

Frog Mortar Creek Surface Water Conditions

LOCKHEED MARTIN

Frog Mortar Creek Surface Water Investigation

As a part of the environmental investigations and cleanup plans under way at the Martin State Airport site, Lockheed Martin has conducted extensive surface water and sediment investigations in Frog Mortar Creek since 2004. Previous investigations of the surface water and sediment were conducted by the airport operator (Maryland Aviation Administration) in 1997. The area under investigation is adjacent to the part of the property known as the Dump Road Area.

Based on the three-phased study submitted to the Maryland Department of the Environment (MDE) in 2009, remediation of sediment or surface water in Frog Mortar Creek was not anticipated. However, ongoing sampling of surface water conducted in July 2010 detected unexpectedly higher levels of contaminants than previously detected. Beginning in 2011 and in coordination with MDE, a quarterly surface water sampling program with additional sampling during the summer season was started to: 1) establish whether sampling results might vary, and if so, whether seasonal or other influences such as tides or depths at which samples were taken might affect findings; and 2) to determine whether existing conditions might pose risks to recreational users of the area. Four years of comprehensive monitoring data show that contaminant concentrations fluctuate throughout the year but are consistently highest close to the airport shoreline. The highest contaminant concentrations are typically detected along the shoreline at location SW38A, depicted on the figure below. In general, the contaminant concentrations are highest in the March and June samples and concentrations decrease over the summer months. The Frog Mortar Creek surface water samples are being taken in 4 locations in lines perpendicular to the shore - at the water's edge, and at 50, 100, and 200 feet from the shore. Human health risk calculations have been developed and updated with each set of sampling data. To date, these calculations have not indicated a need to actively restrict access to the area; however, it would be advisable to limit swimming in the portion of the creek located closest to the Dump Road Area.



Samples are being collected at four locations: shoreline, and 50, 100 and 200 feet offshore

MDE issued a water contact advisory for Frog Mortar Creek, adjacent to the Martin State Airport. The advisory does not prohibit swimming yet leaves that decision as a personal choice of users of the area. However, it advises the public about the chemicals that are present in the creek near the Dump Road Area shoreline.

Lockheed Martin currently is proposing a treatment system to capture and treat groundwater in that area; by containing the movement of contaminated groundwater toward the creek, a reduction of contaminant concentrations in surface water is expected in the future. However, until that system can be approved and constructed, surface water monitoring will continue to be used to evaluate whether additional steps are needed to protect the health of people using the creek.



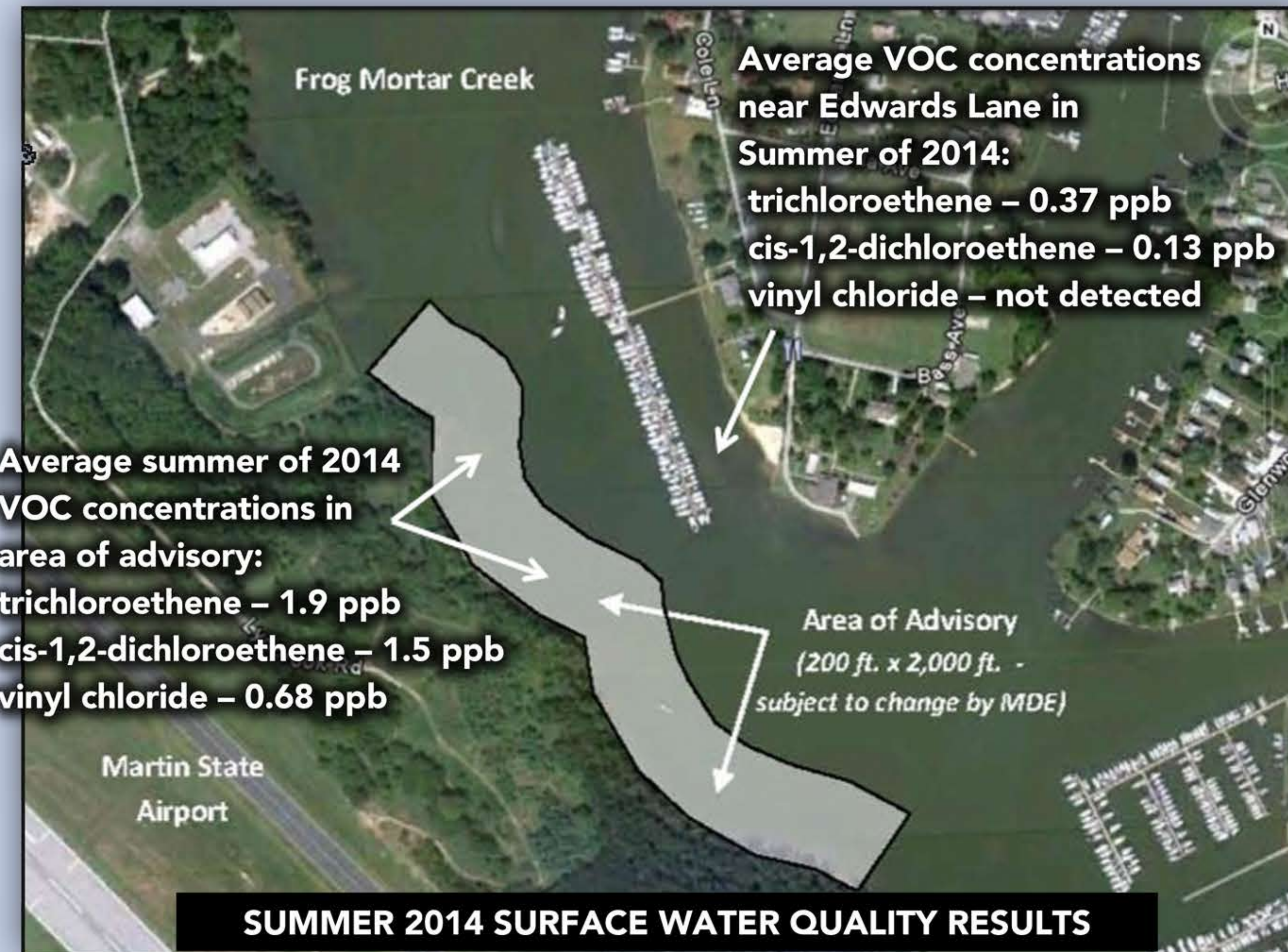
Frog Mortar Creek Water Contact Advisory

4/18/2012



The Department will be placing signs in the very near future along on the shoreline in the affected area to advise boaters and swimmers of the water contact advisory for this portion of Frog Mortar Creek. Lockheed Martin is proposing a treatment system to capture and treat groundwater prior to it entering the creek. Until the system can be approved and constructed, and reductions in surface water concentrations confirmed, the water contact advisory will remain in place and monitoring will continue to be used to evaluate whether additional steps are needed to protect the health of people using the creek.

The average summer 2014 concentrations of trichloroethene, cis-1,2-dichloroethene and vinyl chloride in the water contact advisory area on the airport (west) side of Frog Mortar Creek are below their screening levels. These compounds are also at concentrations below their screening levels on the eastern side of Frog Mortar Creek.



The shaded area indicates where the water contact advisory has been put into place. Test results generally show the highest concentrations of contaminants occur close to the shoreline of Martin State Airport



Signs have been posted at Martin State Airport advising people to limit swimming in that area.

Is this a ban on swimming in this area?

No. The contaminants in the sampling results are not at a level that merits a prohibition against swimming in this area. The contaminants at the levels measured do not present an acute health risk. They represent lifetime risk estimates and are developed to be conservative and protective of all potential users.

How often would I be able to swim there and still be safe?

The calculations assume that someone beginning as a small child who spends four hours a day in the water, 70 days a year over 30 years could have a slightly greater cancer risk, based on a statistical analysis. Swimming less frequently than this estimate will lower the potential health risks. MDE generally requires remedial measures to be put in place for cancer risks in excess of 1 in 100,000 over the course of a lifetime. Based on the current contaminant concentrations in the area of concern, reducing swimming activities to less than four hours a day and approximately 20 days a year during the summer months would result in risk levels within the MDE acceptable lifetime cancer risk range. Any person should choose the risk level with which they feel comfortable. This is personal decision.

What are the levels of these compounds that have been detected, and what levels are allowed as safe?

The swimming screening levels that are currently being used for this site for Cis-1,2-Dichloroethene, TCE and vinyl chloride are 300 ppb, 10 ppb and 0.7 ppb, respectively. The levels of each of the three compounds have varied seasonally and between sampling locations. Cis-1,2-Dichloroethene and TCE concentrations were below their swimming screening values in all three 2011 swimming season rounds. To date, the highest level of vinyl chloride has been 140 parts-per-billion (ppb), found adjacent to the Dump Road Area shoreline in March 2011, when swimming was unlikely due to the time of year. The highest observed summertime level of vinyl chloride has been 32 ppb, identified in July 2010. The average vinyl chloride concentration in June met the screening level of 0.7 ppb, the combined average of June and August results was 0.9 ppb and the combined average of June, August and September results was 1.8 ppb. The overall summertime average increased primarily due to an elevated concentration of vinyl chloride of 21 ppb at location SW-38 in September 2011.

What are the potential health impacts of TCE, cis-1,2 dichloroethene, and vinyl chloride?

Trichloroethene, known as TCE, breaks down and forms "daughter" byproducts. TCE and two such byproducts, cis-1,2-dichloroethene and vinyl chloride, are found in groundwater at Martin State Airport and in Frog Mortar Creek. Vinyl chloride is the most toxic of the "daughter" compounds, so the vinyl chloride levels that regulators consider to be safe - or "allowable" - are extremely low.

Studies have shown that some people exposed to high concentrations of these chemicals may have an increased risk of cancer. People can potentially be exposed to these chemicals while swimming by accidentally ingesting water and by direct skin contact.

For additional information on the potential health impacts of TCE, cis-1,2-dichloroethene and vinyl chloride, the federal Agency for Toxic Substances and Disease Registry (ATSDR) provides summaries about TCE, cis-1,2-dichloroethene and vinyl chloride and their health effects. These fact sheets can also be obtained directly from ATSDR at:

- Trichloroethene (TCE) - <http://www.atsdr.cdc.gov/tfacts19.pdf> ;
- cis-1,2 Dichloroethene (CIS-1,2) - <http://www.atsdr.cdc.gov/tfacts87.pdf> ; and
- Vinyl Chloride (VC) - <http://www.atsdr.cdc.gov/tfacts20.pdf>.

Any personal health-related questions should be consulted with a personal physician.

What happens to the chemicals when they reach Frog Mortar Creek?

The nature of these chemicals is to evaporate, or volatilize, which is why they are known as volatile organic compounds, or VOCs. Sampling indicates these chemicals appear to be entering Frog Mortar Creek in the sediments closest to the shoreline near the Dump Road Area. Through dilution, dispersion, and volatilization, the concentrations generally decrease further away from the airport shoreline. Higher water and air temperatures and tidal movements cause volatilization and mixing, continuing the process of lessening the effects of these VOCs.

My family and I have been swimming at Frog Mortar Creek for years. Should we be concerned?

Historical information suggests that contamination sources present along the perimeter of Frog Mortar Creek have existed for some time but have only recently been discovered due to advances in screening technologies and extensive efforts to identify and clean up historical sources of contamination.

LOCKHEED MARTIN

Lockheed Martin's Proposed Plan for Groundwater Treatment at Martin State Airport

In early 2012, Lockheed Martin Corporation (Lockheed Martin) shared with the public a Proposed Plan for the groundwater Interim Remedial Action (IRA) at the Dump Road Area (DRA) Site at Martin State Airport (MSA) in Middle River, Maryland. The primary goal of this interim action is to capture and treat the contaminated groundwater at the site before it reaches Frog Mortar Creek. This Proposed Plan is the recommended alternative for achieving this goal, and consists of the following:

- Extraction of groundwater;
- *Ex situ* treatment (an action that will be accomplished above ground) using a water treatment facility to clean groundwater;
- Reinjection of treated groundwater in high concentration areas;
- Discharge of treated water to the publicly owned treatment works (POTW) or to surface water;
- Monitoring; and
- Land use controls.

Purpose Of The Preferred Alternative

The preferred alternative meets the Interim Remedial Action goal in that it captures and treats trichloroethene (TCE), 1,4-dioxane, and other site contaminants before groundwater reaches Frog Mortar Creek. This approach also will provide for additional groundwater extraction and treatment, if it is needed in the future.



Site Description

Martin State Airport (MSA) is located at 701 Wilson Point Road in Middle River, Maryland, and is bounded by Frog Mortar Creek to the east and Stansbury Creek to the west. Both creeks join the Chesapeake Bay at the southern side of the airport. The Dump Road Area (DRA) Site is on the southeast portion of Martin State Airport, and is bounded by Frog Mortar Creek to the east and Taxiway Tango and the main airport runway to the west. See the figure above for a site wide aerial photograph with the Dump Road Area outlined.

More information on environmental activities at Martin State Airport, including a *Frequently Asked Questions* document on *Frog Mortar Creek Surface Water Investigation* can be found at the Essex public library, and the Lockheed Martin website at: www.lockheedmartin.com/martinstate

Feel free to contact Gary Cambre, Senior Manager of Communications for Lockheed Martin, at 800-449-4486 or by email at gary.cambre@lmco.com if you have questions or concerns.