

# Waste: The Proposed Wheeling Waste Water Facility



WHEELING  
JESUIT  
UNIVERSITY

**Ben M. Stout III,**  
**Ph.D.**  
Department of

Site of  
proposed  
GreenHunter  
frackwater  
recycling and  
barge  
offloading  
facility,  
Wheeling,  
WV



# Timeline:

**Warwood Getting Frack Water Plant**  
**Former gasoline storage facility will be converted** **March 15, 2013**  
The Intelligencer / Wheeling News-Register

**New Frack Plant Faces Opposition**  
**Councilwoman Aims to Halt Plan** **March 24, 2013**  
By CASEY JUNKINS - Staff Writer , The Intelligencer / Wheeling News-Register

**GreenHunter Water Reveals Its Plans**  
**Jack Confident Facility in Wheeling Will Get Done** **May 12, 2013**  
By CASEY JUNKINS , The Intelligencer / Wheeling News-Register

**Opposition to GreenHunter Frack Water Plant Persists**  
**Company officials expected to present site plan next week** **June 5, 2013**  
By IAN HICKS - Staff Writer , The Intelligencer / Wheeling News-Register

**GreenHunter Recycling Water in New Matamoras** **July 5, 2013**  
By CASEY JUNKINS Staff Writer , The Intelligencer / Wheeling News-Register

**GreenHunter Decision On Hold Again** **July 9, 2013**  
By CASEY JUNKINS Staff Writer , The Intelligencer / Wheeling News-Register

# “Wheeling Water Warriors”



# Voices: community opposition



Wheeling Planning Commission in June 2013, asked GreenHunter to provide the following information:

- Documentation from WV DEP and WV DOT showing the GreenHunter project meets their guidelines.
- Documentation from US EPA or the NRC showing that GreenHunter will not emit excessive radiation.

# Dialog from the Monday July 8, 2013 meeting of the Wheeling Planning Commission

Tom Connelly, assistant director of the city's Economic and Community Development Department, said Monday that GreenHunter had submitted only the lighting plan. However, John Jack, vice president of Business Development for GreenHunter, seems puzzled at these requirements, asking commissioners, "Is this something normal for you to require? I have contacted the agencies. They say, 'Why do you want a letter from us when you are not governed by us?'

"We don't want a permit. We want something that says you don't need a permit," Atkinson told Jack. Noting he has received "dozens of emails regarding this," Monroe said he wants proper documentation. "When we approve your site plan, the city's agencies will check to make sure you are complying with the plan we approve," Mauck told Jack.

As the somewhat testy exchange continued, Jack said, "West Virginia DEP has oversight over our operations." He said DEP will do a "walk-through" inspection once the plant is completed

Frackwater destination



Ohio River and  
groundwater  
flow,  
distance 1.2  
miles



Water treatment plant





# GreenHunter facility, New Matamoras, Washington County, OH

(Potential barge offloading facility)



June 3<sup>rd</sup> letter to Wheeling City Council in support of the community:

**I discourage any variance from existing city ordinance in permitting the proposed GreenHunter application for the following six reasons:**

**I. Truck traffic in Wheeling will increase, not decrease**

**II. Brinewater trucks present unknown hazards to Wheeling residents and first responders**

**III. Wheeling's previous experience with shale waste resulted in community liability**

**IV. Laboratory testing indicates brinewater**

## Marc Harshman, Poet Laureate of West Virginia, in “A song for West Virginia”

- “All our heroes for the working class: Sid Hatfield, Blizzard, Mother Jones, Reuther, Hechler, Larry Gibson . . . shoulder to shoulder. Look close at the bullet holes in those courthouse steps in Welch, the same holes in Larry’s outbuildings. Look close at the big hat with the little woman and the fiery voice. And all the good stand with us still. We hear them singing.”



# I. Truck traffic in Wheeling will increase, not decrease

June 20, 2013, West Virginia Sesquicentennial: West Virginia Poet Laureate Marc Harshman also recited a composition he developed to honor the state. He received a standing ovation for a passionate reading of his poem, "A Song for West Virginia," which celebrates a treasured list of notable characters, places and events of West Virginia history.

May 30, 2013, Letter to the Editor: This should make us ask why the rush? Which, as I look over the serious gaps in information from this meeting, is a real question. It is the question that's been asked from the beginning when GreenHunter neglected the courtesy of first contacting appropriate city officials and other community representatives this past winter. What is the rush? And, if everything is to be so good about this plant, why do so many serious questions remain?  
Marc Harshman Wheeling

# II. Brinewater trucks present unknown hazards to Wheeling residents and first responders

- April 21-22, 2009, WV DEP sampled 13 frackwater trucks entering Liquid Assets Disposal in Wheeling
- 5 out of 13 trucks contained liquids that contained hazardous waste, as determined by WV DEP
- However, The Haliburton Exemptions allow these trucks to transport hazardous waste without identifying the contents as hazardous waste.
- 38% of the trucks contained hazardous waste.
- There are no placards identifying the contents.
- Citizens, first responders, and drivers are unaware of the contents of hazardous waste trucks traveling our highways.

# Fractwater Disposal Data

Sample #	NW-MCF-042109-9
Hauling Company	Deeter Farms
Date Sampled	4/21/2009
Time Sampled	2:55 PM
Site Name	Wyhe HH
Well #	37-121-23194
Type of Waste	
Waste Source	Pit
Volume in Truck, Gal.	5000
Well Location, Co./St	Washington Co., PA
Well Owner/Producer	Range Resources
Sample Color	Black
Sample Odor	None
Parameter, units	
Arsenic, mg/l	0.21
Barium, mg/l	7.86
Boron, mg/l	0.87
Iron, mg/l	348
Magnesium, mg/l	24.6
Potassium, mg/l	1840
Selenium, mg/l	<0.2
Sodium, mg/l	3500
Alkalinity, mg/l	<1
Total Dissolved Solids(TDS), mg/l	16600
Flouride, mg/l	340
Chloride, mg/l	10900
Biochemical Oxygen Demand(BOD), mg/l	3340
Chemical Oxygen Demand(COD), mg/l	5240
Total Suspended Solids(TSS), mg/l	810
Sulfate, mg/l	229
Calcium, mg/l	346
Bromide, mg/l	45
TP-DRO, mg/l	94.4
Benzene, ug/l	<12.9
Toulene, ug/l	<16.7
Ethylbenzene, ug/l	N/A
m.p-Xylene, ug/l	N/A
o-Xylene, ug/l	N/A
Specific Conductance, umhovcm	42100
Gross Alpha, pCi/l	54.1 ± 24.9
Gross Beta, pCi/l	1306 ± 244
Strontium, ug/l	15800
Strontium-90, pCi/l	Minus 0.710 ± /1.47
Radium-226, pCi/l	5.09 ±/ 2.83
Radium-228, pCi/l	Minus 0.0169 ± 1.08
Total Uranium, ug/l	7.81 ± 0.336
Uranium-234, (Sludge Only)	
Uranium-235, (Sludge Only)	
Uranium-238, (Sludge Only)	
pH, Standard units	1.5
Temp. °C	13
PID Reading, m.u.	18
FiD Reading, m.u.	N/D
Rad Meter Reading	Neg

5,000 gallons



pH = 1.5

# III. Wheeling's previous experience with shale waste resulted in community liability

- Wheeling got fined \$400,000 for allowing LAD to dispose of excessive chlorides through the Wheeling Sewage Treatment Plant.
- Wheeling had to sue LAD to get the money back, even though LAD (another out-of state corporation) had said publically that it would be responsible.
- If it wasn't for WV DEPs oversight of the Industrial User Permits through the Municipal Treatment Plant, WV DEP would not have collected data.
- The frackwater truck data are among the few data in the public domain.
- One of the 13 samples was OK:

Parameter, units	1	2	3	4	5	6	7	8	9	10	11	12	13
Arsenic, mg/l (primary standard=0.010mg/L)	0.29	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.21	<0.2	<0.2	<0.2	<0.2
Barium, mg/l (primary standard =2.000mg/L)	5.59	4.59	2.99	0.14	0.191	4.11	1.34	3.96	7.86	834	0.02	<0.02	0.05
Boron, mg/l (health advisory 3-5mg/L)	44.4	35.6	38.2	58.6	0.367	37.5	0.67	2.24	0.87	66.7	37.7	34.8	17.3
Iron, mg/l (secondary standard=0.300 mg/L)	30.7	25.2	26.8	4.84	0.311	26.4	85	4.85	348	86.5	43.9	39.6	96.6
Magnesium, mg/l	488	453	485	5.4	11.1	476	97.1	87.4	24.6	915	522	467	417
Potassium, mg/l	836	665	710	11.7	19.2	704	32.9	1020	1840	1710	742	664	1400
Selenium, mg/l (primary standard=0.050mg/L)	0.2	<0.2	<0.2	0.76	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sodium, mg/l (health advisory=20mg/L)	17800	14100	14700	218	229	15600	200	5430	3500	31600	15800	15600	12900
Alkalinity, mg/l	130	36.9	37.3	294	112	35.7	4810	118	<1	80.1	126	124	418
Total Diss. Solids mg/l (secndry std=500mg/l)	57800	53400	51500	1560	759	52200	711	17200	16600	121000	63600	60600	49500
Flouride, mg/l (secondary standard=2mg/l)	85	87.5	57.5	7.2	0.16	1380	3.19	300	340	2600	600	70	75
Chloride, mg/l (secondary stndrd=200mg/l)	9300	31500	32000	135	371	37700	646	10900	10900	105000	43000	36000	30200
Biochemical Oxygen Demand(BOD), mg/l	414	364	524	66400	12	444	66	228	3340	434	474	323	>684.2
Chemical Oxygen Demand(COD), mg/l	1420	914	947	290000	40	781	1330	516	5240	1620	1290	997	2420
Total Suspended Solids(TSS), mg/l	210	170	213	239	12	63	23900	94	810	409	184	228	506
Sulfate, mg/l (secondary stndrd=250mg/L)	1350	799	807	129	55.1	39800	99	2700	229	565	15800	893	402
Calcium, mg/l	4310	3750	4000	201	56.5	3980	1160	1020	346	9380	2160	2060	2160
Bromide, mg/l	77.5	240	280	3.25	1.29	525	4.4	62.5	45	70	303	325	283
TPH-DRO, mg/l (WV DEP action level 1mg/L)	26.1	7.44	6.95	76.6	1.93	7.38	4.21	27.6	94.4	6.41	2.09	9.35	41.5
Benzene, ug/l (primary standard=5ug/L)	<12.9	<12.0	<12.1	1310	0.5	<12.9	5.5	43	<12.9	<12.9	<12.9	<12.9	79
Toulene, ug/l (primary standard=1000 ug/L)	<16.7	<16.7	<16.8	271	12.1	<16.7	26.4	144	<16.7	<16.7	<16.7	<16.7	226
Ethylbenzene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
m,p-Xylene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
o-Xylene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductance, umhovcm	88300	80400	80100	2390	1600	80300	1220	32000	42100	152000	88900	85600	75600
Gross Alpha, pCi/l (primary stndrd=15pCi/L)	us 6.524 ± 17.5 ±/93.5	24.0 ±/56.8	us 6.356 ± 2.66 ±/1.38	us 44.017 ± 34.6 ±/7.63	47.8 ±/35.9	54.1 ± 24.9	4846 ± 994	us 88822 ± 76.4 ± 115	3.754 ± 731				
Gross Beta, pCi/l	164 ±/140	201 ±/133	361 ±/99.7	215 ±/60.7	8.79 ±/1.99	348 ±/98.2	41.9 ±/8.03	659 ±/127	1306 ± 244	2662 ± 529	252 ± 128	354 ± 136	1.684 ± 328
Strontium, ug/l	732000	709000	689000	7130	3770	695000	4510	88000	15800	2820000	935000	891000	640000
Strontium-90, pCi/l	us 5.83 ±/1.04	us 0.10 ±/3.0	us 0.360 ±/1.0	us 1.43 ±/1.5	us 0.0770 ±/0.01	us 0.510 ±/0.05	us 0.131 ±/0.01	us 0.690 ±/0.05	us 0.710 ±/0.05	7.44 ± 8.62	us 0.04 ± 2.0	us 2.88 ± 2.0	20.630 ± 2.59
Radium-226, pCi/l (primary standard=5pCi/L)	8.30 ±/2.45	9.0 ±/2.45	1.49 ±/2.92	6.38 ±/3.10	us 0.121 ±/0.01	10.6 ±/6.69	1.10 ±/1.26	31.5 ±/8.56	5.09 ±/2.83	1136 ± 217	4.31 ± 4.43	0.000 ± 4.48	44.1 ± 13.3
Radium-228, pCi/l (combined with Rad226)	73.5 ±/17.6	6.44 ±/2.73	1.45 ±/1.79	487 ±/0.48	683 ±/0.41	2.51 ±/2.21	0.334 ±/0.45	9.58 ±/2.08	us 0.0169 ± 0.01	347 ±69.7	1.77 ±2.25	0.124 ± 1.82	44.7 ± 12.5
Total Uranium, ug/l (primary stndrd=30ug/L)	1.09 ±/0.02	0.119 ±/0.00	0.117 ±/0.00	0.28 ±/0.52	0.665 ±/0.01	0.503 ±/0.11	0.05 ±/0.06	1.48 ±/0.03	7.81 ± 0.336	1.08 ± 0.02	1.22 ± 0.03	1.37 ± 0.03	1.57 ± 0.04

Red – Primary Drinking Water Standard Exceedence  
Yellow- Secondary Drinking Water Standard Exceedence  
Blue – No Exceedence s (Sample 5)



# IV. Laboratory testing indicates brinewater is a threat to residents and first responders

- 5 of 13 samples (38%) of frackwater trucks entering the Liquid Assets Disposal facility in Wheeling, WV contained hazardous waste.
- This is a small sample size considering the plethora of trucks using highways in West Virginia.
- Call me when there are more data available, and I'll recalculate.
- For now, the only conclusion that can be drawn is that over 1/3 of the trucks carrying liquids labeled "brinewater" or "residual waste" in West Virginia are actually carrying hazardous waste, period.
- Citizens have a right-to-know. First responders have a need-to-know.

Parameter, units													
Arsenic, mg/l (primary standard=0.010mg/L)	0.29	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.21	<0.2	<0.2	<0.2	<0.2
Barium, mg/l (primary standard =2.000mg/L)	5.59	4.59	2.99	0.14	0.191	4.11	1.34	3.96	7.86	834	0.02	<0.02	0.05
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Magnesium, mg/l	488	453	485	5.4	11.1	476	97.1	87.4	24.6	915	522	467	417
Potassium, mg/l	836	665	710	11.7	19.2	704	32.9	1020	1840	1710	742	664	1400
Selenium, mg/l (primary standard=0.050mg/L)	0.2	<0.2	<0.2	0.76	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Sodium, mg/l (health advisory=20mg/L)	17800	14100	14700	218	229	15600	200	5430	3500	31600	15800	15600	12900
Alkalinity, mg/l	130	36.9	37.3	294	112	35.7	4810	118	<1	80.1	126	124	418
Total Diss. Solids mg/l (secndry std=500mg/l)	57800	53400	51500	1560	759	52200	711	17200	16600	121000	63600	60600	49500
Flouride, mg/l (secondary standard=2mg/l)	85	87.5	57.5	7.2	0.16	1380	3.19	300	340	2600	600	70	75
Chloride, mg/l (secondary stndrd=200mg/l)	9300	31500	32000	135	371	37700	646	10900	10900	105000	43000	36000	30200
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Chemical Oxygen Demand(COD), mg/l	1420	914	947	290000	40	781	1330	516	5240	1620	1290	997	2420
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Sulfate, mg/l (secondary stndrd=250mg/L)	1350	799	807	129	55.1	39800	99	2700	229	565	15800	893	402
Calcium, mg/l	4310	3750	4000	201	56.5	3980	1160	1020	346	9380	2160	2060	2160
Bromide, mg/l	77.5	240	280	3.25	1.29	525	4.4	62.5	45	70	303	325	283
TPH-DRO, mg/l (WV DEP action level 1mg/L)	26.1	7.44	6.95	76.6	1.93	7.38	4.21	27.6	94.4	6.41	2.09	9.35	41.5
Benzene, ug/l (primary standard=5ug/L)	<12.9	<12.0	<12.1	1310	0.5	<12.9	5.5	43	<12.9	<12.9	<12.9	<12.9	79
Toulene, ug/l (primary standard=1000 ug/L)	<16.7	<16.7	<16.8	271	12.1	<16.7	26.4	144	<16.7	<16.7	<16.7	<16.7	226
Ethylbenzene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
m,p-Xylene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
o-Xylene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductance, umhvc/m	88300	80400	80100	2390	1600	80300	1220	32000	42100	152000	88900	85600	75600
Gross Alpha, pCi/l (primary stndrd=15pCi/L)	Minus 6.524 ±/106	17.5 ±/93.5	24.0 ±/56.6	Minus 6.356 ±/30.3	2.66 ±/1.38	Minus 44.017 ±/97.2	34.6 ±/7.63	47.8 ±/35.9	54.1 ±/24.9	4846 ±/994	Minus 88822 ±/107	76.4 ±/115	3.754 ±/731
Gross Beta, pCi/l	164 ±/140	201 ±/133	361 ±/99.7	21.5 ±/60.7	8.79 ±/1.99	348 ±/98.2	41.9 ±/8.03	659 ±/127	1306 ±/244	2662 ±/529	252 ±/128	354 ±/136	1.684 ±/328
Strontium, ug/l	732000	709000	689000	7130	3770	695000	4510	88000	15800	2820000	935000	891000	640000
Strontium-90, pCi/l	Minus 5.83 ±/3.46	Minus 0.10 ±/3.88	Minus 0.360 ±/4.67	Minus 1.43 ±/1.98	Minus 0.0770 ±/0.458	Minus 0.510 ±/3.27	Minus 0.131 ±/0.693	Minus 0.690 ±/2.31	Minus 0.710 ±/1.47	7.44 ±/8.62	Minus 0.04 ±/2.82	Minus 2.88 ±/2.45	0.630 ±/2.59
Radium-226, pCi/l (primary standard=5pCi/L)	8.30 ±/2.45	9.0 ±/2.45	1.49 ±/2.92	6.38 ±/3.10	Minus 0.121 ±/0.535	10.6 ±/6.69	1.10 ±/1.26	31.5 ±/8.56	5.09 ±/2.83	1136 ±/217	4.31 ±/4.43	0.000 ±/4.48	44.1 ±/13.3
Radium-228, pCi/l (combined with Rad226)	73.5 ±/17.6	6.44 ±/2.73	1.45 ±/1.79	0.487 ±/0.483	0.683 ±/0.418	2.51 ±/2.21	0.334 ±/0.451	9.58 ±/2.08	Minus 0.0169 ±/1.08	347 ±/69.7	1.77 ±/2.25	0.124 ±/1.82	44.7 ±/12.5
Total Uranium, ug/l (primary stndrd=30ug/L)	1.09 ±/0.024	0.119 ±/0.004	0.117 ±/0.003	4.28 ±/0.523	0.665 ±/0.013	0.503 ±/0.118	3.05 ±/0.064	1.48 ±/0.037	7.81 ±/0.336	1.08 ±/0.027	1.22 ±/0.032	1.37 ±/0.035	1.57 ±/0.042
Uranium-234, (Sludge Only)													
Uranium-235, (Sludge Only)													
Uranium-238, (Sludge Only)													
pH, Standard units (secndry stndrd 6.5-8.5)	6.63	5.95	5.98	7.93	8.59	5.97	9.26	7.04	1.5	6.49	6.53	6.44	6.31

# NO Placards Required....?

- 5/13 Samples from previous slide considered **“Hazardous Waste”**
- “Hazardous waste is waste that is dangerous or potentially harmful to our health or the environment. Hazardous wastes can be liquids,



US EPA in an October 2002 guidance document entitled Exemption of Oil and Gas and Production Wastes from Federal Hazardous Waste Regulations (EPA530-K-01-004)

- *“although they are relieved from regulation as hazardous wastes, the exemption does not mean these wastes could not present a hazard to human health and the environment if improperly managed.”*

# V. Laboratory testing indicates brinewater is a threat to the Wheeling water supply

- Only 1 out of 13 samples met primary drinking water standards
- seven of thirteen (7/13) exceeded the primary drinking water standard for barium.
- One sample from a frac pit in Westmoreland County, PA contained 834 mg/l of barium, or 417 times the primary standard.
- 4/13 samples exceeded the primary standard for benzene.
- A sample from a compressor station (1320 ug/l) exceeding the benzene standard (5 ug/l) by 262 times.
- 9/13 samples exceeded the drinking water standard for radium.
- 7/13 samples exceeded the drinking water standard for gross alpha particles.
- One sample had combined radium readings well over 1,000 pCi/l, a multiple in excess of 200 times the (5 pCi/l) standard.
- none of the samples triggered a response from radiation meters.

Parameter, units													
Arsenic, mg/l (primary standard=0.010mg/L)	0.29	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.21	<0.2	<0.2	<0.2	<0.2
Barium, mg/l (primary standard =2.000mg/L)	5.59	4.59	2.99	0.14	0.191	4.11	1.34	3.96	7.86	834	0.02	<0.02	0.05
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Magnesium, mg/l	488	453	485	5.4	11.1	476	97.1	87.4	24.6	915	522	467	417
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Sodium, mg/l (health advisory=20mg/L)	17800	14100	14700	218	229	15600	200	5430	3500	31600	15800	15600	12900
Alkalinity, mg/l	130	36.9	37.3	294	112	35.7	4810	118	<1	80.1	126	124	418
Total Diss. Solids mg/l (secndry std=500mg/l)	57800	53400	51500	1560	759	52200	711	17200	16600	121000	63600	60600	49500
Flouride, mg/l (secondary standard=2mg/l)	85	87.5	57.5	7.2	0.16	1380	3.19	300	340	2600	600	70	75
Chloride, mg/l (secondary stndrd=200mg/l)	9300	31500	32000	135	371	37700	646	10900	10900	105000	43000	36000	30200
Biochemical Oxygen Demand(BOD), mg/l	414	364	524	66400	12	444	66	228	3340	434	474	323	>684.2
Chemical Oxygen Demand(COD), mg/l	1420	914	947	290000	40	781	1330	516	5240	1620	1290	997	2420
Total Suspended Solids(TSS), mg/l	210	170	213	239	12	63	23900	94	810	409	184	228	506
Sulfate, mg/l (secondary stndrd=250mg/L)	1350	799	807	129	55.1	39800	99	2700	229	565	15800	893	402
Calcium, mg/l	4310	3750	4000	201	56.5	3980	1160	1020	346	9380	2160	2060	2160
Bromide, mg/l	77.5	240	280	3.25	1.29	525	4.4	62.5	45	70	303	325	283
TPH-DRO, mg/l (WV DEP action level 1mg/L)	26.1	7.44	6.95	76.6	1.93	7.38	4.21	27.6	94.4	6.41	2.09	9.35	41.5
Benzene, ug/l (primary standard=5ug/L)	<12.9	<12.0	<12.1	1310	0.5	<12.9	5.5	43	<12.9	<12.9	<12.9	<12.9	79
Toulene, ug/l (primary standard=1000 ug/L)	<16.7	<16.7	<16.8	271	12.1	<16.7	26.4	144	<16.7	<16.7	<16.7	<16.7	226
Ethylbenzene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
m.p-Xylene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
o-Xylene, ug/l	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Specific Conductance, umhovcm	88300	80400	80100	2390	1600	80300	1220	32000	42100	152000	88900	85600	75600
Gross Alpha, pCi/l (primary stndrd=15pCi/L)	Minus 6.524 ±106	17.5 ±93.5	24.0 ±56.6	Minus 6.356 ±30.3	2.66 ±1.38	Minus 44.017 ±97.2	34.6 ±7.63	47.8 ±35.9	54.1 ± 24.9	4846 ± 994	Minus 88822 ± 107	76.4 ± 115	3.754 ± 731
Gross Beta, pCi/l	164 ±140	201 ±133	361 ±99.7	21.5 ±60.7	8.79 ±1.99	348 ±98.2	41.9 ±8.03	659 ±127	1306 ± 244	2662 ± 529	252 ± 128	354 ± 136	1.684 ± 328
Strontium, ug/l	732000	709000	689000	7130	3770	695000	4510	88000	15800	2820000	935000	891000	640000
Strontium-90, pCi/l	Minus 5.83 ±3.46	Minus 0.10 ±3.88	Minus 0.360 ±4.67	Minus 1.43 ±1.98	Minus 0.0770 ±/ 0.458	Minus 0.510 ±3.27	Minus 0.131 ±/ 0.693	Minus 0.690 ±/2.31	Minus 0.710 ± /1.47	7.44 ± 8.62	Minus 0.04 ± 2.82	Minus 2.88 ± 2.45	0.630 ± 2.59
Radium-226, pCi/l (primary standard=5pCi/L)	8.30 ±2.45	9.0 ±2.45	1.49 ±2.92	6.38 ±3.10	Minus 0.121 ±0.535	10.6 ±6.69	1.10 ±1.26	31.5 ±8.56	5.09 ±/ 2.83	1136 ± 217	4.31 ± 4.43	0.000 ± 4.48	44.1 ± 13.3
Radium-228, pCi/l (combined with Rad226)	73.5 ±17.6	6.44 ±2.73	1.45 ±1.79	0.487 ±/ 0.483	0.683 ±0.418	2.51 ±2.21	0.334 ±0.451	9.58 ±2.08	Minus 0.0169 ± 1.08	347 ±69.7	1.77 ±2.25	0.124 ± 1.82	44.7 ± 12.5
Total Uranium, ug/l (primary stndrd=30ug/L)	1.09 ±0.024	0.119 ±0.004	0.117 ±0.003	4.28 ±0.523	0.665 ±0.013	0.503 ±0.118	3.05 ±0.064	1.48 ±0.037	7.81 ± 0.336	1.08 ± 0.027	1.22 ± 0.032	1.37 ± 0.035	1.57 ± 0.042
Uranium-234, (Sludge Only)													
Uranium-235, (Sludge Only)													
Uranium-238, (Sludge Only)													
pH, Standard units (secndry stndrd 6.5-8.5)	6.63	5.95	5.98	7.93	8.59	5.97	9.26	7.04	1.5	6.49	6.53	6.44	6.31

# VI. Bromides are already causing problems with Wheeling's water supply

- Bromide is an unregulated ion.
- bromide interferes with the pre-chlorination process in water treatment plants, resulting in the production of trihalomethanes (PAHs).
- Wheeling isn't alone, as multiple communities are struggling with this issue.
- The best way to get trihalomethanes out of the water supply is to keep bromide out of source water, meaning the Ohio River.

# Three Rivers Quest (3RQ) by Colcom Foundation

- 3 Rivers:
  - Allegheny
  - Monongahela
  - Ohio
- WVU, Duquesne University, Wheeling Jesuit University, Trout Unlimited Partnership to compile data from 54 total sampling sites
- Our Role: Biweekly Sampling of 13 sites from Youngtown, OH to





# Regional Conductivity

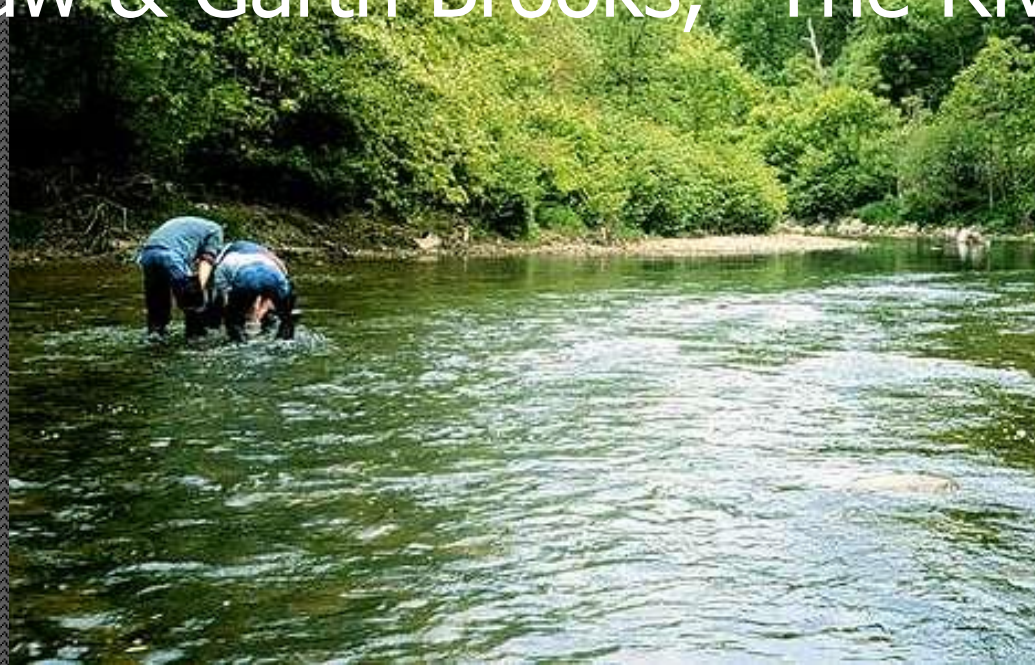
- What is Conductivity?
  - The ability of water to generate an electric current
  - How do you generate an electric current?
    - Metals, ions, total dissolved solids
    - Therefore, the more metals, ions, and TDS in the water...the higher the conductivity
- The Big Questions...
  - What is Our Regional Conductivity?
  - How do we find this value?
- The Answer...
  - A really, really big database

# FracTracker

- <http://www.fractracker.org/>
- Dr. Stout is a board member and is open to any comments or suggestions you have



“...Too many times we stand aside and let the waters slip away...” Victoria Lynn Shaw & Garth Brooks, “The River”



Thank You For Your Time and  
Attention  
Questions?