

# **Tenmile Creek Interim Update**

## **January 2016 Sampling Summary**

**May 12, 2016**

### **Background**

DEP's Bureau of Radiation Protection (BRP) and California District Mining Office have performed additional sampling to evaluate various potential contaminants at the Clyde Mine Treatment Facility (CMTF) and in Tenmile Creek in the vicinity of the CMTF, near Clarksville, Greene County. This is a follow-up to previous sampling performed by DEP and posted in a summary document in December of 2015. While the results of the 2015 sampling were found to be at acceptable levels, DEP chose to perform three additional rounds of sampling in January, April, and June 2016. This update is a summary of the sampling event performed on January 20, 2016.

### **Sample Locations and Types**

The June 2015 sampling was conducted at 12 locations and included samples to evaluate the water quality and materials where contaminants may accumulate over time such as sediment, aquatic vegetation, and fish. Based on the results, the decision was made to focus the follow-up sampling more closely around the CMTF. Samples were collected at a total of five locations in January 2016.

Water samples were collected at the following four locations and are duplicates of the 2015 sampling:

1. CMTF – Raw: Water as it enters the CMTF from the mine pool.
2. CMTF – Treated: The water at the CMTF after it is treated just before it is discharged to Tenmile Creek.
3. Above CMTF: Collected in Tenmile Creek approximately 75 yards upstream from the CMTF discharge location.
4. Downstream CMTF: Collected in Tenmile Creek immediately downstream of the discharge location.

At the fifth location BRP collected a sample of the sludge generated during the treatment process at the CMTF. The sludge samples collected in both June 2015 and January 2016 are the only samples that had radiological results statistically above the laboratory detection limits.

### **Laboratory Analysis**

DEP's Bureau of Laboratories conducted the analyses using several analytical methods. All of these methods are approved by EPA for the determination of radium-226 and radium-228 in various media. These analytical methods are approved under the Code of Federal Regulations in Title 40, Chapter 1,

Subchapter D, Parts 141.25 and 141.27<sup>1</sup>. Water samples were analyzed using radiochemistry extraction methods. For radium-226 EPA method 903.1 was used, and for radium-228 the Brooks and Blanchard method was used. These methods were used for all four water samples and the CMTF sludge.

In addition, all water samples were analyzed for the same non-radiological parameters performed in June 2015, which include the typical water quality parameters associated with coal mine drainage and the major cations and anions commonly found in groundwater in Pennsylvania.

## Results

Radiological: The radiological results from the January 2016 sampling closely matched the results from June 2015. All of the water samples were indicative of normal environmental levels for these naturally occurring radioisotopes, and none of the results exceeded the EPA drinking water limit of 5 picocuries per liter (pCi/L) for combined radium-226 and radium-228. The sludge sample result was slightly less than the June 2015 results. A comparison of the radiological results is presented in Table 1.

**Table 1**

<b>Clyde Mine Treatment Facility Radium Activity (pCi/L) Comparison of June 2015 and January 2016</b>				
<b>Date</b>	<b>June 2015</b>		<b>January 2016</b>	
<b>Sampling Location</b>	<b>Ra-226</b>	<b>Ra-228</b>	<b>Ra-226</b>	<b>Ra-228</b>
Above CMTF	0.082	<MDA	0.093	<MDA
CMTF-Raw Water	0.169	<MDA	0.131	<MDA
CMTF-Treated Water	0.155	<MDA	0.052	<MDA
Downstream CMTF	0.112	<MDA	<MDA	<MDA
CMTF-Sludge from Pit	1.31	19.5	1.92	15.8

Non-Radiological: The results of the non-radiological water sampling are provided in Table 2. After reviewing the non-radiological parameters of the raw and treated mine discharge samples, DEP's Bureau of Mining Programs believes the results from January 2016 are comparable to those from June 2015, and any concentration increases are within a normal range of fluctuation that would be expected when sampling occurs at various times throughout the year.

---

<sup>1</sup> U.S. Government Publishing Office, Electronic Code of Federal Regulations, [http://www.ecfr.gov/cgi-bin/text-idx?SID=adc28002836a6c9b208da4bc63206116&mc=true&tpl=/ecfrbrowse/Title40/40cfr141\\_main\\_02.tpl](http://www.ecfr.gov/cgi-bin/text-idx?SID=adc28002836a6c9b208da4bc63206116&mc=true&tpl=/ecfrbrowse/Title40/40cfr141_main_02.tpl) (December 8, 2015)

Table 2

Clyde Mine Treatment Facility Non-Radiological Comparison of June 2015 and January 2016								
Date	June 2015				January 2016			
Sampling Location	Above CMTF	CMTF-Raw	CMTF-Treated	Downstream CMTF	Above CMTF	CMTF-Raw	CMTF-Treated	Downstream CMTF
Lab pH (S.U.)	8.3	6.6	6.6	7.9	8.1	6.7	6.5	7.4
Specific Conductivity ( $\mu\text{S}/\text{cm}$ )	375.0	8570.0	8420.0	841.0	462.0	8550.0	8400.0	1505.0
Alkalinity	129.40	548.00	290.00	133.20	141.20	560.00	321.00	158.20
Total Dissolved Solids	240.0	6992.0	6850.0	734.0	284.0	7200.0	7034.0	954.0
Total Suspended Solids	36.00	72.00	<5.00	26.00	<5.00	58.00	22.00	6.00
Sulfate	38.84	3672.00	3714.00	220.00	55.52	3740.00	3708.00	468.00
Chloride	15.18	656.00	698.00	48.35	28.37	726.00	742.00	106.00
Bromide	0.03697	4.45714	4.48157	0.23494	0.05298	4.98590	5.29814	0.62390
Ammonia, Total as Nitrogen	<0.02	2.24	2.12	0.13	<0.02	2.24	2.18	0.25
Total Nitrate/Nitrite Nitrogen	0.50	<0.05	<0.05	0.48	0.71	<0.05	<0.05	0.65
Total Phosphorous as P	0.070	0.042	<0.010	0.074	0.026	0.047	0.012	0.033
Calcium	51.2	279.0	275.0	60.8	57.2	287.0	287.0	81.2
Magnesium	6.74	99.30	99.10	12.50	9.46	104.00	108.00	20.20
Sodium	15.7	1760.0	1760.0	107.0	26.9	1770.0	1740.0	236.0
Iron	1.043	164.000	2.397	1.143	0.246	170.000	1.464	0.595
Manganese	0.070	2.689	2.444	0.195	0.038	2.690	2.511	0.369
Aluminum	0.53	<0.20	<0.20	0.53	<0.20	<0.20	<0.20	<0.20
Arsenic	<0.003	0.018	<0.015	<0.003	<0.003	0.016	0.006	<0.003
Barium	0.063	0.012	<0.010	0.059	0.059	0.012	<0.010	0.052
Boron	<0.200	0.288	0.304	<0.200	<0.200	0.342	0.324	<0.200
Lithium	<0.025	0.147	0.140	<0.025	<0.025	0.107	0.103	<0.025
Molybdenum	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Selenium	<0.0070	<0.0350	<0.0350	<0.0070	<0.0070	0.0116	0.0108	<0.0070
Strontium	0.181	6.656	5.991	0.485	0.246	6.491	6.108	0.948
Uranium	<0.002000	<0.002000	<0.002000	<0.002000	0.000309	0.001360	0.000542	0.000302
Zinc	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.011
Hardness, Calculated	156.00	1107.00	1096.00	203.00	182.00	1146.00	1162.00	286.00
Osmotic Pressure (MOS/KG)	3.00	133.00	126.00	11.00	6.00	141.00	135.00	20.00
Biochemical Oxygen Demand - 5 Day	0.80	9.60	0.80	0.90	1.20	4.30	1.00	1.60

Note: Units in milligrams per liter (mg/L) unless otherwise noted.

## Conclusions

The sampling event conducted in January 2016 was designed to provide additional data regarding the impacts of the CMTF. The laboratory analysis did not indicate any significant changes compared to the June 2015 samples. The radiological samples appear to be consistent with expected naturally occurring background values, and the non-radiological results are also consistent with similar conditions associated with a flooded mine in this area of Pennsylvania.

In the continued effort to evaluate the impact of the CMTF on Tenmile Creek, DEP's April 2016 sampling effort is currently undergoing laboratory analysis. The April data, as well as the samples to be collected in June 2016, will be evaluated against the above results to look for any trends or additional impacts that may exist.