

# THINK



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## Not Just USTs Anymore

by Kathy Stiller Banning

If you phoned the former Underground Storage Tank (UST) Branch recently, you probably noticed we have changed our name. We are now the Tank Management Branch of the Division of Air and Waste Management. While the names and faces in the Branch have not changed, after over 15 years as the UST Branch our name has changed.

The name change to the Tank Management Branch (TMB) has taken place as we have taken on the Aboveground Storage Tank Program created by the Jeffrey Davis Aboveground Storage Tank Act. When Governor Minner signed the bill into law in July, it placed the program with the Department of Natural Resources and Environmental Control and the Department decided it would be in the Division of Air and Waste Management. After looking at several options, Division Director,

John Blevins decided to place the program in the Branch then known as the UST Branch. Upon making this decision, all recognized a name change was needed and so the UST Branch became the TMB.

Although our name has changed, our approach to site management and customer service has not. But bear with us as we develop the AST program and the staffing requirements to support it. We will involve as many members of the regulated community and interested parties as possible in the development process.

As with any new program there will be growing pains and your feedback will help us to better serve you and address any issues in a timely manner. Please do not hesitate to contact any member of the Branch and let us know what we are doing right and where we can improve. If we all work together we will be able to provide the best protection possible for Delaware's environment and public health.

*UST Branch  
is now the  
Tank  
Management  
Branch*

### Case Study

## Diving BTEX Plumes

by David Lerner

### Introduction

Dissolved-phase hydrocarbon contaminant plumes in groundwater often descend ("dive") into an aquifer, pushed downward by precipitation, whether rainwater or snowmelt, especially where the ground surface is not impermeable because of paving or surface structures. Because of this diving phe-

nomenon, any characterization of a contaminant plume based on groundwater samples collected only from the water table will likely underestimate the horizontal and vertical extent of plume and accompanying potential risks to human health and the environment.

*Continued on p. 2*

Ellis (2000) described instances nationwide where dissolved-phase hydrocarbon plumes migrated several thousand feet downgradient from their source areas and dove more than 50 feet below the water table. Fischer (2001) described two instances of diving plumes in Delaware.

### Plume diving in Delaware

Another diving plume of dissolved-phase hydrocarbons has been identified at a leaking underground storage tank site south of Dover. Several out-of-service gasoline tanks were removed during the mid-1990s from a former service station (Site A, Figure 1). The site is currently used as an automobile repair and detailing facility. Analyses of groundwater samples showed BTEX concentrations exceeding 32,000 ppb and MTBE concentrations either very low or less than laboratory detection limits. The Department contracted to drill seven additional monitoring wells at the site in January 2001, with well screens set 5–25 feet below ground surface. Analyses of groundwater samples collected from these wells appeared to show that dissolved BTEX constituents had migrated no farther than 200 feet from the source.

But when BTEX contamination was found 475 feet downgradient in a residential water-supply well (SW-R, Figure 1) drilled in August 2001, it became evident the contaminant plume was more widespread. Well SW-R is 47 feet deep and is screened 37–47 feet below ground surface. A water sample contained 510 ppb benzene, 2390 ppb total BTEX and no detectable MTBE.

Tank Management Branch staffers considered three possible sources for the contamination in the residential well:

1. Hydrocarbons migrated from an active service station (Site B, Figure 1) located about 550

feet southwest of well SW-R and 600 feet south of Site A.

2. Hydrocarbons migrated from Site A after being released into the ground and groundwater before its underground storage tanks were removed.
3. The contamination in SW-R originated at the residence itself from repair and maintenance of automobiles.

Site B was ruled out for two reasons: (a) high concentrations of MTBE were present in its products and (b) the groundwater flow

about 15 feet.

Groundwater samples were collected from four different depths in each Geoprobe point. Maximum concentrations of total BTEX were found to decrease with distance from the source, as one expects, but also to occur at progressively greater depths—a clear example of a diving plume (Table 1).

The third possibility, that the contamination in well SW-R originates from automobile repair activities on-site, cannot be ruled out by currently available data. Collection and analysis of soil and groundwater samples from differ-

Table 1. Groundwater analyses

Boring	Depth	Benzene	Toluene	Ethylbenzene	Xylene	BTEX	MTBE
MW-6	15-25	1.4	4.0	0.9	4.4	11	< 5
MW-7	15-25	1.4	11.0	71	120	204	< 5
GP-2	16-20	11.0	3.9 *	3.1 *	7.8	26	< 5
	24-28	1600	4100	2000	9600	17,300	< 250
	32-36	1400	950	690	2700	5740	< 100
	40-44	55	55	27	120	207	< 5
GP-1	16-20	17	< 5	< 4	< 5	31	< 5
	24-28	180	1.2	2.5	7.2	191	< 10
	32-36	1800	4300	1200	3600	10,900	< 250
	40-44	5.3	8.0	2.2	4.2	20	< 5
GP-3	16-20	0.9 *	1.1 *	< 4	0.8 *	7.0	24
	24-28	40	280	1,000	880	2,200	< 50
	32-36	950	1,600	520	1,600	4,670	8.4
	40-44	2.7	7.7	2.7 *	6.8	20	0.9
SW-R	37-47	510	380	300	1,200	2,390	< 25

direction at Site B was found to be west–northwest, away from Well SW-R.

To determine whether or not Site A was the source of the contamination in well SW-R, the Department installed three Geoprobe points in April 2002 between monitoring wells MW-6 and MW-7 and well SW-R. Depth to the water table at the time was

ent depths on-site are necessary to evaluate this possibility.

### Conclusions

1. Plumes of groundwater contaminated with dissolved petroleum compounds can “dive” in an aquifer in response to natural forces *regardless of the plume’s composition*.

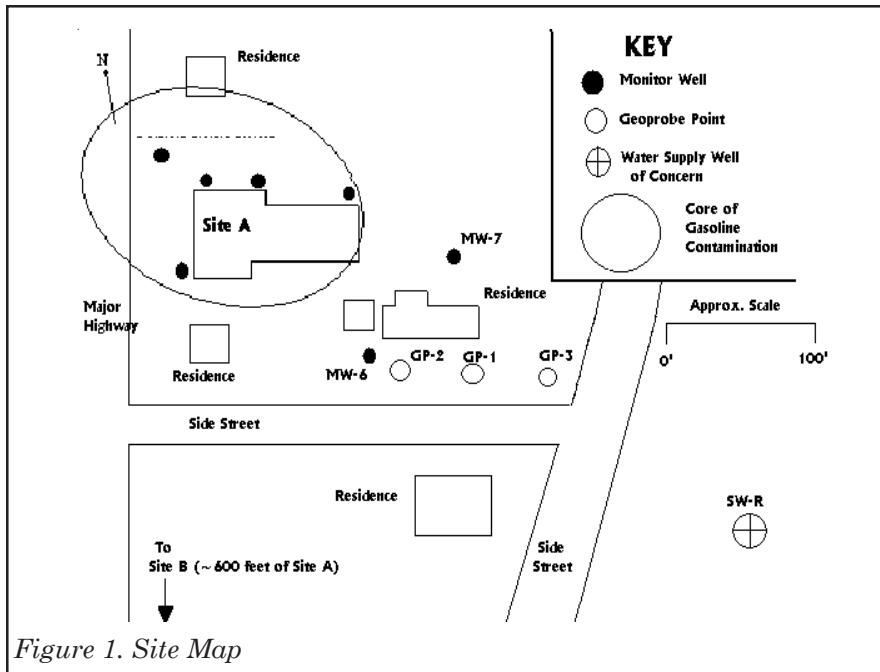


Figure 1. Site Map

2. Hydrodynamic dispersion may cause contaminant plumes to spread out and individual contaminant constituents to move at different rates. Note, for example, that the maximum concentration of ethylbenzene in GP-3 is lagging behind at a shallower depth than the maximum concentrations for benzene, toluene and xylene (Table 1). Plume spreading may be mistaken as indicating

a decrease in total contaminant mass with a resulting underestimation of potential risks to human health and the environment.

3. Groundwater monitoring wells screened at the water table may not accurately characterize the full horizontal and vertical extent of a dissolved-phase hydrocarbon plume. Consultants should consider multi-level groundwater sampling at

petroleum LUST sites, especially where the downgradient ground surface is not paved or covered by impermeable structures. Multi-level sampling can be accomplished using direct push methods such as a Geoprobe.

Part B, Section 4.02 B (2)(b) of Delaware's *Regulations Governing Underground Storage Tank Systems* states that a hydrogeologic investigation must include determining the "areal extent of the release, both horizontal and vertical, including whether the contaminant is distributed homogeneously or heterogeneously." The U.S. EPA has developed a plume diving calculator to help consultants determine the likelihood of plume diving at a given site. The calculator is available on the Web at [http://www.epa.gov/Athens/learn2model/part-two/onsite/b0\\_onsite.htm](http://www.epa.gov/Athens/learn2model/part-two/onsite/b0_onsite.htm).

#### References

Ellis, P.M., 2000, "MTBE and BTEX Plume Behavior": *Think Tank* #31, Technical Paper #1.

Fischer, W.P., 2001, "MTBE: Time is Money": *Think Tank* #32.

## Must I remove my old heating oil (heating fuel) tank?

by Jill Hall

There is some confusion as to whether the Department requires older heating oil tanks be removed. First, what is a Heating Oil tank? It is a tank that stores fuel used for heating a space in a building. It may be a home, office, or it might be used to heat space for animals or plants. The tank must store fuel that is used only on the premises and only for heating purposes. If fuel in the tank is used for any other purpose, such as fueling vehicles, the Department does not classify it as

a Heating Oil tank.

The Delaware DNREC requires that heating oil tanks comply with *Delaware's Regulations Governing Underground Storage Tank Systems* (the Regulations). These regulations **DO** allow the use of underground heating oil tanks. Owners and operators must meet any tank compliance requirements and also comply with the cleanup, registration and leak prevention requirements as outlined in the Regulations. Local

laws and ordinances may differ from those imposed by the State of Delaware. Check with local officials before installing a tank or purchasing a property with an existing tank.

In addition, there are differences in requirements for tanks with a capacity of 2000 gallons or less and those greater than 2000 gallons. And there are differences between tanks installed prior to May 14, 1993 and those installed after that date. Call the TMB for more information.

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## Announcements

*Ron Brown* – was promoted to Environmental Scientist III in August. Ron is a UST compliance project officer and tracks UST removals and abandonments for the Branch. He also coordinates LUST information with the Land Use Planning Act (LUPA) and Delaware Advisory Service when new construction is planned.

*Luella Allen* - was hired as an Operations Support Specialist in August. Luella was previously a seasonal employee with the Tank Management Branch. She maintains the nearly 5000 UST facility files, assists with FOIA requests, and provides general office support.

*Frank Gavas* - married Brigitte Blake September 28. The couple honeymooned in France and now reside in Dover.

### *New DNREC Secretary*

On October 10, the Delaware State Senate confirmed John A. Hughes as the eighth Secretary of the Department of Natural Resources and Environmental Control. Secretary Hughes, 61, was director of the Department's Division of Soil and Water for 18 years before being named Secretary by Governor Minner. Prior to his tenure as director, he served as operations manager of the division for 14 years.

As the state's top environmental official, Secretary Hughes is not only concerned with protecting the environment, he is also concerned with service and responsiveness to the community. "Every phone call returned promptly fills a reservoir of good will that we may have to tap in the future."

UST Web site: [www.dnrec.state.de.us/dnrec2000/Divisions/AWM/ust/](http://www.dnrec.state.de.us/dnrec2000/Divisions/AWM/ust/)  
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