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December 9, 2012

Mr. Stephen Platt, EPA Region III  
Ground Water & Enforcement Branch  
Office of Drinking Water & Source Water Protection (3WP22)  
1650 Arch Street  
Philadelphia, PA, 19103

RE: UIC Permit PAS2D020BCLE (Windfall/Zelman 1)

Dear Mr. Platt,

This letter is to provide as a cover sheet to my testimony and attachments that will be submitted on December 10, 2012 at 7 pm at the EPA Public Hearing on the Zelman #1 Injection Well proposed for Brady Township, Clearfield County. Please extend the deadline for submitting comments, since only one copy of the permit application was available for review along with the limited time for local government bodies to properly review this information over the holidays.

All my concerns deal directly with the potential contamination of the underground sources of drinking water (USDWs). Please realize this is a highly developed residential neighborhood with valuable properties on water wells and springs close to the proposed disposal injection wells. The environmental impact on underground sources of drinking water (USDWs) could be affected by truck traffic patterns on our narrow roads and the road into the proposed site due to the permit applications "hydrology report."

Highland Street Extension has over 69 properties that will be affected. These properties have 57 water wells, 5 springs, and 1 cistern. In a one mile radius, we have over 370 properties with over 107 water wells being utilized regularly along with the springs in the area. Property values in a one mile radius total \$17,545,120 based on a final review of all properties and assessed value listings in the deed books this week.

The testimony will cover the following items and attachments will provide support to the testimony. An index is provided before the attachments and this cover sheet provides a detailed description of all the attachments included.

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Attachments Included in Binder for EPA are the following:

I. Testimony (17 pages)

II. Index

III. Pictures

1. My home (1 picture – page one)
2. Deep gas well behind our property (1 picture – page one)
3. ¼ mile radius map demonstrating my home is outside ¼ mile review area near a deep gas well (1 page)
4. Entrance and roadway into proposed disposal injection well site (2 pages)
5. Roads near the proposed disposal injection well (3 pages)
6. Highland Street Elementary School (1 page)
7. Highland Street Extension Development (14 pages)

IV. Irvin A-19 Violation Details (5 pages)

V. Faults & Earthquakes

1. Fault Maps (2 pages)
2. Subsurface Rock Correlation Diagram (1 page)
3. Earth: the operator's manual by Richard Alley (excerpt – 3 pages)

VI. Coal Mines

1. Coal mine map showing ¼ mile review area
2. DuBois Mall, Sandy Lick Creek and Coal Mines (pictures - 2 pages)
3. Map showing DuBois Mall and Erton -- Sykesville area (1 page)

VII. Gas Wells

1. Map of old existing gas wells within one mile area of proposed site (1 page)
2. List of old existing gas wells within one mile area of proposed site (2 pages)
3. Map of residents wells outside ¼ mile review by deep gas well – Carlson (1 page)

VIII. Plugging Costs

1. Sandy Township proposal map to bring water with prices written (1 page)
2. Taxpayers could get stuck paying for old gas wells, Courier Express 11/2011 (2 pages)
3. Deep Injection Wells, United States General Accounting Office report (2 pages)
4. List of water wells for Highland Street Extension Development (3 pages)
5. List of water sources for one mile radius (12 pages)

IX. Halliburton Loophole -- Explanation (1 page)

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X. Definitive Boundaries – Map marked to show faults, coal mines & deep gas wells (1 map)

XI. Headwaters – Maps (3 pages)

XII. Gas Well Field Map – Shows Deep Gas Wells in our area (1 page)

XIII. Studies

1. Representative George's Letter (2 pages) & Referenced Studies
2. Subsurface liquid waste disposal and its feasibility in Pennsylvania (4 pages)
3. May 2012 study, Nicholas School of the Environment Duke University (9 pages)
4. AP news article on National Research Council report (2 pages)
5. National Research Council report, testimony (5 pages)
6. United States Geological Survey (USGS) news article (2 pages)

XIV. Deficiencies, Permit application (2 pages)

XV. Property One Mile

1. Appraisal Addendum (1 page)
2. One Mile Radius Maps of Property (2 pages)
3. Property Values for One Mile Radius (12 pages)

XVI. Injection Wells

1. UIC Class IID Injection Wells in Pennsylvania, 9/17/2012 (1 page)
2. Brine Disposal in Pennsylvania (1 page)
3. Wasterwater disposal wells in Western Pa. Map (1 page)

XVII. Northwest Clearfield County Region Comprehensive Plan & Maps (4 pages)

XVIII. Chemicals

1. Penn State Extension Summary of Marcellus Shale Wastewater Issues in PA (9 pages)
2. Penn State Water Facts #28, Gas Well Drilling & Your Private Water Supply (2 pages)

XIX. Caledonia Syncline

1. Map of Clearfield County showing Caledonia Syncline in our area (1 page)
2. Map of Clearfield County showing Two Mile Radius & Jefferson County Line (1 page)

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XX. Letters

1. EPA Testimony

- ✓ Duane Marshall (3 pages)
  - ✓ Brady R. LaBorde, Sandy Township Supervisor (1 page)
  - ✓ Laurie Wayne (1 page)
  - ✓ Leslie Barr (1 page)
  - ✓ Rev. James Green (1 page)
  - ✓ Sherry Green (1 page)
  - ✓ Vivian Marshall (1 page)
  - ✓ Loretta Slattery (1 page)
  - ✓ Pat Erickson (1 page)
  - ✓ Terry & Carole Lawson (1 page)
  - ✓ John Parsons (1 page)
  - ✓ Ethel Marshall (1 page)
  - ✓ Robert Marshall (2 pages letter with attached article)
  - ✓ Valerie Powers (2 pages)
  - ✓ Randell Powers (2 pages)
2. Request for EPA Public Hearing (Duane & Darlene Marshall, one page)
  3. Petitions to stop a Frack Wastewater Well (22 pages)
  4. List of Some Participants who mailed postcards (1 page)
  5. Brady Township Letter Opposing Disposal Injection Well (2 pages)
  6. Clearfield County Commissioners – Letter to EPA (1 page)
  7. City of DuBois – Letter to EPA (2 pages)
  8. Sandy Township – Letter to EPA (1 page)
  9. Representative Glenn Thompson – Letter on Commonsense (2 pages)
  10. Duane & Darlene Marshall – Letter to EPA & Attachment 7/23/12 (6 pages)

Respectfully we request you deny this application due to all the concerns listed in our testimony with our underground sources of water (USDWs). Thank you for your consideration of my testimony and attachments.

Sincerely,



Darlene Marshall

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November 29, 2012

Mr. Stephen Platt, EPA Region III  
Ground Water & Enforcement Branch  
Office of Drinking Water & Source Water Protection (3WP22)  
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RE: UIC Permit PAS2D020BCLE (Windfall/Zelman 1)

Dear Mr. Platt,

This letter is to provide testimony due December 10, 2012 on the Zelman #1 Injection Well proposed for Brady Township, Clearfield County. Please extend the deadline for submitting comments, since only one copy of the permit application was available for review along with the limited time for local government bodies to properly review this information over the holidays. All my concerns deal directly with the potential contamination of the underground sources of drinking water (USDWs). Please realize this is a highly developed residential neighborhood with valuable properties on water wells and springs close to the proposed disposal injection wells. The environmental impact on underground sources of drinking water (USDWs) could be affected by truck traffic patterns on our narrow roads and the road into the proposed site. [See Attachment-Pictures--Highland Street Extension Development pictures of homes (14 pgs.)]

1 – The water source for my home and my drinking well are from a private water well located directly outside the ¼ mile area of review. This disposal injection well has the potential to contaminate my water well through the disposal of waste underground near my home. **Many neighbor's water wells are affected when work is done on the deep "Ginter" well, which is over 7000 feet into the Oriskany.**

**My main concern is the Carlson Stewart deep well into the Oriskany behind my home that gives off gas smells constantly. This makes me believe it isn't plugged properly and its depth is drilled into the Oriskany. All these deep gas wells in the area need reviewed and properly plugged. These two deep wells are just feet outside the ¼ mile area of review. These old deep well casings may also allow leakage of waste up into underground sources of water (USDWs). We can find five deep gas wells very close to the ¼ mile area of review.**  
[See Attachment - Pictures -- "Deep gas well picture behind my home"]

Please explain how the EPA plans to protect all the water wells in the area from contamination. For example, the Irvin Well (Clearfield County) was over pressurized and fined. How will residents feel safe? How will residents be notified of a violation? How was the waste cleaned up? It appears this Irvin well had prior violations before. Violations happened in 1987, 1997 & 2010. This last violation took a significant amount of time to be fined. It was in violation for

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three months and in this residential neighborhood we can't wait three months for violations to be found, corrected and fined (two years later). This is not acceptable to water well owners in our area. Any violation of the Zelman #1 Injection Well would endanger homes and lives and is an unacceptable risk. [See Attachment - Irvin A-19 Violation Details]

2 – The water well tests done for the Windfall Oil & Gas permit application showed neighbors had really *excellent* water. Bill Sabatose told the neighbors this when he tested the water. We are concerned that this will not be the case if you allow this disposal injection well to be placed in our neighborhood.

The permit application states the general water quality is *excellent* in the hydrology report. This report stressed the imperative need to protect these water supplies. This report shows the flow towards many other homes and water supplies making their source of water important to protect, also. **We request you extend your area of review outside the ¼ mile because many additional residents have private water wells just feet outside the area of review near old deep gas wells. At least fourteen residents with at least sixteen water wells plus springs are closely located (just feet) directly outside the ¼ mile area of review and close to the Atkinson and Carlson Stewart deep gas wells. We rely on private water wells along with all the residents inside the ¼ mile area of review.**

[See Attachment - Gas Wells -- Map of residents wells outside ¼ mile review by deep gas well]

*It is not acceptable that the water well owners in the area be forced to pay to test their water and feel unsafe to drink it on a daily basis.* Residents don't want to use alternative water supplies if contamination happens to the USDWs. When they purchased their homes it came with clean water and they want it to stay that way. For example, in the violation case of the Irvin Well (Clearfield County) it was stated that, "if a well owner had their water tested regularly and now, finds an issue with the water, the EPA wants to know and EXCO could be forced to provide an alternative water supply. EPA suggests well owners have their water tested regularly to protect their rights." Disposal injection wells should be required to monitor quarterly or more regularly water sources in the area. This waste will be pumped underground continuously and will stay for many years with the potential to come up any "naturally occurring pathway" or any old gas well casing already in the same formation. This is not a risk that should be taken, especially near our water wells, springs, sources of public water and coal mines that lie under many homes in this neighborhood, city and area.

The permit application mentioned water purveyors denied access to water samples yet they didn't deny access. They were all originally tested. After the original tests, Windfall Oil & Gas sent at least four residents letters requesting signatures yet no one wanted to sign them and show support for the disposal injection well. **These water purveyors need to be approached again appropriately with more information about what they are signing specifically.** A letter in the mail just stating they want to test water a couple times a year is not acceptable. Not signing the letter didn't mean these people denied access. For example, the Powers family didn't sign

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the agreement but it showed up on the permit as if they were allowing access so this is a discrepancy. Because two other families show up as denying access and they never signed the agreement either. We all figured they should drill monitoring wells for the permit application not use a signed form for the EPA application granting access to our wells for monitoring.

Monitoring wells semi-annually still might not find contamination in underground sources of water (USDWs) in time to protect residents since undocumented boreholes or natural transmissive conduits (faults or fractures) would endanger water sources (USDWs) before testing results are conducted and injection processes are halted. Additionally, the company states in the permit application they have no experience in pollution control. This is scary when we have so many homes depending on water sources that are recharged from their proposed site.

[See Attachments - Plugging Costs -- List of water wells]

3 - Ground faults are located in the area close to the proposed disposal injection site. The proposed injection well may be located in an earthquake prone area. Taking the chance to lubricate these faults could additionally jeopardize our underground sources of water. An earthquake is the last thing you need near a disposal injection well to crack the casing and leak this into our private water wells or the deep coal mines within the ¼ mile area of review. Any small fracture or leak has the potential to seep into these mines and carry waste under the City of DuBois and into surrounding areas like Sykesville and Reynoldsville. These mines are full of water and are all over our area, so these deep mines would transmit toxic fluid into USDWs or water sources.

As we have seen in Ohio, earthquakes were linked to injection wells. The National Research Council reported in June that underground injection of wastewater produced by hydraulic fracturing and other energy technologies has a higher risk of causing such earthquakes. It states, "injection wells used only for the purpose of waste water disposal normally do not have a detailed geologic review performed prior to injection and the data are often not available to make such a detailed review. Thus, the location of possible nearby faults is not a standard part of siting and drilling these disposal wells." So it makes it harder to evaluate this area for the possibility of induced seismic activity and the potential to create an earthquake with the faults in our area. A new study is being released by the United States Geological Survey (USGS) that summarizes additional concerns (this full study is not yet available only a summary).

[See Attachment - Studies]

Has this area been identified as an earthquake prone area? Do transmissive faults intersect the proposed injection zone (potential to over or under pressurize or fracture)? What is the probability of an earthquake from the disposal injection well activity?

**In the fluid injection target for this permit we have faults in the Onondaga Formation, which lies over top of the Oriskany Sandstone. The Onondaga Formation is the confining formation above the Oriskany/Huntersville Chert and we have evidence of faults in this confining layer,**

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*which would allow waste to escape into other formations and into our aquifers. We also know other deep gas wells were drilled into the Oriskany near here and they used hydro fracking a good reason to deny this permit.*

[See Attachment - Faults & Earthquakes -- Fault Maps & Subsurface Rock Correlation Diagram]

"We have long known that injecting fluids into Earth, for whatever reason, can trigger earthquakes. One famous series of quakes in the early to mid 1960s near Denver, Colorado, with many having magnitudes of between 3 and 4, was triggered when people tried to dispose of waste fluids by injecting them under pressure into deep rocks (Richard B. Alley in "Earth: the operator's manual" originally from "The Denver Earthquakes" in "Science")." Richard Alley also states, "If the old cracks are oriented such that today's stresses are trying to reopen them, then the 'fracking' from gas extraction or waste disposal or geothermal-power generation will just help reopen the old cracks." We already know that deep gas wells used the "fracking" process in our area with two deep gas wells that would have affects into the ¼ mile area of review. Even though the permit application states no "fracture data" is available in the area on the confining zones. An excellent statement about our situation is found in Richard Alley's book "Earth: the operator's manual" stating, "hydrogeologists have lent their weight to efforts to keep pollutants out of the ground, because keeping them out is often a lot easier than getting them back out." [See Attachment - Faults & Earthquakes]

**4 - How will the depths of mines and potential for fluid migration be addressed? Six acres of coal mines are located in the ¼ mile radius of review and any small fracture or leak has the potential to seep into these mines and carry waste under the City of DuBois. These mines are full of water and are all over our area, so these deep mines would transmit toxic fluid into water sources. These mines go under the City of DuBois to the DuBois mall and honey comb into the Sykesville and Reynoldsville areas, too.**

These coal mines actually have water coming out by the DuBois Mall into the Sandy Lick Creek. This seems to be a major concern for area residents. The water in the coal mines is able to be cleaned up and used if needed. If toxic waste seeps into the coal mines through a "natural pathway" or a "fracture in the ground" the mine water will not be treatable for consumption. Instead our area will have a hazardous mess all under our neighborhood, city and area. Additionally, the Onondaga faults or other faults (permit application map) where the waste is being disposed could cause this waste to push up and go directly towards the coal mines and the old deep gas wells following a path of least resistance.

[See Attachment Sections - Coal Mines; Faults & Earthquakes; Definitive Boundaries]

5 - The possibility of a surface spill that would go directly into the aquifer is a concern. Due to all the springs feeding off the hill near the proposed disposal injection well site along with area headwaters (Reasinger Run & LaBorde Branch) having their source of water coming from proposed site is a major concern for our area. The permit application mentions the Sandy Lick



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Creek and this is important to area residents, also. Underground sources of water (USDWs) have the potential to be contaminated.

Many homes in the area depend on their springs and water wells for their water supplies and drinking waters. The permit application "hydrology report" showed the water flow towards many homes, springs and streams due to the configuration of the hill (location of the proposed disposal injection well). Additionally, the proposed site is listed as a recharge area for these homes. The homes are listed as being down grade from the proposed site and their water sources will be replenished from surface waters infiltrating the proposed disposal injection well site. [See Attachment - Headwaters]

6 - Just a few feet outside the ¼ mile review at least 5 deep gas wells are located in the same Oriskany formation that are able to transmit toxic fluid into water wells if casings are old, perforated, non-existent or the gas well isn't plugged properly. **We request all these old gas wells be reviewed before any permit is issued to Windfall Oil and Gas for a disposal injection well.** Abandoned wells could provide a pathway for methane migration into drinking water wells into the aquifer. Some of these abandoned wells may not be plugged properly. The fractures from these old gas wells are an important concern because they may have affected the proposed confining layers and made pathways to allow waste migration into aquifers. [See Attachment - Gas Wells]

7 - A few feet outside the ¼ mile review we have 5 deep gas wells located in the same formation (Oriskany) that are able to transmit toxic fluid into water wells. Has the EPA required research on other deep abandoned gas wells in a two mile radius? Residents are aware of deep abandoned gas wells in close proximity to the proposed site. A recent study of the DuBois watershed showed many abandoned gas wells in the area. If fluid migrates even 2 ½ miles away it could affect public water sources due to all these abandoned wells that need plugged. We know past history shows this waste can travel at least five miles away. **For the safety of so many residents, we request this application for an injection well be denied due to all the abandoned gas wells in the area. We know of 26 existing gas wells inside a one mile radius.**

8 - **The Carlson Stewart deep well (7,250) is not plugged properly and the smell coming off this well currently isn't coming from a few feet down since natural gas is not found near the surface.** Actually, the Carlson Stewart well has an air pocket from the surface to 1,160 feet below the surface based on the Windfall Oil & Gas permit application well logs. For 33 years this deep well has supposedly been plugged. The plugging below 1,160 feet was a mixture of salt and water to cement along with the metal casing. The well log stated it had 10% salt. This casing after 52 years is non-existent or it is perforated. Below the air pocket is 15 feet of gravel and then they layered cement and gelled water. This deep well is taking a chance of the waste coming back up and one accident with the pressures being used would push the waste into our underground sources of water (USDWs) or our well. The smell may be methane or natural gas so the disposal injection well could push waste down and make this gas or methane move to the

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surface since it will be in the same depth of the Oriskany. This example is just one of many concerns with reliability and potential for accidents.

The discrepancies between the well logs that are plugged aren't sufficient to believe they are plugged correctly. The Carlson Stewart well had 145 bags of cement used and the Ginter well had 375 bags of cement used. This demonstrates that twice as much cement was actually used in the Ginter well, which was half the depth of the Carlson Stewart well. We can't take this for granted with the deep wells in our area and having waste being injected near these wells.  
[See Attachment - Gas Wells -- map of homes near deep gas well outside ¼ mile review area]

9 - Explain the necessary bond or resources to abandon or plug. The cost to plug the disposal injection well should be much higher than \$30,000, since residents feel this is insufficient. Local newspapers have been explaining about the Pennsylvania abandoned wells and the cost has been cited extremely higher than \$100,000. A Carnegie Mellon University study stated, "the cost of decommissioning 3,000 foot deep wells in southwestern Pennsylvania has averaged approximately \$60,000 each. Since the cost increases with the depth of the well; Marcellus Shale wells, which can be 5,000 to 8,000 feet deep, are expected to cost much more to plug (Courier Express, November 14, 2011)." **The company should also have this amount of money in the bank and it shouldn't be a line of credit.**  
[See Attachments - Plugging Costs -- Taxpayers could get stuck paying for old gas wells]

**It is also important to residents to ensure funds are available for any potential costs incurred if water becomes contaminated in the area.** Especially, taking the chance so near a residential area full of private water wells. We know it would cost around one million dollars plus all the connection fees to bring water to our area from the City of DuBois through Sandy Township based on their projected figures. This may not be a feasible solution and it would be really hard right now for Brady Township to bring water to their residents due to the expansion of their lines being limited. Brady Township would need to cross a rail road property and this in the past has cost a \$5 million dollar liability policy to drill. Costs to run public water along a state highway will be higher due to the regulations. Residents don't want to plan to replace their *excellent* water sources with public water sources (that may not be as *excellent*). They would have connection fees of at least \$2,500 to \$3,000 within 100 feet of the line, so those living further away would have much higher connection fees. [See Attachment Sections - Northwest Clearfield County Region Comprehensive Plan; Plugging Costs -- Water Well Owner Lists]

**Windfall Oil & Gas providing only a line of credit for \$30,000 is not demonstrating financial resources to bring city water to all residences with water wells. We want to know the entire cost up front and have a bond for it in place. Bonding or performance guarantees by the company demonstrates their ability to abate a situation should something go wrong.** What assurances will EPA provide in regard to our Highland Street Extension Development? [See Attachment - Plugging Costs]

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10 - Why is a toxic waste dump & industrial activity being put into a residential area? This toxic waste dump & industrial activity should not be placed in an area designated residential. The chance being taken is dangerous if our water is contaminated because any emergency in our area would have the potential to need water brought to the emergency site. Our area has no fire hydrants and tanker trucks must be used. Discussion with emergency personnel brings up major concerns if USDWs are contaminated and a plan should be in place in case of any emergencies.

Emergency response guides for our area explain that our local responders are not always trained to handle these situations. Various types of incidents can happen: fires, blowouts, release of gas or chemicals on site, injuries to employees or other incidents involving the equipment. Often specially trained responders must be brought in from far distances. This site is located close to neighbors and any major emergency would be disastrous to our neighborhood and underground sources of water (USDWs), since this is where a major source of our water comes from for the Highland Street Extension Development. The chemicals in the waste water are not classed as toxic even though they are really toxic because of the Halliburton Loophole. If they were classed properly they would go in a Class I disposal well for toxic chemicals and have a two mile radius of review of the area before the permit application was approved. **Due to the high development of the area we request the area of review be extended beyond a ¼ mile.**  
[See Attachment - Halliburton Loophole]

11 - The Windfall Oil & Gas permit application attachment G mentions definitive boundaries in the Oriskany. These boundaries will confine the waste so that the waste will follow the path of least resistance. That path will be upwards towards the surface, towards ground water (USDWs) or towards coal mines. Any "naturally occurring pathways" and "cracks or crevices from prior fracturing" listed on the permit application well logs could give the waste a place to migrate. The well logs state hydro fracturing was used on these old gas wells. The potential for USDWs becoming contaminated due to the waste following a path of least resistance is a reality. This waste has the potential to travel into the deep coal mines and into the old deep gas wells or around the old gas well casings that are perforated or non-existent.

**The faults shown on the permit application maps would mean the definitive boundaries would contain the waste and it would only have a path towards the coal mines or follow the faults towards deep gas wells located at the ends of these faults, which one deep gas well is behind my home. For this reason this permit application should be denied.**  
[See Attachment - Definitive Boundaries]

12 - My private water well is 360 feet deep and this proposed disposal injection well shows two outer casings only going 170 feet and 375 feet deep. The other cement casing only goes 1,000 feet deep and we already know that the Carlson Stewart deep well has an air pocket from the surface to 1,160 feet deep causing great concern. The only other cement casing for the disposal injection well will be from the 7,000 depth up to 5,000 feet leaving the actually pipe exposed in the ground from 1,000 feet deep to 5,000 feet deep. This pipe has another pipe inside it yet the

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waste is highly corrosive and toxic and will affect the pipe over time. **This protection is not sufficient with all the prior drilling done in the area since a pipe leak or over pressurizing could cause waste to go into the ground between 1,000 feet and 5,000 feet near USDWs, coal mines and many gas wells (over 26 gas wells in the area have been located).**

The permit application notice of deficiencies demonstrated concerns about the lower most underground source of water (USDWs) and the best depth for the second string casing that makes me feel very uncomfortable. Residents concerns about the actual protection of our USDWs are really explained in these deficiency notes and the decision to case to 850 feet, 1,000 feet or 1,200 feet, which raises many questions. How can we trust that our water might not be affected if something like the Irvin injection well violation in Clearfield County occurs if this well is permitted?

13 - We request that the EPA extend the area of review and look beyond the original ¼ mile area of review. A better understanding of the area should be researched due to all the deep wells in the Oriskany already near our homes and private water wells. The City of DuBois being located so closely is another major consideration. Water supplies are only 2 ½ miles for many city and township residents. This is very close to this proposed site along with many private water wells and a Class 1 well would be reviewed for 2 miles, which Class 1 is for hazardous waste and we all know the waste being disposed of in this proposed Class 2 will be hazardous. Class Two disposal wells accept materials that are from the Oil & Gas Act that are exempt from being hazardous even though it is actually hazardous.

**Due to the problems we have already seen in Clearfield County with the Irvin Well and due to the residential location proposed in Brady Township we request a two mile radius of review.** It is not far to sources of water for Brady Township wells and the City of DuBois water sources that serve many surrounding areas. The Highland Street Extension Development has many residents with water wells along with the surrounding area in a two mile radius. Old deep gas wells have been drilled in the area, abandoned gas wells are very close to the proposed site, abandoned mines that spread throughout the area are significantly close to the proposed site, springs, water wells and headwaters are located in close proximity to this proposed disposal injection well.

The area of review can be a fixed radius of no less than one-quarter mile around an injection well or may be calculated "zone of endangering influence" based on geological parameters found in the injection zone, such as permeability, porosity, etc and proposed operational conditions, such as injection volumes, rates, length of injection, etc. What geological parameters are specifically being considered for this proposed disposal injection well? With other deep gas wells drilled into the same depth we believe the area of review must be two miles and many residents are very concerned about their water wells due to all these previously drilled deep gas wells.

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Some residents also believe the current zone of endangering influence hasn't been accurately figured due to the faults being confining boundaries. They believe the zone is more of an egg shape that would take into account deep gas wells in the area.

[See Attachment - Gas Well Field Map]

14 - It has been stated that Pennsylvania's geology is not conducive to disposal injection wells, so why are we discussing utilizing them more often in Pennsylvania? Representative Bud George is submitting testimony that further explains this statement. He states, "my comments on the Brady Twp. Injection well proposal focus on the threat to public and private water supplies. Simply put, geologic and hydrological conditions in the area make the proposed site an egregiously poor one for such a well. As the state representative from the adjacent district and longtime chair of the Pa. House of Representatives' Environmental Resources & Energy Committee, I have great familiarity with the area's incredibly complex geology. As a state geologist said of Clearfield County, "the geology was not as difficult as you thought it... It was worse!" It is infamous for its high pyrite and sulfur concentrations, which have had local ramifications. An environmental assessment omitted for an Interstate 99 construction project in adjacent Centre County has cost taxpayers tens of millions of dollars for remediation as the disturbed pyrite ruined water resources. In the 1972 Pa. Department of Environmental Resources report, "Subsurface Liquid Waste Disposal and Its Feasibility in Pennsylvania," it was noted, "It cannot be overstressed that the introduction of waste liquids into the subsurface is a permanent alteration of the subsurface environment... The magnitude of these changes may be small, but they are cumulative."

[See Attachment - Studies -- Representative George's Letter & Referenced Studies]

This permit application is trying to state the ideal conditions and unfortunately Pennsylvania studies show we don't have ideal conditions due to our history of drilling and fracturing the ground. The Environmental Geology Report titled "Subsurface Liquid Waste Disposal and Its Feasibility in Pennsylvania" by Neilson Rudd states extended effects of waste disposal, "The area of effect of an injection operation is considered to be defined by the extent of the effluent in its reservoir. While this area may be difficult to define, the area of pressure effect is even greater and more difficult to predict." It also states, "Oil field and ground-water experience shows too many examples of far-ranging and unpredictable displacement and pressure responses to justify confidence in simplistic calculations based upon idealized conditions." In summary the report states, "It cannot be overstressed that the introduction of waste liquids into the subsurface is a permanent alteration of the subsurface environment. The magnitude of these changes may be small, but they are cumulative." The accumulation of waste under our ground being confined into a small area with deep gas wells into the Oriskany already is an unacceptable risk with all the water wells, coal mines and fractures in our subsurface. Another finding in the report states, "The long-term injection of large volumes of waste must eventually result in the upward displacement of the brine intraformationally or through fractures into the fresh-water zone. The concentration of subsurface brines is so great, up to the order of 300,000 parts per million, that the intermixing of even one gallon will render several thousands of gallons of fresh water unfit

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for human use.” *This is what our Highland Street Extension Development finds unacceptable because our underground sources of water (USDWs) would be contaminated with worse things than brines, since we all know toxic chemicals are in waste water. We can't compare waste disposal to storage of gas for a temporary time, since waste is continuously disposed of for an indefinite time frame.* The final summary statement of the report mentions, “It is, however, an endeavor requiring careful planning and foresight, together with careful operation and observation, to prevent the ultimate environmental damage which outweighs the immediate benefit. The planners of subsurface disposal projects must think in terms of the whole rock-fluid system, in terms of tectonism, regional stratigraphic relationships, structural discontinuities and stresses, hydrodynamics, and interactive chemistry between all components of the systems, not just in terms of the immediate problems of fluid flow and storage in the vicinity of the injection site.”

This leads to a major question our group has asked, **“the study of the waste and its reaction to the limestone confining layer wasn't addressed in the permit application.” This needs more study. Another question that seemed to be a concern in the deficiencies is the actual permeability and still needs to be addressed further.** The application indicated .0061, which is extremely low. The EPA response was normal ranges between 10 - 100 millidarcies. The final response from Windfall Oil & Gas is 6.1 millidarcies, which is still very low. The report conclusion of the “Subsurface Liquid Waste Disposal and Its Feasibility in Pennsylvania” states, “Within Pennsylvania, there are no known reservoirs of truly good disposal quality.” “The well-known reservoirs of Pennsylvania are exceedingly restricted both vertically and laterally, their thickness measured in tens of feet and their lateral extent in tens of hundreds of square miles. Porosities are generally lower by half and permeabilities, even to gas, are characteristically a tenth as great.” “There are severe geological and man-made limitations on the use of the subsurface for disposal of liquid wastes in Pennsylvania. It is unlikely that subsurface liquid waste disposal will be widely employed in the near future due to the very high costs of adequate evaluation, operation, and observation which must be required if such injections is to be done efficiently and safely.”

15 – Don't repeat history. The Pennsylvania history shows these wells haven't worked:

- What about the first Pennsylvania disposal injection well that failed because fluid was found to be coming back to the surface five miles away? Hammermill Paper Co, Erie, Pa. 1968 leaked five miles away and gas came up five miles away in an abandoned gas well.
- Consol's Blacksville No. 2 "Dunkard Creek"
- McKean County 1990's residents water wells were contaminated near Custer City south of Bradford Co, petroleum products showed up in private residential water wells down-gradient from the disposal well (Don Hopey, Pittsburgh *Post Gazette*, *Wastewater disposal wells under scrutiny following Irvin leak*)

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- Irvin A-19, Clearfield Co., overpressurized for 3 months and leaked -- Violations for EXCO Resources fined \$159,000 for brine disposal well issues, failed mechanical integrity, exceeded knowingly permitted maximum pressure for 3 months in 2010, ordered to pay \$159,624 penalty & repair well. Private water well owners must prove contamination.
- Now many of us wonder why the disposal injection well in Erie, Pennsylvania was abandoned recently. It shows no records of violations yet questions have been raised about problems that might have existed. This concerns us since a disposal injection well is proposed for our area now.

16 – Our Township (Brady) is located near two watersheds (the Susquehanna and Ohio river basins). The DuBois Reservoir is a few miles away and the new water wells that will be the secondary source of water are as close as 2 ½ miles away. These are the main water sources for the City of DuBois. Brady Township and Borough of Troutville have their water wells within 2 ½ miles. Many private water wells are located within two miles of the proposed injection well site. Many deep gas wells have been drilled in the area since we know of five right outside the ¼ area of review. Abandoned gas wells are very close to the proposed site. Abandoned mines are within the ¼ area of review for the proposed site. Our springs, water wells and a couple headwaters feed directly from the proposed disposal injection well site since it is a hill with many springs below.

17 – Clearfield County is actually on known faults. Clearfield County didn't receive high marks for storage of carbon dioxide and this would infer it is not a good place to store wastewater. Let us learn from history and not repeat the mistakes that occurred in Erie, Pennsylvania; at the Irvin well in Clearfield County; and in McKean County. Pennsylvania seems to have more issues with disposal injection wells than it actually has disposal injection wells.

18 - In May 2012, Duke University presented that we are at greater risk of USDWs being contaminated due to all the shale gas development. [See Attachments - Studies]

19 - Wastewater treatment facilities are being built and becoming operational reducing the need for disposal injection wells. The residential site of this proposed well and the geology should be considered and no risk should be taken with our USDWs in this area near the City of DuBois so close to public water supplies.

ProChem Tech International has a local chemist, Tim Keister, that has two patents pending to recycle wastewater using total resource recovery to make chemical products for sale. The company is currently talking with Shell Oil, which states the significance of this accomplishment. This is an option that would protect our area and our underground sources of water (USDWs).

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20 – The EPA safely protects the underground sources of drinking water (USDWs defined as an aquifer system containing less than 10,000 milligrams per liter total dissolved solids). So the aquifer below this proposed disposal injection well site needs to be found and we need to know where it actually goes so these water sources can be monitored, especially if it flows toward Brady Township or the City of Dubois since they serve many residents. The permit application and the notice from the EPA had some discrepancies on the lowest USDWs. **The second layer of cement casing also seemed like it may not be enough to properly protect our USDWs.** [See Attachments - Deficiencies]

21 - What about the invasion of other owner's property rights? Having homes lose value and loss of revenue for property taxes due to USDWs becoming contaminated is an invasion of our rights. What can be done to protect the resident's real estate interests, their right to quiet enjoyment of their property, and to ensure the value of their property investments? Loss of private water wells and good water (USDWs) would ruin home values in the area.

Right now 272 property owners actually own the property in a one mile radius even though the deed parcels are well over 369 plots of individual ground. Sandy Township and Brady Township have a Property Value Total of \$17,545,120 in the one mile radius. The breakdown is: Assessed Sandy Township is \$1,527,417 so Total Sandy Township Property Value is \$6,109,668; Assessed Brady Township is \$2,858,863 so Total Brady Township Property Value is \$11,435,452. [See Attachment - Property One Mile]

22 - This waste may be radioactive. EPA has Class 2 Injection rules that aren't as strict as Class 1 Injection rules but they need to be for this site due to all the water wells and springs in the area along with abandoned gas wells or other potential conduits that exist within the area of review or zone of endangering influence that penetrate the proposed injection zone. No chances should be taken with the USDWs in the area.

23 - Residents are aware the use of monitoring fluid levels in the injection zone during injection operations is done to ensure pressure created by the injection operation will not cause migration of fluid up abandoned wells that could exist. Due to the example of the Irvin Well in Clearfield County being over pressurized they feel this monitoring process isn't sufficient to ensure their water or USDWs remain uncontaminated. **Residents request constant monitoring even after the disposal injection well is plugged and want a comprehensive monitoring plan. Some residents request that the injection pump system should have a restriction on net horse power below 45.**

24 – The residents request EPA have a **full survey of water wells in a two mile radius before this permit is issued.**



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25 – Residents request a way to **prevent the over pressurizing** of this injection well and not knowing about it for months. They want drinking water protections in place that protect against what happened in the Irvin A-19 Well (Clearfield County).

26 - Please **characterize the wastewater being disposed**. Residents want to know the density and corrosiveness of injection fluids.

27 - Please provide residents a **list of all producing gas wells, abandoned gas wells, dry holes, surface bodies of water, springs, mines, other pertinent surface features, faults, roads, public sources of water, residences and water wells in a two mile radius**. Residents feel all these are factors that contribute to protect USDWs.

28 - Please **provide a description of all known gas wells that penetrate formations affected by the increase in pressure**. Residents know this information is important to protect our USDWs.

29 - Please explain further all vertical limits and lateral limits of all underground sources of drinking water and their position in relation to the proposed disposal injection well and the direction of water movement (every USDWs that may be affected with name and depth). We want to ensure that the public water sources will not be affected since we know water travels and many wells are in the area even ones not being used currently, since public water sources were brought to homes (since 1972). Brady Township serves over 800 customers and they use the same source of water from the Anderson Creek that the City of DuBois uses. Brady Township serves the Troutville area and they have two wells over 430 feet deep. These wells are 2,000 feet apart yet they are connected.

30 - **Further research needs done on the geological structure of the area**. The information provided in the permit application wasn't thorough enough with the factors we see needing addressed.

31 - Further research needs done and a **complete plan for well failure along with a disaster preparedness plan for emergency personnel and a plan to prevent migration of fluids into any USDWs**.

32 - Explain a full plan for plugging and abandonment that demonstrates adequate protection of USDWs and covers costs of any failure over time after plugging. What we see in the permit application doesn't seem to be realistic to current studies. [See Attachments - Plugging Costs]

33 - DEP states "disposal injection wells are unsafe due to abandoned, old, unplugged or uncharted wells." This proposed area (Highland Street Extension) should be deemed unsafe for disposal.

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34 – Please present a comprehensive erosion and sedimentation plan since many springs are closely located to this proposed site. **The plan presented didn't seem to address the road appropriately.** [See Attachment - Pictures -- Roads]

35 – Further information needs to be provided in **a plan that demonstrates no significant fluid movement into USDWs**, oil or gas zone, underground gas storage horizon through vertical channels adjacent to the injection well bore.

36 – Please identify the closest public source of water allowed to be located to a disposal injection well. **Explain how the public sources of water will be monitored.**

37 – **Please explain how the EPA will track disposal injection well failures, issues impacting USDWs, permit denials or revocations, fines.** Residents need to understand who is ultimately responsible for risk assessment in local communities.

38 – Please **explain the plan of who will be fully responsible for any costs if an accident or leak occurs or if Windfall Oil & Gas would go bankrupt.**

39 - In 2009, an EPA report showed eight (8) disposal injection wells in Pennsylvania and yet in 2010 another EPA report showed only six (6) disposal injection wells. What was the discrepancy in reports? In 2006, EPA completed 12 inspections for disposal injection wells; 20 in 2007 and 6 in 2008. This decline in inspections concerns residents and we believe more inspections should be done regularly (at least quarterly). In July 2012, at our meeting it was stated five disposal injection wells were operational. [See Attachment - Injection Wells]

40 – It seems that only one layer of protection has been proposed for this proposed disposal injection well being limestone. This concerns residents and the actual disposal injection well casing information also seems insufficient. Will the proposed casings meet the new DEP regulations?

41 - A **Mechanical Integrity Test (MIT) needs to be performed more often than every two years.** We don't believe a two year period is sufficient with the high number of water wells in the area.

42 - Range Resources Cross #2 disposal injection well north of Waterford, PA in Erie County has recently been plugged. It had five layers of steel casing, three layers of cement and was 8000' deep. Many residents would like to know why this disposal injection well has been taken off line and plugged. If an issue occurred it should be considered before moving forward with the Windfall Oil & Gas permit since we have a high number of private water wells in our residential neighborhood.

43 - Due to the significant number of swamps in our area consideration should be given to it

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being a wetlands. All the springs around this area need to be taken into consideration and the affect on USDWs if anything contaminates these water sources.

44 - Due to population density, the residential nature, and village zoning of the area, we request at least a two mile radius be considered for review defined as an "area of concern." The "Northwest Clearfield Comprehensive Plan" for Brady Township, City of DuBois, Falls Creek Borough, Huston Township, and Sandy Township designates Brady Township as a village and also states that no significant expansion of water services should be done.  
[See Attachment - Northwest Clearfield County Region Comprehensive Plan]

45 - If this disposal injection well is planned for fracking wastewater (production waste) some of it will be radioactive. **A plan should address the types of radioactive isotopes found in this water and what actions would be taken in the event of a spill, leak or violation of over pressurizing since this could affect our USDWs.** The Penn State Extension office report states, "Untreated flowback water is toxic to aquatic life, particularly trout and other sensitive species." In this neighborhood, we have elderly people and people with other disorders that make them more susceptible to toxins, who are closely located to the proposed disposal injection well site. [See Attachment - Chemicals]

46 - Future and current Marcellus activity, fracturing and over pressurization may open a natural fracture joint into the disposal injection well zone. So how will this be avoided? We know plans are proceeding in Brady Township for Marcellus Shale gas activity. This could affect our USDWs. What measures will be taken to protect the residents for the future? Will owners of the gas be limited in their potential development of the gas fields knowing that the disposal injection well is in the area?

47 - **Background monitoring should be required of all water wells, springs and public water sources including enough samples over a long period of time to demonstrate natural deviations or cyclic trends.** Not just a single background sample that Windfall Oil & Gas can later say that future samples don't show pollution, just some deviations from the single background sample.

48 - Residents using geothermal energy in the area have concerns about this disposal injection well and these concerns need to be addressed.

49 - Windfall Oil & Gas inc. is proposing the development of the Zelman#1 as a Class 2 D injection well that they believe will provide a service to gas producers in Pennsylvania. The disposal of these fluids by injection into deep depleted formations may be an option, yet residents truly believe it isn't an environmentally friendly or proven process that should be utilized in Pennsylvania. The operation of the proposed Windfall Oil & Gas Zelman #1 injection well facility would jeopardize all the residents in the City of DuBois, Brady Township and Sandy

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Township along with other local towns including Sykesville that purchase water from the City of DuBois.

A water well owner in our area during March 2012 had their water well cave in due to drilling activities in Luthersburg. This is a concern for our residents because they felt the ground rumbling miles away. A few years ago, an explosion in Sylvan Heights was felt and heard clear to our home, which was a few miles away. This proposed industrial activity has ramifications for our community that need to be addressed, since it has the potential to affect our water sources.

50 – It seems like enough pressure could be underground already, and no one is sure if a geyser of waste will be created if a crack is anywhere underground in this area. Also, pressures used for the disposal of waste have the potential to fracture the ground more. Not so far away in Big Run a gas well blew the casing back out (a major incident). A storage field leaked during the 1960's and 1970's into Kettle Creek.

51 – Windfall Oil & Gas needs to prove a reaction won't happen between the injection fluid and limestone at the bottom of the well.

52 – Residents request the use of an electronic log be required before this permit is considered.

53 – The residents future concerns deal with water wells, property values, future mortgages, insurance, radioactive chemicals that are toxic yet exempt due to oil & gas exploration, truck traffic, elementary school (on Highland Street), spills, and much more. All these concerns actually stem from possible contamination of USDWs near our private water wells and major public water supplies. Recent articles have cited one well integrity violation was issued for every six deep injection wells examined in the nation (*Propublica, 680,000 wells hold waste across US without unknown risks*).

54 - It seems Windfall Oil & Gas actually planned for a disposal injection well with five layers of casing and the EPA seemed to only require three layers of casing. Residents request the EPA reevaluate and provide more protection for our underground sources of drinking water (USDWs) in our residential area.

55 - The permit application is lacking a topographic map for the entire one mile radius. This is a serious deficiency in the permit application. The EPA application states a one mile radius map is required with all gas wells and coal mines (EPA Application Attachment B).

56 - The Statement of Basis concerning the faults seems confusing, since it states well below the injection area 16,500 feet yet it is a confining factor. This is a major deficiency. A fault could have waste run right towards the Carlson Stewart deep gas well.

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57 - The permit should be denied since gas well records show hydro fracking of deep gas wells and the confining zone is to be free of open fractures. The area of review has fractures in the confining zone. The Ginter and Potter wells both were fracked and extend into the ¼ mile of review. They also don't know the permeability of the Oriskany and they may want to stimulate this injection well. Stimulation is equal to fracking and is not a good idea in our area if waste will be injected. It has been stated, "Pennsylvania is rarely what you think it is." This is something we should stop and rethink.

58 - The permit application states additional water sources are recommended to be monitored yet access has been denied. We are unaware of anyone denying access. Residents request this be clarified.

59 - The Caledonia Syncline is close to us and mentioned in the permit application. A syncline brings fluids up to the surface and isn't a good place to inject fluids in the ground.  
[See Attachment - Caledonia Syncline]

60 - Over 300 people signed petitions that request the denial of this application. Many residents sent the EPA, DEP, and legislators post cards asking them to stop this permit. Now many residents are writing additional letters of concern to the EPA.

Residents have 370 plots of property in a one mile radius and 107 water wells are identified in the one mile radius. Some residents have public water and still have water wells, so this is not fully taken into account with the number of water wells on our list. Information was gathered voluntarily from neighbors and the Highland Street Extension Development has an accurate listing on water sources. The Brady Township Water Authority was consulted to figure the rest of the one mile radius water sources unless information was submitted by local residents.  
[See Attachment Sections - Letters; Property One Mile]

Respectfully we request you deny this application due to all the concerns listed with our underground sources of water (USDWs). Thank you for your consideration of my testimony.

Sincerely,



Darlene Marshall

EPA Public Hearing  
December 10, 2012

**Index for Attachments**

Pictures

Irvin A-19 Violation Details

Faults & Earthquakes

Coal Mines

Gas Wells

Plugging Costs

Halliburton Loophole

Definitive Boundaries

Headwaters

Gas Well Field Map

Studies

Deficiencies

Property One Mile

Injection Wells

Northwest Clearfield County Region Comprehensive Plan

Chemicals

Caledonia Syncline

Letters

# Pictures

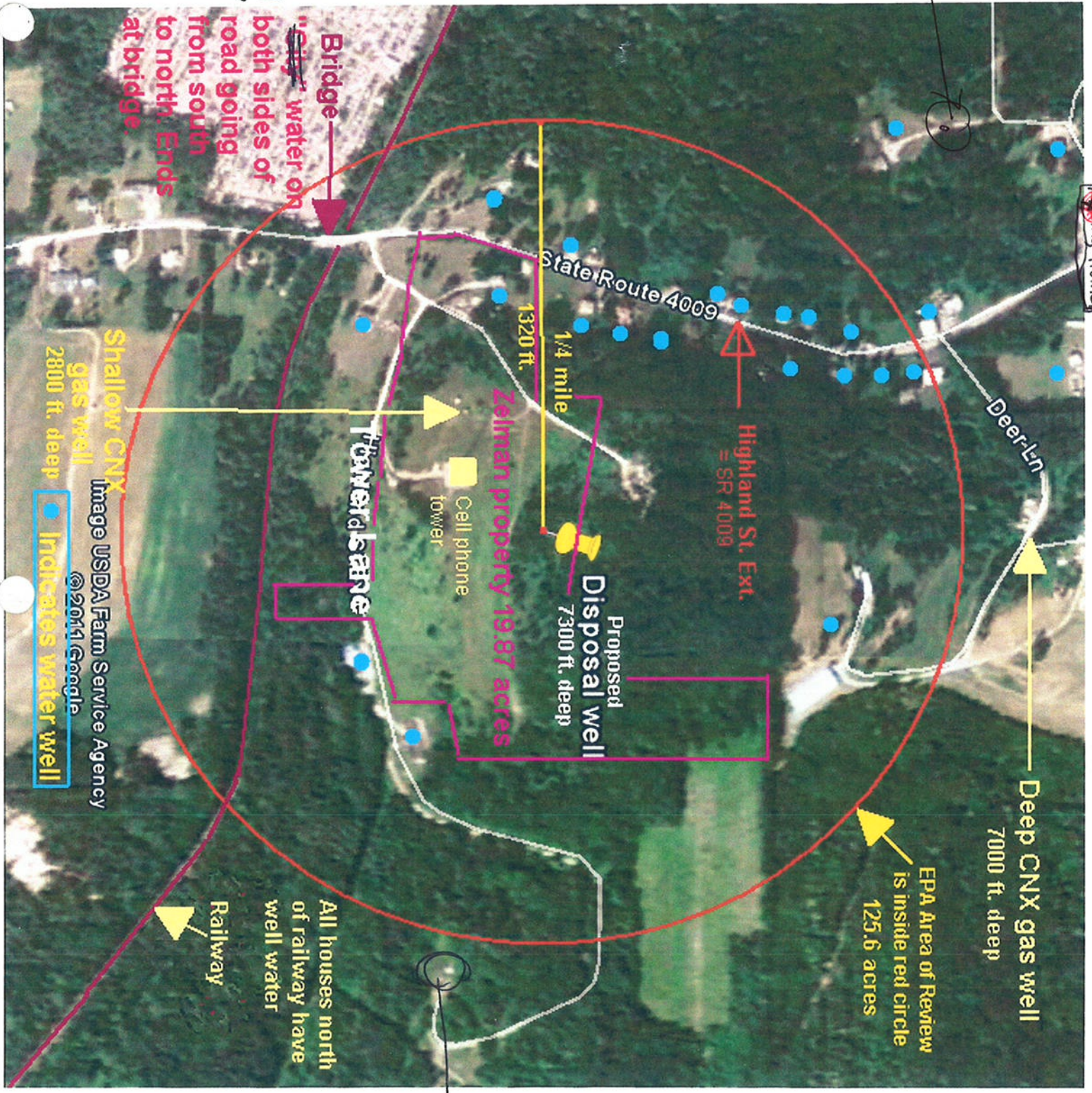


My home



Deep gas well  
behind our  
property





Deep gas well

Brady Township

Bridge - ~~side~~ water on both sides of road going to north. Ends at bridge.

My Home

Deep CNX gas well 7000 ft. deep

EPA Area of Review is inside red circle 125.6 acres

Proposed Disposal well 7300 ft. deep

Zelman property 19.87 acres

Cell phone tower

Shallow CNX gas well 2800 ft. deep

Indicates water well

Image USDA Farm Service Agency ©2011 Google

All houses north of railway have well water

Railway

Deep CNX gas well

Entrance and Roadway  
Into  
Proposed Disposal Injection Well Site



Entrance and Roadway  
Into  
Proposed Disposal Injection Well Site



Roads near the Proposed Disposal Injection Well

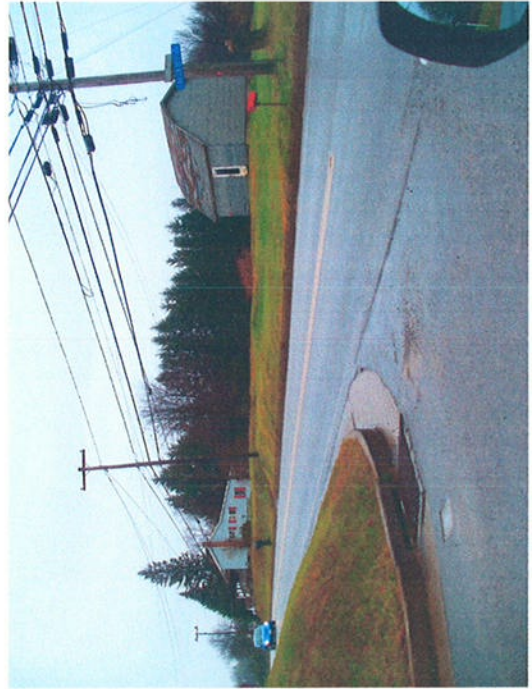


Roads

Roads near the Proposed Disposal Injection Well



Roads near the Proposed Disposal Injection Well



Highland Street Elementary School





Highland Street Extension Development



















9















# Irvin A-19 Violation Details

BELL TOWNSHIP, CLEARFIELD COUNTY, PA  
EXCO RESOURCES (PA), LLC  
300 ERICSSON DRIVE, SUITE 200  
WARRENDALE, PA 15086-5501

**UNDERGROUND INJECTION CONTROL PROGRAM**

**NOTICE OF PROPOSAL TO ISSUE ADMINISTRATIVE ORDER  
DOCKET NO. SDWA-03-2012-0061  
OPPORTUNITY FOR PUBLIC COMMENT**

**U.S. ENVIRONMENTAL PROTECTION AGENCY--REGION III  
WATER PROTECTION DIVISION  
OFFICE OF DRINKING WATER & SOURCE WATER PROTECTION  
GROUND WATER & ENFORCEMENT BRANCH, (3WP22)  
1650 ARCH STREET  
PHILADELPHIA, PENNSYLVANIA 19103**

**COMMENTS WILL BE ACCEPTED UNTIL FEBRUARY 3, 2012.**

**NOTICE:** THE U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA), REGION III IS HEREBY GIVING NOTICE THAT IT HAS ENTERED INTO A CONSENT AGREEMENT AND FINAL ORDER ("CAFO") WITH EXCO RESOURCES (PA), LLC ("EXCO") FOR VIOLATIONS OF ITS UNDERGROUND INJECTION CONTROL (UIC) PROGRAM PERMIT AND THE SAFE DRINKING WATER ACT (SDWA). SPECIFICALLY, EXCO VIOLATED THE TERMS OF ITS UIC PERMIT BY FAILING TO IMMEDIATELY CEASE INJECTION OF BRINE INTO THE IRVIN A-19 BRINE DISPOSAL WELL ("IRVIN WELL") UPON DISCOVERING THAT THE WELL HAD FAILED MECHANICAL INTEGRITY. THE CAFO ALSO FINDS EXCO IN VIOLATION FOR FAILING TO PROVIDE EPA WITH PROPER NOTICE OF A MECHANICAL INTEGRITY FAILURE AND OF A WELL REWORK. FINALLY, THE CAFO FINDS THAT EXCO OPERATED THE IRVIN WELL AT A PRESSURE EXCEEDING ITS PERMITTED MAXIMUM INJECTION PRESSURE FOR A THREE MONTH PERIOD IN 2010. THE CAFO WILL REQUIRE EXCO TO PROPERLY REPAIR THE IRVIN WELL, DEMONSTRATE MECHANICAL INTEGRITY OF THE WELL, AND PAY A PENALTY OF ONE HUNDRED FIFTY-NINE THOUSAND SIX HUNDRED TWENTY-FOUR DOLLARS (\$159,624). THE PENALTY IS BASED ON THE GRAVITY OF THE VIOLATIONS AND ON AVOIDED EXPENSES ASSOCIATED WITH THE CONTINUED INJECTION OF BRINE DURING THE PERIOD OF FAILED MECHANICAL INTEGRITY. THERE WAS NO DOCUMENTED CONTAMINATION TO UNDERGROUND SOURCES OF DRINKING WATER.

**NEED AND DESCEIPTION:** IN PENNSYLVANIA, THE UIC PROGRAM IS DIRECTLY IMPLEMENTED BY EPA. THEREFORE, EPA IS RESPONSIBLE FOR ISSUING ENFORCEMENT ACTIONS TO ADDRESS VIOLATIONS OF THE UIC PROGRAM.

**OPPORTUNITY FOR COMMENT:** SECTION 309(G) OF THE ACT, 33 U.S.C. § 1319(G), REQUIRES THAT INTERESTED PERSONS BE GIVEN NOTICE OF THE PROPOSED PENALTY AND A REASONABLE OPPORTUNITY TO COMMENT. PROCEDURES BY WHICH THE PUBLIC MAY SUBMIT WRITTEN COMMENTS OR PARTICIPATE IN THE PROCEEDINGS ARE DESCRIBED IN THE *CONSOLIDATED RULES OF PRACTICE GOVERNING THE ADMINISTRATIVE ASSESSMENT OF CIVIL PENALTIES, ISSUANCE OF COMPLIANCE OR CORRECTIVE ACTION ORDERS, AND THE REVOCATION, TERMINATION OR SUSPENSION OF PERMITS*, (CONSOLIDATED RULES), 40 C.F.R. PART 22. THE DEADLINE FOR SUBMISSION OF WRITTEN PUBLIC COMMENTS IS FORTY (40) DAYS AFTER ISSUANCE OF THE PUBLIC NOTICE. COMMENTS SHOULD BE MADE TO:

### Site Details

North East  
Regional Office

Site  
Search

Sites by  
County/Muni  
Search

no paging

Site ID:	22287
Site Name:	IRVIN A-19 FMLY FEE A 19 WELL
Address:	
Status:	Active

### Clients

Client List
EXCO RESOURCES PA INC (48277)

### Programs

DEP Programs
Oil & Gas

### PA Municipalities

Municipalities/Counties
Bell Twp, Clearfield County

### Site Permits

Authorization Id	Authorization Type	Date Received	Status/Date
9267	Drill & Operate Well Permit Inactive Status	08/28/1997	Issued 11/21/1997

### Facility Permits

Authorization Id	Authorization Type	Date Received	Status/Date
73173	Drill & Operate Well Permit Operation	04/13/1998	Issued 04/13/1998
73174	Well Registration Operated Well	07/14/1986	Issued 07/14/1986

### Site-Level and Primary Facility-Level Inspections

Inspection ID	Inspection Date	Inspection Type	Inspection Results
2029479	12/22/2011	Routine/Complete Inspection	No Violations Noted
2008401	10/05/2011	Compliance Evaluation	No Violations Noted
2034189	01/12/2011	Routine/Complete Inspection	No Violations Noted
1773323	03/02/2009	Routine/Complete Inspection	No Violations Noted
1742868	10/10/2008	Routine/Complete Inspection	No Violations Noted
1716595	06/20/2008	Routine/Complete Inspection	No Violations Noted
1692188	03/03/2008	Routine/Complete Inspection	No Violations Noted
1668422	11/21/2007	Routine/Complete Inspection	No Violations Noted
1651694	09/11/2007	Routine/Complete Inspection	No Violations Noted
1633901	06/21/2007	Routine/Complete Inspection	No Violations Noted
1608014	03/13/2007	Routine/Complete Inspection	No Violations Noted
1589880	12/05/2006	Routine/Complete Inspection	No Violations Noted
1564345	08/16/2006	Routine/Complete Inspection	No Violations Noted
1546695	05/26/2006	Routine/Complete Inspection	No Violations Noted
1508589	01/20/2006	Routine/Complete Inspection	No Violations Noted
1499180	12/06/2005	Routine/Complete Inspection	No Violations Noted
1185773	11/14/2002	Routine/Complete Inspection	No Violations Noted
383843	11/13/1997	Routine/Complete Inspection	No Violations Noted
383355	10/08/1997	Routine/Complete Inspection	No Violations Noted

DEP website  
go to  
e.FACTS



383504	10/03/1997	Routine/Complete Inspection	No Violations Noted
383370	10/01/1997	Routine/Complete Inspection	No Violations Noted
382695	07/30/1997	Routine/Complete Inspection	Violation(s) Noted <a href="#">View Details</a>
353655	12/10/1987	Routine/Complete Inspection	Violation(s) Noted <a href="#">View Details</a>

## Violation Details for Inspection ID: 382895

Facility: IRVIN A-19 FMLY FEE A 19 (24038)

Program: Oil & Gas

**Disclaimer: The dollar amounts listed below are for the entire related enforcement, and may encompass many sites/facilities. The Total Amount Collected may or may not be related to the Penalty Amount Assessed, depending on how your program or regional office records payments in eFACTS. Questions regarding payments or penalties should be directed to the eFACTS Help Desk at:**

(717) 705-3768 or <mailto:ep-efactshelpdeskteam@state.pa.us>

Violation ID	Date	Violation Description										
109794	07/30/1997	<p>Failure to adequately plug or schedule plugging of a well upon abandonment</p> <p>Resolution:</p> <p>PA Code Legal Citation: 58 P.S. 210(a) : <a href="#">PA Code Website</a></p> <p>Violation Type: Administrative</p> <p style="text-align: center;"><b>Related Enforcements</b></p> <hr/> <p><b>Please note: the following related enforcement data is accumulated from possibly many different sites/facilities that may be unrelated to the facility for this inspection.</b></p> <table> <tr> <td>Enforcement ID: 7404</td> <td>Penalty Final Date:</td> </tr> <tr> <td>Enforcement Type: Notice of Violation</td> <td>Penalty Amount Assessed:</td> </tr> <tr> <td>Date Executed: 08/01/1997</td> <td>Total Amount Due:</td> </tr> <tr> <td>Taken Against: ANGERMAN ASSOC INC</td> <td>Total Amount Collected:</td> </tr> <tr> <td>On Appeal? N</td> <td>Penalty Status:</td> </tr> </table> <p>Enforcement Status: Unresolvable</p> <p># of Violations Addressed by this Enforcement and Penalty Action (possibly from many facilities): 2</p>	Enforcement ID: 7404	Penalty Final Date:	Enforcement Type: Notice of Violation	Penalty Amount Assessed:	Date Executed: 08/01/1997	Total Amount Due:	Taken Against: ANGERMAN ASSOC INC	Total Amount Collected:	On Appeal? N	Penalty Status:
Enforcement ID: 7404	Penalty Final Date:											
Enforcement Type: Notice of Violation	Penalty Amount Assessed:											
Date Executed: 08/01/1997	Total Amount Due:											
Taken Against: ANGERMAN ASSOC INC	Total Amount Collected:											
On Appeal? N	Penalty Status:											

## Violation Details for Inspection ID: 353655

Facility: IRVIN A-19 FMLY FEE A 19 (24038)

Program: Oil & Gas

**Disclaimer: The dollar amounts listed below are for the entire related enforcement, and may encompass many sites/facilities. The Total Amount Collected may or may not be related to the Penalty Amount Assessed, depending on how your program or regional office records payments in eFACTS. Questions regarding payments or penalties should be directed to the eFACTS Help Desk at:**

(717) 705-3768 or <mailto:ep-efactshelpdeskteam@state.pa.us>

Violation ID	Date	Violation Description
83573	12/10/1987	O&G Act 223-General. Used only when a specific O&G Act code cannot be used
		Resolution:
		PA Code Legal Citation: 58 P.S. 601.101 et seq : <a href="#">PA Code Website</a>
		Violation Type: Administrative
		Enforcement Type: No Enforcement Data

Violation ID	Date	Violation Description
83572	12/10/1987	Unpermitted discharge of pollutants. Used for sediment discharges & similar discharges not identified as an IW or directly related to trmt or drilling
		Resolution:
		PA Code Legal Citation: 35 P.S. 401 : <a href="#">PA Code Website</a>
		Violation Type: Environmental Health & Safety
		Enforcement Type: No Enforcement Data

Violation ID	Date	Violation Description
83574	12/10/1987	Failure to install, in a permanent manner, the permit number on a completed well
		Resolution:
		PA Code Legal Citation: 58 P.S. 201(h) : <a href="#">PA Code Website</a>
		Violation Type: Administrative
		Enforcement Type: No Enforcement Data

Violation ID	Date	Violation Description
83571	12/10/1987	Unpermitted discharge of IW (brine, drill cuttings, & oil spills)
		Resolution:
		PA Code Legal Citation: 35 P.S. 301, 35 P.S. 307 : <a href="#">PA Code Website</a>
		Violation Type: Environmental Health & Safety
		Enforcement Type: No Enforcement Data

# Faults & Earthquakes

# Proposed Class II Disposal Injection Well-Brady Township-Clearfield County

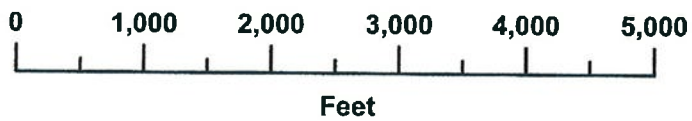
Red lines are faults in the Onondaga Formation, which lies over top of the Oriskany Sandstone, which is the fluid injection target.



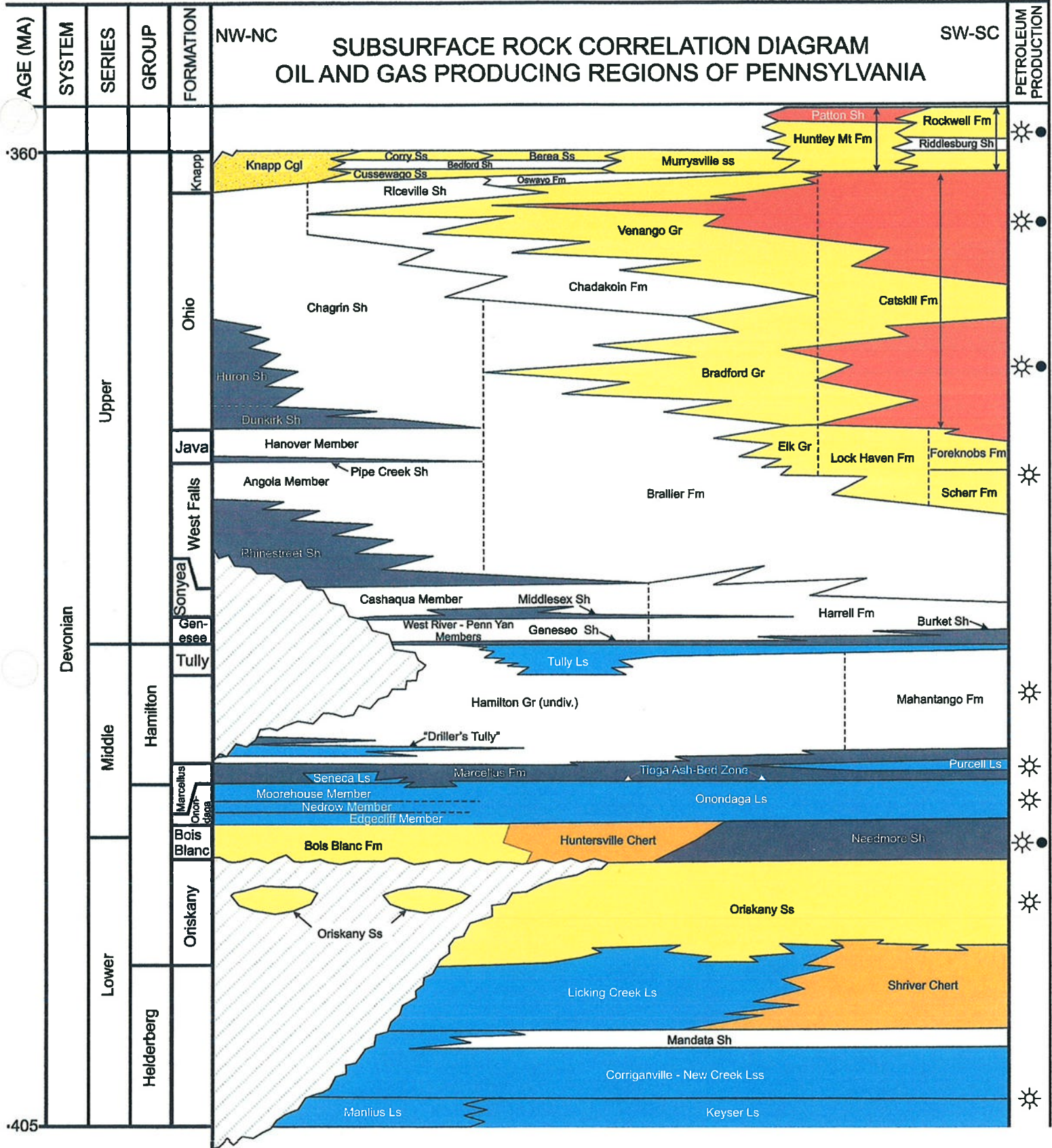
Proposed well

Faults in Onondaga Fm

Information from Chuck Anderson,  
Penn State Geology Professor

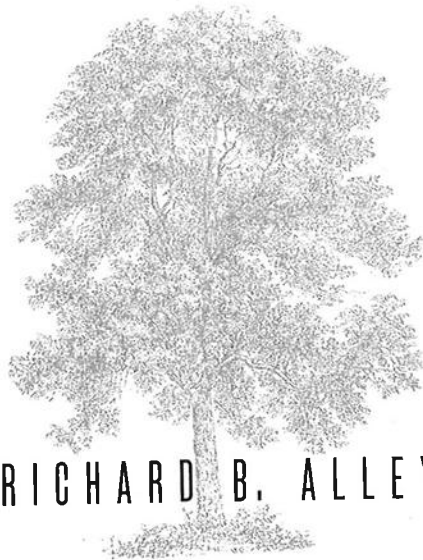


- Plugged well
- Existing gas well
- ⊕ Proposed well
- Faults in Onondaga Fm



# EARTH

## THE OPERATORS' MANUAL



RICHARD B. ALLEY



W. W. NORTON & COMPANY  
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now (less than 9 gigawatts [GW], well under 0.1 percent of total human energy use),<sup>27</sup> although geothermal is important in some of the places mentioned earlier, including Iceland, New Zealand, and parts of the United States. Recall that the total geothermal flux to the surface is only 44 TW, or a shade less than three times the total human energy use, with most of that geothermal energy supplied beneath the sea where we would have great difficulty in collecting it, and with almost all of it fairly difficult to collect. Geothermal-energy development so far has been focused on those few places where magma or very hot rocks sit close to the surface and collecting the energy is relatively easy.

Even in these special places, though, geothermal plants remove heat faster than nature supplies it, so over time the rocks begin to cool off and lose their oomph for the power plants.<sup>28</sup> The flux of melted rock to the surface is not large enough to supply humanity with all the energy we want, and the conduction of heat through nonmelted rocks to bring up energy from deeper is simply too slow.

All is not lost, though. There is an immense amount of very hot rock deep below our feet, and the environmental impacts of making that rock cooler are likely to be very much smaller than the environmental impacts of burning a lot of fossil fuel. A report from the Massachusetts Institute of Technology estimated that the energy stored in hot rock beneath the United States and above a depth of 6 miles (10 km) is equivalent to 130,000 years of U.S. human energy use at modern rates, with enough of that energy technically available that the unsustainable aspects of the exercise would not become important until much, much further in the future than for fossil fuels.<sup>29</sup> As described earlier, drill two holes in hot dry rock, fracture the rocks between, pump cold water down one, take the warm water that comes up the other, transfer the heat to a different fluid in pipes to drive a turbine, and put the now-cooled water back down to warm up again. When the rock is too cold to supply energy economically, drill deeper, or move to a new place. The energy used in drilling is small compared to the energy that can be generated. The colder rocks left behind are, well, colder rocks.

A potential shadow over generating geothermal energy from hot dry

rock is the possibility that the process of making the cracks will trigger earthquakes large enough to matter to people living nearby, or will upset their water wells or otherwise change things in ways they don't like, with earthquakes especially important. We have long known that injecting fluids into Earth, for whatever reason, can trigger earthquakes. One famous series of quakes in the early to mid 1960s near Denver, Colorado, with many having magnitudes of between 3 and 4, was triggered when people tried to dispose of waste fluids by injecting them under pressure into deep rocks.<sup>30</sup> A rapidly growing scientific literature addresses such issues for purposes of carbon sequestration (see chapter 21), enhanced oil recovery, natural gas extraction, and geothermal power, among other purposes.

Quite simply, we like to think of the ground beneath our feet as rock solid, just sitting there and behaving itself. No way. We are all rafting across the surface of the planet, with the Atlantic spreading as the Pacific narrows, India still burrowing into Asia to push up the Himalayas, the west coast of New Zealand's South Island and the western slice of California sliding north past their neighbors, and much more. Slabs of dense rock are sinking into the mantle, tugging on the continents or sea floor behind them, while mountain ranges and the high undersea ridges where sea floor is made are spreading under their own weight and pushing neighboring rocks ahead. Pretty much everywhere all the time, the pushing and pulling on the rocks have stressed them enough that they either are breaking occasionally or are not too far from breaking.

Furthermore, almost all rocks contain mostly-closed cracks from when they broke in the past. Any of this cracking can make earthquakes, but most are tiny—the big ones that people worry about occur when the rocks on one side of a long crack (called a fault) slide past those on the other side.<sup>31</sup>

If the old cracks are oriented such that today's stresses are trying to reopen them, then the "fracking" from gas extraction or waste disposal or geothermal-power generation will just help reopen the old cracks, with not too much chance of a big earthquake. But if the rocks

useful, but they have the satisfaction of watching their students go off to good jobs.

I learned early in my "career" mowing lawns to raise money for college that gasoline tastes lousy, and if you get a little on your hands before lunch, applying soap and water in abundance is wise. Some chemicals in gasoline may be carcinogens or otherwise unhealthy. And, gasoline has a tendency to burn or explode under certain conditions. Based on this, if gasoline were to show up in your water well, you almost certainly would be unhappy. And, you might involve a hydrogeologist rather quickly, perhaps with a lawyer in pursuit. Yet, we have gasoline storage tanks sitting beneath filling stations across the world. Older tanks can rust and leak; newer ones might rupture if a refueling truck drives over improperly applied pavement, or fittings might come loose. So gasoline does get into the ground sometimes. Once there, the gasoline moves, and eventually may spread out rather widely into many water wells. Furthermore, gasoline is far from the only problem of this sort. Diesel, and pesticides, and many other liquids or chemicals that dissolve in water can escape and do harm as they leak into wells or streams or coastal waters.

Hydrogeologists have a few tools to use in such cases. Contaminated water can be pumped out and treated, or made to flow through treatment zones where chemical or biological reactions attack the contaminants especially rapidly, or special waste-eating microbes or chemicals can be added to the site of contamination.

One neat trick is "air sparging"—if the contaminant evaporates easily, clean air can be pumped down to the contaminated zone and then back out, picking up the contaminant on the way.<sup>14</sup> Air sparging is not necessarily the most important tool for a hydrogeologist, it is inappropriate in some applications, but it works, and it is probably the hydrogeological tool with the best name.

Anyway, air sparging, and all of the other tools available to hydrogeologists, are not perfect. Contaminants spread out a lot, so while the hydrogeologist is trying to get the contaminant back out of the ground,

the contaminant is running away. Then costs go up, and more people get unhappy.

In response to these difficulties, a lot of hydrogeologists have lent their weight to efforts to keep pollutants out of the ground, because keeping them out is often a lot easier than getting them back out. But suppose an economist showed up, or a cold warrior, and said, "Don't worry about passing laws to require sturdy underground gasoline storage tanks and frequent inspections to keep gasoline out of groundwater. If there are leaks, we can build a super-air-sparger and remove all the gas. We don't technically have one now, and no one has ever built one, but we know from existing air spargers that air sparging works."

The hydrogeologists are likely to point out that it isn't that simple. For example, air sparging should not be used where "... nearby basements, sewers, or other subsurface confined spaces are present at the site. Potentially dangerous constituent concentrations could accumulate in basements unless a vapor extraction system is used to control vapor migration." (Boomi!)<sup>15</sup>

## GEOENGINEERING BITES BACK

So, can we trust a "super sun blocker" that doesn't exist and therefore has never been tested under real conditions, but that seems technically possible and uses principles that have been tested in nature? Or are there issues to be investigated before we spray sulfur dioxide into the stratosphere, or otherwise geoengineer the climate?

Maybe the first issue is that the cooling induced by sun-blocking particles does nothing to counteract the acidification of the ocean, or the ecosystem changes on land. Thus, at best geoengineering treats one symptom, not the whole set. Sick people sometimes take a lot of pills to treat a lot of symptoms, sometimes taking one pill to treat the effects of another one. Likewise, a geoengineered "super sun blocker" might cause other symptoms.

Particles and CO<sub>2</sub> are not exact opposites. We saw that in general the