

Lockheed Martin Corporation
6801 Rockledge Drive
MP CCT 246
Bete Middle Riv

er, Maryland

Dear Mr. Dietz:

For your review, please find enclosed two hard copies of the above-referenced document. This document addresses comments received from Maryland Aviation Administration on September 30, 2019

If you have any questions or require any additional information please contact my phone at 301-548-2223, or via e-mail at charlestrio@lockheed.com.

Sincerely,



Charles Trione
Project Lead, Environmental Remediation
Lockheed Martin Corporation

cc:(via email with enclosure)
Anmadha Mohanty MDE
Christine Kane, Lockheed Martin
NoriWarney Lockheed Martin
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cc:(via email with CD enclosure) with enclosure)
Mark Wiasa MAA
Al Pollard, Martin State Airport

cc:(via Secure Information Exchange)
Ann Richardson, Lockheed Martin

**Tetra Tech Response to Comments for
Maryland Aviation Administration
Martin State Airport
Review Comments**

**Groundwater Discharge Characterization Report Frog Mortar Creek, Martin State
Airport, 701 Wilson Boulevard, Middle River, Maryland, September 2019**

Please add details regarding approximate screen length of each drive point installed in the FMC sediment for falling head tests. The next paragraph provides details on total depths of the temporary wells, but it is unclear if the screened length is consistent or varied between each location.

- The information requested is presented in the first paragraph of Section 3.3 (reproduced below). The screens for both falling head test temporary wells (one set at 2 feet into the sediment and one set at four feet into the sediment) were both six inches in length.

Tetra Tech installed two temporary wells within FMC sediment (Figure 3-1) and conducted falling-head testing at each well. The wells consisted of an assembled screen and riser (with drive-w. MP (s)-1 T0.001 Tc -0.001 w 0 -1.15 TD(l)-1 (a)1 (yer))9.)1.1 (T)2 (h)1 (e w)3 SBPFMs was used to install the temporary wells. The wells were filled with water to create excess head, and the water-level drop was recorded using a standard water-level meter.

The two temporary wells were installed next to each other, with one driven to an approximate depth of two feet, and the other to an approximate depth of four feet. Well locations were surveyed via a handheld global positioning system (GPS) with sub-meter accuracy, using the Maryland State Plane NAD83 system.”

Please clarify if the average hydraulic conductivity, provided in parentheses, is averaging the shallow and deeper estimated sediment conductivities.

- Yes, the average hydraulic conductivity, provided in parentheses, was calculated by averaging the shallow and deeper estimated sediment conductivities. The average of 0.3932 ft/day was calculated by averaging 0.3318 feet per day (ft/day) at a depth of two feet, and 0.4545 ft/day at a depth of four feet.
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What is the cause of the single high outlying value at SBPFM-71? Please add an explanation or hypothesis as to the cause, since this value differs greatly from all others and strongly influenced the average value for comparison to the 2015 average.

- The cause of the single high outlying value at SBPFM-71 is unknown, but as described in the last paragraph of Section 4.4.2:

The reasons for the change in flow patterns from 2015 to 2018 are not completely understood, but are assumed to be strongly influenced by the local change of groundwater flow created by the activation of the groundwater extraction wells. The significantly lower net flux measured in 2018 is due to groundwater that now is captured by (i.e., discharges to) the extraction wells rather than to FMC. Some of the observed decrease in net flux may also be due to seasonal variation. The 2015 study was conducted during March and April, a period typically characterized by high groundwater and surface water flow. The 2018 study was conducted during October and November, a period typically characterized by low groundwater and surface water flow.”

Please explain why the studies were conducted in different seasons, if there are known seasonal variations associated with groundwater levels and surface water flow. Would this have affected the overall results of the 2018 study which is compared to the 2015 study under different seasonal conditions? This theory is mentioned in the next section (Section 4.4.3).

- The two studies (2015 and 2018) were conducted during two different times of the year in different seasons, however, that was not strategic. The discussion in the last paragraph of Section 4.4.2 as stated above, along with the additional discussion in Section 4.4.3, presents hypothesis on the varied results between the 2018 study as compared to the 2015 study. The possible explanations include: 1) high groundwater and surface flow compared to low groundwater and surface flow; and 2) due to the local change in groundwater flow created by the activation of the groundwater extraction wells.

While the very significant decrease in magnitude of the VOC mass discharge in 2018 compared to 2015 may be partially attributable to reduced groundwater discharge in fall conditions compared to the spring, any relatively small difference in groundwater discharge is considered unlikely to reduce the VOC mass discharge by the observed extent. Moreover, 2018 was a very wet year with multiple extreme precipitation events throughout the summer. It follows that groundwater discharge would be relatively high
