O'Reilly, Talbot & Okun
ENGINEERING ASSOCIATES

File No. 2663-12-01
January 14, 2019

Chicopee Concrete Service, Inc.
158 New Lombard Road
Chicopee, MA 01020

Attn.: Mr. Jason Ouellette

Re: Petroleum Migration in the Environment
Hadley Street Site
South Hadley, Massachusetts

Dear Mr. Ouellette:

This letter provides general information regarding the movement of petroleum in soil and groundwater. This information is provided for reference with regard to the gravel pit site in South Hadley. In particular, you have asked for information on whether or not a release of petroleum at the gravel pit site would be expected to migrate to the public supply well located approximately 1,500 to 2,000 feet northwest of the site. As discussed below, we conclude that this is unlikely.

O'Reilly, Talbot & Okun Associates, Inc. (OTO) is a 25-year old company. In that time, we have assessed and/or remediated hundreds of petroleum-impacted sites in New England. The discussion below is based on our experience, and on documents published by the Massachusetts Department of Environmental Protection (MassDEP).

PETROLEUM MIGRATION

The petroleum products most likely to be used during excavation operations at the site are diesel fuel and hydraulic oil. When released to the environment, both of these products have a preference for sorbing to soil instead of water. The most significant impacts are therefore to the soil at the point of release.

Released product would migrate over time. First it would travel downward through the soil under the influence of gravity, leaving a significant amount of the petroleum sorbed onto the soil as it moved. The vertical migration down through the soil would continue until a barrier was reached. In most cases, this is either a dense layer of fine material such as silt or clay, or the water table. Because oil and water are largely immiscible, the vertical migration of petroleum is limited to a large extent by groundwater. At this site, there is not a layer of fine material above the water table in the excavation area, so we anticipate that the water table would be the limiting medium.

If the volume of petroleum released was large enough that the soil column became saturated, some liquid petroleum would reach the water table. Once in contact with water, a percentage of the oil would become dissolved in and migrate laterally with the groundwater in the downgradient direction. At this site, we presume the public supply well is directly downgradient, although groundwater flow at the site is complex, and does not flow entirely toward the supply well.

Multiple mechanisms affect the distribution of released petroleum in the environment over time. Rainwater and meltwater will infiltrate the ground and draw additional oil downward from the release area. Some of the petroleum constituents are volatile and will be released to the air and diminish over time. Petroleum is also subject to biodegradation, in which microbes naturally present in the environment break the petroleum down, eventually to carbon dioxide and water. Because it is subject to biodegradation, MassDEP considers petroleum to be a "degradable" or "nonpersistent" material in the environment.[1]

MassDEP documents indicate that petroleum plumes in groundwater generally migrate less than 400 feet.[2] Their conclusion was based on a review of 70 sites in Massachusetts and a literature review of other petroleum releases. The fact that petroleum generally does not migrate substantial distances is due to biodegradation and attenuation occurring at the same rate and time as the migration at the downgradient edge of the plume.

In effect, residues from a petroleum release tend to stay localized and decay with time.

CONCLUSIONS

At this site, there will not be large volumes of petroleum used or stored on site. There are no storage tanks on site. The potential volume of petroleum that could be released is relatively small. Due to its tendency to sorb onto soil rather than enter the water phase, and on the natural biodegradation that occurs in the environment, released petroleum is unlikely to travel more than 400 feet from the point of release.

Based on this information, in our opinion, a potential petroleum release at the site associated with gravel excavation is unlikely to impact the municipal well.

[1] MassDEP, "Conducting Feasibility Evaluations under the MCP, Policy #WSC-04-160" July 16, 2004, Table 9-1.
[2] MassDEP, "Proposed Changes to the Massachusetts Contingency Plan – 310 CMR 40.0000" July 6, 2006.

Please do not hesitate to contact us if you have any questions on this information.

Sincerely yours,
O'Reilly, Talbot & Okun Associates, Inc.

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