Issue No. 3 | September 2016

Is It a REC? – Hydraulic Oil Equipment

Welcome to Issue No. 3 of our series examining some of the less well-defined site conditions that might be considered *recognized environmental conditions (REC)* when conducting a Phase I Environmental Site Assessment (ESA). As discussed in previous issues, the U.S. EPA's amended All Appropriate Inquiries (AAI) Final Rule and the American Society for Testing and Materials (ASTM International) E1527-13 "Standard Practice for Environmental Site Assessments" provide a broad definition for RECs. By now it has become standard practice to closely examine petroleum storage tanks on a property as potential RECs, inasmuch as the definition of REC begins with "*the presence or likely presence of any hazardous substance or petroleum products in, on, or at a property…*" However, the definition of petroleum products does not specifically include hydraulic oils. In fact, throughout the entire ASTM 1527-13 standard the word "hydraulic" appears only once, in reference to PCBs (polychlorinated biphenyls).

<u>Should Hydraulic Oils be considered a REC?</u>

Despite the limited ASTM reference, hydraulic oils can occur in a wide range of active or out-of-use equipment found in commercial/industrial/institutional facilities including elevators, vehicle lifts, compactors, and machinery. The composition of hydraulic oil is different from other petroleum products since hydraulic oils not only provide lubrication but also transmit fluid energy to a particular machine or component. This special use requires additives to improve hydraulic fluid properties such as viscosity, fire-resistance, and anti-foaming, which is why hydraulic oils can contain other chemicals used as pressure additives (sulfur, phosphorus and chlorine compounds), corrosion inhibitors (glycols, phenols, sulfides), defoamers (silicone oils), and other hydrocarbon-based viscosity improvers (olefins, acrylates, and styrene).

A Note on PCBs - Accounting for one of the key reasons that electrical transformers are considered in a Phase I ESA, PCB content also is a concern in hydraulic oil applications. PCBs were added to hydraulic oils to prevent thermal breakdown, and were used from approximately 1929 until being banned in the U.S. in 1979. ASTM 1527-13 Section 9.4.2.10 calls out PCBs specifically when making interior and exterior observations, namely "electrical or hydraulic equipment known to contain PCBs or likely to contain PCBs shall be described in the report…" Clearly, PCB containing equipment should be carefully evaluated in any Phase I, and perhaps deserves a separate discussion when considering RECs (Hint: a future issue of *Is It a REC?* may be entitled *The ABCs of PCBs*…). But, should we care about hydraulic oil whether or not it contains PCBs? Yes…

Hydraulic Lifts - By design, a hydraulic lift has the potential to release oil to the environment and should be evaluated for this possibility. A common area of contamination from hydraulic oil leaks is the soil around the in-ground pistons of a lift system. Modern automotive repair shops may use above-ground lifts with hydraulic tanks that are also aboveground and easy to inspect. Older systems with underground vaults can include individual buried fluid tanks at each lift, or have a series of lifts that are connected to remote reservoir tanks via lines or hoses that also can leak. Another concern with buried hydraulic systems is their ability to collect floor wash and other waste liquids from vehicle maintenance. These types of in-ground lift systems, whether they are working, abandoned in-place, or removed, are candidates for further investigation of soil and shallow groundwater conditions through a Phase II.

Elevators - Hydraulic elevators for smaller buildings (less than 8 stories) are often powered by a piston that travels inside a fluid-filled cylinder, raising the elevator cab and allowing for a smooth descent as the oil is released from the cylinder and back into the reservoir tank. The piston can extend into the ground to a depth equal to the full rise of the elevator. Other elevator designs avoid this direct conduit of oil leaks to soils and groundwater below the building, but may still have hydraulic machinery installed in the elevator pit. Modern elevator pits often have liners (casings) that reduce corrosion and can be monitored for leaks. It is important, therefore to determine the details of elevator construction when conducting the Phase I inspection, and review plans or directly observe the elevator shaft bottom when possible. Also review elevator inspection logs which may contain an oil log book that keeps track of oil losses and changes in oil levels, a requirement in some localities. Odors, especially of burnt oil, can provide a clue to presence of hydraulic lift systems.

dpSTUDIO

environmental consulting & design

Other Hydraulic Equipment - Other potential hydraulic equipment to look for on your Phase I site visit can include leveling platforms on shipping and receiving docks (determine if they are electrically operated or hydraulic); trash dumpsters with hydraulic compactors; and other industrial machinery such as mounted presses, drills or jacks that may be connected to a remote or below-ground fluid reservoir or tank.

Case Study

A Phase I ESA prior to demolition of a former automobile dealership led to a site characterization and closure of underground storage tanks (USTs), which included 25 hydraulic lifts and associated hydraulic tanks. The lifts were distributed among three buildings, with 20 lifts located in the main service shop, four lifts in the used car service shop, and one in a body shop attached to the main shop. Further inspection revealed that the lifts in the main building (arranged in two lines, 10 lifts per line) and body shop were operated by above-ground hydraulic tanks, whereas the four lifts in the older, used car shop building each were connected to hydraulic USTs. The lifts, hydraulic fluid USTs, and associated piping were excavated and removed from the site, which allowed direct inspection and sampling. Each UST was an approximate 25-gallon steel tank containing hydraulic oil and positioned vertically beneath the concrete floor slab directly adjacent to the lift which it served. Prior to excavation, residual fluids were pumped from each tank. During removal the condition of the backfill material was monitored by field screening with a photo ionization detector (PID), which indicated readings suggesting hydrocarbon impacts. No free product was observed in the tank removal pits, however rust, dents, pits, and holes were observed on the USTs. Excavated soils were stockpiled next to the tank pit waiting for analytical results of soil samples.

Hydraulic oil USTs removed from under floor slab of vehicle lift area.

Vehicle lift after removal, showing underground piston assembly.

In addition to sampling soil stockpiles, soil samples were collected from the bottom of the tank pit (approximately 4 feet below grade) underneath the location of the vertically-standing tanks and submitted for laboratory analysis of total petroleum hydrocarbons (TPH) as gasoline range organics (GRO), diesel range organics (DRO) and PCBs. Results indicated no PCBs, and TPH in mostly the heavier weight diesel range in concentrations as high as 1800 parts per million (ppm) which necessitated disposal as non-hazardous, petroleum-contaminated wastes.

The lifts in the main shop were removed by excavating two pits, one along each line of lifts and measuring approximately 100 feet long by 4 feet wide and 8 feet deep. As with the use car shop area, no free product was observed and some areas of clean fill could be selectively removed and returned as backfill. Also, no PCBs were detected. However, TPH was detected at higher levels than in the used car shop, up to 4,000 ppm, indicating that hydraulic oils were still released to the environment from normal use of the pistons, even though no USTs were associated with these newer lifts.

dpSTUDIO environmental consulting & design is an environmental engineering consulting firm anchored by senior engineers and scientists, each with more than 25 years of experience and supported by project staff and field technicians across the U.S. Our goal is to provide cost effective service on a fast-turnaround schedule to exceed your expectations.

Locations in Richmond, VA ◆ Denver, CO ◆ Providence, RI