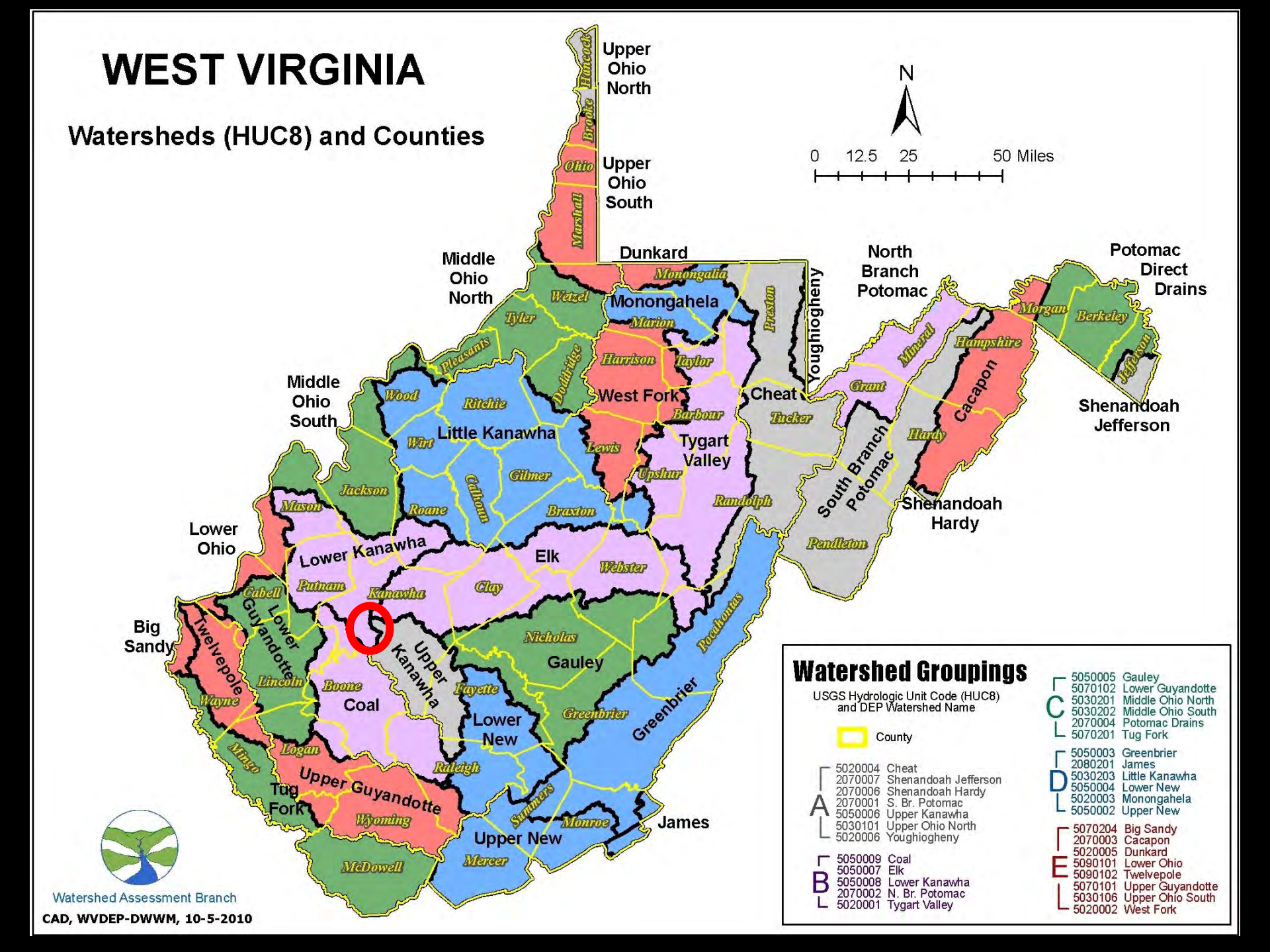
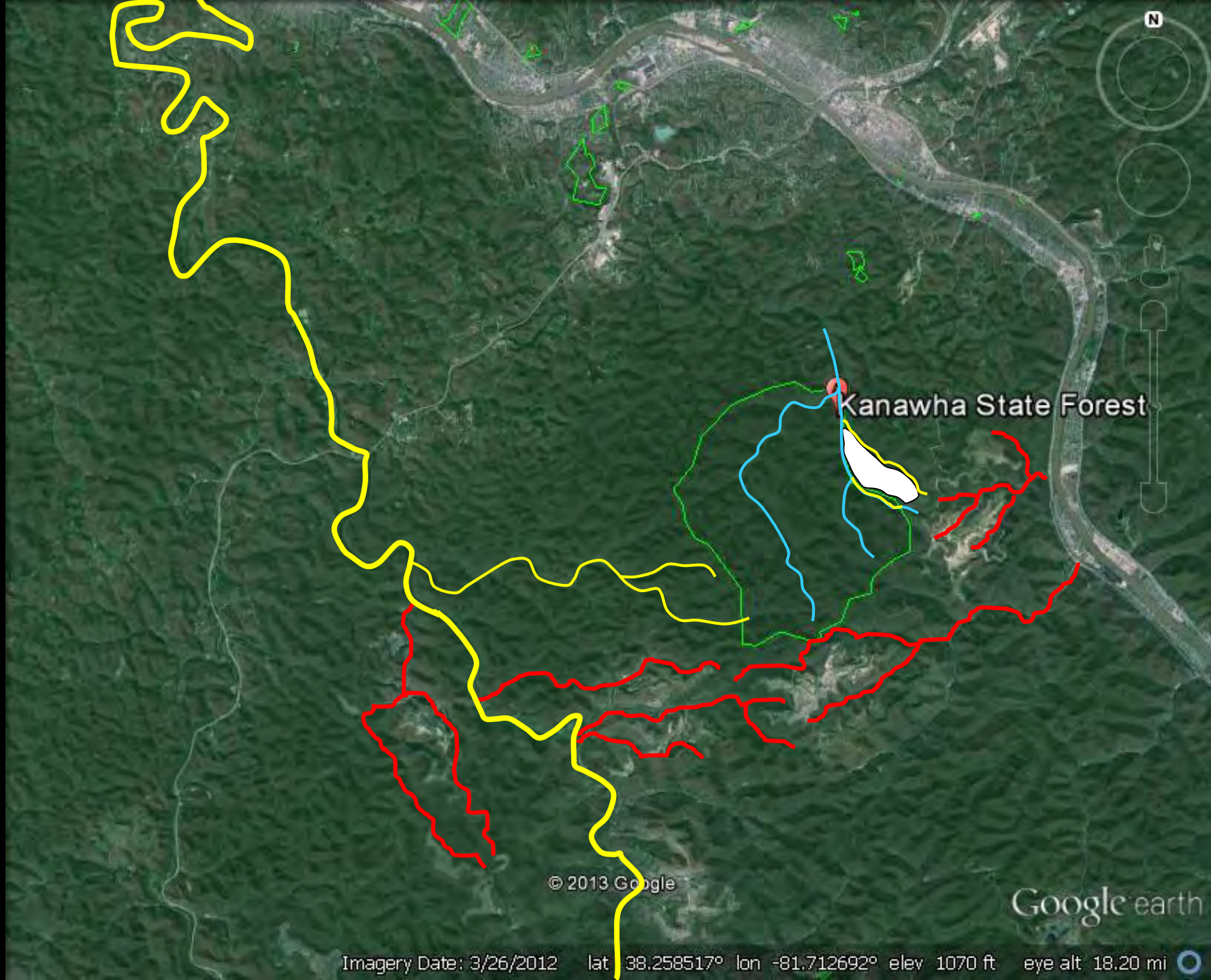
Citizen Monitors; Help or Hindrance

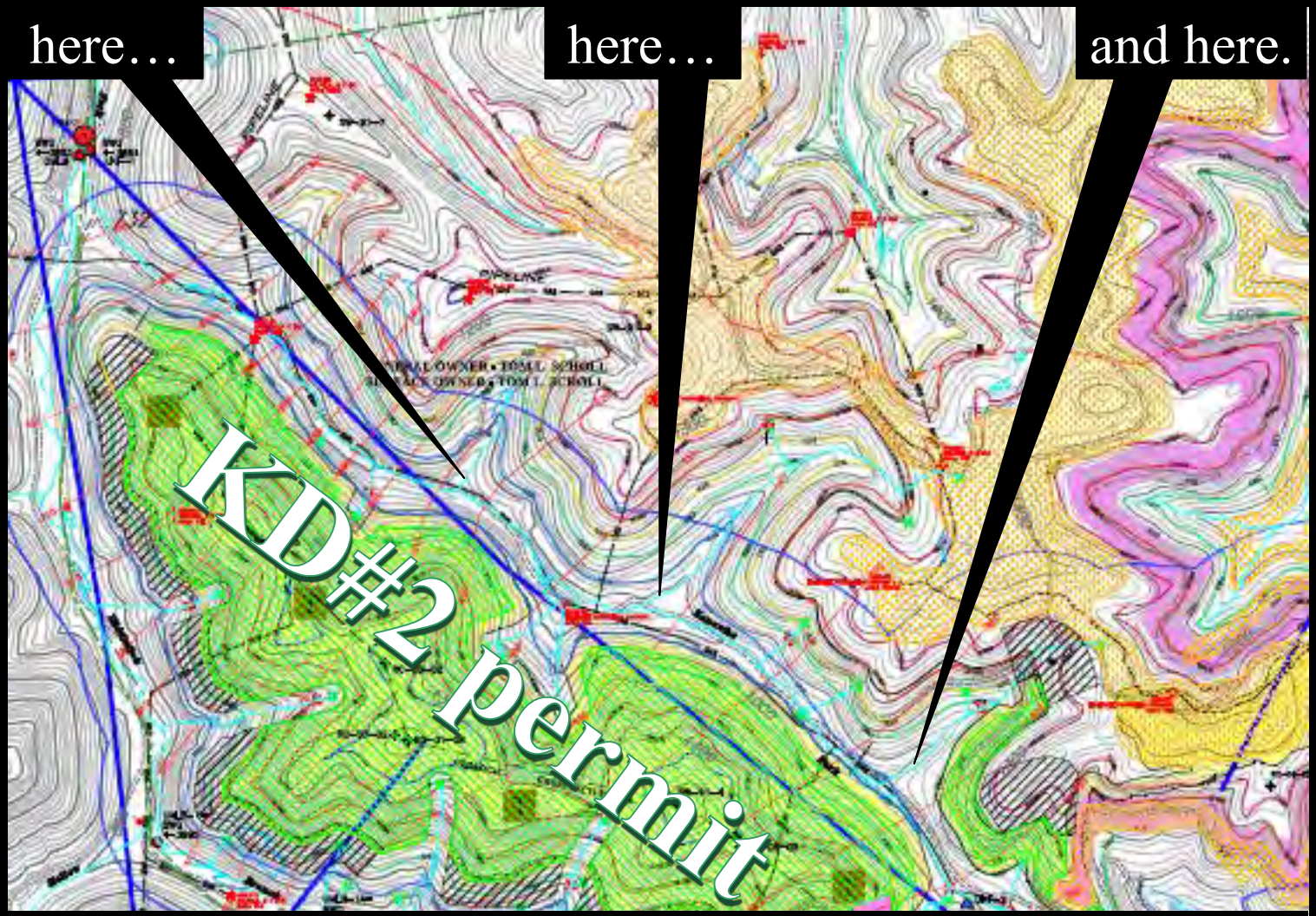
A Case Study from Southwestern West Virginia

Site Location and History


WEST VIRGINIA
Watersheds (HUC8) and Counties
N
0 12.5 25 50 Miles
Upper Ohio North
Upper Ohio South
Middle Ohio North
Middle Ohio South
Lower Ohio
Big Sandy
Tug Fork
Dunkard
Monongahela
Youghiogheny
North Branch Potomac
Potomac Direct Drains
Shenandoah Jefferson
Shenandoah Hardy
South Branch Potomac
Cheat
West Fork
Little Kanawha
Tygart Valley
Lower Kanawha
Upper Kanawha
Elk
Gauley
Coal
Lower New
Upper New
Greenbrier
James
Twelvepole
Lower Guyandotte
Upper Guyandotte
Hancock
Brooke
Ohio
Marshall
Wetzel
Tyler
Pleasants
Wood
Ritchie
Doddridge
Harrison
Taylor
Marion
Monongalia
Preston
Barbour
Tucker
Lewis
Upshur
Randolph
Webster
Braxton
Gilmer
Calhoun
Wirt
Roane
Jackson
Mason
Putnam
Kanawha
Clay
Nicholas
Fayette
Greenbrier
Pocahontas
Boone
Lincoln
Cabell
Wayne
Logan
Mingo
Raleigh
Wyoming
McDowell
Mercer
Summers
Monroe
Pendleton
Grant
Hardy
Mineral
Hampshire
Morgan
Berkeley
Jefferson
Cacapon
Watershed Groupings
USGS Hydrologic Unit Code (HUC8) and DEP Watershed Name
County
A
5020004 Cheat
2070007 Shenandoah Jefferson
2070006 Shenandoah Hardy
2070001 S. Br. Potomac
5050006 Upper Kanawha
5030101 Upper Ohio North
5020006 Youghiogheny
B
5050009 Coal
5050007 Elk
5050008 Lower Kanawha
2070002 N. Br. Potomac
5020001 Tygart Valley
C
5050005 Gauley
5070102 Lower Guyandotte
5030201 Middle Ohio North
5030202 Middle Ohio South
2070004 Potomac Drains
5070201 Tug Fork
D
5050003 Greenbrier
2080201 James
5030203 Little Kanawha
5050004 Lower New
5020003 Monongahela
5050002 Upper New
E
5070204 Big Sandy
2070003 Cacapon
5020005 Dunkard
5090101 Lower Ohio
5090102 Twelvepole
5070101 Upper Guyandotte
5030106 Upper Ohio South
5020002 West Fork
Watershed Assessment Branch
CAD, WVDEP-DWWM, 10-5-2010

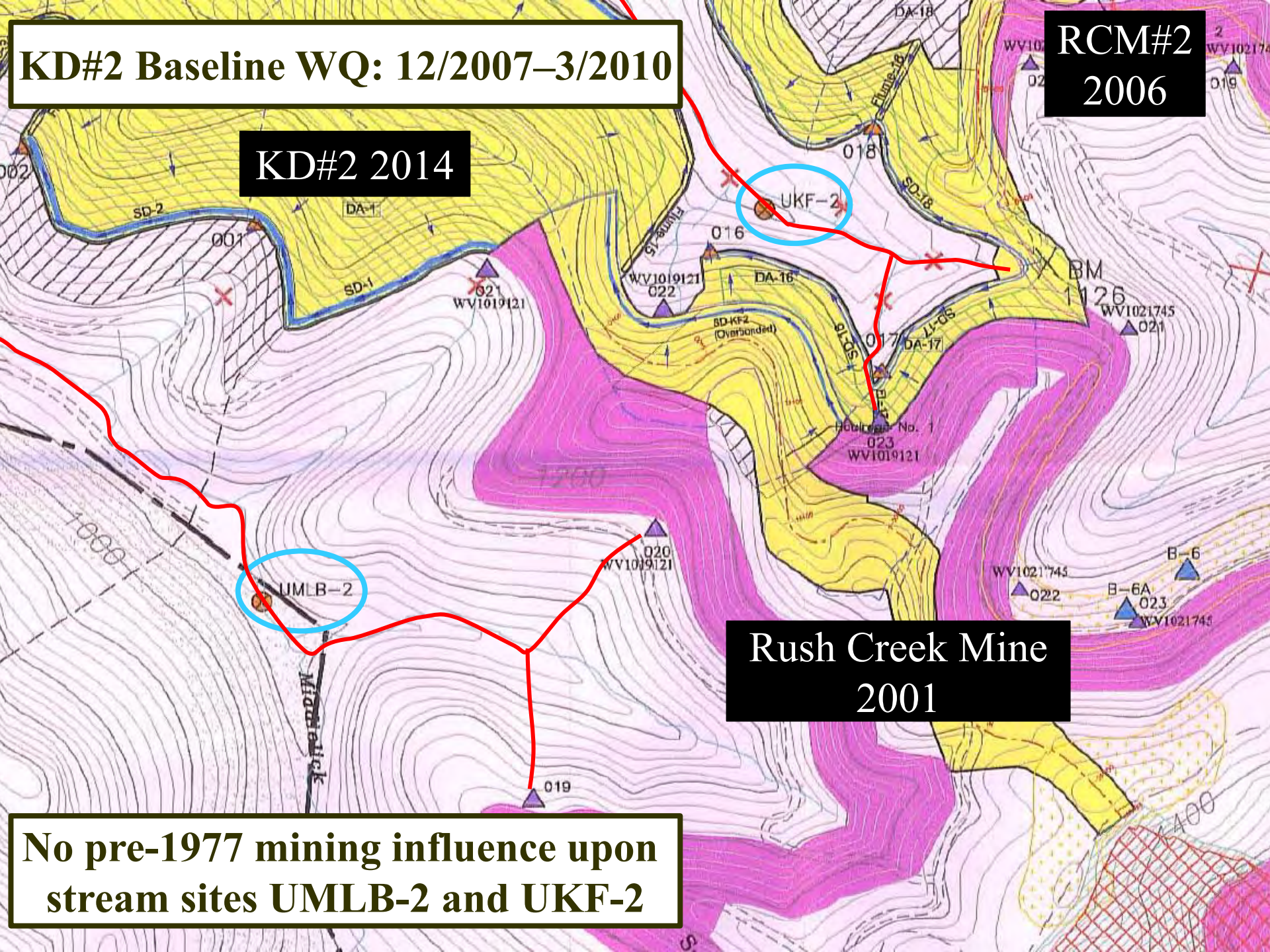

Kanawha State Forest
© 2013 Google
Google earth
Imagery Date: 3/26/2012 lat 38.258517° lon -81.712692° elev 1070 ft eye alt 18.20 mi

Tom Scholl Sr. mined 2 seams (tan) in 1972 & caused acid mine drainage to this day in Kan. Fk. tributaries…



After the 1977 SMCRA passed, Tom Scholl Jr. opened the Rush Ck. & Rush Ck.#2 Mines, causing further amd.

http://www.epa.gov/acidrain/images/waterspecies.gif


KD#2 Baseline WQ: 12/2007–3/2010
KD#2 2014
RCM#2
2006
Rush Creek Mine
2001
No pre-1977 mining influence upon
stream sites UMLB-2 and UKF-2
UKF-2
UMLB-2
001
002
016
017
018
019
020
021
022
023
SD-1
SD-2
SD-16
SD-17
SD-18
DA-1
DA-16
DA-17
DA-18
WV1019121
WV1021745
BM
1126
B-6
B-6A

BASELINE SURFACE WATER ANALYSIS

Attachment I-3B

Company Name: Keystone Industries LLC dba Keystone Development LLC
Mine Name: KDI Surface Mine

Laboratory Name: Standard Laboratories

28%

UMLB-2 exceeded WQ pH standards

Red Flag

Sample I.D. No.	Date Sampled	pH	Flow Cfs Or Gpm	Total Hot Acidity Ppm CaCO3	Mineral Acidity ppm CaCO3	Total Alkalinity ppm CaCO3	Total Fe ppm	Total Mn ppm	TSS ppm	TDS ppm	Spec. Cond umhos	SO4 ppm	Al Ppm	Dis Al Ppm	Other Se
UMLB-2 BASELINE SITE	12/19/2007	5.9	18	9	0	5	0.09	0.16	2	152	288	125	0.07	<.05	
UMLB-2 BASELINE SITE	1/8/2008	5.8	4	8	0	4	0.65	0.03	1	190	241	107	<.05	<.05	
UMLB-2 BASELINE SITE	1/21/2008	5.3	16	13	0	5	0.98	0.05	1	157	225	109	0.98	<.05	
UMLB-2 BASELINE SITE	3/24/2008	6	64	7	0	3	0.06	0.07	2	136	182	43	0.1	<.05	
UMLB-2 BASELINE SITE	4/3/2008	6.1	39	[illegible]	0	[illegible]	[illegible]	[illegible]	1	81	158	67	0.19	<.05	
UMLB-2 BASELINE SITE	4/24/2008	6	27	[illegible]	[illegible]	4	[illegible]	[illegible]	1	102	198	87	0.09	<.05	
UMLB-2 BASELINE SITE	5/7/2008	6	[illegible]	[illegible]	[illegible]	3	[illegible]	[illegible]	[illegible]	121	101	63	<.05	<.05	
UMLB-2 BASELINE SITE	6/26/2008	5.9	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	<1	568	696	381	0.33	0.06	
UMLB-2 BASELINE SITE	7/29/2008		NF												
UMLB-2 BASELINE SITE	9/24/2008		NF												
UMLB-2 BASELINE SITE	11/20/2008	5.7	pooled	9	0	[illegible]	0.39	0.07	2	[illegible]	188	94	<.05	<.05	
UMLB-2 BASELINE SITE	1/16/2009		frozen												
UMLB-2 BASELINE SITE	2/19/2009	5.8	9	[illegible]	[illegible]	5	<.05	[illegible]	[illegible]	[illegible]	100	44	<.05	<.05	
UMLB-2 BASELINE SITE	3/6/2009	6.1	[illegible]	[illegible]	0	[illegible]	0.12	[illegible]	1	[illegible]	93	39	0.06	<.05	
UMLB-2 BASELINE SITE	5/8/2009	5.9	45	5	0	3	0.21	0.22	1	279	278	172	<.05	<.05	
UMLB-2 BASELINE SITE	6/8/2009	5.9	251	11	0	5	0.39	0.22	13	108	145	62	0.26	<.05	
UMLB-2 BASELINE SITE	6/17/2009	5.5	247	<1	0	4	0.34	0.41	3	134	138	65	0.28	<.05	
UMLB-2 BASELINE SITE	7/6/2009	6.1	22	13	0	4	0.25	0.54	1	340	416	322	0.15	<0.05	0.0006
UMLB-2 BASELINE SITE	7/15/2009	6	48	11	0	4	0.5	0.43	5	312	431	210	0.26	<0.05	<0.0006
UMLB-2 BASELINE SITE	8/17/2009	6.6	49	[illegible]	0	6	[illegible]	[illegible]	[illegible]	[illegible]	291	151	0.34	0.12	<0.0006
UMLB-2 BASELINE SITE	8/27/2009	7.1	25	[illegible]	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	390	163	0.06	0.1	0.0015
UMLB-2 BASELINE SITE	9/2/2009	6.8	9	<1	0	5	0.28	0.54	14	301	427	190	0.15	<0.05	<0.0006
UMLB-2 BASELINE SITE	9/15/2009		NF												
UMLB-2 BASELINE SITE	9/24/2009	6.8	5	[illegible]	0	[illegible]	[illegible]	0.81	1	328	[illegible]	187	0.08	<0.05	<0.0006
UMLB-2 BASELINE SITE	10/6/2009	6.8	8	<1	0	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	558	283	0.09	<0.05	<0.0006
UMLB-2 BASELINE SITE	10/21/2009	7	9	<1	0	5	0.1	0.39	3	401	570	317	<0.05	<0.05	<0.0006
UMLB-2 BASELINE SITE	11/3/2009	7.1	10	<1	0	6	0.06	0.29	1	420	527	207	<0.05	<0.05	<0.0006
UMLB-2 BASELINE SITE	11/16/2009	7.1	8	<1	0	4	0.06	0.14	1	368	540	272	<0.05	<0.05	<0.0006
UMLB-2 BASELINE SITE	12/16/2009	6.9	10	<1	0	5	0.11	0.22	3	150	268	113	0.08	<0.05	<0.0006
UMLB-2 BASELINE SITE	12/28/2009	6.8	12	<1	0	[illegible]	0.1	0.13	4	111	136	55	0.04	<0.05	<0.0006
UMLB-2 BASELINE SITE	1/13/2010	6.6	14	<1	0	[illegible]	[illegible]	[illegible]	2	129	190	85	0.05	<0.05	<0.0006
UMLB-2 BASELINE SITE	1/28/2010	6.5	44	<1	0	[illegible]	[illegible]	[illegible]	1	90	134	62	0.18	<0.05	<0.0006
UMLB-2 BASELINE SITE	2/6/2010	7.5	23	29	0	[illegible]	[illegible]	[illegible]	2	106	185	82	0.08	<0.05	<0.0006
UMLB-2 BASELINE SITE	2/24/2010	6.8	24	11	0	[illegible]	[illegible]	[illegible]	11	147	232	109	0.24	0.08	<0.0006
UMLB-2 BASELINE SITE	3/3/2010	6.15	165	13	0	[illegible]	[illegible]	[illegible]	2	236	349	114	0.45	0.24	<0.0006
UMLB-2 BASELINE SITE	3/19/2010	6.06	190	31	0	[illegible]	[illegible]	[illegible]	<2	163	250	100	0.21	<0.05	<0.0006
	Max	7.5	251.0	31.0	0.0	10.0	0.50	0.90	14.0	568.0	696.0	381.0	0.45	0.24	0.0015
	Average	6.4	50.5	11.6	0.0	4.6	0.31	0.32	3.3	218.9	301.9	144.4	0.14	0.12	0.0011
	Min	5.5	5.0	3.0	0.0	2.0	BDL	0.02	1.0	[illegible]	95.0	39.0	BDL	BDL	BDL

60%

UKF-2 exceeded WQ pH standards

Red Flag

BASELINE SURFACE WATER ANALYSIS
Attachment 3-3B

Company Name: Keystone Industries LLC dba Keystone Development LLC
Mine Name: KD2 Surface Mine

Laboratory Name: Standard Laboratories

Sample I.D. No	Date Sampled	PH	Flow Cfs Or Gpm	Total Hot Acidity Ppm CaCO3	Mineral Acidity ppm CaCO3	Total Alkalinity ppm CaCO3	Total Fe ppm	Total Mn ppm	TSS ppm	TDS ppm	Spec. Cond umhos	SO4 ppm	Al Ppm	Dis Al Ppm	Other Se ppm
UKF-2 BASELINE SITE	3/24/2008	5	40	11	0	2	0.15	1.37	6	275	335	159	1	0.78	
UKF-2 BASELINE SITE	4/3/2008	4.9	47	13	0	[illegible]	0.61	[illegible]	2	156	222	149	1.34	0.8	
UKF-2 BASELINE SITE	4/24/2008	5.7	14	[illegible]	0	2	0.14	[illegible]	1	192	313	140	0.71	0.63	
UKF-2 BASELINE SITE	5/7/2008	4.8	12	[illegible]	0	1	0.13	[illegible]	<1	274	517	245	0.84	0.72	
UKF-2 BASELINE SITE	6/26/2008	4.8	1	21	0	1	0.23	[illegible]	[illegible]	728	884	479	1.35	1.13	
UKF-2 BASELINE SITE	7/29/2008		NF												
UKF-2 BASELINE SITE	9/24/2008		NF												
UKF-2 BASELINE SITE	11/20/2008	6	pooled	<1	0	39	0.05	<.01	1	[illegible]	355	110	0.09	<.05	
UKF-2 BASELINE SITE	1/16/2009		frozen												
UKF-2 BASELINE SITE	2/17/2009	5.7	7	13	0	2	0.09	[illegible]	2	[illegible]	304	164	0.9	0.66	
UKF-2 BASELINE SITE	3/6/2009	5.3	7	[illegible]	0	2	0.16	[illegible]	2	[illegible]	206	130	0.71	0.57	
UKF-2 BASELINE SITE	5/20/2009		NF												
UKF-2 BASELINE SITE	6/8/2009		NF												
UKF-2 BASELINE SITE	6/17/2009		NF												
UKF-2 BASELINE SITE	7/9/2009		NF												
UKF-2 BASELINE SITE	7/15/2009		NF												
UKF-2 BASELINE SITE	8/17/2009		NF												
UKF-2 BASELINE SITE	8/27/2009		NF									0.06			
UKF-2 BASELINE SITE	9/2/2009		NF												
UKF-2 BASELINE SITE	9/15/2009		NF												
UKF-2 BASELINE SITE	9/24/2009		NF												
UKF-2 BASELINE SITE	10/6/2009		NF												
UKF-2 BASELINE SITE	10/21/2009		NF												
UKF-2 BASELINE SITE	11/2/2009		NF												
UKF-2 BASELINE SITE	11/16/2009		NF												
UKF-2 BASELINE SITE	12/16/2009		NF												
UKF-2 BASELINE SITE	12/28/2009	6.7	2	<1	0	[illegible]	0.32	0.01	8	182	243	104	0.2	<0.05	<0.0006
UKF-2 BASELINE SITE	1/13/2010	6.5	2	<1	0	[illegible]	[illegible]	<0.01	3	239	318	121	<0.05	<0.05	<0.0006
UKF-2 BASELINE SITE	1/28/2010	6.7	3	<1	0	[illegible]	[illegible]	[illegible]	20	140	192	88	1.71	0.09	<0.0006
UKF-2 BASELINE SITE	2/4/2010	7.2	3	16	0	[illegible]	[illegible]	[illegible]	2	155	245	104	0.3	<0.05	<0.0006
UKF-2 BASELINE SITE	2/24/2010	7	2	<1	0	[illegible]	[illegible]	[illegible]	22	184	268	101	0.32	<0.05	<0.0006
UKF-2 BASELINE SITE	3/3/2010	5.45	31	21	0	[illegible]	[illegible]	[illegible]	2	320	476	214	1.66	1.43	0.001
UKF-2 BASELINE SITE	3/19/2010	5.51	44	58	0	[illegible]	[illegible]	[illegible]	3	308	464	220	1.8	1.5	<0.0006
	Max:	7.2	47.0	58.0	0.0	39.0	3.0	5.0	22.0	728.0	884.0	479.0	1.8	1.5	0.001
	Average:	5.8	15.6	20.5	0.0	9.9	0.4	1.4	5.4	270.9	381.5	182.3	0.8	0.8	0.001
	Min:	4.8	2.0	BDL	0.0	1.0	BDL	BDL	BDL	140.0	192.0	88.0	BDL	BDL	BDL

Rush Creek Mine (RCM) records available to DMR from 5/2001 to 1/2013 when staff reviewed the KD#2 permit application

- Tom Scholl (mine permittee/owner) was cited for 23 violations, with 13 notices of violation (NOV's) and one cessation order issued for problems related to sediment control, water quality, or the hydrologic balance at that mine.

Rush Creek #2 Mine (RCM#2) records available to DMR from 12/2007 through 1/2013 when staff reviewed the KD#2 permit application

- Tom Scholl (mine permittee/owner) was issued 5 NOV's related to water and sediment control issues through January 2013 (two for sediment control problems, two for effluent limit violations, and one for failure to properly handle acid bearing/toxic materials).

Doug Wood photos


Doug Wood photo

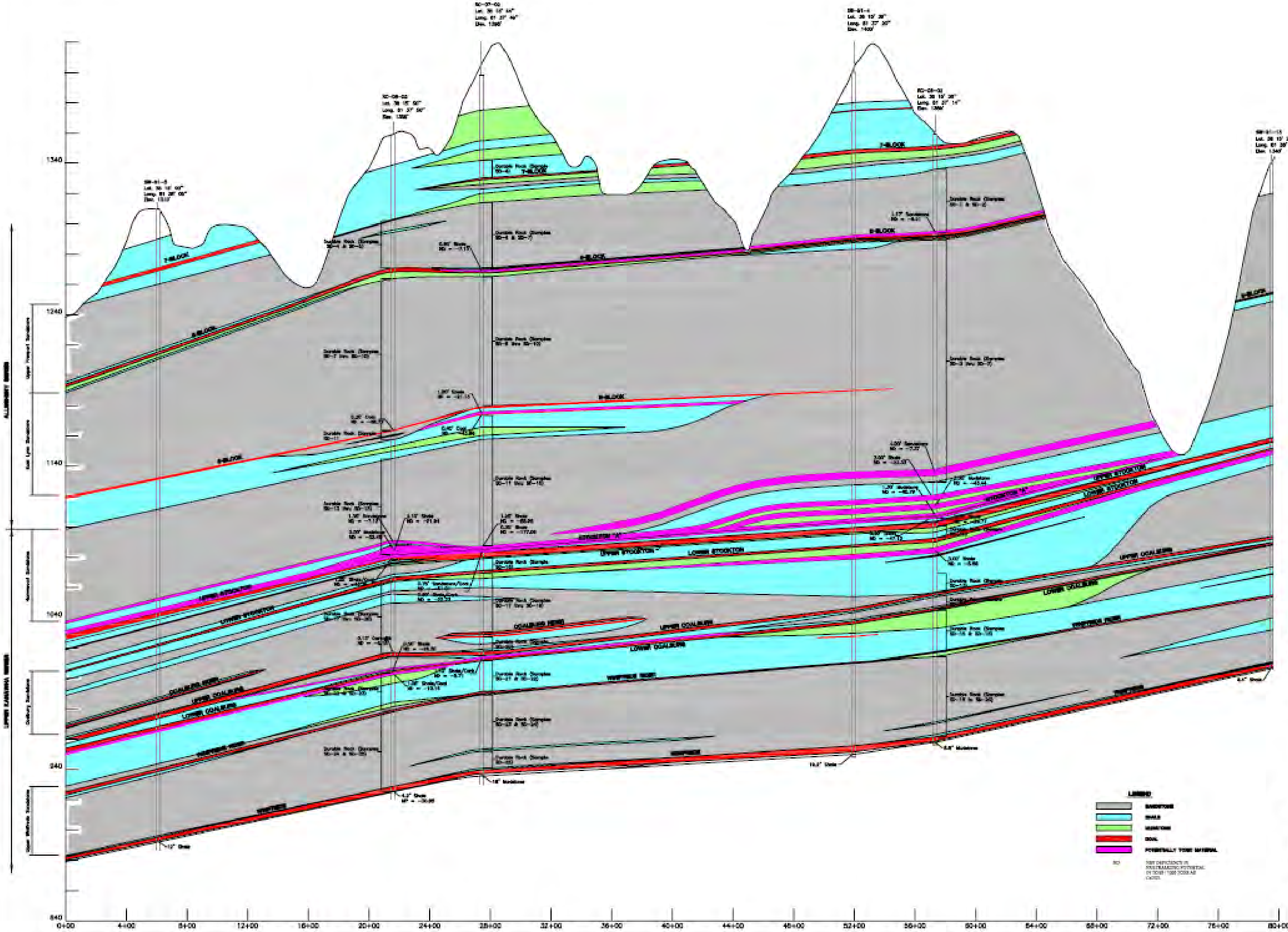
KD2, Ten Seams of Acidic Coal: Same Old Problems, Different Permit

The KD2 CHIA says…

- [p. 13] Any materials thought to have the potential for the production of a [sic] waters of an excessive acidic nature, excessive concentration of iron or a discharge high in selenium will be encapsulated "High and Dry" by alkaline material. This proposed Special Handling Plan appears to be adequate.

The permit says…

- No acid production is expected
- No disch. other than precip-induced-only
- Permeable sediment ditches constructed of unconsoldiated, blasted rock and disturbed soil, will adequately prevent leakage of toxic materials
- Dilution by precip runoff will prevent upset in hydrological balance in stream
- Therefore, no need for biomonitoring



Notes:

The term "certify" as used herein is defined as follows: An Engineer's certification of conditions or information is a declaration of professional judgment. It does not constitute a warranty or guarantee, either expressed or implied, nor does it relieve any other party of their responsibility to abide by contract documents, design and approval documents, applicable codes, standards, regulations and/or ordinances.

KEYSTONE INDUSTRIES, LLC dba
KEYSTONE DEVELOPMENT, LLC

KD Surface Mine No. 2
ATTACHMENT I-7
GEOLOGIC CROSS-SECTION
SMA NO. ______

SHEET NO. 1 of 1

Prepared by
DECOTA CONSULTING COMPANY

Feet	Material	pH	PyS	Net	Color	Notes
3.20	Mudstone	5.7		2.86	10YR8/4	
3.20	Mudstone	5.6		3.01	10YR7/8	
3.00	Mudstone	6.9		1.54	10YR7/2	Special handling (SH) due to Se
3.00	Mudstone	6.7		3.40	10YR7/3	SH due to Se
3.00	Mudstone	7.1		6.36	10YR7/3	
3.00	Shale	7.2		7.51	10YR7/2	
3.00	Shale	7.1		9.64	10YR7/2	
2.40	Shale	6.5		7.21	10YR7/2	SH due to Se
2.60	Shale	6.9		6.91	10YR6/2	
2.00	Shale	7.1		5.68	10YR6/2	
2.30	Shale	6.8		6.83	10YR6/1	
1.40*	Coal 7-Blk	3.3		-91.43	10YR2/1	SH due to Se & acid
3.40	Shale	5.6		-0.25	10YR6/1	
2.90	Mudstone	7.0		3.94	10YR7/1	
3.25	Mudstone	7.1		4.56	10YR7/2	
2.75	Shale	7.0		4.26	10YR7/6	
2.60	Shale	6.8		2.14	10YR7/8	
4.40	Sandstone	6.3		7.15	10YR7/6	Targeted topsoil substitute
5.0	Sandstone	8.7		88.44	10YR7/4	Targeted topsoil substitute
5.0	Sandstone	8.3		16.99	10YR7/4	Targeted topsoil substitute
5.0	Sandstone	8.8		97.12	10YR7/6	Targeted topsoil substitute
5.0	Sandstone	8.5		4.54	10YR7/4	Targeted topsoil substitute
5.0	Sandstone	8.0		2.44	10YR7/6	Targeted topsoil substitute
5.0	Sandstone	7.8		1.44	10YR7/4	Targeted topsoil substitute
5.0	Sandstone	7.7		1.16	10YR7/8	Targeted topsoil substitute
2.80	Sand/Shale	7.1		4.56	10YR6/4	Targeted topsoil substitute
0.80*	Sandstone	4.0	1.06	-38.40	10YR6/1	Called "shale" in Attach.O-8. SH(Se,acid)
0.70	Coal 6-Blk	3.2	0.21	-12.24	10YR2/1	SH due to Se & acid
0.50	Shale	7.0		0.16	10YR5/1	SH due to Se
0.90	Coal 6-Blk	4.6	0.49	-19.21	10YR2/1	SH due to Se & acid
1.65	Mudstone	6.4		-0.91	10YR6/1	
2.65	Mudstone	6.9		0.91	10YR8/6	
5.00	Sandstone	6.9		1.09	10YR7/8	
5.00	Sandstone	7.0		0.66	10YR7/8	
1.00	Sandstone	7.2		0.41	10YR7/6	
1.70	Core loss					
2.30	Sandstone	7.1		0.79	10YR7/6	
5.00	Sandstone	7.1		1.36	10YR8/4	
5.00	Sandstone	7.0		1.66	10YR7/6	
5.00	Sandstone	6.4		1.86	10YR7/6	
5.00	Sandstone	5.4		-1.69	10YR7/1	
5.00*	Sandstone	5.4	0.07	-6.66	10YR7/1	SH due to acid
4.00*	Sandstone	5.1	0.10	-6.63	10YR7/1	SH due to acid
3.60	Sandstone	6.0		-3.53	10YR7/1	
2.90	Sandstone	6.6		-1.93	10YR6/1	
4.50*	Sandstone	7.1		-5.51	10YR6/4	SH due to acid

5.00	Sandstone	6.6		-2.16	10YR6/1	
5.00	Sandstone	7.7		4.34	10YR6/1	
5.00	Sandstone	7.4		4.36	10YR6/1	
5.00	Sandstone	7.1		0.39	10YR6/1	
5.00	Sandstone	7.4		1.51	10YR6/1	
4.90	Sandstone	7.0		-0.30	10YR6/1	
1.15	Coal 5-Blk	3.4	0.24	-21.40	10YR2/1	SH due to Se & acid
2.95*	Mudstone	7.5		-2.71	10YR5/1	SH due to Se & acid
1.00*	Shale/Coal	5.4	0.21	-21.91	10YR4/1	SH due to Se & acid
3.00	Shale	7.7		2.76	10YR5/1	
3.00	Shale	7.9		5.91	10YR5/1	
3.00	Shale	8.0		5.41	10YR5/1	
3.00	Mudstone	8.2		-0.41	10YR7/2	
4.00	Sandstone	7.7		3.29	10YR6/1	Targeted topsoil substitute
4.00	Sandstone	6.7		-0.51	10YR6/1	Targeted topsoil substitute
5.00	Sandstone	7.9		-0.64	10YR6/4	Targeted topsoil substitute
5.00	Sandstone	7.1		-0.54	10YR7/1	Targeted topsoil substitute
2.00	Sandstone	7.1		-2.49	10YR6/1	Targeted topsoil substitute
3.00	Sandstone/shale	7.6		4.25	10YR5/1	Targeted topsoil substitute
5.00	Sandstone	8.3		6.81	10YR6/2	Targeted topsoil substitute
5.00	Sandstone	8.3		7.49	10YR7/1	Targeted topsoil substitute
5.00	Sandstone	8.7		7.34	10YR7/1	Targeted topsoil substitute
0.45	Sandstone/coal	7.3		2.64	10YR5/1	Targeted topsoil substitute
4.55	Sandstone	8.0		5.21	10YR6/1	Targeted topsoil substitute
5.00	Sandstone	8.1		5.84	10YR6/2	Targeted topsoil substitute
4.00	Sandstone	8.0		5.41	10YR8/1	Targeted topsoil substitute
2.90	Sandstone	8.1		3.76	10YR8/1	Targeted topsoil substitute
0.50	Sandstone/Coal	8.4		87.68	10YR4/2	
2.60	Sandstone	8.5		12.80	10YR7/2	
5.00	Sandstone	8.5		6.56	10YR7/1	
5.00	Sandstone	8.5		6.14	10YR7/1	
4.00	Sandstone	8.3		5.36	10YR7/1	
4.10	Sandstone	7.8		0.13	10YR7/1	
1.20	Shale	4.1	1.85	-70.24	10YR4/2	SH due to Se & acid
0.70	Coal,UprStockton	3.3	2.08	-90.33	10YR2/1	SH due to Se & acid
1.60	Shale/Coal (U.S.)	4.2	0.53	-41.56	10YR4/2	SH due to Se & acid
3.25	Coal,UprStockton	4.3	0.45	-27.86	10YR2/1	SH due to Se & acid
3.15	Mudstone	7.0		-8.56	10YR5/1	SH due to Se & acid
2.00	Shale	7.5		0.84	10YR5/1	
3.00	Shale	7.8		3.54	10YR5/1	SH due to Se
0.20	Coal,LwrStockton	5.3	0.18	-13.33	10YR2/1	SH due to Se & acid
0.45	Carbolith, L.S.	6.8	0.18	-6.48	10YR3/2	SH due to Se & acid
1.95	Coal,LwrStockton	5.8		-9.01	10YR2/1	SH due to Se & acid
3.00	Mudstone	7.4		-0.86	10YR5/1	SH due to Se
3.00	Shale	7.5		3.61	10YR5/1	
3.40	Shale	8.1		6.49	10YR5/1	
5.00	Sandstone	8.2		7.59	10YR6/1	
5.00	Sandstone	8.2		7.21	10YR5/1	
5.00	Sandstone	8.8		48.44	10YR7/1	

5.00	Sandstone	8.8		57.19	10YR7/1	
5.00	Sandstone	8.6		20.66	10YR7/1	
3.30	Sandstone	8.2		3.84	10YR7/1	
0.90	Shale	7.2	0.25	-3.04	10YR5/1	SH due to Se
1.20	Coal,CoalburgR.	4.7	0.47	-28.46	10YR2/1	SH due to Se & acid
1.25	Shale	8.4		-4.39	10YR4/1	SH due to Se
0.35	Coal,CoalburgR.	5.1	0.14	-23.28	10YR2/1	SH due to Se
3.00	Shale	8.1		10.29	10YR6/1	SH due to Se
2.00	Shale	8.3		10.56	10YR6/1	
3.30	Sandstone	8.1		9.14	10YR7/1	
1.20	Shale	8.0		4.46	10YR6/1	SH due to Se
2.65	Coal,UpCoalburg	5.7	0.10	-8.65	10YR2/1	SH due to Se & acid
2.25	Shale	6.8		-3.15	10YR5/1	SH due to Se
1.70	Coal,LCoalburg	6.5	0.16	-5.58	10YR2/1	SH due to Se & acid
0.22	Shale	6.6		-0.30	10YR5/1	SH due to Se
0.30	Coal,LCoalburg	3.9	0.16	-13.40	10YR2/1	SH due to Se & acid
0.45	Shale	7.0		1.98	10YR5/1	SH due to Se
0.35	Coal,LCoalburg	4.9		-20.75	10YR2/1	SH due to Se & acid
3.00	Shale	6.8		-0.44	10YR5/1	
2.58	Shale	8.0		2.86	10YR7/2	
3.00	Shale	8.0		3.89	10YR5/1	
3.00	Shale	7.7		1.89	10YR6/1	
3.00	Shale	8.2		4.26	10YR6/1	
1.20	Shale	8.2		2.94	10YR7/2	
3.00	Shale	8.1		9.79	10YR6/1	
1.50	Coal,WinifredeR	7.0	0.07	-5.96	10YR2/1	SH due to Se & acid
5.00	Sandstone	8.1		-0.06	10YR7/2	Targeted topsoil substitute
5.15	Sandstone	8.1		1.44	10YR7/1	Targeted topsoil substitute
5.15	Sandstone	8.2		1.54	10YR7/1	Targeted topsoil substitute
5.00	Sandstone	8.3		3.31	10YR7/1	Targeted topsoil substitute
5.00	Sandstone	8.4		2.89	10YR71	Targeted topsoil substitute
5.00	Sandstone	8.2		5.06	10YR7/1	Targeted topsoil substitute
5.00	Sandstone	8.7		183.44	10YR7/2	Targeted topsoil substitute
2.35	Sandstone	8.7		16.26	10YR7/1	Targeted topsoil substitute
1.20	Mudstone	8.4		5.51	10YR5/1	Targeted topsoil substitute
2.45	Sandstone/Mudst	8.4		4.39	10YR5/1	Targeted topsoil substitute
4.00	Sandstone	8.0		5.44	10YR7/2	Targeted topsoil substitute
5.10	Sandstone	7.8		2.84	10YR7/1	Targeted topsoil substitute
0.15	Coal, Winifrede	7.3	0.08	-4.35	10YR2/1	SH due to Se
0.85	Mudstone	8.5		-1.54	10YR4/1	SH due to Se
2.60	Coal,WinifredeBE	5.8	0.19	-14.31	10YR2/1	SH due to Se & acid
2.30	Shale	6.9		1.14	10YR5/1	
3.85	Sandstone	8.9		387.19	10YR6/1	
3.15	Sandstone	8.3		16.96	10YR6/1	
3.00	Shale	8.4		3.79	10YR5/1	
End						

On-the-ground problems in distinguishing toxic overburden from non-toxic overburden

- Despite careful planning, blasts often mix toxic with non-toxic
- Colors are often too similar to distinguish
- Color is not uniform through each stratum
- Neutralization potential/deficiency is not uniform through each stratum
- Accurate field testing is not possible

Instructions to the dozer operator after a blast:


"Push the black stuff to the hoe for loading, then push the brownish-gray stuff into an isolation area and push the grayish-brown stuff over top of the brownish-gray stuff. That ought to satisfy the inspector."

Doug Wood photo

FINE PARTICLE SEPARATION DEVICE

http://www.arthon.com/equipment/arthon/D10_ARTHON_CutOUT_Rocks700.jpg

Kanawha Forest Coalition

Kanawha Forest Coalition Assessed the Situation and Took Action

- Poor permit engineering & complex geology guaranteed that WQ problems would worsen
- DMR reluctant to enforce narrative WQ criteria
- DMR Inspection/Enforcement is understaffed
- Inspectors are woefully under-trained & under-equipped to adequately protect water resources
- Consulting firm proved itself untrustworthy
- Experts at DWWM were not officially engaged to help DMR…

- …The new inspector was open to information generated by citizen monitors
- Many volunteers were eager to stop the nightmare from worsening
- Inspection guidelines required the inspector to respond within 24 hours of receipt of a complaint
- SOS program was available for training volunteers & for supplying some equipment
- Sampling equipment purchases were minimal & KFC had grant-writing capability & other talents

August 8, 2014
KFC Citizen complaint about billows of foam on Kanawha Fork

DMR investigated foam complaint

Kevin Seagle photo

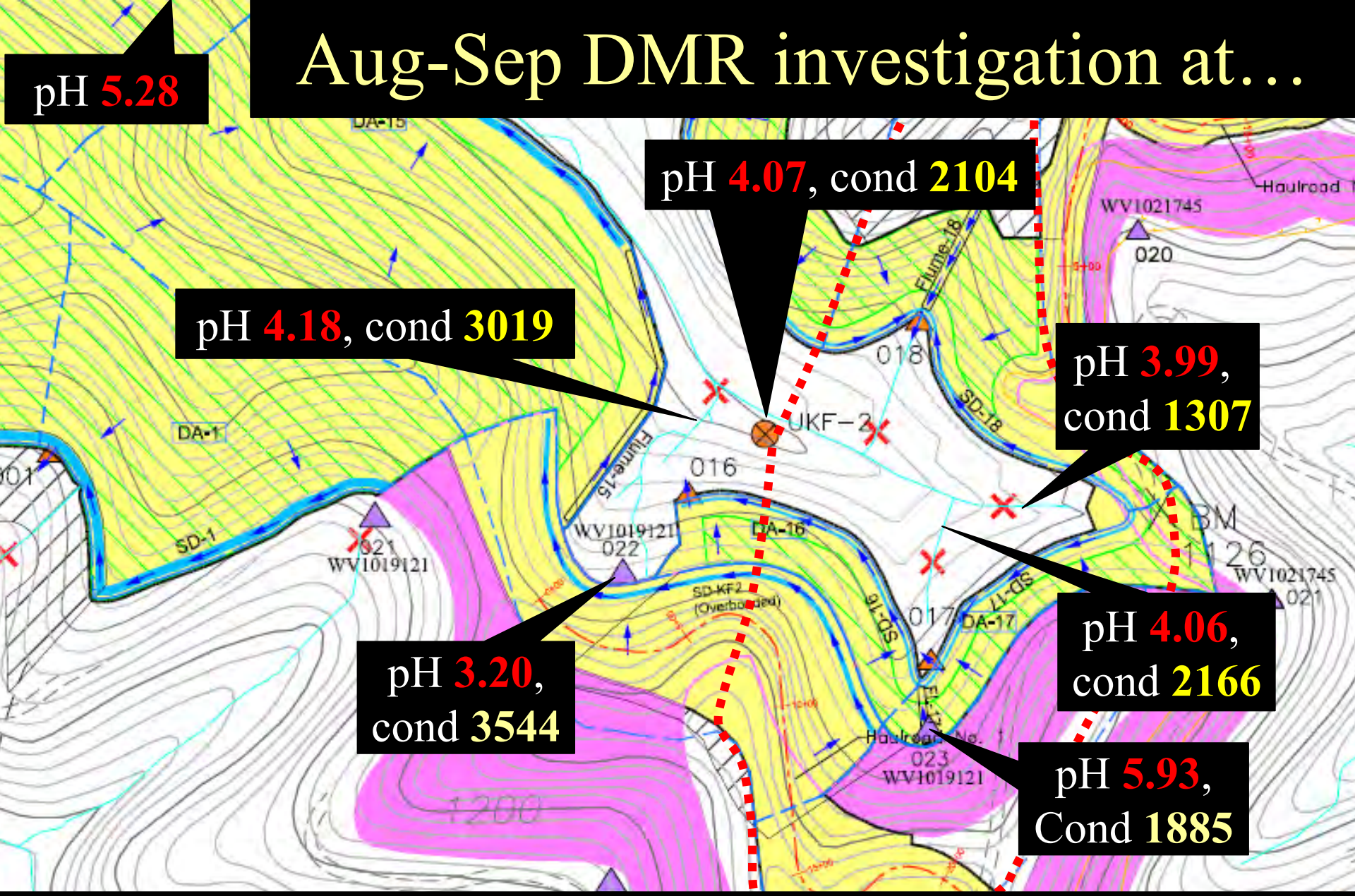
-Significant rainfall the previous week

-Rainfall within 24 hours of stream sampling

-Higher stream flows did not adequately dilute discharges

-Found pH violations (permit & WQ) & high conductivity

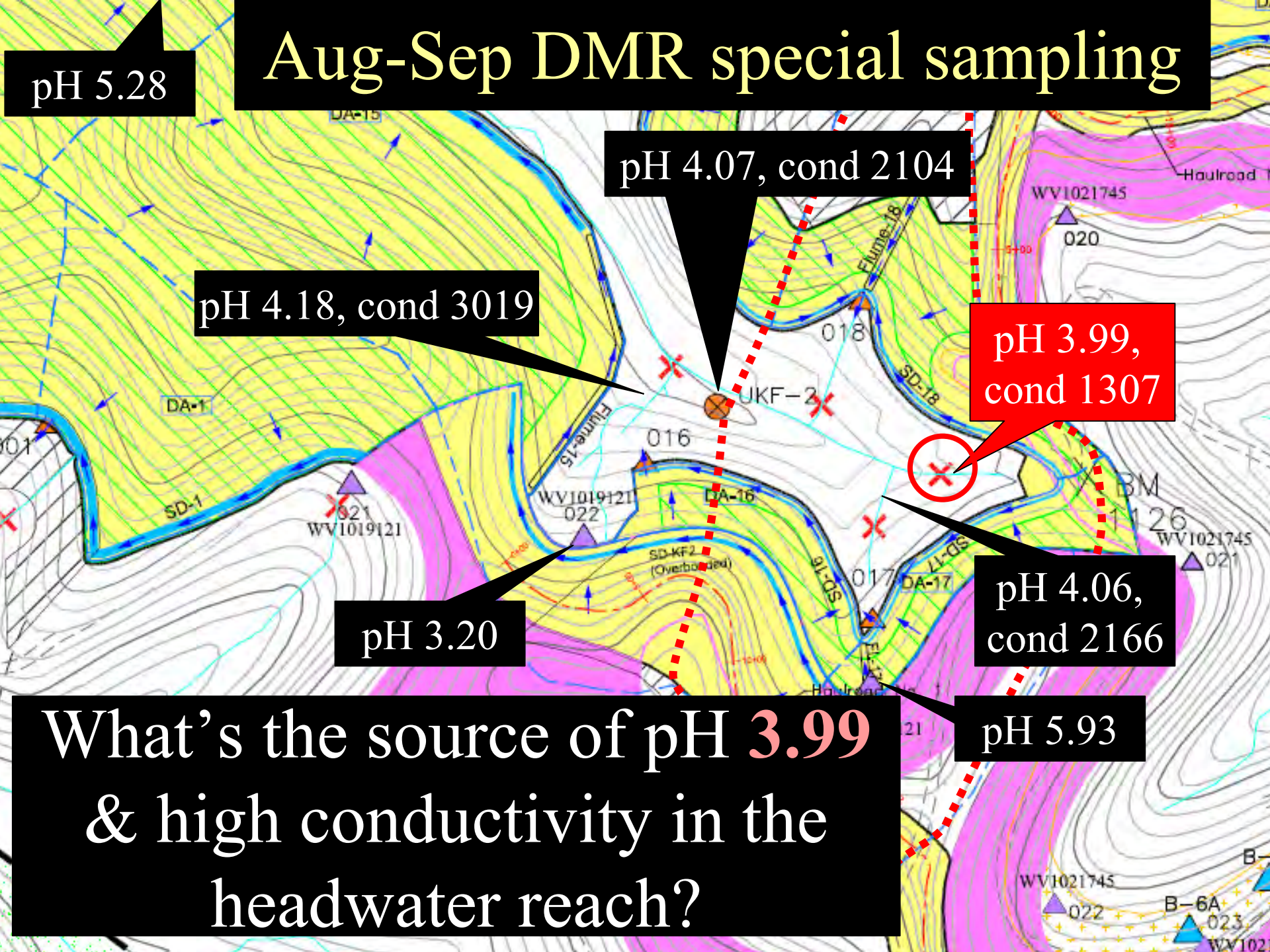
Aug-Sep DMR investigation at…



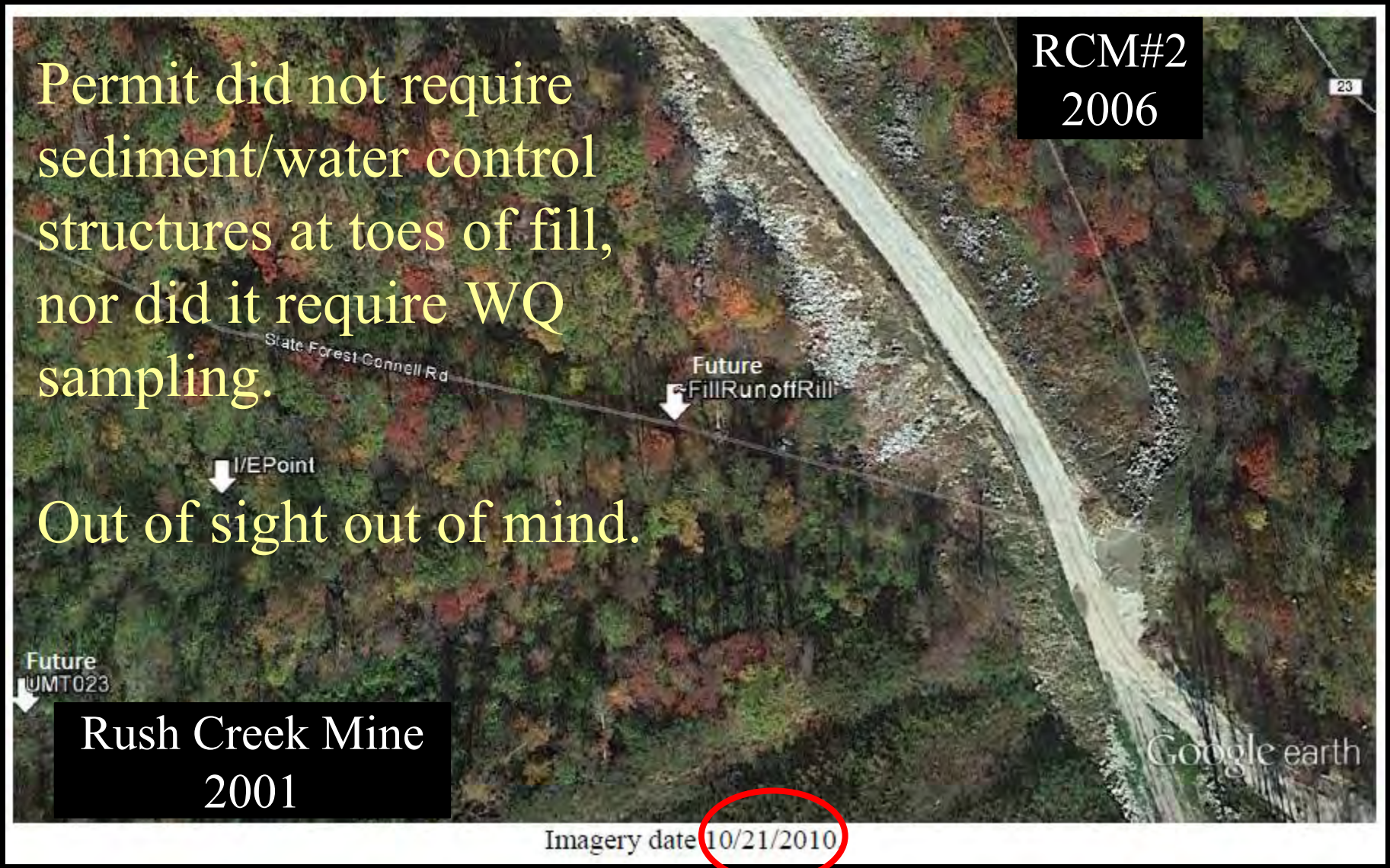
…shared outlets, ignored KD2 O-15 & 14

September 4, 2014 result of investigation

- Outlet 22 pH = **3.20**
- Inspector Casto issued NOV
- Permittee/Operator set up inadequate, manual NaOH drip


Aug-Sep DMR special sampling
pH 5.28
pH 4.07, cond 2104
pH 4.18, cond 3019
pH 3.99, cond 1307
pH 3.20
pH 4.06, cond 2166
pH 5.93
What's the source of pH 3.99 & high conductivity in the headwater reach?
UKF-2
016
017
018
020
021
022
DA-1
DA-15
DA-16
DA-17
SD-1
SD-16
SD-17
SD-18
Flume-15
Flume-18
WV1019121
WV1021745
Haulroad

Road rock fill built 2008 & 2009.
Connects the Rush Creek & RC#2 Mines.



Title 38 Legislative Rule, Series 2 West Virginia Surface Mining Reclamation Rule

- The road was constructed in a manner that violates Performance Standard 4.7.a.5.
- "4.7.a. Each road shall be located, designed, constructed, reconstructed, used, maintained, and reclaimed so as to: […]"
- "4.7.a.5. Neither cause nor contribute to, directly or indirectly, the violation of State or Federal water quality standards applicable to receiving waters"

BASELINE SURFACE WATER ANALYSIS
Attachment J-3B

Company Name: Keystone Industries LLC dba Keystone Development LLC
Mine Name: KD2 Surface Mine

Laboratory Name: Standard Laboratories

Sample I.D. No's	Date Sampled	PH	Flow CFS Or Gpm	Total Hot Acidity Ppm CaCO3	Mineral Acidity ppm CaCO3	Total Alkalinity ppm CaCO3	Total Fe ppm	Total Mn ppm	TSS ppm	TDS ppm	Spec. Cond. umohs	SO4 ppm	Al Ppm	Dis Al Ppm	Other Se ppm
UKF-2 BASELINE SITE	3/24/2008	5	40	18	0	2	0.15	1.37	6	275	335	159	1	0.78	
UKF-2 BASELINE SITE	4/3/2008	4.9	27	18	0	1	0.61	1.32	2	156	223	140	1.34	0.8	
UKF-2 BASELINE SITE	4/24/2008	5.7	14	13	0	2	0.14	1.12	1	192	313	140	0.71	0.63	
UKF-2 BASELINE SITE	5/7/2008	4.8									517	245	0.84	0.72	
UKF-2 BASELINE SITE	6/26/2008	4.8									884	479	1.35	1.13	
UKF-2 BASELINE SITE	7/29/2008														
UKF-2 BASELINE SITE	9/24/2008														
UKF-2 BASELINE SITE	11/20/2008	6									352	110	0.09	<.05	
UKF-2 BASELINE SITE	1/16/2009														
UKF-2 BASELINE SITE	2/17/2009	5.7									324	164	0.9	0.66	
UKF-2 BASELINE SITE	3/6/2009	5.3									206	130	0.71	0.57	
UKF-2 BASELINE SITE	5/20/2009														
UKF-2 BASELINE SITE	6/8/2009														
UKF-2 BASELINE SITE	6/17/2009														
UKF-2 BASELINE SITE	7/9/2009														
UKF-2 BASELINE SITE	7/15/2009														
UKF-2 BASELINE SITE	8/17/2009														
UKF-2 BASELINE SITE	8/27/2009												0.06		
UKF-2 BASELINE SITE	9/9/2009														
UKF-2 BASELINE SITE	9/15/2009														
UKF-2 BASELINE SITE	9/24/2009														
UKF-2 BASELINE SITE	10/6/2009		NF												
UKF-2 BASELINE SITE	10/21/2009		NF												
UKF-2 BASELINE SITE	11/3/2009		NF												
UKF-2 BASELINE SITE	11/16/2009		NF												
UKF-2 BASELINE SITE	12/16/2009		NF												
UKF-2 BASELINE SITE	12/28/2009	6.7	2	<1	0		0.32	0.01	8	182	243	104	0.2	<0.05	<0.0006
UKF-2 BASELINE SITE	1/13/2010	6.5	2	<1	0		<.05	<0.01	3	239	318	121	<0.05	<0.05	<0.0006
UKF-2 BASELINE SITE	1/28/2010	6.7	3	<1	0				20	140	192	88	1.71	0.09	<0.0006
UKF-2 BASELINE SITE	2/4/2010	7.2	3	16	0				2	155	249	104	0.3	<0.05	<0.0006
UKF-2 BASELINE SITE	2/24/2010	7	2	<1	0				22	184	268	101	0.32	<0.05	<0.0006
UKF-2 BASELINE SITE	3/3/2010	5.45	31	21	0				2	320	476	214	1.66	1.43	0.001
UKF-2 BASELINE SITE	3/19/2010	5.51	44	58	0				3	308	464	220	1.8	1.5	<0.0006
Max		7.2	47.0	58.0	0.0	39.0	2.0	5.0	22.0	728.0	884.0	479.0	1.8	1.5	0.001
Average		5.8	15.6	20.5	0.0	9.9	0.4	1.4	5.4	270.9	381.5	182.3	0.8	0.8	0.001
Min		4.8	2.0	BDL	0.0	1.0	BDL	BDL	BDL	140.0	192.0	88.0	BDL	BDL	BDL

0.035

The KD#2 baseline WQ sampling caught the problem, but DMR staff did not.

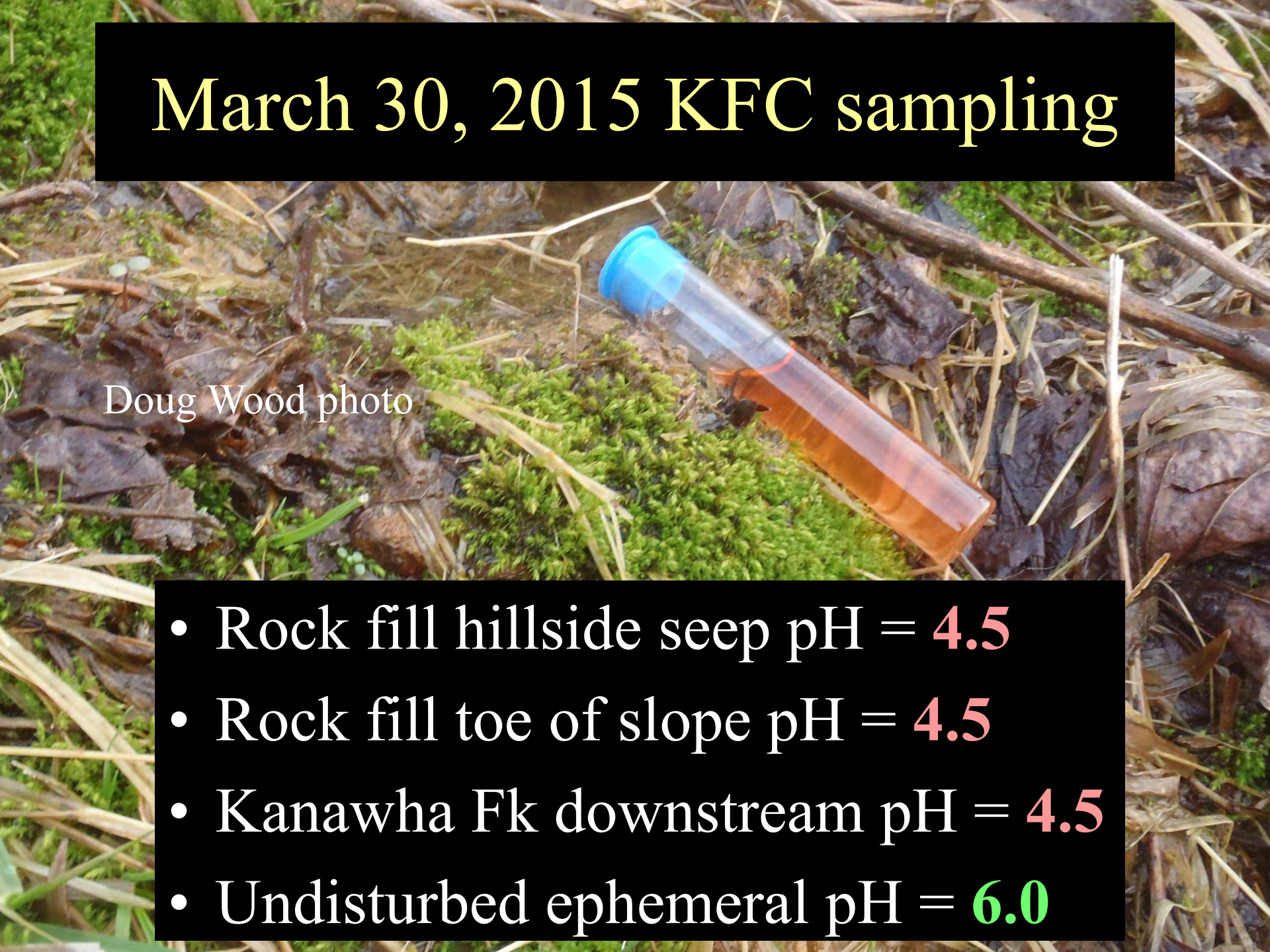
Red Flag

Rock fill at head of Kanawha Fork with no sediment/water control structures

Rock fill is crammed with acid-producing coals, gray shales, and other nasties.

Permeable road surface and sediment ditch allow water into the toxic rock fill

March 30, 2015 KFC sampling



Doug Wood photo

- Rock fill hillside seep pH = **4.5**
- Rock fill toe of slope pH = **4.5**
- Kanawha Fk downstream pH = **4.5**
- Undisturbed ephemeral pH = **6.0**

April 7, 2015 DMR follow-up sampling accompanied by the citizen who called attention to the rock fill source of acid at the very head of Kanawha Fork

- Rock fill hillside seep pH = **4.4**
- Kanawha Fk downstream pH = **4.7**
- As of 3/22/2016, no NOVs issued and no further sampling by DMR

Jan. 22, 2015 Middlelick Branch Foam Investigation

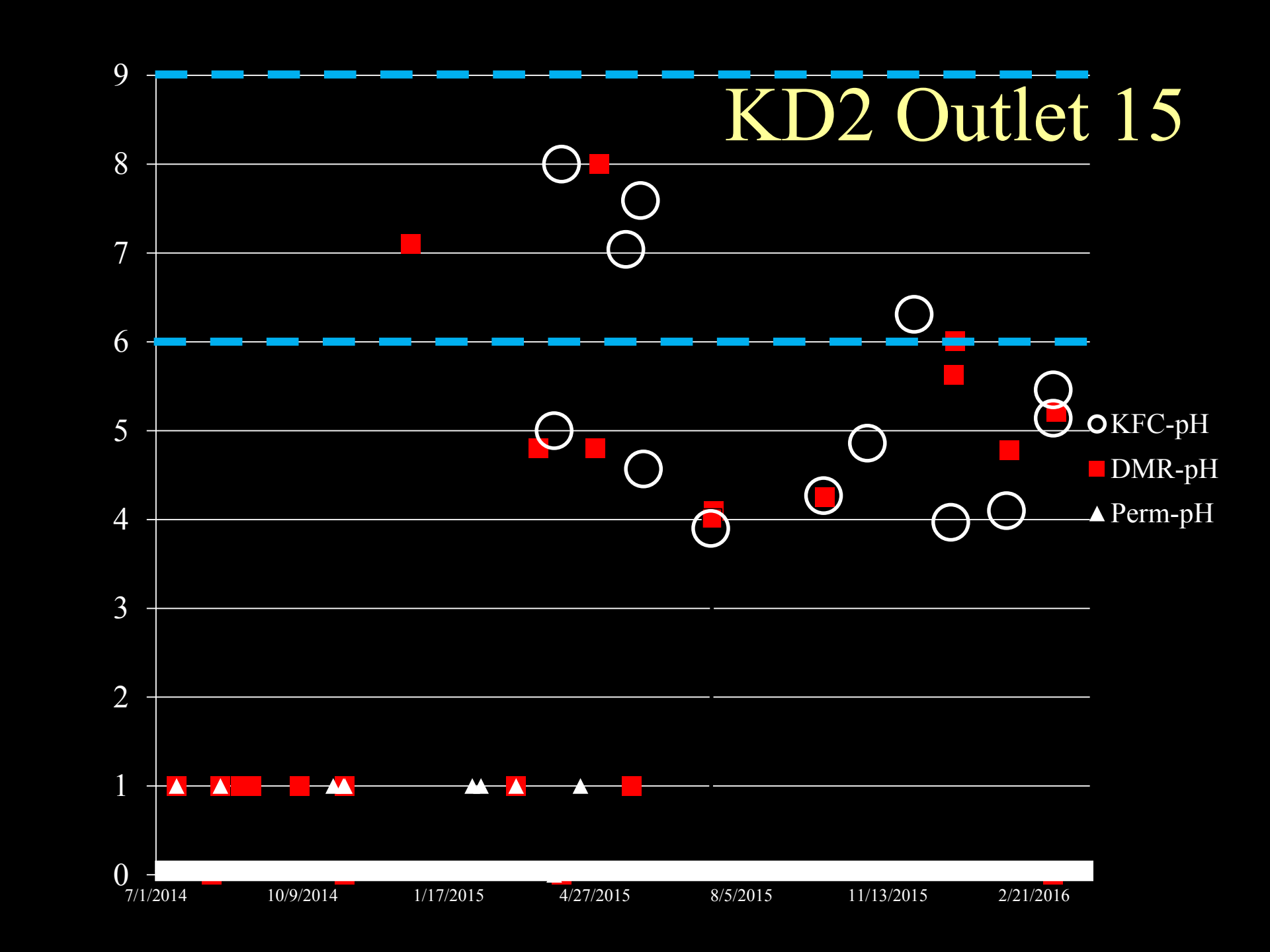
- When sodium hydroxide (NaOH) is added to high bicarbonate mine drainage, sodium bicarbonate forms. In the presence of acid, $NaHCO_3$ reacts to form dissolved sodium, water, and carbon dioxide. Extraordinary billows of foam form as the CO_2 rapidly escapes from the water, a reaction familiar to every soda-pop consumer. (Doug Wood photo)

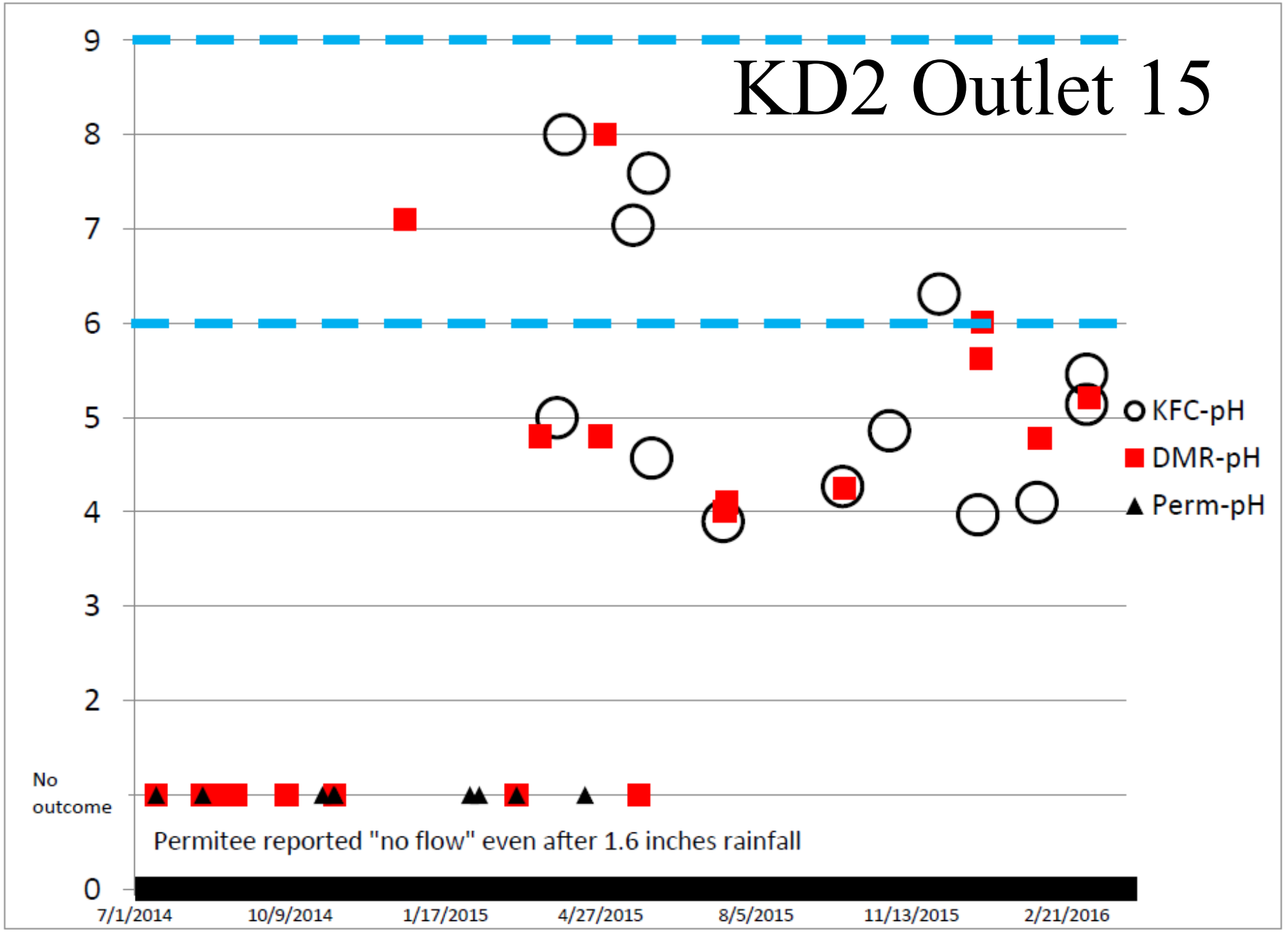
Result: NOV for off-site damages to tributary

Doug Wood photo

April 4, 2015 KFC sampling

- Outlet 20 pH = 4.5
- Not enough NaOH

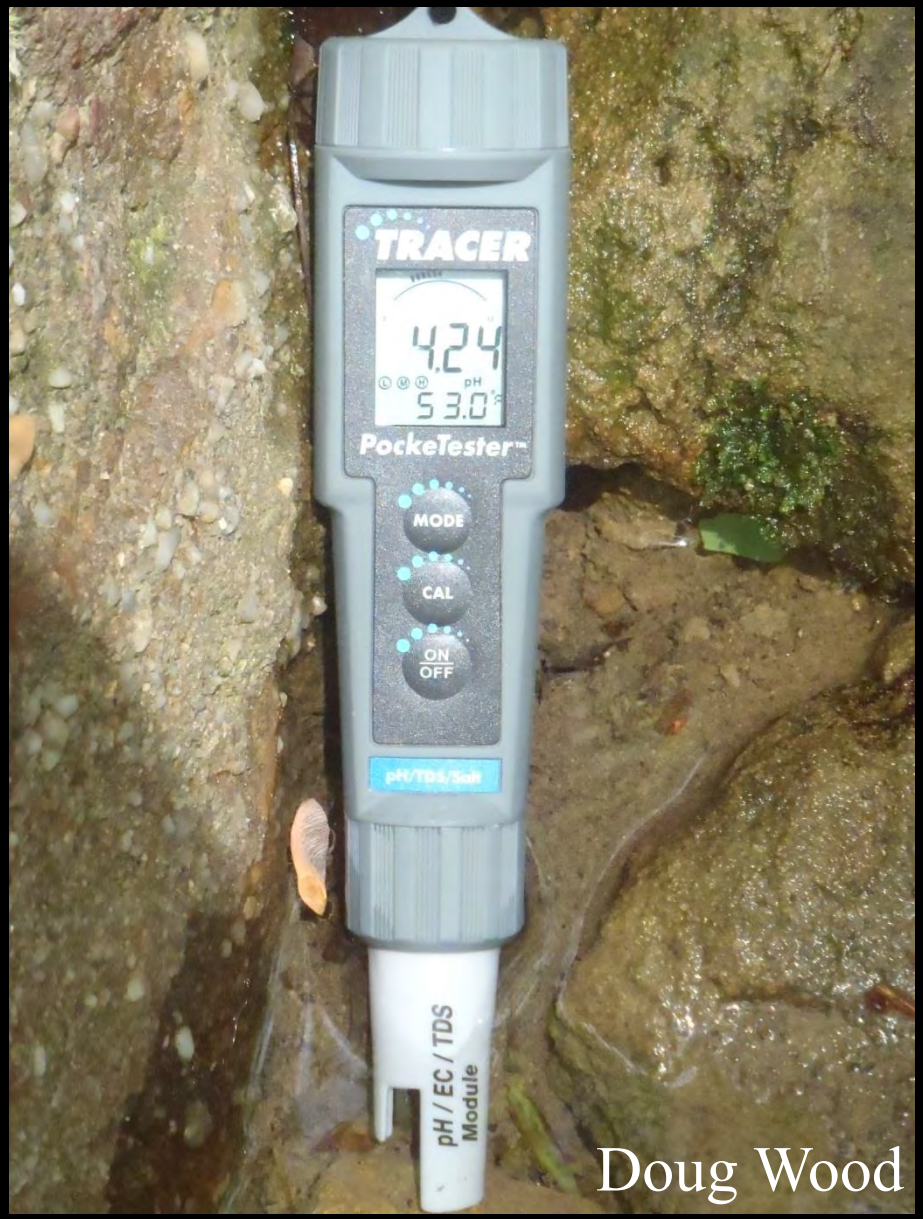

KD2 Outlet 15
9
8
7
6
5
4
3
2
1
0
7/1/2014
10/9/2014
1/17/2015
4/27/2015
8/5/2015
11/13/2015
2/21/2016
KFC-pH
DMR-pH
Perm-pH


KD2 Outlet 15
9
8
7
6
5
4
3
2
No outcome
0
KFC-pH
DMR-pH
Perm-pH
Permitee reported "no flow" even after 1.6 inches rainfall
7/1/2014
10/9/2014
1/17/2015
4/27/2015
8/5/2015
11/13/2015
2/21/2016

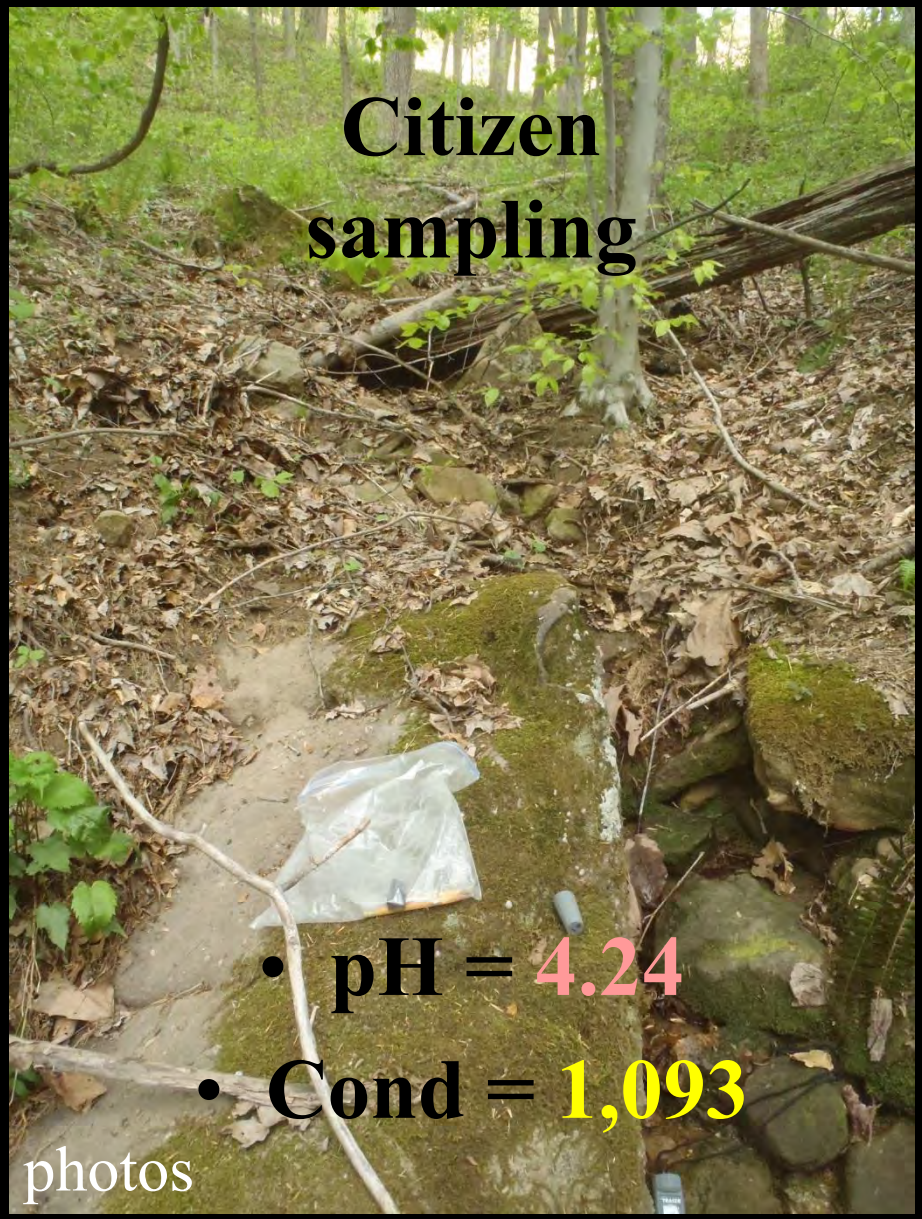
April 28, 2015 KFC Bioassessment

STREAM NAME	MILE POINT	WVSCI	WVSCI NARRATIVE SCORE	WVSCI PCT OF THRESHOLD	SEAGION	GLIMPSS CHIRO FAMILY	GLIMPSS CF NARRATIVE SCORE	GLIMPSS CF PCT OF THRESHOLD	GLIMPSS CHIRO GENUS	GLIMPSS CG NARRATIVE SCORE	GLIMPS CG PCT OF THRESHOLD	SOS HABITAT SCORE
Middlelick Branch	2.3	94	Unimpaired-Very Good	137.69	Spring Mountains	80.86	Unimpaired-Excellent	158.54	80.60	Unimpaired-Excellent	152.07	59
Middlelick Branch	1.6	85	Unimpaired-Very Good	125.21	Spring Mountains	59.64	Unimpaired-Good	116.95	60.76	Unimpaired-Good	114.64	53
Kanawha Fork	2.4	58	Impaired-Slightly	85.33	Spring Mountains	24.62	Impaired-Moderately	48.27	25.75	Impaired-Moderately	48.58	51

May 3, 2015 leachate from SD-1 of O-21

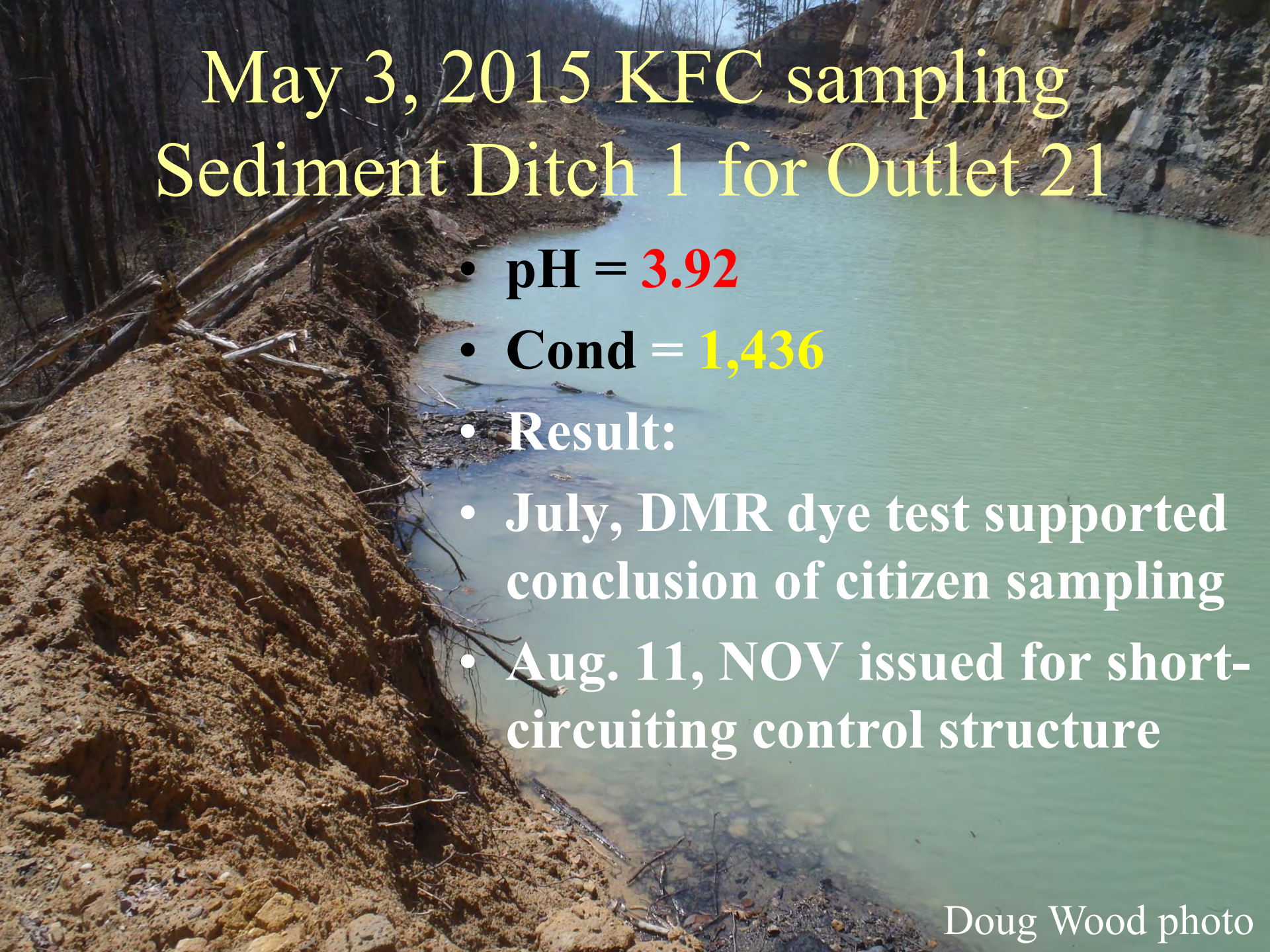


Doug Wood photos



May 3, 2015 KFC sampling Sediment Ditch 1 for Outlet 21

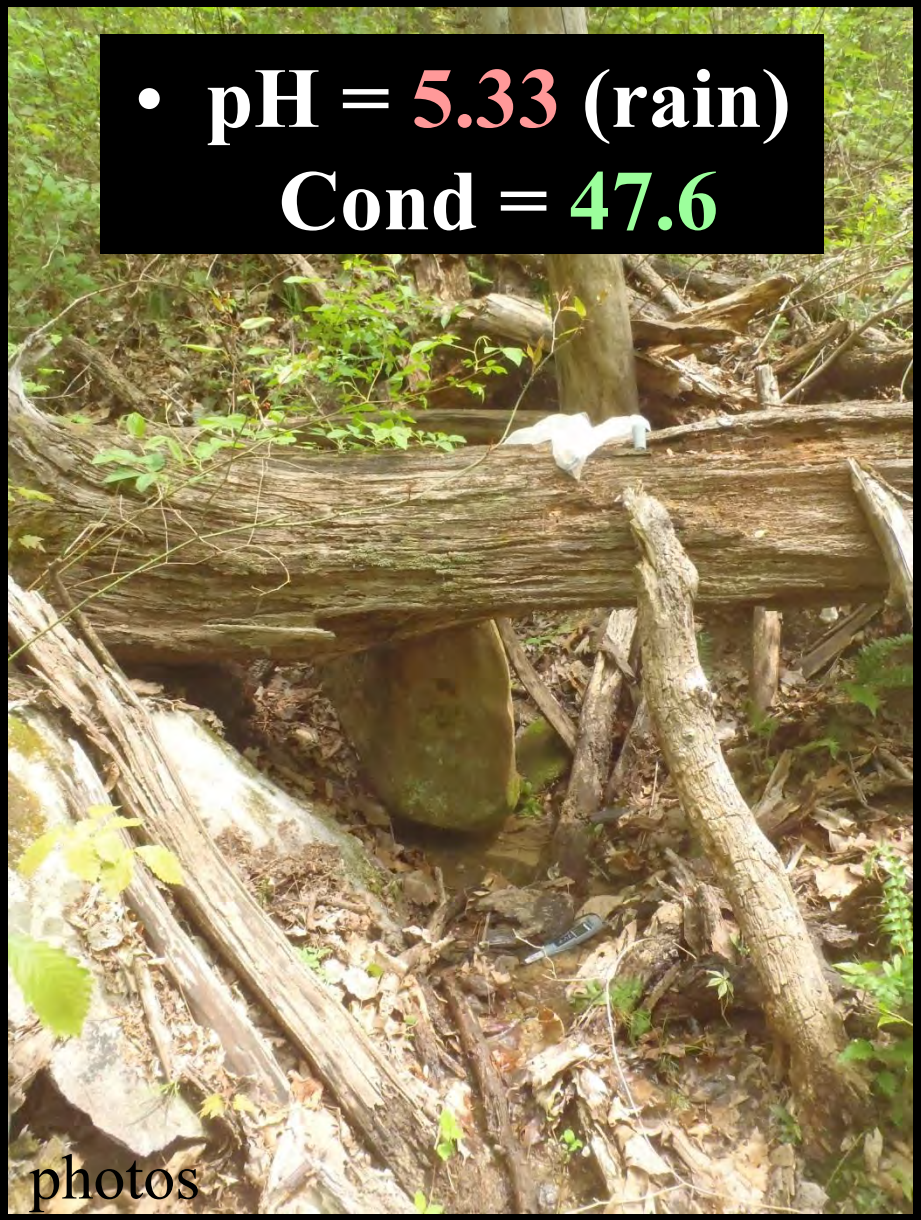
- **pH = 3.92**
- **Cond = 1,436**
- **Result:**
- **July, DMR dye test supported conclusion of citizen sampling**
- **Aug. 11, NOV issued for short-circuiting control structure**



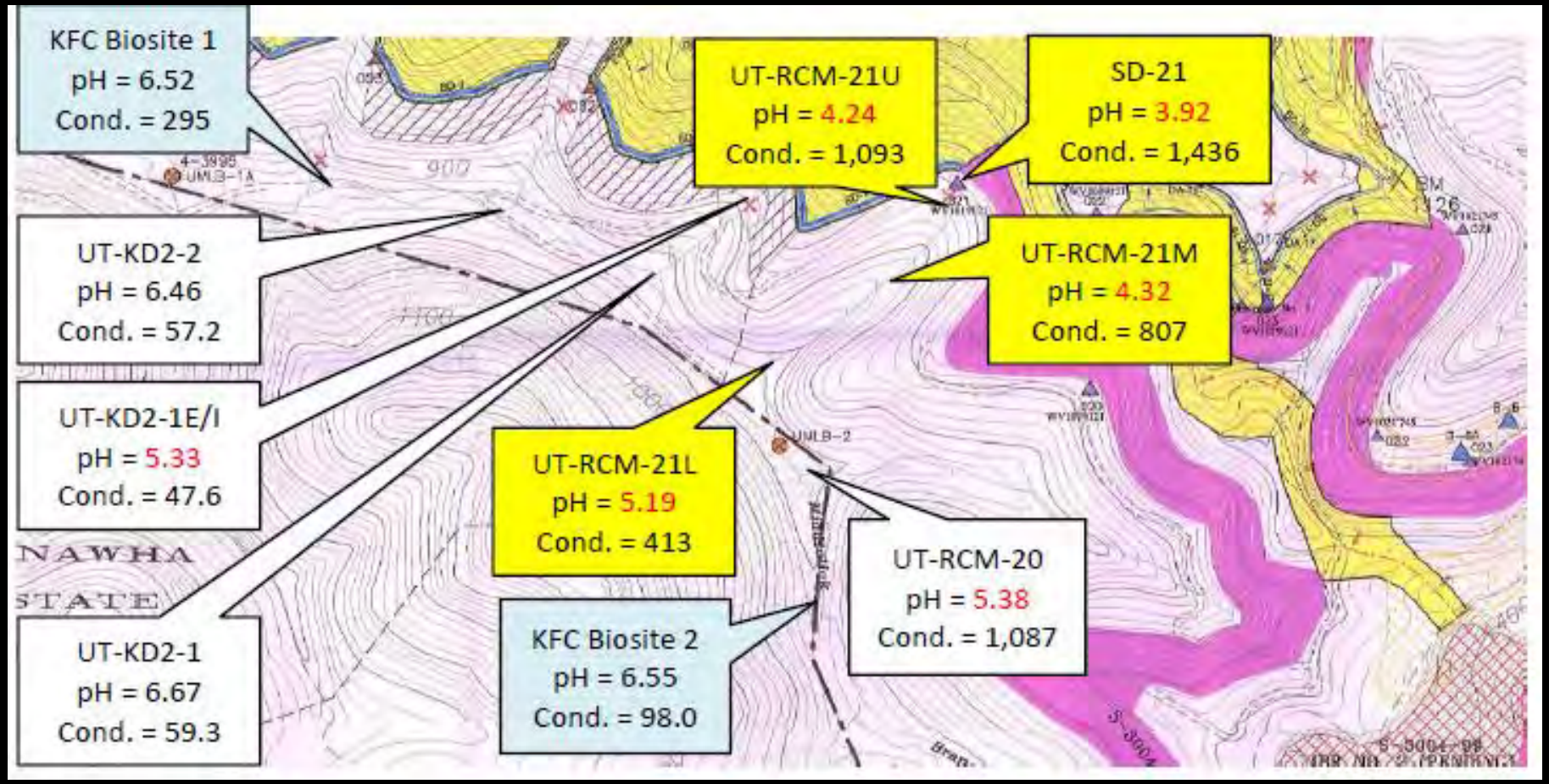
Doug Wood photo

May 3, 2015 undisturbed headwater

Doug Wood photos



- pH = 5.33 (rain)
  Cond = 47.6



Contrast UT-RCM-21 with UT-KD2-1 to understand stream chemistry of acid mine seepage

Contrasting streams

Undisturbed headwater

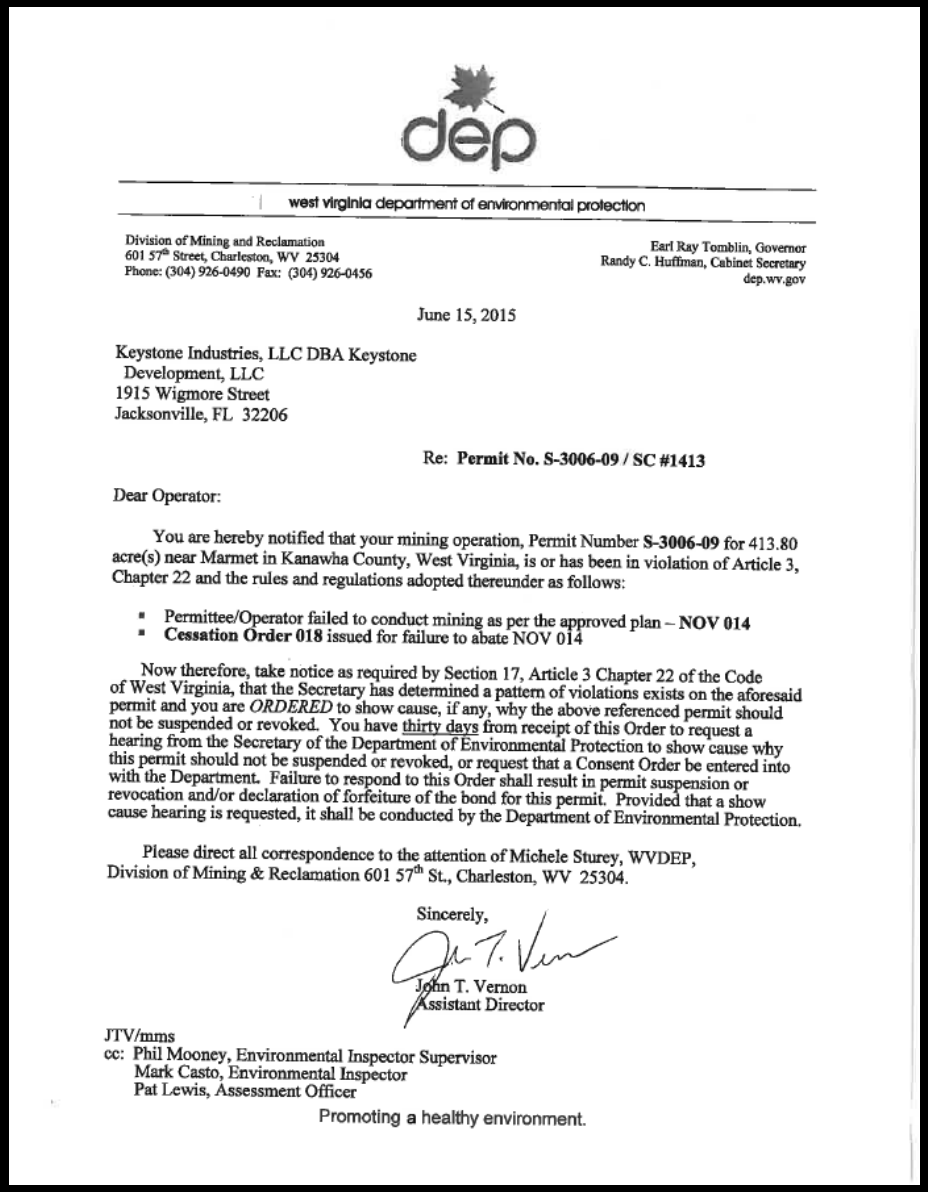
- pH at E/I point = **5.33**
- Cond. = **47.6** µS/cm
- Mayfly, crayfish, & salamander survive.

- pH at mouth = **6.67**
- Cond. = **59.3** µS/cm
- Enough natural alkalinity to overcome the low pH just a few hundred meters downstream. No foam.

Mine leachate headwater

- pH at E/I point = **4.24**
- Cond. = **1,093** µS/cm
- Mayfly, crayfish, & salamander die.

- pH at mouth = **5.19**
- Cond. = **413** µS/cm
- Alkalinity inadequate for acid burden. Foam forms in receiving stream. Mayfly & crayfish die. Salamander survival is not assured due to high metal & ion levels.



dep

west virginia department of environmental protection

Division of Mining and Reclamation
601 57th Street, Charleston, WV 25304
Phone: (304) 926-0490 Fax: (304) 926-0456

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
dep.wv.gov

June 15, 2015

Keystone Industries, LLC DBA Keystone
Development, LLC
1915 Wigmore Street
Jacksonville, FL 32206

Re: **Permit No. S-3006-09 / SC #1413**

Dear Operator:

You are hereby notified that your mining operation, Permit Number **S-3006-09** for 413.80 acre(s) near Marmet in Kanawha County, West Virginia, is or has been in violation of Article 3, Chapter 22 and the rules and regulations adopted thereunder as follows:

- Permittee/Operator failed to conduct mining as per the approved plan – **NOV 014**
- **Cessation Order 018** issued for failure to abate NOV 014

Now therefore, take notice as required by Section 17, Article 3 Chapter 22 of the Code of West Virginia, that the Secretary has determined a pattern of violations exists on the aforesaid permit and you are *ORDERED* to show cause, if any, why the above referenced permit should not be suspended or revoked. You have thirty days from receipt of this Order to request a hearing from the Secretary of the Department of Environmental Protection to show cause why this permit should not be suspended or revoked, or request that a Consent Order be entered into with the Department. Failure to respond to this Order shall result in permit suspension or revocation and/or declaration of forfeiture of the bond for this permit. Provided that a show cause hearing is requested, it shall be conducted by the Department of Environmental Protection.

Please direct all correspondence to the attention of Michele Sturey, WVDEP, Division of Mining & Reclamation 601 57th St., Charleston, WV 25304.

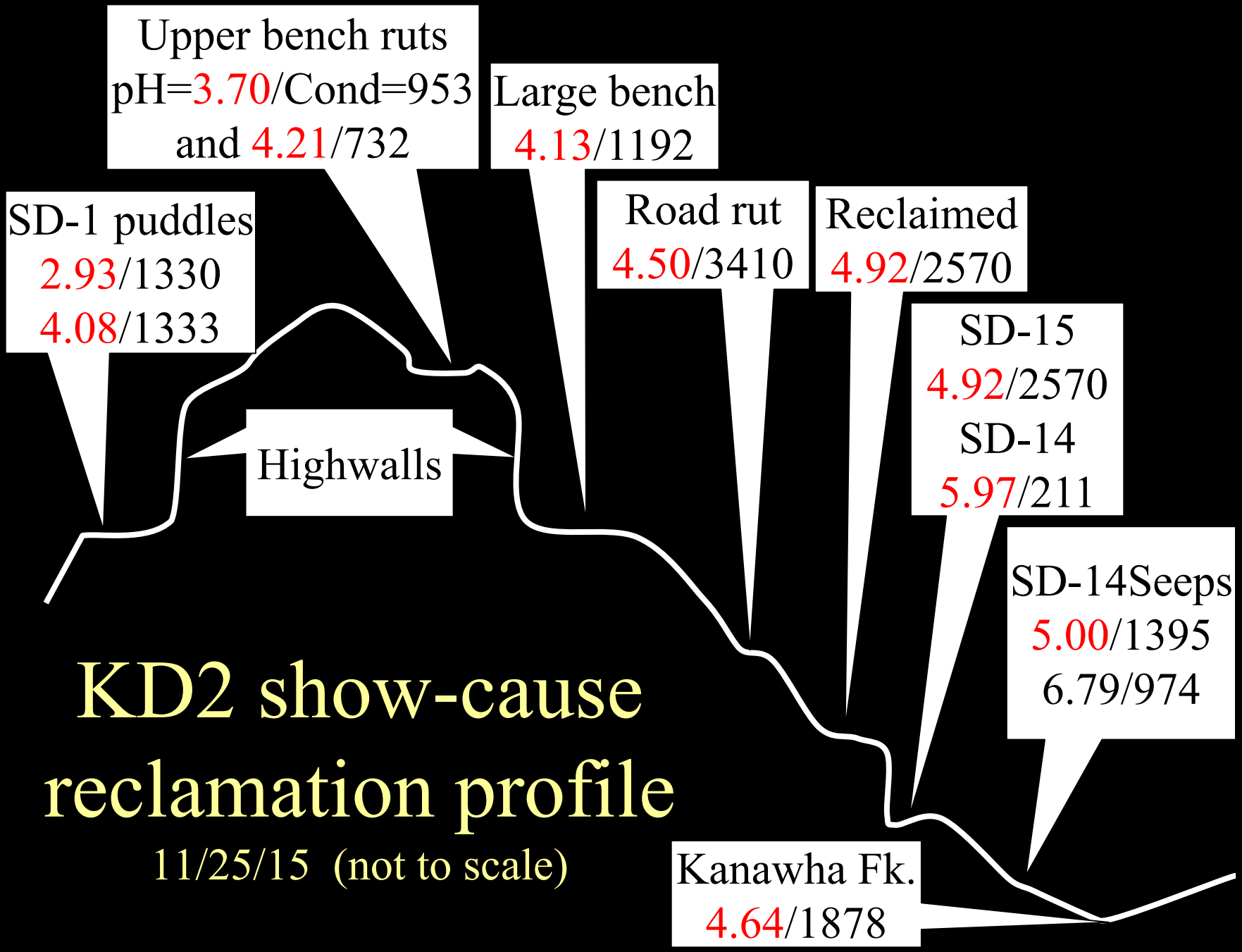
Sincerely,

John T. Vernon
Assistant Director

JTV/mms
cc: Phil Mooney, Environmental Inspector Supervisor
Mark Casto, Environmental Inspector
Pat Lewis, Assessment Officer

Promoting a healthy environment.

“[…] the Secretary has determined a pattern of violations exists on the aforesaid permit and you are ordered to show cause, if any, why the above referenced permit should not be suspended or revoked.”


Upper bench ruts
pH=3.70/Cond=953
and 4.21/732
Large bench
4.13/1192
SD-1 puddles
2.93/1330
4.08/1333
Road rut
4.50/3410
Reclaimed
4.92/2570
SD-15
4.92/2570
SD-14
5.97/211
Highwalls
SD-14Seeps
5.00/1395
6.79/974
KD2 show-cause
reclamation profile
11/25/15 (not to scale)
Kanawha Fk.
4.64/1878

KFC's assistance to the DMR

- Foam complaints triggered findings of frequent and many AMD discharges
- Suspicion led to discovery of data falsification by the consultant
- Upward stream investigations found off-site damages, foam sources, acid leachate, & road fill acid source …

- … Proved that toxic overburden cannot be effectively isolated in complex acidic geology using current technologies
- Proved that manually adjusted NaOH drip cannot effectively treat widely varying flow
- Sampling effort triggered responses from DMR inspector that led to 5 show-cause orders on 3 mines & limited the perpetual acid mine drainage footprint at KD2 to 83 acres instead of the originally planned 413 acres ...

… disproved these permit assumptions

- No acid production expected
- No discharges other than precipitation-only
- Permeable sediment ditches constructed of unconsoldiated, blasted rock and disturbed soil, will adequately prevent leakage of toxic materials
- Rainfall dilution will prevent upset in hydrological balance in stream
- Therefore, no need for biomonitoring

“Like a fiend with his dope
and a drunkard his wine,
a man will have lu$t
for the lure of the mine$.”

-- Merle Travis, *It’s dark as a dungeon way down in the mine*, first recorded August 8, 1946.

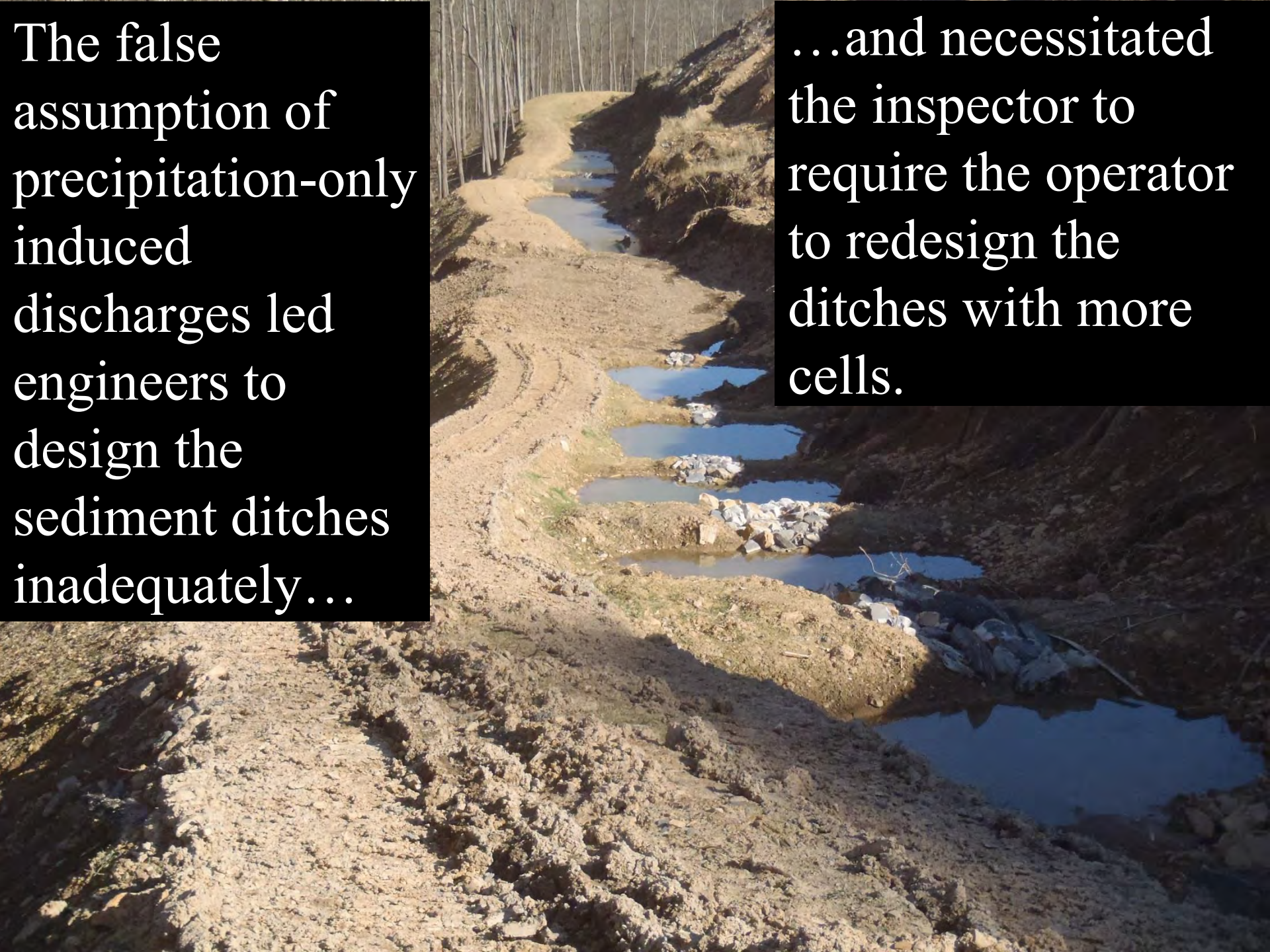
Feb. 5, 2014 KD#2 Mine Cumulative Hydrologic Impact Assessment (CHIA), DMR geologist wrote (bracketed words are not his)…

- [p. 14] The writer as an agent of the Department of Environmental Protection has used all the available information and assessed the hydrologic impacts of the proposed operation.
- [p. 2] To date, the author is unaware of any outstanding environmental problems. Elevated levels of traditional acid mine drainage (AMD), such as […] low Ph, [sic] have not manifested themselves in the surrounding mine locations. Baseline water data tested within acceptable water quality standards (WQS).
- [p. 3] The applicant has a history of successfully managing these same ABA [Acid-Base Accounting] and selenium problems on the adjoining active mining permits. I see no reason to believe that this success will not continue
- [p. 8] To the best of the writer's knowledge the adjacent mine [RCM] is/ has been environmental [sic] successful. No adverse environmental conditions were noted at the time of Field Inspection. Therefore, I see no reason not to believe that the mining of S-3009-04 [KD#2] [will] lead to an[y] environmental problems.

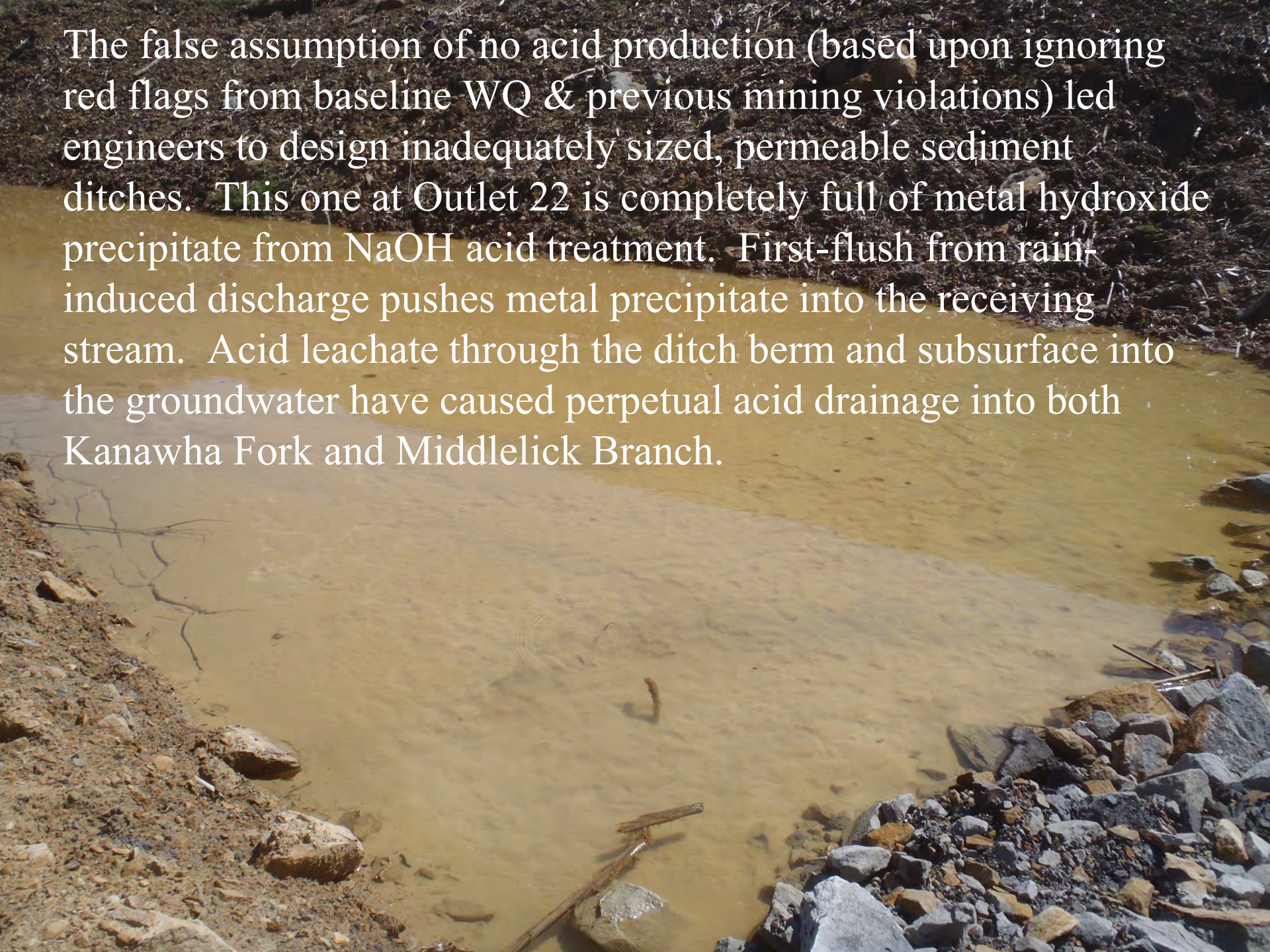
How the permit's special sampling requirement failed to protect streams

- Incorrect assumption of no pollution due to dilution
- Permittee failed to conduct/agency failed to enforce special sampling during first 11 months, and almost never since
- Permittee targeted sampling primarily during no-flow periods
- Permittee/Consultant falsified no-flow data
- Permit stipulation of sampling after 0.3 inches of rain in 24-hour period allowed consultant to sample before outlets discharged and to inadequately sample first-flush and runoff taper phenomena (greatest potential pollution)
- First-flush pushes metal precipitates and acid out of sediment control ditches before dilution can work
- Runoff taper period leaches acid in large quantities from the ditches into the receiving streams

The false assumption of precipitation-only induced discharges led engineers to design the sediment ditches inadequately…



…and necessitated the inspector to require the operator to redesign the ditches with more cells.



The false assumption of no acid production (based upon ignoring red flags from baseline WQ & previous mining violations) led engineers to design inadequately sized, permeable sediment ditches. This one at Outlet 22 is completely full of metal hydroxide precipitate from NaOH acid treatment. First-flush from rain-induced discharge pushes metal precipitate into the receiving stream. Acid leachate through the ditch berm and subsurface into the groundwater have caused perpetual acid drainage into both Kanawha Fork and Middlelick Branch.

Assurances from geology?

From Attachment O-8 of the revised Material Handling Plan:

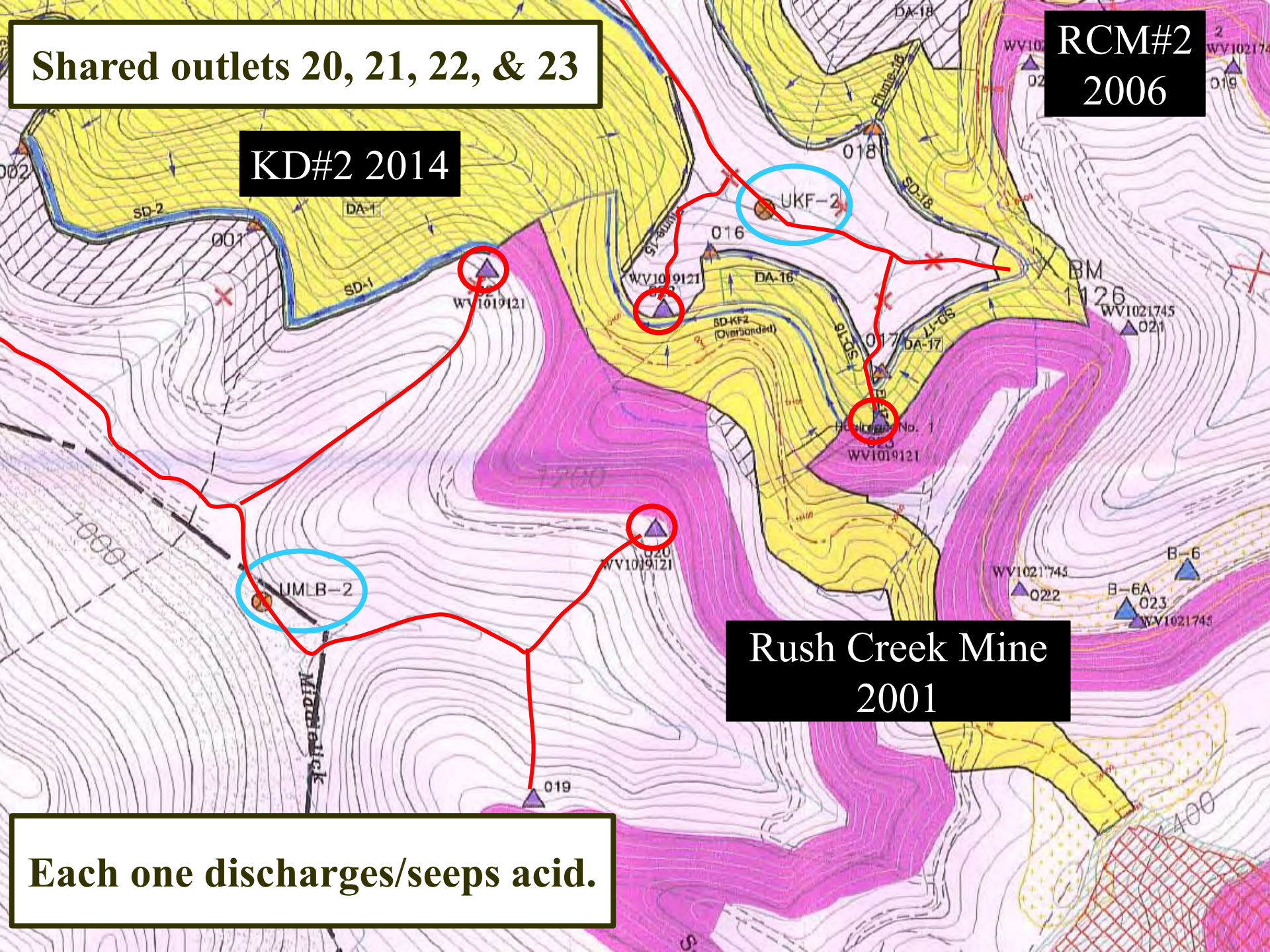
"Experience with Acid-Base Accounting (ABA) has shown that overburden layers which provide values greater than 5 tons per 1000 tons net deficient in neutralizing potential PRODUCE ACID, while values greater than 20 tons per 1000 tons net excess in neutralizing potential USUALLY produce alkaline discharge. Overburden layers between 0 and 5 net deficient or less than 20 tons in net excess MAY PRODUCE ACID or alkaline drainage or they may be neutral producing neither alkalinity nor acidity. (Where little or no pyrite exists, even with low amounts of neutralizing potential, little acid will be produced.)"

What's the prognosis?

- Reclamation is entrusted to the same permittee (Tom Scholl) who caused perpetual acid mine drainage at the adjacent two mines
- Reclamation plan is approved and overseen by the same agency that approved the faulty permit
- Perpetual acid mine drainage already at KD#2 is worsening as reclamation progresses
- Complex geology combined with ignorance = Inability of Tom Scholl to appropriately blend non-toxic with toxic overburden or to adequately cover toxic with non-toxic overburden
- Inability of DMR staff to adequately guide Tom Scholl's blasters and dozers in distinguishing toxic from non-toxic blasted rock
- Perpetual acid runoff/leachate from the rock road fill between RCM and RCM#2 with no treatment whatsoever considered by the DMR
- Kanawha Fork and tribs of Middlelick Branch will never recover

And yet…

- The mine spoil surrounding the sediment ditches leaches acid, causing at least 3 of the 4 shared sediment ditches to leach acid, causing three shared outlets (20, 22, & 23) to discharge acid, & causing KD#2 outlets 14 & 15 to discharge acid & their sediment ditches to leach acid resulting in permit violations & WQ standards violations. Hand-operated NaOH drips are now used to neutralize discharges (inadequately so), but the drip treatment fails to neutralize the acid leaching from the sediment ditches into the soil & groundwater.


Shared outlets 20, 21, 22, & 23
KD#2 2014
RCM#2
2006
Rush Creek Mine
2001
Each one discharges/seeps acid.
UKF-2
UMLB-2
SD-1
SD-2
DA-1
DA-16
DA-17
DA-18
001
016
017
018
019
020
021
022
023
WV1019121
WV1021745
BM
1126
B-6
B-6A
1200
1000
400