



**MEMORANDUM – HYDROGEOLOGIC ZONES OF INTEREST: MW-8D
HOFF VC SITE
NEW HANOVER TOWNSHIP, MONTGOMERY COUNTY, PENNSYLVANIA
REQUISITION NUMBER GTAC5-1-263**

April 19, 2013

SAIC Energy, Environment & Infrastructure (SAIC) is pleased to present this memorandum to the Pennsylvania Department of Environmental Protection (DEP) to summarize the findings of the hydrogeologic assessment of the potential water bearing zones at MW-8D. On April 11, 2013 a borehole geophysical survey was conducted at MW-8D. The geophysical survey log was used in conjunction with the well construction/drilling logs (prepared by SAIC) to assess the primary water bearing zones and to determine zones of interest for straddle packer sampling and/or potential target well screen depths. Complete geophysical logs will be presented in more detail in a summary report to be completed and submitted under separate cover. The following sections present a summary of SAIC's assessment and recommendations.

Assessment of MD-8D

MW-8D was drilled to a total depth of approximately 250 feet below grade (fbg), cased to 40 fbg and had an estimated blown yield of 0.5 gallons per minute (gpm). Well construction logs note water bearing zones at 30 fbg (1 gpm) and diffuse water bearing zones between approximately 85 and 145 fbg (0.5 gpm). The well construction log describes the lithology as approximately 10 feet of fill material underlain by approximately 110 feet of hornfels, underlain by diabase with occasional hornfels. Based on the rate of drilling the rock strength of the diabase was reported to be hard to very hard. Multiple mineral-filled fractures were noted throughout the borehole, however, no distinct water bearing zones were noted below 30 fbg. The geophysical log corroborates the findings of the lithologic logging. Furthermore, geophysical logs do not indicate distinct water bearing fractures. The logs do indicate the potential for a water bearing fracture at approximately 107 fbg, but the data are not conclusive and require further evaluation.

Based on review of the drilling logs and geophysical logs the primary zones of interest for straddling packer sampling are: 40 to 90 fbg, 90 to 120 fbg, 120 to 150 fbg, 150 to 180 fbg, and 180 to 250 fbg. The zone from 40 to 90 fbg is logged as hornfels with occasional mineral filled fractures. This zone extends from the bottom of the casing to approximately 5 feet below a mineral-filled fracture. No water bearing zones were noted during drilling, however, this zone may have diffuse low-yielding fractures that are representative of the shallow bedrock aquifer. Straddle-packer sampling of this zone is recommended to assess the potential for minor water bearing zones above the hornfels/diabase contact.

The zone from 90 to 120 fbg is logged as hornfels and diabase. The contact between the two lithologies occurs at approximately 115 to 120 fbg. During well construction, the blown yield

was assessed at a total depth of approximately 90 fbg and again at approximately 145 fbg. No yield was noted at 90 fbg, however, a blown yield of approximately 0.5 gpm was noted at 145 fbg. The geophysical log indicates several minor fractures throughout the zone, including a fracture at approximately 107 fbg. The fracture at 107 fbg also displays a change in slope of the temperature and conductivity logs. The changes in slope may represent a water bearing zone. Straddle-packer sampling of this zone is intended to assess the water-bearing properties of the fracture at 107 fbg as well as the contact between the hornfels and diabase.

The zone from 120 to 150 fbg is logged as diabase with inter-fingered hornfels and occasional mineral-filled fractures. The blown yield was assessed at 145 fbg and 0.5 gpm was produced. The geophysical logs indicate multiple hairline fractures and several minor fractures. In addition, a change in slope of the conductivity was noted at approximately 127 fbg. Straddle-packer sampling of this zone is intended to assess the water-bearing properties of the minor fractures noted throughout and to assess the upper contact with the hornfels.

The zone from 150 to 180 fbg is logged as diabase with occasional mineral-filled fractures. The blown yield was assessed at 170 fbg and 0.5 gpm was produced. The geophysical logs indicate multiple hairline fractures and several minor fractures. In addition, a change in slope of the conductivity was noted at approximately 153 fbg. Straddle-packer sampling of this zone is intended to assess the water-bearing properties of the minor fractures noted throughout and to assess the water-bearing properties of the diabase.

The zone from 180 to 250 fbg is logged as diabase with occasional mineral-filled fractures. The blown yield was assessed at 250 fbg and 0.5 gpm was produced. The geophysical logs indicate multiple hairline fractures and several minor fractures. Review of the geophysical log and drilling logs do not indicate distinct water bearing zones. Straddle-packer sampling of this zone is intended to assess the water-bearing properties of the minor fractures noted throughout and to assess the water-bearing properties of the diabase in the lower portion of the borehole.

Recommendations

SAIC recommends straddle packer aquifer testing and groundwater sampling at five zones in MW-8D. The testing has two primary objectives: to determine the approximate yield from specific intervals and to determine the water quality at specific intervals. Results of the packer testing will be used to assess the interconnectivity of aquifer zones, assess groundwater quality, and assess contaminant transport. Ultimately, nested well screens may be designed and installed based on the results of the straddle packer sampling work.

SAIC recommends that straddle packer testing be conducted on the following zones:

- 40 to 90 fbg
- 90 to 120 fbg
- 120 to 150 fbg
- 150 to 180 fbg
- 180 to 250 fbg