HAZARDOUS WASTE MINIMIZATION TECHNIQUES APPLIED TO SOLVENT AND OIL RECYCLING

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Most waste streams from automotive-related sources, and from many industrial generators, contain primarily oil, hydrocarbon solvents, and water. While the ratios change depending on whether the waste came from a parts washer, a crankcase, or a process stream, these three components tend to predominate. Fortunately, mixtures of oil, solvents, and water can be separated for recovery using distillation, much as a petroleum refinery originally isolates those materials. For example, Figure 1 shows a boiling point curve for a used oil. The cut points show how various materials can be recovered from this single waste stream. Similarly, a parts washer solvent would be distilled with most of the stream coming over in the solvent boiling range and the oil contamination recovered as residue. In this way, waste streams are actually turned into feedstock to recovery process plants, such as oil re-refineries and solvent reprocessors. Waste minimization goals are achieved by removing these materials from the waste category, since they are collected not for disposal, but rather for recycling.

The reclamation of these wastes involves well-known process technologies. For example, in the used oil re-refining case, the following steps are applied to the feed material:

- An initial atmospheric distillation removes the water as a vapor, along with some of the light solvents. The water can be treated and used within the plant or discharged. The solvents become part of the fuel to operate the plant.

- The second distillation stage involves a moderate vacuum, which vaporizes hydrocarbon distillate materials, such as diesel fuel and mineral spirits. These also can be used as fuel for the process, or as cleaning solvents.

- The third and final distillation step utilizes high vacuum to vaporize the lubricating oil, leaving behind a tar-like material that can be sold for use as road asphalt, heavy industrial fuel, or cement kiln fuel.

- The lube oil portion is recondensed and passed over a solid catalyst in the presence of high pressure hydrogen to remove color- and odor-causing contaminants. The final product is indistinguishable from virgin lube oils.

This process description is one example of many processes that are functioning around the country and are permitted by EPA to be in compliance with RCRA, HSWA, and BIF regulations. The costs to construct and operate these systems depend on their complexity and size. However, a key to their success is the testing they perform to demonstrate that:

- The feedstock, intermediate by-products, and final products all comply with environmental regulations.

- The recovered material meets specifications, often the same specifications as applied to virgin material.
- The fuels will not cause emission problems.

- Materials incorporated into products, such as fuels sent for cement kiln use, will not negatively affect quality.

The more generators are encouraged to segregate their waste and seek recyclers who will maximize recovery of all portions of their wastes, the more true waste minimization that will occur. Not all wastes can be eliminated at the point of generation through process and feedstock changes. By combining engineering enhancements with effective utilization of those wastes that are generated, overall waste minimization impacting the environment can be achieved.

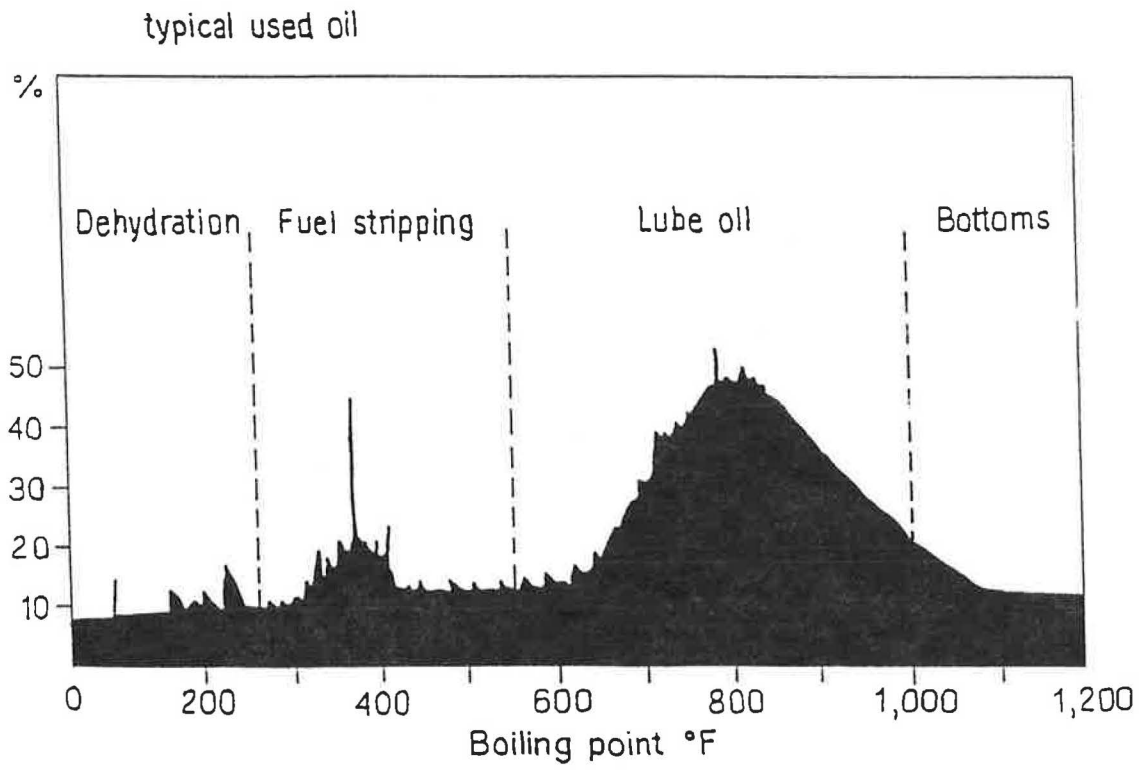

Figure 1 Boiling Point Curve for Used Oil.