Applied EcoSystems, Inc.
Environmental Management, Consulting & Field Services

July 12, 2017 Project # 11-4317-102

Mr. Jim Innes
Michigan Department of Environmental Quality
Remediation and Redevelopment Division
Lansing District Office
525 West Allegan Street
Post Office Box 30473
Lansing, Michigan 48909-7973

Via email: InnesJ@Michigan.gov

Subject: Addendum – Draft Work Plan for Hydrogen Release Compound (HRC) Pilot Test
Revitalizing Automotive Communities Environmental Response (RACER)
Flint West #12990
Kearsley Street at Chase Street
Flint, Michigan

Dear Mr. Innes:

Applied EcoSystems, Inc. (Applied EcoSystems) has prepared this Addendum to address questions and comments presented by the Michigan Department of Environmental Quality (MDEQ) following review of the above draft Work Plan, dated October 6, 2016. MDEQ reviewed the draft Work Plan as MDEQ regulates injections into groundwater. The draft Work Plan was designed to allow for evaluation of the approvals needed, field methods, and effectiveness of the proposed injection of HRC to address chlorinated volatile organic compounds (CVOCs) contamination in soil and groundwater on the Site and the northern adjacent, downgradient property (formerly an abandoned former rail line parcel but now understood to be owned by the Genesee County Parks and Recreation Commission).

No Further Action Considerations:

The MDEQ indicated that there did not appear to be current complete exposure pathways identified for the contamination at the Site and that it might be possible to obtain no further action pursuant to MDEQ's Part 201 program relying on institutional controls and without active corrective action. However, it is noted that corrective action was proposed for this Site to enhance the apparent on-going attenuation of CVOCs in the groundwater, which could reduce the time period for future groundwater monitoring, minimize reliance on institutional controls on downgradient properties, and address possible future more stringent cleanup criteria.

The proposed corrective action is intended to reduce bulk contaminant mass in the soil underlying the upper saturated zone and the concentrations in the upper saturated zone that appear to be a result of CVOCs slowly leaching from the underlying soil to the overlying upper saturated zone thereby lengthening the time period necessary for the CVOCs to attenuate. Given RACER's purpose and structure, shortening monitoring time periods is desirable.

Pilot Study Objectives:

MDEQ requested a statement of the objectives for the pilot study. The objectives of this pilot study are to obtain a project specific understanding of the requirements for implementing the proposed full-scale in-situ corrective measure, including MDEQ approval of the injections, all field methods, and effectiveness of the injections in reducing contaminant mass.

Performance Monitoring:

MDEQ requested that performance monitoring be conducted using the proposed monitoring wells, MW-109S, MW-111S and MW-113S, and adding MW-112S as an upgradient baseline well and installing a new downgradient well near the location of SB-137, which is in line with the groundwater flow path from the pilot injection locations. The new well will be installed at a similar depth to the proximate wells and will be constructed of four-inch PVC. The well location is downgradient from the area of highest CVOC soil contamination.

During injection activities, water will be pumped from MW-109S and returned to the saturated unit through an injection point to be located approximately 10 to 15 feet upgradient from MW-109S. This recirculation effort will be attempted for a period of approximately two to four hours (yield and permitting). Water extracted from MW-109S will be monitored during pumping using field instruments to evaluate the presence, magnitude, and rate of influence of the HRC injection.

The performance monitoring schedule is proposed in the draft Work Plan but MDEQ asked that the pilot study monitoring be extended if the monitoring data indicates it would be beneficial to help show the impacts of the pilot injections. The performance monitoring will also include the following for each groundwater sample: turbidity (from field instruments); total organic carbon; iron (total and dissolved); manganese (total and dissolved), methane and oxidation reduction potential (ORP), in order to obtain data to help evaluate the impacts of the injected HRC on the general geochemistry. Results will be presented in Data Reports that will be submitted to EPA and copied to the MDEQ.

Contingency Plans:

MDEQ requested a contingency plan. The scope of work included in the draft Work Plan was designed to identify logistical, environmental, and other factors that may affect the project. More detailed information is provided below:

- The two northernmost areas of injection, the proposed additional well location, and wells, MW-109S and MW-113S are located on the former railroad parcel. It is understood that this parcel was recently acquired by Kettering University (and has now been transferred to the Genesee County Parks and Recreation Commission). Efforts to secure access for well installation, monitoring, and injection are in progress. In the event that access cannot be secured in a timely manner, injection points may be relocated to the RACER Site.
- Some proposed injection points may have limited accessibility due to tree growth and drilling obstructions (such as concrete in the subsurface on the north end of the RACER site). Should this occur, alternative injection locations will be placed as close as possible to the original areas proposed.
- Should fluid be observed daylighting from any nearby monitoring well, injection will immediately stop until the fluid level in the affected monitoring well falls to a few feet below the ground surface. When injection starts back up, the injection pressure will be reduced in order to prevent any fluid from daylighting from nearby wells and the fluid level in the affected well will be monitored to make sure the reduced injection pressure is appropriate and will not result in more daylighting.
- Should complications arise due to equipment limitations, weather and/or ambient lighting, field activities will be rescheduled. Due to the nature of the proposed activities, delays and rescheduling will be easily accommodated.
- If groundwater monitoring indicates excessive formation of methane, options to address this concern, such as passive venting, will be evaluated for implementation.

Groundwater Characteristics:

MDEQ requested that the saturated unit properties and resulting groundwater flow rate be estimated. Groundwater velocity was estimated using Darcy's Law and wells, MW-106SR, MW-108S, and MW-110S. Depth to groundwater data collected in 2016 is as follows:

Well ID	Groundwater Elevation (feet)
MW-106SR	707.85
MW-108S	700.97
MW-110S	700.30

An estimate of the groundwater flow rate for the Site has been determined using the following equation:

V = KS/n

Where:

V = groundwater flow velocity (ft/day)

K = average hydraulic conductivity

S = average hydraulic flow gradient

n = effective porosity

The hydraulic flow gradient was calculated at 0.0204 ft/ft.
Hydraulic conductivity is estimated at 100 ft/day.
Effective porosity is estimated at 0.3.

The estimated groundwater flow rate is approximately 6.8 ft/day.

Groundwater flow in the area of the proposed injection is generally to the west and has been consistent during sampling events conducted since 2012. Based on the above estimated flow rate, evidence of the injections could reach the downgradient performance monitoring wells in about 10 days, however it will likely take longer to observe any decreased CVOC concentrations.

Attached, are maps illustrating the Site layout, monitoring well locations, proposed injection points, and monitoring wells to be evaluated during performance monitoring.

If you have any questions, please do not hesitate to contact me.

Kind regards,

APPLIED ECOSYSTEMS, INC.

Mike Smith
Senior Technical Manager

MDS:lm

C: Mr. Brandon Pursel, United States Environmental Protection Agency – via email.