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APPENDIX 1

**WEST VIRGINIA ENVIRONMENTAL QUALITY BOARD
CHARLESTON, WEST VIRGINIA**

BRADLEY KEENAN,
NATURAL RESOURCES
DEFENSE COUNCIL,
WV SURFACE OWNERS'
RIGHTS ORGANIZATION, and
PLATEAU ACTION NETWORK,

Appellants,

v.

Appeal No.: 14-04-EQB

DIRECTOR, DIVISION
OF WATER AND WASTE MANAGEMENT
WEST VIRGINIA DEPARTMENT OF
ENVIRONMENTAL PROTECTION;

Appellee.

I Avner Vengosh declare as follows:

- 1.) I am a Professor of Geochemistry and Water Quality in the Nicholas School of Environment at Duke University with a professional experience of over 25 years in the field of water contamination and water quality. Since 2010 I have been working on issues related to water contamination directly associated with shale gas exploration and hydraulic fracturing in the US. My group has published 13 papers in the top peer-review scientific journals on different issues related to environmental effects and water contamination associated with oil and gas and hydraulic fracturing.
- 2.) On September 14, 2013 myself and my graduate student Jennie Harkness collected two water samples from wolf creek, approximately 200 feet directly downstream of

the eastern discharge pit at Danny Webb injection site (Figure 1). Samples were filtered, acidified, and transported according to standardized USGS field sampling techniques.



- 3.) Analysis of the samples was conducted by several instrumentations at Duke University, including ThermoFischer Dionex ion chromatography (IC), VG PlasmaQuad-3 inductively coupled - mass spectrometry (ICP-MS), and current plasma optical emission spectrometry (DCP-OES). Results of the chemical measurements are appended to this declaration.

- 4.) In my expert opinion, the two surface water samples we sampled exceed typical surface water quality parameters observed in streams in West Virginia (WV), with

elevated levels of several dissolved constituents in water such as chloride, bromide, sodium, manganese, strontium, and barium. This chemical composition is typical of oil and gas wastewater observed in PA and WV (Warner et al., 2013; Haluszczak et al., 2013; Ferrar et al., 2013; Vengosh et al., 2014). The elevated water quality parameters observed in the stream samples downstream of the Danny Webb UIC site are not consistent with the concept that the elevated contaminant levels of chloride, bromides and others originate from an acid mine drainage (AMD) source. Acid mine drainage originating from bituminous coal is typically characterized by high levels of iron and sulfate while the water samples have low contents of these elements. Instead, oil and gas wastewater is characterized by high content of chloride, bromide, strontium, and barium. This composition was observed in the two water samples, which suggest that surface water at wolf creek, downstream of the eastern discharge pit of the Danny Webb injection site originated from migration of oil and gas wastewater discharged into the environment.

- 5.) My opinion is supported by data my team has collected from numerous sources including 75 flowback and produced waters samples from both conventional and unconventional oil and gas wells in the Appalachian Basin, as well as 40 effluent samples from discharge sites (outfalls) in PA. This large dataset show that effluents originated from oil and gas wastewater have typical geochemical affinities that are consistent with the geochemical fingerprint observed in the two water samples. This composition is different from AMD water composition measured in the region (Cravotta 2008; Larson et al. 2014), and scientific research on low-pH trace metal leaching from AMD sites (Romero et al. 2010).

- 6.) Acid mine drainage (AMD) occurs when pyrite (FeS_2), a mineral in coal ore, becomes exposed to atmospheric oxygen and water. When this reaction occurs, acidity, iron, and sulfate are released into the stream, causing low pH water (hence 'acid mine drainage'), high iron, and high sulfate concentrations. Consequently, elevated concentrations of sulfate are typical of AMD impaired streams. The sulfate concentrations in the stream samples downstream of Danny Webb UIC were low (0.8 and 5.1 mg/L). It is not uncommon to observe sulfate in AMD samples two orders of magnitude or more in AMD impacted streams (~500 – 2000 mg/L; Larson et al. 2014).
- 7.) Depending on the geology of the coal, AMD conditions can also produce elevated levels of various other trace metals, such as arsenic, chromium, lead, and selenium. In an inventory study of 140 abandoned and AMD impacted sites, the USGS has determined statistical percentile distribution ranges for numerous water quality parameters originating from AMD produced water (Cravotta 2008). However, certain elements, such as barium, bromide, chloride, and strontium are not observed in elevated concentrations in AMD, such as those observed in the two stream samples.
- 8.) In studying barium leaching from AMD producing ore, research observed that barium minerals are insoluble (not released to the water) under low-pH conditions, similar to AMD (Romero et al. 2010). Therefore, elevated concentrations of barium observed in the downstream water samples (2,068 and 1,296 ppb) could not be produced from AMD. This is consistent with the USGS data, which found the 100 percentile barium

concentrations were 39 ppb (Cravotta 2008). In contrast, oil and gas wastewater in the Appalachian Basin is characterized by high barium concentrations.

- 9.) In conclusion, the chemical profile of the water samples downstream of Danny Webb UIC leads me to the conclusion that the stream is impacted by contamination of oil and gas wastewater, and that any assertion that contamination is due to Acid Mine Drainage is contrary to the actual scientific evidence.

I declare under penalty of perjury that the foregoing is true and correct. Executed in Durham, North Carolina on August 26, 2014.



Avner Vengosh, Ph.D.
Professor,
Nicholas School of the Environment
Duke University

Sources:

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Name	Latitude	Longitude	County	Date Sampled	pH	Conductivity	Cl (ppm)	Br (ppm)	SO4 (ppm)	Ca (ppm)	Mg (ppm)	Na (ppm)	Fe (ppm)	Mn (ppm)
WV-LG-1	38.01499	-81.12038	Fayette	9/14/2013	6.22	1640	575.07	2.78	0.08	112.32	21.00	199.00	113.80	6.23
WV-LG-2	38.01499	-81.12038	Fayette	9/14/2013	6.2	1053	366.96	2.48	5.02	44.93	14.43	178.92	11.28	2.96

Name	Latitude	Longitude	County	Date Sampled	Li (ppb)	Be (ppb)	B (ppb)	V (ppb)	Cr (ppb)	Co (ppb)	Ni (ppb)	Zn (ppb)	As (ppb)	Se (ppb)	Rb (ppb)	Sr (ppb)	Ba (ppb)
WV-LG-1	38.01499	-81.12038	Fayette	9/14/2013	11.61	0.17	0.36	3.18	8.77	8.12	2.45	1.18	1.48	4.14	6.75	1702.47	2068.30
WV-LG-2	38.01499	-81.12038	Fayette	9/14/2013	33.86	0.13	24.10	2.27	5.52	6.13	1.35 <DL		0.36	0.78	5.03	2218.02	1296.16

APPENDIX 2



west virginia department of environmental protection

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Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
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February 6, 2014

Danny E. Webb Construction Inc. **UIC Permit 2D0190460** Comment and Response to Comment and Final UIC Permit.

On January 29, 2013 the Draft Underground Injection Control Permit No. **UIC2D0190460** was present to the public of review and comment. Subsequently a public hearing was request and held on June 4, 2013 therefore extending the public comment period to June 14, 2013. The following is a summary of written and verbal comment received during the comment period.

1. Danny Webb's operation is a public health and environmental hazard and continues to be a nuisance to the local community. Objectionable odors have been smelled periodically in the neighborhood surrounding the site since 2004. The odors have been originating from settling ponds located on the premises of the operation. The odor was determined to be caused by hydrogen sulfide, a flammable, toxic gas. The previous UIC permit was issued in 2007 with the condition that the settling ponds be removed within six months. Danny Webb was cited on May 12, 2008 for failing to comply with the previous permit requirement. The only reason these ponds are still present is because the DEP decided not to enforce the permit that it had written and allowed Danny Webb to enter into a consent decree, allowing the pits to remain. The consent decree conditioned the ponds' continued existence on Danny Webb not allowing any waste in the pits with objectionable odors sufficient to be smelled off- site. The local community has extensive complaints documenting obnoxious odors emanating from the site. The local Postmaster, the Access Health Fayette Clinic and nearby neighbors have all submitted letters complaining of objectionable odors. More recently, neighbors smelled obnoxious odors on February 24, 2013. Given that this problem has persisted for at least nine years, Danny Webb clearly is not willing to operate the settling ponds in compliance with the applicable rules and regulation. He has violated his permit and the consent decree, and therefore should not be issued another permit. The DEP should not allow such toxic materials to be released into the environment, either from the settling ponds or the injection well.

DEP Response:

In or around 2007 odorous fluids from Oil and Gas activities were received at the Webb facility for injection. This fluid should have been unloaded into tanks with odor flappers and filtered then injected into UIC well. The DEP's Office of Oil and Gas investigated an odor complaint received following this incident and issued a violation to the company. The facility was required to train all truck drivers and operators at the site to ensure proper assessment and handling of fluids. The Office of Oil and Gas has responded to additional odor

Promoting a healthy environment.

complaints, with the assistance of staff from the Division of Air Quality, but has not been able to substantiate any more odor releases to date.

2. There is evidence that the settling ponds are leaking, polluting both the ground and adjacent stream, and violating the Clean Water Act. It should be noted that Wolf Creek is an impaired stream listed on the state's listing of impaired waters under Section 303(d) of the Clean Water Act and the Water Quality Planning and Management Regulations, 40CFR130.7. The New River TMDL, which includes the Wolf Creek subwater shed, was completed by Tetra Tech in 2008, and shortly thereafter a Watershed Based Plan for Wolf Creek was approved by the EPA in 2009. The sole purpose of this program is to track waters that are NOT supporting their designated uses and to reduce the discharge of pollutants into impaired waters. Danny Webb's operation is located in the headwaters of the main stem of Wolf Creek and has been identified as a possible water quality threat. A marshy spot has developed on the north side of the operation near the settling pond embankment. The area is reddish in color and an oily sheen has been observed. The runoff from the leaking settling ponds is directly discharging into a tributary of Wolf Creek. A recent water sample taken by a concerned citizen from the adjacent downstream property showed a chloride level of 271mg/L, in violation of the human health water quality standards and the chronic water quality standard for aquatic life. Tests of the fluid in the settling ponds have shown very high chloride levels. The direct correlation of water quality analysis and visual observation suggest that the settling ponds are failing to contain fluids and are polluting the stream. Additionally, it should be noted that Wolf Creek is the source of emergency drinking water for Fayetteville and toxic fluids from hydraulic fracturing waste should not be allowed to pollute its waters.

DEP Response:

To date there has been no conclusive evidence to support the statement "*There is evidence that the settling ponds are leaking*". In addition to the monitoring required by the facility DEP staff has conducted numerous spot checks of the stream as well as the fluid contained within the pits. Further, in March of this year, DEP staff inserted dye into the pits to further evaluate the potential for leakage of the liner system. Based on the physical and analytical analysis DEP has determined there is no substantial evidence that the pits is leaking. The upstream (background) sample replicates within the acceptable analytical variation the analysis of the sample collected adjacent to the pits and the immediate downstream sample results. A comparison of the Oil and Gas fluid placed into the pits and the stream data shows a significant variation between stream vs. the Oil and Gas fluid. In other words, the stream samples and the pits samples do not match. If the pits were leaking, the samples would have a closer resemblance to each other. During the evaluation of the waste fluid pits, it was determined that the pits would need upgrades for continued use. As part of the application process, DEP informed the applicant that an upgrade plan would need to be submitted for approval or the pits would need to be closed. An upgrade plan has not been approved. Consequently, as a condition of the permit, the pits are to be closed.

3. Danny Webb has a history of ignoring legal obligations and regulations. In 2007, a UST inspector found that Danny Webb was not managing his storage tanks properly. In an email to other DEP personnel, the inspector stated that Danny Webb, "is not to be trusted. He is loose cannon, doing as he jolly well pleases, right or wrong, regulations be damned." This is not the sort of operator who should be granted permits. If the permit must be issued, removing the settling ponds must be a condition.

DEP Response:

Over the past eleven years there has only been two violations issued to this operator pursuant to this permit. This in itself does not indicate a chronic offender or skirting of the regulations.

4. The UIC permit for injection well 019-00460 expired on October 25, 2012. Danny Webb has continued to receive waste at the site. Oil and gas wastes are exempted from the definition of solid waste under the regulations implementing the West Virginia Solid Waste Management Act only if they are disposed of in a permitted facility. W.Va.Code § 22-15-2.31. Because the facility is not permitted, the settling ponds are open dumps. W.Va. Code § 22-15-2.23. Open dumps are unlawful, as is their operation. W. Va. Code § 22-15-10. Danny Webb is unlawfully operating an open dump. Such flouting of state law should preclude Danny Webb from receiving a UIC permit for his currently unlawful operation.

DEP Response:

During the renewal process both the EPA and DEP allow operators to conduct business under the existing permit, as long as the operators continue to follow the permit conditions.

5. The traffic, dust, noise, smell, and danger of tanker trucks traveling up the small road to the UIC site are a hazard to local residents. The permitted injection well is the only reason tanker trucks have to enter the neighborhood. While the Office of Oil and Gas cannot regulate the trucks, it does have the power to determine that the operation, with all of its consequences, is not in the public interest and deny the permit on that basis.

DEP Response:

The West Virginia Department of Environmental Protection does not regulate traffic on commerce.

6. Significant concerns related to water quality continue to exist. The stream adjacent to the pits is a tributary of Wolf Creek and the DWC site is in the headwaters of the main stem of Wolf Creek, the source of emergency drinking water for Fayetteville. Wolf Creek is an impaired stream listed on the state's listing of impaired waters under Section 303(d) of the Clean Water Act and the Water Quality Planning and Management Regulations. Among the impairments for which Wolf Creek is listed is a high concentration of iron, a contaminant that appears in high levels in a number of the water samples provided by DWC.

Longstanding reports of contamination in the stream may be related to DWC's operations. While DWC was required to sample the stream twice annually, it is not clear that it has undertaken sampling as often as required. The sampling has not been on a regular schedule, which is important to account for seasonal change in the stream. In addition, it appears that DWC gathers the samples itself, casting doubt on the credibility of the samples and the methods used to collect them. The location at which samples were collected is not precisely recorded, and does not appear to have been recorded at all for certain samples. DEP should require sampling to be conducted by an independent third-party laboratory using best practices for establishing the location of the sampling

(including taking GPS coordinates of sampling locations) and maintaining a secure chain of custody. It is extremely concerning that a number of the water tests show high levels of contaminants, including benzene, a known carcinogen, oil, chloride, and iron, yet the record reveals no evidence that DEP has investigated or taken independent samples since these results were provided.

DEP Response:

It is a fact the watershed is impacted. In February 2002 the *Wolf Creek Environmental Trust* was established to address impacts from past activities within the watershed. This trust is currently being managed by the Plateau Action Network (PAN).

Monitoring requirements pursuant to the order issued by the agency places the sampling requirements on the permit holder. The agency does not dictate which entity the permit holder utilizes for sample collection: however, the samples are required to be submitted to a certified laboratory for analysis. Failure to properly monitor or sample would be a violation of the order that would be addressed by the agency.

7. There is photographic, video, and eye-witness evidence that indicates that contaminants may be seeping out of the sides of the pits berms, leading to the contamination of soil and the creek. Yet there is no evidence that the DEP has ever investigated the reports of seeping pits. A seeping pit with a failed liner is a potential threat to underground sources of drinking water, to the creek itself, and could result in numerous statutory violations.

DEP Response:

On numerous occasions, the DEP has evaluated the potential for leakage from the pits. The latest field event was conducted in March of 2013. Field personnel collected surface water samples upstream, adjacent to the spring at the pits and immediately downstream of the pits. In addition, a dye test of the pits was conducted. Dye was introduced to the fluid, circulated to ensure homogeneity, contained within the pits and monitored for a week. After the monitoring effort, DEP's field staff has periodically visited the site to determine whether there is any evidence of breakthrough of dye. No evidence of breakthrough or seepage has been identified.

8. The Site has no security. One of the videos I am submitting shows the gate standing open while several trucks, tankers and pickups, drive in and out, and an ATV goes through. Even if the gate is closed, there is a bypass for smaller vehicles that would stay open; and because the site is not fenced, a person could walk into the site from virtually any direction.

DEP Response:

As a condition of the permit is to provide security the facility maintains twenty four hour video surveillance to satisfy this criterion.

9. One of the storage tanks has no containment, and due to the myriad other ways Webb's site is not in compliance, we would like an independent inspection of whether there is

adequate containment for the other tanks.

DEP Response:

During an inspection conducted March 2013 a professional engineer assessed the secondary containment structures. Other than routine maintenance, secondary containment is adequate. Any deficiency will be addressed by the permit.

10. What are the pits used for and why can't this be done at the location the Frack water is produced.

DEP Response:

The pits are utilized for the purpose of settling solids that may be in solution. This is a business solution for the process of these fluids. Regulations do not prohibit this process for handling of this fluid because the practice provides a centralized location for management of these fluids.

11. Is it true Danny Webb Construction is bringing in Frack water from out of state to dump in our community? Is it true that the reason this is happening is because other states do not permit the Frack water to be disposed of in their states, because it is deemed too toxic and public health hazard? I have verified this with Maryland DEP.

DEP Response:

This is a lawfully regulated practice that is managed by the United States Environmental Protection Agency. Ohio, Pennsylvania, and West Virginia, as well as other states have active Underground Injection Control programs that accept waste water from the oil and gas industry. There are no regulations that prohibit out of state fluids from being properly disposed of at the Webb facility. There are companies that drill in West Virginia that transport their waste fluids to other states for disposal, as well.

12. According to the EPA and other federal agencies, the Natural Resources Defense Council (NRDC) and other documented Nonprofit reports, fracking wastewater has shown to be extremely toxic and radioactive. When released into the environment, these chemicals can cause major health problems and cancer.

DEP Response:

Most of the injected fluid is salt water (brine), which is brought to the surface in the process of producing (extracting) oil and gas. The various additives in the fracturing fluid, combined with the produced brine water have toxic constituents and can have elevated radioactivity levels. Of the readings that have been taken, generally they are within normal ranges for human health. It is our understanding that there may be studies regarding radioactivity that will be conducted on a national scale. Some states still allow this type of fluid to be land applied, which means it is sprayed out into an open field. West Virginia does not allow that because of the very reason stated in the comment-in the open environment, it has a greater chance of having a negative impact. West

Virginia's regulations only allow this fluid to be disposed of by injecting back into the rock formations from which most came, into Class II wells that are regulated, undergo integrity testing and monitoring.

13. Since the inception of the injection well. How many gallons/barrels have been pumped into the Well?

DEP Response:

Since 2002 Underground Injection Control (UIC) well # 2D0190460 has injected a total of 1,502,229.04 BBLs of fluid.

14. Why was Danny Webb Construction given a Descent Decree to keep the pits at the Injection site? When the 2001-2008 OOG agreement said he had to remove them in six months.

DEP Response:

The pits were investigated and found not to be leaking. It was decided to let Danny Webb Construction, LLC keep operating the pits but require stream sampling to be conducted.

15. Was Danny Webb Construction ever given a permit for the Pits?

DEP Response:

The pits are a part of the UIC facility regulated under permit #2D0190460. Regulation does not prevent surface impoundments/pits at UIC facilities.

16. How many citations has Danny Webb Construction been given and who issued the citations?

DEP Response:

UIC well #2D0190460 has had two violations since 2002 by WVDEP/Office of Oil and Gas

UIC well #2d0190508 has had two violations since 2007 by WVDEP/Office of Oil and Gas

17. Who gave Danny Webb Construction permission to reroute the stream at the Injection site? You can see this through Google Earth looking at the 1996 image and the 2003 image. I will attach a map showing the original stream location and the new stream location.

DEP Response:

It cannot be shown/proven that Danny Webb Construction has rerouted a stream.

18. Is it true that Danny Webb Construction is bringing in Frack water from out of state to dump in our community?

DEP Response:

Yes, commercial injection wells in West Virginia can accept out of state fluids. Such fluids must meet the definition of a UIC Class II fluid under 47CSR13-4.2.

19. Why is Danny Webb allowed to have the pits when other UICs only have tanks?

DEP Response:

UIC regulations do not prevent surface impoundments/pits at such facilities.

20. What is happening to it (fluid) when it goes down?

DEP Response:

Fluids are injected deep into the ground into formation(s) that can accept it. The fluids are prevented from coming back up due to UIC well construction and confining geological layer(s) above the injection formation.

APPENDIX 3



**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
1650 Arch Street
Philadelphia, Pennsylvania 19103-2029**

Received

JUL 31 2013

Office of Oil and Gas
WV Dept. of Environmental Protection

JUL 24 2013

The Honorable John D. Rockefeller IV
United States Senator
405 Capitol Street, Suite 508
Charleston, West Virginia 25301

Dear Senator Rockefeller:

Thank you for your letter of June 20, 2013 to the U.S. Environmental Protection Agency (EPA) on behalf of your constituent, Ms. Mary Rahall, concerning two Lochgelly, West Virginia injection wells operated by Danny Webb Construction and permitted by the West Virginia Department of Environmental Protection (WVDEP) Office of Oil and Gas.

Ms. Rahall expresses a number of concerns regarding the operation of the wells, alleging that wastewater storage pits at the facility are operated without permit coverage, that nearby Wolf Creek is contaminated with pollutants related to hydraulic fracturing, and that standards for disposal of hydraulic fracturing waste via underground injection are less stringent in West Virginia than in Pennsylvania, where EPA directly implements the Underground Injection Control (UIC) program. Ms. Rahall also expresses concerns regarding cancer incidence and mortality in her area.

EPA's Region III office has received numerous calls from Ms. Rahall reporting spills and other complaints regarding air emissions and water discharges she attributes to the two Danny Webb Construction brine disposal wells. Please see Enclosure A for a record of our findings.

Ms. Rahall raises concerns about potential impacts to Wolf Creek and its use as a drinking water source. According to the West Virginia Department of Health and Human Services (WVDHHS), the West Virginia American Water system serves the Fayetteville area and does not use Wolf Creek as a source of drinking water, and Ms. Rahall has been informed by WVDHHS of the variety of contaminants sampled in her public water system (e.g. bacteria, metals, chlorides, and volatile organic compounds) and that results do not indicate their presence in water delivered to customers.

Enclosure A

Information Regarding the Underground Injection Control (UIC) Program and Danny Webb construction UIC Wells in Lochgelly, West Virginia

July 22, 2013

These brine disposal wells are used for the disposal of fluids brought to the surface in association with oil and gas production, including hydraulic fracturing flow back, drilling fluids, and produced fluids (saltwater or brine from the oil bearing formations), and must be operated in compliance with the UIC program requirements for Class II disposal wells, which are administered pursuant to the Safe Drinking Water Act. EPA approved West Virginia's UIC program in 1983, and this program is equivalent to the federal program implemented in Pennsylvania and therefore, equally as stringent in defining types of waste that may be disposed of via injection into Class II wells.

One of the Danny Webb Construction UIC wells has been in operation since 2002, and the other since 2008. The permits issued by WVDEP for construction and operation of the wells specify casing and cementing requirements to protect underground sources of drinking water as well as requirements for operation of the wells. WVDEP issues permits, conducts inspections for compliance, and has the wells tested for mechanical integrity in accordance with the basic provisions of the Safe Drinking Water Act. The wells have passed mechanical integrity tests, and these results indicate that there are no leaks in the casing or cementing. In addition, WVDEP and Danny Webb Construction have entered a consent order that requires the operator to monitor water quality in Wolf Creek twice each year.

Ms. Rahall's complaints have been investigated by both WVDEP staff and EPA representatives from emergency response and other water-related programs. On March 25, 2013, pursuant to EPA's information gathering authority under Section 308 of the Clean Water Act ("CWA"), 42 U.S.C. § 1318, EPA issued an Information Request letter to Danny Webb Construction in response to an National Response Center report (#1040428) of a discharge of produced/waste water into Wolf Creek. The information request letter was issued to gather information about the March 8, 2013 incident. On April 18, 2013, EPA received a response from Danny Webb Construction. EPA can provide a copy of the information request and response to Ms. Rahall if she would like to review this information.

WVDEP has also conducted sampling of the stream and dye tests of the pits, and has communicated to EPA that these tests did not indicate any leaks or discharges. EPA has reviewed results for chloride analysis from the required monitoring of Wolf Creek. These results indicate that the level of chloride in the creek has been elevated on at least one occasion and that higher levels of chloride have been observed in Wolf Creek downstream of the facility than in upstream tributaries. If there are other potential sources of chloride (such as abandoned mine drainage seeps) between the sampling points, the exact locations of which are unknown to EPA, chloride observed in the creek may be attributable to these other sources. In any case the pits are not permitted to discharge to waters of the United States under the National Pollutant Discharge Elimination System program and therefore any discharges from the pits are prohibited pursuant to the Clean Water Act.

Age-adjusted Cancer Incidence Rates by Site for Males and Females, 2006-2010, West Virginia and Fayette County

Cancer Site	West Virginia				Fayette County			
	Rate	Lower CI	Upper CI	Count	Rate	Lower CI	Upper CI	Count
All Sites	483.7	479.6	487.8	55,579	499.9	474.4	526.4	1,509
Oral Cavity and Pharynx	11.4	10.8	12.0	1,327	14.3	10.2	19.6	43
Esophagus	5.3	4.9	5.7	634	7.1	4.5	10.7	24
Stomach	5.6	5.1	6.0	654	7.7	4.8	11.9	22
Colon and Rectum	50.1	48.8	51.4	5,790	54.4	46.4	63.6	168
Liver and Intrahepatic Bile Duct	5.2	4.8	5.7	608	6.5	4.0	10.2	21
Pancreas	10.5	10.0	11.2	1,236	13.5	9.6	18.5	41
Lung and Bronchus	85.6	84.0	87.3	10,106	93.6	83.0	105.2	291
Melanoma of the Skin	19.6	18.8	20.5	2,120	17.9	13.2	23.8	51
Urinary Bladder	22.8	21.9	23.7	2,650	24.0	18.8	30.4	74
Kidney and Renal Pelvis	17.0	16.2	17.8	1,936	13.2	9.2	18.3	39
Brain and Other Nervous System	7.1	6.6	7.7	755	6.6	3.8	10.7	18
Thyroid	12.2	11.5	13.0	1,237	9.6	6.0	14.5	24
Non-Hodgkin Lymphoma	19.9	19.1	20.7	2,274	20.8	15.9	26.9	63
Myeloma	5.3	4.9	5.7	622	6.1	3.7	9.7	19
Leukemia	13.6	12.9	14.3	1,504	19.7	14.7	25.8	56

CI=Confidence Interval. Rates are per 100,000 and age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1130) standard;
Confidence intervals (Tiwarí mod) are 95% for rates.

Age-adjusted Cancer Incidence Rates by Site for Females, 2006-2010, West Virginia and Fayette County

Cancer Site	West Virginia				Fayette County			
	Rate	Lower CI	Upper CI	Count	Rate	Lower CI	Upper CI	Count
All Sites	433.2	427.9	438.6	26,301	459.9	425.8	496.2	730
Oral Cavity and Pharynx	6.2	5.6	6.9	381	8.5	4.4	15.3	13
Esophagus	1.6	1.3	2.0	103	^	^	^	^
Stomach	3.8	3.3	4.3	238	6.3	3.0	12.3	10
Colon and Rectum	43.8	42.2	45.5	2,782	50.6	40.3	62.9	88
Liver and Intrahepatic Bile Duct	3.1	2.7	3.6	202	2.7	0.9	7.0	5
Pancreas	9.0	8.2	9.7	584	13.6	8.6	20.9	23
Lung and Bronchus	70.0	67.9	72.1	4,476	79.3	66.2	94.6	133
Melanoma of the Skin	16.8	15.7	17.9	898	14.3	8.5	22.7	20
Breast	109.6	106.9	112.4	6,586	111.1	94.5	129.9	174
Cervix Uteri	9.9	9.0	10.9	492	12.1	6.6	20.5	15
Corpus and Uterus, NOS	28.5	27.1	29.9	1,738	35.9	27.0	47.2	58
Ovary	12.7	11.8	13.7	759	13.3	8.1	21.0	21
Urinary Bladder	10.7	9.9	11.6	695	10.0	5.4	17.1	15
Kidney and Renal Pelvis	12.9	12.0	13.9	790	7.5	3.8	13.7	12
Brain and Other Nervous System	6.2	5.5	6.9	342	6.1	2.6	12.3	9
Thyroid	18.3	17.1	19.6	933	14.8	8.5	24.0	18
Non-Hodgkin Lymphoma	17.3	16.3	18.4	1,078	16.5	10.7	24.6	27
Myeloma	4.3	3.8	4.9	281	4.3	1.7	9.4	7
Leukemia	10.8	9.9	11.7	644	13.6	8.1	21.6	20

CI=Confidence Interval. Rates are per 100,000 and age-adjusted to the 2000 US Std Population (19 age groups - Census P25-1130) standard;

Confidence intervals (Tiwari mod) are 95% for rates.

^ Statistic not displayed due to fewer than 4 cases.

APPENDIX 4

STATEMENT BY: Levi Rose, Plateau Action Network


DATE: April 14, 2015

RE: Water & Soil Sampling Collection, Danny E. Webb Construction, Inc. Site

I, Levi Rose, declare as follows:

- 1) I am currently an employee of the Plateau Action Network, and have served as the Wolf Creek Watershed Coordinator since November of 2009. During my employment with PAN, my primary responsibilities have been the remediation of the Summerlee Acid Mine Drainage site, implementing restoration projects outlined in the Wolf Creek Watershed-Based Plan, and long-term water quality monitoring. Water quality data are used to characterize waters, identify trends over time, identify emerging problems, determine whether remediation projects are working, and to help direct restoration efforts to where they are most needed. Since 2009, I have taken over 396 water quality measurements in the Wolf Creek Watershed. Water samples are collected following West Virginia Department of Environmental Protection Watershed Assessment Branch standard operating procedures, and water quality data are sent to the Watershed Assessment Branch annually for review. Through an extensive water quality monitoring program, I have gained valuable insights into the health of Wolf Creek, results of which were recently released in a State of the Watershed Report¹.
- 2) On January 6, 2015, I collected two water quality samples. One sample was collected at UIC-1, and a second sample was collected at S-1 (Map attached, Exhibit 1). UIC-1 was collected from a tributary of Wolf Creek running adjacent to the Danny E. Webb Construction, Inc. site, at GPS coordinates [38.014944, -81.15055]. S-1 was collected from the discharge of the Summerlee AMD site at GPS coordinates [38.003519, -81.157864]. Water samples were collected following West Virginia Department of Environmental Protection Watershed Assessment Branch standard operating procedures. Both water quality samples were taken to REI Consultants for lab analysis (Chain of Custody attached, Exhibit 2).

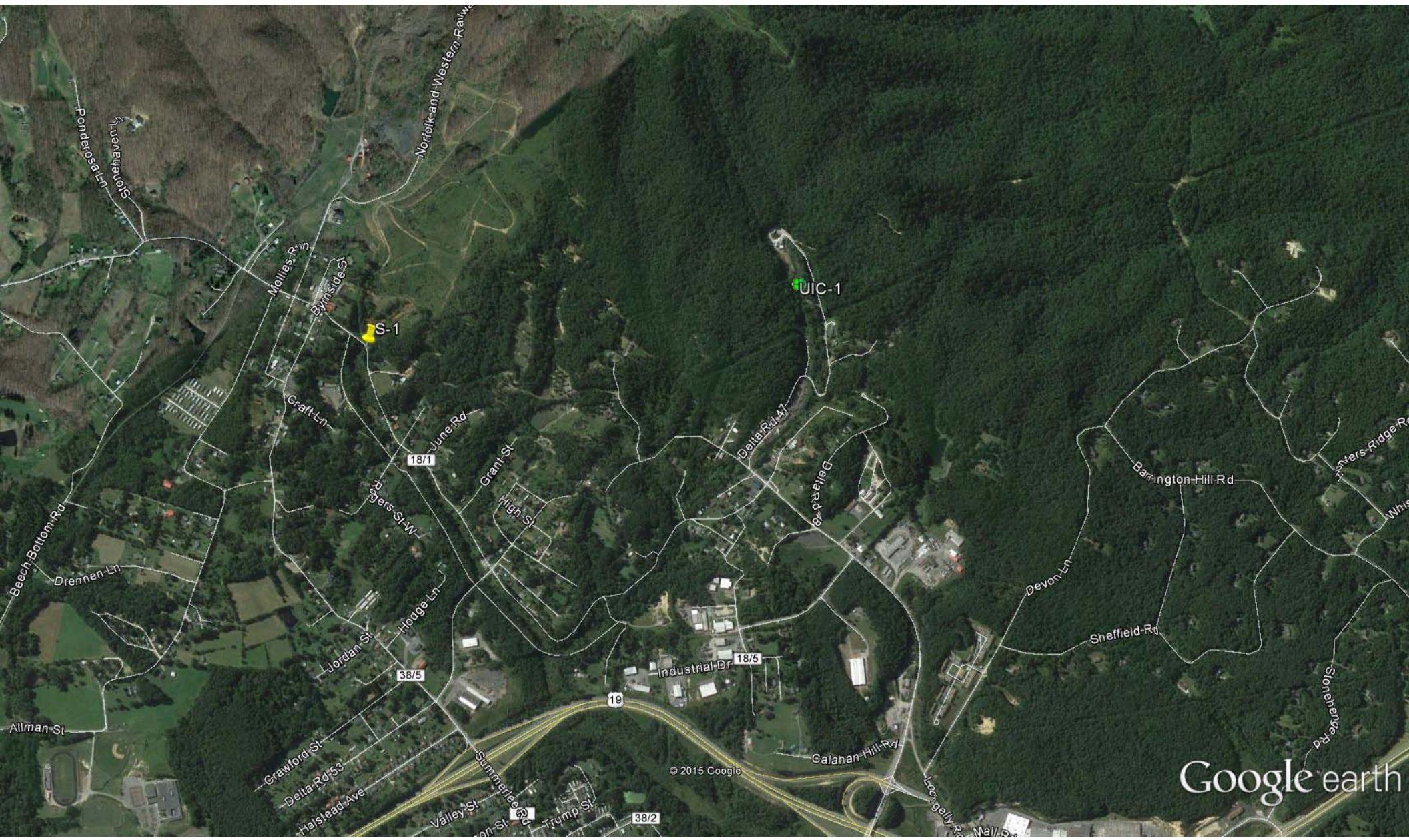
¹ http://plateauactionnetwork.org/wp-content/uploads/2014/12/Wolf-Creek-SOTW-Final-12-22-14_opt.pdf



Levi Rose

Plateau Action Network

4/14/15
Date



Google earth

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CHAIN OF CUSTODY RECORD



Research Environmental & Industrial Consultants, Inc.

MAIN LABORATORY & CORPORATE HEADQUARTERS:

P.O. Box 286 • 225 Industrial Park Rd, Beaver, WV 25813
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540-248-0183

ROANOKE Service Center
3029-C Peters Creek Rd
Roanoke, VA 24019
540-777-1276

MORGANTOWN Service Center
16 Commerce Drive
Westover, WV 26501
304-241-5861

Client: Plateau Action Network PO # _____
Contact Person: Levi Rose Phone: 740-591-1750
QUOTE # _____ Fax: _____ Email: levi.rose@gmail.com
Address: P.O. Box 482 City: Fayetteville State: WV Zip: 25840
Billing Address (if different) _____
City _____ State _____ Zip _____
Site ID & State: WV Project ID: Wolf Creek Sampler: Levi Rose

SAMPLE LOG & ANALYSIS REQUEST

TURNAROUND TIME

NORMAL

RUSH TURNAROUND*

5 DAY 3 DAY 2 DAY 1 DAY

*Rush work needs prior laboratory approval and will incur additional charges

ANALYSIS & METHOD REQUESTED
PH, cond., Acidity, Alkalinity
TDS, chloride, Sulfate
Bromide, Nitrate
Total metals: Fe, Al, Mn
Disc. metals: Cu, Mg, Na, Li, As, Se, Sr, Ba
Radium 226/228

Preservative Codes:

- 0 None
- 1 Hydrochloric Acid
- 2 Nitric Acid
- 3 Sulfuric Acid
- 4 Sodium Thiosulfate
- 5 Sodium Hydroxide/
Sodium Arsenite
- 6 Sodium Hydroxide
- 7 Ascorbic Acid
- 8 Sodium Bisulfate/Methanol
- 9 Ammonium Chloride
- 10 _____
- 11 _____

*(Use blanks for preservatives not listed.)

SAMPLE ID	No. & Type of Containers	Sampling Date/Time	Matrix	Sample Comp/Grab	ANALYSIS & METHOD REQUESTED												
					PH	cond.	Acidity	Alkalinity	TDS	chloride	Sulfate	Bromide	Nitrate	Total metals	Disc. metals	Radium	
UIC-1	5	1-6-15 / 11:00am	Grab	Grab	X	X	X	X	X	X	X	X	X	X	X	X	X
S-1	3	1-6-15 / 11:30am	Grab	Grab	X	X	X	X	X	X	X	X	X	X	X	X	X

ENTER PRESERVATIVE CODE

COMMENTS:

All analytical requests are subject to REIC's Standard Terms and Conditions.

REIC USE ONLY: Temperature at arrival: 1 °C ICED? Y N Containers provided by: REIC Client

Relinquished by (signature): <u>Levi Rose</u>	Date/Time: <u>1-6-15 1:57pm</u>	FAX RESULTS <input type="checkbox"/>	EMAIL RESULTS <input type="checkbox"/>
Received by (signature): <u>Bob Sw</u>	Date/Time: <u>1/6/15</u>	REIC USE ONLY	SHIPMENT <input checked="" type="checkbox"/> Hand Delivered <input type="checkbox"/> Courier <input type="checkbox"/> UPS <input type="checkbox"/> FEDEX <input type="checkbox"/> USPS <input type="checkbox"/> OTHER <input type="checkbox"/>

1:57pm

APPENDIX 5

STATEMENT BY: Lance Larson, Ph.D.

DATE: April 14, 2015

RE: Water & Soil Sampling Results, Danny E. Webb Construction, Inc. Site

I, Lance Larson, declare as follows:

- 1) I am currently a post-doctoral science fellow with the Natural Resources Defense Council (NRDC). I earned a dual doctorate in environmental engineering and biogeochemistry from the Pennsylvania State University (2013). My Ph.D. research was on the environmental impacts of acid mine drainage throughout western Pennsylvania and West Virginia. Specifically, my research developed a model describing the thermodynamic intricacies associated with microbial low-pH iron oxidation and precipitation. I've been lead author on multiple peer-reviewed publications regarding acid mine drainage, presented my research at international scientific conferences, and used some of the most sophisticated environmental sample characterization instruments in the world. (Curriculum vitae attached as Exhibit 1).
- 2) I have reviewed the results of the water sample analysis provided by REI Consultants, Inc. for two samples collected by Levi Rose of the Plateau Action Network on January 6, 2015. (Attached as Exhibit 2).
- 3) I have also reviewed the results of the soil testing conducted by ALS Group USA, Corp. for three samples collected by Danny Webb Construction on May 22, 2014. (Attached as Exhibit 3)

Water Sampling Results:

- 4) It is my understanding from Mr. Rose that water sample UIC-1 was collected from the tributary of Wolf Creek running adjacent to the Danny E. Webb Construction, Inc. site, downstream of the site, at approximately the same coordinates as Duke University took

samples in September 2013 (38.01499, -81.15055). It is my understanding that water sample S-1 was taken from the Summerlee site, in order to provide a comparison to water quality at a known, nearby, acid mine drainage site (38.003519, -81.157864).

- 5) Based on my review of these data sources, it is my expert opinion that the results of the analysis of sample UIC-1 do not exhibit a chemical composition consistent with elevated contaminant levels due to an acid mine drainage source. Instead, the elevated contaminant levels are consistent with previous samples taken at this location by Duke University researchers, which concluded that the contaminants were likely due to an oil and gas wastewater source.
- 6) Water quality from the water sample UIC-1 exhibits similar parameters to those reported previously by Dr. Avner Vengosh.¹ The analysis measured the concentration of barium at 752 µg/L which is not observed in any appreciable concentration in acid mine drainage (AMD) water, nor characteristic of AMD water quality (Cravotta 2008)². Similarly, bromide was observed at 1,460 µg/L, which exceeds the 100 percentile from other AMD sites (600 µg/L) (Cravotta 2008). Finally, sulfate concentrations remained relatively low (2.81 mg/L), which was below the 0 percentile concentrations observed at AMD sites (0 percentile = 34 mg/L). (Cravotta 2008). This data suggests that water quality is consistent with previous samples at this location, and is not consistent with elevated contaminant concentrations from AMD.
- 7) Water quality from sample S-1 was highly consistent with the composition of AMD-impacted water. For example, the pH was acidic (3.20), sulfate concentrations were consistent with the oxidation of pyrite (Cravotta 2008 and Larson 2014) at 1,150 mg/L, and iron concentrations were elevated at 106 mg/L.

¹ Declaration of Avner Vengosh in West Virginia Environmental Quality Board Appeal No. 14-04-EQB (Aug. 26, 2014).

² According to Cravotta 2008, based on data from 140 AMD discharge sites, the 100 percentile concentration for Barium was 39 µg/L.

- 8) Radiological samples at UIC-1 for Radium-226 and Radium-228 were 1.08 ± 0.996 pCi/L and 0.608 ± 0.429 pCi/L, respectively. The maximum contaminant level (MCL) for radium-226 combined with radium-228 is 5 pCi/L^3 , suggesting radioactivity due to radium-226 and radium-228 at UIC-1 was low.
- 9) In summary, the water quality results from the UIC-1 sample collected on January 6, 2015 suggest that the water quality downstream of the Danny E. Webb Construction site continued to exhibit elevated contaminant levels and remained similar to the composition previously observed by the researchers from Duke University.⁴ Similarly, analytical data from UIC-1 also supports that the water quality is highly inconsistent with AMD.

Soil Sampling Results:

- 10) It is my understanding, after reviewing the closure and reclamation plan for the waste fluid pits, as well as instructions from Assistant Chief Smith in his April 4, 2014 letter (attached as Exhibit 4), that soil samples were taken at the site once all fluids and the pit liners had been removed and disposed of. One of these samples was a composite sample that was required to be taken by “taking an equal amount of soil from the four corners of the pit area and the center . . . and homogenized into a single sample for analysis.” This sample should therefore provide a reasonably representative sample of the soil that remained at the site after completion of the reclamation activities.
- 11) While comparison of water sampling results to maximum contamination levels (MCLs) established by the Environmental Protection Agency (EPA) is straightforward, the risks due to specific contaminant levels in soil may be more difficult to discern for multiple reasons, including the difficulty of predicting exposure routes and multiple factors which influence rates at which contaminants may volatilize or leach into surrounding groundwater. To determine the risks posed to health and the environment due to contaminant levels in soils, often site-specific field collection and analysis are required.

³ <http://water.epa.gov/drink/contaminants/basicinformation/radionuclides.cfm>.

⁴ Declaration of Avner Vengosh in West Virginia Environmental Quality Board Appeal No. 14-04-EQB (Aug. 26, 2014).

- 12) In order to provide initial threshold values that merit further investigation because contaminant levels may represent a significant risk to the environment and human health, the Environmental Protection Agency Region IV has established Ecological Screening Values.⁵ According to the EPA, “Ecological screening values are based on contaminant levels associated with a low probability of unacceptable risks to ecological receptors.”⁶
- 13) According to the EPA, these values were intended to be used as a preliminary evaluation of potential site contamination and “to determine if there is a need to conduct further investigations at the site.”⁷ The values do not represent goal limits for remediation. The EPA notes that “[e]xceedances of the ecological screening values may indicate the need for further evaluation of the potential ecological risks posed by the site. The decision concerning the necessity for evaluation requires the weighing of such factors as the frequency, magnitude, and pattern of these exceedances. The basis of the screening values should also be considered when making the decision for the collection of additional data. An exceedance may result in the retention of that contaminant for further evaluation even though its frequency of detection may be low. The sampling may indicate a ‘hot spot’ which would be addressed by future investigations.”
- 14) The EPA developed this risk assessment method to examine levels of contamination in various media at hazardous waste sites; however the values provide a useful guide to contaminant levels which may pose a risk to ecological receptors.⁸ By using the ecological screen values as reference, soil concentrations from the Danny Webb Pits can be compared to a quantitative value to investigate any exceedances.
- 15) Soil sampling results from the Danny Webb Construction site were compared with EPA’s ecological screen values (see Table Below).

⁵ While West Virginia is located in EPA Region III, Region III has not yet established screening values for soil, so values established by Region IV are used. Regardless, these values were intended to be used as a benchmark screening level and are not geographically specific.

⁶ <http://www.epa.gov/region4/superfund/programs/riskassess/ecolbul.html>.

⁷ Ibid.

⁸ Ibid.

Constituent	North Pit #1	North Hills Pit #1	North Hills Pit #1	Ecological Screen (EPA) [^]
	1 - Pit Composite	2 - Upper Pit	3 - Lower Pit	
Iron	69,000	38,000	28,000	200
Manganese	760	220	250	100
Chloride	550	300	360	*
Benzene	ND	ND	ND	0.05
Ethylbenzene	0.3	ND	ND	0.05
m,p-Xylene	1.1	0.13	ND	*
o-Xylene	0.37	ND	ND	*
Toluene	0.13	ND	ND	0.05
Xylene (total)	1.5	0.13	ND	0.05

[^]All Concentrations are mg/Kg-dry

ND - Non-detect

* No values provided

[^]Ecological Screen-<http://www.epa.gov/region4/superfund/images/allprogrammedia/pdfs/tsstablesoilvalues.pdf>

- 16) The comparison demonstrates that the three samples observed elevated concentrations of iron and manganese, exceeding EPA's screen values by an order of magnitude or more. Sample '1-Pit Composite' observed evidence of BTEX contamination (Benzene, Toluene, Ethylbenzene, and Xylene). Compared to ecological screen values, samples from '1-Pit Composite' were elevated for ethylbenzene, toluene, and xylene (total). Xylene was also elevated at '2-Upper Pit' relative to ecosystem screen values. No evidence for elevated BTEX was observed for the '3 - Lower Pit' sample.
- 17) This soil data alone cannot provide enough information to make conclusions regarding contaminant fate and transport or risk-based toxicity. However, it can be concluded that elevated contaminant levels in the samples relative to ecological screen values, in some samples by an order of magnitude or more, suggest that industrial operations have detrimentally impacted the environmental soil quality. Accordingly, this data would suggest that further sampling and investigation into the contamination source, other reasonably expected contaminants not previously measured, and risk pathways (such as potential groundwater contamination, erosional impacts to surface water and downstream users, etc.) is warranted.


Lance Larson, Ph.D.
Science Fellow, NRDC

4/14/2015
Date

Sources:

Cravotta III, C. A. (2008). Dissolved metals and associated constituents in abandoned coal-mine discharges, Pennsylvania, USA. Part 1: Constituent quantities and correlations. *Applied Geochemistry*, 23(2), 166-202.

Larson, L. N., Sánchez-España, J., & Burgos, W. (2014). Rates of low-pH biological Fe (II) oxidation in the Appalachian Bituminous Coal Basin and the Iberian Pyrite Belt. *Applied Geochemistry* 2014, 47, 85-98.

Vengosh, A. (2014). Declaration, West Virginia Environmental Quality Board Appeal No. 14-04-EQB, August 26, 2014.

EXHIBIT 1

Lance Nicholas Larson, Ph.D., EIT

Curriculum Vitae

202-513-6279

llarson@nrdc.org

EDUCATION

Ph.D.	Fall 2013	Environmental Engineering and Biogeochemistry, Pennsylvania State University
M.Sc.	2010	Civil and Environmental Engineering, South Dakota School of Mines and Technology
B.Eng.	2008	Environmental Engineering, California Polytechnic State University, SLO

POSITIONS

2014-present	Postdoctoral Science Fellow, Natural Resources Defense Council (NRDC), Washington, DC.
2010-2013	Graduate Research Assistant, Pennsylvania State University, University Park, Pa
2008-2010	Graduate Research Assistant, South Dakota School of Mines and Technology

PUBLICATIONS

- *Jones D.J., Kolesar C., Grettenberger C., **Larson L.N.**, Burgos W.D., Macalady J.L. (2014). Ecological niches of Fe-oxidizing acidophiles in an acidic coal mine drainage.
- ***Larson L.N.**, Miller C., Macalady J.L., Borch T., Gorski C., Burgos W.D. (2014). Biogeochemical transformation of schwertmannite to goethite under a coal mine drainage impacted stream.
- Larson L.N.**, Sánchez-España J., Kaley B., Sheng, Y., Bibby, K., Burgos W.D. (2014). Thermodynamic controls on the kinetics of microbial low-pH Fe(II) oxidation. *Environmental Science and Technology*, 48 (16), pp 9246–9254
- Larson L.N.**, Burgos W.D., Sánchez-España J. (2014). Rates of Low-pH biological Fe(II) oxidation in the Appalachian Bituminous Coal Basin and the Iberian Pyrite Belt. *Applied Geochemistry*, 47, 85-98.
- Larson L. N.**, Fitzgerald M., Singha K., Gooseff M. N., Macalady J. L. and Burgos W. (2013). Hydrogeochemical niches associated with hyporheic exchange beneath an acid mine drainage-contaminated stream. *Journal of Hydrology*, 501, 163-174.
- Larson L. N.**, Kipp G. G., Mott H. V. and Stone J. J. (2012). Sediment pore-water interactions associated with arsenic and uranium transport from the North Cave Hills mining region, South Dakota, USA. *Applied Geochemistry*, 27, 879-891.
- Burgos W. D., Borch T., Troyer L. D., Luan F., **Larson L. N.**, Brown J. F., Lambson J. and Shimizu M. (2012). Schwertmannite and Fe oxides formed by biological low-pH Fe(II) oxidation versus

abiotic neutralization: Impact on trace metal sequestration. *Geochimica et Cosmochimica Acta*, 76, 29-44.

Larson L. N., Stone J. J. (2011). Sediment-bound arsenic and uranium within the Bowman–Haley Reservoir, North Dakota. *Water, Air, Soil Pollution*, 219, 27-42.

* *In Preparation*

PUBLICATION ACKNOWLEDGEMENTS

Luan, F., Li Xie, Jie Sheng, Jun Li, Qi Zhou, Guiming Zhai, Reduction of nitrobenzene by steel convert slag with Fe(II) system: The role of calcium in steel slag, *Journal of Hazardous Materials*, Volumes 217–218, 30 May 2012, Pages 416-421, ISSN 0304-3894, 10.1016/j.jhazmat.2012.03.047.

Lupo C. Stone J.J. Bulk Atmospheric Mercury Fluxes for the Northern Great Plains, USA. *Water, Air, Soil Pollution*. 224, 1-12, 2013

TEACHING EXPERIENCE

2012, spring Guest Lecturer, Pennsylvania State University. Water Quality Chemistry, CE 475.
2012, fall Teaching Assistant, Pennsylvania State University. Environmental Engineering Capstone Design, CE 472W
2010, fall Teaching Assistant, Pennsylvania State University. Introduction to Environmental Engineering, CE 370
2010, spring Teaching Assistant, South Dakota School of Mines and Technology. Physical/Chemical Process Design and Laboratory, ENVE 426.
2006-2008 Multicultural Engineering Program Tutor, Cal Poly, San Luis Obispo, Ca.

CONFERENCE PRESENTATIONS AND ABSTRACTS

Larson, L.N., Comparison of field and laboratory low-pH Fe(II) oxidation rates. Presented at 14th annual Abandoned Mine Reclamation Conference, State College, Pa, August 2012

Borch, T., Troyer, L., **Larson, L.N.**, Stone, J.J., Impact of biogeochemical redox processes on U and As dynamics within a U mining impacted watershed. Presented at the International Workshop on Uranium Biogeochemistry: transformations and applications, Ascona Switzerland, March 2012.

Burgos, W., Fitzgerald, M., **Larson, L.N.**, Herwehe, L., Singha, K., Gooseff, M., Electrical resistivity imaging of a deep coal mine discharge. Presented at the 21st Annual Goldschmidt Geochemistry Conference, Prague, Czech Republic, August 2011.

Jones, D., Brown, J., **Larson, L.N.**, Mills, D., Burgos, W., Macalady, J., Ecological niches of Fe-oxidizing acidophiles in a coal mine discharge. Presented at the 21st Annual Goldschmidt Geochemistry Conference, Prague, Czech Republic, August 2011.

Larson, L.N., Luan, F., Troyer, L., Borch, T., Burgos, W., Schwertmannite and Fe oxides formed by biological low-pH Fe(II) oxidation versus abiotic neutralization. Presented at the 21st Annual Goldschmidt Geochemistry Conference, Prague, Czech Republic, August 2011.

Stone, J.J., **Larson, L.N.**, Kipp, G., Sediment pore-water equilibria interactions associated with arsenic and uranium transport within a historical uranium mining-impacted watershed in South Dakota. Proceedings from the 28th Annual Meeting of American Society of Mining and Reclamation, Bismarck, ND, 2011.

Kipp, G., Stone, J.J., **Larson, L.N.** Arsenic and uranium transport in sediments near abandoned uranium mines in Harding County, South Dakota. Presented at the 2010 Geologic Society of American Denver Annual Meeting, Denver, CO, November 2010.

Troyer, L., Borch, T., **Larson, L.N.**, Stone, J.J. Impact of redox chemistry on the fate and transport of arsenic and uranium at an abandoned uranium mine. Presented at the 20th Annual Goldschmidt Geochemistry Conference, Knoxville, TN, June 2010.

Larson, L.N., Stone, J.J., Stetler, L., Troyer, L., Borch, T., Sediment pore-water equilibrium interactions associated with arsenic and uranium transport within a historical uranium mining impacted watershed, Harding County, SD. Presented at the joint meeting of the Rocky Mountain Section, Geologic Society of America 62nd Annual Meeting and the 2010 Western South Dakota Hydrology Conference, Rapid City, SD, April 2010.

Larson, L.N., Stone, J.J., Stetler, L., Arsenic and uranium impacted sediment behavior within the Bowman-Haley Reservoir, Bowman County, North Dakota. Presented at the joint meeting of the Rocky Mountain Section, Geologic Society of America 62nd Annual Meeting and the 2010 Western South Dakota Hydrology Conference, Rapid City, SD, April 2010.

Larson, L.N., Stone, J.J., Stetler, L.D., Development of an arsenic and uranium fate and transport model for historical uranium mining impacts from Custer National Forest, Harding County, South Dakota. Presented at 2009 Western South Dakota Hydrology Conference, Rapid City, SD, April 2009.

EXHIBIT 2



REI Consultants, Inc.
PO Box 286
Beaver, WV 25813
TEL: (304) 255-2500
Website: www.reiclabs.com

Improving the environment, one client at a time...

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Ashland, KY 41101
TEL: 606.393.5027

1557 Commerce Road, Suite 201
Verona, VA 24482
TEL: 540.248.0183

16 Commerce Drive
Westover, WV 26501
TEL: 304.241.5861

Tuesday, January 13, 2015

MR. LEVI ROSE
PLATEAU ACTION NETWORK
PO BOX 482
FAYETTEVILLE, WV 25840

TEL: (740) 591-1750
FAX:

RE: WOLF CREEK
Work Order #: 1501250
Dear MR. LEVI ROSE:

REI Consultants, Inc. received 2 sample(s) on 1/6/2015 for the analyses presented in the following report.
Sincerely,

Bobby Adams



Client: PLATEAU ACTION NETWORK**Project:** WOLF CREEK

The analytical results presented in this report were produced using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. Verification of required sample preservation (as required) is recorded on associated laboratory logs. Any deviation from compliance or method modification is identified within the body of this report by a qualifier footnote which is defined at the bottom of this page.

All sample results for solid samples are reported on an "as-received" wet weight basis unless otherwise noted.

Results reported for sums of individual parameters, such as TTHM and HAA5, may vary slightly from the sum of the individual parameter results, due to rounding of individual results, as required by EPA.

The test results in this report meet all NELAP (and/or VELAP) requirements for parameters except as noted in this report.

Please note if the sample collection time is not provided on the Chain of Custody, the default recording will be 0:00:00. This may cause some tests to be apparently analyzed out of hold.

All tests performed by REIC Service Centers are designated by an annotation on the test code. All other tests were performed by REIC's Main Laboratory in Beaver, WV.

This report may not be reproduced, except in full, without the written approval of REIC.

DEFINITIONS:

MCL: Maximum Contaminant Level

MDL: Method Detection Limit; The lowest concentration of analyte that can be detected by the method in the applicable matrix.

Mg/Kg or mg/L: Units of part per million (PPM) - milligram per Kilogram (weight/weight) or milligram per Liter (weight/volume).

NA: Not Applicable

ND: Not Detected at the PQL or MDL

PQL: Practical Quantitation Limit; The lowest verified limit to which data is quantified without qualifications. Analyte concentrations below PQL are reported either as ND or as a number with a "J" qualifier.

Qual: Qualifier that applies to the analyte reported.

TIC: Tentatively Identified Compound, Estimated Concentration denoted by "J" qualifier.

Ug/Kg or ug/L: Units of part per billion (PPB) - microgram per kilogram (weight/weight) or microgram per liter (weight/volume).

QUALIFIERS:

X: Reported value exceeds required MCL

B: Analyte detected in the associated Method Blank at a concentration > 1/2 the PQL

E: Analyte concentration reported that exceeds the upper calibration standard. Greater uncertainty is associated with this result and data should be consider estimated.

H: Holding time for preparation or analysis has been exceeded.

J: Analyte concentration is reported, and is less than the PQL and greater than or equal to the MDL. The result reported is an estimate.

S: % REC (% recovery) exceeds control limits

CERTIFICATIONS:

Beaver, WV: WVDHHR 00412CM, WVDEP 060, VADCLS 00281, KYDEP 90039, TNDEQ TN02926, NCDWQ 466, PADEP 68-00839, VADCLS (VELAP) 460148

Bioassay (Beaver, WV): WVDEP 060, VADCLS(VELAP) 460148, PADEP 68-00839

Roanoke, VA: VADCLS(VELAP) 460150

Verona, VA: VADCLS(VELAP) 460151

Ashland, KY: KYDEP 00094, WVDEP 389

Morgantown, WV: WVDHHR 003112M, WVDEP 387

REI Consultants, Inc. - Analytical Report

WO#: 1501250

Date Reported: 1/13/2015

Client:	PLATEAU ACTION NETWORK	Collection Date:	1/6/2015 11:00:00 AM
Project:	WOLF CREEK	Date Received:	1/6/2015
Lab ID:	1501250-01A	Matrix:	Liquid
Client Sample ID:	UIC-1	Site ID:	WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
METALS BY ICP			Method: EPA 200.7 Rev. 4.4 (1994)				Analyst: JD	
Aluminum	0.055	0.005	0.100	NA	J	mg/L	1/7/2015 5:43 PM	PA/VA
Arsenic	ND	0.020	0.200	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Barium	0.752	0.002	0.100	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Calcium	18.6	0.050	1.00	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Iron	20.5	0.010	0.100	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Lithium	ND	0.020	0.100	NA		mg/L	1/12/2015 2:44 PM	
Magnesium	6.75	0.050	0.500	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Manganese	2.27	0.002	0.100	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Selenium	ND	0.020	0.200	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Sodium	65.0	0.050	1.00	NA		mg/L	1/7/2015 5:43 PM	PA/VA
Strontium	0.636	0.001	0.010	NA		mg/L	1/9/2015 11:20 AM	PA
ANIONS by ION CHROMATOGRAPHY			Method: EPA 300.0, Rev.2.1 (1993)				Analyst: CF	
Bromide	1.46	0.05	0.10	NA		mg/L	1/6/2015 3:40 PM	PA/VA
Chloride	150	1.00	10.0	NA		mg/L	1/6/2015 3:40 PM	PA/VA
Sulfate	2.81	1.00	5.00	NA	J	mg/L	1/6/2015 3:40 PM	PA/VA
ANIONS by ION CHROMATOGRAPHY-48 HOUR			Method: EPA 300.0, Rev.2.1 (1993)				Analyst: CF	
Nitrogen, Nitrate	ND	0.02	0.10	NA		mg/L	1/6/2015 3:40 PM	PA/VA
CONDUCTIVITY			Method: SM2510 B - 1997				Analyst: KY	
Specific Conductivity	689	NA	NA	NA		µmhos/cm	1/12/2015 11:30 AM	PA/VA
TOTAL DISSOLVED SOLIDS			Method: SM2540 C-1997				Analyst: KY	
Total Dissolved Solids	374	5	10	NA		mg/L	1/7/2015 8:07 PM	PA/VA
ACIDITY			Method: SM2310 B-1997				Analyst: DSD	
Acidity, Total	74.1	1.0	10.0	NA		mg/L	1/7/2015 11:05 AM	PA/VA
ALKALINITY			Method: SM2320 B-1997				Analyst: DSD	
Alkalinity, Total (As CaCO3)	20.2	1.0	10.0	NA		mg/L	1/7/2015 11:05 AM	PA/VA
pH - LAB TEST, HOLD TIME EXPIRED			Method: SM4500-H+-B-2000				Analyst: DSD	
pH	5.71	NA	NA	NA		SU	1/7/2015 11:05 AM	PA

REI Consultants, Inc. - Analytical Report

WO#: 1501250

Date Reported: 1/13/2015

Client:	PLATEAU ACTION NETWORK	Collection Date:	1/6/2015 11:00:00 AM
Project:	WOLF CREEK	Date Received:	1/6/2015
Lab ID:	1501250-01B	Matrix:	Liquid
Client Sample ID:	UIC-1	Site ID:	WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
DISSOLVED METALS BY ICP			Method: EPA 200.7 Rev. 4.4 (1994)			Analyst: JD		
Aluminum	0.037	0.005	0.100	NA	J	mg/L	1/7/2015 5:49 PM	PA/VA
Iron	17.1	0.010	0.100	NA		mg/L	1/7/2015 5:49 PM	PA/VA
Manganese	2.21	0.002	0.100	NA		mg/L	1/7/2015 5:49 PM	PA/VA

REI Consultants, Inc. - Analytical Report

WO#: 1501250

Date Reported: 1/13/2015

Client:	PLATEAU ACTION NETWORK	Collection Date:	1/6/2015 11:30:00 AM
Project:	WOLF CREEK	Date Received:	1/6/2015
Lab ID:	1501250-02A	Matrix:	Liquid
Client Sample ID:	S-1	Site ID:	WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
METALS BY ICP			Method: EPA 200.7 Rev. 4.4 (1994)				Analyst: JD	
Aluminum	14.0	0.005	0.100	NA		mg/L	1/7/2015 5:52 PM	PA/VA
Iron	106	0.100	1.00	NA		mg/L	1/8/2015 11:39 AM	PA/VA
Manganese	8.85	0.002	0.100	NA		mg/L	1/7/2015 5:52 PM	PA/VA
ANIONS by ION CHROMATOGRAPHY			Method: EPA 300.0, Rev.2.1 (1993)				Analyst: CF	
Chloride	2.09	0.10	1.00	NA		mg/L	1/7/2015 12:02 AM	PA/VA
Sulfate	1,150	25.0	125	NA		mg/L	1/7/2015 12:02 AM	PA/VA
CONDUCTIVITY			Method: SM2510 B - 1997				Analyst: KY	
Specific Conductivity	2,090	NA	NA	NA		µmhos/cm	1/12/2015 11:30 AM	PA/VA
TOTAL DISSOLVED SOLIDS			Method: SM2540 C-1997				Analyst: KY	
Total Dissolved Solids	1,670	10	20	NA		mg/L	1/7/2015 8:07 PM	PA/VA
ACIDITY			Method: SM2310 B-1997				Analyst: DSD	
Acidity, Total	419	1.0	10.0	NA		mg/L	1/7/2015 11:05 AM	PA/VA
ALKALINITY			Method: SM2320 B-1997				Analyst: DSD	
Alkalinity, Total (As CaCO3)	ND	1.0	10.0	NA		mg/L	1/7/2015 11:05 AM	PA/VA
pH - LAB TEST, HOLD TIME EXPIRED			Method: SM4500-H+-B-2000				Analyst: DSD	
pH	3.20	NA	NA	NA		SU	1/7/2015 11:05 AM	PA

REI Consultants, Inc. - Analytical Report

WO#: 1501250

Date Reported: 1/13/2015

Client:	PLATEAU ACTION NETWORK	Collection Date:	1/6/2015 11:30:00 AM
Project:	WOLF CREEK	Date Received:	1/6/2015
Lab ID:	1501250-02B	Matrix:	Liquid
Client Sample ID:	S-1	Site ID:	WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
DISSOLVED METALS BY ICP			Method: EPA 200.7 Rev. 4.4 (1994)				Analyst: JD	
Aluminum	14.3	0.005	0.100	NA		mg/L	1/7/2015 5:55 PM	PA/VA
Iron	105	0.100	1.00	NA		mg/L	1/8/2015 11:42 AM	PA/VA
Manganese	8.97	0.002	0.100	NA		mg/L	1/7/2015 5:55 PM	PA/VA



REI Consultants, Inc.
PO Box 286
Beaver, WV 25813
TEL: (304) 255-2500
Website: www.reiclabs.com

Improving the environment, one client at a time...

3029-C Peters Creek Road
Roanoke, VA 24019
TEL: 540.777.1276

101 17th Street
Ashland, KY 41101
TEL: 606.393.5027

1557 Commerce Road, Suite 201
Verona, VA 24482
TEL: 540.248.0183

16 Commerce Drive
Westover, WV 26501
TEL: 304.241.5861

Monday, January 26, 2015

MR. LEVI ROSE
PLATEAU ACTION NETWORK
PO BOX 482
FAYETTEVILLE, WV 25840

TEL: (740) 591-1750
FAX:

RE: WOLF CREEK
Work Order #: 1501296
Dear MR. LEVI ROSE:

REI Consultants, Inc. received 1 sample(s) on 1/6/2015 for the analyses presented in the following report.
Sincerely,

Bobby Adams



Client: PLATEAU ACTION NETWORK**Project:** WOLF CREEK

The analytical results presented in this report were produced using documented laboratory SOPs that incorporate appropriate quality control procedures as described in the applicable methods. Verification of required sample preservation (as required) is recorded on associated laboratory logs. Any deviation from compliance or method modification is identified within the body of this report by a qualifier footnote which is defined at the bottom of this page.

All sample results for solid samples are reported on an "as-received" wet weight basis unless otherwise noted.

Results reported for sums of individual parameters, such as TTHM and HAA5, may vary slightly from the sum of the individual parameter results, due to rounding of individual results, as required by EPA.

The test results in this report meet all NELAP (and/or VELAP) requirements for parameters except as noted in this report.

Please note if the sample collection time is not provided on the Chain of Custody, the default recording will be 0:00:00. This may cause some tests to be apparently analyzed out of hold.

All tests performed by REIC Service Centers are designated by an annotation on the test code. All other tests were performed by REIC's Main Laboratory in Beaver, WV.

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DEFINITIONS:

MCL: Maximum Contaminant Level

MDL: Method Detection Limit; The lowest concentration of analyte that can be detected by the method in the applicable matrix.

Mg/Kg or mg/L: Units of part per million (PPM) - milligram per Kilogram (weight/weight) or milligram per Liter (weight/volume).

NA: Not Applicable

ND: Not Detected at the PQL or MDL

PQL: Practical Quantitation Limit; The lowest verified limit to which data is quantified without qualifications. Analyte concentrations below PQL are reported either as ND or as a number with a "J" qualifier.

Qual: Qualifier that applies to the analyte reported.

TIC: Tentatively Identified Compound, Estimated Concentration denoted by "J" qualifier.

Ug/Kg or ug/L: Units of part per billion (PPB) - microgram per kilogram (weight/weight) or microgram per liter (weight/volume).

QUALIFIERS:

X: Reported value exceeds required MCL

B: Analyte detected in the associated Method Blank at a concentration > 1/2 the PQL

E: Analyte concentration reported that exceeds the upper calibration standard. Greater uncertainty is associated with this result and data should be consider estimated.

H: Holding time for preparation or analysis has been exceeded.

J: Analyte concentration is reported, and is less than the PQL and greater than or equal to the MDL. The result reported is an estimate.

S: % REC (% recovery) exceeds control limits

CERTIFICATIONS:

Beaver, WV: WVDHHR 00412CM, WVDEP 060, VADCLS 00281, KYDEP 90039, TNDEQ TN02926, NCDWQ 466, PADEP 68-00839, VADCLS (VELAP) 460148

Bioassay (Beaver, WV): WVDEP 060, VADCLS(VELAP) 460148, PADEP 68-00839

Roanoke, VA: VADCLS(VELAP) 460150

Verona, VA: VADCLS(VELAP) 460151

Ashland, KY: KYDEP 00094, WVDEP 389

Morgantown, WV: WVDHHR 003112M, WVDEP 387

REI Consultants, Inc. - Analytical Report

WO#: 1501296

Date Reported: 1/26/2015

Client:	PLATEAU ACTION NETWORK	Collection Date:	1/6/2015 11:00:00 AM
Project:	WOLF CREEK	Date Received:	1/6/2015
Lab ID:	1501296-01A	Matrix:	Liquid
Client Sample ID:	UIC-1	Site ID:	WV

Analysis	Result	MDL	PQL	MCL	Qual	Units	Date Analyzed	NELAP
RADIUM-226		Method: EPA 903.1			Analyst: BA			
Radium-226	See Attachment	NA	NA	NA		pci/L	1/26/2015 9:22 AM	
RADIUM-228		Method: EPA 904.0			Analyst: BA			
Radium-228	See Attachment	NA	NA	NA		pci/L	1/26/2015 9:22 AM	

January 23, 2015

Mr. Bobby Adams
REI Consultants, Inc.
225 Industrial Park Drive
Beaver, WV 25813

RE: Project: 1501296
Pace Project No.: 30138381

Dear Mr. Adams:

Enclosed are the analytical results for sample(s) received by the laboratory on January 12, 2015. The results relate only to the samples included in this report. Results reported herein conform to the most current TNI standards and the laboratory's Quality Assurance Manual, where applicable, unless otherwise noted in the body of the report.

If you have any questions concerning this report, please feel free to contact me.

Sincerely,



Carin Ferris
carin.ferris@pacelabs.com
Project Manager

Enclosures



REPORT OF LABORATORY ANALYSIS

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

CERTIFICATIONS

Project: 1501296

Pace Project No.: 30138381

Pennsylvania Certification IDs

1638 Roseytown Rd Suites 2,3&4, Greensburg, PA 15601

ACLASS DOD-ELAP Accreditation #: ADE-1544

Alabama Certification #: 41590

Arizona Certification #: AZ0734

Arkansas Certification

California/TNI Certification #: 04222CA

Colorado Certification

Connecticut Certification #: PH-0694

Delaware Certification

Florida/TNI Certification #: E87683

Guam/PADEP Certification

Hawaii/PADEP Certification

Idaho Certification

Illinois/PADEP Certification

Indiana/PADEP Certification

Iowa Certification #: 391

Kansas/TNI Certification #: E-10358

Kentucky Certification #: 90133

Louisiana DHH/TNI Certification #: LA140008

Louisiana DEQ/TNI Certification #: 4086

Maine Certification #: PA00091

Maryland Certification #: 308

Massachusetts Certification #: M-PA1457

Michigan/PADEP Certification

Missouri Certification #: 235

Montana Certification #: Cert 0082

Nebraska Certification #: NE-05-29-14

Nevada Certification

New Hampshire/TNI Certification #: 2976

New Jersey/TNI Certification #: PA 051

New Mexico Certification

New York/TNI Certification #: 10888

North Carolina Certification #: 42706

North Dakota Certification #: R-190

Oregon/TNI Certification #: PA200002

Pennsylvania/TNI Certification #: 65-00282

Puerto Rico Certification #: PA01457

South Dakota Certification

Tennessee Certification #: TN2867

Texas/TNI Certification #: T104704188

Utah/TNI Certification #: PA014572014-4

Vermont Dept. of Health: ID# VT-0282

Virgin Island/PADEP Certification

Virginia/VELAP Certification #: 460198

Washington Certification #: C868

West Virginia DEP Certification #: 143

West Virginia DHHR Certification #: 9964C

Wisconsin/PADEP Certification

Wyoming Certification #: 8TMS-Q

REPORT OF LABORATORY ANALYSIS

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SAMPLE SUMMARY

Project: 1501296
Pace Project No.: 30138381

Lab ID	Sample ID	Matrix	Date Collected	Date Received
30138381001	1501296-01A	Water	01/06/15 11:00	01/12/15 09:45

REPORT OF LABORATORY ANALYSIS

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SAMPLE ANALYTE COUNT

Project: 1501296
Pace Project No.: 30138381

Lab ID	Sample ID	Method	Analysts	Analytes Reported
30138381001	1501296-01A	EPA 903.1	JC2	1
		EPA 904.0	JLW	1

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: 1501296

Pace Project No.: 30138381

Method: EPA 903.1

Description: 903.1 Radium 226

Client: REI Consultants, Inc.

Date: January 23, 2015

General Information:

1 sample was analyzed for EPA 903.1. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

The time on the sample label does not match the Chain of Custody.

- 1501296-01A (Lab ID: 30138381001)

REPORT OF LABORATORY ANALYSIS

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PROJECT NARRATIVE

Project: 1501296
Pace Project No.: 30138381

Method: EPA 904.0
Description: 904.0 Radium 228
Client: REI Consultants, Inc.
Date: January 23, 2015

General Information:

1 sample was analyzed for EPA 904.0. All samples were received in acceptable condition with any exceptions noted below.

Hold Time:

The samples were analyzed within the method required hold times with any exceptions noted below.

Method Blank:

All analytes were below the report limit in the method blank, where applicable, with any exceptions noted below.

Laboratory Control Spike:

All laboratory control spike compounds were within QC limits with any exceptions noted below.

Matrix Spikes:

All percent recoveries and relative percent differences (RPDs) were within acceptance criteria with any exceptions noted below.

Additional Comments:

Sample Comments:

- The time on the sample label does not match the Chain of Custody.
- 1501296-01A (Lab ID: 30138381001)

This data package has been reviewed for quality and completeness and is approved for release.

REPORT OF LABORATORY ANALYSIS

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ANALYTICAL RESULTS - RADIOCHEMISTRY

Project: 1501296

Pace Project No.: 30138381

Sample: 1501296-01A **Lab ID: 30138381001** Collected: 01/06/15 11:00 Received: 01/12/15 09:45 Matrix: Water

PWS: Site ID: Sample Type:

Comments: • The time on the sample label does not match the Chain of Custody.

Parameters	Method	Act ± Unc (MDC) Carr Trac	Units	Analyzed	CAS No.	Qual
Radium-226	EPA 903.1	1.08 ± 0.996 (1.25) C:NA T:80%	pCi/L	01/20/15 10:15	13982-63-3	
Radium-228	EPA 904.0	0.608 ± 0.429 (0.826) C:83% T:80%	pCi/L	01/22/15 16:21	15262-20-1	

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 1501296

Pace Project No.: 30138381

QC Batch: RADC/22964

Analysis Method: EPA 904.0

QC Batch Method: EPA 904.0

Analysis Description: 904.0 Radium 228

Associated Lab Samples: 30138381001

METHOD BLANK: 841584

Matrix: Water

Associated Lab Samples: 30138381001

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-228	-0.0974 ± 0.277 (0.668) C:88% T:80%	pCi/L	01/22/15 16:18	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALITY CONTROL - RADIOCHEMISTRY

Project: 1501296
Pace Project No.: 30138381

QC Batch:	RADC/23002	Analysis Method:	EPA 903.1
QC Batch Method:	EPA 903.1	Analysis Description:	903.1 Radium-226
Associated Lab Samples:	30138381001		

METHOD BLANK:	842505	Matrix:	Water
Associated Lab Samples:	30138381001		

Parameter	Act ± Unc (MDC) Carr Trac	Units	Analyzed	Qualifiers
Radium-226	0.339 ± 0.568 (0.941) C:NA T:93%	pCi/L	01/20/15 09:45	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

REPORT OF LABORATORY ANALYSIS

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QUALIFIERS

Project: 1501296
Pace Project No.: 30138381

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to changes in sample preparation, dilution of the sample aliquot, or moisture content.

ND - Not Detected at or above adjusted reporting limit.

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit.

S - Surrogate

1,2-Diphenylhydrazine (8270 listed analyte) decomposes to Azobenzene.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Act - Activity

Unc - Uncertainty: SDWA = 1.96 sigma count uncertainty, all other matrices = Expanded Uncertainty (95% confidence interval).

Gamma Spec = Expanded Uncertainty (95.4% Confidence Interval)

(MDC) - Minimum Detectable Concentration

Trac - Tracer Recovery (%)

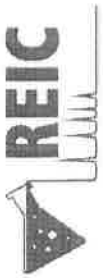
Carr - Carrier Recovery (%)

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

REPORT OF LABORATORY ANALYSIS

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Improving the environment, one client at a time...

CHAIN OF CUSTODY RECORD

COC ID: 3221

PAGE: 1

OF: 1

ADDRESS

REI Consultants, Inc.
PO Box 286
Beaver, WV 25813
TEL: (304) 255-2500
FAX: (304) 255-2572
Website: www.reicons.com



30138381

Please Include Email Address of Report Recipient Whenever Possible!!!

SUB CONTRACTOR: PACE_PA		COMPANY: PACE ANALYTICAL SERVIC				
ADDRESS: 1638 ROSEYTOWN ROAD						
CITY, STATE, ZIP: GREENSBURG, PA 15601						
PHONE: (724) 850-5600	FAX:	EMAIL:				
ACCOUNT #: 050719EVF1						
ITEM #	SAMPLE ID	Client Sample ID	Bottle Type	MATRIX	DATE COLLECTED	NUMBER OF CONTAINERS
1	1501296-01A	S-1		Liquid	1/6/2015 11:30:00 AM	1

SPECIAL INSTRUCTIONS / COMMENTS:
 State Code: WV Please use SampleID as purchase order number.
 After analysis, the samples do not need to be returned and can be disposed per your standard laboratory practices. All results to Bobby Adams at badams@reicons.com.

ANALYTICAL PARAMETERS	
RADIUM_228_SUB (EPA 904.0)	22 ✓
RADIUM_226_SUB (EPA 903.1)	✓

- * Preservation Codes:
- 0 None
 - 1 Hydrochloric Acid
 - 2 Nitric Acid
 - 3 Sulfuric Acid
 - 4 Sodium Thiosulfate
 - 5 Sodium Hydroxide/ Sodium Arsenite
 - 6 Sodium Hydroxide
 - 7 Ascorbic Acid
 - 8 Sodium Sulfite/HCL
 - 9 Potassium Dithyrogen Citrate
 - 10 Bromium Chloride

COMMENTS: **cool**

Relinquished By: Brook S	Date: 1/6/15	Time: 16:00	Received By: UPS	Date: 1/6/15	Time: 16:00
Relinquished By:	Date:	Time:	Received By: Adams	Date: 1/12/15	Time: 0945
Relinquished By:	Date:	Time:	Received By:	Date:	Time:
TAT: <input checked="" type="checkbox"/> Standard	<input type="checkbox"/> RUSH	Next BD <input type="checkbox"/>	2nd BD <input type="checkbox"/>	3rd BD <input type="checkbox"/>	

Note: RUSH requests will incur surcharges!

REPORT TRANSMITTAL DESIRED:

HARDCOPY (extra cost) FAX EMAIL ONLINE

FOR LAB USE ONLY

Temp of samples **MA** °C Attempt to Cool? _____

Comments: _____



Sample Condition Upon Receipt

Ann

Client Name: REIC

Project # 30138381

Courier: Fed Ex UPS USPS Client Commercial Pace Other

Tracking #: 17 26X 713 03 6089 6471

Custody Seal on Cooler/Box Present: yes no Seals intact: yes no Biological Tissue is Frozen: Yes No

Packing Material: Bubble Wrap Bubble Bags None Other

Thermometer Used NA Type of Ice: Wet Blue None Samples on ice, cooling process has begun

Cooler Temp.: Observed Temp.: NA °C Correction Factor: NA °C Final Temp: NA °C

Date and Initials of person examining contents: Ann 1/12/15

Temp should be above freezing to 6°C

Comments:

Table with 16 rows of inspection items and checkboxes. Includes items like Chain of Custody Present, Samples Arrived within Hold Time, and Correct Containers Used.

Client Notification/ Resolution: Person Contacted: Brady Adams Date/Time: 1/12/15 Comments/ Resolution: Correct time is 11:00

Project Manager Review: [Signature] Date: 1/12/15

Note: Whenever there is a discrepancy affecting North Carolina compliance samples, a copy of this form will be sent to the North Carolina DEHNR Certification Office (i.e. out of hold, incorrect preservative, out of temp, incorrect containers)

EXHIBIT 3

ALS Group USA, Corp

Date: 29-May-14

Client: Danny Webb Construction
 Project: North Hills Pit #1
 Sample ID: 1 - Pit Composite
 Collection Date: 5/22/2014 10:30 AM

Work Order: 14051144
 Lab ID: 14051144-01
 Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID						
			SW8015M		Prep: SW3541 / 5/27/14	Analyst: IT
DRO (C10-C28)	50		10	mg/Kg-dry	1	5/28/2014 12:40 PM
ORO (C28-C40)	56		10	mg/Kg-dry	1	5/28/2014 12:40 PM
Surr: 4-Terphenyl-d14	86.4		39-133	%REC	1	5/28/2014 12:40 PM
GASOLINE RANGE ORGANICS BY GC-FID						
			SW8015		Prep: SW5035 / 5/27/14	Analyst: IT
GRO (C6-C10)	ND		6,100	µg/Kg-dry	1	5/27/2014 07:58 PM
Surr: Toluene-d8	61.7		50-150	%REC	1	5/27/2014 07:58 PM
METALS BY ICP-MS						
			SW6020A		Prep: SW3050B / 5/27/14	Analyst: ML
Iron	69,000		67	mg/Kg-dry	5	5/28/2014 01:13 AM
Manganese	760		4.2	mg/Kg-dry	5	5/28/2014 01:13 AM
VOLATILE ORGANIC COMPOUNDS						
			SW8260B		Prep: SW5035 / 5/23/14	Analyst: RS
Benzene	ND		74	µg/Kg-dry	1	5/28/2014 06:54 PM
Ethylbenzene	300		74	µg/Kg-dry	1	5/28/2014 06:54 PM
m,p-Xylene	1,100		150	µg/Kg-dry	1	5/28/2014 06:54 PM
o-Xylene	370		74	µg/Kg-dry	1	5/28/2014 06:54 PM
Toluene	130		74	µg/Kg-dry	1	5/28/2014 06:54 PM
Xylenes, Total	1,500		220	µg/Kg-dry	1	5/28/2014 06:54 PM
Surr: 1,2-Dichloroethane-d4	95.7		70-130	%REC	1	5/28/2014 06:54 PM
Surr: 4-Bromofluorobenzene	97.4		70-130	%REC	1	5/28/2014 06:54 PM
Surr: Dibromofluoromethane	92.4		70-130	%REC	1	5/28/2014 06:54 PM
Surr: Toluene-d8	103		70-130	%REC	1	5/28/2014 06:54 PM
CHLORIDE						
			E325.3		Prep: EXTRACT / 5/28/14	Analyst: JB
Chloride	550		73	mg/Kg-dry	1	5/28/2014 02:50 PM
MOISTURE						
			A2540 G			Analyst: AT
Moisture	59		0.050	% of sample	1	5/27/2014 12:15 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: 29-May-14

Client: Danny Webb Construction
 Project: North Hills Pit #1
 Sample ID: 2 - Upper Pit
 Collection Date: 5/22/2014 10:50 AM

Work Order: 14051144
 Lab ID: 14051144-02
 Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID						
			SW8015M		Prep: SW3541 / 5/27/14	Analyst: IT
DRO (C10-C28)	34		4.9	mg/Kg-dry	1	5/28/2014 01:10 AM
ORO (C28-C40)	30		4.9	mg/Kg-dry	1	5/28/2014 01:10 AM
Surr: 4-Terphenyl-d14	95.7		39-133	%REC	1	5/28/2014 01:10 AM
GASOLINE RANGE ORGANICS BY GC-FID						
			SW8015		Prep: SW5035 / 5/27/14	Analyst: IT
GRO (C6-C10)	ND		3,000	µg/Kg-dry	1	5/27/2014 08:23 PM
Surr: Toluene-d8	119		50-150	%REC	1	5/27/2014 08:23 PM
METALS BY ICP-MS						
			SW6020A		Prep: SW3050B / 5/27/14	Analyst: ML
Iron	38,000		37	mg/Kg-dry	5	5/28/2014 01:19 AM
Manganese	220		2.3	mg/Kg-dry	5	5/28/2014 01:19 AM
VOLATILE ORGANIC COMPOUNDS						
			SW8260B		Prep: SW5035 / 5/23/14	Analyst: RS
Benzene	ND		38	µg/Kg-dry	1	5/28/2014 07:19 PM
Ethylbenzene	ND		38	µg/Kg-dry	1	5/28/2014 07:19 PM
m,p-Xylene	130		76	µg/Kg-dry	1	5/28/2014 07:19 PM
o-Xylene	ND		38	µg/Kg-dry	1	5/28/2014 07:19 PM
Toluene	ND		38	µg/Kg-dry	1	5/28/2014 07:19 PM
Xylenes, Total	130		110	µg/Kg-dry	1	5/28/2014 07:19 PM
Surr: 1,2-Dichloroethane-d4	102		70-130	%REC	1	5/28/2014 07:19 PM
Surr: 4-Bromofluorobenzene	96.0		70-130	%REC	1	5/28/2014 07:19 PM
Surr: Dibromofluoromethane	98.2		70-130	%REC	1	5/28/2014 07:19 PM
Surr: Toluene-d8	96.8		70-130	%REC	1	5/28/2014 07:19 PM
CHLORIDE						
			E325.3		Prep: EXTRACT / 5/28/14	Analyst: JB
Chloride	300		36	mg/Kg-dry	1	5/28/2014 02:50 PM
MOISTURE						
			A2540 G			Analyst: AT
Moisture	16		0.050	% of sample	1	5/27/2014 12:15 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

ALS Group USA, Corp

Date: 29-May-14

Client: Danny Webb Construction

Project: North Hills Pit #1

Sample ID: 3 - Lower Pit

Collection Date: 5/22/2014 11:05 AM

Work Order: 14051144

Lab ID: 14051144-03

Matrix: SOIL

Analyses	Result	Qual	Report Limit	Units	Dilution Factor	Date Analyzed
DIESEL RANGE ORGANICS BY GC-FID						
			SW8015M		Prep: SW3541 / 5/27/14	Analyst: IT
DRO (C10-C28)	ND		5.0	mg/Kg-dry	1	5/28/2014 01:40 AM
ORO (C28-C40)	ND		5.0	mg/Kg-dry	1	5/28/2014 01:40 AM
Surr: 4-Terphenyl-d14	96.3		39-133	%REC	1	5/28/2014 01:40 AM
GASOLINE RANGE ORGANICS BY GC-FID						
			SW8015		Prep: SW5035 / 5/27/14	Analyst: IT
GRO (C6-C10)	ND		3,000	µg/Kg-dry	1	5/27/2014 08:47 PM
Surr: Toluene-d8	59.6		50-150	%REC	1	5/27/2014 08:47 PM
METALS BY ICP-MS						
			SW6020A		Prep: SW3050B / 5/27/14	Analyst: ML
Iron	28,000		31	mg/Kg-dry	5	5/28/2014 01:25 AM
Manganese	250		1.9	mg/Kg-dry	5	5/28/2014 01:25 AM
VOLATILE ORGANIC COMPOUNDS						
			SW8260B		Prep: SW5035 / 5/23/14	Analyst: RS
Benzene	ND		36	µg/Kg-dry	1	5/28/2014 07:44 PM
Ethylbenzene	ND		36	µg/Kg-dry	1	5/28/2014 07:44 PM
m,p-Xylene	ND		73	µg/Kg-dry	1	5/28/2014 07:44 PM
o-Xylene	ND		36	µg/Kg-dry	1	5/28/2014 07:44 PM
Toluene	ND		36	µg/Kg-dry	1	5/28/2014 07:44 PM
Xylenes, Total	ND		110	µg/Kg-dry	1	5/28/2014 07:44 PM
Surr: 1,2-Dichloroethane-d4	104		70-130	%REC	1	5/28/2014 07:44 PM
Surr: 4-Bromofluorobenzene	93.0		70-130	%REC	1	5/28/2014 07:44 PM
Surr: Dibromofluoromethane	97.9		70-130	%REC	1	5/28/2014 07:44 PM
Surr: Toluene-d8	97.2		70-130	%REC	1	5/28/2014 07:44 PM
CHLORIDE						
			E325.3		Prep: EXTRACT / 5/28/14	Analyst: JB
Chloride	360		36	mg/Kg-dry	1	5/28/2014 02:50 PM
MOISTURE						
			A2540 G			Analyst: AT
Moisture	18		0.050	% of sample	1	5/27/2014 12:15 PM

Note: See Qualifiers page for a list of qualifiers and their definitions.

EXHIBIT 4



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

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

April 4, 2014

Mr. Danny Webb
Danny E. Webb Construction Inc.
P O Box 267
Lochgelly, WV 25866

RE: Compliance Order No. 2014-UIC-13

Dear Mr. Webb,

This letter is in reference to the waste fluid pits closure and reclamation plan required in Compliance Order No. 2014-UIC-13. A revised plan was submitted to our office on April 4, 2014. Be advised that the plan has been approved by our engineer with the additional requirements stipulated below:

- Inspector Terry Urban and Jamie Peterson of the Office of Oil and Gas (OOG) shall be provided at least 48 hours notification prior to commencement of activities of the approved plan.
- Compaction testing by a qualified laboratory is required and the results of the testing shall be maintained at the site as well as be available for review by the OOG upon request.
- Any visually impacted soil encountered will be removed and properly disposed of. Upon removal of impacted soil and/or regrading of the pit area, a five (5) point composite sample shall be collected for analysis. The composite sample shall consist of taking an equal amount of soil from the four corners of the pit area and center. The five samples shall be homogenized into a single sample for analysis. The sample shall be analyzed for the following parameters: Chloride, Iron, Manganese, TPH DRO, TPH GRO, TPH ORO, and BTEX. *Take sample from last list*
- Filter sock(s) to be installed per the attached detail.

If you have any questions please call me at 304-926-0499 ext. 1652.

Sincerely,

Gene Smith, Assistant Chief - Permitting

Promoting a healthy environment.

**WASTE PIT CLOSURE AND RECLAMATION PLAN AS REQUIRED BY
COMPLIANCE -13 ORDER NO. 2014-UIC SECTION EIGHTEEN (18)**

**RECEIVED
Office of Oil and Gas**

APR 04 2014

**WV Department of
Environmental Protection**

**DANNY WEBB PITS REMOVAL
AT THE INJECTION WELL LOCATED
NEAR OAK HILL**

NARRATIVE

SEQUENCE OF EVENTS FOR REMOVING THE PITS:

- (1) Pump all water into tanks on 47-019-0460 location and inject into the injection well.**
- (2) Remove all liners and dispose of them at an appropriate land fill.**
- (3) Clear all brush, trees, and other organic material from the embankment or any other area from which the reclamation/fill material will be removed. This organic material will be stockpiled in an appropriate area away from the material that will be used to reclaim and eliminate the two pits. This brush and organic material will not be used for reclamation material.**
- (4) After installing temporary sediment control fencing, the embankment will be removed by pulling the material back starting a minimum of 3 vertical feet above the toe of the slope which will also be above any seep that may be obvious. This material will be placed in one (1) foot lifts and compacted according to ASTM D-698 at a minimum of 90% of standard proctor density. This will prevent any depressions in the fill area of the pits. The temporary sediment control fencing will be removed after re-vegetation and properly disposed of. However if a 12" MINIMUM COMPOST FILTER SOCK™ is used it will not be removed but will remain because of its ability to support vegetation growth. It will also be installed along the entire length of the disturbed area. An example of a compost filter sock is included; however, this particular one may not be used. One that best fits this project will be used as deemed necessary.**
- (5) All topsoil will be stockpiled and used on the final grade in order to support the final reclamation seeding.**
- (6) If borrow material is needed from another approved area, temporary sediment control fencing will be used and maintained until the borrow area is completely reclaimed and seeded at which time the temporary sediment control fencing will be removed and properly disposed of.**
- (7) The diversion ditch at the hill side of the pits will be maintained and sloped toward the down dip in the same direction of the stream. Rip rap will be placed at the discharge end of the diversion ditch to reduce the possibility of the water discharge from eroding the original ground.**
- (8) As the material is placed in the pits, it will be sloped at a minimum of 2% toward the diversion ditch. This will prevent any run-off from the reclaimed pits from entering the area toward the creek. However, final grade approved on the cross-sections may slope toward the creek at a slope of not greater than 2%.**

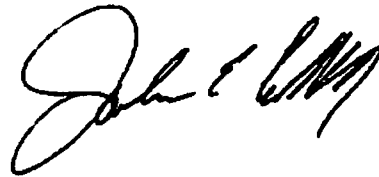
APR 04 2014

WV Department of
Environmental Protection

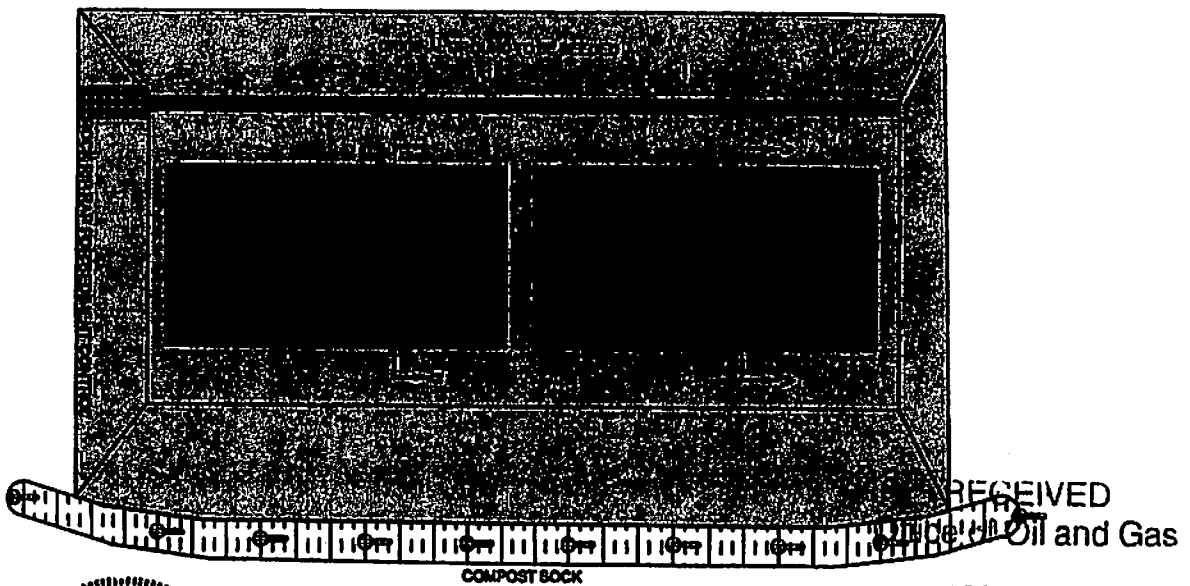
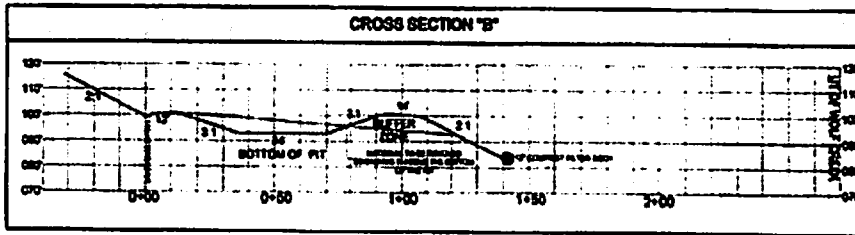
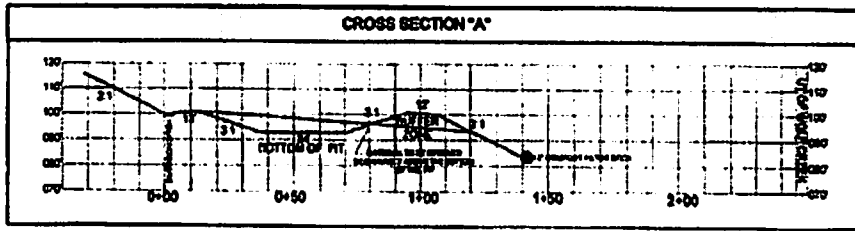
(9) The soil that is removed will be used to back fill the pits; however, after it has been removed and before it is placed in the pits for back filling, a representative sample will be taken and tested by an approved laboratory in order to determine if it is contaminated. If any contaminated soil is encountered, it will be segregated from the non-contaminated soil and hauled away from the site and disposed of at an approved landfill.

Please see following specifications for procedures to be followed during reclamation:

- (1) The soil will be tested and if the pH is less than 5.5, lime will be used at rates adequate enough to render a uniform pH of 6.0.**
- (2) The fill area will tracked over with a dozer of not greater than a machine comparable to a 650 John Deere or smaller. The soil will be loosely graded and the tracks will create growth pockets but still not compacted so greatly that the growth of the vegetation will be hampered. This is only for the top or final grading of the area.**
- (3) A fertilizer of comparable quality of 10-20-20 will be applied at a rate of 600 pounds per acre.**
- (4) The regraded area that is to be seeded will be mulched with wood fiber mulch at a rate of 1000 pounds per acre or straw or hay will be applied at the rate of 3000 to 4000 pounds per acre.**



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Office of Oil and Gas
APR 04 2014
WV Department of
Environmental Protection



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 WV Department of Oil and Gas

APR 04 2014

WV Department of
 Environmental Protection



John E. Caffrey
 SIGNATURE OF JOHN E. CAFFREY

	DRAINAGE STRUCTURES
	VEGETATED AREA
	ROCK RIP RAP
	COMPOST FILTER SOCK
	FLOW DIRECTION
	STAKES
	PIT CONFIGURATION AS IS
	PIT CONFIGURATION AFTER RECLAIMED

DANNY E. WEBB CONSTRUCTION INC.

PLAN VIEW OF PIT AREA
 NORTH HILLS WELLS NO 1

LIC PERMIT 0019040 DATE: APRIL 3, 2014

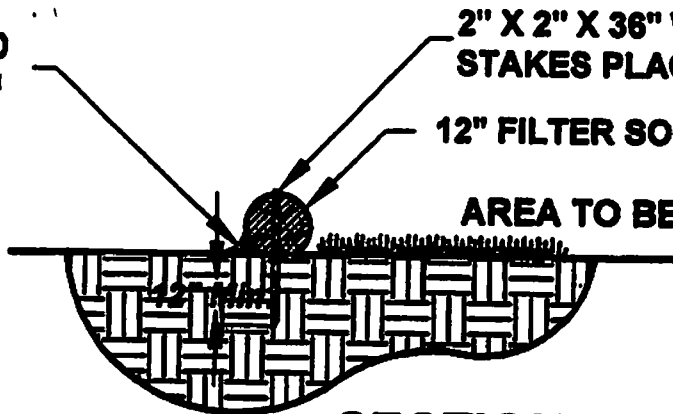
**BLOWN/PLACED
FILTER MEDIA™**

**2" X 2" X 36" WOODEN
STAKES PLACED 10' O.C.**

12" FILTER SOCK

WORK AREA

AREA TO BE PROTECTED



SECTION

**2" X 2" X 36" WOODEN
STAKES PLACED 10'
O.C.**

AREA TO BE PROTECTED

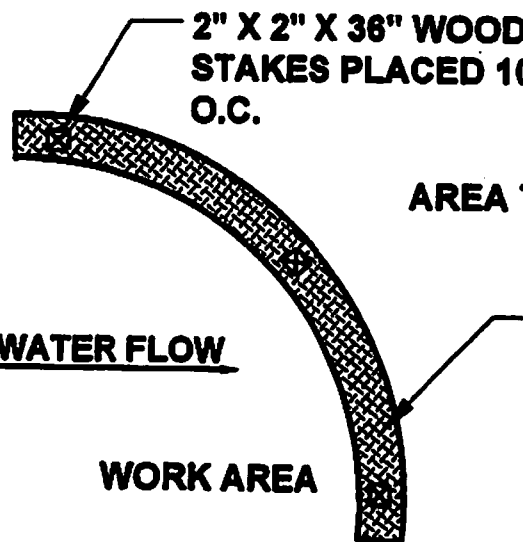
WATER FLOW

RECEIVED
Office of Oil and Gas

APR 04 2014

WV Department of
Environmental Protection

WORK AREA



PLAN

**USE SOCKS BY FILTREXX, SILT SOCK OR OTHER
APPROVED MFG**

FILTER SOCK DETAIL

N.T.S.

APPENDIX 6



IV-35
(Rev 8-81)

Date 1-26-82
Operator's
Well No. 1
Farm North Hills Group, Inc
API No. 47-019-0460

State of West Virginia
Department of Mines
Oil and Gas Division

FEB 02 1982
OIL & GAS
CONSERVATION COMMISSION
WELL OPERATOR'S REPORT
OF
DRILLING, FRACTURING AND/OR STIMULATING, OR PHYSICAL CHANGE

WELL TYPE: Oil ___ / Gas x / Liquid Injection ___ / Waste Disposal ___ /
(If "Gas," Production x / Underground Storage ___ / Deep ___ / Shallow ___ /)

LOCATION: Elevation: 1989.95' Watershed Wolf Creek of New River
District: New Haven County Fayette Quadrangle 75' Beckwith-
15' Fayetteville

COMPANY Amoco Production Company
ADDRESS P. O. Box 1350, Traverse City, MI 49684
DESIGNATED AGENT M. J. Root
c/o Chamberlaine & Flowers, Inc.
ADDRESS 128 W. 2nd St., Clarksburg, WV 26301
SURFACE OWNER North Hills Group, Inc.
c/o R. E. Kelly, Jr.
ADDRESS 114 E. Main St., Oak Hill, WV 25901
MINERAL RIGHTS OWNER North Hills Group, Inc.
ADDRESS Same as above
OIL AND GAS INSPECTOR FOR THIS WORK Deo
Mace ADDRESS Rt. 1, Box 65, Sand Ridge,
WV 25274
PERMIT ISSUED 5-29-81
DRILLING COMMENCED 9-23-81
DRILLING COMPLETED 10-8-81
Well Completed 10-30-81
IF APPLICABLE: PLUGGING OF DRY HOLE ON
CONTINUOUS PROGRESSION FROM DRILLING OR
REWORKING. VERBAL PERMISSION OBTAINED
ON _____

Casing & Tubing	Used in Drilling	Left in Well	Cement fill up Cu. ft.
Size 20-16 Cond.			
13-10"	140'		130 SX
9 5/8	648'		247 SX
8 5/8			
7	1853'		215 SX
5 1/2			
4 1/2	3248'		94 SX
3			
2			
Liners used			

Top o
cemen
at
surf
Top o
cemen
at 165
(insid
7")

GEOLOGICAL TARGET FORMATION Berea Depth 3250 feet
Depth of completed well 3248 feet Rotary X / Cable Tools _____
Water strata depth: Fresh _____ feet; Salt _____ feet
Coal seam depths: 700' Is coal being mined in the area? No

OPEN FLOW DATA
Producing formation Weir Pay zone depth 2636-2684 feet
2616
Gas: Initial open flow 360 Mcf/d Oil: Initial open flow - Bbl/d
Final open flow 360 Mcf/d Final open flow - Bbl/d
Time of open flow between initial and final tests 24 hours
Static rock pressure 724 psig (Bottom-hole surface measurement) after 1 month shut in
(If applicable due to multiple completion--)
Second producing formation None Pay zone depth _____ feet
Gas: Initial open flow _____ Mcf/d Oil: Initial open flow _____ Bbl/d
Final open flow _____ Mcf/d Oil: Final open flow _____ Bbl/d
Time of open flow between initial and final tests _____ hours
Static rock pressure _____ psig (surface measurement) after _____ hours shut in

NOV 15 1982

(Continue on reverse side)

DETAILS OF PERFORATED INTERVALS, FRACTURING OR STIMULATING, PHYSICAL CHANGE, ETC.

Perforations: 2636 - 2646', 2672 - 2684'
 Stimulating: 1000 gal. 15% HCL
 Fracturing: 590 bbls with 15,000 # 80/100 mesh
 75,000 # 20/40 mesh

WELL LOG

FORMATION COLOR HARD OR SOFT	TOP FEET	BOTTOM FEET	REMARKS Including indication of all fresh and salt water, coal, oil and gas
No Description Given	0	140	Water at 60'
Sandst.-white-crs grain-Tr.Sh.	140	160	
Sandst.-Sltstone-coal-40-59-3%	160	200	1" Water at 180'
Sandst-White-V. crs-Non-calc.	200	220	
Sandst 50%-Slt-30%-Sh-20%-Non-calc.	220	240	
Sandst-White-med grain	240	340	
Sh-80%-Ss-20%-gry-blk	340	360	
Ss-70%-Sh-30%-wht-lt.gr-Non-calc	360	550	
Ss-wht-med gr. Tr. Sh.	550	560	
Sh-Blk dense-80%-Ss-20%	560	580	
Ss.-wht-lt.gray-Fine med grain	580	600	
No Description Given-Hit aband coal mine	600	650	
Shale-drk gr-Blk-Tr. Ss.-2%	650	680	
Ss w/increas. Sh to 100%-fine grain	680	820	Damp hole at 705'
Shale-drk. gray-Tr. coal	820	840	
No Description Given	840	860	
Shale-drk gry-Increas. Tr. Sandstone	860	960	
Sandstone-white-med. grain-Tr. Shale	960	1090	1/8" water at 1022'
Shale-drk gray-med grain-Increas Tr.Slt	1090	1140	
Shale-60%-Slt-40%-red-Slight calc.	1140	1180	
No Description Given-poor returns	1180	1230	
Sltst-med gray-slightly coarser-Tr.calc.	1230	1270	
Sh & Sltst-med gray-Tr. calc	1270	1330	
Sltst-lt. med. gray-Non-calc	1330	1510	
Sandst.-Shale layer intermixed Tr. calc.	1510	1580	Ravencliff (1500')
Shale-red-Tr. Slt. mudstone	1580	1640	
Sh w/20% Ss. decreas. Ss. Tr. Calc.	1640	1750	
Ss w/increase of Ss. lt.gr to white-fine gr.	1750	1780	
Shale-Med-lt. gray to red-Tr. Slt-Tr. calc.	1780	1830	
Ss. lt gray-v. fine grain	1830	1870	
Sh-red to gray-increas. slt-Non-calc.	1870	2040	
Shale & Sandst layer mixed-gray to white-fine grain	2040	2110	
Sandst w/slight St. layer-lt. gray-saturated	2110	2580	Pencil Caye (2193')
Sltst/Shale-red ang.	2580	2630	Greenbriar (2230') MacCrary (2540')

(Attach separate sheets as necessary)

Well Operator _____

By: _____

Date: _____

Note: Regulation 2.02(i) provides as follows:
 "The term 'log' or 'well log' shall mean a systematic detailed geological record of all formations, including ..."

DETAILS OF PERFORATED INTERVALS, FRACTURING OR STIMULATING, PHYSICAL CHANGE, ETC.

RECEIVED

FEB 02 1982

OIL & GAS
CONSERVATION COMMISSION

WELL LOG

FORMATION	COLOR	HARD OR SOFT	TOP FEET	BOTTOM FEET	REMARKS Including indication of all fresh and salt water, coal, oil and gas
Ss. white-V. Lt gray-V. fine grain-Vry clear			2630	2710	Weier (2616')
Sltst-lt. med gray-very fine grain			2710	2734	Sunbury (2700')
Shale-med gray-varying Slt. Tr. mica			2734	3130	
Sandstone-v. fine grain-tr. mica-occ. Shale			3130	3150	Berea (3064')
Sltst-lt. med gray-ang.			3150	3249	
No Description Given			3249	3260 TD	

(Attach separate sheets as necessary)

Amoco Production Company
Well Operator

By: J. F. Trickett

J. F. Trickett
Dist. Supt.

Date: January 26, 1982

Note: Regulation 2.02(i) provides as follows:
"The term 'log' or 'well log' shall mean a systematic detailed geological record of all formations, including ... encountered in the drilling of a well."

NOV 15 1982

APPENDIX 7



MR-35

DIVISION OF OIL & GAS of West Virginia
DEPARTMENT OF ENERGY
Oil and Gas Division

Date March 11, 1986
Operator's Well No. North Hills #1-A
Farm North Hills
API No. 47-019-508

WELL OPERATOR'S REPORT
OF
DRILLING, FRACTURING AND/OR STIMULATING, OR PHYSICAL CHANGE

WELL TYPE: Oil / Gas / Liquid Injection / Waste Disposal
(If "Gas," Production / Underground Storage / Deep / Shallow)

LOCATION: Elevation: 1985' Watershed Wolf Creek of New River
District: Plateau County Fayette Quadrangle Beckwith 7.5

COMPANY Peake Operating Company
ADDRESS 423 Charleston National Plaza
Charleston, W. Va. 25301
DESIGNATED AGENT Timothy K. Wilcox
ADDRESS 423 Charleston National Plaza
Charleston, W. Va. 25301
SURFACE OWNER North Hills Group
ADDRESS Oak Hill, W. Va.
MINERAL RIGHTS OWNER North Hills Group
ADDRESS Oak Hill, W. Va.
OIL AND GAS INSPECTOR FOR THIS WORK Rodney
Diller ADDRESS Sophia, W. Va.
PERMIT ISSUED October 15, 1982
DRILLING COMMENCED October 19, 1982
DRILLING COMPLETED October 25, 1982
IF APPLICABLE: PLUGGING OF DRY HOLE ON
CONTINUOUS PROGRESSION FROM DRILLING OR
REWORKING. VERBAL PERMISSION OBTAINED
ON _____

Casing Tubing Size Cowl.	Used in Drilling	Left in Well	Cement fill up Cu. ft.
20-16			
13-10"	15	15	3 sks. CTS
9 5/8	672	672	200 sks. CTS
8 5/8			
7	1430	1430	240 sks. CTS
5 1/2			
4 1/2	2776	2776	240 sks.
3			
2			
Liner's used			

GEOLOGICAL TARGET FORMATION Weir Depth 2757 feet
Depth of completed well 2806 feet Rotary / Cable Tools _____
Water strata depths: Fresh 50 feet; Salt 500 feet
Coal seam depths: _____ Is coal being mined in the area?

OPEN FLOW DATA
Producing formation Ravencliff Pay zone depth 1550-1605 feet
Gas: Initial open flow 151M Mcf/d Oil: Initial open flow - Bbl/d
Final open flow 14 Mcf/d Final open flow - Bbl/d
Time of open flow between initial and final tests - hours
Static rock pressure - psig (surface measurement) after - hours shut in
(If applicable due to multiple completion--)

Second producing formation Weir Pay zone depth 2703-2715 feet
Gas: Initial open flow 151M Mcf/d Oil: Initial open flow - Bbl/d
Final open flow 151M Mcf/d Oil: Final open flow - Bbl/d
Time of open flow between initial and final tests - hours
Static rock pressure - psig (surface measurement) after - hours shut in

(Continue on reverse side)

JUL 21 1986

DETAILS OF PERFORATED INTERVALS, FRACTURING OR STIMULATING, PHYSICAL CHANGE, ETC.

- Sept. 12, 1983 - Perf. Weir from 2703-2715 w/36 holes.
- Sept. 14, 1983 - Frac. w/190 bbls. H₂O, 688,000 SCFN₂, BD 1700#, ATP 2000#, ISIP 1300#.
- Sept. 17, 1983 - Perfed Ravencliff from 1575-1601 with 34 holes.
- Sept. 19, 1983 - Frac. w/578 bbl. H₂O, 116,000 SCFN₂, BD 1600#, ATP 25,000#, ISIP 2400#, 15 min. 1150#

WELL LOG

FORMATION	COLOR	HARD OR SOFT	TOP FEET	BOTTOM FEET	REMARKS
					Including indication of all fresh and salt water, coal, oil and gas
Sand and Shale			0	1000	Open mines 635-637
Shale			1000	1012	
Sand			1012	1150	
Shale			1150	1542	
Ravencliff			1542	1608	Gas checks:
Shale			1608	2083	1554 - No gas
Sand			2083	2126	1629 - TSTM
Shale			2126	2145	2280 - 15 MCF
Little Lime			2145	2210	2580 - TSTM
Pencil Cave			2210	2250	2670 - TSTM
Big Lime			2250	2568	2706 - TSTM
Shale			2568	2650	2730 - TSTM
<u>Weir</u>			2650	2722	2806 - TSTM
Slate			2722	2806	

LTD 2806

(Attach separate sheets as necessary)

PEAKE OPERATING COMPANY
 Well Operator
 By: *Thomas S. Shrestas*
 Date: March 11, 1986

Note: Regulation 2.02(i) provides as follows:
 "The term 'log' or 'well log' shall mean a systematic detailed geological record of all formations, including soil, encountered in the drilling of a well."

JUL 21 1986



1) Date: September 30, 1982
 2) Operator's Well No. 1-A North Hills (Amoco)
 3) API Well No. 47 - 019 - 0508
 State County Permit

DRILLING CONTRACTOR:

Unknown

STATE OF WEST VIRGINIA
DEPARTMENT OF MINES, OIL AND GAS DIVISION

OIL AND GAS WELL PERMIT APPLICATION

- 4) WELL TYPE: A Oil / Gas X
 B (If "Gas", Production X / Underground storage / Deep / Shallow X)
- 5) LOCATION: Elevation: 1985 Watershed: Molly Creek of New River
 District: Plateau County: Fayette Quadrangle: Beckwith 71
- 6) WELL OPERATOR Peake Operating Company 11) DESIGNATED AGENT Floyd B. Wilcox
 Address Suite 423, Charleston National Plaza Address Suite 423, Charleston National Plaza
Charleston, W. Va. 25301 Charleston, W. Va. 25301
- 7) OIL & GAS ROYALTY OWNER North Hills Group, Inc. 12) COAL OPERATOR New River Company
 Address c/o R. E. Kelly, Jr. Address P. O. Box 711
114 E. Main St., Oak Hill, WV 25901 Mt. Hope, WV 25888
 Acreage 3624
- 8) SURFACE OWNER North Hills Group, Inc. 13) COAL OWNER(S) WITH DECLARATION ON RECORD:
 Address (Same as above) Name North Hills Group, Inc.
 Address (Same as above)
- 9) FIELD SALE (IF MADE) TO: Name New River Company
 Address P. O. Box 711
MT. HOPE, WV 25888
- 10) OIL & GAS INSPECTOR TO BE NOTIFIED Name D. Craig Duckworth
 Address P. O. Box 454 MT. LOOKOUT, WV 26041
- 15) PROPOSED WORK: Drill X / Drill deeper / Redrill / Fracture or stimulate X
 Plug off old formation / Perforate new formation
 Other physical change in well (specify)
- 16) GEOLOGICAL TARGET FORMATION, weir
- 17) Estimated depth of completed well, 2757 feet
- 18) Approximate water strata depths: Fresh, 50 feet; salt, 500 feet.
- 19) Approximate coal seam depths: Is coal being mined in the area? Yes / No X

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SEP 30 1982
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DEPT. OF MINES

20) CASING AND TUBING PROGRAM

CASING OR TUBING TYPE	SPECIFICATIONS					FOOTAGE INTERVALS		CEMENT FILL-UP OR SACKS (Cubic feet)	PACKERS	
	Size	Grade	Weight per ft.	New	Used	For drilling	Left in well			
Conductor	13-3/8	H-40	45.0#	X		30'	30'	To surface		Kinds
Fresh water										
Coal	9-5/8	H-40	36.0#	X		661'	661'	To surface		Sizes
Intermediate	7	H-40	17.0#	X		1433'	1433'	150 sacks at		req. Rule 15.01
Production	4-1/2	J-55	9.5#	X		2760'	2760'	300 sacks		Depths set
Tubing										
Liners										Perforations:
										Top Bottom

- 21) EXTRACTION RIGHTS
 Check and provide one of the following:
 Included is the lease or leases or other continuing contract or contracts by which I hold the right to extract oil or gas.
 The requirement of Code 22-4-1-(c) (1) through (4). (See reverse side for specifics.)
- 22) ROYALTY PROVISIONS
 Is the right to extract, produce or market the oil or gas based upon a lease or other continuing contract or contracts providing for flat well royalty or any similar provision for compensation to the owner of the oil or gas in place which is not inherently related to the volume of oil or gas so extracted, produced or marketed? Yes No
- If the answer above is No, nothing additional is needed. If the answer is Yes, you may use Affidavit Form IV-60.
- 23) Required Copies (See reverse side.)
- 24) Copies of this Permit Application and the enclosed plat and reclamation plan have been mailed by registered mail or delivered by hand to the above named coal operator, coal owner(s), and coal lessee on or before the day of the mailing or delivery of this Permit Application to the Department of Mines at Charleston, West Virginia.

Notary: [Signature] Signed: [Signature]
 My Commission Expires June 30, 1971 Its: [Signature]

OFFICE USE ONLY
DRILLING PERMIT
 Permit number 47-019-0508 Date October 15 1982

This permit covering the well operator and well location shown below is evidence of permission granted to drill in accordance with the pertinent legal requirements subject to the conditions contained herein and on the reverse hereof. **Notification must be given to the District Oil and Gas Inspector.** (Refer to No. 10) Prior to the construction of roads, locations and pits for any permitted work. In addition, the well operator or his contractor shall notify the proper district oil and gas inspector 24 hours before actual permitted work has commenced.)

Permit expires June 15, 1983 unless drilling is commenced prior to that date and prosecuted with due diligence.

Bond: <u>BLANKET</u>	Agent: <u>M.Y.</u>	Plat: <u>[Signature]</u>	Casing: <u>[Signature]</u>	Fee: <u>1808</u>
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Administrator, Office of Oil and Gas

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JUN 06 1986

DIVISION OF OIL & GAS
DEPT. OF ENERGY

AFFIDAVIT OF PLUGGING AND FILLING WELL

AFFIDAVIT SHOULD BE MADE IN TRIPLICATE, one copy mailed to the Department, one copy to be retained by the Well Operator and the third copy (and extra copies if required) should be mailed to each coal operator at their respective addresses.

Coal Operator or Owner _____
Address _____
North Hills Group _____
Coal Operator or Owner _____
Oak Hill, WV _____
Address _____
North Hills Group _____
Lease or Property Owner _____
Oak Hill, WV _____
Address _____

Peake Operating Company _____
Name of Well Operator _____
Ste. 423 Char. Nat'l Plaza - Char., WV 25301 _____
Complete Address _____
North Hills #1-A (wolf creek) 19 _____
WELL AND LOCATION _____
Plateau _____ District _____
Fayette _____ County _____
WELL NO. 47-019-508P _____
North Hills Group _____ Farm _____

STATE INSPECTOR SUPERVISING PLUGGING Rodney Dillon - Sophia, WV 683-3989

AFFIDAVIT

STATE OF WEST VIRGINIA,
County of Fayette

ss:

Tom Liberatore and Steve Davis

being first duly sworn according to law depose and say that they are experienced in the work of plugging and filling oil and gas wells and were employed by Peake Operating Company, well operator, and participated in the work of plugging and filling the above well, that said work was commenced on the 22nd day of April, 19 86, and that the well was plugged and filled in the following manner:

Sand or Zone Record Formation	Filling Material	Plugs Used Size & Kind	Casing	
			CSG PULLED	CSG LEFT IN
	McCullough set Model S Solid bridge plug at 1633 in	12-3/4		15'
	November, 1982. - 8 sacks = 100' cement plug from 1633' to 1533'	9-5/8 7 4-1/2		672' 1430' 1665'
Coal Seams				
(Name) 635' - 637'				
(Name)				
(Name)				
(Name)				
		Description of Monument		
		7 x 2 swedge with 2" vent pipe 6' high - API well # stenciled in 1/2" #s		

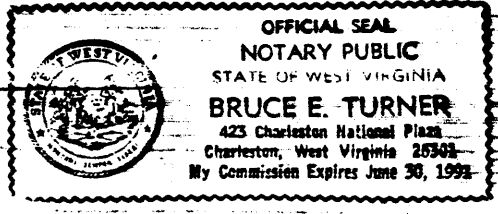
[Signature] 6/16/86

and that the work of plugging and filling said well was completed on the 23th day of April, 19 86.

And further deponents saith not.

Sworn to and subscribed before me this 4th day of JUNE, 19 86.
[Signature]
[Signature]
Notary Public

My commission expires: 6/20/91



Permit No. 019-0508-P

WR-35
Rev (5-01)

DATE: 6/30/08
API #: 47-019-00508

State of West Virginia
Department of Environmental Protection
Office of Oil and Gas

Well Operator's Report of Well Work

Farm name: North Hills Operator Well No.: #1-A

LOCATION: Elevation: 1985 Quadrangle: Beckwith

District: Plateau County: Fayette
Latitude: _____ Feet South of _____ Deg. _____ Min. _____ Sec.
Longitude _____ Feet West of _____ Deg. _____ Min. _____ Sec.

Company: Danny Webb Construction, Inc.

	Casing & Tubing	Used in drilling	Left in well	Cement fill up Cu. Ft.
Address: P O Box 267 Lochgelly, WV 25866	13 - 10"	15	15	3 sks. CTS
Agent: Danny Webb	9 5/8"	672	672	200 sks CTS
Inspector: Rod Dillon	7	1430	1430	240 sks CTS
Date Permit Issued: 12/14/06	4 1/2"	2776	2776	380 sks CTS
Date Well Work Commenced: 1/2/07	2 "	2600	2600	
Date Well Work Completed: 1/4/07				
Verbal Plugging:				
Date Permission granted on:				
Rotary X Cable Rig				
Total Depth (feet):				
Fresh Water Depth (ft.):				
Salt Water Depth (ft.):				
Is coal being mined in area (N/Y)?				
Coal Depths (ft.):				

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Office of Oil & Gas
JUL 21 2008
WV Department of
Environmental Protection

OPEN FLOW DATA

Producing formation Weir Pay zone depth (ft) 2757
Gas: Initial open flow 2806 MCF/d Oil: Initial open flow _____ Bbl/d
Final open flow 50 MCF/d Final open flow 500 Bbl/d
Time of open flow between initial and final tests _____ Hours
Static rock Pressure _____ psig (surface pressure) after _____ Hours

Second producing formation _____ Pay zone depth (ft) _____
Gas: Initial open flow _____ MCF/d Oil: Initial open flow _____ Bbl/d
Final open flow _____ MCF/d Final open flow _____ Bbl/d
Time of open flow between initial and final tests _____ Hours
Static rock Pressure _____ psig (surface pressure) after _____ Hours

NOTE: ON BACK OF THIS FORM PUT THE FOLLOWING: 1). DETAILS OF PERFORATED INTERVALS, FRACTURING OR STIMULATING, PHYSICAL CHANGE, ETC. 2). THE WELL LOG WHICH IS A SYSTEMATIC DETAILED GEOLOGICAL RECORD OF ALL FORMATIONS, INCLUDING COAL ENCOUNTERED BY THE WELLBORE.

Signed: Danny Webb
By: Danny Webb
Date: 6/30/08

AUG 01 2008

FAY 0508

Drill out cement plug at surface drill cement from 1449' to 1645'. Drill CIBP at 1645' and clean out to 2806 (TD). Run 1100' of 4 1/2' casing tie into existing casing CTS with 140 sacks of cement run 2 3/8" tubing and packer and set at 2600'.

WELL LOG

Sand and shale	0	1000
Shale	1000	1012
Sand	1012	1150
Shale	1150	1542
Ravenclyff	1542	1608
Shale	1608	2083
Sand	2083	2126
Shale	2126	2145
Little Lime	2145	2210
Pencil Cave	2210	2250
Big Lime	2250	2568
Shale	2568	2650
Weir	2650	2722
Slate	2722	2806
TD	2806	

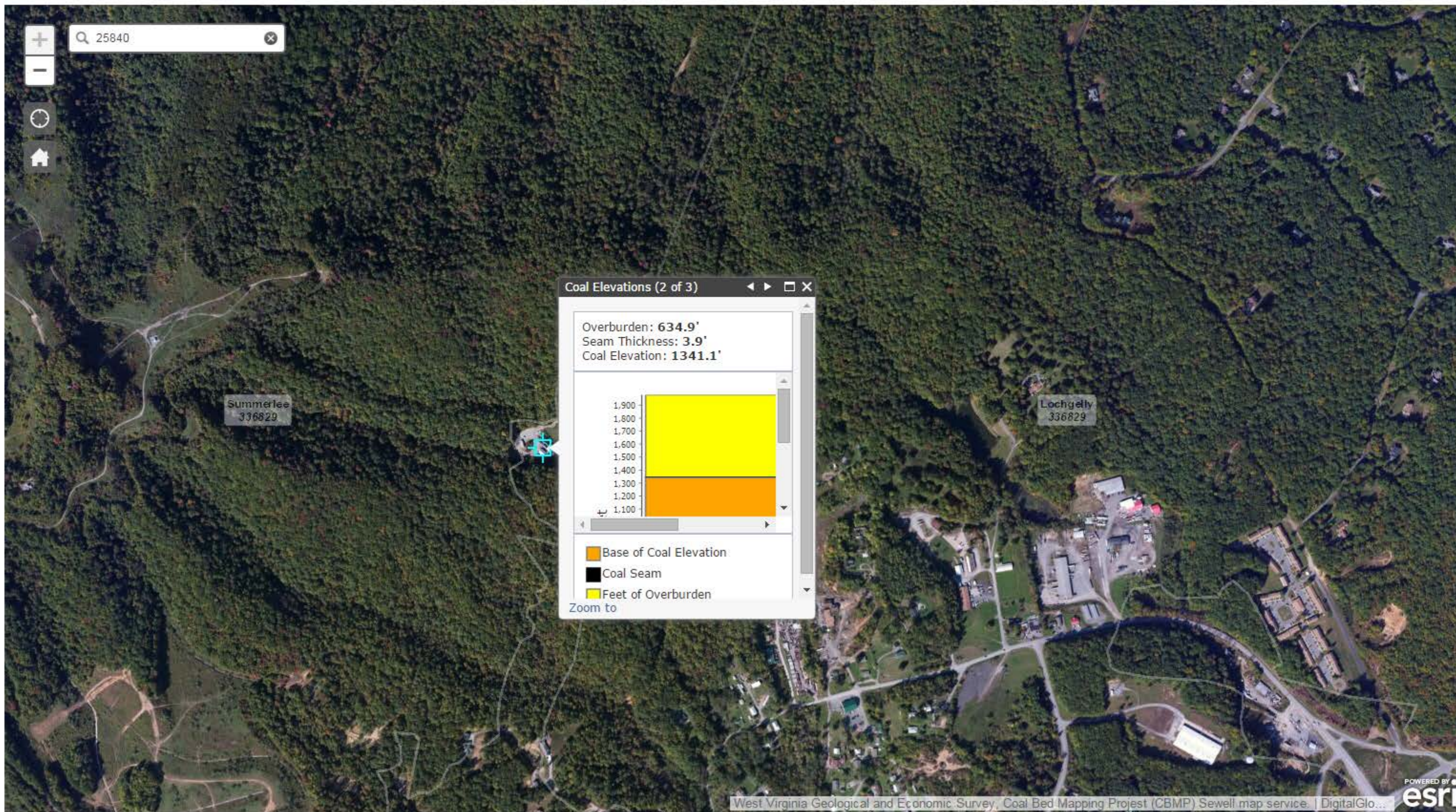
APPENDIX 8

Zoom in and click on coal mining, boundaries, structural contours to get further information.

Layer/Legend Tools Info

Use the slider bar to adjust transparency.

- Reference
- Sewell Coal
 - Coal Bed Boundaries
 - Underground Mine Labels/Outlines
 - Mined and Remaining Coal
 - Coal Elevation
 - Total Bed Thickness
 - Net Coal Thickness
 - Percent Parting
 - Overburden



Zoom in and click on coal mining, boundaries, structural contours to get further information.

Layer/Legend Tools Info

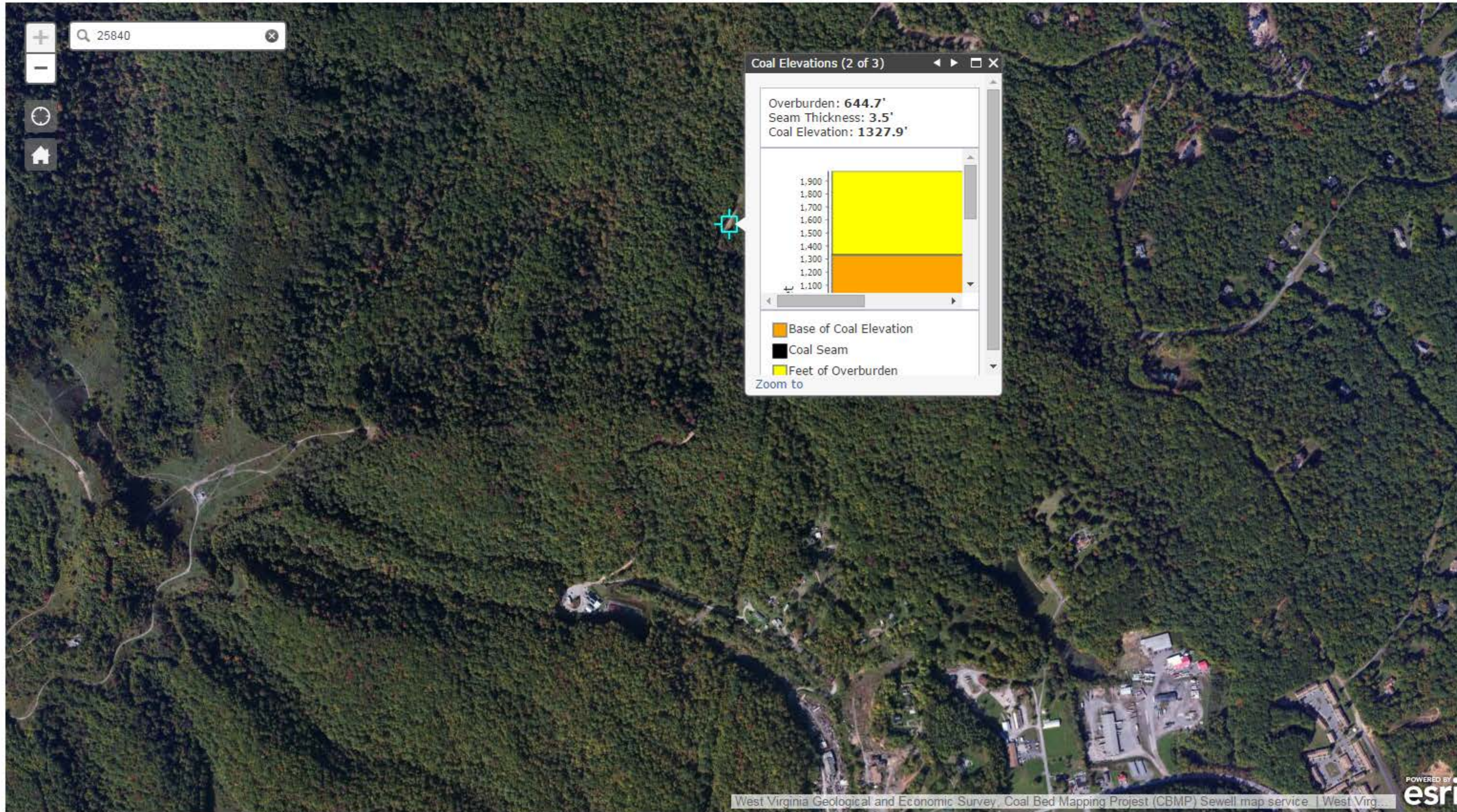
Use the slider bar to adjust transparency.

Reference

- Tax Districts
- Tax District Labels
- 7.5 Minute Quadrangles
- 7.5 Minute Quadrangle Labels
- Counties
- County Labels
- Planning & Development Regions
- State Boundary

Sewell Coal

- Coal Bed Boundaries
 - Adequate Data Control
 - Coal Outcrop
 - Coal Outcrop
 - Coal Outcrop
 - Final Map Extent
 - Stratigraphic Termination
 - Temporary Map Extent
- Underground Mine Labels/Outlines
- Mined and Remaining Coal
- Coal Elevation
- Total Bed Thickness
- Net Coal Thickness
- Percent Parting
- Overburden



APPENDIX 9

Zoom in and click on coal mining, boundaries, structural contours to get further information.

Layer/Legend Tools Info

Switch Basemap

Switch Basemap:

- Imagery
- Imagery with Labels
- Streets
- Topographic
- Dark Gray Canvas
- Light Gray Canvas
- National Geographic
- Oceans
- Topographic
- OpenStreetMap

Search: []

North Hills #1A (0508)

Summerlee 336829

North Hills #1 (0460)

Coal Status (1 of 3)

- Underground Mined**
- Mine ID: 336829B
- Mine Name: LOCHGELLY
- Company Name: UNKNOWN
- Mine Map Document
- Mine Information
- Other Company Listings

Zoom to

POWERED BY esri

West Virginia Geological and Economic Survey, Coal Bed Mapping Projes...