

# MARYLAND DEPARTMENT OF THE ENVIRONMENT

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**Environmental Investigation  
Royal Farm Store No. 95  
3606 Conowingo Road, Street  
Harford County, Maryland  
Case No. 2006-0602-HA**

The Maryland Department of the Environment (MDE), Oil control Program (OCP), in coordination with the Harford County Health Department (HCHD), is evaluating the impact of methyl tertiary-butyl ether (MTBE) at Royal Farms Store No. 95 and select off-site drinking water wells in the vicinity.

In January 2006, the MDE-OCP received groundwater-sampling results from the tank field observations pipes and the three newly installed monitoring wells. Tank field observation pipes are installed near the underground storage tank (UST) systems as an early warning device used to detect releases and to provide access to the tank field backfill. Typically, these pipes are placed at opposite ends of the UST system at the time of installation. They are screened at shallow depths in the pea gravel of the backfill, usually intercepting perched groundwater or shallow groundwater tables. MTBE contamination was detected at 18,000 parts per billion (ppb) in a tank field observation pipe and at 1,600 ppb in a monitoring well located 10 feet from the fuel-dispensing island. The station's drinking water supply well is sampled on a quarterly basis (every three months) and has been non-detect for petroleum constituents.

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 of 20 to 40 parts per billion (ppb), based on taste and odor. 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 Royal Farm Store, operated by Two Farms Inc., has been an active store and service station since October 2000 when two USTs were installed. The 20,000-gallon compartmentalized gasoline UST and the 12,000 diesel fuel UST have been registered to Cloverland Farms Dairy/Royal Farms Inc. since May 23, 2001. The UST system comprises double-walled composite steel with fiberglass-reinforced plastic and double-walled flexible plastic piping. The site has Stage I and Stage II vapor recovery systems. Six monitoring wells, two tank field observation pipes, and a transient non-community drinking water supply well are located on-site.

Based on the levels of petroleum contaminants in the station's groundwater monitoring network and pursuant to Section 4-411.2 of the Environment Article, Annotated Code of Maryland, the MDE opened a case, issued a directive letter to Royal Farms/Two Farms Inc., and notified the HCHD of petroleum impacts at this site, located in a high-risk groundwater use area. Currently the UST systems are in operational compliance with State and federal regulations.

In March 2006, a soil vapor extraction (SVE) system was installed in the tank field as a remedial strategy to reduce MTBE vapor releases. Since December 31, 2007, the SVE system has recovered approximately 300 pounds of total volatile organic compounds and has been successful in decreasing the overall concentrations of petroleum constituents in the groundwater.

To date, thirteen (13) off-site drinking water wells, located in close proximity to the active station, have been sampled by Royal Farms. Ten of these private wells were non-detect for petroleum constituents, while the remaining three wells had low levels of MTBE well below the State's action level of 20 parts per billion (ppb). At this time, the MDE-OCP does not anticipate expanding the off-site residential sampling effort beyond sampling needed to ensure community safety.

## Chronology

- June 25, 2001. MDE-OCP conducted a routine site inspection of this new facility.
- July 12, 2002. MDE-OCP conducted a routine site inspection. Minor violations cited with debris found in the spill catchment basins.
- August 31, 2005. MDE-OCP received *Groundwater Monitoring Well Installation and Sampling Results – July 20, 2005*.
  - Groundwater flow east/southeasterly.
  - In June 2005 monitoring wells installed pursuant to the new MTBE emergency regulations.
  - July 12, 2005 Sampling event
    - MW-1 (25 feet) ND (non detect for petroleum constituents)
    - MW-2 (25 feet) ND
    - MW-3 (25 feet) MTBE at 57 ppb
    - PW (345 feet) ND
- September 27, 2005. Harford County Fire Department responded to a 16-gallon gasoline surface spill from a customer drive off.
- October 20, 2005. MDE-OCP letter to Royal Farms regarding the *Groundwater Monitoring Well Installation and Sampling Results – July 20, 2005*.
  - Continue to sample the three on-site monitoring wells, tank field monitoring pipes, and the potable wells semi-annually (i.e. every six months).
  - Submit well logs for the drinking water well.
- January 18, 2006. MDE-OCP received *December 2005 Groundwater Sampling Results – January 11, 2006*.
  - A point-of-use treatment system is installed at the sink for food preparation at the store.
  - December 28, 2005 Sampling event (*see Table*).
- January 27, 2006. MDE-OCP issued directive letter to Royal Farm/Two Farms Inc. requiring the following:
  - Perform a helium test to check vapor leaks in the gasoline UST system;
  - Test all spill catchment basins and containment sumps;
  - Conduct a self-audit of UST system;
  - Conduct semi-annual (every 6 months) sampling of all monitoring wells and tank field monitoring pipes;
  - Conduct semi-annual sampling of the transient non-community drinking water supply well on-site;
  - Perform a half-mile survey; and
  - As a precautionary measure, sample off-site drinking water wells immediately adjacent to the facility.
- January 27, 2006. MDE-OCP notified HCHD of this new petroleum impact pursuant to the Section 4-411.2 of the Environmental Article, Annotated Code of Maryland, for a regulated facility in a high-risk groundwater use area.
- February 6, 2006. Notification letters mailed to 149 property owners within half-mile radius of the station by HCHD. In addition, a news release was issued by the HCHD on February 7, 2006.
- February 9, 2006. MDE-OCP conducted a full compliance inspection. Royal Farms contractors preparing the site for testing of the UST systems.
- February 13, 2006. MDE-OCP received *February 8, 2006 - Groundwater Sampling Results*.
  - February 8, 2006 Sampling event (*see Table*).

- February 15, 2006. MDE-OCP approved the *Design Basis Summary, Underground Storage Tank Pit Venting System – February 13, 2006*. Approved with modifications to require dewatering of tank pit, hook-up to both TF-1 and TF-2, and the installation of vacuum gauge ports.
- February 15, 2006. MDE-OCP received storage system test results from Station Maintenance Solutions.
 

Stage II pressure decay test:	passed 4/10/05
Stage II Liquid to Air test:	passed 4/10/05 (adjusted pumps)
Line leak detector test:	passed 4/10/05
Product line test:	passed 4/10/05
Catch basin test:	passed 6/13/05
Tank tightness test:	passed 2/10/06
Stage II Liquid to Air test:	passed 2/10/06 (drained hoses)
Line leak detector test:	passed 2/10/06
Product line test:	passed 2/10/06
Stage II pressure decay test:	passed 2/10/06 (replace cap)
Maryland Helium test:	passed 2/10/06 (replaced 2 tm caps, tighten fill and vapor adaptors replaced PV vent cap)
Catch basin test:	passed 2/10/06
Sump test:	passed 2/10/06
- February 15, 2006. MDE-OCP received neighboring drinking water well sampling performed by Royal Farms – e-mail version submitted in the *February 2006 - Groundwater Sampling Results – 02/15/2006* report.
  - February 10, 2006 Sampling event (*see Table*).
- February 16, 2006. Via email, MDE-OCP received a copy of the Air and Radiation Management Administration *Application for Permit to Construct for SVE Systems*.
- February 17, 2006. Via Email, MDE-OCP received a copy of the *Notice of Intent to Discharge*.
- February 17, 2006. MDE-OCP approved a discharge permit.
- February 28, 2006. MDE-OCP received the *Well Search Summary - February 24, 2006*.
  - A Freedom of Information Act request sent to Harford County Health Department to obtain well completion reports for the onsite potable well and other wells within a half-mile radius.
  - A Freedom of Information Act request was sent to MDE Water Supply Program.
  - To date, 112 potable wells have been identified in the half-mile radius, 33 of which could be downgradient of the Royal Farms.
- February 28, 2006. MDE-OCP received the email version of drinking water well sampling results .
  - February 23, 2006 sampling event (*see Table*).
- March 2, 2006. MDE-OCP visited the site. The SVE system is operational and enclosed by a fence.
- March 6, 2006. MDE-OCP received the *Facility Audit - March 1, 2006*.
- March 23, 2006. MDE-OCP received the *Interim Corrective Action Plan Underground Storage Tank Pit Venting System Installation Completion Report - March 23, 2006*.
  - Installation of the SVE system was completed on March 2, 2006.
  - Hook-ups were installed to both TF-1 and TF-2
  - UST pit was dewatered March 8, 2006
  - Conduits installed for air sparging if needed
  - 14-day Pilot Testing underway

- MDE-OCP received the *Groundwater Sampling Results Report - March 2006*.
    - March 13, 2006 Sampling Event (*see Table*).
- March 24, 2006. MDE-OCP approved a modified sampling schedule for the monitoring wells and the tank field monitoring pipes for full suite VOC analysis.
- March 29, 2006. MDE-OCP received an email from Royal Farms to HCHD summarizing the progression of events at the site.
- April 4, 2006. MDE-OCP received the *Discharge Monitoring Report – First Quarter 2006 – March 31, 2006*. Site dewatering of tank field conducted March 7, through March 13, 2006.
- April 14, 2006. MDE-OCP visited the site to verify the presence of GAC treatment system. A three-carbon treatment system was present on the drinking water well.
- April 20, 2006. MDE-OCP attended the public meeting at Darlington Fire Department. Royal Farms offered to sample select homes in the area around the station.
- April 20, 2006. MDE-OCP received an email from AEC with the latest site sampling data.
    - April 11, 2006 sampling event (*see Table*).
- April 25, 2006. MDE-OCP received the email version of the *Subsurface Investigation Work Plan – April 24, 2006*, proposing the following:
    - Install two borings in the area of the dispenser islands, with the collection of soil and groundwater samples;
    - The installation of one additional monitoring well downgradient of the tank field.
- May 1, 2006. MDE-OCP received the *April 2006 Groundwater Sampling Results – April 26, 2006*.
- May 3, 2006. MDE-OCP received the email version of the radius sampling performed by Royal Farms.
    - April 27, 2006 sampling event (*see Table*).
- May 8, 2006. MDE-OCP approved the *Subsurface Investigation Work Plan* with the following modifications:
    - Install at least 3 monitoring wells in locations selected by the Department;
    - The Department denies the request to hand-auger in the area of the UST system;
    - Following the installation of the new monitoring wells, perform an additional round of sampling;
    - Submit the information generated by field activities to the Department no later than July 30, 2006;
    - Begin sampling the site on a quarterly basis, starting in September 2006;
    - Submit the results of the helium testing, testing of the spill catchment basins, and sump testing to the Department no later than July 30, 2006.
- May 10, 2006. MDE-OCP received the *Adjacent Potable Water Well Sampling – May 8, 2006*.
- May 17, 2006. MDE-OCP received the *May 2006 Groundwater Sampling Results – May 15, 2006*.
    - May 9, 2006 Sampling Event (*see Table*).
- May 24 and 26, 2006. MDE on-site to observe the installation of three monitoring wells. Helium test for UST systems also in progress.
- July 12, 2006. MDE-OCP received *Groundwater Monitoring Well Installation and Sampling Results – July 7, 2006*.
    - June 13 and 28, 2006 Sampling Events (*see Table*).

- July 20, 2006. MDE on-site to check the SVE system. The system was operating.
- October 11, 2006. MDE-OCP received *September 2006 Groundwater Sampling Results – October 10, 2006*.
  - September 22, 2006 Sampling Event (*see Table*).
- October 23, 2006. MDE received *Request for Groundwater Sampling Schedule Modification – October 20, 2006*, requesting that sampling be reduced to quarterly events including MW-1 through MW-3 and the tank field monitoring wells only.
- November 2, 2006. MDE-OCP letter to Royal Farm requiring at least 4 more quarterly sampling events before consideration is given to modifying the sampling frequency. A review of the September 2006 sampling results for the monitoring well network confirmed that the soil vapor extraction (SVE) is successfully controlling and mitigating the migration vapors.
- January 8, 2007. MDE-OCP received *December 2006 Groundwater Sampling Results – January 5, 2007*.
  - December 22, 2006 Sampling Event (*see Table*).
- April 2, 2007. MDE-OCP received *March 2007 Groundwater Sampling Results – March 30, 2007*.
  - March 19, 2007 Sampling Event (*see Table*).
- April 27, 2007. MDE directive letter requiring that MW-3 be connected to the existing soil vapor extraction system.
- July 16, 2007. MDE-OCP received *June 2007 Groundwater Sampling Results – July 12, 2007*.
  - June 29, 2007 Sampling Event (*see Table*).
- November 2, 2007. MDE-OCP site visit to confirm the connection of MW-3 to the existing soil vapor extraction system.
- January 9, 2008. MDE-OCP received SVE system recovery totals. Since December 31, 2007, the SVE system has recovered approximately 300 pounds of total volatile organic compounds.
- January 24, 2008. MDE-OCP email request to provide helium test data for 2007.

**Future Updates:**

- Future updates on this case investigation will be posted at [www.mde.state.md.us](http://www.mde.state.md.us) [at the MDE home page, (select) Land, (select) Program, (select) Oil Control, (select) Remediation Sites].

**Contacts**

- Maryland Department of the Environment (MDE) Oil Control Program: 410-537-3443
- Harford County Health Department (HCHD) at 443-643-0322 or 443-643-0321
- Royal Farms 1-800-573-0098

**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.

## Groundwater Sampling Results near Royal Farms No. 95 at 3606 Conowingo Road, Street in Harford County

Well Information	Sample Dates	Benzene (MCL –5 ppb)	MTBE (Action Level – 20 ppb)	Other petroleum constituents of concern <i>Ethylbenzene – MCL at 700 ppb</i> <i>Toluene – MCL at 1000 ppb</i> <i>Xylene – MCL at 10,000 ppb</i>
<b>Transient Non-Community Supply Wells</b>				
<b>Royal Farms Station's Supply Well</b> (345 ft.) 3606 Conowingo Road <i>MDE Case No. 2006-0602HA</i>	7/13/05	ND (pre-filtration)	ND (pre-filtration)	ND (pre-filtration)
	12/28/05	ND (pre/post)	ND (pre/post)	ND (pre/post-filtration)
	2/10/06	ND (pre-filtration)	ND (pre-filtration)	ND (pre-filtration)
	6/13/06	ND (pre/post)	ND (pre/post)	ND (pre/post-filtration)
	9/22/06	ND (pre/mid/post)	ND (pre/mid/post)	ND (pre/mid/post-filtration)
	12/22/06	ND (pre/mid/post)	ND (pre/mid/post)	ND (pre/mid/post-filtration)
	3/19/07	ND (pre/mid/post)	ND (pre/mid/post)	ND (pre/mid/post-filtration)
	6/29/07	ND (pre/mid/post)	ND (pre/mid/post)	ND (pre/mid/post-filtration)
09/24/07	ND (pre/mid/post)	ND (pre/mid/post)	ND (pre/mid/post-filtration)	
<b>1311 Whiteford Road (Dublin Cutters)</b>				
	3/16/05	---	ND	---
	2/10/06	ND	ND	ND
<b>3535 Conowingo Road (NBRS Financial)</b>				
	3/18/05	---	ND	---
	2/10/06	ND	ND	ND
<b>3601 Conowingo Road (Moxleys)</b>				
	11/2/04	---	ND	---
	2/10/06	ND	ND	ND
<b>3610 Conowingo Road (Harford Auto Parts)</b> <i>MDE Case No. 2006-0827HA</i>				
	3/9/05	---	54.2	---
<b>3440 Conowingo Road (VFW Post)</b>				
	4/05	---	ND	---
<b>1205 Priestford Road (Harford Tire)</b>				
	2/10/06	ND	9.9	ND
<b>Private Well Sampling Results</b>				
<b>3609 Conowingo Road</b>				
	4/15/05	---	ND	---
	2/10/06	ND	ND	ND
<b>3617 Conowingo Road</b>				
	3/29/05	---	ND	---
<b>3618 Conowingo Road</b>				
	6/3/04	---	ND	---
	4/27/06	ND	1.7	ND
<b>3522 Conowingo Road</b>				
	1/27/05	---	ND	---
<b>3525 Conowingo Road</b>				
	2/1/05	---	ND	---
<b>3621 Conowingo Road</b>				
	3/29/05	---	ND	---
<b>3622 Conowingo Road</b>				
	3/24/05	---	0.79	---
<b>3440 Conowingo Road</b>				
	4/5/05	---	ND	---
<b>1165 Priestford Road</b>				
	4/27/06	ND	ND	ND
<b>1169 Priestford Road</b>				
	3/15/05	--	ND	---
<b>1310 Whiteford Road</b>				
	2/10/06	ND	ND	ND
<b>1424 Whiteford Road</b>				
	4/27/06	ND	ND	ND
<b>1509 Poole Road</b>				
	2/23/06	ND	ND	ND
<b>1535 Poole Road</b>				
	4/27/06	ND	ND	ND
<b>3145B Old Scarboro Rd</b>				
	4/27/06	ND	ND	ND
<b>1130 Poplar Grove Rd</b>				
	4/27/06	ND	3	ND
<b>1136 Poplar Grove Rd</b>				
	4/27/06	ND	ND	ND

## Monitoring Well Sampling Results at Royal Farms No. 95 located at 3606 Conowingo Road, Street in Harford County

Well Information	Sample Dates	Benzene (MCL – 5 ppb)	MTBE (Action Level – 20 ppb)	Other petroleum constituents of concern <i>Ethylbenzene – MCL at 700 ppb</i> <i>Toluene – MCL at 1000 ppb</i> <i>Xylene – MCL at 10,000 ppb</i>
<b>Monitoring Wells</b>				
<b>MW-1</b> 2 in. diameter well; Borehole depth 25 ft. Screen depth 5 to 24.5 ft; Casing depth 0-5 ft.	7/13/05	ND	ND	ND
	12/28/05	ND	ND	ND
	2/8/06	ND	ND	ND
	3/13/06	ND	ND	ND
	4/11/06	ND	ND	ND
	5/9/06	ND	ND	ND
	6/13/06	ND	ND	ND
	9/22/06	ND	ND	ND
	12/22/06	ND	ND	ND
	3/19/06	ND	ND	ND
	6/29/06	ND	ND	ND
09/24/07	ND	ND	ND	
<b>MW-2</b> 2 in. diameter well; Borehole depth 25 ft. Screen depth 5 to 24.5 ft; Casing depth 0-5 ft.	7/13/05	ND	ND	ND
	12/28/05	ND	ND	ND
	2/28/05	ND	ND	ND
	3/13/06	ND	ND	ND
	4/11/06	ND	ND	ND
	5/9/06	ND	5.4	ND
	6/13/06	ND	ND	ND
	9/22/06	ND	ND	ND
	12/22/06	ND	ND	ND
	3/19/07	ND	ND	ND
	6/29/07	ND	ND	ND
09/24/07	ND	ND	ND	
<b>MW-3</b> 2 in. diameter well; Borehole depth 25 ft. Screen depth 5 to 24.5 ft; Casing depth 0-5 ft.	7/13/05	ND	57	ND
	12/28/05	ND	1,600	ND
	2/8/06	ND	1,400	ND
	3/13/06	ND	750	ND
	4/11/06	ND	1,300	ND
	5/9/06	ND	1,200	ND
	6/13/06	ND	490	ND
	9/22/06	ND	680	ND
	12/22/06	ND	7,000	ND
	3/19/07	ND	1,500	ND
	6/29/07	ND	1,000	ND
09/24/07	ND	1,300	ND	
<b>MW-4</b> 2 in. diameter well; Borehole depth 25 ft. Screen depth 3 to 24.5 ft; Casing depth 0-3 ft.	6/13/06	ND	ND	ND
	9/22/06	ND	ND	ND
	12/22/06	ND	ND	ND
	3/19/07	ND	ND	ND
	6/29/07	ND	ND	ND
09/24/07	ND	ND	ND	ND
<b>MW-5</b> 2 in. diameter well; Borehole depth 25 ft. Screen depth 3 to 24.5 ft; Casing depth 0-3 ft.	6/13/06	ND	ND	ND
	9/22/06	ND	ND	ND
	12/22/06	ND	ND	ND
	3/19/07	ND	ND	ND
	6/29/07	ND	ND	ND
09/24/07	ND	ND	ND	ND

**Monitoring Well Sampling Results at Royal Farms No. 95 located at 3606 Conowingo Road, Street in Harford County cont.**

Well Information	Sample Dates	Benzene (MCL –5 ppb)	MTBE (Action Level – 20 ppb)	Other petroleum constituents of concern <i>Ethylbenzene – MCL at 700 ppb</i> <i>Toluene – MCL at 1000 ppb</i> <i>Xylene – MCL at 10,000 ppb</i>
<b>MW-6</b> 2 in. diameter well; Borehole depth 25 ft. Screen depth 3 to 24.5 ft; Casing depth 0-3 ft.	6/13/06	ND	ND	ND
	9/22/06	ND	ND	ND
	12/22/06	ND	ND	ND
	3/19/07	ND	94	ND
	6/29/07	ND	94	ND
	09/24/07	ND	ND	ND
<b>TF-1 (unknown depth)</b>	12/28/05	ND	2,100	ND
	2/8/06	ND	1,500	ND
	3/13/06	ND	ND	ND
	4/11/06	ND	600	ND
	5/9/06	ND	350	ND
	6/28/06	Not sampled (NS)	5	Not sampled (NS)
	9/22/06	ND	5.4	ND
	12/22/06	ND	ND	ND
	3/19/07	ND	ND	ND
	6/29/07	ND	8.6	ND
<b>TF-2 (unknown depth)</b>	12/28/05	ND	18,500	ND
	2/8/06	ND	2,500	ND
	3/13/06	ND	1,200	ND
	4/11/06	ND	18,500	ND
	5/9/06	ND	370	ND
	6/28/06	Not sampled (NS)	300	Not sampled (NS)
	9/22/06	ND	ND	ND
	12/22/06	ND	ND	ND
	3/19/07	ND	ND	ND
	6/29/07	ND	ND	ND