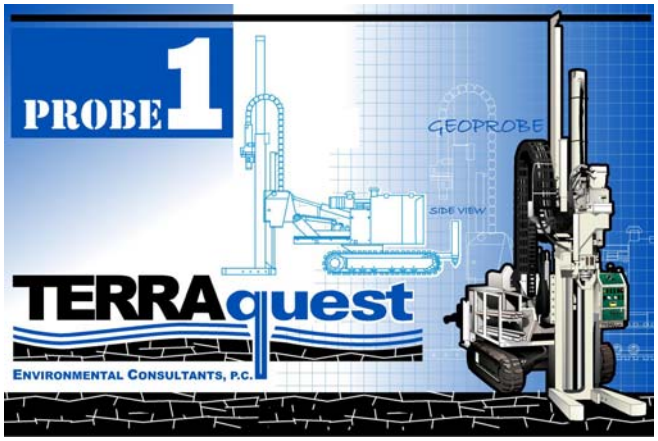
environmental monitoring

TERRAquest
ENVIRONMENTAL CONSULTANTS, P.C.

November 2005

news



Our updated website is located at www.terraquestpc.com, where you can find additional information about our services, downloadable documents, and useful links. As newsletters are published, they will be added to the website for future reference.

Please contact us to be added to our e-mail list.

HOW MUCH DATA IS ENOUGH?

Almost every month, the question arises of either how much a Phase II audit will cost or why we are spending so much money on assessing a contaminant release instead of cleaning it up. Before answering those questions, let's clarify what is a Phase II audit.

Prior to commercial real estate transactions, a Phase I audit is conducted to investigate if there are any recognized environmental conditions (RECs). RECs might be stains, spills, piles of chemical containers, etc. The Phase I audit indicates that these items are RECs and might be an environmental issue. There is no sampling to determine if they are an issue.

During a Phase II audit, samples are collected at these areas to determine if they are actually a problem. Maybe the soil is contaminated, but the analytical results show that the levels are acceptable. The purpose of the Phase II audit is to gather data about these areas.

How much does a Phase II audit cost? It depends on how many samples you request or how many are necessary to adequately characterize the site. As an example; if you went to a typical gasoline station and collected one soil sample near the tanks, does that adequately characterize the site? No. There still could be leaks at the pumps, along the product lines, or at the old waste oil pit out back. Are two samples enough? Again, it depends on the site and your level of comfort. Ultimately, if you or someone else purchases a property that has been poorly characterized, there can be significant environmental costs.

Assessing the nature and extent of contamination at sites can cost tens of thousands of dollars. Why don't we just spend that money on cleaning it up instead? The analogy can be used that if you were sick and went to the doctor, he wouldn't perform open heart surgery right away. He would conduct some tests (data) and try to arrive at a likely cause of the sickness before prescribing a treatment. How can a release be cleaned up if you don't know where it is or what is the source? And when is there enough data to start remediation?
(cont. on page 2)

TERRAQUEST ENVIRONMENTAL CONSULTANTS, P.C. 5th ANNIVERSARY 2000 2005

IN THIS ISSUE

HOW MUCH DATA IS ENOUGH (Continued)

In the Summer 2005 issue of *Groundwater Monitoring & Remediation*, there was an article on "Where do mistakes come from?". This article, too, is about how much site data is enough. In order to demonstrate how little we actually know about site conditions, a relatively simple example is offered.

"There are 15 #2 unsharpened pencils that have been taken from separate locations within a box full of pencils. The box measures 8' x 10' x 3'. Each of the 15 pencils is made out of a different material, has a varying degree of graphite in it, and 3 out of the 15 have been thoughtfully chewed. Based on this information alone, tell me how much graphite is in the whole box and who has been chewing on the pencils."

At the opposite end of the spectrum, there are many consultants and regulators that believe more is better. They always want one more boring or one more monitoring well. While these sample points give us the information we need to adequately characterize a site, it can get to the point of diminishing return. That one more boring or monitoring well might cost $1,000, but will it help to characterize or cleanup the site better? If it can't be answered yes, the cost might be better spent on remediation in stead of assessment. With that said, how do you decide how much assessment is enough? For some, it will either be what your budget or the regulators allow. By allow, it is meant that if you are subject to a reimbursement program, you are doing no more than what will be reimbursed. Obviously, if you have spent all you can to thoroughly assess a release, you have demonstrated environmental responsibility. On the other hand, if you default to doing no more than a regulator allows or requires, you might be leaving yourself open for litigation. While you can say that you complied with all of the applicable regulatory requirements, can you say you went beyond what was required?

As you can see, there are no easy answers to when there is enough data. It depends upon many factors, including your budget, regulatory requirements, and your degree of environmental risk. Discussing your goals and risks at the beginning of a project can allow the assessment to be better tailored to your needs instead of a "one size fits all" approach.

PETROLEUM TANK FUND UPDATE

After a year of significant work restrictions, the NC leaking underground storage tank fund (LUST fund) has retired approximately $30 million in claims. Since the fall of 2004, work on most of the leaking tank sites in NC has been restricted or severely limited. The LUST fund recently lowered the eligible ranking of sites to High 600 for commercial sites. This means that if your site is ranked High 600 or above, you can conduct work under a directed pre-approval process. Once claims are submitted, they will be processed and reimbursed within 90 days. For those sites that rank below High 600, work can still proceed as non-directed and funds are reimbursed as they become available.

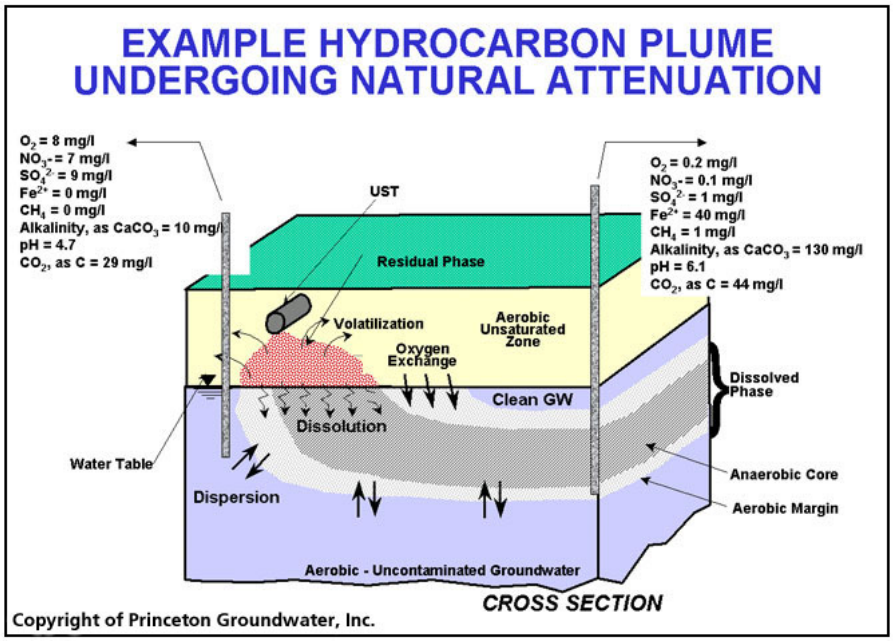
Given the work slow down, many clients probably wonder what the state regulatory agencies are doing. Many of the regulators have begun to review old release incidents in an effort to get them closed out. We have recently seen several sites where the last work was conducted in the early 1990's. Given the length of time that has passed, many clients probably thought the site was closed. Some responsible parties may not even own the property anymore.

Regulators have also increased inspections of tank facilities in an effort to achieve compliance. While this is a great step toward minimizing releases, it won't solve the problem entirely. Routine inspections, employee training, and engineering controls are also needed.

With future compliance deadlines on the horizon, now is the time to take inventory of your sites and their current status. TerraQuest can help you develop a risk reduction strategy to achieve compliance and reduce future environmental costs. This will be more important than ever if NC phases out the LUST fund and requires oil jobbers to shift to private insurance as their financial responsibility mechanism. If you have any questions or would like to discuss a specific risk reduction strategy, please contact us.

CONTAMINANT MIGRATION

The migration of contaminants in soil and groundwater is an extremely complicated process. In order to better understand how contaminants migrate through soil and water, it is necessary to know the type of contaminants and the type of soil in which the release occurred. First, let's look at the contaminant. There are two basic categories: light non-aqueous phase liquid (LNAPL) and dense non-aqueous phase liquid (DNAPL). LNAPLs have a density less than water, so they tend to float; while DNAPLs are denser and tend to sink. If the volume of the release is sufficient, the contaminant may form free-phase product. Smaller volumes will become dissolved into the groundwater.



Now, let's look at the soil. If the soil is clayey, the migration of the release will be slowed. If the soil is primarily comprised of silt or sand, the release can migrate faster. Soils that contain more organic carbon can also slow the spread of contaminants because they tend to bind to the organic material.

Once the contaminant is released into the environment, it will start to undergo transformation. A discussion of the transformation, including biodegradation, will be discussed in future issues.

As indicated in the above diagram, if the volume of the release is sufficient, the contaminants may impact groundwater. In sandy soils, the soil impact tends to be narrow since most of the transport is vertical. In clayey soils, the soil impact will tend to be broad because clays generally have lower vertical permeability than lateral permeability.

Once the contaminant release impacts groundwater, the contaminant will migrate with the direction of groundwater flow through a process called advective transport. This means the contaminant is migrating at the same rate and direction as groundwater flow. Dispersion is another factor that will cause groundwater plumes to spread. Dispersion is the process of molecular diffusion where higher concentrations are trying to reach equilibrium by diffusing into the aquifer until they reach equilibrium.

Future issues will discuss contaminant transport and biodegradation effects in more detail.

WHAT INFORMATION WOULD YOU LIKE TO SEE?

Since beginning the newsletter, we have put together articles that we felt were pertinent to our clients' businesses or of a general interest nature. In order to make sure we are providing you with the information you want, please let us know what articles or areas of interest you would like for us to discuss in upcoming issues.

Some of the topics recommended so far are:

- Innovative remediation technologies
- Rapid site assessment techniques
- Contaminant migration
- Phase I and II audits
- Brownfields redevelopment
- MTBE issues
- Risk reduction
- Remediation system processes
- Arsenic in groundwater
- Lead paint and asbestos issues
- Soil and groundwater terminology
- North Carolina geology

Also, if you would prefer the newsletter e-mailed, please send your address information to Michael at mjbrown@terraquestpc.com. Your e-mail address will not be used for any other purposes and we will remove your name upon request.

TERRAquest
ENVIRONMENTAL CONSULTANTS, P.C.

TerraQuest Environmental Consultants, P.C. is a full service environmental consulting company providing assessment and remediation services to various industries. Our highly trained staff is OSHA certified and able to provide clients with high quality, cost competitive services. If you have any questions regarding our services, please contact us.

Specializing In:

- Phase I/Phase II audits
- Soil and Groundwater assessment and remediation
- Drilling and Geoprobing
- UST removal and in-place abandonment
- Permitting
- Pilot testing
- Expert witness testimony
- Brownfields

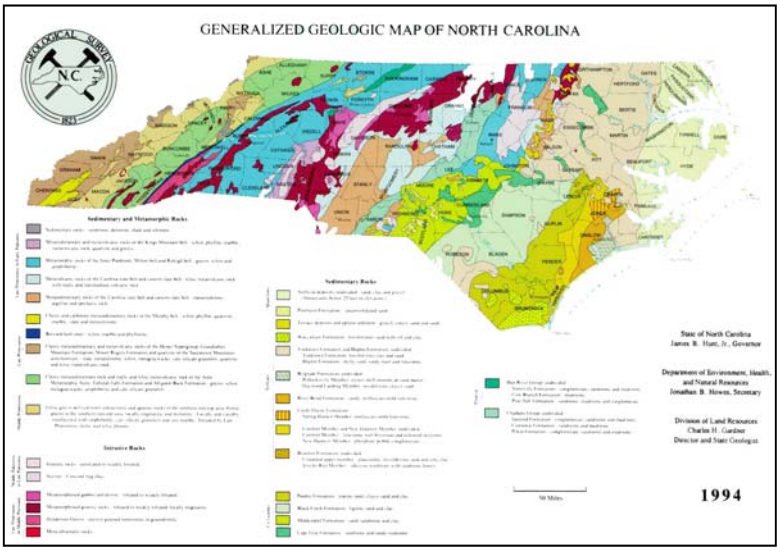
NORTH CAROLINA GEOLOGY

North Carolina is divided into three physiographic provinces. They are the Coastal Plain, Piedmont, and Blue Ridge. Each province is characterized by a particular type of landform.

The Coastal Plain is characterized by flat land and gently rolling hills. Geologically, the Coastal Plain is comprised of mostly marine sediments that become thicker to the east. Common materials found in the Coastal Plain are sand, clay, and limestone. A generalized geologic map of North Carolina is shown to the right.

The Piedmont lies between the Coastal Plain and the Blue Ridge. The Piedmont is characterized by gently rolling hills and valleys. There are several geologic belts within the Piedmont. Geologic belts are groups of rocks that are similar and have a similar geologic history. Some of these belts include the Raleigh belt, Carolina Slate belt, Eastern Slate belt, and the Triassic basins. The Raleigh belt is generally characterized by granite. The Carolina Slate belt and Eastern Slate belt are generally comprised of metamorphosed volcanic and sedimentary rocks. The Triassic basins are ancient lakes that have filled with clay, silt, sand, and gravel. Clay and their rock counterpart, mudstone, are processed to produce brick.

The Blue Ridge province consists of the mountainous region in the western portion of the state. This region consists of a complicated mix of igneous, sedimentary, and metamorphic rocks. Some of the rocks in the region exceed one billion years old.



TERRAQUEST ENVIRONMENTAL CONSULTANTS, P.C.
209 E. MAIN STREET
CARRBORO, NC 27510

919.932.1590
919.932.1594

www.terraquestpc.com