Water Resources Protection and Management Act

Annual Report to the WV Joint Legislative Oversight Commission on State Water Resources

West Virginia Department of Environmental Protection

Water Use Section

November 14, 2011
Contents of Today’s Report

- Large quantity user registration/certification
- Meetings with stakeholders update
- Biological In-stream Flow Study results
- Groundwater Study and Mine Pool Atlas
- Water Withdrawal Guidance Tool update
- Small Stream Withdrawal Study
- Marcellus frac water tracking
- Oil and Gas Executive Order WMP
- 3 new stream gauges
- Growing pains of the Water Use Section
- 2011-2013 Timeline
Large Quantity User Registration / Certification

• We have Completed the 2010 certification/registration
• Made upgrades to the database
• Better reports
• Search engine
• Annual percent change in water use to date
  — (based on 7 years of data)
# LQU - Summary by Use-Type

**Report generated:**  
Friday, November 04, 2011  
11:40:21 AM

<table>
<thead>
<tr>
<th>Water Use Category</th>
<th>2010 Water Volume (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture/aquaculture</td>
<td>49,857,602,940</td>
</tr>
<tr>
<td>Chemical</td>
<td>85,116,330,531</td>
</tr>
<tr>
<td>Frac Water</td>
<td>567,000,000</td>
</tr>
<tr>
<td>Hydroelectric</td>
<td>126,510,096,924,535</td>
</tr>
<tr>
<td>Industrial</td>
<td>345,381,183,819</td>
</tr>
<tr>
<td>Mining</td>
<td>16,217,749,925</td>
</tr>
<tr>
<td>Petroleum</td>
<td>483,475,044</td>
</tr>
<tr>
<td>Public water supply</td>
<td>70,987,570,924</td>
</tr>
<tr>
<td>Recreation</td>
<td>1,468,357,700</td>
</tr>
<tr>
<td>Thermoelectric (coal)</td>
<td>679,177,907,464</td>
</tr>
<tr>
<td>Timber</td>
<td>1,172,317,796</td>
</tr>
</tbody>
</table>

**Total Annual Statewide Water Use:**  
127,760,001,077,076
2010 Water Usage + Thermal-electric

2010 Water Use by SIC Group (millions of gallons)
(excluding Hydroelectric Facilities)

Thermoelectric (coal), 679,178
Industrial, 345,381
Chemical, 85,116
Public water supply, 70,988
Agriculture/aquaculture, 49,858
Mining, 16,218
Recreation, 1,468
Petroleum, 483
Timber, 1,172
Estimated Frac Water, 567
WV Infrastructure and Jobs Development Council
Should we lower the limit?
Water Use Section
Watershed Presentations Completed as of November 1, 2011

Progress
- Green: Completed
- Blue: Remaining

This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should verify or consult the primary data and information sources to ascertain the appropriate usage of the information.
We have made updates to the Marcellus Frac Water Database

- De-Bugging
- Better reports
- Better search engine
- Improved instruction manual
- Beginning analysis of the data
Frac Water Search Utility

**By date range**
- Start Date
- End Date

**By permit number**
- API Number:

**By operator**
- Operator Name
- Detail Report
- Summary Report

**Frac Water Disposal**
- Summary

Data last updated October 26, 2011
# Summary Frac Water Use Report

**Start Date:** 1/1/2011  
**End Date:** 11/4/2011

Report generated: Tuesday, November 08, 2011  2:58:40 PM

## Water Use Volumes by Operator

<table>
<thead>
<tr>
<th>Operator</th>
<th>ActiveWell Sites*</th>
<th>Amount Withdrawn: (gal)</th>
<th>Amount Injected: (gal)</th>
<th>Amount Recovered: (gal)</th>
<th>Percent Recovered:</th>
<th>Amount Disposed: (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antero Resources</td>
<td>7</td>
<td>58,904,367</td>
<td>81,695,954</td>
<td>11,144,617</td>
<td>13.84%</td>
<td>10,175,856</td>
</tr>
<tr>
<td>Chesapeake Appalachia</td>
<td>10</td>
<td>83,599,376</td>
<td>106,786,008</td>
<td>4,535,242</td>
<td>4.25%</td>
<td>4,535,244</td>
</tr>
<tr>
<td>EQT Production Company</td>
<td>23</td>
<td>108,815,784</td>
<td>111,190,506</td>
<td>2,723,405</td>
<td>2.45%</td>
<td>2,915,955</td>
</tr>
<tr>
<td>Gastar Exploration USA Inc.</td>
<td>1</td>
<td>15,388,632</td>
<td>12,868,632</td>
<td>602,537</td>
<td>4.68%</td>
<td>602,537</td>
</tr>
<tr>
<td>Grenadier Energy Partners LLC</td>
<td>4</td>
<td>13,406,232</td>
<td>13,406,232</td>
<td>3,990,294</td>
<td>29.76%</td>
<td>964,053</td>
</tr>
<tr>
<td>Hunt Marcellus Operating Company</td>
<td>2</td>
<td>11,287,920</td>
<td>11,287,920</td>
<td>797,076</td>
<td>7.06%</td>
<td>524,902</td>
</tr>
<tr>
<td>Jay Bee Oil and Gas Inc</td>
<td>1</td>
<td>5,180,168</td>
<td>4,788,000</td>
<td>210,000</td>
<td>4.39%</td>
<td>210,000</td>
</tr>
<tr>
<td>Mark Adams Company</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Div/OI</td>
<td>0</td>
</tr>
<tr>
<td>Range Resources Appalachia LLC</td>
<td>3</td>
<td>37,983,456</td>
<td>38,551,212</td>
<td>2,110,686</td>
<td>5.48%</td>
<td>2,110,686</td>
</tr>
<tr>
<td>TRANS ENERGY INC.</td>
<td>3</td>
<td>18,101,454</td>
<td>18,101,454</td>
<td>1,719,102</td>
<td>9.50%</td>
<td>1,718,652</td>
</tr>
<tr>
<td>Trilana Energy LLC</td>
<td>1</td>
<td>7,666,134</td>
<td>3,858,134</td>
<td>424,242</td>
<td>11.00%</td>
<td>479,514</td>
</tr>
<tr>
<td>WV Department of Environmental Protection</td>
<td>1</td>
<td>6,000,000</td>
<td>5,000,000</td>
<td>400,000</td>
<td>8.00%</td>
<td>400,000</td>
</tr>
<tr>
<td>XTO Energy Inc</td>
<td>6</td>
<td>25,335,399</td>
<td>25,213,524</td>
<td>1,764,462</td>
<td>7.00%</td>
<td>1,570,506</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Statewide Totals:</th>
<th></th>
<th>Total Withdrawn: (gal)</th>
<th>Total Injected: (gal)</th>
<th>Total Recovered: (gal)</th>
<th>Percent Recovered:</th>
<th>Total Disposed: (gal)</th>
</tr>
</thead>
<tbody>
<tr>
<td>64</td>
<td>391,668,922</td>
<td>432,747,576</td>
<td>30,421,663</td>
<td>7.03%</td>
<td>26,207,905</td>
<td></td>
</tr>
</tbody>
</table>

*Active well sites may contain more than one individual well; contact the DEP's Water Use Section for any questions regarding individual wells or the data contained herein (304) 926-0499 ext. 1271*
### Marcellus Shale Water Demand

<table>
<thead>
<tr>
<th>Year</th>
<th>Reported wells</th>
<th>Total reported vol.</th>
<th>Volume per well</th>
<th>Est. wells drilled</th>
<th>Est. water use</th>
</tr>
</thead>
<tbody>
<tr>
<td>2009</td>
<td>4</td>
<td>57,000,000 gal</td>
<td>14,200,000 gal</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>2010</td>
<td>103</td>
<td>567,000,000 gal</td>
<td>5,500,000 gal</td>
<td>86</td>
<td>567,000,000 gal</td>
</tr>
<tr>
<td>2011</td>
<td>80</td>
<td>391,668,922 gal</td>
<td>4,895,861 gal</td>
<td>181</td>
<td>905,000,000 gal</td>
</tr>
</tbody>
</table>
Water Withdrawal Tool

- In need of another Upgrade
  - Biological in-stream flow project (inconclusive)
  - Lessons learned during preparation to review Marcellus Water Management Plans
  - USGS small stream project
Mine Pool Atlas
Water Management Plans
In Accordance With 35CSR8
Water Management Plans

✓ Location
✓ Volume
✓ Months
✓ Disposal
✓ Additives
Goals

• Easy for companies to submit plans
• Searchable, transparent and consistent
• Easy for enforcement
• Minimize truck traffic while protecting our waters
Underlying Theme

• At this location we believe there will be this much available water. At x pump rate, you can have Y water, and protect AQL.
WATER MANAGEMENT PLAN/
WATER ADDENDUM
For Horizontal Oil and Gas Well Permits
Office of Oil and Gas
Phone: (304) 926-0499

Section I - Operator Information

API: 47 - County - Permit  □ Modification?

Operator Name
Operator ID
*Registered in the Frac Water Reporting Website?
Yes □ No □
Mailing Address
Contact Name/Title (Water Resources Manager)
Contact Phone
Contact Email

*R if no, the operator will be required to register with the WVDEP Water Use Section. Contact dep.water.use@wv.gov

Section II - Well Overview
Operator's Well Number
Anticipated Frac Date
Latitude
Location (decimal degrees, NAD 83)
Longitude
County:

Section III - Source Water Overview (check all that apply)

Streams/Rivers □ Lakes/Reservoirs □ Ground Water □ Purchased Water (PSD) □
Purchased Water (Private) □ Recycled Frac Water □ Multi-Site Impoundment □
Other (describe) □

Total anticipated water volume to be used (gal):
Data entry interface:

- Well Information
- Water Source Information
# Water Management Plan Data-Entry Interface

## Well/Operator Information

- **API Number**
- **Well Name**
- **Operator ID**
- **Well Latitude**
- **Well Longitude**
- **County**
- **Frac Date**
- **Total water (gal):**

## Contact Information

- **Contact Name**
- **Contact Phone**
- **Contact Email**
- **Contact Address 1**
- **Contact Address 2**
- **Contact City**
- **Contact State**
- **Contact Zip Code**

## Administrative Detail

- **Date Received (OG):**
- **Date Received (WVUS):**
- **Date of Completion**

## Water Source Information

- **API Number**
- **Source Name**
- **Source Type**
- **Source Lat:**
- **Source Long:**
- **County**
- **HUC-8 Watershed:**

## Surface Water Source Additional Information

- **Basin Area (sq. mi.):**
- **Stream final code:**
- **Endangered Species?**
- **Mussel Stream?**
- **Trout Stream?**
- **Tier 3?**
- **Gauged Stream?**
- **Regulated Stream?**
- **Proximate PSD?**

## Purchased Water Source Additional Information

- **Supplier type:**
- **Max. Daily Purchase (gal):**
- **Supplier is registered LQUI:**

## Ground Water Source Additional Information

- **Permit Number:**
- **New Well? Drill date:**
- **Aquifer (if known):**

## Reservoir Water Source Additional Information

- **Minimum release (cfs):**

## Reused Frac Water Source Additional Information

- **Source API:**

## Multi-site Impoundments

- **MSI Name:**
- **MSI Owner:**
- **MSI is registered LQUI?**
- **Permanent Withdrawal?**
- **MSI Latitude:**
- **MSI Longitude:**

## Activity Detail

- **Start Date:**
- **End Date:**
- **Pump rate (gpm):**
- **Total volume (gal):**

## Reference Gauge Information

- **Reference Gauge:**
- **Known Demand on Stream (cfs) [from GIS]:**
- **Required Gauge Reading (cfs) [from Water Profile]:**
- **Req. Passby flow at location (cfs) [from Water Profile]:**

## Water Availability Profile

- **WMP Promising?**

---

**Report Generator**
### Cover letter to the applicant

- Limitations of the Water Availability Profile
- Summary of intake flow requirements
  - Max. Pump rate
  - Min. Gauge reading
  - Min. Pass by flow at location

### Intake Summary

<table>
<thead>
<tr>
<th>Intake Point</th>
<th>Start Date</th>
<th>End Date</th>
<th>Volume (gal)</th>
<th>Ref. Gauge ID</th>
<th>Ref. Gauge Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tygart River #1</td>
<td>12/1/2011</td>
<td>1/31/2012</td>
<td>1,000,000</td>
<td>3057000</td>
<td>TYGART VALLEY RIVER AT COLFAX, WV</td>
</tr>
<tr>
<td>Max. Pump Rate (gpm)</td>
<td>954</td>
<td>Min. Gauge Reading (cfs)</td>
<td>628.26</td>
<td>Min. Pass by (cfs)</td>
<td>592.8</td>
</tr>
<tr>
<td>Intake Point</td>
<td>Start Date</td>
<td>End Date</td>
<td>Volume (gal)</td>
<td>Ref. Gauge ID</td>
<td>Ref. Gauge Name</td>
</tr>
<tr>
<td>West Fork #1</td>
<td>12/1/2011</td>
<td>1/31/2012</td>
<td>1,000,000</td>
<td>3061000</td>
<td>WEST FORK RIVER AT ENTERPRISE, WV</td>
</tr>
<tr>
<td>Max. Pump Rate (gpm)</td>
<td>954</td>
<td>Min. Gauge Reading (cfs)</td>
<td>254.34</td>
<td>Min. Pass by (cfs)</td>
<td>67.7</td>
</tr>
<tr>
<td>Intake Point</td>
<td>Start Date</td>
<td>End Date</td>
<td>Volume (gal)</td>
<td>Ref. Gauge ID</td>
<td>Ref. Gauge Name</td>
</tr>
<tr>
<td>Middle Island Creek #1</td>
<td>12/1/2011</td>
<td>1/31/2012</td>
<td>1,000,000</td>
<td>3114500</td>
<td>MIDDLE ISLAND CREEK AT LITTLE, WV</td>
</tr>
<tr>
<td>Max. Pump Rate (gpm)</td>
<td>954</td>
<td>Min. Gauge Reading (cfs)</td>
<td>51.83</td>
<td>Min. Pass by (cfs)</td>
<td>12.48</td>
</tr>
</tbody>
</table>
General intake information

- Flags for sensitive aquatic life
- Location details
  - Basin area
- Reference Gauge Information
  - Basin area
  - Statistically-based threshold (point where withdraws must stop)

Water Availability Information

- Estimated median monthly flow
- Known water demands
  - LQU
  - Marcellus
- Safety factors (where appropriate)

Minimum required flow @ Gauge
Minimum pass-by flow @ location
Talk about companies funding gages
Growing Pains

- Last November Update We Were Fully Staffed with a Program Manager, Geologist, GIS & Database
- Dec. 2010 – Database Tech Retired (-1)
- Dec. 2010 – Hired new Database Tech (Full)
- April 2011 – GIS Tech Resigned (-1)
- May 2011 – Program Manager Retired (-2)
- June 2011 – Hired new GIS Tech (-1)
- Sept. 2011 – Program Manager replaced from within the section (-1)
- Today we are still down 1 FTE and our workload has increased significantly due to the Executive Order.
Water Management Plan Time Line

- November 2011: Write Plan
  - Compile Data & Maps
- June 2012: Write Plan
  - Complete Map Atlas
- January 2013: Corrections
  - Submit Draft
  - For Peer Review
- March 2013: Corrections
- April 2013: Corrections/Print
- September 2013: Final Draft
  - Submitted for Review
- November 2013: Due to Legislature
Questions?

Thank you.