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Florida Specifier

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Practical Information For Environmental Professionals

New Releases Cloud the Remedial Picture

By
Steve Hilfiker, MS, CFEA, REPA

A new fuel release at a site with existing contamination presents some complicated challenges to consultants, owners, operators, insurance companies and regulatory agencies. Most of the complications are associated with the allocation of responsibility and the methods used to determine the percentage that each party should be responsible for.

The FDEP provides guidance for Limited Contamination Assessment Reports prepared for funding allocation agreements for new, non-eligible discharges at sites that are eligible for the petroleum clean up program. Similar guidelines should apply for non-program sites when a new release occurs and another party (such as an insurance company or a former owner) is responsible for a previous discharge. Insurance claim departments will become very familiar with funding allocation agreements.

At many allocation sites, assessment data since the original discharge is limited and many questions are difficult to answer:

1. Has the old discharge migrated significantly?
2. Are the currently detected constituents the result of a new independent release?
3. How much attenuation has occurred since the last sample event?
4. When did the new discharge occur, and how much was released?

Forensic and environmental studies are becoming increasingly necessary to age and characterize a pollution spill. If the date of discharge could be determined through interpretation of a laboratory chromatogram, many of the questions surrounding these cases could be resolved.

Analyzing the chromatogram can provide a signature to each specific discharge and can be helpful in comparing the specific concentrations of volatile organic aromatic hydrocarbons or polynuclear aromatic hydrocarbons that are present at the site. I believe that there is an opportunity for chemists to improve the precision of aging fuel releases, which would assist the decision makers in the funding allocation process.

There are many ways to justify funding allocations. Mass calculations based on assessment data from the old and new discharges can be compared to form the basis of a funding allocation proposal. The volume of impacted media can be compared. Remediation cost estimates can be prepared for each discharge. The horizontal and/or

vertical extent of contamination can be compared. All of these methods are dependant upon the availability of data to verify the current extent of the two discharges.

In many cases it is difficult to determine the precise locations of these contamination plumes. Typically, discharges overlap in the center, but have not commingled at the periphery of the plume. One allocation method involves comparing the volume calculations of the new discharge to the area of the old discharge and the overlap area can be split. This method assumes an equal mass of contaminants in the overlap area.

The point here is that the precision of the allocation is dependant on the availability of data. In most funding allocation agreements there is not enough data to make a precise determination that would enable a justifiable allocation responsibility for cleanup of the old and new discharges. It becomes a negotiation based on the available data that can be utilized to make these determinations. The two parties negotiating the allocation agreement may justify their proposed allocations based on a method that is most favorable to them. There may be a large gap in the opinions of the responsible parties as to what the cost share agreement should be. The solution to this problem is usually to collect more data and perform additional assessment activities. Then the responsible parties need to decide who will pay for the additional assessment activity. It becomes a tangled web and can lead to economically significant differences of opinion.

After working on two funding allocation agreements with FDEP and several similar cases with environmental insurance companies, our suggestion is to promote communication between the parties as early and as often as possible. There should be a mutually acceptable, predetermined allocation method that each party agrees to. At some sites, the easiest thing to do would be to simply have the two parties split the remediation costs and apply the money that would have been spent determining the appropriate funding allocation to assessment and remediation. The time and cost associated with determining the appropriate funding allocation can be significant enough to make up for any differences associated with basing the funding allocation on limited data. The potential environmental or human health liabilities, third party liabilities, plume migration, and other environmental risks associated with a delayed remediation project can also be factored into the equation.

The environmental cleanup industry is just beginning to accumulate information on the most appropriate method to justify funding allocations. Additional guidance and logical solutions to this dilemma should become available as we proceed down this path. New discharges will occur at active fuel tank sites. Insurance companies will receive claims for reasonable and necessary corrective action costs associated with new discharges. Many of these new discharges will occur at sites where another responsible party is already in the process of assessment or remediation. This will become a more popular topic at conferences, in regulatory memos and in Florida Specifier articles in the future.

Steve Hilfiker is President and CEO of Environmental Risk Management, Inc., an FDEP Petroleum Cleanup Contractor and a licensed engineering, geology, real estate and mortgage broker business based in Naples. He can be reached at www.envmgmt.com.

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January 2003

Practical Information For Environmental Professionals

New releases cloud the remedial picture, Part II

By STEVE HILFIKER, MS, CFEA, REPA
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In the January 2002 edition of the *Florida Specifier*, the "New Releases Cloud the Remedial Picture, Part I" article describes some of the challenges associated with secondary fuel discharges at sites where previous petroleum discharges exist. The January 2002 article was provided as an Outsert article in the December 2002/January 2003 edition of the *Petrogram*. As described in the article, the funding allocation agreement process can be a complicated negotiation.

Other ways that new releases complicate environmental protection at gas station sites are discussed in this article. For example,

- Undetected and/or unreported new releases on active cleanup projects add unexpected hydrocarbon mass and delay progress on sites that may otherwise have achieved site closure.
- Contractors with active remediation Pay for Performance Agreements may need to either cancel the contract, lose money cleaning up a discharge that was not included in the original scope of work, or bear the burden of proof to demonstrate a new release.
- The party responsible for the original discharge remains on the hook until the site is completely cleaned up even if they were very close to achieving site closure at the time of a substantial new release.
- The responsible party for a relatively minor new release, that otherwise could have been resolved quickly, may theoretically be exposed to joint and several liabilities for the entire discharge that could lead to significant third party liability exposure.

These and related issues cause disputes over responsibility for cleanup that are difficult to resolve because differentiating between new and old gasoline discharges is a complex task. While much of this article describes the concerns about this issue, technological advancements and the latest innovative solutions are the intended focus and purpose of this article.

There are many sources for new releases. Tanks, lines, pumps, loose pipe fittings, overspills during delivery, overspills by consumers, and accumulation of surface water runoff toward a well or a depression on the site can lead to a positive detection of hydrocarbons above the regulatory standard. There are numerous legitimate concerns similar to those outlined above caused by actual (as opposed to suspected) new discharges. These concerns at active gas stations where remediation is underway cause the contractor and regulatory reviewer to carefully interpret analytical results for potential new releases, but not all spikes in laboratory reports are due to secondary releases.

Changes in dissolved hydrocarbon concentrations can be due to migration, changes in water levels (recent storms or drought), impacts from the smear zone, and external influences such as remedial systems. Activating a remedial system can create a dynamic sub-surface condition caused by pumping or adding fluids, which can create groundwater drawdown or mounding. Injecting air, excavation with backfill of different density than the original, turning off systems or adjusting remedial flow rates may also disturb static conditions. Utility work, construction activities, and paving or building over previous pervious areas can limit storm water recharge, which affects water levels.

There are typically four compliance wells around the relatively large tank farm area at a gas station. Often there are high concentrations of dissolved hydrocarbons within this area that have not been previously detected because they have not migrated out to the four perimeter compliance monitoring wells. The cylindrical underground storage tanks in a pit backfilled with pea gravel create a condition where dissolved hydrocarbons or free product may exist without being detected in the compliance wells. When a remedial system is activated, the chemicals can be mobilized and detected in perimeter monitoring wells. It is not uncommon to see increases in the dissolved hydrocarbon concentrations when interpreting the results of initial sample events after the initiation of a remedial system. If a new release happens at the time a system is started, it is extremely difficult to differentiate between a new release and a normal spike caused by increasing water levels, the start up of a remedial system, or migration.

When a new release is suspected, an investigation should be performed to assess all relevant factors in an attempt to verify the new release. The investigation should include confirmatory sampling, compliance research, and fingerprinting analyses (which are introduced below) if necessary.

These are challenging issues for insurance companies, which have two primary objectives. They want to confirm that claims are legitimate and they want cost effective closure for the legitimate claims. Some claims will be denied if sufficient evidence of a new release is not produced. Insurance companies are wary of second discoveries of the same old discharge.

Forensic technologies are developing rapidly and new innovative software applications are becoming available to help identify specific discharges. Fingerprinting and identifying a specific spectral signature can be quite valuable in resolving the inevitable disputes that will occur between property owners, insurance companies, the FDEP and contractors over this issue. Researching laboratory chromatograms, conducting lead isotope ratio analyses, analyzing product samples, comparing volatile and semi-volatile ratios, assessing the concentrations of non-target compounds, groundwater modeling, evaluating product aging and weathering influences, identifying breakdown products, and developing a library of product characteristics are tools of the forensic environmental assessor that are rapidly developing to help solve this complicated environmental legal matter. Further research on this matter is ongoing and future *Florida Specifier* articles on the subject of proving new releases are likely forthcoming.

Steve Hilfiker is president and CEO of Environmental Risk Management, Inc. (ERMI), a DEP petroleum cleanup contractor, a licensed Real Estate Brokerage, and a licensed engineering, geology, and mortgage broker business. He can be reached at 1-888-ENV-MGMT (1-888-368-6468) or through www.envmgmt.com.

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January 2003

Practical Information For Environmental Professionals

New releases cloud the remedial picture, Part III

By STEVE HILFIKER, MS, CFEA, REPA
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Editors Note: This is Part III in a series of articles on New Releases. Parts I and II were included as outserted articles with the December 2002 and February 2003 Petrogram *Publications.*

The new release issue demonstrates the need for continuing the equip ment improvements of the 1990's. An ounce of prevention is worth a pound of cure. Pollution prevention has come a long way in the last ten to fifteen years, and has prevented or minimized numerous new releases. The number of reported discharges in Florida has declined extensively over the last ten years, and much of this is due to the pollution prevention measures implemented by the FDEP Bureau of Petroleum Storage Systems throughout the 1990's. Changes to the Tanks Rule, Chapter 62-761, Florida Administrative Code, in the 1990's require secondary containment for tanks and piping, and dispensers are now equipped with swing joints, flex connectors, and/or dispenser liners, to outline a few of the preventative measures.

The Tanks Rule is currently in the rule making process and revisions should be complete within a year or so. Public written comments will be reviewed by the FDEP until February 3, 2003. Much of the focus of the revisions will be to consolidate the rule, update tables, and add new references. There will likely be some new or revised release detection standards set for above ground storage tanks at bulk fuel plants, but no other major changes relative to the new release issue are expected.

According to Marshall Mott-Smith of the FDEP Bureau of Petroleum Storage Systems, there are approximately 32,000 underground storage tanks in Florida and approximately 11,500 have been upgraded to meet the secondary containment tank requirements that are due by December 31, 2009.

The FDEP and industry leaders strongly encourage tank owners to do these upgrades as soon as possible. There are economic benefits (based on supply and demand) to not wait until 2009 to do this. Insurance premiums could probably be reduced if a more secure system is installed. Regulatory and environmental issues such as described in this article can be avoided if a petroleum discharge is prevented. Don't wait. Upgrade now.

Mr. Mott-Smith indicated that the FDEP will strictly enforce the 2009 deadline and will consider it a major violation to not have secondary containment with interstitial monitoring by 2010. There have been six similar deadlines in Florida for tank upgrades, and none have been extended.

We need tank systems that don't leak, release detection systems that can identify small releases, and investigative techniques to differentiate between new and old discharges. One of the problems is that the standard established by the federal government in 1988 for release detection systems is based on 1980's technology. A tank system can pass a tank tightness test with a .2 gallons per hour leak and the report will indicate that the system is tight. A minor, persistent, undetected leak could therefore lead to a significant discharge with a system that is considered to be in compliance with state and federal standards.

A common release detection system is a Pressurized Line Leak Detection system (PLLD) for line leak detection and Continuous Statistical Leak Detection system (CSLD) for underground storage tanks. As stated in an Operating Manual for one of these systems, "The CSLD provides 24-hour, .2 gallons per hour (gph) leak detection without requiring tank shutdown. Information is updated constantly for accurate leak detection. CSDL meets federal, state, and local compliance requirements for monthly monitoring. Test results show a 99% probability of detection and less than 0.1 % chance of false alarm". The PLLD is rated to .1 to .3 gph. When the groundwater cleanup target level for Benzene is one part per billion, the potential for a .2 gallon per hour release creates concern for the current and former property owners, FDEP, contractors, and insurance companies.

Fortunately, the new tank systems required in Florida are technologically advanced. The interstice (the space between the two tanks in a new tank system) can be inspected for leaks through vacuum, air pressure, or hydrostatic monitoring, electronic sensors and probes, and from visual observations if designed to drain to a sump. Secondary containment provides an extra layer of defense, so we are not completely reliant on release detection.

Prevention can be maximized, but if a new release is suspected on a site that is already contaminated, the issue is beyond release detection. The issue now becomes release verification.

Many court cases are based on disagreements over responsibility for petroleum discharges. On a site where a previous discharge exists, it can be very difficult to prove that a secondary release has occurred. Definitive evidence is hard to come by and most disputes will be resolved through negotiation or litigation. Getting two opposing parties to agree on subjective interpretations over data is not any easy task.

Forensic technologies are developing rapidly and new innovative software applications are becoming available to help identify specific discharges. Fingerprinting and identifying a specific spectral signature can be quite valuable in resolving the inevitable disputes that will occur between property owners, insurance companies, the FDEP and contractors over this issue. Researching laboratory chromatograms, conducting lead isotope ratio analyses, analyzing product samples, comparing volatile and semi-volatile ratios, assessing the concentrations of non-target compounds, groundwater modeling, evaluating product aging and weathering influences, identifying breakdown products, and developing a library of product characteristics are tools of the forensic environmental assessor that are rapidly developing to help solve this complicated environmental legal matter. Further research on this matter is ongoing and future *Florida Specifier* articles on the subject of proving new releases are likely forthcoming.

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Florida Specifier

March 2003

Practical Information For Environmental Professionals

New petroleum release case studies: The value of chromatography

By STEVE HILFIKER, MS, CFEA, REPA

Editor's note: This is Part IV of a series of articles on new releases. Part I appeared in the January 2002 issue, and II and III were combined in the January 2003 issue.

As described in the previous articles referenced above, new petroleum discharges at sites where petroleum contamination has already been reported cause a variety of concerns for interested parties.

The Florida Department of Environmental Protection diligently manages the Inland Protection Trust Fund for the pre-approval cleanup program, and wants to be sure that the monies are spent cleaning up eligible discharges only. If secondary releases have occurred and are not eligible, the responsible party for the new discharge, RP New, would be required by the DEP to participate in the cleanup effort.

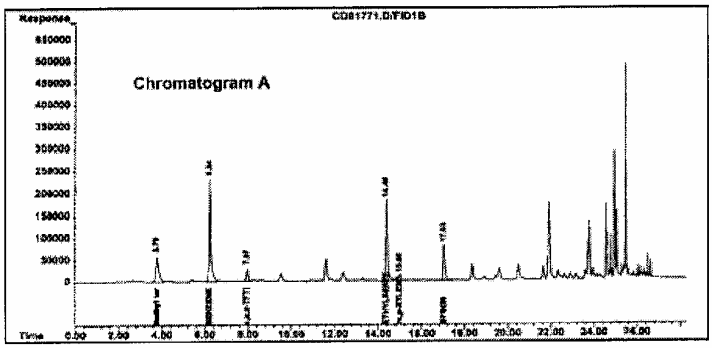
In the above scenario, the insurance company for RP New will honor the claim in accordance with the terms of the subject policy, provided of course that it is a new release and not a second discovery of the initial discharge.

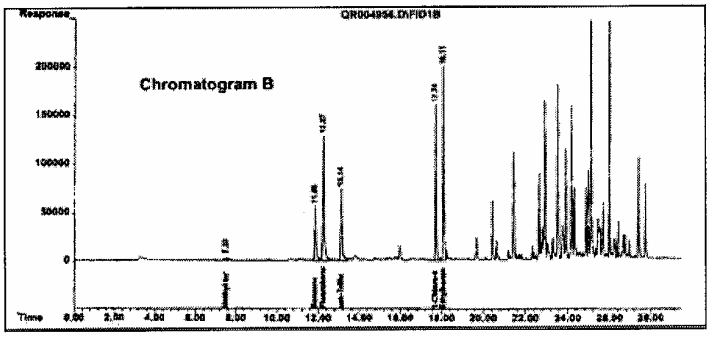
These issues also impact contractors, facility operators, and parties of real estate transactions, including current, former and future owners.

The subject property for each of the two case studies described here is an active gasoline station that is being cleaned up through a Pay-for-Performance Contract between DEP and the designated contractor. Groundwater cleanup target levels were successfully achieved at the site and post-active remediation monitoring was initiated. Dissolved hydrocarbons have been detected since achieving the target cleanup objectives and a new petroleum discharge was suspected as the source of the increase.

Research was conducted in each case to determine if the increased dissolved hydrocarbon concentrations are from a rebound of previously existing contamination or if a new release has occurred. The value of chromatography is demonstrated in each case study.

Reviewing laboratory chromatograms can provide valuable information when conducting this type of research. Chromatography can provide a fingerprint of each monitoring well. As a remedial system progresses, the spectral signature or fingerprint for each well will decrease in a fairly uniform pattern. In other words, all relative peaks will usually decrease proportionally as the remedial system cleans up the site.





When rebounding occurs, the same trend usually occurs, proportionally, in the opposite direction. In other words, the similar constituents will increase in a relatively uniform pattern. Generally speaking, lighter hydrocarbons will be more mobile. There may be more changes in the lighter, more volatile constituents, but the trends should be consistent. Heavier compounds will rebound more slowly, but again, the pattern should be consistent.

New release claim denied due to rebound

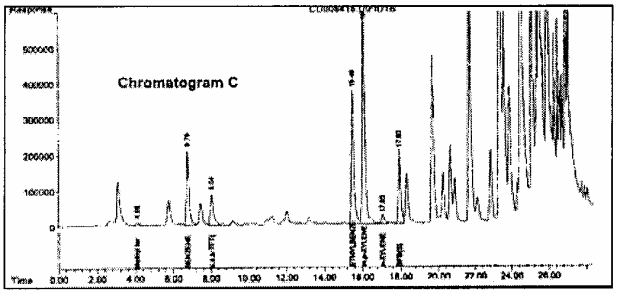
The following case study outlines the results of a new release investigation, which turned out to be rebound. Dissolved hydrocarbon concentrations that were reduced by remedial activity rebounded after terminating the remedial process.

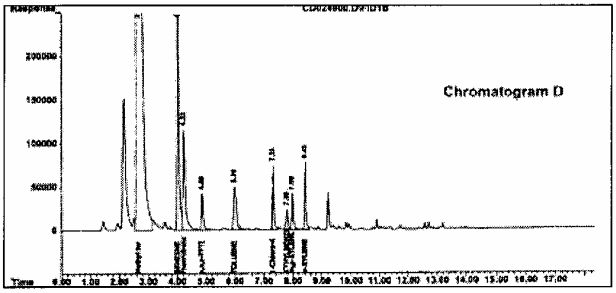
Chromatogram A represents VOA analyses on samples collected before the suspected new release. Chromatogram B represents VOA analyses from the same well after the suspected new release.

With the exception of surrogates and system monitoring compounds used by the laboratory for QA/QC purposes, all peaks from the center of each graph to the left represent MTBE, benzene, or ethylbenzene concentrations. Toluene and xylenes were not detected in either analysis. The relative peaks between MTBE, benzene, and ethylbenzene on the left half of each graph, and the non-target, heavier hydrocarbons—mostly naphthalenes and cyclobenzenes—on the right side of each chromatogram are similar and consistent. There is a similar spectral signature in the chromatography. The historical groundwater analytical data and chromatography from other wells on the site show similar ratios and patterns. Based on this information, the source of the hydrocarbons detected in the analyses is consistent. These patterns and ratios are evidence of rebound. A new release is not suspected based on this data.

New release claim approved

This case study outlines the results of an investigation that provides evidence to verify a suspected new release. There was a significant increase in dissolved hydrocarbon concentrations in the four monitoring wells surrounding the underground storage tank area at the subject property.





Please refer to Chromatogram C, which represents volatile organic aromatic analyses on samples collected from MW-3 before the suspected new release. Chromatogram D represents VOA analyses from the same well after the suspected new release.

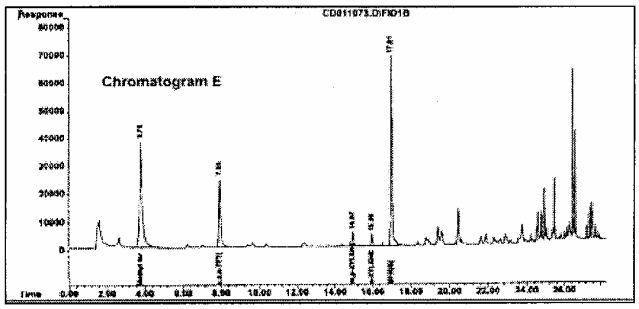
Observations can be made regarding different spectral patterns in the graphs:

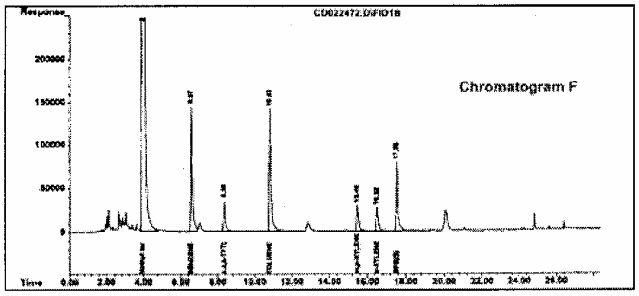
- MTBE, the first target compound in from the left, has a higher concentration than benzene, the second target compound in from the left, in the 2001 analysis (D), and benzene has a higher concentration than MTBE in the 1999 analysis (C). *(Note: Only target or the QA/QC compounds are labeled under the peaks.)*
- The heavier hydrocarbons on the right side of graphs are not present in the 2001 analysis and are present at high concentrations in the 1999 analysis.
- The ratios between the lighter volatiles on the left side and heavier volatiles on the right side in the two sets of analyses are not consistent with one discharge.

Based on this analysis, a new release is the suspected cause for the increased dissolved hydrocarbon concentrations detected in MW-3. Upon reviewing the table of historical groundwater analytical data, the approximate time frame of the new release was estimated. MW-3 is the closest well to the fuel dispensers, which are the most common source of petroleum discharges, according to a recent study conducted by the DEP and EPA. Assessment activities near the dispensers were recommended.

Similar findings are presented in groundwater samples collected from MW-2 in 1999—see Chromatogram E for the "before" condition—and 2001—see Chromatogram F for the "after" condition. The same comments that were made in the previous paragraphs regarding the spectral signature and the ratios between the lighter volatile hydrocarbons and the heavier volatile organic aromatic hydrocarbons are demonstrated in these chromatograms.

In addition, a significant peak exists in Chromatogram F that is not present in Chromatogram E. The system monitoring compound a,a,a-TFT was used for quality assurance and quality control purposes in each analysis. This surrogate was detected at approximately 8 minutes through the run in each analysis—the second and third labeled compound in from the left on graphs E and F, respectively. In the 2001 analysis (F), toluene—the fourth labeled compound in from the left in graph F—was detected at a high concentration at 10.83 minutes in to the run. We would expect at least a small peak somewhere around 10.50 to 11.25 minutes through the 1999 (E) run for toluene if the detected chemicals came from the same discharge. There were no detections along the baseline between approximately 10.24 minutes and 12.24 minutes in the 1999 analysis. The detection limit represented by the baseline during this analysis is most likely on the order of .2 or .3 parts per billion, so it is safe to say the toluene was not detected in 1999. The 2001 analysis documenting the presence of toluene in a relatively high concentration, when compared to the 1999 data, is an indication that a new release has occurred.





Similar patterns exist in the chromatography for other analyses performed at MW-1, 2, 3, and 4 to further support the conclusion that a new release had occurred.

Based on a review of the lab chromatograms as described above, the increase in the dissolved hydrocarbon concentrations is due to a relatively recent fuel release that had previously gone undetected and had not been reported to DEP.

The purpose of chromatography research is similar to looking at tables of groundwater data, but the visual, graphical presentation often helps to distinguish a pattern that may not be apparent in a tabular, numerical comparison. Chromatography may also identify patterns caused by non-target compounds that are not listed in tables or lab reports. While the non-target compounds are not relevant to regulatory objectives, they can be useful in establishing an identity to a particular discharge.

This type of research is valuable, but may not be conclusive. It is another tool in the forensic assessors toolbox. Other fingerprinting techniques to be described in future articles in this series should be used to supplement the findings.

Steve Hilfiker is president and CEO of Environmental Risk Management Inc., a DEP petroleum cleanup contractor, a licensed real estate brokerage, and a licensed engineering, geology, and mortgage broker business.

He can be reached through www.envmgmt.com and would like to acknowledge Ed Dabrea of Jupiter Environmental Laboratories Inc. as a valuable reference during this research.

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Practical Information For Environmental Professionals

NEW RELEASE CASE STUDY
Claim Approved: New Release

By: Steve Hilfiker, MS, CFEA, REPA

Editor's Note: This is Part V of a series of articles on New Releases. Part I appeared in the January 2002 issue, Parts II and III were combined into the January 2003 issue, and Part IV appeared in the February 2003 issue of the Florida Specifier.

As described in the previous articles referenced above, new petroleum discharges at sites where petroleum contamination has already been reported cause a variety of concerns for interested parties.

The FDEP diligently manages the Inland Protection Trust Fund for the pre-approval cleanup program, and wants to be sure that the monies are spent cleaning up eligible discharges only. If secondary releases have occurred and are not eligible, the responsible party for the new discharge (RP New) would be required by the FDEP to participate in the cleanup effort.

In the scenario described in the previous paragraph, the insurance company for RP New will honor the claim in accordance with the terms of the subject policy provided of course that it is a new release and not a second discovery of the same old discharge.

These issues also impact contractors, facility operators, and parties of real estate transactions (current, former, and future owners).

This article will outline the results of a New Release Investigation which provides evidence to verify the suspected a new release. The value of chromatography is demonstrated in this case study.

BACKGROUND:

The subject property is an active Gasoline Station that is being cleaned up through a Pay for Performance Contract between the FDEP and the designated contractor. Groundwater cleanup target levels were successfully achieved at the site and Post-Active Remediation Monitoring was initiated. Dissolved hydrocarbons have been detected since achieving the target cleanup objectives and a new petroleum discharge is suspected as the source of the increase.

REVIEW OF GROUNDWATER ANALYSES

There was a significant increase in dissolved hydrocarbon concentrations in Monitoring Wells 1, 2, 3, and 4 which are the four wells surrounding the underground storage tank area at the subject

property. Research was conducted to determine if the increased dissolved hydrocarbon concentrations are from a rebound of previously existing contamination or if a new release has occurred.

Reviewing laboratory chromatograms can provide valuable information when conducting this type of research. Chromatography can provide a fingerprint of each monitoring well. As a remedial system progresses, the spectral signature or fingerprint for each well will decrease in a fairly uniform pattern. In other words, all relative peaks will usually decrease proportionally as the remedial system cleans up the site.

When rebounding occurs, the same trend usually occurs (proportionally) in the opposite direction. In other words, the similar constituents will increase in a relatively uniform pattern. Generally speaking, lighter hydrocarbons will be more mobile. There may be more changes in the lighter (more volatile) constituents, but the trends should be consistent. Heavier compounds will rebound more slowly, but again, the pattern should be consistent.

Please refer to Chromatogram No. 1 (CD008418.D\FID1B), which represents volatile organic aromatic analyses on samples collected from MW-3 before the suspected new release. Chromatogram No. 2 (CD024900.D\FID1B) represents VOA analyses from the same well after the suspected new release. Note the different spectral pattern on the graphs. The compounds on the right side of Chromatogram No. 1 are non-target Cyclobenzenes and Naphthalenes. Additional observations made from these graphs include:

- MTBE has a higher concentration than Benzene in the 2001 analysis (D) and Benzene has a higher concentration than MTBE in the 1999 analysis (C).
- The heavier hydrocarbons are not present in the 2001 analysis and are present at high concentrations in the 1999 analysis.
- The ratios between the lighter volatiles and heavier volatiles in the two sets of analyses are not consistent with one discharge.

Based on this analysis, a new release is the suspected cause for the increased dissolved hydrocarbon concentrations detected in MW-3. Upon reviewing the table of historical groundwater analytical data, the approximate time frame of the new release was estimated. MW-3 is the closest well to the fuel dispensers, which are the most common source of petroleum discharges according to a recent study conducted by the FDEP and EPA. Assessment activities near the dispensers were recommended.

Similar findings are presented in groundwater samples collected from MW-2 in 1999 (see Chromatogram No. 3 [CD011073-D\FID1B] for the “before” condition) and 2001 (see Chromatogram No. 4 [CD022472.D\FID1B] for the “after” condition). The same comments that were made in the previous paragraphs regarding the spectral signature and the ratios between the lighter volatile hydrocarbons and the heavier volatile organic aromatic hydrocarbons are demonstrated in these chromatograms as well.

In addition, a significant peak exists in Chromatogram No. 4 that is not present in Chromatogram No. 3. The surrogate system monitoring compound a,a,a-TFT was used for quality assurance

and quality control purposes in each analysis. This surrogate was detected at approximately 8 minutes through the run in each analysis. In the 2001 analysis (No. 4), Toluene was detected at a high concentration at 10.83 minutes in to the run. We would expect at least a small peak somewhere around 10.50 to 11.25 minutes through the 1999 (No. 3) run for Toluene if the detected chemicals came from the same discharge. There were no detections along the baseline between approximately 10.24 minutes and 12.24 minutes in the 1999 analysis. The detection limit represented by the baseline during this analysis is most likely on the order of .2 or .3 parts per billion, so it is safe to say the Toluene was not detected in 1999. The 2001 analysis documenting the presence of Toluene in a relatively high concentration is an indication that a new release has occurred.

Similar patterns exist in the chromatography for other analyses performed at MW-1, 2, 3, and 4 at the subject property further supported the conclusion that a new release had occurred at the site.

CONCLUSION/OPINION:

Based on a review of the laboratory chromatograms as described above, the increase in the dissolved hydrocarbon concentrations at the subject property is due to a relatively recent fuel release that had previously gone undetected and had not been reported to the FDEP.

A new release is not suspected based on this data. The purpose of chromatography research is similar to looking at tables of groundwater data, but the visual, graphical presentation often helps to distinguish a pattern that may not be apparent in a tabular, numerical comparison. Chromatography may also identify patterns caused by non-target compounds that are not listed in tables or laboratory reports. While the non-target compounds are not relevant to regulatory objectives, they can be useful in establishing an identity to a particular discharge.

This type of research is valuable, but may not be conclusive. It is another tool in the forensic assessors toolbox. Other fingerprinting techniques to be described in future articles in this series (the techniques are briefly referenced at the end of the January 2003 article) should be used to supplement the findings.

Steve Hilfiker is president and CEO of Environmental Risk Management, Inc. (ERMI), a DEP petroleum cleanup contractor, a licensed Real Estate Brokerage, and a licensed engineering, geology, and mortgage broker business. He can be reached through www.envmgmt.com. *Mr. Hilfiker acknowledges Mr. Ed Dabrea of Jupiter Environmental Laboratories Inc., who has been a valuable reference during the research of this subject.*