

Waste Analyses Project for Iowa Automotive Dealerships

Introduction

The IWRC often recommends Toxicity Characteristic Leaching Procedure (TCLP) analysis for wastes such as antifreeze, sump sludge and used floor dry. Follow-up reveals that small businesses rarely characterize these wastes through laboratory analyses. Many businesses simply do not perform hazardous/non-hazardous waste determinations on waste. This bases disposal decisions on incomplete data that does not often lead to implementation of pollution prevention alternatives.

The Waste Analyses Project performed TCLP test on used antifreeze, used oil absorbent, and sump sludge from Iowa automotive dealerships. The objective of the project was to improve the implementation rate of P2 practices by making a hazardous waste determination to categorize wastes and determine the proper pollution prevention action and disposal method at volunteer facilities. Assisting businesses in becoming compliant will facilitate the first step toward P2 implementation.

Waste Analyses for Auto Dealerships

The Waste Analyses for Auto Dealerships project conducted TCLP analysis on used antifreeze, used oil absorbent, and floor drain sump sludge at Iowa automotive dealerships. The purpose of the project was to collect enough data to produce a study report that dealerships could use in lieu of an individual test from each shop on each waste if the data supported such a statement. Like all other services the IWRC provides, the

Waste Analysis Project maintained client confidentiality during the on-site review at the facility and in the data analysis of the sample results.

The Waste Analyses for Auto Dealerships project summary and data analysis for each waste can be downloaded from the IWRC website at: <http://www.iwrc.org/SBPPC/index.htm>.

These wastes have the potential to be a hazardous, due to the presence of toxins, therefore require the TCLP testing protocol to determine whether the waste is hazardous or non-hazardous. While the TCLP includes 40 test parameters, wastes need only be tested for the toxins likely to be present. Common testing parameters for these wastes include the eight heavy metals and some volatile organic compounds (VOCs).

- [Common TCLP Testing Parameters](#)
- [Analytical Laboratories Able to Perform TCLP Testing](#)

Using the EPA's Decision Error Feasibility Trials (DEFT) tool and published data from a test of metals in the wastes a sample population of 49 facilities was derived as being statistically significant to draw a generalized conclusion from the data should one become apparent. Samples from these facilities were tested for the TCLP parameters listed in the attachment link above Common TCLP Testing Parameters. Overall 56 Iowa automotive dealerships participated in the study. The project was extensive, 190 TCLP tests were conducted for approximately \$58,000, with 73 antifreeze samples being taken due to the

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testing anomaly discovered. Oil absorbent as either floor dry or oily mats contributed 57 data points and sump sludge the remaining 60 results.

The study did not support a generalized statement that automotive dealerships should no longer make a hazardous waste determination through TCLP analysis on these wastes. Some toxins were present in each of the waste streams.

Overall the study identified that shops that continue to use chlorinated brake cleaner have the potential to generate waste that is toxic due to the presence of Tetrachloroethene at levels above the 0.7 milligrams per Liter (mg/L) regulatory threshold in antifreeze and sump sludge.

Waste Antifreeze Summary

Of the initial twenty-two (22) samples taken, fifteen (15) returned with hazardous waste results for Arsenic and/or Selenium, with the presence of the two toxins above the regulatory threshold level of 5.0 and 1.0 mg/L, respectively. The samples were taken from ten different dealership facilities.

The project staff embarked on research to determine the source of the contaminants. Web research showed a strong possibility that Arsenic and Selenium were present from the metal fabrication process that takes place in building automobiles. Some inquiry to the dealerships was conducted to determine if the antifreeze was being changed out in new vehicles upon arrival from the automaker (that was not the case).

Samples of virgin antifreeze were sent to the laboratory with the intent to eliminate the virgin product as the source of the toxins. Surprisingly, the samples came back with the presence of the two toxins, Arsenic and Selenium. The Selenium was above the regulatory threshold level of 1.0 mg/L in the virgin samples. With the virgin samples coming back hazardous the research on the manufacturing process was discontinued.

The TCLP results were presented and discussed with the National Oil Recycling Association (NORA) Antifreeze Work Group meeting in Scottsdale, AZ on February 1, 2006. All members present agreed that a testing problem was the cause of the results. The group overwhelmingly agreed that there was no possibility of Arsenic or Selenium at levels exceeding the regulatory limit was possible in virgin antifreeze. They also suggested that one or more of the additives in antifreeze were causing interference in the matrix of the tests.

At the laboratory the information was discussed. Experts in glycol were contacted but had very little experience with waste analysis so were unable to identify the potential inference. The lab diligently studied the test results looking for any anomalies. The lab explained that the standard TCLP analysis (protocol ICP SW 6010) determined the presence of heavy metals through a process of elimination in which graphs of the chemicals presence in the test material were compared to the known graphs of the eight heavy metals. When the peaks of the two graphs align then the toxin is reported to be present.

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Upon scrutiny of the Arsenic and Selenium graphs it was determined that the two peaks were, in fact, slightly different. The lab then recognized two other tests that identified metals in other ways that could be used to verify or refute the presence of Arsenic or Selenium in antifreeze. Those tests use mass spectrometry or a graphite furnace known as SW6020 and SW7060 respectively.

Six samples including duplicates were submitted to the laboratory for testing using all three methodologies. The new samples were taken from three of the sites that originally had received hazardous waste results. The standard SW6010 procedure once again showed the presence of Arsenic and Selenium above the regulatory threshold. The mass spectrometer and graphite furnace tests then refuted the presence of the heavy metals and the waste was determined to be non-hazardous without much additional expense for the testing procedures. The lab was unable to identify the interference by name.

Antifreeze sampling was resumed. The sites with previous hazardous results were re-sampled and found to be non-hazardous through the use of the mass spectrometer and graphite furnace but still erroneously indicated the presence of Arsenic and/or Selenium at levels above the regulatory limits when using the standard TCLP procedure (SW6010).

It was interesting that samples from the same facilities were able to reproduce the erroneous Arsenic and Selenium results indicating some common denominator that we were not able to identify.

In the data set the only sites determined to have hazardous antifreeze were those that tested positive for the presence of Tetrachloroethene above the regulatory limit. In all cases those shops were using chlorinated brake cleaner, often as a general cleaning agent, and the toxin was also often present in their sump sludge.

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Antifreeze TCLP Test Results Summary

Heavy Metals:

Arsenic	Not present in antifreeze but a testing anomaly was identified.
Barium	Detected at very low levels in three cases (one was virgin).
Cadmium	Not detected in antifreeze.
Chromium	Detected at low levels in three cases.
Lead	Detected in 1/3 of the samples below the threshold except in one case it was hazardous.
Mercury	Not detected in antifreeze.
Selenium	Not present in antifreeze but a testing anomaly was identified.
Silver	Not detected in antifreeze.

VOCs:

Benzene	Detected at very low levels in two cases.
Methyl Ethyl Ketone	Not detected in antifreeze.
Carbon Tetrachloride	Not detected in antifreeze.
Chlorobenzene	Not detected in antifreeze.
Chloroform	Not detected in antifreeze.
1,2-Dichloroethane	Not detected in antifreeze.
1,1-Dichloroethene	Not detected in antifreeze.
Tetrachloroethene	Detected in ? of the samples with 9 cases being hazardous.
Trichloroethene	Detected in one case.
Vinyl Chloride	Not detected in antifreeze.

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Waste Oil Absorbent Summary

For the most part, oil absorbent was non-hazardous. The one sample that had a hazardous test result was due to the presence of benzene likely from fuel contamination from a spill event. Re-sampling is warranted to produce a more representative sample. In all other 56 cases no toxins were detected above the regulatory threshold. However, the presence of toxins at any level could be construed as reason to continue TCLP testing at each facility.

Waste Oil Absorbent TCLP Test Results Summary

Heavy Metals:

Arsenic	Detected at low levels in four cases.
Barium	Detected at very low levels in most cases.
Cadmium	Detected at low levels in 30% of the samples.
Chromium	Detected at low levels in ten cases.
Lead	Detected in 1/3 of the samples below the threshold.
Mercury	Not detected in oil absorbent.
Selenium	Not detected in oil absorbent.
Silver	Not detected in oil absorbent.

VOCs:

Benzene	Detected in 6 samples one that was hazardous.
Methyl Ethyl Ketone	Detected at very low levels in 5 cases.
Carbon Tetrachloride	Not detected in oil absorbent.
Chlorobenzene	Not detected in oil absorbent.
Chloroform	Not detected in oil absorbent.
1,2-Dichloroethane	Not detected in oil absorbent.
1,1-Dichloroethene	Not detected in oil absorbent.
Tetrachloroethene	Detected at low levels in 4 cases.
Trichloroethene	Detected at low levels in 1 case.
Vinyl Chloride	Not detected in oil absorbent.

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Sump Sludge Summary

In the data set the sites determined to have hazardous sump sludge were those that tested positive for the presence of Tetrachloroethene above the regulatory limit. In all cases those shops were using chlorinated brake cleaner, often as a general cleaning agent, and the toxin was also often present in their antifreeze. In one case a shop that had Tetrachloroethene above the regulatory threshold also tested positive for Trichloroethene.

The presence of toxins at any level could be construed as reason to continue TCLP testing at each facility.

Sump Sludge TCLP Test Results Summary

Heavy Metals:

Arsenic	Not detected in sump sludge.
Barium	Detected at low levels in most samples.
Cadmium	Detected at low levels in eight cases.
Chromium	Detected at low levels in one case.
Lead	Detected in over 1/3 of the samples below the threshold.
Mercury	Not detected in sump sludge.
Selenium	Not detected in sump sludge.
Silver	Detected in one case.

VOCs:

Benzene	Detected at low levels in 5 cases.
Methyl Ethyl Ketone	Detected at very low levels in 6 cases.
Carbon Tetrachloride	Not detected in sump sludge.
Chlorobenzene	Not detected in sump sludge.
Chloroform	Detected at low levels in 3 cases.
1,2-Dichloroethane	Not detected in sump sludge.
1,1-Dichloroethene	Not detected in sump sludge.
Tetrachloroethene	Detected in 10 samples 6 were hazardous.
Trichloroethene	Detected in one sample that was hazardous.
Vinyl Chloride	Not detected in sump sludge.

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The detailed analysis of these wastes and the corresponding data sets can be viewed online at <http://www.iwrc.org/SBPPC/index.htm>.

Fact Sheets

[Waste Analysis Project Summary](#)

[Antifreeze Waste Analysis Study](#)

[Oil Absorbent Waste Analysis Study](#)

[Sump Sludge Waste Analysis Study](#)

Data Tables

[Antifreeze Heavy Metal Data Sheet](#)

[Antifreeze VOC Data Sheet](#)

[Oil Absorbent VOC Data Sheet](#)

[Sump Sludge VOC Data Sheet](#)

The Iowa Waste Reduction Center (IWRC) is a free, confidential and non-regulatory small business technical assistance program located at the University of Northern Iowa. The IWRC offers a free on-site review of any Iowa business with fewer than 200 employees. Contact the IWRC at 319-273-8905 or on the web at www.IWRC.org.

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