What You Need to Know

A Practical Guide to Covering Your Ass

updated: June 18, 2009 (from: www.journeyoftheforsaken.com)

First of all, my prayers are with you and you family. I hope you are treated fairly and with compassion by those in a position to help you successfully negotiate your crises. Keep your faith and courage and get thoroughly educated fast!

Second of all, since I'm a paralegal, I have to tell you that I'm not a lawyer and this isn't legal advice. I would recommend getting in touch with a qualified attorney, just to get your foot firmly in the starting block. You may or may not ever need to lean on them, but they certainly should be able to walk you through your situation.

This whole page is just common sense how-to's from someone who has lived through it and learned a few lessons that may be useful to you on your journey toward justice. Here's what the track looks like.

Before You Get Frac'd

PS - if you're lucky enough to read this before you get frac'd, here are four things you need to do before an oil and gas company moves in.

- Photograph / video every inch of your property.
- Conduct baseline water and air tests (air in your home as well, since migrating natural gas can move into a home through the foundation).
- Note the health of the vegetation and wildlife species if any.
- Get a current appraisal - if things go badly, chances are your home value will reflect it, and this could be a tool to use in negotiating a settlement for damages. Don't count on the value of your neighbor's home - these things tend to affect entire communities.

Essential Steps

if you believe your water has been impacted
by a natural gas well blow-out or similar contamination event

1) **Notify the EPA National Response Center (EPA-NRC) -** 1-800-424-8802 If you call in a complaint with the EPA at the national level, they should pass your complaint on to their regional office in your area as well as notify all other agencies with jurisdiction over the issue. **This is a huge deal, and establishes an official record - against which all other agency folk will be held theoretically accountable** (Oil and Gas officials actually denied that the Arbaney well (photo on

homepage) had any problems at all. I had to dig out my filed report to "remind" them.). **Get a list of any and all agencies the NRC intends to notify (and the contact numbers)**. You may may want to follow-up with each of these agencies yourself. Ask each agency (including and most importantly the NRC) for a copy of their report. Be sure to let them know if there is a risk to public safety or wildlife. Usually, if people are at risk, so are critters. Let them know if you suspect water supplies, air sheds and/or soils have been impacted (this will help determine which agencies are notified).

2) **Pay Attention and Document everything** - take photographs, noting times, dates and places. Take video if you can of the incident (you can rent cameras). Make a note of any witnesses present with you when you gathered your evidence, or who might have witnessed aspects of the event at different times. Remember, the situation can and probably will quickly change. Don't take for granted that a symptom observed today will be the same or even be there tomorrow. The importance of good documentation and record-keeping cannot be overstated. It's the basis of every good investigation, and in the end, it's all you may have to fall back on. Be careful not to muck up your evidence and take care to stay safe.

3) **Sample Collection** - Sometimes you have no choice but to take your own samples. You never know when those taken by a regulatory official or an oil and gas company representative might get "lost" or "damaged". Sometimes, it's a good idea to take one of your own just to have a backup in case you refute the official findings given to you.

IMPORTANT! Don't forget your safety and the safety of those around you. If you do not understand the complexity of the potential risk involved, call in a pro. For instance, I was filming the black seep from 2008 and only stood over the area for three minutes. My skin burned when I came into contact with the soil, and just from breathing the air around it (it smelled a little like rotten eggs - a sign of H2S) I was loopy for three hours. Don't jack around with something that can take you out. And H2S can take you out.

A scientist once told me how to collect a liquid sample: Use a clean glass jar, with a clean ziplock-type baggie under the lid to help seal it from leaking. Take care not to contaminate the sample. Protect your skin, eyes and other mucus membranes from exposure. Protect yourself from inhalation effects.

By the way, hydrocarbons, like methane, will volatilize quickly (get ripped apart by air molecules) out of water and soil, so lid your specimen quickly and (if you are sampling soils or if soils are mixed in with the water) indicate how far into the ground you captured your sample. For seeps that are bubbling up, a foot to 16" is probably good - unless you are dealing with a surface spill or contaminant flowing over the surface of soils.

Take a photograph of the collection taking place (before, during, after). Note the time (incl. time zone), date and place (a GPS reading is great if you have the equipment) of collection as well as what you have collected. Assign your sample an identifying number or name of some kind - as you may be taking more than one. Note any witnesses present. I like to write all this on a piece of paper and duplicate the basic stuff on a piece of tape attached to the jar - including a note as to where the paper will be.

He also said that when taking it into a lab (not all labs can perform the same tests), you can do so anonymously. That is, simply give the lab your sample (using the assigned indentifying name or number you've given it) and ask them to perform the analysis. If you think you are to well

recognized, have a surrogate deliver it for you. It's true what they say about the color of money. And frankly, it can be tough to find an objective lab in an area where they are making big bucks off the industry. You don't have to let them know you're a landowner. I suppose it's not by accident that the term "sink test" came about.

It is often a good idea when collecting liquid samples to reduce the amount of air (head space) between the substance and the lid. It is generally suitable to store the substance in a cool/dark environment away from temperature and light fluctuations.

Specimens of dead insects/invertebrates/amphibians, etc. can be stored in clean glass jars filled with distilled water and kept frozen for later analysis (necropsy). Again - take good notes and document the essentials.

4) **If possible, collect signed and dated statements from other witnesses to the event. People forget, whether or not intentionally.**

5) **When dealing with company representatives, government officials and others** who may, under certain circumstances "forget" what they told you earlier, **get everything in writing** - denials, admissions, promises, etc. Further, **Keep records of all vital communications.** Just make a folder (electronic or hard copy) and put everything in it. You are building a case, whether or not you realize it. You may or may not ever need to follow-up, but if you do, the last thing you want to do at such a time is try and find all the junk you've got scattered all over the place. Try to keep things organized by date so that, later, determining a chronologic order will be easier. Invest in a binder and a hole punch. The 2004 seep yielded three banker's boxes - all of which were easily (but tediously) photocopied and sent with our attorney lickity-split. By the way, it's a good idea to keep your most critical and damning evidence on file in more than one location. I don't mean to alarm you, but most folks deep in these kinds of battles eventually sense the need to stash a second set. If you don't have a scanner, you can shoot digital pictures of your documents in order to create a digital backup. Just make sure they are readable.

6) **Get your water tested** (preferably in ADVANCE of a blowout, so you have proof of previous water quality) - In a natural gas blow out there are all kinds of toxins that may be present in the affected water supply. Methane, ethane and propane are three things to look for. The largest component of natural gas is methane. However, ethane is also a large component. Often, companies or agencies will say "We tested for gas and all we found was biogenic methane." You say, "Yes... but did you test for natural gas - that is the hydrocarbon suite (C-1 through C-10) that includes propane and ethane?". Ethane and propane are not typical of shallow biogenic gas, which is why gas companies and agencies tend to avoid looking for them when they are trying to convince you that the methane in your well is biogenic. Also make sure to test for the BTEX (benzene, toluene, ethyl benzene and xylene). BTEX are the fast and dirty group of constituents that are initially looked for to help determine whether the gas is "naturally occurring" or "production" oriented. those two terms can be misleading, so more on that below.

Regardless of what company representatives or officials tell you: realize that methane (a gas) is the largest component of natural gas. It can be formed in the environment (and in our tummies) through bacterial action in the breakdown of organic matter in an oxygen rich environment (like occurs in swamps). This gas is considered "biogenic gas" It is also referred to as "swamp gas".

Methane can also be formed through thermal / bacterial action deep beneath the Earth's surface. This gas is known as "thermogenic gas". It can be referred to as "production gas", "formation gas", etc. This is the stuff gas companies drill for. It tends to be much deeper in the Earth between say 1,000 and 15,000 feet and exists between pores in sandstone, sometimes in coal veins or in shallow layers in between rock. Fracturing and high-pressure volatile drilling situations (kicks) can cause gas to travel upward through strata contaminating aquifers, lakes, streams and other fresh water sources. Sometimes production gas is sought in formations as shallow as 300-500 feet.

The Earth, being what it is, can sometimes allow oxygen and thermal dynamics to mix - particularly when thermogenic gas is brought up through strata into an oxygen rich environment (like in a wetlands or shallow fresh water aquifer area) Under these circumstances, the gases will mix, and the presence of oxygen, sunlight, etc. will cause a proliferation of bacteria to feed on the presence of methane and lighter hydrocarbons that accompany it. When the little microbes eat the formation gas, they poop out methane themselves. This can cause the thermogenic methane to begin to appear more like biogenic methane. However, this type of activity will leave a chemical signature behind, which is a little complicated - and can be misinterpreted even by experts. Generally speaking, the presence of carbon dioxide and a ratio of lighter hydrocarbons can signal this type of mixing and microbial action event. So don't let them BS you that it's "perfectly normal" when you know darned well it isn't.

Along with methane, there are other hydrocarbon-type gases too. And other constituents that can be dangerous. Unfortunately, no one has ever really dissected natural gas, so no one knows all of what is in it. There are hundreds, possibly thousands of components. Some constituents are known-mainly because they are involved in the production of commercial products like kerosene and gasoline, so fortunately you'll have some idea of what you may be being exposed to.

A hydrologist once advised me of what to look for in a water sample. Be aware, that water can accompany gas during production. That is, water can be brought up from deep down along with the gas. Different geologic formations will yield different types of signature substances. For example, in our area, the water that comes up with the gas is typically very salty, so a high concentration of sodium, chlorides, and total dissolved solids (TDS) can be a tip-off to where the gas came from should gas show up in a water supply. In other words, all of a sudden, some private water wells in our area began showing high salt concentrations - plus methane which authorities identified as "biogenic". Some bacteria also seem to accompany gas blow-outs, either because they are drawn in to feed or because they are brought up with the gas. The test used to look for bacteria is called a BART (Biological Activity Reaction Test) test. In other areas where methane has come up from deep underground, manganese and iron show up. Knowing this type of compositional information can be helpful in corroborating certain findings which can lead you to more definitive speculation, which can finally get you to a better conclusion. I mean, you have to know what to look for, right?

Once you have a reasonable suspicion based on the presence of other factors (not normally considered dangerous), you can take these in combination and push for further testing that could yield more accurate results. Sometimes you have to do things this way to motivate officials into action.

The hydrologist I spoke to recommended testing for at least the following "Drinking Water" tests (the lab will ask you if it's groundwater, drinking water, etc., so you'll want to specify.):

150.1 - pH, Electometric

160.1 Residue, Filterable ,Gravimetric, Dried at 180 degrees C (TDS or Total Dissolved Solids)

200.8 - Total Recoverable ICPMS Metals by 200.8 CWA

SM 2120B - Color, Colorimetric

SM 2340C - Total Hardness (Titrimetric Method)

300.0 Anions by Ion Chromatography (including fluoride and sulfate)

310.1 Alkalinity - Titrimetric, pH 4.5

376.2 - Sulfide (Colorimetric, Methylene Blue)

524.2 Purgeable Organic Compounds in Water by GC/MS (Gas chromatagrah / mass spectrometry)

525.2- Semivolitile Organic Compounds in Drinking Water by GC/MS

RSK 175 Dissolved Gases in Water

Also of value are tests for: Glycol (a presumed constituent of fracturing fluids) / Arsenic / Barium / Iron-Reducing Bacteria / Iron-Oxidizing Bacteria / Slime-Forming Bacteria (again, the bacteria tend to be grouped within the BART test). In Texas, radioactive materials were found around some gas sites, so this is a whole other area of concern, but unfortunately, I don't know that much about it. I'm in the early stages of research. If you find something, please let me know!

In one area of the country, where black plastic liners were used in a pit incident ground water was found to be contaminated with styrene and acrylonitril. This is believed to be relative to the liner breaking down in the presence of drilling chemicals and waste.

Always ask for the raw data sheets, including gas chromatograph / mass spectrometry sheets. These can get pitched, and this is where experts can vary in terms of their interpretations. Make sure 1) the lab you are dealing with is certified for the tests conducted on the substance tested and 2) that the data from the testing is admissible in court (not all labs are so certified).

Further analysis on methane (Stable carbon isotopic value of dissolved bicarbonate (inorganic carbon) of the water sample) can help fingerprint or identify the source of the gas. That is, it may be very possible to tie the gas in the water well to the gas in a natural gas well.

It's best to talk to an expert (such as a hydrologist) to find out what you need to test for relative to your particular situation. The above explanation just gives you a quick lay of the land and a head start on your conversation.

If natural gas is present in your water, it is likely that other constituents are also - things like other hydrocarbons C1-C10, and BTEX noted above. Not all substances will be regulated. And of those that are, you need to see what substances and at what federal/state levels are allowed to be present in your water supply. Your water quality agency should be able to help with that - you can likely find out who they are from the EPA National Response Center.

Because methane is considered non-toxic, there are no established safety thresholds for its presence in water. This is a favorite thing to cite among oil and gas companies and regulatory agencies, prompting some folks to assume that it's okay to go ahead and drink the water. But, even if methane were the only gas present (and it probably isn't), no one knows the health effects of ingesting and processing it through the liver, kidneys or bloodstream. What we do know is that methane is lighter than oxygen and in confined spaces can displace oxygen leading to asphyxiation. In the environment, methane saturation can suffocate roots or dehydrate them. And remember BTEX? It isn't just the methane you need to be concerned about.

So, some folks buy bottled water believing that it will be enough to guard against health effects. What they don't realize is that skin is the body's largest organ, and we absorb a great deal of environmental toxins through it. So, you obviously want to avoid showering or bathing in natural gas saturated water. Plus, you would be dealing with vapor inhalation of all the stuff in the gas stream.

Also, methane is explosive and in at least one case where it was brought into a home via plumbing, a hot water heater exploded. So, there could be an explosive hazard depending upon the concentration and length of time in closed storage.

Here's something else to think about that was revealed to me by a toxicologist a while back: If the water has been contaminated then there is a possibility that natural gas is also seeping up around and into your home and in the air. If this is the case, it could accumulate inside the home and even find points of entry through septic drains, other plumbing orifices and cracks in basements and foundations. If you suspect a blow-out has contaminated your water well, get after the health department to sample the air also.

When we had the big blow-out here in 2004 the Oil and Gas Conservation Commission exercised its authority over the health department and only put out (at our insistence) three canisters in the region and collected air samples over the course of a single, 24-hour period. The idea seemed to be to limit the amount of damning evidence. So, even though an acknowledged 115 million cubic feet of raw gas saturated the environment, and we and our neighbors experienced dizziness and so forth for a number of weeks, only this one sampling effort was done. But it did reveal pentane in the air. Pentane causes all kinds of interesting problems, like de-fatting of the skin.

Soil/gas tests can be conducted to determine if gas is coming up around the house. Hand-held methane detectors are also available, but we have found them to be pretty useless. Maybe newer models are better though. The gas company or your regulatory agency may provide them for you to use. Listen, if these people put your family and you in harms way, don't be shy about asking for whatever you can get to protect you and your family's health and welfare. If you do detect methane, it's likely that other gases are present also - like pentane.

Frac Fluid Implications

If a natural gas well blow-out has occurred, there is the possibility that "frac" (hydraulic fracturing) fluids and other drilling fluids are also present in the water supply. Unfortunately, companies typically refuse and are protected from disclosing the chemicals used in frac fluids, but they often contain the following types of constituents: Benzene, diesel fuel; CO2 (carbon dioxide gas - which can liberate arsenic from rock and bring it right on into water supplies when it percolates up);

surfactants (soaps), solvents, polymers (plastics), foaming agents, anti-scaling agents, corrosion inhibitors and environmentally toxic biocides, as well as patented synthetics - of which there are hundreds and none of which companies have to disclose under special exemptions - plus a lot of threats and whining by industry lawyers. I hate to tell you if you don't already know this, but Frac fluids have been exempted from the Safe Drinking Water Act - thanks to Cheny/Bush and their 2005 Energy Act (the whistleblower that tried to tell the EPA that their study on the safety of these fluids was flawed is now in Africa). Unfortunately, many of these fluids contain very toxic components, and in some cases, as with benzene, only small amounts can contaminate an entire aquifer. For more info on fracing check out this website's primer at www.journeyoftheforsaken.com/fracpage.htm. It is possible that glycol is a common additive to fracturing fluids, so you may want to include this substance in your sampling. Even if you don't have access to the list for fracturing chemicals, certain state or federal agencies might (Dpt. of health, Oil and Gas regulatory body, OSHA). So, perhaps you can push for disclosure if you find glycol in your water.

Fundamental to protecting your legal rights is sound data. Every lawyer, judge and jury wants to see the proof. Get your sampling done, check to see if it exceeds limits deemed safe by regulatory agencies. If you are fortunate enough to have sampling conducted by state or federal agencies, demand to see the results. If you are denied, submit a Freedom of Information Act form. It won't look good in court for these people if they deny you access to this kind of information.

I have found it useful to make the struggle public. That will be a decision you'll have to make by weighing perceived risks and benefits, but it's been my experience that a silent struggle is buried and forgotten. Going public may not help much, but it might - at least in securing information you have a right to.

A note on soils testing. In our case, in the ongoing 2008 seep situation, the soils where the black gunk was seeping were sampled by the COGCC. This seems like a good thing right? Of course, except that they didn't sample for BTEX or napthalenes. In other states this is common practice. So make sure if samples are taken they are at least tested for DRO (diesel range organics); GRO (gasoline range organics); BTEX, methane and napthalenes. Ask that both the wet (liquid component of wet soil) and dry matrix (soil) is tested.

7) **Help officials help you**. There is no guarantee you will be able to inspire them to any greater or more thorough action, because sometimes, there is no political will to do so, but sometimes the "experts" don't even know what you know, so make an effort to educate them by asking if they are aware of fill in the blank and then provide them with information you have that might help shed some light on the situation and your needs.

8) **Broadcast!** I began a website when EnCan rode their rig back into town knowing we were going to have problems. And it has been an invaluable tool to help officials respond quickly and concertedly to seep issues (well, in theory.... if we had officials wiling to be responsive). The presence of the website, however, noted on every letter I've sent out, has made it difficult for officials to deny knowing about the full situation. It's all here on the web. And they can even access it from the comfort of their offices hundreds of miles away. It's been helpful in discussing the issue with experts and it's also been helpful for media. Overall, it has been a very useful communications tool. You can easily and pretty affordably (considering the benefit) set up your own website at Earthlink or Homestead (both have their own built-in, easy-to-use software). Seriously, an hour fussing around and you'll have it.

9) **Consider developing a neighborhood coalition.** Be wary of divide and conquer tactics favored by industry. Share when and what you can, but don't reveal anything you don't want the world to know about. Coalitions have a way of quickly disintegrating under pressure.

10) **Talking to the media.** Lots of folks want to lay low in these kinds of situations. That's a natural human tendency the oil and gas folk count on and can use against you to keep the situation buried. Local media - influenced by big money in the community may be reluctant to cover your side of the story. This is another reason to create your own website and post what you know. Remember, always be truthful and as conservative as possible. If you can't control your emotions, get a spokesperson to speak for you.

Signs in the Environment

Vegetation

Remember how I said methane will kill vegetation? Here is some info on it. Keep an eye out for sudden defoliation of trees and shrubs and areas of dead grass, particularly multiple species in one area. Some of the vegetation may appear blackened. The patches of dead grass will appear rounded and may be large or small, and even elongated. This is because the gas is entering the environment through fractured areas underground and can therefore appear in crazy patterns all over the place - or maybe only in one place. If you suspect methane coming up through the ground, soil/gas analysis can be conducted through the installation of soil/gas monitors (small canisters) planted in the ground at suspect locations.

The following article will hopefully help shed some light on this issue that oil and gas companies and regulatory agencies tend to want to ignore. In fact, officials will probably tell you that beetles or fungus have attacked, without considering other evidence of a seep in the area. The fact is, that bugs and fungus will attack - but a sudden attack in a seep situation occurs after the vegetation has been weakened and is vulnerable. That's when the fungus and insects move it.

Ask your investigating officials to demonstrate the primary cause of decline (not just the obvious secondary causes). More than likely it will be dehydration or suffocation - just think what it could do inside the human bloodstream. Who knows.

> **The Effect of Natural Gas on Trees and Other Vegetation**
> Journal of Arboriculture 3(8): August 1977 153
> by Spencer H. Davis, Jr.
>
> "When manufactured gas was used in homes and industry, a leak in the gas main could result in sudden death to nearby vegetation. The death of plants was acknowledged by all to be the result of toxic components such as cyanogen which formed hydrocyanic acid when mixed with water and carbon monoxide. It was simple to determine if manufactured gas was present in soil atmosphere by placing a potted tomato plant in a hole in the "suspect" area. If manufactured gas was present, another of its components — ethylene — resulted in severe epinasty of the tomato leaves within 24 hours.

With the swing to use of natural gas the question arose whether a gas leak in soil could injure plants. It was known that natural gas in itself was apparently non-toxic to plants. However, the death of trees and other vegetation in the vicinity of a gas leak in soil was still quite common.

Natural gas was known to be dryer than manufactured gas, and the gas companies were soon faced with an increased number of gas leaks as natural gas dried out the packing at the joints of underground pipes, and the leaks resulted.

Despite the dead vegetation in the vicinity of natural gas, there were those who claimed that non-toxic gas could not possibly be responsible for death of vegetation. However there were those who would refute this. A speaker at the 1958 annual meetings of the New Jersey Federation of Shade Tree Commissions was Mr. Milton W. Heath, Jr., of the Heath Survey Consultants, Wellesley, Massachusetts. The Heath Company operated a service of detecting gas leaks in soil, serving over 650 utility companies in 47 states. Two excerpts from the presentation by Mr. Heath are as follows:

"Let me state beforehand that our Company has been locating gas leaks by the effects of gas on vegetation for over 25 years, and the transition from manufactured gas to natural gas has not impaired the ability of our consultants to accomplish this whatsoever. In fact, the overall effects are more striking with natural gas in many instances than they were with manufactured gas, one reason being the increased pressures natural gas is distributed under, which results in greater volume loss."

"Some will contend that there is no effect on vegetation from natural gas but again, as I mentioned previously, our experience proves otherwise and, in fact, our business functions as a result of this fact that vegetation IS affected by this gas."

For a number of years some utility companies refused to accept claims against them for trees allegedly killed by gas leaks when natural gas was involved. However, one of these companies, even though originally claiming "no fault" did pay the City of New York for "Trees apparently killed by natural gas." (New York World Telegram, July 13, 1961; and Da/7y News, July 14, 1961.)

Tests conducted by Braverman, Ettinger and Jacobs, and reported in the technical section of Gas Age, April 26, 1962, described the results of their determination of air quality in soil where natural gas was associated with dead trees. They reported higher percentage of methane, up to 10% carbon dioxide, and less than 5% oxygen in soil near recently killed trees. By contrast, they observed a lack of methane, 3 to 4% carbon dioxide, and 20% oxygen in the root area of healthy trees. Their final comment was — "The results obtained in this set of experiments are fairly consistent. In the absence of any counter evidence it appears that trees are damaged and killed by methane and the concomitant lack of oxygen."

For years scientists, as well as the industrialists who recognized that vegetation would die in the vicinity of natural gas leaks, did not know the chain of events leading up to the plant death. It was conjectured that the natural gas under pressure replaced the oxygen in the soil which was so necessary for root survival and also that its extreme dryness caused roots to die from dehydration.

It was not until 1972 that the scientific answer to the question of gas damage was established and reported in a paper in Soil Science, Volume 113, pages 46-54. In that paper "Changes in Composition in Soil Air Near Leaks in Natural Gas Mains" by J. Hoeks, the reason was presented.

The paper begins "During the last four or five years because of its disastrous influence on plantations in towns and villages, leakage of natural gas from underground mains has become a real problem in the Netherlands and also in other Western European Countries." The paper then goes on to describe the experiments: Natural gas containing approximately 82% methane, 14% nitrogen, 1 % carbon dioxide and minor quantities of- other hydrocarbons, was released in the "normal soils." The normal soil had an oxygen content of approximately 18%, and 3% carbon dioxide.

After a period of gas release (varying number of weeks, pressures and temperatures), the oxygen concentration became extremely low, almost zero percent, and the carbon dioxide rose to up to 15%. The extremely low oxygen concentration is regarded as the most important cause of death of the trees.

The low oxygen content may be caused in part by the displacement of the soil air by the leaking gas, but much more so by intensive oxygen consumption as a result of methane oxidation. Methane consuming bacteria multiply in methane contaminated soil using up the oxygen and giving off carbon dioxide.

The microbiologic investigation proved that the oxidation of methane is brought about by methane consuming bacteria and the oxygen is depleted during the process. In a normal soil in which there is no natural gas, there are few or no methane consuming bacteria. Therefore, just after the start of a gas leak the rate of oxidation of the methane is slow. However, after a period of time the methane utilizing bacteria increase and in turn the concentration of oxygen in the soil will decrease.

As stated by Heath in 1958, and accepted by many observers during the interim when natural gas has pretty much displaced manufactured gas, trees and other vegetation did die in the vicinity of gas leaks in soil even though the scientific reasons were not known.

The results described by Hoeks in his recent paper now give us the scientific answers to the question, "Why do plants die as a result of leaks of natural gas in soil?"

Department of Plant Pathology
Cook College-Rutgers University
New Brunswick, N.J.

Water

When methane saturates an environment, particularly in wetland areas, there will be tell tale signs.

Look for:

Biofilm (looks like a multi-colored oil slick, but if you drag a stick through it, it will break apart)

Iron-reducing bacteria (orange slimy-looking gunk).

Other signs to look for are:

Coal fines, or oil

Bubbles - vigorous or intermittent in water sources like streams or ponds, where bubbling hasn't been noticed before. These are probably methane bubbles, and they will ignite. One neighbor demonstrated the gas from small bubbles in water by cutting the bottom out of a plastic milk jug, inverting it over the bubbles, capping the top and letting the gas build a little, then he lit the gas when he took the cap off (of course, he also burned the hell out of his thumb when the plastic melted). My Dad built a metal cone, covered in in duct tape, held his thumb over the opening and did the same thing. While some folks want to get down and light the bubbles on fire when they see them to see if the gas is combustible (and admittedly, officials and media do seem to respond to this), be wary of a couple of things: 1) there could be a greater saturation of methane in the air than the balance of air itself - particularly in an enclosed area. So not only could you potentially blow yourself up, but you could suffocate going down into such an area. 2) you might also inadvertently start a fire if not careful of surrounding dry grasses, etc. There may be other dangers, I just can't think of them. This message is mainly for guys, bless their hearts.. Women tend to just pick up the phone.

Water expressing to the surface and running and/or pooling where water has not been noticed before. The water may have a high sodium or total dissolved solids content if it is drilling brine. Or it may possess other signature qualities like metals content etc. associated with deep production water.

Wildlife

Look around the area for dead wildlife also. Frogs and other amphibians are particularly sensitive to environmental toxins. You may come across dead birds (or an absence of birds), butterflies or other small mammals. Take care to look after your pets. You should notify your state health department, state EPA and/or state wildlife office if you find any of these in a suspect area. I found a little partially paralyzed frog in an area of our creek where the gas was found (you can see the video in the 2008 seep pages - link below). We also found dead birds, dead crawdads and a dead rabbit. No necropsies have yet to be performed, however - or I'd share that with you. I rehabilitated the frog - which was an extraordinary experience. Most of our other wildlife just disappeared, which yielded an abundance of acorns and wild berries in the forest that fall.

From the Field

To see photos and details of all of this stuff, visit Divide Creek Seep 2008. **There, you'll find page after page of real-field examples and hints on collecting data. You can just print the whole darned thing off and throw it in a binder. You can also find video links on the sitemap!** Timeline **is another good place to look for photos.**

If you want to see how other's situations have played out in hearings before regulatory agency's you should check out the hearing documents. There are four different situations you can learn from that are linked within this site - all relative to water wells trashed by drilling and methane gas. These kinds of public information documents are invaluable for providing insight into process, clues on what to look for, investigative protocol, witness testimony and more. Know that in any such document, you will only hear the filtered, official story. In our case - evidence was ignored (The very spot where the 2004 seep was first discovered and reported by a Oil and Gas Commission official was simply ignored throughout the investigation and never even sampled). But this site gives you rest of the story, so you can judge for yourself.

View All 3 Hearing Documents (listed immediately below relative to the 2004 Divide Creek seep):

Schwartz Well / Divide Creek Seep 2004 / Resulting Moratorium - COGCC Order: 1V-276

Bill Barrett Seeks to Drill Within Moratorium - CGCCC Order 191-12

COGCC Lifts the Moratorium - COGCC Order #9 191 23

During the time of the Divide Creek Seep - other seeps erupted from the Arbaney pad, leading to EnCana's purchase of this property. You don't hear much about this one but a neighbor's water well was thoroughly trashed because of it.

View the hearing document: COGCC Order 1V-297

To read the story of Laura Amos and her family (which occurred just a couple miles away from us here at Divide Creek, but within the moratorium area) click here on the Earthwork's website. http://www.earthworksaction.org/cvLauraAmos.cfm. This story was written before she was asked to hush-up in a settlement with EnCana.

View the hearing document: COGCC Order 1V-298

Newspaper accounts of other's issues are available at the Consortium of the Frac'd feature on this site.

Additional Resources

The following is an outstanding reference for researching the effects of toxic chemicals.
State of New Jersey Department of Health and Senior Services
http://web.doh.state.nj.us/rtkhsfs/indexfs.aspx
For example: Benzene
http://nj.gov/health/eoh/rtkweb/documents/fs/0197.pdf

For more resources, please visit the Hydraulic Fracturing Primer

The Sootypaws folks recommended this publication: **"Simple techniques for assessing impacts of oil and gas operations on Federal Lands"** by Jim Otton of the US Geological Survey
http://pubs.usgs.gov/of/2000/ofr-00-499/OF00-499.pdf

Ohio Environmental Council - Guide to a Citizen Suit
http://www.theoec.org/PDFs/water/cwater_pollaw_suit.pdf

Environmental / Health / Financial / Legal / Resources: There may be local non-profit groups in your area with funding aligned with their mission to advocate for citizen or environmental need. It's worth checking around. In most states such businesses are registered with the secretary of state's office or the office of the attorney general. You can also contact a large national organization, since many of them have affiliates or partnerships that can perhaps get you going in the right direction.

By May, 2009 I will have published my **guide on corporate negotiations.** Despite resolute corporate denials and overwhelming regulatory bias, we settled with EnCana back in 2004 and I can show you how we did it, sitting at the table ourselves without a lawyer or a coalition of neighbors or state/federal laws on our side. Excerpts from the body of work have been published in corporate journals and executive training manuals internationally and used by the USAF in international negotiations. The big dogs are certainly using the information in it. All the more reason for you to get your copy first. I wrote it for regular folks as a tool for equalization. If you want me to send you a notice of release, please let me know through this e-mail: projectforsaken@earthlink.net Thanks.