Waste Analyses Project for Auto Dealerships

Oil Absorbent Summary

Introduction

Most automotive dealerships generate used oil absorbent on a regular basis. Oil absorbents include products such as clay granules, commonly referred to as "floor dry," and oil absorbent pads, socks or mats. Some oil absorbent material is reusable (by squeezing out the oil) but most oil absorbents are disposed after use.

The IWRC recommends Toxicity Characteristic Leaching Procedure (TCLP) analysis for used oil absorbent since it has the potential to be hazardous. Material absorbed such as used motor oil, spilled gasoline, solvent or antifreeze and other automotive fluids adds contaminants to the floor dry, including toxins such benzene from fuel contamination. TCLP testing is required to determine whether the waste is hazardous or non-hazardous. Follow-up reveals that small businesses rarely characterize used floor dry through laboratory analyses. Many businesses simply do not perform hazardous/non-hazardous waste determinations, most likely due to perceived financial constraints. The lack of testing bases disposal decisions on incomplete data that does not often lead to regulatory compliance or implementation of pollution prevention (P2) alternatives.

The *Waste Analyses Project for Auto Dealerships* conducted TCLP analysis on used oil absorbent from 56 Iowa automotive dealerships. The primary objective of the project was to improve the implementation rate of P2 practices by first making a hazardous waste determination to categorize wastes and then determine the proper P2 practice and disposal method at volunteer facilities. The secondary goal 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 for Auto Dealerships* maintained client confidentiality.

Sampling & 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. Members of the Iowa Automotive Dealership Association (IADA) were approached and 56 facilities agreed to participate in the study. IWRC staff were trained and collected all samples used in the study to help eliminate sampling error. The study collected 57 samples of used oil absorbent (oily mats/pads or floor dry).

While the TCLP includes 40 test parameters, wastes need only be tested for the toxins likely to be present. The heavy metals and volatile organic compounds (VOCs) listed in **Table 1** were the toxins tested for used oil absorbent in this study.

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Table 1: TCLP Testing Parameters.

TCLP Parameter	Regulatory Level*	EPA Number
Metals		
Arsenic	5.0 mg/L	D004
Barium	100.0 mg/L	D005
Cadmium	1.0 mg/L	D006
Chromium	5.0 mg/L	D007
Lead	5.0 mg/L	D008
Mercury	0.2 mg/L	D009
Selenium	1.0 mg/L	D010
Silver	5.0 mg/L	D011
VOCs		
Benzene	0.5 mg/L	D018
Carbon Tetrachloride	0.5 mg/L	D019
Chlorobenzene	100.mg/L	D021
Chloroform	6.0 mg/L	D022
1,2-Dichloroethane	0.5 mg/L	D028
1,1-Dichloroethene	0.7 mg/L	D029
Methyl Ethyl Ketone (MEK)	200.0 mg/L	D035
Tetrachloroethene	0.7 mg/L	D039
Trichloroethylene	0.5 mg/L	D040
Vinyl Chloride	0.2 mg/L	D043

* Samples exceeding these levels are hazardous

The eight heavy metals and ten VOCs tested for in the Waste Analysis Study for oil absorbent.

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Table 2: 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.

Table 2 lists a summary of the TCLP test results. Each parameters is then discussed at length in the following results section.

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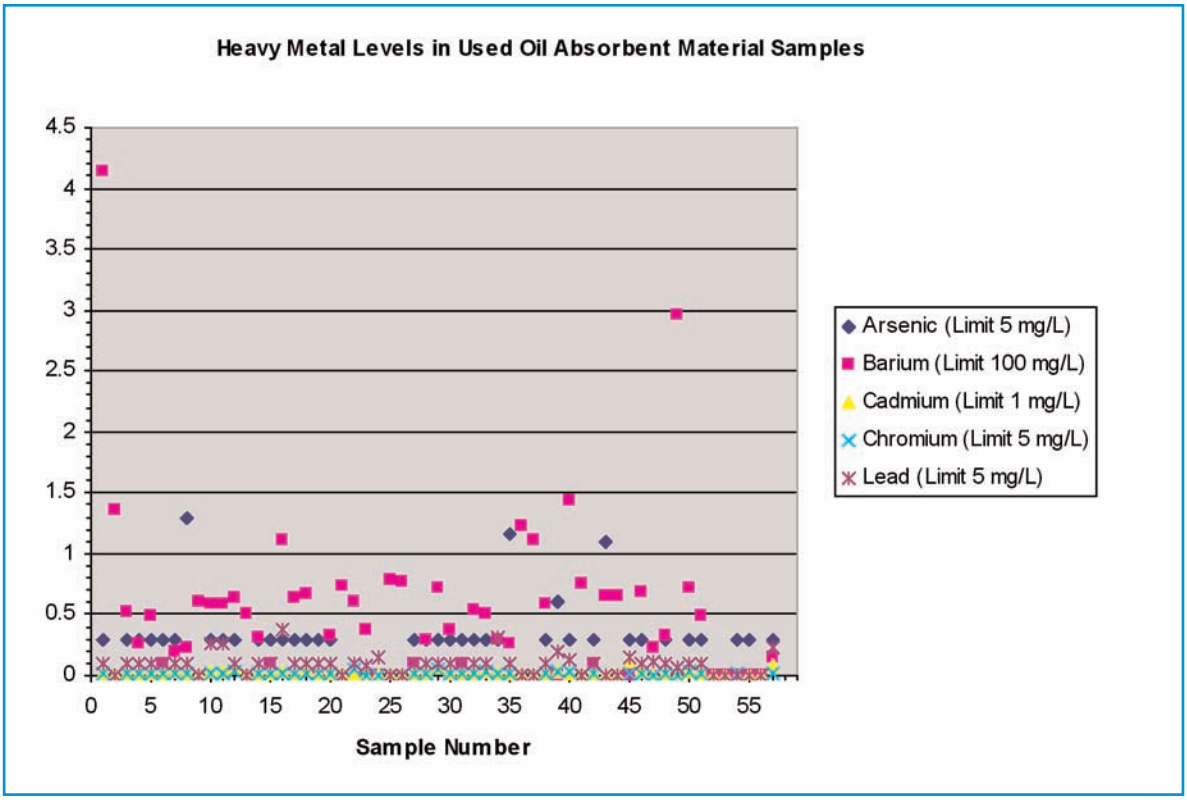
Results

Heavy Metals

TCLP test results on the 58 samples of used oil absorbent material (floor dry, oily pads or oily mats) showed that none had heavy metal concentration at or above the corresponding regulatory threshold. **Figure 1** shows a summary of the heavy metal results.



Figures 2 through 5 show the individual results. It is important to note that in the testing of both heavy metals and VOCs, several samples returned with inconclusive results. More specifically, due to possible interference during the testing procedure, or discrepancies in the sample itself, the result was reported not as a specific quantity, but as 'less than' the lowest detectable level (i.e., <0.02 mg/L.) These results can be interpreted as 'non-detectable or zero,' however in the figures they are visualized as the lowest detectable level (i.e., 0.02 mg/L etc.). Also, data points visualized as zero actually represent instances where the toxin was not actually detected. All such cases are noted in the figure descriptions.

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Of the 58 samples, one sample set is not shown on the graphs. This sample had an extremely high detection level and therefore inconclusive results as discussed above. Therefore only 57 data points are shown on the graphs.

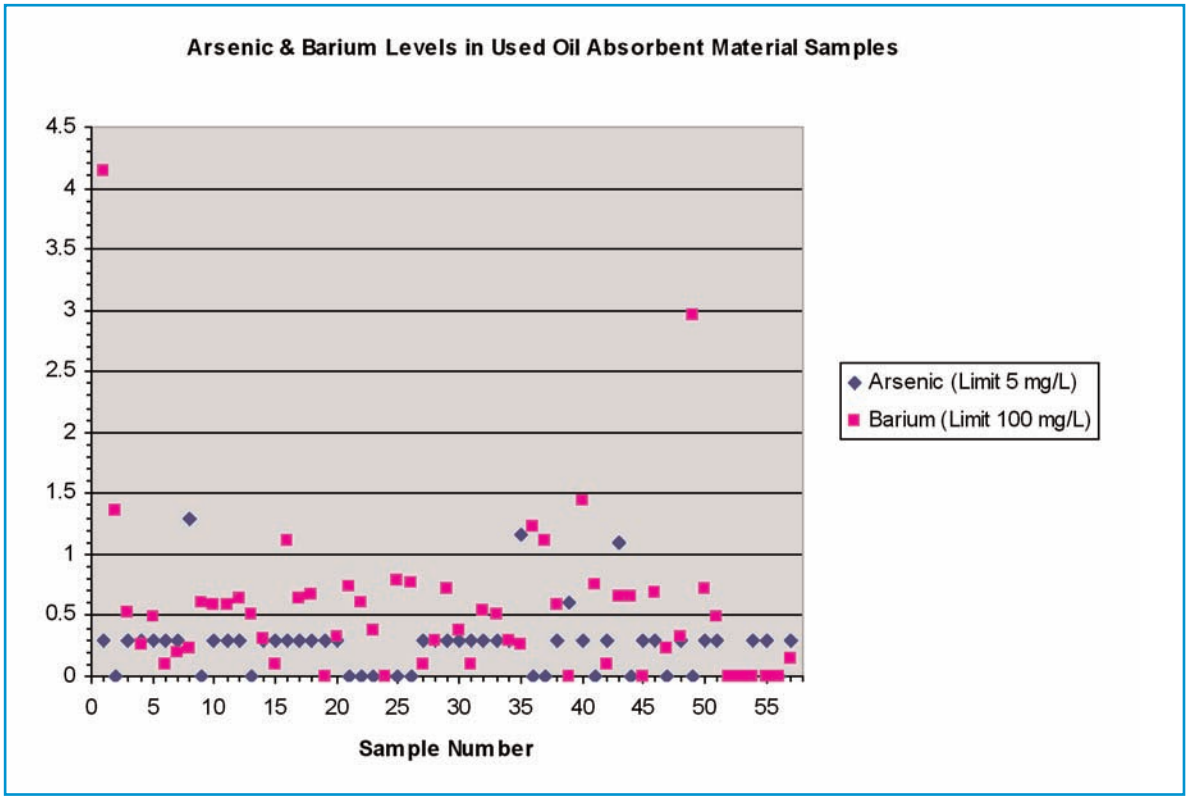

Figure 2. Arsenic and Barium Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for arsenic is 5.0 mg/L. The highest detected concentration was 1.3 mg/L. Arsenic could not be detected at concentrations less than 0.3 mg/L in thirty-five samples (60.3%) or less than 0.6 mg/L in one sample (shown as 0.3 mg/L and 0.6 mg/L respectively.) Seventeen samples (29.3%) had no detectable concentrations of arsenic (shown as 0.0 mg/L.) The regulatory limit for barium is 100.0 mg/L. The highest detected concentration was 4.14 mg/L. Barium could not be detected at concentrations less than 0.1 mg/L in four samples (0.07%, shown as 0.1 mg/L). Barium was undetected in one sample (shown as 0.0 mg/L.) Barium was the most detected heavy metal, however at very low levels compared to the regulatory threshold.

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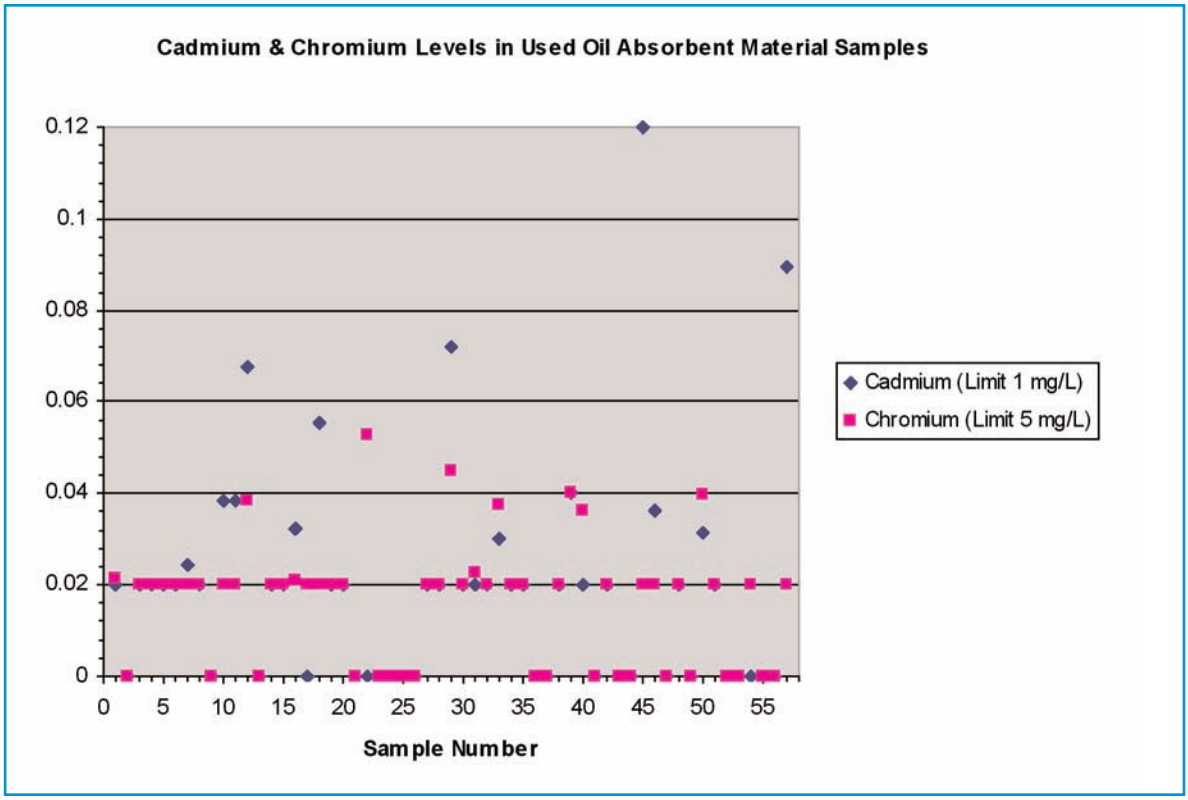

Figure 3. Cadmium and Chromium Concentrations in Used Oil Absorbent Material Samples.

The regulatory limit for cadmium is 1.0 mg/L. The highest detected concentration was 0.093 mg/L. Cadmium could not be detected at concentrations less than 0.02 mg/L in twenty-two samples (37.9%) or less than 0.04 mg/L in one sample (shown as 0.02 mg/L and 0.04 mg/L respectively.) Eighteen samples (31.0%) had no detectable concentrations of cadmium (shown as 0.0 mg/L.) The regulatory limit for chromium is 5.0 mg/L. The highest detected concentration was 0.045. Chromium could not be detected at concentrations less than 0.02 mg/L in twenty-eight samples (48.3%) or less than 0.04 mg/L in one sample (shown as 0.02 mg/L and 0.04 mg/L respectively.) Eighteen samples (31.0%) had undetectable levels of chromium (shown as 0.0 mg/L.)

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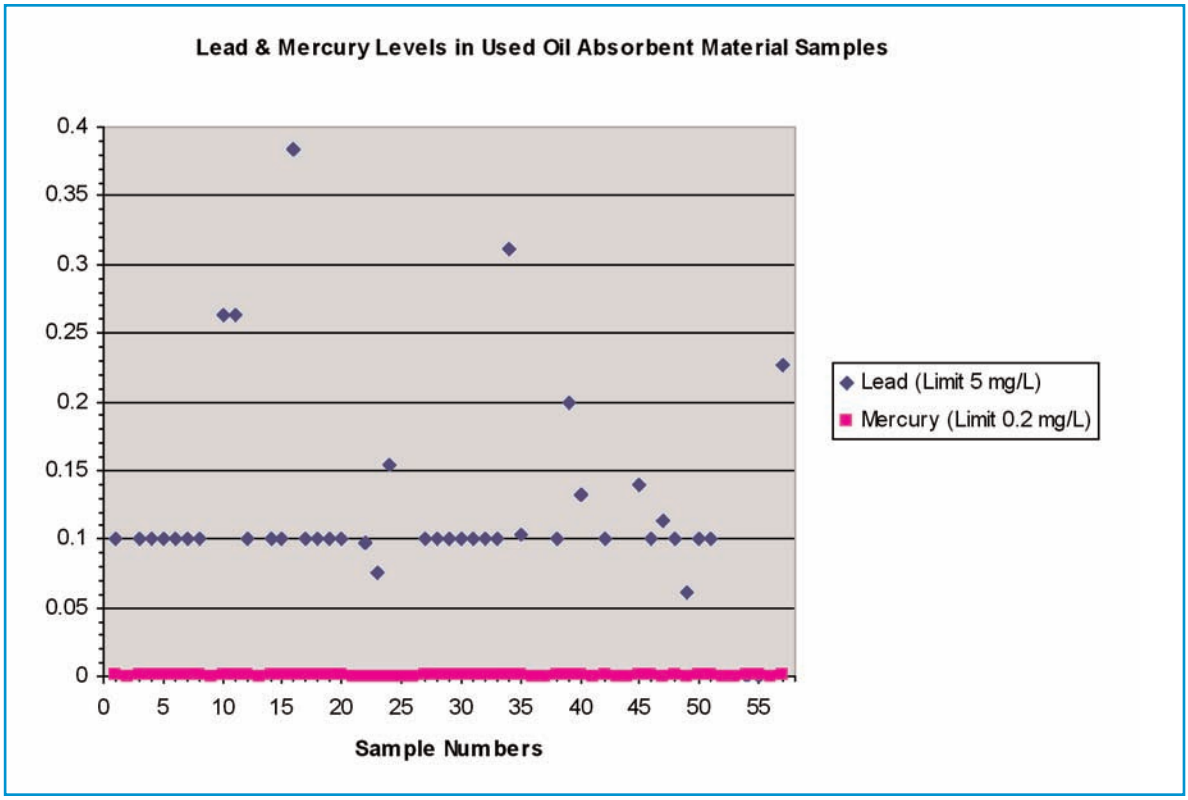

Figure 4. Lead and Mercury Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for lead is 5.0 mg/L. The highest detected concentration was 0.384 mg/L. Lead could not be detected at concentrations less than 0.1 mg/L in twenty-seven samples (46.6%) or less than 0.2 mg/L in one sample (shown as 0.1 mg/L and 0.2 mg/L respectively.) Ten samples (17.2%) had no detectable concentrations of lead (shown as 0.0 mg/L.) The regulatory limit for mercury is 0.2 mg/L. There were no actual detections of mercury in any of the samples. Mercury could not be detected at concentrations less than 0.002 mg/L in thirty-five samples (60.3%) or less than 0.001 mg/L in two samples (0.03%, shown as 0.002 mg/L and 0.001 mg/L respectively.) Nineteen samples (32.8%) had undetectable levels of mercury (shown as 0.0 mg/L.)

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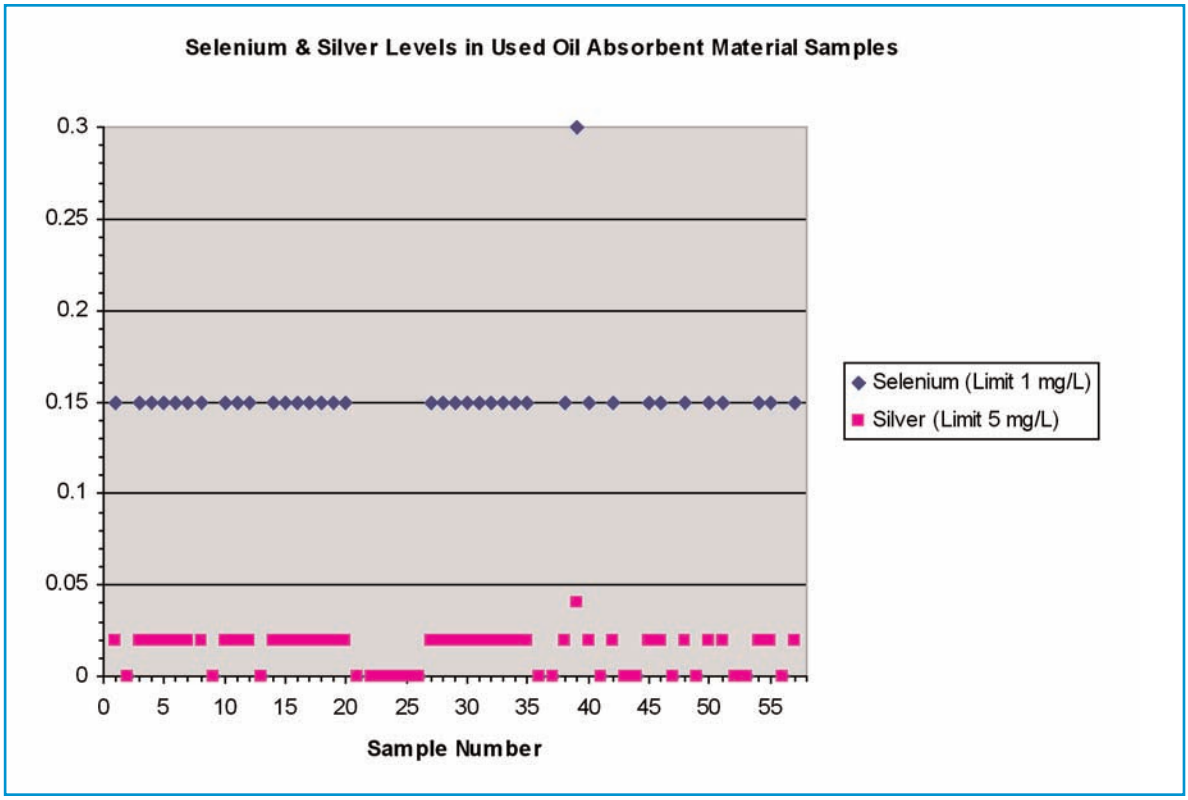

Figure 5. Selenium and Silver Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for selenium is 1.0 mg/L. There were no actual detections of selenium in any of the samples. Selenium could not be detected at levels less than 0.15 mg/L in thirty-seven samples (63.8%) or less than 0.3 mg/L in one sample (shown as 0.15 mg/L and 0.3 mg/L respectively.) Nineteen samples (32.8%) had no detectable concentrations of selenium (shown as 0.0 mg/L.) The regulatory limit for silver is 5.0 mg/L. There were no actual detections of silver in any of the samples. Silver could not be detected at concentrations less than 0.02 mg/L in thirty-seven samples (63.8%) or less than 0.04 mg/L in one sample (shown as 0.02 mg/L and 0.04 mg/L respectively.) Nineteen samples (32.8%) had undetectable levels of silver (shown as 0.0 mg/L.)

VOCs

TCLP test results on the 58 samples of used oil absorbent material (floor dry, oily pads or oily mats) showed that one sample had VOC (specifically benzene) concentrations above the corresponding regulatory threshold.

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Figures 6 through 14 show the individual results. It is important to note that in the testing of both heavy metals and VOCs, several samples returned with inconclusive results. More specifically, due to possible interference during the testing procedure, or discrepancies in the sample itself, the result was reported not as a specific quantity, but as 'less than' the lowest detectable level (i.e., <0.02 mg/L.) In most cases, this can be interpreted as 'non-detectable or zero,' but in some cases the lowest detectable level of toxin in the sample was reported above the regulatory threshold. This was the case with 10 samples and eight toxins (benzene, carbon tetrachloride, chloroform, 1,2-dichloroethane, 1,1-dichloroethene, tetrachloroethene, trichloroethene and vinyl chloride.) Also, data points visualized as zero actually represent instances where the toxin was not detected. All such cases are noted in the figure descriptions.

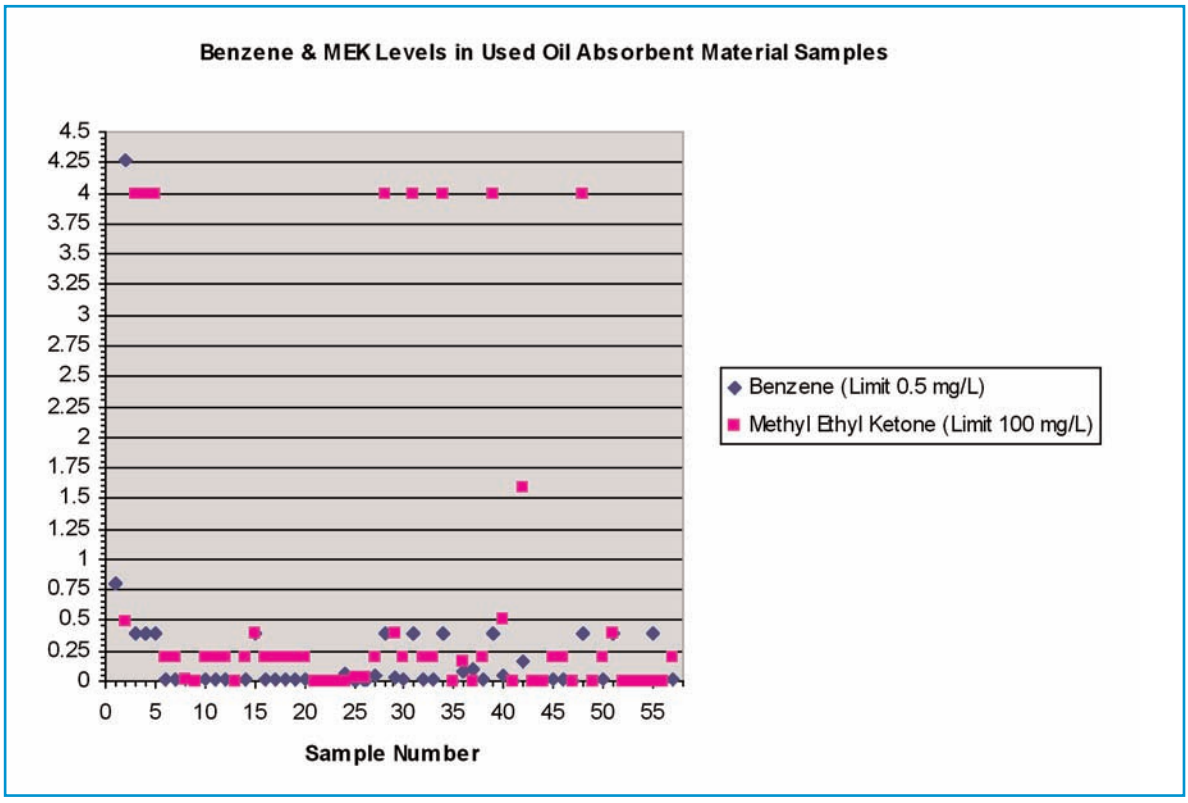

Figure 6. Benzene & MEK Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for benzene is 0.5 mg/L. ***One sample showed benzene concentrations higher than the regulatory limit at 4.27 mg/L.*** Two samples showed results warranting further

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investigation. In these samples, benzene could not be detected at concentrations lower than 0.80 mg/L or 0.5 mg/L. These two cases are noteworthy, in that the lowest detectable level is at or above the regulatory limit. These samples may or may not be representative of a hazardous waste. Additionally, benzene could not be detected at concentrations less than 0.4 mg/L in seven (12.1%) samples (shown as 0.4 mg/L.) This is close to the regulatory limit. Benzene could not be detected at concentrations less than 0.02 mg/L in twenty samples (34.5%), less than 0.04 mg/L in five samples (8.6%), less than 0.05 mg/L in one sample or less than 0.159 mg/L in one sample (shown as 0.02 mg/L, 0.04 mg/L, 0.05 mg/L and 0.159 mg/L respectively.) Fifteen samples (31.0%) had undetectable levels of benzene (shown as 0.0 mg/L.) The regulatory limit for MEK is 200 mg/L. The highest detected concentrations was 0.49 mg/L. MEK could not be detected at concentrations less than 8.0 mg/L in one sample, less than 4.0 mg/L in seven samples (12,1%), or less than 1.59 mg/L in one sample (shown as 8.0 mg/L, 4.0 mg/L and 1.59 mg/L respectively). Likewise, MEK could not be detected at concentrations less than 0.2 mg/L in twenty-two samples (37.9%), less than 0.4 mg/L in six samples (10.3%), or less than 0.5 mg/L in one sample (shown as 0.2 mg/L, 0.4 mg/L and 0.5 mg/L respectively.) Fourteen samples (24.1%) had undetectable levels of MEK (shown as 0.0 mg/L.)

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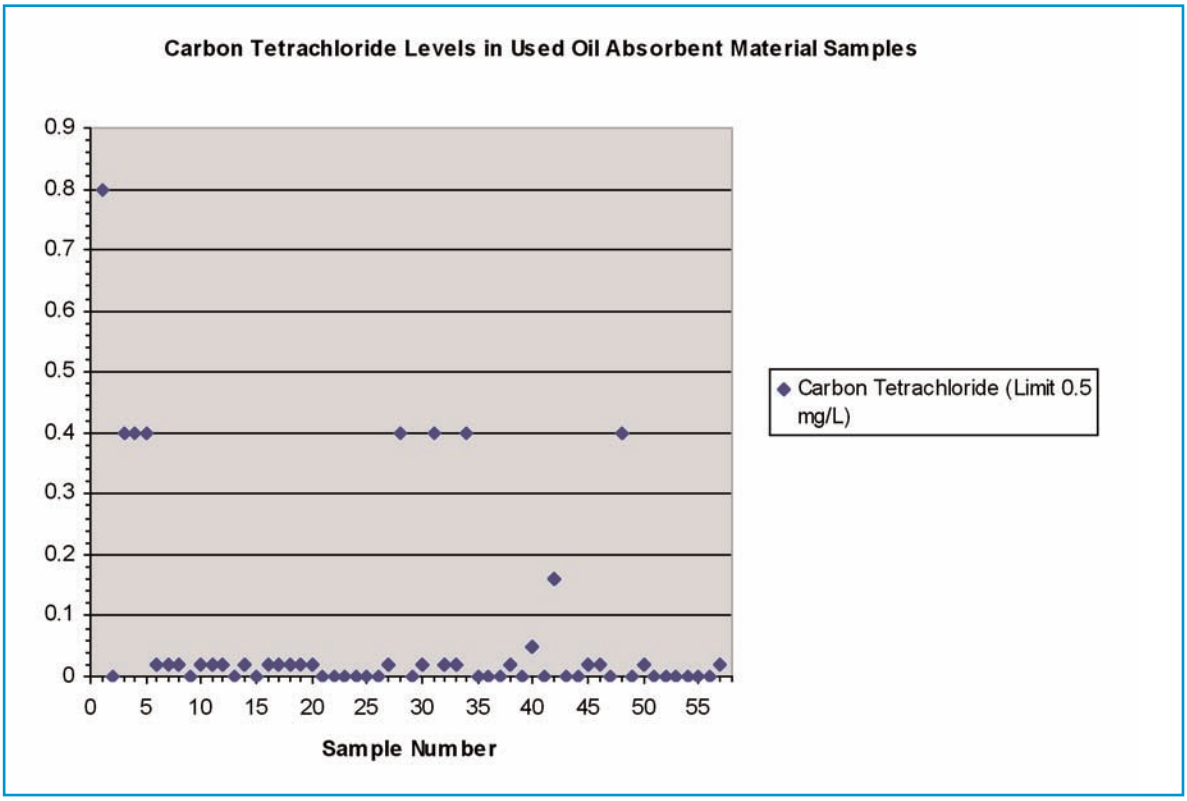

Figure 7. Carbon Tetrachloride Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for carbon tetrachloride is 0.5 mg/L. There were no actual detections of carbon tetrachloride in any of the samples. One sample showed results warranting further investigation at less than 0.8 mg/L (shown as 0.8 mg/L.) This case is noteworthy, in that the lowest detectable level is above the regulatory limit. This sample may or may not be representative of a hazardous waste. Additionally, carbon tetrachloride could not be detected at concentrations less than 0.4 mg/L in seven (12.1%) samples (shown as 0.4 mg/L.) This is close to the regulatory limit. Carbon tetrachloride could not be detected at concentrations less than 0.02 mg/L in twenty-two samples (37.9%), less than 0.04 mg/L in six samples (10.3%), less than 0.05 mg/L in one sample or less than 0.159 mg/L in one sample (shown as 0.02 mg/L, 0.04 mg/L, 0.05 mg/L and 0.159 mg/L respectively.) Nineteen samples (32.8%) had undetectable levels of carbon tetrachloride (shown as 0.0 mg/L.)

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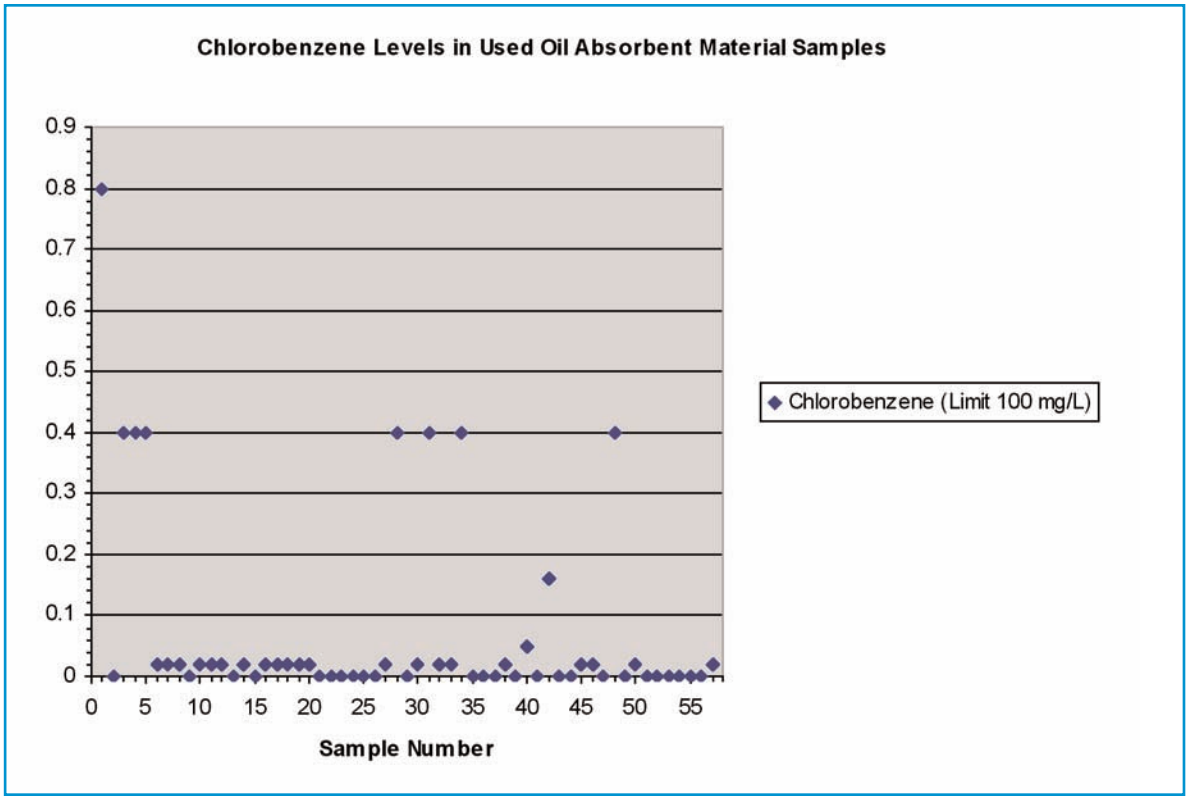

Figure 8. Chlorobenzene Concentrations in Used Oil Absorbent Material Samples.
The regulatory limit for chlorobenzene is 100 mg/L. There were no actual detections of chlorobenzene in any of the samples. Chlorobenzene was undetected at concentrations less than 0.02 mg/L in twenty-two samples (37.9%), less than 0.04 mg/L in six samples (10.3%) or less than 0.05 mg/L in one sample (shown as 0.02 mg/L, 0.04 mg/L and 0.05 mg/L respectively.) Additionally, chlorobenzene was undetected at concentrations less than 0.159 mg/L in one sample, less than 0.4 mg/L in seven samples (12.1%) and less than 0.8 mg/L in one sample (shown as 0.159 mg/L, 0.4 mg/L and 0.8 mg/L respectively). Nineteen samples (32.8%) had undetectable levels of chlorobenzene (shown as 0.0 mg/L.)

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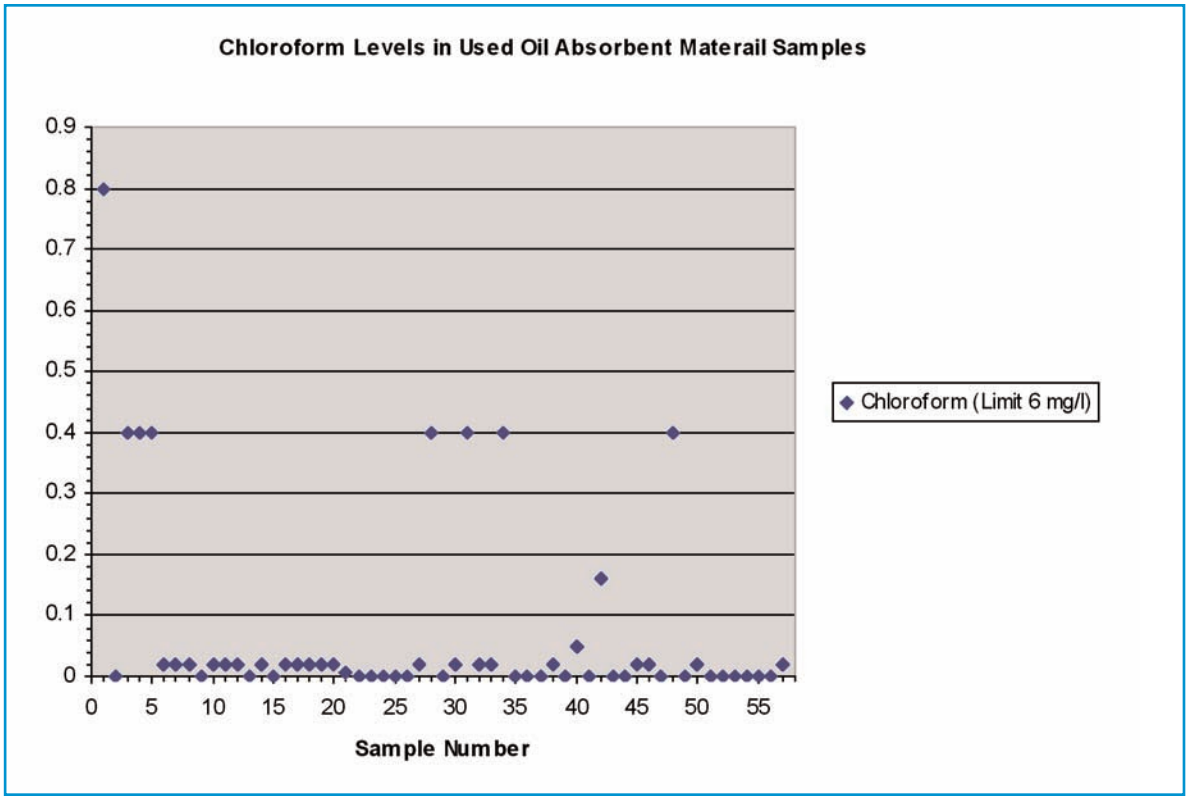

Figure 9. Chloroform Concentrations in Used Oil Absorbent Material Samples.
The regulatory limit for chloroform is 6 mg/L. There were no actual detections of chloroform in any of the samples. Chloroform was undetected at concentrations less than 0.02 mg/L in twenty-two samples (37.9%), less than 0.04 mg/L in six (10.3%) samples or less than 0.05 mg/L in one sample (shown as 0.02 mg/L, 0.04 mg/L and 0.05 mg/L respectively.) Additionally, chloroform was undetected at concentrations less than 0.159 mg/L in one sample, less than 0.4 mg/L in seven samples (12.1%) and less than 0.8 mg/L in one sample (shown as 0.159 mg/L, 0.4 mg/L and 0.8 mg/L respectively). Nineteen samples (32.8%) had undetectable levels of chloroform (shown as 0.0 mg/L.)

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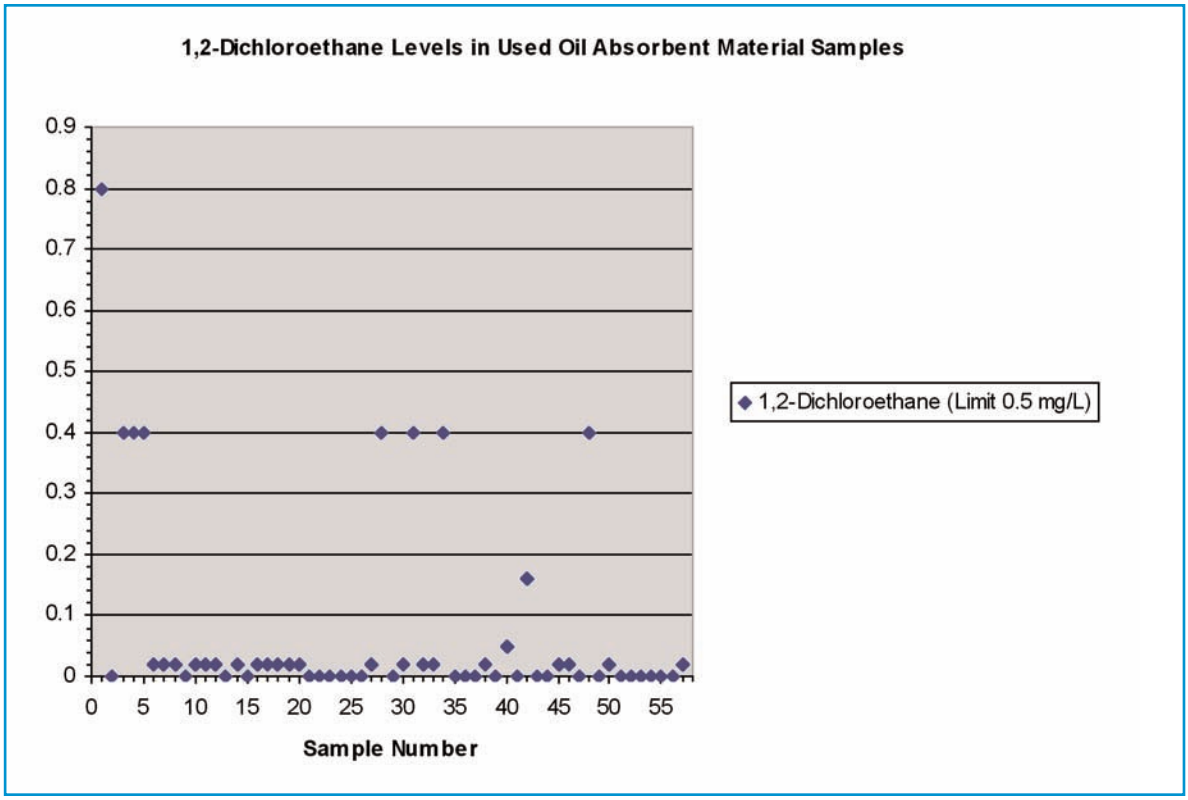

Figure 10. 1,2-Dichloroethane Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for 1,2-dichloroethane is 0.5 mg/L. There were no actual detections of 1,2-dichloroethane in any of the samples. One sample showed results warranting further investigation at less than 0.8 mg/L (shown as 0.8 mg/L.) This case is noteworthy, in that the lowest detectable level is above the regulatory limit. This sample may or may not be representative of a hazardous waste. Additionally, 1,2-dichloroethane could not be detected at concentrations less than 0.4 mg/L in seven (12.1%) samples (shown as 0.4 mg/L.) This is close to the regulatory limit. 1,2-dichloroethane could not be detected at concentrations less than 0.02 mg/L in twenty-two samples (37.9%), less than 0.04 mg/L in six samples (10.3%), less than 0.05 mg/L in one sample or less than 0.159 mg/L in one sample (shown as 0.02 mg/L, 0.04 mg/L, 0.05 mg/L and 0.159 mg/L respectively.) Nineteen samples (32.8%) had undetectable levels of 1,2-dichloroethane (shown as 0.0 mg/L.)

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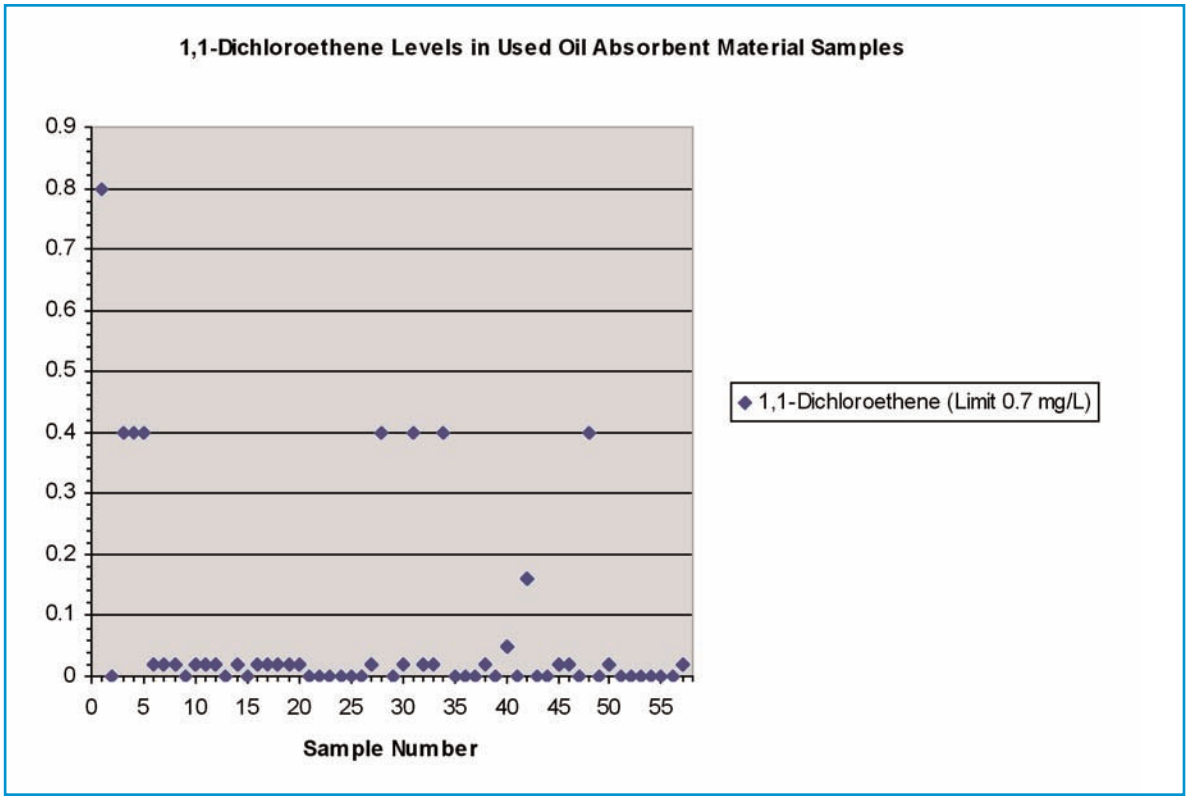

Figure 11. 1,1-Dichloroethene Concentrations in used Oil Absorbent Material Samples. The regulatory limit for 1,1-dichloroethene is 0.7 mg/L. There were no actual detections of 1,1-dichloroethene in any of the samples. One sample showed results warranting further investigation at less than 0.8 mg/L (shown as 0.8 mg/L.) This case is noteworthy, in that the lowest detectable level is above the regulatory limit. This sample may or may not be representative of a hazardous waste. Additionally, 1,1-dichloroethene could not be detected at concentrations less than 0.4 mg/L in seven (12.1%) samples (shown as 0.4 mg/L.) This is close to the regulatory limit. 1,1-dichloroethene could not be detected at concentrations less than 0.02 mg/L in twenty-two samples (37.9%), less than 0.04 mg/L in six samples (10.3%), less than 0.05 mg/L in one sample or less than 0.159 mg/L in one sample (shown as 0.02 mg/L, 0.04 mg/L, 0.05 mg/L and 0.159 mg/L respectively.) Nineteen samples (32.8%) had undetectable levels of 1,1-dichloroethene (shown as 0.0 mg/L.)

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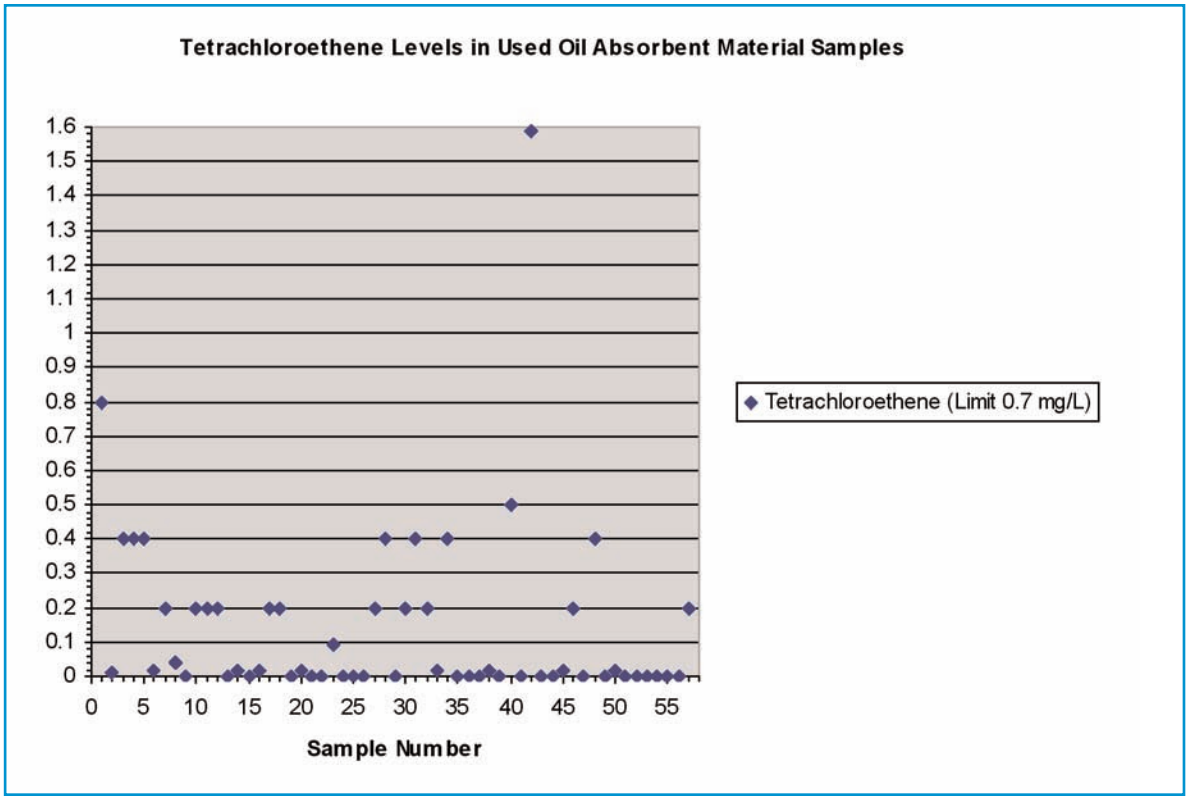

Figure 12. Tetrachloroethene Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for tetrachloroethene is 0.7 mg/L. The highest detected concentration was 0.093 mg/L. Two samples showed results warranting further investigation. In these samples, tetrachloroethene could not be detected at concentrations lower than 1.6 mg/L or 0.8 mg/L. These two cases are noteworthy, in that the lowest detectable level is above the regulatory limit. These samples may or may not be representative of a hazardous waste. Tetrachloroethene could not be detected at concentrations less than 1.59 mg/L in one sample, less than 0.5 mg/L in one sample, less than 0.4 mg/L in eleven samples (19%), or less than 0.2 mg/L in eleven samples (19%, shown as 1.59 mg/L, 0.5 mg/L, 0.4 mg/L and 0.2 mg/L respectively.) Additionally, tetrachloroethene could not be detected at concentrations less than 0.073 mg/L in one sample, less than 0.04 mg/L in three samples (5.2%) and less than 0.02 mg/L in eight samples (14%, shown as 0.073, 0.04 and 0.02 mg/L respectively.) Seventeen samples (29.3%) had undetectable levels of tetrachloroethene (shown as 0.0 mg/L.)

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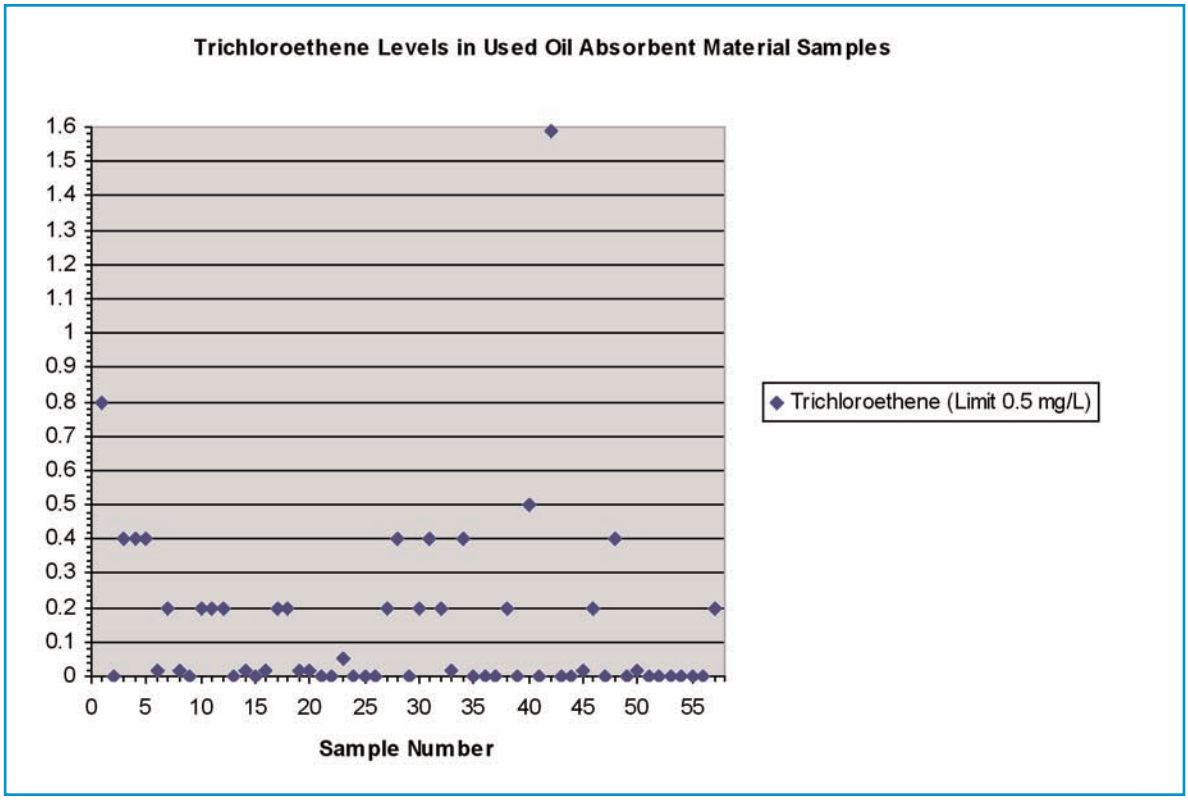

Figure 13. Trichloroethene Concentrations in Used Oil Absorbent Material Samples. The regulatory limit for trichloroethene is 0.5 mg/L. The highest detected concentration was 0.052 mg/L. Three samples showed results warranting further investigation. In these samples, trichloroethene could not be detected at concentrations lower than 1.59 mg/L, 0.8 mg/L or 0.5 mg/L. These three cases are noteworthy, in that the lowest detectable level is at or above the regulatory limit. These samples may or may not be representative of a hazardous waste. Trichloroethene could not be detected at concentrations less than 0.4 mg/L in eleven samples (19%) or less than 0.2 mg/L in twelve samples (20.7%, shown as 0.4 mg/L and 0.2 mg/L respectively.) Additionally, trichloroethene could not be detected at concentrations less 0.04 mg/L in two samples (3.4%) and less than 0.02 mg/L in nine samples (15.5%, shown as 0.04 mg/L and 0.02 mg/L respectively.) Eighteen samples (31.0%) had undetectable levels of trichloroethene (shown as 0.0 mg/L.)

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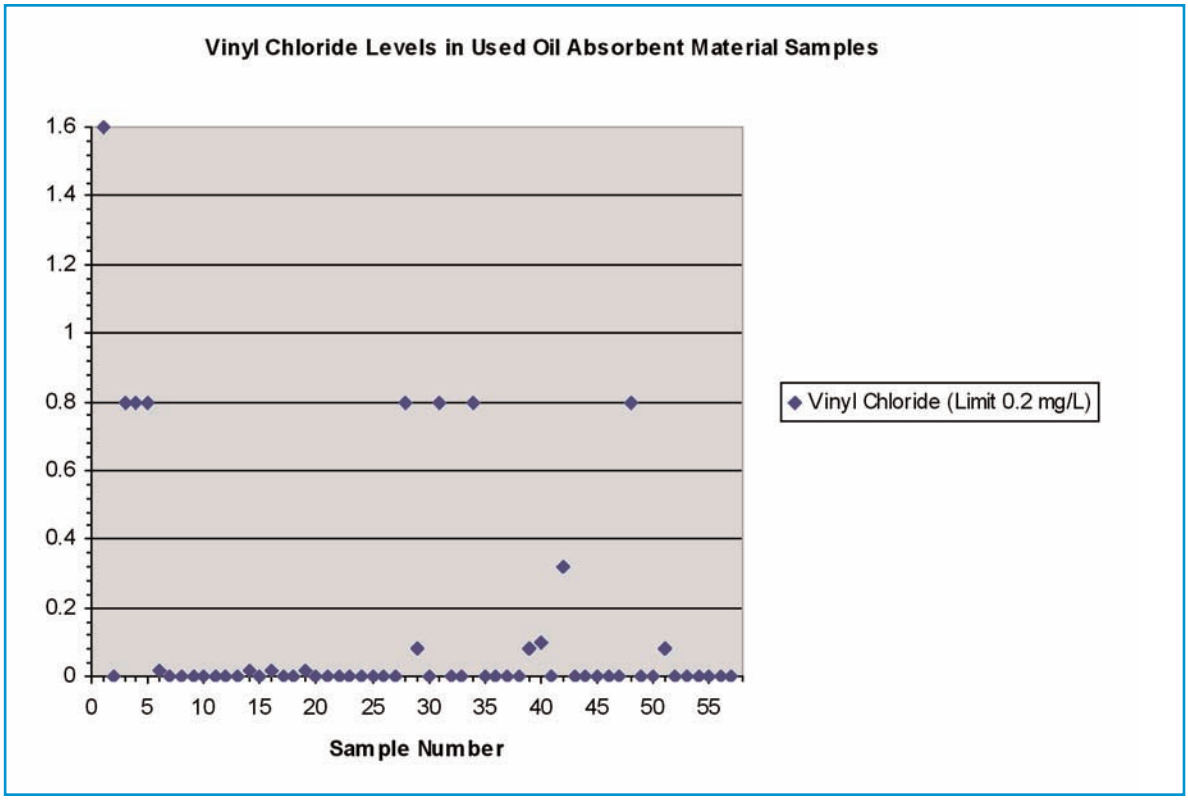

Figure 14. Vinyl Chloride Concentrations in Used Oil Absorbent Material Samples.
The regulatory limit for vinyl chloride is 0.2 mg/L. There were no actual detections of vinyl chloride in any of the samples. Eight samples showed results warranting further investigation. In these samples, vinyl chloride could not be detected at concentrations lower than 1.6 mg/L, 0.8 mg/L or 0.318 mg/L. These eight cases are noteworthy, in that the lowest detectable level is above the regulatory limit. These samples may or may not be representative of a hazardous waste. Vinyl chloride could not be detected at concentrations less than 0.1 mg/L in one sample or less than 0.08 mg/L in five samples (8.6%, shown as 0.1 mg/L and 0.08 mg/L respectively.) Additionally, vinyl chloride could not be detected at concentrations less 0.04 mg/L in eighteen samples (31.0%) or less than 0.02 mg/L in four samples (6.9%, shown as 0.04 and 0.02 mg/L respectively.) Nineteen samples (32.8%) had undetectable levels of vinyl chloride (shown as 0.0 mg/L.)

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Conclusions

The study showed it is not likely heavy metal contamination would occur at high enough concentrations to render the waste hazardous. Five of the eight heavy metals (arsenic, barium, cadmium, chromium and lead) were detected at measurable levels, but well below the regulatory threshold. Three of the eight heavy metals were undetected (mercury, selenium and silver).

The study also showed it is unlikely VOC contamination would occur at levels above the regulatory threshold (if samples are truly representative.) Three of the ten VOCs were detected but at concentrations well below the regulatory limit (methyl ethyl ketone, tetrachloroethene and trichloroethene.) Only one VOC, benzene, was detected at a hazardous concentration in one sample (4.27 mg/L.) In this case, the sample was suspected to have been taken from waste containing fuel from a spill event and therefore, NOT representative of all waste oil absorbent generated at the facility.

Seven VOCs (ten samples) showed results warranting further testing (benzene, carbon tetrachloride, 1,2-dichloroethane, 1,1-dichloroethene, tetrachloroethene, trichloroethene and vinyl chloride). These results were inconclusive because the lowest detectable level was at or above the corresponding regulatory limit. Such results may occur due to interference during testing or discrepancies in the sample.

Overall, 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. It is therefore recommended that all facilities conduct TCLP testing once on a representative sample of the waste stream.

Recommendations

In Iowa, the US EPA regulates hazardous waste. The federal hazardous waste management standards require that a hazardous/non-hazardous waste determination be made for any waste with the potential to be hazardous.

As this study showed, the collection of a representative sample is extremely important. In the case of the one sample showing hazardous concentrations of benzene, the sample was probably collected from floor dry used to clean up a fuel spill. This sample was probably not representative of all the floor dry used at the facility.

To collect a representative sample, the business representative should first call an analytical laboratory and inform them of plans to collect a sample. The laboratory will send the business a sampling kit, including a sampling vessel compatible with the waste being collected and detailed guidelines on how to store and ship the waste. The IWRC can provide a list of analytical laboratories able to perform TCLP analysis.

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The other important point this study showed was the need to review testing results immediately upon receiving them. As indicated earlier, many samples had inconclusive results, which ideally would have been noted and requested for retesting within a two-week timeframe. The IWRC can assist a business in interpreting the TCLP results.

If TCLP results show any parameter at a concentration level equal to or greater than its corresponding regulatory level, the used oil absorbent must be managed as hazardous waste. Hazardous waste must be stored in sealed, labeled containers and disposed by an EPA-permitted hazardous waste management company. Hazardous used oil absorbent must also be included in the facility's hazardous waste inventory and managed on-site in compliance with the applicable generator regulations.

If the TCLP test results of the representative sample show concentrations less than regulatory levels for each parameter, then the used oil absorbent is non-hazardous and may be disposed in an Iowa landfill provided it contains no free liquids and a Special Waste Authorization is obtained.

The Iowa Department of Natural Resources (DNR) regulates non-hazardous solid waste disposal. Iowa DNR requirements for landfill disposal include; no free liquids and TCLP laboratory analytical results below regulatory levels. The DNR requires a Special Waste Authorization (SWA) for landfill disposal of commercial or industrial non-hazardous solid wastes. An SWA application is available at http://www.iowadnr.com/waste/sw/files/specialauthoriz.pdf or by calling the Iowa Waste Reduction Center at 319-273-8905.

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Some dealerships report two 40-pound bags of absorbent material is purchased and used each month. This means that as much as 960 pounds of potential hazardous waste is generated annually. Oil absorbent waste should not be ignored when it comes to making a hazardous/non-hazardous waste determination.

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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