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Hazardous Waste Engineering
Research Laboratory
Cincinnati OH 45268

Research and Development

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Project Summary

Sampling Oil-Water Mixtures at OHMSETT

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This report describes procedures developed for sampling oil and water mixtures.

Two procedures for sampling in containers are discussed: grab and stratified sampling. Both of these techniques require stripping free-standing water from the container bottom. The grab sample technique requires that the remaining fluids be thoroughly mixed before immersing a bottle through the resulting homogeneous emulsion. The stratified sampling procedure uses a sample thief to capture a segmented cross-section of the remaining fluids.

Two procedures for sampling flowing fluids were tested. The two sampling tubes tested were installed immediately downstream of a series of static mixers and a centrifugal pump. The sampling ports were a simple slotted tube and a pilot-shaped tube.

This Project Summary was developed by EPA's Hazardous Waste Engineering Research Laboratory, Cincinnati, OH, to announce key findings of the research project that is fully documented in a separate report of the same title (see Project Report ordering information at back).

Discussion

In the documentation of oil spill skimmer performance, a measure of the relative oil/water makeup of collected fluids is essential. The U.S. Environmental Protection Agency (EPA) conducted tests at the Oil & Hazardous Materials Simulated Environmental Test Tank (OHMSETT) in Leonardo, New Jersey to determine the usefulness of several techniques to obtain and analyze representative samples of oil/water mixtures. Two methods of sampling containers holding the mixed fluids and two methods of sampling flowing streams of the mixed fluids were tested.

Complete statistical studies were not conducted, but the tests indicate that the two methods for sampling containers of the fluids would give a precision of 3% oil. The first method entailed thoroughly mixing the oil and water to form a homogeneous emulsion. The sample was then taken by lowering a bottle through the emulsion to obtain a 100 ml sample for later analysis. The second method used a stratified sampling thief to capture a representative cross-sectional core of the fluids. The entire sampler was then sent to the laboratory for analysis. Tests were conducted using the stratified sampler to determine if the complete analysis could be abbreviated for field application, where speed rather than accuracy may be the prime consideration. These tests showed that, while order-of-magnitude results could be obtained, significant deterioration of precision should be expected. The selection of the method used in the field would depend on the use of the sample and support facilities available as well as the shape of the container sampled.

Two methods of sampling flowing streams were investigated. One method used a slotted sampling port; the second method used a pitot-shaped tube for the sampling port. In both cases, the sampling port was located immediately downstream of an in-line static mixer. The analysis of samples taken through the two ports each gave results within the precision of the comparison technique. The use of the static mixer to eliminate radial nonsymmetry in the flowing liquid appears to make the selection of samples purely arbitrary.

These tests were performed using only OHMSETT Circo X medium oil and salt

water as the immiscible fluids. Highly viscous mixtures may affect the results of future application of either of the stationary techniques. When sampling materials other than oil and water, chemical compatibility of the materials with the sampling device must be considered.

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The complete report, entitled "Sampling Oil-Water Mixtures at OHMSETT," (Order No. PB 88-102 892/AS; Cost: $11.95, subject to change) will be available only from:
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