SITE REMEDIATION NEWS

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Research Organic Inorganic Chemical Corporation Property Sold, State Receives $495,000

By: Tom O'Neill, Bureau of Construction

The Research Organic Inorganic Chemical Corporation (Research Organic) property located on Main Street, adjacent to Route 21, in Belleville Township, Essex County was recently sold as part of a cost recovery effort. The proceeds, $495,000, were recently received by the State. This is the first publicly funded site to be remediated and returned to productive use by way of public sale. Research Organic has been a publicly funded site remediation project since 1983. Cooperative efforts between the buyer, the Department of Treasury and the Site Remediation Program resulted in the sale that will help reimburse the Spill Fund for costs incurred in the clean up of the site.

A view of the warehouse at the Research Organic Inorganic site showing the variety of containerized chemicals during the 1985 emergency clean up effort.

Research Organic was a specialty chemical manufacturing plant and warehouse operation located in a mixed residential, commercial, industrial section of Belleville. Repeated odor complaints from the neighbors, fires in drum storage areas and dumpsters, and allegations of illegal waste disposal via the sewer system led the Township and County to shut down the facility in 1983. The DEP assisted the local officials in securing the site and stabilizing the very hazardous conditions. Initially some 1,000 drums of hazardous material were removed from the site.

During 1984 the DEP took over full control of the clean up. The Bureau of Construction engaged the emergency response contractor to stabilize and dispose of the balance of the containerized material at the site. Approximately, 12,000 containers ranging in size from laboratory vials up to 55 gallon drums were staged, evaluated, and disposed of during this effort. Numerous compressed gas cylinders were a particular challenge during this clean up effort. Liquids contained in the on site process equipment, lines, and underground storage tanks were also processed for disposal. As a result of this clean up the US Army Technical Escort Group

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conducted the removal of a small quantity of mustard gas from the site. The cost to the DEP for the emergency activities was $1.45 million.

The site then entered the Remedial Investigation / Feasibility Study phase using public funding in 1986. The Bureau of Site Management oversaw the resulting remedial investigation and generated a decision document that called for the decontamination of the building, the decommissioning of the underground storage tanks and contaminated soil removal. Work to accomplish the objectives of the decision document was completed by the Bureau of Construction in 1992 using a publicly bid contract at a cost of $1.45 million. Approximately $1 million of the costs expended at the site came from the Spill Fund, the balance coming from bond fund accounts.

A sample view of the types of chemical containers, as segregated by compatible type, during the 1985 emergency clean up.

Unknown chemicals being staged by a worker in Level B protective clothing for consolidation during the 1985 emergency clean up.

In 1995, Commissioner Shinn signed the decision document, developed by the Bureau of Site Management, to address the ground water contamination. The decision was to establish a Classification Exception Area (CEA), due to levels of volatile, semi-volatiles, and metals that exceeded the Class II-A Ground Water Quality Criteria. The contamination plume was found to be small and confined primarily to the site. A quarterly monitoring program was established and implemented by the Operations and Maintenance Section of the Bureau of Construction. Evaluation of the data caused the DEP to conduct additional soil borings to further define the extent and travel direction of the plume, which was done in 1999 and 2000. Based on the findings a narrow plume was confirmed that has traveled off site under Main Street in the direction of the nearby Passaic River. A sentinel well will be installed to monitor the plume.

In addition, a deed notice was placed on the property due to the unknown nature of the

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contamination under the building. Since the building was left in place and not demolished the soils investigation was limited. The deed notice requires that anyone seeking to disturb the soil underneath the footprint of the buildings must notify the DEP.

Cost recovery efforts resulted in court action that culminated in a judgement in favor of the State in 1992. The New Jersey Superior Court awarded the judgement in the amount of $2.7 million based on the costs incurred up to April 1992. These expenses included contractors, administrative, and legal costs. In 1999 and then again in 2000 the Essex County Sheriff attempted to sell the property for back taxes. No party stepped forward to take the property and as a result the title was given to the DEP as holder of the judgement against the property.

Fall 2000, the empty cleaned up warehouse just prior to closing on the property sale.

Upon receipt of the title by the Attorney General's Office, DEP decided to sell the property to recoup a portion of the clean-up costs. Sale of the property was referred to the Department of Treasury, Bureau of Real Property Disposals and Acquisitions. Treasury and DEP held an open house on May 3, 2000 and public auction was conducted on May 11, 2000 with a minimum bid requirement of $325,000. Competitive bidding drove the price up to the final sale price of $495,000. The Town of Belleville received $80,685 based on the terms of the 1992 Superior Court decision to cover portions of their costs related to the site remediation.

Extensive negotiations in development of an agreement for sale were conducted in the intervening months. The Attorney General's Office represented both Treasury and DEP, technical support from the Bureau of Construction, administrative support from the Division of Responsible Party Site Remediation and the Assistant Commissioner's Office were all needed to conclude the negotiations. Closing was held in late October.

The DEP will remain involved with the property. A condition of sale committed the DEP to conduct the monitoring required by the CEA. A two year monitoring program is underway with the installation of the off site sentinel well to be completed this Spring. Also, the deed notice regarding the soils under the existing buildings remains in place that will require Department notification of building activity.

At the time of this writing the new owners are actively renovating the buildings and have ordered equipment for their new enterprise: a specialty bakery and ice creamery for the restaurant and institutional trade. A factory outlet retail operation is also slated for inclusion at the site. ❖

General Information:

The *Site Remediation News* is published by the Program Support Element. If you want to receive the *Site Remediation News*, it is available on the web page at *http://www.state.nj.us/dep/srp*. If you want a paper copy, please send a request containing your name and address to:

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Removal of USTs and Contaminated Soils Allow Immediate Reuse of Two Contaminated Sites

By: Peter Cagno, Bureau of Construction

In the world of environmental cleanups, it is not uncommon for an abandoned contaminated site to sit relatively untouched and unusable for years before it is properly addressed. PA/SI, RI, RAW, RA – these are some of the acronyms used in our business. The most coveted, however, is NFA, or "No Further Action." There are many different ways to get from Point A (contamination identification) to Point B (site cleanup/ NFA). In many instances multiple remedial investigations are needed and many remedial alternatives are evaluated. One of the many downsides to these steps is that a contaminated property can sit vacant, usually run down and in a state of disrepair, contributing to the blight of the city, town or neighborhood.

Former Marine Police Station – Monmouth Beach

The former Marine Police station located on the oceanfront in Monmouth Beach, Monmouth County, had been all but abandoned after a nor'easter hit in December 1992. The building suffered severe structural damage during the storm and was in a complete state of disrepair. Many people thought the building should be torn down, however, the 100+ year old building held a rich history within the small beach community.

During the winter of 1995, an oil sheen was observed intermittently coming from a storm sewer outfall into the Shrewsbury River, about two blocks from the site. The two underground storage tanks at the site were suspected of being the source. A private contractor subsequently removed the USTs in early 1998. In March 1998, however, a sheen was still being detected in the river.

Since the State owned the property, the case was referred to NJDEP, Division of Publicly Funded Site Remediation for remedial action. The case was classified as an Immediate Environmental Concern (IEC) due to the impact to surface water. With cooperation from the Monmouth Beach sewer authority, the storm sewer line was videotaped to look for evidence of oil seepage into the pipe. While viewing the tape, it appeared as if the sanitary sewer lateral coming from the old building traversed the concrete storm pipe. The area was investigated using test trenches where it was found that the sanitary sewer lateral was acting as a conduit for fuel oil product to enter into the hole that was made in the storm pipe. The old sanitary lateral was removed and the hole in the pipe was immediately patched.

Remedial alternatives were evaluated for the contaminated saturated soil, including bioremediation. Complete source removal was determined to be the best alternative. During the summer of 1998 some 750 cubic yards of contaminated soil were removed and transported off-site for recycling. The DEP's quick actions alleviated soil, ground water and surface water impacts at the site, so all that remained was the dilapidated building. The swift and positive response by DEP inspired to the residents of Monmouth Beach to save this piece of history. Through donations and many volunteer efforts, the building was completely refurbished and as of Memorial Day 2000, became the new home of the Monmouth Beach Cultural Center.

331 Broadway, Long Branch

The second site is located at 331 Broadway in Long Branch and is an abandoned gas station. The site consisted of a boarded up, single story block building with three suspected USTs. The site had been abandoned for over a decade. Garbage and litter were strewn about the site, which was found to be the source of gasoline vapors in a nearby utility vault as well as soil contamination under an adjacent building.

This facility was situated on the corner of an older strip mall on the main street of Long Branch across from the Long Branch Municipal Complex. The owners of the adjacent building had become very frustrated because the uncertain future of this property made it impossible to market their abandoned building left to them by their grandfather.

Since there was no viable responsible party, the NJDEP, DPFSR addressed the IEC in the fall of 1998. Remedial investigations concluded that soil across the entire 90' x 50' site was contaminated with gasoline. After evaluating remedial alternatives including soil vapor extraction and ground water treatment, complete source removal was selected. In December 1998, the small gas station building was razed and about 1720 tons of contaminated soil were removed and transported off-site for recycling. The entire site was excavated from corner to corner. In addition to the original three USTs, an *additional* five USTs were found during the removal.

Once again, complete source removal addressed the impacted soils, while the relatively low-level ground

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Removal of USTs and Contaminated Soils Allow Immediate Reuse of Two Contaminated Sites (continued)

water contamination will be addressed via natural attenuation. Not only did removing the rundown structure allow complete source removal, but the vacant lot proved to be an attractive addition to a prospective buyer of the adjacent building. The adjacent building was recently purchased and is being refurbished. The owner is working with the town and the Department to purchase the now vacant lot, which will be paved, landscaped and used for parking.

Although on a small scale, these two cases demonstrate how performing a quick and concise remedial action can lead to a swift positive response from the community and return near worthless properties back into something beneficial. ❖

Guidance on Vertical Delineation of Ground Water Contaminant Plumes

By: Erick Kinsel
Bureau of Underground Storage Tanks

Scope: This guidance is intended to apply to dissolved petroleum-derived ground water contaminant plumes in unconsolidated formations. This guidance should not be applied to sites where ground water occurs in bedrock, or where the contaminants of concern are dense non-aqueous phase liquids or inorganics.

Pursuant to the Technical Requirements for Site Remediation, specifically N.J.A.C. 7:26E-4.4 (h) 3. i., if ground water is contaminated above the applicable remediation standards, delineation of the horizontal and vertical extent of the contaminant plume is required. If a party can successfully demonstrate that vertical delineation is not necessary at a particular site, the Department can grant a variance from the vertical delineation requirement, in accordance with N.J.A.C. 7:26E-1.6 (d). The burden of proof for providing justification why vertical delineation is not necessary in a particular case rests with the party conducting the remedial activity.

The criteria presented below are intended to assist parties conducting remedial activities in evaluating whether vertical delineation is necessary for dissolved petroleum-derived contaminant plumes, and in compiling the information that will be needed by the Department in reviewing requests for variances from vertical delineation requirements.

A. Vertical delineation shall be conducted in the following situations:

1. Where potable wells, supply wells, industrial wells or irrigation wells are located within 1000 feet downgradient of the site;
2. Where potable wells, supply wells, industrial wells or irrigation wells are located within 500 feet sidegradient of the site;
3. Where potable wells, supply wells, industrial wells or irrigation wells are located within 250 feet upgradient of the site;
4. Any other sites which, in the Department's opinion, pose a risk to potable wells, supply wells, industrial wells or irrigation wells;
5. In non-aquifer use areas (no potable, supply, industrial or irrigation wells), when gasoline additives that do not significantly biodegrade (e.g. MTBE) are present in the source area of the plume at sustained concentrations of 10 PPM or greater;
6. There is a downward vertical component to the ground water flow regime at the site;
7. Stratigraphic information shows that hydraulic conductivity increases significantly with depth in the first 50 feet of saturated aquifer thickness;
8. At sites underlain by stratified material (e.g. interbedded silts, clays and sands) with zones of higher permeability acting as zones of preferential ground water migration; or
9. Other information indicates that vertical migration of contamination may be occurring.

B. Vertical delineation may not be necessary in the following situations:

None of the conditions in "A" above are met and;

1. The age and duration of the release are known, the identity and volume of the release are known, the source and soils have been mitigated within one year of the release, and the ground water remediation will be completed in less than five years from the release date;
2. The plume constituents are only petroleum-derived compounds and gasoline additives (e.g. MTBE,

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Guidance on Vertical Delineation of Ground Water Contaminant Plumes (continued)

TBA), and the source area ground water concentrations of individual non-biodegradable compounds have always been and remain below 10 ppm;

3. The site is on a confining unit or underlain by a confining unit that is contiguous across the site within the first 30 feet of saturated aquifer thickness as documented by geologic reports, on-site logs, or data from nearby sites;

4. The source area is adjacent to a gaining surface water body. The gaining or losing status of the surface water body shall be determined with seasonal (e.g., quarterly) measurements of ground water and surface water elevations. Tidal influences shall also be evaluated; or

5. The party conducting the remedial investigation documents that vertical migration of a contaminant plume is unlikely based upon site-specific factors, in accordance with N.J.A.C. 7:26E-1.6.

C. Guidelines on initial vertical sampling locations:

1. If the dominant mechanism for vertical plume displacement is infiltration of precipitation, then the initial vertical sampling point should be placed at the leading edge of the plume along the plume centerline as defined by existing horizontal monitoring points. It is recommended that the top of the vertical sampling interval be approximately 5 to 10 feet below the bottom of the horizontal sampling point. It is also recommended that the screened interval in each well not exceed 10 feet. This may be adjusted to account for site-specific conditions.

2. If a lithologic change is triggering the vertical delineation requirement, then the initial vertical point should be screened within the lithologic zone of interest. Locate the vertical point within the plume, rather than at the downgradient edge of the plume.

3. If other mechanisms are controlling the vertical displacement of the plume, then the location(s) of the vertical delineation point(s) should be decided using site specific conditions.

4. The Department does not recommend that vertical profile sampling (e.g. low flow sampling, double check-valve bailer sampling) be attempted within an individual water table well. Instead, it is recommended that permanent vertical monitor points be installed. Initial vertical profiling may be conducted utilizing temporary sampling points. Temporary sampling points provide an advantage in optimizing locations and depths for subsequent permanent monitoring points. However, in most instances successive monitoring events over a sustained time interval will be required, necessitating permanent monitoring points. Permanent vertical points enable head measurements to be obtained in order to assess the presence and magnitude of a vertical component of ground water flow. ❖

No Cost Technology Sessions

NJDEP, in cooperation with the Interstate Technology and Regulatory Cooperation Workgroup (ITRC), will be conducting in-depth, three-hour technical sessions on selected technologies for DEP Case managers in the coming months (see additional details on page 11). We encourage consultants, military base environmental managers, industry representatives, and other interested parties to attend these sessions as well, again, at no charge. The first of these was on Chemical Oxidation on April 30, 2001 in the DEP Public Hearing Room. Additional technology sessions will be held on June 28, September 5, and December 5, 2001, so please mark your calendars. Please register online at *http://www.state.nj.us/dep/srp/training/contact.htm* or contact Marybeth Brenner, NJDEP at 609-292-2885 to register. We look forward to seeing you there! ❖

SITE REMEDIATION NEWS

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Diving Plumes: The Development and Investigation of Dissolved Contaminant Plumes that Migrate Vertically Downward to Depths Below the Water Table

By: Jeff Griesemer
Bureau of Ground Water Pollution Abatement

A "diving plume" is described as a dissolved contaminant plume that has migrated to a depth below the water table. The vertical profile of a diving plume includes a zone of overlying "clean" ground water (Figure 1).

Diving plumes occur at a significant number of sites due to both hydrogeological and non-hydrogeological factors. Since the forces that induce a plume to dive are independent of a dissolved parameter's specific gravity, vertical migration can occur in any dissolved plume regardless of its composition. As a result, a dissolved plume could vertically migrate if the density of the source material is less than (e.g., LNAPL), or greater than (e.g., DNAPL), the density of water.

The characterization of ground water conditions at most sites relies heavily on the use of analytical data from water-table monitor wells. However, the effectiveness of an investigation using only water-table wells can be decreased due to vertical migration of the contaminant plume to depths below the water table and the screened intervals of the shallow monitor wells.

As illustrated in Figure 1, the contaminant plume has migrated downgradient of the source (MW-1) and vertically downward to a depth that is below the screened intervals of the more distal, water-table monitor wells (MW-5). The leading edge of the diving plume actually extends beyond the position of a shallow well exhibiting a clean ground water sample (MW-5). Site investigation efforts would not detect the full downgradient extent of the diving plume and, consequently, the actual size of the plume would be underestimated.

Due to the vertical displacement of the plume, a well such as MW-4 would be contaminated, but might underrepresent actual contaminant concentrations because of dilution. Dilution is caused by the entry of both "clean" and contaminated ground water into a screened interval that is situated partially above the plume.

Development of A Diving Plume

Both hydrogeologic and non-hydrogeologic conditions can influence the degree to which a dissolved plume will migrate downward to a level below the water table. A combination of these conditions usually influences ground water and plume dynamics. These conditions include:

1) ***Downward Vertical Gradient –*** The most important mechanism that causes vertical migration of a plume is the presence of a downward vertical gradient beneath the site.

   A trend of increasing hydraulic conductivity with depth could induce a downward vertical potential beneath the site. A more permeable horizon may be situated below, and be hydraulically connected to, the shallower unit in which the discharge occurred. A downward hydraulic potential would develop causing the ground water and associated contaminant plume to migrate towards the deeper more permeable layer.

   A downward vertical gradient could also be induced at recharge zones where water is entering the aquifer.

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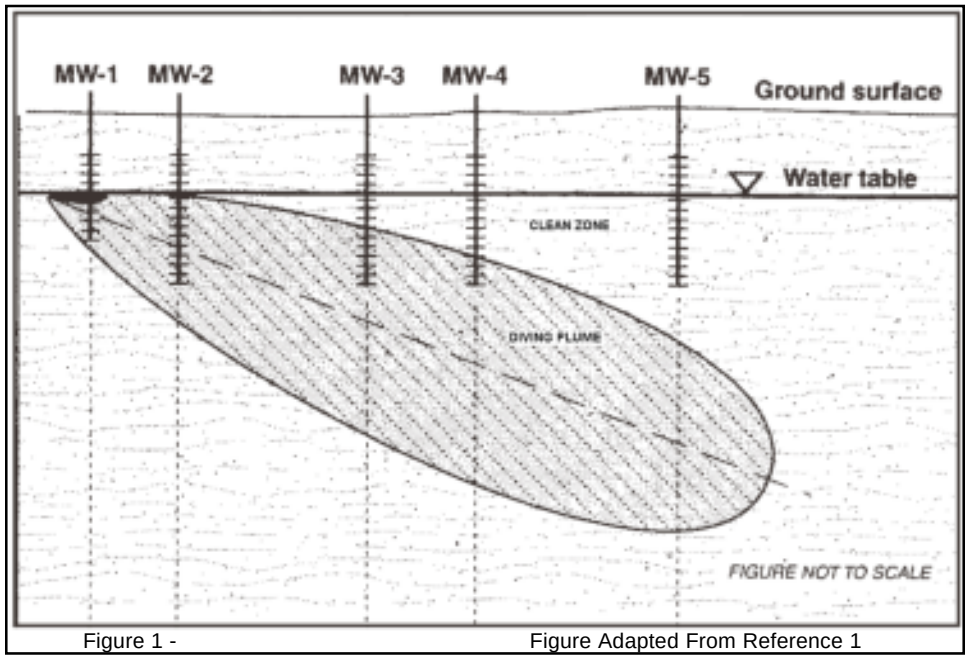

Figure 1 - Figure Adapted From Reference 1

Diving Plumes: The Development and Investigation of Dissolved Contaminant Plumes that Migrate Vertically Downward to Depths Below the Water Table (continued)

Conversely, even though a more permeable horizon might be situated beneath the zone of contamination, an upward hydraulic potential might be present if the site is located within a discharge zone. For example, if a site is located near a surface water body, ground water beneath the facility might be discharging to the surface water (i.e., discharge zone). This discharge would create an upward vertical gradient. This situation would not be conducive to the development of diving plumes.

Since downward and upward vertical gradients are produced in recharge and discharge areas respectively, it is important for investigators to comprehend a site's subsurface hydrogeologic conditions in order to adequately evaluate the presence of a diving plume.

2) Precipitation Infiltration **–** Significant surface infiltration of fresh water from precipitation and/or surface runoff could force a migrating contaminant plume to "dive." Therefore, analytical results of ground water samples obtained from water-table monitor wells may be representative of the relatively clean infiltrated water overlying the plume.

High rates of precipitation infiltration mainly increase the vertical migration of plumes in recharge areas. However, precipitation rates can be great enough to also cause vertical migration of contaminant plumes in discharge areas.

3) Time – If the plume is the result of an older discharge, the contaminants would have sufficient time to migrate downward along a vertical gradient to a level below the water table. In addition, longer periods of time may allow infiltration of rainfall to induce significant vertical migration.

4) Dispersion – The degree to which a compound will disperse in ground water will affect the vertical profile of the plume. Specifically, an aquifer with a lower vertical dispersion factor would cause a plume to develop a relatively narrow vertical profile (Figure 2). Consequently, the vertical height of the "clean" zone above the diving plume would be relatively larger.

An aquifer that exhibits a high rate of vertical dispersion would cause a diving plume to expand relatively closer to the water table. The resulting profile would produce a narrower, less significant "clean" zone above the plume (Figure 2).

An understanding of the configuration (e.g., thickness) of the overlying "clean" zone is an important factor in establishing an accurate model of a diving plume's vertical profile. (continued on page 9)

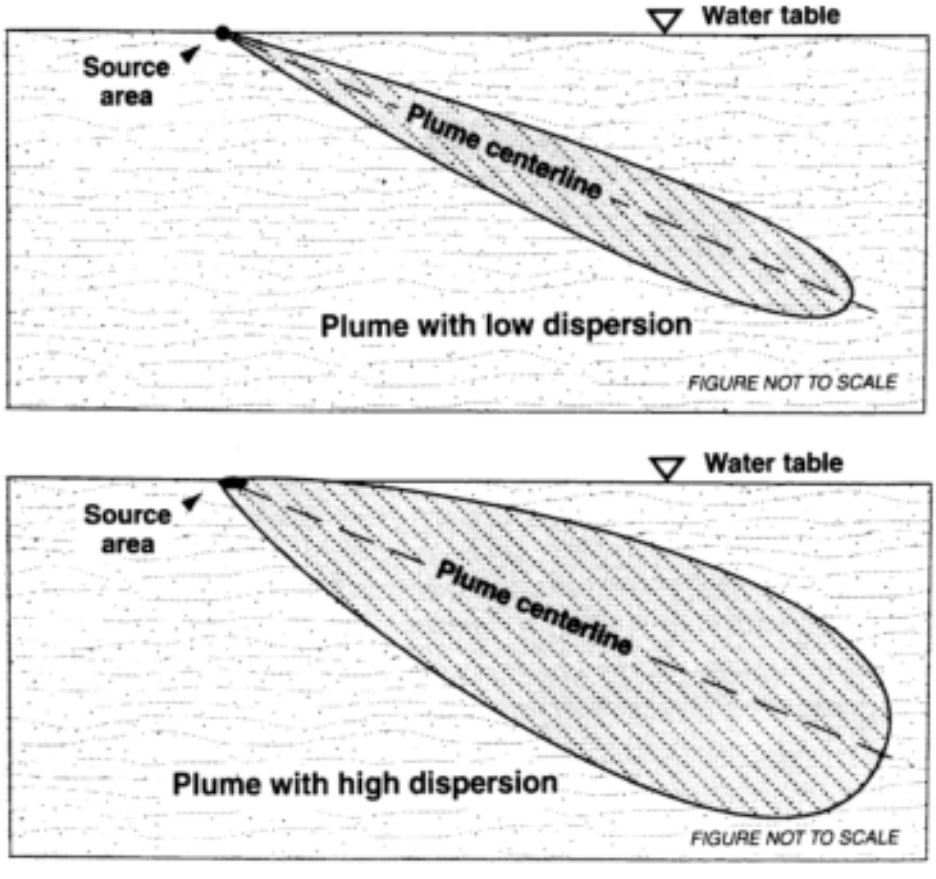

Figure 2 - The effects of dispersion on diving plumes can be seen in the cross section of two plumes, one with low vertical dispersion and one with high vertical dispersion. Figure Adapted From Reference 1

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5) ***Source Area –*** An on-going discharge or unmitigated source would sustain the development of a plume for a longer period of time. Therefore, the relatively longer time period would allow the cumulative effects of recharge, gradient and dispersion to displace the plume to a greater vertical extent.

6) ***Type of Contaminant –*** Each compound has unique migration characteristics. Characteristics such as degradation and solubility would affect the velocity and distance to which a compound will move through the subsurface media.

   For example, high biological and chemical degradation could limit plume growth and subsequently limit vertical migration. Conversely, a recalcitrant compound such as MTBE may persist in ground water for a longer period of time than a readily degradable compound such as benzene. Therefore, there would be more time for the cumulative effects of recharge, gradient, and dispersion to vertically displace the plume.

   With successful source control, persistent compounds such as MTBE might not even be found close to the site. The MTBE may continue to move downgradient of the site as a finite plume. The contaminants could be displaced to deeper depths as the plume migrates further downgradient and away from the source area.

   The forces that vertically displace a plume would also have a greater influence on plumes composed of more soluble compounds. Specifically, more soluble compounds can be present in the aquifer at relatively higher concentrations. Therefore, highly dissolved constituents can travel further since their residence time in the aquifer is relatively longer.

Vertical Delineation

Factors Affecting Vertical Delineation Decisions

Part of the site investigator's task is to evaluate the degree of vertical delineation needed for a specific site. Much of this evaluation is based on site-specific qualitative and quantitative assessments of the hydrogeologic and non-hydrogeologic factors that promote the development of diving plumes.

The Site Remediation Program (SRP) developed a set of guidelines to facilitate decisions regarding site-specific vertical delineation activities ("Guidance on Vertical Delineation of Ground Water Contaminant Plumes" by Erick Kinsel, Bureau of Underground Storage Tanks; published in this issue of the *Site Remediation Newsletter*). These guidelines are partly based on a number of hydrogeological factors that should be assessed at a site in order to determine, a) the likelihood of a diving plume, and b) how much deeper ground water sampling is needed. The hydrogeologic factors include:

1) ***Vertical Hydraulic Gradient –*** If it can be determined from existing ground water elevation data that a downward vertical gradient is present beneath the facility, additional vertical sampling downgradient of the source area would be needed. Additional wells (e.g., shallow and deep well couplets) would also be warranted if the vertical gradient cannot be determined from the existing on-site wells.

   Knowledge of locally active production and municipal well operations is important since the pumping of nearby deep wells might induce a downward vertical gradient beneath the site.

2) ***Stratigraphy –*** If well logs from existing wells at the site indicate the presence of, a) a more permeable horizon below the zone of contamination, and/or b) an increasing trend of hydraulic conductivity with depth, further investigation of the deeper aquifer would be warranted. The more conductive material at depth may promote a downward vertical component to ground water flow. A diving plume could subsequently develop under these conditions. Conversely, a plume is less likely to dive to a significant depth if a shallow, impervious stratigraphic unit is present beneath the zone of contamination.

   A good knowledge of site stratigraphy can greatly enhance investigation decisions and the conceptual model of a site.

3) ***Infiltration of Precipitation –*** Since the infiltration of fresh water influences vertical migration of a plume, it is important to assess the actual or potential degree of site-specific freshwater infiltration activity. Factors such as, a) amount of rainfall, b) degree of infiltration potential due to the facility's surface permeability (e.g., impermeable macadam cap or an exposed, highly permeable sandy soil), and c) amount of runoff should be evaluated as part of the decision-making process.

   Weaver, et.al., [1999 (2)] points out that at a site in Long Island, an MTBE plume did not begin to dive until it reached a distance of approximately 1000

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feet downgradient of the facility. This location coincided with the beginning of a suburban residential area. The relatively permeable surface of the suburban zone contrasted with the 95% paved, commercial district that was situated between the 1000 foot point and the upgradient source.

Certain non-hydrogeologic factors need to be assessed since these factors have a bearing on vertical delineation activities. For example, non-hydrogeological factors that would affect the necessity for vertical delineation would include, but are not necessarily limited to, a) the presence of receptors (e.g., potable wells, surface water bodies) close to, and downgradient of, the site, b) high contaminant levels at the source, and c) an older release. Regarding the assessment of these factors, the "Guidance On Vertical Delineation Of Ground Water Contaminant Plumes" includes numeric parameters to be applied when evaluating a strategy for vertical delineation.

These assessments and observations merely suggest the likelihood of a diving plume beneath the site. Therefore, additional sampling would be necessary in order to, a) confirm the existence of a diving plume, and b) delineate the plume's true lateral and vertical extent. In addition, downgradient, off-site conditions may need to be considered since plumes can migrate beyond site boundaries.

Diving Plume Delineation Procedures

The most straightforward approach for the investigation of diving plumes is to install additional, deeper sampling points at locations along the plume's centerline and further downgradient of the most concentrated portion of the plume that is detected in the existing water table monitor wells. Specifically, the additional deeper investigation should begin at points further downgradient of the source area and those wells exhibiting a noticeably reduced level of contaminant concentrations.

Wells with lower contaminant concentrations may represent a mixing zone of contaminated ground water and the "clean" zone overlying a diving plume. Therefore, deeper wells would be needed past these points in order to target the deeper core of a diving plume.

The vertical investigation would need to be continued beyond the apparent leading edge of the plume. The plume's apparent leading edge is represented by water-table monitor wells in which no contaminant concentrations are detected. The additional points should be screened at depths below the water table in order to evaluate the presence of a deeper contaminant plume.

Discrete-zone ground water sampling is necessary to adequately evaluate the degree (angle) to which a plume is diving. The preferred method of discrete sampling is to install nested wells with separate (i.e., not overlapping), short-screen intervals. Screen interval placement should target any lithologic units that are suspected of controlling vertical migration.

Alternate ground water sampling points (AGSPs) using direct-push technologies could be used to optimize the locations and screened intervals of permanent monitor wells. Prior to configuring the array of permanent wells, the AGSPs would yield substantial quantities of ground water quality data that could initially characterize, a) the centerline, and b) the top, bottom and downgradient boundaries of the diving plume. Optimum well locations and construction specifications would subsequently be based on the identified outline of the plume.

Summary

It is important that investigators and the regulated community be aware that vertical plume characterization will be necessary at many contaminated sites. This necessity is due to the consequence that an underestimation of actual plume size might have on human health and the environment. For example, an underestimated definition of a diving plume's lateral and vertical extent could have a significant implication where there are deeper potable wells situated downgradient of the contaminated site.

The occurrence of a diving plume is dependent on several hydrogeologic and non-hydrogeologic factors. The evaluation of these parameters should be included in a site's ground water characterization plan. The evaluation can be used to assess the potential for vertical migration of the contaminant plume. Complete vertical delineation is necessary in order to characterize a diving plume's true lateral and vertical extent.

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f) University of Wisconsin-Madison, Department of Engineering Professional Development, Underground Tank Technology Update (UTTU). 1999. "MTBE Study at the U.S.G.S. Site in South Carolina", UTTU, Vol. 13, No. 4, July/August 1999, pp. 9–11.

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NJDEP Plays Key Role in Technology Training and Deployment

By: Brian Sogorka, NJDEP/ITRC

The Interstate Technology and Regulatory Cooperation Workgroup (ITRC) is a state-led, national coalition whose mission is to create tools and strategies to reduce interstate barriers to the deployment of environmental technologies. The Department Co-Chairs the ITRC and leads several technical teams as well, including Permeable Reactive Barriers, led by Matt Turner, RPCE; Diffusion Samplers, led by George Nicholas, HSSE; Contaminated Sediments, led by Richard Dewan, ODST; and Phytoremediation, led by Bob Mueller, DRST. The Department has recently placed even greater emphasis on technology by naming Brian Sogorka as Manager of Remediation Technologies. In this new position, Brian Co-Chairs the ITRC and develops guidance for the deployment of innovative technologies at military bases and private sector sites in New Jersey and across the Country.

The ITRC has played a key role in the deployment of more than 45 technologies, trained more than 5000 state, federal, industry and public stakeholders, and effected more than 45 institutional changes in state agencies. ITRC forms technical teams, with members from states, federal agencies, and industry, to develop technical and regulatory guidance documents and training courses. Information in our documents and courses helps site owners with making decisions regarding smarter solutions to environmental cleanup at contaminated sites.

ITRC has developed over 40 technical publications, all of which can be downloaded at www.itrcweb.org. ITRC will also offer 30 two-hour Internet training sessions during the upcoming year. These sessions can be accessed at no cost through the web. ITRC offers guidance and training for technologies and contaminants such as Natural attenuation, In situ bioremediation, Phytoremediation, Permeable reactive barriers, Diffusion sampler technology, Unexploded Ordnance, Chemical Oxidation, and many more.

The ITRC was also instrumental in regulatory streamlining for in-situ treatment of ground water. There was confusion in the environmental community regarding the applicability of RCRA Section 3020 to in-situ treatment of ground water. The ITRC formally peti-

(continued on page 12)

NJDEP Plays Key Role in Technology Training and Deployment (continued)

tioned EPA for a clarification of this issue. In response, EPA issued a policy statement which clarified that reinjection of treated ground water to promote in-situ treatment is allowed under RCRA section 3020(b) as long as certain conditions are met. Specifically, the ground water must be treated prior to reinjection; the treatment must be intended to substantially reduce hazardous constituents in the ground water, either before or after reinjection; the cleanup must be protective of human health and the environment; and the injection must be part of a response action under CERCLA section 104 or 106 or a RCRA corrective action intended to clean up the contamination. More details may be found at http://clu-in.org/techpubs.htm.

The Department, in cooperation with ITRC, will be conducting in-depth, three-hour technical sessions on selected technologies for NJDEP Case managers in the coming months. Consultants, military base environmental managers, industry representatives, and other interested parties are encouraged to attend these sessions as well, again, at no cost. Please register online at *http://www.state.nj.us/dep/srp/training/contact.htm* or contact Marybeth Brenner, NJDEP at 609-292-2885 to register. We look forward to seeing you there! ❖

General Information:

Please be sure to include the box number on all mail addressed to the Industrial Site Evaluation Element. Some mail has been received by the element many weeks past the date on the correspondence, due to the omission of the box number. The proper way to address mail to the element is:

Section Name or Case Manager's Name
Industrial Site Evaluation Element
PO Box 028
Trenton, New Jersey 08625-0028

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Applications for NJPDES Permits in the SRP

By: Michael Infanger
Bureau of Underground Storage Tanks

The Site Remediation Program (SRP) issues New Jersey Pollutant Discharge Elimination System (NJPDES) permits for discharges to ground water (DGW) associated with sites under SRP oversight. For the most part, the permit process parallels the process that the Division of Water Quality uses, but there are certain policies unique to the SRP. The following should be considered when applying to the SRP for a NJPDES DGW permit.

The application should be sent directly to the case manager rather than to the address listed in N.J.A.C 7:14A-4.2(b). Also, the SRP does not collect the $350.00 or $700.00 application fee cited in N.J.A.C 7:14A-3.1(k)3. Costs associated with issuance of the permit will be assessed according to the cost recovery formula specified in N.J.A.C. 7:26C at the time of permit issuance.

Endorsements from the local municipality and sewage authority are no longer required. However, the applicant must send copies of the application to these entities and provide documentation that this was done. Normally, it is sufficient to supply copies of cover letters to these entities or similar documentation that the copies were sent. Stronger documentation, such as certified mail receipts, may be required on a case-by-case basis.

N.J.A.C. 7:14A-22.4(a)13 exempts SRP permits from obtaining a Treatment Works Approval, but other requirements of Subchapters 22 and 23 must be met, namely the engineer's report and the licensed operator designation. Note that N.J.A.C 7:10A-1.10(b)6 exempts the requirement of a licensed operator for Class V injection wells which receive water only by gravity or automatic siphon. This is significant because many SRP permits fall in this category (e.g., discharges to injection wells or infiltration galleries).

The SRP's NJPDES Technical Manual may answer other questions an applicant may have. It also includes a general overview of the process and the current SRP NJPDES application. It can be found on the SRP's web site at *www.state.nj.us/dep/srp/regs/guidance.htm.* ❖

A Reminder for New Landowners Interested in Asserting "Innocent Purchaser" Defense

By: Phyllis E. Bross
Deputy Attorney General

While the DEP assumes no role in the determination of whether a person's defense to environmental liability will ultimately apply in any given situation, in the interest of promoting partnerships through effective government, and, as a way to demonstrate support for redeveloping and marketing brownfield sites in this State, the DEP is prepared to assist prospective purchasers in their efforts to limit liability.

On January 6, 1998, our Legislature provided a novel immediate third-party defense for a prospective purchaser that voluntarily enters into a DEP clean-up oversight document **prior** to taking ownership, N.J.S.A. 58:10-23.11g.f. Interested prospective owners may contact Jerry O'Donnell or Ralph Downs at (609)292-2943 to apply for a Memorandum of Agreement ("MOA") in that connection. Recognizing the importance of deadlines inherent in effectuating any land deal, Jerry and Ralph are ready to help applicants effectively and efficiently move through the "MOA" process.

Moreover, because this third-party innocent purchaser defense also requires, among other things, that the new owner provide DEP with reasonable site access within 10 days of acquisition of the property, DEP also is prepared to accept, and include in its public file, evidence of new owners' access grants. Proof of access grants should be forwarded to Assistant Director Edward Putnam. Persons interested in asserting this defense must have given notice of any discharge to the DEP upon actual discovery. DEP suggests that any interested person also obtain legal review of N.J.S.A. 58:10-23.11g.f. Anyone may contact Terri Smith, DEP's Brownfield Coordinator, at (609)292-1250 or Phyllis Bross, Deputy Attorney General, at (609)292-3214 for further assistance. ❖

Please Note: The *Site Remediation News Alphabetical Index*, which is updated every year, will now only appear on the SRP Web Page at *http://www.state.nj.us/dep/srp/news/srn_index_a.htm.*

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