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To: Rachel Carson

From: Ken Gayman

Please read page 1 and page 4 on Fly Ash disposal at Hatfield power plant, How toxic is this material, what happened at Labelle near Brownsville, Pa. Please read page 3 Nature's corner about Ten Mile Creek

Thank you
Ken Gayman

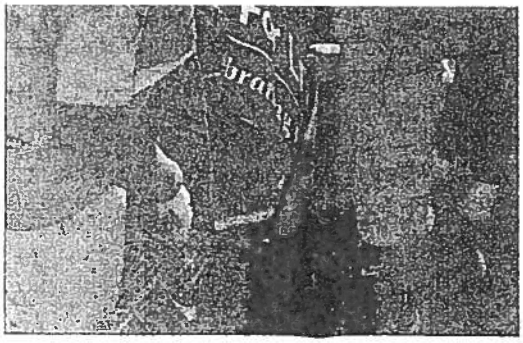
Read D.E.P. Test results

Izaak Walton League of America
Shawnee/Cherokee Chapter, Washington Co.
Kenny Gayman
112 Oak Dr.
Jefferson, PA. 15344

INDEX

Vol. 23 No. 1 268

A large number of area businesses, agencies, schools, churches and individuals who participated in the event helped make the event a truly memorable and special affair, participating in a traditional fundraising initiative that has raised more than $2.1 million over the past 19 years...and



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activities offering fun for all ages throughout the 24-hour Relay.

As is tradition, the Greene County Relay kicked off with the annual torch run. The torch was carried by runners representing the county high schools. The runners were escorted by members of various local police departments and members of the Patriot's Dream Riding Association.

After the torch arrived at the Relay, it was time for the opening ceremony, where Relay representatives presented special plaques to the many individuals, businesses and agencies that

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Please

FirstEnergy looks to ship coal waste to Greene facility

By Susy Kelly, fo the Greene County Messenger

The state Department of Environmental Protection (DEP) is reviewing an application to modify the solid waste permit for FirstEnergy's non-operational Hatfield's Ferry plant, and plans to hold a public meeting on the matter this month.

FirstEnergy is seeking to transport coal combustion byproduct (CCB) by barge from its Bruce Mansfield Power Station, located in Shippingport, Beaver County, to the Greene County facility in Monongahela Township.

The power company is under a consent decree with DEP to stop disposing of CCB in the Little Blue Run impoundment, which straddles the border of Beaver County and Hancock County, West Virginia, by the end of 2016.

The consent order also requires FirstEnergy to perform remediation at the site and fully complete the work to close it by 2028, according to DEP.

DEP spokesperson John Poister said Little Blue Run is "the largest coal refuse dump site in North America."

He said Little Blue Run impoundment predates a lot of DEP's regulations — it lacks a liner and leak detection measures, for example. "There was material

Please see **Coal**, *Page* A4

Southwest Reg join Washingtc

Transaction expected tc close on July 1

By Eric Morris and Steve Barrett

WAYNESBURG — Greene County's sole hospital is set to come under ownership of an area health system this summer.

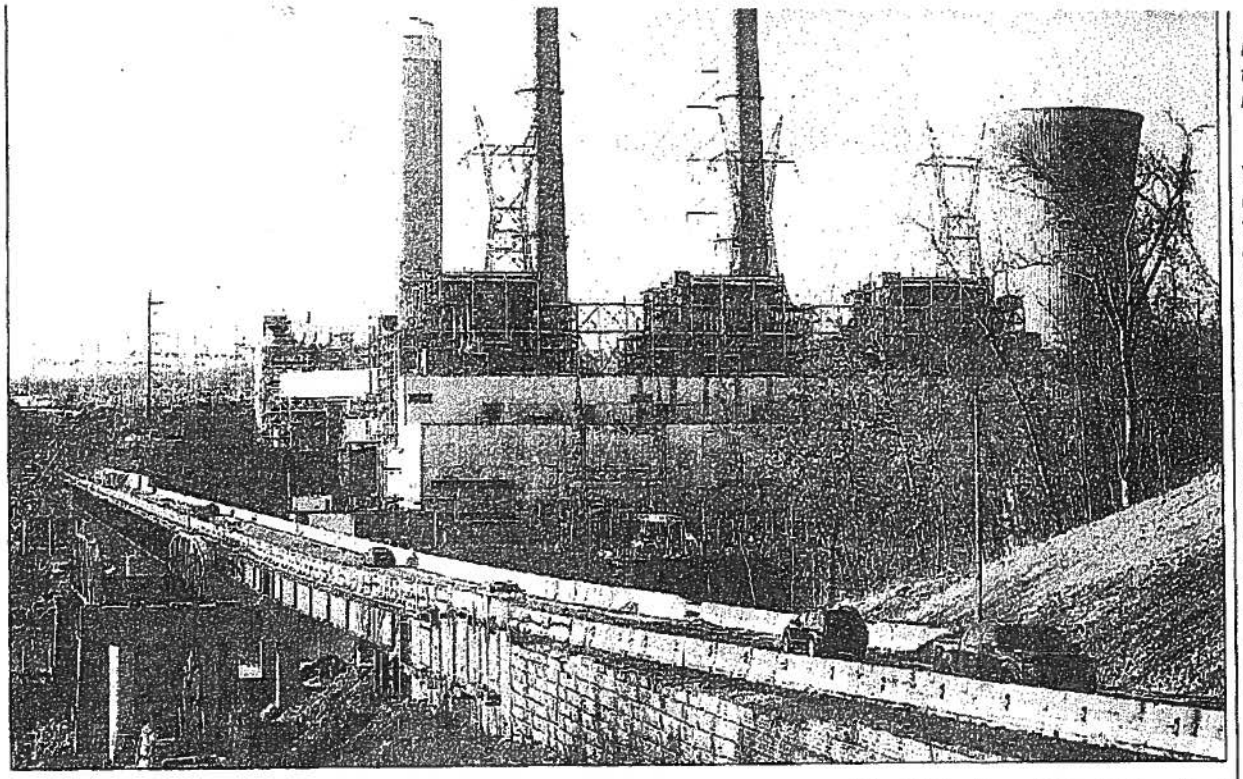
Washington Health System (WHS) has entered into an agreement to purchase Southwe Regional Medical Center, according to a new release issued Monday by the Washington-based health provider.

WHS spokesperson Stephanie Wagoner sai details of the contract to purchase the 49-bed Waynesburg hospital from RegionalCare Hos pital Partners will not be disclosed, but the transaction is expected to close July 1.

WHS said it intends to continue services provided by Southwest Regional and to hono existing union contracts of hospital employee According to Wagoner, the hospital employs staff of about 300.

"It's going to be an easy transition for the community," said Wagoner, adding that the

Please see **SRMC**, *Page*



John F. Brothers | Herald-Standard

This 2014 file photo shows Hatfield's Ferry power plant in Greene County.

Coal

"We'll be taking questions. The purpose is to get it out in the open and explain exactly what FirstEnergy wants to do."

— DEP spokesperson John Poister

Continued from A1

beginning to leak," said Poister.

The refuse dump at Hatfield's Ferry, which powered down late in 2013, is more modern, Poister explained. He said it meets DEP requirements, and meets or exceeds federal regulations.

"It's a very sophisticated site and it's not being used," said Poister.

Fir tEnergy's permit app'ication has been reviewed for completeness and has moved to the second stage, the technical review.

The technical review, according to DEP, involves both a detailed examination of the application and an informational meeting to allow for public participation.

"We'll be taking questions," said Poister. "The purpose is to get it out in the open and explain exactly what FirstEnergy wants to do."

Last year, the federal Environmental Protection Agency (EPA) proposed regulations for the disposal of coal ash from electricity generating plants for the first time.

After review, including public testimony, the agency issued a final rule in April regulating CCB as solid waste under the Resource Conservation and Recovery Act (RCRA). The new regulations go into effect in October.

"The available information demonstrates that the risks posed to human health and the environment by certain (CCB) management units warrant regulatory controls," the EPA determined.

The public meeting regarding the Hatfield's Ferry permit application will be held May 21 from 6 to 8 p.m. at the Carmichaels Junior/Senior High School Building, located at 300 West Greene Street in Carmichaels.

Copies of the application are available for review or copying at the DEP Southwest Regional Office at 400 Waterfront Drive in Pittsburgh between the hours of 8 a.m. and 4 p.m.

DEP recommends calling ahead for an appointment at 412-442-4000 for review and copying to assure proper assistance.

Greene

"It's the toughest job I've ever done, and it's the most rewarding job I've ever done."

Continued from A1

Waynesburg.

Commissioners also proclaimed May Foster Parent Appreciation Month.

The proclamation recognizes the services

incredibly talented per-
ı who has her whole life
ead of her. I am proud of
r and I wish her the very
st in life, and I cannot
it to see what exciting
ngs are going to happen
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:t was during those con-
:sations with survivors
en I was reminded again
just how incredible Relay
r Life is...Not just because
the fund-raising, but be-
ıse it gives me the oppor-
ıity to meet real people
ose lives have been im-
:ted by cancer and who
use to give up hope.

ınd then there was that
:t special Victory Lap tak-
by the cancer survivors.
is is probably my favorite
't of the whole Relay. As
survivors held each oth-
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phantly, smiling proudly,
ıce again was reminded
y I truly look forward to
Relay each and every
ır.

ınd as if the event could
be any more emotional
me, I was snapping pho-
of the Victory Lap when
ıw my Mom, a cancer
vivor, walking the lap
h my sister, cousin, wife
l son.

ınd I put away the cam-
and notepad and joined
m. And as we walked,
ging Mom and wiping
ay tears as hundreds of
ple stood along the track
ering and applauding
of the cancer survivors,
as just simply amazed
ıow powerful the Relay
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sincerely hope that many
ou were able to find
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rs at the Relay this past
ekend, and I hope those
did attend were able to
erience the joy, laughter,
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nd, I hope that if you
e there, you were able to
e home a memory or two
: will stay with you for
rs to come.

ook for in-depth cov-
ge and photos of the
5 Relay inside this very
ıe...

NATURE'S CORNER

Why is Ten Mile Creek not being stocked this year?

By Ken W. Dufalla

Let me first make the following membership pledge that is followed by the Izaak Walton League of America (IWLA): "To strive for the purity of water, the clarity of air, and the wise stewardship of the land and its resources. To know the beauty and understanding of nature, and the value of wildlife, woodlands and open space. To the preservation of this heritage and to man's sharing in it, I pledge myself as a member of the Izaak Walton League of America." This pledge is a major part of the recent decision not to stock Ten Mile Creek because of its high radiation levels.

With this in mind, the IWLA has always stood for honesty and integrity. It has never been the intent of the League to in any way mislead the public. The League has developed a water quality testing system not to find any anomalies, but instead to ensure local residents that their water is safe. It was discovered that the water in our area is not safe. The discharges from Clyde Mine, Emerald Mine and Cumberland Mine have been polluting our streams for at least four years. This can be proven by scientific certified lab data.

Notice that I did not say for the period of time prior to the IWLA's testing because there was not enough testing done to make such a statement, but I can state that these discharges have been polluting our streams for the last four years. I have the data to prove this statement. This brings us to the problem with stocking Ten Mile Creek. If one would look at only the Code 46 method used by the DEP, the water is well within the parameters for acceptable water quality. However, this testing is only half the picture. The second part of the testing is to check for radiation. You may ask yourself, "Why test for radiation?" The answer is simple. The fracking industry is bringing large amounts of radioactive material

Ken Dufalla

to the surface and in flow back water. This material is entering our streams and drinking water supplies. The same sections of stream that were tested with the 046 code was also checked for radiation and found to have levels of radiation of over 60 times higher than that of acceptable drinking water standards of 5 PCI/L. When the PA Fish and Boat Commission (PAFBC) regional biologist (Rich Lorson) was given the results of the radiological testing, he passed it to the higher-ups in the Commission. The end result is that I was told that if this section of Ten Mile Creek was stocked by the Commission, they would cease stocking until further tests could be undertaken to evaluate how bad the situation really has become. Consequently, in tandem with PAFBC's cease-stock decision and following their directive, that is exactly what the IWLA recently found it necessary to do with their Ten Mile Creek stocking program.

Some people have been saying to stock anyway, but to put an advisory out saying that the fish have radiation in them and don't eat them. This goes against the ideals of the IWLA. We will not put fish in polluted water. It is not only a waste of hard earned money, but it is unsafe to expect that people will not consume the fish and leaves the IWLA open for law suits. The idea of stocking polluted waters goes against the membership pledge. The IWLA will not stock fish until the problem with the water is corrected. If you have a complaint, go to the source of the problem. Go to the mining discharges and find out who put these radioactive materials in our mine pools. The blame for not stocking is not the IWLA. It is the industry that is contaminating our waters.

Put the blame where it belongs. Do not adjust to their continual polluting of streams by saying, "Stock anyway, we just won't eat the fish or drink the water." NO! NO! Stop the pollution at its source and then you will not have to adjust to industries failure to keep the water and air clean. It is your water and your right to have pure water. Stand up for what is yours and stop making excuses for the industry. For too long they have gotten everything they want and we have suffered the consequences. Aren't you tired of being an acceptable casualty of the industry? Ten Mile Creek and the excellent trout stocking program is just another example of being an acceptable causality. When does it quit and when do we demand better? It is your water, what are you going to do about it?

Breaking news: It has been reported as of May 5, 2015, that an advisory has gone into effect on fish from the Susquehanna River. Many fish are developing black spots on their bodies – cancer. Affected fish cannot be eaten, since they contain cancer.

This news is just another reason to wait and to further test Ten Mile Creek. This could be the beginning of a very serious environmental problem in our area also.

As always, belief in a higher power sometimes is the only thing we have to hold on to.

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CIRCULATION

Bromide in Surface Waters in Western Pennsylvania and Its Effects on Disinfection By-product (DBP) Formation in Community Water Systems

PA Department of Environmental Protection

INTRODUCTION

In 2010, the Pennsylvania Department of Environmental Protection (DEP) became aware of increased levels of bromide in the Monongahela and Allegheny rivers. Bromide in water is a concern because of its ability to form brominated analogs of drinking water disinfection by-products (DBPs). Bromide is not regulated and there is no established maximum contaminant level (MCL). However, according to a study conducted by the Environmental Protection Agency (EPA), source water with bromide concentrations of 150 micrograms per liter (µg/L) was classified as containing high levels.[1] The EPA report also referred to bromide concentrations of 150 ug/L as moderate levels, and 20 ug/L as low concentrations. Other studies and sampling efforts by the University of Pittsburgh and the Pittsburgh Water and Sewer Authority have contributed to DEP's understanding of the bromide levels of concern.[2]

Natural background levels of bromide in most Pennsylvania surface waters have typically been below detected levels when using the historical detection limit of 50 µg/L. Starting mid- 2012, samples were analyzed using a more sensitive detection limit of [illegible] µg/L. Samples collected with the more sensitive detection limit at Water Quality Network (WQN) Station #0866 (the Allegheny River upstream from Warren, PA), which is not affected by any known sources of bromide in Pennsylvania, were measured near 25 ug/L bromide. Samples collected at reference WQN stations in the eastern part of Pennsylvania, which are not affected by any known point sources of bromide, typically [illegible] using the more sensitive detection limit of 25 ug/L bromide.

Brines with high salinity occupy pore spaces in sedimentary rocks at depths throughout western Pennsylvania. Brine waters can originate from deep or shallow gas or oil wells. Since all brine waters have the same geological origin, the chemical compositions of brine waters are relatively similar. Therefore, the particular source (rock layer) of the brine cannot be determined from the chemical analysis of the source water; only the concentration can be reported. The source of the brine water, that is, whether it could be from the Marcellus Shale or another rock layer.

High Total Dissolved Solids (TDS) values in rivers can be traced to a variety of sources. Many miles of Western Pennsylvania surface waters are influenced by mineral extraction as well as industrial and agricultural activities. TDS values are a function of all these variables. Consequently, high TDS values, or high bromide levels, are not attributable to one type of activity.

Potential Sources of Bromide

Bromide in fresh water is typically found in areas influenced by saltwater intrusion or another bromide source. Potential sources of bromide include the coal power, oil and gas drilling industries, surface/ground water quality and geography. Some applications of bromide include:

- Pesticides: Some pesticides contain bromine. The compound methyl bromide is used to fumigate soil and kill pests. In 1991, 35,000 metric tons of bromine pesticides were used to attack weeds, fungi, and soil-borne diseases. Bromine pesticide use declined in the last decade due to environmental concerns, and some pesticide manufacturers phased out this chemical.
- Coal-Fired Power Plants: Most recently, bromide products have been used to reduce mercury emissions from coal-fired utilities. Bromine has been shown to effectively oxidize the elemental mercury found in coal-fired flue gas to form mercuric bromide, which is more effectively

captured by wet scrubbers and retained in scrubbers than mercuric chloride. In various embodiments, inorganic bromides make up a part of sorbent compositions to reduce emissions of mercury upon combustion of fuels such as coal The sorbent compositions are added directly to the fuel before combustion; are added partially to the fuel before combustion and partially into the flue gas post combustion zone; or are added completely into the flue gas post combustion zone. In preferred embodiments, the sorbent compositions comprise a source of halogen and preferably a source of calcium. Among halogens, iodine and bromine are preferred.

- Natural Resource Extraction: The hydraulic fracturing process uses large volumes of water to fracture rock layers to release the deep shale gas. Flowback and produced water can be managed through disposal or treatment, which may then be followed by discharge to surface water bodies or reuse. Underground injection is the primary method for final disposal in all the major gas shale plays, including the Marcellus Shale, but some surface water discharges of natural gas wastewater remain and are major sources of bromide. There are a number of discharges from coal mining and coal bed methane operations that may be substantial sources in some cases.
- Cooling Water Systems: Some cooling water systems for industrial facilities use brominated compounds as algaecides.

Many other types of products contain bromine in small amounts such as clothing dyes, citrus-flavored soft drinks, perfumes and pharmaceuticals. Different bromine compounds can also purify water in swimming pools, and are used to develop film.

Concerns about Bromide Levels

Regulatory authorities and drinking water treatment plant operators are concerned when bromide levels exceed the natural background levels, which are typically below detection levels in Pennsylvania surface waters. The presence of bromide in raw water sources (source waters) of Community Water Systems (CWS) that chlorinate will produce a greater amount of brominated Disinfection By-Products (DBPs), which have been shown to have greater health impacts (i.e., more toxic) than chlorinated DBPs.[2] Also, because of their inherently higher molecular weight, brominated DBPs will result in higher concentrations (by weight) than their chlorinated counterparts (e.g., bromoform versus chloroform), potentially causing a CWS to exceed the current DBP regulatory limits.

Formation of Brominated DBPs

In waters where no bromide is present, chlorine will react with the natural organic matter to form chloroform. In the presence of chlorine, bromide is oxidized and the oxidized forms of bromide out-compete the chlorine in the reaction with the natural organic matter present within the water, forming the brominated DBPs. As the ratio of bromide to natural organic matter increases, the percentage of brominated DBPs will increase. Specifically, bromide can be involved in reactions between chlorine and naturally occurring organic matter in drinking water, forming brominated and mixed chloro-bromo by-products, such as trihalomethanes (THMs) or halogenated acetic acids.

If bromide is present at low concentrations in the source water, then the trihalomethanes that are formed consist primarily of chlorinated species (e.g., chloroform). However, when elevated concentrations of bromide are present in the source water, greater concentrations of the brominated

species are formed (e.g., bromoform, dibromochloromethane, and bromodichloromethane). Research has found that the rate of formation of the brominated DBPs is relatively fast when compared to the rate of formation of chloroform. Brominated trihalomethanes have been shown to be more carcinogenic than chloroform and as a result, three of the four regulated THMs are brominated species. The federal safe drinking water standard for total trihalomethanes (TTHM) is 0.080 milligrams per liter (mg/L) or 80 µg/l. As a result of the Stage 2 Disinfectants/Disinfection By-products Rule (Stage 2 DBPR), more stringent standards went into effect in April of 2012. These standards are based on a locational running annual average of sample results at each sample location within the distribution system. Compliance problems are expected to increase as a result of the more stringent standards.

Challenges for CWSs

Removing brominated THMs from finished drinking water is difficult. Conventional drinking water treatment processes are not effective in removing bromide from the source water. CWSs can address the bromide problem by changing their treatment methods – for example, substituting chloramines for the chlorinated disinfectants that they normally use in the disinfection process. However, chloramines will produce different byproducts, and treatment with chloramines is complex and has other disadvantages. Reverse osmosis is a more effective process to remove bromide, although it is cost prohibitive for larger treatment plants. Limiting bromide levels in raw source water through effective regulation of wastewater discharges facilitates drinking water treatment and is the most cost effective approach to address the problem.

DEP Actions Since 2010

Since 2010, the department has taken several actions in response to the emerging issues surrounding high source water bromide levels. The following describes the actions taken, DEP's findings and recommendations for moving forward.

BROMIDE IN SURFACE WATERS

There are three major watersheds where bromide in surface waters is a significant concern: 1) Monongahela River Basin, 2) Allegheny River Basin; and 3) Beaver River Basin. Two smaller watersheds that are tributary to the Allegheny River are of lesser concern: Redbank Creek and Clarion River.

DEP started sampling for bromide routinely at WQN stations in 2010, and some targeted sampling has been performed in the southwest region since 2008. Bromide is essentially nontoxic to aquatic life and human health at any concentration that may reasonably occur in surface waters, the formation of disinfection byproducts during the chlorination process is the governing issue.

An appropriate planning goal is to assess and limit bromide concentrations at control points that will reflect all the sources and receptors (CWS intakes) in a watershed. Certain WQN water quality monitoring stations are well located for this purpose:

- Monongahela River at Charleroi (WQN0702)
- Allegheny River at Natrona (WQN0801),
- Redbank Creek at St Charles (WQN0820)
- Clarion River at Cooksburg (WQN0822)
- Beaver River at Beaver Falls (WQN0905)

Based on the locations of the major sources and sensitive receptors of bromide, we expect that if bromide concentrations are well controlled at these points, bromide concentrations are well controlled overall. Regular collection of water samples at these stations provides ongoing field verification of the efficacy of any control measures. This assessment would potentially change only if new sources of bromide or new CWS intakes manifest.

Monongahela River Basin

Water quality at WQN0702 (Monongahela River at Charleroi) is broadly representative of the upper Monongahela River basin as a whole.

Bromide concentrations in the Monongahela River from West Virginia [illegible] Between 2010 and 2014, bromide concentrations at WQN0702 decreased, and in 2014 the [illegible] observed value was 151 ug/L. However, in 2012 one sample was observed at 190 ug/L, and concentrations overall were slightly higher, indicating that bromide remains a concern in the Monongahela River.

WQN data collected on three tributaries (Whiteley, Tenmile and [illegible]) entering the [illegible] of the Monongahela River all consistently exhibit elevated [illegible] substantially higher in 2012 than has been observed previously.

WQN728 Whiteley Creek at Kirby

µg/L	Mean	Median	Min	Max
2012	2620	2785	[illegible]	5251
2011	658	669	240	1411

WQN713 Southfork Tenmile Creek at Jefferson

µg/L	Mean	Median	Min	Max
2012	456	540	33	2401
2011	115	75	25	357

WQN714 Dunkard Creek near Bobtown

µg/L	Mean	Median	Min	Max
2012	[illegible]	311	[illegible]	[illegible]
2011	250	247	98	367
2010	450	460	50	896

Allegheny River Basin

Water quality at WQN0801 (Allegheny River at Natrona) is broadly representative of the Allegheny Basin as a whole.

Bromide concentrations in the Allegheny River from New York are modest and do not exceed 50 µg/L. Concentrations generally increase in the river between Warren and Natrona, but generally only challenge 150 µg/L between Franklin and Natrona. In 2012, the maximum concentration of bromide observed at Natrona (WQN0801) was 125 µg/L, compared to 148 µg/L in 2011, and 289 µg/L in 2010.

Two tributaries in the Allegheny River Basin have both point sources and CWS receptors: the Clarion River and Red Bank Creek. Maximum concentration of bromide observed on the Clarion River at Cooksburg (WQN0822) was 87 µg/L in 2012, compared to 161 µg/L in 2011, and 224 µg/L in 2010. Maximum concentration of bromide observed on the Redbank Creek at St Charles (WQN0820) was 99 µg/L in 2012, compared to 244 µg/L in 2011, and 278 µg/L in 2010.

There is therefore a clear positive trend of decreasing bromide concentrations in the basin, perhaps tempered by the fact that the median concentration of bromide at Natrona was substantial at 100 µg/L in 2012. Also, the trend could be more the result of higher river flows than any decrease in loading.

Beaver River Basin

Water quality at WQN0905 (Beaver River at Beaver Falls) is broadly representative of the Beaver Basin as a whole.

Bromide concentrations in the Beaver River Basin may challenge 150 µg/L throughout the main stem of the River. Maximum concentration of bromide observed on the Beaver River at Beaver Falls (WQN0905) was 200 µg/L in 2012, compared to 126 µg/L in 2011, 153 µg/L in 2010, and 179 µg/L in 2009.

The major tributaries that form the upper Beaver River Basin are the Shenango River, Neshannock Creek, and the Mahoning River. Almost all of the Mahoning River drainage basin lies in Ohio. WQN data indicate that bromide concentrations in the Shenango River are consistently below levels of concern. There are no WQN data for the Neshannock Creek, but there are no known sources on the creek, either. Maximum concentration of bromide observed on the Mahoning River at North Edinburg (WQN0915) was 297 µg/L in 2012, compared to 227 µg/L in 2011, and 207 µg/L in 2010. Median concentration of bromide on the Mahoning River at North Edinburg was 206 µg/L in 2012.

One tributary in the lower Beaver River Basin, the Connoquenessing Creek, exhibits significant concentrations of bromide. Maximum concentration of bromide observed on the Connoquenessing Creek near Hazen (WQN0907) was 222 µg/L in 2012, compared to 156 µg/L in 2011, and 179 µg/L in 2010. Median concentration of bromide on the Connoquenessing Creek near Hazen was 89 µg/L in 2012. WQN data for another major tributary in the lower Beaver River Basin, Slippery Rock Creek (WQN0922), indicate that bromide concentrations do not rise to levels of concern on Slippery Rock Creek.

BROMIDE LEVELS AND DBP FORMATION IN COMMUNITY WATER SYSTEMS

DEP evaluated TTHM results from 2009 to 2012 for 42 community water systems in western Pennsylvania with intakes located on the Allegheny, Monongahela and Beaver rivers and tributaries to these rivers.

In October 2011, DEP requested water suppliers and labs in western PA to begin reporting the individual TTHM constituents (chloroform, bromoform, bromodichloromethane and chlorodibromomethane) rather than just the total TTHM value. DEP received data for 41 of the 42 water systems located within the Allegheny, Monongahela and Beaver river basins. Based on an evaluation, the percent of brominated constituents (compared to the TTHM value) was calculated to determine whether these water systems are: (1) not impacted by brominated TTHM constituents (up to 33 percent are brominated species); (2) moderately impacted (34 to 80 percent are brominated species); or (3) significantly impacted (more than 80 percent are brominated species).

The following table lists the 42 water systems by river basin, their source of supply, TTHM MCL exceedance/violation data, and impacts from brominated TTHM constituents.

Allegheny River Basin								
No.	Community Water System	Source Water	TTHM MCL Compliance Data 2009 – 2012 (MCL = 80 µg/L)			Impact from Brominated TTHMs Oct 2011 – 2012		
			Quarterly Value Max	Years Q Value > 80 µg/L	RAA MCL Violation (Yes/No)	No Impact (0-33%)	Moderate Impact (34-80%)	Significant Impact (81-100%)
1	Cambridge Springs (6200004)	French Creek	59	N/A	No		X	
2	Aqua PA-Emlenton (6610019)	Allegheny River	120	2010-2012	No	----	No data	----
3	PAWC-Clarion (6160001)	Clarion River	120	2010, 2012	No		X	
4	Parker Area Water Auth (5030013)	Allegheny River	107	2010-2011	No			X
5	PAWC-Butler (5100012)	Allegheny River	61	N/A	No		X	
6	Redbank Valley Mun Auth (6160010)	Redbank Creek	138	2011-2012	Yes		X	
7	Hawthorn Area Water Auth (6160026)	Redbank Creek	130	2011-2012	No			X
8	Kittanning Suburban (5030043)	Allegheny River	107	2009-2012	No		X	
9	PAWC-Kittanning (5030008)	Allegheny River	133	2009-2012	No			X
10	Buffalo Township (5020019)	Allegheny River	101	2012	No			X
11	Harrison Township (5020108)	Allegheny River	99	2010-2012	No			X
12	Brackenridge Borough (5020006)	Allegheny River	138	2009-2012	Yes			X
13	Tarentum Borough (5020055)	Allegheny River	100	2010	No		X	
14	New Kensington (5650070)	Allegheny River	90	2009-2010	No		X	
15	Oakmont Borough (5020036)	Allegheny River	94	2009-2010	No			X
16	Wilkinsburg-Penn Joint WA (5020050)	Allegheny River	52	N/A	No			X
17	Pittsburgh Water Swr Auth (5020038)	Allegheny River	131	2009-2012	No			X
18	ICMSA Crooked Creek (5320109)	Crooked Creek	119	2010-2011	No			X
19	PAWC-Indiana (5320025)	Two Lick Creek	87	2011	No	X		
20	Central Indiana Water Auth (5320040)	Yellow Creek	61	N/A	No	X		

Monongahela River Basin								
No.	Community Water System	Source Water	TTHM MCL Compliance Data 2009 – 2012 (MCL = 80 µg/L)			Impact from Brominated TTHMs Oct 2011 – 2012		
			Quarterly Value Max	Years Q Value > 80 µg/L	RAA MCL Violation (Yes/No)	No Impact (0-33%)	Moderate Impact (34-80%)	Significant Impact (81-100%)
1	PAWC-Pittsburgh (5020039)	Monongahela River - 1	100	2010-2012	No		X	
2	W County MA-McKeesport (5020025)	Youghiogheny River	80	N/A	No	X		
3*	PAWC-Pittsburgh (5020039)	Monongahela River - 3	100	2010-2012	No		X	
4	Charleroi Borough Auth (5630039)	Monongahela River	94	2009	No			X
5	Belle Vernon Borough (5260004)	Monongahela River	20	N/A	No			
6	Washington Twp Mun Auth (5260009)	Monongahela River	105	2009-2012	No			
7	Newell Mun Auth (5260014)	Monongahela River	93	2009	No			X
8	PAWC-Brownsville (5260005)	Monongahela River	128	2009-2012	No			
9	Tri County Mun Auth (5630045)	Monongahela River	130	2009-2011	Yes			X
10	Southwestern PA WA (5300017)	Monongahela River	128	2009-2012	No		X	
11	Carmichaels Borough MA (5300005)	Monongahela River	143	2009-2011	Yes			
12	Masontown MWW (5260013)	Monongahela River	257	2009, 12	Yes		X	
13	Dunkard Valley Joint MA (5300007)	Monongahela River	118	2009, 11, 12	No		X	
14	East Dunkard Water Auth (5300012)	Monongahela River	65	N/A	No		X	
15	Point Marion Borough (5260017)	Cheat River	143	2011-2012	No	X		
16	Marianna Mun WW (5630050)	Tenmile Creek	151	2009-2012	Yes			
17	MAWC-Yough (5260036)	Youghiogheny River	66	N/A	No	X		
18	N Fayette County MA (5260019)	Youghiogheny River	85	2010	No		X	
19	Somerset Borough MA (4560042)	Laurel Hill Creek	30	N/A	No	X		

* Duplicate water system. PAWC-Pittsburgh has two surface water intakes.

Beaver River Basin								
No.	Community Water System	Source Water	TTHM MCL Compliance Data 2009 – 2012 (MCL = 80 µg/L)			Impact from Brominated TTHMs Oct 2011 – 2012		
			Quarterly Value Max	Years Q Value > 80 µg/L	RAA MCL Violation (Yes/No)	No Impact (0-33%)	Moderate Impact (34-80%)	Significant Impact (81-100%)
1	PAWC-New Castle (6370034)	Shenango River	89	2010-2011	No		X	
2	Beaver Falls (5040012)	Beaver River	142	2009-2010	Yes		X	
3	PAWC-Ellwood City (6370011)	Slippery Rock Creek	58	N/A	No		X	
4	Harmony Borough (5100042)	Little Connoquenessing	136	2009-2012	Yes		X	

Of the 42 water systems with intakes on the Allegheny, Monongahela and Beaver rivers, and their tributaries:

- Eight water systems (19 percent) had at least one TTHM running annual average (RAA) MCL violation between 2009 and 2012.
- 32 water systems (76 percent) had at least one quarterly TTHM MCL exceedance between 2009 and 2012. 20 of these systems (48 percent) had TTHM MCL exceedances continuing into 2012.
- The majority of the TTHM MCL exceedances occurred during the third quarter (July through October). This time-frame represents the months of warmest water temperature, lowest flows, and highest DBP precursor (i.e., bromide, TOC) concentrations. All of these factors contribute to greater TTHM formation.
- Several systems were able to make operational or treatment improvements under the existing Stage 1 DBPR. As a result, the RAA remained below the MCL, even with the high averages from the third quarter. Improved compliance rates may have more to do with operational/treatment changes being made during this time, rather than an actual improvement in source water quality.

Of the 41 water systems that reported TTHM constituent data from October 2011 to 2012:

- Not Impacted: Seven water systems (17 percent) are not impacted by brominated TTHM constituents.
- Moderately Impacted: 21 water systems (51 percent) are moderately impacted by brominated TTHMs.
- Significantly Impacted: 13 water systems (31 percent) are significantly impacted by brominated TTHMs.

The TTHM constituent data will continue to be tracked as it provides a more complete picture of relative impacts from high source water bromide levels.

Although all of the water systems evaluated in this study returned to compliance with the TTHM MCL by the end of 2012, roll-out and implementation of the more stringent Stage 2 DBPR is just beginning. The new rule requires water systems to identify locations with the highest historical or expected DBP results as the new compliance sampling locations. Additionally, the new rule revises the compliance determination process - each individual sample location must now have a RAA value below the MCL to be in compliance. Under the old rule, the results of all sample locations were averaged together to determine compliance. Roll-out for the Stage 2 DBPR is as follows:

- Systems serving 100,000 or more begin compliance monitoring on 04/01/2012.
- Systems serving 50,000 – 99,999 begin compliance monitoring on 10/01/2012.
- Systems serving 10,000 – 49,999 begin compliance monitoring on 10/01/2013.
- Systems serving less than 10,000 begin compliance monitoring on 10/01/2013 or 10/01/2014.

Compliance determinations under the Stage 2 DBPR will be deferred until after four quarters of monitoring have been completed. Over the next two years, as water systems conduct sampling at the new locations and the locational RAAs are calculated, DEP expects to see additional MCL exceedances and violations. In the tables above, water systems with bolded data may have difficulty meeting the Stage 2 DBPR. DEP will continue to track DBP levels and respond to MCL exceedances and violations as appropriate. However, options for water suppliers to return to compliance are expected to be fewer in number, more cost prohibitive, and less effective. The most feasible options for tweaking/changing treatment or operations have already been employed to achieve compliance under the Stage 1 DBPR.

SOURCES OF BROMIDE

The Secretary's "Call to Action" in April 2011, together with the promulgation of the Chapter 95 regulations and related National Pollutant Discharge Elimination System (NPDES) permit actions, greatly reduced TDS and bromide loadings to surface waters from point sources in western Pennsylvania. Each of the three major affected river basins has been left with a distinctive source profile.

Monongahela River Basin

In the Monongahela River Basin, discharges of natural gas wastewater to surface water were virtually eliminated in response to the "Call to Action", and there are now only a few coal bed methane discharges in the entire basin. Based on our best information and very limited sampling, the coal bed methane discharges are minor contributors. Similarly, little data are available for coal-fired power plants. Based on our best information, coal-fired power plants may be moderate sources in some cases.

Based on WQN data, the major remaining sources of bromide originate on Whiteley, Tenmile and Dunkard creeks. Since there are no point source discharges of natural gas wastewater on any of those tributaries, an association with mining activity discharges is likely. Although bromide is not normally associated with mining discharges, it is possible that deep mines could have significant bromide. Alternatively, present or past practices of disposing of brine into mine voids could possibly be a contributing factor.

Allegheny River Basin

Point source discharges of unconventional natural gas wastewater in the Allegheny River Basin also were constrained by the "Call to Action," Chapter 95, and related NPDES permit actions, but not eliminated. The major sources of bromide in the Allegheny River basin continue to be point source discharges of oil and natural gas wastewater, both conventional and unconventional. These point sources have been well quantified (see table below).

Discharge	Receiving Water	Estimated Typical Loading (Bromide)
PA Brine – Josephine PA0095273	Blacklick Cr -- Conemaugh R – Kiskiminetas R -- Allegheny R	1,750 lb./d -9,000 lb./d
PA Brine – Franklin PA[illegible]	Allegheny R (Franklin, PA)	[illegible]
Hart Resource – Creekside PA0095443	McKee Run – Crooked Cr – Allegheny R	Outfall 401: 100 lb./d Outfall 501: 525 lb./d
Waste Treatment Corp PA0102784	Upper Allegheny River (Warren, PA)	1,0[illegible]
Tunnelton Liquids PA0091472	Conemaugh R – Kiskiminetas R -- Allegheny R	1,000 lb./d
Ridgway POTW PA0023213	Clarion R – Allegheny R	175 lb./d

Dannic/Brockway POTW PA0028428	Little Toby Creek –Clarion R – Allegheny R	160 lb./d
Dannic/Punxsutawney POTW PA0020346	Mahoning Creek –Allegheny R	190 lb./d
Reynoldsville POTW PA0028207	Sandy Lick Creek – Redbank Cr – Allegheny R	150 lb./d

The loadings from the Publically Owned Treatment Works (POTWs) in the basin are modest, and in stream concentrations in the Clarion River and on Redbank Creek were within acceptable limits in 2012. But Ridgway POTW, Brockway POTW, and Reynoldsville POTW discharge loadings of bromide that substantially contribute to the in stream concentrations of the surface waters at the first downstream receptors (Hawthorn Area Water Authority CWS on the Redbank Creek, and PA American Water Company Clarion CWS on the Clarion River).

The high loadings from the major industrial brine treatment plants are excessive by any standard, even considering the overall improvement in water quality with respect to bromide in the Allegheny River Basin from 2010 to 2012. Coal-fired power plants also may contribute significant loadings of bromide in the Allegheny Basin and may need to be considered.

It is clear that the point sources of conventional oil and natural gas wastewater have remained as major sources in the Allegheny River Basin despite the success of the "Call to Action." Each facility has certified that they accept no Marcellus Shale wastewater, and all of their oil and natural gas wastewater comes from conventional, shallow well formations. The chemical data indicate that this wastewater is as concentrated as any Marcellus Shale wastewater, with TDS concentrations up to 300,000 mg/L. Revisions to Chapter 95 in 2010 did not substantially constrain these facilities, since their pre-existing TDS loadings were exempted from any treatment requirements under the revised rule.

Beaver River Basin

There are no remaining point sources of unconventional natural gas wastewater in the Beaver River Basin. New Castle POTW does not sample for bromide (their NPDES permit requires sampling but they have appealed their permit). The best information is that they have not received unconventional natural gas wastewater since the first half of 2011, but they have Chapter 95 exempted TDS load and are authorized to accept conventional oil and natural gas wastewater.

The only major source of bromide that has been identified in the upper basin is the Mahoning River from Ohio, despite the fact that the major brine disposal model in Ohio is disposal into underground injection wells. Ohio generally does not allow brine disposal to POTWs, but the Warren POTW, which discharges to the Mahoning River, received approval to treat brine in 2010. Ohio EPA rescinded this approval in 2012, but that action has been contested with the result that Warren POTW is still discharging 100,000 gallons of brine per day. Also, Ohio EPA recently uncovered evidence of repeated dumping of untreated natural gas wastewater into storm drains in Youngstown that drain to the Mahoning River. The situation needs to be monitored.

CONCLUSIONS

1. Based on WQN data, water quality with respect to bromide in surface waters generally has improved from 2010 to 2012, but remains a concern in all three watersheds (Monongahela, Allegheny and Beaver rivers). Further actions are recommended to assure protection of the PWS use. (see Recommendations)

2. The Secretary's "Call to Action" in April 2011, together with the promulgation of the Chapter 95 regulations and related NPDES permit actions, greatly reduced TDS and bromide loadings to surface waters. This is the primary reason that water quality improved with respect to bromide from 2010 to 2012. Nevertheless, certain conventional oil and natural gas wastewater treatment facilities are still major sources of TDS and bromide. These facilities were exempted from the Chapter 95 treatment requirements as existing sources, and producers continue to send them this wastewater. However, that natural gas wastewater exhibits TDS concentrations as high as any Marcellus shale wastewater. These facilities are discharging loadings of bromide in the Allegheny River Watershed.

3. DEP evaluated TTHM data from 2009 to 2012 for 42 community water systems in western Pennsylvania. During this time period, three-quarters of the water systems (76 percent) had a least one quarterly TTHM MCL exceedance. Eight systems (19 percent) had at least one TTHM RAA MCL violation. By the end of 2012, all 42 water systems were able to return to compliance with the Stage 1 DBPR TTHM MCL as a RAA. However, it is unclear whether the improved compliance rate was due to improved source water quality, changes in treatment or operational practices, or a combination of both. Nearly half of these water systems (45 percent) continue to exceed the TTHM MCL during certain times of the year, exposing consumers to high levels of carcinogens. In general, this time-frame represents the months of warmest water temperature, lowest flows, and highest DBP precursor (i.e., bromide, TOC) concentrations. Compliance with the new Stage 2 DBPR will be much more challenging and feasible options for returning to compliance will be limited.

4. DEP evaluated TTHM constituent data from October 2011 to 2012 for 41 of the 42 community water systems. Based on the evaluation, the percent of brominated constituents (compared to the TTHM value) was calculated to determine the level of impact by brominated TTHMs. Eighty-three percent of the water systems (34 of 41) are moderately to significantly impacted by source water bromide concentrations and the formation of brominated TTHM constituents.

5. There appears to be a correlation between point source discharges of bromide and impacts on downstream CWS systems, as measured by the formation of brominated TTHMs. The correlation is not perfect, as several CWS systems located outside of the influence of major point sources and affected tributaries were still moderately impacted by brominated TTHMs. However, all of the CWS systems that had RAA MCL violations between 2009 and 2012 are located in areas where the source water may exceed 150 ug/L.

RECOMMENDATIONS

1. DEP's Bureau of District Mining Operations should investigate the sources of bromide in the Monongahela River Basin related to mining activities, especially those that discharge to Whiteley, Dunkard and Tenmile creeks. The sources of bromide on these streams should be quantified. A similar concern exists for the Clyde Mine discharge into Tenmile Creek, and the Consol Renton Mine discharge into Little Plum Creek on the Allegheny River. Alternatively, identify whether the bromide is the result of past practices that have been discontinued, or if the bromide originates naturally in the formations subject to mining activity.
2. Increase the sampling frequency from bimonthly to monthly at WQN801 (Allegheny River at Natrona) and WQN915 (Mahoning River at North Edinburg). This has already been accomplished for WQN915, Mahoning River at North Edinburg.
3. Implement expanded monitoring of point source discharges containing bromide in order to identify and characterize loadings for facilities and industrial categories that may not have been adequately addressed thus far. These data may support the development of a Chapter 93 water quality criterion for bromide.
4. Extend sampling of bromide to most WQN sampling stations.

References

[1]The Occurrence of Disinfection By-Products (DBPs) of Health Concern in Drinking Water: Results of a Nationwide DBP Occurrence Study, EPA/600/R-02/068, 2002.

[2]Bromide in the Allegheny River: A Possible Link with Marcellus Shale Operations, Pittsburgh Water and Sewer Authority and the University of Pittsburgh joint presentation, 2012.

[3]Drinking Water Criteria Document for Brominated Trihalomethanes, EPA-822-R-05-011, 2005.

Date of Issue: 06/06/2014 04:27:30

DEP Bureau of Laboratories - Harrisburg
P.O. Box 1467
2575 Interstate Drive
Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

NELAP - accredited by

NJ DEP - Laboratory Number: PA059
PA DEP LAP - DEP Lab ID: 22-00223

Analytical Report For
Mining And Reclamation

Sample ID: 0523 089 Date Collected: 04/10/2014 11:00:00 AM Lab Sample ID: R2014000800 Status: Completed

Name of Sample Collector: Gregory Prentice
Date Received:

County: Greene State:
Municipality: Jefferson Twp

Sample Medium: Surface Water
Sample Medium Type: Water

Location: 10 Mile Creek Downstream of AMD Plant
Reason: Complaint
Project: NOT INDICATED
Suite: RAD62
Matrix: Water

Stream Condition:

A sample value is an observed reading of a sample's radioactivity on a given date and time.

The Lower Level of Detection (LLD) is the minimum sample value that can be detected with 95% confidence.

The Counting Error (CE) is a factor that when added to and subtracted from a sample value, defines a range that will with 95% confidence encompass the actual sample value.

Test Codes/CAS# - Description	95% LLD	Sample Value	95% CE	Analyzed	Analyst	Test Method
BA140W BARIUM 140 WATER	10	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	

Mining And Reclamation

Sample ID: 0523 080 | Date Collected: 04/10/2014 11:00:00 AM | Lab Sample ID: R2014000800 | Status: Completed

Test Codes/CAS# - Description	95% LLD	Sample Value	95% CE	Analyzed	Analyst	Test Method
CS134W CESIUM 134 WATER	2	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
CS137W CESIUM 137 WATER	3	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
CO58W COBALT 58 WATER	3	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
CO60W COBALT 60 WATER	3	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
GALPHA Gross Alpha Activity	4.487	-1.496 PCI/L	2.542	05/19/2014 11:52 PM	JENFESLER	
EPA 900.0 ALPHA DUP QC FAIL; Possible Matrix Interference						
GBETA Gross Beta Activity	2.352	0.339 PCI/L	1.41	05/19/2014 11:52 PM	JENFESLER	
EPA 900.0 ALPHA DUP QC FAIL; Possible Matrix Interference						
I131W IODINE 131 WATER	4	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
FE59W IRON 59 WATER	5	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
LA140W LANTHANUM 140	4	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
PB212W LEAD 212 WATER	5	3 PCI/L	3	04/15/2014 10:02 AM	TMATUKAITI	
PB214W LEAD 214 WATER	[illegible]	12 PCI/L	4	04/15/2014 10:02 AM	TMATUKAITI	
MN54W MANGANESE 54 WATER	3	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
GAMMA RESULTS Analyzed by method EPA 901.1						
NB95W NIOBIUM 95	3	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
[illegible]8GW RADIUM 226 WATER BY GAMMA	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
RA228GW RADIUM 228 WATER BY GAMMA	6	0 PCI/L	0	04/15/2014 10:02 AM	TMATUKAITI	
TH232GW THORIUM 232 WATER BYGAMMA	9	0 PCI/L	0	04/15/2014 10:02 AM	TMATUKAITI	
U235GW URANIUM 235 WATER BY GAMMA	17	0 PCI/L	0	04/15/2014 10:02 AM	TMATUKAITI	
U238GW URANIUM 238 WATER BY GAMMA	149	0 PCI/L	0	04/15/2014 10:02 AM	TMATUKAITI	
ZN65W ZINC 65 WATER	6	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	
ZR95W ZIRCONIUM 95	4	0 PCI/L	0	04/15/2014 07:07 AM	TMATUKAITI	

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* denotes tests that the laboratory is not accredited for
** Laboratory is accredited by NJ NELAP, parameter not offered by PA LAP

Tanu Upadhyay, Technical Director, Bureau of Laboratories

Date of Issue: 05/02/2014 04:10:32

DEP Bureau of Laboratories - Harrisburg
P.O. Box 1467
2575 Interstate Drive
Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

Analytical Report For
Mining And Reclamation

Sample ID: 0523 090 Date Collected: 04/10/2014 11:00:00 AM Lab Sample ID: I2014009873 Status: Completed

Name of Sample Collector: Gregory Prentice
Date Received:

County: Greene State: PA
Municipality: Jefferson Twp

Sample Medium: Surface Water
Sample Medium Type: Water

Location: Ten Mile Creek Downstream of AMD plant
Reason: Complaint
Project: NOT INDICATED
Standard Anlysis: 755
Matrix: Water

Stream Condition:

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
00410M ALKALINITY REPORTED @ pH 3.9	126.4 MG/L	04/11/2014 05:54 PM	SSPUHLER	SM 2320B
01105A ALUMINUM, TOTAL (WATER & WASTE) BY ICP	205.000 UG/L	04/16/2014 10:04 AM	MOBERCASH	EPA 200.7
71870 [illegible]	[illegible] MG/L	[illegible]	[illegible]	[illegible]
01045A IRON, TOTAL (WATER & WASTE) BY ICP	[illegible] UG/L	04/16/2014 10:04 AM	MOBERCASH	[illegible]
01055A MANGANESE, TOTAL (WATER & WASTE) BY ICP	91.000 UG/L	04/16/2014 10:04 AM	MOBERCASH	EPA 200.7

Mining And Reclamation

Sample ID: 0523 090 | Date Collected: 04/10/2014 11:00:00 AM | Lab Sample ID: I2014008973 | Status: Completed

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
82550 OSMOTIC PRESSURE, MOS/KG	8 MOSM	04/11/2014 12:45 PM	KMCMULLEN	BOL BOL
00403M pH Reported with 3.9 alk	3.2 pH units	04/11/2014 05:54 PM	SSPUHLER	SM 4500H-B
** Comment ** Time Limit For Test Exceeded				
01147H SELENIUM, TOTAL (WATER & WASTE) BY ICPMS	<7 UG/L	04/16/2014 03:33 PM	DSCLENBERG	EPA 200.8
00929A SODIUM, TOTAL (WATER & WASTE) BY ICP	49.300 MG/L	04/16/2014 10:01 AM	MOBERCASH	EPA 200.7
01082A STRONTIUM, TOTAL (WATER & WASTE) BY ICP	329.000 UG/L	04/16/2014 10:01 AM	MOBERCASH	EPA 200.7
70508 Total Acidity	-82.00 MG/L	04/14/2014 03:16 PM	TVOROBEYCH	SM 2310B
00940A Total Chloride-Colorimetric	[illegible] MG/L	[illegible]	CRADEK	SM 4500-CL E
70300U [illegible]	[illegible]	[illegible]	[illegible]	[illegible]
00945A Total Sulfate-Colorimetric	107.1 MG/L	04/23/2014 11:45 PM	LHREHA	EPA 375.2
00530 TOTAL SUSPENDED SOLIDS	12 MG/L	04/11/2014 12:00 AM	LWILKINSON	USGS I-3765

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Tanu Upadhyay, Technical Director, Bureau of Laboratories

Date of Issue: 06/06/2014 01:01:49

DEP Bureau of Laboratories - Harrisburg
P.O. Box 1467
2575 Interstate Drive
Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

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NJ DEP - Laboratory Number: PA059
PA DEP LAP - DEP Lab ID: 22-00223

Analytical Report For
Mining And Reclamation

Sample ID: 0523 091 Date Collected: 04/10/2014 11:20:00 AM Lab Sample ID: R2014000801 Status: Completed

Name of Sample Collector: Gregory Frenico
Date Received:

County: Greene State:
Municipality: Jefferson Boro

Sample Medium: Water
Sample Medium Type: Water

Location: Outfall of Clyde Mine - AMD Treatment Plant
Reason: Complaint
Project: NOT INDICATED
Suite: RAD02
Matrix: Water

Stream Condition:

A sample value is an observed reading of a sample's radioactivity on a given date and time.

The Lower Level of Detection (LLD) is the minimum sample value that can be detected with 95% confidence.

The Counting Error (CE) is a factor that when added to and subtracted from a sample value, defines a range that will with 95% confidence encompass the actual sample value.

Test Code/Description	95% LLD	Sample Value	95% CE	Analyzed	Analyst	Test Method
BA140W BARIUM 140 WATER	10	0 PCi/L	0	04/15/2014 07:08 AM	TMATUKAITI	

Mining And Reclamation

Sample ID: 0523 091 | Date Collected: 04/10/2014 11:20:00 AM | Lab Sample ID: R2014000801 | Status: Completed

Test Code/CAS# - Description	95% LLD	Sample Value	95% CE	Analyzed	Analyst	Test Method
CS134W CESIUM 134 WATER	3	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
CS137W CESIUM 137 WATER	3	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
CO58W COBALT 58 WATER	3	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
CO60W COBALT 60 WATER	3	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
GALPHA Gross Alpha Activity	[illegible]	[illegible] PCI/L	[illegible]	05/20/2014 09:13 AM	JENFESLER	
EPA 900.0						
GBETA Gross Beta Activity	17.055	12.155 PCI/L	10.551	05/20/2014 09:13 AM	JENFESLER	
EPA 900.0						
I131W IODINE 131 WATER	4	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
FE59W IRON 59 WATER	5	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
LA140W LANTHANUM 140	4	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
PB212W LEAD 212 WATER	6		5	04/15/2014 10:07 AM	TMATUKAITI	
PB214W LEAD 214 WATER	4		6	04/15/2014 10:07 AM	TMATUKAITI	
MN54W MANGANESE 54 WATER	3	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
GAMMA RESULTS Analyzed by method EPA 901.1						
NB95W NIOBIUM 95	3	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
[illegible]						
[illegible]228GW RADIUM 228 WATER BY GAMMA	0	0 PCI/L	0	04/15/2014 10:07 AM	TMATUKAITI	
TH232GW THORIUM 232 WATER BYGAMMA	9	0 PCI/L	0	04/15/2014 10:07 AM	TMATUKAITI	
U235GW URANIUM 235 WATER BY GAMMA	16	9 PCI/L	11	04/15/2014 10:07 AM	TMATUKAITI	
U238GW						
ZN65W ZINC 65 WATER	7	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	
ZR95W ZIRCONIUM 95	4	0 PCI/L	0	04/15/2014 07:08 AM	TMATUKAITI	

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Taru Upadhyay, Technical Director, Bureau of Laboratories

Date of Issue: 05/07/2014 04:11:41

DEP Bureau of Laboratories - Harrisburg
P.O. Box 1467
2575 Interstate Drive
Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

Analytical Report For
Mining And Reclamation

Sample ID: 0523 092 Date Collected: 04/10/2014 11:20:00 AM Lab Sample ID: I201400097-1 Status: Completed

Name of Sample Collector: Gregory Preston
Date Received:

County: Greene State: PA
Municipality: Jefferson Boro

Sample Medium: Water
Sample Medium Type: Water

Project: NOT INDICATED
Standard Anlysis: 750
Matrix: Water

Stream Condition:

Sample Standard Comment: Time Limit For Test Exceeded

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
00110M ALKALINITY REPORTED @ pH 3.8	216.0 MG/L	04/11/2014 06:02 PM	SSPUHLER	SM 2320B
01105A ALUMINUM, TOTAL (WATER & WASTE) BY ICP	[illegible]08 UG/L	04/16/2014 10:09 AM	MGOBERCASH	EPA 200.7
71370 [illegible]				
01045A IRON, TOTAL (WATER & WASTE) BY ICP	[illegible] UG/L	[illegible]	MGOBERCASH	EPA 200.7

Mining And Reclamation

Sample ID: 0523 092 | Date Collected: 04/10/2014 11:20:00 AM | Lab Sample ID: I2014009874 | Status: Completed

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
01055A MANGANESE, TOTAL (WATER & WASTE) BY ICP	217.000 UG/L	04/16/2014 10:09 AM	MOBERCASH	EPA 200.7
62550 OSMOTIC PRESSURE, MO/KG	[illegible] MOSM	[illegible]	[illegible]	[illegible]
00403M pH Reported with 3 9 alk	8.5 pH units	04/11/2014 06:02 PM	SSPUHLER	SM 4500H-B
** Comment ** Time Limit For Test Exceeded				
01147H SELENIUM, TOTAL (WATER & WASTE) BY ICP/MS	[illegible] UG/L	[illegible]	DSOLENBERG	EPA 200.8
00929A SODIUM, TOTAL (WATER & WASTE) BY ICP	1910.000 MG/L	04/16/2014 10:09 AM	MOBERCASH	EPA 200.7
01082A STRONTIUM, TOTAL (WATER & WASTE) BY ICP	[illegible] UG/L	[illegible]	MOBERCASH	EPA 200.7
70508 Total Acidity	-124.80 MG/L	04/14/2014 03:17 PM	TVSROBEYCH	SM 2310B
00940A Total Chloride-Colorimetric	[illegible] MG/L	04/30/2014 01:01 PM	CRADEK	SM 4500-CL E
70300U TOTAL DISSOLVED SOLIDS @ 180C BY USGS I-3765	[illegible] MG/L	[illegible]	[illegible]	USGS I-3765
** Comment ** Aliquot of sample used for analysis yielded > 200 mg dried				
00945A Total Sulfate-Colorimetric	[illegible] MG/L	04/24/2014 01:51 PM	LHREHA	EPA 375.2
00530 TOTAL SUSPENDED SOLIDS	64 MG/L	04/11/2014 12:00 AM	LWILKINSON	USGS I-3765

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Upadhyay, Technical Director, Bureau of Laboratories

Date of Issue: 05/08/2014 04:19:55

DEP Bureau of Laboratories - Harrisburg
P.O. Box 1467
2575 Interstate Drive
Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

NELAP - accredited by

NJ DEP - Laboratory Number: PA069
PA DEP LAP - DEP Lab ID: 22-00223

Analytical Report For
Mining And Reclamation

Sample ID: 0523 093 Date Collected: 04/10/2014 11:30:00 AM Lab Sample ID: R2014000802 Status: Completed

Name of Sample Collector: Gregory Prentice
Date Received:

County: Greene State:
Municipality: Jefferson Twp

Sample Medium: Surface Water
Sample Medium Type: Water

Location: (1 TMI 10 Mile Creek UPSTREAM of Clyde AMD Treatment Plant)
Reason: Complaint
Project: NOT INDICATED
Suite: RAD62
Matrix: Water

Stream Condition:

A sample value is an observed reading of a sample's radioactivity on a given date and time.

The Lower Level of Detection (LLD) is the minimum sample value that can be detected with 95% confidence.

The Counting Error (CE) is a factor that when added to and subtracted from a sample value, defines a range that will with 95% confidence encompass the actual sample value.

Isotope Name	ABC Description	95% LLD	Sample Value	95% CE	Analyzed	Analyst	Total Method
BA140W	BARIUM 140 WATER	24	0 PCI/L	0	04/16/2014 07:16 AM	TMATUKAITI	

Mining And Reclamation

Sample ID: 0523 093 | Date Collected: 04/10/2014 11:30:00 AM | Lab Sample ID: R2014090602 | Status: Completed

Test Codes/CAS# - Description	95% LLD	Sample Value	95% CE	Analyzed	Analyst	Test Method
CS134W CESIUM 134 WATER	5	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
CS137W CESIUM 137 WATER	6	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
CO58W COBALT 58 WATER	6	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
CO60W COBALT 60 WATER	6	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
GALPHA Gross Alpha Activity	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
EPA 900.0						
GBETA Gross Beta Activity	1.501	175.472 PCI/L	3.394	05/20/2014 08:13 AM	JENFESLER	
EPA 900.0						
I131W IODINE 131 WATER	0	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
FE59W IRON 59 WATER	10	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
LA140W LANTHANUM 140	9	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
PB212W LEAD 212 WATER	13	31 PCI/L	16	04/15/2014 10:11 AM	TMATUKAITI	
PB214W LEAD 214 WATER	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
MN54W MANGANESE 54 WATER	6	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
GAMMA RESULTS Analyzed by method EPA 901.1						
NB95W NIOBIUM 95	5	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
26GW [illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	
23GW RADIUM 226 WATER BY GAMMA	11	152 PCI/L	24	04/15/2014 10:11 AM	TMATUKAITI	
TH232GW THORIUM 232 WATER BYGAMMA	14	151 PCI/L	22	04/15/2014 10:11 AM	TMATUKAITI	
U235GW URANIUM 235 WATER BY GAMMA	37	0 PCI/L	0	04/15/2014 10:11 AM	TMATUKAITI	
U238GW URANIUM 238 WATER BY GAMMA	260	0 PCI/L	0	04/15/2014 10:11 AM	TMATUKAITI	
ZN65W ZINC 65 WATER	11	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	
ZR95W ZIRCONIUM 95	11	0 PCI/L	0	04/15/2014 07:16 AM	TMATUKAITI	

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* denotes tests that the laboratory is not accredited for

** Laboratory is accredited by NJ NELAP, parameter not offered by PA LAP

Tanu Upadhyay, Technical Director, Bureau of Laboratories

Date of Issue: 05/02/2014 04:09:00

DEP Bureau of Laboratories - Harrisburg
P.O. Box 1467
2575 Interstate Drive
Harrisburg, PA 17105-1467

Contact Phone Number: (717) 346-7200

Analytical Report For
Mining And Reclamation

Sample ID: 0523 094 Date Collected: 04/10/2014 11:00:00 AM Lab Sample ID: 12014009875 Status: Completed

Name of Sample Collector: Gregory Prentice
Date Received:

County: Greene State: PA
Municipality: Jefferson Twp

Sample Medium: Surface Water
Sample Medium Type: Water

Reason: Complaint
Project: NOT INDICATED
Standard Anlysis: 755
Matrix: Water

Stream Condition.

Sample Standard Comment: Time Limit For Test Exceeded

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Method
00410M ALKALINITY REPORTED @ pH 3.5	135.0 MGL	04/11/2014 03:08 PM	SSPUHLER	SM 2320B
01105A ALUMINUM, TOTAL (WATER & WASTE) BY ICP	200 UGL	04/16/2014 10:11 AM	MOBERDASH	EPA 200.7
71870 BROMIDE BY IC	[illegible] MGL	[illegible]	[illegible]	[illegible]
01045A IRON, TOTAL (WATER & WASTE) BY ICP	11,000 UGL	04/16/2014 10:11 AM	MOBERDASH	EPA 200.7

Mining And Reclamation

Sample ID: 0523 094 | Date Collected: 04/10/2014 11:30:00 AM | Lab Sample ID: 12014009075 | Status: Completed

Test Codes / CAS # - Description	Reported Results	Date And Time Analyzed	Analyst	Test Metho
01055A MANGANESE, TOTAL (WATER & WASTE) BY ICP	35.000 UG/L	04/16/2014 10:11 AM	MOBERCASH	EPA 200.7
82550 OSMOTIC PRESSURE, MOS/KG	4 MOSM	04/11/2014 12:45 PM	RMCMULLEN	BOL BOL
00403M pH Reported with 3 9 atk	8.3 pH units	04/11/2014 06:02 PM	SSPUHLER	SM 4500H-
** Comment ** Time Limit For Test Exceeded				
01147H SELENIUM, TOTAL (WATER & WASTE) BY ICPMS	7 UG/L	04/16/2014 03:33 PM	DSOLENBERG	EPA 200.8
00929A SODIUM, TOTAL (WATER & WASTE) BY ICP	18.400 MG/L	04/16/2014 10:11 AM	MOBERCASH	EPA 200.7
01082A STRONTIUM, TOTAL (WATER & WASTE) BY ICP	360.000 UG/L	04/16/2014 10:11 AM	MOBERCASH	EPA 200.7
70508 Total Acidity	403.40 MG/L	04/14/2014 03:17 PM	TVOROBEYCH	SM 2310B
00940A Total Chloride-Colorimetric	17.9 MG/L	04/15/2014 09:05 PM	CRADEK	SM 4500-Cl
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
00945A Total Sulfate-Colorimetric	55.8 MG/L	04/23/2014 11:56 PM	LHREHA	EPA 375.2
00530 TOTAL SUSPENDED SOLIDS	20 MG/L	04/11/2014 12:00 AM	LWILKINSON	USGS I-376

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Tanu Upadhyay, Technical Director, Bureau of Laboratories