December 22, 2021

Mr. Christopher E. Williams
Environmental Issues Program Manager
Anne Arundel County Public Schools
9034 Fort Smallwood Road
Pasadena MD 21122

RE: PUMP TEST WORK PLAN APPROVAL
Case No. 2018-0559-AA
Wiley H. Bates Middle School
701 Chase Street, Annapolis
Anne Arundel County, Maryland
Facility I.D. No. 3200

Dear Mr. Williams:

The Maryland Department of the Environment's (MDE's) Oil Control Program (OCP) completed a review of the case file for the above-referenced property, including the *Step Drawdown Test* edited work plan proposal, dated October 28, 2021 and *Quarterly Sampling Report 4th Quarter 2021,* dated December 3, 2021 provided by Petroleum Management, Inc. This case was opened on May 2, 2018 following the report of light non-aqueous phase liquids (LNAPL) impacting Spa Creek. The current monitoring well network in the vicinity of the school's boiler room consists of 13 monitoring wells, one of which was installed as a replacement tank field monitoring pipe. Fuel recovery has been ongoing at this location since August 8, 2019. LNAPL recovery efforts have included enhanced fluid recovery (EFR) events, soil excavation, and LNAPL dedicated skimmer systems. The LNAPL skimmer system was deployed April 30, 2020 in accordance with MDE's *Corrective Action Plan Approval* letter, dated March 10, 2020 (copy enclosed). Two monitoring wells, MW-1 and MW-2, were targeted by the LNAPL skimmer pumps. As of June 23, 2021, the LNAPL skimmers recovered 191.25-gallons of LNAPL and 37-gallons of groundwater. The skimmer pumps were removed June 23, 2021 in order to gauge pre-pumping static conditions. During the December 1, 2021 site visit, LNAPL thicknesses rebounded to 1.04 feet in MW-1 and 0.23 feet in MW-2.

The *Step Drawdown Test* was submitted to depress the water table and assess the potential for submerged LNAPL. The *Step Drawdown Test* proposes a continuous 16-hour drawdown pump test on monitoring well MW-1. The depth of the pump intake will be set at 25 feet below the ground surface (bgs) to drawdown the water table to interval depths of 18 feet bgs, 20 feet bgs, 22 feet bgs, and 24 feet bgs. The *Step Drawdown Test* proposes to hold each interval for a duration of four hours. A double diaphragm pump will be utilized to pump groundwater into an oil-water separator frac tank. The effluent from the frac tank will be pumped through a bag filter, then two granular activated carbon (GAC) units in series.

Using data that was collected during EFR events, a calculated pump rate of approximately 2.5 gallons/minute is proposed to achieve drawdown for this test. However, the pump will be equipped with a flow control box to allow the operator to vary the flow rate to achieve targeted drawdown levels. Water levels in adjacent monitoring wells will be monitored by in-well *HOBO* transducers. In-well LNAPL thicknesses will be recorded at consistent intervals during the pump test and the system will be checked every 30 minutes.

The OCP hereby approves the proposed *Step Drawdown Test,* contingent upon the following modification and requirements:

1) The OCP recognizes the ITRC and ASTM procedures for calculating LNAPL transmissivity rates. This proposal does not address those procedures. If transmissivity calculations are necessary, this must be conducted under a different work plan.

2) Notify the OCP at least five working days prior to conducting any work at this site so we have an opportunity to observe field activities.

3) The approved pump test must be completed over a continuous 16-hour period for the selected monitoring well (MW-1). Ensure there is enough capacity to store, treat, and discharge impacted water from the site to complete the pump test without interruption. Ensure there is enough holding capacity to allow for proper separation of LNAPL and settlement of sediment for the necessary duration of time. The OCP understands that if recovered water or petroleum capacities are too large, that a vacuum truck will be utilized to control the containment.

4) Be prepared to adjust the pumping rate as necessary to achieve the proposed sustained drawdown.

5) Ensure that all conditions of the General Discharge Permit are met and that samples are collected in accordance with permit requirements.

    a. The OCP understands that in order to achieve the conditions of the permit, the *Step Drawdown Test* proposes to treat the effluent water through a 50-micron bag filter, then two GAC units in series, prior to discharging the water.

    b. The OCP requires that the treated water be discharged to the storm drain system. No treated water may be discharged to the ground surface.

    c. Ensure that effluent discharge rates are set to allow for appropriate contact time in carbon vessels for treatment before discharge. Sampling of the treated water must be performed in accordance with the approved Discharge Permit. The OCP recommends that additional sampling be considered to demonstrate the treatment system is operating as designed and that all water discharged to the storm drain meets regulatory standards.

6) The OCP requires the use of a **covered** frac tank, in order to contain potential vapors to the maximum extent practicable. Visually observe and measure the recovered product as proposed by utilizing an access manhole or pulling back the cover.

7) The OCP understands *HOBO* in-well transducers will be used in the adjacent monitoring wells to monitor water levels and an interface probe will be used to gauge LNAPL thicknesses. Both MW-1 and MW-2 must be gauged during this test for the presentation of LNAPL rebound.

8) Immediately upon completion of the pump test:

   a. Return the skimmer pumps to MW-1 and MW-2 as approved in MDE's *Corrective Action Plan Approval* letter dated March 10, 2020.

   b. Gauge MW-1, MW-2, MW-3, MW-4, MW-5, MW-6, MW-8, MW-9, MW-10, and MDE-1 on a weekly basis for four weeks or until water levels return to pre- pump test static conditions.

   c. Continue monthly gauging of all wells and quarterly (every three months) sampling of all wells as previously required.

9) A comprehensive, standalone *Pump Test Results Report* must be submitted **no later than 45 days following the completion of pump testing activities**. The document must include, at a minimum: step drawdown/ pump testing results; gauging summary tables for all wells gauged during the pump test; the amount of water/LNAPL recovered; and feasibility analysis of recovery options to optimize LNAPL recovery in the source zone area. **Include copies of Discharge Monitoring Report (DMR) forms that are submitted online to the EPA in accordance with the General Discharge Permit.**

10) Based on the presented results, propose necessary recovery actions or plans for future testing, if warranted. If gauging results show that significant LNAPL is present under drawdown conditions, the current approved Corrective Action Plan (CAP) is not designed to address these conditions. Additional investigation and/or a new CAP may be required.

When submitting documentation to the OCP, provide three hard copies and one electronic copy on a labeled compact disc (CD) or via email. If you have any questions, please contact Ms. Lindley Campbell at 410-537-3387 (*lindley.campbell1@maryland.gov*) or me at 410-537-3499 (*susan.bull@maryland.gov*).

Sincerely,

Susan R. Bull, Eastern Region Supervisor
Remediation Division
Oil Control Program

Enclosures: *Corrective Action Plan Approval*, March 10, 2020

cc: Mr. Scott Alexander, Project Manager, Petroleum Management, Inc.
Mr. Don Curtian, Director, Division of Environmental Health, Anne Arundel County Health Dept.
Mr. Matthew Waters, Bureau of Engineering and Construction, Anne Arundel County DPW
Ms. Lindley Campbell, Case Manager, Remediation Division, Oil Control Program
Mr. Martins Osakue, Permits Division, Oil Control Program
Mr. Andrew B. Miller, Chief, Remediation Division, Oil Control Program
Mr. Christopher H. Ralston, Program Manager, Oil Control Program