THE REYNOLDS GROUP
a California corporation

GROUNDWATER WELL REDEVELOPMENT AND SAMPLING REPORT

1400 Park Avenue
Emeryville, California

JANUARY 31, 2007

TRG Project #7103

Tel 714-730-5397

PO Box 1996, Tustin, California 92781-1996
www.reynolds-group.com

Fax 714-730-6476

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1400 Park Avenue
Emeryville, California

1.0 EXECUTIVE SUMMARY

As specified in our Workplan for Groundwater Re-Development and Sampling, The Reynolds Group (TRG) conducted groundwater monitoring well redevelopment and sampling activities on January 8 and 15, 2007, at the property located at 1400 Park Avenue in Emeryville, California (Site). This report documents these activities and presents the results of the groundwater monitoring. Based on the results presented herein, TRG is also requesting closure of the Site on behalf of Emeryville Properties.

Included with this report are descriptions of TRG's groundwater monitoring and sampling procedures, groundwater elevation data and laboratory results (**Table 1**), a Site Location Map (**Figure 1**), Site Plot Plan With Groundwater Monitoring Results (**Figure 2**), and Site Plot Plan With Groundwater Contours measured on January 15, 2006 (**Figure 3**). Analytical results with chain of custody documentation are included as **Appendix A**, Standard Operating Procedures are attached as **Appendix B**, and field data sheets are attached as **Appendix C**, Registered Survey of Groundwater Monitoring Wells are attached in **Appendix D** and a Site Specific Health and Safety Plan in found in **Appendix E**.

On January 15, 2007, a week after re-developing the onsite groundwater monitoring wells, the three wells (MW-1, MW-2, and MW-4) were sampled by TRG. Samples were analyzed for Lead by EPA Method 200, for total petroleum hydrocarbons (TPH) as Diesel and as Gasoline by EPA Method 8015, and by EPA Method 8260B for benzene, toluene, ethylbenzene and xylenes (BTEX) and methyl tertiary butyl ether (MTBE) and other fuel oxygenates. Groundwater samples collected from each of the three wells had no detected levels of petroleum hydrocarbons, BTEX or fuel oxygenates. Trace levels of total lead, were detected ranging from 0.005 to 0.006 milligrams per liter (mg/L, see **Table 1** and **Figure 2**). These lead detections are well below the State of California Maximum Contamination Levels for Drinking Water (MCLs) of 0.015 mg/L as specified in the Lead and Copper Rule. Thus lead is not considered an impact to the groundwater.

TRG requests that this Site be granted regulatory closure. Based on results of the recent testing, there are no contaminants which present any threat to groundwater at the Site or any of the neighboring sites. The data presented herein demonstrates that there has been no release of hydrocarbons from the former USTs and ASTs at the Site.

2.0 BACKGROUND

The Site, located at 1400 Park Avenue in Emeryville, California (see **Figure 1 – Site Location Map**), formerly housed facilities operated by Chromex and The Charles Lowe Company. A former below grade concrete vault associated with Chromex's activities was removed in 1992. In December 1995, a "No Further Action" letter was issued for the Site by the Alameda County Health Care Services (ACHCS) for the former chromium vault at the Site. In 1995, Aqua Science Engineers (ASE) excavated and removed hydrocarbon contaminated soils beneath the vertical honing pit area. A total of 75 yards of soil was removed during these excavation activities. Also in 1995, ASE removed three 550 gallon steel underground storage tanks (USTs), which at one time contained diesel, motor oil and gasoline. In 1997, ASE successfully abandoned a half buried 700 gallon steel Above-Ground Storage Tank (AST). Three monitoring wells (MW-1, MW-2 and MW-4) were installed between 1994 and 1996 and still exist at the Site.

2.10 Involved Parties

The Reynolds Group was retained by the Site owner to perform the work associated with this project. The Alameda County Health Care Services Agency is the lead agency on this case as represented by Mr. Steven Plunkett.

TRG was responsible for managing this project and overseeing the developing, surveying, and sampling the groundwater monitoring wells, and producing this report. Associated Laboratories of

Orange, California, provided laboratory analytical services for groundwater samples. Associated Laboratories is a California State Certified Laboratory. Gregg Drilling helped with the well redevelopment, Blaine Tech Services assisted in the groundwater sampling, and Morrow Surveying of Sacramento, a liscensed surveyor located all three monitoring wells using a NAD 83 coordinate datum.

3.0 FIELDWORK

3.10 Well Redevelopment

On January 8, 2007, three monitoring wells (MW1, MW2, and MW4) at the Site were re-developed to obtain a representative sample of formation groundwater. The specific field procedures used in the groundwater well development and groundwater sampling are attached in **Appendix B – Standard Operating Procedures**.

Before purging any wells, the depth to groundwater was measured in all wells using a sounder. The depth to water and total depth of each well was recorded on a field data sheet to 0.01 feet accuracy. Development included surging the well screen to remove fines from the filter pack. After surging was completed and the sand content of the bailed water decreased, as determined by another well depth measurement, a submersible pump was used to continue well development. The surge block and submersible were decontaminated with Liquinox and deinozed water in between each well development. The three groundwater monitoring wells had a total of 162 gallons purged, with more than three boring volumes removed per well, to remove fines from the filter pack material. At the completion of well development, all physical parameters (temperature, dissolved oxygen, specific conductivity, pH, turbidity, and oxidation reduction potential) had stabilized (see **Appendix C – Field Data Sheets**). All field generated wastes (development water) were containerized on-Site in 55 gallon drums pending profiling for proper off-Site disposal.

3.20 Well Surveying

Since two of the three wells had been previously surveyed, MW-1, MW-3 and MW-4 were surveyed on January 8, 2007, by a California licensed surveyor, Morrow Surveying (see **Appendix D**). The groundwater well location was measured at the top of the casing and referenced to the elevation relative to mean sea level and latitude and longitude using NAD 83. The casing elevations are shown in **Table 1**. The field data sheets are included in **Appendix D**.

3.30 Groundwater Sampling

Prior to gauging and sampling activities on January 15, 2007, an equipment cleaning station was set up that consisted of a wash bucket and two rinse buckets. The wash bucket was filled with tap water and mixed with Liquinox cleaning solution. The first rinse bucket was filled with tap water and the second rinse bucket contained deionized water. The well sounder, pump and discharge hose were all cleaned, flushed and rinsed prior to their initial use on site and between each subsequent use.

Before purging any wells, the depth to groundwater was measured in all wells using a sounder. The depth to water and total depth of each well was recorded on a field data sheet to 0.01 feet accuracy. All wells were sampled using the (low-flow) sampling method shown in Appendix D. A 2" Grundfos Pump with tubing (separate tubing used for each well), attached to a Flow Cell, was used to purge, read, and collect groundwater samples. The pump was placed two feet above the total depth of the wells. The purge rate was one gallon per minute and the total purge volume per well varied from 17 to 27 gallons.

During purging, temperature, pH, conductivity, dissolved oxygen and turbidity were measured and recorded on the field data sheets. Purging continued until the monitored purge water characteristics stabilized. Approximately 68 gallons of purge water was generated during this groundwater

monitoring event. Purge and decontamination water was deposited into 55-gallon drums and stored on site pending profiling for proper offsite disposal.

Groundwater samples were collected directly from the submersible pump's tubing prior to the flow cell. Each water sample was collected into 5 vials (voas) preserved with hydrochloric acid, a 1 Liter Amber bottle (unpreserved), and one 250 mL plastic bottle (unpreserved). The sample containers we filled to avoid headspace and bubbles. The filled sample containers were labeled, placed in an ice-cooled chest, and transported following proper chain-of-custody procedures to Associated Laboratories.

3.40 Groundwater Gradient

Prior to purging and sampling on January 15, 2007, the depth to groundwater in each well was measured from the top of each well casing using an EnviroSupply and Service Inc. Interface Meter Model H. Oil. The groundwater flow direction and slope were calculated by determining the elevation of groundwater in each well relative to surveyed top-of-casing elevations (top of casing minus depth to water). These data are summarized in Table 1. The location and elevation of each well was professionally surveyed by Morrow Surveying Land Surveyors (see Appendix D).

Groundwater gauging during this event was performed in January 15, 2007. The groundwater flow direction was shown to be from the north northeast to the south southwest direction at 0.67 ft. per foot. Groundwater elevation contours for January 2007 are shown on the attached **Figure 3**.

4.0 LABORATORY ANALYSES & RESULTS

All samples were analyzed for TPH as gasoline and diesel by EPA Method 8015, for BTEX, MTBE and other fuel oxygenates by EPA Method 8260B, and for lead by EPA Method 200. The laboratory reports and chain-of-custodies are included as **Appendix A.**

Groundwater samples were collected from a total of three of the monitoring wells (MW1, MW-2, and MW-4). Groundwater samples from each of the three wells had no detected hydrocarbons or VOCs, including gasoline (<50 ug/L), diesel(<0.1 mg/L), benzene (<1 ug/L), toluene (<5 ug/L), ethylbenzene (<5 ug/L), xylenes (<5 ug/L), MTBE (<1 ug/L), di-isopropylether (<1 ug/L), ethyl-tertbutylether (<1 ug/L), tert-amylmethylether (<1 ug/L), and tertiary butyl alcohol (<10 ug/L). Trace concentrations of lead were detected in the three monitoring wells ranging from 0.005 to 0.006 mg/L. When compared to the California State Action Level of 0.015 mg/L, as specified in the Lead and Copper Rule, the concentrations of lead are not considered hazardous.

5.0 CONCLUSIONS

Based on the results of this current investigation, closure should be granted at the Site given that:

(1) No evidence of any release of hydrocarbons to the groundwater from the former on-site USTs and AST was found in this investigation. The data presented herein shows no detections of gasoline, diesel, BTEX, MTBE or other oxygenates in the groundwater samples collected at the Site;

(2) Trace levels of Total Lead were found, ranging from 0.005 to 0.006 mg/L0.006 mg/L. These lead detections are well below the State of California Maximum Contamination Levels for Drinking Water (MCLs) of 0.015 mg/L as specified in the Lead and Copper Rule. Thus lead is not considered an impact to the groundwater.

6.0 RECOMMENDATIONS

TRG recommends that the Alameda County Health Care Agency grant closure to the Site located at 13702 Ventura Boulevard based on the information provided herein.

If you have any questions or concerns pertaining to the Closure Request, I can be reached directly at (949)378-8448.

Thank you for your consideration of this matter.

Sincerely,
THE REYNOLDS GROUP
a California corporation by:

Gwen Tellegen, P.E.
Project Manager

TABLES

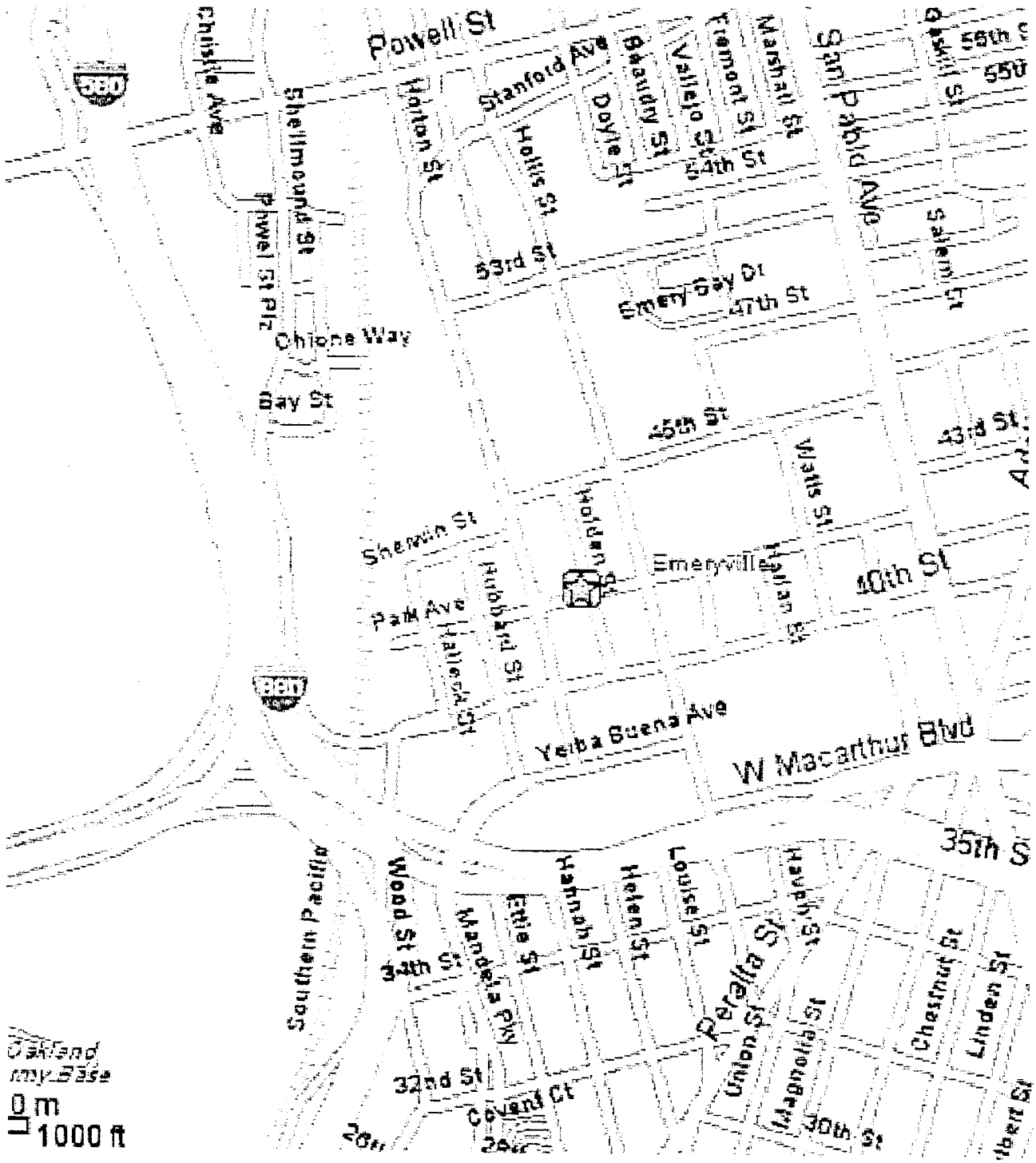
TABLE 1
Groundwater Elevation Data and Sample Results

Emeryville Properties
1400 Main St.
Emeryville, CA

Well ID	Date	Casing Elevation (ft)	Water Elevation (ft)	Depth to Water (ft)	EPA 8015 mg/L	EPA 8015B ug/L	200.7 Lead In H20 mg/L	EPA 8015B ug/L	EPA 8260B ug/L							
					TEPH Diesel	Gasoline	Lead	Benzene	Toluene	Ethylbenzene	Xylene	DIPE	ETBE	TAME	TBA	MTBE
MW-1 (Dup MW-X)	1/15/2007	19.17	10.94	8.23	<0.1	<50	0.006	<1	<5	<5	<5	<1	<1	<1	<10	<1
MW-2	1/15/2007	16.43	10.78	5.65	<0.1	<50	0.005	<1	<5	<5	<5	<1	<1	<1	<10	<1
MW-4	1/15/2007	14.6	10.28	4.32	<0.1	<50	0.006	<1	<5	<5	<5	<1	<1	<1	<10	<1
MW-X	1/15/2007	19.17	10.94	8.23	<0.1	<50	0.006	<1	<5	<5	<5	<1	<1	<1	<10	<1
Maximum Contamination Levels for Drinking Water (MCL)					na	na	0.015*	1	150	300	1750	na	na	na	na	5**

na = not available
* = Copper and Lead Rule
** = Secondary MCL

FIGURES



Adapted from Yahoo Maps.com

Project No: 7103		SITE LOCATION MAP
Date: January 2006		
1400 Park Avenue Emeryville, CA		FIGURE 1

WELL ID	SAMPLE DATE	EPA 8015B (ug/L)	EPA 8015 (ug/L)	200.7 Lead (mg/L)	EPA 8260B (ug/L)								
		Gasoline	Diesel	Lead	B	T	E	X	MTBE	TBA	DIPE	ETBE	TAME
MW-1	1/15/2007	<50	<0.1	0.006	<1	<5	<5	<5	<1	<10	<1	<1	<1

WELL ID	SAMPLE DATE	EPA 8015B (ug/L)	EPA 8015 (ug/L)	200.7 Lead (mg/L)	EPA 8260B (ug/L)								
		Gasoline	Diesel	Lead	B	T	E	X	MTBE	TBA	DIPE	ETBE	TAME
MW-2	1/15/2007	<50	<0.1	0.005	<1	<5	<5	<5	<1	<10	<1	<1	<1

WELL ID	SAMPLE DATE	EPA 8015B (ug/L)	EPA 8015 (ug/L)	200.7 Lead (mg/L)	EPA 8260B (ug/L)								
		Gasoline	Diesel	Lead	B	T	E	X	MTBE	TBA	DIPE	ETBE	TAME
MW-4	1/15/2007	<50	<0.1	0.006	<1	<5	<5	<5	<1	<10	<1	<1	<1

Note: Monitoring well locations are approximate
See Appendix E for actual surveyed locations

Legend:

MW-4 - Groundwater Monitoring Well

NOTE:
B = Benzene
T = Toluene
E = Ethylbenzene
X =Xylenes
MTBE = Methyl Tertiary Butyl Ether
# = Below Laboratory Reporting Limit

DIPE = Di-isopropyl-ether
ETBE = Ethyl tertiary butyl ether
TAME = Tertiary amyl methyl ether
TBA = Tertiary butyl alcohol

THE REYNOLDS GROUP ENVIRONMENTAL SERVICES

Site Name: Emeryville Properties
1400 Park Avenue, Emeryville, CA

SITE PLOT PLAN WITH GROUNDWATER MONITORING WELL RESULTS

Prepared By: The Reynolds Group

Project No: 7103

Date: January 2007

FIGURE 2

NOTE: Monitoring well locations are approximate. See Appendix E for actual survey locations.

Legend:

MW-4 - Groundwater Monitoring Well

10.xx - Groundwater Elevation Contour

THE REYNOLDS GROUP ENVIRONMENTAL SERVICES

Site Name: Emeryville Properties
1400 Park Avenue, Emeryville, CA

SITE PLOT PLAN WITH GROUNDWATER ELEVATION CONTOURS

Prepared By: The Reynolds Group

Project No: 7103

Date: January 2007

FIGURE 3

APPENDIX A

Laboratory Analytical Results

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868 - 714/771-6900

FAX 714/538-1209

CLIENT The Reynolds Group (6428)
ATTN: Gwen Tellegan
100 E. San Marcos Blvd. # 400
San Marcos, CA 92069

LAB REQUEST 183068
REPORTED 01/24/2007
RECEIVED 01/10/2007

PROJECT #7163
Emeryville Props LLC

SUBMITTER Client

COMMENTS

This laboratory request covers the following listed samples which were analyzed for the parameters indicated on the attached Analytical Result Report. All analyses were conducted using the appropriate methods as indicated on the report. This cover letter is an integral part of the final report.

Order No.	Client Sample Identification
769936	MW-2
769937	MW-1
769938	MW-X
769939	TB
769940	FB
769941	MW-4
769942	Laboratory Method Blank

Thank you for the opportunity to be of service to your company. Please feel free to call if there are any questions regarding this report or if we can be of further service.

ASSOCIATED LABORATORIES by,

Edward S. Behare, Ph.D.
Vice President

NOTE: Unless notified in writing, all samples will be discarded by appropriate disposal protocol 30 days from date reported.

TESTING & CONSULTING
Chemical
Microbiological
Environmental

Order #: 769936
Matrix: WATER
Date Sampled: 01/15/2007
Time Sampled: 09:10
Sampled By:

Client: The Reynolds Group
Client Sample ID: MW-2

Analyte	Result	DF	DLR	Units	Date/Analyst
200.7 Lead in water by ICP					
Lead	0.005	1	0.005	mg/L	01/17/07 NVR
8015 TEPH Diesel					
TEPH Diesel	ND	1	0.1	mg/L	01/17/07 AF
Surrogates				**Units**	**Control Limits**
o-Terphenyl (sur)	120			%	55 - 200
8260B BTEX/MTBE Only					
Benzene	ND	1	1	ug/L	01/20/07 RP
Ethyl benzene	ND	1	5	ug/L	01/20/07 RP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/20/07 RP
Toluene	ND	1	5	ug/L	01/20/07 RP
Xylenes, total	ND	1	5	ug/L	01/20/07 RP
Di-isopropyl ether (DIPE)	ND	1	1	ug/L	01/20/07 RP
Ethyl-tertbutylether (ETBE)	ND	1	1	ug/L	01/20/07 RP
Tert-amylmethylether (TAME)	ND	1	1	ug/L	01/20/07 RP
Tertiary butyl alcohol (TBA)	ND	1	10	ug/L	01/20/07 RP
Surrogates				**Units**	**Control Limits**
Surr1 - Dibromofluoromethane	90			%	70 - 130
Surr2 - 1,2-Dichloroethane-d4	106			%	70 - 130
Surr3 - Toluene-d8	100			%	70 - 130
Surr4 - p-Bromofluorobenzene	107			%	70 - 130
8015B - Gasoline					
Gasoline	ND	1	50	ug/L	01/17/07 LD
Surrogates				**Units**	**Control Limits**
a,a,a-Trifluorotoluene	81			%	55 - 200

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 769937 **Client:** The Reynolds Group
Matrix: WATER **Client Sample ID:** MW-1
Date Sampled: 01/15/2007
Time Sampled: 10:00
Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
200.7 Lead in water by ICP					
Lead	0.006	1	0.005	mg/L	01/17/07 NVK
8015 TEPH Diesel					
TEPH Diesel	ND	1	0.1	mg/L	01/17/07 AF
Surrogates				**Units**	**Control Limits**
o-Terphenyl (sur)	110			%	55 - 200
8260B BTEX/MTBE Only					
Benzene	ND	1	1	ug/L	01/20/07 RP
Ethyl benzene	ND	1	5	ug/L	01/20/07 RP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/20/07 RP
Toluene	ND	1	5	ug/L	01/20/07 RP
Xylenes, total	ND	1	5	ug/L	01/20/07 RP
Di-isopropyl ether (DIPE)	ND	1	1	ug/L	01/20/07 RP
Ethyl-tertbutylether (ETBE)	ND	1	1	ug/L	01/20/07 RP
Tert-amylmethylether (TAME)	ND	1	1	ug/L	01/20/07 RP
Tertiary butyl alcohol (TBA)	ND	1	10	ug/L	01/20/07 RP
Surrogates				**Units**	**Control Limits**
Surr1 - Dibromofluoromethane	90			%	70 - 130
Surr2 - 1,2-Dichloroethane-d4	106			%	70 - 130
Surr3 - Toluene-d8	104			%	70 - 130
Surr4 - p-Bromofluorobenzene	105			%	70 - 130
8015B - Gasoline					
Gasoline	ND	1	50	ug/L	01/17/07 LD
Surrogates				**Units**	**Control Limits**
a,a,a-Trifluorotoluene	59			%	55 - 200

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 769938
Matrix: WATER
Date Sampled: 01/15/2007
Time Sampled: 10:02
Sampled By:

Client: The Reynolds Group
Client Sample ID: MW-X

Analyte	Result	DF	DLR	Units	Date/Analyst
200.7 Lead in water by ICP					
Lead	0.006	1	0.005	mg/L	01/17/07 NVK
8015 TEPH Diesel					
TEPH Diesel	ND	1	0.1	mg/L	01/17/07 AF
Surrogates				**Units**	**Control Limits**
o-Terphenyl (sur)	115			%	55 - 200
8260B BTEX/MTBE Only					
Benzene	ND	1	1	ug/L	01/20/07 RP
Ethyl benzene	ND	1	5	ug/L	01/20/07 RP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/20/07 RP
Toluene	ND	1	5	ug/L	01/20/07 RP
Xylenes, total	ND	1	5	ug/L	01/20/07 RP
Di-isopropyl ether (DIPE)	ND	1	1	ug/L	01/20/07 RP
Ethyl-tertbutylether (ETBE)	ND	1	1	ug/L	01/20/07 RP
Tert-amylmethylether (TAME)	ND	1	1	ug/L	01/20/07 RP
Tertiary butyl alcohol (TBA)	ND	1	10	ug/L	01/20/07 RP
Surrogates				**Units**	**Control Limits**
Surr1 - Dibromofluoromethane	89			%	70 - 130
Surr2 - 1,2-Dichloroethane-d4	105			%	70 - 130
Surr3 - Toluene-d8	102			%	70 - 130
Surr4 - p-Bromofluorobenzene	105			%	70 - 130
8015B - Gasoline					
Gasoline	ND	1	50	ug/L	01/17/07 LD
Surrogates				**Units**	**Control Limits**
a,a,a-Trifluorotoluene	61			%	55 - 200

DLR = Detection limit for reporting purposes. ND = Not Detected below indicated detection limit. DF = Dilution Factor

Order #: 769939
Matrix: WATER
Date Sampled: 01/15/2007
Time Sampled: 10:30
Sampled By:

Client: The Reynolds Group
Client Sample ID: TB

Analyte	Result	DF	DLR	Units	Date/Analyst
8260B BTEX/MTBE Only					
Benzene	ND	1	1	ug/L	01/20/07 RP
Ethyl benzene	ND	1	5	ug/L	01/20/07 RP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/20/07 RP
Toluene	ND	1	5	ug/L	01/20/07 RP
Xylenes, total	ND	1	5	ug/L	01/20/07 RP
Di-isopropyl ether (DIPE)	ND	1	1	ug/L	01/20/07 RP
Ethyl-tertbutylether (ETBE)	ND	1	1	ug/L	01/20/07 RP
Tert-amylmethylether (TAME)	ND	1	1	ug/L	01/20/07 RP
Tertiary butyl alcohol (TBA)	ND	1	10	ug/L	01/20/07 RP
Surrogates				**Units**	**Control Limits**
Surr1 - Dibromofluoromethane	91			%	70 - 130
Surr2 - 1,2-Dichloroethane-d4	107			%	70 - 130
Surr3 - Toluene-d8	102			%	70 - 130
Surr4 - p-Bromofluorobenzene	104			%	70 - 130
8015B - Gasoline					
Gasoline	ND	1	50	ug/L	01/17/07 LD
Surrogates				**Units**	**Control Limits**
a,a,a-Trifluorotoluene	88			%	55 - 200

DLR = Detection limit for reporting purposes. ND - Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 769940 **Client:** The Reynolds Group
Matrix: WATER **Client Sample ID:** FB
Date Sampled: 01/15/2007
Time Sampled: 10:25
Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
200.7 Lead in water by ICP					
Lead	ND	1	0.005	mg/L	01/17/07 NVK
8015 TEPH Diesel					
TEPH Diesel	ND	1	0.1	mg/L	01/17/07 AF
Surrogates				**Units**	**Control Limits**
o-Terphenyl (sur)	100			%	55 - 200
8260B BTEX/MTBE Only					
Benzene	ND	1	1	ug/L	01/20/07 RP
Ethyl benzene	ND	1	5	ug/L	01/20/07 RP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/20/07 RP
Toluene	ND	1	5	ug/L	01/20/07 RP
Xylenes, total	ND	1	5	ug/L	01/20/07 RP
Di-isopropyl ether (DIPE)	ND	1	1	ug/L	01/20/07 RP
Ethyl-tertbutylether (ETBE)	ND	1	1	ug/L	01/20/07 RP
Tert-amylmethylether (TAME)	ND	1	1	ug/L	01/20/07 RP
Tertiary butyl alcohol (TBA)	ND	1	10	ug/L	01/20/07 RP
Surrogates				**Units**	**Control Limits**
Surr1 - Dibromofluoromethane	87			%	70 - 130
Surr2 - 1,2-Dichloroethane-d4	102			%	70 - 130
Surr3 - Toluene-d8	100			%	70 - 130
Surr4 - p-Bromofluorobenzene	107			%	70 - 130
8015B - Gasoline					
Gasoline	ND	1	50	ug/L	01/18/07 LD
Surrogates				**Units**	**Control Limits**
a,a,a-Trifluorotoluene	94			%	55 - 200

DLR = Detection limit for reporting purposes, ND = Not Detected below indicated detection limit, DF = Dilution Factor

Order #: 769941 **Client:** The Reynolds Group
Matrix: WATER **Client Sample ID:** MW-4
Date Sampled: 01/15/2007
Time Sampled: 10:55
Sampled By:

Analyte	Result	DF	DLR	Units	Date/Analyst
200.7 Lead in water by ICP					
Lead	0.006	1	0.005	mg/L	01/17/07 NVK
8015 TEPH Diesel					
TEPH Diesel	ND	1	0.1	mg/L	01/17/07 AF
Surrogates				**Units**	**Control Limits**
o-Terphenyl (sur)	135			%	55 - 200
8260B BTEX/MTBE Only					
Benzene	ND	1	1	ug/L	01/20/07 RP
Ethyl benzene	ND	1	5	ug/L	01/20/07 RP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/20/07 RP
Toluene	ND	1	5	ug/L	01/20/07 RP
Xylenes, total	ND	1	5	ug/L	01/20/07 RP
Di-isopropyl ether (DIPE)	ND	1	1	ug/L	01/20/07 RP
Ethyl-tertbutylether (ETBE)	ND	1	1	ug/L	01/20/07 RP
Tert-amylmethylether (TAME)	ND	1	1	ug/L	01/20/07 RP
Tertiary butyl alcohol (TBA)	ND	1	10	ug/L	01/20/07 RP
Surrogates				**Units**	**Control Limits**
Surr1 - Dibromofluoromethane	90			%	70 - 130
Surr2 - 1,2-Dichloroethane-d4	108			%	70 - 130
Surr3 - Toluene-d8	102			%	70 - 130
Surr4 - p-Bromofluorobenzene	105			%	70 - 130
8015B - Gasoline					
Gasoline	ND	1	50	ug/L	01/18/07 LD
Surrogates				**Units**	**Control Limits**
a,a,a-Trifluorotoluene	192			%	55 - 200

DLR = Detection limit for reporting purposes. ND = Not Detected below indicated detection limit. DF = Dilution Factor

Order #: 769942
Matrix: WATER
Date Sampled:
Time Sampled:
Sampled By:

Client: The Reynolds Group
Client Sample ID: Laboratory Method Blank

Analyte	Result	DF	DLR	Units	Date/Analyst
200.7 Lead in water by ICP					
Lead	ND	1	0.005	mg/L	01/17/07 NVK
8015 TEPH Diesel					
TEPH Diesel	ND	1	0.1	mg/L	01/17/07 AF
Surrogates				**Units**	**Control Limits**
o-Terphenyl (sur)	130			%	55 - 200
8260B BTEX/MTBE Only					
Benzene	ND	1	1	ug/L	01/20/07 RP
Ethyl benzene	ND	1	5	ug/L	01/20/07 RP
Methyl-tert-butylether (MTBE)	ND	1	1	ug/L	01/20/07 RP
Toluene	ND	1	5	ug/L	01/20/07 RP
Xylenes, total	ND	1	5	ug/L	01/20/07 RP
Di-isopropyl ether (DIPE)	ND	1	1	ug/L	01/20/07 RP
Ethyl-tertbutylether (ETBE)	ND	1	1	ug/L	01/20/07 RP
Tert-amylmethylether (TAME)	ND	1	1	ug/L	01/20/07 RP
Tertiary butyl alcohol (TBA)	ND	1	10	ug/L	01/20/07 RP
Surrogates				**Units**	**Control Limits**
Surr1 - Dibromofluoromethane	89			%	70 - 130
Surr2 - 1,2-Dichloroethane-d4	104			%	70 - 130
Surr3 - Toluene-d8	102			%	70 - 130
Surr4 - p-Bromofluorobenzene	107			%	70 - 130
8015B - Gasoline					
Gasoline	ND	1	50	ug/L	01/17/07 LD
Surrogates				**Units**	**Control Limits**
a,a,a-Trifluorotoluene	93			%	55 - 200

DLR = Detection limit for reporting purposes. ND = Not Detected below indicated detection limit. DF = Dilution Factor

ASSOCIATED LABORATORIES
QA REPORT FORM - METHOD 200.7 / 6010

QC Sample: 183069-769945 H# 011707 W1

Matrix: WATER

Prep. Date: January 17, 2007

Analysis Date: January 17, 2007

Lab ID#'s in Batch: 183069, 183087, 183106, 183108, 183065, 183068, 183078, 183155

Reporting Units ~ mg/L

MATRIX SPIKE / MATRIX SPIKE DUPLICATE RESULT

Test	Sample Result	Spike Added	Matrix Spike	Matrix Spike Dup	%Rec MS	%Rec MSD	% RPD
As	0.027	1	0.96	0.95	93	92	1
Se	0.108	1	1.00	0.99	89	88	1
Tl *	ND	1	0.54	0.55	54	55	2
Pb	0.005	1	0.90	0.89	90	89	1
Sb	ND	1	1.09	1.08	109	108	1
Ba	0.079	1	1.01	1.06	93	98	5
Be	ND	1	1.01	1.02	101	102	1
Cd	ND	1	0.94	0.98	94	98	4
Cr	0.009	1	0.93	0.96	92	95	3
Co	ND	1	0.89	0.92	89	92	3
Cu	0.014	1	0.90	0.95	89	94	5
Mo	0.026	1	1.03	1.04	100	101	1
Ni	ND	1	0.87	0.89	87	89	2
Ag *	ND	1	0.35	0.35	70	70	0
V	ND	1	0.94	0.99	94	99	5
Zn	0.247	1	1.13	1.18	88	93	4
Al	0.011	1	0.86	0.89	85	88	3
Mn	ND	1	0.89	0.92	89	92	3
B	0.219	1	1.12	1.17	90	95	4
Fe *	0.654	1	1.00	1.23	35	58	21
Sr	0.676	10	11.70	11.80	110	111	1
Ti *	ND	10	17.00	16.90	170	169	1
Ca	153.000	10	171.00	170.00	NC	NC	1
Mg	45.000	10	50.40	51.10	NC	NC	1
K	3.080	10	14.00	14.30	109	112	2
Na	90.100	10	106.00	105.00	NC	NC	1

* = Outside QC limits, due to matrix interference
If Sample Result > 4 times Spike Added, then "NC"

% REC LIMITS – 75 -125
RPD LIMITS – 20

ASSOCIATED LABORATORIES
LCS REPORT FORM - METHOD 200.7 / 6010

LCS RECOVERY / METHOD BLANK

Test	LCS Result	True Value	LCS %Rec	QC Limit %REC	MB Limit	MB Result
Ag	0.97	1	97	80-120	0.005	ND
Al	2.17	2	109	80-120	0.030	ND
As	2.05	2	103	80-120	0.005	ND
B	2.23	2	112	80-120	0.050	ND
Ba	2.10	2	105	80-120	0.010	ND
Be	2.05	2	103	80-120	0.005	ND
Cd	2.06	2	103	80-120	0.005	ND
Co	2.04	2	102	80-120	0.005	ND
Cr	2.02	2	101	80-120	0.010	ND
Cu	1.94	2	97	80-120	0.010	ND
Fe	2.02	2	101	80-120	0.029	
Mn	2.05	2	103	80-120	0.010	ND
Mo	2.07	2	104	80-120	0.010	ND
Ni	2.03	2	102	80-120	0.015	ND
Pb	2.08	2	104	80-120	0.005	ND
Sb	2.34	2	117	80-120	0.006	ND
Se	2.03	2	102	80-120	0.006	ND
Tl	2.03	2	102	80-120	0.005	ND
V	2.02	2	101	80-120	0.005	ND
Zn	2.08	2	104	80-120	0.010	ND
Sr	1.90	2	95	80-120	0.010	ND
Ti	2.03	2	102	80-120	0.010	ND
Ca	105.00	100	105	80-120	0.100	ND
Mg	103.00	100	103	80-120	0.100	ND
K	104.00	100	104	80-120	0.500	ND
Na	107.00	100	107	80-120	0.100	ND

ASSOCIATED LABORATORIES
LCS REPORT FORM

QC Sample: LCS/LCSD

Matrix: WATER

Extraction Method : 3510C

Prep. Date: January 17, 2007

Analysis Date January 17, 2007

Lab ID#'s in Batch: 183055, 183068

LAB CONTROLLED SPIKE / LAB CONTROLLED DUPLICATE RESULT

Reporting Units = mg/L

Test	Method	Method Blank	Spike Added	LCS Spike	LCSD Spk. Dup	%Rec LCS	%Rec LCSD	RPD
DIESEL	8015D	ND	1	0.78	0.97	78	97	22

ND = Not Detected
LCS Result = Lab Control Sample Result
%REC-LCS & LCSD = Percent Recovery of LCS Spike & LCS Spike Duplicate
RPD = Relative Percent Difference of LCS Spike and LCS Spike Duplicate

%REC LIMITS - 70 - 130
RPD LIMITS = 30

SURROGATE RECOVERY

Sample No.	O-Terphenyl
QC Limit	55-200
Method Blank	130
LCS	150
LCSD	190

ASSOCIATED LABORATORIES
LCS REPORT FORM

QC Sample: G15-LCS&LCSD

Matrix: WATER

Prep. Date: January 17, 2007

Analysis Date January 17, 2007

Lab ID#'s in Batch: 183183, 183155, 183068, 183055, 182936

LAB CONTROLLED SPIKE / LAB CONTROLLED DUPLICATE RESULT

Reporting Units = µg/L

Test	Method	Method Blank	Spike Added	LCS Spike	LCSD Spk. Dup	%Rec LCS	%Rec LCSD	RPD
TPH	8015M-G	ND	500	425	415	85	83	2

ND = Not Detected
LCS Result = Lab Control Sample Result
%REC-LCS & LCSD = Percent Recovery of LCS Spike & LCS Spike Duplicate
RPD = Relative Percent Difference of LCS Spike and LCS Spike Duplicate

%REC LIMITS - 70 - 130
RPD LIMITS = 30

SURROGATE RECOVERY

Sample No.	AAA-TFT
QC Limit	55-200
Method Blank	93
LCS	140
LCSD	129

AAA-TFT = a,a,a-Trifluorotoluene

ASSOCIATED LABORATORIES
LCS REPORT FORM

QC Sample: G2-LCS&LCSD

Matrix: WATER

Prep. Date: January 17, 2007

Analysis Date January 17, 2007

Lab ID#'s in Batch: 183138, 183120, 183068, 183123,

LAB CONTROLLED SPIKE / LAB CONTROLLED DUPLICATE RESULT

Reporting Units = µg/L

Test	Method	Method Blank	Spike Added	LCS Spike	LCSD Spk. Dup	%Rec LCS	%Rec LCSD	RPD
TPH	8015M-G	ND	500	463	469	93	94	1

ND = Not Detected
LCS Result = Lab Control Sample Result
%REC-LCS & LCSD = Percent Recovery of LCS Spike & LCS Spike Duplicate
RPD = Relative Percent Difference of LCS Spike and LCS Spike Duplicate

%REC LIMITS = 70 - 130
RPD LIMITS = 30

SURROGATE RECOVERY

Sample No.	AAA-TFT
QC Limit	55-200
Method Blank	110
LCS	100
LCSD	117

AAA-TFT = a,a,a-Trifluorotoluene

ASSOCIATED LABORATORIES
806 North Batavia – Orange, California 92868 – 714-771-6900 *FAX 714-538-1209*

SAMPLE ACCEPTANCE CHECKLIST

Section 1
Client: The Reynolds Project: _____
Date Received: 1/16/07
Sample(s) received in cooler: (Yes) No (Skip Section 2)

Section 2
Was the cooler packed with: ✓ Ice ___ Ice Packs ___ Bubble Wrap ___ Styrofoam
___ Paper ___ None ___ Other _____
Cooler or box temperature: 3.2°C

(Acceptance range is 2 to 6 Deg. C.)

Section 3	YES	NO	N/A
Was a COC received?			✓
Were custody seals present?	✓		
If Yes – were they intact?	✓		
Were all samples sealed in plastic bags?	✓		
Did all samples arrive intact? If no, indicate below.	✓		
Did all bottle labels agree with COC? (ID, dates and times)	✓		
Were correct containers used for the tests required?		✓	
Was a sufficient amount of sample sent for tests indicated?	✓	✓	
No head space in VOA vials?	✓		
Were the correct preservatives used?			✓
Were the samples scanned for presence of radioactivity?			✓
Was total residual chlorine measured (Fish Bioassay samples only)? *			

Not enough Diesel ID: FB

*: If the answer is no, please inform Fish Bioassay Dept. immediately.

Section 4
Explanations/Comments

Section 5
Was Project Manager notified of discrepancies: Y / N (N/A)

Completed By: _____ Date: 1/16/07

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868
714/771-6900 FAX 714/538-1209

CHAIN OF CUSTODY RECORD

Date 1/15/07 Page 2 of 2

Assigned LR# 18306

CLIENT: The Reynolds Group

ADDRESS: 100 E San Marcos Blvd #400 San Marcos CA 92069

Is this the address the final report is to be sent to? Yes X No ___
If "No" list mailing address in "Special Instructions" section at the bottom of this Chain of Custody.

CONTACT PERSON: Gwen Tellegen

SAMPLED BY (Circle One): (Client) Assoc. Lab Personnel

PROJECT IDENTIFICATION/LOCATION: Emeryville Properties LLC

PURCHASE ORDER #: 7124

SAMPLER: (Print AND Sign) Gwen Tellegen

PHONE #: (949) 728-8448

FAX #: (949) 760 510-2377

SAMPLE TURNAROUND TIME:

Requested Turnaround Time (CIRCLE ONE)*
Priority Charges Apply to Rush Turn Around Times
RUSH: Same Day 24 Hr 48 Hr 72 Hr
(STANDARD) Standard TAT **(5 to 10 Working Days)
Other

* Availability of Same Day/24/48/72 Hr TAT Varies Based Upon Test Method Requirements.
**Standard TAT Varies According to Analyses.

SAMPLE CONDITION INFO - *FOR LAB USE ONLY:*
Samples Intact: Yes ✓ No ___
Sample Seals Intact: Yes ___ No ___ N/A ✓
Cooler Seals Intact: Yes ___ No ___ N/A ✓

	SAMPLE ID	SAMPLE OR LOCATION DESCRIPTION	DATE	TIME	MATRIX (See Codes Below)	# OF CONTAINERS	TEST REQUIRED
1	TB	Trip Blank	1/15/07	1030	W	2 VOAs	8260 BTEX oxygenates 8015 gas
2	FB	Field Blank	1/15/07	1025	W	5 VOAs	8260 BTEX oxygenates Gas
3	FB	Field Blank	1/15/07	1025	W	1-Lite Amber	8015 Diesel
4	FB	Field Blank	1/15/07	1025	W	1 250ml plastic	Total Lead
5	MW-1	Emeryville Monitoring Well #4	1/15/07	1055	GW	1-LAmber	8015 Diesel
6	MW-1 (MW-4)	↓ ↓ Well #4	1/15/07	1055	GW	1 250ml plastic	Total Lead
7	MW-1 (MW-4)	↓ ↓ Well #4	1/15/07	1055	GW	5-VOAs	8260 BTEX oxygenates 8015 gas
8							
9							
10							

MATRIX: GW=Ground Water DW=Drinking Water WW=Waste Water SW=Storm Water S=Solid/Soil A=Air L=Liquid F=Food (Use the codes shown here to identify the matrix above)

Relinquished by: (Print AND Sign)*** Gwen Tellegen	Received By: (Print AND Sign) Juan Montano 1040	Date/Time 1/15/07 5PM	Special Instructions:
Relinquished by: (Print AND Sign)***	Received By: (Print AND Sign)	Date Time:	
Relinquished by: (Print AND Sign)***	Received by Lab for Analysis: (Print AND Sign)	Date Time	

***By signing this Chain of Custody you are authorizing the analyses shown above. (Print AND Sign)

COC DISTRIBUTION: White with report. Yellow to AL Pink to Client's Courier.

ASSOCIATED LABORATORIES
806 North Batavia - Orange, California 92868
714/771-6900 FAX 714/538-1209

CHAIN OF CUSTODY RECORD

Date 1/15/07 Page 1 of 2

Assigned LR# 183068

CLIENT: The Reynolds Group

ADDRESS: 100 E San Marcos Blvd #400
San Marcos CA 92069

Is this the address the final report is to be sent to? Yes X No ___
If "No" list mailing address in "Special Instructions" section at the bottom of this Chain of Custody.

CONTACT PERSON: Gwen Tellega

SAMPLED BY (Circle One): (Client) Assoc. Lab Personnel

PROJECT IDENTIFICATION/LOCATION: EMERYVILLE PROPS LLC

~~PURCHASE~~ Proj ORDER #: 71163

SAMPLER: (Print AND Sign) Gwen Tellega

PHONE #: (949) 378-8448

FAX #: (760) 510-2377

SAMPLE TURNAROUND TIME:

Requested Turnaround Time (CIRCLE ONE)*
Priority Charges Apply to Rush Turn Around Times
RUSH: ~~Same Day~~ 24 Hr 48 Hr 72 Hr
STANDARD: Standard TAT **(5 to 10 Working Days)
Other ___
* Availability of Same Day/24/48/72 Hr TAT Varies Based Upon Test Method Requirements.
**Standard TAT Varies According to Analyses.

SAMPLE CONDITION INFO (FOR LAB USE ONLY):
Samples Intact: Yes ✓ No ___
Sample Seals Intact: Yes ___ No ___ N/A ✓
Cooler Seals Intact: Yes ___ No ___ N/A ✓

	SAMPLE ID	SAMPLE OR LOCATION DESCRIPTION	DATE	TIME	MATRIX (See Codes Below)	# OF CONTAINERS	TEST REQUIRED
1	MW-2	Emeryville Monitoring Well 2	1/15/07	9:10 am	GW	1-L-amber	8015 Diesel
2	MW-2	" "	1/15/07	9:10 am	GW	1-250mL plastic	Total Lead
3	MW-2	" "	1/15/07	9:10 am	GW	5-VOAs	8260 BTEX Oxygenates only 8015 Gasoline
4	MW-1	Emeryville Monitoring Well 1	1/15/07	10:00 am	GW	1-L Amber	8015 Diesel
5	MW-1	" Monitoring Well 1	1/15/07	10:00	GW	1-250mL plastic	Total Lead
6	MW-1	" "	1/15/07	10:00	GW	5-VOAs	8260 BTEX Oxygenate 8015 Gasoline
7	MW-X	Emeryville Monitoring Well X	1/15/07	10:02	GW	1-L amber	8015 Diesel
8	MW-X	" "	1/15/07	10:02	GW	1-250mL plastic	Total Lead
9	MW-X	" "	1/15/07	10:02	GW	5-VOAs	8260 BTEX Oxygenate 8015 Gasoline
10	next page						

MATRIX: GW=Ground Water DW=Drinking Water WW=Waste Water SW=Storm Water S=Solid/Soil A=Air L=Liquid F=Food (Use the codes shown here to identify the matrix above

Relinquished by: (Print AND Sign)***	Received By: (Print AND Sign)	Date/Time
Gwen Tellega	Juan Montoya	1/16/07 10:10
Relinquished by: (Print AND Sign)	Received By: (Print AND Sign)	Date/Time:
Relinquished by: (Print AND Sign)**	Received by Lab for Analysis (Print AND Sign)	Date/Time:

***By signing this Chain of Custody you are authorizing the analyses shown above. (Print AND Sign)

Special Instructions:

COC DISTRIBUTION: White with report Yellow to AL Pink to Client's Courier

1-16-07 11:25

ASSOCIATED LABORATORIES

QA / QC EPA Methods 8260 - GCMS # 3

Sample ID: *MS/MSD Water Sample* 183068-936
Date Prepared: January 19, 2007
Date Analyzed: January 21, 2007
Sample Matrix: Water
Units: µg/L

Lab ID#'s in Batch: 183068, 183210, 183123, 183173

Compound	Sample Conc.	Spike Added	Spike Res	Dup Res	Spike % Rec	Dup % Rec	RPD	QC RPD	Limits % Rec
1,1-Dichloroethene	0.00	50.0	50.60	51.60	101	103	2	22	59 - 172
MTBE	0.00	50.0	49.60	50.50	99	101	2	24	62 - 137
Benzene	0.00	50.0	49.20	52.00	98	104	6	24	62 - 137
Trichloroethene	3.40	50.0	51.90	52.60	97	98	1	21	66 - 142
Toluene	0.00	50.0	49.60	49.70	99	99	0	21	59 - 139
Chlorobenzene	0.00	50.0	49.00	48.70	98	97	1	21	60 - 133

Sample ID: *LCS*

Compound	Spike Added	Spike Res	Spike % Rec	Limits % Rec
1,1-Dichloroethene	50.0	46.40	93	59 - 172
MTBE	50.0	48.10	96	62 - 137
Benzene	50.0	48.20	96	62 - 137
Trichloroethene	50.0	47.60	95	66 - 142
Toluene	50.0	48.30	97	59 - 139
Chlorobenzene	50.0	48.20	96	60 - 133

*=Outside QC limits due to high concentration in sample

If Sample Result > 4 times Spike Added, then "NC"

Surrogate Recovery

Compound	MB 1 % Rec	MB 2 % Rec		MS % Rec	MSD % Rec		LCS % Rec	Limits % Rec
Dibromofluoromethane	89			96	97		98	70 - 135
1,2-Dichloroethane-d4	104			95	96		93	70 - 135
Toluene-d8	102			103	103		102	70 - 135
p-Bromofluorobenzene	107			99	101		96	70 - 135

APPENDIX B

Standard Operating Procedures

THE REYNOLDS GROUP -STANDARD OPERATING PROCEDURE

GROUNDWATER WELL DEVELOPMENT

SCOPE OF WORK

Monitoring well development establishes a complete hydraulic connection between the well and the aquifer material surrounding the well screen and filter pack. Monitoring wells will be measured and developed according to the TRG Well Development Standard Operating Procedure described below. The Well Development SOP consists of Field Preparation, Well Development and Decontamination Procedures.

Field Preparations include the following:

1. Review of Health and Safety Plan (HASP), especially required PPE and hospital route map
2. Discuss field procedures and requirements with project team/ development contractor
3. Completion of the Field Prep Checklist (See Attached)
4. Obtain all required development equipment – IF THE DEVELOPMENT EQUIPMENT IS PROVIDED BY THE SUBCONTRATOR BE SURE TO CALIBRATE IT IN THE OFFICE BEFORE FIELD WORK
    - PPE (Tyvec, booties, gloves, hardhat, steel toe boots)
    - Proper instruments to measure specific conductivity, temperature, and pH
    - Turbidimeter
    - PID/ FID
    - Plastic
    - Paper towels
    - Camera
    - Trash bags
    - Surge block
    - Submersible pump

Well Development Procedures include the following:

1. Most wells are developed by using surge block and submersible pumping methods to draw the coarse and/or fine material out of the sand pack.

2. Well development should begin no sooner than 72 hours after well installation. However, if drilling muds are used during well installation, well development should occur approximately 24 hours following well installation so that the drilling mud does not set up in well screen section. A phased process is used to develop wells, starting with a gentle pumping or bailing phase to remove sand, followed by a surging phase, and then a pumping phase after the well begins to clear up. Step by step procedures are described as follows:

a. At the time of installation, immediately after the well completion, gentle pumping is used to remove water and sand from the well. The purpose of this technique is used to settle the sand pack with the borehole.

b. Approximately 72 hours after well installation, bailing or pumping for well development can begin. The initial bailing removes sand and fine material that may have accumulated in the well, and pulls in natural material into the sand pack. To determine the amount of sediment in the well, the total well depth should be measured and compared to the well installation boring log depth. The difference between measured depth and installed depth represents the amount of sediment in the well. Bailing or pumping is conducted until the sand content in the water begins to decrease and the measured depth approaches the total well depth.

c. After the sand content begins to decrease, surging is conducted. A surge block is used to move sediments from the filter pack into the well casing. A surge block consists of a plunger attached to a rod or pipe of sufficient length to reach bottom of the well. All surge blocks are made of inert materials that cannot contaminate the well. Surge blocks should release pressure to prevent casing collapse. Care should be taken to not surge too strongly which could result in casing collapse or deformation. The surge block is moved up and down the well screen interval and then removed, followed by a return to bailing or pumping to remove any sand brought into the well by the surging action.

d. After surging has been completed and the sand content of the bailed water has decreased, as determined by another well depth measurement, a submersible pump is used to continue well development. The pump should be moved up and down the well screen interval until the obtained water is relatively clear. During well development pH, specific conductivity, temperature, and turbidity should be monitored frequently (every 2-5 minutes) to establish natural conditions and evaluate whether the well has been completely developed. The primary criteria used to determine the completion of well development is the clearness of the groundwater (Nephelometric Turbidity Units or NTU). Before ceasing well development activities a turbidity of less than 5 NTU should be attained. Any well with turbidity greater than 5 NTU after development is considered to be suspect in integrity by the State of California.

i. Development will conclude when at least 3 well bore volumes are removed, the water clarifies, and water quality parameters have stabilized within 10% for three successive readings. The final three readings collect should conform to the following readings:
pH +/- 0.1 unit
electrical conductance (EC) +/- 3%

A copy of The Reynolds Group Well Development log form is attached. These parameters as well as time, depth to water, total volume pumped, temperature should be recorded on this form.

The volume of water purged from the well during development will be a minimum of 3 borehole volumes (wells will typically not reach stabilization of water quality parameters before this condition is achieved and may not have reached stability even after this threshold has been achieved). A copy of The Reynolds Group well volume calculation form is attached. Greater volumes may be required if the measured water quality parameters do not stabilize to the stated criteria.

THE REYNOLDS GROUP -STANDARD OPERATING PROCEDURE

LOW FLOW GROUNDWATER MONITORING

SCOPE OF WORK

Monitoring wells will be measured, purged, and sampled according to the TRG Well Monitoring Low Flow Groundwater Monitoring Standard Operating Procedure described below. The Groundwater Monitoring SOP consists of Field Preparation, Sampling Procedures, and Decontamination Procedures sections.

Field Preparations include the following:

1. Review of Health and Safety Plan (HASP), especially required PPE and hospital route map
2. Discuss field procedures and requirements with project team
3. Completion of the Field Prep Checklist (See Attached)
4. Obtain all required sampling equipment – IF THE SAMPLING EQUIPMENT IS RENTED BE SURE TO TRY USE AND CALIBRATION IN THE OFFICE BEFORE FIELD WORK
    - PPE (Tyvec, booties, gloves, hardhat, steel toe boots)
    - Dedicated tubing
    - Low flow pump
    - In-line Flow Cell to measure DO, ORP, Temperature, and pH
    - Turbidimeter
    - PID/ FID
    - Plastic
    - Paper towels
    - Ziplock bags
    - Cooler
    - Ice
    - Disposable bailers
    - Twine
    - Camera
    - Trash bags

5. Review site specific monitoring procedure, which will include the following:
    a. Removal of any dedicated tubing from each well before purging and sampling, safely placing it in a clean area in separate clean trash bags.
    b. Purging water from wells using a low flow pump connected to a Flow Cell (removing at least 3 casing volumes or until all parameters stabilize-see below)
    c. Measuring water quality parameters during purging on attached monitoring form

d. Sampling the well using a disposable bailer or from the low flow pump discharge hose (before the Flow cell)
e. Re-inserting the dedicated tubing after sampling.

6. Obtain sample containers for required analysis
   a. The two wells will be sampled for:
      - Filtered CAM Metals by EPA Method 6010
      - Hex Chromium by EPA Method 7199 (24 hour hold time)
      - Nitrates (48 hour hold time)
      - Sulfates by EPA Method 300
      - The laboratory will filter ONLY the samples for dissolved metals
      - From each well the samples will be collected in two 1 Liter polyethylene bottles with no preservatives

Sampling Procedures include the following:

1. Arrive at Site and conduct tailgate meeting discussing HASP.
2. Don proper PPE, which will consist of a tyvex uniform with booties and gloves for each technician, and carefully open each well and remove the dedicated tubing, placing it in separate clean trash bags.
3. Measure the total depth and depth to water of each well to the nearest one-tenth of a foot using a sounder, properly decontaminating (see Section below) the instrument between each well.
4. Place visqueen around each well while noting and recording the condition of well lids, caps, seals, and casing. IF THE WELLS ARE NOT LABELED, A PERMANENT MARKER OR PAINT PEN SHOULD BE USED TO MARK THE TOPAND UNDERSIDE OF THE WELL CAP, as well as the casing.
5. Properly decontaminate the low flow pump prior to purging of each well (see Decontamination Procedure).
6. Cut appropriate length of tubing for each well (total well depth minus two ft.)
7. Calibrate all instruments (Flow Cell, FID, and Turbidimeter) being used to collect parameters or monitor air quality during the purge and sample process. This must be done before the start of EVERY day, and if readings seem to drift during the monitoring, the instrument should be recalibrated.
8. Calculate three well volumes for each well (see Attached Spreadsheet).

9. **Purging Wells** – minimize spillage during pumping by having extra drums in the well area
   a. Each well will be purged to extract three boring volumes while measuring and recording on to two minute intervals for temperature, conductivity, pH, turbidity, and dissolved oxygen.

b. Purging will conclude after three volumes are removed, or when the water quality parameters have stabilized within 10% for three successive readings.

pH +/- 0.1
specific electrical conductance (SEC) +/- 3%
oxidation-reduction potential (ORP) +/- 10 millivolts
turbidity +/- 10% (when turbidity is greater than 5 NTUs)
dissolved oxygen (DO) +/- 0.3 milligrams per liter

7. Monitor and record water levels during purging. Adjust pump flow levels so that water levels do not fluctuate more than 10% of total water column and do not cause aeration.
8. All purged water will be contained in properly labeled drums for characterization and proper disposal.
9. **Sampling Wells** - will be carried out once water quality parameters have stabilized.
   a. Sampling will be performed either from the discharge line of the low flow pump (before the Flow Cell) or from disposable bailers lowered slowly with twine (new twine will be used for each well) approximately two ft. below the water surface.
   b. Sample bottles, will be labeled with well name, date, time sampled, and constituents to be analyzed.
      i. Each well will be sampled using the required number of bottles
      ii. A field blank sample will be taken by running distilled water through the sampling equipment into sample bottles and will be labeled FB.
      iii. A trip blank sample will be taken using distilled water to fill the bottle set and labeled TB
      iv. A duplicate sample will be taken will be taken by taking separate samples from the same well and labeled MW-X.
   c. Sample bottles will be placed into buckets while sampling to ensure no spillage of water onto the sidewalk or street.
   d. Sample bottles will be rinsed with sample water that is discarded before sampling.
   e. Water retrieved from each well will be deposited into bottles by opening the check valve at the bottom of the disposable bailer allowing water to slowly fill to the top of the rims minimizing spillage, agitation, and aeration.
   f. Bailers will be placed back into the bags in which they came and placed into drums for proper disposal.
   g. The sample bottles from each well will be put into separate ziplock bags to ensure no cross contamination.
   h. Samples will be kept on ice in coolers and chilled to 4 degrees C.
10. Following the collection of each sample, a chain of custody will be properly completed showing sample identification, date, time of sample, matrix, number of containers, and tests required.
11. Any dedicated micro-purge tubing will be carefully re-installed into wells, ensuring no contact with the ground surface.

12. All persons involved in purging and sampling will remove and dispose of PPE in a properly labeled drum.
13. All equipment will be decontaminated and placed in special storage containers.
14. A state certified laboratory will arrive onsite to receive all samples and chain of custody.

Decontamination Procedures include the following:

1. Once removed from the well, the purging and sampling pumps should be decontaminated with a non-phosphate soapy-water wash and scrubbed with a brush, a water rinse, and a distilled-water rinse, to help ensure that there is no cross-contamination between wells.
2. The step-by-step procedure is:
    a. Pull pump out of previously-sampled well (or out of vehicle) and use three sprayers filled with soapy water, tap water and distilled water. Spray outside of tubing and pump until water is flowing off of tubing after each rinse. Use bristle brush to help remove visible dirt, contaminants, etc.
    b. Have three long-PVC tubes with caps or buckets filled with soapy water, tap water and distilled water. Run pump in each until approximately 2 to 3 gallons of each decon solution is pumped through tubing. Pump at low rate to increase contact time between the decon solutions and the tubing.
    c. Prior to lowering the pump down the next well, spray the outside of the pump with distilled water. Use disposable paper towels and dry the pump.
    f. It is especially important to clean thoroughly that portion of the equipment that will be in contact with sample water. In addition, a clean plastic sheet should be placed adjacent to or around the well to prevent surface soils from coming in contact with the purging equipment. The effects of cross-contamination also can be minimized by sampling the least contaminated well first and progressing to the more contaminated ones. The bailer cable/rope (if a bailer is used) and plastic sheet should be properly discarded, as provided in the site health and safety plan, and new materials provided for the next well.
    g. Dedicated tubing will be used and disposed of after each well is sampled.

APPENDIX C

Field Data Sheets

TRG

WELL DEVELOPMENT LOG

Well Number: MW-1

Client: Emeryville Properties

Job No: 7103

Location: 1400 Park Ave, Emeryville, CA

Sample Time:

Rep: Sean Boykin

Sample #:

DEVELOPMENT/PURGING LOG

DTB = 23.23
DTW = 8.10

DATE	TIME	DTFP (0.01) ft.	DTW (0.01) ft.	DTB (0.01) ft.	Vol. Purged (Gal)	pH	Temp °F	EC µ mhos	Turbidity Color
	1200				3	7.1	19.9	.573	210
	1202		8.22		6	6.8	20.0	.579	>1000
	1204				9	6.7	20.1	.567	600
	1206		8.33		12	6.6	20.1	.576	320
	1208				15	6.5	20.1	.579	230
	1210		8.55		18	6.6	19.9	.590	95
	1212				21	6.6	20.0	.593	50
	1214		8.55		24	6.6	20.0	.595	30
	1216				27	6.6	20.0	.596	19
	1218		8.57		30	6.5	20.0	.596	14
	1220				33	6.5	19.9	.596	10
	1222				36	6.5	20.0	.598	8.6
	1224		8.55		39	6.5	20.0	.598	7.1
	1226				42	6.5	19.9	.599	6.0

Well Volume Calculations

41 gal. 23.23 − 8.10

• Water Column (ft)	(WCH)	DTB-DTW	23.23 − 8.10
• Casing Diameter		2", 4"	2
• Casing capacity(gal/ft)	(CK)	2"(.16), 4"(.65)	.16
• Casing WC Volume (gal)	(CV)	(CK) (WCH)	
• Borehole Diameter		6", 8", 10"	10"
• Borehole Capacity (gal/ft)	(BK)	6"(1.46), 8"(2.6), 10" (4.1)	4.1
• Borehole WC Volume (gal)	(BV)	(BK) (WCH)	
• Porosity	(N)	Sand (.3)	.3
• Annulus WC Volume (gal)	(AV)	(BV-CV) (N)	
• Total Well Volume (gal)	(TV)	CV + AV	
• Min. Development Vol. (gal)	(DV)	(1.5) (TV)	
• LPH Thickness (ft)	(Well)	DTW-DTFP	0

Recovery Calculations 8.10

• Bailer/Pump Type	
• Pump Rate (gpm)	
• DTW Before Purging (ft)	
• DTW After Purging (ft)	
• Recovery Time After 80% WC Recharge (min)	
• Recovery Time To Static Water Level (min)	
• Recharge Rate (ft/min)	
• Comments	

TRG

WELL DEVELOPMENT LOG

Well Number: MW-1

Client: Emeryville Properties

Job No: 7103

Location: 1400 Park Ave., Emeryville, CA

Sample Time:

Rep: Sean Boykk

Sample #:

DEVELOPMENT/PURGING LOG

DATE	TIME	DTFP (0.01) ft.	DTW (0.01) ft.	DTB (0.01) ft.	Vol. Purged (Gal)	pH	Temp °F	EC µ mhos	Turbidity Color
	1228		8.55		45	6.6	19.9	.599	5.5
	1230				48	6.5	19.9	.598	4.8
	1232		8.55		51	6.6	20.0	.599	4.8
	1234				54	6.5	20.1	.596	4.0
			Final Depth To Water = 8.10						

Well Volume Calculations

8.10

• Water Column (ft)	(WCH)	DTB-DTW	
• Casing Diameter		2", 4"	4"
• Casing capacity(gal/ft)	(CK)	2"(.16), 4"(.65)	.65
• Casing WC Volume (gal)	(CV)	(CK) (WCH)	
• Borehole Diameter		6", 8", 10"	10"
• Borehole Capacity (gal/ft)	(BK)	6"(1.46), 8"(2.6), 10" (4.1)	4.1
• Borehole WC Volume (gal)	(BV)	(BK) (WCH)	
• Porosity	(N)	Sand (.3)	.3
• Annulus WC Volume (gal)	(AV)	(BV-CV) (N)	
• Total Well Volume (gal)	(TV)	CV + AV	
• Min. Development Vol. (gal)	(DV)	(1.5) (TV)	
• LPH Thickness (ft)	(Well)	DTW-DTFP	0

Recovery Calculations

• Bailer/Pump Type	
• Pump Rate (gpm)	
• DTW Before Purging (ft)	
• DTW After Purging (ft)	
• Recovery Time After 80% WC Recharge (min)	
• Recovery Time To Static Water Level (min)	
• Recharge Rate (ft/min)	
• Comments	

TRG

WELL DEVELOPMENT LOG

Well Number: MW-2

Client: Emeryville Properties

Job No: 7103

Location: 1400 Park Ave., Emeryville, CA

Sample Time:

Rep: Sean Boykin

Sample #:

DEVELOPMENT/PURGING LOG

DTB = 23.17
DTW = 5.52

DATE	TIME	DTFP (0.01) ft.	DTW (0.01) ft.	DTB (0.01) ft.	Vol. Purged (Gal)	pH	Temp °C	EC mS µ mhos	Turbidity Color
	815				3	5.8	40.6	.508	999
	817		5.82		7	6.1	37.2	.473	999
	819				11	6.3	40.4	.449	999
	821				15	6.4	32.5	.552	999
	823		9.57		19	6.5	33.1	.512	866
	825				23	6.6	40.1	.470	660
	827		9.55		27	6.6	34.0	.512	393
	829				31	6.6	33.7	.508	497
	831		9.31		34	6.6	31.1	.364	380
	833				38	6.6	33.9	.527	236
	835		9.16		41	6.6	36.0	.492	134
	837				44	6.6	29.3	.612	32
	839		9.16		47	6.6	24.9	.602	4
	841				48	6.7	22.0	.601	3
	843				51	6.7	22.1	.601	3

Well Volume Calculations

23.17 − 5.52
23.19

• Water Column (ft)	(WCH)	DTB-DTW	
• Casing Diameter		2", 4"	2
• Casing capacity(gal/ft)	(CK)	2"(.16), 4"(.65)	.16
• Casing WC Volume (gal)	(CV)	(CK) (WCH)	
• Borehole Diameter		6", 8", 10"	10"
• Borehole Capacity (gal/ft)	(BK)	6"(1.46), 8"(2.6), 10" (4.1)	4.1
• Borehole WC Volume (gal)	(BV)	(BK) (WCH)	
• Porosity	(N)	Sand (.3)	.3
• Annulus WC Volume (gal)	(AV)	(BV-CV) (N)	
• Total Well Volume (gal)	(TV)	CV + AV	
• Min. Development Vol. (gal)	(DV)	(1.5) (TV)	
• LPH Thickness (ft)	(Well)	DTW-DTFP	0

Recovery Calculations

Final DTW → 5.55

• Bailer/Pump Type	
• Pump Rate (gpm)	
• DTW Before Purging (ft)	
• DTW After Purging (ft)	
• Recovery Time After 80% WC Recharge (min)	
• Recovery Time To Static Water Level (min)	
• Recharge Rate (ft/min)	
• Comments	

TRG

WELL DEVELOPMENT LOG

Well Number: MW-4

Client: Emeryville Properties

Job No: 7103

Location: 1400 Park Ave., Emeryville, CA

Sample Time:

Rep: Sean Boykin

Sample #:

DEVELOPMENT/PURGING LOG

DTB = 19.91
DTW = 4.55

DATE	TIME	DTFP (0.01) ft.	DTW (0.01) ft.	DTB (0.01) ft.	Vol. Purged (Gal)	pH	Temp °F/C	EC mS/cm mhos	Turbidity Color
~~[illegible]~~	1010		5.10		3	7.0	18.6	.519	>1000
	1012				6	6.8	21.8	.501	>1000
	1014		9.60		9	6.8	22.2	.556	>1000
	1016				12	6.6	22.4	.675	>1000
	1019		9.59		15	6.7	19.4	.694	>1000
	1021				18	6.7	19.7	.735	>1000
	1023		9.60		21	6.8	19.9	.751	>1000
	1025				24	6.8	21.5	.744	>1000
	1027		9.58		27	6.8	21.6	.772	310
	1029				30	6.8	25.7	.728	160
	1031		9.58		33	6.8	21.0	.761	75
	1034				36	6.9	23.6	.760	38
	1036		9.58		39	6.9	24.2	.755	60
	1039				42	6.9	23.8	.755	50

Well Volume Calculations

19.91 − 4.55
~~23.19 − 5~~

• Water Column (ft)	(WCH)	DTB-DTW	
• Casing Diameter		2", 4"	~~4~~ 2
• Casing capacity(gal/ft)	(CK)	2"(.16), 4"(.65)	~~.65~~ .16
• Casing WC Volume (gal)	(CV)	(CK) (WCH)	
• Borehole Diameter		6", 8", 10"	10"
• Borehole Capacity (gal/ft)	(BK)	6"(1.46), 8"(2.6), 10" (4.1)	4.1
• Borehole WC Volume (gal)	(BV)	(BK) (WCH)	
• Porosity	(N)	Sand (.3)	.3
• Annulus WC Volume (gal)	(AV)	(BV-CV) (N)	
• Total Well Volume (gal)	(TV)	CV + AV	
• Min. Development Vol. (gal)	(DV)	(1.5) (TV)	
• LPH Thickness (ft)	(Well)	DTW-DTFP	0

Recovery Calculations

• Bailer/Pump Type	
• Pump Rate (gpm)	
• DTW Before Purging (ft)	
• DTW After Purging (ft)	
• Recovery Time After 80% WC Recharge (min)	
• Recovery Time To Static Water Level (min)	
• Recharge Rate (ft/min)	
• Comments	

TRG

WELL DEVELOPMENT LOG

Well Number: MW-4

Client: Emeryville Properties

Job No: 7103

Location: 1400 Park Ave, Emeryville, CA

Sample Time:

Rep: Sean Boykin

Sample #:

DEVELOPMENT/PURGING LOG

DATE	TIME	DTFP (0.01) ft.	DTW (0.01) ft.	DTB (0.01) ft.	Vol. Purged (Gal)	pH	Temp °F	EC µ mhos	Turbidity Color
	1042		9.57		45	6.9	20.2	.825	14
	1044				48	6.9	22.9	.779	15
	1046		9.58		51	6.8	21.9	.801	4.6
	1048				54	6.8	25.8	.782	2.8
	1050				57	6.8	25.4	0.781	2.2
			Final Depth To Water = 5.34						

Well Volume Calculations DTW = 5.34

• Water Column (ft)	(WCH)	DTB-DTW	
• Casing Diameter		2", 4"	4"
• Casing capacity(gal/ft)	(CK)	2"(.16), 4"(.65)	.65
• Casing WC Volume (gal)	(CV)	(CK) (WCH)	
• Borehole Diameter		6", 8", 10"	10"
• Borehole Capacity (gal/ft)	(BK)	6"(1.46), 8"(2.6), 10" (4.1)	4.1
• Borehole WC Volume (gal)	(BV)	(BK) (WCH)	
• Porosity	(N)	Sand (.3)	.3
• Annulus WC Volume (gal)	(AV)	(BV-CV) (N)	
• Total Well Volume (gal)	(TV)	CV + AV	
• Min. Development Vol. (gal)	(DV)	(1.5) (TV)	
• LPH Thickness (ft)	(Well)	DTW-DTFP	0

Recovery Calculations

• Bailer/Pump Type	
• Pump Rate (gpm)	
• DTW Before Purging (ft)	
• DTW After Purging (ft)	
• Recovery Time After 80% WC Recharge (min)	
• Recovery Time To Static Water Level (min)	
• Recharge Rate (ft/min)	
• Comments	

WELLHEAD INSPECTION CHECKLIST

Date 1/15/07 Client Reynolds Group

Site Address 1400 Park Ave. Emeryville, CA

Job Number 070115-A91 Technician DA

Well ID	Well Inspected - No Corrective Action Required	Water Bailed From Wellbox	Wellbox Components Cleaned	Cap Replaced	Debris Removed From Wellbox	Lock Replaced	Other Action Taken (explain below)	Well Not Inspected (explain below)
MW-2							X	
MW-1							X	
MW-4							X	

NOTES: MW-2: casing is too high. Apron has major cracks, is below grade MW-1: wellbox rim is damaged. MW-4: 2/2 bolts missing. Lid tab is broken. Casing is too high for cap.

WELL GAUGING DATA

Project # 070115-DA1 Date 1/15/07 Client Reynolds Group

Site Emeryville Properties 1400 Park Ave, Emeryville, CA

Well ID	Time	Well Size (in.)	Sheen / Odor	Depth to Immiscible Liquid (ft.)	Thickness of Immiscible Liquid (ft.)	Volume of Immiscibles Removed (ml)	Depth to water (ft.)	Depth to well bottom (ft.)	Survey Point: TOB or TOC	Notes
MW-2	0813	2					5.65	23.02	TOC	
MW-1	0816	2					8.23	23.15	↓	
MW-4	0820	2					4.32	19.78	↓	

WELL MONITORING DATA SHEET

Project #: 070115-DA1	Client: Reynolds Group
Sampler: DA	Start Date: 1/15/07
Well I.D.: MW-1	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 23.15	Depth to Water Pre: 8.23 Post: 8.37
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	Flow Cell Type: YSI 556

Purge Method: (2" Grundfos Pump) 2.4 gal/w Peristaltic Pump Bladder Pump
Sampling Method: Dedicated Tubing x3 = 7.2 (New Tubing) Other____

Flow Rate: ~1 gpm Pump Depth: 17'

Time	Temp. (°C or °F)	pH	Cond. (mS or µS)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Observations	
0934	18.66	6.93	581	340	0.73	44.4	—	tan, cloudy	8.23
0937	19.21	6.71	602	101	0.23	40.7	3	clearing	8.33
0940	19.34	6.73	676	21	0.29	47.8	6	"	8.34
0943	19.37	6.72	692	11	0.53	48.4	9	"	8.35
0946	19.35	6.73	701	8	0.33	46.2	12	"	8.35
0949	19.33	6.73	705	6	0.28	44.6	15	"	8.38
0952	19.31	6.73	709	4	0.24	42.5	18	"	8.38
0955	19.33	6.73	711	3	0.24	40.4	21	"	8.37
0958	19.30	6.73	713	2	0.25	39.0	24	"	8.37

Did well dewater? Yes (No)	Amount actually evacuated:
Sampling Time: 1000	Sampling Date: 1/
Sample I.D.: MW-1	Laboratory: Assoc.
Analyzed for: TPH-G BTEX MTBE TPH-D	Other: see COC
Equipment Blank I.D.: @ Time	Duplicate I.D.: MW-X

WELL MONITORING DATA SHEET

Project #: 070115-DA1	Client: TRC
Sampler: DA	Start Date: 1/15/09
Well I.D.: MW-2	Well Diameter: (2) 3 4 6 8 ___
Total Well Depth: 23.02	Depth to Water Pre: 5.65 Post: 8.30
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: (PVC) Grade	Flow Cell Type: YSI 556

Purge Method: X 2" Grundfos Pump 2.8 gpm Peristaltic Pump Bladder Pump
Sampling Method: Dedicated Tubing X New Tubing Other ___
x 3 = 8.4
Flow Rate: ~1.5 Pump Depth: 18'

Time	Temp. (°C or °F)	pH	Cond. (mS or µS)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals or mL)	Observations	DTW
0848	17.79	6.72	805	217	1.00	207.6	-	tan, cloudy	7.18
00851	17.94	6.69	809	97	0.86	201.0	3	cleaning	8.28
0854	18.40	6.69	817	49	1.63	190.7	7.5	"	8.42
0857	18.34	6.70	816	44	2.27	181.1	10.5	"	8.42
0900	18.37	6.70	817	11	1.79	176.2	15	"	8.38
0903	18.34	6.70	816	4	1.17	170.9	19.5	"	8.38
0906	18.33	6.70	815	3	0.94	162.5	24	"	8.32
0909	18.40	6.69	816	2	6.79	158.7	27	"	8.30

Did well dewater? Yes (No) Amount actually evacuated: 27
Sampling Time: 0911 Sampling Date: 1/15/09
Sample I.D.: MW-2 Laboratory: Assoc.
Analyzed for: TPH-G BTEX MTBE TPH-D Other: See COC
Equipment Blank I.D.: @ Time Duplicate I.D.:

WELL MONITORING DATA SHEET

Project #: 070115-DA1	Client: Reynolds Groups
Sampler: DA	Start Date: 1/15/07
Well I.D.: MW-4	Well Diameter: (2) 3 4 6 8 ____
Total Well Depth: 19.78	Depth to Water Pre: 4.32 Post: 8.05
Depth to Free Product:	Thickness of Free Product (feet):
Referenced to: PVC Grade	Flow Cell Type: YSI 556

Purge Method: 2" Grundfos Pump 2.5 gpm Peristaltic Pump Bladder Pump
Sampling Method: Dedicated Tubing x3 = 7.5 New Tubing Other____

Flow Rate: ~1 gpm Pump Depth: 17'

Time	Temp. (°C or °F)	pH	Cond. (mS or µS)	Turbidity (NTUs)	D.O. (mg/L)	ORP (mV)	Water Removed (gals. or mL)	Observations	ppm
1032	17.80	6.93	945	842	0.67	61.8	–	cloudy	4.32
1035	17.94	6.93	913	~~9~~136	0.28	42.9	3	"	7.94
1038	18.42	6.91	963	49	0.22	36.4	6	"	8.32
1041	18.59	6.97	988	25	0.27	19.0	9	"	8.62
1044	18.87	6.96	1007	6	0.32	16.7	11	"	8.32
1047	18.87	6.96	1009	4	0.26	18.7	13	"	8.28
1050	18.86	6.92	1011	3	0.22	19.2	15	"	8.20
1053	18.90	6.97	1012	2	0.21	11.0	17	"	8.05

Did well dewater? Yes (No) Amount actually evacuated: 17

Sampling Time: Sampling Date: 1/15/07

Sample I.D.: MW-4 Laboratory: Assoc.

Analyzed for: TPH-G BTEX MTBE TPH-D Other: see COC

Equipment Blank I.D.: @ Time Duplicate I.D.:

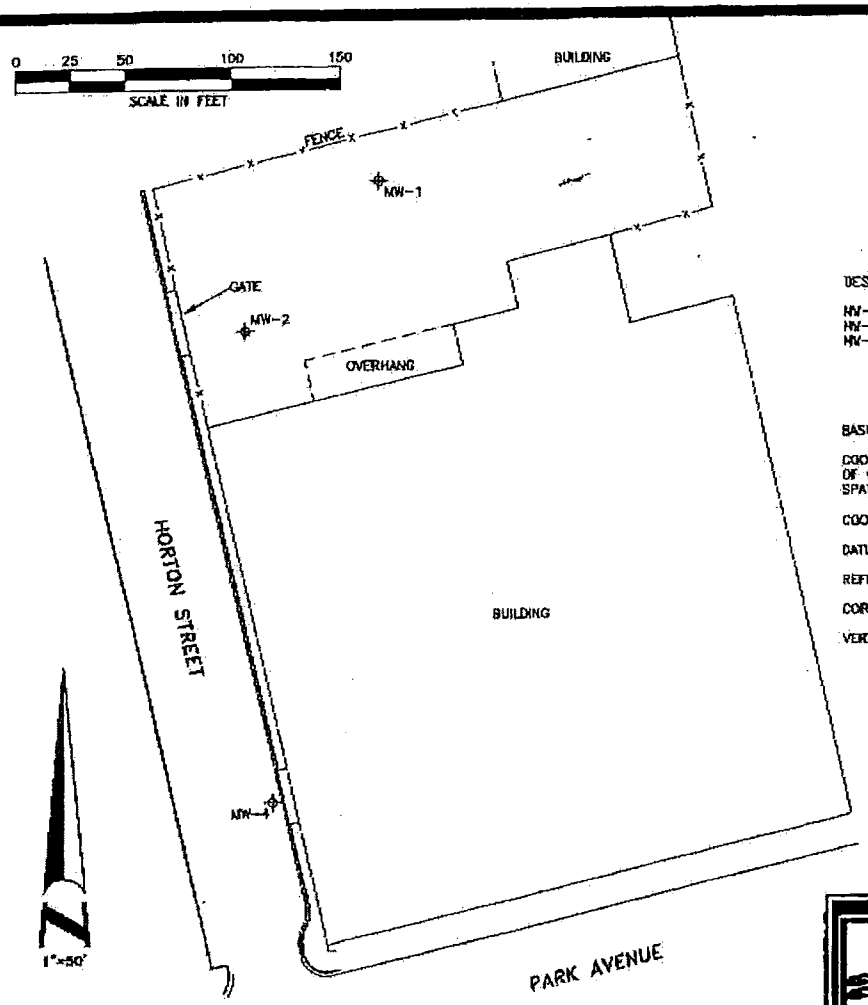
APPENDIX D

Registered Survey of Groundwater Monitoring Wells

Monitoring Well Exhibit

Prepared For:

Reynolds Group



DESCRIPTION	NORTHING	EASTING	LATITUDE	LONGITUDE	ELEV (PVC)	ELEV (BOX)
MW-1	2130287.4	6045357.7	37.8319175	-122.2867999	19.17	19.42
MW-2	2130219.9	6045296.1	37.8317289	-122.2870089	16.43	16.64
MW-4	2130006.7	6045307.8	37.8311441	-122.2869542	14.60	14.72

BASIS OF COORDINATES AND ELEVATIONS:

COORDINATES ARE CALIFORNIA STATE PLANE ZONE 3 COORDINATES FROM GPS OBSERVATIONS USING UNIVERSITY OF CALIFORNIA BAY AREA DEFORMATION CORS STATION OBSERVATION FILES AND BASED ON THE CALIFORNIA SPATIAL REFERENCE CENTER DATUM, REFERENCE EPOCH 2000.35.

COORDINATE DATUM IS NAD 83(1986).

DATUM ELLIPSOID IS GRS80.

REFERENCE GEOID IS HG509.

CORS STATIONS USED WERE DIAB AND MHOB.

VERTICAL DATUM IS NAVD 88 FROM GPS OBSERVATIONS.

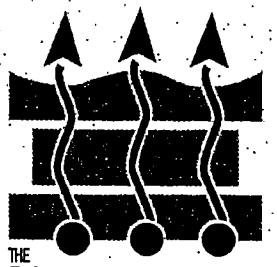
Former Chromex Facility
1400 Park Avenue
Emeryville
Alameda County
California

Morrow Surveying
LAND SURVEYORS
1450 Harbor Blvd. Ste. B
West Sacramento
California 95691
(916) 372-6124
curt@morrowsurveying.com

Date: 1-8-07
Scale: 1" = 50'
Sheet 1 of 1
Revised:
Field Book: MW-30,31
Dwg. No. 6885-D01 CI

APPENDIX E

Site Specific Health and Safety Plan



HEALTH AND SAFETY PLAN

GROUNDWATER MONITORING

EMERYVILLE PROPERTIES
1400 PARK AVENUE
EMERYVILLE, California

Tel 714-730-5397

PO Box 1996, Tustin, California 92781-1996
www.reynolds-group.com

Fax 714-730-6476

INTRODUCTION

The Reynolds Group (TRG) was engaged to perform groundwater monitoring at Emeryville Properties located at 1400 Park Avenue in Emeryville, California.

KEY PERSONNEL AND RESPONSIBILITIES

Following are key assignments for this project:

ASSIGNMENT	RESPONSIBLE PARTY
Project Manager:	Gwen Tellegen/Ed Reynolds
Project Site Safety Officer:	Sean Boykin
Office Health and Safety Manager:	Gwen Tellegen

The Project Manager (PM) has overall responsibility for field development and implementation of this Health and Safety Plan (HASP). The PM assigns health and safety related duties and responsibilities only to qualified individuals. Before anyone enters the work area, they must meet the requirements of 29 CFR 110.120 for medical examination and health and safety training.

The Project Site Safety Officer (PSSO), who must be on-site during all work activities, will be responsible for on-site health and safety activities. The PSSO has stop-work authorization that he will exercise when he perceives an imminent safety hazard, an emergency situation, or any other potentially dangerous situations, such as extreme weather conditions. If the PSSO stops work for a safety-related issue, work cannot begin again until approved by the OHSM. In an emergency, the PSSO will arrange for emergency support services when needed.

GENERAL SAFETY REQUIREMENTS

Continuous air monitoring for worker safety and regulatory compliance will be conducted using a photoionization detector (PID) or flame-ionization detector (FID) a minimum of every 15 minutes during the entire operation, unless directed otherwise by the appropriate regulatory agency officer(s) present on site.

Monitoring equipment, including PID/FID and CG/O2 meter, will be calibrated daily and calibration logs will be maintained on-site and made available upon request.

All on-site personnel operating within the work zone will show proof of current 40-hour hazardous waste operations training upon request.

Cellular telephones/radios will be available on-site at all times during work for communication in the event of an emergency.

HAZARD EVALUATION

The following is an evaluation of the hazards which might be associated with this project and the countermeasures which should be taken to remediate these hazards:

Exposure

POTENTIAL CHEMICALS:

The most likely chemical compounds to be encountered during this remediation are elevated petroleum fuel hydrocarbons, found typically in oil field operations.

ASSOCIATED HAZARD:

Gasoline, Diesel, Oil and Grease:	Dermal: can defat and irritate skin Inhalation: TLV's typically 300-600 ppm Acute effects = irritant to skin, eyes, nose, mouth
BTEX:	Dermal: can defat and irritate skin Inhalation: TLV for benzene = 1 ppm Acute effect = irritant Chronic effect: benzene is a human carcinogen.
MTBE:	Dermal: can defat and irritate skin Inhalation: TLV for MTBE = 25 ppm Acute effect = irritant Chronic effects: MTBE is a human carcinogen.

EXPOSURE PROBABILITY AND LIKELY CONSEQUENCE:

A low hazard level exists where there is no contact with the chemicals, when low concentrations are encountered, or when proper protection is worn.

COUNTERMEASURES:

- When OVM reading is less than 50 ppm above background level wear Level D protection;
- When OVM reading is above 100 ppm for greater that 15 minutes wear Level C protection;
- When OVM reading is above 1000 ppm cease work operations until level decreases.

Fire and Explosion

POTENTIAL FOR FIRE OR EXPLOSION:

Workers may encounter fire or explosion hazards on this project. Fire or explosion could occur by rupturing an underground gas line or if digging through soil that contains high concentrations of fuel hydrocarbons.

EXPOSURE PROBABILITY AND LIKELY CONSEQUENCE:

Low probability with moderate consequence.

COUNTERMEASURES:

Seek information about possible underground obstructions from knowledgeable individuals before excavating. Note if Dig Alert has marked the site for underground lines (see Section 3.11).

Oxygen Deficiency

On-site workers are not likely to encounter an oxygen deficiency. Workers will not enter confined spaces on this project.

Ionizing Radiation

On-site workers are not likely to encounter radioisotopes or other hazardous ionizing radiation on this site.

Biologic Hazards

On-site workers are not likely to encounter biologic hazards on this site.

Safety Hazards

On-site workers may encounter physical safety hazards on this site. Work operations include:

- working near moving, powered machinery;
- slips, strains, trips, and falls;
- moving and lifting of heavy objects;
- use of hand tools, and
- use of motor vehicles.

COUNTERMEASURES:

Use experienced on-site persons. Wear hard-toed shoes and approved hard hats. Heighten worker awareness with a tailgate safety session for all on-site workers at the start of work each day. Maintain all equipment (including safety devices) in proper operation condition. Never leave an open excavation unattended.

Electrical

On-site workers could encounter electrical hazards on this site if the front loader contacts overhead power lines, if subsurface work encounters buried live electrical lines, if poor weather conditions exist, or equipment is not properly grounded.

COUNTERMEASURE:

Be sure not to raise the front loader in proximity to overhead power lines. Work shall cease if bad weather conditions exist. Equipment shall be grounded. Seek information about possible underground lines from knowledgeable individuals before excavating. Note if Dig Alert has marked the site for underground lines (see Section 3.11).

Heat Stress

There will be a low likelihood that on-site workers may encounter heat stress on this project. Workers will be wearing Tyvek suits and ambient temperature will likely be in the low-to mid-eighties.

COUNTERMEASURES:

Heighten worker awareness about heat stress at daily tailgate safety session. Monitor heart rate at break time. If heart rate exceeds 110 beats per minute, cut work period by one-third. Provide and encourage drinking of water and juices at the job site.

Cold Exposure

On-site workers are not likely to encounter cold exposure on this project.

Noise

On-site workers will likely encounter excessive noise levels from operation of the heavy equipment.

COUNTERMEASURE:

Workers will wear hearing protection around the backhoe and whenever they have trouble conversing in normal tones at a distance of about five feet.

Underground Lines

Every effort will be made to determine if underground lines exist beneath the site. Dig Alert will be contacted at least two working days prior to the commencement of work.

SITE CONTROL

For control purposes, the work area consists of a 160-foot area around the backhoe. It is open and workers will enter and leave the site with care. Smoking, eating, and drinking are prohibited in the immediate work area. The PSSO will exclude casual observers from the work area and will be on-site during work operations.

EMERGENCY RESPONSE PLAN

Following are emergency names, phone numbers, and contacts:

Police	911
Fire Department	911
Ambulance	911
Emergency Hospital Alta Bates Summit Medical Center 350 Hawthorne Avenue Oakland, California	(510) 655-4000
The Reynolds Group 520 West First Street Tustin, CA 92780	(714) 730-5397
Closest Phone for Emergencies:	Cellular Phones

Medical Emergencies:

For emergencies requiring ambulance service, call 911 for transportation of injured to hospital. Life-flight is available and can be obtained when calling 911.

Nearest Facility:

Alta Bates Summit Medical Center is nearest the Site. The most direct route is shown on the attached map.

Emergency Decontamination:

In a medical emergency, personnel decontamination is of lesser importance than medical attention. Alert paramedics or emergency room attendants about the potential for contamination.

The undersigned have read and will comply with the Health and Safety Plan for the 1400 Park Avenue, Emeryville Groundwater Well Development and Monitoring project.

REPRESENTING	NAME	SIGNATURE	DATE

THE REYNOLDS GROUP
A California Corporation by:

F. Edward Reynolds

F. Edward Reynolds, Jr., P.E.

Yahoo! Driving Directions

Maps | **Driving Directions** MY YAHOO!

Starting from: A 1400 Park Ave, Emeryville, CA 94608-3520 Save Address

Arriving at: B 350 Hawthorne Ave, Oakland, CA 94609-3108 Save Address

Distance: 1.7 miles **Approximate Travel Time:** 6 mins Get Reverse Directions

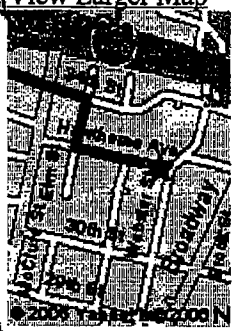
New! Send to Phone | Text Only | Printable Version | Email Directions

Your Full Route

Zoom In - 1st.3city567state910- Zoom Out

Your Destination

View Larger Map



Traffic

SmartView tm

See locations on this

- Restaurants
- Hotels
- ATMs
- Gas Stations
- More

◉ Zoom in & Re-Center ○ Re-Center only

What's this?

Directions Show Turn by Turn Maps

1.	Start at **1400 PARK AVE, EMERYVILLE** going toward **HOLDEN ST** - go **0.1** mi
2.	Turn R on **HOLLIS ST** - go **0.4** mi
3.	Turn L on **34TH ST** - go **1.1** mi

4.	Turn R on **ELM ST** - go **0.1 mi**
5.	Turn L on **HAWTHORNE AVE** - go **0.1 mi**
6.	Arrive at **350 HAWTHORNE AVE, OAKLAND**, on the L

When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Get New Driving Directions

A Enter starting address or select from My Locations

My Locations Sign In
-- My Locations --
Address
1400 Park Ave
City, State or Zip
Emeryville, CA 94608-3520
Country
United States

B Enter destination address or select from My Locations

My Locations Sign In
-- My Locations --
Address
350 Hawthorne Ave
City, State or Zip
Oakland, CA 94609-3108
Country
United States

Get Directions

Learn about Mobile Phone Directions

APPENDIX A

QUALIFICATIONS AND HAZWOPPER TRAINING CERTIFICATES FOR PM AND PSSO

ENVIRONMENTAL TRAINING AND COMPLIANCE

CERTIFICATE OF COMPLETION

8 HOUR REFRESHER

HEALTH & SAFETY TRAINING

Gwen Tellegen

has successfully completed the 8-Hour Refresher Health and Safety Training course, satisfying the OSHA Hazardous Waste Operators and Emergency Response Standard [29 CFR 1910.120(e)(8),(q)(8) and 8 CCR 5192 (e)(q)].

Class Date: March 24, 2006
Expiration Date: March 24, 2007

Certificate # 24710-6

Joseph T. Thompson, MPH

1979 State College Boulevard • Anaheim, CA 92806 • Phone: 800-949-4473

ENVIRONMENTAL TRAINING AND COMPLIANCE

CERTIFICATE OF COMPLETION

8 HOUR REFRESHER

HEALTH & SAFETY TRAINING

Sean Boykin

has successfully completed the 8-Hour Refresher Health and Safety Training course, satisfying the OSHA Hazardous Waste Operators and Emergency Response Standard [29 CFR 1910.120(e)(8),(q)(8) and 8 CCR 5192 (e)(q)].

Class Date: September 28, 2006
Expiration: September 28, 2007

Certificate # 25374

Joseph T. Thompson, MPH

1979 State College Boulevard • Anaheim, CA 92806 • Phone: 800-949-4473

ENVIRONMENTAL TRAINING AND COMPLIANCE

CERTIFICATE OF COMPLETION

8 HOUR REFRESHER

HEALTH & SAFETY TRAINING

F. Edward Reynolds, Jr.

has successfully completed the 8-Hour Refresher Health and Safety Training course, satisfying the OSHA Hazardous Waste Operators and Emergency Response Standard [29 CFR 1910.120(e)(8),(q)(8) and 8 CCR 5192 (e)(q)].

Class Date: March 24, 2006
Expiration Date: March 24, 2007

Certificate # 24710-5

Joseph T. Thompson, MPH

1979 State College Boulevard • Anaheim, CA 92806 • Phone: 800-949-4473

APPENDIX B

CALIBRATION TECHNIQUES

		Effective Date 3-19-96	Number
		Page 1 OF 1	Revision 3-19-96

SUBJECT: CALIBRATION PROCEDURE MINIRAE

1. Follow steps 1 through 4 of the standard operation procedure titled "Normal Operations".

2. Depress the (MENU) key repeatedly until (CO x.x) is displayed. This is the zero calibration menu. You will attach the organic vapor zeroing kit to the intake of the sample probe and let it flow for 30 seconds. After 30 seconds you will depress the (ENTER) key to set the zero value. You should now have (CO 0.0) on the display.

3. Depress the (MENU) key 1 time to go to the calibration menu. Your display should now have (Clu xxx.x) where xxx.x is the value of the calibration gas you are using.

4. The first digit is flashing and if you need to change this value, just use the up or down arrow key to increment or decrement the value. Once the correct value is entered for the first digit, you will depress the (ENTER) key to move to the second digit.

5. Repeat step 5 unit all digits match the value of your calibration gas.

6. When you depress (ENTER) for the last digit, it takes you to the "GAS ON" screen. You will now attach a Tedlar sample bag filled with the Isobutylene calibration gas and depress the (ENTER) key.

7. The display will now show "Cal..." Wait until the display shows "Cl xxx.x" where xxx.x is equal to the calibration gas that is attached to the inlet.

8. Depress the (MENU) key until you get back to the instantaneous ppm display. The readings should be very close to that of the calibration gas you have just calibrated to.

9. Remove the bag of Isobutylene calibration gas from the sample inlet probe. The readings should fall back towards zero. It is no unusual to get some background readings on the display at this time.

10. Follow the standard operation procedure titled "Quality Control Procedure" to ensure the unit passes the Q.C. check and is ready for rental.

APPENDIX C

MATERIAL SAFETY DATA SHEETS (MSDS)

HYDROCARBONS

CORNELL

Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only

570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Section 1 - Product and Company Identification
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Product Identification: 570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)
Date of MSDS: 06/10/1994 **Technical Review Date:** 08/14/1996
FSC: 6665 **NIIN:** **LIIN:** 00N072167
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ENVIRONMENTAL RESOURCE ASSOC
Manufacturer's Address1: 5540 MARSHALL ST
Manufacturer's Address2: ARVADA, CO 80002
Manufacturer's Country: US
General Information Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 1R664
Special Project Code: N

Contractor Information

Contractor's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Contractor's Address1: 5540 MARSHALL STREET.
Contractor's Address2: ARVADA, CO 80002
Contractor's Telephone: 303-431-8454
Contractor's CAGE: 1R664

Section 2 - Compositon/Information on Ingredients
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Ingredient Name: PETROLEUM HYDROCARBONS; (IN SOIL) (>98% SOIL + <1% PETROLEUM HYDROCARBONS)
Ingredient CAS Number: **Ingredient CAS Code:** X
RTECS Number: **RTECS Code:** X
=WT: **=WT Code:**
=Volume: **=Volume Code:**
>WT: **>WT Code:**
>Volume: **>Volume Code:**
<WT: **<WT Code:**
<Volume: **<Volume Code:**
% Low WT: **% Low WT Code:**
% High WT: **% High WT Code:**
% Low Volume: **% Low Volume Code:**
% High Volume: **% High Volume Code:**
% Text: <1
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 5 MG/M3 (OIL MIST) **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: 5 MG/M3 (OIL MIST) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Health Hazards Acute & Chronic: NO SIGNIFICANT HAZARD TO HUMAN HEALTH. MINOR IRRITATION IS POSSIBLE IF EYE EXPOSED TO DUST.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:
- **Inhalation:** YES
- **Skin:** YES
- **Ingestion:** YES

Carcenogenicity Indicators
- **NTP:** NO
- **IARC:** NO
- **OSHA:** NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

First Aid:
INHAL: REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE OXYGEN/ARTIFICIAL RESPIRATION) (FP N). EYES: FLUSH WITH WATER FOR AT LEAST 15 MINUTES. SKIN: FLUSH WITH WATER. INGEST: INDUCE VOMITING FOR LARGE ING ESTIONS ONLY.

Section 5 - Fire Fighting Measures
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Fire Fighting Procedures:
USE NIOSH APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
NONE.
Extinguishing Media:
MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).
Flash Point: Flash Point Text: NOT IGNITABLE

Autoignition Temperature:
- **Autoignition Temperature Text:** N/A
- **Lower Limit(s):** N/A
- **Upper Limit(s):** N/A

Section 6 - Accidental Release Measures
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Spill Release Procedures:
SWEEP OR VACUUM AND DISPOSE OF AS ORDINARY WASTE.

Section 7 - Handling and Storage
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Repiratory Protection:
NOT REQUIRED. USE NIOSH APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).
Ventilation:
NOT REQUIRED.
Protective Gloves:
IMPERVIOUS GLOVES (FP N).
Eye Protection: ANSI APPRVD CHEM WORKERS GOGGLES (FP N).
Other Protective Equipment: ANSI APPROVED EYE WASH & DELUGE SHOWER (FP N).
Work Hygenic Practices: SOIL MATRIX MAY IRRITATE MUCOUS MEMBRANES.
Supplemental Health & Safety Information: MFR'S TRADE NAME/PART NO: SOIL, TPH-91, WITHOUT FATTY ACIDS.

Section 9 - Physical & Chemical Properties
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

HCC:
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: SOLID
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/A **Vapor Density:** N/A
Percent Volatile Organic Content:
Specific Gravity: N/A
Volatile Organic Content Pounds per Gallon:
pH: N/A
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/A
Solubility in Water: NONE
Appearance and Odor: BROWN SOIL; ODORLESS.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Stability Indicator: YES
Materials to Avoid:
NONE SPECIFIED BY MANUFACTURER.
Stability Condition to Avoid:
NONE.
Hazardous Decomposition Products:
NONE SPECIFIED BY MANUFACTURER.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Toxicological Information:
N/P

Section 12 - Ecological Information
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Ecological Information:
N/P

Section 13 - Disposal Considerations
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Waste Disposal Methods:
DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N). DISPOSE OF AS NON-HAZARDOUS WASTE.

Section 14 - MSDS Transport Information
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

Transport Information:
N/P

Section 15 - Regulatory Information
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)

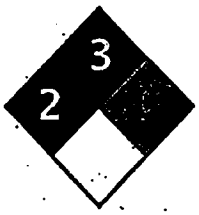
Other Information:
N/P

HAZCOM Label Information

Product Identification: 570, TOTAL PETROLEUM HYDROCARBONS (TPH) IN (SUPDAT)
CAGE: 1R664
Assigned Individual: N
Company Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Company PO Box:
Company Street Address1: 5540 MARSHALL STREET
Company Street Address2: ARVADA, CO 80002 US
Health Emergency Telephone: 303-431-8454
Label Required Indicator: Y
Date Label Reviewed: 08/14/1996
Status Code: C
Manufacturer's Label Number:
Date of Label: 08/14/1996
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: CAUTION
Health Hazard: None
Contact Hazard: Slight
Fire Hazard: None
Reactivity Hazard: None

8/9/2002 9:41:54 AM

ScienceLab.com
Chemicals & Laboratory Equipment



Health	2
Fire	3
Personal Protection	H

Material Safety Data Sheet
Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C6-H6

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: 1-800-901-7247
International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC.
MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].
The substance is toxic to blood, bone marrow, central nervous system (CNS).
The substance may be toxic to liver, Urinary System.
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention immediately.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat.
Slightly flammable to flammable in presence of oxidizing materials.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Extremely flammable liquid and vapor. Vapor may cause flash fire.
Reacts on contact with iodine heptafluoride gas.

Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition.
Contact with sodium peroxide with benzene causes ignition.
Benzene ignites in contact with powdered chromic anhydride.
Virgorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:
Benzene vapors + chlorine and light causes explosion.
Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.
Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion.
Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.
The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.
Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion.
Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States]
TWA: 1.6 STEL: 8 (mg/m3) from ACGIH (TLV) [United States]
TWA: 0.1 STEL: 1 from NIOSH
TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States]
TWA: 10 (ppm) from OSHA (PEL) [United States]
TWA: 3 (ppm) [United Kingdom (UK)]
TWA: 1.6 (mg/m3) [United Kingdom (UK)]
TWA: 1 (ppm) [Canada]
TWA: 3.2 (mg/m3) [Canada]
TWA: 0.5 (ppm) [Canada]Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:
Aromatic. Gasoline-like, rather pleasant.
(Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone.
Very slightly soluble in cold water.

Section 10. Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Benzene vapors + chlorine and light causes explosion.
Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate.
Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion.
Interaction of nitryl perchlorate with benzene gave a slight explosion and flash.
The solution of permanganic acid (or its explosive anhydride, dimaganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene.
Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion.
Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11 - Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 930 mg/kg [Rat].
Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC.
MUTAGENIC EFFECTS: Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female [POSSIBLE].
Causes damage to the following organs: blood, bone marrow, central nervous system (CNS).
May cause damage to the following organs: liver, Urinary System.

Other Toxic Effects on Humans:
Very hazardous in case of inhalation.
Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects.
May affect genetic material (mutagenic).
May cause cancer (tumorigenic, leukemia))
Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism,and urinary system.
Eyes: Causes eye irritation.
Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and

other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system.
Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene
California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value)
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Benzene
Connecticut carcinogen reporting list.: Benzene
Connecticut hazardous material survey.: Benzene
Illinois toxic substances disclosure to employee act: Benzene
Illinois chemical safety act: Benzene
New York release reporting list: Benzene
Rhode Island RTK hazardous substances: Benzene
Pennsylvania RTK: Benzene
Minnesota: Benzene
Michigan critical material: Benzene
Massachusetts RTK: Benzene
Massachusetts spill list: Benzene
New Jersey: Benzene
New Jersey spill list: Benzene
Louisiana spill reporting: Benzene
California Director's list of Hazardous Substances: Benzene

TSCA 8(b) inventory: Benzene
SARA 313 toxic chemical notification and release reporting: Benzene
CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable.
R22- Harmful if swallowed.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.
R45- May cause cancer.
R62- Possible risk of impaired fertility.
S2- Keep out of the reach of children.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S39- Wear eye/face protection.
S46- If swallowed, seek medical advice immediately and show this container or label.
S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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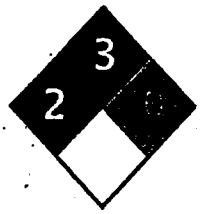

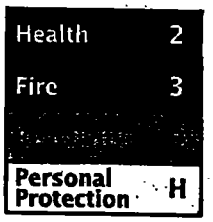

Material Safety Data Sheet
Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: 1-800-901-7247
International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks, of heat.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable liquid, insoluble in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:
Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide;

concentrated nitric acid, sulfuric acid + nitric acid; N_2O_4; $AgClO_4$; BrF_3; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6. Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Toxic flammable liquid, insoluble or very slightly soluble in water.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7. Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8. Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States]
TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN
TWA: 100 STEL: 150 from NIOSH [United States]
TWA: 375 STEL: 560 (mg/m3) from NIOSH [United States]
Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 2.7

Ionicity (In Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:
Soluble in diethyl ether, acetone.
Practically insoluble in cold water.
Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide.
Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:
Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride.
Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C.
Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 636 mg/kg [Rat].
Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC.
May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of skin contact (irritant), of ingestion, of inhalation.
Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:
Lowest Published Lethal Dose:
LDL [Human] - Route: Oral; Dose: 50 mg/kg
LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin.
Eyes: Causess mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abraisons. This usually resolves in 2 days.
Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite.
Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation.
Chronic Potential Health Effects:
Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophostatemia), severe, muscle weakness and Rhabdomyolysis..
Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12 - Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may

arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene
California prop. 65 (no significant risk level): Toluene: 7 mg/day (value)
California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value)
California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene
Connecticut hazardous material survey.: Toluene
Illinois toxic substances disclosure to employee act: Toluene
Illinois chemical safety act: Toluene
New York release reporting list: Toluene
Rhode Island RTK hazardous substances: Toluene
Pennsylvania RTK: Toluene
Florida: Toluene
Minnesota: Toluene
Michigan critical material: Toluene
Massachusetts RTK: Toluene
Massachusetts spill list: Toluene
New Jersey: Toluene
New Jersey spill list: Toluene
Louisiana spill reporting: Toluene
California Director's List of Hazardous Substances.: Toluene
TSCA 8(b) inventory: Toluene
TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92
SARA 313 toxic chemical notification and release reporting: Toluene
CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable.
R20- Harmful by inhalation.
S16- Keep away from sources of ignition - No smoking.
S25- Avoid contact with eyes.
S29- Do not empty into drains.
S33- Take precautionary measures against static discharges.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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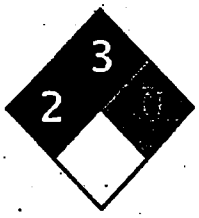

Health	2
Fire	3
Personal Protection	H

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: 1-800-901-7247
International Sales: 1-281-441-4400

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer).
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001)
CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001)
CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.
Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location..

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States]
TWA: 435 STEL: 545 from OSHA (PEL) [United States]
TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States]
TWA: 100 STEL: 125 (ppm) from NIOSH [United States]
TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States]
TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)]
TWA: 100 STEL: 125 (ppm) [Belgium]
TWA: 100 STEL: 125 (ppm) [Finland]
TWA: 50 (ppm) [Norway]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether.
Very slightly soluble in cold water or practically insoluble in water.
Soluble in all proportions in Ethyl alcohol.
Soluble in Carbon tetrachloride, Benzene.
Insoluble in Ammonia.
Slightly soluble in Chloroform.
Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials.
Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation.
Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill:
LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg
Lowest Published Lethal Dose/Conc:
LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data.
May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate.
May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Can cause mild skin irritation. It can be absorbed through intact skin.
Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS)
Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987).
Ingestion: Do not drink, pipet or siphon by mouth. May cause gastrolnestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene
Illinois toxic substances disclosure to employee act: Ethylbenzene
Illinois chemical safety act: Ethylbenzene
New York release reporting list: Ethylbenzene
Rhode Island RTK hazardous substances: Ethylbenzene
Pennsylvania RTK: Ethylbenzene
Minnesota: Ethylbenzene
Massachusetts RTK: Ethylbenzene
Massachusetts spill list: Ethylbenzene
New Jersey: Ethylbenzene
New Jersey spill list: Ethylbenzene
Louisiana spill reporting: Ethylbenzene
California Director's List of Hazardous Substances: Ethylbenzene
TSCA 8(b) inventory: Ethylbenzene
TSCA 4(a) proposed test rules: Ethylbenzene
TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97
SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).
CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable.
R20- Harmful by inhalation.
S16- Keep away from sources of ignition - No smoking.
S24/25- Avoid contact with skin and eyes.
S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other information

References:
-Manufacturer's Material Safety Data Sheet.
-Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA)
-Registry of Toxic Effects of Chemical Substances (RTECS)
-Chemical Hazard Response Information System (CHRIS)
-Hazardous Substance Data Bank (HSDB)
-New Jersey Hazardous Substance Fact Sheet
-Ariel Global View
-Reprotext System

Other Special Considerations: Not available.

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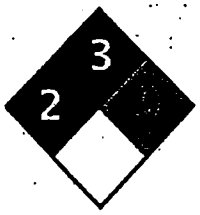

Material Safety Data Sheet
Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

Chemical Name: Xylenes (o-, m-, p- isomers)

Chemical Formula: C6H4(CH3)2

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call: 1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:
In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:
Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Highly flammable in presence of open flames and sparks, of heat.
Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:
Vapors may form explosive mixtures with air.
Containers may explode when heated.

May polymerize explosively when heated.
An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6. Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7. Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8. Exposure Controls/Personal Protection

Engineering Controls:
Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.

Personal Protection:
Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Vapor respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
TWA: 100 (ppm) [Canada]
TWA: 435 (mg/m3) [Canada]
TWA: 434 STEL: 651 (mg/m3) from ACGIH (TLV) [United States]
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States]
Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:
Insoluble in cold water, hot water.
Miscible with absolute alcohol, ether, and many other organic liquids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 2119 mg/kg [Mouse].

Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC.
May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals:
Lowest Lethal Dose:
LDL [Human] - Route: Oral; Dose: 50 mg/kg
LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:
Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal.
May cause adverse reproductive effects (male and femael fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Causes skin irritation. Can be absorbed through skin.
Eyes: Causes eye irritation.
Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves.
Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/kidneys. May cause effects similar to those of acute inhalation.
Chronic Potential Health Effects:
Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may alsocause mucosal bleeding.
Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:
Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other regulatory information

Federal and State Regulations:
Connecticut hazardous material survey.: Xylenes
Illinois chemical safety act: Xylenes
New York acutely hazardous substances: Xylenes
Rhode Island RTK hazardous substances: Xylenes
Pennsylvania RTK: Xylenes
Minnesota: Xylenes
Michigan critical material: Xylenes
Massachusetts RTK: Xylenes
Massachusetts spill list: Xylenes
New Jersey: Xylenes
New Jersey spill list: Xylenes
Louisiana spill reporting: Xylenes
California Director's List of Hazardous Substances: Xylenes
TSCA 8(b) inventory: Xylenes
SARA 302/304/311/312 hazardous chemicals: Xylenes
SARA 313 toxic chemical notification and release reporting: Xylenes
CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R10- Flammable.
R21- Harmful in contact with skin.
R36/38- Irritating to eyes and skin.
S2- Keep out of the reach of children.
S36/37- Wear suitable protective clothing and gloves.
S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other information

References: Not available.

Other Special Considerations: Not available.

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NFPA 704 (Section 16)

AMERADA HESS CORPORATION

MATERIAL SAFETY DATA SHEET

Methyl tert-Butyl Ether (MTBE) **MSDS No. 9922**

1. CHEMICAL PRODUCT and COMPANY INFORMATION (rev. Apr-98)

Amerada Hess Corporation
1 Hess Plaza
Woodbridge, NJ 07095-0961

EMERGENCY TELEPHONE NUMBER (24 hrs): **CHEMTREC (800) 424-9300**
COMPANY CONTACT (business hours): Corporate Safety (732) 750-6000

SYNONYMS: 2-methoxy-2-methyl propane; Methyl t-butyl ether; MTBE; t-butyl methyl ether

See Section 16 for abbreviations and acronyms.

2. COMPOSITION and INFORMATION ON INGREDIENTS (rev. Sep-94)

INGREDIENT NAME	EXPOSURE LIMITS	CONCENTRATION PERCENT BY WEIGHT
Methyl-tertiary butyl ether (MTBE)	OSHA PEL-TWA/STEL: None established	> 97%
CAS NUMBER: 1634-04-4	ACGIH TLV-TWA: 40 ppm, A3	

MTBE ($C_5H_{12}O$) is used as an octane booster and oxygenate for unleaded gasoline.

3. HAZARDS IDENTIFICATION (rev. Apr-98; Tox-98)

EMERGENCY OVERVIEW
DANGER!
EXTREMELY FLAMMABLE - EYE AND MUCOUS MEMBRANE IRRITANT - EFFECTS CENTRAL NERVOUS SYSTEM - HARMFUL OR FATAL IF SWALLOWED - ASPIRATION HAZARD

High fire hazard. Keep away from heat, spark, open flame, and other ignition sources.

Contact may cause eye, skin and mucous membrane irritation. Avoid prolonged breathing of vapors or mists. Inhalation may cause irritation, anesthetic effects (dizziness, nausea, headache, intoxication), and respiratory system effects.

If ingested, do NOT induce vomiting, as this may cause chemical pneumonia (fluid in the lungs).

EYES
Contact with the eye may cause slight to mild irritation.

SKIN
Practically non-toxic if absorbed following acute (single) exposure. May cause skin irritation with prolonged or repeated contact. Liquid may be absorbed through the skin in toxic amounts if large areas of skin are exposed repeatedly.

INGESTION
The major health threat of ingestion occurs from the danger of aspiration (breathing) of liquid drops into the lungs, particularly from vomiting. Aspiration may result in chemical pneumonia (fluid in the lungs), severe lung damage, respiratory failure and even death.

Ingestion may cause gastrointestinal disturbances, including irritation, nausea, vomiting, and diarrhea, and central nervous system (brain) effects similar to alcohol intoxication. In severe cases, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death may occur.

INHALATION
Excessive exposure may cause irritation to the nose, throat, lungs and respiratory tract. Central nervous system (brain) effects may include headache, dizziness, loss of balance and coordination, unconsciousness, coma, respiratory failure, and death.

WARNING: the burning of any hydrocarbon as a fuel in an area without adequate ventilation may result in hazardous levels of combustion products, including carbon monoxide, and inadequate oxygen levels, which may cause unconsciousness, suffocation, and death.

CHRONIC EFFECTS and CARCINOGENICITY
This product has produced cancer, developmental and systemic toxicity in laboratory animals following repeated exposure. The significance of these results to human exposures has not been determined – see Section 11, Toxicological Information.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE
Irritation from skin exposure may aggravate existing open wounds, skin disorders, and dermatitis (rash) conditions. Chronic respiratory disease, or pre-existing central nervous system disorders may be aggravated by exposure.

4. FIRST AID MEASURES (rev. Apr-98; Tox-98)

EYES
In case of contact with eyes, immediately flush with clean, low-pressure water for at least 15 min. Hold eyelids open to ensure adequate flushing. Seek medical attention.

SKIN
Remove contaminated clothing. Wash contaminated areas thoroughly with soap and water or waterless hand cleanser. Obtain medical attention if irritation or redness develops.

INGESTION
DO NOT INDUCE VOMITING. Do not give liquids. Obtain immediate medical attention. If spontaneous vomiting occurs, lean victim forward to reduce the risk of aspiration. Small amounts of material which enter the mouth should be rinsed out until the taste is dissipated.

INHALATION
Remove person to fresh air. If person is not breathing, ensure an open airway and provide artificial respiration. If necessary, provide additional oxygen once breathing is restored if trained to do so. Seek medical attention immediately.

5. FIRE FIGHTING MEASURES (rev: Nov-96)

FLAMMABLE PROPERTIES:

FLASH POINT:	-14 °F (-25 °C)
AUTOIGNITION TEMPERATURE:	AP 815 °F (435 °C)
OSHA/NFPA FLAMMABILITY CLASS:	1B (flammable liquid)
LOWER EXPLOSIVE LIMIT (%):	1.6
UPPER EXPLOSIVE LIMIT (%):	8.4

FIRE AND EXPLOSION HAZARDS
Vapors may be ignited rapidly when exposed to heat, spark, open flame or other source of ignition. Flowing product may be ignited by self-generated static electricity. When mixed with air and exposed to an ignition source, flammable vapors can burn in the open or explode in confined spaces. Being heavier than air, vapors may travel long distances to an ignition source and flash back. Runoff to sewer may cause fire or explosion hazard.

This product burns with a blue flame which is often less visible than gasoline or other petroleum hydrocarbons flames.

EXTINGUISHING MEDIA
SMALL FIRES: Any extinguisher suitable for Class B fires, dry chemical, CO_2, water spray, fire fighting foam, or Halon.

LARGE FIRES: Water spray, fog or fire fighting foam suitable for polar solvents. Water may be ineffective for fighting the fire, but may be used to cool fire-exposed containers.

Firefighting foam suitable for polar solvents is recommended - refer to NFPA 11 "Low Expansion Foam."

FIRE FIGHTING INSTRUCTIONS

Small fires in the incipient (beginning) stage may typically be extinguished using handheld portable fire extinguishers and other fire fighting equipment.

Firefighting activities that may result in potential exposure to high heat, smoke or toxic by-products of combustion should require NIOSH/MSHA- approved pressure-demand self-contained breathing apparatus with full facepiece and full protective clothing.

Isolate area around container involved in fire. Cool tanks, shells, and containers exposed to fire and excessive heat with water. For massive fires the use of unmanned hose holders or monitor nozzles may be advantageous to further minimize personnel exposure. Major fires may require withdrawal, allowing the tank to burn. Large storage tank fires typically require specially trained personnel and equipment to extinguish the fire, often including the need for properly applied fire fighting foam.

See Section 16 for the NFPA 704 Hazard Rating.

6. ACCIDENTAL RELEASE MEASURES (rev. Apr-98)

ACTIVATE FACILITY SPILL CONTINGENCY or EMERGENCY PLAN.

Evacuate nonessential personnel and remove or secure all ignition sources. Consider wind direction; stay upwind and uphill, if possible. Evaluate the direction of product travel, diking, sewers, etc. to confirm spill areas. Spills may infiltrate subsurface soil and groundwater; professional assistance may be necessary to determine the extent of subsurface impact.

Carefully contain and stop the source of the spill, if safe to do so. Protect bodies of water by diking, absorbents, or absorbent boom, if possible. Do not flush down sewer or drainage systems, unless system is designed and permitted to handle such material. The use of fire fighting foam may be useful in certain situations to reduce vapors. The proper use of water spray may effectively disperse product vapors or the liquid itself, preventing contact with ignition sources or areas/equipment that require protection.

Take up with sand or other oil absorbing materials. Carefully shovel, scoop or sweep up into a waste container for reclamation or disposal - caution, flammable vapors may accumulate in closed containers. Response and clean-up crews must be properly trained and must utilize proper protective equipment (see Section 8).

7. HANDLING and STORAGE (rev. Apr-98)

HANDLING PRECAUTIONS

Handle as a flammable liquid. Keep away from heat, sparks, and open flame! Electrical equipment should be approved for classified area. Bond and ground containers during product transfer to reduce the possibility of static-initiated fire or explosion.

Special slow load procedures for "switch loading" must be followed to avoid the static ignition hazard that can exist when higher flash point material (such as fuel oil) is loaded into tanks previously containing low flash point products (such as this product) - see API Publication 2003, "Protection Against Ignitions Arising Out Of Static, Lightning and Stray Currents.

STORAGE PRECAUTIONS

Keep away from flame, sparks, excessive temperatures and open flame. Use approved vented containers. Keep containers closed and clearly labeled. Empty product containers or vessels may contain explosive vapors. Do not pressurize, cut, heat, weld or expose such containers to sources of ignition.

Store in a well-ventilated area. This storage area should comply with NFPA 30 "Flammable and Combustible Liquid Code". Avoid storage near incompatible materials. The cleaning of tanks previously containing this product should follow API Recommended Practice (RP) 2013 "Cleaning Mobile Tanks In Flammable and Combustible Liquid Service" and API RP 2015 "Cleaning Petroleum Storage Tanks".

WORK/HYGIENIC PRACTICES
Emergency eye wash capability should be available in the near proximity to operations presenting a potential splash exposure. Use good personal hygiene practices. Avoid repeated and/or prolonged skin exposure. Wash hands before eating, drinking, smoking, or using toilet facilities. Do not use as a cleaning solvent on the skin. Do not use solvents or harsh abrasive skin cleaners for washing this product from exposed skin areas. Waterless hand cleaners are effective. Promptly remove contaminated clothing and launder before reuse. Use care when laundering to prevent the formation of flammable vapors which could ignite via washer or dryer. Consider the need to discard contaminated leather shoes and gloves.

8. EXPOSURE CONTROLS and PERSONAL PROTECTION (rev. Nov-96)

ENGINEERING CONTROLS
Use adequate ventilation to keep vapor concentrations of this product below occupational exposure and flammability limits, particularly in confined spaces.

EYE/FACE PROTECTION
Safety glasses or goggles are recommended where there is a possibility of splashing or spraying.

SKIN PROTECTION
Gloves constructed of nitrile or neoprene are recommended. Chemical protective clothing such as of E.I. DuPont Tychem ®, Barricade ®, or equivalent recommended based on degree of exposure. Note: The resistance of specific material may vary from product to product as well as with degree of exposure. Consult manufacturer specifications for further information.

RESPIRATORY PROTECTION
A NIOSH/MSHA-approved air-purifying respirator with organic vapor cartridges or canister may be permissible under certain circumstances where airborne concentrations are or may be expected to exceed exposure limits or for odor or irritation. Protection provided by air-purifying respirators is limited. Use a positive pressure, air-supplied respirator if there is a potential for uncontrolled release, exposure levels are not known, in oxygen-deficient atmospheres, or any other circumstance where an air-purifying respirator may not provide adequate protection.

Refer to OSHA 29 CFR 1910.134, ANSI Z88.2-1992, NIOSH Respirator Decision Logic, and the manufacturer for additional guidance on respiratory protection selection.

9. PHYSICAL and CHEMICAL PROPERTIES (rev. Sep-94)

APPEARANCE
A clear, water-like liquid

ODOR
A sweet, ether-like odor.

ODOR THRESHOLD
Odor detectable at 0.05 ppm and recognizable at 0.13 ppm. Highly odorous.

BASIC PHYSICAL PROPERTIES

BOILING POINT:	131 °F (55 °C)
VAPOR PRESSURE:	7.8 PSI @ 100 °F (38 °C)
VAPOR DENSITY (air = 1):	3.1
SPECIFIC GRAVITY (H_2O = 1):	0.74
EVAPORATION RATE:	ND - probably high
PERCENT VOLATILES:	100 %
SOLUBILITY (H_2O):	AP 5% @ 68 °F (20 °C)

10. STABILITY and REACTIVITY (rev. Sep-94)

STABILITY: Stable. Hazardous polymerization will not occur.

CONDITIONS TO AVOID
Avoid high temperatures, open flames, sparks, welding, smoking and other ignition sources.

INCOMPATIBLE MATERIALS
Keep away from strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS
Carbon monoxide, carbon dioxide, non-combusted hydrocarbons (smoke), irritating aldehydes and ketones, and other toxic vapors.

11. TOXICOLOGICAL PROPERTIES (rev. Apr-98)

ACUTE EFFECTS

Acute Dermal:	LD50 (rabbit): >10 g/kg	Eye Irritation (rabbits): mild to moderate
Acute Inhalation:	LC50 (rat): 35,000 ppm	Dermal Irritation (rabbit): slight
Acute Oral:	LD50 (rat): 4.0 ml/kg	Dermal Sensitization: negative

CHRONIC EFFECTS AND CARCINOGENICITY
Carcinogenic: IARC: NO NTP: NO OSHA: NO ACGIH: A3 (animal carcinogen)
MTBE has demonstrated some evidence of developmental toxicity in animal models.

MUTAGENICITY (genetic effects)
MTBE was positive in a single mutagenicity study following activation.

12. ECOLOGICAL INFORMATION (rev. Apr-98)

Keep out of sewers, drainage and waterways. Report spills and releases, as applicable, under Federal and State regulations. If released, MTBE will be expected to exhibit fairly high mobility in soil, and therefore may leach into groundwater. Refer to API Publication 4497, "Cost-Effective, Alternative Treatment Technologies For Reducing the Concentrations of Ethers and Alcohols in Groundwater."

13. DISPOSAL CONSIDERATIONS (rev. Apr-98)

Consult federal, state and local waste regulations to determine appropriate disposal options.

14. TRANSPORTATION INFORMATION (rev. Sep-94)

PROPER SHIPPING NAME:	Methyl tert-butyl ether
HAZARD CLASS AND PACKING GROUP:	3, PG II
DOT IDENTIFICATION NUMBER:	UN 2398
DOT SHIPPING LABEL:	FLAMMABLE LIQUID

15. REGULATORY INFORMATION (rev. Nov-96)

U.S. FEDERAL, STATE, and LOCAL REGULATORY INFORMATION
This product and its constituents listed herein are on the EPA TSCA Inventory. Any spill or uncontrolled release of this product, including any substantial threat of release, may be subject to federal, to state and/or local reporting requirements. This product and/or its constituents may also be subject to other regulations at the federal, state and/or local level. Consult those regulations applicable to your facility / operation. Consult those regulations applicable to your facility/operation.

CLEAN WATER ACT (OIL SPILLS)
Any spill or release of this product to "navigable waters" (essentially any surface water, including certain wetlands) or adjoining shorelines sufficient to cause a visible sheen or deposit of a sludge or emulsion must be reported immediately to the National Response Center (1-800-424-8802) or, if not practical, the U.S. Coast Guard with follow-up to the National Response Center, as required by U.S. Federal Law. Also contact appropriate state and local regulatory agencies as required.

CERCLA SECTION 103 and SARA SECTION 304 (RELEASE TO THE ENVIRONMENT)
MTBE is a CERCLA hazardous substance and as such is subject to CERCLA and SARA federal reporting requirements. Reportable Quantity (pounds): 1000

SARA SECTION 311/312 - HAZARD CLASSES

ACUTE HEALTH	CHRONIC HEALTH	FIRE	SUDDEN RELEASE OF PRESSURE	REACTIVE
X	X	X	–	–

SARA SECTION 313 - SUPPLIER NOTIFICATION

This product contains the following toxic chemicals subject to the reporting requirements of section 313 of the Emergency Planning and Community Right-To-Know Act (EPCRA) of 1986 and of 40 CFR 372:

INGREDIENT NAME	CONCENTRATION PERCENT BY WEIGHT
Methyl-tertiary butyl ether (MTBE) CAS NUMBER: 1634-04-4	> 97

CANADIAN REGULATORY INFORMATION (WHMIS)

Class B, Division 2 (Flammable Liquid)
Class D, Division 2, Subdivision B (Toxic by other means)

16. OTHER INFORMATION (rev. Nov-96)

NFPA® HAZARD RATING	HEALTH:	1	Slight
	FIRE:	3	High
	REACTIVITY:	0	Negligible
HMIS® HAZARD RATING	HEALTH:	1*	Slight
	FIRE:	3	Serious
	REACTIVITY:	0	Negligible
			* Chronic

SUPERSEDES MSDS DATED: 11/21/96

ABBREVIATIONS:

AP = Approximately < = Less than > = Greater than
N/A = Not Applicable N/D = Not Determined ppm = parts per million

ACRONYMS:

ACGIH	American Conference of Governmental Industrial Hygienists
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute (212)642-4900
API	American Petroleum Institute 202)682-8000
CERCLA	Comprehensive Emergency Response, Compensation, and Liability Act
DOT	U.S. Department of Transportation [General Info: (800)467-4922]
EPA	U.S. Environmental Protection Agency
HMIS	Hazardous Materials Information System
IARC	International Agency For Research On Cancer
MSHA	Mine Safety and Health Administration
NFPA	National Fire Protection Association (617)770-3000
NIOSH	National Institute of Occupational Safety and Health
NOIC	Notice of Intended Change (proposed change to ACGIH TLV)
NTP	National Toxicology Program
OPA	Oil Pollution Act of 1990
OSHA	U.S. Occupational Safety & Health Administration
PEL	Permissible Exposure Limit (OSHA)
RCRA	Resource Conservation and Recovery Act
REL	Recommended Exposure Limit (NIOSH)
SARA	Superfund Amendments and Reauthorization Act of 1986 Title III
SCBA	Self-Contained Breathing Apparatus
SPCC	Spill Prevention, Control, and Countermeasures
STEL	Short-Term Exposure Limit (generally 15 minutes)
TLV	Threshold Limit Value (ACGIH)
TSCA	Toxic Substances Control Act
TWA	Time Weighted Average (8 hr.)
WEEL	Workplace Environmental Exposure Level (AIHA)
WHMIS	Canadian Workplace Hazardous Materials Information System

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