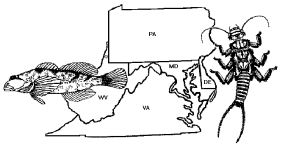
U.S. EPA REGION III
Office of Monitoring and Assessment
Freshwater Biology Team
1060 Chapline St. Suite 303
Wheeling, WV 26003
Phone: 304-234-0244 Fax: 304-234-0260



September, 14, 2009
RE: Dunkard Creek Fish Kill

We are in the midst of a fish kill on Dunkard Creek which flows between the borders of WV and PA in the vicinity of Mount Morris, PA. At this time, all indications are that the outfall from the Blacksville #2 mine is the likely culprit of this kill. The high amount of chloride in that waste stream is certainly toxic to aquatic organisms and the kill could very well be solely due to the high amount of TDS in this outfall.

This report summarizes our field activities as well as some preliminary reports and data from WVDEP, WVDNR, and PFBC.

On September 9, 2009, we investigated reports of a fish kill on Dunkard Creek. We collected in situ meaurements of pH, dissolved oxygen, conductivity, and temperature at ten sites (D1-D10) and water samples for metals, nutrients and mining constituents at 4 sites (D4, and D8-10). Our investigation was centered on the Blacksville #2 discharge in the WV Fork of Dunkard Creek.

Attention was drawn to Dunkard Fork on 8/28/2009 with the following from an email from Dan Cincotta, a fish biologist with WV DNR:

"The conductivity in Dunkard Creek near Wadestown wasn't 4,000 like "Michael Baker" biologists' said it was. It was 25,000 to 45,000, depending where you took the measurement in the stream (50,000 immediately below their discharge, 5,000 above)!!!! Consol said they thought they had a contract to treat the water of a Marsalis Shale gas company, but when he checked ---- it had already ended. So he said it was their problem. We ended up seining three sites upstream of their main facility (ca. 5,000 conductivity). Got about 20 species at each of these sites. There appeared to be many less species and numbers of individuals immediately below the discharge (we didn't have time to do a full site below the discharge, but could go back if anyone is interested).

I forwarded this email to the rest of the Freshwater Biology Team and WPD on 8/31/2009. On 9/4/2009 I received reports of the mussel kill via Cindy Tibbot of the USFWS who got this information from Janet Clayton of WVDNR and Patti Morrison of the USFWS.

After several phone calls on September 8, we ascertained that biologists from WVDNR had been to Dunkard Creek during the previous week to assess the fish kill and a preliminary assessment of the mussel kill. We decided to visit the stream on September 9, after hearing reports of a "total kill" of all mussels in Dunkard Fork.

On September 9, we found Janet Clayton (WVDNR) and Nevin Welty (PFBC) counting mussels at D3 (upstream of Route 7 Bridge). They told us that they were seeing 100% mortality of mussels. We told them about the Blacksville #2 discharge and they agreed to investigate the kill up to that discharge.

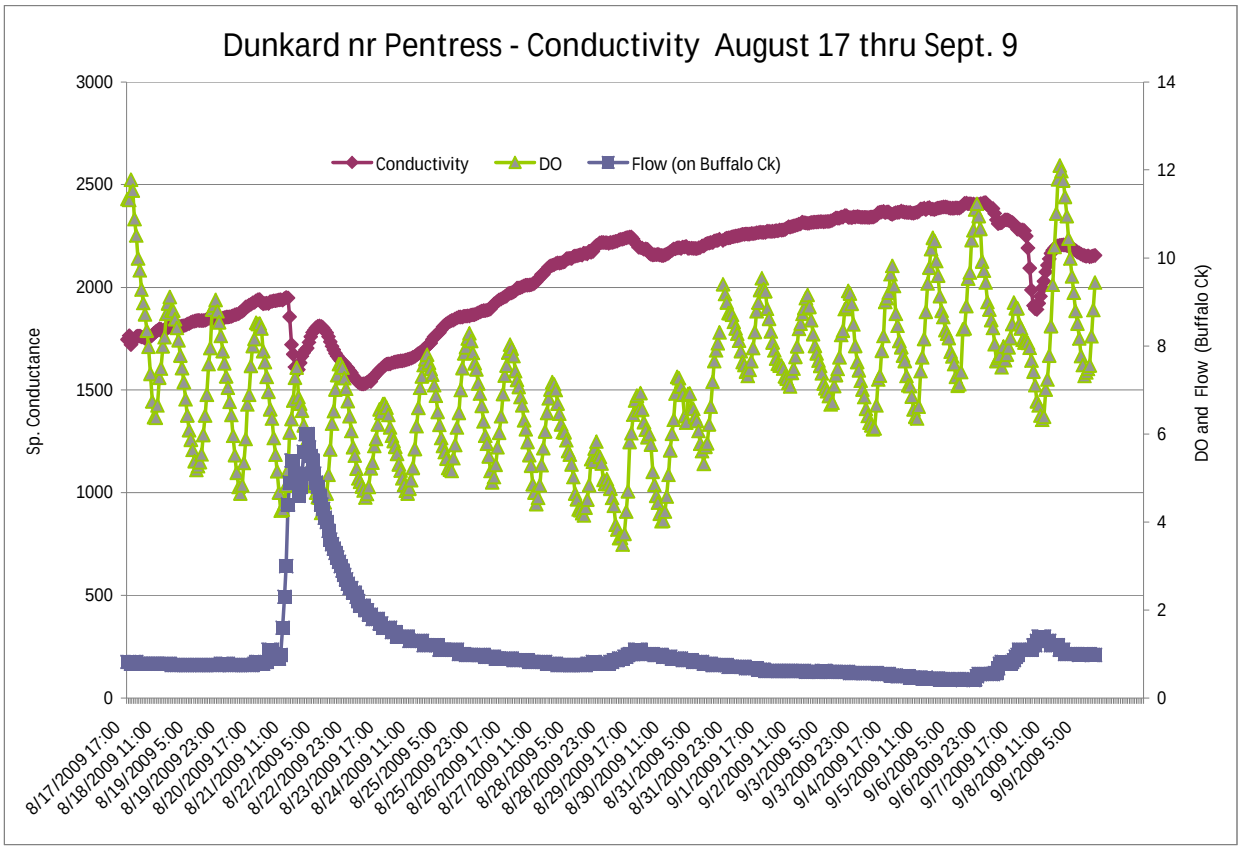
The results of our survey are in Table 1. Notable are the conductivity measurements downstream of the mine discharge. Also notable are the high conductivities in the main stem of Dunkard Creek. The conductivity reported by WVDNR was twice what we saw. We expect preliminary results from our water sampling by tomorrow.

Table 1. Sample locations on Dunkard Creek. Sites in bold were sampled for metals and other inorganic constituents.

Site #	**Location**	**Lat**	**Long**	**Temp ©**	**Sp. Cond (us/cm)**	**DO (mg/l)**	**DO sat %**	**pH**
D1	Dunkard Creek us Dolls Run	39.71386	80.11665	19.7	2257	8.67	95.3	8.28
D2	Dunkard Creek in Pentress, WV	39.71237	80.16134	20.1	2714	13.93	154.8	8.37
D3	Dunkard Creek in Blacksville, WV	39.72027	80.2084	19.5	3259	9.52	104.7	8.2
D4	Dunkard Creek ds Miracle Run	39.71949	80.24094	19.4	3911	8.85	97.3	8.13
D5	Dunkard Creek us Morris Run	39.73042	80.25139	20.67	5085	10.36	117.4	8.39
D6	Hoovers Run (trib to Dunkard)	39.72999	80.26601	18.8	770	8.64	92.8	8.45
D7	PA Fork Dunkard at T309 Bridge	39.722	80.27048	18.95	672	7.88	84.7	8.02
D8	WV Fork Dunkard ds Consol Outfall	39.72102	80.27453	21.93	18,570	13.45	165.8	8.17
D9	Consol Outfall 005 WV 0064602	39.71864	80.27777	22.64	25,250	8.34	105.3	8.55
D10	WV Fork Dunkard us Consol Outfall	39.71863	80.27785	20.62	4957	11.54	130.7	8.13

Site #	Comments
D1	few dead fish,strong dead fish smell, water slightly turbid/orange
D2	Locals indicate creek has been red for a month, saw dead fish in large numbers last week. Catfish, suckers, sauger drum, crappie
D3	DNR on site, many dead mussels
D4	Dead Golden Redhorse, gelatinous material in water, many fish crowded at mouth of Miracle Run seeking shelter
D5	Many dead fish piled up on rock (smallmouth, rockbass, redhorse, white sucker), DNR on site, many dead mussels
D6	live minnows, low conductivity trib
D7	no dead fish, many live minnows, no smell
D8	no fish observed between D9 and D8
D9	Mn deposits on culvert
D10	Conductivity still elevated above "normal" us of outfall, did not sample any higher in the watershed

John Wirts of the WV DEP supplied the following from the WVDEP continuous *in situ* monitor.



The following was supplied by Brad Swiger's group from WVDEP. They also sampled yesterday (9/13/09) and are out sampling today:

9/4/09 Sampling Dunkard Creek				
	Sampling Sites			
Parameter	**Sample #1**	**Sample 2**	**Sample #3**	**Sample #4**
NH3-N, mg/l	1.86	<0.04	0.07	<0.04
Al, mg/l	0.0278	0.128	0.0791	0.0871
Cr, mg/l	0.0013	<0.001	0.0013	<0.001
Cu, mg/l	<0.002	<0.002	<0.002	<0.002
Fe, mg/l	0.877	0.403	0.434	0.19
Pb, mg/l	<0.003	<0.003	<0.003	<0.003
Mn, mg/l	1.17	0.154	0.862	0.195
Se, mg/l	0.0067	<0.02	<0.02	<0.02
Zn, mg/l	0.0051	0.0058	0.0044	0.0051
TDS, mg/l	18900	1940	5790	1310
TSS, mg/l	56	12	26	18
Chloride, mg/l	4000	302	1270	246
Sulfate, mg/l	6590	840	2360	579
COD, mg/l	105	16	20	28
TOC, mg/l	3.22	4.94	4.72	7.71
Beta-BHC, mg/l	<0.0000016	<0.0000016	<0.0000016	0.000084

All other pesticide, volatile and semi-volatile results were non-detect

Sample #1 -	WV Fork of Dunkard Ck	D.S. of Blacksville 2 Mine
Sample #2 -	WV Fork of Dunkard CkU.S of Blacksville 2 Mine	
Sample #3 -	PA Fork of Dunkard Ck	
Sample #4 -	Dunkard Ck at Low Water Bridge at Buckeye Church	

Charlie Brethauer of the PADEP sent Stacy Cox on 9/10/09 to complement the WVDEP sampling. Some of these data will be available by 9/15 or 9/16. The field data was summarized and sent by PADEP today:

Dunkard Creek Sampling Event 9-10-09.

(Modified 9/14/09)

Sampling Site and Time: N 39° 43' 52.2" W 080° 17' 06.0" 09:15
Site Description: **PA Fork Dunkard Creek**, ¼ mile upstream of.jct with Toms Run & 1.25 miles upstream of jct with WV Fork Dunkard Creek at Shamrock. Water appeared clear.
Samples Collected: Volatile Organics (1552077), Semi-Volatile Organics (1552076), Pesticides (1552075), Metals (1552078), and General Chemistry (1552079)
Field Tests: pH 7.9
Dissolved Oxygen 7.78 mg/L
Conductivity 336 µS/cm @ 25° C
Temperature 18.1° C

Sampling Site and Time: N 39° 43' 59.9" W 080° 16' 48.7" 10:30
Site Description: **Toms Run** (small, shallow tributary to PA Fork Dunkard Creek), ¼ mile upstream jct with PA Fork. Water appeared clear.
Samples Collected: Volatiles Organics (1552097), Semi-Volatile Organics (1552096), Pesticides (1552095), Metals (1552098), and General Chemistry (1552099)
Field Tests: pH 7.8
Dissolved Oxygen 8.53 mg/L
Conductivity 440 µS/cm @ 25° C
Temperature 19.0° C

Sampling Site and Time: N 39° 43' 18.3" W 080° 16' 25.1" 13:30
Site Description: **West Virginia Fork Dunkard Creek**, ¼ mile upstream of jct with PA Fork at Shamrock. Large pockets of non-petroleum "iron" sheen along creek bank as well as pockets of rust colored solids build up.
Samples Collected: Volatile Organics (1552092), Semi-Volatile Organics (1552091), Pesticides (1552090), Metals (1552093), and General Chemistry (1552094)
Field Tests: pH 8.5
Dissolved Oxygen 13.67 mg/L *
Conductivity 24,500 µS/cm @ 25° C
Temperature 22.6° C

Sampling Site and Time: N 39° 43’ 39.0” W 080° 15’ 21.9” 11:30
Site Description: **Downstream of Cerro Fabricated Products**, Inc. (formerly Accurate Brass) near Brave & ~1.5 miles downstream of Shamrock. This area of Dunkard Creek has two dams, therefore water was deeper and fairly stagnant. One fish was observed alive, however appeared very sluggish.
Samples Collected: Volatile Organics (1552087), Semi-Volatile Organics (1552086), Pesticides (1552085), Metals (1552088), and General Chemistry (1552089)
Field Tests: pH 8.3
Dissolved Oxygen 16.01 mg/L *
Conductivity 6,290 µS/cm @ 25° C
Temperature 21.9° C

Sampling Site and Time: N 39° 43’ 15.7” W 080° 13’ 20.6” 12:43
Site Description: **Dunkard Creek behind High School in Blacksville, WV** & ~4.5 miles downstream of Shamrock. Creek was shallow with a slight rust color.
Samples Collected: None
Field Tests: pH 8.2
Dissolved Oxygen 10.98 mg/L *
Conductivity 4,030 µS/cm @ 25° C
Temperature 21.4° C

Sampling Site and Time: N 39° 45’ 20.0” W 080° 00’ 43.4” 16:00
Site Description: **Dunkard Creek at the end of Bald Hill Church Rd**. Creek was deeper at this location and appeared clear. This is ~3.5 miles downstream of I-79 and ~25 miles downstream of Shamrock. Also is just downstream of mouth of Meadow Run, left descending bank, & (***this needs to be verified***) immediately upstream of Shannopin Mine discharge.
Samples Collected: Volatile Organics (1552102), Semi-Volatile Organics (1552101), Pesticides (1552100), Metals (1552103), and General Chemistry (1552104)
Field Tests: pH 8.6
Dissolved Oxygen 11.44 mg/L
Conductivity 1575 µS/cm @ 25° C
Temperature 22.0° C

* Footnote: These D.O. readings seem unrealistically high - possible interference.

The PFBC sampled dead fish at many locations throughout the basin. Chris Urban of the PFBC supplied the following 2 reports :

Friday, September 11, 2009 Dunkard Creek Fish Kill Update

Nevin and I met Mike Depew of Area 7 this am to further track the pollution/kill zone and conduct 2nd pass dead fish surveys at established 100 meter sampling stations.

Since the lower teminus of the pollution had moved through Mt Morris yesterday, we moved further downstream to check Bald Hill and two other locations further east on Dunkard Creek for stressed/dying or dead fish and mussels.

The first site we checked was an Area 7 smallmouth sampling location (Old Water Works Road). This site is downstream of the Dana Mine. While the stream appeared to be somewhat impacted already (little aquatic life), we did not observe dead or dying fish/mussels.

At the Bald Hill Bridge site, where we had witnessed stressed and dead mussels yesterday, but also observed other live mussels and fish, we did not observe any dead fish.

Moving further west, we established a new site near the bridge on Gas Co. Road. Here we found two beached adult carp, and one 13" smallmouth bass on the shore below the bald hill bridge. It was difficult to determine if these fish died of natural causes (e.g., predation) or pollution. However, we did observe schooled shiners on the southern shoreline behaving unusually, and potentially stressed - turning over completely, suspending momentarily belly up before turning back over.

The next site, Mt Morris bridge, WCO Bob Wheeler joined us for fish sampling. This is where two days ago we found our first healthy fish/mussels since we had been on Dunkard Creek this week. We were hoping it was the eastern terminus of the kill zone, until yesterdays sampling when we found dead, dying and stressed fish and mussels. Today this site had significantly more fresh-dead fish, mussels, and mudpuppies, including several large adult smallmouth. It should be noted that nearly all of the critters collected here were fresh dead.

Moving further west to the next station, Creek Road, also endearingly known as "Car Wash" to the locals, we found less fish and a group of approximately 10-12 local onlookers mostly gauking at the large and small fish stacked up at the mouth of Shannon Run which enters Dunkard Creek from the north side. Today we noted additional stressed fish, including muskies, flathead catfish and drum. We had collected a number of dead large fish (e.g., redhorses, drum, channel catfish) and observed large stressed flathead catfish here the previous day. Today, the number of small fish (e.g., shiners, darters) was much greater, but overall we captured/removed much less fish.

Musky Bridge - the previous day, this station comprised the largest biomass of fish and 64 dead mudpuppies. Today, the numbers had dropped off signifcantly for all species. Dead mussels were observed here.

Moving further west, our next sampling station is in Blacksville, approximately 10 miles away. Dunkard Creek is mostly in WV for this entire stretch between stations. Fish kills were noted in several locations, but

mostly around Pentress, WV. Yesterday, we did not observe any dead fish at this sampling station. Today would prove to be no different.

Our final fish sampling station on Dunkard is in Brave, below dam#2. Today we conducted the third and final fish sampling pass. The dead fish numbers have dropped off significantly.

On Saturday, Nevin and I will be meeting WCO Wheeler and one of this deputies in the morning to conduct 3rd passes at the established fish sampling stations.

Update for Saturday, September 12, 2009--Dunkard Creek Fish Kill update

On Saturday morning, Nevin and I met WCO Bob Wheeler at Mount Morris to continue sampling established fish sampling stations on Dunkard Creek, which add up to 8 now...

As we have done previously, we worked the sampling stations moving west. The most eastern site, Old Water Works Road, still did not reveal any dead fish or mussels. At the next site, Meadow Run, we observed a few stressed and fresh dead mussels, and stressed but no dead fish - suggesting that the leading edge of the pollution plume was potentially upon this area. At Gas Co. Road, where we had observed stressed fish the day before, we documented our first dead fish at this site - a number of fresh dead smallmouth bass and redhorses, suggesting that the pollution zone had recently passed through the station. At Mount Morris bridge, we observed what appeared to be as significant a (fresh) fish kill as Friday - which like Friday's kill, was comprised of a relatively high number of smallmouth bass. This site appears to be in the middle of the pollution plume.

Next, we skipped ahead to the Muskie Bridge site, because we had heard from locals that there were a number of dead muskies at the Car Wash/Creek Rd site - and we needed voucher specimens. WCO Wheeler had arranged for one of his deputies to bring a cooler to us to preserve at least one dead muskie and a number of other larger dead fish as vouchers. The dead fish numbers have dropped off significantly at the Car Wash site, but we do continue to observe some new fresh dead fish here. Noteworthy at the Muskie Bridge site is that after 3 passes at this site, approximately~100 dead mudpuppies have been found here, which is the highest number of mudpuppies for any of the 8 sampling stations.

We came back to the Car Wash site, and met DWCO Tom Byrnes with his coolers packed with ice. This site had a lot of fresh kill, including approximately eight large dead muskies lined up on the northern shoreline. Like Friday, several large muskies, as well as redhorses and other smaller fish were stacked up at the mouth of Shannon Run. These fish appeared to be stressed and moving up the tributary to avoid the mainstem. The onlookers informed us that 3 of the muskies (two largest and smallest muskie) and one walleye were brought to the northern shore/beach to show us. WCO Bonney went to get a statement from the person that moved the fish into the sampling area. We excluded these four fish from our counts and measurements for this station. As we prepared to count and process the fish at this station, a freelance cameraman/reporter for network Channel 4 Action News out of Pittsburgh surprised me somewhat, as he quickly approached me and started asking questions. I asked him to call our Press Chief (Eric Levis), but he said he would need to run the story on Sat. night. The news brief was on the evening news in the Pittsburgh viewing area, and the morning news the following day.

We next hop-scotched to Blackville and were in for a surprise. The previous two days we had not observed any dead, dying, or stressed fish. On this day,

we would observe a number of very fresh-dead smallmouth bass and redhorses. Both appear to be fairly sensitive and the first to appear as the pollution has moved through Dunkard Creek. This was disturbing as well as puzzling, as it appeared that the fish kill had been subsiding at this site. Fresh-killed fish here potentially suggests that a new slug of pollution had entered this area, or fish that moved up the tributaries to avoid the Dunkard main stem toxicity, have returned and been mortally affected. Because Dunkard Creek moves east and south into WV, we notified the WV DNR biologists that there may be another potential slug of pollution entering WV waters of Dunkard Creek.

I returned to central PA on Sunday. WCO Wheeler and DWCO Byrnes were going to follow-up and check the sites for new dead fish, as well as look for dead fish at the Dunkard Creek/Mon River confluence. At this point, I have not heard the results.

Natural Diversity Section staff will be sampling fish and mussels on Monday and Tuesday. We will continue to monitor the fish/mussel kill until we see the numbers dropping off, or as needed.

The following is my rough estimate of a time line. We should make corrections and refinements to this as reports come in and there may be some mistakes.

August 28 – Dan Cincotta WVDNR reports high conductivity in Dunkard Creek. Note that the conductivity may have been higher at an earlier point in time. Also, we don't know how long it was at 50,000 uS.
Sept 4 – Preliminary investigations by WVDNR on mussel and fish kills in Pentress, WV area. I do not know the full extent of the kill at this time. WVDEP samples water at 4 sites and conductivity at 31 sites.
Sept 8 - 11 – WVDNR and PAFBC on site evaluating fish and mussel kill.
Sept 9 – USEPA samples in situ water chemistry at 10 sites and collects water samples at 4 sites.
Sept 9-ongoing – PFBC samples fish kill at numerous sites in PA
Sept 10 – PADEP samples at five sites
Sept 13-14 – WVDEP (Brad Swiger) sampling in Dunkard Creek.
Sept 15 – PADEP sampling in Dunkard Creek.

I will keep tabs from Wheeling and can return to Dunkard Creek at any time if we need more samples. Please call or email me with any comments or questions. If anyone needs assistance or a sample, please don't hesitate to call.

Lou Reynolds
Biologist