FYI

Memorandum

To: Lynne Cayting Division of Remediation

From: Fred Lavallee, P.E. Division of Technical Services

Date: 01/08/01

Re: Farwell Mills Oil Collection System

At your request I have looked into the problems with the oil collection system at this property. I have reviewed the Haley and Aldrich 1991 O/M Plan for the facility and the LEDA Associates' 1999 and 2000 reports of activity at the facility. I spoke briefly by phone with Bearl Keith of Miller Hydro to clarify several items in the report. Finally, I visited the site on December 19, 2000 and observed the system's operation.

BACKGROUND

The system is intended to intercept free product, primarily heavy oils, remaining in the soil from past uses of the site and prevent their discharge to the Sabattus River. It consists of a French drain with a perforated pipe center, approximately 250' in length, running parallel to the river and between the river and the source soils. This collection system flows by gravity to an oil-water separator installed below grade in a vault. Discharge from the separator flows by gravity to a pump station wet well, from which it is pumped back up to a distribution box and infiltration gallery. Product collected by the separator is periodically removed. The system was installed in 1991. During its first year of operation, it collected over 2000 gallons of product. This amount has been decreasing each year until – in 2000 – it will collect approximately 300 gallons of product by year's end. Total product collected since 1991 is about 11,000 gallons.

EVALUATION OF THE EXISTING SYSTEM

At my inspection, two problems were apparent:

- A large amount of the flow pumped to the distribution box was not being infiltrated but was discharging out the box's manway, flowing overland, and discharging down the riprapped bank into the Sabattus River. I would estimate the flow to be 15 to 20 gpm.

- A small but significant amount of product was escaping the oil-water separator, flowing into the wet well and was being pumped to the distribution box and gallery. This was evidenced by heavy oil staining of the area surrounding the manway and by stained sorbent pads which had been placed in the distribution box. There was a distinct smell of weathered product throughout the trench/pump station/gallery area. There was little staining along the path of the discharge down the bank nor on the shell ice in the river, suggesting that only small amounts of oil were passing the separator.

It's not possible to be sure of all the problems with this system based on what I could observe and learn from interviews. Here are some possibilities:

- At the very least, it's clear that the infiltration gallery is badly clogged, probably with iron precipitates and possibly with heavy oil as well. The problem may have arisen from poor design, it may be a natural consequence of trying to infiltrate groundwater with dissolved minerals, or it may be a combination of both. In our experience at DEP, it is difficult to re-infiltrate groundwater with any significant mineral content after it has been oxygenated. Groundwater flowing through a contaminated formation typically becomes anoxic. Under anoxic (reducing) conditions, the solubility of many metals present in the soil matrix (iron, mangenese, arsenic) increases and their concentrations in groundwater also increase. When the groundwater is later aerated – in the separator, pump station, or distribution box – oxidizing conditions are produced, metals' solubility decreases, and the dissolved minerals precipitate. This often produces clogging in equipment or in receiving soils. Addition of sequestrants is sometimes sufficient to keep minerals soluble while still within remediation equipment such as blowers and strippers. We have not found a satisfactory fix to prevent a soil formation from clogging. Rehabilitative measures such as shocking with hypochlorite or industrial strength hydrogen peroxide have seldom improved performance except in the short term. If it is necessary to continue infiltrating treated groundwater, we have usually had to develop a new infiltration site, knowing that it too will have a limited life.

- It is not clear that the gallery's initial design was adequate. I understand that the gallery has not been able to accept all the flow from the interceptor system almost since its installation, and that water has intermittently discharged from the distribution box manway for years. Discharge from the wet well pumps is unmetered, so it is currently not possible to estimate the fraction of the flow being accepted by the gallery. Also, I understand that the volume collected by the trench varies seasonally. During my inspection, the pumps ran continuously. A few weeks earlier Gordon Fuller watched the system through several on-off cycles during an inspection. During late summer and low water table conditions, it's possible that the pumps cycle only occasionally. The 1991 O/M Plan included as-built drawings of the gallery, but its design and hydraulic loading rate were not discussed. In addition, there is no information as to the soils the gallery was placed in: whether these were coarse-grained alluvial deposits or fine-grained, organic, or soils otherwise unsuitable for infiltration. These areas would need to be

evaluated before serious consideration was given to reconstruction of the existing gallery.

- The oil-water separator is apparently not removing 100% of the separate-phase product that reaches it. According to the as-built drawings, the separator is a Model HT-500 manufactured by Highland Tank, modified slightly for the Farwell Mills application by removal of an extension of its pump-out pipe. It is not clear to me why this modification was made, unless to gain more volume for oil accumulation when the separator was still collecting more than 100 gallons of product per month. It is also not clear how this modification would affect separator performance. The manufacturer's technical information states that this model should be adequate for flows of up to 50 gpm for DNAPLs having a specific gravity of 0.95 or less. According to specifications, the API specific gravity of unweathered #6 oil is 12.3, which converts to about 0.98. The speficic gravity of the weathered product that reaches the separator is probably slightly higher, making this piece of equipment marginal for the job. As with the gallery, the separator's initial design and current performance would need to be evaluated if it is to remain in service at this site.

RECOMMENDATION

In my opinion this system is still serving a valuable function, in that it continues to collect annually 200 to 300 gallons of free product that would otherwise discharge to the Sabattus River. I believe a collection system should be operated here until a truly *de minimus* volume of product is being collected.

The existing system is nearly completely passive, operating with minimal oversight, and at a cost of only the energy to operate its pumps, periodically remove and dispose of collected product, analyze a grab sample, and an annual letter report. However, the malfunction of this system has resulted in an unlicensed overboard discharge to the Sabattus River. This needs to be addressed and corrected by the owner, as it is a direct violation of 38 MRSA §413, which prohibits unlicensed discharges to surface waters. If the status quo conditions continued uncorrected, the owner would be subject to enforcement action.

The owner's options here are limited to eliminating the discharge or licensing it. Eliminating the discharge could be done be finding a means to infiltrate the collected and treated groundwater into the formation, either by rehabilitating/reconstructing the existing infiltration gallery or constructing a new one. Alternatively, the owner could propose a means of intercepting and collecting the free product *insitu*, without withdrawing –and therefore having to dispose of – groundwater discharging from this site.

Licensing the discharge is also not out of the question. To do this the owner would need to obtain a discharge license from DEP's Bureau of Land and Water Quality (BLWQ). To

obtain a license, the owner would need to fully characterize the proposed discharge and demonstrate that its constituents – including both petroleum and inorganic compounds – will not violate the receiving water's classification standards nor impair its intended uses. BLWQ would almost certainly require a monitorable outfall pipe to the river, as an alternative to the existing bank discharge. If the owner wishes to investigate this option, he should contact BLWQ's licensing staff. I suggest Gregg Wood.

I'd be happy to meet with you, the owner, and his consultant if you'd like to discuss this situation and the possibilities for solution further. I'm sure Gregg would be willing to attend if a discharge license is to be considered.

I will return the O/M Manual and recent operating reports to your mailslot.

Cc: Gordon Fuller
Gregg Wood