

PUBLIC COMMENTS

THE ENVIRONMENTAL LAW CLINIC
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February 15, 2012

Highlands Water Protection and Planning Council (via fax)
100 North Road
Chester, New Jersey 07930

Re: Tennessee Gas Northeast Upgrade Project

Dear Highlands Water Protection and Planning Council:

On behalf of the New Jersey Highlands Coalition, the New Jersey Chapter of the Sierra Club, and the Delaware Riverkeeper Network (hereinafter “commenters”), we respectfully submit the following comments regarding the Highlands Applicability Determination for Loop 325 of Tennessee Gas Pipeline’s (“TGP”) proposed Northeast Upgrade Project. TGP is attempting to circumvent the stringent development standards set forth in the Highlands Water Protection and Planning Act (“Highlands Act”) and its implementing regulations by characterizing the Northeast Upgrade Project as “routine maintenance and operations, rehabilitation, preservation, reconstruction, repair or upgrade of [a] public utility line[]” that qualifies for Exemption 11 of the Highlands Act. *See* N.J.S.A. 13:20-28(a)(11). The Project—which will add 7.6 miles of new natural gas pipeline to the Preservation Area of the Highlands Region and disturb approximately 109 acres of environmentally sensitive lands—can in no way be fairly or accurately described as “routine maintenance” or “upgrade” that falls within the scope of Exemption 11. For the reasons stated below, we urge the Highlands Water Protection and Planning Council (“the Highlands Council”) to follow the intent and the letter of the Highlands Act and deny TGP’s deficient application.

The New Jersey Highlands Region is part of a 3.5 million acre, multi-state Highlands system that has been recognized by the federal government for its exceptional “water, forest, agricultural, wildlife, recreational, and cultural resources.” Highlands Conservation Act, Pub. L. No. 108-421, § 102. Within the State of New Jersey, the Highlands Region spans approximately 1,250 square miles and crosses through 7 counties and 88 municipalities. N.J.S.A. 13:20-2. It contains “the greatest diversity of natural resources of any region of the State, with the U.S. Forest Service classifying 70% of its lands as environmentally sensitive.” Highlands Task Force, Action Plan 3 (2004). The Region’s pristine waters provide drinking water to half of the State’s population, and its lush forests and scenic lands preserve open space, replenish clean air, support diverse habitats for plant and wildlife species, and contain numerous important historic and cultural sites. *See id.* *See also* N.J.S.A. 13:20-2. Recognizing the “vital link” between the New Jersey Highlands Region and “the future of the State’s drinking water supplies and other key natural resources,” the New Jersey State Legislature passed the Highlands Act in 2004 to protect

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and preserve the Region “intact, in trust, forever for the pleasure, enjoyment, and use of future generations.” See N.J.S.A. 13:20-2.

For the second time in two years TGP is asking the Highlands Council to exempt a project that will result in the construction of miles of new natural gas pipeline through this unique region from the requirements of the Highlands Act under Exemption 11 of the Act, which covers “routine maintenance and operations, rehabilitation, preservation, reconstruction, repair or upgrade of [a] public utility line[.]” See N.J.S.A. 13:20-28(a)(11). The history and language of the Highlands Act demonstrate that the clear intent of the New Jersey State Legislature in passing the Highlands Act was to prevent such unplanned and piecemeal development. Between 1984 and 2003, over 100 square miles of the Highlands Region were lost to development. See Exec. Order No. 70, 35 N.J.R. 4810(b) (Sept. 19, 2003). The Highlands Task Force, created by Governor James E. McGreevey in 2003 to “make recommendations intended to preserve the natural resources of and enhance the quality of life in the Highlands region,” found that the Region was “increasingly at risk of being devoured by sprawl.” See *id.*; Highlands Task Force, *supra*, at 4. It reported that 17,000 acres of forest and 8,000 acres of farmland were lost in the Region between 1995 and 2000. Highlands Task Force, *supra*, at 4. The Task Force recommended immediate action to combat the unchecked development that threatened the Region, which ultimately resulted in the passage of the Highlands Act in 2004. The Act declared that the protection of the Highlands Region is “an issue of State level importance” and that a primary goal of the Act was “to discourage piecemeal, scattered, and inappropriate development” in the Highlands Region. N.J.S.A. 13:20-2.

Exempting natural gas pipeline segments from the requirements of the Highlands Act under Exemption 11 undermines the goals and purposes of the Highlands Act and encourages the same type of fragmented, unplanned, and destructive development that threatened the future of the Highlands Region before the passage of the Highlands Act. When completed, the 300 Line Project, approved by the Highlands Council in 2010, will have disturbed approximately 230 acres of land in the Highlands Region. If approved, the construction of the Northeast Upgrade Project will disturb an additional 109 acres of land in the same area. Cumulatively, the projects will add over 23 miles of natural gas pipeline to the Region, resulting in permanent and irreversible impacts to its land and resources. While both projects are located appurtenant to an existing TGP pipeline, mischaracterizing major developments such as these as “routine maintenance” or “upgrade” of a public utility line that qualifies for an exemption from the Highlands Act promotes irresponsible development that will ensure the steady destruction of the resources of the Highlands Region. By narrowly limiting Exemption 11 to “*routine maintenance . . . or upgrade,*” the New Jersey State Legislature evinced a clear intention not to exempt major new developments such as the 300 Line and the Northeast Upgrade Project from the requirements of the Highlands Act and its implementing regulations. See N.J.S.A. 13:20-28(a)(11) (emphasis added). The Highlands Council must not ignore this clear intent.

Beyond the applicability of Exemption 11, however, the commenters also have significant concerns about the thoroughness with which TGP’s application has been reviewed. The Highlands Staff Consistency Determination readily acknowledges that the Northeast Upgrade Project is inconsistent with numerous goals, policies, and objectives of the Regional Master Plan. See Highlands Council, Highlands RMP Consistency Determination (Revised) 29

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(Jan. 17, 2012). Nevertheless, the Staff recommends that TGP be granted an exemption for the Northeast Upgrade Project, largely because it has developed a Comprehensive Mitigation Plan (CMP) that “use[s] the approach of avoid, minimize, and mitigate.” *Id.* The Highlands Council cannot approve the Project hoping to receive mitigation; any approval must be based on the record and must be in accordance with the Highlands Act and its implementing regulations. Both the CMP and the Consistency Determination clearly indicate that essential information about the Northeast Upgrade Project and its impacts has not been collected or submitted to the Highlands Council, including, but not limited to, the identification of suitable parcels of land to mitigate permanent forest impacts, *id.* at 8, information about the location of steep slopes, *id.* at 12, field surveys for endangered and threatened flora and fauna, *id.* at 14, and calculations of groundwater recharge volumes, *id.* at 20. The fact that this information and more has not been submitted to or evaluated by the Highlands Staff raises significant concerns about the basis for the Staff’s conclusion that the Northeast Upgrade Project will not have a significant impact on the Highlands Region.

Moreover, the CMP relied upon by the Highlands Staff for its Consistency Determination relies heavily on the use of best management practices (BMPs), environmental inspectors, and environmental monitoring to support its assertion that the Northeast Upgrade Project is consistent with the goals and purposes of the Highlands Act and will not significantly impact the Highlands Region. However, TGP has demonstrated time and again with the 300 Line Project that its mitigation and monitoring plans are inadequate. The most recent monthly status report submitted by TGP to FERC reveals that, during the construction of the 300 Line, there have been 15 instances (the report refers to them as “problem areas”) where TGP failed to install erosion controls or use BMPs adequately to protect resources, 43 occasions (“problem areas”) where silt-laden water overwhelmed erosion controls and entered water resources, and 9 failures (“problem areas”) where TGP did not properly install or maintain erosion controls or BMPs resulting in impacts to natural resources.¹ Other reports indicate that TGP has accumulated at least 45 violations of the Clean Streams Law during construction of the 300 Line in Pennsylvania, resulting in part from failures to properly implement and maintain BMPs.² The Highlands Council cannot simply take TGP’s word that it will adequately mitigate the impacts of the Northeast Upgrade Project on the Highlands Region. Given TGP’s troubling record and the value of the resources at stake, it is imperative that all of the information about the Project be thoroughly assessed before the Highlands Council makes a final decision regarding TGP’s application.

Finally, to the extent the Highlands Council is concerned that it will lose the mitigation promised by TGP if it does not approve TGP’s application at its meeting tomorrow, that concern is misplaced. The Council will certainly be in just as strong a position to negotiate mitigation, if necessary, if it were to defer a decision on this matter until it receives complete information about the Project. Moreover, because the Highlands Preservation Area Approval process imposes higher burdens on applicants than the Highlands Applicability Determination, the

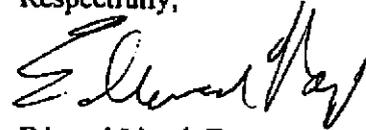
¹ TGP 300 Line Project, Docket No. CP09-444-000, Monthly Status Report: December 18, 2011 through January 15, 2012 (submitted Jan. 18, 2012).

² Beth Brelje, “Pike Conservation Official Fed Up With Gas Company’s Violations,” *Pocono Record* (Dec. 20, 2011), available at <http://www.poconorecord.com/apps/pbcs.dll/article?AID=/20110920/NEWS/109200330/-1/rss01>.

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mitigation required for the Project would be substantially greater if TGP were held to the full requirements of the Highlands Act. The New Jersey Department of Environmental Protection (DEP) is an intervenor in TGP's proceeding before the Federal Energy Regulatory Commission and has raised serious concerns about the Project; neither DEP nor the Council should act to approve the Project until these concerns have been addressed.

Respectfully,



Edward Lloyd, Esq.
Susan Kraham, Esq.
Briana Dema, Legal Intern
Counsel for Commenters

cc: Chris Ross (via email)

>>> ross kushner <pqguy@optonline.net> 8/16/2011 4:20 PM >>>
Armand,

I received a call last week about the Tennessee Gas Pipeline in the area of Clinton Road/West Milford. It was flooding Lake Lookover and Bearfort Waters with sediment. I checked the site and the silt barriers they had in place were barely adequate. With a major storm they would be overwhelmed.

I spoke with Mike Lennon (603-325-5869) at El Paso. He assured me they would take care of it. They didn't!

With the recent heavy rains the lakes are being flooded with sediment. I ask that the DEP investigate, enforce appropriate actions, and develop a mitigation plan to remove the sediment when the project is completed.

Let me know.

Thanks!

Ross Kushner, Executive Director
Pequannock River Coalition
P.O. Box 392
Newfoundland, NJ 07435
www.pequannockriver.org
(973)492-3212

-----Original Message-----

From: Armand Perez [<mailto:Armand.Perez@dep.state.nj.us>]
Sent: Tuesday, August 16, 2011 4:56 PM
To: pqguy@optonline.net
Cc: Janet Budesa-Carroll; mayorbieri@hotmail.com
Subject: Re: Lake Lookover

Ross:

We're aware of the sediment control measure failure. Water Enf has been to the site, issued a NOV under the Water Pollution Control Act and have reported that the control measures have already been repaired. Additionally, we've been in contact with the Soil Conservation District and they're inspecting the site regularly and well satisfied with the Pipeline's soil and sediment control measures. It appears that an new phase of the project has been opened and the loose soil coupled with the heavy rain is causing some problems. There are also problems in Vernon.

We'll continue to monitor the situation.

Armand

>>> ross kushner <pqguy@optonline.net> 8/16/2011 5:06 PM >>>
Armand,

I was told that they only erected an additional turbidity screen. They already have a series of these in place and they are clearly not sufficient. Originally there was talk of a coffer dam. What happened to that? I know we had heavy rain but that's exactly why these measures are built. If they don't work under those conditions, what's the point?

Also, what is the plan to remove the sediment that is now accumulating in the lakes. It's not going to remove itself, right?

I appreciate the fast response!

Thanks!

Ross Kushner, Executive Director
Pequannock River Coalition
P.O. Box 392
Newfoundland, NJ 07435
www.pequannockriver.org
(973)492-3212

-----Original Message-----

From: Armand Perez [<mailto:Armand.Perez@dep.state.nj.us>]
Sent: Wednesday, August 17, 2011 12:09 PM
To: pqguy@optonline.net
Cc: Janet Budesa-Carroll; mayorbieri@hotmail.com
Subject: RE: Lake Lookover

Ross:

As you know, I don't approve permits but my understanding is that the bottom of the lake is rocky, boulders and irregular enough that pipeline people were not going to be able to effectively coffer and de-water the lake. There were also some problems with the depth of the water and safety issues associated with operators being that far below the water level. I'm betting that lowering the lake elevation to allow for de-watering was going to be a problem with recreation.

I think there are were also some time constraint issues from FERC that they could most easily satisfy with wet placement. As far as the sediment control measures go, I'm hearing from the District that the project is in compliance with the their approval, but that the high volume of water overwhelmed the floating barrier.

If any adjustments to the approvals are made, you may have to speak with the District and Land Use.

As far as remediation goes, unless a sediment control failure resulted in an

unauthorized filling of a regulated area, like a land slide, we don't require a remedial action. The suspended solids in this event will settle out to an amount that not practical to have removed.

-Armand

>>> ross kushner <pqguy@optonline.net> 8/18/2011 7:12 AM >>>
Armand,

Again, I appreciate the response. I'm betting cost and effort had more to do with not using a coffer dam than the bottom configuration.

We will wait to see how much sediment was deposited after the project is complete before we decide what to do. I hope you are right and it is minimal.

Which district office is running this? If it is Glen Van Olden, forget it. I won't waste my time with him.

Thanks,

Ross Kushner, Executive Director
Pequannock River Coalition
P.O. Box 392
Newfoundland, NJ 07435
www.pequannockriver.org
(973)492-3212

-----Original Message-----

From: Armand Perez [<mailto:Armand.Perez@dep.state.nj.us>]
Sent: Thursday, August 18, 2011 8:37 AM
To: pqguy@optonline.net
Cc: Janet Budesa-Carroll; mayorbieri@hotmail.com
Subject: RE: Lake Lookover

Glen's office is monitoring the project where it passes through Passaic.

-Ap

>>> ross kushner <pqguy@optonline.net> 8/27/2011 2:32 PM >>>
I had a chance to inspect the Lake Lookover site prior to the hurricane today. The sediment barrier is totally ineffective. Sediment has flooded the entire lake. I can't imagine the impact that the coming heavy rains will have. Why is

the DEP doing nothing here? This project should be stopped and the site fully stabilized. Work should only continue when ADEQUATE measures are put in place.

Ross Kushner, Executive Director
Pequannock River Coalition
P.O. Box 392
Newfoundland, NJ 07435
www.pequannockriver.org
(973)492-3212

-----Original Message-----

From: Armand Perez [<mailto:Armand.Perez@dep.state.nj.us>]
Sent: Monday, August 29, 2011 10:45 AM
To: pqguy@optonline.net
Cc: Janet Budesa-Carroll; Larry Baier; Marcedius Jameson; Scott Brubaker;
mayorbieri@hotmail.com
Subject: RE: Lake Lookover

Ross:

I'm not sure which portion of the sediment control system you were observing, but if you have a specific location of a breach please let me know. From our perspective, the silt curtains in the lake appear to be working nicely. Here is what we've done in preparation for the storm with regard to the land-based control measures;

DEP's permit writers, Water and Land Use Enforcement staff, and the pipeline staff targeted several hot spots along the line in Passaic and Sussex Counties to be inspected. Sussex was inspected on Thursday and Sussex was inspected on Friday by DEP Enforcement, Soil Conservation District, and pipeline inspectors. Water Enf provided an inspector with specific soil and sediment control experience. The control measures were observed to be compliant with the plan, however recommendations to bolster control measures, and add redundant measures including additional silt fence, hay bales, rip-rap, and water diversion bars were implemented by the pipeline. Everyone involved was working toward the shared goal of minimizing impacts to surface water.

My understanding is that the pipe was supposed to be completed in the lake section by Saturday. In my opinion, the sooner they can finish and permanently stabilize the more critical areas and move on to the more upland portions of the project the better. The longer the project lasts, the more likely we are to experience bad weather while still under construction.

As far as shutting down the project goes, my staff has not discovered a violation or an issue of negligence that would typically lead us to suspend their permit. However, I'll forward your request to my superiors for their consideration.

Armand

If the lake is entirely chocolate (as it was on Saturday), how can DEP say the silt control measures are effective? What yardstick are you using? I don't care if the plan is followed or not. It isn't "working nicely". In fact, it does not seem to be working at all.

I am advising the lake association to sue both TG and the state for damages.

Ross Kushner, Executive Director
Pequannock River Coalition
P.O. Box 392
Newfoundland, NJ 07435
www.pequannockriver.org
(973)492-3212



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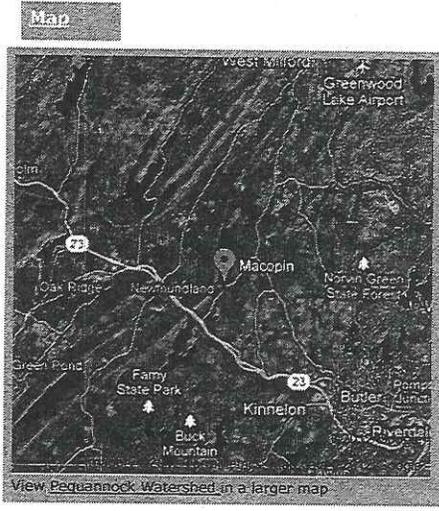
Search

SHARE

Pequannock Watershed

Park Overview: The clear lakes, streams and ponds, the mountains with their dramatic rock outcroppings, the forests all combine to make it one of the most scenic areas in New Jersey. FEE and PERMIT REQUIRED

Trail Uses: Hiking
Dogs:
Trail Miles: 24.1 miles
Park Acreage: 15000 acres
City/County/State: West Milford/Passaic/NJ
Buy Trail Map: [North Jersey Trails Map](#)



Comments submitted at Highlands Council Meeting on February 16, 2012 by Diane Wexler
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Diane
Wexler
Vernon

Park Description: The City of Newark's Pequannock Watershed property adjoins the southern boundary of Wawayanda State park. The area encompasses 15,000 acres and includes five major reservoirs totaling almost 2,000 acres. The clear lakes, streams and ponds, the mountains with their dramatic rock outcroppings, the forests, and the varied vegetation of the watershed all combine to make it one of the most scenic areas in New Jersey.

Trails Overview: In addition to the [Jersey Highlands Trail Map](#), the [North Jersey Trails Map](#) covers the northern portion of the watershed. Nine trails range from 0.7 to 4.6 miles. The Bearfort Waters/Clinton Trail [4.6 miles; yellow] is a major north-south trail that connects the main section of Wawayanda State Park with the Pequannock Watershed [see "Comment" posted below on June 23, 2010 for update]. It runs parallel to and west of Clinton Road. The Echo Lake East Trail [2.1 miles; white] off Echo Lake Road follows a relatively level route along the east shore of Echo Lake. Several trails lead to a fire tower northeast of Clinton Reservoir.

Advisory: Hiking is by permit only [see [schedule](#)]. For more information about obtaining a hiking permit, contact Newark Watershed Conservation and Development Corporation [NWDCD] by mail at P.O. Box 319, Newfoundland, NJ 07435; or in person at either their Newfoundland office (223 Echo Lake Road, West Milford, NJ 07480; 973-697-2850; Monday-Friday 8-4) or Newark office (40 Clinton St., 4th Floor, Newark, NJ 07102; 973-622-4521; Monday-Friday 9-5).

- Directions:**
- The primary access to trails is from Clinton Road, which extends north from NJ 23 near Newfoundland. The watershed has assigned numbers to the trailhead parking areas, from P1 to P8 [not all of which are on Clinton Road]. Area P1 is located at the intersection of Clinton Road and Van Orden Road, 1.7 miles north of NJ 23. [Google Maps: "Clinton Road and Van Orden Road, Newfoundland, NJ"]
 - NJ Transit Bus #194 & 195, which run along NJ 23.

Contact Information: [Newark Watershed Conservation and Development Corporation](#)
 973-697-2850
Region: Bearfort Ridge and Wawayanda
Fees: Yes, click on 'Contact Information' for further information

Comments

Bearfort Waters/Clinton & Highlands Trail

On June 23rd, 2010 Phil McLevin says:

On June 5th, 2010 Estelle says:

The reroute of the BW/C and Highlands Trail has been completed. All the HT blazing is done, some of the BW/C yellow blazes will be completed shortly. The HT crosses Clinton Rd, Pequannock Watershed at P4 and now continues straight up the hill. It turns left and co-aligns along the newly created Bearfort Waters/Clinton (yellow) trail. Since it's new, take care to follow the blazes. There is no longer a loop hike possible since the trail across the beaver dam is closed. The beavers have made this crossing nearly impossible! It's possible to hike from P4 to parking area P9 using a car shuttle. This is a beautiful hike along ridges, with, at one point, a view of Buckabear Pond and Clinton Reservoir. After the beaver dam, the rest of the hike is along the reservoir. Check the Highlands Trail webpages for further detail.

Happy hiking!

[Click](#) for further discussion, especially about Timber Rattlesnakes in the area.

This is a remote area with

On April 25th, 2010 Cindyvart says:

This is a remote area with very limited police presence and long delays in response, to problems. A car was vandalized 3/28 with a wallet and cell phone taken.

Clinton Road

On March 23rd, 2010 Estelle says:

The bridge has been replaced and Clinton Road is open. This repair was completed before Winter.

Vandalism Alert

On March 25th, 2009 Estelle says:

A caution to take all your valuables with you, and lock your car when parking along Clinton Road and in any of the designated parking areas. This is a remote area with very limited police presence and long delays in response to problems. A car was vandalized 3/28 with a wallet and cell phone taken.

The Highlands Trail

On March 25th, 2009 Brenda Holmger says:

Visit [The Highlands Trail](#) website for complete, accurate and up-to-date information about New Jersey's Millenium Trail, including trail descriptions, current trail conditions and maps.

Click [here](#) to go directly to information about the Highlands Trail in Pequannock Watershed.

Notice of some Trail Closings

On April 7th, 2009 Bob says:

Just a reminder to hikers that due to Beaver Activity, the Clinton West and Buckabear Trails where they cross the Dam between Clinton Reservoir and Buckabear Pond are sometimes immersed in water. Please use caution. And due to this same raising of the water level and the steep slopes, the portion of the Bearfort Waters Trail West of Buckabear Pond is impassable, unmaintained and we suggest making alternate plans before attempting a thru-hike. We expect to have a reroute of this section completed by Summer of 2009. The remaining sections of these trails are still open.

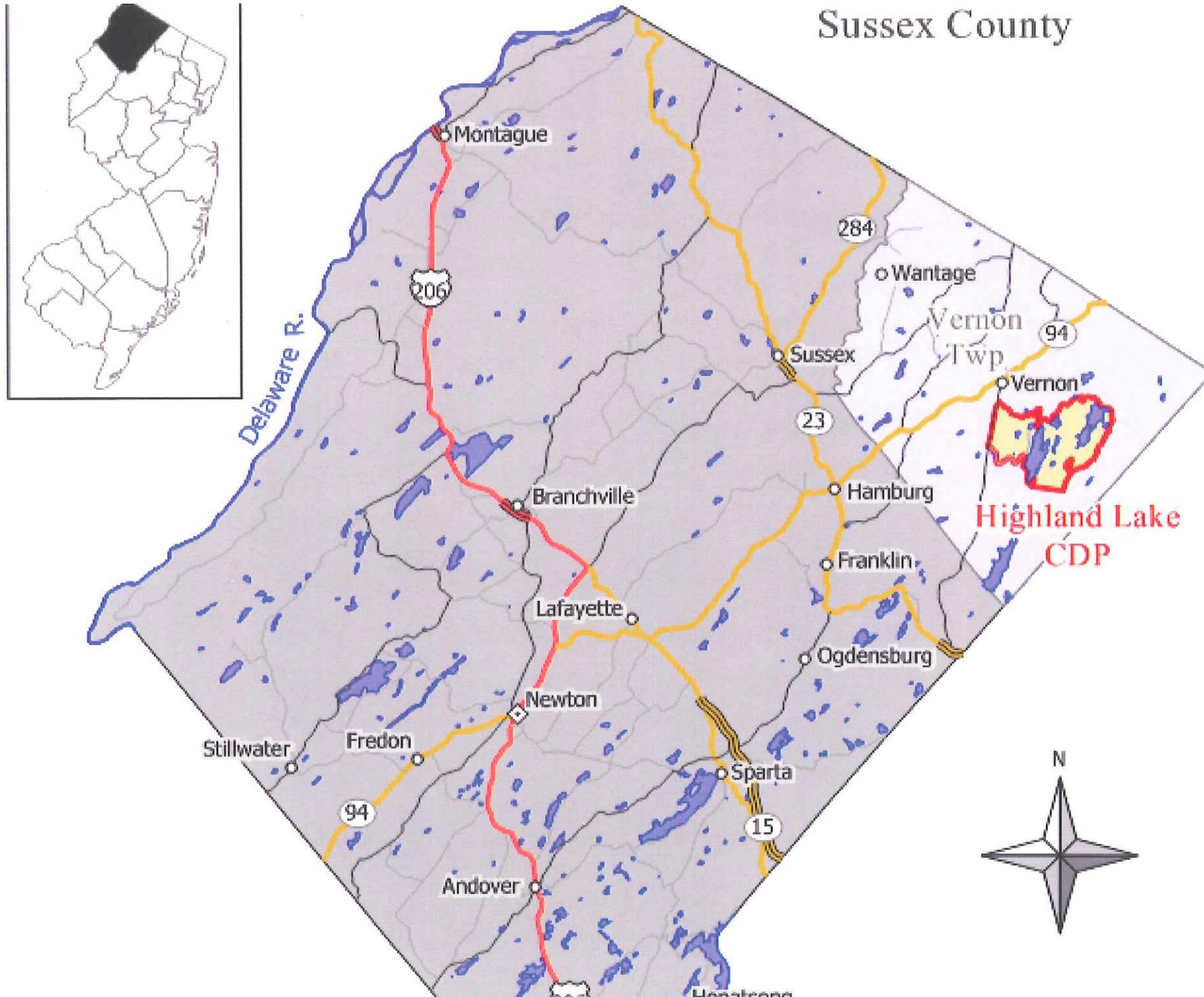
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Sussex County

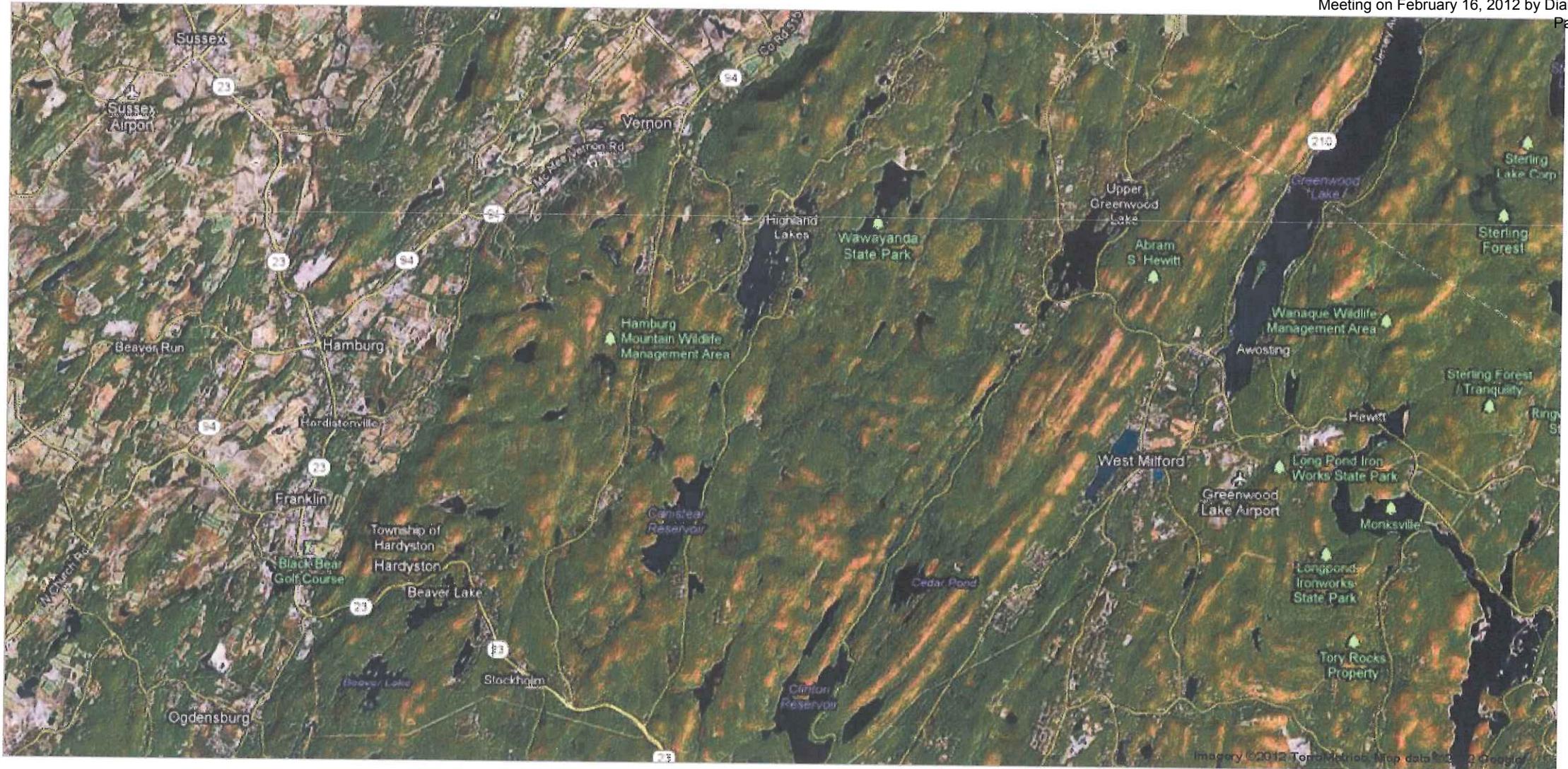
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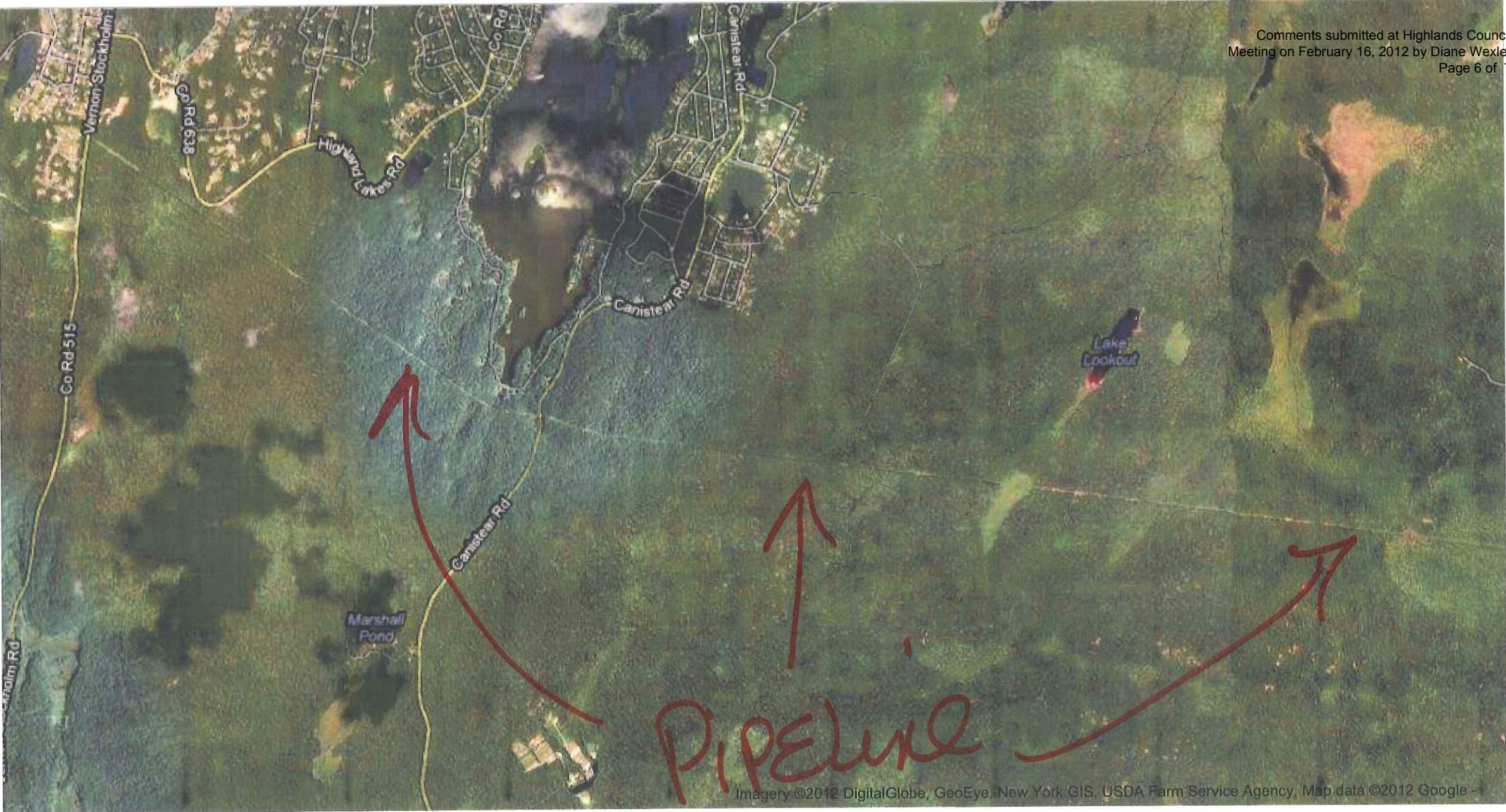
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1 Feb 11, 2009

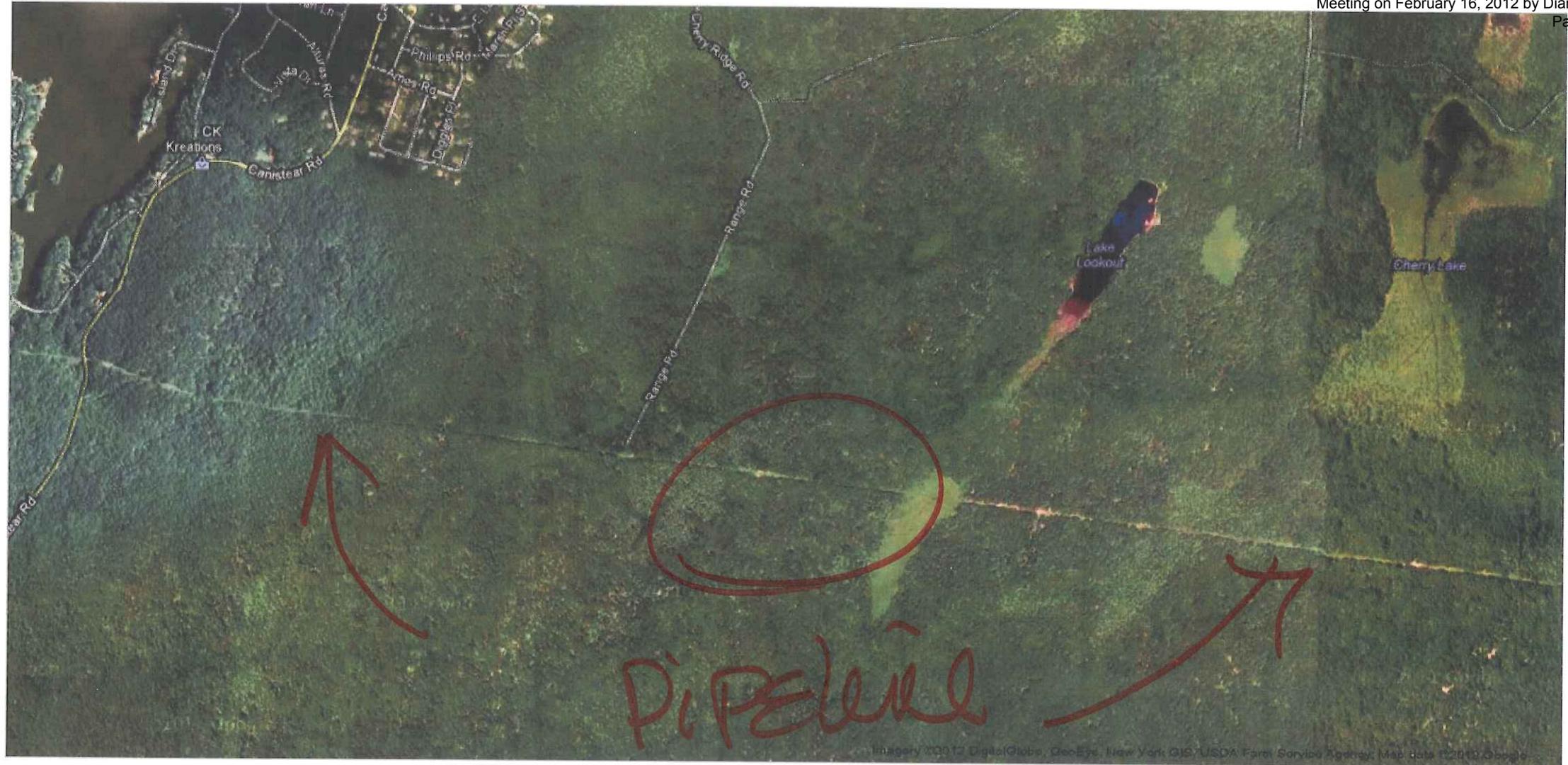
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To see all the details that are visible on the screen, use the "Print" link next to the map.

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1 Feb 11, 2009























From: The Undersigned
Number of pages including cover: 2
Regarding: Highlands Council Decision on Approval of Tennessee Gas Pipeline

To: Highlands Council
Fax Number: highlands@highlands.state.nj.us
Date: February 15, 2012

Dear Council Members: Rilee, Schrier, Alstede, Carluccio, Dougherty, Dressler, Francis, Holtaway, James, Mengucci, Richko, Sebetich, Visioli and Walton,

We, the undersigned, members of many North Jersey Township Environmental Commissions, acting in our own individual capacities, ask that the Highlands Council reject the Tennessee Gas Pipeline's (TGP) request for an exemption from the Highlands Act.

Simply put, we feel that by asking the Highlands Council to "clear the way" for this project, TGP is looking to "fast track" the project before any Federal or State approvals have been granted. They are also moving forward without any independent alternative route analysis that would avoid having the pipeline cut through our public parkland in the Ramapo Reservation. For those of us who live in Bergen and Passaic Counties, we know the project would not only temporarily disrupt our enjoyment of the park, but would permanently destroy large tracts of remaining wilderness in Bergen County. We only need to look as far as West Milford to see the destructive impacts of this pipeline, where mature forests have been clear cut and Lake Look Over has been turned seriously damaged. The impacts to West Milford were so devastating that last month their town council voted unanimously to pass a resolution requesting no further action from TN Gas Pipeline in NJ until all impacts from their previous work have been restored.

The current application is also moving forward without an environmental impact statement, which is necessary to understand all the potential impacts to our sensitive ecological resources in the NJ Highlands region. One concern of particular importance is that the current pipeline route ~~cut directly under~~ the Monksville Reservoir,

close to

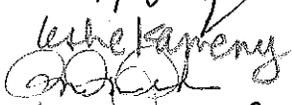
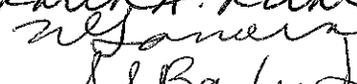
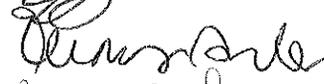
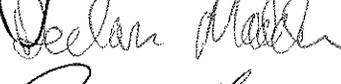
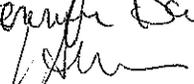
Ridgewood
Ridgefield
Wyckoff
Aven Rock
Fair Lawn
Midland Park
Franklin Lakes
Hawthorne
River Edge
Upper Saddle River
Woodcliff Lake
Teaneck

Company

which is part of a reservoir system that supplies clean drinking water for millions of NJ families. Why would you rush local approval of this project when the drinking water for millions of NJ residents at stake? Why aren't we all calling for an Environmental Impact Statement considering the fact that the USEPA and NJDEP have both raised significant concerns about the environmental review process that has taken place so far?

Given the above concerns, and the fact that we don't have answers for many of these questions and concerns, we need you, the Council members who are charged with protecting the Highlands region, to reject this project, at this time.

Sincerely,

Name	Signature	Town
Harriet Shugerman		Wyckoff
Leslie Kamorny		Glen Rock
Andy Purshon		GLEN ROCK
KAREN A. RIEDE		Ridgefield
Naomi Gamorra		Glen Rock
Susan Barbuto		Franklin Lakes
Eco-Ed Schwartz		Ridgewood
Eleanor Gruber		Ridgewood
Nancy Cochrane		Teaneck
Mimi Duffey		Midland Park
Bronwen Sutherland		Ridgewood
Nancy A. Biggs		Ridgewood
Chris Rutishauser		Ridgewood
Timothy Cronin		Ridgewood
DECLAN MADDEN		Ridgewood/Hawthorne
Paul SHARAR		Glen Rock, NJ
Lie Stewart		Ridgewood
Jennifer Dougherty		River Edge
Lesley Elam		Glen Rock

Kimi Wei	Ubrock U	Fair Lawn
Elaine Silverstein	U	Glen Rock
Adam Jacobs Mast	Woodcliff Lake	Woodcliff Lk
Clay Bosch	Ubrock	
Barbara Sena	Burnside	Upper Saddle River, NJ
Smadar Beckingus	Upper Saddle River	
Annie Friedman	U.S.R. ST.C.	Upper Saddle River
Joe O'Rourke	USR STC	USR
	Hardwood Tree Sys Corp	
Adam Greenbaum	USR STC	USR

ALERTS:

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER Second Total Trihalomethanes (TTHM) MCL Violation at Passaic Valley Water Commission-High Crest Public Water System High Crest Lake Community, West Milford, NJ

Posted December 23, 2011

Passaic Valley Water Commission-High Crest (PVWC-High Crest) Public Water System recently violated a drinking water standard. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we are doing to correct this situation.

The PVWC-High Crest Public Water System is supplied potable water that is purchased from the Butler Water Department. The Butler Water Department operates a surface water treatment plant that produces potable water from the Kakeout Reservoir.

We routinely monitor for the presence of drinking water contaminants. Testing results from January 2011 – December 2011 show that our system exceeds the standard, or maximum contaminant level (MCL), for TTHM for the 4th quarter of 2011. The standard for TTHM is 80 µg/L (one µg/L is approximately one part per billion) and is based on a running annual average which is determined by averaging all samples collected by our system for the last 12 months. The level of TTHM averaged at our system for January 2011 – December 2011 was 89 µg/L. You were notified in our October 27, 2011 mailing that the TTHM MCL was also exceeded for the 3rd quarter of 2011.

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water.

What does this mean?

- This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.
- TTHM are four volatile organic chemicals which form when chlorine reacts with natural organic matter in the water.
- Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

What is being done?

We are working with a professional engineering firm to assist us in evaluating methods to reduce the TTHM within the High Crest Public Water System.

- We have completed a review of the treatment process used at the Butler Water Treatment Plant and have implemented a series of laboratory scale tests designed to evaluate alternative methods of treatment that will aid in the reduction of TTHM.
- We have completed a preliminary review of alternative TTHM removal processes that may be considered for application within the High Crest system.
- We are working to identify and implement measures to reduce the water age which will also aid in the reduction of TTHM, and as a result, we have installed one continuous flush line within the High Crest system.

For more information, please contact our Customer Service Department at 973-340-4300 or customerservice@pvwc.com.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by PVWC-High Crest – Public Water System ID No. NJ1615003

Date distributed: December 27, 2011

**IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER
Total Trihalomethanes (TTHM) MCL Violation at
Passaic Valley Water Commission-High Crest Public Water System
High Crest Lake Community, West Milford, NJ**

Posted: October 25, 2011

Passaic Valley Water Commission-High Crest (PVWC-High Crest) Public Water System recently violated a drinking water standard. Although this incident was not an emergency, as our customers, you have a right to know what happened and what we are doing to correct this situation.

We routinely monitor for the presence of drinking water contaminants. Testing results from October 2010 – September 2011 show that our system exceeds the standard, or maximum contaminant level (MCL), for TTHM. The standard for TTHM is 80 ug/L and is based on a running annual average which is determined

by averaging all samples collected by our system for the last 12 months. The level of TTHM averaged at our system for October 2010 – September 2011 was 81 ug/L.

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. If a situation arises where the water is no longer safe to drink, you will be notified within 24 hours.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water.

What does this mean?

This is not an emergency. If it had been an emergency, you would have been notified within 24 hours.

TTHM are four volatile organic chemicals which form when disinfectants react with natural organic matter in the water.

Some people who drink water containing trihalomethanes in excess of the MCL over many years may experience problems with their liver, kidneys, or central nervous system, and may have an increased risk of getting cancer.

What is being done?

We are working with a professional engineering firm to assist us in evaluating methods to reduce the TTHM within the distribution system. These methods include a review of the water treatment process and disinfection practices to determine if the process can be further optimized for TTHM reduction. Other potential methods that will be evaluated include options for the physical removal of the TTHM. We will be establishing an implementation schedule for the necessary improvements to resolve this issue as quickly as possible.

For more information, please contact our Customer Service Department at 973-340-4300 or customerservice@pvwc.com.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example,

people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by PVWC-High Crest – Public Water System ID No. NJ1615003

Date distributed: November 3, 2011

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

Posted: January 3, 2011

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

Passaic Valley Water Commission found elevated levels of lead in drinking water in some homes/buildings in our community. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger. **Please read the following notice closely to see what you can do to reduce lead in your drinking water and to learn what Passaic Valley Water Commission is doing to address this problem.**

Call us at 973-340-4300 for more information. January 2011.

IMPORTANT INFORMATION ABOUT LEAD IN YOUR DRINKING WATER

Passaic Valley Water Commission found elevated levels of lead in drinking water in some homes/buildings. Lead can cause serious health problems, especially for pregnant women and children 6 years and younger. Please read this notice closely to see what you can do to reduce lead in your drinking water.

This notice is brought to you by Passaic Valley Water Commission, Public Water System ID # NJ1605002. January 2011.

HEALTH EFFECTS OF LEAD

Lead can cause serious health problems if too much enters your body from drinking water or other sources. It can cause damage to the brain and kidneys, and can interfere with the production of red blood cells that carry oxygen to all parts of your body. **The greatest risk of lead exposure is to infants, young children, and pregnant women.** Scientists have linked the effects of lead on the brain with lowered IQ in children. **Adults with kidney problems and high blood pressure can be affected by low levels of lead more than healthy adults.** Lead is stored in the bones and it can be released later in life. During pregnancy, the child receives lead from the mother's bones, which may affect brain development.

SOURCES OF LEAD

Lead is a common metal found in the environment. Drinking water is one possible source of lead exposure. The main sources of lead exposure are lead-based paint and lead-contaminated dust or soil, and some plumbing materials. In addition, lead can be found in certain types of pottery, pewter, brass fixtures, food, and cosmetics. Other sources include exposure in the work place and exposure from certain hobbies (lead can be carried on clothing or shoes).

New brass faucets, fittings, and valves, including those advertised as “lead-free,” may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8 percent lead to be labeled as “lead free”. However, plumbing fixtures labeled National Sanitation Foundation (NSF) certified may only have up to 2 percent lead. Consumers should be aware of these options when choosing fixtures and take appropriate precautions.

Lead has not been detected in Passaic Valley Water Commission’s finished water sources. When water is in contact with pipes [or service lines] or plumbing that contains lead for several hours or more, the lead may enter drinking water. This means the first water drawn from the tap in the morning, or later in the afternoon after returning from work or school, can contain fairly high levels of lead. Homes built before 1986 are more likely to have plumbing containing lead. New homes may also have lead; even “lead-free” plumbing may contain some lead.

EPA estimates that 10 to 20 percent of a person’s potential exposure to lead may come from drinking water. Infants who consume mostly formula mixed with lead-containing water can receive 40 to 60 percent of their exposure to lead from drinking water.

Don’t forget about other sources of lead such as lead paint, lead dust, and lead in soil. Wash your children’s hands and toys often as they can come into contact with dirt and dust containing lead.

STEPS YOU CAN TAKE TO REDUCE YOUR EXPOSURE TO LEAD IN YOUR WATER

- 1. *Run your water to flush out lead.*** Run water for 15-30 seconds or until it becomes cold or reaches a steady temperature before using it for drinking or cooking, if it hasn’t been used for several hours. This flushes lead-containing water from the pipes. Flushing usually uses less than one or two gallons of water and costs less than 30 cents per month.
- 2. *Use cold water for cooking and preparing baby formula.*** Do not cook with or drink water from the hot water tap; lead dissolves more easily into hot water. Do not use water from the hot water tap to make baby formula.
- 3. *Do not boil water to remove lead.*** Boiling water will not reduce lead.
- 4. *Look for alternative sources or treatment of water.*** You may want to consider purchasing bottled water or a water filter. Read the package to be sure the filter is approved to reduce lead or contact NSF International at 800-NSF-8010 or www.nsf.org for information on performance standards for water filters. Be sure to maintain and replace a filter device in accordance with the manufacturer’s instructions to protect water quality.

5. **Test your water for lead.** Call PVWC at 973-340-4300 to find out how to get your water tested for lead and for a list of local laboratories that have been certified by EPA for testing water quality. The following is a list of some State approved laboratories in your area that you can call to have your water tested for lead.

● Passaic Valley Water Commission
1525 Main Avenue, Clifton NJ 07011
973-340-4300

● All-Test Laboratories, Div of QC Laboratories
196 Paterson Avenue, East Rutherford, NJ 07073
201-288-6511

6. **Get your child tested.** Contact your local health department or healthcare provider to find out how you can get your child tested for lead if you are concerned about exposure.

7. **Identify if your plumbing fixtures contain lead.** New brass faucets, fittings, and valves, including those advertised as “lead-free,” may contribute lead to drinking water. The law currently allows end-use brass fixtures, such as faucets, with up to 8% lead to be labeled as “lead-free.” Visit the National Sanitation Foundation (NSF) Web site at www.nsf.org to learn more about lead-containing plumbing fixtures.

WHAT HAPPENED? WHAT IS BEING DONE?

Tap water monitoring results from our most recent monitoring study, which took place during September and October of 2010, revealed elevated lead levels in some homes/buildings in Paterson, Clifton, Passaic, and Prospect Park.

We are continuing our efforts to correct the problem such as:

- Monitoring the system twice per year through voluntary public involvement in accordance with EPA/NJDEP requirements.
- Replacing lead service lines, where 193 lead service lines were replaced in 2010.
- Constructing new chemical feed control systems in the distribution system that will improve water stability.
- Designing a new water quality stabilization system for the Wanaque supply, which is blended with finished water produced at PVWC’s main treatment facility.
- Continuing the reservoir improvement project to address finished water storage to allow the application of the recommended corrosion control treatment. The feasibility study phase of the project was completed in 2010. We are now working on the next phase of the project which is anticipated to be complete in 2011.

Find out if your home plumbing has lead. A licensed plumber can check to see if your home’s plumbing contains lead solder, lead pipes, or pipe fittings that contain lead. The public water system that delivers water to your home should also maintain records of the materials located in the distribution system.

Find out whether your service line is made of lead. Determine whether or not the service line that connects your home or apartment to the water main is made of lead. The best way to determine if your service line is made of lead is by either hiring a licensed plumber to inspect the line or by contacting the plumbing contractor who installed the line. You can identify the plumbing contractor by checking the city’s record of building permits which should be maintained in the files at your local building department.

If the service line that connects your dwelling to the water main contributes more than 15 ppb to drinking water, after our comprehensive treatment program is in place, we are required to replace the portion of the line we own. If the line is only partially owned by Passaic Valley Water Commission, PVWC is required to provide the owner of the privately-owned portion of the line with information on how to replace the privately-owned portion of the service line, and offer to replace that portion of the line at the owner's expense.

If we replace only the portion of the line that we own, we also are required to notify you in advance and provide you with information on the steps you can take to minimize exposure to any temporary increase in lead levels that may result from the partial replacement; to take a follow-up sample at our expense from the line within 72 hours after the partial replacement; and to mail or otherwise provide you with the results of that sample within three business days of receiving the results. Acceptable replacement alternatives include copper, steel, iron, and plastic pipes.

FOR MORE INFORMATION

For more information, call us at 973-340-4300, or visit our website at www.pvwc.com. For more information on reducing lead exposure around your home/building and the health effects of lead, visit EPA's website at www.epa.gov/lead or contact your health care provider.

Your family doctor or pediatrician can perform a blood test for lead and provide you with information about the health effects of lead.

Your local building/code department can provide you with information about building permit records that should contain the names of plumbing contractors that plumbed your home. Please call the following numbers:

Residents of Clifton:

Clifton Building Department at 973-470-5809

Residents of Passaic:

Passaic Code Enforcement at 973-365-5549

Residents of Paterson & Prospect Park:

Paterson Building Department at 973-321-1232

This report contains information about your drinking water. If you do not understand it, please have someone translate it for you.

Este informe contiene información muy importante sobre su agua beber. Tradúzcalo o hable con alguien que lo entienda bien.

ਇਸ ਅਹੁਦਾਗ ਮੇਂ ਤਮਾਰੀ ਪੇਲਾਬਾ ਪਾਣੀ ਬਿਖੇ
ਬਿਅਰਾਮ ਨੀ ਸਮਝਲੀ ਬਾਬਦਾ ਮੇਂ ਬਾਠੀ ਏ.
ਅੱਖੋਂ ਅਠੁਦਾਗ ਕਰੋ ਬਿਅਰਾਮ ਕੋਰੇ ਸਮਝਲੀ ਪਾਣੀ
ਬਿਖੇ ਕੋਰੇ ਸਮਝ ਲੈਣਾ ਚਾਹੁੰਦੇ ਫੇਰੇ

العلومات في هذا التقرير تحتوي على
معلومات مهمة عن مياه الشرب التي
تتربها. من فضلك اذا لم تفهم هذه
العلومات، اطلب من يترجمها لك.

For additional copies of this pamphlet please contact Passaic Valley Water Commission at 973-340-4300.

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Natural Gas Operations from a Public Health Perspective

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Running head: Natural Gas Operations from a Public Health Perspective

Natural Gas Operations from a Public Health Perspective

ABSTRACT

In the 1990s, the U.S. rush to become energy self-sufficient led to rapid expansion in acreage and intensity of natural gas operations across the western U.S. Modern technology to recover natural gas depends on undisclosed amounts of toxic chemicals and the release of combustion materials and other gases that may pose immediate and long term hazards to human health, water and air. We compiled a list of products and chemicals used in natural gas operations, searched the literature for their health effects, and categorized them according to standard toxicological categories. From this we created a profile of possible health effects based on the number of chemicals associated with each category. We demonstrated that toxic chemicals are used during both the fracturing and drilling phases of gas operations, that there may be long term health effects that are not immediately recognized, and that waste evaporation pits may contain numerous chemicals on the Superfund list. Our findings show the difficulty of developing a water quality monitoring program. To protect public health we recommend full disclosure of the contents of all products, extensive air and water monitoring, a comprehensive human health study, and regulation of hydraulic fracturing under the Safe Drinking Water Act.

Key words: drilling, health, hydraulic fracturing, natural gas, ozone, pollution

INTRODUCTION

Over the past two decades, in an effort to reduce dependence upon imported fossil fuels, the U.S. government has supported increased exploration and production of natural gas. The responsibility for overseeing the nation's underground minerals lies with the U.S. Department of Interior, Bureau of Land Management (BLM) with some oversight from the U.S. Environmental Protection Agency (EPA). Attempting to meet the government's need for energy self-sufficiency, the BLM has auctioned off thousands of mineral leases and issued permits to drill across vast acreages in the Rocky Mountain West. Since 2003, natural gas operations have increased substantially, with annual permits in Colorado alone increasing from 2,249 to 8,027 in 2008 (Colorado Oil and Gas Conservation Commission 2010).

In tandem with federal support for increased leasing, legislative efforts have granted exclusions and exemptions for oil and gas exploration and production from a number of federal environmental statutes, including the Clean Water Act, the Clean Air Act, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA, better known as the Superfund Act), the Resource Conservation and Recovery Act (RCRA), the Toxic Release Inventory under the Emergency Planning and Community Right-to-Know Act (EPCRA), and the National Environmental Policy Act (NEPA) (Oil and Gas Accountability Project 2007). The most recent of these efforts was an amendment included in the 2005 Energy Policy Act that prevented the use of the Safe Drinking Water Act to regulate certain activities, known as hydraulic fracturing, which are involved in 90% of natural gas drilling.

The cumulative effect of these exemptions and exclusions has been to create a federal void in environmental authority over natural gas operations, leaving the responsibility primarily up to the states. Although some states have oil and gas commissions to watch over natural gas production activity, the primary mission of these agencies has been to facilitate natural gas extraction and increase revenues for the states. In addition, when states issue permits to drill, they have not traditionally required an accounting of how the liquid and solid waste would be handled. In short, their focus has not typically been on health and the environment.

The Need for Chemicals

In keeping with the rush to produce more natural gas, technological advances have permitted the industry to drill deeper and expand wider, tapping into gas reserves with greater facility and profitability. While these advances have allowed the mining of vast, newly discovered gas deposits, the new technology depends heavily on the use of undisclosed types and amounts of toxic chemicals.

Chemicals are used throughout operations to reach and release natural gas. First, combinations of chemicals are added to the “muds” used to drill the bore hole. Chemicals are added to increase the density and weight of the fluids to facilitate boring, to reduce friction, to facilitate the return of drilling detritus to the surface, to shorten drilling time, and to reduce accidents. After drilling, hydraulic fracturing (also known as fracking, frac’ing or stimulation) is done to break up the zone in which the gas is trapped and make it easier for the methane to escape, increasing well productivity. In the West, approximately a million or more gallons of fluid containing toxic chemicals are injected underground during this operational stage. As with drilling, chemicals are used in fracking fluids for many purposes (Table 1). One well can be fracked 10 or more times and there can be up to 30 wells on one pad. An estimated 50% to 90% of the fracking fluid is returned to the surface during well completion and subsequent production (B.C. Oil and Gas Commission 2001), bringing with it toxic gasses, liquids, and solid material that are naturally present in underground oil and gas deposits. Under some circumstances, none of the injected fluid is recovered.

In most regions of the country, raw natural gas comes out of the well along with water, various liquid hydrocarbons including benzene, toluene, ethylbenzene, and xylene (as a group, called BTEX), hydrogen sulfide (H₂S), and numerous other organic compounds that have to be removed from the gas. When the gas leaves the well it is passed through units called heater treaters that are filled with triethylene glycol and/or ethylene glycol that absorbs the water from the gas. Once the glycol solution becomes saturated with water, the heaters turn on and raise the temperature enough to boil off the water, which is vented through a closed system and upon cooling, ends up in a nearby tank labeled “produced water”. The glycol fluid, which has a higher boiling point than water, cools and is reused. During the heating process at critical temperatures the oily substances that came up with the gas become volatile and then re-condense into a separate holding tank. This is known as “condensate” water. The contaminated water can be re-injected underground on the well pad or off site, common practices in the eastern U.S., or hauled off the well pad to waste evaporation pits in the West. Temporary pits are also constructed during drilling to hold the cuttings, used drilling mud which is often re-used, and any other contaminated water that comes to the surface while drilling. These reserve pits on well pads are supposed to be drained and covered with top soil or other suitable material within a month after drilling stops.

An Unexpected Side Effect: Air Pollution

In addition to the land and water contamination issues, at each stage of production and delivery tons of toxic volatile compounds (VOCs), including BTEX, other hydrocarbons, and

fugitive natural gas (methane), can escape and mix with nitrogen oxides (NO_x) from the exhaust of diesel-fueled, mobile, and stationary equipment, to produce ground-level ozone (CH2MHILL 2007; Colorado Department of Public Health and Environment [CDPHE] 2007; URS 2008; U.S. Congress, Office of Technology Assessment 1989). One highly reactive molecule of ground level ozone can burn the deep alveolar tissue in the lungs, causing it to age prematurely. Chronic exposure can lead to asthma, chronic obstructive pulmonary diseases (COPD), and is particularly damaging to children, active young adults who spend time outdoors, and the aged (Islam et al. 2007; Tager et al. 2005; Triche et al. 2006). Ozone combined with particulate matter less than 2.5 microns produces smog (haze) which has been demonstrated to be harmful to humans as measured by emergency room admissions during periods of elevation (Peng et al 2009). Gas field ozone has created a previously unrecognized air pollution problem in rural areas, similar to that found in large urban areas, and can spread up to 200 miles beyond the immediate region where gas is being produced (U.S. Congress, Office of Technology Assessment 1989; Roberts 2008). Ozone not only causes irreversible damage to the lungs, it is similarly damaging to conifers, aspen, forage, alfalfa, and other crops commonly grown in the western U.S. (Booker, et al. 2009; Reich 1987; U.S. Congress, Office of Technology Assessment 1989). Adding to this air pollution is the dust created by fleets of diesel trucks working around the clock hauling the constantly accumulating condensate and produced water to large waste facility evaporation pits on unpaved roads. Trucks are also used to haul the millions of gallons of water from the source to the well pad.

PROJECT DESIGN

The following project grew from a 2004 request by OGAP (Oil and Gas Accountability Project) to TEDX (The Endocrine Disruption Exchange) to explore the potential health effects of chemicals used during drilling, fracking, processing, and delivery of natural gas. OGAP, a project of Earthworks, is a national non-profit organization established in 1999 to watchdog the oil and natural gas industry. TEDX is a non-profit organization dedicated to compiling and disseminating technical information on chemicals that affect health and the environment.

Data Sources

In order to find out what chemicals were being used to extract natural gas, we took advantage of the information on the Material Safety Data Sheets (MSDSs) that accompany each product used during natural gas operations. MSDSs detailing specific products in use were provided by multiple

sources including the BLM, U.S. Forest Service, state departments, and the natural gas industry. MSDSs are designed to inform those who handle, ship, and use products that contain dangerous chemicals. They provide information about the physical and chemical characteristics of the chemicals in a product, and the immediate and chronic health effects, in order to prevent injury while working with the products. They are also designed to inform emergency response crews in case of accidents or spills. In addition to the MSDSs, we also used State Tier II Reports that must be filed by storage facilities under EPCRA. This relatively new Act sets a minimum amount above which a product that contains a hazardous substance in a storage facility has to be reported. We also supplemented our analysis with product information from disclosures in Environmental Impact Statements, Environmental Assessment Statements, and accident and spill reports. At first we looked only at what was taking place in Colorado and over the course of several years we acquired information from Wyoming, New Mexico, Texas, Washington, Montana, Pennsylvania, and New York. The list of products and chemicals quickly grew, making it apparent that hundreds of different products serving many purposes were being used in natural gas operations across the country. The number of chemical products manufacturers has also grown, making this a highly competitive industry.

It should be clear that our list of products is not complete, but represents only products and chemicals that we were able to identify, through a variety of sources, as being used by industry during natural gas operations. For most products, we cannot definitively say whether they were used during drilling or during fracking. However, an accidental blow-out of the Crosby well in Wyoming provided a unique opportunity to analyze the chemicals used during drilling, as fracking had not yet begun on that well. When the blow-out occurred, methane and other gases, petroleum condensates, and drilling fluids (muds) were released from fissures in the ground adjacent to the well. During the 58 hours the eruption took place, 25,000 square feet of soil surface in the area were contaminated. The driller released copies of the MSDSs for the products used during the blow-out and later we found the names of several more products from remedial action work plans to clean up the site (Terracon 2007).

On another occasion we were provided data from a 2007 New Mexico study, sponsored by 19 oil and gas companies and conducted by a third party consultant and analytical laboratory. This gave us the opportunity to explore the health effects of chemicals in samples of pit solids drawn from six evaporation pits where gas operations were ceasing.

Data limitations

MSDSs and Tier II reports are fraught with gaps in information about the formulation of the products. The U.S. Occupational Safety and Health Administration (OSHA) provides only general guidelines for the format and content of MSDSs. The manufacturers of the products are left to determine what information is revealed on their MSDSs. The forms are not submitted to OSHA for review unless they are part of an inspection under the Hazard Communication Standard (U.S. Department of Labor 1998). Some MSDSs report little to no information about the chemical composition of a product. Those MSDSs that do may only report a fraction of the total composition, sometimes less than 0.1%. Some MSDSs provide only a general description of the content, such as “plasticizer”, “polymer”, while others describe the ingredients as “proprietary” or just a chemical class. Under the present regulatory system all of the above “identifiers” are permissible. Consequently, it is not surprising that a study by the U.S. General Accounting Office (1991) revealed that MSDSs could easily be inaccurate and incomplete.

Tier II reports can be similarly uninformative, as reporting requirements vary from state to state, county to county, and company to company. Some Tier II forms include only a functional category name (e.g. “weight materials” or “biocides”) with no product name. The percent of the total composition of the product is rarely reported on these forms.

The most critical limiting factor in our research was that Chemical Abstract Service (CAS) numbers were often not provided on MSDSs. The American Chemical Society has established the CAS number system to identify unique chemical substances. A single substance can have many different names, but only one CAS number. CAS numbers identify substances that may be a single chemical, an isomer of a chemical, a mixture of isomers, polymers, biological sequences, or a mixture of related chemicals. For purposes of accuracy, our research into the health effects of chemicals used in natural gas operations was restricted to only chemicals for which a CAS number was available.

Health Effects

Information on the health effects associated with identified chemicals was obtained from MSDSs, as well as government toxic chemical databases such as TOXNET and the Hazardous Substances Database, and through literature searches of biomedical studies. Information available for some chemicals is limited due to lack of access to studies performed on the toxicity of the

substance. For example, many laboratory studies submitted to EPA for the registration of chemicals are not accessible on the basis that the information is proprietary to the industry.

Health effects were broken into 14 health categories, focusing on the main target organs or systems that are identified on MSDSs, government toxicological reports, and in medical literature. The categories include all 7 priority health conditions identified by the Agency for Toxic Substances and Disease Registry (U.S. Department of Health and Human Services 2010) associated with uncontrolled hazard waste sites listed as required by CERCLA, 1984, as amended (U.S. Environmental Protection Agency 1984). We reduced these to 12 categories by combining developmental and reproductive health impacts under endocrine disruption. The resulting 12 categories included: skin, eye and sensory organ, respiratory, gastrointestinal and liver, brain and nervous system, immune, kidney, cardiovascular and blood, cancer, mutagenic, endocrine disruption, other, and ecological effects.

Data Analysis

Using the data sources described above, we entered the names of all the products and chemicals into a spreadsheet. Initially, chemicals were separated according to the state in which the data source originated. Analysis of the profiles of health effects revealed minimal differences across states, thus for this report we combined all the data into one multi-state analysis. Using only the chemicals on the multi-state list for which CAS numbers were available, we produced a profile based on how often each of the 12 possible health effects were associated with the chemicals. We created separate profiles for the water soluble chemicals alone, and the volatile chemicals alone. We also did an analysis of the drilling chemicals from the Wyoming well-blowout and an analysis of the chemicals found in the New Mexico evaporation pits. Finally, we tested the utility of the spreadsheet for providing guidance for water quality monitoring, focusing on the most potentially harmful and frequently used chemicals.

RESULTS

Product Information

As of May, 2010 TEDX identified 944 products used in natural gas operations in the U.S. Of these, between 95 and 100% of the ingredients were available for 131 (14%) of the products (Figure 1). For 407 (43%) of the products, less than 1% of the total product composition was available. For

those 407 products, only the name of the product with no identifiable chemical name or percent composition was reported. A total of 632 chemicals were reported in the products and we were able to locate CAS numbers for 353 (56%) of them.

Health Effects Profile

Using the health effect information for the 353 chemicals with CAS numbers, we created a profile of possible health effects that depicts the percentage of chemicals associated with each of the 12 health effect categories (Figure 2). Viewing the profile from left to right, more than 75% of the chemicals on the list can affect the skin, eyes, and other sensory organs, the respiratory system, the gastrointestinal system and the liver. Over half the chemicals show effects in the brain and nervous system. These first four categories represent effects that would likely be expressed upon immediate exposure, such as eye and skin irritation, nausea and/or vomiting, asthma, coughing, sore throat, flu-like symptoms, tingling, dizziness, headaches, weakness, fainting, numbness in extremities, and convulsions. Products containing chemicals in powder form, irritants, or highly corrosive and volatile chemicals would all come with MSDS warnings in one or more of these categories. In all probability, none of the chemicals in these categories would normally be ingested during natural gas operations, but immediate eye, nasal, dermal contact and inhalation could lead to rapid absorption and cause direct exposure to the brain and other vital organ systems.

Health categories that reflect chronic and long term organ and system damage comprise the middle portion of Figure 2. These included the nervous system (52%), immune system (40%), kidney (40%), and the cardiovascular system and blood (46%). More than 25% of the chemicals can cause cancer and mutations. Notably, 37% of the chemicals can affect the endocrine system that encompasses multiple organ systems including those critical for normal reproduction and development. The category of 'other' is more common, and includes effects on weight, teeth and bone and the ability of a chemical to cause death. Over 40% of the chemicals have been found to have ecological effects, indicating that they can harm aquatic and other wildlife.

Volatile and Soluble Chemicals

Organization of the data by pathway of exposure, Figure 3 shows separate health category profiles for the volatile and water soluble chemicals. Approximately 37% of the chemicals are volatile and can become airborne. Over 89% of these chemicals can harm the eyes, skin, sensory organs, respiratory tract, gastrointestinal tract or liver. Compared with the soluble chemicals, far more of the volatile chemicals (81%) can cause harm to the brain and nervous system. Seventy one

percent of the volatile chemicals can harm the cardiovascular system and blood, and 66% can harm the kidneys. Overall, the volatile chemicals produce a profile that displays a higher frequency of health effects than the water soluble chemicals. In addition, because they vaporize, not only can they be inhaled, but also ingested and absorbed through the skin, increasing the chance of exposures.

Drilling Chemicals

Figure 4 shows the profile for the 22 drilling chemicals identified from the well blow-out in Wyoming. The profile was unique in the following ways. All of the chemicals used in the drilling fluids were associated with respiratory effects. Nearly 60% were associated with 'other' effects, a category that includes outright mortality as an end point. A relatively high percentage of chemicals that affect the immune system were used.

Evaporation Pit Chemicals

Figure 5 shows the health effects of the 40 chemicals and metals reported in the New Mexico evaporation pits. These chemicals produced a health profile even more hazardous than the pattern produced by the drilling and fracking chemicals. Upon further investigation, we discovered that 98% of the 40 chemicals found in the pits are listed on EPA's 2005 CERCLA (Superfund) list and 73% are on the 2006 EPCRA List of Lists of reportable toxic chemicals. Of the nine chemicals found to be over the New Mexico state limits, all are on the CERCLA list and all but one are on the EPCRA List of Lists.

Analyses for water quality monitoring

For the purpose of water quality monitoring guidance, we analyzed the data according to the most potentially harmful chemicals and the most frequently used chemicals. Table 2 provides a list of the most egregious chemicals, those with 10 or more health effects. Roughly half of these chemicals are used in only one product on our list, making it impractical and a waste of time and money to try to test water for the most harmful chemicals. A more practical approach would be to test for the most frequently used chemicals. Although we do not know how often each product is used, we assume that the more products that contain a given chemical, the more likely it is to be detected in a water sample. Table 3 shows all the chemicals on our list that were found in at least seven different products. Many of these chemicals are relatively harmless. The most frequently cited chemical was crystalline silica (quartz) which was reported in 125 different products. Note that petroleum distillates and a variety of alcohols are found in numerous products, as are several forms of

potassium, which is a relatively easy and inexpensive chemical to detect in water. This list may prove useful in devising a water monitoring program. Regardless of how many health effects a chemical has, elevated levels of frequently used chemicals found in a water source could provide evidence of communication between natural gas operations and water resources.

DISCUSSION

Industry representatives have said there is little cause for concern because of the low concentrations of chemicals used in their operations. Nonetheless, pathways that could deliver chemicals in toxic concentrations at less than one part-per-million are not well studied and many of the chemicals on the list should not be ingested at any concentration. Numerous systems, most notably the endocrine system, are extremely sensitive to very low levels of chemicals, in parts-per-billion or less. The damage may not be evident at the time of exposure but can have unpredictable delayed, life-long effects on the individual and/or their offspring. Effects of this nature would be much harder to identify than obvious impacts such as skin and eye irritation that occur immediately upon contact. Health impairments could remain hidden for decades and span generations. Specific outcomes could include reduced sperm production, infertility, hormone imbalances, and other sex-related disorders. Further compounding this concern is the potential for the shared toxic action of these contaminants, especially those affecting the same and/or multiple organ systems.

It was difficult to arrive at a 'short list' of chemicals that would be informative for water quality monitoring because of the vast array of products constantly being developed, and the wide selection of chemicals used in those products. We can, however, provide some guidance by pointing out four types of chemicals that are used in a relatively high number of products. These include (1) the silicas, which appear frequently as product components; (2) potassium based chemicals, which are also found in numerous products, although with relatively low toxicity; (3) petroleum derived products, which take on many different forms (including some without CAS numbers), and some of which are toxic at low concentrations and might be detected with diesel or gasoline range organics tests; and (4) the alcohols for which new detection technology is being developed, and because they are among the chemicals with the most health effects.

Detection of increasing or elevated concentrations of these chemicals near gas operations could indicate that communication between natural gas activities and a water resource such as a domestic well, creek, pond, wetland, etc is occurring. If a longitudinal monitoring program were to reveal any increase in concentration in one of these target groups, even if the concentrations were well below any water quality standards, it should trigger more testing immediately.

For many years, drillers have insisted that they do not use toxic chemicals to drill for gas, only guar gum, mud, and sand. While much attention is being given to chemicals used during fracking, our findings indicate that drilling chemicals can be equally, if not more dangerous. What we have learned about the chemicals used in the Crosby well blowout provides insight into why citizens living nearby suffered severe respiratory distress, nausea and vomiting and had to be evacuated from their homes for several days. It might also shed light on why other individuals living near gas operations have experienced similar symptoms during the gas drilling phase (prior to fracking).

From the first day the drill bit is inserted into the ground until the well is completed, toxic materials are introduced into the borehole and returned to the surface along with produced water and other extraction liquids. In the western U.S. it has been common practice to hold these liquids in open evaporation pits until the wells are shut down, which could be up to 25 years. These pits have rarely been examined to ascertain their chemical contents outside of some limited parameters (primarily metals, chlorides, and radioactive materials). Our data reveal that extremely toxic chemicals are found in evaporation pits and indeed, these and other similar sites may need to be designated for Superfund cleanup. In the eastern U.S., and increasingly in the west, these chemicals are being re-injected underground, creating yet another potential source of extremely toxic chemical contamination. In other words, what ends up in evaporation pits in the West, will in other parts of the country be injected underground.

RECOMMENDATIONS

TEDX has collected the names of nearly a thousand products used in natural gas operations in the U.S. We have no idea how many more products are in use. We have health data on only a small percentage of the chemicals in use because CAS numbers are often not provided on MSDSs and without a CAS number it is impossible to search for health data. Working under the assumption that our results underestimate the consequences of the health impacts to the labor force, residents living in close proximity to the wells, and those dependent upon potable and agricultural water that could be affected by natural gas operations, we make the following recommendations:

(1) Product labels and/or MSDSs must list the complete formulation of each product, including the precise name and CAS number and amount of every chemical, as well as the composition of the vehicle used to fill the product container. To prevent serious injury and mortality the products used during natural gas operations should be exempt from confidentiality.

(2) If an ingredient does not have a CAS number it must be clearly defined, leaving no doubt about its possible health impact(s).

3) Records should be kept for each drilling and fracking operation, listing the total volume of fluid injected, the amount of each product used, the depth at which the products were introduced, and the volume of fluid recovered.

4) The volume and concentration of all liquids and solids removed from the work sites should be made available to the public. Without this information the full health and environmental hazards posed by natural gas production cannot be predicted.

(5) Air quality monitoring for individual VOCs as well as ozone must become standard procedure in any region where natural gas activity is taking place and must commence prior to initiation of operations to establish baseline levels. Estimating tonnage of VOCs and NOx released and ignoring ozone should no longer be the practice.

(6) Comprehensive water monitoring programs should be established in every gas play across the U.S. both prior to and after gas production commences, that include new chemical species indicators based on toxicity and mobility in the environment, and pollution of sub-surface and above-surface domestic and agricultural water resources, and all domestically-used aquifers and underground sources of drinking water.

(7) We recommend the development of labeled isotopic fingerprints of the chlorinated compounds in products used to drill and fracture. Each manufacturer would have its own fingerprint. A plot of this isotopic data found down gradient of a hydraulically fractured well would aid a state or federal regulator in identifying the contamination source.

(8) Given the general consistency of reported adverse health effects by citizens and laborers across many gas plays, public health authorities should establish an epidemiological monitoring program that merges at the state and national level in order to increase power and be able to reach conclusions early on. The design of the study should include environmental monitoring of air and water as well as any health changes in those living and working in regions of natural gas operations. The health monitoring should be able to detect early trends in parameters, such as asthma, hypertension, chemical sensitization, chronic skin and eye irritation, and neurological alterations, to mention a few.

(9) As underground injection of waste is becoming the most frequent choice for waste disposal, rigid accounting of the date, volume, and source of all materials, and the exact location in the geological formation(s) in which it is injected should become a part of permanent government records that will be publicly available for future generations.

(10) Before a permit is issued to drill for natural gas, complete waste management plans should be reviewed and approved and become part of the permit.

(11) The injection of hydraulic fracturing fluids should be regulated under the Safe Drinking Water Act. This is needed to assure mechanical integrity of the injection wells and isolation of the injection zone from underground sources of drinking water.

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Table 1. Functional categories of hydraulic fracturing chemicals.

Acids	To achieve greater injection ability or penetration and later to dissolve minerals and clays to reduce clogging, allowing gas to flow to the surface.
Biocides	To prevent bacteria that can produce acids that erode pipes and fittings and break down gellants that ensure that fluid viscosity and proppant transport are maintained. Biocides can produce hydrogen sulfide (H ₂ S) a very toxic gas that smells like rotten eggs.
Breakers	To allow the breakdown of gellants used to carry the proppant, added near the end of the fracking sequence to enhance flowback.
Clay stabilizers	To create a fluid barrier to prevent mobilization of clays, which can plug fractures.
Corrosion inhibitors	To reduce the potential for rusting in pipes and casings.
Crosslinkers	To thicken fluids often with metallic salts in order to increase viscosity and proppant transport.
Defoamers	To reduce foaming after it is no longer needed in order to lower surface tension and allow trapped gas to escape.
Foamers	To increase carrying-capacity while transporting proppants, and decreasing the overall volume of fluid needed.
Friction reducers	To make water slick and minimize the friction created under high pressure and to increase the rate and efficiency of moving the fracking fluid.
Gellants	To increase viscosity and suspend sand during proppant transport.
pH control	To maintain the pH at various stages using buffers to ensure maximum effectiveness of various additives.
Proppants	To hold fissures open, allowing gas to flow out of the cracked formation, usually composed of sand and occasionally glass beads.
Scale control	To prevent build up of mineral scale that can block fluid and gas passage through the pipes.
Surfactants	To decrease liquid surface tension and improve fluid passage through pipes in either direction.

Table 2. Chemicals with CAS numbers that have 10 or more adverse health effects.

Chemical	CAS #	Number of Products
(2-BE) Ethylene glycol monobutyl ether	111-76-2	22
2,2',2"-Nitrilotriethanol	102-71-6	3
2-Ethylhexanol	104-76-7	7
5-Chloro-2-methyl-4-isothiazolin-3-one	26172-55-4	2
Acetic acid	1186-52-3	1
Acrolein	107-02-8	1
Acrylamide (2-propenamide)	79-06-1	6
Acrylic acid	79-10-7	2
Ammonia	7664-41-7	3
Ammonium chloride	12125-02-9	2
Ammonium nitrate	6484-52-2	2
Aniline	62-53-3	1
Benzyl chloride	100-44-7	2
Boric acid	10043-35-3	4
Cadmium	7440-43-9	1
Calcium hypochlorite	7778-54-3	1
Chlorine	7782-50-5	1
Chlorine dioxide	10049-04-4	2
Dibromoacetonitrile	3252-43-5	1

Diesel 2	68476-34-6	19
Diethanolamine	111-42-2	4
Diethylenetriamine	111-40-0	1
Dimethyl formamide	68-12-2	1
Epidian	25068-38-6	1
Ethanol (acetylenic alcohol)	64-17-5	8
Ethyl mercaptan	75-08-1	1
Ethylbenzene	100-41-4	7
Ethylene glycol	107-21-1	17
Ethylene oxide	75-21-8	2
Ferrous sulfate	7720-78-7	1
Formaldehyde	50-00-0	4
Formic acid	64-18-6	8
Fuel oil #2	68476-30-2	9
Glutaraldehyde	111-30-8	11
Glyoxal	107-22-2	2
Hydrodesulfurized kerosene	64742-81-0	1
Hydrogen sulfide	7783-06-4	1
Iron	7439-89-6	3
Isobutyl alcohol (2-methyl-1-propanol)	78-83-1	3
Isopropanol (propan-2-ol)	67-63-0	47
Kerosene	8008-20-6	3
Light naphthenic distillates, hydrotreated	64742-53-6	2
Mercaptoacidic acid	68-11-1	2

Methanol	67-56-1	74
Methylene bis(thiocyanate)	6317-18-6	2
Monoethanolamine	141-43-5	5
NaHCO ₃	144-55-8	5
Naphtha, petroleum medium aliphatic	64742-88-7	2
Naphthalene	91-20-3	18
Natural gas condensates	68919-39-1	1
Nickel sulfate	7786-81-4	1
Paraformaldehyde	30525-89-4	2
Petroleum distillate naphtha	8002-05-9	7
Petroleum distillate/ naphtha	8030-30-6	1
Phosphonium, tetrakis(hydroxymethyl)- sulfate	55566-30-8	2
Propane-1,2-diol	57-55-6	6
Sodium bromate	7789-38-0	1
Sodium chlorite (chlorous acid, sodium salt)	7758-19-2	1
Sodium hypochlorite	7681-52-9	1
Sodium nitrate	7631-99-4	3
Sodium nitrite	7632-00-0	3
Sodium sulfite	7757-83-7	1
Styrene	100-42-5	1
Sulfur dioxide	7446-09-5	1
Sulfuric acid	7664-93-9	1
Tetrahydro-3,5-dimethyl-2H-1,3,5-	533-74-4	3

thiadiazine-2-thione (Dazomet)

Titanium dioxide	13463-67-7	2
Tributyl phosphate	126-73-8	1
Trichylene glycol	112-27-6	1
Urca	57-13-6	3
Xylene	1330-20-7	11

Table 3. Chemicals with CAS numbers found in the highest number of products

Chemical	CAS #	Number of products	Number of health effects
Crystalline silica, quartz	14808-60-7	125	7
Methanol	67-56-1	74	11
Isopropanol (propan-2-ol)	67-63-0	47	10
Petroleum distillate hydrotreated light	64742-47-8	26	6
(2-BE) Ethylene glycol monobutyl ether	111-76-2	22	11
Bentonite	1302-78-9	20	6
Diesel 2	68476-34-6	19	10
Naphthalene	91-20-3	18	12
Aluminum oxide	1344-28-1	17	3
Ethylene glycol	107-21-1	17	10
Sodium hydroxide	1310-73-2	17	5
Barite (BaSO ₄)	7727-43-7	15	5
Heavy aromatic petroleum naphtha (aromatic solvent)	64742-94-5	15	5
Crystalline silica, cristobalite	14464-46-1	14	5
Mica	12001-26-2	14	3
Sodium chloride	7647-14-5	14	9

Crystalline silica, tridymite	15468-32-3	13	3
Hydrochloric acid (HCl)	7647-01-0	13	7
Glutaraldehyde	111-30-8	11	11
Xylene	1330-20-7	11	10
Guar gum	9000-30-0	10	3
Iron oxide (Fe ₂ O ₃ , diiron trioxide)	1309-37-1	10	5
Potassium chloride	7447-40-7	10	8
Potassium hydroxide	1310-58-3	10	7
Xanthan gum	11138-66-2	10	4
Fuel oil #2	68476-30-2	9	11
Hydrotreated heavy petroleum naphtha	64742-48-9	9	8
Limestone (calcium carbonate)	1317-65-3	9	2
Polyacrylamide/polyacrylate copolymer	25085-02-3	9	3
Sodium carboxymethylcellulose (polyanionic cellulose)	9004-32-4	9	5
Calcium hydroxide	1305-62-0	8	8
Crystalline silica (silicon dioxide)	7631-86-9	8	4
Ethanol (acetylenic alcohol)	64-17-5	8	12

Formic acid	64-18-6	8	11
Graphite	7782-42-5	8	4
2-Ethylhexanol	104-76-7	7	11
Acetic acid	64-19-7	7	9
Asphaltite (gilsonite, hydrocarbon black solid)	12002-43-6	7	4
Butanol (n-butyl alcohol, butan-1-ol, 1-butanol)	71-36-3	7	8
Calcium carbonate (sized)	471-34-1	7	6
Calcium chloride	10043-52-4	7	8
Ethoxylated nonylphenol	9016-45-9	7	6
Ethylbenzene	100-41-4	7	11
Petroleum distillate naptha	8002-05-9	7	12
Propargyl alcohol (prop-2-yn-1-ol)	107-19-7	7	9
Tetramethylammonium chloride	75-57-0	7	8

Figure 1. Percent of Composition Disclosed for 944 Products Used in Natural Gas Operations

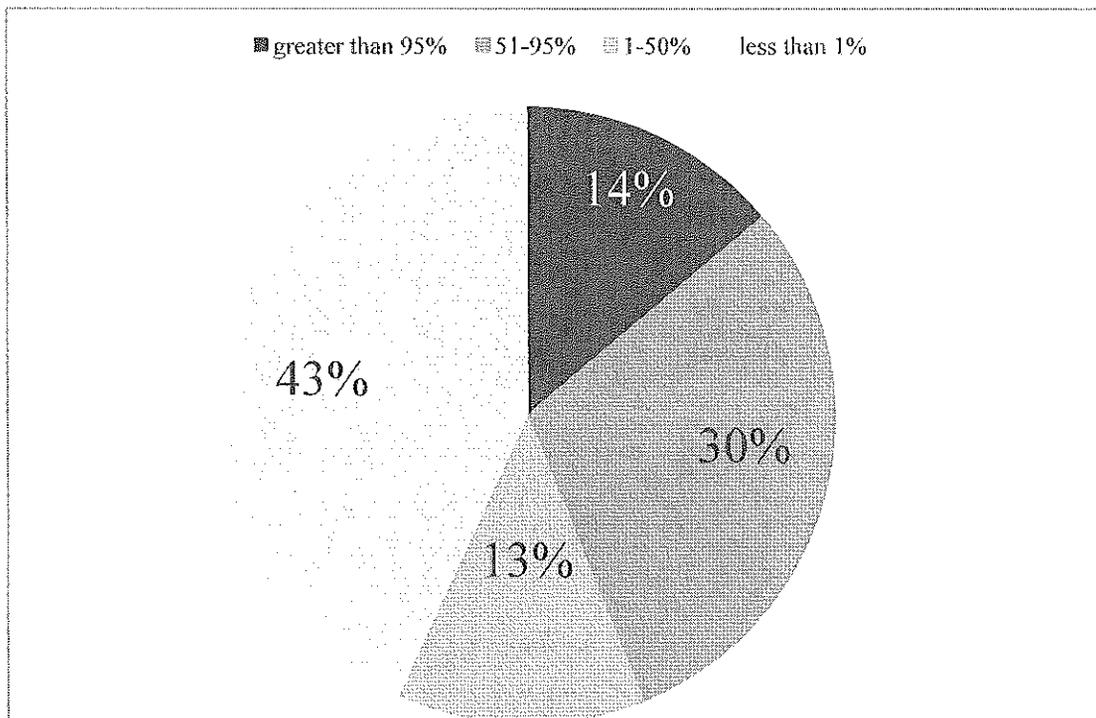


Figure 2. Profile of Possible Health Effects of Chemicals with CAS Numbers used in Natural Gas Operations

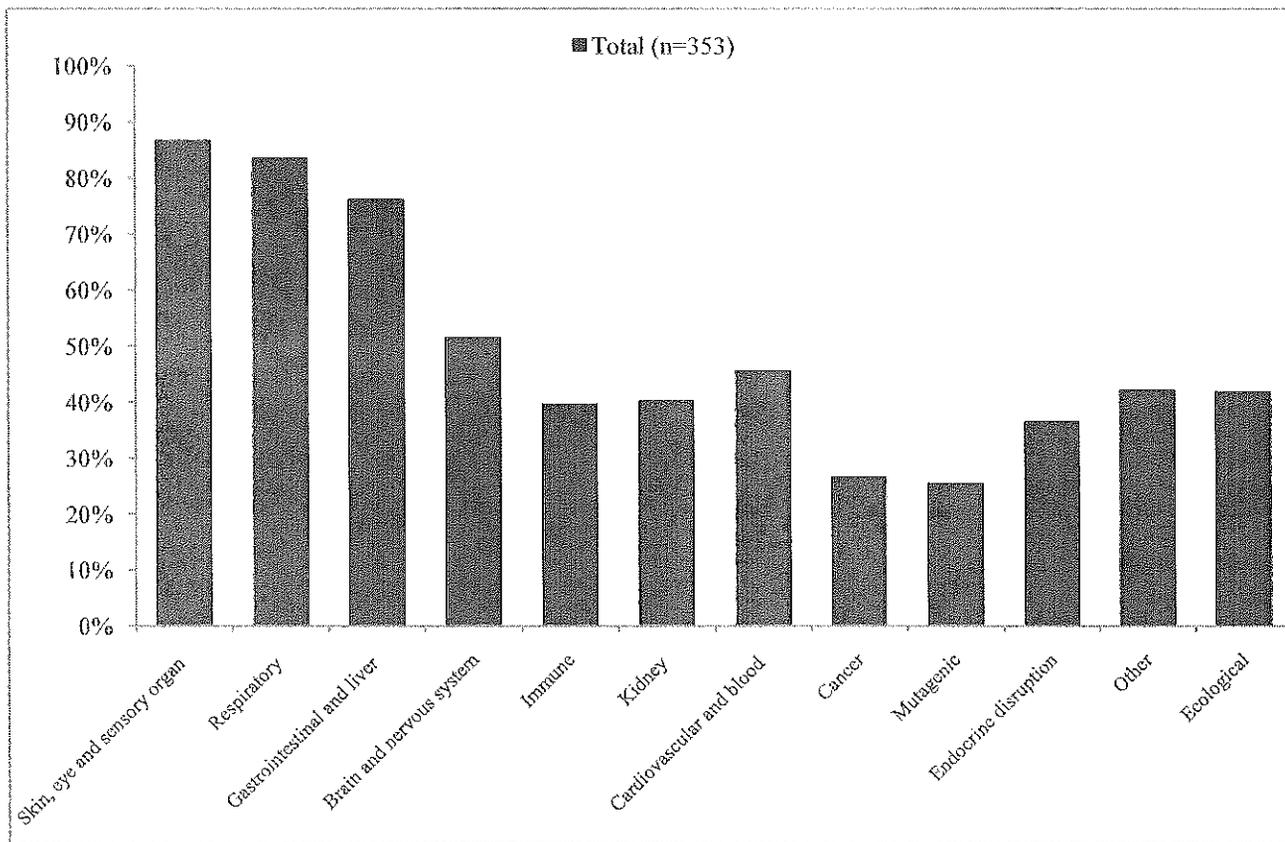


Figure 3. Profile of Possible Health Effects of Soluble and Volatile Chemicals with CAS Numbers

Used in Natural Gas Operations

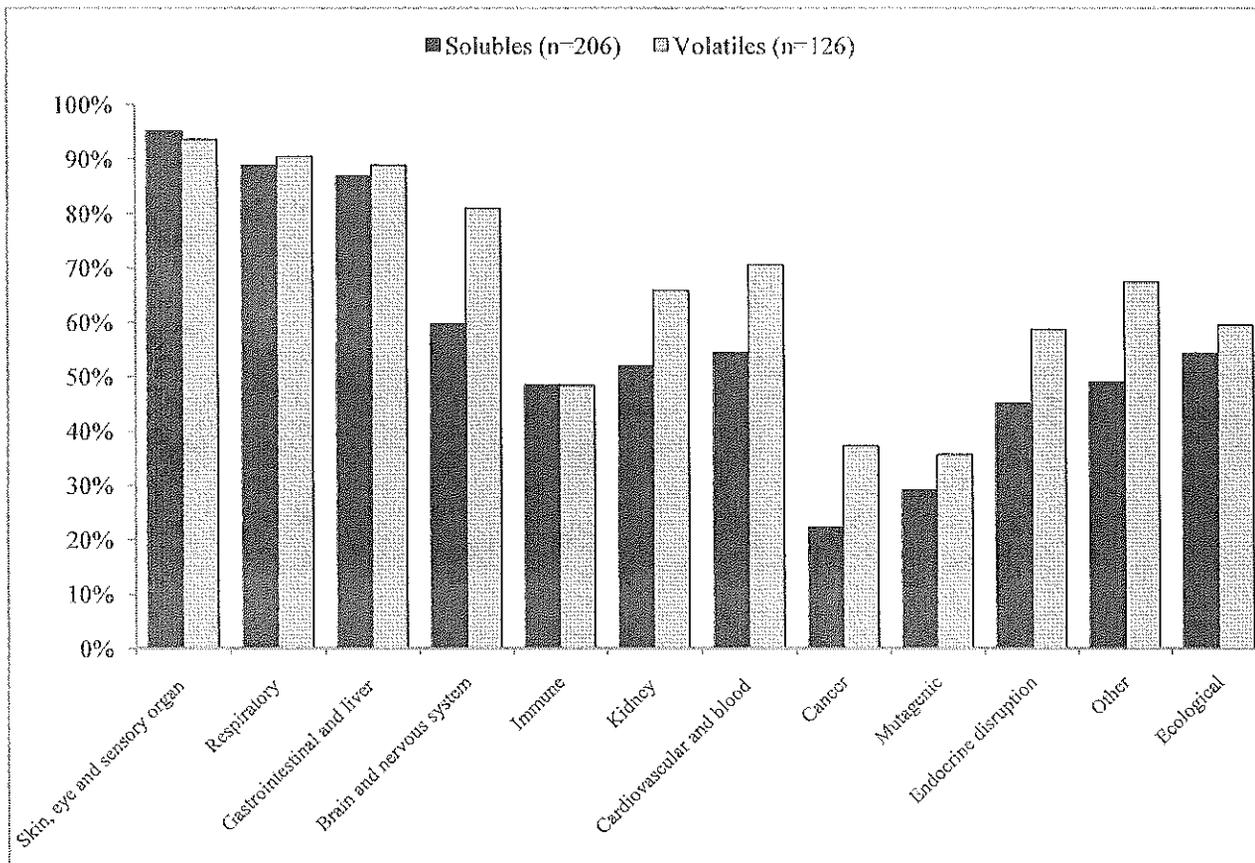


Figure 4. Profile of Possible Health Effects of Chemicals with CAS Numbers Used to Drill the Crosby 25-3 Well, Wyoming

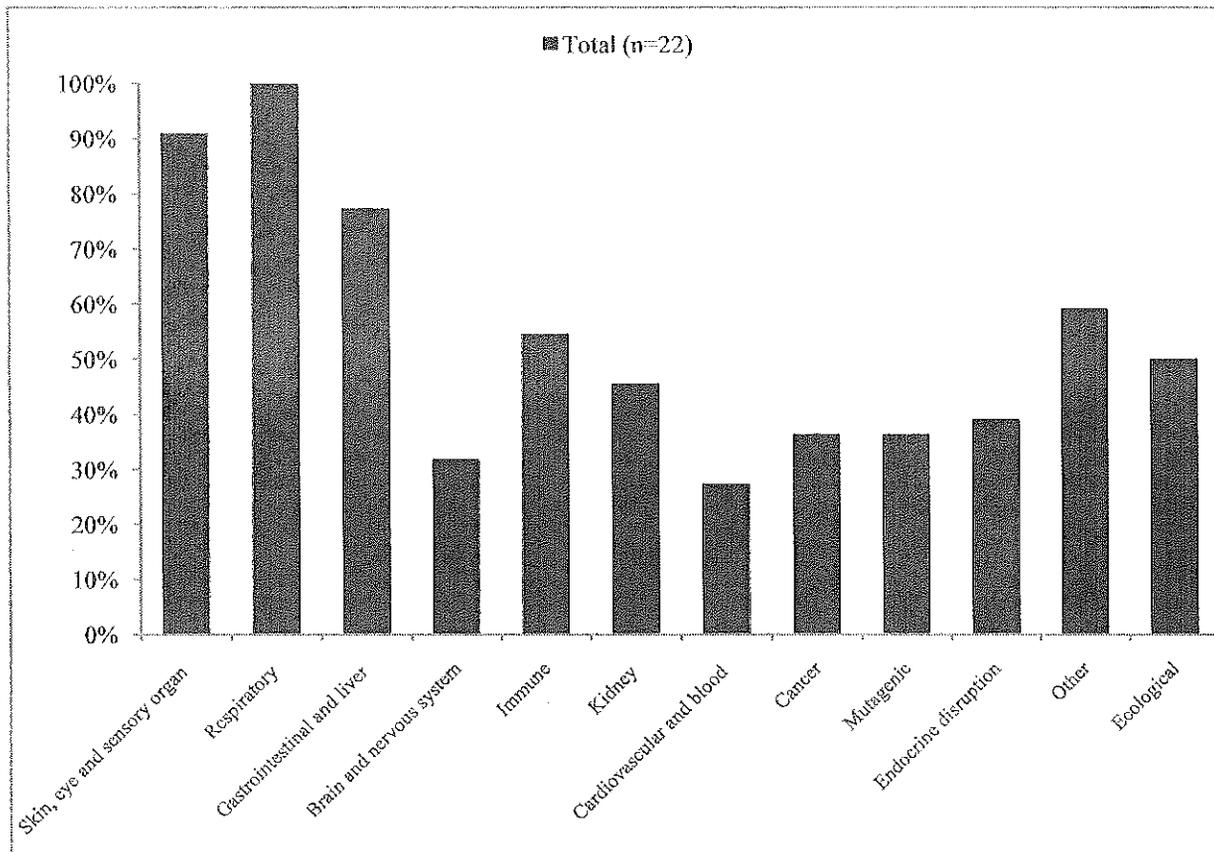
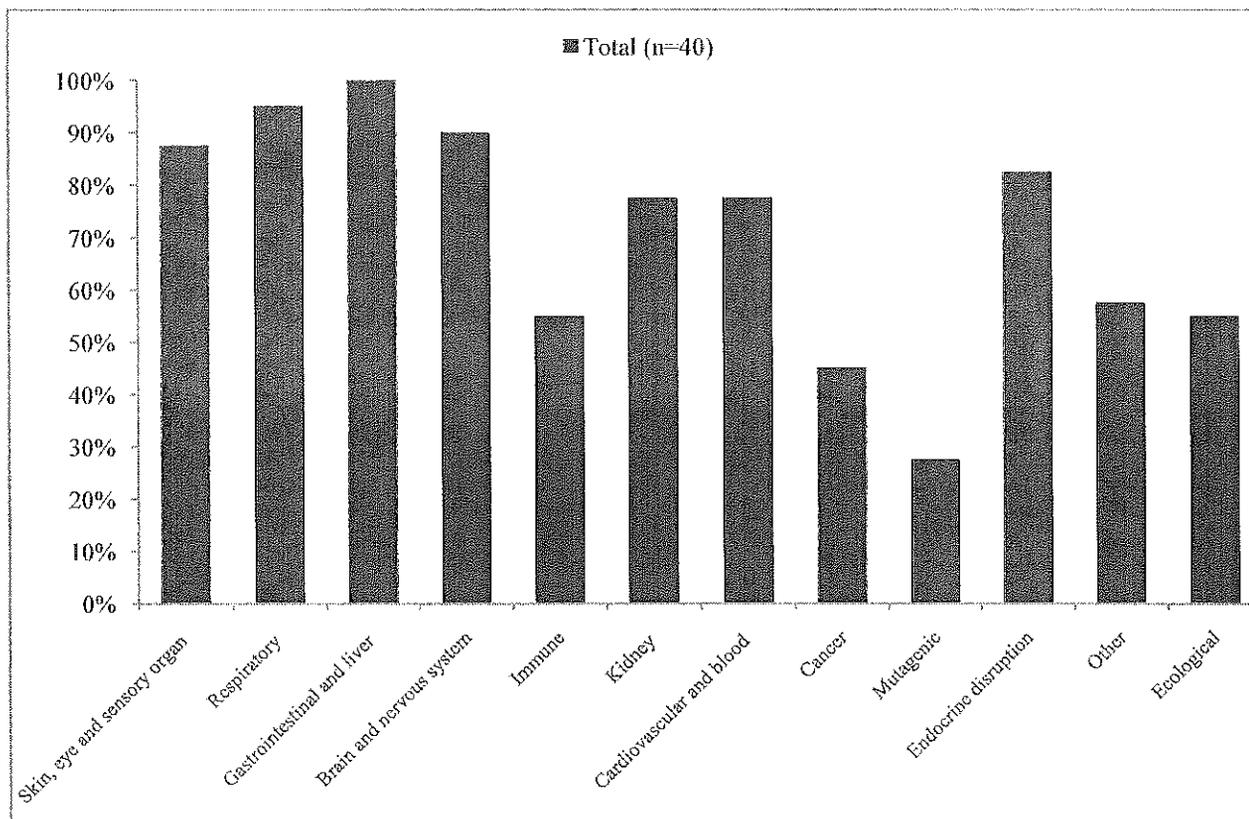


Figure 5. Profile of Possible Health Effects of Chemicals with CAS Numbers Found in Six New Mexico Drilling Evaporation Pits



Margaret Wood
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The Honorable Senator Joseph Pennacchio
370 Change Bridge Rd., Suite 102
Pine Brook, NJ

To the Highlands Council:

~~Dear Senator Pennacchio,~~

I would like to refer you to the paper: "Natural Gas Operations from a Public Health Perspective", by Theo Colborn, Carol Kwiatkowski, Kim Schultz, and Mary Bachran. The expected publication date was September or October 2011. (Colborn, Theo; Kwiatkowski, Carol; Schultz, Kim; Bachran, Mary (2011). "Natural Gas Operations from a Public Health Perspective". *Human and Ecological Risk Assessment: An International Journal* (17:5): 1039–1056) It can be found at this link, from The Endocrine Disruption Network: http://www.endocrinedisruption.com/files/NaturalGasManuscriptPDF09_13_10.pdf

"According to the study synopsis, the researchers demonstrated that toxic chemicals are used during both the fracturing and drilling phases of gas operations. The study also showed that there may be long-term health effects that are not immediately recognized, and that waste evaporation pits may contain numerous chemicals on the U.S. Environmental Protection Agency (EPA) Superfund list." (This quote is taken from this link: <http://www.water-contamination-from-shale.com/main/fracking-study-sees-public-health-risks/>)

If New Jersey supports the gas fracturing, the waste water will create air pollution filled with the chemicals described in this report. Some of these chemicals are not safe at any level of exposure. Since the atmosphere circulates eastward, for about a 200 mile distance, all of New Jersey's citizens will suffer the ill health effects described in this report.

New Jersey should move away from "Fossil-fuel derived chemicals" because these chemicals "... produce pollution at every stage they are handled - extraction, refinement, processing, production, distribution and waste disposal." Please note that distribution is included in this list. The pipeline infrastructure, will leak 3 to 4% of it's contents. That is the national average of leakage through the pipelines and connectors and compressor stations. Those contents will include fracking fluid, that leaks into the pipeline and is not recovered. It will include brine, which is an ancient earth fluid that is much saltier than ocean water, and is toxic to our eco-systems. It also leaks into the pipelines after fracking, and much of this will also not be recovered. It will also contain some radioactive elements, radon, and heavy metals that are encountered during drilling, which leak into the pipeline and are not recovered. Another 3 to 4% of the methane gas will leak out at the site of the fracturing. In total, 7% of the fractured Methane gas will leak. This was proven in the Scientific, Peer reviewed paper, "Methane and the greenhouse-gas footprint of natural gas from shale formations" a letter by Robert W. Howarth, Renee Santoro, & Anthony Ingraffea. I would like to refer you to this paper as

<http://www.endocrinedisruption.com/chemicals.fracturing.php>

Chemicals in Natural Gas Operations

Drilling Chemicals

Drilling Chemicals

The information here is based on chemicals used in drilling a natural gas well, Crosby 25-3, in Park County, Wyoming. Natural gas, petroleum condensate, and drilling fluids were accidentally released from the ground adjacent to the well due to a breach in the surface casing. This occurred over a period of about 58 hours between August 11 and 13th, 2006.

[Click here to download a summary of the products and chemicals used to drill the Crosby 25-3 well \(PDF\).](#)

[Click here to download an EXCEL spreadsheet of the chemicals used to drill the Crosby 25-3 well.](#)

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Analysis of Products Used for Drilling

Crosby 25-3 Well – Windsor Energy, Park County, Wyoming

April 2009

INTRODUCTION

The following summaries are based on the possible health effects of the products and chemicals used in drilling a natural gas well, Crosby 25-3, northwest of Clark, Park County, Wyoming. This well was directionally drilled with a total vertical depth of 8,038 feet. Natural gas, petroleum condensate, and drilling fluids were accidentally released from the ground adjacent to the well due to a breach in the surface casing at approximately 255 feet below ground surface. Released fluids and natural gas followed near-vertical bedding planes and/or fractures until they reached the surface at two locations. The release occurred over a period of about 58 hours between August 11 and 13th, 2006 and resulted in surface soil impacts in an area estimated to cover approximately 25,000 square feet.¹

TEDX compiled a list of 42 products containing 32 chemicals used to drill the Crosby 25-3 Well as of March 2009. Information for the analysis came from Material Safety Data Sheets (MSDS) for the products in use at the time of the blowout, through information provided in the Terracon Remedial Investigation Work Plan – Final Draft, dated July 2, 2007, and information disclosed in the Terracon Remedial Investigation Work Plan – Amended Draft, dated September 14, 2007. TEDX makes no claim that the list of products and chemicals in this analysis is complete.

PRODUCT SUMMARY

Material Safety Data Sheets (MSDSs)

MSDSs are designed to inform those who handle, ship, and use the products about their physical and chemical characteristics, and their direct and/or immediate health effects, in order to prevent injury while working with the products. The sheets are also designed to inform emergency response crews in case of accidents or spills. The total reported composition of a product on an MSDS can be less than 0.1% up to 100%. MSDSs are not submitted to the Occupational Safety and Health Administration (OSHA) for review. The product manufacturers determine what is revealed on their MSDSs.

The health information on MSDSs most often warns of possible harm to the skin and eyes, gastrointestinal and respiratory tracts, followed by the nervous system and brain. Many MSDSs do not address the outcome of long term, intermittent or chronic exposures, or adverse health effects that may not be expressed until years after the exposure.

¹ Terracon Consulting Engineers & Scientists. 2007 Sep 14. Remedial Investigation Work Plan - Final Draft: Crosby 25-3 Natural Gas Well Release, Road 1AB, Clark, Park County, Wyoming, submitted to Windsor Energy Group, LLC, Oklahoma City, Oklahoma Project No. 26067064.

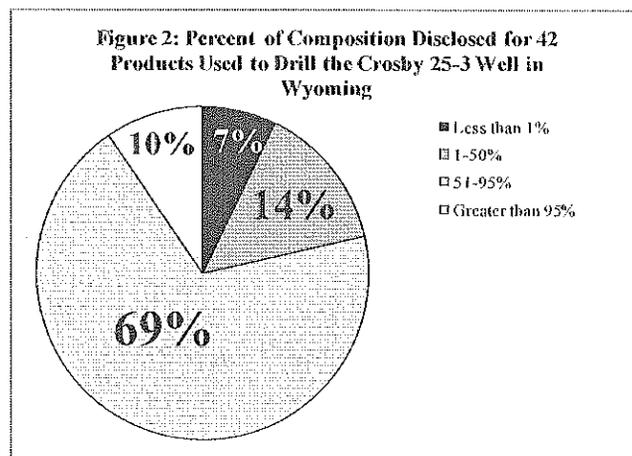
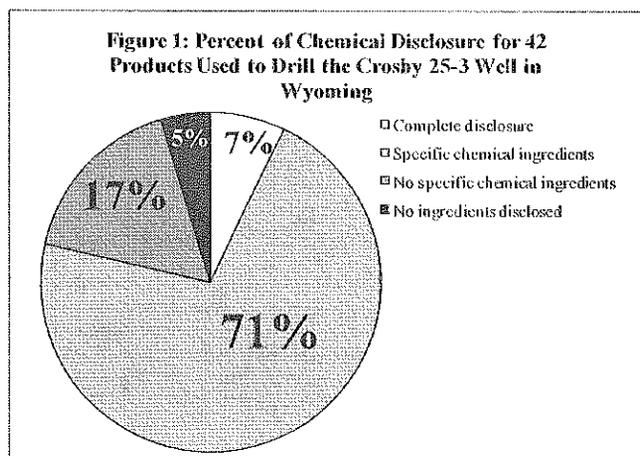
Of the 42 products known to be used to drill the Crosby Well, TEDX has obtained MSDSs for 37 of them. Two of the MSDSs listed “no hazardous ingredients” as the composition of the product. Seven MSDSs listed at least one ingredient, but no CAS numbers², and one of these MSDSs provided no percent of composition. Of the 28 MSDSs that listed at least one ingredient with a CAS number, five provided information on less than 50% of the total composition and 20 listed between 51% and 95%. Three MSDSs disclosed over 95% of the product ingredients and all the CAS numbers.

Other Sources of Information

The remaining five products on the TEDX list came from the Terracon reports listed above. The Terracon reports list a single chemical in each of the products. Information on the composition ranges from 10 to 30% and 60-100%, but no product in these reports provides complete information on the specific chemical makeup for 100% of the composition.

Evaluation of the information available about the 42 products

Thirty products (71%) list specific chemical ingredients (Figure 1). Seven (17%) contain chemicals with only general or non-specific names and no information for two (5%) of the products was provided. The remaining 3 (7%) of the products disclose all of the ingredients.

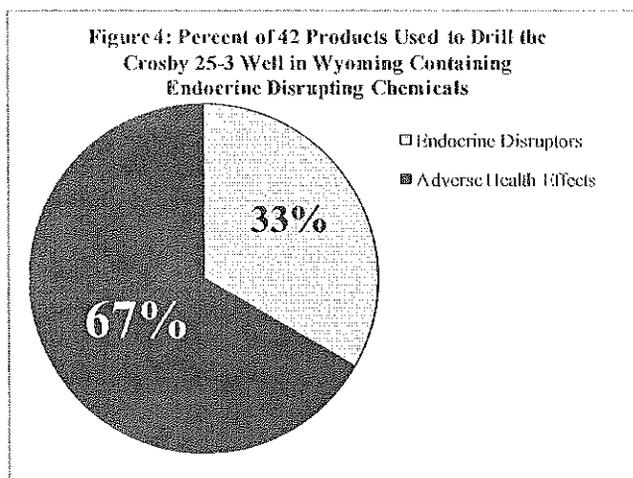
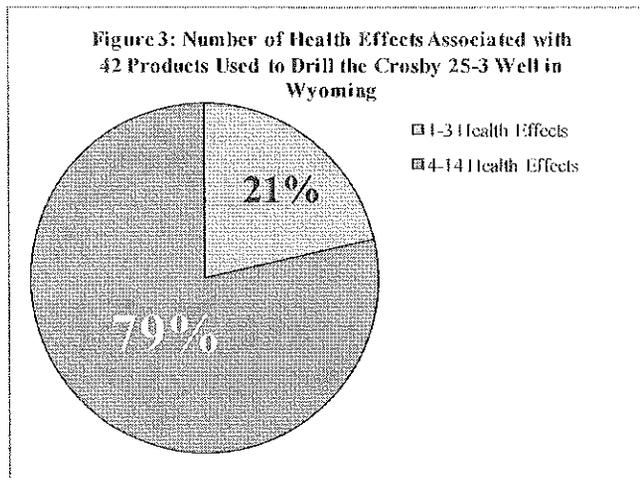


Less than 1% of the total composition is known for 3 (7%) of the 42 products used to drill the Crosby Well (Figure 2). Less than 50% of the composition is known for 6 (14%) of the products, and between 51% and 95% of the composition is known for 29 (69%) of the products. Four (10%) of the products have information about more than 95% of their full composition.

Evaluation of the health effects associated with the 42 products

All of the products on TEDX’s list are associated with adverse health effects, even though two of the MSDSs stated that they contained no hazardous ingredients. Twenty-one percent had one to three associated health effects, and 79% had 4-14 health effects (Figure 3). Thirty-three percent of the products contained one or more chemicals considered to be endocrine disruptors (Figure 4), chemicals that interfere with development and function.

² CAS –Chemical Abstracts Service, provided by the American Chemical Society. This unique number is used to identify a specific substance. A single substance can have many different names, but only one CAS number. A substance may be a single chemical, an isomer of a chemical, a mixture of isomers, polymer, biological sequences, or a mixture of related chemicals.



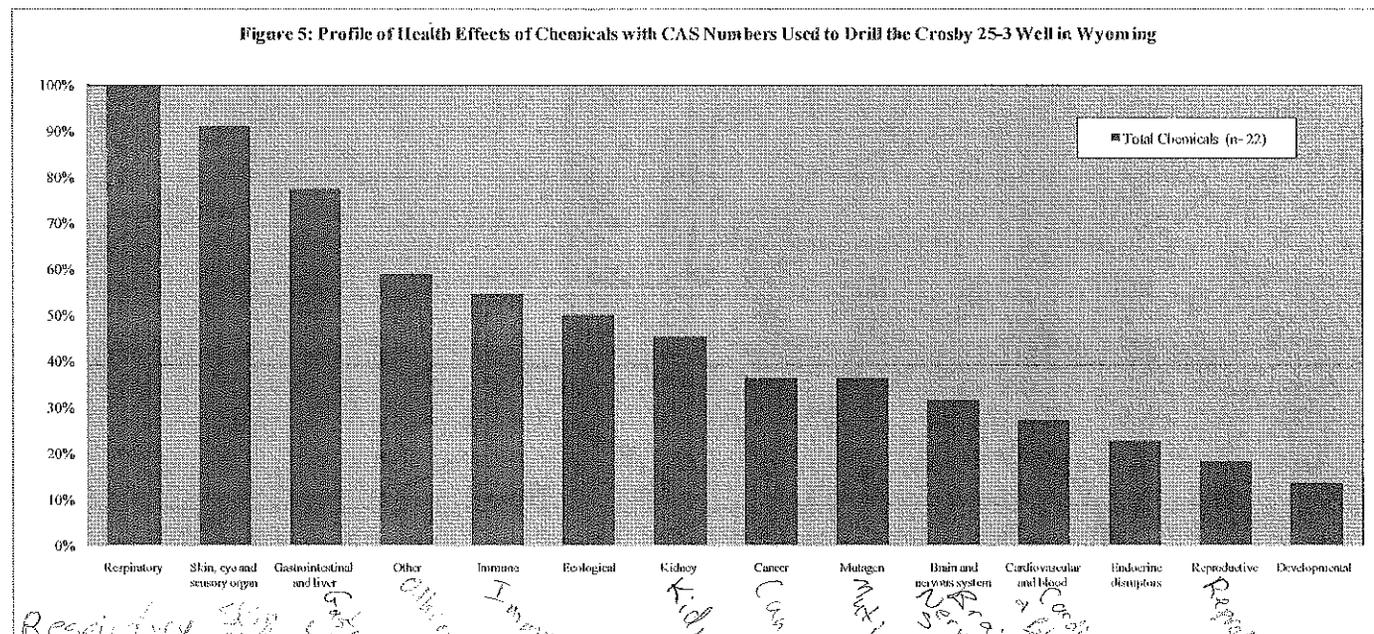
CHEMICAL SUMMARY

Evaluation of the information available about the 32 chemicals

Products may contain more than one chemical, and a given chemical may occur in more than one product. In the 42 products identified above, there were a total of 32 chemicals. Specific chemical names and CAS numbers could not be determined for 10 (31%) of the chemicals on TEDX's list. The names provided were too general (e.g. cellulose derivative, inert material), or they were listed as "mixtures," or "no hazardous ingredients/substances." It was impossible to link these 10 chemicals without CAS numbers to any health category aside from the health data reported on an MSDS. The limitations of MSDS data for possible health effects are noted above.

Summary of the health effects associated with the 22 chemicals with CAS numbers

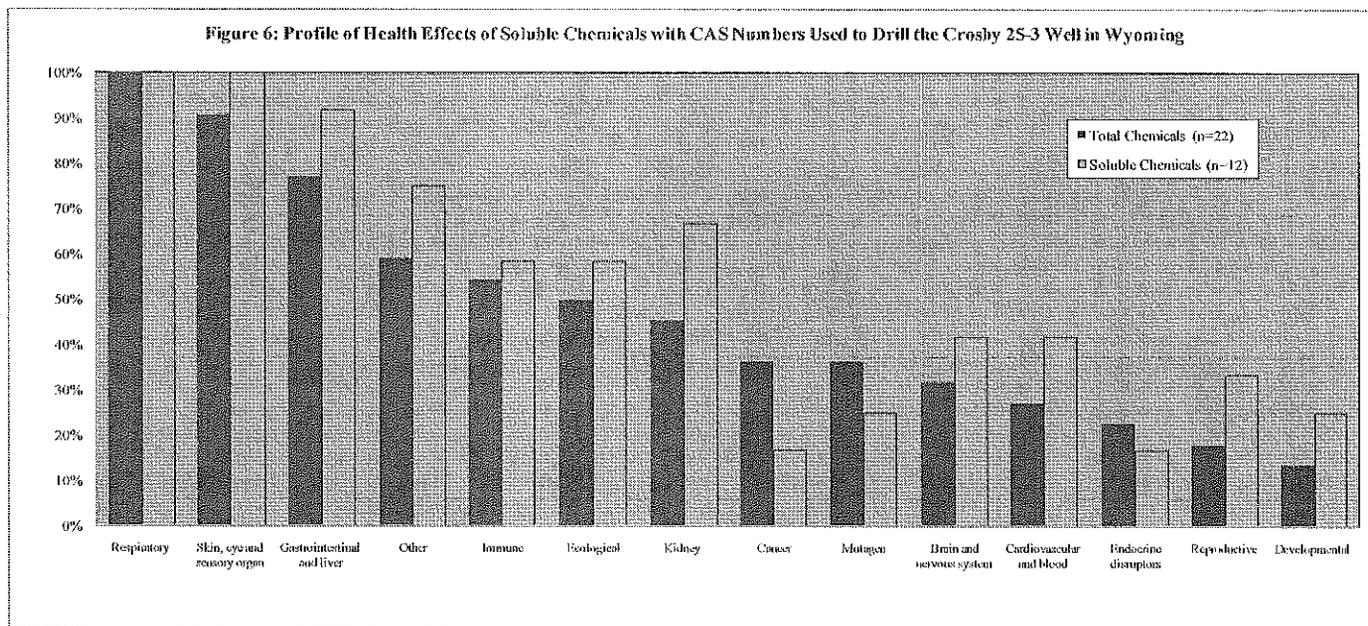
Figure 5 shows the percentages of the 22 chemicals with CAS numbers associated with the general health categories used in government reports. Chemicals are often included in more than one category.



When all of the chemicals are combined, 100% are associated with respiratory effects. Over 90% cause skin, eye and sensory organ problems, and 77% are associated with damage to the gastrointestinal system or liver. The immune system damage can result from exposure to 55% of the chemicals and 50% can cause ecological

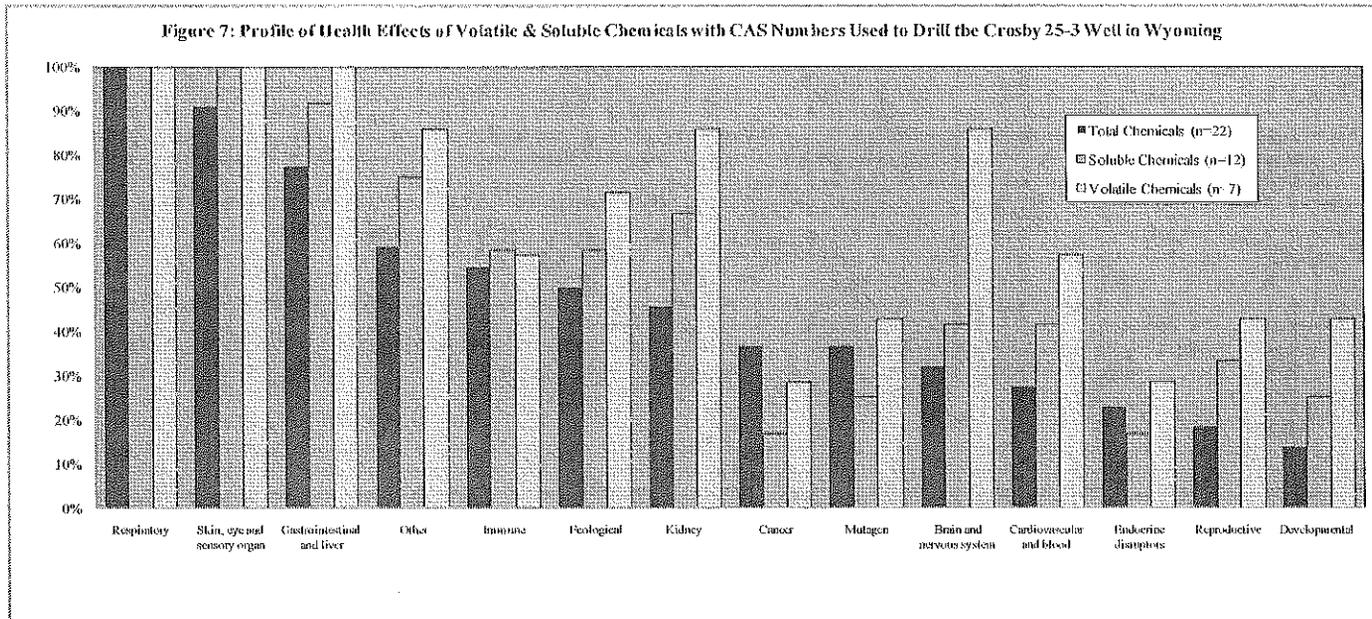
effects (harm to aquatic species, birds, amphibians or invertebrates). Fifty-nine percent of the chemicals have health effects in the ‘Other’ category. The ‘Other’ category includes such effects as changes in weight gain, or effects on teeth or bones, for example, but the most often cited effect in this category is the ability of the chemical to cause death.

The health effects on the left side of the figure are those effects that are more likely to appear immediately or soon after exposure. These effects include symptoms such as burning eyes, rashes, coughs, nausea, vomiting and diarrhea. The health effects on the right side of the figure are long term and would tend to appear months or years later, such as some cancers, the results of organ damage, harm to the reproductive system, or developmental effects as the result of prenatal exposure, all of which were associated with over 10% of the chemicals in this analysis.



Twelve (54%) of the chemicals with CAS numbers are water soluble. When examined alone (Figure 6), they produce a similar profile of health effects as all the chemicals combined, but with higher percentages in every category except Cancer, Mutagen and Endocrine disruptors. Notably, 100% of these chemicals can harm the respiratory system and the skin, eyes and sensory organs.

Seven (32%) of the chemicals are volatile (Figure 7), in other words, they can become airborne. All of these chemicals can harm the respiratory system, the skin, eyes or sensory organs, and the gastrointestinal system or liver. Over 80% of the volatile chemicals harm the kidneys, the brain and nervous system, or have ‘other’ effects. Overall, the volatile chemicals produce a different profile with higher percentages than the water soluble chemicals. Because they can readily become airborne and can be inhaled as well as swallowed, and they can reach the skin, the potential for exposure to these chemicals is greater.



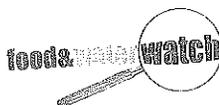
COMMENTS

The health effects summary for the chemicals used in Crosby Well is not a weighted analysis. Each chemical is included only once in the summary whether it is in only one product, or in many. Some of the most prevalent chemicals are among those associated with the most health categories.

The products used to drill this Wyoming well eventually made their way to the surface because of an accident. However, most drilling fluids are deliberately brought back to the surface during the drilling process and either reused in a closed loop system, or deposited into pits on the pad for later disposal. Each drilling event is custom-designed depending on the geology, depth, and resources available. The products and chemicals used, and the amounts or volumes used, therefore can differ from well to well.

Chemical	# of Products	Product	Purpose	CAS #	Residually respirable particulates	Water Soluble Particulate	Cancer	Mutagen	Cardiovascular and blood	Developmental	Endocrine disruptors	Gastrointestinal and liver	Immune	Kidney	Heart and nervous system	Reproductive	Respiratory	Skin, eye and sensory organ	Toxicological	Other	Protective Clothing
Fumaric acid	1	Fumaric Acid	pH control, fracturing	110-17-8	X	T						S	S				S	S			R,G,C,E
✓ Glutaraldehyde	3	Diald 25, Aldacide G, X-C	Biocide, fracturing	111-30-8	X	X		S	S	S	S	S	S	S	S	S	S	S	S		GE
Xanthan gum	4	Barazan D Plus, Barazan	Corrosion inhibitor, viscosifier, additive, drilling mud additive, fracturing	11138-66-2		X						S					S	S			R,G,C,E
✓ Diethanolamine	3	Enviro-Torg #3, Clean U	Detergent, unknown	111-42-2	X	X	S	S	S	S		S	S	S	S	S	S	S	S		
Mica	2	Barite #1, Micatex Fine	Lost circulation material, unknown, fracturing	12001-26-2								S					S				R
Bentonite	6	Aquagel, Bentonite #1, B	Viscosifier/gellant, unknown, extender, fracturing	1302-78-9			S					S	S				S	S	S		R,G,E,C
✓ Calcium hydroxide	3	Lime #1,3, Diaseal M	pH control, lost circulation material, fracturing	1305-62-0		X		S	S			S		S	S		S	S			R,G,E,C
Sodium hydroxide	5	Caustic Soda #3, Activat	Gellant, chelating agent, fracturing, activator, unknown	1310-73-2		X						S					S	S	S		R,G,C,E
Limestone (Calcium carbonate)	3	Baracarb, Baracarb #2 (2)	Lost circulation material, fracturing	1317-65-3													S	S			
NaHCO3	1	Bicarbonate of Soda	pH control, fracturing	144-55-8		X	P		S		S	S	S	S			S	S	S	S	R,G,E
Crystalline silica, cristobalite	2	Aquagel, Baro-Trol Plus	Viscosifier, fracturing, shale inhibitor	14464-46-1			S	S									S	S			RE
Crystalline silica, quartz	26	Acfrao PR-6000W, Aqua	Weighting material, unknown, viscosifier, fracturing, lost circulation material, surfactant, gellant, cement additive, shale inhibitor, proppant	14803-60-7			X	S				S	X	S			S	S			R,G,E,C
Crystalline silica, tridymite	2	Aquagel, Baro-Trol Plus	Viscosifier, shale inhibitor, fracturing	15468-32-3			S	S									S				
✓ Dipropylene glycol monomethyl ether	2	SandWedge NT, N-Vis L	Proppant, viscosifier, fracturing	34590-94-8	X	X						S		S	S	S	S	S			G,E,R
Coal	1	Carbonox	Surfactant, fracturing	50815-10-6			S	S				S					S	S			RE
Aluminum tristearate (stearate)	3	Aluminum Stearate 1,3&4	Drilling mud additive, unknown	637-12-7								S					S	S	S		E,R
✓ Petroleum distillate hydrotreated light	6	B145 #1, EZ-Mud L, Em	Fracturing, unknown, additive, friction reducer	64742-47-8		X						S			S		S	S	S		R,G,E,C
✓ Isopropanol (Propan-2-OL)	10	Losurf-300, HAI-85M,	Surfactant, gellant, non-emulsifier, corrosion inhibitor, emulsifier, fracturing fluid, unknown, hydrogen sulfide scavenger	67-63-0		X	X		S	S		S	S	S			S	S	S		
Barite (BaSO4)	3	Barite #1, Baroid, New B	Weighting material, unknown	7727-43-7		T							S				S	S	S		RE
Sodium acid pyrophosphate	1	SAPP #1	Dispersant	7758-16-9		X						S	S				S	S			G,R,E
✓ Kerosene	3	Bara-Defoam 1, Bara-De	Defoamer, fuel, fracturing	8008-20-6	X		S	S	S		S	S	S	S			S	S	S		E,G
Sodium ligninsulfonate	1	Carbonox	Surfactant, fracturing	8061-51-6		X						S	S	S		S	S	S			R,G,E
Anionic acrylic polymer	1	Therma-Thin	Thinner	mixture		X	X					S					S	S	S		GE
Fatty acid ester	1	Drill-N-Slide	Lubricant, fracturing	mixture													S	S	S		GE
No hazardous ingredients	1	N-Vis P Plus	Viscosifier, fracturing	mixture		X											S	S	S		R,G
No hazardous substances	1	Diamond Seal	Additive	mixture													S	S			E
Sodium polyacrylate	1	PolyAc Plus	Additive	mixture		X											S	S			GE
Celulose derivative	1	Pac-R Premium	Fluid loss additive, fracturing			X											S	S	S		E
Inert material	1	BaroSeal	Lost circulation material, fracturing														S	S			E
Nut hulls	1	Barofibra	Lost circulation material, fracturing														S	S	S		G
Walnut hulls	1	Wall-Nut Fine	Lost circulation material, fracturing														S	S			R,E,C,G
Wood by-product	1	Sawdust	Lost circulation material, fracturing														S	S	S		R

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**Mr. Adam Strobel, Director
 Bergen County Open Space Division**

**Mr. Kevin Koslosky
 New Jersey Department of Environmental Protection
 Green Acres Program**

I am very concerned about El Paso Corporation's proposed Tennessee Gas Pipeline Northeast Upgrade Project and the effects it will have on the Highlands and the region. The land was purchased for the purpose of recreation and conservation, and there is no need to assist the El Paso Corporation in profiting off of gas extracted by hydraulic fracturing. We know there are devastating effects on the environment and public health from fracking. Pennsylvania, which is a source of gas for the proposed pipeline, has experienced blowouts, leaks and spills. I urge you not to sell county land to a company that has already had three gas pipeline explosions in the last year.

The pipeline will put our drinking water supplies, waterways and aquifers at risk, as well as several state and federal endangered species. We have already seen the heavy damage to Lake Lookover by this company and increased flooding along the right of way, which demonstrates that their mitigation plans do not work.

Please say NO to this pipeline project and reject the sale of county land for the Tennessee Gas Pipeline Northeast Upgrade Project.

	First Name	Last Name	City	Zip
1	Mary And Roy	Derstine	Kinnelon	07405
2	Florence	Margalit	Livingston	07039
3	Louis	Taterka	Lafayette	07848
4	Beth	Gatlin	Lincoln Park	07035
5	Lascinda	Goetschius	Fair Lawn	07410
6	Matthew	Shapiro	Fort Lee	07024
7	Louis	Avrami	Morristown	07960
8	Rosalie	Richter-Goldberg	Lafayette	07848
9	Dina	Willner	Mahwah	07430
10	Simone	Healey	Glen Rock	07452
11	Marie	Danna	Ridgefield	07657
12	David	Turner	Belleville	07109
13	Cindy	Kerekes	Wharton	07885
14	Gail	Adrian	Stockholm	07460
15	Christopher	Dougherty	Wanaque	07463
16	Gloria And Marvin	Levitt	Fair Lawn	07410
17	Joy	Sullivan	Newton	07860



	First Name	Last Name	City	Zip
18	Nick	Berezansky	Ridgewood	07450
19	Liz	D.	Morris Plains	07950
20	Karen	Winslow	Glen Ridge	07028
21	Keith	Karasky	East Rutherford	07073
22	Renee	Allessio	Hewitt	07421
23	Richard	Jaretsky	Clifton	07011
24	P	Scoville	Hewitt	07421
25	Brian	Craig	Rockaway	07866
26	Annmarie	Parmenter	Belleville	07109
27	Sheryl	Kantor	Ringwood	07456
28	Lorelei	Okun	Lyndhurst	07071
29	Shirley	Bensetler	Cresskill	07626
30	Carroll	Arkema	Pompton Lakes	07442
31	Rama	Vemulapalli	Whippany	07981
32	Louise	Sherman	Leonia	07605
33	Susan	Nierenberg	Teaneck	07666
34	Jae	Yun	Ramsey	07446
35	Nancy	Taiani	Montclair	07043
36	Virginia	Rietz	West Milford	07480
37	Lynne	Bruger	Belleville	07109
38	Scott	Byrne	Dover	07801
39	Sherry	Gordon	Fort Lee	07024
40	Dan	Brennan	East Rutherford	07073
41	Robert	Nerbetski	East Rutherford	07073
42	Michaela	Redden	Norwood	07648
43	Nicole	Reicher	West New York	07093
44	Rich	Pecha	Lake Hopatcong	07849
45	Melanie	Deysher	Montclair	07043
46	Mary Ellen	Doyle-Birchenough	Vernon	07462
47	Paul	Eisenman	Cliffside Park	07010
48	Carol	Jagiello	Bloomingtondale	07403
49	Anne	Chang	Mahwah	07430
50	Tracy	Mclarnon	Bogota	07603
51	Barbara	Cullinan	North Bergen	07047
52	Kate	Walsh	Montclair	07042
53	Candace	Tice-Tomasik	Toms River	08753
54	Arlene	Patoray	Paramus	07652
55	Steve	Yakoban	Englewood	07631
56	Maria	Winter	Morristown	07960
57	Robert	Keller	Parsippany	07054
58	K	Muccillo	Morris Township	07082
59	Delis	Guzman	Bergenfield	07621



	First Name	Last Name	City	Zip
60	Reggie	Thomas Reggie	Bloomfield	07003
61	Myrna	Marcarian	Montclair	07042
62	Marvin	Levitt	Fair Lawn Nj	07410
63	Kelly	Palazzi	South Hackensack	07606
64	Rosann	Guglielmo	Parkridge	07656
65	Jackie	Schramm	Pompton Lakes	07442
66	Ryan	Hasko	Cliffside Park	07010
67	James	Hill	Riverdale	07470
68	Kim	Fugel	Lincoln Park	07035
69	Lee	Mackenn	Bloomingtondale	07403
70	Ingrid	Werner	Englewood	07631
71	Janet	Wortendyke	Upper Nyack	10960
72	Chrissie	Carlin	Bloomfield	07003
73	Greg	Shortway	North Haledon	07508
74	Eileen	Mcinerney	N. Caldwell	07006
75	Sam	Feuss	Woodland Park	07424
76	George	Schaefer	Kinnelon	07405
77	Susan K.	Lapp	Cresskill	07626
78	Pauline	Alama	Rutherford	07070
79	Sam	Banola	West Milford	07480
80	Marnie	Vyff	Mountain Lakes	07046
81	Dac	Campbell	Montclair	07042
82	Jim	Walsh	Keanseburg	07734
83	Nancy	Miller	Sussex	07461
84	Karen	Frei	Saddle River	07458
85	Lila	Applebaum	Fort Lee	07024
86	Colleen	Keating	Ridgewood	07450
87	Robert	Simpson	Wayne	07470
88	Barb	Maddalena	Teaneck	07666
89	Barry	Moore	Montclair	07042
90	Toni	Grenz	Newton	07860
91	Michael	Baki	Blairstown	07825
92	Pete	Delorenzo	Garfield	07026
93	Gunta	Alexander	Glen Ridge	07028
94	Laura	Dickey	Waldwick	07463
95	Patricia	Alessandrini	Teaneck	07666
96	Frank	Cano	Ridgefield Park	07660
97	Amy	Richardson	Clifton	07012
98	Jo	Sippie-Gora	Kinnelon	07405
99	Frank	Santangelo	Prospect Park	07508
100	Kathleen	Kirk	Nutley	07110
101	Mary	Lurie	River Edge	07661



	First Name	Last Name	City	Zip
102	Patricia	Jenatsch	Morris Plains	07950
103	Martha	Kerr	Montclair	07042
104	Jeff	Nach	Belleville	07109
105	Sylvia	Golbin	Mahwah	07430
106	Rachel Dawn	Davis	Manalapan	07726
107	Kevin	Pflug	Montclair	07042
108	Joseph	Attamante	Morristown	07960
109	Jim	Silva	Bronx	10467
110	Maryann	Mueller	Lodi	07644
111	Lisa	Stewart	Wharton	07885
112	Monica	Garofalo	Hackensack	07601
113	Bruce	Gorodn	Fort Lee	07024
114	Camille	Gaines	Kinnelon	07405
115	Susan	Clancy	Kinnelon	07405
116	Eric	Carlson	Ramsey	07446
117	Sharon	Coughlin	Boonton	07005
118	Piera	Digiulio	Ridgefield	07657
119	Will	Roy	Wayne	07470
120	Judy	Michaels	Bloomfield	07003
121	James	Seiler	Alpine	07620
122	Clifford/Christine	Schmutz	Boonton	07005
123	Brenda	Cummings	Closter	07624
124	Norbert	Langer	Lincoln Park	07035
125	Dorothy	Danner	Englewood	07631
126	Nancy	Hedinger	Morristown	07960
127	Bea	Levoy	Rockaway	07866
128	Meredith	Kates	Hillsdale	07642
129	Priscilla	Sisco	North Bergen	07047
130	Cynthia	Soroka-Dunn	Demarest	07627
131	Raymond	Intemann	Cliffside Park	07010
132	Adel	Matar	Montclair	07043
133	Rebecca	Burke	Kinnelon	07405
134	Samuel	Wagstaff	Norwood	07648
135	Christina	Elsayed	Lafayette	07848
136	Janys	Kuznier	Vernon	07462
137	Roger	Haase	Edgewater	07020
138	Ken	Price	Bloomfield	07003
139	Ruth Bauer	Neustadter	Hackensack	07601
140	John	Schneider	Twp. Of Washington	07676
141	Barbara	Dalton	Morristown	07960
142	Judith	Faulkner	Mahwah	07430
143	Frank A.	Brincka	Sussex	07461



	First Name	Last Name	City	Zip
144	Robin	Nelson	Glen Ridge	07028
145	Kelly	Larkin	Ridgewood	07450
146	Y.D.	Jordan	Montclair	07043
147	Susan	Mullins	Bloomfield	07003
148	Janis	Bozowski	Kendall Park	08824
149	Suzanne	Maresca	Lake Hopatcong	07849
150	Steven	Hugelmann	Dumont	07628
151	Scott	Rotman	Vernon	07462
152	Louise	Disclafani	Garfield	07026
153	Susan	Whitsell	Woodland Park	07424
154	Magda	Wolk	Newton	07860
155	Robert	Veralli	West Milford	07480
156	Susan	Hurwitz	River Edge	07661
157	Charles	Carrier	Montclair	07042
158	Marriott	Sheldon	Ridgewood	07450
159	John	Horner	Verona	07044
160	Barbara	Curtis	Monroe Twp.	08831
161	Gregory	Gorman	Hamburg	07419
162	Florence	Rollino	Bloomfield	07003
163	Neva	Moore	Leonia	07605
164	Imani	White	Eugene	07421
165	Joanna	Meakin	Harrington Park	07640
166	O.	Ruiz	Clifton	07013
167	Karen	Bernard	Verona	07044
168	Tanja	Israel	Mahwah	07430
169	Cole	Koeniger	Hoboken	07940
170	Edmund	Venella	Blairstown	07825
171	Maryjean	Amore	Paterson	07504
172	Nick	Mantas Esq	Twp Of Washington	07676
173	Thomas	Nangle	Parsippany	07054
174	Susan	Loesser	Edgewater	07020
175	Kim	Latham	Newton	07860
176	Shaun	Ananko	Morristown	07960
177	Heather	Spergel	Livingston	07039
178	Vivian	Addeo	Glen Ridge	07028
179	Timothy	Mcbride	Hackensack	07606
180	Dr. Peter	Geidel	Paterson	07504
181	Alan	Firkser	Montclair	07042
182	Tara	Becker	Dover	07801
183	Bill	Wasley	Hackensack	07601
184	Peter	Foley	Oakland	07436
185	Michael	Schaeffer	Caldwell	07006



	First Name	Last Name	City	Zip
186	Barbara	Coe	Morristown	07960
187	Robert	Watrous Rla	Andover	07821
188	Dian	Buehlmeier	Wyckoff	07481
189	Erin	Karp	Teaneck	07666
190	Jennifer	Ciambrone	Clifton	07011
191	E	Cordova	Bloomfield	07003
192	Marie	Keegan	Boonton	07005
193	Norman	Hartz	Fair Lawn	07410
194	Jeffrey	Rattner	Lake Hopatcong	07849
195	Marge	Jaros	Verona	07044
196	Henry	Rauchweld	Wyckoff	07481
197	Kevin	Dail	Rockaway	07866
198	Rich	Haddad	North Arlington	07031
199	Andrea	Frary	Dover	07801
200	Barbara Ann	Krebs	Clifton	07011
201	Margaret C.	Mchugh	Sparta	07871
202	Kristin	Fischer	Glastonbury	06033
203	Mary	Mcguinness	Verona	07044
204	Kevin	Bolembach	Clifton	07012
205	James	Lambert	Tenafly	07670
206	Marianne	Vetter	Pompton Plains	07444
207	Laura	Dempsey	Hardwick	07825
208	Diane	Hoffman	Montclair	07043
209	Robert	Jones	Newton	07860
210	Thomas	Casal	Rockaway	07866
211	Katherine	Rabenau	Hancock	13783
212	Clara	Rodriguez	North Bergen	07047
213	Julie	O'Brien	Ramsey	07446
214	Hilary	Malyon		07436
215	Nancy	Lester	Mountain Lakes	07046
216	Joellen	Lundy	Red Bank	07701
217	Debra	Wardell	Oakland	07436
218	William	Brown	Little Falls	07424
219	Ann	Garcia	Little Ferry	07643
220	Lora	Schwacke	Wyckoff	07481
221	S M Bridget	Becker	Lodi	07644
222	Aquinas	Szott	Lodi	07644
223	Susan	Williams	Sparta	07871
224	Nancy	Woods`	Demarest	07627
225	David	Knechel	Upper Saddle River	07458
226	John	Fitzgerald	Ringwood	07456
227	Vincenza	Euripides	Oakland	07436



	First Name	Last Name	City	Zip
228	Kinga	Salierno	Cedar Grove	07009
229	David A	Lawrence	Morris Plains	07950
230	Steven	Maginnis	West Caldwell	07006
231	Darryl	Manthey	Wantage	07461
232	Janie	Horowitz	River Edge	07661
233	Donald	Elliker	Sparta	07871
234	Mark	Neidorff	River Edge	07661
235	Nadia	Levytsky	Denville	07834
236	Denise	Soto	Hamburg	07419
237	Marianne	Maunsell	Kingston Upon Thames	10024
238	Susan	Uustal	Morristown	07960
239	Lawrence	Gioielli	Kinnelon	07405
240	Susanne	Walther	Montclair	07043
241	Paul	Kirchoff	Wyckoff,	07481
242	Jen	Perlaki		07470
243	Mary	Derengowski	Montclair	07043
244	Patrick	Samay	Passaic	07055
245	Douglass	Herd	Hewitt	07421
246	Jon	Padden	Convent Station	07961
247	Dennis	Schvejda	North Haledon	07508
248	Margarete	Hyer	Mahwah	07430
249	Mary	Bouchoux	Bloomfield	07003
250	Chris	Noyes	Bloomfield	07003
251	Carroll	Gunnigle	Montclair	07042
252	Monica	Jelonnek	Dover	07801-4530
253	Nancy J.	Lavoie	Waldwick	07463
254	George	Bourlotos	Belleville	07109
255	Ricardo	Fonseca	East Rutherford	07073
256	Donna	Brauchle	Cedar Grove	07009
257	Wanda	Power	Rutherford	07070
258	Carol	Tarlo	Pompton Lakes	07442
259	Mary	Leane	Clifton	07012 1023
260	Susan	Krcmar	Woodland Park	07424
261	Joanne	Ryan	Caldwell	07006
262	Maryann	Fahey	Washington Twp	07676
263	Harriet	Shugarman	Wyckoff	07481
264	Sherill	Ketchum	Skaneateles	13152
265	John	Fazio	Pine Brook	07058
266	Meredith	Wolf	Caldwell	07006
267	Adam	Wall	East Hanover	07936
268	Barbara	Conover	Montclair	07042
269	Susan	Standley	Sparta	07871



	First Name	Last Name	City	Zip
270	Harold	Jenssen	Ridgewood	07450
271	Wendy	Johnson	Mahwah	07430
272	Andrew	Korkes	Wayne	07470
273	Julie	Behmer	Hopatcong	07843
274	Simone	Richmond	Allendale	07401
275	Patty	Epstein	Ramsey	07446
276	Fred	Keen	Tenafly	07670
277	Nancy	Ruckert	Secaucus	07094
278	Taylor	Eldridge	Little Falls	07424
279	Walter	Bock	Tenafly	07670
280	Gerd	Schubert	Saddle Brook	07663
281	Ernie	Needham	Newton	07860
282	Michael	August	Parsippany	07054
283	Valerie	Capezuto	Rutherford	07070
284	Cheyenne	Russo	West Milford	07480
285	Joseph	Sinzer	Cedar Grove	07009
286	Janet	Sprance	Teaneck	07666
287	Dina	Grinshpun	Monsey	10952
288	Bonner	Doemling	Bloomfield	07003
289	David	Pinkham		07874
290	Garrett	Winton	Hamburg	07419
291	James	Svendsen	Boonton	07005
292	Carol	Folan	Wayne	07470
293	Erica	Panek	Stockholm	07460
294	Nick	Sheehan	Glen Ridge	07028
295	Pamela	Lynn	Oak Ridge	07438
296	Phillip	Barone		07093
297	Sl	Fyre	Emerson	07630
298	Robert	Liebman	Wayne	07470
299	Dale	Hawrylczak	Westwood	07675
300	Debbie	Fine	Landing	07850
301	Sophia	Grammatas	Saddle Brook	07663
302	Marylin	Wechselblatt	Wharton	07885
303	Louise	Umberto	Morris Plains	07950
304	Patricia	Finn	Allendale	07401
305	Jason	Teepie	Morristown	07960
306	Mary	Waldeck	West Milford	07480
307	Dave	Mariconda	Fairfield	07004
308	Nicholas	Lee	Hopatcong	07843
309	Linda	Marticek	Ho-Ho-Kus	07423
310	Ellen	Mendelsohn	New Milford	07646
311	Michele	Van Allen	Hamburg	07419



	First Name	Last Name	City	Zip
312	Emily	Maldonado		07011
313	Betty	Kish	Bloomfield	07003
314	Theodore	Wirth	Denville	07834
315	Patricia	Williamson		07856
316	Ian	Whelan	Ridgewood	07450
317	Greg	Navarro	Montclair	07042
318	Jessica	Defabritis	Newton	07860
319	Gloria	Antaramian	Upper Saddle River	07458
320	Robert	Debenedette	Tenafly	07670
321	Charles	Brunner	River Edge	07661
322	Lianna	Flynn	Montclair	07042
323	Seth	Klibonoff	Bergenfield	07621
324	Christopher	Grasso	Mahwah	07430
325	David	Altman	Glen Rock	07452
326	John	Gangale	Midland Park	07432
327	Wendy	Schuman	Essex Fells	07021
328	Carl	Oerke	River Edge	07661
329	Susan	Kolton	Butler	07405
330	John	Codner	Totowa	07512
331	Annelie	Schreck	Sparta	07871
332	Irene	Del	Haledon	07508
333	Arthur	Gilroy	Wharton	07885
334	Dean	Bigbee	New Milford	07646
335	Debbie	Brick	Sandyston	07826
336	Gowri	Varanashi	Wyckoff	07481
337	E	Sto	Passaic	07055
338	David A.	Thélémaque	West Milford	07480
339	Laurent	Comes	Kinnelon	07405
340	Patricia B.	Gass	Franklin Lakes	07417
341	Daniel	Dirocco	Clifton	07042
342	Chris	Duncan	Upper Montclair	07043
343	Andrea	Dealmagro	Hopatcong	07843
344	Robert	Karasiewicz	Parsippany	07054
345	Diane	Zaun	Wharton	07885
346	Ellyn	Ward	Hackensack	07601
347	Lisa	Kelly	Hardwick	07825
348	Matt	Smith	Wyckoff	07481
349	Jennifer	Ferencz-Barato	Bergenfield	07621
350	Cecille	Kupfer	Oradell	07649
351	Jeremy	Wyble	Bloomingtondale	07403
352	Paul	Rosolie	Wyckoff	07481
353	Mick	Gormaley	Saddle Brook	07663



	First Name	Last Name	City	Zip
354	Derek	Demeri	North Haedon	07508
355	Alice	Kessler	Ocean	07712
356	Janus	Varela	Bergenfield	07621
357	Sandra	Wyble	Bloomington	07403
358	Julie	Cunningham	Glen Rock	07452
359	Cami	Klein		07452
360	Mridula	Shetler	Glen Rock	07452
361	Frank	Spratt	Rutherford	07070
362	Dianne	Kidwell	Ridgewood	07450
363	Ronald	Perez	Ramsey	07446
364	Andy	Middleton	Montclair	07043
365	Elisabeth	Barker	Hawthorne	07506
366	Brenda	Gormaley	Saddle Brook	07663
367	Barbara	Stomber	Wayne	07470
368	Maureen	Brodts	Pompton Lakes	07442
369	Leeann	Sinpatanasakul	Wayne	07470
370	Eric	Meier		07624
371	Anna	Sand	Saddle Brook	07663
372	Arlene	Aughey	Saddle Brook	07663
373	Rachel Dawn	Fudim Davis	Manalapan	07726
374	Jessica	Epstein	Teaneck	07666
375	Melissa	Tow		29464
376	Jean	Spratt	Rutherford	07070
377	Anita	Riley	Lake Hopatcong	07849
378	Helen	Egan	Newfoundland,	07435
379	David	Smith	Demarest	07627
380	Holly	Keller		07670
381	Frank	Sole		07935
382	Robert	Garcia	Morristown	07960
383	K.	Wong		07444
384	George	Almond	Ridgewood	07450
385	Ann	Garrity	Uncasville	06382
386	Antoinette	Califano	Bloomington	07403
387	Andrew	Ptak	Highlands	07732
388	Patricia	Leach		07940
389	Mary	Tomlinson	Lake Hopatcong	07849
390	Grace	Kim		07660
391	Jin	Jung		07632
392	Patty	Cavuoto	Ramsey	07446
393	Chris	Mcvey		07423
394	Gabriela	Carpio	Bogota	07603
395	Emma	McLaughlin	Seaside Heights	08751



	First Name	Last Name	City	Zip
396	Sam	Bradley		07001
397	Dean	Sibrizzi	Monsey	10952
398	Amylynn	Buterbaugh		07054
399	Amy	Heid		07456
400	Elizabeth	Bechok		07823
401	Jennette	Morgan		10977
402	Michelle	Assoian	Asheville	28804
403	Jack	Kasparian		07423
404	Jacqueline	Cascone		07481
405	Retep	Howling		07430
406	Ada	Brunner	Linden	07036
407	Peter	Kasparian		07423
408	Amanda	Penrose		07054
409	Kishen	Das	Sunnyvale	94086
410	Richard	Browning	Ringwood	07456
411	Louis	Schoen	Jackson	08527
412	Sarah	Davis		07450
413	Lan	Wang		07450
414	Alison	Graham		07450
415	Karen	Montero	Ridgewood	07450
416	Brian	Kurtz		07869
417	Patrick	Mawhinney	Wyckoff	07481
418	Kenneth	Harris	Waldwick	07463
419	Katie	Holdefehr	Oakland	07436
420	Helena	Holmes		07422
421	Brian	Bourne	North Bergen	07047
422	Anne Marie	Conn		07825
423	Moore	Douglas	Leonia	07605
424	Mary	Wiseman		07450
425	Daphna	Sterndaphnas		10977
426	Sydney	Young		07028
427	Susan	Potters	Glen Ridge	07028
428	Laila	Russoniello	Mountain Lakes	07046
429	Charles	Carrier		07042
430	Linda Lee	Rodenberg		07801
431	Gretchen	Fry	Mountain Lakes	07046
432	Mary	Hostak	East Rutherford	07073
433	Basil	Vorolieff	Fair Lawn	07410
434	Natascha	Israel	Mahwah	07430



①

my name is Hank Klumpp. I'm a farmer in Tewksbury, Hunterdon County and own 150+ acres in the Highlands Preservation Area.

Tewksbury voted not to opt into the Highlands Master Plan in the Preservation Area. But - the environmentalists and lobbyists were outraged - called for a do-over - which should be against the law - they got to someone - and the decision was reversed.

I have been standing before the Highlands Council for almost eight years now asking to see the scientific study that put my

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property into the Preservation Area - no one can show me anything. I put in an O PRA request to see the minutes of the township meeting that put Tewksbury into the Highlands and exactly who voted for it to pass and to see the resolution. But - there are no such records or resolution on record. On the original map Tewksbury was not even part of the Highlands. Overnight the boundaries were erased. It was political not scientific.

I have to laugh at how development in Hunterdon is the hot issue like Bellemead building a sewage treatment

③

plant, office complexes, large scale development, and homes.

Let's face it - let's be honest - the whole Highlands Act was to keep Hunterdon a park. The whole SAVE THE WATER was nothing but a huge cover-up for one of the biggest land-grabs in history. The Highlands Act was signed as a pay-back to environmentalists from McGreevy for getting him elected and then he had to sign it as fast as he could as he made

4)

his exit out of office - so the Act could possibly be his legacy. And here I am - paying for this. My property ^{value} was worth too much to reimburse me - so it was taken - No money was in place before the Act was passed and there still is none. Can anyone tell me that I should just accept an 80% loss on my property value. That is what the TDR Credit Bank wants me to accept. I may be old, but I'm not stupid. Not one of you

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on the council would accept
such a deal if you were in my
boots — and I am sure that
you would also want answers.

Thank you!

Hank Klumpp
24 Longview Road
Lebanon, N. J. 08833

Table 44: Summary of water quality conditions at 21 NJDEP/USGS sites sampled in the Raritan River basin from 1991-97

[Green Cells = the 3 sites with most samples meeting the standard or 3 sites with lowest median values for each constituent (highest median DO and alkalinity values); Red Cells = the 3 sites with most samples not meeting standards or 3 sites with highest median values (lowest median DO and alkalinity values); Alkalinity, biochemical oxygen demand, total ammonia + organic nitrogen (TKN) and total organic carbon do not have a standard; Ratings for pH and hardness are based on percent of samples meeting or not meeting both a high and low standard; *, trout maintenance; ** trout production; # coastal plain waters have naturally low alkalinity]

Station Number	Nutrients					Inorganics						Other Constituents					
	Ammonia + Organic Nitrogen	Ammonia, Un-ionized	Nitrite plus Nitrate	Organic Carbon, Total	Phosphorus, total	Alkalinity	Chloride	Dissolved solids, total	Hardness	Sodium	Sulfate	Biochemical Oxygen Demand	Dissolved Oxygen	Fecal coliform	pH	Suspended solids, total	Water temperature
South Branch Raritan River Sub-basin																	
**01396280 – South Branch, Middle Valley											Green					Green	
*01396535 – South Branch, High Bridge	Green					Green					Green						
**01396588 – Spruce Run	Green	Green		Green			Green	Green						Green			
*01396660 – Mulhockaway Cr.	Green		Green	Green			Green		Green					Green	Green		
*01397000 – South Branch, Stanton					Green			Green									
01397400 – South Branch, Three Bridges					Red	Green		Red			Red					Red	
01398000 – Neshanic River		Red						Red		Red	Red		Green	Red	Red		
North Branch Raritan River Sub-basin																	
**01398260 – North Branch, Chester		Red					Red								Green		
01399120 – North Branch, Burnt Mills								Green									
**01399500 – Lamington River, Pottersville			Green				Red			Green			Green			Green	
01399700 – Rockaway Creek				Green		Green						Green					
01399780 – Lamington River, Burnt Mills												Green				Green	

Station Number	Nutrients					Inorganics						Other Constituents					
	Ammonia + Organic Nitrogen	Ammonia, Un-ionized	Nitrite plus Nitrate	Organic Carbon, Total	Phosphorus, total	Alkalinity	Chloride	Dissolved solids, total	Hardness	Sodium	Sulfate	Bio-chemical Oxygen Demand	Dissolved Oxygen	Fecal coliform	pH	Suspended solids, total	Water temperature
Millstone River Sub-basin																	
01400540 – Millstone River, Manalapan						#											
01400650 – Millstone River, Grovers Mill																	
01401000 – Stony Brook, Princeton																	
01401600 – Beden Brook																	
01402000 – Millstone River, Blackwells Mills																	
Raritan River Mainstem																	
01400500 – Raritan River, Manville																	
01403300 – Raritan River, Bound Brook																	
South River Sub-basin																	
01405302 – Matchaponix Br.						#											
01405340 – Manalapan Brook						#											









































**Pennsylvania American
Water Company**
 Group
Comforts Pond Reservoir
Private Property
No Unauthorized Personnel
Permitted

NOTICE
BOATING
IS
PROHIBITED

FISHING
PROHIBITED







**NO
REFUELING
ZONE**

 Tennessee Gas Pipeline
an El Paso company

**WETLAND
BOUNDARY**
321WΦAΦ

 Tennessee Gas Pipeline
an El Paso company

PEM (860+57-863+30) MP 16.30-16.35



CAUTION
OVERHEAD

NO
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ZONE
Tennessee Gas Pipeline
an Enbridge company

WETLAND
BOUNDARY
321WΦΦ
Tennessee Gas Pipeline
an Enbridge company
PEM













**NO
REFUELING
ZONE**

 Tennessee Gas Pipeline
an El Paso company

**WETLAND
BOUNDARY**
321WΦ4Φ

PEM

 Tennessee Gas Pipeline
an El Paso company

(860+57-863+30)
MP 16.30-16.35





