

PFAS Fact Sheet

Middle River Complex and Martin State Airport

Middle River, Maryland



Lockheed Martin Middle River Complex
2323 Eastern Boulevard
Middle River, Maryland

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History of the Middle River Complex and Martin State Airport

In 1929, the Glenn L. Martin Company, a predecessor to Lockheed Martin Corporation, purchased land in Middle River, Maryland, to build and test aircraft. This land is now part of the Middle River Complex and Glenn L. Martin State Airport. In 1975, the airport was sold to the State of Maryland. The Maryland Aviation Administration, a unit of the Maryland Department of Transportation, operates the airport which is home to the Maryland Air National Guard 175th Wing, as well as to private and corporate aircraft operations.

Martin Marietta Corporation merged with Lockheed Corporation in 1995 to form Lockheed Martin Corporation, which today conducts engineering and research at the Middle River Complex. The complex is owned by LMC Properties, Inc., which provides global real estate and asset management services to Lockheed Martin. Lockheed Martin's Rotary and Mission Systems business operates at a portion of the facility.

At both the Middle River Complex and Martin State Airport, investigations analyzed for eight of the many PFAS compounds, based on those most likely to have been historically used, and these are:

- ***Perfluorooctanoic Acid (PFOA)***
- ***Perfluorobutanesulfonic Acid (PFBS)***
- ***Perfluoroheptanoic Acid (PFHpA)***
- ***Perfluorohexanesulfonic Acid (PFHxS)***
- ***Perfluorononanoic Acid (PFNA)***
- ***Perfluorooctanesulfonic Acid (PFOS)***
- ***6:2-Fluorotelomer Sulfonate (6:2 FTS)***
- ***8:2-Fluorotelomer Sulfonate (8:2 FTS)***

More information about environmental remediation at both sites is available at: www.lockheedmartin.com/middleriver and www.lockheedmartin.com/martinstateairport.

What are PFAS?

Per- and polyfluoroalkyl substances (PFAS) are a large group of man-made chemicals that have been used in a variety of industries since the 1940s. PFAS were used to manufacture commercial products, including firefighting foam. Some PFAS are no longer used. Of the eight PFAS compounds sampled for by Lockheed Martin, the U.S. Environmental Protection Agency (EPA) has established human health advisory levels of 70 parts per trillion (ppt) for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS), and EPA has groundwater screening levels for PFOA and PFOS of 40 ppt each. At this time, no surface water screening levels are available from EPA or Maryland Department of the Environment (MDE). Additional information on PFAS can be obtained at www.epa.gov/pfas/basic-information-pfas.

PFAS have been applied in metal plating operations and could potentially have been used in association with historical plating operations within the Middle River Complex (refer to map on page 2). In addition, a former firefighting training area at the complex may have used aqueous film forming foams (AFFFs).

Because PFAS may have been used at the Middle River Complex, Lockheed Martin undertook a voluntary investigation in October 2019 to determine if PFAS contamination is present in groundwater at the site.

Two PFAS compounds, PFOA and PFOS, were historically present in firefighting AFFF but have been replaced with other PFAS compounds and non-fluorinated compounds in recent decades. The history and type of AFFF used at Martin State Airport is unknown, although the United States Air Force (USAF) generally began using PFOA and PFOA-containing AFFF in the 1970s to extinguish petroleum fires. Between 2015 and 2017 the USAF phased out the use of AFFF containing PFOS, PFOA and other persistent



Yellow dots indicate 41 groundwater sampling locations near potential PFAS source areas at the Middle River Complex.

pollutants. The history of AFFF use on the civilian side of Martin State Airport is unknown, although its use at civilian airports has been common, and an accidental release of AFFF occurred at the Lockheed Martin corporate aircraft hangar in 2012. The initial groundwater and surface water investigation round at Martin State Airport was in February-March 2020 and, to better understand the findings, a follow-up groundwater and surface water investigation occurred in July 2020.

Preliminary Investigation and Environmental Sampling—at the Middle River Complex

The goal of the PFAS investigation was to sample existing groundwater wells in the vicinity of areas where PFAS may have been used to evaluate whether groundwater at the Middle River Complex has been affected by the substances. The investigation included the collection of background, upgradient, potential source, and downgradient groundwater samples from 41 locations:

- 11 groundwater samples addressing the former fire training area and locations near Dark Head Cove, and
- 30 groundwater samples addressing the former metal plating areas and locations near Cow Pen Creek.

Key Findings of the PFAS Groundwater Sampling

The PFAS groundwater sampling results revealed that:

- Low-level PFAS concentrations are present in 40 of the 41 locations sampled (one sample found no detections of PFAS).
- None of the samples exceed the EPA's human health advisory levels of 70 ppt for PFOA and PFOS either individually or combined.
- PFOA and PFOS concentrations detected in those 40 locations sampled ranged from 0.83 to 62 ppt.
- PFOS concentrations detected in 2 locations sampled exceeded the U.S. EPA groundwater screening level guidance level of 40 ppt (measured concentrations of 42 and 47 ppt).

Preliminary Investigation and Environmental Sampling—at Martin State Airport

The goal of the initial PFAS investigation (February-March 2020) was to sample existing groundwater wells and near-by ponds and drainage channels in areas where PFAS may have been historically deposited or used, to evaluate whether groundwater and surface water at Martin State Airport have been affected by these substances. In the Dump Road Area, groundwater samples from twenty wells and surface water samples from two ponds were collected and analyzed for eight PFAS compounds. At Greater Strawberry Point, groundwater samples from eight wells and two drainage channel samples were collected and analyzed for PFAS.

A follow-up groundwater and surface water investigation, based on the results of the first-round investigation, was undertaken in July 2020 and included the collection of groundwater samples from 28 locations and four surface water samples. In the Dump Road Area, groundwater samples from sixteen wells and surface water samples from two ponds were collected and analyzed for PFAS. At Greater Strawberry Point, groundwater samples from eleven wells and three drainage channel samples were collected and analyzed for PFAS.

In September 2019 and again in June 2020, water samples from the groundwater treatment facility in the Dump Road Area were also tested for PFAS. PFAS is now part of the routine monthly monitoring of the intake and exiting water at the facility. The treatment facility (<https://www.lockheedmartin.com/content/dam/lockheed-martin/eo/documents/remediation/msa/gwo-photo-tour-aug2018.pdf>) is designed primarily to treat volatile organic compounds in groundwater and the treatment includes three in-series, 6,000-pound, granular activated carbon vessels as a final treatment before the treated water is discharged to Frog Mortar Creek. This type of carbon is also highly effective in removing PFAS from water.

Key Findings of the PFAS Groundwater Sampling – at Martin State Airport

February/March 2020 Investigation

In the Dump Road Area and adjacent areas on the east side of the airport:

- PFAS compounds, including PFOA and PFOS, were detected in nineteen of the twenty wells tested.
- PFOA levels exceeded the EPA groundwater screening level of 40 ppt in three of the twenty wells, located near the north and south ends of the Dump Road Area.
- PFOS levels exceeded the EPA groundwater screening level of 40 ppt in two of the twenty wells, located near the north and south ends of the Dump Road Area. Both of these wells also had PFOA levels above 40 ppt.
- The highest PFAS groundwater concentrations were 180 ppt of PFOA and 300 ppt of PFOS (both from the same location south of the Dump Road Area). Groundwater from a second location, north of the Dump Road Area, contained 280 ppt of PFOS and 79 ppt of PFOA.
- Both pond surface water samples (near the Dump Road Area) had low-levels of PFAS, including PFOA and PFOS. No PFAS screening levels are established for surface water.
- Groundwater PFAS concentrations generally were highest in the shallower wells, with decreasing concentration in the intermediate and lower surficial aquifer.

In Greater Strawberry Point on the west side of the airport:

- PFAS compounds, including PFOA and PFOS, were detected in five of the eight wells tested.
- PFOA was detected above the 40 ppt EPA groundwater screening level in one well only (66 ppt), near the north end of the Greater Strawberry Point wooded area.
- PFOS was detected at slightly above the 40 ppt EPA groundwater screening level in one well only (48 ppt), located north of the airport maintenance facility.
- Both surface water samples, collected from the channel draining the wooded area and also connected to airport storm water detention basins, had PFAS. The

Samples taken at the groundwater treatment system indicate PFAS are being removed prior to releasing treated water to Frog Mortar Creek.

downstream drainage channel sample had elevated PFOS (520 ppt) and PFOA at 29 ppt; the upstream sample had 16 ppt PFOA and 3.5 ppt PFOS.

- No PFAS screening levels are established for surface water, however, a second round of sampling was planned to verify the initial surface water results.

July 2020 Investigation

In the Dump Road Area and adjacent areas on the east side of the airport:

- Wells tested were focused in areas of PFAS detection in the initial investigation.
- PFAS compounds, including PFOA and PFOS, were detected in all sixteen of the wells tested.
- PFOA levels exceeded the EPA groundwater screening level of 40 ppt in fourteen of the sixteen wells, located near the north and south ends of the Dump Road Area.
- PFOS levels exceeded the EPA groundwater screening level of 40 ppt in nine of the sixteen wells, located near the north and south ends of the Dump Road Area.
- All nine wells with elevated PFOS also had PFOA levels above 40 ppt.
- The highest PFAS groundwater concentrations were 2,300 ppt of PFOA and 7,800 ppt of PFOS in the same sample (near the south end of the Dump Road Area).
- The next highest PFAS concentrations were 3,000 ppt of PFOS and 680 ppt of PFOA, in a well to the north of the DRA.
- Both pond surface water samples had low-levels of PFAS, including PFOA and PFOS. No PFAS screening levels are established for surface water.

- Groundwater PFAS concentrations generally were higher in the shallower (upper surficial aquifer) wells than in wells screened in the intermediate surficial aquifer; no lower surficial aquifer (deep) wells were tested.

In Greater Strawberry Point on the west side of the airport:

- PFAS compounds, including PFOS and PFOA, were detected in all eleven of the wells tested.
- PFOA was detected above the 40 ppt EPA groundwater screening level in one well only (66 ppt), located near the north end of the Greater Strawberry Point wooded area.

PFAS EXCEEDANCES, GREATER STRAWBERRY POINT

LEGEND

- MONITORING WELL
- ▲ SURFACE WATER
- ▲ SAMPLE LOCATION

All results in parts per trillion (ppt)

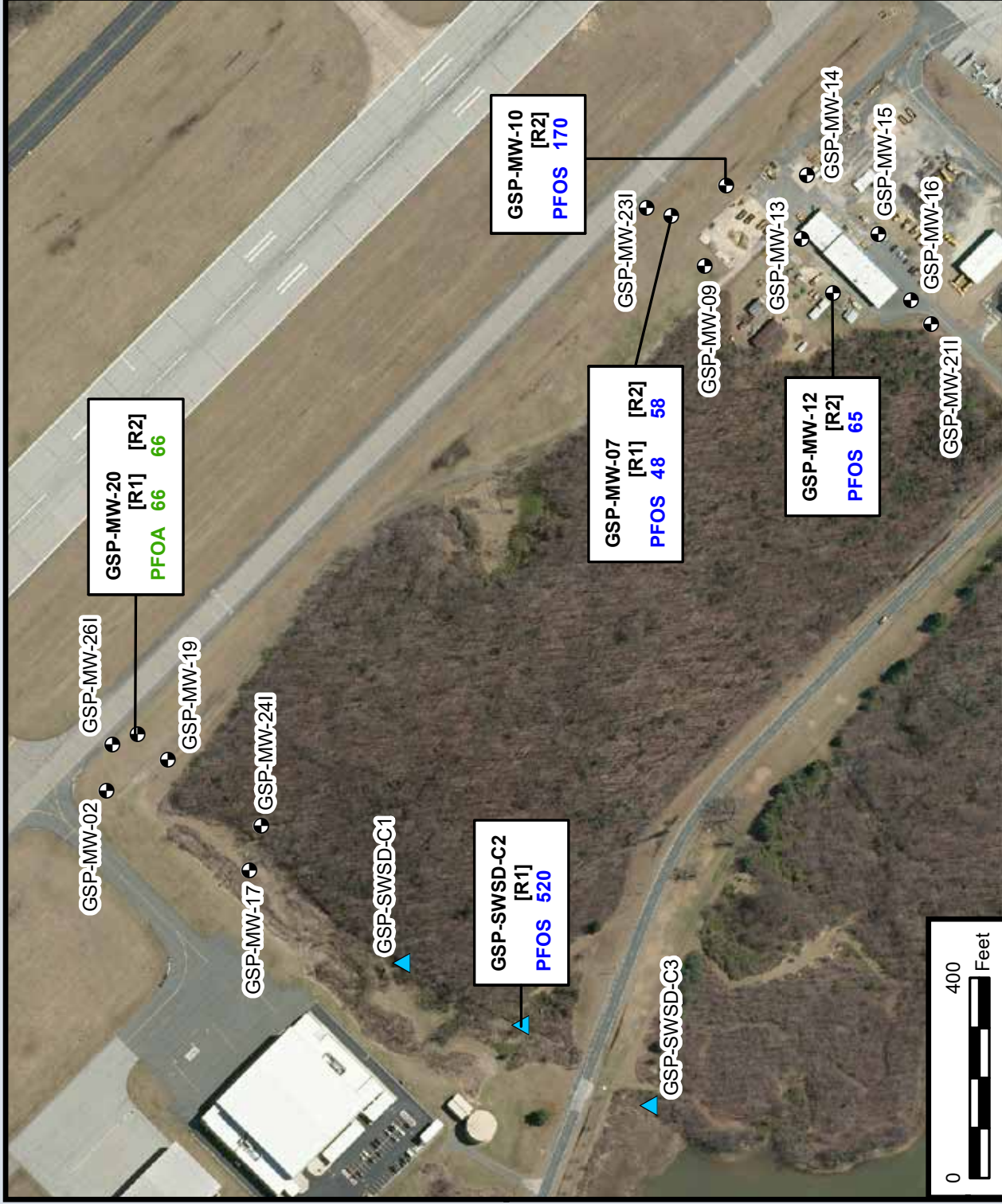
PFOS results are shown in **blue** text.

PFOA results are shown in **green** text.

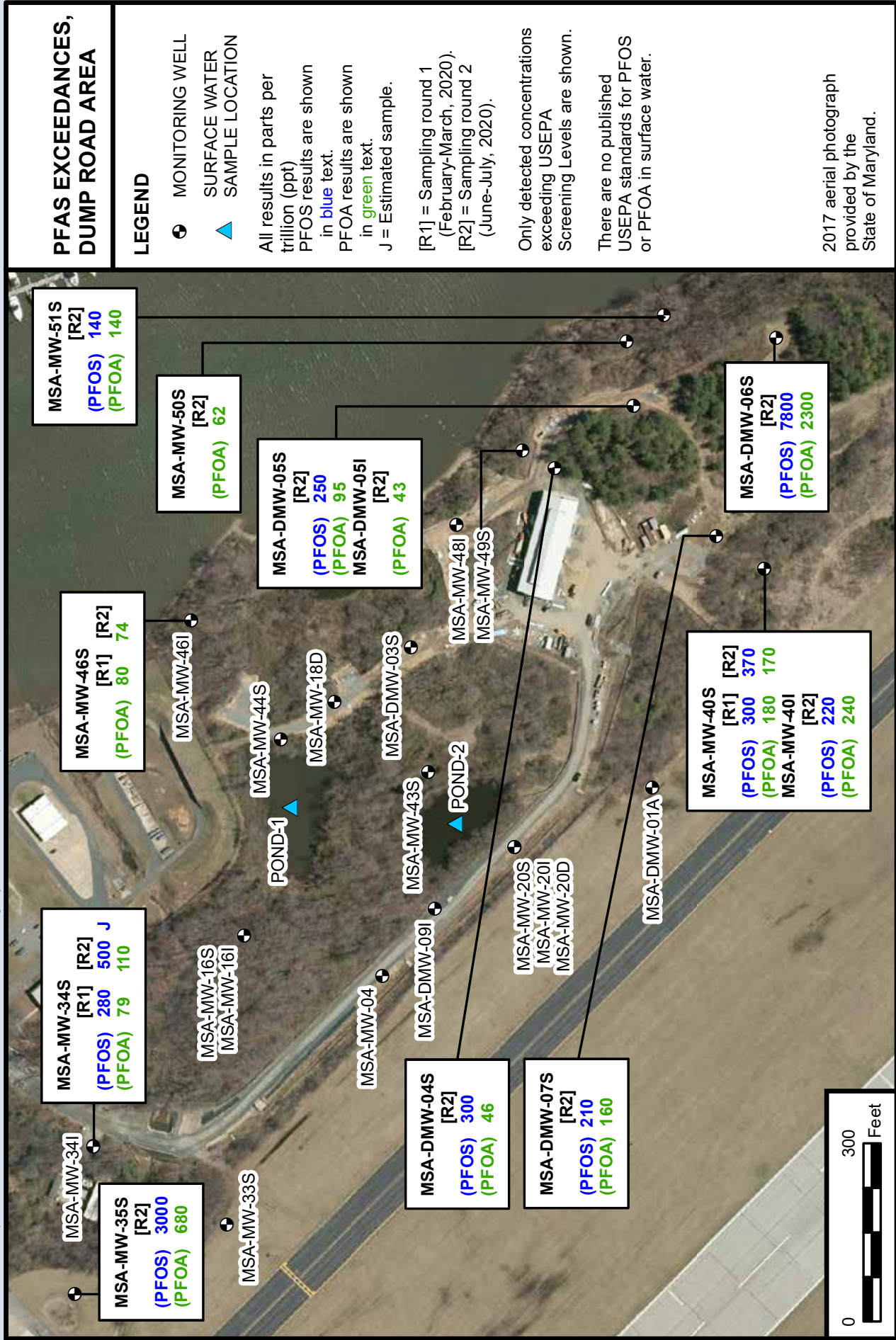
[R1] = Sampling round 1 (February-March, 2020).
[R2] = Sampling round 2 (June-July, 2020).

Only detected concentrations exceeding USEPA Screening Levels are shown.

2017 aerial photograph provided by the State of Maryland.



Black/white circles and blue triangles indicate locations where PFAS sampling occurred in groundwater and surface water in Greater Strawberry Point at the Martin State Airport in February/March and July 2020. Only detected concentrations exceeding USEPA screening levels are shown.



PFAS EXCEEDANCES, DUMP ROAD AREA

LEGEND

- MONITORING WELL
- ▲ SURFACE WATER
- ▲ SAMPLE LOCATION

All results in parts per trillion (ppt)
 PFOS results are shown in **blue** text.
 PFOA results are shown in **green** text.
 J = Estimated sample.

[R1] = Sampling round 1 (February-March, 2020).
 [R2] = Sampling round 2 (June-July, 2020).

Only detected concentrations exceeding USEPA Screening Levels are shown.

There are no published USEPA standards for PFOS or PFOA in surface water.

2017 aerial photograph provided by the State of Maryland.

MSA-MW-51S
 [R2]
 (PFOS) 140
 (PFOA) 140

MSA-MW-50S
 [R2]
 (PFOA) 62

MSA-DMW-05S
 [R2]
 (PFOS) 250
 (PFOA) 95
 MSA-DMW-05I
 [R2]
 (PFOA) 43

MSA-DMW-06S
 [R2]
 (PFOS) 7800
 (PFOA) 2300

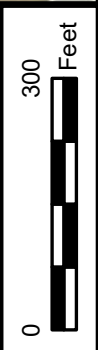
MSA-MW-46S
 [R1] [R2]
 (PFOA) 80 74

MSA-MW-40S
 [R1] [R2]
 (PFOS) 300 370
 (PFOA) 180 170
 MSA-MW-40I
 [R2]
 (PFOS) 220
 (PFOA) 240

MSA-MW-34S
 [R1] [R2]
 (PFOS) 280 500 J
 (PFOA) 79 110

MSA-DMW-04S
 [R2]
 (PFOS) 300
 (PFOA) 46

MSA-DMW-07S
 [R2]
 (PFOS) 210
 (PFOA) 160



Black/white circles and blue triangles indicate locations where PFAS sampling occurred in groundwater and surface water in Dump Road Area at the Martin State Airport in February/March and July 2020. Only detected concentrations exceeding USEPA screening levels are shown.

- PFOS was detected above the 40 ppt EPA groundwater screening level in three wells, located near the airport maintenance facility; the highest level detected was 170 ppt.
- All three surface water samples, collected from the channel draining the wooded area and also connected to airport storm water detention basins, had similar, low levels of PFAS. The highest concentrations detected were 21 ppt PFOA and 4.7 ppt PFOS.

Groundwater Treatment Facility Samples

- Process water sampling for PFAS compounds is performed regularly in the groundwater treatment facility. In June 2020 the sampling included five extraction wells to help determine the location and concentration of PFAS entering and being processed by the treatment plant.
- PFAS was detected in plant influent samples in each sampling round, but was not detected in the effluent, indicating that PFAS is being introduced to the groundwater treatment plant process water via the extraction wells, but is being removed by the carbon vessels.

Understanding What It Means

At this time, the Maryland Department of the Environment (MDE) has not established regulatory criteria for PFAS chemicals in groundwater; however, the MDE currently relies upon EPA's human health advisory level of 70 ppt for total PFAS in groundwater. MDE is working closely with its federal partners and stakeholders on establishing PFAS environmental screening criteria. EPA has set a groundwater screening level of 40 ppt each for PFOA and PFOS. Screening levels are risk-based values that are used to determine if levels of PFAS may warrant further investigation.

Because the public is not drinking the groundwater at the Middle River Complex or Martin State Airport, there is little-to-no risk of potential exposure onsite. At Martin State Airport, PFAS that is being captured by the groundwater treatment system is being effectively removed by its carbon treatment, as shown by sampling performed at each step of the treatment process.

Lockheed Martin has provided the MDE reports on Lockheed Martin's PFAS investigations and will work closely with MDE to review possible next steps, potentially including additional sampling in areas of the airport where the highest levels of PFAS have been identified.

Further Information

The Interstate Technology Regulatory Council (ITRC) and EPA have additional information on PFAS:

- ITRC: <https://pfas-1.itrcweb.org/fact-sheets/>
- EPA: <https://www.epa.gov/pfas/fact-sheet-protectingpublic-health-and-addressing-pfas-chemicals>

Final environmental reports and other public information covering Lockheed Martin's environmental remediation activities at the Middle River Complex and Martin State Airport sites are available at the Essex Public Library at 1110 Eastern Boulevard, Essex, Maryland, 21221. For more information about the library, call 410-887-0295.

Information also is available on the Lockheed Martin website: www.lockheedmartin.com/middleriver and www.lockheedmartin.com/martinstateairport.

Contact Information

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