

Parameters Run on Reservoir Samples

Total 179

The parameters that are tested for and the testing frequency have been developed from input from MAWC Source Water Consultants, Indiana University of PA, MAWC Consulting Engineers, MAWC Water Quality staff and Public groups that are part of our Source Water Protection Committee, such as the Marcellus Citizens Group of Westmorland County and Mt. Watershed.

In addition to the water quality testing being discussed MAWC also contracts with IUP for air quality testing around the compressor station and MAWC facilities.



Sampling Frequencies

➤ All VOC's, SVOC's, Radionuclides, Metals (IUP tests)

Typically Conducted Quarterly

When a fracking event is scheduled then testing begins weekly one month before frac is to commence. Weekly testing continues until 1 month after fracking is completed based on pad location.

During the Shaw Event sampling for ALL these parameters was done daily the first week, 3 times per week beginning Feb. 4th and continues to be done 3 times per week. This is based on estimated flows from points in the reservoir to our water intake.



Sampling Frequencies, Cont.

- MAWC has continuous on-line monitors that run 24/7/365 on both our water intake line and the conservation discharge to Beaver Run below the dam. This is to see any change through out the water column in the reservoir.
- Testing frequency of the raw water supply in the water plant by the plant operators are shown on the following slides.



VOC

- Dichlorodifluoromethane
- Chloromethane
- Vinyl chloride
- Bromomethane
- Chloroethane
- Trichlorofluoromethane
- 1,1-Dichloroethene
- Acetone
- Methylene Chloride
- Methyl-tert-butyl ether
- trans-1,2-Dichloroethene
- 1,1-Dichloroethane
- 2-Butanone
- cis-1,2-Dichloroethene
- Chloroform
- Bromochloromethane
- 1,1,1-Trichloroethane
- 1,1-Dichloropropene
- Carbon Tetrachloride
- Benzene
- 1,2-Dichloroethane
- Trichloroethene



VOC cont

- 1,2-Dichloropropane
- Dibromomethane
- Bromodichloromethane
- cis-1,3-Dichloropropene
- 4-Methyl-2-pentanone
- Toluene
- trans-1,3-Dichloropropene
- 1,2,3-Trichloropropane
- 1,1,2-Trichloroethane
- 1,3-Dichloropropane
- Tetrachloroethene
- 2-Hexanone
- Dibromochloromethane
- 1,2-Dibromoethane
- Chlorobenzene
- 1,1,1,2-Tetrachloroethane
- Ethyl Benzene
- m,p-Xylenes
- o-Xylene
- Total Xylenes
- Styrene
- Isopropylbenzene



VOC cont

- Bromoform
- 1,1,2,2-Tetrachloroethane
- n-Propyl Benzene
- 1,3,5-Trimethylbenzene
- Bromobenzene
- 2-Chlorotoluene
- 4-Chlorotoluene
- tert-Butylbenzene
- 1,2,4-Trimethylbenzene
- sec-Butylbenzene
- 4-Isopropyltoluene
- 1,3-Dichlorobenzene
- Butylbenzene
- 1,4-Dichlorobenzene
- 1,2-Dichlorobenzene
- 1,2-Dibromo-3-chloropropane
- 1,2,4-Trichlorobenzene
- Naphthalene
- 1,2,3-Trichlorobenzene



Radionuclides

Gross Alpha

Gross Beta

Radium 226

Radium 228



SVOC

- Pyridine
- N-Nitrosodimethylamine
- Aniline
- Phenol
- bis(2-chloroethyl)ether
- 2-Chlorophenol
- 1,3-Dichlorobenzene
- 1,4-Dichlorobenzene
- Benzyl alcohol
- 1,2-Dichlorobenzene
- 2-Methylphenol
- bis(2-chloroisopropyl)ether
- 3 & 4-Methylphenol
- N-Nitroso-di-n-propylamine
- Hexachloroethane
- Nitrobenzene
- Isophorone
- 2-Nitrophenol
- 2,4-Dimethylphenol
- bis(2-chloroethoxy)methane
- 2,4-Dichlorophenol
- Benzoic acid



SVOC Cont.

- 1,2,4-Trichlorobenzene
- Naphthalene
- 4-Chloroaniline
- Hexachlorobutadiene
- 4-Chloro-3-methylphenol
- 2-Methylnaphthalene
- Hexachlorocyclopentadiene
- 2,4,6-Trichlorophenol
- 2,4,5-Trichlorophenol
- 2-Chloronaphthalene
- 2-Nitroaniline
- Dimethylphthalate
- Acenaphthylene
- 2,6-Dinitrotoluene
- 3-Nitroaniline
- Acenaphthene
- 2,4-Dinitrophenol
- 4-Nitrophenol
- Dibenzofuran
- 2,4-Dinitrotoluene
- Diethylphthalate
- Fluorene



SVOC Cont. (3)

- 4-Chlorophenyl-phenylether
- 4-Nitroaniline
- 4,6-Dinitro-2-methylphenol
- N-Nitrosodiphenylamine
- Azobenzene
- 4-Bromophenyl-phenylether
- Hexachlorobenzene
- Pentachlorophenol
- Phenanthrene
- Anthracene
- Carbazole
- Dimethylphthalate
- Acenaphthylene
- 2,6-Dinitrotoluene
- 3-Nitroaniline
- Acenaphthene
- 2,4-Dinitrophenol
- 4-Nitrophenol
- Dibenzofuran
- 2,4-Dinitrotoluene
- Diethylphthalate
- Fluorene



SVOC Cont (4)

- Benzo[k]fluoranthene
- Benzo[a]pyrene
- Indeno(1,2,3-cd)pyrene
- Dibenzo(a,h)anthracene
- Benzo[ghi]perylene



IUP Tests

- Fluoride
- Chlorine
- Bromine
- No3
- Po4
- So4
- Calcium
- Magnesium
- Iron
- Aluminum
- Strontium
- Lead
- Arsenic
- Mercury
- Chromium
- Barium
- Cadmium
- pH
- TDS
- Conductivity
- Temp

<https://www.iup.edu/energy/research-initiatives/beaver-run-reservoir/>



Online monitors

- Temp
- pH
- Conductivity
- DO (dissolved oxygen)
- Raw Turbidity
- Clearwell Total Chlorine



Plant tests

- Raw turbidity (4hrs)
- Clearwell turbidity (4hrs)
- Raw pH (4hrs)
- Raw total hardness (Daily)
- Raw iron (Daily)
- Raw chlorides (Daily)
- Raw conductivity (Daily)
- Raw Alkalinity (Daily)
- Raw smell test hot and cold (8hrs)
- Uv 254 (Daily)

- Sample pH*
- Sample chlorides*
- Sample conductivity*

* Collected at all 5 sample sites run in house



Shaw Utica Well Incident

January 26, 2019

- Weekly Pre-fracking sampling had begun in November 2018 as per MAWC protocol
- Fracking on the 1st well began in January 2019
- CNX contacted MAWC January 27, 2019 at approximately 7 pm to tell us they had a “pressure anomaly” on the 2nd Utica well which they were fracking on the Shaw pad (Shaw 1G). No fluids had been released and DEP had been notified.
- MAWC Senior Management was contacted and a meeting with CNX was scheduled for 9 am the following morning.
- MAWC Water Quality staff were directed to begin sampling at 3 sites on the reservoir below gradient from the Shaw pad. Sampling would take place daily.



Shaw Incident cont.

- At the meeting with CNX on January 28th, MAWC was informed that a shallow well near the Shaw pad showed increased pressure overnight. Other shallow wells in the vicinity were being check for high pressure.
- Discussion proceeded on implementation of CNX's EAP so that the reservoir would be protected in case any fluids were found to be discharging. It was reiterated that no fluids had been observed.
- MAWC's Water Quality reported no visible indications of discharge into the reservoir. Plant monitors indicated no changes to water quality entering the plant or the low elevation release point from the reservoir.



Shaw Incident cont.

- MAWC began to review implementation of its EAP for any potential contamination event on the reservoir.
- This included a schedule of implementation, sampling, notifications, necessary MAWC personnel/equipment, plans for alternative supplies, changes to reservoir discharge operation, etc.
- Daily updates with CNX were conducted. On January 30th it was reported that further shallow wells were being influenced.
- MAWC monitoring continued. So far nothing was indicating any deviation from the normal raw water quality.



Shaw Incident cont.

- January 30th contacted PADEP Water Quality group to review the current situation and discuss MAWC's potential plans if indications of any reservoir contamination appeared. MAWC asked for approval to reduce our conservation discharge from the reservoir if necessary.
- As part of MAWC's EAP our major bulk water customers were contacted to discuss being prepared to open these interconnects or shutoff ones we supplied to maintain water supplies in our northern districts.



Shaw Incident cont.

- Contractors were contacted to implement other parts of the MAWC EAP to help maintain water supplies if necessary.
- Indiana University was contacted to take additional samples from all around the Shaw pad. Due to the severe cold (-4) during this period sampling was required to be delayed until Feb. 2nd however a site review indicated no new outcroppings of water. Everything was frozen at this time.
- Press releases were prepared by CNX and reviewed by MAWC for release.



Shaw Incident cont.

- Sampling was reduced to Three (3) times per week after CNX reported the well was shutdown and gas pressures began to reduce.
- Sampling continues on a Three (3) time per week basis.
- All monitoring and sample results continue to be normal.
- MAWC is waiting for the final reports from the PADEP and CNX to proceed on this event.

