

DRINKING WATER SAMPLING AND ENVIRONMENTAL INVESTIGATION
Lisbon Groundwater Investigation
Lisbon, Maryland
Case No. 1988-1496HO; Case No. 2005-1012HO

The Maryland Department of the Environment (MDE), Oil Control Program (OCP) in coordination with the Howard County Department of Health (HOCHD), continues to evaluate petroleum impacts in the Lisbon area located in Howard County. Lisbon is a small-unincorporated town in the Northwest corner of Howard County. It is served by individual private wells and septic systems. The Department has determined that there have been two historic petroleum releases related to the two independently owned and operated gas stations in the study area; Lisbon Citgo/Lisbon Garage (15943 Frederick Road) and Lisbon Service Center/Lisbon BP Amoco (15882 Frederick Road). Two distinct but co-mingled groundwater contaminant plumes comprising of benzene and methyl tertiary butyl ether (MTBE) have been identified.

Benzene is a component of gasoline. The Federal and State drinking water standard or Maximum Contaminant Level for benzene is 5 parts per billion (ppb). MTBE is a fuel additive commonly used to reduce carbon monoxide and ozone levels caused by auto emissions. There is no national regulatory standard for MTBE in drinking water. In 1997, the U.S. Environmental Protection Agency (EPA) issued an advisory for MTBE based on taste and odor of 20 to 40 parts per billion (ppb). Although the EPA has not established a regulated Maximum Contaminant Level (MCL) for MTBE, the MDE has adopted an action level of 20 ppb.

The underground storage tanks at the Lisbon Citgo/Lisbon Garage (also known as Lisbon Auto Center, Flick's Auto Body) located at 15943 Frederick Road are registered to Lisbon Auto Center and operated by the Frederickson's. Currently the facility operates three (3) cathodic protected, steel underground storage tanks (USTs). These gasoline tanks were installed in 1987 and include a 6,000-gallon and two 8,000-gallon capacity storage tanks. Historically, this facility had other underground tanks that have been removed; a 2,000-gallon diesel, a 2,000-gallon and a 4,000-gallon gasoline, two heating oil tanks that were 1,000 gallons in capacity and a 1,000-gallon used oil tank.

The Lisbon Service Center at 15882 Frederick Road is branded as a BP Amoco station (also known as, Lisbon Amoco). The underground tanks are registered to BP, independently operated by M. Shahid. Currently there are six UST systems comprising of four (4) 4,000-gallon gasoline, a 4,000-gallon diesel, and a 1,000-gallon kerosene tank. These tanks were installed in 1985 and are composite steel/fiberglass with flexible plastic piping.

Case Chronology

In April 1978 the Department's Water Resource Administration (precursor to the MDE) became aware of potential environmental issues in the Lisbon area when gasoline odors were detected in a drinking water well servicing the resident at 15935 Frederick Road, adjacent to the former Lisbon Garage/Lisbon Citgo. Testing of the UST systems at the Lisbon Service Center/Lisbon BP Amoco was conducted in July 1979 and the tanks were determined to be in operational compliance.

In February 1981, approximately 500 gallons of gasoline were released from a 2,000-gallon gasoline UST system at the Lisbon Garage/Lisbon Citgo. Based on this release, the Department identified the property owner (Lisbon Properties, Inc.) and property lessee (Lisbon Garage, Inc.) as the responsible party for the off-site petroleum impact at 15935 Frederick Road. In May 1981, the MDE-OCP sampled two additional supply wells (15927 and 15936 Frederick Road) and petroleum contaminants were also detected.

A private settlement agreement was reached between the responsible party (Lisbon Garage/Lisbon Citgo) and three impacted homeowners at 15921, 15935, and 15936 Frederick Road. The Department understands that the terms of this settlement included the installation and maintenance of granular activated carbon (GAC) filtration systems on impacted drinking water wells. To date, the Department has not received data regarding the installation and/or maintenance of any GAC systems on the supply wells serving these properties, pursuant to the settlement agreement.

- In April 1987 six USTs were removed from the Lisbon Garage/Lisbon Citgo property, including the UST implicated in the original 500 gallon gasoline release. The MDE-OCP required soil removal and the installation of monitoring wells on-site. Three new gasoline USTs (two 6,000-gallon and one 8,000-gallon) were installed on the property in June 1987 and are currently in use at the site.
- Throughout the late-1980s and late 1990s, the MDE-OCP continued to monitor groundwater conditions in the Lisbon area to delineate the extent of groundwater contamination. This investigation included sampling of 38 drinking water wells in the area and the installation and sampling of seventeen (17) monitoring wells. Several of these monitoring wells were installed on the Howard County Parks and Recreation property located adjacent to Lisbon Elementary School.
- In March 2003, the new property owner of 15921 Frederick Road contacted the Department requesting assistance to maintain the GAC. The new property owner is related to the former owner who was part of settlement agreement with the responsible party for the original release. Currently the Department is maintaining this GAC treatment system at no cost to the homeowner.
- On March 7, 2005, the MDE-OCP received a *Phase II Environmental Site Assessment (ESA)*, which was performed at the Lisbon Service Center/Lisbon BP Amoco as part of a pending property transaction. During the assessment, three on-site monitoring wells (MW1-MW3), four temporary well points (GP1-GP4), and the on-site potable well were sampled. The three monitoring wells had been installed on-site in 1985 as part of a site investigation for closed *MDE Case No. 6-0237HO*. The highest level of MTBE detected on-site was 16,000ppb in MW-1, which is located adjacent to the tankfield. The on-site potable well sample detected MTBE at 5.5ppb.
- On March 30, 2005, the MDE-OCP opened *Case No. 2005-1012HO* due to reported levels of MTBE contamination in the on-site monitoring well network at the Lisbon Service Center/Lisbon BP Amoco. The MDE-OCP required helium testing of the UST systems to be performed on-site.
- On March 1, 2006, the MDE-OCP performed a compliance inspection at the Lisbon Service Center/Lisbon BP Amoco. The inspection revealed that helium testing of the on-site UST systems was conducted; system passed. In addition, the cathodic system was upgraded with sacrificial anodes; system passed.
- On March 2006, resident at 15921 Frederick Road, Mascaro residence, replace hand dug 16 foot well with a 300-foot double cased well.
- On August 24, 2006, MDE-OCP issued a directive letter to K & K Excavating, operators of Lisbon Service Center/Lisbon BP Amoco, which required redevelopment and sampling of existing monitoring wells (MW1-MW3) and tankfield monitoring pipes, sampling of the on-site potable well, and sampling of potable wells at the following adjacent properties: 15878, 15886, and 15904 Frederick Road).
- In late 2006, the MDE-OCP received a *Report of Monitoring Well Sampling and Analysis* performed at the Lisbon Service Center/Lisbon BP Amoco, which included sampling of three monitoring wells, on-site potable well, and three adjacent potable wells. The highest level of MTBE detected on-site was 37.3ppb in MW-2. Benzene was not detected in any on-site monitoring wells. The on-site potable well sample detected MTBE at 3.51ppb and benzene at 1.57ppb; no GAC system was installed on the domestic well. The potable well sample collected from 15878 Frederick Road was non-detect for all petroleum constituents. However, the well sample collected from 15904 Frederick Road detected MTBE at 73.2ppb and benzene at 58.5ppb.
- In October 2006, the HOCHD sampled the domestic well at 15886 Frederick Road, located on the subdivided lot adjoining the Lisbon BP Amoco/Lisbon Service Center. Sampling detected MTBE at 91 ppb and benzene at 61.8

ppb. This well servicing the residential property is illegal and not permitted by the HOCHD. Therefore, the Department issued a letter to the property owner on November 16, 2006 stating that the State will not assume responsibility for the installation of a GAC system on this unpermitted well.

- In January 2007, the MDE-OCP determined that the property located at 15904 Frederick Road was vacant and being considered for use as a rental property. The Department issued a letter on January 18, 2007, which stated that the well should not be utilized for drinking water purposes and that the State would not assume responsibility for installing a GAC system, given that it was not an owner-occupied residence.
- On February 5, 2007, the Department issued a directive letter to K& K Excavating, operators of Lisbon Service Center/Lisbon BP Amoco requiring continued quarterly sampling of the three on-site monitoring wells, monitoring pipes and the permitted drinking water well.
- Between February and April 2007, the MDE- OCP in conjunction with HOCHD conducted a joint sampling effort of seventeen (17) properties (*see Table 1 for Sampling Results*). Three (3) properties were not sampled as part of the investigation due to denial of access and/or property vacancy, including: 15904, 15927, and 15928 Frederick Road.
- June 5, 2007. MDE-OCP contractor installed a GAC system at 15912 Frederick Road (*See Table*).
- June 22, 2007. MDE-OCP contractor installed a GAC system at 15935 Frederick Road (*See Table*).
- July 13, 2007. MDE-OCP conducted follow-up sampling at 15931 and 15935 Frederick Road (*See Table*).
- July 31, 2007. MDE-OCP contractor sampled monitoring wells in the Lisbon area (*See Tables*). The following wells were unable to be located during sampling activities: MW2, MW3, MW6, MW8, and P8
- August 8, 2007. MDE-OCP contractor collected a sample from 15935 Frederick Road. The sample was collected to confirm the presence of petroleum constituents in post-GAC filtration samples. During sample collection, the contractor noted several filtration devices (i.e., water softener, reverse osmosis filter) located after the State's maintained GAC filters. Sample results collected after the GAC filters were non-detect for petroleum constituents (*See table*).
- August 13, 2007. MDE-OCP collected a sample from 15931 Frederick Avenue (*See Table*).
- August 2007. MDE-OCP contractor collected drinking water samples from three residences (*See table*).
- August 24, 2007. MDE-OCP received sample results from HOCHD for the domestic well at 15878 Frederick Road. The County sampled the well due to a complaint of odor in the drinking water (*See Table*).
- September 2007. MDE-OCP contractor collected drinking water samples from two residences (*See table*).
- October 2007. MDE-OCP contractor collected drinking water samples from two residences (*See table*).
- October 3, 2007. MDE-OCP contractor installed GAC system at 15931 Frederick Road (*See table*).
- November 2007. MDE-OCP contractor collected drinking water samples from two residences (*See table*).
- December 15, 2007. MDE-OCP contractor installed GAC system at 15921 Frederick Road (*See table*).
- January 2008. . MDE-OCP contractor collected drinking water samples from five residences (*See table*).
- April 2008... MDE-OCP contractor collected drinking water samples from five residences (*See table*).

Current Activities:

- Currently the MDE-OCP has assumed responsibility for the sampling and maintenance of three (3) GAC systems at no cost to these homeowners
 - Mascaro residence (15921 Frederick Road);
 - H. Esworthy residence (15935 Frederick Road),
 - Hansgen residence (15912 Frederick Road),
 - T. Esworthy residence (15931 Frederick Road), and
 - Marick residence (15921 Frederick Road)
- MDE-OCP will continue to monitor groundwater conditions in the Lisbon area for petroleum constituents and anticipates collecting another round of sample in the future from select drinking water wells in the area.
- The MDE-Water Supply Program will continue to require periodic sampling of the schools supply well located hydrologically upgradient of the impacted area.

Associated Cases:

- *Case No. 1986-0237-HO.* This case was opened on September 3, 1985 due to perforations observed during the removal of four USTs from the Lisbon Service Station property, including two (2) 2,000-gallon gasoline, a 550-gallon gasoline, and a 550-gallon heating oil. BP Oil, Inc owned the USTs removed from the site. Three monitoring wells were installed on-site to delineate potential contamination on the property, no LPH was detected in the monitoring wells and the case was subsequently closed with no further action required.
- *Case No. 1991-2365-HO.* This case was opened on May 28, 1991 due to a release of petroleum product from a multi-pump dispenser occurred on the Lisbon Garage property. Approximately one (1) gallon of product was released and station personnel took appropriate action to remediate the release. The case was subsequently closed with no further action required.
- *Case No. 1999-2339-HO* was opened and closed on March 24, 1999 due to the removal of a 550-gallon waste oil UST from the Lisbon Garage property. MDE-OCP observed no perforations in the UST or contaminated soil in the excavation. The case was subsequently closed with no further action required.
- *Case No. 1992-0076HO* was closed on March 9, 2007. In August 1998 a 15,000-gallon heating oil tank was properly abandoned-in-place at the Lisbon Elementary School located at 15901 Frederick Road. Liquid Phase hydrocarbon was subsequently detected in an on-site monitoring well. This well was periodically gauged. In September 1991 sampling of the monitoring well detected toluene at 3 ppb and xylene at 1.6 ppb, well below the cleanup standard of 1000 and 10000 ppb respectively for each compound. Sampling of a monitoring well in September 2006 yielded non-detect levels. This well was properly abandoned.
- *Case No. 2001-0985-HO* was opened and closed on January 21, 2001 due to the removal of two 1,000-gallon #2 heating oil USTs from the property at 15941 Frederick Road, located adjacent to and under the same ownership as Lisbon Garage. MDE-OCP observed no perforations in the USTs or contaminated soil in the excavation. The case was subsequently closed with no further action required.
- *Case No. 2006-0050-HO* was opened and closed on July 8, 2005 due to the installation of a 10,000-gallon diesel UST on-site. The tank was placed in operation on August 2005 and the case was subsequently closed.

Future Updates:

- Future updated on this case investigation will be posted at www.mde.state.md.us [at the MDE homepage, (select) Land, (select) Program, (select) Oil Control, (select) Remediation Sites].

Contacts

- Maryland Department of the Environment (MDE) Oil Control Program: 410-537-3443
- Howard County Health Department Bureau of Environmental Health: 410-313-2640

Disclaimer

The intent of this fact sheet is to provide the reader a summary of site events as they are contained within documents available to MDE. To fully understand the site and surrounding environmental conditions, MDE recommends that the reader review the case file that is available at MDE through the Public Information Act. The inclusion of a person or company's name within this fact sheet is for informational purposes only and should not be considered a conclusion by MDE on guilt, involvement in a wrongful act or contribution to environmental damage.

Table 1: Drinking Water Sample Results from Lisbon Area Investigation

Property Owner	Site Address (UST/AST system present)	Land Use	Sampled By	Sample Event	Petroleum Constituents of Concern			GAC Installed Yes ✓ Pending ☑
					Benzene MCL at 5ppb	MTBE (ppb) State's Action Level at 20 ppb	Other Compound	
Betty Ward	15875 Frederick Rd. (AST Heating oil on-site)	Commercial		1989	ND	ND	---	
			MDE-OCP	02/27/07	ND	ND	---	
Susan White	15878 Frederick Rd	Residential	HOCHD	9/29/06 7/2/07	ND ND	ND ND	--- TBA @ 4.28ppb	
Judy Ketterman	15884 Frederick Rd	Residential	HOCHD	10/04/06	61.8	91	---	Illegal well
Lisbon Elementary School	15901 Frederick Rd	Commercial Served by two supply wells	HOCHD	02/12/91	ND	ND	ND	
			MDE-WSP	01/10/95	ND	ND	ND	
			MDE-WSP	04/12/95	ND	ND	ND	
			MDE-WSP	05/09/95	ND	ND	ND	
			MDE-WSP	07/13/95	ND	ND	ND	
			MDE-WSP	10/12/95	ND	ND	ND	
			MDE-WSP	09/18/96	ND	ND	ND	
			MDE-WSP	05/09/97	---	---	---	
			MDE-WSP	11/05/01	---	0.58	---	
Kim Jun Suk	15904 Frederick Rd.	Residential Vacant;		1989	ND	ND	---	
				09/29/06	58.8	73.2	---	
Cathy Datz	15908 North Ave. (UST heating oil on-site)	Residential Owner Occupied		1989	ND	ND	---	
			HOCHD	03/14/07	ND	0.66	---	
Stephen Hansgen	15912 Frederick Rd. (AST Heating oil on-site)	Residential Owner Occupied (former daycare)		1990	ND	4.8	---	✓ New GAC installed June 2007 by State
			MDE-OCP	02/28/07	ND	56.6	---	
			HOCHD	03/14/07	ND	62	---	
			MDE-OCP	6/20/07	Pre-filter - 5	Pre-filter - 47	---	
			MDE-OCP	8/23/07	Post-filter - 3.8	Post-filter - 38	Post-Filter TBA - 5ppb;	
			MDE-OCP	9/13/07	Pre-filter - 3.5	Pre-filter - 45		
			MDE-OCP	1/2/08	ND	Pre-filter - 31		
			MDE-OCP	4/29/08	ND	Pre-filter - 28		
Paul Dayhoff	15919 Frederick Rd. (UST heating oil on-site)	Residential Owner Occupied		1990	ND	Pre-filter - 4.6		
			MDE-OCP	03/05/07	ND	0.54		
Michael Marick	15920 Frederick Rd.	Residential Owner Occupied		1990	720	301		✓ New GAC installed December 2007 by State. Homeowner previously had one carbon filter on drinking water well.
			MDE-OCP	03/08/07	Pre-filter - ND Post-filter - ND	Pre-filter - ND Post-filter - 20		
			MDE-OCP	3/26/07	Pre-filter - ND Post-filter - ND	Pre-filter - 0.74 Mid-filter - 10.20 Post-filter - 22.30		
			MDE-OCP	8/31/07	Pre-filter - ND Post-filter - ND	Pre-filter - 20.6 Mid-filter - 46.6 Post-filter 20.5		
			MDE-OCP	11/1/07	Pre-filter - 6	Pre-filter - 110	Pre-filter - 18	
			MDE-OCP	11/15/07	Pre-filter - 5	Pre-filter - 79	Pre-filter - 15	
			MDE-OCP	1/2/08	Pre-filter - 2	Pre-filter - 79	Pre-filter - ND	
			MDE-OCP	1/17/08	Pre-filter - 6	Pre-filter - 79	Pre-filter - 17	
MDE-OCP	4/30/08	ND	Pre-filter - 1	ND				
	9/10/08	Pre-filter - 2	Pre-filter - 74	ND				

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Property Owner	Site Address (UST/AST system present)	Land Use	Sampled By	Sample Event	Petroleum Constituents of Concern			GAC Installed Yes <input checked="" type="checkbox"/> Pending <input type="checkbox"/>
					Benzene MCL at 5ppb	MTBE (ppb) State's Action Level at 20 ppb	Other Compound	
Dianne Mascaro	15921 Frederick Rd.	Residential Owner Occupied 03/2006 - Old hand dug well 16ft well replaced by a new deep well drilled to 300 ft.	MDE-OCP	03/26/03	Pre-filter -76	Pre-filter - 770	Pre-filter TBA -210	✓New GAC installed by State in December 2003.
			MDE-OCP	04/18/03	Pre-filter -45	Pre-filter - 880	Pre-filter TBA -190	
			MDE-OCP	07/21/03	Pre-filter -38	Pre-filter - 540	Pre-filter TBA -150	
			MDE-OCP	10/22/03	Pre-filter -34	Pre-filter - 530	Pre-filter TBA -380	
			MDE-OCP	02/26/04	Pre-filter -40	Pre-filter - 660	Pre-filter TBA -350	
			MDE-OCP	06/17/04	Pre-filter -45	Pre-filter - 1300	Pre-filter TBA -400	
			MDE-OCP	08/11/04	Pre-filter -ND	Pre-filter - 930	Pre-filter TBA -620	
			MDE-OCP	10/12/04	Pre-filter -37	Pre-filter -1000	Pre-filter TBA -690	
			MDE-OCP	12/15/04	Pre-filter - 25	Pre-filter - 950	Pre-filter TBA - 480 Mid-filter TBA - 100 Post-filter TBA - 89	
			MDE-OCP	2/18/05	Pre-filter - 61	Pre-filter - 1100 Mid-filter - 610	Pre-filter TBA - 610 Mid-filter TBA - 280 Post-filter TBA - 120	
			MDE-OCP	4/15/05	Pre-filter - 33	Pre-filter - 680	Pre-filter TBA - 480 Mid-filter TBA - 100 Post-filter TBA - 92	
			MDE-OCP	7/8/05	Pre-filter - 29	Pre-filter - 860 Mid-filter - 610	Pre-filter TBA - 570 Mid-filter TBA - 390 Post-filter TBA - 100	
			MDE-OCP	10/11/05	Pre-filter - 20	Pre-filter - 910 Mid-filter - 510	Pre-filter TBA - 500 Mid-filter TBA - 23 Post-filter TBA - 44	
			MDE-OCP	1/10/06	Pre-filter - 26	Pre-filter - 1900 Mid-filter - 790 Post-filter 99	Pre-filter TBA - 1300 Mid-filter TBA - 130 Post-filter TBA - 53	
			MDE-OCP	4/24/06	ND	Mid-filter - 300 Post-filter - 13	Pre-filter TBA - 40 Mid-filter TBA - 180 Post-filter TBA - 40	
			MDE-OCP	5/18/06	ND	Pre-filter - 200	Pre-filter TBA - 49	
			MDE-OCP	7/19/06	Pre-filter - 150	Pre-filter - 290 Mid-filter - 4	Pre-filter TBA - 91	
			MDE-OCP	10/19/06	Pre-filter - 42	Pre-filter - 94	Pre-filter TBA - 18 Mid-filter TBA - 61 Post-filter TBA - 51	
			MDE-OCP	1/26/07	Pre-filter - 220	Pre-filter - 280 Mid-filter - 85	Pre-filter TBA - 92 Mid-filter TBA - 60 Post-filter TBA - 48	
			MDE-OCP	4/27/07	Pre-filter - 500	Pre-filter - 600	Pre-filter TBA - 170 Mid-filter TBA - 86 Post-filter TBA - 46	

Table 1: Drinking Water Sample Results from Lisbon Area Investigation

Property Owner	Site Address (UST/AST system present)	Land Use	Sampled By	Sample Event	Petroleum Constituents of Concern			GAC Installed Yes <input checked="" type="checkbox"/> Pending <input type="checkbox"/>
					Benzene MCL at 5ppb	MTBE (ppb) State's Action Level at 20 ppb	Other Compound	
Dianne Mascaro (continued)			MDE-OCP	8/16/07	Pre-filter - 90	Pre-filter - 140 Mid-filter - 230	Pre-filter TBA - 46 Mid-filter TBA - 66 Post-filter TBA - 97	
			MDE-OCP	10/22/07	Pre-filter - 13	Pre-filter - 20 Mid-filter - 0.70 Post-filter 0.50		
			MDE-OCP	1/17/08	Pre-filter - 190	Pre-filter - 360	Pre-filter DCA - 5, TBA - 90 Mid-filter TBA - 44	
			MDE-OCP	4/24/08	Pre-filter - 160	Pre-filter - 220	Pre-filter TBA - 65 Mid-filter TBA - 84 Post-filter TBA - 53	
			MDE-OCP	9/10/08	Pre-filter - 91	Pre-filter - 180	Pre-filter Naphthalene - 4; TBA - 37 Mid-filter TBA - 55 After-filter TBA - 47	
RFC Inc. Ramirez	15927 Frederick Rd.	Commercial		1994	697	144.6		
			MDE-OCP	02 - 05/07	Access denied for sampling			
Peter McIntosh (Northern Cross Electric)	15928 Frederick Rd.	Commercial		1988	ND	ND		
			MDE-OCP	02 - 05/07	Access denied for sampling			
Thomas Esworthy	15931 Frederick Rd.	Residential Owner Occupied		1994	190.5	118.4	✓ New GAC installed October 2007 by State	
			MDE-OCP	02/27/07	Pre-filter - ND Post-filter - ND	Pre-filter - 14.5 Post-filter - 18.1		
			MDE-OCP	7/16/07	Post-Filter - ND	Post-Filter - 16.8		
			MDE-OCP	8/13/07	0.57	21.1		
			MDE-OCP	10/22/07	ND	Pre-filter - 20		
			MDE-OCP	11/15/07	ND	Pre-filter - 17		
			MDE-OCP	1/2/08	ND	Pre-filter - 14		
			MDE-OCP	4/30/08	ND	Pre-filter - 7		
MDE-OCP	10/27/08	ND	Pre-filter - 10 Mid-filter - 1.5	ND				

Table 1: Drinking Water Sample Results from Lisbon Area Investigation

Property Owner	Site Address (UST/AST system present)	Land Use	Sampled By	Sample Event	Petroleum Constituents of Concern			GAC Installed Yes <input checked="" type="checkbox"/> Pending <input type="checkbox"/>
					Benzene MCL at 5ppb	MTBE (ppb) State's Action Level at 20 ppb	Other Compound	
Hazel Esworthy	15935 Frederick Rd.	Residential Owner Occupied		1994	121.6	305.3	---	✓ New GAC installed June 2007 by State
			HCHD	02/27/07	Pre-filter – 12.6 Post-filter – ND	Pre-filter – 830 Post-filter – 18.1	Pre-filter DCE – 7.31 ppb	
			MDE-OCP	6/27/07	Pre-filter – 13 Post-filter – ND	Pre-filter – 900 Post-filter – ND	Pre-filter DCE - 6	
			MDE-OCP	7/16/07	Post-filter – 1.72	Post-filter – 23.3	Post-filter DCE – 0.68	
			MDE-OCP	8/8/07	After-GAC filter – ND After-sink filter – 1.2	After-GAC filter – ND After-sink filter – 9.0		
			MDE-OCP	8/23/07	Pre-filter – 15 Post-filter – 2.0	Pre-filter – 1,100 Post-filter – 7.9	Pre-filter – 1,2-DCE – 7ppb; TBA – 330ppb; TAME 18 ppb; Naphthalene – 6 ppb	
			MDE-OCP	9/12/07	Pre-filter – 12	Pre-filter - 940	Pre-filter – TBA – 240	
			MDE-OCP	1/2/08	Pre-filter - 4	Pre-filter - 730	Pre-filter – TBA - 190	
			MDE-OCP	4/24/08	Pre-filter - ND	Pre-filter - 510	Pre-filter – TBA – 150	
			MDE-OCP	9/10/08	Pre-filter – 8	Pre-filter - 960	Pre-filter – TBA 590 Mid-filter – TBA 36	
David Jenkins	15936 Frederick Rd.	Residential Owner Occupied		1990	1050	828		
			MDE-OCP	02/28/07	ND	4.05		
Gail Frederickson (Atlas Flooring)	15940 Frederick Rd.	Commercial		1989	ND	4		
			MDE-OCP	02/26/07	ND	ND		
Property Owner	Site Address (UST/AST system present)	Land Use	Sampled By	Sample Event	Petroleum Constituents of Concern			GAC Installed Yes <input checked="" type="checkbox"/> Pending <input type="checkbox"/>
					Benzene MCL at 5ppb	MTBE (ppb) State's Action Level at 20 ppb	Other Compound	
*Auto Body Shop (shares well with Citgo)	15941 Frederick Rd.	Commercial		1989	18			GAC system previously installed by owner.
			MDE-OCP	02/26/07	Pre-filter – ND Post-filter - ND	Pre-filter – 1.91 Post-filter – 2.01		
Doris Bell (Belcor)	15908/15916 Frederick Road	Commercial	MDE-OCP	1990 2/22/07	87 ND	35 3.28		
Jake & Mindy Tapscott	15925 North Ave (AST Heating oil on-site)	Residential Owner Occupied		1990	ND	ND		
			MDE-OCP	03/08/07	ND	ND		
Mirian Sirk	15939 South Ave. (UST heating oil on-site)	Residential Owner Occupied		1990	ND	ND		
			HOCHD	03/26/07	ND	ND		
			MDE-OCP	03/29/07	ND	0.59		
Tara Sirk	15945 South Ave.	Residential Owner Occupied	MDE-OCP	03/06/07	ND	ND		
U.S. Postal Office	1280 Hopkins Alley	Commercial	MDE-OCP	02/22/07	ND	ND		

Active Gasoline Stations								
Lisbon Service Center/Lisbon BP Amoco Station K& K Excavating (Ketterman's)	15882 Frederick Road	Commercial	Owner	2/11/05	ND	5.5		
			Owner	9/29/06	1.57	3.51		
			HOHCD	10/04/06	1.55	4.2		
*Lisbon Garage/Lisbon Citgo Station (Larry & Gail Frederickson)	15943 Frederick Road (Shared well with Auto Body shop)	Commercial	MDE-OCP	02/26/07	Pre-filter – ND Post-filter – ND	Pre-filter – 1.91 Post-filter – 2.01		GAC system previously installed by owner/operator

Table 2: Monitoring Well Sampling at Lisbon Service Station/Lisbon BP Amoco at 15882 Frederick Road

Monitoring Well	Sampling Event	MTBE (ppb) State's Action Level at 20 ppb	Benzene MCL at 5ppb	Other Petroleum Constituents (ppb) (TBA) is an unregulated comp. Di-isopropyl ether (DIPE) is an unregulated comp.
MW-1	2/11/05	16,000	ND	ND
	9/29/06	18.1	ND	TBA - 676; DIPE 16.1
MW-2	2/11/05	420	ND	
	9/29/06	37.3	ND	TBA - 110; DIPE-10.7
MW-3	2/11/05	1400	0.60	ND
	9/29/06	ND	ND	ND

Table 3: OCP Monitoring Well Network Sampling in Lisbon Groundwater Investigation Area

Monitoring Well	Sampling Event	MTBE (ppb) State's Action Level at 20 ppb	Benzene MCL at 5ppb	Other Petroleum Constituents (ppb) (TBA) is an unregulated comp. Di-isopropyl ether (DIPE) is an unregulated comp.
P1	12/11/90	7.2	38	ND
	5/23/91	8.9	80	
	5/11/93	8.48	35.9	
	8/30/94	13.6	74.3	
	11/29/95	ND	ND	
	3/19/98	2.2	ND	
	7/31/07	4	ND	
P2	12/11/90	52	1,210	1,2-DCA @ 5ppb; Naphthalene @ 4ppb; TBA @ 84ppb
	5/28/91	44	1,100	
	4/29/93	95.3	1,800	
	9/9/94	11.8	178	
	11/29/95	93.9	1,690	
	3/19/98	108	760	
	7/31/07	270	57	
P3	12/11/90	ND	ND	ND
	2/4/93	-	ND	
	9/13/94	12.7	ND	
	11/29/95	15.9	ND	
	3/19/98	28	ND	
	7/31/07	2	ND	
	P4	12/11/90	36	
4/29/93		49.5	668	
9/9/94		73.6	629	
11/29/95		ND	1,230	
3/19/98		66	228	
7/31/07		22	ND	
P5		12/11/90	ND	ND
	4/29/93	ND	ND	
	9/9/94	ND	ND	
	11/29/95	ND	ND	
	3/19/98	2.1	ND	
	7/31/07	ND	ND	
	P6	12/11/90	2.8	30
5/11/93		5.8	11.8	
9/13/94		ND	ND	
11/29/95		ND	ND	
3/19/98		19	5.5	
7/31/07		ND	ND	
P8		12/11/90	ND	ND
	4/29/93	ND	ND	
	9/9/94	ND	ND	
	11/29/95	ND	ND	
MW1	11/8/90	ND	ND	ND
	5/11/93	ND	ND	
	9/9/94	ND	ND	
	11/29/95	ND	ND	
	7/31/07	ND	ND	

Monitoring Well	Sampling Event	MTBE (ppb) <i>State's Action Level at 20 ppb</i>	Benzene <i>MCL at 5ppb</i>	Other Petroleum Constituents (ppb) (TBA is an unregulated comp. Di-isopropyl ether (DIPE) is an unregulated comp.)
MW2	11/9/90	ND	ND	
	2/4/93	-	ND	
	9/14/94	ND	ND	
	11/29/95	ND	ND	
MW3	11/9/90	ND	ND	-
	5/11/93	ND	ND	-
	9/13/94	ND	ND	-
	11/29/95	ND	ND	-
MW4	11/8/90	ND	ND	-
	2/4/93	-	ND	-
	9/14/94	ND	ND	-
	11/29/95	ND	ND	-
	3/18/98	2.4	ND	-
	7/31/07	ND	ND	ND
MW5	11/9/90	154	672	-
	7/31/07	52	ND	TBA @ 18ppb
MW6	11/8/90	5.2	ND	-
	9/14/94	14	ND	-
	11/29/95	20.3	ND	-
MW7	11/9/90	4,580	12,000	-
	2/4/93	2,880	7,290	-
	9/13/93	6,307	10,462	-
	11/29/95	3,390	8,550	-
	3/18/98	4,960	4,760	-
	7/31/07	3,900	5,400	Naphthalene @ 1,400ppb; TBA @ 2,700ppb
MW8	11/9/90	ND	50	-
	2/4/93	-	12	-
	9/14/94	10.6	71	-
	11/29/95	ND	49	-
	3/19/98	12	99	-
MW9	11/8/90	ND	4.8	-
	9/13/93	ND	ND	-
	11/20/95	ND	ND	-
	7/31/07	ND	ND	ND
MW10	11/8/90	ND	7.4	-
	5/11/93	ND	ND	-
	9/13/93	ND	ND	-
	11/29/95	ND	ND	-
	7/31/07	ND	ND	ND

- Constituents was not sampled for