

# MARYLAND DEPARTMENT OF THE ENVIRONMENT

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Land Management Administration • Oil Control Program

## Drinking Water Well Impact and Environmental Investigation

Crown MD-142 201 Hanover Pike

Hampstead, Carroll County, Maryland

Case No: 2003-0376 CL

The Maryland Department of the Environment (MDE) Oil Control Program (OCP), in coordination with the Carroll County Health Department (CCHD), is evaluating the impact of petroleum contaminants at the Crown service station. In 2002, the Department opened a case in response to detections of methyl tertiary butyl ether (MTBE) in the on-site transient non-community drinking water well.

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.

Crown Central, LLC owned and operated the subject facility from September 1997 through August 2004. The Oil Control Program was first notified of petroleum contamination in the on-site, drinking water supply well in September 2002. A water sample collected from this well on September 24, 2002 detected methyl tertiary-butyl ether (MTBE) at 723 parts per billion (ppb). A granular-activated carbon (GAC) filtration system was installed on September 26, 2002 and completely replaced in March 2007. The GAC treatment system is sampled on a monthly basis and maintained as necessary by Crown.

Between November and December 2002, six (6) steel underground storage tanks (USTs) were removed from the subject property. These USTs were installed in 1987. At the time of removal, no perforations were noted in the USTs; however, approximately 1,300 tons of oil-contaminated soil was removed for proper disposal. Following removal of the USTs, the Department's records indicate that Crown installed five (5) fiberglass-reinforced plastic USTs in the same excavation in November 2002. In August 2004, Crown installed five (5) monitoring wells to complete the subsurface investigation. Samples collected from the monitoring wells in August 2004 detected MTBE at 13,000 ppb in MW1.

In August 2004, PMIG 1006 LLC registered the underground storage tank (UST) systems and currently they conduct gasoline retail activities at the facility. Five (5) UST systems are in place at this gas station [a 15,000-gallon gasoline; two (2) 8,000-gallon gasoline; a 10,000-gallon diesel; and a 2,500-gallon kerosene]. These tanks replaced the original six (6) UST systems installed in September 1987. The current UST systems are single walled fiberglass reinforced plastic tanks comprising single-walled fiberglass reinforced plastic piping. Since petroleum contamination was discovered and occurred during Crown's tenure, future investigation and cleanup activities related to the original release is the responsibility of Crown. However, PMIG 1006 LLC as the new operator is required to ensure compliance with the regulations for the existing UST systems.

To date a total of fifteen (15) private drinking water wells have been sampled in the study area. The Department currently maintains two granular activated carbon (GAC) systems at no cost to the homeowners of two off-site residential properties, which have been impacted by petroleum constituents. At this time, the MDE-OCP does not anticipate expanding the off-site residential sampling effort beyond sampling needed to ensure community safety.

- 8 properties Non-detect
- 3 properties MTBE below 5 ppb
- 2 properties MTBE between 5 and 20 ppb
- 3 properties MTBE greater than 20 ppb
  - Station's supply well -MTBE 2400 to 6.9 ppb (recent sample 03/04/2008– MTBE at 19 ppb)
  - 136 Hanover Pike - MTBE 730 to 140 ppb (recent sample 02/21/2008 – MTBE at 276 ppb)

- 4311 Wolf Hill Dr. - MTBE 40 to 15.2 ppb (recent sample 09/04/2007 – MTBE non-detect)

## Chronology:

- May 13, 1998. MDE-OCP conducted a compliance assistance inspection. Crown was required to provide the following information:
  - Repaint color codes on all caps and lids; and
  - Provide copies of precision test results, vapor recovery testing and the Stage II training certificate.
- June 6, 2002. MDE entered into a Consent Order with Crown for twenty-two (22) facilities (including the Crown Hanover Pike) that have tanks utilizing impressed current protection. Requirements of this order included the following:
  - Upgrade or close the 22 facilities by June 30, 2003;
  - Provide MDE with a plan to achieve compliance;
  - Remove all UST systems slated for closure; and
  - Remove all steel tanks and piping for UST systems remaining in operation and replace with systems that fully compliant with Maryland regulations.
- July 26, 2002. MDE-OCP notified that first generation UST systems at the site would be replaced in October 2002.
- August 17, 2002. Line and leak detector test results submitted to MDE - all passed.
- September 24, 2002. MDE-OCP notified in via e-mail from Crown that petroleum constituents were detected in the on-site drinking water supply system. Crown indicated that arrangements were being made to install a treatment system
- October 4, 2002. MDE site visit to inspect the tank field and monitoring pipes.
  - Wells gauged and no product observed.
  - Treatment system to be installed.
- October 4, 2002. MDE received fax of *Test Result Site Summary Report – September 30, 2002* certifying completion of retest.
  - Test date 09/30/02.
  - All five (5) UST systems passed the line and leak detector tests.
- October 16, 2002. *Quarterly Drinking Water Sampling Report – October 14, 2002* submitted to MDE. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well (*see table for results*).
- November 13, 2002. MDE oversaw the removal of five (5) steel USTs.
  - Three (3) 10,000 gallon gasoline tank, a 6,000-gallon diesel tank; a 2,000-gallon kerosene tank
  - All removed UST's and associated piping had no perforations.
  - Soil contamination was noted and further sampling required.
- December 4, 2002. MDE-OCP on-site to oversee the removal of a 1,000-gallon heating oil steel UST.
  - No perforations observed. Soil contaminants evident. Further sampling required.
- February 4, 2003. MDE-OCP received the *Quarterly Sampling Report – January 22, 2003*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well.
  - Sampling results for the Crown supply well collected on 10/30/02; 11/27/02 and, 12/27/02 (*see table for results*)
- February 11, 2003. MDE received *Tank Closure Assessment & Subsurface Investigation Work Plan- February 7, 2003*.
  - Six (6) UST systems removed at the site
    - Three (3) 10,000-gallon gasoline steel tanks
    - A 6,000-gallon diesel steel tank
    - A 2,000-gallon kerosene steel tank

- A 1,000-gallon heating oil tank
  - Approximately 1,346.03 tons of impacted soils removed for proper disposal
  - Twelve (12) soil samples collected from the tank pit excavation.
- April 8, 2003. MDE-OCP received the *Quarterly Sampling Report – April 7, 2003*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well.
    - Carbon system modified in series. Bottled water provide to station between 01/27/03 to 03/11/03.
    - Sampling results for the Crown supply well collected on 1/27/03, 2/27/03 and 3/11/03 (*See table for results*)
  - July 8, 2003. MDE-OCP approval letter for implementation of the *Subsurface Investigation Work Plan- 2003*.
  - July 24, 2003. MDE-OCP received the *Quarterly Sampling Report – July 23, 2003*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well.
    - Sampling results for the Crown supply well collected on 4/23/03, 5/30/03, and 6/25/03 (*See table for results*):
  - October 8, 2003. MDE-OCP received the *Quarterly Sampling Report – October 3, 2003*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well.
    - Sampling results for the Crown supply well collected on 7/2/03, 8/18/03, and 9/4/03 (*See table for results*):
  - January 21, 2004. MDE-OCP received the *Quarterly Sampling Report – January 16, 2004*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well.
    - Sampling results for the Crown supply well collected on 10/13/03, 11/4/03 and 12/15/03 (*See table for results*):
  - April 14, 2004. *Monitoring Well Installation Work Plan-2004* submitted to MDE.
    - Six (6) new monitoring wells to be drilled.
  - May 3, 2004. *Subsurface Investigation Report – April 28, 2004* submitted to MDE.
    - March 2004 sampling event
      - Five (5) direct push geoprobe points(GP1 – GP5) sampled for TPH-DRO/GRO at depths of 3 to 9.5’.
      - Soil analyses collected were non-detect for petroleum constituents.
  - May 10, 2004. MDE-OCP received the *Quarterly Sampling Report – May 6, 2004*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well.
    - Sampling results for the Crown supply well collected on 1/9/04, 2/6/04, and 3/3/04 (*See table for results*)
  - June 2, 2004. MDE letter approved the *Monitoring Well Installation Work Plan –April 14, 2004*.
  - June 9, 2004. MDE received the site map showing the locations of the 6 proposed monitoring wells.
  - August 11, 2004. MDE-OCP on-site to observe the progress of well installation at which time it was reported that product line had broke during hand augering activities.
    - MW-2 was not installed due to potential damage to UST and/or septic system piping.
    - Product line broken during initial probe in preparation for drilling MW-2.
    - MDE responded reportedly it was a minimal product spill.
  - September 1, 2004. MDE-OCP received the *Quarterly Sampling Report – August 31, 2004*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well.
    - Sampling results for the Crown supply well collected on 04/14/04, 05/26/04, 06/23/04 (*See table for results*)
  - September 13, 2004. *Monitoring Well Installation and Risk Assessment Report- September 10, 2004* submitted to MDE
    - Station supply well sampled monthly and reports submitted on a quarterly basis.
    - Depth to groundwater 26.39 to 31.89 feet.

- Groundwater flow direction is southeasterly.
  - A well survey identified 395 drinking water wells in the area. Most of these drilled wells were 78 to 503 feet.
  - 6 off-site drinking water wells to be sampled (Parcels 3, 14, 154 and 160; Piney Branch Golf Course -Parcel 129)
  - No petroleum impacts to soil
  - Groundwater samples collected from monitoring wells on 08/16/04. (See table for results)
- September 15, 2004. CCHD letters to residents concerning drinking water sample results collected 8/16/04.
    - 4310 Wolf Hill Rd. ND
    - 4311 Wolf Hill Rd. MTBE – 15.2 ppb
  - October 12, 2004. MDE-OCP received the *Quarterly Sampling Report – October 8, 2004*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station’s supply well.
    - Sampling results for the Crown supply well collected on 7/21/04, 8/12/04 and 9/30/04 (See table for results):
  - October 12, 2004. Drinking well sampling results from CCHD collected on 9/23/2004 from 5 homes.
  - October 25, 2004. MDE receive CCHD letters to residents dated 10/22/04 concerning drinking water sample results collected on 9/02/2004.
    - 4309 Wolf Hill Drive MTBE – 3.4 ppb.
    - 137 Hanover Pike MTBE – 2.03 ppb.
  - 2004. MDE-OCP received fax from CCHD concerning drinking water sample results collected from off-site drinking water wells.
  - January 25, 2005. MDE-OCP received the *Quarterly Sampling Report – January 21, 2005*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station’s supply well.
    - Sampling results for the Crown supply well collected on 10/8/04, 11/12/04, and 12/29/04 (See table for results)
  - February 8, 2005. *Baseline Subsurface Investigation Report-March 15, 2004* received by MDE.
    - 5 soil samples were non-detect for petroleum constituents
    - Report concluded that contamination has probably migrated offsite.
    - Recommendation to upgrade the station.
  - March 31, 2005. MDE letter approving the *Monitoring Well Installation and Risk Assessment Report- September 10, 2004* and the *Work Plan* contingent upon the following:
    - Submit sample notification letter to select properties;
    - Conduct quarterly sampling & monthly gauging of all existing monitoring wells;
    - Continued monthly sampling of onsite potable well;
    - Sample six (6) offsite drinking water wells. (Parcels 160-161, 154; 14, 3 and 129 –Piney Branch Golf Course);
    - Plot the drinking water wells identified in the well survey on a topographic map; and
    - Prepare a revised hydrogeological investigation *Work Plan* no later than April 30, 2005.
  - April 26, 2005. MDE-OCP received the *Quarterly Sampling Report – April 15, 2005*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station’s supply well.
    - Sampling results for the Crown supply well collected on 01/27/05, 02/23/05, and 03/28/05 (See table for results)
  - May 24, 2005. CCHD notified MDE-OCP of a residential drinking water well impact.
    - Mann property (136 Hanover Pike) MTBE - 293 ppb; TAME - 4.28 ppb
  - May 26, 2005. MDE-OCP forwards a copy of the Mann’s drinking water sample results. Crown requests approval of their access letter for off-site drinking well sample collection.
  - May 27, 2005. CCHD forward a list of residents sampled in the Crown-Wolf Hill area.

- May 27, 2005. MDE-OCP approved Crown's *Residential Notification* letter for access to sample.
- June 2, 2005. CCHD faxed to MDE raw sampling results for Newkirk (4311 Wolf Hill Drive).
- June 6 & 10, 2005. MDE-OCP conducted a field reconnaissance of the area surrounding the Crown station. Several businesses identified in the area but no USTs were observed. The development is located along Wolf Hill Road approximately 200 feet west of the Crown station. There are approximately 50 houses in the development but no tanks were observed.
- June 13, 2005. MDE-OCP received a copy of the confirmatory domestic well sampling results for samples collected on 06-06-05 at 136 Hanover Pike (*See table for results*).
- June 14, 2005. MDE-OCP received a fax copy of the Crown station monitoring well and drinking water well sampling results. Samples collected on May 19, 2005 (*See table for results*).
- June 20, 2005. MDE-OCP conducted a field reconnaissance of the area.
- June 22, 2005. MDE-OCP letter to property owner at 136 Hanover Pike stating that a GAC system will be installed due to elevated concentrations of MTBE detected in domestic well sampled on 06/06/2005.
- July 15, 2005. MDE-OCP letter to property owner at 136 Hanover Pike regarding the results of the water sampling conducted on 06/29/05.
- July 27, 2005: MDE-OCP received *Quarterly Sampling Report Second Quarter 2005 – July 21, 2005*. Sampling limited to BTEX and MTBE using EPA Method 8260 for the station's supply well (*See table for results*).
- August 17, 2005. MDE-OCP letter to property owner at 136 Hanover Pike regarding the results of sampling conducted on 07/29/05.
- August 29, 2005. MDE-OCP received a copy of Crown's letter dated 08/25/05 of the *Analytical Results of Domestic Supply Well Samples* collected in 07-08/2005 at 4310 Wolf Hill Drive and at Piney Branch Golf & Country Club.
- September 19, 2005. MDE-OCP letter to property owner at 136 Hanover Pike regarding the results of sampling conducted on 08/29/05.
- September 29, 2005. MDE-OCP received *Analytical Results of Supply Well Sample* collected on 9/13/05 (*see Table for results*).
- October 12, 2005. MDE-OCP letter to property owner at 136 Hanover Pike regarding the results of sampling conducted on 09/23/05.
- October 27, 2005: MDE-OCP received *Quarterly Sampling Report Third Quarter 2005 – October 21, 2005*, samples collected on 8/15/05 (*See table for results*).
- November 14, 2005. MDE-OCP received Crown's letter of the *Analytical Results of Supply Well Sample* collected on 10/21/05 at 4311 Wolf Hill Drive.
- November 14 and December 16m 2005. MDE-OCP letters to property owner at 136 Hanover Pike regarding the results of sampling conducted on 10/26/05 and 11/29/05.
- February 8, 2006. MDE-OCP received *Site Characterization Work Plan-February 6, 2006*.

- March 10, 2006. MDE-OCP requested an *Interim Corrective Action Plan* and approved the literature survey outlined in the *Site Characterization Work Plan-February 6, 2006* contingent upon the requirements:
  - Perform a helium test of the UST system;
  - Test all spill catchment basins and containment sumps;
  - Conduct a self audit of the UST system;
  - Complete a half-mile well survey;
  - Monitoring wells and tank field monitoring pipes must be sampled every 3 months;
  - Sample the on-site supply well monthly; and
  - Sample 5 off-site private wells quarterly (4310 and 4311 Wolf Hill Drive, 145 and 155 Hanover Pike, and Piney Branch Golf and Country Club).
- March 3, 2006. MDE-OCP letter to property owner at 136 Hanover Pike regarding drinking water sample results on 2/16/06.
- April 17, 2006. MDE-OCP received a copy of the *First Quarter 2006 Sampling Report-April 14, 2006*, samples collected on 03-28-06, (*See table for results*).
- April 21, 2006. MDE-OCP directive letter to Crown regarding sampling analytical requirements.
- May 10 and July 7, 2006. MDE-OCP letters to property owner at 136 Hanover Pike regarding the results of sampling conducted on 04/20/2006 and 06/14/2006.
- August 1, 2006. MDE received the *Second Quarter 2006 Sampling Report – July 28, 2006*, samples collected from the monitoring wells on 06/23/06 (*See table for results*).
- August 4, 2006. MDE-OCP letter to the current operator – PMG 1006LLC requiring compliance with the new emergency regulations for sites in high-risk groundwater use area.
  - Perform a helium test of the UST system no later than September 8, 2006.
  - Test all spill catchment basins and containment sumps no later than September 8, 2006.
  - Conduct a self-audit of the UST system no later than September 8, 2006.
  - Coordinate with Crown the sampling of the existing monitoring wells and sampling the existing tank field observation pipes every 3 months.
- August 9, 2006. MDE-OCP letter to Crown regarding approving the *Site Characterization Work Plan-February 6, 2006* and *First Quarter 2006 Sampling Report-April 14, 2006* with some modifications, :
  - Abandonment of a temporary recovery well installed in 08/2004;
  - Provide detail description of proposed slug test;
  - Continue quarterly sampling of the monitoring well network;
  - Continue monthly sampling of the on-site supply well;
  - Sample 5 off-site potable wells quarterly (4310 and 4311 Wolf Hill Drive, 145 and 155 Hanover Pike, and Piney Branch Golf and Country Club; and
  - Submit the *Final Site Characterization Report* no later than October 8, 2006.
- August 30, 2006. MDE-OCP letter to property owner at 4311 Wolf Hill Drive regarding the results of the water sample collected from the potable supply well on 10/21/05 and 05/22/06. The MDE is also taking over the responsibility for the sampling and maintenance of the GAC system
- October 10, 2006. MDE-OCP received the analytical results for the water sample collected from the unused potable well at 145 Hanover Pike on 09/22/06.
- October 10, 2006. MDE-OCP letter to property owner at 136 Hanover Pike regarding water samples collected from potable well on 08/28/06.

- October 20, 2006. MDE-OCP received the results of samples collected from residential drinking water supply wells at 155 Hanover Pike, 4310 Wolf Hill Dr. and Piney Branch Golf Course.
- October 27, 2006. MDE-OCP received, via facsimile, a letter from Crown regarding clarifications to the February 2006 *Work Plan*.
  - ISOC installed in MW1 on 09/26/06
  - Request to install ISOC in MW3 on 10/27/06
  - Slug tests to be completed on the monitoring wells and analyzed using the Bouwer-Rice method
  - Collection of continuous water level data at MW5 for the purpose of evaluating existence of hydraulic connection between bedrock supply well and upper water bearing zone
  - Request to abandon temporary recovery point without licensed well driller
  - Request to install GAC system at 155 Hanover Pike in response to sample collected on 07/26/06
  - Request extension to December 16, 2006 to submit the requested *Site Characterization Report*
- November 1, 2006. MDE-OCP received the *Third Quarter 2006 Sampling Report – October 31, 2006*. Samples collected from the monitoring wells on 09/26/06 (*see table for results*)
- November 1, 2006. MDE-OCP received the *Work Plan Details – October 27, 2006*.
  - Proposed slug testing on site monitoring wells
  - Collection of continuous water level data from MW5
  - Review of previously published information for other environmental assessments in the vicinity
  - Installed ISOC into MW1 on 09/28/06
  - Request approval to install ISOC in MW3
  - Request extension on the preparation of the Site Characterization Report to 12/15/06
- November 8, 2006. MDE-OCP approved, via email, the abandonment of the temporary recovery pipe.
- November 13, 2006. MDE received results of UST system testing.
  - Passing helium testing completed on 06/15/06 following repairs.
  - Passing results for spill catchment basins and containment sumps as completed on 09/25/06
- November 16, 2006. MDE-OCP received the passing results of the self-audit completed on 11/13/06. Requirements of 08/04/06 letter completed.
- November 20, 2006. MDE-OCP personnel on-site to review the location of the monitoring well, tank field pipes and potable supply well.
  - Site visit to 155 Hanover Pike indicated the presence of a heating oil UST
  - Site visit to 145 Hanover Pike indicated the potential presence of a heating oil UST
- November 21, 2006. MDE-OCP received the signed access agreement from the property owner at 4311 Wolf Hill Drive. Copy mailed to homeowner on 12/06/06.
- December 6, 2006. MDE-OCP personnel on-site at 145 Hanover Pike to verify existence of UST. Investigation revealed heating oil tank is located in the basement.
- December 14, 2006. MDE-OCP letters to property owners at 136 Hanover Pike and 4311 Wolf Hill Drive regarding the results of sampling conducted on 11/21/2006. (*see table for results*)
- January 22, 2007. MDE-OCP letter to PMIG requiring the collection of samples from the tank field monitoring pipes on a quarterly basis and to provide the results to Crown.
- January 24, 2007. MDE-OCP letter to Crown requiring the submittal of the *Interim Corrective Action Plan* and *Site Conceptual Model* and providing approval, with modifications, for the *Work Plan*.

- February 8, 2007. MDE-OCP received the *Fourth Quarter 2006 Sampling Report-January 31, 2007*. Sampling event completed on 12/20/06 (*see table for results*)
- February 8, 2007. MDE-OCP received the analytical results for samples collected from the potable supply wells at the Piney Branch Golf and Country Club and 155 Hanover pike on 11/29/06. (*see table for results*)
- February 22, 2007. MDE-OCP received the results of water samples collected from the potable supply well at 4310 Wolf Hill Drive. (*see table for results*)
- February 28, 2007. MDE-OCP received the proposed *Interim Corrective Action Plan-February 27, 2007*.
- March 19 and 21, 2007. MDE-OCP to property owners at 136 Hanover Pike and 4311 Wolf Hill Drive regarding the results of sampling conducted on 02/28/2007. (*see table for results*)
- April 16, 2007. MDE-OCP letter approving, the *Interim Corrective Action Plan-February 27, 2007* with contingencies.
  - Crown and PMIG to coordinate sampling of groundwater wells and monitoring pipes on a quarterly basis
  - Crown to continue sampling of potable well on monthly basis
  - Crown continue to sample private wells at 4310 Wolf Hill Drive and Piney Branch Country Club semi-annually.
- April 27, 2007. MDE-OCP received the results of a water sample collected at the Piney Branch Country Club on 03/09/07. (*see table for results*)
- May 18, 2007. MDE-OCP received the *Site Conceptual Model – May 16, 2007*, including the data for the 03/08/07 groundwater monitoring event.
  - Interim Corrective Actions field activities confirmed a hydraulic connection between station supply well and MW5.
  - No volatiles detected in vapor samples collected from the tank field monitoring pipes. SVE not feasible
  - Data deficiencies identified include off-site well construction information, vertical gradients and dissolved hydrocarbon distribution.
  - MW4 included in bail-down test. All tank field monitoring pipes not monitored during vacuum extraction testing
  - Groundwater at approximately 30 ft. bgs on-site with apparent ground water flow towards the southeast
  - Hydraulic conductivity ranged from 0.48 ft/day (MW1) to 0.78 ft/day (MW4). On average 0.66 ft/day
  - Recommend installation of three nested wells to 60, 80 and 100ft – screen at final 5 feet
- June 20, 2007. MDE-OCP letter to property owners regarding the sample results collected from private drinking water wells on 05/31/07. (*see table for results*)
- June 28, 2007. MDE-OCP informational letter sent to residents within ¼-mile of the facility.
- August 27, 2007. MDE-OCP received summary letter regarding the cases discussed at the August 22, 2007 meeting held between MDE, Crown, and QES.
- September 10, 2007. MDE-OCP received the results of samples collected from the private well at 4310 Wolf Hill Drive on 08/06/07. (*see table for results*)
- September 19, 2007. MDE-OCP personnel visited 136 Hanover Pike. Information obtained during site visit indicates there are no underground storage tanks on this private residential property.
- September 19 and 20, 2007. MDE-OCP correspondence to property owners at 136 Hanover Pike and 4311 Wolf Hill Drive regarding the results of samples collected in August and September 2007. (*see table for results*)

- October 1, 2007. MDE-OCP received the *Second Quarter 2007 Sampling Report-September 28, 2007*.
  - Groundwater monitoring completed on 06/15/07 (*see table for results*)
  - Continued monthly sampling of the drinking water well (*see table for results*)
- October 30, 2007. MDE-OCP letter to Crown approving, with modifications, the *Site Conceptual Model-May 16, 2007* and the proposed additional subsurface investigation activities.
  - Collection of well construction data for private drinking water wells located on adjacent properties
  - Installation of three nested deep wells in the vicinity of existing monitoring well MW1
  - OCP directed that two additional deep wells be installed in the vicinity of monitoring wells MW3 and MW5
  - Complete a hydrogeologic analysis of the site following installation of the new monitoring wells
  - Submit a revised SCM for review by 02/28/08
  - OCP requested that an attempt should be made to complete the lineament analysis
  - Arrange with property owner at 145 Hanover Pike to utilize former drinking water well as a monitoring point
  - Continued quarterly sampling of the monitoring wells and tank field pipes
  - Quarterly sampling of the stations drinking water well
- November 28, 2007. MDE-OCP received the *Third Quarter 2007 Sampling Report-November 26, 2007*.
  - Groundwater monitoring completed on 09/13/07 (*see table for results*)
  - Continued monthly sampling of the drinking water well (*see table for results*)
- January 31, 2008. MDE-OCP correspondence to property owner at 136 Hanover Pike regarding the results of the 11/28/07 sample collected from the GAC treatment system. (*see table for results*)
- February 1, 2008. MDE-OCP received the Work Plan Clarification-January 30, 2008.
  - Obtain additional construction information for the private drinking water wells at 4310 and 4311 Wolf Hill Drive; 145 and 155 Hanover Pike.
  - Completion of a bedrock lineament analysis
  - Modification- installation of deep monitoring wells (100 ft) adjacent to existing monitoring wells MW1, MW3 and MW5
  - Completion of a geophysical investigation the three newly installed deep wells
  - Continued monthly sampling of the on-site drinking water well
  - Continued quarterly sampling of the monitoring well network
  - Semi-annual sampling of the off-site private drinking water wells at the Piney Branch Country Club and 4310 Wolf Hill Drive
  - Preparation of revised SCM
- March 7, 2008. MDE-OCP letter to PMIG LLC regarding the additional testing requirement for active UST systems located in high-risk groundwater use areas.
- March 12, 2008. MDE-OCP correspondence to property owner at 136 Hanover Pike regarding the results of the 02/21/08 sample collected from the GAC treatment system. (*see table for results*)
- March 20, 2008. MDE-OCP received a copy of the letter from Crown to the property owner at 145 Hanover Pike and requesting permission to use the former drinking water well as a monitoring point.
- March 17, 2008. MDE-OCP received the *Fourth Quarter 2007 Sampling Report-March 13, 2008*.
  - Groundwater monitoring completed on 12/10/07 (*see table for results*)
  - Continued monthly sampling of the drinking water well (*see table for results*)
- April 3, 2008. MDE-OCP on-site to observe the geophysical work being completed on the newly installed deep monitoring wells.

- April 14, 2008. MDE-OCP received the *First Quarter 2008 Sampling Report-April 11, 2008*.
  - Groundwater monitoring completed on 03/03/08. (*see table for results*)
  - Sample results received for private off-site drinking water well. (*see table for results*)
- April 25, 2008. MDE-OCP received the *First Quarter 2008 Tank Field Monitoring Pipe Report-April 4, 2008*.
  - Tank field pipes TP1, TP2 and TP4 were dry. Sample collected from TP3 (*see table for results*)
- May 5, 2008. MDE-OCP approved, via email, a request to allow for a change to the protocol used to collect samples from the groundwater monitoring wells.
  - *HYDRASleeves* to be used to collect discrete interval samples from the two on-site bedrock wells and an off-site former drinking water supply well.
- May 14, 2008. MDE-OCP report of observations for the site investigation regarding the vent pipe located on the east side of the on-site building. Excavation of portions of the parking lot indicated the vent pipe was properly capped during previous UST removal activities. The vent pipe was removed on this date. (*see photographs in file*)
- July 9, 2008. MDE-OCP received the *Second Quarter 2008 Tank Field Monitoring Pipe Sampling-July 3, 2008*.
  - Sampling of tank field monitoring pipes completed on 06/05/08 (*see table for results*)
- August 5, 2008. MDE-OCP received the *Revised Site Conceptual Model-July 31, 2008*.
  - Monitoring wells 3D (CL-95-1117) and 5D (CL-95-1116) installed in March 2008
  - Geophysical evaluation completed on wells 3D, 5D and former drinking water well at 145 Hanover Pike
  - Groundwater flow occurs in the saprolitic overburden and bedrock fracture and primarily to the southeast
  - Residual petroleum hydrocarbons in the vicinity of the tank field may act as the source of contamination and continue to show a declining trend
  - Soil vapor extraction testing shows that SVE is not a viable remedial option
  - Groundwater monitoring completed on 06/11/08 (*see table for results*)
- October 8, 2008. MDE-OCP received the *Third Quarter 2008 Tank Field Monitoring Pipe Sampling-October 6, 2008*.
  - Sampling of tank field monitoring pipes (TP3 and TP4) completed on 09/29/08 (*see table for results*)
- October 15, 2008. MDE-OCP letter to property owner at 136 Hanover Pike regarding water sample collected on 09/17/08. (*see table for results*)
- October 23, 2008. MDE-OCP received the results of samples collected from the drinking water well at 155 Hanover Pike on 10/02/08. (*see table for results*)
- October 29, 2008. MDE-OCP received the *Quarterly Sampling Report Third Quarter 2008-October 24, 2008*.

### 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
- Carroll County Health Department (CCHD) 410-876-4972

### 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 liability, involvement in a wrongful act or contribution to environmental damage.

## Monitoring Well Sample Results at the former Crown station located at 201 Hanover Pike

On-site Monitoring Wells at the former Crown station	Sampling Date	Benzene MCL – 5 ppb	MTBE	Tertiary butyl alcohol is an unregulated comp.	Other Constituents of Concern <i>Naphthalene's action level is 10 ppb</i>
			Action Level – 20 ppb		
<b>MW1</b> (Installed 08/2004) Total Depth - 42 ft 4 inch diameter well	08/16/04	31	13000	480	---
	08/26/04	17	3200	---	---
	05/19/05	ND	6100	---	---
	08/15/05	13	3000	---	---
	12/12/05	33	4500	---	---
	04/27/06	140	2200	330	---
	06/23/06	220	1800	8200	---
	09/26/06	400	11000	670	Naphthalene 110 ppb
	12/20/06	140	6500	6100	Naphthalene 65 ppb
	03/08/07	230	10000	640	Naphthalene 86 ppb
	06/15/07	120	9700	370	Naphthalene 64 ppb
	09/13/07	150	9200	2100	Naphthalene 100 ppb
	12/10/07	90	5000	310	Naphthalene 97 ppb
	03/03/08	92	5100	930	Naphthalene 78 ppb
	06/11/08	ND	530		
09/29/08	29	1800	400	Naphthalene 41 ppb	
<b>MW3</b> (installed 08/2004) Total Depth 45 ft 4 inch diameter well	08/16/04	ND	110	---	---
	05/19/05	ND	59	---	---
	08/15/05	ND	45	---	---
	12/12/05	ND	10	---	---
	03/28/06	ND	8.9	---	---
	06/23/06	ND	170	2800	---
	09/26/06	ND	38	---	---
	12/20/06	ND	ND	210	ND
	03/08/07	ND	ND	ND	ND
	06/15/07	ND	ND	ND	ND
	09/13/07	ND	ND	ND	ND
	12/10/07	ND	ND	ND	ND
	03/03/08	ND	ND	ND	ND
06/11/08	ND	ND	ND	ND	
09/29/08	ND	ND	ND	ND	
<b>MW3Deep</b> Installed 03/2008 Interval sampling	06/11/08 102 ft	ND	16	ND	
	06/11/08 135 ft	ND	12	ND	
	09/29/08 125 ft	ND	ND	ND	
<b>MW4</b> (installed 08/2004) Total Depth 45 ft 4 inch diameter well	08/16/04	ND	9000	47	---
	08/26/04	ND	830	---	---
	05/19/05	ND	2600	ND	---
	08/15/05	ND	730	---	---
	12/12/05	ND	370	---	---
	03/28/06	ND	190	---	---
	06/23/06	6.1	42	74	---
	09/26/06	ND	100	ND	---
	12/20/06	ND	85	ND	---
	03/08/07	ND	79	ND	ND
	06/15/07	ND	86	ND	ND
	09/13/07	ND	27	ND	ND
	12/10/07	ND	15	ND	ND
03/03/08	ND	59	ND	ND	
06/11/08	ND	120		ND	
09/29/08	ND	47	ND	ND	

On-site Monitoring Wells at the former Crown station	Sampling Date	Benzene MCL – 5 ppb	MTBE Action Level – 20 ppb	Tertiary butyl alcohol is an unregulated comp.	Other Constituents of Concern <i>Naphthalene's action level is 10 ppb</i>
<b>MW5</b> (installed 08/2004) Total Depth 40 ft 2 inch diameter well	08/16/04	ND	31	---	---
	05/19/05	ND	ND	ND	ND
	08/15/05	ND	54	---	---
	12/12/05	ND	27	---	---
	03/28/06	ND	18	---	---
	06/23/06	ND	ND	ND	---
	09/26/06	ND	14	ND	---
	12/20/06	ND	ND	ND	---
	03/08/07	ND	ND	ND	ND
	06/15/07	ND	ND	ND	ND
	09/13/07	ND	ND	ND	ND
	12/10/07	ND	ND	ND	ND
	03/06/08	ND	ND	ND	ND
	06/11/08	ND	ND	ND	ND
09/29/08	ND	ND	ND	ND	
<b>MW5 Deep Installed 03/2008 Interval sampling</b>	06/11/08 87 ft	ND	7.4		
	06/11/08 99 ft	ND	8.9		
	06/11/08 136 ft	ND	6.6		
	06/11/08 152 ft	ND	8.3		
	09/29/08 125 ft	ND	ND		
<b>MW6</b> (installed 08/2004) Total Depth 40 ft 2 inch diameter well	08/16/04	ND	ND	ND	---
	05/19/05	ND	ND	ND	ND
	08/15/05	ND	7.5	---	---
	12/12/05	ND	ND	---	---
	03/28/06	ND	ND	---	---
	06/23/06	ND	ND	ND	---
	09/26/06	ND	ND	ND	---
	12/20/06	ND	ND	ND	---
	03/08/07	ND	ND	ND	ND
	06/15/07	ND	ND	ND	ND
	09/13/07	ND	ND	ND	ND
	12/10/07	Dry	Dry	Dry	Dry
03/03/08	ND	ND	ND	ND	
06/11/08	ND	ND	ND	ND	
09/29/08	ND	ND	ND	ND	
<b>MW145 Former drinking water well at 145 Hanover Pike (see below)</b>	06/11/08 96 ft	ND	29		
	06/11/08 114 ft	ND	27		
	06/11/08 125 ft	ND	30		
	09/29/08 125 ft	ND	ND		
<b>TP1</b>	03/20/08	Dry			
	06/05/08	Dry			
	09/29/08	Dry			
<b>TP2</b>	03/20/08	Dry			
	06/05/08	Dry			
	09/29/08	Dry			
<b>TP3</b>	03/20/08	ND	ND	ND	ND
	06/05/08	ND	ND	ND	ND
	09/29/08	ND	ND	ND	ND
<b>TP4</b>	03/20/08	Dry			
	06/05/08	Dry			
	09/29/08	ND	ND	ND	ND

Sample Location	Sample Date	MTBE (ppb) MDE's action level 20 ppb	TAME (ppb) An unregulated comp.	TBA (ppb) An unregulated comp.	
136 Hanover Pike - (Mann Resident)  Granular Activated Carbon (GAC) unit installed by MDE in June 2006. Samples collected quarterly	CCHD - 05/05/05	293		4.28	
	MDE - 06/06/05	140	100		
	MDE - 06/29/05	(pre-filter) - 190 (mid filter) - ND (post-filter) - ND	(pre-filter) - 94 (mid filter) - 16 (post-filter) - ND		
	MDE - 07/29/05	(pre-filter) - 240 (mid filter) - ND (post-filter) - ND	(pre-filter) - 140 (mid filter) - ND (post-filter) - ND		
	MDE - 08/29/05	(pre-filter) - 210 (mid filter) - ND (post-filter) - ND	(pre-filter) - 110 (mid filter) - ND (post-filter) - ND		
	MDE - 09/23/05	(pre-filter) - 160 (mid filter) - ND (post-filter) - ND	(pre-filter) - 67 (mid filter) - ND (post-filter) - ND		
	MDE - 10/26/05	(pre-filter) - 350 (mid filter) - 11 (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND		
	MDE - 11/29/05	(pre-filter) - 310 (mid filter) - 110 (post-filter) - ND	(pre-filter) - 160 (mid filter) - ND (post-filter) - ND		
	MDE - 02/16/06	(pre-filter) - 480 (mid filter) - ND (post-filter) - ND	(pre-filter) - 8 (mid filter) - ND (post-filter) - ND	pre-filter) - 95 (mid filter) - ND (post-filter) - ND	
	MDE - 04/20/06	(pre-filter) - 420 (mid filter) - 13 (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	pre-filter) - 130 (mid filter) - ND (post-filter) - ND	
	MDE - 06/14/06	(pre-filter) - 370 (mid filter) - 250 (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	pre-filter) - 150 (mid filter) - 160 (post-filter) - ND	
	Carbon filters replaced 06/29/06				
	MDE - 08/28/06	(pre-filter) - 570 (mid filter) - ND (post-filter) - ND	(pre-filter) - 5j (mid filter) - ND (post-filter) - ND	(pre-filter) - 19(est) (mid filter) - ND (post-filter) - ND	
	MDE - 11/21/06	(pre-filter) - 370 (est) (mid filter) - 45 (post-filter) - ND	(pre-filter) - 6j (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	
	MDE - 02/28/07	pre-filter) - 730 (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	
	MDE - 05/28/07	pre-filter) - 710 (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	
	MDE- 08/31/07 Filter change requested	pre-filter) - 220 (mid filter) - 23 (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	
	MDE- 11/28/07	pre-filter) - 120 (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	
	MDE- 02/21/08	pre-filter) - 276 (mid filter) - ND (post-filter) - ND	(pre-filter) - 4.8 (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	
	MDE- 09/17/08	pre-filter) - 102 (mid filter) - 52.7 (post-filter) - ND	(pre-filter) - 0.9 (mid filter) - ND (post-filter) - ND	(pre-filter) - ND (mid filter) - ND (post-filter) - ND	
137 Hanover Pike (Western Industrial Machine)	CCHD - 09/02/04	2.03	ND	ND	
135 Hanover Pike -Columbia Property	CCHD - 10/12/04	1.31			
145 Hanover Pike	Private - 09/22/06	59.7	1.3		
155 Hanover Pike - Harrell Bros. Kitchens Heating oil UST removed 10/09/07 - no perforations observed	CCHD - 09/07/04	6.16			
	Crown - 09/13/05	5.4			
	Crown - 04/27/06	6.2			
	Crown - 07/26/06	19	0.6		
	CCHD - 11/02/06	6.84	ND		
	CCHD - 11/29/06	5.1	ND		
	Private - 10/09/07	7.1	ND	ND	
	MDE - 10/02/08	7.42	ND	ND	
4203 Wolf Hill Rd.	CCHD - 09/23/04	ND			
4205 Wolf Hill Rd.	CCHD - 09/23/04	ND			
4303 Wolf Hill Rd.	CCHD - 09/23/04	ND			

## Drinking Water Sampling results in the Hampstead Area near the Hanover Pike Crown Station

Sample Location	Sample Date	MTBE (ppb) MDE's action level 20 ppb	TAME (ppb) An unregulated comp.	TBA (ppb) An unregulated comp.
4305 Wolf Hill Rd.	CCHD – 09/23/04	ND		
4306 Wolf Hill Rd.	CCHD – 09/23/04	ND		
4308 Wolf Hill Rd.	CCHD – 09/23/04	ND		
4309 Wolf Hill Rd.	CCHD – 09/23/04	3.4		
4310 Wolf Hill Drive. – semi-annual	CCHD – 08/16/04	ND	ND	ND
	Crown – 08/14/05	ND	ND	ND
	Crown – 04/27/06	ND	ND	ND
	Crown – 07/26/06	ND	ND	ND
	Crown – 08/06/07	ND	ND	ND
	Crown – 09/13/07	ND	ND	ND
4311 Wolf Hill Drive –semi-annual MDE assumed the operation, maintenance and sampling of privately installed GAC system in September 2006	CCHD – 08/16/04	15.2	ND	ND
	CCHD – 04/13/05	18.4	ND	ND
	Crown – 10/21/05	20 (raw water)	ND	ND
	Crown – 05/22/06	40 (raw water)	ND	ND
	MDE – 11/21/06	19 (pre-filter)	ND	ND
		ND (mid-filter) ND (post-filter)		
	MDE – 02/28/07	17 (pre-filter)	ND	ND
		15 (mid-filter) ND (post-filter)		
MDE – 05/31/07	ND (pre-filter)	ND	ND	
	ND (mid-filter) ND (post-filter)			
MDE – 09/04/07	ND (pre-filter)	ND	ND	
	ND (mid-filter) ND (post-filter)			
Piney Branch Golf & Country Club – semi-annual	Crown – 07/27/05	ND	ND	ND
	Crown – 04/27/06	ND	ND	ND
	Crown – 07/26/06	ND	ND	ND
	Crown – 11/29/06	ND	ND	ND
	Crown – 03/09/07	ND	ND	ND
	Crown – 09/13/07	ND	ND	ND
	Crown - 03/04/08	ND	ND	ND
314 Hanover Pike (sampled by CCHD) 09-07-06	CCHD – 09/07/06	ND	ND	ND

## Drinking Water Sampling results at the Hanover Pike Crown Station (cont)

Sample Location	Sample Date	MTBE ( ppb) Action Level at 20 ppb	TBA – Unregulated compound
201 Hanover Pike – Crown Station - monthly Total Depth 100 Feet All samples collected by Crown GAC installed 09/26/02	09/18/02	652 (raw)	
	09/24/02	610 (raw) 723 (pre-filter)	ND (< 625)
	09/27/02	(post-filter) – 1.6	ND
	10/30/02	(pre-filter) – 685 (post-filter) – 3.3	ND (< 625)
	11/27/02	(pre-filter) - 725 (post-filter) – ND	ND (< 750)
	12/27/02	(pre-filter) - 1030 (post-filter) – ND	ND (< 625)
	01/27/03	(pre-filter) - 760 (post-filter) – 202	ND (< 250)
	02/27/03	(pre-filter) - 705 (post-filter) – 414	ND (< 625)
	03/11/03 <i>Carbon system modified</i>	(pre-filter) – 763 (post-filter) – ND	(pre-filter) – ND(<625)
	04/23/03	(pre-filter) – 680	
	05/30/03	(pre-filter) – 770 (post-filter) – ND	(pre-filter) – ND(<250)
	06/25/03	(pre-filter) – ND (mid-filter ) – 620 (post-filter) – 640	(pre-filter) - ND (mid-filter ) – 58 (post-filter) – <625
	07/02/03	(pre-filter) – 730 ((mid filter A) – 800 (mid-filter B) – 480 (post-filter) – 8.3	(pre-filter) - 59 ((mid filter A) – 50 (mid-filter B) – 52
	07/14/03	(pre-filter) – 580 ((mid filter A) – 630 (mid-filter B) – 650 (post-filter) – 166	(pre-filter) – 7.6 ((mid filter A) – 33 (mid-filter B) – 21
	07/28/03	(pre-filter) - 1100 ((mid filter A) – 590 (mid-filter B) – 450 (post-filter) – ND	(pre-filter) - 16 ((mid filter A) – 8.8 (mid-filter B) – 8
	08/18/03	(pre-filter) – 870 (mid filter A) – ND	(pre-filter) - 12
	09/04/03	(pre-filter) - 750 (mid filter A) – 22	(pre-filter) - 16
	10/13/03	(pre-filter) - 2400 (mid filter A) – 1200 (mid-filter B) – ND (post-filter) – 0.6	(pre-filter) - 35 (mid filter A) – 5.9
	11/04/03	(pre-filter) - 1600 (mid filter A) – 1900 (mid-filter B) – 23 (post-filter) – 7	(pre-filter) - 19 (mid filter A) – 10
	12/15/03	(pre-filter) - 180 ((mid filter A) – 4.7 (mid-filter B) – 41 (post-filter) – 38	(pre-filter) - 50 (mid filter A) – 19
	01/09/04	(pre-filter) - 95 ((mid filter A) – 10 (mid-filter B) – 42 (post-filter) – ND	---
	02/06/04	(pre-filter) – 6.9 ((mid filter A) – 13 (mid-filter B) – 22 (post-filter) – ND	---
	03/03/04	(pre-filter) – 9.9 ((mid filter A) – 42 (mid-filter B) – 8.7 (post-filter) – ND	---

## Drinking Water Sampling results at the Hanover Pike Crown Station (cont)

Sample Location	Sample Date	MTBE ( ppb) Action Level at 20 ppb	TBA – Unregulated compound
201 Hanover Pike – Crown Station Total Depth 100 Feet All samples collected by Crown GAC installed 09/26/02  <b>Product line broken during well drilling                      activities in 08/2004</b>	04/14/04	(pre-filter) – 51 (mid filter A) – 290 (mid-filter B) – 20 (post-filter) – 1.3	---
	05/26/04	(pre-filter) – 130 (mid filter A) – 10	---
	06/23/04	(pre-filter) – 37	---
	07/21/04	(pre-filter) – 35 (mid filter A) – 12	---
	09/30/04 -	(pre-filter) – 53 (mid filter A) – 58	---
	10/08/04	(pre-filter) – 54 (mid filter A) – 14 (mid-filter B) – 8.3 (post-filter) – ND	---
	CCHD - 10/12/04	(?post-filter) - ND	---
	07/26/06	(pre-filter) – 64 (mid filter A) – 61 (mid-filter B) – 0.6 (post-filter) – ND	---
	09/05/06	(pre-filter) – 58 (mid filter A) – 41 (mid-filter B) – 17 (post-filter) – 1.1	---
	10/30/06	(pre-filter) – 60 (mid filter A) – ND (mid-filter B) – ND (post-filter) – ND	---
	11/29/06	(pre-filter) – 8.8 (mid filter A) – ND (mid-filter B) – ND (post-filter) – ND	---
	12/20/06	(pre-filter) – 18 (mid filter A) – 3.7 (mid-filter B) – ND (post-filter) – ND	---
	01/22/07	pre-filter) – 16 (mid filter A) – 11 (mid-filter B) – ND (post-filter) – ND	---
	02/16/07	Pressure tank - 70 (pre-filter) – 43 (mid filter A) – 17 (mid-filter B) – 5 (post-filter) – ND	---
	03/19/07 Carbon treatment system replaced	(pre-filter) – 110 (mid filter A) – ND (mid-filter B) – 6.2 (post-filter) – 3.8 Tap – 3.5	---
	04/03/07	Pressure tank - 130 (pre-filter) – 120 (mid filter A) – ND (mid-filter B) – ND (post-filter) – ND Tap – ND	---
	02/16/07	Pressure tank - 70 (pre-filter) – 43 (mid filter A) – 17 (mid-filter B) – 5 (post-filter) – ND	---
	03/19/07	(pre-filter) – 110 (mid filter A) – ND (mid-filter B) – 6.2 (post-filter) – 3.8 Tap – 3.5	---

## Drinking Water Sampling results at the Hanover Pike Crown Station (cont)

Sample Location	Sample Date	MTBE ( ppb) Action Level at 20 ppb	TBA – Unregulated compound
201 Hanover Pike – Crown Station (cont) Total Depth 100 Feet All samples collected by Crown GAC installed 09/26/02	04/03/07	Pressure tank - 130 (pre-filter) – 120 (mid filter A) – ND (mid-filter B) – ND (post-filter) – ND Tap – ND	----
	05/23/07	Pressure tank - 210 (pre-filter) – 110 (mid filter A) – 42 (mid-filter B) – 2.1 (post-filter) – ND Tap – not sampled	---
	06/16/07	Pressure tank - 170 (pre-filter) – 38 (mid filter A) – 54 (mid-filter B) – 21 (post-filter) – ND Tap – not sampled	---
	09/13/07	Pressure tank - 160 (pre-filter) – 79 (mid filter A) – 11 (mid-filter B) – ND (post-filter) – ND Tap – not sampled	---
	12/10/07	Pressure tank - 139 (pre-filter) – 47 (mid filter A) – 45 (mid-filter B) – 38 (post-filter) – 28 Tap – not sampled	---
	01/29/08	Pressure tank - 120 (pre-filter) – 22 (mid filter A) – 30 (mid-filter B) – 2.9 (post-filter) – ND Tap – not sampled	
	02/12/08	Pressure tank - 73 (pre-filter) – 18 (mid filter A) – 21 (mid-filter B) – 16 (post-filter) – ND Tap – not sampled	
	03/04/08 Carbon change out on 03/17/08	Pressure tank - 90 (pre-filter) – 19 (mid filter A) – 24 (mid-filter B) – 24 (post-filter) – 16 Tap – not sampled	
	04/016/08	Pressure tank - 69 (pre-filter) – 19 (mid filter A) – 7.3 (mid-filter B) – ND (post-filter) – ND Tap – not sampled	
	05/20/08 Carbon change out on 06/10/08	Pressure tank - 100 (pre-filter) – 55 (mid filter A) – 33 (mid-filter B) – 28 (post-filter) – 8.5 Tap – not sampled	
	06/11/08	Pressure tank - 66 (pre-filter) – 17 (mid filter A) – ND (mid-filter B) – ND (post-filter) – ND Tap – not sampled	

Sample Location	Sample Date	MTBE ( ppb) Action Level at 20 ppb	TBA – Unregulated compound
<b>Sample Location</b>  201 Hanover Pike – Crown Station (cont) Total Depth 100 Feet All samples collected by Crown GAC installed 09/26/02	07/25/08	Pressure tank - 63 (pre-filter) – 14 (mid filter A) – 5.5 (mid-filter B) – ND (post-filter) – ND Tap – not sampled	
	08/20/08	Pressure tank - 63 (pre-filter) – 16 (mid filter A) – 17 (mid-filter B) – ND (post-filter) – ND Tap – not sampled	
	09/29/08	Pressure tank - 58 (pre-filter) – 35 (mid filter A) – 25 (mid-filter B) – 9.1 (post-filter) – ND Tap – not sampled	