west virginia department of environmental protection

Revisions to Water Quality Standards Variances for Martin Creek, Maple Run, Left Fork Little Sandy Creek Watersheds

with Associated

Draft Pollutant Minimization Programs

May 29, 2025

Prepared by
Division of Land Restoration - Office of Special Reclamation
Division of Water & Waste Management

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X. Attachments

I. Introduction

The following document provides information concerning the proposed revisions to the water quality standard variances for the Martins Creek, Maple Run, and Left Fork Little Sandy Creek and their tributaries in the Chear River and Tygart Valley River Watersheds. Included herein is a Draft Pollution Minimization Program for each of the watershed variances.

II. Background

Past coal mining operations in the Cheat River and Tygart Valley River basins in north central West Virginia have resulted in acid and metal loading of numerous streams in these watersheds. Consequently many of these streams have been unable to provide a habitat capable of sustaining aquatic life associated with the Category B - propagation and maintenance of fish and other aquatic life designated use and have been unable to attain the Category C - water contact recreation use.

The West Virginia Department of Environmental Protection's (WVDEP) Office of Special Reclamation (OSR) is charged with restoration of water quality in areas where coal mining operations after August 3, 1977, when the Surface Mining Control and Reclamation Act (SMCRA) was signed into law, have resulted in degradation. In the state of West Virginia, OSR is required to obtain a National Pollutant Discharge Elimination System (NPDES) permit for each outfall over which it has jurisdiction. In many cases, treatment of individual outfalls to attainment with water quality standards (WQS) would result in no net benefit to watersheds because once the treated water would enter a stream, it would combine with water of degraded quality from other sources such as that emanating from abandoned mine land (AML) areas that are not subject to NPDES permitting.

Recognizing this fact, OSR identified the need for an alternative treatment structure that would result in an overall watershed improvement in the Cheat River and Tygart Valley River watersheds while maximizing financial resources. The alternative treatment methodology chosen involved instream lime dosing and a centralized water treatment facility for metals removal and pH improvement (see Attachments 1, 2, 4 and 5 for details). In order to allow time for the alternative treatment to be fully implemented and optimized by OSR, WVDEP proposed WQS variances during the 2015 triennial review of W. Va. C.S.R. §47-2, Requirements Governing Water Quality Standards as follows:

> 7.2.d.8.2. A variance pursuant 46CSR6, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to the Division of Land Restoration's Office of Special Reclamation's discharges into Martin Creek of Preston County and its tributaries, including Glade Run, Fickey Run, and their unnamed tributaries. The following existing conditions will serve as

instream interim criteria while this variance is in place: pH range of 3.2-9.0, 10 mg/l total iron, and 15 mg/l dissolved aluminum. Alternative restoration measures, as described in the variance application submitted by the Division of Land Restoration's Office of Special Reclamation, shall be used to achieve significant improvements to existing conditions in these waters during the variance period. Conditions will be evaluated during each triennial review throughout the variance period. This variance shall remain in effect until action by the secretary to revise the variance or until July 1, 2025, whichever comes first.

7.2.d.11.1. A variance pursuant to 46CSR6, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to the Division of Land Restoration's Office of Special Reclamation's discharges into Maple Run, Left Fork Little Sandy Creek, and their unnamed tributaries. The following existing conditions will serve as instream interim criteria while this variance is in place: For Maple Run, pH range of 3.3-9.0, 2 mg/l total iron, and 12 mg/l dissolved aluminum; for Left Fork Little Sandy Creek, pH range of 2.5-9.0, 14 mg/l total iron, and 33 mg/l dissolved aluminum. Alternative restoration measures, as described in the variance application submitted by the Division of Land Restoration's Office of Special Reclamation, shall be used to achieve significant improvements to existing conditions in these waters during the variance period. Conditions will be evaluated and reported upon during each triennial review throughout the variance period. This variance shall remain in effect until action by the secretary to revise the variance or until July 1, 2025, whichever comes first.

These variances were approved by the WV Legislature in the 2016 regular session and were approved by United States Environmental Protection Agency (EPA) by letters dated June 15, 2017 and February 20, 2018 respectively (see Attachments 3 and 6).

III. Variance Progress

Over the course of these variances, impressive progress has been made toward improving Muddy Creek to meet its Category B2 trout stream designated use and Sandy Creek to meet its Category B1 warm water aquatic life use designation as well as for both streams to meet their Category A (water supply, public) and Category C (water contact recreation) use designations due to in-stream acid mine drainage (AMD) treatment, which is in the upstream reaches of Muddy Creek and Sandy Creek. The water quality of the streams to which this variance applies has improved greatly, however more improvement is needed in order for these waters to consistently attain WQS.

A. Muddy Creek Watershed

i. Martin Creek

Before in-stream treatment began in early 2018 in Martin Creek, the stream had water quality measurements of pH ranging between 3.2 and 4.0 standard units, with total iron ranging between 3 and 35 mg/l and dissolved aluminum ranging between 5 and 35 mg/l. In addition to the impaired water quality in Martin Creek, benthic macroinvertebrates have been severely impaired WV Stream Condition Index (WVSCI) scores based on several surveys completed from late 1990s to 2010s and no documented fish community.

Since the onset of in-stream treatment, pH within the stream has increased to a range of 3.8 to 7 standard units, with an average of 5.3 standard units. The total iron and dissolved aluminum have decreased as well. Monthly water quality sampling has shown total iron ranging between 0.26 mg/l and 15.9 mg/l with a monthly average of 4.3 mg/l. Monthly water quality sampling has shown dissolved aluminum ranging between 0.07 mg/l and 12.9 mg/l with a monthly average of 3.5 mg/l. There has also been an increase in benthic macroinvertebrates from several surveys completed from 2019 to 2021 along Martin Creek. While highly variable, WVSCI scores have ranged from 22.29 to 50.74, which is impaired severely to impaired slightly. To be considered meeting its aquatic life use, a waterbody must have a score higher than a 72. Benthic macroinvertebrate reports from 2022, 2023 and 2024 were 41.10, 22.18 and 33.00 respectively. There remains no documented fish community within Martin Creek.

ii. Muddy Creek

Since in-stream treatment started on Martin Creek and since point-source AMD treatment commenced at the T&T Fuels Water Treatment Facility on Muddy Creek, there have been vast improvements along Muddy Creek. Water quality samples from 2021 to 2023 just upstream of the confluence of Muddy Creek with Cheat River have shown pH averaging 7.35 standard units, total iron averaging 1.28 mg/l and dissolved aluminum of 0.05 mg/l. Pre-treatment water quality conditions in lower Muddy Creek were dominated by the discharge of Martin Creek, thus severely impaired. There has also been an increase in benthic macroinvertebrates from several surveys completed from 2019 to 2021 along Muddy Creek. The WVSCI scores have been constantly between 50 to 70 seasonally, which is impaired slightly. Benthic macroinvertebrate scores from 2022, 2023 and 2024 were 60.50, 52.88 and 64.46 at milepoint 0.0 and 53.02, 58.84 and 60.23 at milepoint 2.1 respectively. Before treatment in 2018, the benthic macroinvertebrate community had severely impaired WVSCI scores. During the 2023 fish survey of Muddy Creek, 11 species were collected totaling 158 individuals at two sample locations below the confluence of Martin Creek. In the pre-treatment fish survey in 2015, no fish were observed within the sample reach above the confluence with the Cheat River.

B. Sandy Creek Watershed

i. Maple Run

In-stream treatment began in mid 2018 in Maple Run. Before treatment, the stream had water quality measurements of pH ranging between 3.5 and 4.3 standard units with an average of 3.8 standard units. Maple Run had total iron ranging between 0.7 and 2.1 mg/l and dissolved aluminum ranging between 4.1 and 12.8 mg/l. In addition to the impaired water quality in Maple Run, benthic macroinvertebrates have been severely impaired based on a survey done to assess watershed pre-Total Daily-Maximum Load (TDML) in 2013. Also in 2013, Maple Run was documented to have no fish taxa.

Since the onset of in-stream treatment in the headwaters of Maple Run, pH within the stream has increased to a range of 5.5 to 8.6 standard units, with an average of 6.6 standard units. Total iron and dissolved aluminum have decreased as well. Monthly water quality sampling has shown total iron ranging between 0.15 mg/l and 5.1 mg/l with a monthly average of 2.5 mg/l and dissolved aluminum ranging between non-detect and 0.8 mg/l with a monthly average of 0.08 mg/l. There has also been an increase in benthic macroinvertebrates from several surveys completed from 2020 to 2023 along Maple Run. WVSCI scores have ranged between 55.62 and 81.67, which is impaired slightly to unimpaired good quality. Two fish surveys have been conducted since in-stream treatment began. In 2021, seven fish species and 135 individuals were collected and in 2023, six fish species and 114 individuals were collected.

ii. Left Fork of Little Sandy Creek

In-stream treatment began in late 2018 in the Left Fork of Little Sandy Creek. Before treatment, the stream had water quality measurements of pH ranging from 2.6 to 3.6 standard units with an average of 3.1 standard units, total iron ranging between 3.74 and 35.3 mg/l and dissolved aluminum ranging between 5.6 and 32.3 mg/l. In addition to the impaired water quality in the Left Fork of Little Sandy Creek, benthic macroinvertebrates have been severely impaired based on a survey done to assess watershed pre-TDML in 2012. Also in 2013, Left Fork of Little Sandy Creek was documented to have no fish taxa.

After the in-stream doser was constructed on Left Fork of Little Sandy Creek, the pH rose from pre-treatment levels to range between 4.9 and 8.3 standard units, with an average of 6.8 standard units. Total iron and dissolved aluminum have reduced. Monthly water quality sampling has shown total iron ranging between 2.5 mg/l and 31.9 mg/l with an average of 10.7 mg/l. The reduction in dissolved aluminum has been more pronounced. Dissolved aluminum has ranged between non-detect and 4.3 mg/l with an average of 0.3 mg/l. Benthic macroinvertebrates and fish taxa have returned to the lower reaches of the Left Fork of Little Sandy Creek. Several benthic macroinvertebrate and fish surveys have been completed at the sampling location at the confluence of Left Fork and Right Fork of Little Sandy Creek. While there is a broad range of WVSCI scores between 39.78 and 64.09, which is impaired moderately to slightly, it is a great improvement from pre-treatment scores of 10.6 and 11.49. In 2021, two fish species and 46 individuals were collected and in 2023, three fish species and 53 individuals were collected. Of note, one of the species collected in the 2023 fish survey was the mottled sculpin (*Cottus bairdii*), as this fish species is documented to be intolerant to moderately intolerant of stream pollution.

iii. Sandy Creek

The effects of in-stream treatment within Maple Run and Left Fork of Little Sandy Creek has shown a rapid improvement on Little Sandy Creek and subsequently the Sandy Creek watershed. In water quality samples beginning in 2020 at the confluence of Little Sandy Creek there has been an average pH of 6.7 standard units, a total iron average of 1.9 mg/l and a dissolved aluminum of 0.04 mg/l. Along Sandy Creek, the last sampling location before the stream enters a deep canyon to its confluence with Tygart Lake, the pH has averaged 7.2 standard units, total iron has averaged 0.8 mg/l, and dissolved aluminum has averaged 0.02 mg/l. Pre-treatment water quality of Sandy Creek and Little Sandy Creek was dominated by the discharges of Maple Run and Left Fork of Little Sandy Creek as described above.

With the improved water quality, profound impacts have been observed in the benthic macroinvertebrate and fish communities of the Sandy Creek watershed from surveys completed beginning in 2020. In pre-treatment (2015) surveys of the benthic macroinvertebrate communities in various sampling locations in Little Sandy Creek found the upper reach to be impaired severely with a WVSCI score of 12.5 and downstream above the confluence of Sandy Creek was also found to be impaired severely with a WVSCI score of 12.54. Within Sandy Creek, at the most downstream sampling location, a WVSCI score of 63.17, which is impaired slightly, was found. Since the beginning of in-stream treatment and during yearly sampling from 2020 to 2023, Little Sandy Creek has seen WVSCI scores ranging between 49.4 to 76.6 which is slightly impaired to unimpaired and within the headwaters and downstream portion near the confluence with Sandy Creek, the WVSCI scores have been ranged between 53.21 to 79.54. Within Sandy Creek mainstem, there have been WVSCI scores ranging between 77.32 to 84.98 which is unimpaired and very good quality. During the 2015 pre-treatment survey of the watershed, it was found that no fish were present at the sampling locations along Sandy Creek and Little Sandy Creek. At the last sampling location in Sandy Creek, during the 2023 fish survey 10 fish species were collected totaling 445 individuals. Within the headwaters of Little Sandy Creek, four species of fish were found with 108 individuals.

Please see the following spreadsheet for Maple Run, Left Fork of Little Sandy Creek and Sandy Creek Watershed aquatic life data:

X WVDEP_WQSAS_Sandy_Creek_Watershed_DataI.xlsx

Please see the following spreadsheet for Martin Creek and Muddy Creek Watershed aquatic life data:

X WVDEP_WAB_Cheat_Muddy_Data_v1.xlsx

Please see the following spreadsheet for Martin Creek and Little Sandy Creek NPDES data:

X Martin Ck_LFLS_NPDES and Raw.xlsx

IV. Justification for Continuation of Variances

When these variances were initially issued, it was not known how long it would take the streams to which they apply to attain WQS, therefore, the selection of an appropriate variance term was difficult. A conservative variance term of ten years was ultimately chosen, however it has become apparent that this term did not provide an adequate amount of time for these streams to attain applicable WQS and achieve their full designated uses. EPA recognized the uncertainty of the amount of time that would be necessary to achieve WQS for these streams in their approval letters of the variances stating the following:

> *"Due to the long-term, multifaceted acid mine drainage problem in this watershed, it is difficult to determine precisely how long it will take the water quality, and subsequently aquatic life, to be restored."*

The water quality improvements that have been observed over the course of these variances however, are a testament to the success of the alternative treatment methodologies employed therefore it would be logical to continue this treatment while working toward ultimate achievement of WQS and full realization of the Category B aquatic life and Category C water contact recreation designated uses.

In a letter written to EPA by United States Senator Shelly Moore Capito dated November 9, 2023 (Attachment 7), the Senator expressed concerns regarding EPA approval of future variances of this nature as a result of additional federal variance requirements codified after WVDEP's work began on the initial variances. EPA Regional Administrator Adam Ortiz recognized the improvements realized over the course of these variances in his response letter to Senator Capito dated December 20, 2023 (Attachment 8) stating the following:

> "*EPA agrees that this watershed-scale approach has achieved excellent results in the Muddy Creek watershed. As noted in your letter, water quality in nearly 20 stream miles has been significantly improved; a remarkable achievement given these same waters previously ranked among the most degraded in the state."*

In this letter, Administrator Ortiz further stated the following:

> *"The Agency (EPA) wholeheartedly supports the innovation and collaboration that has enabled efforts to restore the Muddy Creek watershed to succeed. Further, we are fully committed to working with WVDEP on the development of WQS variances and/or other regulatory tools in other locations in the state, where appropriate and beneficial to facilitate WV's progress in addressing AMD impacts to its waters."*

WVDEP appreciates EPA's recognition of the improvements that have been observed over the course of these variances and EPA's reassured commitment to assisting WVDEP in future efforts such as these.

In addition to the success that has been attained by the alternative treatment measures that are already in place, WVDEP's Office of Abandoned Mine Lands and Reclamation (AML&R) is slated to begin construction of an instream treatment facility to capture sludge produced below the Left Fork of Little Sandy Creek Instream Doser in 2026. This will remove a large portion of sludge which currently collects within the stream by injecting it into underground mine workings. With the inclusion of this new water treatment facility, an additional 3.8 miles of the stream will be improved.

In light of the substantial overall watershed improvements that have been observed over the initial period of these variance as a result of the alternative treatment methodologies employed and the anticipated substantial additional pollutant removal as a result of the system to be installed by AML&R, WVDEP wishes to seek continuation of these variances in order to afford the time necessary to meet all applicable WQS and to fully achieve the assigned designated uses.

V. Assessment of Highest Attainable Condition

40 C.F.R. § 131.14 requires assessment of Highest Attainable Condition (HAC). Although the goal is to achieve compliance with WQS, it is essential to set HAC at levels that can realistically and consistently be achieved by the alternative treatment methods employed over the term of this variance recognizing that it will take time to achieve compliance with WQS.

The following tables illustrate the original variance limits for dissolved aluminum, total iron and pH as well as the new proposed limits. In all but one case, substantial reduction in pollutant load and movement toward compliance of WQS are reflected in the new proposed limits. The only exception is an increase in total iron from 2 mg/l (2,000 µg/l) to 5 mg/l (5,000 µg/l) for Maple Run and the Unnamed Tributary (UNT) of Maple Run. In this case, the original variance limit has become too conservative as a result of changing water chemistry which resulted from activities that were performed in order to isolate an underground mine fire. These activities are discussed in detail in the Term of Variance section of this document. In all cases, pH has improved greatly. A pH variance is no longer necessary for Maple Run and Left Fork of Little Sandy Creek.

Table 1: Glade Run, Martin Creek, UNTs. Glade Run, UNTs. Martin Creek proposed criteria

Glade Run, Martin Creek, UNTs. Glade Run, UNTs. Martin Creek		
Parameter	**2015 variance criteria**	**2025 proposed criteria**
Dissolved aluminum	15 mg/l (15,000 µg/l)	10,000 µg/l
Total iron	10 mg/l (10,000 µg/l)	8,000 µg/l
pH	3.2 - 9.0 su	5.0 - 9.0 su

Table 2: Maple Run and UNT. Maple Run proposed criteria

Maple Run and UNT. Maple Run		
Parameter	**2015 variance criteria**	**2025 proposed criteria**
Dissolved aluminum	12 mg/l (12,000 µg/l)	6,000 µg/l
Total iron	2 mg/l (2,000 µg/l)	5,000 µg/l
pH	3.3 - 9.0 su	no variance needed

Table 3: Left Fork Little Sandy Creek proposed criteria

Left Fork Little Sandy Creek		
Parameter	**2015 variance criteria**	**2025 proposed criteria**
Dissolved aluminum	33 mg/l (33,000 µg/l)	7,000 µg/l
Total iron	14 mg/l (14,000 µg/l)	12,000 µg/l
pH	2.5 - 9.0 su	no variance needed

VI. Term of Variance

Due to the complexity of this issue, the anticipated additional pollutant removal as a result of the system to be installed by AML&R and the time that will be required in order for each of the streams subject to this variance to meet applicable numeric WQS and designated uses, WVDEP wishes to seek continuation of these variances for an additional period of twenty (20) years. Further justification for the requested variance term is discussed below.

Coal mining began within the Martin Creek, Maple Run and Left Fork Little Sandy Creek watersheds in the late 1800's. The decrease in water quality started shortly after the mining operations began. Within both watersheds, underground mining was the first type of coal mining and in the 1950's and 1960's a transition to surface mining occurred. Upon the passage of SMCRA in 1977, coal mining operations became responsible for the water quality discharging from the permitted area. After the passage of SMCRA, all post-law AMD has been treated at source with little to no improvement of water quality, due to the large number of pre-law AMD sources within each watershed.

Over 140 years since coal mining began within these watersheds and nearly 50 years since the passage of SMCRA, little to no improvement of the water quality has been recorded. Since the EPA approval of the Martin Creek, Maple Run, and Left Fork of Little Sandy Creek variances in 2017 and 2018, there have been measurable improvements to the water quality within these two watersheds, which have been impaired for over 135 years. AMD will continue to be generated in these watersheds well past the end of the request for the 20 year term of this proposed variance.

Over the past five years of the current variance approved within Martin Creek, Maple Run and Left Fork of Little Sandy Creek in 2017 and 2018, there have been several watershed wide disturbances which have caused difficulties with the in-stream treatment. The influx of beavers, increased logging operations and climate impacts have been observed within each watershed. These activities are outside of the control of the OSR and should be taken into consideration when evaluating the term of the proposed variance.

Beavers have been found within these watersheds for many years, but in very small numbers and in the upper headwaters where water quality was not impaired by AMD from coal mining activities. Beaver immigration and their activities were limited to the upper headwaters due to the low pH of the main stem Martin Creek, Maple Run and Left Fork of Little Sandy Creek. Shortly after infrastructure for water treatment was constructed within each watershed, OSR observed beaver dams being constructed within the main stem streams of Martin Creek, Maple Run and Left Fork of Little Sandy Creek starting below the in-stream treatment areas and near the confluence with larger streams. Over the years of the current variance, they have migrated throughout the entire length of each stream. When in-stream treatment for each watershed was conceptualized, metal precipitate resulting from the increase in pH was to be periodically flushed downstream when there were rainfall events. However, when the beavers migrated into the main stems of each stream, the beaver dams began to impound metal precipitate behind each dam. While the return of the beaver is a positive sign that instream treatment is restoring the ecological processes in these watersheds, the beaver dams have made the OSR compliance with the current variance more difficult to manage specifically within the Martin Creek and Maple Run watersheds. Beavers have changed how water moves through each watershed causing the metal precipitate to remain with each watershed for a longer amount of time before being flushed downstream. Within time, these beaver dams could become wetlands, but until fully established, this issue will likely remain within each watershed throughout the 20 year term of the proposed variance.

Within the watersheds of Martin Creek, Maple Run and Left Fork of Little Sandy Creek, large tracts of land have been subject to logging activities during the current variance. Logging has always been a part of these watersheds, but within the past five years logging operations have become more numerous and noticeable within the landscape. Within the logging industry, best management practices (BMPS) are to be used however, at times, it does not stop erosion and increased sedimentation of the streams. The increase of sedimentation from logging activities has been seen to elevate the metal precipitation within the streams. Most notable was a logging operation using a former coal haul road next to the outcrop of the Upper Freeport coal seam next to and crossing Left Fork of Little Sandy Creek. When the logging operation began in the winter of 2020, runoff from logging roads and the log landing laden with sediments were directed into the stream during logging operations Water samples were collected upstream and downstream of this logging operation. Due to the increased sedimentation from the logging operation, OSR exceeded the current variance's NPDES limits at the compliance point nearly 0.5 miles downstream of the logging. Cumulative effects from increased logging within each watershed have been seen in the past, but this example is the only time when it was specifically measured and documented. Within the 20 year term of the variance, it is possible to see this type of disturbance affecting compliance.

The Martin Creek, Maple Run and Left Fork of Little Sandy Creek watersheds have seen extremes in climate variability over the past five years. In 2017-2018, the watersheds each saw record totals of annual precipitation, but in the summer and fall of 2024, they saw exceptional drought. Maple Run completely dried up for a period of time due to the lack of rainfall in 2024. The more frequent and intense weather events, which are in the long term forecasting within these watersheds, will add difficulty in maintaining consistent treatment within each watershed over the 20 year term of the proposed variance.

Within the headwaters of the Maple Run watershed in the Sandy Creek watershed, there is an underground mine fire (UMF) in the Pittsburgh coal seam. The UMF is in an area known as

Scotch Hill and was reported to AML&R in December 2011. From 2011 until 2017, the UMF was monitored by AML&R and in late 2017, the UMF became an emergency project as it began to harm human health and safety. From late 2017 to 2020, several different phases of the emergency project were constructed to isolate the UMF by; removing surface vegetation and coal, trenching, grouting and constructing drainage structures around the coal seam outcrop. The current strategy being implemented for control of the UMF is to isolate the coal seam and let it burn itself out. In the summer of 2024, several new areas were identified outside of the perimeter of the UMF. At this time, there are no plans to expand the containment area or extinguish the UMF, only monitoring known areas of concern.

When the activities to isolate the UMF occurred from 2017 to 2020, the remaining underground mine workings were opened, trenched, removed and drained causing the known areas of AMD seepage to move to other areas and portals. This has caused an increase in both AMD production and flow from the underground mine workings. These two factors have changed the iron loadings within the headwaters of Maple Run. With increased AMD production in Maple Run and the isolate/monitor approach to control the UMF, this issue will remain problematic through the 20 year term period.

The final designs for the Left Fork of Little Sandy Creek Water Treatment Facility are under review at this time by AML&R. The construction of the facility will begin as soon as possible, but is anticipated for 2026. Once the construction begins, the contract is awarded for 1 year to complete construction. This timeframe does not account for any issues that may arise during the construction process or any change orders that may be required. Once construction has been completed, another 3 to 6 months may be required to optimize treating efficiencies. The operation of this water treatment facility will be for the duration of the 20 year variance term to remove the metal precipitate from the in-stream treatment of AMD within the Left Fork of Little Sandy Creek. With the inclusion of the water treatment facility to remove metal precipitate from the stream, an additional 3.8 miles of the stream will be improved.

Reassessment of the requested interim WQS criteria will occur every five years coinciding with NPDES permit reissuance. If it is determined that more stringent criteria are warranted, the interim variance criteria will be adjusted accordingly and the revised criteria will be shared with EPA as well as subject to public comment at permit reissuance as required by 40 C.F.R. § 131.14.

VII. Draft Pollutant Minimization Program

In cases where no additional feasible pollutant control technology can be identified, 40 C.F.R. § 131.14 requires the interim criteria to reflect the greatest pollutant reduction achievable with the pollutant control technologies installed at the time the State adopts the WQS variance and the adoption of a Pollutant Minimization Program (PMP). The PMP must contain a structured set of activities to improve processes and controls that will prevent and reduce pollutant loadings. Following is an assessment of the pollutant sources within the watersheds subject to this variance as well as descriptions of pollutant minimization actions to be taken as part of the PMP.

A. Muddy Creek Watershed

i. Pollutant Source Identification

EPA approved WVDEP's *Total Maximum Daily Loads (TMDLs) for Select Streams in the Cheat River Watershed, West Virginia* in a letter dated December 7, 2010. The TMDL characterized sources causing and contributing to the pH, total iron and dissolved aluminum impairments in the Muddy Creek watershed. During TMDL development, watersheds for each impaired stream are subdivided into smaller subwatersheds to more accurately represent pollutant sources (Figure 1). Pollutant source specifically related to pH and dissolved metals impairments identified in Muddy Creek prescribed load reductions from direct sources of pollution, including from AML&R, Acid Mine Drainage (AMD) seeps, bond forfeiture sites (i.e., associated with permits issued to the Office of Special Reclamation) and active mining sites. Wasteload allocations and load allocations were assigned to these sources. To see detailed TMDL information select "Cheat" from the lists of watersheds on the following webpage: https://dep.wv.gov/WWE/watershed/TMDL/grpa/Pages/default.aspx. The TMDL document, allocation spreadsheets and technical documentation are provided.

WVDEP's AML&R identified locations of multiple types of abandoned mine lands in the Cheat River watershed from their records. Source tracking efforts by WVDEP DWWM identified additional AML&R discharges, seeps, portals and refuse piles. The locations of these sources are shown for Muddy Creek along with current treatment locations (as described in Section II-A above) in Figure 2.

Facilities that were subject to SMCRA during active operations are required to post a performance bond to ensure completion of the reclamation requirements. When a bond is forfeited, WVDEP Special Reclamation assumes the responsibility for the reclamation requirements and, since the TMDL development, have been issued mining NPDES permits. The permits are called bond forfeitures. These are sources of aluminum, iron and acidity. The bond forfeiture sites for the Muddy Creek watershed are shown in Figure 3. Current associated NPDES permits are shown in Figure 4.

Untreated active mining-related point source discharges from deep, surface and other mining areas may have low pH (high acidity) and may be sources of aluminum and iron. These sources will have NPDES discharge permits that contain effluent limits for total iron, total manganese, total suspended solids and pH.

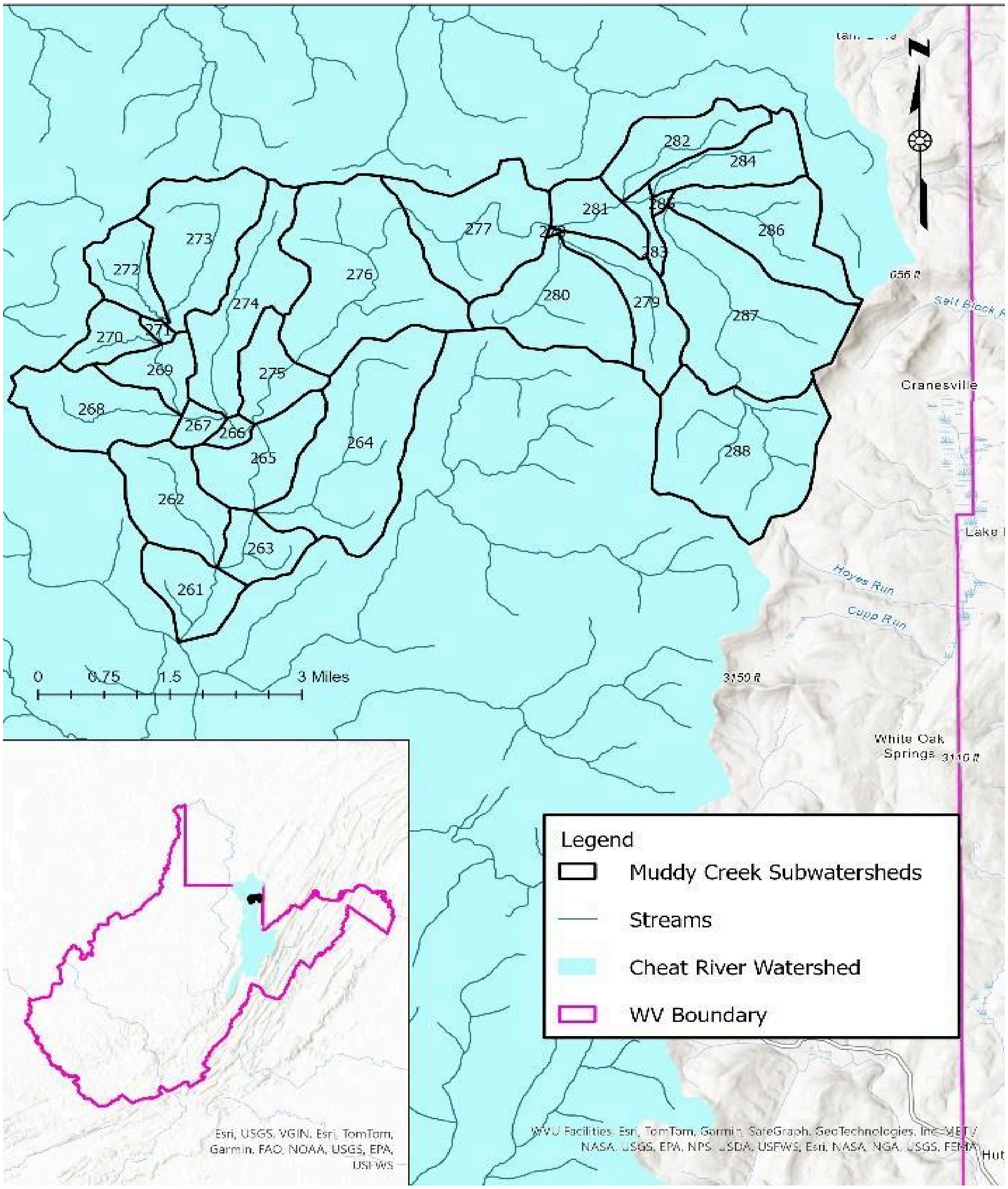

Figure 1. Location of the Muddy Creek subwatersheds used in TMDL development

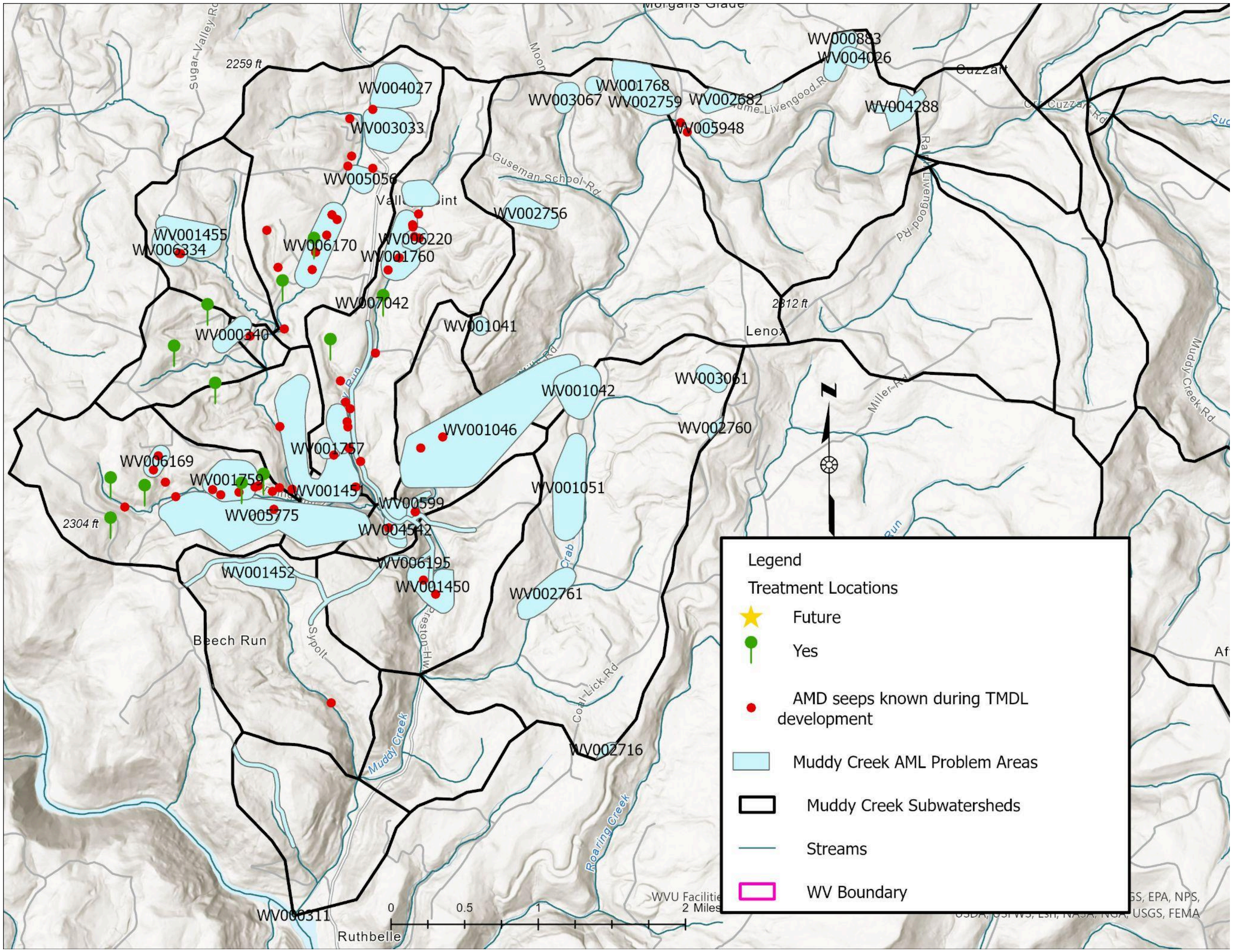

Figure 2: Sources of aluminum, iron and high acidity include identified AMD seeps and AML areas shown with current treatment locations

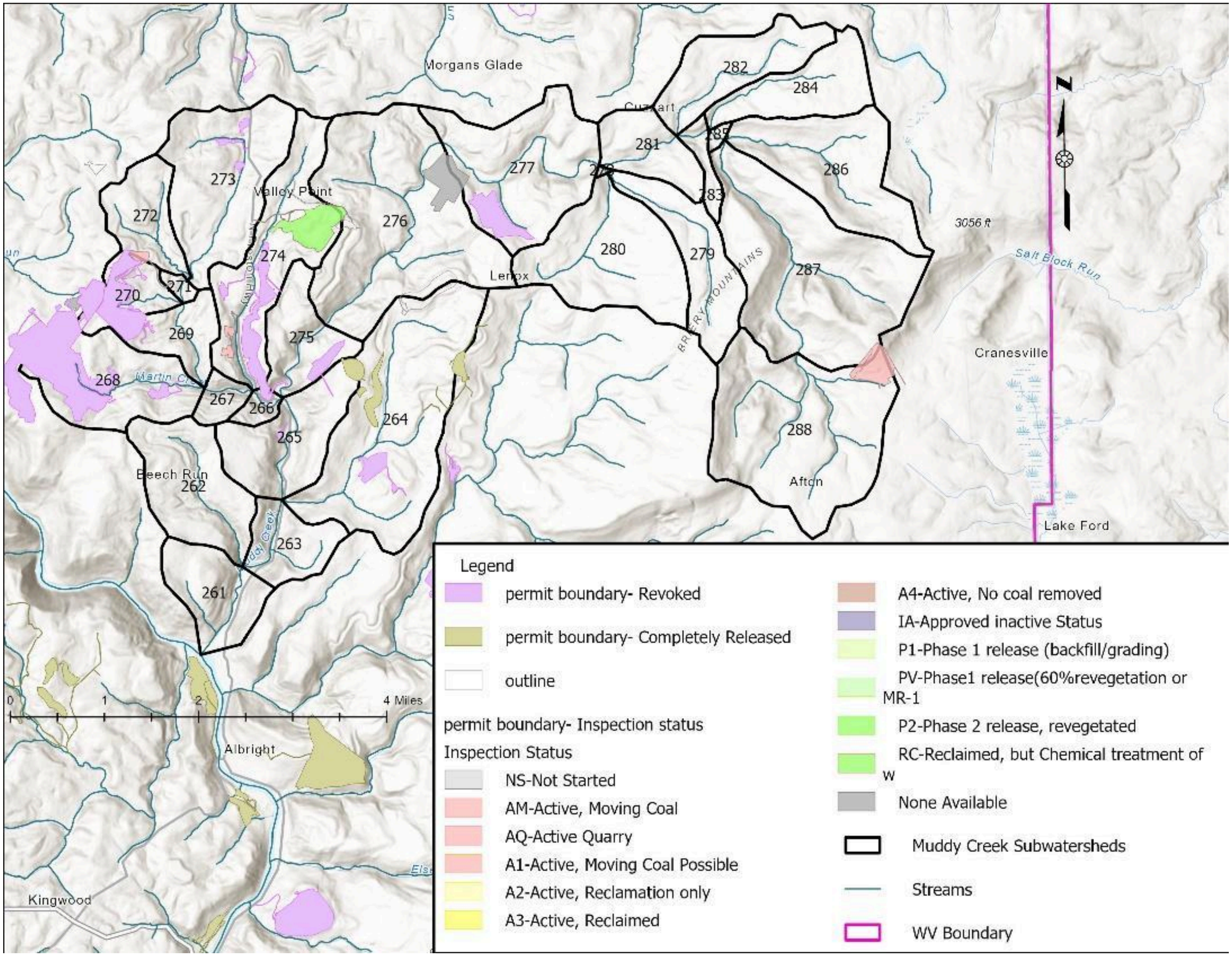

Figure 3: Muddy Creek watershed bond forfeiture sites

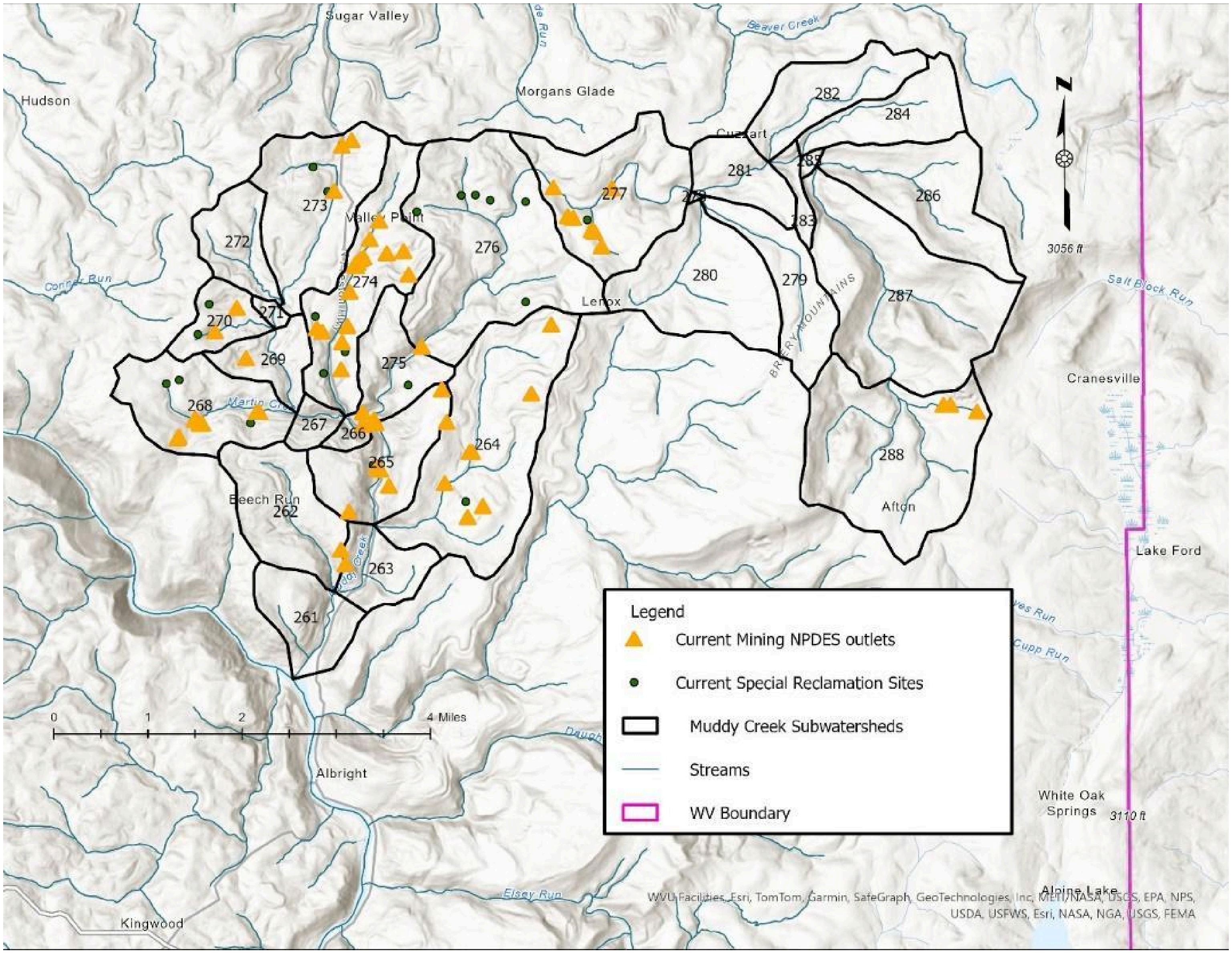

Figure 4: Current mining NPDES outlets and current Special Reclamation sites

ii. Muddy Creek TMDL Summary

a. Aluminum Sources

There are nine streams considered in the aluminum TMDL in the Muddy Creek watershed shown in Figure 5 below. Seven of these streams require aluminum reductions including Muddy Creek, Martin Creek, Fickey Run, Glade Run, UNT/Glade Run RM 1.06 and UNT/Glade Run RM 1.36. There were two active mining permits at the time the TMDL was developed, including WV0063576 and WV0119113. The operable allocation for these permits were 0.75 mg/l total aluminum and 1.47 mg/l total aluminum respectively. Similarly, concentration based operable allocations were assigned to seven bond forfeiture sites of either 0.75 mg/l or 1.47 mg/l (Table 4) Lastly, Table 5 lists the known AML discharges at the time of TMDL development. Out of 57 discharges, 53 required aluminum reductions. No other reductions were made from non-point sources of dissolved aluminum.

b. Acidity/Low pH Sources

There are 11 streams with TMDLs for net acidity (low pH) in the Muddy Creek watershed shown in Figure 6 below. Reduction of acidity were required in all of the 11 streams, including the same streams in which reductions were prescribed for aluminum (i.e., Muddy Creek, Martin Creek, Fickey Run, Glade Run, UNT/Glade Run RM 1.06 and UNT/Glade Run RM 1.36); as well as those without aluminum reductions (i.e., Sypolt Run, UNT/Muddy Creek RM 9.80, UNT/UNT RM 1.02/Muddy Creek RM 9.80, Jump Rock Run and Sugarcamp Run).

The TMDL allocation sheets provide specific amounts of acidity attributed to atmospheric deposition, AML discharges (Table 5), and, given the dynamic nature of pH, acidity attributed to excess aluminum and iron molecules. Allocations for acidity reductions are expressed as alkalinity (i.e., calcium carbonate) additions to the model. The loads of alkalinity assume that 100% will dissolve, thus actual alkaline addition must contemplate how efficiently the alkaline material dissolves to attain water quality standards.

c. Iron Sources

There are 11 streams with TMDLs for Iron in the Muddy Creek watershed shown in Figure 7 below (i.e., Muddy Creek, Sypolt Run, Crab Orchard Run, Martin Creek, Fickey Run, Glade Run, UNT/Glade Run RM 1.06, and UNT/Glade Run RM 1.36, UNT/Muddy Creek RM 9.80, Jump Rock Run and Sugarcamp Run). While the 11 streams are similar to those already appearing as impaired for dissolved aluminum and pH impairment, additional sources of total iron were reduced in the TMDL. As with the aluminum TMDL, two mining permits were represented in the model, as well as seven bond forfeiture sites. Operable allocations of 1.5 mg/l total iron were prescribed for all but one mining permit (WV0119113), which retained technology based limits.

Table 5 lists all AML discharges with their corresponding load reductions for both aluminum and iron. In addition to these non-point sources, the TMDL allocated loads to non-mining NPDES permits for stormwater, individual discharges and drinking water plants. No reductions were prescribed for these sources. Reductions were made to other non-point sediment sources of iron, including forestry, oil/gas, roadways, barren lands and streambank erosion.

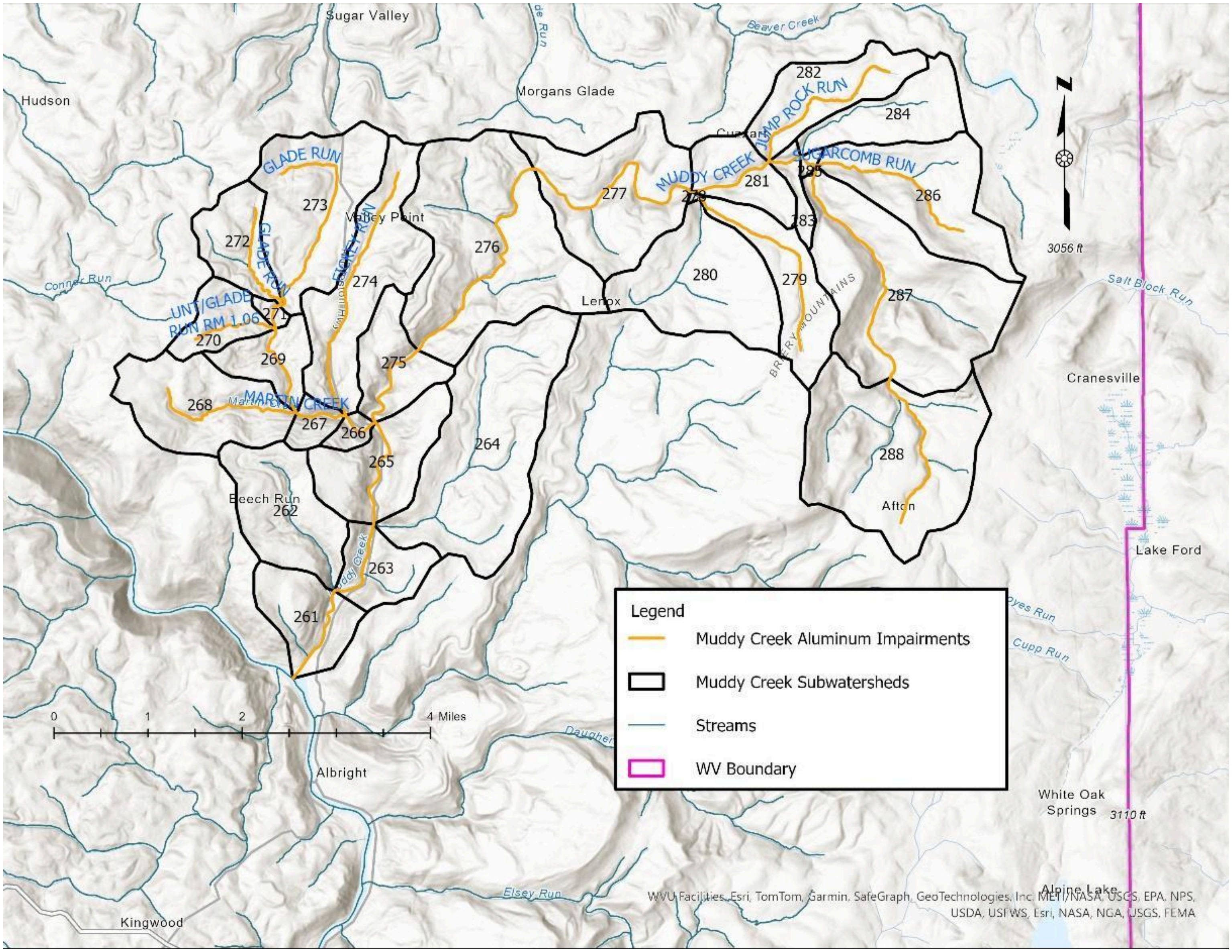

Figure 5: Aluminum impaired waters in Muddy Creek

Table 4: Bond forfeiture sites in Muddy Creek watershed

Stream Code	Stream Name	Metal	SWS	PERMIT	Baseline Load (lbs/yr)	Baseline Concentration (mg/L)	Reduced Load (lbs/yr)	Allocated Concentration (mg/L)
WV-MC-39	Muddy Creek	Aluminum	265	EM-113	45	1.47	45.07	1.47
WV-MC-39-E	Martin Creek	Aluminum	268	S-65-82	2,796	1.47	1426.48	0.75
WV-MC-39-E	Martin Creek	Aluminum	268	U-125-83	126	1.47	64.42	0.75
WV-MC-39-E-2-A	UNT/Glade Run RM 1.06	Aluminum	270	65-78	1,308	1.47	667.20	0.75
WV-MC-39-E-2	Glade Run	Aluminum	273	S-27-83	72	1.47	72.14	1.47
WV-MC-39-E-1	Fickey Run	Aluminum	274	S-91-85	451	1.47	450.82	1.47
WV-MC-39-E-1	Fickey Run	Aluminum	274	UO-519	99	1.47	99.18	1.47

Table 5: Sources of acid mine drainage from Abandoned Mine Land areas

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MC-39-B	Sypolt Run	Aluminum	262	MC39-050-1	8	8	0
WV-MC-39-B	Sypolt Run	Iron	262	MC39-050-1	3,280	58	98
WV-MC-39	Muddy Creek	Aluminum	265	MC39-100-1	55,178	1,586	97
WV-MC-39	Muddy Creek	Iron	265	MC39-100-1	164,489	2,115	99
WV-MC-39	Muddy Creek	Aluminum	265	MC39-350-1	11,902	2,031	83
WV-MC-39	Muddy Creek	Iron	265	MC39-350-1	26,513	2,708	90
WV-MC-39-E	Martin Creek	Aluminum	266	MC39E-100-7	163	46	72

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MC-39-E	Martin Creek	Iron	266	MC39E-100-7	787	61	92
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-1	441	105	76
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-1	139	139	0
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-10	294	13	96
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-10	24	18	27
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-11	241	10	96
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-11	83	13	84
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-12	1,095	33	97
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-12	469	44	91
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-13	1,184	40	97
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-13	1,337	53	96
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-14	803	33	96
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-14	277	44	84
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-2	674	82	88
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-2	109	109	0
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-3	579	5	99
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-3	78	7	91
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-4	217	49	77

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-4	1,462	66	95
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-5	2,534	85	97
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-5	519	114	78
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-6	555	23	96
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-6	191	30	84
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-8	6,814	444	93
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-8	676	593	12
WV-MC-39-E	Martin Creek	Aluminum	268	MC39E-100-9	117	29	75
WV-MC-39-E	Martin Creek	Iron	268	MC39E-100-9	365	39	89
WV-MC-39-E-2	Glade Run	Aluminum	269	MC39E2-100-1	6,053	329	95
WV-MC-39-E-2	Glade Run	Iron	269	MC39E2-100-1	944	439	53
WV-MC-39-E-2	Glade Run	Aluminum	269	MC39E2-100-2	1,663	58	97
WV-MC-39-E-2	Glade Run	Iron	269	MC39E2-100-2	81	77	5
WV-MC-39-E-2	Glade Run	Aluminum	271	MC39E2-175-1	6,437	130	98
WV-MC-39-E-2	Glade Run	Iron	271	MC39E2-175-1	1,069	174	84
WV-MC-39-E-2-B	UNT/Glade Run RM 1.36	Aluminum	272	MC39E2-200-1	821	16	98
WV-MC-39-E-2-B	UNT/Glade Run RM 1.36	Iron	272	MC39E2-200-1	148	22	85
WV-MC-39-E-2-B	UNT/Glade Run RM 1.36	Aluminum	272	MC39E2-200-2	22,005	521	98

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MC-39-E-2-B	UNT/Glade Run RM 1.36	Iron	272	MC39E2-200-2	1,538	695	55
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-300-1	3,927	49	99
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-300-1	1,832	66	96
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-300-2	2,462	99	96
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-300-2	527	132	75
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-310-1	280	79	72
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-310-1	1,348	105	92
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-1	7,698	60	99
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-1	962	80	92
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-10	4,946	133	97
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-10	1,679	177	89
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-2	9,941	263	97
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-2	10,359	351	97
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-3	4,506	99	98
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-3	1,297	132	90
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-4	70	20	72
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-4	337	26	92
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-5	0	0	0

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-5	2	1	56
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-6	40	16	60
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-6	979	22	98
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-7	111	86	23
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-7	249	114	54
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-8	1,412	79	94
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-8	117	105	10
WV-MC-39-E-2	Glade Run	Aluminum	273	MC39E2-350-9	13,566	204	98
WV-MC-39-E-2	Glade Run	Iron	273	MC39E2-350-9	3,029	271	91
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-1	4,778	63	99
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-1	5,624	84	99
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-2	32,173	654	98
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-2	9,418	872	91
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-3	2,621	40	98
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-3	2,443	53	98
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-4	3,277	49	98
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-4	3,054	66	98
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-5	434	20	95

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-5	87	27	69
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-6	4	4	0
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-6	20	9	56
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-7	15	7	57
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-7	344	9	97
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-100-8	77	7	91
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-100-8	104	9	92
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-200-1	8,847	766	91
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-200-1	3,969	1,021	74
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-1	1,920	44	98
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-1	13,392	59	100
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-2	20,360	110	99
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-2	123,278	147	100
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-3	2,237	59	97
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-3	2,331	79	97
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-4	2,609	69	97
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-4	2,719	92	97
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-5	1,243	33	97

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-5	1,295	44	97
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-6	1,864	49	97
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-6	1,942	66	97
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-7	2,458	66	97
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-7	7,023	88	99
WV-MC-39-E-1	Fickey Run	Aluminum	274	MC39E1-300-8	1,119	99	91
WV-MC-39-E-1	Fickey Run	Iron	274	MC39E1-300-8	7,966	132	98
WV-MC-39	Muddy Creek	Aluminum	275	MC39-200-1	16,410	199	99
WV-MC-39	Muddy Creek	Iron	275	MC39-200-1	16,447	266	98
WV-MC-39	Muddy Creek	Aluminum	275	MC39-200-2	14,345	146	99
WV-MC-39	Muddy Creek	Iron	275	MC39-200-2	20,242	195	99
WV-MC-39	Muddy Creek	Aluminum	275	MC39-200-3	3,125	579	81
WV-MC-39	Muddy Creek	Iron	275	MC39-200-3	394	394	0
WV-MC-39	Muddy Creek	Aluminum	277	MC39-300-1	1	1	0
WV-MC-39	Muddy Creek	Iron	277	MC39-300-1	290	26	91
WV-MC-39	Muddy Creek	Aluminum	277	MC39-300-2	3,338	206	94
WV-MC-39	Muddy Creek	Iron	277	MC39-300-2	233	233	0

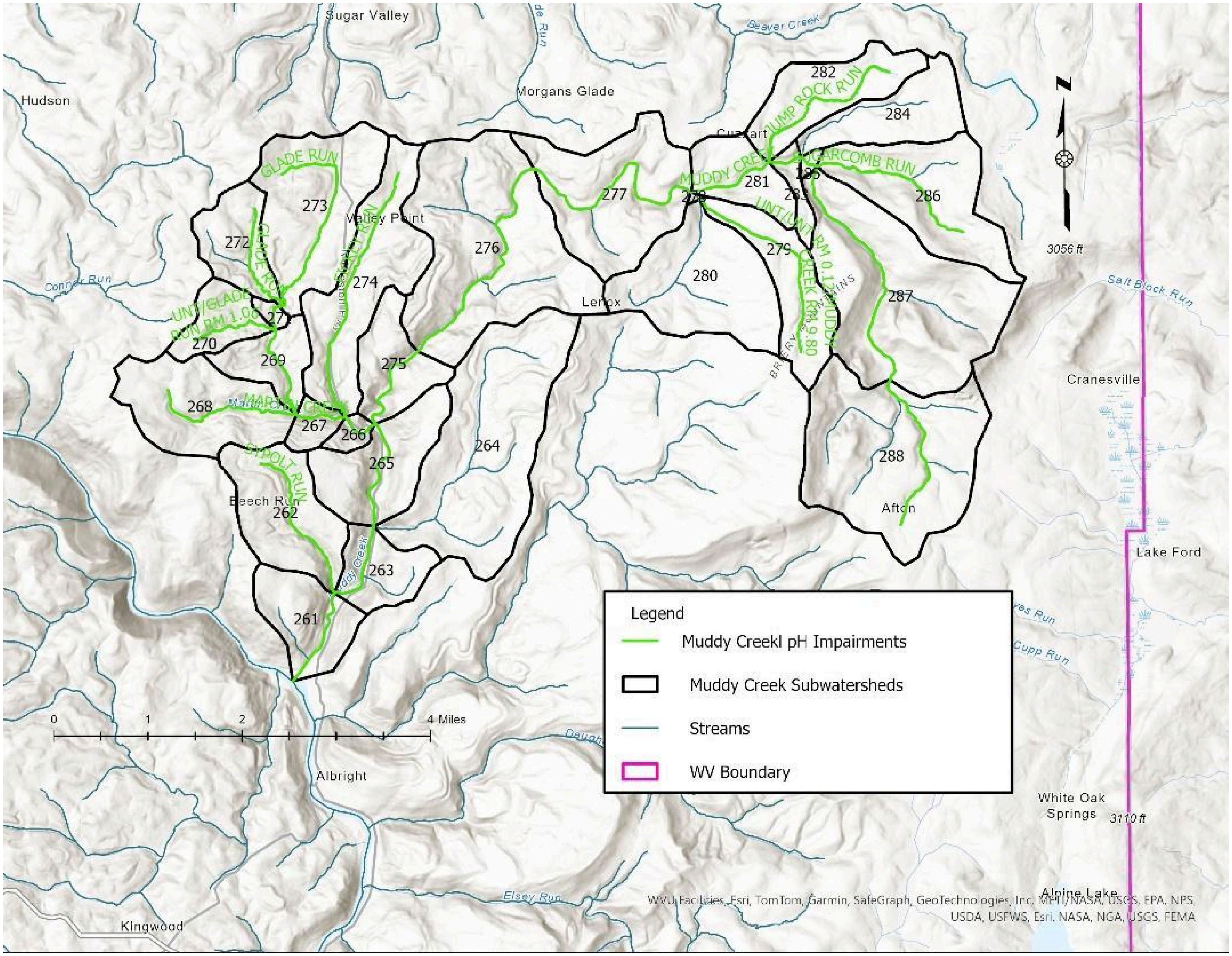

Figure 6: Streams with acidity TMDLs in Muddy Creek watershed

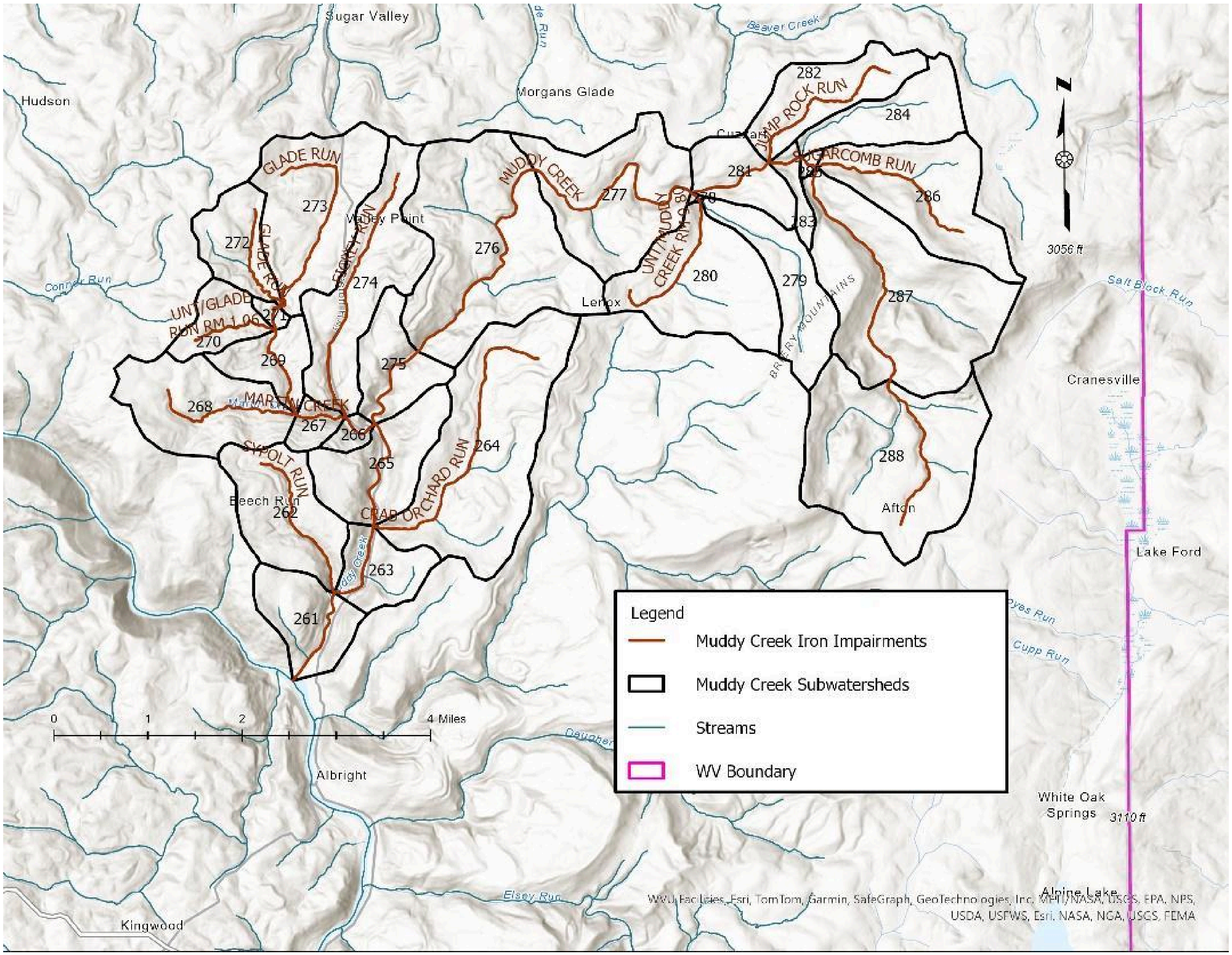

Figure 7: Streams with TMDLS for iron in the Muddy Creek watershed

iii. Pollution Minimization Plan Actions

As part of this variance, OSR proposes the following PMP for the Martin Creek Watershed in order to achieve the HAC and continue to improve water quality. While the watershed variance applies to Martin Creek, the success of the PMP is best demonstrated at the discharge of the T&T Fuels No. 2 Water Treatment Facility where metals are removed and pH standards are achieved. The treatment facility discharges directly to Muddy Creek.

Information and data will be kept by the OSR throughout the variance period. OSR will work with the DWWM WQSAS to gather data for the generation of annual report documenting the progression of the watersheds through the term of the variance. Additionally, these data will be used to reevaluate the HAC every five years coinciding with permit reissuance. Water quality sampling and biological monitoring of the watersheds will mainly be completed by OSR with the assistance of DWWM WQSAS.

The annual report issued by OSR will assess the effectiveness of the PMP. The annual report will include: if BMPs were implemented, alternative treatment availability, any changes to the facilities NPDES treatment technology, effluent data, planned steps for the following year, issues encountered and monitoring data.

a. Martin Creek Watershed

Because this variance is to be a continuation of an existing variance, many of the BMPs to be employed within the Martin Creek watershed have already been implemented. Figure 2 above shows locations of current treatment features, known AML Problem Area Designation (PADs) and AML seeps. The following is a milestone summary.

- WV Legislature approved the WQS during the 2016 regular session.
- EPA approved the variance on June 15, 2017.
- T&T Fuels No. 2 Water Treatment Facility began construction in the winter of 2016 and start-up of the treatment facility began in December 2017. This system collects non-point AML sources (AML PADs WV-1760 and WV-6220) and point-source OSR discharges from two revoked mining permits (S009185 and UO51900) within the Fickey Run watershed and conveys the AMD for active treatment at the facility.
- The permanent Glade Run In-Stream Doser began construction in the spring of 2018 and was completed in February 2019.
- All point-source OSR discharges within the Martin Creek and Glade Run watersheds began treatment in 2019 when the two in-stream dosers were turned on. These point-source treatment systems were then changed from active treatment to passive treatment utilizing existing infrastructure. These are maintained annually by OSR.
- The Martin Creek In-Stream Doser used the same chemical feed system as set up during the trial dosing from October 2015 to December 2016. The Martin Creek

In-Stream Doser was upgraded with a larger silo and integrated controls and programming in the spring of 2022.

Over the course of the proposed variance renewal, OSR will;

1. Continue to treat eleven non-point sources at nine AML PADs (WV-1450, WV-5775, WV-1759, WV-6169, WV-0340, WV-5056, WV-1760, WV-1451, WV-1757) with the Martin Creek and Glade Run in-stream dosers to neutralize the acidity, thus increasing the pH, before reaching the Martin Creek compliance point. During the term of the proposed variance, assist AML&R and non-profit organizations to evaluate each non-point source to determine the most appropriate action to take to reduce the impairments to Martin Creek and Glade Run.

2. Continue to treat two non-point source AML PADs within the Fickey Run watershed (AML PADs WV-1760 and WV-6220) with the T&T Fuels No. 2 Water Treatment Facility operated by OSR, to neutralize acidity and remove metal precipitate from these non-point sources before being discharged into Muddy Creek. Continue to work with AML&R to evaluate what AML PADs within the Fickey Run watershed can be routed to the water treatment facility for active treatment. There are two revoked mining permits (S-91-85 and UO-519) within the Fickey Run watershed where AMD is collected and sent to the T&T Fuels No. 2 Water Treatment Facility for treatment. By routing the Fickey Run sources to the T&T Fuels No. 2 Water Treatment Facility, OSR removes the metals and acidity loads from Fickey Run and Martin Creek.

3. Continue to maintain seven revoked mining permit point-source discharges (U-125-83, S-65-82, 65-78, UO-204, S-27-83, UO-519, S-91-85). These are treated by passive systems where limestone channels and splash pads will be used to increase pH and maintain capacity within settling ponds to increase retention time of metal precipitate produced.

4. Continue to work with landowners, non-profits organization and other stakeholders within the Martin Creek watershed to assist with development of passive treatment systems for pre-law, non-point source AMD sources within the watershed.

5. Continue to work with AML&R to identify pre-law, non-point sources of AMD and to assist with development of treatment strategies within the watershed.

6. Pursue additional improvements and optimization at the Martin Creek and Glade Run in-stream dosers' operation and function. OSR will work to decrease overall use and/or reliance of in-stream lime dosing over the 20 year term of the proposed variance to meet the HAC.

7. Evaluate bringing more AMD into the T&T Fuels No. 2 Water Treatment Facility for treatment. OSR will work to bring in other non-point sources of AMD within the Fickey Run watershed with the help of AML&R to neutralize acidity and remove metal precipitate before being discharged in Muddy Creek.

8. Continue to assess the possibility of implementation of new PMP actions in the event that additional potential pollutant reduction actions are identified.

B. Sandy Creek Watershed

i. Pollutant Source Identification

EPA approved WVDEP's *Total Maximum Daily Loads (TMDLs) for the Tygart Valley River Watershed, West Virginia* in a letter dated June 17, 2016. The TMDL characterized sources causing and contributing to the pH, total iron and dissolved aluminum impairments in the Sandy Creek watershed. During TMDL development, watersheds for each impaired stream are subdivided into smaller subwatersheds to more accurately represent pollutant sources (Figure 8). Pollutant source specifically related to pH and dissolved metals impairments identified in Sandy Creek watershed prescribed load reductions from direct sources of pollution, including AML&R AMD seeps, bond forfeiture sites (i.e., associated with permits issued to OSR) and active mining sites. Wasteload allocations and load allocations were assigned to these sources. To see detailed TMDL information select "Tygart Valley" from the lists of watersheds on the following webpage:https://dep.wv.gov/WWE/watershed/TMDL/grpb/Pages/default.aspx. The TMDL document, allocation spreadsheets, and technical documentation are provided.

WVDEP's AML identified locations of multiple types of abandoned mine lands in the Tygart Valley watershed from their records. Source tracking efforts by WVDEP DWWM identified additional AML discharges, seeps, portals and refuse piles. The locations of these sources along with current and future treatment locations (as described in Section II-B above) are shown for Sandy Creek in Figure 9.

Facilities that were subject to SMCRA during active operations are required to post a performance bond to ensure completion of the reclamation requirements. When a bond is forfeited, WVDEP Special Reclamation assumes the responsibility for the reclamation requirements and, since the TMDL development, have been issued mining NPDES permits. The permits are called bond forfeitures. These are sources of aluminum, iron and acidity. The bond forfeiture sites for Sandy Creek watersheds are shown in Figure 10. Current associated NPDES permits are shown in Figure 11.

Untreated active mining-related point source discharges from deep, surface and other mining areas may have low pH (high acidity) and may be sources of aluminum and iron. These sources will have NPDES discharge permits that contain effluent limits for total iron, total manganese, total suspended solids and pH. Active mine outlets in Sandy Creek areas are shown in Figure 11.

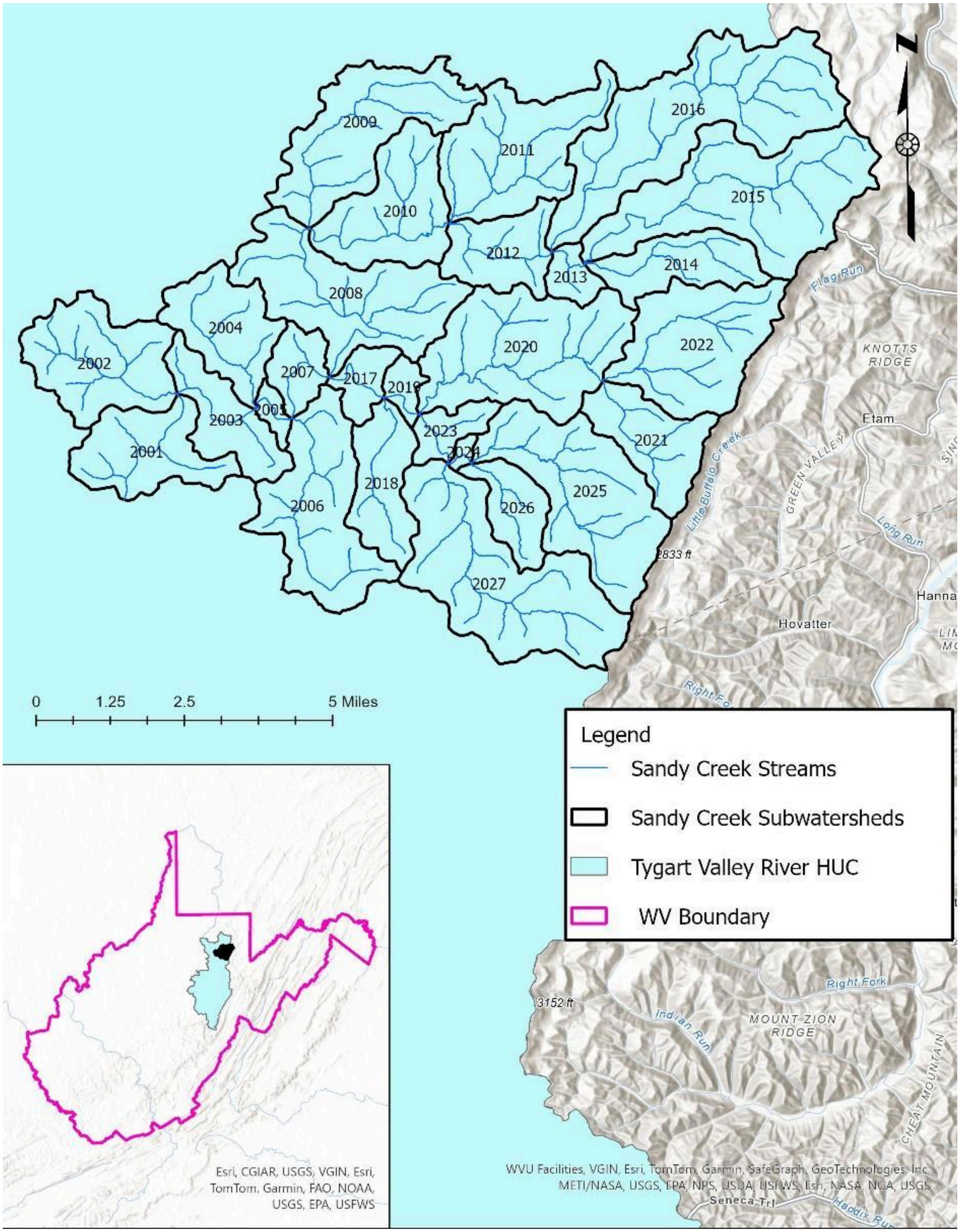

Figure 8: Location of the Sandy Creek subwatersheds used in TMDL development

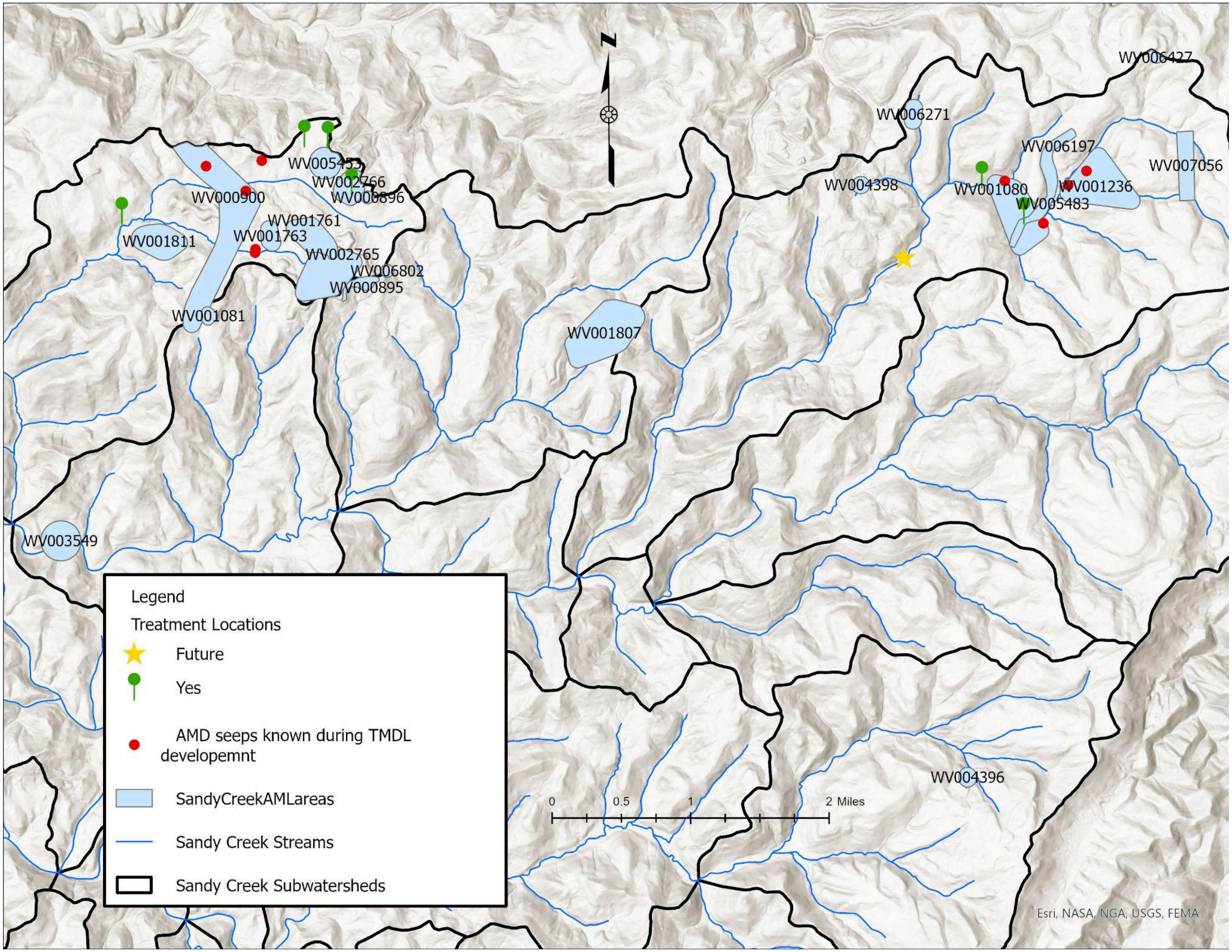

Figure 9: Sources of aluminum, iron and high acidity include identified AMD seeps and AML areas shown with current treatment locations

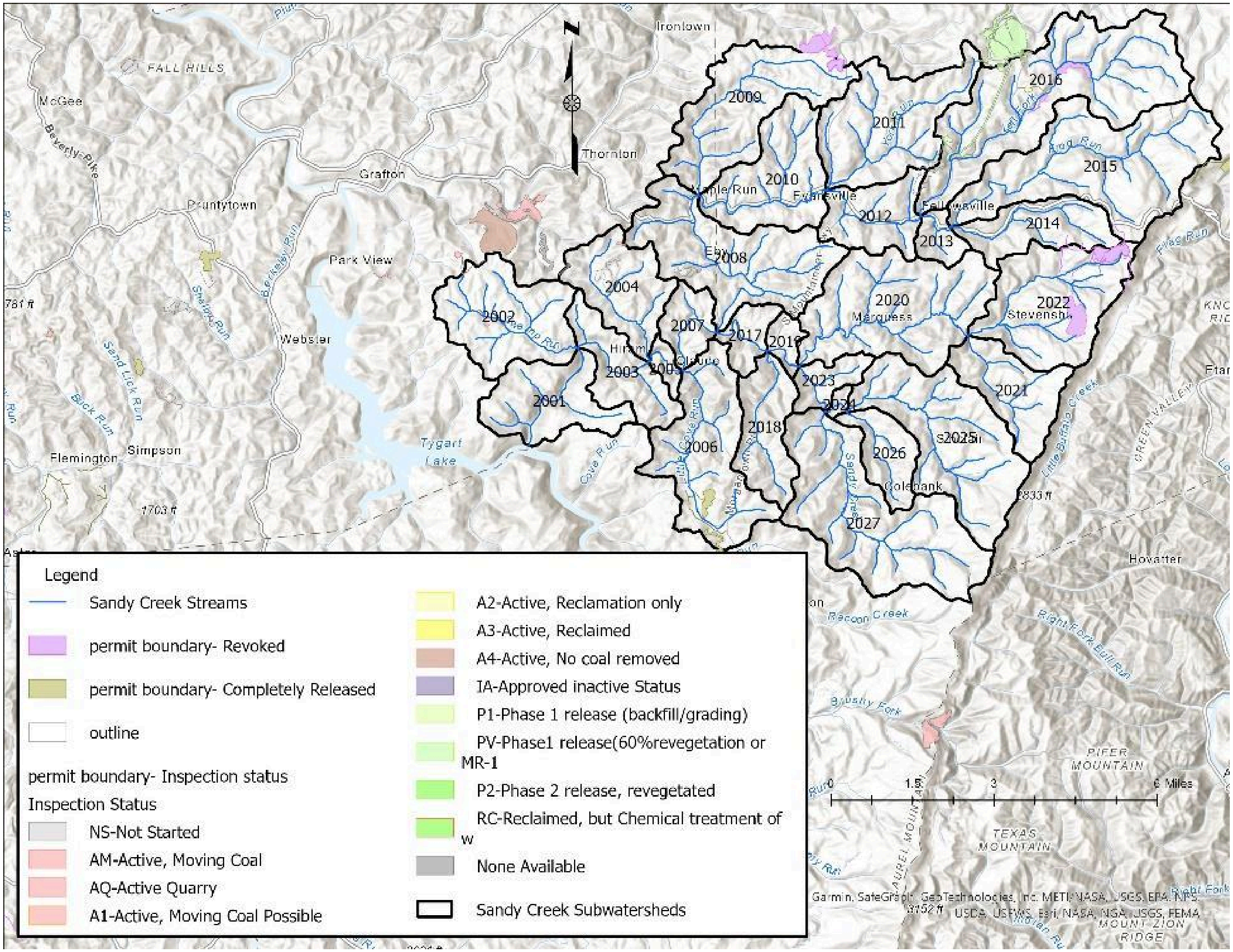

Figure 10: In phase reclamation and revoked Article 3 mining permits in Sandy Creek watershed

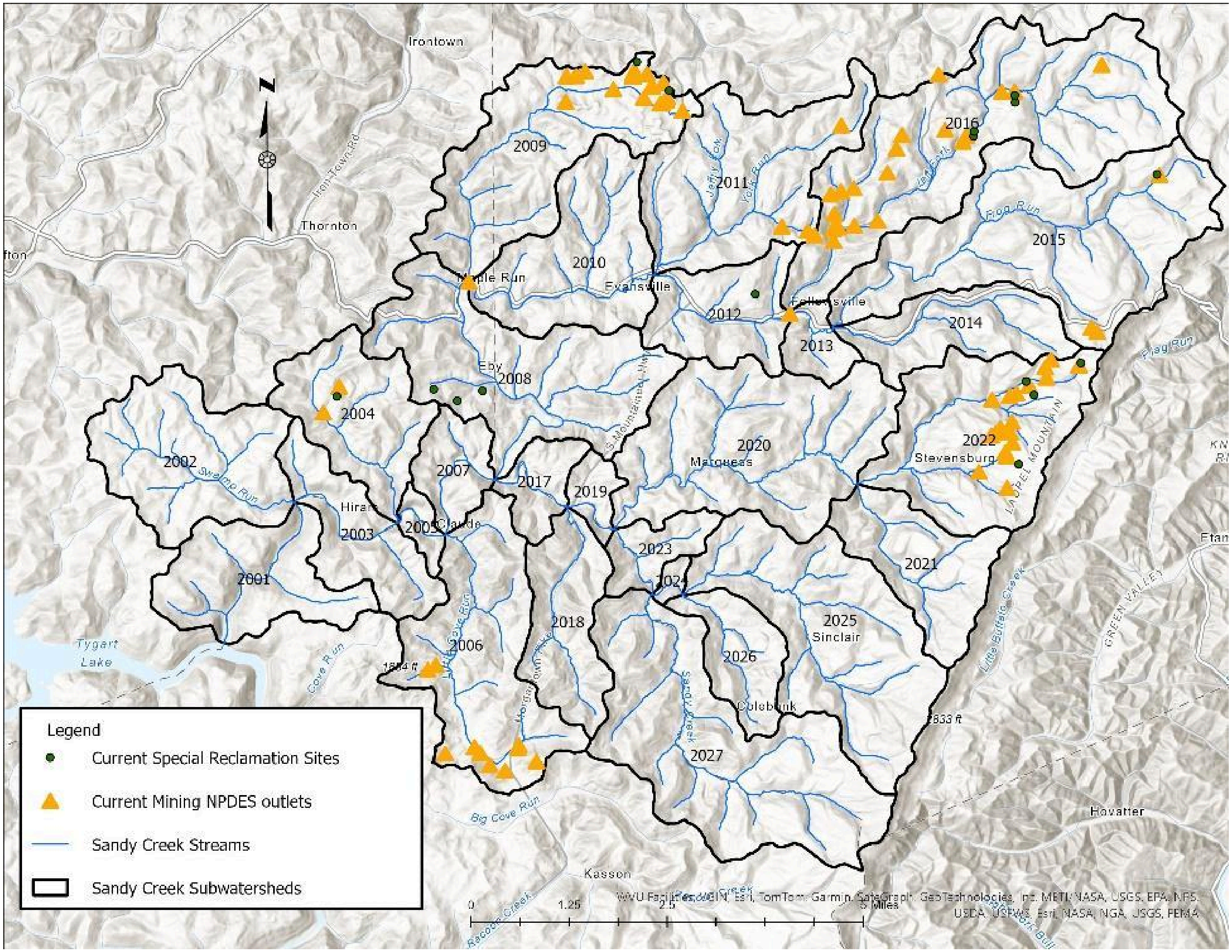

Figure 11: OSR sites and NPDES outlets in Sandy Creek watershed

ii. Sandy Creek TMDL Summary

a. Aluminum Sources

There are three streams impaired by dissolved aluminum requiring a TMDL in the Sandy Creek watershed calling for reductions, Little Sandy Creek, Maple Run and Left Fork/Little Sandy Creek (Figure 12). In Little Sandy Creek, there was one active mining permit (i.e., WV0095583) represented in the model and prescribed an operable allocation of 1.39 mg/l total aluminum. When investigating bond forfeiture sites in the Maple Run watershed, both treated discharges and untreated seeps were identified during source tracking efforts. The TMDL assumes that all water from bond forfeiture Article 3 boundaries will be treated to meet an operable allocation of 1.39 mg/L total aluminum in mining NPDESs WV1025694, WV1027239 and WV1025848.

A major source of aluminum to the Sandy Creek tributaries is AML discharges. Table 6 lists the known AML discharges at the time of TMDL development. There were nine AML discharges, all of which required aluminum reductions. In addition to the dissolved aluminum sources, there were also background sources of total aluminum with no prescribed reductions.

Table 6: Known AML discharges in Sandy Creek watershed

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MT-34-J-8	Maple Run	Al	2009	MT18E-PAM100-1	4,960.59	48.77	99.0%
WV-MT-34-J-8	Maple Run	Al	2009	MT18E-PAM110-1	3,190.04	231.67	92.7%
WV-MT-34-J-8	Maple Run	Al	2009	MT18E-PAM200-1	16,942.39	731.59	95.7%
WV-MT-34-J-8	Maple Run	Al	2009	MT18E-PAM200-2	554.57	60.97	89.0%
WV-MT-34-J-8	Maple Run	Al	2009	MT18E-PAM300-1	6,984.89	170.98	97.6%
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Al	2016	MT34J19-PAM100-1	15,473.97	548.69	96.5%
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Al	2016	MT34J19-PAM100-2	8,289.58	213.38	97.4%
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Al	2016	MT34J19-PAM100-3	34,847.51	518.94	98.5%
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Al	2016	MT34J19-PAM200-1	533.34	3.05	99.4%
WV-MT-34-J-8	Maple Run	Iron	2009	MT18E-PAM100-1	452.97	52.67	88.37
WV-MT-34-J-8	Maple Run	Iron	2009	MT18E-PAM110-1	1000.75	250.19	75.00
WV-MT-34-J-8	Maple Run	Iron	2009	MT18E-PAM200-1	5003.75	790.07	84.21
WV-MT-34-J-8	Maple Run	Iron	2009	MT18E-PAM200-2	535.49	65.84	87.70

Stream Code	Stream Name	Metal	SWS	Discharge Number	Baseline Load (lbs/yr)	Reduced Load (lbs/yr)	% Reduction
WV-MT-34-J-8	Maple Run	Iron	2009	MT18E-PAM300-1	1240.81	184.64	85.12
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Iron	2016	MT34J19-PAM200-1	917.13	3.29	99.64
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Iron	2016	MT34J19-PAM100-3	32504.36	560.42	98.28
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Iron	2016	MT34J19-PAM100-1	13154.60	592.55	95.50
WV-MT-34-J-19	Left Fork/Little Sandy Creek	Iron	2016	MT34J19-PAM100-2	6866.99	230.44	96.64

b. Acidity/low pH Sources

In addition to the three streams with dissolved aluminum impairment (i.e., Little Sandy Creek, Maple Run, and Left Fork/Little Sandy Creek), one additional stream, UNT/UNT RM 0.56/Sandy Creek RM10.47, was impaired for pH due to acidity (Figure 13). TMDLs prescribe reductions of acidity in all four streams, expressed as additions of alkalinity (calcium carbonate). The prescribed loads of alkalinity additions assume that 100% will dissolve. Thus actual alkaline addition must contemplate how efficiently the alkaline material dissolves to attain water quality standards.

c. Iron Sources

There are 15 streams with TMDLs for iron in the Sandy Creek watershed shown in Figure 14 below (i.e., Sandy Creek, Swamp Run, Glad Run, Little Cover Run, Little Sandy Creek, York Run, Right Fork/Little Sandy Creek, Tibbs Run, Left Fork/Little Sandy Creek, Maple Run, Oldroad Run, Left Fork/Sandy Creek, UNT/Left Fork RM 4.58/Sandy Creek, UNT/Sandy Creek RM 10.47 and UNT/UNT RM 0.56/Sandy Creek RM 10.47). Four of the streams have already been identified as impaired for dissolved aluminum or pH. The remaining 11 streams were impaired due to sediment sources of total iron. As in the aluminum TMDL, one active mining permit was represented in the model (WV0095583), along with four mining permits issued for bond forfeiture sites (WV1025848, WV1025694, WV1027239 and WV1023560). Untreated seeps were identified on the bond forfeited sites. Prescribed allocations assume all water will be treated. Operable allocations range from 1.5 mg/l total iron to 3.2 mg/l.

Table 6 lists all AML discharges with their corresponding load reductions for both aluminum and iron. In addition to these non-point sources, the TMDL allocated loads to non-mining NPDES permits for stormwater, individual discharges and drinking water plants. No reductions were prescribed for these sources. Reductions were made to other non-point sediment sources of iron, including forestry, oil/gas, roadways, barren lands, urban residential, agriculture and streambank erosion.

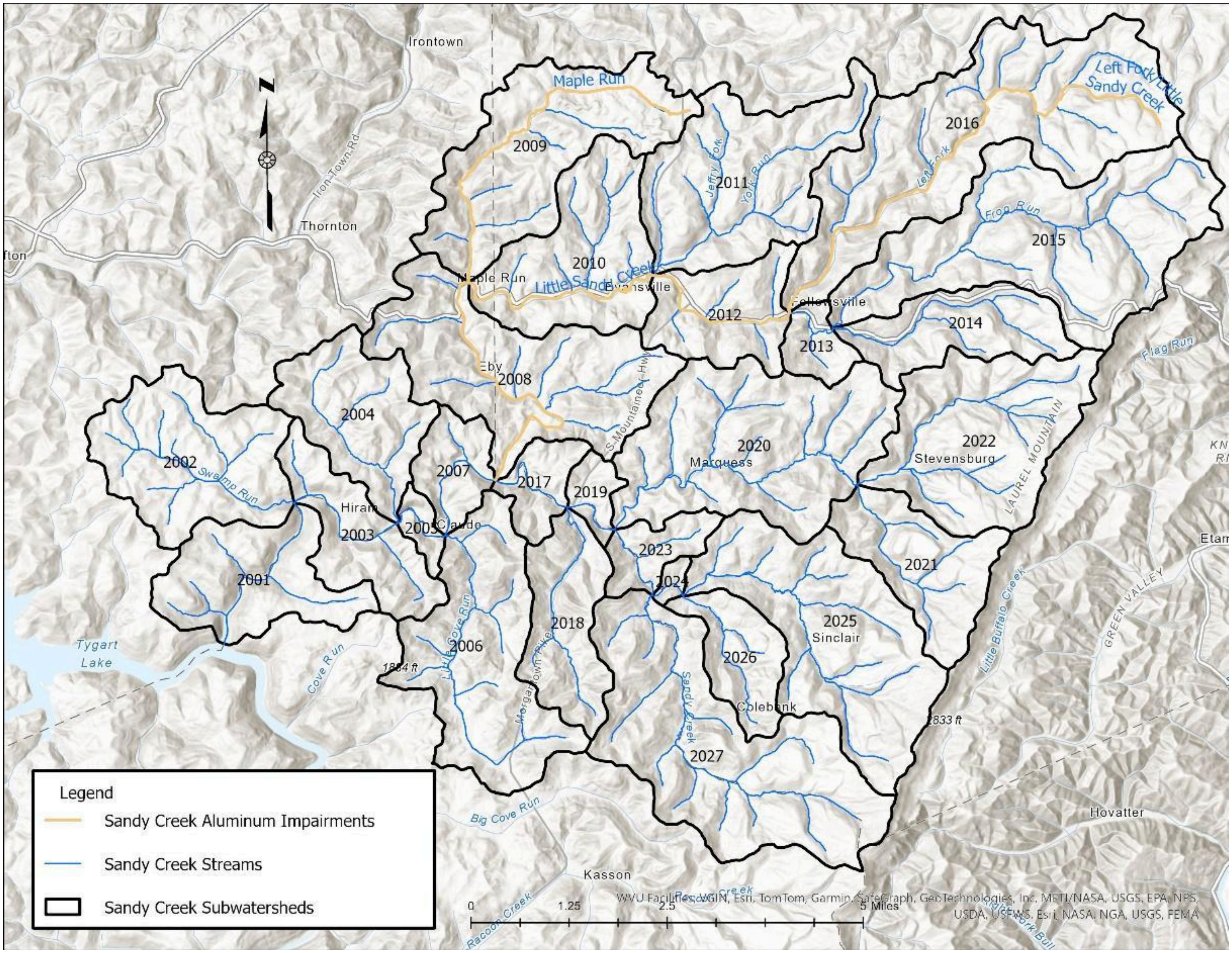

Figure 12: Streams with aluminum TMDLs in Sandy Creek Watershed

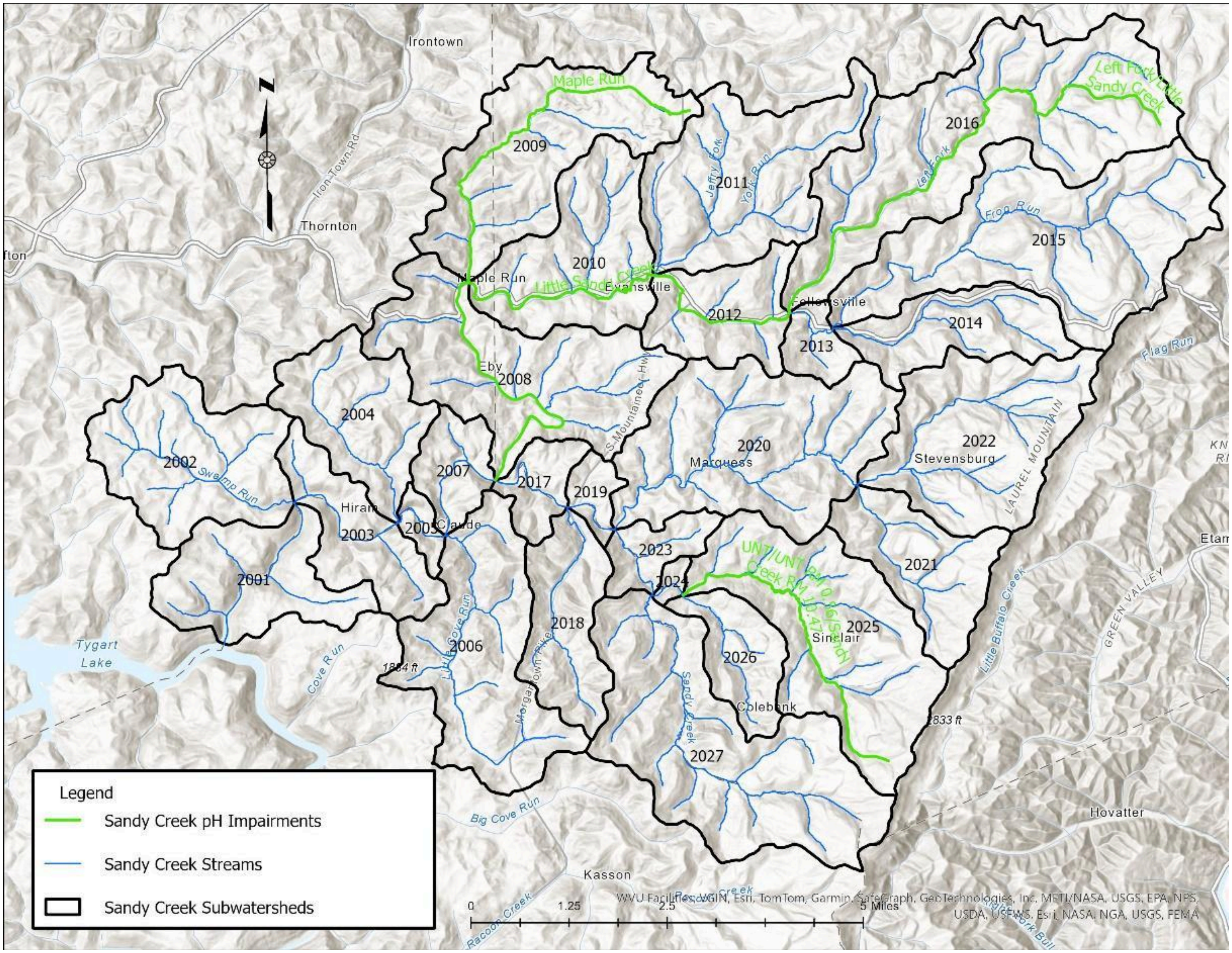

Figure 13: Streams with acidity TMDLs in Sandy Creek watershed

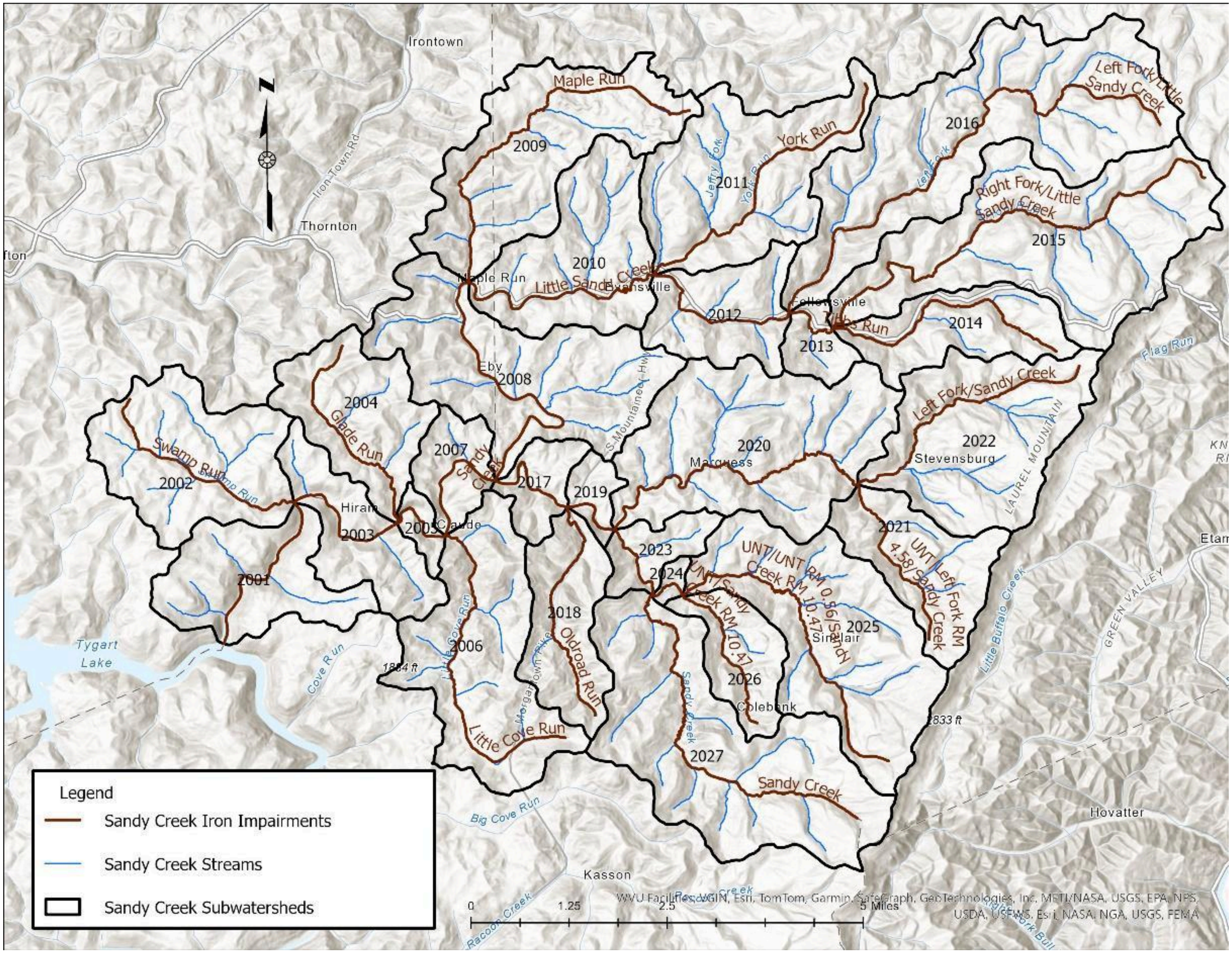

Figure 14: Streams with TMDLs for iron in Sandy Creek watershed

iii. Pollution Minimization Plan Actions

As part of this variance, OSR proposes the following PMP within the Left Fork of Little Sandy Creek watershed. An annual progress report will be issued by OSR assessing the effectiveness of the PMP. The annual report will include: if BMPs were implemented, alternative treatment availability, any changes to the facilities NPDES treatment technology, effluent data, planned steps for the following year, issues encountered and monitoring data.

a. Left Fork of Little Sandy Creek

Because this variance is to be a continuation of an existing variance, many of the BMPs to be employed within the Left Fork of Little Sandy Creek watershed have already been implemented. Figure 9 above shows locations of current treatment features, known AML PADs and AML seeps. Following is a milestone summary.

- WV Legislature approved the WQS during the 2016 regular session.
- EPA approved the variance on February 20, 2018.
- The permanent Left Fork of Little Sandy Creek In-Stream Doser began construction in August 2018 and was completed in May 2019.
- All point-source OSR discharges within the Left Fork of Little Sandy Creek watershed were treated instream by the middle of 2019. These point-source treatment systems were then changed from active treatment to passive treatment utilizing existing infrastructure. These are maintained annually by OSR.

Over the course of the proposed variance renewal, OSR will;

1. Continue to treat three non-point source AML PADs (WV-7056, WV-1236 and WV-1080) with the Left Fork of Little Sandy Creek in-stream dosers to neutralize the acidity, thus increasing the pH, before reaching the Left Fork of Little Sand Creek compliance point. During the term of the proposed variance, assist AML&R and non-profit organizations to evaluate each non-point source to determine the most appropriate action to take to reduce the impairments at source within the headwaters of Left Fork of Little Sandy Creek.

2. Continue to maintain one revoked mining permit point-source discharge (S-1018-88). The passive system has limestone channels and splash pads used to increase pH and maintain capacity within settling ponds to increase retention time of metal precipitate produced.

3. Continue to work with landowners, non-profit organizations and other shareholders within the Left Fork of Little Sandy Creek watershed to assist with

development of passive treatment systems for pre-law, non-point source AMD sources within the watershed.

4. Continue to work with AML&R to identify pre-law, non-point sources of AMD and to assist with development of treatment strategies within the watershed.

5. Pursue additional improvements and optimization at the Left Fork of Little Sandy Creek in-stream doser's operation and function. OSR will work to decrease overall use and/or reliance of in-stream lime dosing over the term of the proposed variance to meet the HAC as well as work with AML&R's proposed Left Fork of Little Sandy Creek Water Treatment Facility anticipated to begin construction in 2026.

6. Continue to assess the possibility of implementation of new PMP actions in the event that additional potential pollutant reduction actions are identified.

b. Maple Run Watershed

Because this variance is to be a continuation of an existing variance, many of the BMPs to be employed within the Maple Run watershed have already been implemented. Figure 9 above shows locations of current treatment features, known AML PADs and AML seeps. Following is a milestone summary.

- WV Legislature approved the WQS during the 2016 regular session.
- EPA approved the variance on February 20, 2018.
- The permanent Maple Run In-Stream Doser began construction in February 2019 and was completed in January 2020.
- All point-source OSR discharges within the Maple Run watershed were treated instream by the middle of 2020. These point-source treatment systems were then changed from active treatment to passive treatment utilizing existing infrastructure. These are maintained annually by OSR.

Over the course of the proposed variance renewal, OSR will;

1. Continue to treat 8 non-point source AML PADs (WV-1811, WV-0900, WV-1763, WV-1761, WV-2765, WV-6802, WV-2766 and WV-0894) with the Maple Run In-stream doser to neutralize the acidity, thus increasing the pH, before reaching the Maple Run compliance point. During the term of the proposed variance, assist AML&R and non-profit organizations to evaluate each non-point source to determine the most appropriate action to take to reduce the impairments at source within the headwaters of Maple Run.

2. Continue to maintain three revoked mining permit point-source discharges (S-1036-91, S-61-83 and S-53-78). These are passive systems where limestone channels and splash pads will be used to increase pH and maintain capacity within settling ponds to increase retention time of metal precipitate produced.

3. Continue to work with landowners, non-profit organizations and other shareholders within the Maple Run watershed to assist with development of passive treatment systems for pre-law, non-point source AMD sources within the watershed.

4. Continue to work with AML&R to identify pre-law, non-point sources of AMD and to assist with development of treatment strategies within the watershed.

5. Pursue additional improvements and optimization at the Maple Run in-stream doser's operation and function. OSR will work to decrease overall use and/or reliance of in-stream lime dosing over the term of the proposed variance to meet the HAC.

6. Monitor the UMF in the headwaters of Maple Run. If more work is needed by AML&R to abate the UMF, assist, where possible, with water sampling or proposed at source treatment of AMD to minimize further possible impairments within Maple Run.

7. Continue to assess the possibility of implementation of new PMP actions in the event that additional potential pollutant reduction actions are identified.

VIII. Proposed Variance Language

Upon EPA approval, the following variances will become effective.

7.2.4.c.2. A variance pursuant 46CSR6, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to the Division of Land Restoration's Office of Special Reclamation's discharges into Martin Creek of Preston County and its tributaries, including Glade Run, Fickey Run, and their unnamed tributaries. This WQS variance is for the dissolved aluminum, total iron and pH criterion, expressed as dissolved aluminum 750 µg/l, iron, 1,500 µg/l and pH 6.0 to 9.0, and the associated Category A - Water supply public, Category B - Propagation and maintenance of fish and other aquatic life, Category C - Water contact recreation, and only applies to the specified discharger and waterbody/waterbody segment in this WQS. The following existing conditions will serve as instream interim criteria while this variance is in place based on current pollution control technologies installed: pH range of 5.0-9.0, 8,000 µg/l total iron, and 10,000 µg/l dissolved aluminum. Alternative restoration measures, as described in the variance application submitted by the Division of Land Restoration's Office of Special Reclamation, shall be used to achieve significant improvements to existing conditions in these waters during the variance period. This variance shall remain in effect until action by the secretary to revise the variance or until July 1, 2045, whichever comes first. The state shall reevaluate the highest attainable condition of this WQS variance, using all existing and readily available information, every 5 years and will submit the results of the reevaluation to U.S. EPA within 30 days of completion of the reevaluation. If the state does not complete a reevaluation at the frequency specified in this rule, or does not submit to U.S. EPA the results of the reevaluation within 30 days of completion of the reevaluation, the WQS variance will no longer be the applicable water quality standard until the state completes and submits the reevaluation to the U.S. EPA. The state intends to obtain public input on the reevaluation by obtaining public comment through the public process on a draft NPDES permit at each permit renewal. The underlying designated use and associated criteria remain applicable for all other CWA purposes, and all other uses and associated criteria not specified in this WQS remain applicable for all CWA purposes.

7.2.4.d.1. A variance pursuant to 46CSR6, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to the Division of Land Restoration's Office of Special Reclamation's discharges into Maple Run, Left Fork Little Sandy Creek, and their unnamed tributaries. This WQS variance is for the dissolved aluminum and total iron criterion, expressed as dissolved aluminum 750 µg/l, and total iron 1,500 µg/l and the associated Category A - Water supply public and Category B - Propagation and maintenance of fish and other aquatic life uses and only applies to the specified discharger and waterbody/waterbody segment in this WQS. The following existing conditions will serve as instream interim criteria while this variance is in place based on current pollution control technologies installed: For Maple Run, 5,000 µg/l total iron and 6,000 µg/l dissolved aluminum; for Left Fork Little Sandy Creek, 12,000 µg/l total iron, and 7,000 µg/l dissolved aluminum. Alternative restoration measures, as described in the variance application submitted by the Division of Land Restoration's Office of Special Reclamation, shall be used to achieve significant improvements to existing conditions in these waters during the variance period. This variance shall remain in effect until action by the secretary to revise the variance or until July 1, 2045, whichever comes first. The state shall reevaluate the highest attainable condition of this WQS variance, using all existing and readily available information, every 5 years and will submit the results of the reevaluation to U.S. EPA within 30 days of completion of the reevaluation. If the state does not complete a reevaluation at the frequency specified in this rule, or does not submit to the U.S. EPA the results of the reevaluation within 30 days of completion of the reevaluation, the WQS variance will no longer be the applicable water quality standard until the state completes and submits the reevaluation to the U.S. EPA. The state intends to obtain public input on the reevaluation by obtaining public comment through the public process on a draft NPDES permit at each permit renewal. The underlying designated use and associated criteria remain applicable for all other CWA purposes, and all other uses and associated criteria not specified in this WQS remain applicable for all CWA purposes.

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X. Attachments

Attachment 1: Original Martin Creek Variance Application

Attachment 2: Martin Creek Supplemental Information

Attachment 3: Martin Creek Variance EPA Approval Letter

Attachment 4: Original Sandy Creek Variance Application

Attachment 5: Sandy Creek Supplemental Information

Attachment 6: Sandy Creek EPA Approval Letter

Attachment 7: U.S. Senator Capito Letter

Attachment 8: EPA Administrator Ortiz Letter

Attachment 1

Original Martin Creek Variance Application

TABLE OF CONTENTS

ATTACHMENTS

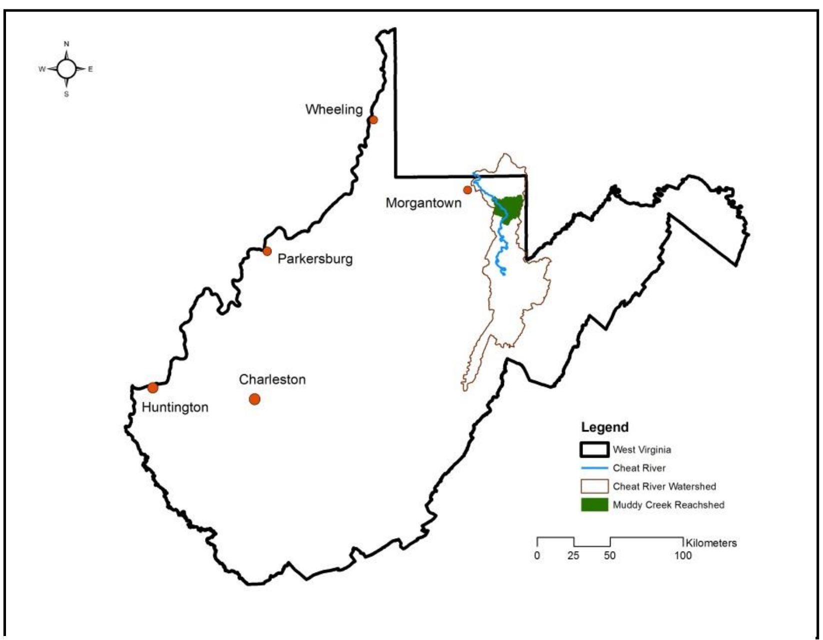
APPLICATION FOR STREAM VARIANCE IN FICKEY RUN, GLADE RUN, MARTIN CREEK, AND TRIBUTARIES THEREOF.

1.0 SUMMARY

WVDEP Office of Special Reclamation (OSR) is submitting this application for variance from water quality standards pursuant to 46 SCR 1, section 8.3. This variance is being requested based on human-caused conditions which prohibit the full attainment of any designated use. It is important to note that these streams have never been able to meet their designated use as a result of human-caused conditions (pre-law mining) that were in existence before the stream designations were assigned. A stream use inventory is currently ongoing and will be supplied once it has been completed. OSR is proposing the strategic placement of in-stream lime doser's in order to enhance overall stream quality.

2.0 INTRODUCTION

Muddy Creek meanders through the hills of Preston County, West Virginia and joins the Cheat River in Ruthbelle, an unincorporated community near Albright. AMD from abandoned mine lands, especially discharges emanating from the Upper Freeport coal seam, is the most damaging pollutant to Muddy Creek and the lower Cheat River watershed. The Cheat River watershed has a long history of coal mining; this activity dates as far back as the late 1700s, with a significant amount of activity occurring prior to the 1977 passage of the Federal Surface Mining Control and Reclamation Act (SMCRA).



Map 1. The Cheat River flows north draining approximately 1,422 square miles. Muddy Creek, heavily impacted by AMD, joins the Cheat River near Albright.

Beginning in the 1970's, whitewater paddlers on the Cheat River witnessed water quality become increasingly degraded from AMD discharging from coal mines, both abandoned and active. Rocks in the rivers were stained a bright orange color that became more common in the Cheat River Canyon each year. Rafters and kayakers complained of stinging eyes, nosebleeds, and other ailments after spending time in the Cheat's waters.

In the spring of 1994, mine water from a large underground coal mine complex blew out of an illegally sealed mine and into Muddy Creek. The resulting discharge impacted Muddy Creek and the Cheat River Canyon, killing fish for 16 miles downstream, and lowering the pH in Cheat Lake to 4.5. A second blowout in 1995 further degraded the Cheat and prompted American Rivers, Inc., a national river conservation organization, to name the Cheat as one of ten of the nation's most endangered rivers (1995). Muddy Creek contributes an estimated 6,000 tons of acidity and 67 tons of iron and aluminum per year to the Cheat River, primarily from three major tributary drainages: Fickey Run, Glade Run, and Martin Creek as well as from an upstream section of Muddy Creek, totaling nearly 30 miles of AMD impaired streams in the Muddy Creek drainage. Fickey Run is impaired by two Abandoned Mine Lands (AML) and three bond forfeiture sites, and Glade Run is impaired by five AML and three bond forfeiture sites (Lower Cheat River Watershed Based Plan, 2005). Both Fickey and Glade empty into Martin Creek which also receives AMD from two AML sites before it joins Muddy Creek. Within less than one mile upstream of the confluence with Martin Creek, Muddy Creek receives AMD from several AMD sources originating from the Dream Mountain abandoned mine area. Upstream of the confluence of Martin Creek and Muddy Creek, the creek supports healthy benthic macroinvertebrate and fish communities including sensitive organisms such as a variety of Ephemeropterans (mayflys) and native brook trout.


Photo 1. An aerial shot of AMD entering the Cheat River main stem from Muddy Creek during the first and most devastating mine blowout.

3.0 REGULATORY BASIS FOR VARIANCE APPLICATION

Streams have designated uses which are described in §47-2-6.2 and include: water supply public, propagation and maintenance of fish and other aquatic life, water contact recreation, agriculture and wildlife, and water supply industrial/water transport/cooling and power. Water use categories are supported by both numeric and narrative criteria. Procedural Rules for Site-Specific Revisions to Water Quality Standards are described in 46 CSR 6 and include rules for promulgation of designated use reclassifications, site-specific criteria, and variances. OSR is proposing the following:

7.2.d.8.2. A variance pursuant to 46 CSR 6, Section 5.1, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to WV DEP Division of Land Restoration's Office of Special Reclamation's discharges into Martin Creek of

Preston County and its tributaries, including Glade Run, Fickey Run, and their unnamed tributaries. The following existing conditions will serve as instream interim criteria while this variance is in place: pH range of 3.2-9.0, 10 mg/L total iron, and 15 mg/L dissolved aluminum. Alternative restoration measures, as described in the variance application submitted by WV DEP Division of Land Restoration's Office of Special Reclamation, shall be used to achieve significant improvements to existing conditions in these waters during the variance period. Conditions will be evaluated during each triennial review throughout the variance period. This variance shall remain in effect until action by the Secretary to revise the variance or until July 1, 2025, whichever comes first.

It is also important to note that the attainment of the use cannot be remedied due to the metal loadings of the streams. A table has been included below showing that the metal loadings from the OSR sites only make up a small percentage of the total loadings as depicted by the corresponding TMDL's.

METAL LOADINGS

	TMDL LOADINGS			OSR LOADINGS	
STREAM	Fe	Al	SITE	Fe	Al
MARTIN CREEK	41.4	30.8	S-65-82	0.16	0.38
FICKEY RUN	12.7	10.83	UO-519	1.64	1.68
GLADE RUN	20.59	11.51	UO-204	0.11	0.1

4.0 REQUIRED INFORMATION

Pursuant to §46-6-3.1 a-g, the following information is required to be included in an application seeking reclassification of a designated use, a variance from numeric water quality criteria, or a site specific numeric criterion:

a. *A USGS 7.5 minute map showing those stream segments to be affected and showing all existing and proposed discharge points. In addition, the alphanumeric code of the affected stream, if known*:

A USGS 7.5 minute map showing the stream segments to be affected and showing all existing and proposed discharge points for Martin Creek (MC-17-A), Fickey Run (MC-17-A-0.5), and Glade Run MC-17-A-1 have been provided, please refer to Attachment 1 at the end of this application.

b. *Existing water quality data for the stream or stream segment. Where adequate data are unavailable, additional studies may be required by the Board*:

Available existing water quality data for Martin Creek, Fickey Run, Glade Run and associated tributaries has been provided, please see below.

FICKEY RUN AT MOUTH

Site_Description	Date	Mouth_Data	FlowGPM	FieldpH	FieldCon	AcidTPY	NetHotAcid	NetCalc_Acid	LabpH	Alk	Acidity	LabCon	D_Al	D_Ca	D_Fe	D_Mg	D_Mn	SO4
Fickey Mouth	8/4/2005	Yes	385.3	2.00	2000	511.2395904	603.15	1166.81241	2.92	0.00	603.15	2670	47.90	286.50	142.40	71.40	10.60	1320.00
Fickey Mouth	12/5/2005	Yes	2536	3.13	988	1684.9184	302	282.3557718	NS	0.00	302.00	NS	25.20	136.70	36.60	34.70	3.99	368.00
Fickey Mouth	5/3/2006	Yes	1109	2.74	1895	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fickey Mouth	8/23/2006	Yes	118.0	2.80	2770	288.825768	1112.58	845.5283537	2.66	0.00	1112.58	3090	48.31	323.35	179.12	82.04	9.96	2080.00
Fickey Mouth	9/15/2006	Yes	252.1	2.60	2530	443.9576425	800.44	432.1821102	2.79	0.00	800.44	2590	1.25	206.78	107.19	59.97	6.89	1550.00
Fickey Mouth	9/27/2006	Yes	NS	2.90	2500	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fickey Mouth	11/9/2006	Yes	732.0	2.88	2200	1068.74196	663.65	380.6463687	3.14	0.00	663.65	2090	30.13	167.51	51.35	41.58	5.39	978.00
Fickey Mouth	12/12/2006	Yes	331.0	3.18	2400	472.113906	648.33	434.0771688	3.14	0.00	648.33	2350	32.30	249.43	78.44	45.86	6.32	1105.00
Fickey Mouth	12/22/2006	Yes	557.0	2.95	2200	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fickey Mouth	1/23/2007	Yes	1520.5	3.27	1800	1287.294833	384.83	289.7918856	3.15	0.00	384.83	1837	22.87	177.66	47.54	39.66	4.70	756.00
Fickey Mouth	3/13/2007	Yes	2433.00	3.35	1200	4276.085088	798.88	248.180987	2.95	0.00	798.88	1590	21.48	120.53	37.43	31.00	3.44	660.00
Fickey Mouth	5/14/2007	Yes	671.00	2.91	2400	1190.156726	806.23	580.5298166	3.28	0.00	806.23	2290	34.51	177.32	117.16	55.07	7.41	1255.00
Fickey Mouth	5/16/2007	Yes	1541.00	2.86	2400	2471.184584	728.92	543.1796028	3.41	0.00	728.92	2230	32.76	199.82	104.60	44.85	6.59	1225.00
Fickey Mouth	6/14/2007	Yes	267.00	2.70	2900	652.648392	1111.08	335.9390176	3.37	0.00	1111.08	2960	41.65	200.50	0.64	59.47	1.69	1600.00
Fickey Mouth	6/26/2007	Yes	320.00	2.70	2700	694.03136	985.84	768.2720443	3.59	0.00	985.84	3180	44.82	225.76	150.27	69.87	9.35	652.00
Fickey Mouth	7/17/2007	Yes	369.00	2.83	2600	498.461436	614.02	606.7591351	3.33	0.00	614.02	2520	37.21	247.25	116.30	52.94	8.01	1640.00
Fickey Mouth	8/15/2007	Yes	349.73	2.85	2500	534.3447729	694.49	238.7869782	3.03	0.00	694.49	2630	18.37	163.07	21.00	70.85	5.42	1620.00
Fickey Mouth	3/13/2008	Yes	1598.00	3.05	1600	1426.489856	405.76	297.4203932	2.96	0.00	405.76	1679	22.65	96.75	45.23	34.98	3.23	696.00
Fickey Mouth	4/23/2008	Yes	1097.00	2.90	1900	926.166384	383.76	409.9010505	3.65	0.00	383.76	1790	23.96	171.23	76.57	39.77	4.81	1008.00
Fickey Mouth	4/24/2008	Yes	875.00	2.90	1900	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Fickey Mouth	5/29/2008	Yes	1385.00	3.30	1500	1133.39259	371.97	294.5430197	3.85	0.00	371.97	1699	15.54	86.26	65.98	21.68	3.53	689.00
Fickey Mouth	6/24/2008	Yes	538.00	2.80	2100	881.699148	744.93	496.3823941	3.12	0.00	744.93	2240	31.52	115.35	86.44	40.14	5.77	1180.00
Fickey Mouth	7/28/2008	Yes	1129.00	3.78	2050	926.606428	373.06	218.8365529	3.45	0.00	373.06	1996	17.32	190.62	40.73	25.80	2.87	832.00
Fickey Mouth	11/12/2008	Yes	220.00	2.81	5470	509.44872	1052.58	696.9879089	3.42	0.00	1052.58	3200	35.73	205.40	150.98	63.19	9.15	1885.00
Fickey Mouth	12/30/2008	Yes	2098.00	3.14	1440	1103.543804	239.09	220.9015419	3.33	0.00	239.09	1466	19.00	115.10	27.13	24.06	3.55	626.00
Fickey Mouth	4/17/2009	Yes	2614.00	3.17	1330	1409.866128	245.16	193.2679294	3.06	0.00	245.16	1357	14.62	63.04	27.52	20.28	2.49	508.00
Fickey Mouth	5/15/2009	Yes	877.00	2.92	1620	828.29142	429.3	381.4499822	2.91	0.00	429.30	1894	28.28	120.40	58.46	34.39	4.20	908.00
Fickey Mouth	6/26/2009	Yes	963.00	2.94	1910	992.797146	468.61	408.0767648	2.97	0.00	468.61	1923	24.73	143.96	76.38	39.98	4.78	1065.00
Fickey Mouth	7/21/2009	Yes	519.00	2.75	2300	750.128346	656.97	625.6178666	3.01	0.00	656.97	2250	30.60	179.05	132.64	46.95	6.28	1455.00

GLADE RUN AT MOUTH

Site_Description	Date	Mouth_Data	FlowGPM	FieldpH	FieldCon	AcidTPY	NetHotAcid	NetCalc_Acid	LabpH	Alk	Acidity	LabCon	D_Al	D_Ca	D_Fe	D_Mg	D_Mn	SO4
Glade Mouth	8/10/2005	Yes	109.0	4.10	1173	12.13388	50.6	35.45757191	4.40	0.00	50.60	1471	4.20	194.00	0.60	85.80	3.60	828.00
Glade Mouth	12/5/2005	Yes	15374	3.75	636	4307.671808	127.36	94.80853269	NS	0.00	127.36	NS	13.30	88.21	1.66	46.27	4.17	370.00
Glade Mouth	1/30/2006	Yes	5200.0	3.60	850	2135.9624	186.71	110.6846847	3.73	0.00	186.71	1008	14.65	84.02	2.80	50.40	5.08	479.00
Glade Mouth	3/27/2006	Yes	1077.0	3.70	1140	541.313124	228.46	135.2953772	3.61	0.00	228.46	1224	19.10	100.39	3.01	62.07	6.13	640.00
Glade Mouth	5/3/2006	Yes	6181	3.32	1209	#VALUE!	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Glade Mouth	6/1/2006	Yes	1669.0	3.60	1280	1068.016466	290.87	129.4888513	3.47	0.00	290.87	7520	18.01	136.36	2.03	69.75	6.29	750.00
Glade Mouth	7/27/2006	Yes	902.0	3.30	1540	792.311388	399.27	165.4454367	3.41	0.00	399.27	1573	21.70	150.98	2.36	79.24	7.43	924.00
Glade Mouth	8/23/2006	Yes	286.0	3.40	1600	207.787008	330.24	184.3358059	3.26	0.00	330.24	1758	24.55	209.67	4.00	97.52	9.53	1038.00
Glade Mouth	8/29/2006	Yes	203.0	3.30	1670	122.060246	273.31	177.7491164	3.25	0.00	273.31	1794.00	23.35	200.77	2.16	94.95	9.45	1125.00
Glade Mouth	9/27/2006	Yes	NS	3.50	1360	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Glade Mouth	11/9/2006	Yes	2038.0	3.55	1300	1510.121316	336.81	120.4595193	3.48	0.00	336.81	1204	16.40	99.87	2.20	50.50	5.15	640.00
Glade Mouth	12/6/2006	Yes	869.0	3.61	1700	620.990876	324.82	161.948743	3.49	0.00	324.82	1431	22.42	131.22	4.45	74.35	7.26	738.00
Glade Mouth	1/23/2007	Yes	2014.00	3.67	1300	985.232688	222.36	116.0213941	3.59	0.00	222.36	1149	16.00	96.51	2.67	55.02	5.11	556.00
Glade Mouth	1/25/2007	Yes	3098.00	3.75	1400	1671.389588	245.23	125.8780673	3.56	0.00	245.23	1230	17.77	106.16	2.97	62.18	5.67	554.00
Glade Mouth	5/14/2007	Yes	1308.00	3.46	1300	1047.417624	363.99	165.9146925	3.46	0.00	363.99	1511	22.12	126.86	4.52	76.88	7.47	764.00
Glade Mouth	5/16/2007	Yes	1294.00	3.44	1400	1061.99874	373.05	149.0293356	3.54	0.00	373.05	1466	19.74	123.15	3.18	73.84	6.98	728.00
Glade Mouth	5/31/2007	Yes	1608.00	3.40	1500	1021.482	288.75	136.6352828	3.93	0.00	288.75	1581	17.25	124.18	3.43	67.18	6.44	862.00
Glade Mouth	6/14/2007	Yes	803.00	3.40	1600	514.221928	291.08	330.0023643	3.70	0.00	291.08	1594	18.34	139.92	72.26	75.39	8.06	852.00
Glade Mouth	6/26/2007	Yes	260.00	3.39	1600	55.09504	96.32	48.64987608	3.80	0.00	96.32	1452	2.03	154.27	5.35	55.86	1.47	650.00
Glade Mouth	6/27/2007	Yes	682.00	3.30	1900	505.199684	336.71	145.9892318	3.58	0.00	336.71	1780	18.18	130.93	2.56	76.29	7.19	970.00
Glade Mouth	9/13/2007	Yes	914.65	3.50	1480	334.8149497	166.39	133.5336827	3.64	0.00	166.39	1461	17.70	133.97	2.84	67.49	6.48	816.00
Glade Mouth	10/8/2007	Yes	308.10	3.40	1900	226.3037634	333.87	163.3620865	3.36	0.00	333.87	1746	22.07	148.45	2.61	79.70	7.62	986.00
Glade Mouth	2/23/2008	Yes	2438.00	3.60	1000	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Glade Mouth	3/10/2008	Yes	6064.00	3.71	1100	2587.314752	193.94	125.3373002	3.74	0.00	193.94	967	19.51	21.34	0.95	9.36	2.56	471.00
Glade Mouth	4/17/2008	Yes	3035.00	3.80	1300	1000.74876	149.88	128.1864609	3.72	0.00	149.88	1221	18.22	120.32	2.73	67.53	6.45	636.00
Glade Mouth	4/23/2008	Yes	2438.00	3.60	1000	639.126576	119.16	96.6067626	3.80	0.00	119.16	1001	12.76	95.10	1.60	49.48	4.88	489.00
Glade Mouth	5/19/2008	Yes	11423.00	3.90	600	2429.375102	96.67	43.57294596	4.04	0.00	96.67	702	5.69	41.23	0.86	22.71	1.85	389.00
Glade Mouth	5/29/2008	Yes	4194.00	3.80	300	1292.766948	140.11	65.96102801	4.06	0.00	140.11	942	8.20	58.25	2.63	30.26	2.99	469.00
Glade Mouth	6/23/2008	Yes	1587.85	3.50	1300	632.4216008	181.04	120.2408255	3.73	0.00	181.04	1327	15.81	113.05	2.32	57.02	5.71	607.00
Glade Mouth	8/12/2008	Yes	1775.00	3.55	1341	792.1683	202.86	71.44211307	3.40	0.00	202.86	1221	8.38	75.64	1.79	44.48	3.30	620.00
Glade Mouth	11/12/2008	Yes	343.00	3.47	1830	226.779938	300.53	133.1064755	3.61	0.00	300.53	1627	16.87	136.42	3.43	68.87	7.29	870.00
Glade Mouth	12/15/2008	Yes	4525.00	3.90	836	1059.6102	106.44	57.78842215	3.85	0.00	106.44	784	7.46	66.41	1.60	27.40	3.17	386.00
Glade Mouth	12/30/2008	Yes	4510.00	3.68	1063	1099.75448	110.84	95.24832048	3.77	0.00	110.84	977	12.48	84.51	2.70	39.96	4.53	481.00
Glade Mouth	5/20/2009	Yes	2780.00	3.62	1210	1008.58956	164.91	114.8542476	3.74	0.00	164.91	1212	15.80	91.94	2.23	44.45	5.01	688.00
Glade Mouth	6/26/2009	Yes	2467.00	3.64	1110	667.5702	123	105.035922	3.76	0.00	123.00	1125	14.02	104.13	2.39	54.95	5.11	642.00

MARTIN CREEK AT MOUTH

Site_Des critption	Date	Mouth_Da ta	FlowGPM	FieldpH	FieldCon	AcidTPY	NetHotAci d	NetCalc_ Acid	LabpH	Alk	Acidity	LabCon	D_Al	D_Ca	D_Fe	D_Mg	D_Mn	SO4
Martin mou	5/28/2002	Yes	7910	3.13	1552	5394.62	310	229.3996	NS	0.00	310.00	NS	22.58	NS	19.70	NS	7.77	904.00
Martin mou	6/17/2002	Yes	3724	3.02	1623	2359.526	288	268.8475	NS	0.00	288.00	NS	26.83	NS	20.71	NS	9.11	1084.00
Martin mou	7/8/2002	Yes	1933	2.83	2347	2117.795	498	451.0819	NS	0.00	498.00	NS	37.41	NS	54.46	NS	12.88	1595.00
Martin mou	7/29/2002	Yes	3181	3.00	2042	2589.334	370	266.8958	NS	0.00	370.00	NS	23.90	NS	30.99	NS	0.61	295.00
Martin mou	8/13/2002	Yes	2011	2.85	2448	3238.514	732	228.8936	NS	0.00	732.00	NS	3.05	NS	43.97	NS	12.95	1072.00
Martin mou	9/9/2002	Yes	599	2.73	2716	971.2186	737	310.004	NS	0.00	737.00	NS	5.22	8.68	60.30	56.78	14.51	1642.00
Martin mou	9/30/2002	Yes	1890	2.93	2394	1787.94	430	269.8128	NS	0.00	430.00	NS	23.59	9.44	21.40	51.50	12.48	1261.00
Martin mou	10/22/2002	Yes	3336	2.96	1843	2656.79	362	275.46	NS	0.00	362.00	NS	22.74	8.36	29.40	38.18	8.55	1084.00
Martin mou	11/4/2002	Yes	9390	2.95	1621	7953.33	385	296.1832	NS	0.00	385.00	NS	28.87	24.48	24.03	34.68	8.43	1010.00
Martin mou	11/11/2002	Yes	9332	3.08	1303	5502.147	268	224.6356	NS	0.00	268.00	NS	24.10	10.28	13.47	42.55	7.19	707.00
Martin mou	12/9/2002	Yes	7008	2.82	1757	6598.733	428	300.5556	NS	0.00	428.00	NS	24.29	141.32	26.20	84.02	10.87	1175.00
Martin mou	1/7/2003	Yes	7703	3.12	1488	3287.64	194	194.3823	NS	0.00	194.00	NS	18.88	60.44	14.84	48.91	6.50	686.00
Martin mou	2/4/2003	Yes	27780	3.26	968	5518.775	90.3	98.99794	NS	0.00	90.30	NS	8.16	6.08	7.05	1.32	4.02	300.00
Martin mou	3/3/2003	Yes	18344	3.03	1342	16505.93	409	210.5305	NS	0.00	409.00	NS	18.91	49.36	18.64	41.52	4.89	710.00
Martin mou	3/31/2003	Yes	6435	3.09	1526	3326.895	235	260.7366	NS	0.00	235.00	NS	25.20	NS	24.89	NS	7.38	670.00
Martin mou	4/22/2003	Yes	9494	3.15	1680	5869.191	281	270.1539	NS	0.00	281.00	NS	25.11	6.60	30.31	18.34	7.74	1026.00
Martin mou	5/12/2003	Yes	24285	3.13	1077	8227.758	154	145.143	NS	0.00	154.00	NS	14.39	73.20	7.61	19.20	4.26	330.00
Martin mou	9/15/2003	Yes	2495	3.04	1643	1471.052	268	299.6215	NS	0.00	268.00	NS	34.20	34.40	18.20	44.98	8.40	431.20
Martin mou	3/11/2004	Yes	15824	3.21	1037	1660.919	47.71	152.2707	NS	0.00	47.71	NS	15.50	82.60	10.40	39.80	4.11	476.00
Martin mou	5/27/2004	Yes	4984	3.32	1330	871.1534	79.45	186.0942	NS	0.00	79.45	NS	18.29	125.03	18.54	59.86	5.99	706.35
Martin mou	7/26/2004	Yes	3138	2.79	2195	1111.963	161.07	481.8517	NS	0.00	161.07	NS	34.33	233.38	68.64	114.06	14.40	1061.00
Martin mou	7/29/2005	Yes	2199.7	3.30	1570	773.9073	159.92	110.4896	3.21	0.00	159.92	1644	9.19	99.00	10.60	38.00	3.29	731.00
Martin mou	12/5/2005	Yes	11570	3.60	717	4066.277	159.75	113.3098	NS	0.00	159.75	NS	13.30	100.30	7.51	43.65	3.71	402.00
Martin mou	5/3/2006	Yes	8400	3.22	1319	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Martin mou	8/23/2006	Yes	556.0	3.00	2010	537.1316	439.12	319.8059	2.89	0.00	439.12	2250	27.02	256.68	39.12	94.09	8.20	1214.00
Martin mou	9/27/2006	Yes	708.0	3.00	1700	632.3389	405.97	270.7942	3.22	0.00	405.97	1937	21.87	195.46	32.04	75.89	7.41	942.00
Martin mou	11/9/2006	Yes	2620.0	3.27	1600	2287.732	396.9	165.5323	3.22	0.00	396.90	1483	17.38	125.12	12.55	48.78	4.68	726.00
Martin mou	1/23/2007	Yes	6186.0	3.60	1300	2941.084	216.11	135.5177	3.37	0.00	216.11	1298	15.33	117.21	11.00	52.36	4.58	351.00
Martin mou	5/14/2007	Yes	1932.00	3.26	1600	1713.124	403.05	233.167	3.47	0.00	403.05	1637	21.57	144.27	27.77	69.24	6.31	802.00
Martin mou	6/12/2007	Yes	760.00	2.90	1800	665.2554	397.88	310.1114	4.10	0.00	397.88	2180	25.35	163.06	35.00	74.69	6.92	1018.00
Martin mou	6/14/2007	Yes	851.00	3.00	1800	750.8833	401.07	208.2162	3.57	0.00	401.07	2090	22.58	167.07	7.30	69.55	7.27	980.00
Martin mou	8/15/2007	Yes	1047.46	3.21	1780	698.5595	303.14	31.83498	3.30	0.00	303.14	1775	0.10	32.79	0.10	7.10	0.10	938.00
Martin mou	3/13/2008	Yes	6257.00	3.42	1200	2788.87	202.6	109.3554	3.45	0.00	202.60	1204	11.21	77.36	8.68	45.51	2.65	485.00
Martin mou	4/23/2008	Yes	3861.00	3.30	1300	1377.504	162.17	153.0789	3.79	0.00	162.17	1257	13.30	118.28	17.29	44.96	4.30	527.00
Martin mou	4/25/2008	Yes	4545.00	3.30	1300	CNBD	CNBD	CNBD	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Martin mou	5/29/2008	Yes	6516.00	3.60	1000	1615.577	112.7	106.4832	3.68	0.00	112.70	1139	11.03	88.01	10.07	37.00	3.12	498.00
Martin mou	6/24/2008	Yes	3090.00	2.90	1500	1868.022	274.79	221.9134	3.39	0.00	274.79	1630	17.34	115.91	19.84	50.32	5.22	768.00
Martin mou	8/7/2008	Yes	6641.00	3.41	1248	1918.027	131.28	95.92403	3.52	0.00	131.28	1178	6.89	75.39	12.63	32.52	2.40	532.00
Martin mou	11/12/2008	Yes	1191.79	3.12	3710	1049.352	400.22	232.6843	3.43	0.00	400.22	2170	17.61	151.14	31.84	61.35	6.40	1050.00
Martin mou	11/12/2008	Yes	1030.00	3.12	3710	906.2187	399.92	228.5427	3.38	0.00	399.92	2180	17.57	150.40	30.37	62.32	6.41	1054.00
Martin mou	11/14/2008	Yes	1682.00	3.14	3460	984.5284	266.06	212.2153	3.06	0.00	266.06	2000	17.15	141.20	25.81	60.08	6.37	958.00
Martin mou	12/30/2008	Yes	5520.00	3.49	1124	1622.681	133.62	108.0802	3.40	0.00	133.62	1082	11.81	90.43	7.31	35.38	3.69	484.00
Martin mou	5/15/2009	Yes	7609.00	3.36	1200	3154.95	188.47	156.5845	3.27	0.00	188.47	1383	15.82	109.64	14.62	48.54	4.24	700.00
Martin mou	6/26/2009	Yes	4435.00	3.33	1320	1720.647	176.35	161.0886	3.30	0.00	176.35	1343	14.68	116.04	18.09	51.62	4.23	734.00
Martin mou	8/17/2009	Yes	681.00	3.00	1960	532.4453	355.39	309.5377	2.79	0.00	355.39	2000	22.64	152.36	45.81	59.69	6.08	1195.00
Martin mou	11/6/2009	Yes	3193.00	2.13	1240	1201.628	171.06	179.5246	3.42	0.00	171.06	1399	15.71	144.41	24.62	46.00	4.01	726.00

MARTIN CREEK @ MOUTH (EXISTING CONDITIONS)

OJECT_NA	PERMIT	AMPLE_N(	SITE_DESC	AMPLE_DATI	CFS	FPH	T_FE	D_AL
T & T FUELS, INC.	EM-113	31	MARTIN CREEK @ MOUTH (26 BRIDGE)	12-May-15	7.8245	3.26	9.63	14.8
T & T FUELS, INC.	EM-113	31	MARTIN CREEK @ MOUTH (26 BRIDGE)	05-Apr-15	18.566	3.68	6.93	9
T & T FUELS, INC.	EM-113	31	MARTIN CREEK @ MOUTH (26 BRIDGE)	17-Mar-15	19.212	4	9.09	

c. *General land uses (e.g., mining, agricultural, recreation, residential, commercial, industrial, etc.) as well as specific land uses adjacent to the waters for the length of the segment proposed to be revised*:

A Total Maximum Daily Load (TMDL) was developed for the Cheat River watershed, the land use coverage are as follows:

Martin Creek 46.6% deciduous forest, 39.4% pasture, 13.2% mine lands, 0.2% residential, 0.6% commercial.

Fickey Run 49.9% deciduous forest, 33.6% pasture, 16.5% mine lands.

Glade Run 33.9% deciduous forest, 49.5% pasture, 15.1% mine lands, 0.3% residential, 1.2% commercial.

d. The existing and designated uses of the receiving waters into which the segment in question discharges and the location where those downstream uses begin to occur:

Martin Creek, Fickey Run, Glade Run, and tributaries thereof is designated as follows:

- Category A (Water Supply, Public), the closest downstream drinking water intake is greater than 5 miles downstream of our bond forfeiture site,
- Category B (Warm Aquatic Life), and
- Category C (Water Contact Recreation);

however, it is important to note that these streams have never been able to meet their designated use as a result of human-caused conditions (pre-law mining) that were in existence before the stream designations were assigned.

e. *General physical characteristics of the stream segment including, but not limited to, width, depth, bottom composition, and slope*:

Fickey Run is located in Preston County and the watershed is approximately 1.72 square miles. The widths of the stream vary along its reach, 1 foot to 6 feet with the average width of 3 feet. The average instream water depth is approximately .2 foot deep. Stream bed substrate is comprised of mainly boulder and cobble; however, bedrock is more prominent in the upper reaches and gravel components increase towards the lower reaches. Martin Creek as a stream gradient is approximately 15,155 feet and has an overall slope of 2.94%.

Martin Creek is located in Preston County and the watershed is approximately 7.1 square miles. The widths of the stream vary along its reach, 1 foot to 9 feet with the average width of 6.4 feet. The average instream water depth is approximately .29 foot deep. Stream bed substrate is comprised of mainly boulder and cobble; however, bedrock is more prominent in the upper reaches and gravel components increase towards the lower reaches. Martin Creek as a stream gradient is approximately 14,245 feet and has an overall slope of 4%.

Glade Run is located in Preston County and the watershed is approximately 3.74 square miles. The widths of the stream vary along its reach, 1.3 foot to 4.1 feet with the average width of 3.17 feet. The average instream water depth is approximately .32 foot deep. Stream bed substrate is comprised of mainly boulder and cobble; however, bedrock is more prominent in the upper reaches and gravel components increase towards the lower reaches. Martin Creek as a stream gradient is approximately 19,691 feet and has an overall slope of 1.68%.

f. *The average flow rate in the segment, the amount of flow at a designated control point, and a statement regarding whether the flow of the stream is ephemeral, intermittent, or perennial*:

Martin Creek is a perennial stream with a watershed area of approximately 7.1 square miles. Average flow data for this stream is approximately 896.26 cfs.

Fickey Run is a perennial stream with a watershed area of approximately 1.72 square miles. Average flow data for this stream is approximately 160.54 cfs

Glade Run is a perennial stream with a watershed area of approximately 3.74 square miles. Average flow data for this stream is approximately 403.14 cfs

g. *An assessment of aquatic life in the stream segment in question and in the adjacent upstream and downstream segments*:

Friends of the Cheat watershed group and its partners began gathering information and developing a remediation plan in 2004. The following data is comprised of over 7 years of study. Biological assessment sight locations can be found on the Attachment 1 map located at the end of this application. WVU Division of Forestry and Natural Resources identified 32,161 individual benthic macroinvertebrates comprising 64 taxonomic families. The upper most sampling location within the Muddy Creek watershed, Upper Muddy Creek, had the greatest family richness (37 taxa; $\bar{x}$ = 30.8) during the study period. The second richest site was Muddy Creek at Million Dollar Bridge, located just upstream of the confluence with Martin Creek, with an average richness of 17.3. Study sites located just downstream of the Gary Conner passive treatment project and the Allen Conner - Messenger passive treatment project (Upper UNT of Glade Run and Glade Run above Tribs, respectively) had an average pre-treatment richness of 4.7 and 7.0 respectively (Table 10). Post-treatment richness for Glade Run above Tribs decreased to 5.0 while the Upper UNT of Glade Run experienced an increase in taxa richness to 8.0. In fact, none of the benthic macroinvertebrate biometrics improved at Glade Run above Tribs in spring 2012 after AMD treatment. However, just below the Gary Conner passive treatment system, at the Upper UNT of Glade Run sampling location, benthic macroinvertebrate metrics improved significantly after AMD treatment. Post-treatment WVSCI scores for Upper UNT of Glade Run still indicate impairment because scores fall below the impairment threshold of 68.0 (WV DEP 2010; Table 10).

Glade Run Mouth, a study site at the mouth of Glade Run downstream of the Gary Conner and Allen Conner - Messenger passive treatment systems (the uppermost study site receiving the cumulative benefit of both passive treatment systems) only showed improvement for the % Ephemeroptera metric. All other post-treatment biometrics were within the pre-treatment 95% confidence intervals, indicating no significant improvement in bioscores (Table 10, Table 11).

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	Taxa Rich	%2Dom	WVSCI	Taxa Rich	%2Dom	WVSCI
Glade above Tribs	7.00±1.60	87.20±4.43	25.70±3.20	5.00	97.89	13.87
Upper UNT Glade	4.67±1.20	97.52±1.81	12.75±3.03	8.00	71.09	26.19
Glade Run Mouth	7.67±3.87	95.93±2.93	19.96±8.84	9.00	96.28	17.23

Martin ab Fickey	6.67±2.80	95.30±2.85	18.64±5.14	5.00	96.60	11.77
Martin Mouth	4.00±2.21	85.80±10.03	23.88±14.83	8.00	53.33	49.12
Muddy ab Crab Orchard	4.00±2.21	70.24±29.57	33.22±18.13	8.00	80.27	32.81
Muddy ab Sypolt	8.33±4.01	71.28±15.96	51.58±13.49	9.00	65.17	36.46
Muddy Mouth	9.83±7.73	72.41±18.03	47.19±19.64	7.00	77.78	39.26
Cheat at Decision Right	13.17±8.42	51.59±8.91	60.35±19.75	17.00	65.25	68.54
Cheat at Jenkinsburg	13.00±3.89	63.36±14.02	75.14±5.30	12.00	48.11	65.06

Table 10. Family Richness (Taxa Rich), Percent of assemblage as the top two dominant families (%2Dom), and West Virginia Stream Condition Index (WVSCI) for the Gary Conner and Allen Conner - Messenger treatment continuums before and after AMD treatment. (“ab” = above)

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	% EPT	EPT Richness	% Ephem	% EPT	EPT Richness	% Ephem
Glade above Tribs	10.40±0.70	0.50±0.67	0.30±0.63	1.68	1.00	0.00
Upper UNT Glade	1.06±1.74	0.50±0.44	0.12±0.23	3.13	1.00	0.00
Glade Run Mouth	2.78±2.43	2.83±2.55	0.35±0.60	1.29	1.00	1.29
Martin ab Fickey	4.04±3.53	2.00±1.13	0.57±1.12	0.00	0.00	0.00
Martin Mouth	14.93±14.77	1.50±1.58	6.80±13.33	40.00	3.00	26.67
Muddy ab Crab Orchard	29.58±29.39	2.33±1.65	3.81±4.32	4.48	2.00	0.00
Muddy ab Sypolt	40.08±20.42	4.67±2.36	10.59±7.02	12.36	3.00	10.11
Muddy Mouth	27.11±21.41	5.17±4.37	7.80±9.38	33.33	2.00	31.48
Cheat at Decision Right	51.94±17.38	7.33±5.23	34.69±18.03	39.67	9.00	3.28
Cheat at Jenkinsburg	72.96±14.21	8.17±1.92	55.32±15.57	59.43	7.00	15.57

Table 11. Percent of assemblage as Ephemeroptera, Plecoptera, and Trichoptera (%EPT), number of families within the orders of Ephemeroptera, Plecoptera, and Trichoptera (EPT Richness), and percent of assemblage as Ephemeroptera (% Ephem) for the Gary Conner and Allen Conner - Messenger treatment continuums before and after AMD treatment. (“ab” = above)

The Fickey Mouth site only experienced a slight improvement in taxa richness post-treatment. All other biometrics (%EPT, EPT Richness, %Ephemeroptera, %2Dominant Taxa) remained extremely degraded with no change or with post-treatment results within the pre-treatment 95% confidence interval (WVSCI) (Table 12, Table 13).

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	% EPT	EPT Richness	% Ephem	% EPT	EPT Richness	% Ephem
Fickey Mouth	0.00±0.00	0.00±0.00	0.00±0.00	0.00	0.00	0.00
Martin Mouth	14.93±14.77	1.50±1.58	6.80±13.33	40.00	3.00	26.67

Muddy ab Crab Orchard	29.58±29.39	2.33±1.65	3.81±4.32	4.48	2.00	0.00
Muddy ab Sypolt	40.09±20.42	4.67±2.36	10.59±7.02	12.36	3.00	10.11
Muddy at Mouth	27.11±21.41	5.17±4.37	7.79±9.38	33.33	2.00	31.48
Cheat at Decision Right	51.94±17.38	7.33±5.23	34.69±18.03	39.67	9.00	3.28
Cheat at Jenkinsburg	72.96±14.22	8.20±1.92	55.32±15.57	59.43	7.00	15.57

Table 12. Percent of assemblage as Ephemeroptera, Plecoptera, and Trichoptera (%EPT), number of families within the orders of Ephemeroptera, Plecoptera, and Trichoptera (EPT Richness), and percent of assemblage as Ephemeroptera (% Ephem) for the Fickey Doser treatment continuums before and after AMD treatment. ("ab" = above)

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	Taxa Rich	%2Dom	WVSCI	Taxa Rich	%2Dom	WVSCI
Fickey Mouth	1.70±0.65	99.0±1.92	13.6±11.53	3.00	0.00	15.87
Martin Mouth	4.00±2.21	85.80±10.03	23.88±14.83	8.00	53.33	49.12
Muddy ab Crab Orchard	4.00±2.21	70.24±29.58	33.22±18.13	8.00	80.27	32.81
Muddy ab Sypolt	8.33±4.01	71.28±15.96	51.58±13.49	9.00	65.17	36.46
Muddy at Mouth	9.83±7.73	72.41±18.03	47.19±19.64	7.00	77.78	39.26
Cheat at Decision Right	13.17±8.43	51.60±8.90	60.36±19.75	17.00	65.25	68.54
Cheat at Jenkinsburg	13.00±3.89	63.40±14.02	75.10±5.30	12.00	48.11	65.06

Table 13. Family Richness (Taxa Rich), Percent of assemblage as the top two dominant families 2Dom), and West Virginia Stream Condition Index (WVSCI) for the Fickey Doser treatment continuums before and after AMD treatment. ("ab" = above)

At the mouth of Martin Creek, the uppermost study site that captures the influence of all three treatment systems, %EPT, % Ephemeroptera, Family Richness, %2Dominant Taxa, and WVSCI all increased significantly post-treatment. There was a slight improvement in EPT Richness (Table 10, Table 11) and a significant decrease in the percent of generally tolerant organisms (%Gen Tol) in the assemblage post-treatment as well (Table 14).

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	% Gen Tol	% Acid Tol	% Alum Tol	% Gen Tol	% Acid Tol	% Alum Tol
Glade above Tribs	93.8±3.67	0.00±0.00	0.00±0.00	97.92	1.69	0.00
Upper UNT Glade	96.9±1.96	0.75±1.48	0.00±0.00	85.19	3.12	0.00
Glade Run Mouth	92.73±4.95	1.58±2.03	0.09±0.13	94.83	0.00	0.00
Martin ab Fickey	91.37±4.16	3.09±3.37	0.00±0.00	95.36	0.00	0.00
Martin Mouth	75.95±20.10	4.20±7.47	0.58±0.73	34.00	6.67	0.00
Muddy ab Crab Orchard	61.56±31.29	3.43±5.83	2.75±4.53	44.88	3.59	0.89

Muddy ab Sypolt	37.23±18.29	13.75±15.49	10.24±15.72	66.41	1.12	1.12
Muddy Mouth	48.86±29.39	12.65±13.26	0.74±1.10	46.48	1.85	0.00
Cheat at Decision Right	39.48±20.49	9.56±7.24	3.77±3.54	44.62	27.86	5.90
Cheat at Jenkinsburg	15.4±11.93	5.70±4.49	5.30±5.74	23.62	3.04	11.32

Table 14. Percent of assemblage as generally tolerant organisms (%Gen Tol), perecent of assemblage as organisms tolerant to acidity (%Acid Tol) (Leuctrids, Capniids, Nemourids), and percent of assemblage as organisms tolerant to aluminum floc (Hydropsychids) along the Gary and Allen Conner treatment continuums before and after AMD treatment. ("ab" = above)

Figures 3a-d display benthic macroinvertebrate metrics along the Muddy Creek stream continuum in regard to distance from the mouth of Muddy Creek. Figure 3a displays % Ephemeroptera (%E) along the stream continuum; interestingly, unimpaired communities were more highly variable over the 6 years compared to impaired sites in terms of %E possibly because there is higher relative biodiversity to begin with at unimpaired sites. The percent of mayflies is relatively high for pre-treatment (~40%) for Muddy at Million Dollar Bridge and Upper Muddy Creek but near the confluence of Martin Creek there is a dramatic decline in both the mean % Ephemeroptera and the 95% confidence intervals which translates as less mayflies and less assemblage diversity as a whole at sites on Muddy Creek near the confluence of Martin Creek and downstream. However, the increase in %E outside the 95% confidence interval at the downstream most site on the Muddy Creek main stem is an exception (Figure 3a).

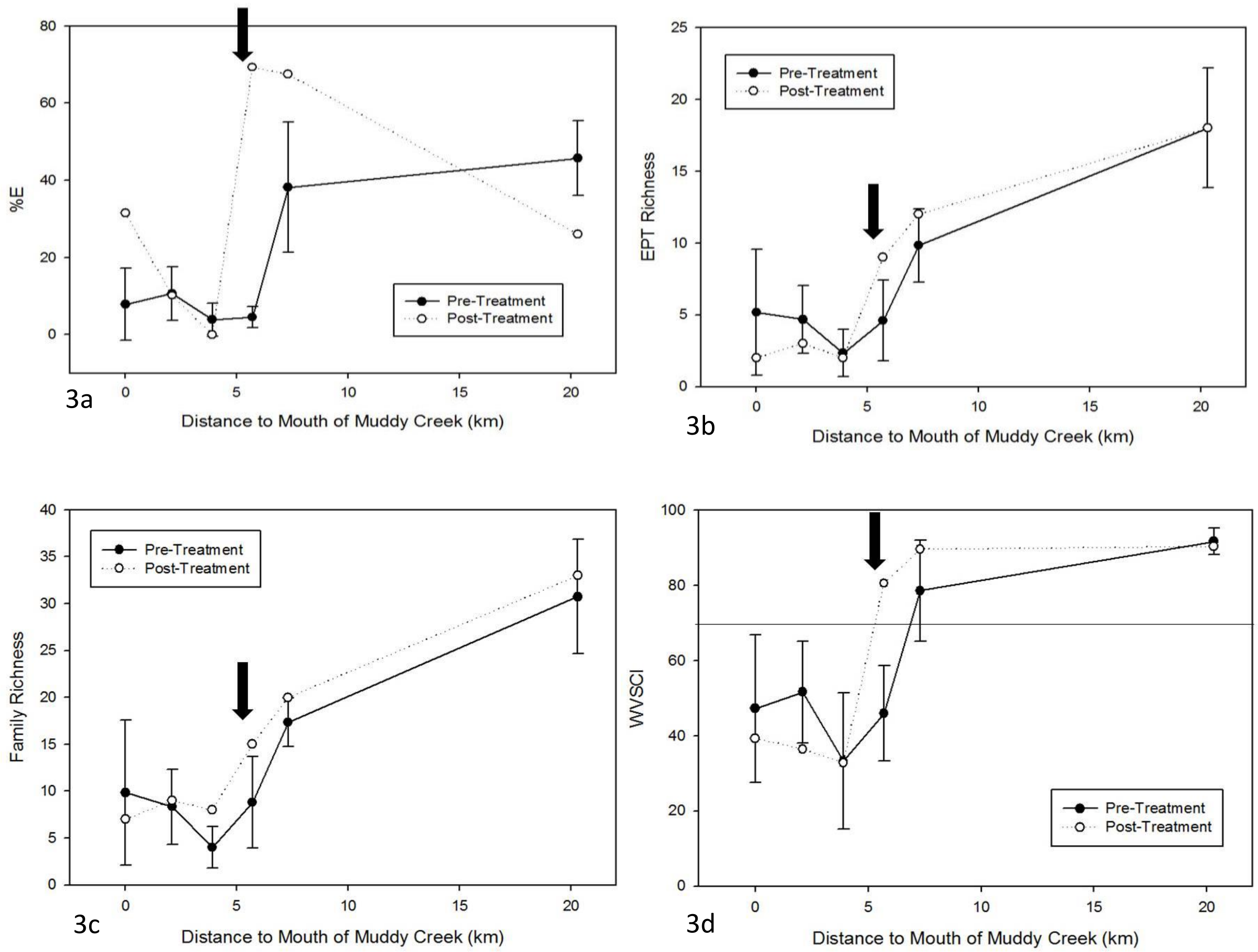


Figure 3a-d. Percent of assemblage comprised of Ephemeroptera (a), the number of families within the orders Ephemeroptera, Plecoptera, and Trichoptera (b), the total number of families comprising an assemblage (c), and the West Virginia Stream Condition Index (WVSCI) scores (d) for sites along the Muddy Creek stream continuum. Error bars represent 95% confidence intervals about the mean for pre-treatment data from 2006-2011.The horizontal line in (d) represents the impairment threshold for WVSCI (68.0) as defined by the West Virginia Department of Environmental Protection. The sites displayed in Figures 3a-d are as follows from left to right along the x-axis of each figure: Muddy Creek at Mouth, Muddy Creek above Sypolt Run, Muddy Creek above Crab Orchard Run, Muddy Creek above Martin Creek, Muddy Creek at Million Dollar Bridge, and Upper Muddy Creek. Martin Creek enters Muddy Creek 5.6 km (3.2 miles) from the mouth of Muddy Creek.

Some of the highest percentages of EPT were observed for sites upstream of the confluence with Martin Creek. When traveling downstream, a severe decline occurs and some of the lowest observances for %EPT were seen in sites downstream from Martin Creek on the main stem of Muddy Creek, except for the Mouth of Muddy Creek which experienced a post-treatment percentage near the mean for pre-treatment. However, when examining EPT Richness (Figure 3b) it can be seen that upstream of Martin Creek EPT richness is slightly elevated relative to the mean and 95% confidence intervals at two of the three upstream sampling locations. Downstream of the confluence with Martin Creek, post-treatment EPT richness declines steeply and is relatively lower than the pre-treatment mean. Post-treatment values of %EPT and EPT richness remained severely depressed at the mouth of Muddy Creek.

Family richness showed a similar pattern to EPT post-treatment (Figure 3c). Upstream of the confluence with Martin Creek, family richness was high. Below the confluence, family richness declined severely, except for Muddy Creek above Crab Orchard Run, which experienced a relative improvement in family richness. Tables 14 – 16 display the percentage of each assemblage that is comprised of generally tolerant organisms (%Gen Tol). Study sites above Martin Creek (5.6 km from Mouth of Muddy Creek) all experience a relatively low composition of generally tolerant taxa post-treatment, while sites below Martin Creek still contained numerous tolerant taxa.

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	% Gen Tol	% Acid Tol	% Alum Tol	% Gen Tol	% Acid Tol	% Alum Tol
Fickey Mouth	81.6±31.89	0.00±0.00	0.00±0.00	70.33	0.00	0.00
Martin Mouth	75.95±20.10	4.20±7.47	0.58±0.73	34.00	6.67	0.00
Muddy ab Crab Orchard	61.56±31.29	3.43±5.83	2.75±4.53	44.88	3.59	0.89
Muddy ab Sypolt	37.23±18.29	13.75±15.49	10.24±15.72	66.41	1.12	1.12
Muddy at Mouth	48.86±29.39	12.65±13.26	0.74±1.10	46.48	1.85	0.00
Cheat at Decision Right	39.48±20.49	9.56±7.24	3.77±3.54	44.62	27.86	5.90
Cheat at Jenkinsburg	15.4±11.93	5.70±4.49	5.30±5.74	23.62	3.04	11.32

Table 15. Percent of assemblage as generally tolerant organisms (%Gen Tol), perecent of assemblage as organisms tolerant to acidity (%Acid Tol) (Leuctrids, Capniids, Nemourids), and percent of assemblage as organisms tolerant to aluminum floc (Hydropsychids) along the Fickey Doser treatment continuum before and after AMD treatment. ("ab" = above)

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	% Gen Tol	% Acid Tol	% Alum Tol	% Gen Tol	% Acid Tol	% Alum Tol
Upper Muddy	12.97±6.01	7.79±6.53	4.32±4.12	7.11	24.27	3.98
Million Dollar Bridge	20.34±14.03	11.54±6.57	6.00±3.02	12.29	2.87	1.83
Muddy ab Martin	54.16±18.77	12.31±10.02	16.75±17.78	15.64	5.75	4.93
Muddy ab Crab Orchard	61.56±31.29	3.43±5.83	2.75±4.53	44.88	3.59	0.89

Muddy ab Sypolt	37.23±18.29	13.75±15.49	10.24±15.72	66.41	1.12	1.12
Muddy at Mouth	48.86±29.39	12.65±13.26	0.74±1.10	46.48	1.85	0.00
Cheat at Decision Right	39.48±20.49	9.56±7.24	3.77±3.54	44.62	27.86	5.90
Cheat at Jenkinsburg	15.4±11.93	5.70±4.49	5.30±5.74	23.62	3.04	11.32

Table 16. Percent of assemblage as generally tolerant organisms (%Gen Tol), perecent of assemblage as organisms tolerant to acidity (%Acid Tol) (Leuctrids, Capniids, Nemourids), and percent of assemblage as organisms tolerant to aluminum floc (Hydropsychids) along the Muddy Creek continuum before and after AMD treatment from the upper most sampling site to the downstream most sampling site. ("ab" = above)

WVSCI scores from the headwaters of Muddy Creek to the Mouth of Muddy Creek take on the same general pattern. There were relatively healthy assemblages upstream of Martin Creek at most study sites, and relatively degraded assemblages at sites below Martin Creek with none of them attaining the non-impaired threshold of 68.0 (Figure 3d).

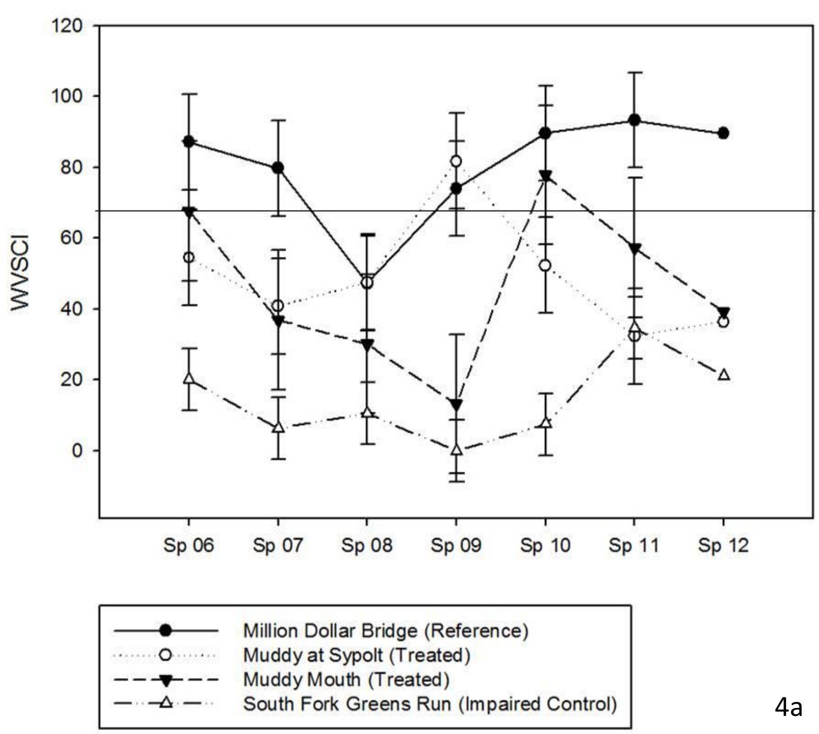
Time series data displayed for the four key study sites show how extremely variable benthic macroinvertebrate assemblages were over the seven years. However, the un-impaired reference site (Muddy at Million Dollar Bridge) and impaired control site (South Fork of Greens Run) were always distinctly different (separated in Figures 4a-d). The study sites that were downstream from AMD were highly variable with large 95% confidence intervals (Table 16-18). These figures indicate that the final round of monitoring in Spring 2012 after AMD treatment did not result in noticeable improvement in benthic macroinvertebrate communities.

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	% EPT	EPT Richness	% Ephem	% EPT	EPT Richness	% Ephem
Upper Muddy	72.99±8.92	18.00±4.16	45.72±9.73	60.89	18.00	26.00
Million Dollar Bridge	65.99±13.62	9.83±2.55	38.18±16.90	79.56	12.00	67.51
Muddy ab Martin	37.61±12.85	4.60±2.81	4.45±2.77	82.47	9.00	69.32
Muddy ab Crab Orchard	29.58±29.39	2.33±1.65	3.81±4.32	4.48	2.00	0.00
Muddy ab Sypolt	40.09±20.42	4.67±2.36	10.59±7.02	12.36	3.00	10.11
Muddy at Mouth	27.11±21.41	5.17±4.37	7.80±9.38	33.33	2.00	31.48
Cheat at Decision Right	51.94±17.38	7.33±5.23	34.69±18.03	39.67	9.00	3.28
Cheat at Jenkinsburg	73.00±14.22	8.20±1.92	55.30±15.57	59.43	7.00	15.57

Table 17. Percent of assemblage as Ephemeroptera, Plecoptera, and Trichoptera (%EPT), number of families within the orders of Ephemeroptera, Plecoptera, and Trichoptera (EPT Richness), and percent of assemblage as Ephemeroptera (% Ephem) for the Muddy Creek continuum before and after AMD treatment from the upper most sampling site to the downstream most sampling site. ("ab" = above)

	Pre-Treatment Mean ± 95%CI			Post-Treatment Spring 2012 Data		
Site Name	Taxa Rich	%2Dom	WVSCI	Taxa Rich	%2Dom	WVSCI
Upper Muddy	30.75±6.11	42.56±5.04	91.64±3.55	33.00	43.72	90.34
Million Dollar Bridge	17.33±2.61	51.20±11.74	78.55±13.46	20.00	72.33	89.58
Muddy ab Martin	8.80±4.86	63.71±13.71	45.92±12.60	15.00	77.26	80.54
Muddy ab Crab Orchard	4.00±2.21	70.24±29.58	33.22±18.13	8.00	80.27	32.81
Muddy ab Sypolt	8.33±4.01	71.28±15.96	51.28±13.49	9.00	65.17	36.46
Muddy at Mouth	9.83±7.73	72.41±18.03	47.19±19.64	7.00	77.78	39.26
Cheat at Decision Right	13.17±8.43	51.60±8.91	60.36±19.75	17.00	65.25	68.54
Cheat at Jenkinsburg	13.00±3.89	63.40±14.02	75.10±5.30	12.00	48.11	65.06

Table 18. Family Richness (Taxa Rich), Percent of assemblage as the top two dominant families (%2Dom), and West Virginia Stream Condition Index (WVSCI) for the Muddy Creek continuum before and after AMD treatment from the upper most sampling site to the downstream most sampling site. (“ab” = above)



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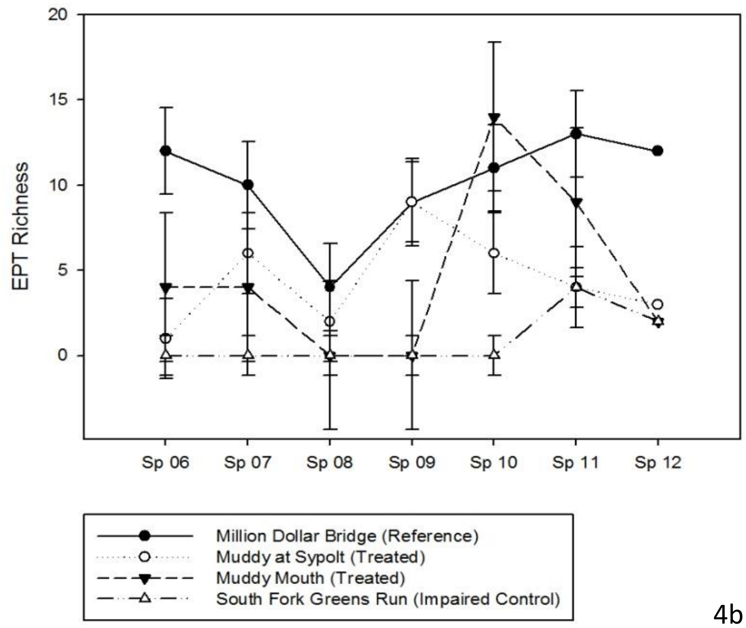
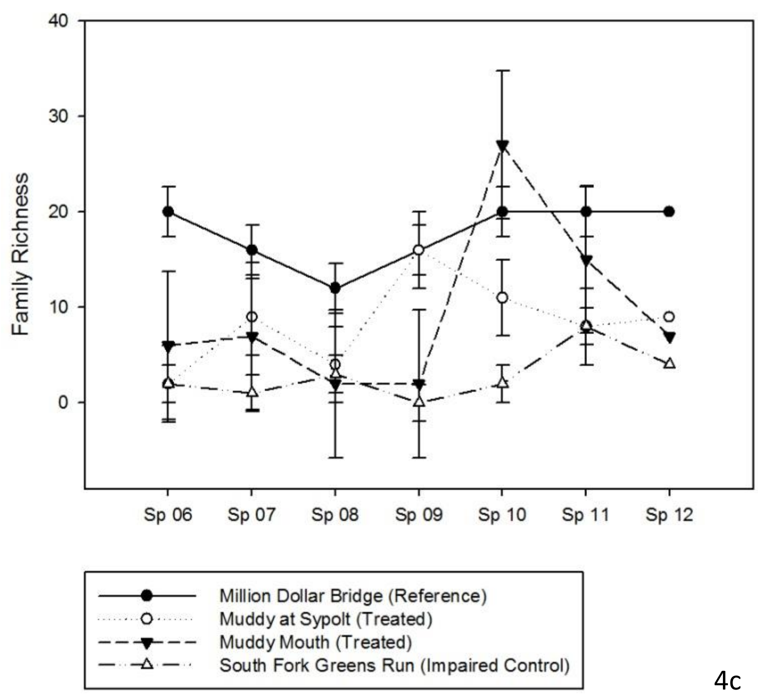


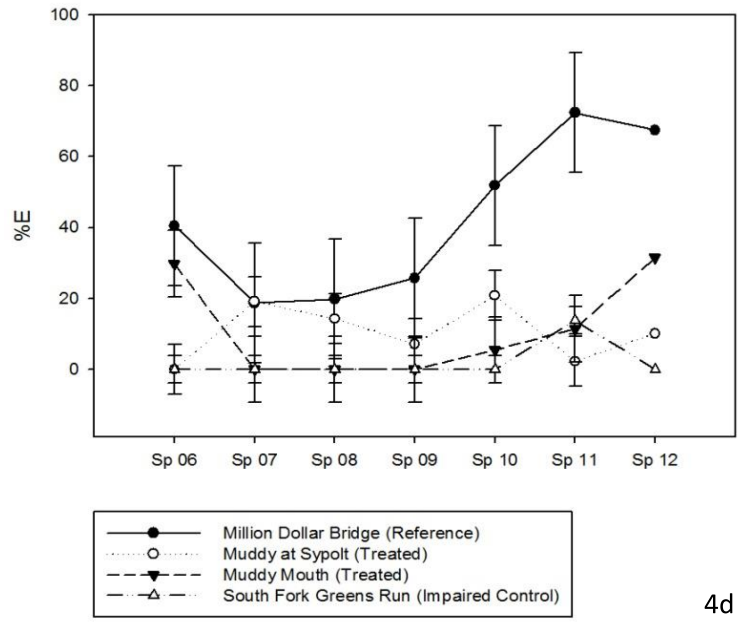
EPT Richness
20
15
10
5
0
Sp 06
Sp 07
Sp 08
Sp 09
Sp 10
Sp 11
Sp 12
Million Dollar Bridge (Reference)
Muddy at Sypolt (Treated)
Muddy Mouth (Treated)
South Fork Greens Run (Impaired Control)

4b



Family Richness
40
30
20
10
0
Sp 06
Sp 07
Sp 08
Sp 09
Sp 10
Sp 11
Sp 12
Million Dollar Bridge (Reference)
Muddy at Sypolt (Treated)
Muddy Mouth (Treated)
South Fork Greens Run (Impaired Control)

4c



4d

Figure 4a-d. West Virginia Stream Condition Index (WVSCI) scores (a), the number of families within the orders Ephemeroptera, Plecoptera, and Trichoptera (b), the total number of families within each assemblage (c), and percent of the assemblage comprised of Ephemeroptera for a reference site, two treated sites, and an impaired, untreated control site. Error bars represent pre-treatment 95% confidence intervals about the mean for each parameter. The horizontal line in (a) represents the impairment threshold for WVSCI (68.0) as defined by the West Virginia Department of Environmental Protection.

The percent of assemblage comprised of the top two dominant taxa (%2Dom) and percent of assemblage comprised of generally tolerant taxa (%Gen Tol) show the greatest variation in treated sites relative to reference and control sites. However, when observing Figure 4a there is a distinct separation in WVSCI scores; with treated sites experiencing a decreased score relative to the little change experienced in reference and impaired control sites. This relationship also holds true for Family Richness (Figure 4b) and EPT Richness (Figure 4c) in that there is little decline or change in impaired and control study sites, but Muddy Creek main stem sites that experience treatment do not respond positively to treatment. There may be a slight improvement in % E (Figure 4d) at the Mouth of Muddy Creek.

5.0 ADDITIONAL REQUIRED INFORMATION

The following information is provided to support preparation of an information sheet (as is required under W.Va. C.S.R. 46-6-5.3), which summarizes the information in the application pertinent to the Board's Decision.

a. *The designated use categories outlined in 46 CSR 1 which apply to the stream*:

Martin Creek, Fickey Run, Glade Run, and tributaries thereof are designated as follows:

- Category A (Water Supply, Public), the closest downstream drinking water intake is less than 5 miles downstream of our bond forfeiture site,
- Category B (Warm Aquatic Life), and
- Category C (Water Contact Recreation);

b. *The existing numeric water quality criterion which applies to the stream and for which the applicant seeks a variance, and the alternative numeric water quality criterion desired by the applicant*:

The existing numeric water quality criterion for these streams and tributaries thereof are as follows: Iron = 1.5 mg/l, Aluminum = 1.0 mg/l, pH = 6-9 su. The existing numeric water quality standards in the stream have never been able to be obtained as a result of human-caused conditions (pre-law mining) that were in existence before the criterions were assigned. The current worst case scenarios for the Martin Creek watershed are 179.12 mg/l dissolved Fe, 48.31 mg/l dissolved Al, and 2.13 pH. The worst case scenario was derived from water samples gathered from TWI from 2005 through 2009. The purpose of this variance is not to meet existing numeric water quality criterion but to show overall improvement to the Martin Creek watershed as a whole and to improve water quality in Muddy Creek downstream of the confluence with Martin Creek. This will be achieved with the addition of in-stream dosers at strategic locations that will raise the pH and reduce metal loading.

c. *Identification of the specific criterion outlined in section 3.1 a-f above which render the existing numeric water quality criterion unattainable*:

As mentioned above, the current worst case scenarios for the Martin Creek watershed are 179.12 mg/l dissolved Fe, 48.31 mg/l dissolved Al, and 2.13 pH

d. *Identification of the specific circumstances which render the discharger unable to meet the existing numeric water quality criteria which apply to the stream*:

AMD from abandoned mine lands, especially discharges emanating from the Upper Freeport coal seam, is the most damaging pollutant to Martin Creek watershed. The Martin Creek watershed has a long history of coal mining; this activity dates as far back as the late 1700s, with a significant amount of activity occurring prior to the 1977 passage of the Federal Surface Mining Control and Reclamation Act (SMCRA).

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Attachment 2

Martin Creek Supplemental Information

west virginia department of environmental protection

Division of Water & Waste Management
601 57th Street, Southeast
Charleston, WV 25304
Phone: (304) 926-0440
Fax: (304) 926-0463

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

March 9, 2017

Denise Hakowski
EPA Region 3
1650 Arch Street
Mail Code: 3RA00
Philadelphia, PA 19103-2029

Re: Additional information for WVDEP Special Reclamation Muddy Creek Variance

Dear Ms. Hakowski:

The West Virginia Department of Environmental Protection (DEP) is hereby submitting additional information for the water quality standards variances for Muddy Creek watershed to the United States Environmental Protection Agency (EPA). The rule containing these variances, "47CSR2 Requirements Governing Water Quality Standards," was legally certified on June 8, 2016 and submitted to EPA for approval on that day. The rule became effective July 8, 2016. DEP is submitting this additional information to aid in the review and approval of this variance for WVDEP Special Reclamation. These varied criteria are needed to facilitate the use of alternative restoration measures to treat not only the bond-forfeited for which Special Reclamation is not responsible, but also all of the acid mine drainage in this historically impaired watershed.

As stated in EPA's Water Quality Standards Regulatory Clarifications document, "A variance is a time-limited designated use and criterion that is targeted to a specific pollutant(s), source(s), and or water body or waterbody segment(s) that reflects the highest attainable condition during the specified time period" (FR Vol 78 No 171 pg 54531). The proposed alternative approach to restoring the historically polluted Muddy Creek watershed is a perfect example of how a variance of water quality standards can be used to improve water quality. This unique approach treats bond forfeiture sites as well as abandoned mine lands together in order to address a situation which has existed in this watershed for decades. This is a situation in which "it is known that the designated use and criterion are unattainable" (FR Vol 78 No 171 pg 54532). Because the designated use and water quality criteria are not being met, but West Virginia intends to retain the designated use as a long-term goal, West Virginia has chosen to pursue a variance for these streams, which will allow the time necessary to implement adaptive management approaches to getting these streams to meet their designated uses.

DEP respectfully requests EPA's timely review and approval of the revisions to the State's water quality standards in accordance with 40 C.F.R. §131.21. If you have any questions or need any additional information, please contact Laura Cooper at (304) 926-0499 extension 1110 or via email at Laura.K.Cooper@wv.gov.

Sincerely,

Laura Cooper
Assistant Director, DWWM Water Quality Standards

cc: Evelyn MacKnight, EPA Region 3

Additional Information for Muddy Creek Watershed Variance

I. Variance Language

from WV Rule, Requirements Governing Water Quality Standards, §47 CSR 2 7.2.d.8.2.

> A variance pursuant to 46 CSR 6, Section 5.1, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to WV DEP Division of Land Restoration's Office of Special Reclamation's discharges into Martin Creek of Preston County and its tributaries, including Glade Run, Fickey Run, and their unnamed tributaries. The following existing conditions will serve as instream interim criteria while this variance is in place: pH range of 3.2-9.0, 10 mg/L total iron, and 15 mg/L dissolved aluminum. Alternative restoration measures, as described in the variance application submitted by WV DEP Division of Land Restoration's Office of Special Reclamation (OSR), shall be used to achieve significant improvements to existing conditions in these waters during the variance period. Conditions will be evaluated during each triennial review throughout the variance period. This variance shall remain in effect until action by the Secretary to revise the variance or until July 1, 2025, whichever comes first.

II. Watershed Information

A. Streams

i. Drainage Area - Glade Run is a perennial stream with a watershed area of approximately 3.74 square miles (2,391 acres) and an average flow of approximately 403.14 cfs. Fickey Run is a perennial stream with a watershed area of approximately 1.72 square miles (1,100 acres) and an average flow of approximately 160.54 cfs. Martin Creek is a perennial stream with a watershed area of approximately 7.1 square miles (4,645 acres) and an average flow of approximately 896.26 cfs.

ii. Existing Conditions - The majority of the Muddy Creek watershed is minimally impacted by AMD, with almost all of the impacts entering Muddy Creek at or downstream of its confluence with Martin Creek. Muddy Creek is designated as a trout stream from the Woolen Mill Road bridge (which is immediately upstream of Martin Creek) to its headwaters. AMD impacts in Martin Creek are primarily from two of its tributaries, Glade Run and Fickey Run, see Figure 1. Martin Creek is considered a "dead stream" with impairments in Aluminum (d), CNA-Biological, Iron, and pH for the entire length. Fickey Run is considered a "dead stream" with impairments in Aluminum (d), CNA-Biological, Fecal Coliform, Iron, and pH for the entire length. Glade Run is considered a "dead stream" with impairments in Aluminum (d) CNA-Biological, Iron, and pH for the entire length. This information is from the approved 2010 TMDL 303(d) list. It should be noted that Kingwood Mining has an NPDES permit.

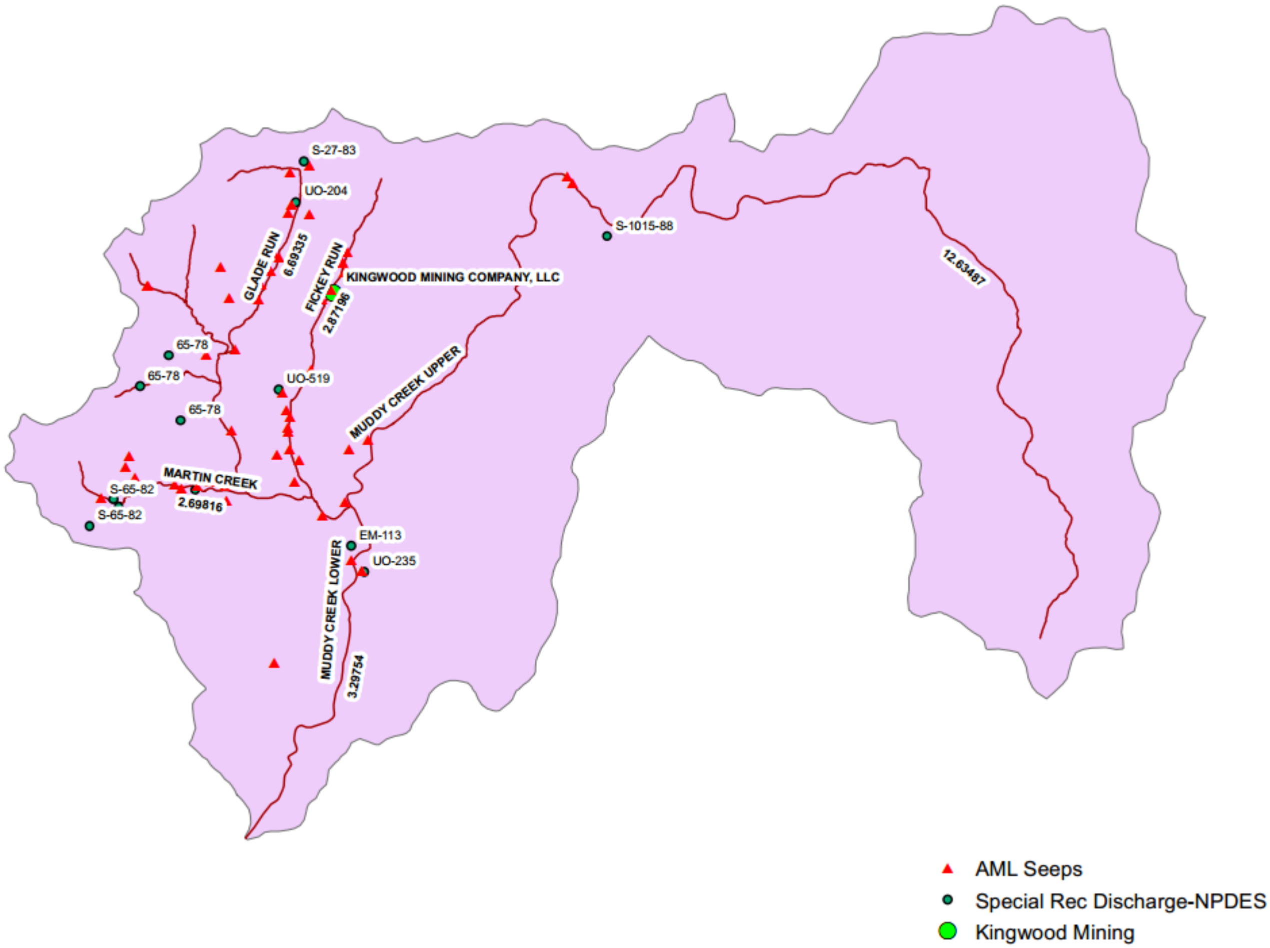


Figure 1 AMD sources within Muddy Creek

III. Office of Special Reclamation (OSR) NPDES Permits Subject to Watershed Variance

A. **Current Dischargers in Watershed**, including Average Flows and Current Treatment

i. **Crane Coal** S-27-83 (WV1027107) – passive treatment site with 1 outlet and an average flow of 0.03 cfs

ii. **Lobo Capital** UO-204 (WV1029151) – active treatment site with 1 outlet, 1 sodium hydroxide tank, and an average flow of 0.13 cfs

iii. **Rockville Mining** 65-78/S-65-82 (WV1023535) – active treatment site with 6 outlets and 11 lime dosing units. Permit 65-78 has 3 outlets, 004 has 2 dosers and an average flow 0.19 cfs. 005 has 2 dosers and an average flow of 0.13 cfs. 006 has 1 doser and an average flow 0.04 cfs. Permit S-65-82 has 3 outlets, 009 has 2 dosers and an average flow of 0.68 cfs. 010 has 2 dosers and an average flow of 0.09 cfs. 011 has 2 dosers and an average flow of 0.37 cfs.

iv. **T&T Fuels** U-125-83 (WV1027131) – active treatment site with one outlet and an average flow of 0.13 cfs.

IV. NPDES Permits Not Subject to Watershed Variance

i. **Kingwood Mining** R-67-30 (WV0063576) – active treatment site with two outlets, 003 has an average flow of 0.14 cfs, outlet 004 has an average flow of 0.02 cfs. This site is currently listed as being on inactive status.

V. Restoration Goal

A. OSR has been treating mine drainage at forfeited mine sites within the Muddy Creek watershed since as early as 1995 when T&T Fuels forfeited following a devastating mine blowout, although a majority of the treatments sites were constructed between 2004 and 2006. OSR has constructed 9 active treatment sites that include a total of fifteen lime dosers, and 1 passive treatment systems at six bond forfeiture sites within the watershed, and three other sites are yet to be constructed. The total capital cost for water treatment construction was approximately $3.4 million and OSR has spent nearly ten million dollars to date for operations and maintenance, or roughly nine hundred and forty thousand dollars annually. OSR now has ten NPDES outlets in the Muddy Creek watershed. Without an alternative permitting structure OSR will spend an additional $1.6 million to retrofit seven existing treatment sites and construct two new sites within Martin Creek and its tributaries - and the lower section of Muddy Creek will remain dead. OSR has set a restoration goal of restoring the lower 3.4 miles of Muddy Creek to its designated stream usage by decreasing the water quality impairment from pre, and post-law coal mine discharges within the watershed. This will effectively reestablish biologic connectivity throughout the entire 15.6 miles of Muddy Creek.

VI. In-Stream Treatment Study

A. Purpose

The West Virginia Water Research Institute (WRI) was contracted by OSR to conduct a study that would utilize portable dosers to treat in-stream. The purpose of the study was to assist in determining the optimal location for placement of permanent dosers within the Martin Creek watershed that would effectively address both pre, and post-law mine discharges. The dosers were modified with skids and solar power to enable them to be moved by truck from one location to another and be placed alongside the targeted stream, see Figure 2. Initially three dosers were used; one was placed near the headwaters of Fickey Run, one at the headwaters of Glade Run, and one at the headwaters of Martin Creek. Water quality samples were collected on a weekly basis at locations upstream of the dosers and at tributary mouths to monitor water quality conditions in response to the dosers. The sample point at the mouth of Martin Creek was initially used to determine the success of the project in terms of water quality, and in meeting the interim criteria as outlined in the variance application (pH 3.2 – 9 s.u., total iron 10 mg/l, dissolved aluminum 15 mg/l). However, due to the unacceptable results with the dosing on Fickey Run, which will be described in more detail below, the sample point used to determine success was moved to Martin Creek immediately upstream of Fickey Run, see Figure 3.

Figure 2 Portable doser

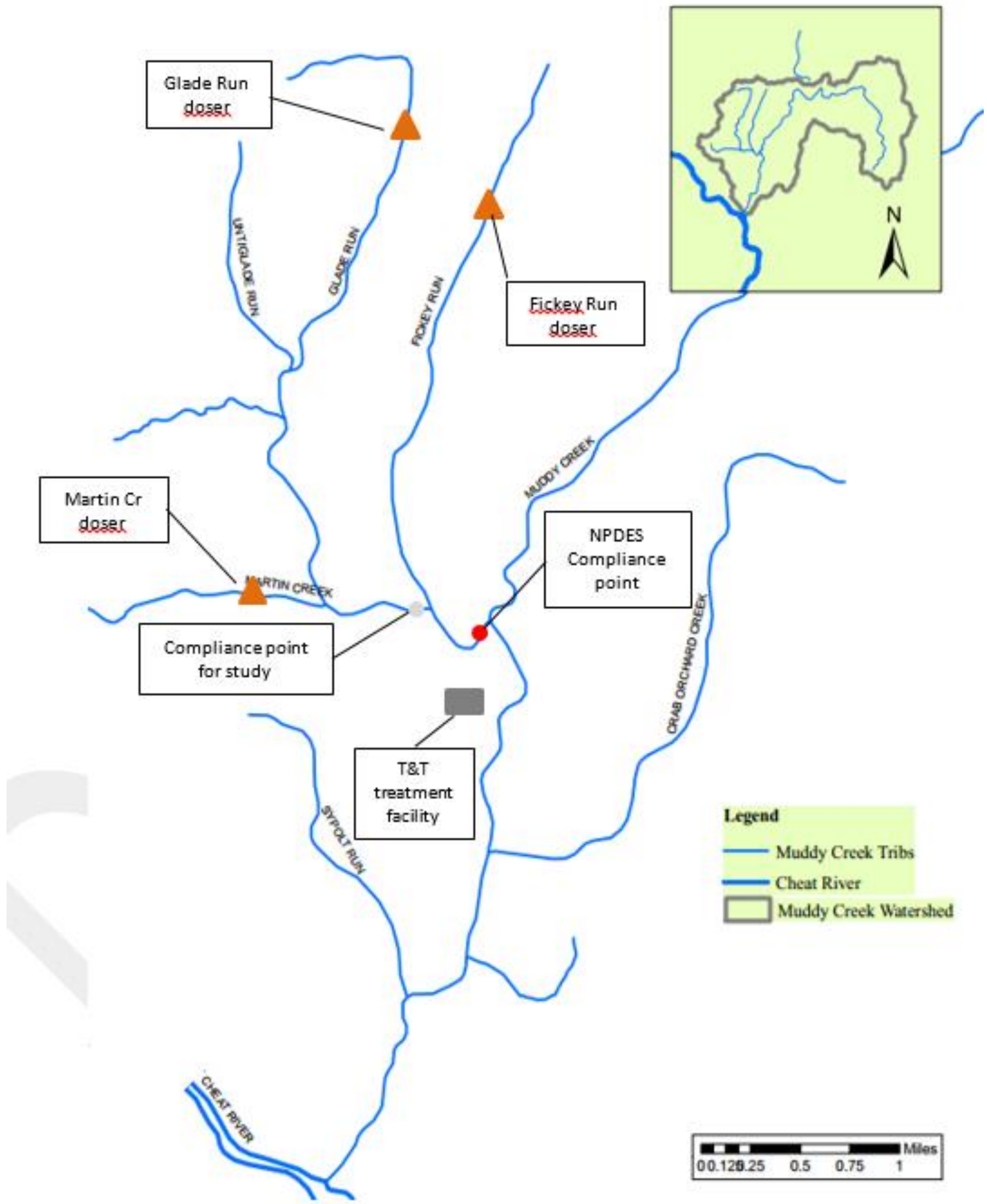


Figure 3 Initial location of dosers

B. Challenges

There were challenges encountered during the study such as power outages due to inadequate sun light and clogged silos, both of which lead to inconsistent dosing to the receiving stream and consequently inconsistent water quality results. To compensate for the lack of power, primarily during the evening hours, gasoline powered generators where used. Theoretically, the solar panels where to run the motors which dispensed the lime while also charging the batteries to last through the evening hours. Unfortunately, the high dosing rate, primarily on Glade Run, put a larger demand on the power supply than anticipated. The clogging issue was addressed by installing vibrators on the silos, but this also added to the power demand. Therefore, it was decided that since positive water quality results were observed during periods of consistent dosing electricity would be run to the Glade Run doser since this one required a much higher power demand.

C. Final Plans

It was determined that the doser on Martin Creek was in an appropriate location and therefore it remained. The doser on Glade Run however had to be moved further downstream because there wasn't enough flow in the headwater reaches during the summer months to allow for adequate mixing and movement of the lime, and due to the poor results of dosing efforts on Fickey Run, as described below, this doser was removed completely. Figure 4 depicts the final placement of the two remaining dosers within Martin Creek.

It was evident early on during the study that in-stream dosing on Fickey Run was not appropriate. An earlier in-stream study conducted on Fickey Run in 2012 resulted in large amounts of iron sludge from Fickey Run entering Martin Creek and Muddy Creek. This was a concern raised by the Friends of the Cheat and other environmental advocacy groups when in-stream treatment was first proposed by the OSR. But this earlier study placed the dosing point a mere one mile from the mouth of Fickey Run. The most recent study moved the dosing point upstream another mile to a portion of the stream with a much lower gradient in hopes that more metals would be retained in the upper reaches of the stream and periodically flushed during high flow events. But this was not the case and similar results to the earlier study were observed in Martin Creek and Muddy Creek, see Figures 5 and 6. This was not an acceptable outcome, therefore, OSR had to come up with an alternative treatment approach for Fickey Run.

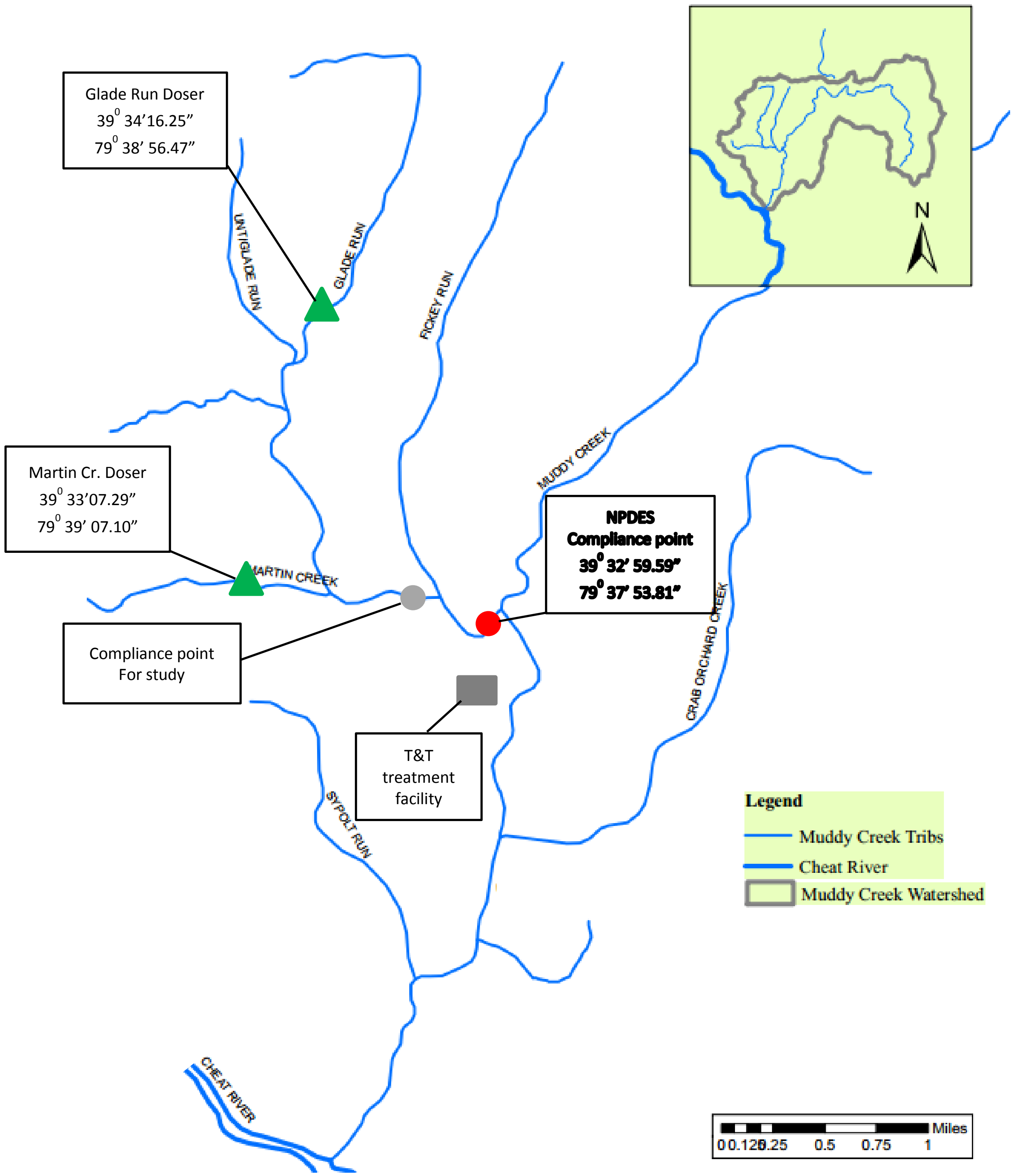


Figure 4 Final location for dosers

Figure 5Mouth of Fickey Run *Figure 6 Confluence of Martin Cr and Muddy Cr*

D. Alternative Treatment Plan for Fickey Run

The Abandoned Mine Land Program (AML) partnered with OSR for fifty percent (50%) of the cost for the in-stream study on Martin Creek. AML has agreed to install an AMD seep collector to capture the pre-law mine drainage that is currently entering Fickey Run on the left descending bank approximately two miles from the mouth of Fickey Run. The seep collector will convey the pre-law mine drainage directly into a pipe line that will flow south approximately one mile to intersect with the pipe line from Viking Coal (see Sec. VII). Additional mine drainage from pre-law wet mine seals, located north of the proposed seep collector, will also be directed into the pipe line, see Figure 7. OSR will also collect, and convey to the pipe line, some mine drainage from Rockville Mining, S-91-85, a bond forfeiture site adjacent to Fickey Run. This alternative treatment approach will effectively remove approximately 86% of the acid and metal loads from Fickey Run. It should also be noted that roughly 68% of the load reductions would come from pre-law mine discharges that would otherwise go untreated according to conventional, at-source, treatment methods carried out by OSR to date. AML will be responsible for the installation cost of the seep collector and the 1 mile pipe line, and will also reimburse OSR for additional treatment cost associated with any pre-law mine drainage.

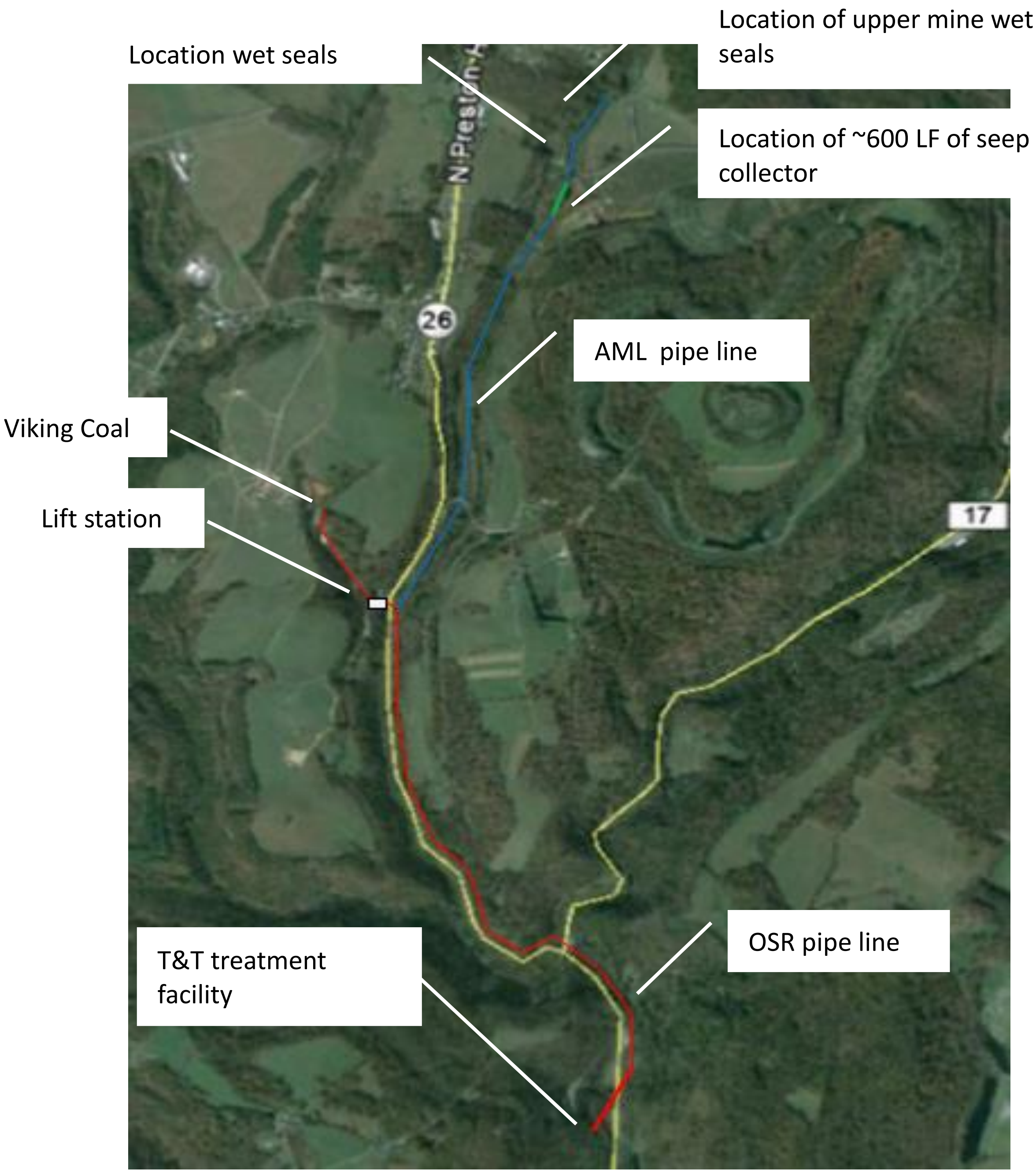


Figure 7 Alternative treatment plan for Fickey Run

E. Conclusion

The in-stream treatment study conducted by WRI did identify the appropriate location for the permanent installation of dosers within the Martin Creek watershed. The study also provided undeniable evidence that in-stream treatment was not an acceptable approach for treating AMD in Fickey Run. Therefore, one doser will be placed on Glade Run, one on Martin Creek near the headwaters, and according to the alternative treatment plan for Fickey Run approximately eighty-six percent (86%) of the acid and metal loads will be removed from Fickey Run, transported through a pipeline, then treated at the T&T treatment facility. Since Fickey Run was not being treated throughout a large portion of the study period, for the purpose of this study, WRI and OSR decided to move the "compliance point" from the mouth of Martin Creek to Martin Creek immediately upstream of Fickey Run, otherwise it would not be feasible to determine if the in-stream treatment strategy would be successful in meeting the interim in-stream criteria established in the variance application (pH 3.2 – 9 s.u., total iron 10 mg/l, dissolved aluminum 15 mg/l). **The NPDES permit will establish the compliance point at the mouth of Martin Creek.**

It was evident that when the dosers were running properly and the pH was maintained at acceptable levels (between 6 and 9 s.u.) the in-stream interim criteria were easily achieved, see Figure 8. Therefore, it is anticipated that during the first triennial review the total iron and dissolved aluminum in-stream criteria would be adjusted appropriately.

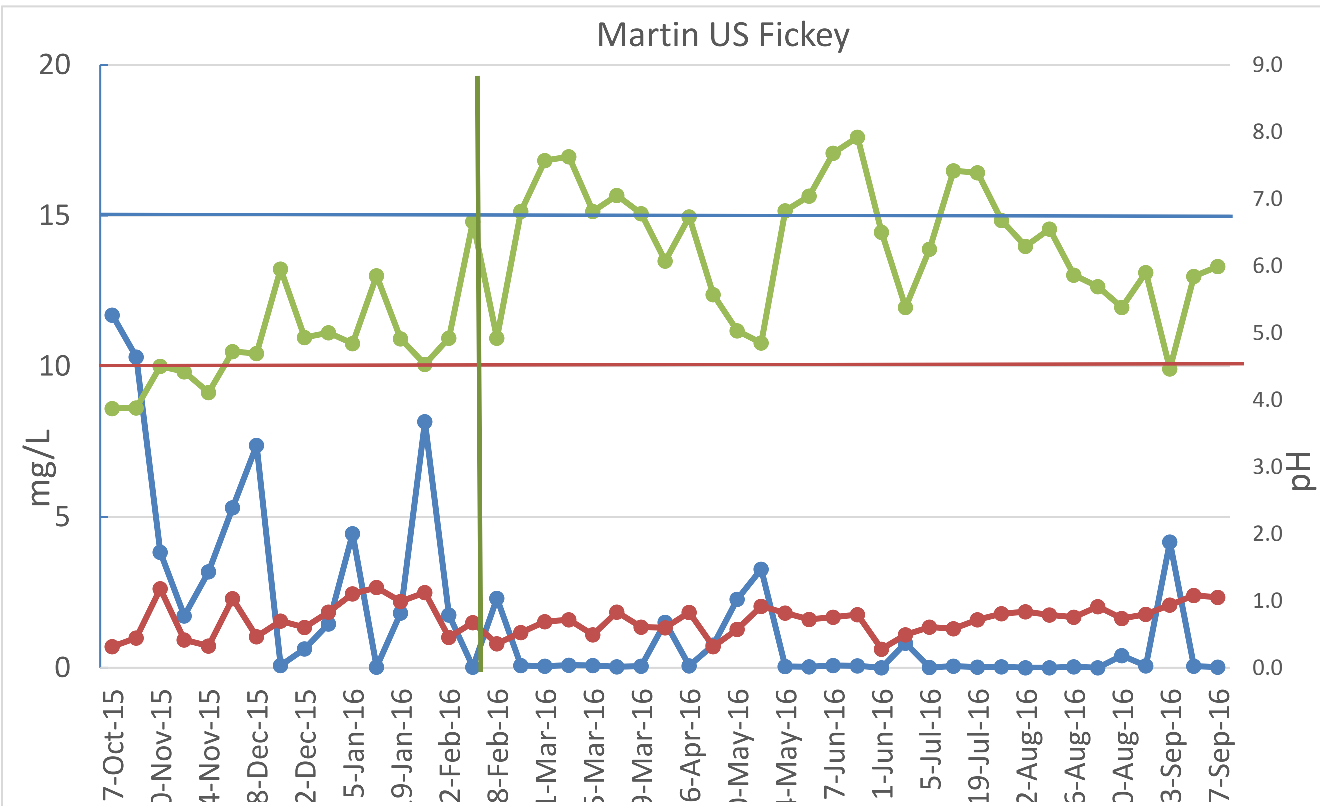


Figure 8 Water quality results for Martin Cr upstream of Fickey Run

VII. Term of the variance

A. Treatment

As part of the 10 -year variance term, OSR will be constructing a treatment facility at the T&T Fuels site, see Figure 9, located in Preston County along route 26, south of Valley Point, WV and downstream of Martin Creek. Construction is scheduled to begin December 2016 and should be complete within the following year. This facility was originally planned to treat water from the T&T, Viking Coal, and Preston Energy mines, but as was described above the facility will also be used to treat a majority of the mine drainage within Fickey Run as well. The treatment facility is capable of treating 4,200 gallons per minute. The facility will consist of two eighty foot clarifiers, a lime slurry (liquefied lime) feed system, a mixing tank, a pump building, and a control building. The lime slurry will be produced on-site using hydrated lime and the final effluent as make-up water for the 35% slurry mix. After treatment, the resulting sludge will be pumped back into an isolated area of the deep mine through an injection borehole. Secondary sludge disposal will utilize Geo Tubes (woven filtering bags) situated adjacent to the treatment facility. The treatment facility will be automated with all pumps (sludge and chemical feed) and motors (flocculators, mixers, clarifier drives) controlled through a PLC (Programmable Logic Controller). The facility will be capable of monitoring pH and flow. The target pH is set by the PLC and the mix tank pH is adjusted accordingly. The final effluent pH will be monitored and alarms will be triggered, notifying OSR staff, if the pH exceeds set parameters. A pipe line approximately one and one-quarter miles long (1 ¼ miles) is to be installed that will convey the AMD downstream from Viking Coal to the T&T treatment facility. Preston Energy will be piped directly across route 26. Installation of the pipe line that will convey the pre-law mine drainage in Fickey Run, and the mine drainage from Viking Coal, to the T&T treatment facility will be done concurrent with the construction of the T&T treatment facility. **It is anticipated that the entire treatment facility will be operational by December 2017.**

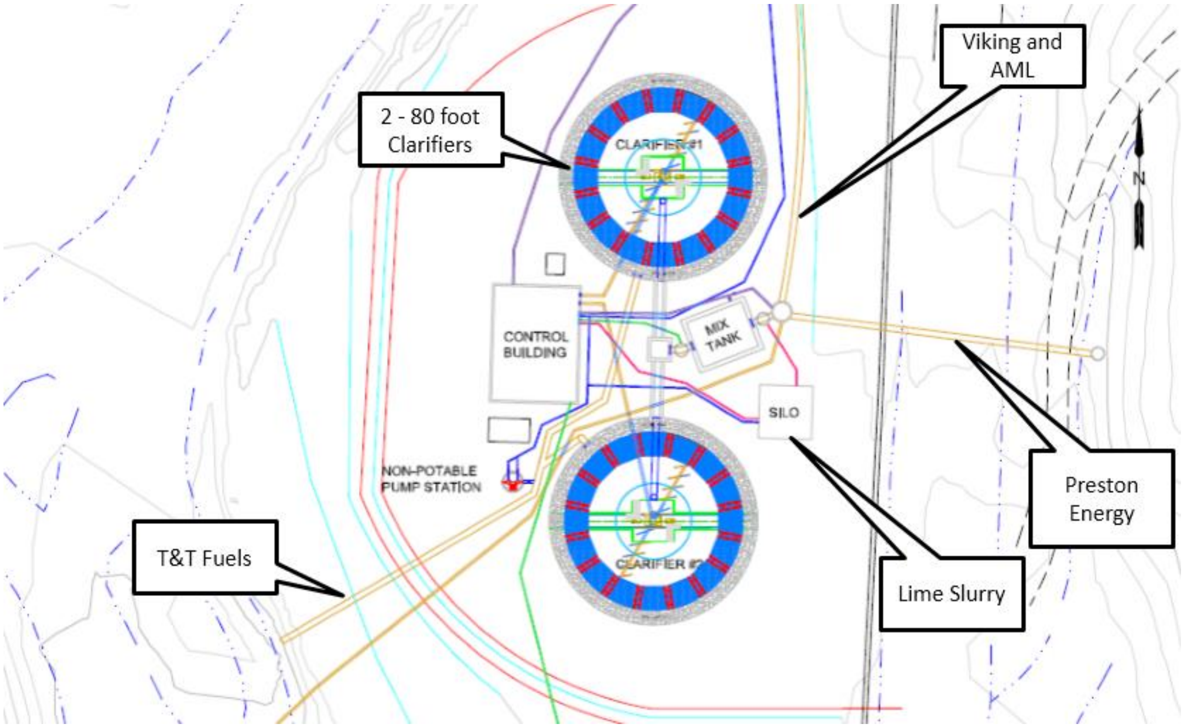


Figure 9 T&T treatment facility

The permanent in-stream dosers will be installed upon approval of the variance. The in-stream dosers will dispense a highly soluble hydrated lime or lime slurry. Glade Run has the highest chemical demand, therefore this in-stream doser will utilize a lime slurry which will be produced on-site. Since this particular site is in close proximity to public water and electrical service OSR will tap into the water supply to use as make-up water to produce the lime slurry and will also have electricity supplied to the site (this has already been done). The site will also have a propane generator that will turn on automatically in the event of a power outage. The Glade Run site will also have a communication link to the T&T treatment facility's PLC. This gives the OSR remote monitoring capabilities for parameters such as exceedances in pH, power outages, and lime level in the silo. Dosing rates will be regulated by pH sensors placed downstream of the doser. The sensor will measure the pH of the stream and send a signal back to the doser that will enable the dosing rate to increase or decrease accordingly. The doser on Martin Creek will be modified slightly to serve as secondary treatment. Since this doser has run successfully with solar power, electricity will not be necessary.

B. Term of the Variance

This variance will be in place until the watershed has been restored to meet water quality standards or until 10 years has passed, whichever comes first. It is not yet clear how long it will take the alternative restoration measures described in this application to be fully effective in restoring water quality. The long-term multifaceted acid drainage problem in this watershed—from both bond forfeited sites and AML sites—makes it difficult to determine how long it will take before water quality is restored, and subsequently for aquatic life to return to these streams.

WVDEP consistently reviews state Water Quality Standards at least every three years, and conducts several public meetings each year. As stated in the variance language, DEP will evaluate conditions during each triennial review to determine if the alternative measures are having the desired impact. Each triennial review will include further review and update of achievable interim water quality standards.

The highest attainable interim criteria used in this variance was determined by examining existing in-stream conditions at the proposed watershed permit compliance point, which is at the mouth of Martin Creek's discharge into Muddy Creek (39° 32' 59.59" 79°37'53.81"). According to the most recent data prior to submittal of the variance application, on May 12, 2015, this point had a flow of 7.8245 CFS, pH 3.26, 9.63 mg/L total iron, and 14.8mg/L dissolved aluminum. For the initial portion of the 10-year life of the variance, it is unknown what water quality improvements can be expected; therefore, use of the existing conditions as interim criteria, at least until a Triennial Review can be done to update the interim criteria, ensures compliance with criteria can be met.

VIII. Monitoring and Assessment

Figure 10 represents the locations for the monitoring and assessment plan described below.

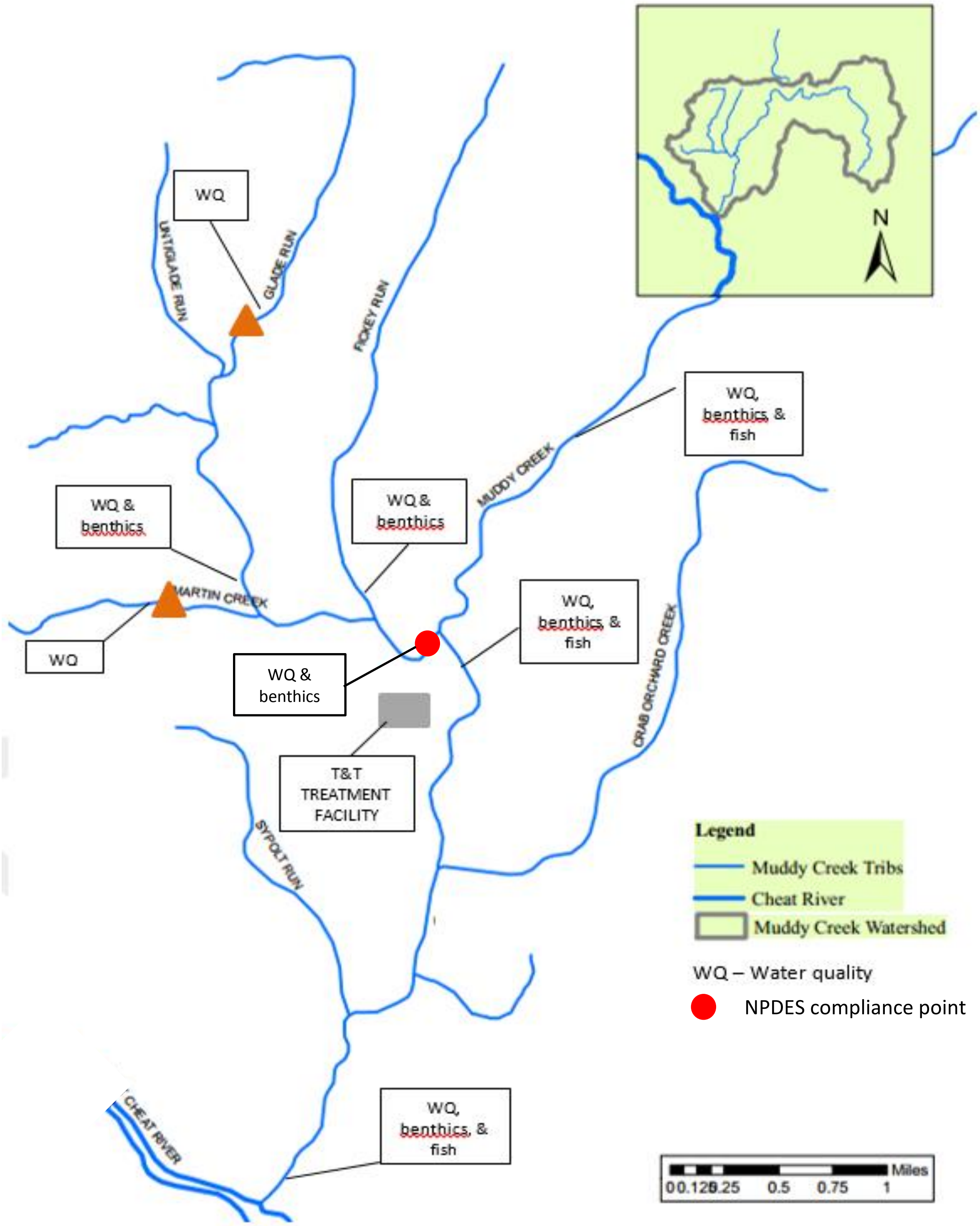


Figure 10 Proposed monitoring and assessment plan

A. Surface water quality monitoring

In an effort to determine the efficacy of the Acid Mine Drainage treatment in the Muddy Creek watershed, water quality samples (grab) will be collected on a monthly basis at 8 locations for a period of two (2) years following start-up of the permanent In-stream dosers and T&T treatment facility. This information is fundamental in managing OSR's In-stream dosers and permanent treatment facilities and is needed to address questions vital to the long-term environmental integrity of the watershed. After two (2) years, water quality samples (grab) will be collected on a quarterly basis at the same eight (8) locations. Specifically, grab samples will be collected at locations upstream of the dosers and at the tributary mouths. Water quality sampling techniques will follow the OSR's Standard Operating Procedures (SOP) that adhere to scientifically sound, quality-assured field methods.

Field parameters will include: temperature (°C), dissolved oxygen (ppm), specific conductance (µS/cm), and total dissolved solids (mg/L) using a YSI 556 multi-parameter probe (Yellow Springs Instruments, Yellow Springs, OH, USA), and turbidity via transparency tube. Stream discharge will be measured using the area-velocity technique with an OTT MF pro Flow Meter. Additionally, grab water samples will be collected at each site and stored on ice until analysis at a laboratory approved by the WVDEP. Parameters to be analyzed include: pH, alkalinity, acidity, conductivity, sulfates, and total suspended solids along with total and dissolved metals (iron, magnesium, aluminum, calcium, and manganese).

Additionally, in-stream data loggers located near the Route 26 bridge (or Martin Creek Mouth) and the Muddy Creek mouth will record pH, conductivity, and temperature at 20 minute intervals. Data will be downloaded monthly during water quality grab sample events.

B. Benthic macroinvertebrate and fish sampling

In an effort to determine the efficacy of the acid mine drainage treatment and overall stream health of the Muddy Creek watershed, benthic macroinvertebrate and fish surveys will be conducted. Following start-up of the permanent In-stream dosers and T&T treatment facility, benthic macroinvertebrate surveys will be conducted every six (6) months for a period of two (2) years at the tributary Mouths (Figure 10). After two (2) years, benthic sampling will be conducted on a yearly basis. Fish surveys will be conducted six (6) months following start-up of the permanent treatment systems, then one (1) year (18 months), and every two (2) years thereafter (Figure 10). Survey and collection procedures will follow the WVDEP's Watershed Assessment Branch's (WAB) protocol. The WAB's protocol can found at: http://www.dep.wv.gov/WWE/watershed/Pages/WBSOPs.aspx

IX. Watershed Permit

A. OSR will obtain an NPDES permit at the mouth of Martin Creek. This in-stream NPDES permit will supersede all other OSR permits covered under the variance. It is anticipated that the initial in-stream permit limits will be equal to the in-stream interim criteria established in the variance application (pH 3.2 – 9 s.u., total iron 10 mg/l, dissolved aluminum 15 mg/l). Upon each triennial review, as required by the variance, the stream conditions and compliance history shall be reviewed and the in-stream limits shall be adjusted appropriately, but under no circumstances may they be made worse than the original criteria as established in the variance without justification and approval by the WVDEP.

i. Baseline Monitoring

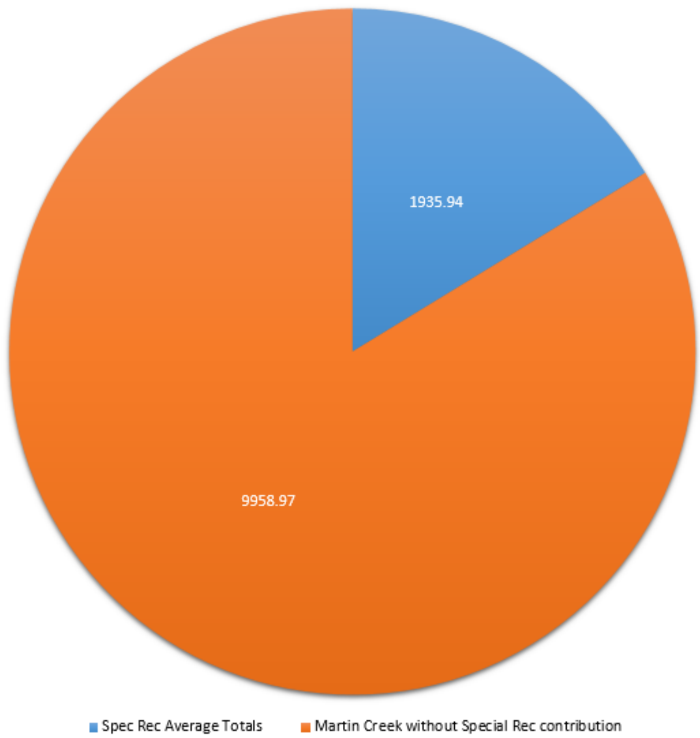
Prior to the in-stream study WAB has collected water quality samples above and below Martin Creek and have also done benthic and fish surveys at the same locations. These same sites, among others, are included in the proposed monitoring plan described above.

Appendix

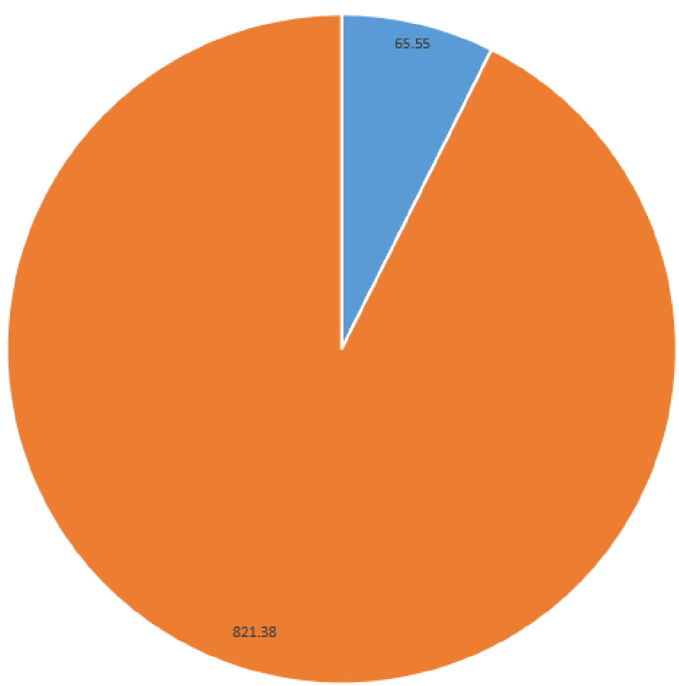
Loading Data

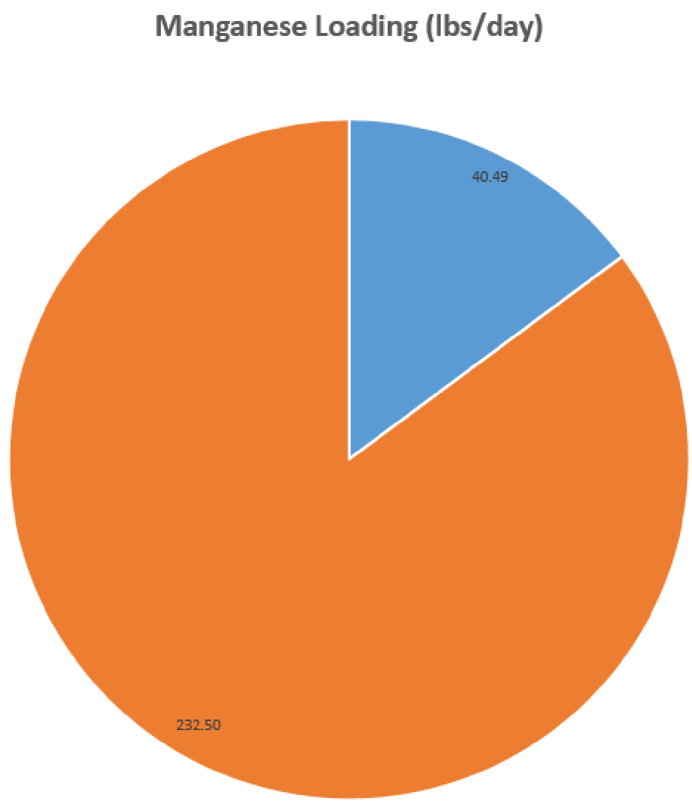
	GPM	Acidity_LD lbs/day	Fe_LD lbs/day	Mn_LD lbs/day	Al_LD lbs/day
UO-204	43.18	78.42	17.20	0.47	5.33
U-125-83	31.22	33.83	3.90	0.59	1.88
S-65-82	267.55	92.49	8.83	12.43	10.33
Viking UO-519 Raw	66.20	240.25	16.31	3.25	31.18
Rockville S-91-85	35.54	1252.65	17.09	10.62	13.48
65-78 Site 1	77.13	175.53	1.22	9.72	28.91
65-78 Site 2	5.36	9.72	0.18	0.95	1.41
65-78 Site 4	43.61	53.04	0.82	2.46	6.97
Spec Rec Average Totals	569.79	1935.94	65.55	40.49	99.48
Mouth of Martin	4435.89	11894.91	886.93	272.99	872.92
Martin Creek without Spec Rec contribution	3866.10	9958.97	821.38	232.50	773.44
		16.28%	**7.39%**	**14.83%**	**11.40%**

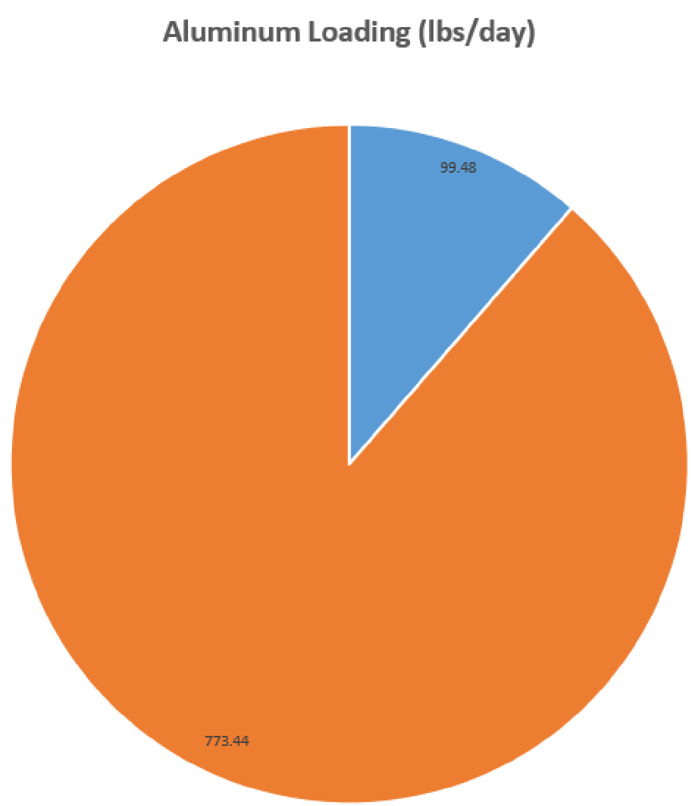
Acidity Loading (lbs/day)



Total Iron Loading (lbs/day)




Manganese Loading (lbs/day)
40.49
232.50


Aluminum Loading (lbs/day)
99.48
773.44

Attachment 3

Martin Creek Variance EPA Approval Letter

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

JUN 15 2017

Mr. Scott Mandirola, Director
Division of Water & Waste Management
West Virginia Department of Environmental Protection
601 57th Street, S.E.
Charleston, WV 25304

Dear Mr. Mandirola:

On June 2, 2016, the West Virginia Legislature approved revisions to the State's water quality standards rule (47CSR2 Requirements Governing Water Quality Standards). Those revisions were then signed by the Governor on June 7, 2016. The West Virginia Department of Environmental Protection's (WVDEP) General Counsel certified on June 8, 2016 that the regulations were duly adopted in accordance with State law. In accordance with Section 303(c)(2)(A) of the Clean Water Act (CWA), 33 U.S.C. §1313(c)(2)(A), and 40 CFR §131.20(c), WVDEP forwarded the amended regulation to the Environmental Protection Agency, Region III, on June 8, 2016, and we received it on June 9, 2016. Included in this submittal is a variance that applies to the Muddy (Martin) Creek watershed in Preston County, West Virginia. The purpose of this letter is to approve the Muddy (Martin) Creek variance pursuant to CWA §303(c) and the implementing regulation at 40 CFR §131.

West Virginia adopted the variance in accordance with its procedural rules at 46 CSR Section 5. The variance was granted based on human-caused conditions which prevent the full attainment of the designated use and cannot be immediately remedied, or would cause more environmental damage to correct than leave in place (40 CFR 131.10(g)(3)). The variance as it appears in regulation identifies the discharges that will be addressed by the variance; the geographic area to which this variance will apply; interim instream criteria that will be in place during the term of the variance; a requirement for re-evaluation during each triennial review throughout the variance term; and an expiration date (July 1, 2025), absent any action by the Secretary to review the variance, whichever comes first.

Along with the submittal of the variance, West Virginia provided more specific information supporting the variance as well as information on restoration measures to be implemented throughout the watershed. West Virginia subsequently revised this supplemental information to address a number of concerns raised during the adoption process. The enclosed March 9, 2017 document addresses those concerns.

The WVDEP, Division of Land Restoration's Office of Special Reclamation (OSR) looked at a number of options to determine the best approach for addressing the impaired conditions in the Muddy Creek watershed. OSR has been treating a number of forfeited mine sites within the watershed but was achieving no meaningful water quality improvement. WVDEP determined through a treatment study that the most effective treatment, with the least amount of inadvertent impact to the stream when correctly located and implemented, is the use of instream lime dosers. In combination with other restoration measures being implemented in the Muddy Creek watershed, including the construction of a treatment facility, EPA has determined that the variance will result in optimal water quality improvement given the constraints. When fully implemented, the lime dosers and other restoration measures implemented during the term of the variance are expected to restore to its designated use the lower 3.4 miles of Muddy Creek below the confluence with Martin Creek. This will effectively reestablish biologic connectivity throughout the entire 15.6 miles of Muddy Creek.

EPA has also determined that the 10-year variance term is warranted to allow for all restoration measures to be fully implemented and fully effective, including construction and optimization of the treatment facility. Due to the long-term, multifaceted acid mine drainage problem in the watershed, it is difficult to determine precisely how long it will take the water quality, and subsequently aquatic life, to be restored. The supplemental information includes plans for monitoring and assessment throughout the variance term. Based on that information, the variance will be re-evaluated during each triennial review throughout the variance term, and the WVDEP Secretary can remove or modify the variance should they find it is no longer needed or no longer effective. Any future new or revised variances would need to be submitted to EPA for review and approval in accordance with CWA section 303(c).

Section 7(a) of the Endangered Species Act (ESA) states that each Federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. EPA has determined that West Virginia's adoption of this variance will have no effect on any ESA-listed species or critical habitat as there are no listed threatened or endangered species in the Muddy Creek watershed.

If you have any questions regarding this action, please do not hesitate to contact me or have your staff contact Denise Hakowski, at 215-814-5726.

Sincerely,

Dominique Lueckenhoff, Acting Director
Water Protection Division

Enclosure

cc: Laura Cooper (WVDEP)
John E. Schmidt (USFWS)

Attachment 4

Original Sandy Creek Variance Application

TABLE OF CONTENTS

ATTACHMENTS

APPLICATION FOR STREAM VARIANCE IN MAPLE RUN, LEFT FORK LITTLE SANDY CREEK, LEFT FORK OF SANDY CREEK UPSTREAM OF STEVENSBURG, AND TRIBUTARIES THEREOF.

1.0 SUMMARY

WVDEP Office of Special Reclamation (OSR) is submitting this application for variance from water quality standards pursuant to 46 SCR 1, section 8.3. This variance is being requested based on human-caused conditions which prohibit the full attainment of any designated use. It is important to note that these streams have never been able to meet their designated use as a result of human-caused conditions (pre-law mining) that were in existence before the stream designations were assigned. A user inventory is currently ongoing and will be supplied once it has been completed. OSR is proposing the strategic placement of in-stream lime doser's in order to enhance overall stream quality.

2.0 INTRODUCTION

Sandy Creek is a subwatershed in the lower section of the Tygart Valley River basin. The Lower Tygart basin lies within the Allegheny Plateau section of the Appalachian Plateau Physiographic Province (USACE, 1996).

> A wide variety of stream types ranging from steep gradients and rocky channels in the mountainous areas, to low gradient streams in the lowlands, are common in the Tygart River basin. The Tygart River originates on Cheat Mountain near Spruce in Pocahontas County, and flows northward. The lower Tygart [—of which Sandy Creek watershed is a part—] extends from the Buckhannon River to the confluence with the West Fork River at Fairmont ([River mile (RM)] 50.4 to RM 0.0). Key tributaries in this segment include the Buckhannon River, Sandy Creek, Three Fork Creek, and Fords Run. (USACE, 1996,p. V-2)

The Sandy Creek watershed drains over 57,000 acres and flows into Tygart Lake (WVDEP, 2003a).

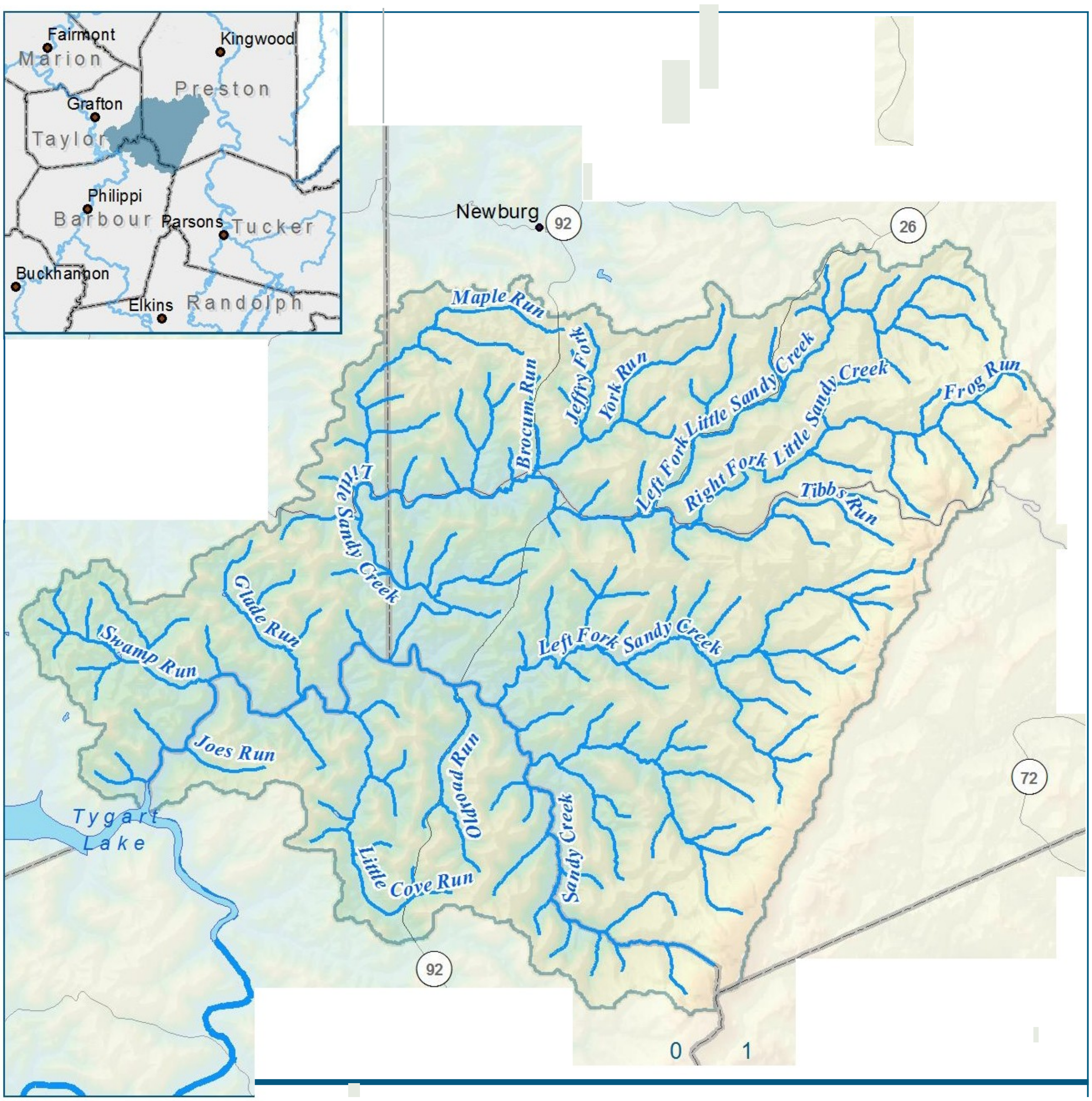
As documented by the West Virginia Department of Environmental Protection (WVDEP):

> Sandy Creek arises from the western slope of Laurel Mountain near the junction of Preston and Barbour Counties. As it flows northwestward forming the boundary between Preston and Barbour Counties, it incorporates the nearly equivalent flow of the Left Fork. (WVDEP, 1987, p. 5)

Historically, various sources have documented AMD-related impairments in the watershed. For example:

> As a result of past coal mining activity 29 miles of the watershed has been severely degraded because of abandoned mines draining highly acidic and mineralized waters. Potential usage of its waters has been eliminated by this pollution. This chronic acid mine drainage causes damage to municipal water supplies, barges, boats, instream facilities, culverts, bridges, industrial water users, agricultural water supplies, aquatic life, water-based recreation, and waterfront property values. (WVDEP, 1987, p. 3)

Sandy Creek watershed was documented in the 1982 Tygart Valley River Subbasin Abandoned Mine Drainage Assessment as contributing 49.5% of the total acid load to the Tygart between Philippi, WV and the mouth at Fairmont, WV. Water quality data collected during the assessment found 9325 lbs/day of acid being discharged into Tygart Reservoir from Sandy Creek. (WVDEP, 1987, p. 3)



Since the mid-1990s, Left Fork Sandy Creek has been—and continues to be—a focus of attention for a coalition of watershed residents; angered at the AMD pollution caused by the forfeited F & M coal mine, the coalition brought suit against the mine and its insurance company. Through this action, the group secured $4 million for treatment of AMD on this tributary. This fund is currently jointly managed by the Office of Special Reclamation (OSR) within the WVDEP Division of Land Restoration and the Laurel Mountain/Fellowsville Area Clean Watershed Association (Christ, 2011).

According to the Laurel Mountain/Fellowsville Area Clean Watershed Association, a significant population of freshwater mussels existed in Left Fork Sandy Creek before the pollution associated with the F & M mine.

> Sandy Creek drains an area of 90.3 square miles, and flows directly into the tailwaters of Tygart Lake. [The West Virginia Department of Natural Resources (WVDNR)] (1982) reported that 49.5% of the acid load in the lower Tygart River originates in the Sandy Creek watershed, and identified a number of problem areas in the Maple Run and Little Sandy Creek subbasins that contribute to water quality problems in Sandy Creek.
> WVDNR (1982) reported acid loads of 4496 lb/day at the mouth of Little Sandy Creek, and 3929 lb/day at the mouth of Maple Run in May 1981. Sandy Creek near its mouth exhibited 10 mg/l of acidity and 10 mg/l of alkalinity, with an acid load of 0 lb/day at this time. [The United States Army Corps of Engineers (USACE)] reported a mean annual pH value of 4.3 for 1973 and a mean annual pH of 4.2 in 1983. The mouth of Sandy Creek was sampled in March 1995 by WVDEP. Acidity exceeded alkalinity by 4 mg/l on this date, but the flow was too high to measure and loadings could not be determined (USACE, 1996, p. V-7).

WVDEP provides additional information about Maple Run:

> Water collection data within the Little Sandy Creek drainage area reveals that Maple Run makes up an average 20% of the flow of Little Sandy Creek. Samples collected along Maple Run show the mainstem to be contaminated with acid mine drainage throughout its entirety with the sources of pollution concentrated in the upper half of the watershed.
>
> Six sources of AMD were located within the Maple Run Drainage Area (WVDEP, 1987, p. 18).

3.0 REGULATORY BASIS FOR VARIANCE APPLICATION

Streams have designated uses which are described in §47-2-6.2 and include: water supply public, propagation and maintenance of fish and other aquatic life, water contact recreation, agriculture and wildlife, and water supply industrial/water transport/cooling and power. Water use categories are supported by both numeric and narrative criteria. Procedural Rules for Site-Specific Revisions to Water Quality Standards are described in 46 CSR 6 and include rules for promulgation of designated use reclassifications, site-specific criteria, and variances. WVDEP Office of Special Reclamation is proposing the following:

A variance pursuant to 46 CSR 6, Section 5.1, based on human-caused conditions which prohibit the full attainment of any designated use, shall apply to Maple Run, Left Fork Little Sandy Creek, Left Fork Sandy Creek for the portion upstream of Stevensburg, and their unnamed tributaries. Existing pollutant concentrations prevent attainment of the following designated uses: pH for any designated use; iron for aquatic life use and human health use; and dissolved aluminum for aquatic life use. Alternative restoration measures shall be used to achieve significant improvements to existing conditions in these waters during the variance period. Conditions will be evaluated and reported upon during each triennial review throughout the variance period. This variance shall remain in effect until action by the Secretary to revise the variance or until July 1, 2025, whichever comes first.

It is also important to note that the attainment of the use cannot be remedied due to the metal loadings of the streams. A table has been included below showing that the metal loadings from the OSR sites only make up a small percentage of the total loadings as depicted by the corresponding TMDL's.

METAL LOADINGS

	TMDL LOADINGS			OSR LOADINGS	
STREAM	Fe	Al	SITE	Fe	Al
LITTLE SANDY	450.67	47.81	S-1018-88	0.03	0.03
MAPLE RUN		1.05	S-1036-91	0.22	0.06
SANDY	2185.79		S-57-84	0.03	0.22

4.0 REQUIRED INFORMATION

Pursuant to §46-6-3.1 a-g, the following information is required to be included in an application seeking reclassification of a designated use, a variance from numeric water quality criteria, or a site specific numeric criterion:

a. *A USGS 7.5 minute map showing those stream segments to be affected and showing all existing and proposed discharge points. In addition, the alphanumeric code of the affected stream, if known*:

A USGS 7.5 minute map showing the stream segments to be affected and showing all existing and proposed discharge points for Maple Run (MC-5), Left Fork Little Sandy (MC-12-B),and Left Fork Sandy Creek (MT-18-E-3) have been provided; please refer to Attachment 1 at the end of this application.

b. *Existing water quality data for the stream or stream segment. Where adequate data are unavailable, additional studies may be required by the Board*:

Please refer to the following pages for water data as provided in the Sandy Creek of the Tygart Valley River Watershed-based plan prepared by Downstream Strategies on behalf of Save the Tygart Watershed Association. Also water data has been supplied as provide from DWWM.

c. *General land uses (e.g., mining, agricultural, recreation, residential, commercial, industrial, etc.) as well as specific land uses adjacent to the waters for the length of the segment proposed to be revised*:

A Total Maximum Daily Load (TMDL) was developed for the Tygart Valley River watershed, the land use coverage are as follows:

Maple Run, Left Fork Little Sandy, and Left Fork of Sandy Creek were calculated together and show 4% crop, 76% Forest, 17% Pasture, and 3% other.

d. *The existing and designated uses of the receiving waters into which the segment in question discharges and the location where those downstream uses begin to occur*:

Maple Run, Left Fork Little Sandy, Left Fork of Sandy Creek above Stevensburg, and tributaries thereof is designated as follows:

- Category A (Water Supply, Public), the closest downstream drinking water intake is greater than 5 miles downstream of our bond forfeiture site,
- Category B (Warm Aquatic Life), and
- Category C (Water Contact Recreation);

however, it is important to note that these streams have never been able to meet their designated use as a result of human-caused conditions (pre-law mining) that were in existence before the stream designations were assigned.

e. *General physical characteristics of the stream segment including, but not limited to, width, depth, bottom composition, and slope*:

Maple Run is located in Preston County and the watershed is approximately 4.75 square miles. The widths of the stream vary along its reach, 1 foot to 18 feet with the average width of 10 feet. Stream bed substrate is comprised of mainly boulder and cobble; however, bedrock is more prominent in the upper reaches and gravel components increase towards the lower reaches. Maple Run as a stream gradient is approximately 27,682 feet and has an overall slope of 1.39%.

Left Fork Little Sandy is located in Preston County and the watershed is approximately 7.91 square miles. The widths of the stream vary along its reach, 3 feet to 19 feet with the average width of 13.8 feet. The average instream water depth is approximately .36 foot deep. Stream bed substrate is comprised of mainly boulder and cobble; however, bedrock is more prominent in the upper reaches and gravel components increase towards the lower reaches. Left Fork Little Sandy as a stream gradient is approximately 38,358 feet and has an overall slope of 2.09%.

Left Fork of Sandy Creek above Stevensburg is located in Preston County and the watershed is approximately 2.77 square miles. The widths of the stream vary along the proposed reach, 4 feet to 13.5 feet with the average width of 7.6 feet. Stream bed substrate is comprised of mainly boulder and cobble; however, bedrock is more prominent in the upper reaches and gravel components increase towards the lower reaches. This section of Left Fork of Sandy Creek as a stream gradient is approximately 16,517 feet and has an overall slope of 6.2%.

f. *The average flow rate in the segment, the amount of flow at a designated control point, and a statement regarding whether the flow of the stream is ephemeral, intermittent, or perennial*:

Maple Run is a perennial stream with a watershed area of approximately 4.75 square miles. Average flow data for this stream is approximately 0.01cfs.

Left Fork Little Sandy is a perennial stream with a watershed area of approximately 7.91 square miles. Average flow data for this stream is approximately .12cfs

Left Fork Sandy Creek is a perennial stream with a watershed area of approximately 2.77 square miles. Average flow data for this stream is approximately 4.54cfs.

g. *An assessment of aquatic life in the stream segment in question and in the adjacent upstream and downstream segments*:

WVDEP describes ecological conditions in the watershed:

> The two streams, Sandy Creek and Little Sandy Creek, had impaired benthic communities. Three smaller streams not included on the 303(d) list were sampled as well and found supporting unimpaired benthic communities.
>
> The site on Sandy Creek is upstream of its confluence with Left Fork and almost 10 miles upstream from Tygart Lake. The water quality appeared to be unimpaired, but the habitat was likely limiting the benthic macroinvertebrate colonization potential. The substrate where the benthic sample was collected consisted of 90% gravel or smaller particles and the larger particles were over 75% embedded with sand and/or silt. The total [rapid bioassessment protocol] habitat score was within the suboptimal range, but it may have been recorded lower than it actually was, due to the assessment team's apparent confusion.
>
> The team entered conflicting information on the assessment form. Eight riffle/run kick samples were collected and both the average riffle depth and the average run depth were recorded as 0.1 meter. However, the recorder also indicated on the [rapid bioassessment protocol] habitat assessment that shallow habitats less than 0.5 meters were entirely missing. Black fly larvae (*Simuliidae*) and midges (*Chironomidae*) comprised over 86 percent of the total number of organisms collected. The sample site had very little riffle/run habitat, yet only a few miles in either direction, where the stream's gradient is much steeper, such habitat was abundant. *Sandy Creek should be sampled at several locations to determine the extent of mine drainage impacts.* The available data indicate that upstream of Little Sandy Creek, the mainstem may not have been negatively impacted by mine drainage.

Little Sandy Creek was sampled less than half a mile from its mouth, near the point where Preston, Taylor, and Barbour counties meet. The pH was 3.5 and the net acidity was 89 mg/L on the day of sampling. This site had the highest concentration of aluminum measured in the entire Tygart Valley River watershed (10.0 mg/L). The iron concentration was also in violation of the state water quality standard. These data indicate this stream should remain on the 303(d) list. There was no riffle/run habitat, therefore the benthos were collected from woody snags and submerged aquatic plants. None of the organisms collected were from the [*Ephemeroptera, Plecotera,* and *Trichoptera*] orders (i.e., orders considered somewhat sensitive to pollution). (WVDEP, 2003a, p. 77-78, emphasis added)

5.0 ADDITIONAL REQUIRED INFORMATION

The following information is provided to support preparation of an information sheet (as is required under W.Va. C.S.R. 46-6-5.3), which summarizes the information in the application pertinent to the Board's Decision.

a. *The designated use categories outlined in 46 CSR 1 which apply to the stream*:

Maple Run, Left Fork Little Sandy, Left Fork of Sandy Creek, and tributaries thereof is designated as follows:

- Category A (Water Supply, Public), the closest downstream drinking water intake is greater than 5 miles downstream of our bond forfeiture site,
- Category B (Warm Aquatic Life), and
- Category C (Water Contact Recreation);

b. *The existing numeric water quality criterion which applies to the stream and for which the applicant seeks a variance, and the alternative numeric water quality criterion desired by the applicant*:

The existing numeric water quality criterion for these streams and tributaries thereof are as follows: Iron = 1.5 mg/l, Aluminum = 1.0 mg/l, pH = 6-9 su. The existing numeric water quality standards in the stream have never been able to be obtained as a result of human-caused conditions (pre-law mining) that were in existence before the criterions were assigned. The current worst case scenarios for the Sandy Creek watershed are 21.1 mg/l Fe, 34.3 mg/l Al, and 2.59 pH. The purpose of this variance is not to meet existing numeric water quality criterion but to show overall improvement to the Sandy Creek watershed as a whole.

c. *Identification of the specific criterion outlined in section 3.1 a-f above which render the existing numeric water quality criterion unattainable*:

As mentioned above, the current worst case scenarios for the Sandy Creek watershed are 21.1 mg/l Fe, 34.3 mg/l Al, and 2.59 pH.

d. *Identification of the specific circumstances which render the discharger unable to meet the existing numeric water quality criteria which apply to the stream*:

Historically, various sources have documented AMD-related impairments in the watershed. For example:

> As a result of past coal mining activity 29 miles of the watershed has been severely degraded because of abandoned mines draining highly acidic and mineralized waters. Potential usage of its waters has been eliminated by this pollution. This chronic acid mine drainage causes damage to municipal water supplies, barges, boats, instream facilities, culverts, bridges, industrial water users, agricultural water supplies, aquatic life, water-based recreation, and waterfront property values. (WVDEP, 1987, p. 3)
> Sandy Creek watershed was documented in the 1982 Tygart Valley River Subbasin Abandoned Mine Drainage Assessment as contributing 49.5% of the total acid load to the Tygart between Philippi, WV and the mouth at Fairmont, WV. Water quality data collected during the assessment found 9325 lbs/day of acid being discharged into Tygart Reservoir from Sandy Creek. (WVDEP, 1987, p. 3).

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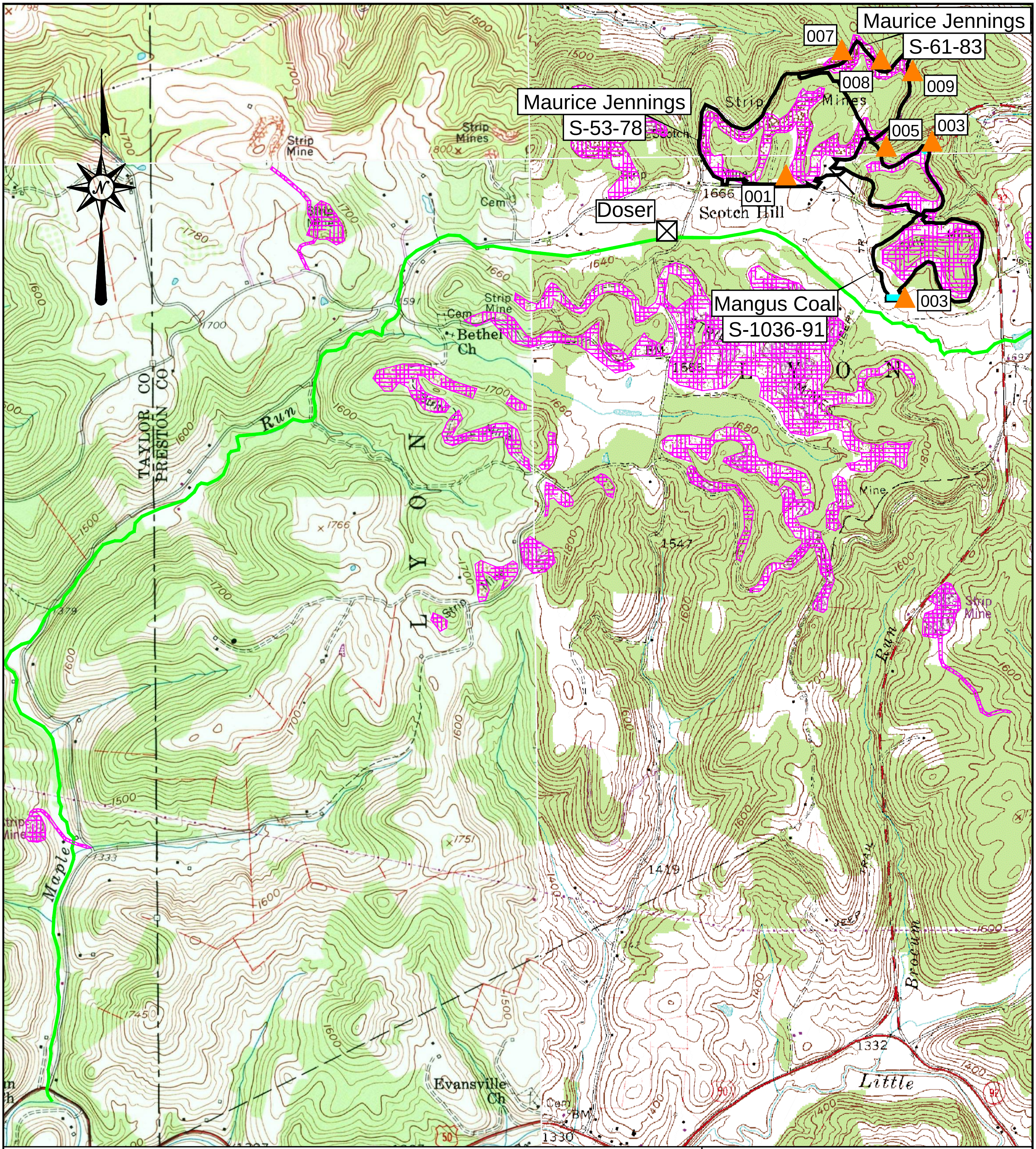
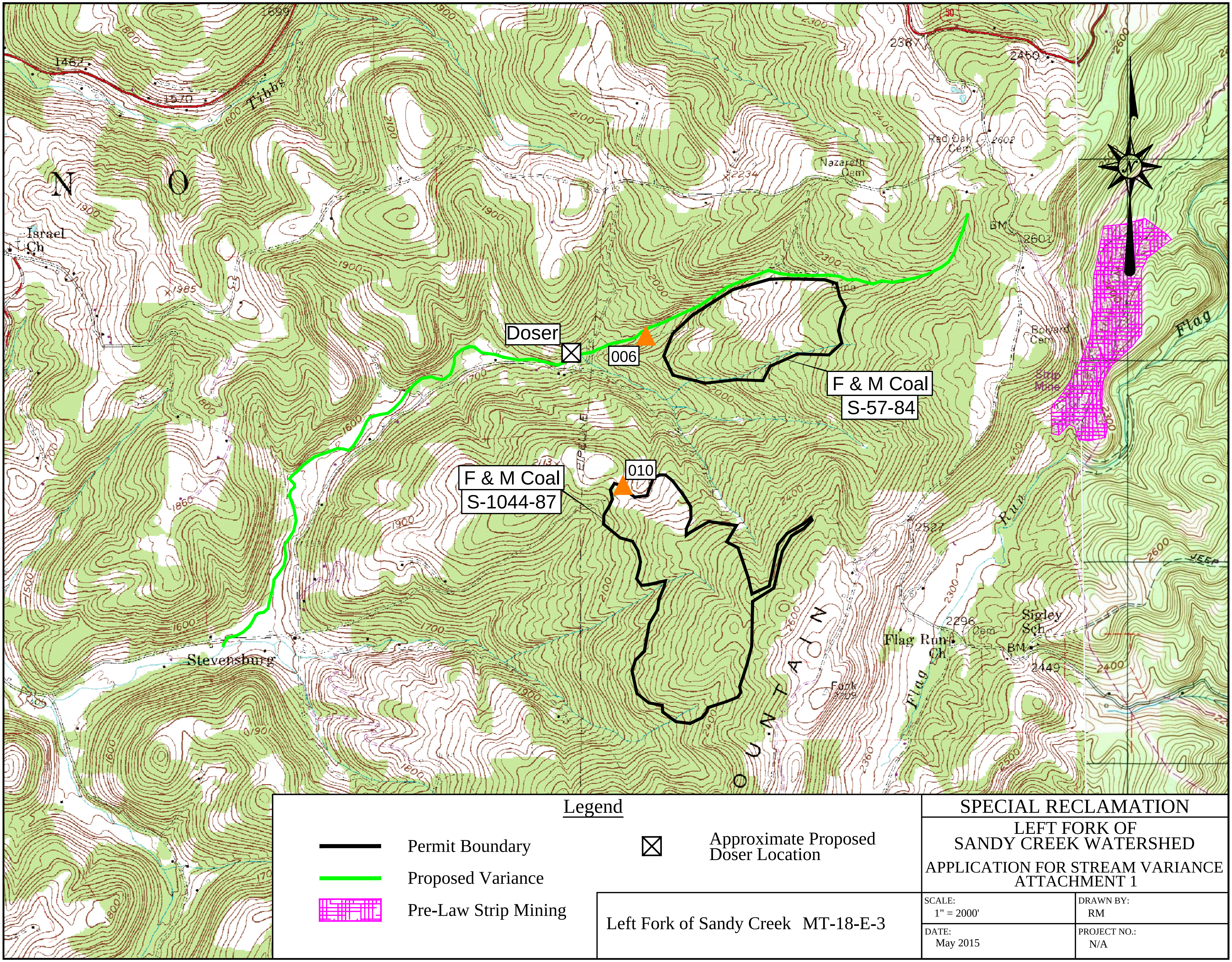


Legend

- Permit Boundary
- Proposed Variance
- Pre-Law Strip Mining
- Approximate Proposed Doser Location

SPECIAL RECLAMATION	
MAPLE RUN WATERSHED APPLICATION FOR STREAM VARIANCE ATTACHMENT 1	
SCALE: 1" = 2000'	DRAWN BY: RM
DATE: May 2015	PROJECT NO.: N/A

Maple Run MC-5



Legend

Black line	Permit Boundary
Green line	Proposed Variance
Magenta hatching	Pre-Law Strip Mining
☒	Approximate Proposed Doser Location

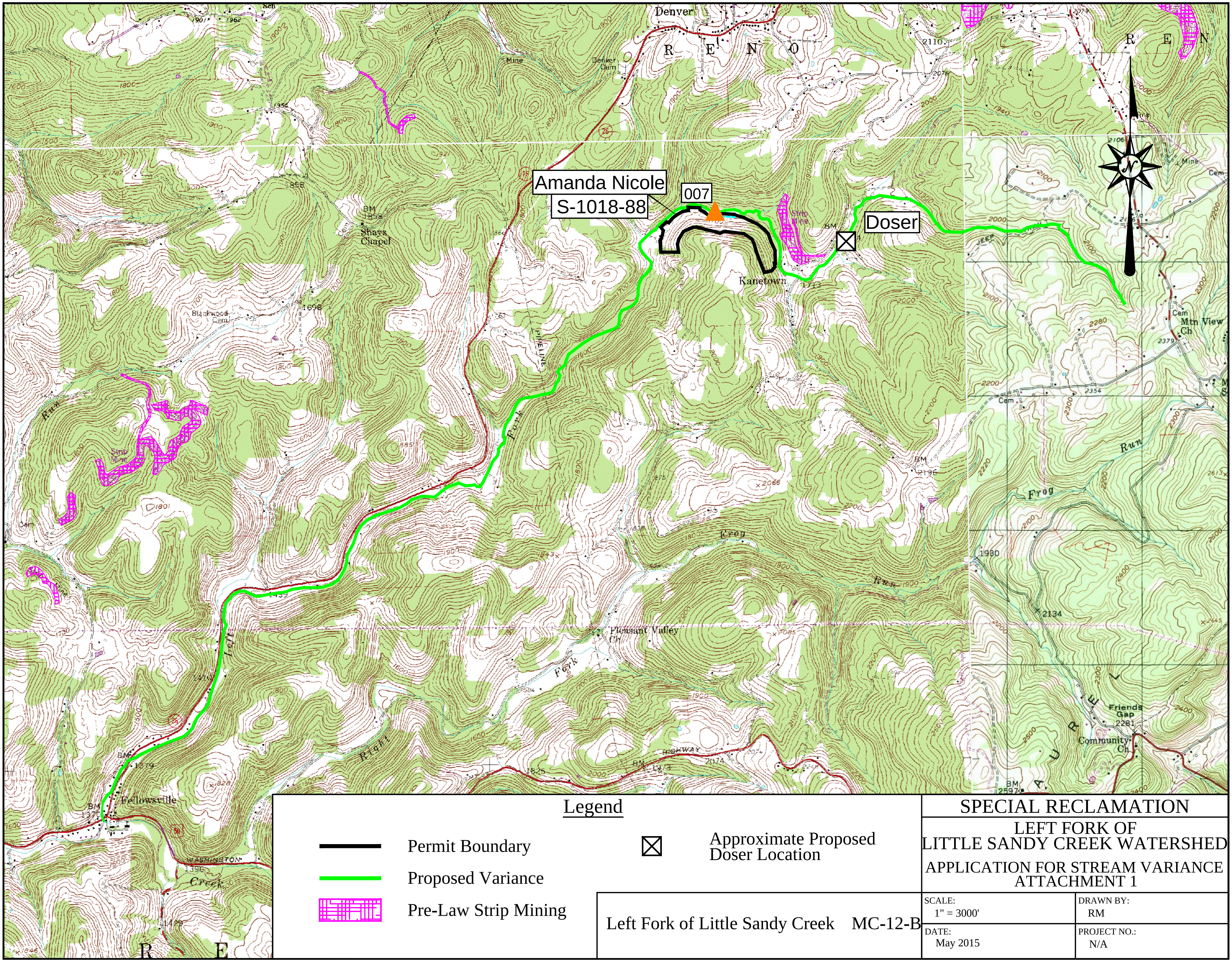
SPECIAL RECLAMATION

LEFT FORK OF SANDY CREEK WATERSHED

APPLICATION FOR STREAM VARIANCE
ATTACHMENT 1

Left Fork of Sandy Creek MT-18-E-3

SCALE: 1" = 2000'	DRAWN BY: RM
DATE: May 2015	PROJECT NO.: N/A



Legend

- Permit Boundary
- Proposed Variance
- Pre-Law Strip Mining
- Approximate Proposed Doser Location

SPECIAL RECLAMATION

LEFT FORK OF LITTLE SANDY CREEK WATERSHED

APPLICATION FOR STREAM VARIANCE ATTACHMENT 1

Left Fork of Little Sandy Creek MC-12-B

SCALE: 1" = 3000'	DRAWN BY: RM
DATE: May 2015	PROJECT NO.: N/A

Table 19: Site 1 data

Date	LFLS-1800			LFLS-1900			LFLS-2000			LFLS-2100			LFLS-2200		
	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)
8/30/1995							617	0.23	347,193						
4/3/1997										103	0.03	7,560	44	0.02	2,153
4/23/1997							1,220	0.33	984,990	156	0.003	1,145	43	0.003	316
4/25/1997				1,150	0.02	56,271	1,170	0.37	1,059,121	136	0.002	665	37	0.005	453
5/16/1997				918	0.01	22,460	935	0.43	983,644	139	0.003	1,020	17	0.004	166
5/20/1997	66	0.01	1,615	870	0.04	85,141	1,030	0.66	1,663,179	130	0.01	3,181	53	0.02	2,593
8/31/2001	1,168.2	0.002	5,716	1,349.3	0.39	1,287,452	326	0.001	798						
Average			3,665			362,831			839,821			2,714			1,136

Source: WVDEP (2007).

Table 20: Site 1 parameters

Total acidity load (g/day)	Total acidity load (lb/day)	120% of design flow acidity load (g/day)	Vertical flow pond area (m^2)	Vertical flow pond area (ft^2)	Vertical flow pond side dimension (ft)	Pipe needed (ft)
1,210,167	2,668	1,452,201	58,088	625,315	799	2,800

Source: Acidity load from previous table. RAPS dimensions from AMDTreat. Pipe needed from assumption that polluted water must be piped to the furthest downstream discharge within this site.

Table 21: Site 2 data

Date	LFLS-2300			LFLS-2400		
	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)
4/25/1997	61	0.007	1,045	106	0.007	1,815
5/16/1997	66	0.001	161	123	0.006	1,806
5/20/1997	59	0.001	144	98	0.004	959
Average			450			1,527

Source: WVDEP (2007).

Table 22: Site 2 parameters

Total acidity load (g/day)	Total acidity load (lb/day)	120% of design flow acidity load (g/day)	Vertical flow pond area (m^2)	Vertical flow pond area (ft^2)	Vertical flow pond side dimension (ft)	Pipe needed (ft)
1,977	4	2,372	95	1,021	40*	500

Source: Acidity load from previous table. RAPS dimensions from AMDTreat. Pipe needed from assumption that polluted water must be piped to the furthest downstream discharge within this site.

Table 23: Site 3 data

Date	LFLS-1000 Hot acidity (mg/L as $CaCO_3$)	LFLS-1000 Flow (cfs)	LFLS-1000 Acidity (g/day)	LFLS-1100 Hot acidity (mg/L as $CaCO_3$)	LFLS-1100 Flow (cfs)	LFLS-1100 Acidity (g/day)	LFLS-1200 Hot acidity (mg/L as $CaCO_3$)	LFLS-1200 Flow (cfs)	LFLS-1200 Acidity (g/day)	LFLS-1300 Hot acidity (mg/L as $CaCO_3$)	LFLS-1300 Flow (cfs)	LFLS-1300 Acidity (g/day)	LFLS-1400 Hot acidity (mg/L as $CaCO_3$)	LFLS-1400 Flow (cfs)	LFLS-1400 Acidity (g/day)
8/30/1995	328	0.03	24,074	320	0.007	5,480	389	0.003	2,855	439	0.07	75,183			
4/3/1997	324	0.54	428,052	299	0.57	416,969				438	0.43	460,787	57	0.01	1,395
4/23/1997	407	0.19	189,193	354	0.15	129,913	348	0.02	17,028	569	0.34	473,314	116	0.008	2,270
4/25/1997	396	0.07	67,819	339	0.24	199,053	336	0.008	6,576	545	0.18	240,009	106	0.001	259
5/16/1997	399	0.4	390,473	364	0.67	596,670	320	0.02	15,658	509	0.78	971,338	63	0.009	1,387
5/20/1997	426	0.58	604,499	374	0.66	603,912	311	0.04	30,435	539	0.41	540,668	65	0.008	1,272
8/31/2001	577.82	0.3	424,103	495.86	0.03	36,395	637.14	0.02	31,176	723.68	0.19	336,402	225.24	0.001	551
Average			304,031			284,056			17,288			442,529			1,189

Source: WVDEP (2007).

Table 24: Site 3 parameters

Total acidity load (g/day)	Total acidity load (lb/day)	120% of design flow acidity load (g/day)	Vertical flow pond area (m^2)	Vertical flow pond area (ft^2)	Vertical flow pond side dimension (ft)	Pipe needed (ft)
1,049,092	2,313	1,258,911	50,356	542,085	744	2,000

Source: Acidity load from previous table. RAPS dimensions from AMDTreat. Pipe needed from assumption that polluted water must be piped to the furthest downstream discharge within this site.

Table 25: Site 4 data

	MRP-200			MRP-300			MRP-400			MRP-500		
Date	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)
2/4/1998	316	0.009	6,958	320	0.007	5,480	325	0.005	3,976	178		0
3/19/1998	404	0.02	19,768	299	0.57	416,969	288	0.004	2,818			
8/20/1998	300			354	0.15	129,913	240	0.002	1,174			
3/1/1999	314	0.002	1,536	339	0.24	199,053						
4/10/2003	514.47	0.02	25,174	364	0.67	596,670						
Average			13,359			269,617			2,656			0

Source: WVDEP (2007).

Table 26: Site 4 parameters

Total acidity load (g/day)	Total acidity load (lb/day)	120% of design flow acidity load (g/day)	Vertical flow pond area (m^2)	Vertical flow pond area (ft^2)	Vertical flow pond side dimension (ft)	Pipe needed (ft)
285,632	630	342,759	13,710	147,591	392	500

Source: Acidity load from previous table. RAPS dimensions from AMDTreat. Pipe needed from assumption that polluted water must be piped to the furthest downstream discharge within this site.

Table 27: Site 5 data

Date	MRP-1100			MRP-1200			MRP-1300			MRP-1400			MRP-1500		
	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)
3/19/1998	226	0.004	2,212	284	0.04	27,793	440	0.008	8,612	465	0.07	79,636	261	0.01	6,386
8/20/1998	130	0.001	318	300	0.004	2,936				700					
3/1/1999				439	0.02	21,481	446	0.003	3,274	422	0.003	3,097	304	0.003	2,231
Average			1,265			17,403			5,943			41,367			4,308

Source: WVDEP (2007).

Table 28: Site 5 parameters

Total acidity load (g/day)	Total acidity load (lb/day)	120% of design flow acidity load (g/day)	Vertical flow pond area (m^2)	Vertical flow pond area (ft^2)	Vertical flow pond side dimension (ft)	Pipe needed (ft)
70,286	155	84,343	3,374	36,318	199.00	2,000

Source: Acidity load from previous table. RAPS dimensions from AMDTreat. Pipe needed from assumption that polluted water must be piped to the furthest downstream discharge within this site.

Table 29: Site 6 data

	MRP-950		
Date	Hot acidity (mg/L as $CaCO_3$)	Flow (cfs)	Acidity (g/day)
3/7/2002	121.3	0.05	14,838
4/10/2003	253.2	0.08	49,558
6/3/2003	368.96	0.25	225,672
9/27/2005	119	0.004	1,165
3/10/2006	317	0.074	57,392
6/8/2006	269	0.024	15,795
9/7/2006	184	0.014	6,302
3/12/2007	253	0.0711	44,010
6/7/2007	220	0.0341	18,354
9/5/2007	210	0.0122	6,268
Average			43,935

Source: WVDEP (2007).

Table 30: Site 6 parameters

Total acidity load (g/day)	Total acidity load (lb/day)	120% of design flow acidity load (g/day)	Vertical flow pond area (m^2)	Vertical flow pond area (ft^2)	Vertical flow pond side dimension (ft)	Pipe needed (ft)
43,935	97	52,722	2,109	22,702	159	20

Source: Acidity load from previous table. RAPS dimensions from AMDTreat. Pipe needed from assumption that polluted water must be piped to the furthest downstream discharge within this site.

STREAM_NAME	MILE_POINT	SAMPLE_DATE	Al Dissolved	Al Total	Fe Dissolved	Fe Total	Hot Acidity	PH
Maple Run	0.1	12-Jul-12	10.8	10.8	1.52	1.55	75	3.74
Maple Run	0.1	12-Sep-12	12.2	11.6	0.8	0.75	85	3.6
Maple Run	0.1	18-Oct-12	11.3	11.4	1.08	1.01	81	3.76
Maple Run	0.1	30-Nov-12	9.65	9.41	1.7	1.69	73	3.61
Maple Run	0.1	15-Jan-13	3.15	3.32	0.4	0.76	21	4.85
Maple Run	0.1	14-Feb-13	4.67	4.74	1.28	1.45	36	3.83
Maple Run	0.1	27-Feb-13	3.07	3.18	0.49	1.26	22	4.81
Maple Run	0.1	12-Mar-13	3.25	3.39	0.59	1.23	23	4.6
Maple Run	0.1	03-Apr-13	3.9	3.94	0.86	1	31	
Maple Run	0.1	15-May-13	4.66	4.87	0.69	0.85	35	4.22
Maple Run	0.1	03-Jul-13	2.85	3.01	0.44	0.66	20	4.37
Maple Run	0.1	22-Jul-13	7.79	8.02	1.3	1.4	72	3.36
Left Fork/Little Sandy Creek	0	01-Oct-02	24.4	24.9	20.2	21.1	264	5.46
Left Fork/Little Sandy Creek	0	12-Jul-12	32.6	34.3	13.4	14.1	294	2.59
Left Fork/Little Sandy Creek	0	13-Sep-12	29.8	27.8	13.9	13	292	2.78
Left Fork/Little Sandy Creek	0	24-Oct-12	21.8	22.2	11.5	11.7	217	3.05
Left Fork/Little Sandy Creek	0	05-Dec-12	5.67	5.7	4.21	5.04	58	3.55
Left Fork/Little Sandy Creek	0	16-Jan-13	1.53	1.89	0.58	3.22	17	4.38
Left Fork/Little Sandy Creek	0	06-Feb-13	6.77	6.82	11.3	11.8	98	3.2
Left Fork/Little Sandy Creek	0	27-Feb-13	4.13	4.68	4.07	6.1	48	3.56
Left Fork/Little Sandy Creek	0	26-Mar-13	7.42	7.83	10.5	12.1	97	3.37
Left Fork/Little Sandy Creek	0	24-Apr-13	7.17	6.99	6.8	7.48	88	3.34
Left Fork/Little Sandy Creek	0	16-May-13	5.22	5.83	4.61	8.05	65	3.49
Left Fork/Little Sandy Creek	0	02-Jul-13	4.31	4.3	2.16	3	40	3.58
Left Fork/Little Sandy Creek	0	22-Jul-13	13.6	13.6	8.62	8.87	158	2.85

SAMPLE_ID	MILE_POIN	STREAM_N	DUPLICATE_NAME	SAMPLE_DATE	SAMPLE_TI	PARAMETE	VALUE	DEFAULT_U	FRACTION
63706	1.4	Left Fork/Sandy Creek		3/7/2013	3:00 PM	PH	6.75	S.U.	
67650	1.4	Left Fork/Sandy Creek		5/15/2013	1:35 PM	Al Total	0.151	mg/L or pp	Total
74831	1.4	Left Fork/Sandy Creek		8/22/2013	10:00 AM	Al Total	0.273	mg/L or pp	Total
67650	1.4	Left Fork/Sandy Creek		5/15/2013	1:35 PM	Fe Total	0.13	mg/L or pp	Total
67650	1.4	Left Fork/Sandy Creek		5/15/2013	1:35 PM	Al Dissolve	0.024	mg/L or pp	Dissolved
67650	1.4	Left Fork/Sandy Creek		5/15/2013	1:35 PM	PH	6.93	S.U.	
74831	1.4	Left Fork/Sandy Creek		8/22/2013	10:00 AM	PH	6.74	S.U.	
74831	1.4	Left Fork/Sandy Creek		8/22/2013	10:00 AM	Fe Total	0.37	mg/L or pp	Total
74831	1.4	Left Fork/Sandy Creek		8/22/2013	10:00 AM	Al Dissolve	0.054	mg/L or pp	Dissolved
62800	4.6	Left Fork/Sandy Creek		1/16/2013	3:00 PM	PH	6.3	S.U.	
63707	4.6	Left Fork/Sandy Creek		2/27/2013	4:05 PM	Al Total	0.74	mg/L or pp	Total
63259	4.6	Left Fork/Sandy Creek		2/6/2013	2:15 PM	Al Dissolve	0.04	mg/L or pp	Dissolved
63259	4.6	Left Fork/Sandy Creek		2/6/2013	2:15 PM	Fe Total	0.12	mg/L or pp	Total
63259	4.6	Left Fork/Sandy Creek		2/6/2013	2:15 PM	Al Total	0.6	mg/L or pp	Total
63707	4.6	Left Fork/Sandy Creek		2/27/2013	4:05 PM	Al Dissolve	0.05	mg/L or pp	Dissolved
63259	4.6	Left Fork/Sandy Creek		2/6/2013	2:15 PM	PH	6.1	S.U.	
63707	4.6	Left Fork/Sandy Creek		2/27/2013	4:05 PM	PH	6.13	S.U.	
63707	4.6	Left Fork/Sandy Creek		2/27/2013	4:05 PM	Fe Total	0.16	mg/L or pp	Total
64068	4.6	Left Fork/Sandy Creek		3/20/2013	3:15 PM	Al Dissolve	0.03	mg/L or pp	Dissolved
64068	4.6	Left Fork/Sandy Creek		3/20/2013	3:15 PM	PH	6.15	S.U.	
62800	4.6	Left Fork/Sandy Creek		1/16/2013	3:00 PM	Fe Total	0.51	mg/L or pp	Total
64068	4.6	Left Fork/Sandy Creek		3/20/2013	3:15 PM	Fe Total	0.18	mg/L or pp	Total
62800	4.6	Left Fork/Sandy Creek		1/16/2013	3:00 PM	Al Total	0.92	mg/L or pp	Total
64068	4.6	Left Fork/Sandy Creek		3/20/2013	3:15 PM	Al Total	0.6	mg/L or pp	Total
62800	4.6	Left Fork/Sandy Creek		1/16/2013	3:00 PM	Al Dissolve	0.05	mg/L or pp	Dissolved
68094	4.6	Left Fork/Sandy Creek		6/26/2013	3:40 PM	Al Total	0.233	mg/L or pp	Total
68094	4.6	Left Fork/Sandy Creek		6/26/2013	3:40 PM	Fe Total	0.08	mg/L or pp	Total
69857	4.6	Left Fork/Sandy Creek		7/30/2013	1:00 PM	Al Dissolve	0.071	mg/L or pp	Dissolved
74832	4.6	Left Fork/Sandy Creek		8/19/2013	5:00 PM	Fe Total	0.39	mg/L or pp	Total
74832	4.6	Left Fork/Sandy Creek		8/19/2013	5:00 PM	Al Total	0.568	mg/L or pp	Total
74832	4.6	Left Fork/Sandy Creek		8/19/2013	5:00 PM	PH	6.8	S.U.	
74832	4.6	Left Fork/Sandy Creek		8/19/2013	5:00 PM	Al Dissolve	0.075	mg/L or pp	Dissolved
67651	4.6	Left Fork/Sandy Creek		4/24/2013	2:55 PM	PH	6.96	S.U.	
69857	4.6	Left Fork/Sandy Creek		7/30/2013	1:00 PM	Fe Total	0.08	mg/L or pp	Total
69857	4.6	Left Fork/Sandy Creek		7/30/2013	1:00 PM	Al Total	0.222	mg/L or pp	Total
69857	4.6	Left Fork/Sandy Creek		7/30/2013	1:00 PM	PH	6.59	S.U.	
67651	4.6	Left Fork/Sandy Creek		4/24/2013	2:55 PM	Al Dissolve	0.027	mg/L or pp	Dissolved
68094	4.6	Left Fork/Sandy Creek		6/26/2013	3:40 PM	PH	6.54	S.U.	
67651	4.6	Left Fork/Sandy Creek		4/24/2013	2:55 PM	Al Total	0.595	mg/L or pp	Total
68094	4.6	Left Fork/Sandy Creek		6/26/2013	3:40 PM	Al Dissolve	0.049	mg/L or pp	Dissolved
67651	4.6	Left Fork/Sandy Creek		4/24/2013	2:55 PM	Fe Total	0.23	mg/L or pp	Total

STREAM_NAME	ANCODE	MILE_POINT	SAMPLE_DATE	FINAL_BENTHIC_IBI_COMPARABLE	WVSCI	PCT_OF_THRESHOLD_GLIMPSS_CF
Maple Run	WVMT-18-E-1	0.1	15-May-13	WVSCI/GLIMPSS	19.19	2.36
Left Fork/Little Sandy Creek	WVMT-18-E-3	0	01-Oct-02	WVSCI/GLIMPSS	9.78	0
Left Fork/Little Sandy Creek	WVMT-18-E-3	0	13-Sep-12	WVSCI/GLIMPSS	10.63	0
Left Fork/Sandy Creek	WVMT-18-G	1.3	02-Oct-02	WVSCI/GLIMPSS	55.48	50.53
Left Fork/Sandy Creek	WVMT-18-G	1.4	15-May-13	WVSCI/GLIMPSS	59.83	71.22
Left Fork/Sandy Creek	WVMT-18-G	4.6	20-Mar-13	GLIMPSS	63.47	54.61

Attachment 5

Sandy Creek Supplemental Information

west virginia department of environmental protection

Division of Water & Waste Management
601 57th Street, Southeast
Charleston, WV 25304
Phone: (304) 926-0440
Fax: (304) 926-0463

Jim Justice, Governor
Austin Caperton, Cabinet Secretary
www.dep.wv.gov

July 19, 2017

Denise Hakowski
EPA Region 3
1650 Arch Street
Mail Code: 3RA00
Philadelphia, PA 19103-2029

Re: Additional information for WVDEP Special Reclamation Left Fork of Little Sandy Creek and Maple Run Variance

Dear Ms. Hakowski:

The West Virginia Department of Environmental Protection (DEP) is hereby submitting additional information for the water quality standards variances for Left Fork of Little Sandy Creek and Maple Run watersheds to the United States Environmental Protection Agency (EPA). The West Virginia rule containing these variances, "47CSR2 Requirements Governing Water Quality Standards," was legally certified on June 8, 2016 and submitted to EPA for approval on that day. The rule became effective July 8, 2016. DEP is submitting this additional information to aid in the review and approval of this variance for DEP Division of Land Restoration's Office of Special Reclamation (OSR). These varied criteria are needed to facilitate the use of alternative restoration measures to treat not only the bond-forfeited sites, but also all acid mine drainage in these historically impaired watersheds.

As stated in EPA's Water Quality Standards Regulatory Clarifications document, "A variance is a time-limited designated use and criterion that is targeted to a specific pollutant(s), source(s), and/or water body or waterbody segment(s) that reflects the highest attainable condition during the specified time period" (FR Vol 78 No 171 pg 54531). The proposed alternative approach to restoring the historically polluted Left Fork of Little Sandy Creek and Maple Run watersheds is a perfect example of how a variance of water quality standards can be used to improve water quality. This unique approach treats bond-forfeiture sites as well as abandoned mine lands together in order to address a situation which has existed in the watersheds for decades. This is a situation in which "it is known that the designated use and criterion are unattainable" (FR Vol 78 No 171 pg 54532). The designated use and water quality criteria are not being met in these streams, but West Virginia intends to retain the designated use as a long-term goal in restoring each stream and improving the watersheds. West Virginia has chosen to pursue a variance for these streams, which will allow the time necessary to implement adaptive management approaches to getting these streams to meet their designated uses and improving their water quality.

DEP respectfully requests EPA's timely review and approval of the revisions to the State's water quality standards in accordance with 40 C.F.R. §131.21. If you have any questions or need any additional information, please contact Laura Cooper at (304) 926-0499 extension 1110 or via email at Laura.K.Cooper@wv.gov.

Sincerely,

Laura Cooper
Assistant Director
Division of Water and Waste Management
Water Quality Standards

cc: Evelyn MacKnight, EPA Region 3
Mike Sheehan WVDEP

Additional Information for Left Fork of Little Sandy Creek and Maple Run Watershed Variance

I. Variance Language taken from WV Rule, Requirements Governing Water Quality Standards, §47 CSR 2 7.2.d.8.2.

A variance pursuant to 46 CSR 6, Section 5.1, based on human-caused conditions which prohibit the full attainment of any designated use and cannot be immediately remedied, shall apply to WV DEP Division of Land Restoration's Office of Special Reclamation's (OSR) discharges into Maple Run, Left Fork Little Sandy Creek, and their unnamed tributaries. The following existing conditions will serve as instream interim criteria while this variance is in place: For Maple Run, pH range of 3.3-9.0, 2 mg/L total iron, and 12 mg/L dissolved aluminum; for Left Fork Little Sandy Creek, pH range of 2.5-9.0, 14 mg/L total iron, and 33 mg/L dissolved aluminum. Alternative restoration_measures, as described in the variance application submitted by WV DEP Division of Land Restoration's Office of Special Reclamation, shall be used to achieve significant improvements to existing conditions in these waters during the variance period. Conditions will be evaluated and reported upon during each triennial review throughout the variance period. This variance shall remain in effect until action by the Secretary to revise the variance or until July 1, 2025, whichever comes first.

II. Watershed Information

A. Streams

i. Drainage Area - Left Fork Little Sandy Creek (LFLS) is a perennial stream with a watershed area of approximately 7.91 square miles (5,062 acres) and an average flow of approximately 1.11 cubic feet per second (cfs). Maple Run is a perennial stream with a watershed area of approximately 4.75 square miles (3,040 acres) and an average flow of approximately 0.5 5cfs.

ii. Existing Conditions – AMD impacts to Sandy Creek are primarily from Little Sandy which is severely impaired with AMD from two tributaries, LFLS and Maple Run. According to the approved 2016 TMDL both the LFLS and Maple Run are impaired by pH, iron, and aluminum. Sandy Creek is slightly impaired below Little Sandy but unable to sustain a healthy fish population, while Sandy Creek above Little Sandy is unimpaired and suitable for a diverse fish population (Table 1).

As can be seen in Table 1, fish surveys conducted by the DEP Watershed Assessment Branch (WAB) in 2013 and 2015 indicate no fish within Sandy Creek except above the Little Sandy Creek confluence and no fish at all within the Little Sandy Creek. However, tributaries to Sandy Creek and Little Sandy Creek have viable fish populations with the exception LFLS and Maple Run (Figure 2). These surveys were done prior to the in-stream treatment study and support the true potential of the watershed approach and how biological connectivity could be reestablished in the Sandy Creek watershed.

Table 1
Results of 2013 and 2015 Fish Surveys

STREAM_NAME	ANCODE	MILE_POINT	SAMPLE_DATE	COMMON_NAME
Sandy Creek below Little Sandy Creek				
Sandy Creek	WVMT-18	2.5	16-Sep-15	No Fish Observed
Sandy Creek above Little Sandy Creek				
Sandy Creek	WVMT-18	8.6	15-Sep-15	Spotted Bass
Sandy Creek	WVMT-18	8.6	15-Sep-15	Johnny Darter
Sandy Creek	WVMT-18	8.6	15-Sep-15	Fantail Darter
Sandy Creek	WVMT-18	8.6	15-Sep-15	River Chub
Sandy Creek	WVMT-18	8.6	15-Sep-15	Bluntnose Minnow
Sandy Creek	WVMT-18	8.6	15-Sep-15	Smallmouth Bass
Sandy Creek	WVMT-18	8.6	15-Sep-15	Rock Bass
Sandy Creek	WVMT-18	8.6	15-Sep-15	Green Sunfish
Sandy Creek	WVMT-18	8.6	15-Sep-15	Bluegill
Sandy Creek	WVMT-18	8.6	15-Sep-15	White Sucker
Sandy Creek	WVMT-18	8.6	15-Sep-15	Northern Hogsucker
Sandy Creek	WVMT-18	8.6	15-Sep-15	Creek Chub
Sandy Creek	WVMT-18	10.5	17-Jul-13	Bluntnose Minnow
Sandy Creek	WVMT-18	10.5	17-Jul-13	Creek Chub
Sandy Creek	WVMT-18	10.5	17-Jul-13	Fantail Darter
Sandy Creek	WVMT-18	10.5	17-Jul-13	Western Blacknose Dace
Sandy Creek	WVMT-18	10.5	17-Jul-13	Northern Hogsucker
Sandy Creek	WVMT-18	10.5	17-Jul-13	Smallmouth Bass
Sandy Creek	WVMT-18	10.5	17-Jul-13	Rock Bass
Sandy Creek	WVMT-18	10.5	17-Jul-13	River Chub
Little Sandy Creek				
Little Sandy Creek	WVMT-18-E	4	15-Sep-15	No Fish Observed
Little Sandy Creek	WVMT-18-E	8.9	15-Sep-15	No Fish Observed
Right Fork of Little Sandy Creek (above Left Fork of Little Sandy)				
Right Fork/Little Sandy Creek	WVMT-18-E-4	0.6	20-Aug-13	White Sucker
Right Fork/Little Sandy Creek	WVMT-18-E-4	0.6	20-Aug-13	Brook Trout
Right Fork/Little Sandy Creek	WVMT-18-E-4	0.6	20-Aug-13	Western Blacknose Dace
Right Fork/Little Sandy Creek	WVMT-18-E-4	0.6	20-Aug-13	Mottled Sculpin
Right Fork/Little Sandy Creek	WVMT-18-E-4	0.6	20-Aug-13	Creek Chub

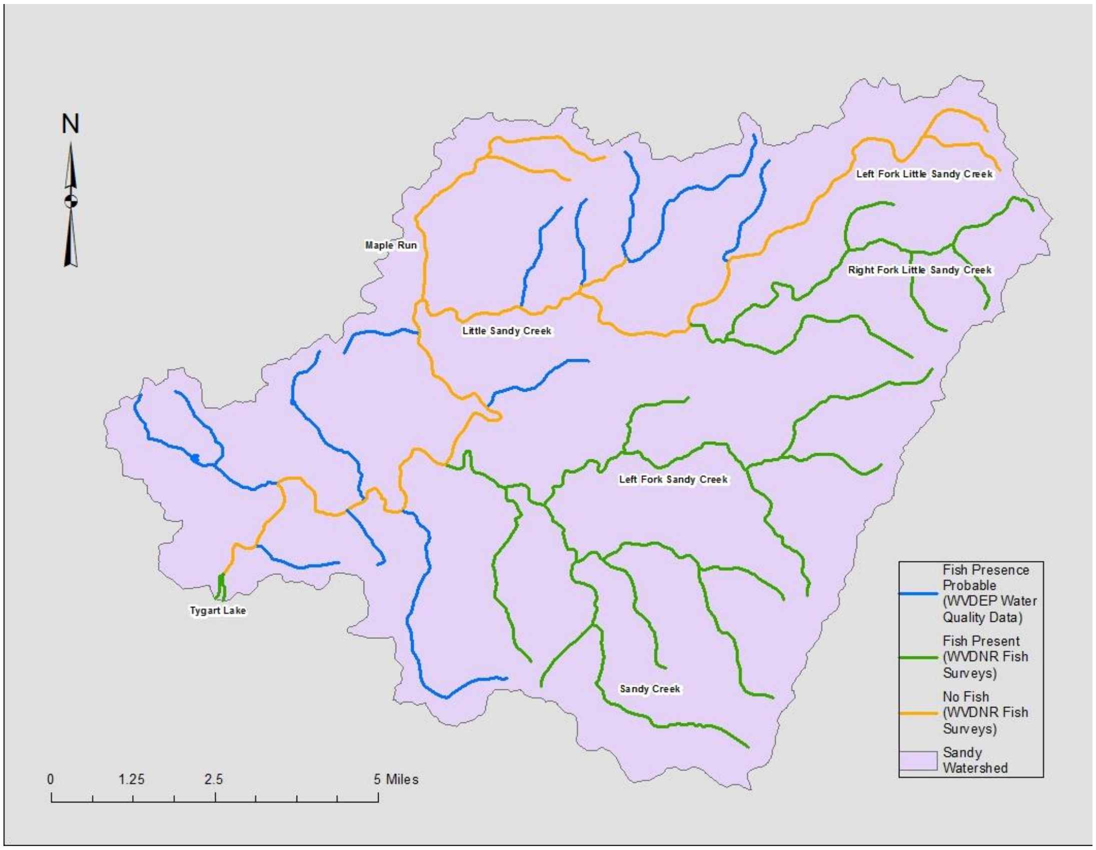


Figure 1 Presences or absence of fish

III. Restoration Goals

OSR has set a restoration goal of restoring 9.2 miles of Little Sandy and 5 miles of Sandy Creek to their designated stream usage by decreasing the water quality impairment from AML and Bond Forfeiture (BF) coal mine discharges within the watershed. Achieving this restoration goal will improve water quality as well as stream appearance which should lead to an increase in outdoor recreational opportunities such as fishing, kayaking, and swimming.

IV. NPDES Permits Subject to Stream Variance

A. Current Dischargers in LFLS and Maple Run, including current or proposed treatment, number of NPDES outlets, and average flows.

i. **Amanda Nicole S-1018-88** (WV1025848) – an active treatment site using one lime dosing unit with one NPDES outlet which has an average flow of 0.07 cfs.

ii. **Mangus Coal S-1036-91** (WV1025694) – an active treatment site (proposed) and one NPDES outlet which has an average flow of 0.02 cfs.

iii. **Maurice Jennings S-53-78/S-61-83** (WV1027239) – an active treatment site (proposed) with six outlets and one lime dosing unit. Permit S-53-78 has one NPDES outlet with an average flow of 0.0.0112 cfs. Permit S-61-83 has 5 NPDES outlets; all of which have no flow.

V. Rationale

Acid Mine Drainage (AMD) from AML sources are 98% and 89% of the loadings for LFLS and Maple Run respectively. The remaining 2% and 11% would be attributed to OSR BF sites (Figure 2).

OSR has constructed one active treatment site within the Sandy Creek Watershed, and three other sites, Mangus Coal and Maurice Jennings (two permits) which are yet to be constructed. The total capital cost for water treatment construction was approximately $700,000 and OSR has spent approximately $100,000 to date for operations and maintenance, or roughly $15,000 annually. OSR now has eight NPDES outlets in the Sandy Creek watershed. Without an alternative permitting structure, OSR will spend an additional $2 million to construct three new active treatment sites with operational cost exceeding $100,000 annually. With this existing approach, Little Sandy Creek and Sandy Creek will not improve.

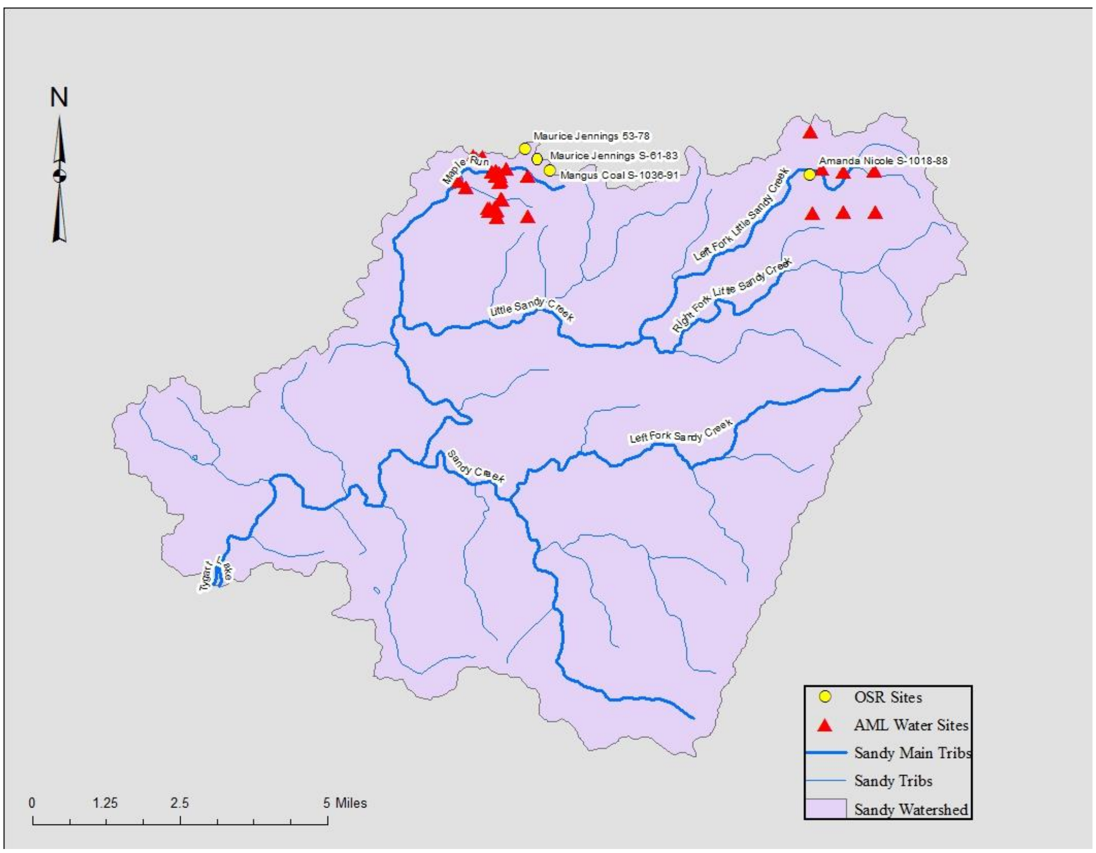


Figure 2 AMD sources in Sandy Creek

VI. In-Stream Treatment Study

A. Purpose

Figure 3 Portable doser

The West Virginia Water Research Institute (WRI) was contracted by OSR to conduct a study that would utilize portable dosers to treat in-stream. The purpose of the study was to assist in determining the optimal location for placement of permanent dosers within the Sandy Creek watershed that would effectively address both AML and BF mine discharges. The dosers were modified with skids and solar power to enable them to be moved by truck from one location to another and placed alongside the targeted stream (Figure 3). The dosers, which were 20 or 40 ton silos, were filled with various lime reagents such as pebble lime (pea sized), hydrated lime (powder), or crushed lime (sand) to determine the most efficient product to suit the needs of the study. Two dosers were used, one was placed near the headwaters of the LFLS and one near the headwaters of Maple Run (Figure 4). Water quality samples were collected on a weekly basis at locations upstream of the dosers and at tributary mouths to monitor water quality conditions in response to the dosers. Field measured turbidity (via a transparency tube) and laboratory measured total suspended solids (TSS) provided a measurement of suspended metal flocs at sampling stations.

Sample points at the mouths of the LFLS and Maple Run were used to verify whether the interim criteria were achievable. For the LFLS, the interim criteria were outlined in the variance application as pH (2.5 – 9), total iron (14mg/L), dissolved aluminum (33 mg/L) and the interim criteria for Maple Run are, pH (3.3 – 9), total iron (2 mg/L), dissolved aluminum (12mg/L)).

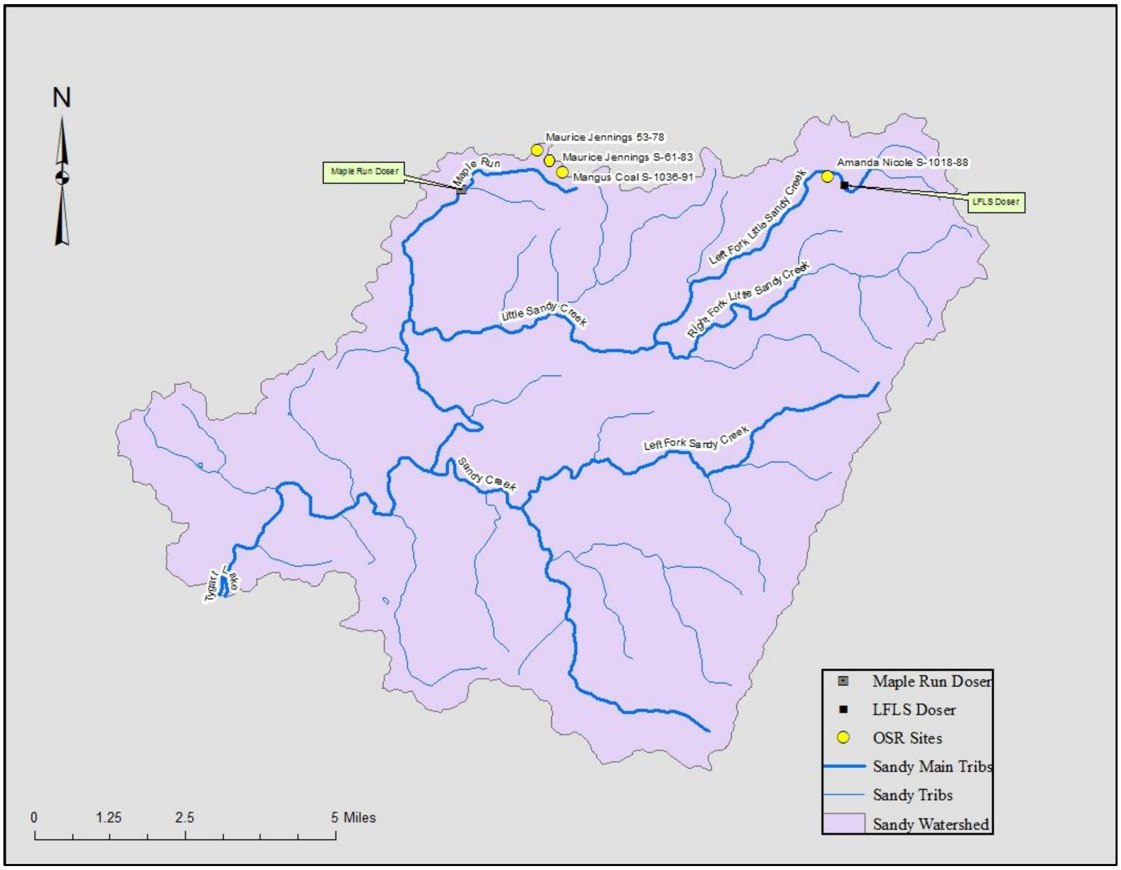


Figure 4 Initial location of dosers

B. Challenges

There were challenges encountered during the study such as power outages due to inadequate sun light for the solar panels and clogged silos, both of which lead to inconsistent dosing to the receiving stream and consequently inconsistent water quality results. By design, the solar panels were installed to run gear driven motors to dispense lime, while also charging the batteries to last through the evening hours. However, due to the high lime dosing rate, a larger demand on the batteries resulted, which was not anticipated. To compensate for the lack of power, primarily during the evening hours, gasoline powered generators where used. The generators were operated by the DEP and volunteers from a local watershed group Save the Tygart (STT). STT is a dedicated, non-profit group with 501 C-3 status that shares an interest in restoring Sandy Creek. The clogging issue was addressed by installing vibrators, both internally and externally on the silos, but this also added to the power demand. Therefore, it was decided that since positive water quality results were observed during periods of consistent dosing, electricity would be run to the LFLS doser since this one required a much higher power demand.

C. Results

The variance interim criteria for Maple Run and LFLS served as restoration targets for the purpose of the study. For LFLS restoration targets were met for pH and dissolved aluminum. Total iron, however, exceeded the limits 24% of the time (Figure 5). These exceedances occurred even when the doser was operational indicating an overload of iron in the system from several headwater AML sources. This was most noticeable during low flow periods throughout the summer and fall months when water temperature and turbidity levels were high, although subsequent data collection by the DEP indicates that the interim criteria is achievable on a much more frequent basis. It is true that exceedances occurred even when the doser was operational, but it has been observed that it is the consistency, or long term operation of the doser that contributes to the overall success.

On Maple Run restoration targets were met as long as the doser was operational (Figure 6).

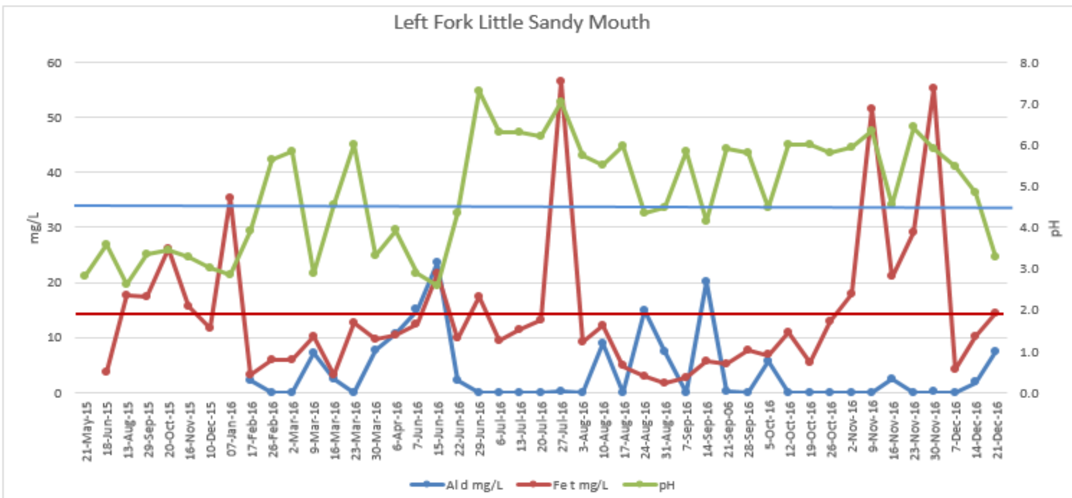


Figure 5 Water quality results for Left Fork Little Sandy at the Mouth (he horizontal lines represent the restoration targets)

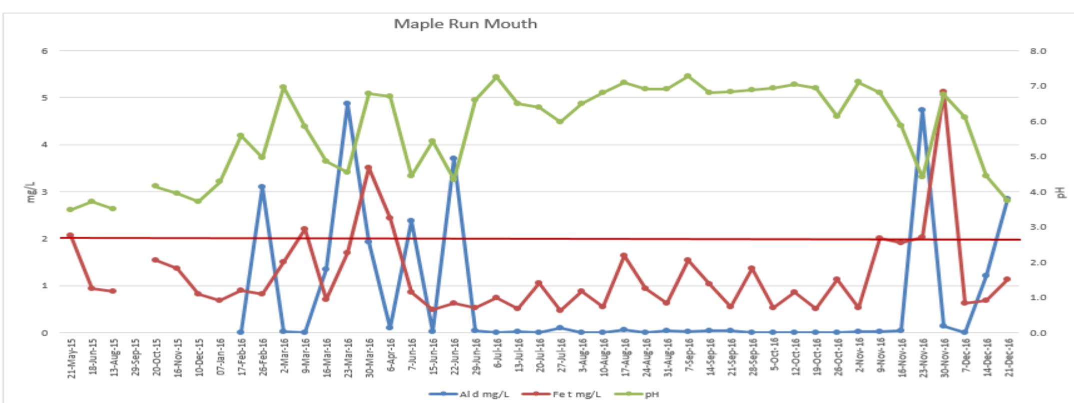


Figure 6 Water quality results for Maple Run at the Mouth

There doesn't appear to be a correlation between TSS and flow (Q) at the mouths of the LFLS or Maple Run (Figures 7 & 10). Photos were taken at sites to show aesthetic changes to the Sandy Creek watershed in response to dosing during varying flows and seasonal conditions (Figures 8, 9, 11 & 12).

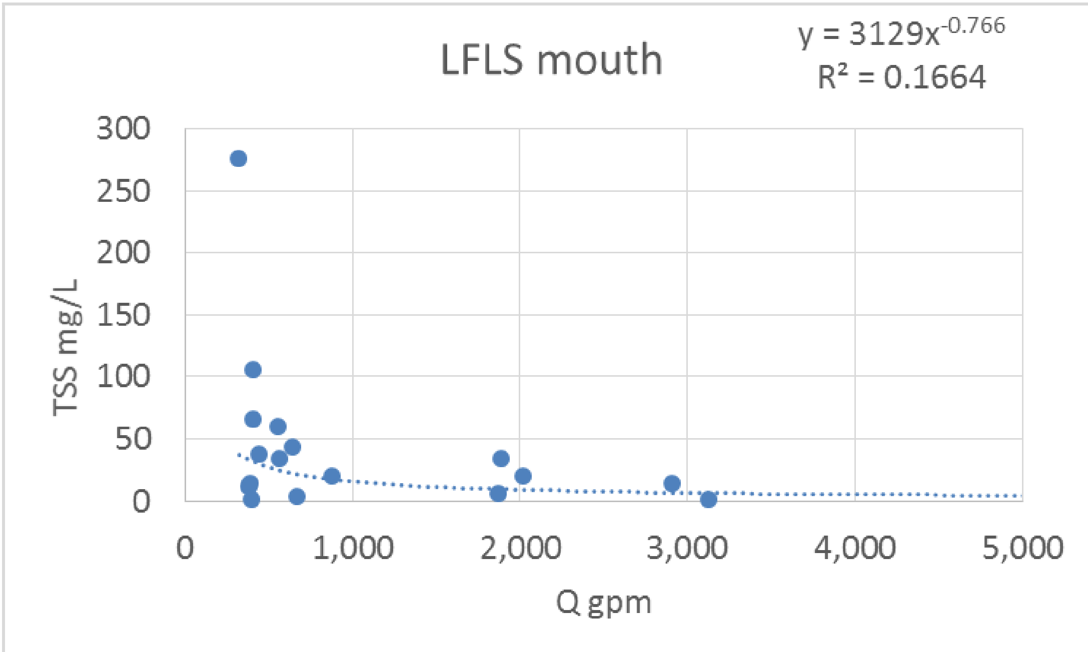


Figure 7 TSS vs flow at the mouth of LFLS

Figure 8 LFLS during low flow

Figure 9 LFLS during high flow

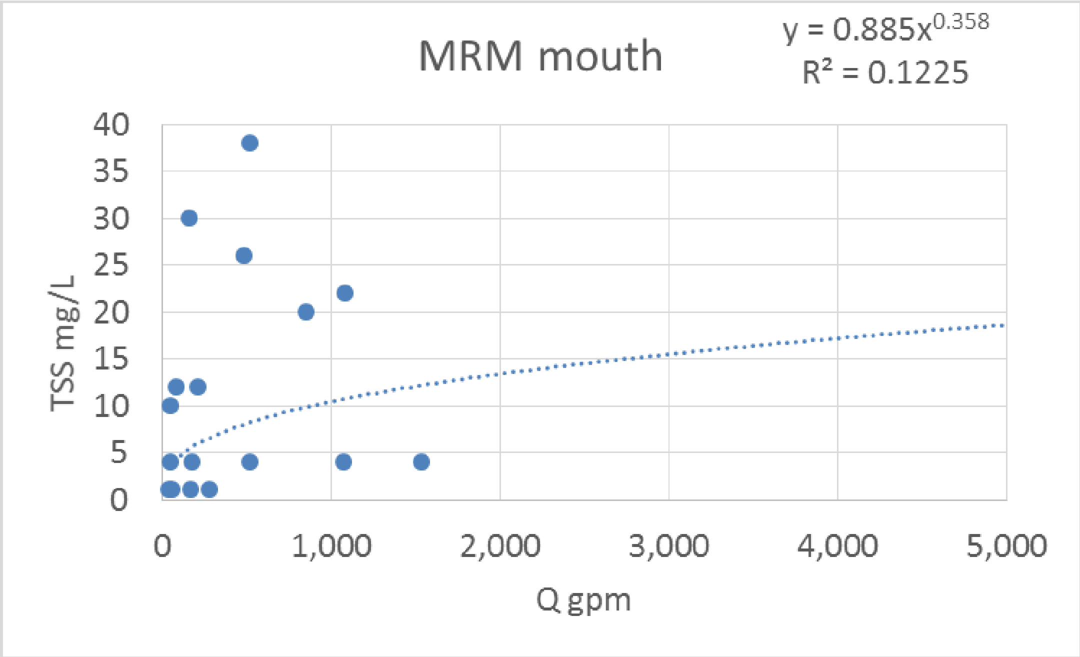


Figure 10 TSS vs flow at the mouth of Maple Run

Figure 11 Maple Run at low flow

Figure 12 Maple Run at high flow

D. Final Plans

Based on gradient of the streams and treatment results, both chemically and physically, it was determined that the dosers on both the LFLS and Maple Run were in appropriate locations and therefore remained throughout the study.

To complement the in-stream treatment approach on LFLS STT has requested the assistance of WRI in the preparation of an application for federal grants to obtain the necessary funding for the design and construction of a passive treatment system. STT has been extremely cooperative throughout the in-stream treatment study and want to contribute to the success of the restoration project by addressing the Barlow Portal. This portal discharge is an AML source that contributes approximately 36,400 lbs/yr of Iron to the LFLS and enters immediately downstream of the doser. WRI anticipates removing approximately 50% of the iron load with the passive treatment system. The landowner at the Barlow Portal site is also interested in the restoration efforts and has donated the property needed for the passive treatment system.

With *the exception* of the *challenges* described above, all of which will be remedied upon full implementation of the in-stream dosers, all parties involved in the study; WVDEP, WRI, and STT, where very encouraged by the results of the study.

VII. Treatment during term of the variance

The permanent in-stream dosers will be installed upon approval of the variance. These dosers will dispense a highly soluble hydrated lime or lime slurry. The Maple Run doser will treat with Hydrated lime and will have electricity. The LFLS doser has the highest chemical demand, therefore this in-stream doser will utilize a lime slurry which will be produced on-site. Since this particular site is in close proximity to public water and electrical service, OSR will utilize these utilities. Public water will be used as make-up water to produce the lime slurry for treatment. This doser has already been connected to an electric supply. Both sites will have backup propane generators that will turn on automatically in the event of a power outage. These in-stream dosing sites will have a communication link to the T&T treatment facility's PLC (Programable Logic Controller) which will give the OSR remote monitoring capabilities for parameters such as exceedances in pH, power outages, and lime level in the silos. Dosing rates will be regulated by pH sensors placed downstream of the doser. The sensor will measure the pH of the stream and send a signal back to the doser that will enable the dosing rate to increase or decrease accordingly.

VIII. Variance Rationale

A. Term of Variance

This variance will be in place until the watershed has been restored to meet water quality standards or until 10 years has passed, whichever comes first. It is not yet clear how long it will take the alternative restoration measures described in this application to be fully effective in restoring water quality. The long-term multifaceted acid drainage problem in this watershed—from both bond forfeited sites and AML sites—makes it difficult to determine how long it will take before water quality is restored, and subsequently for aquatic life to return to these streams.

WVDEP conducts a required Water Quality Standards Triennial Review consistently and as scheduled, every three years. As stated in the variance language, DEP will evaluate conditions during each triennial review to determine if the alternative measures are having the desired impact. Each Triennial Review will provide an opportunity for review and update of achievable interim water quality standards. In fact, since the variance was approved by the WV State Legislature in July 2016, one year of the allotted 10 years has already expired.

B. Determination of Highest Attainable Condition and Interim Criteria

The highest attainable interim criteria used in this variance was determined by examining existing in-stream conditions at the proposed watershed permit compliance points, which are at the mouths of LFLS and Maple Run. These points had average flow measurements of 0.12 cfs and 0.01 cfs respectively. For the LFLS, the interim limits as outlined in the variance application are pH (2.5 – 9), total iron (14mg/L), and dissolved aluminum (33 mg/L), and the interim limits for Maple Run are, pH (3.3 – 9), total iron (2 mg/L), dissolved aluminum (12mg/L)). For the initial portion of the 10-year life of the variance, it is unknown what water quality improvements can be expected; therefore, use of the existing conditions as interim criteria, at least until a Triennial Review can be done to update the interim criteria, ensures compliance with criteria can be met.

IX. Monitoring and Assessment

Eight locations in the Sandy Creek watershed will be used for monitoring and assessing the restoration target (Figure 13).

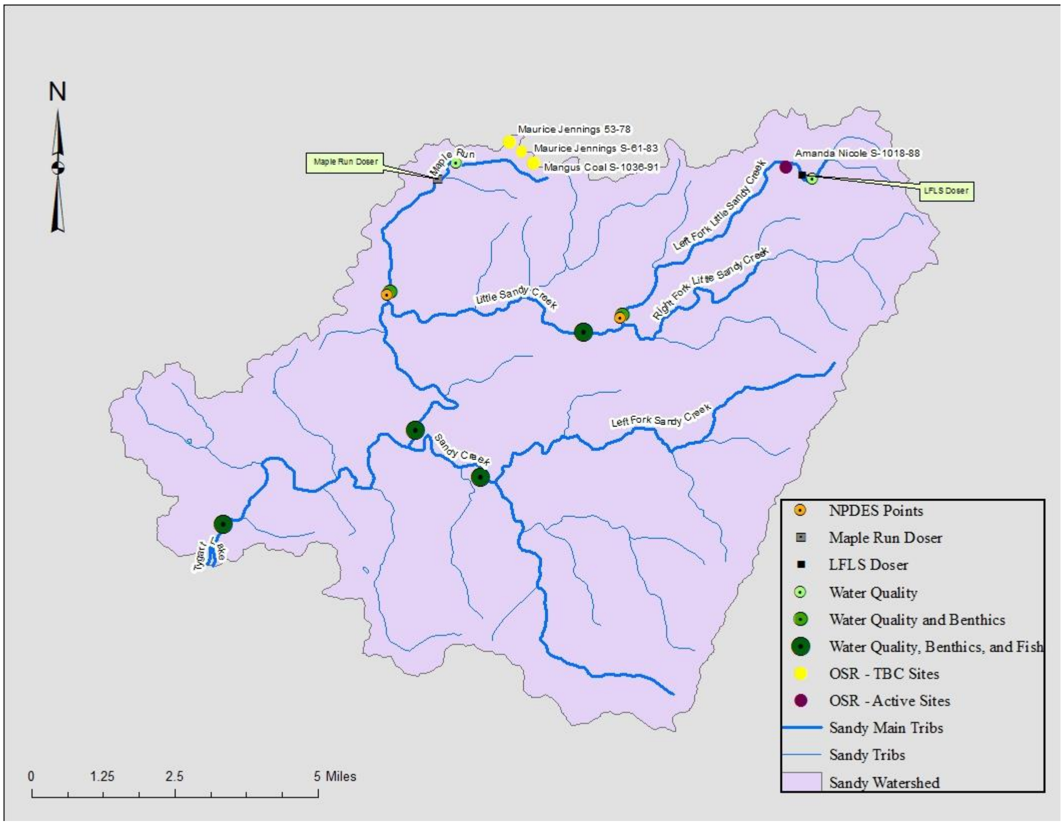


Figure 13 Proposed monitoring and assessment plan for the Sandy Creek Watershed

A. Surface water quality monitoring

In an effort to determine the efficacy of the AMD treatment in the Sandy Creek watershed, water quality samples (grab) will be collected on a monthly basis at 6 locations for a period of two (2) years following start-up of the permanent In-stream dosers. This information is fundamental in managing OSR's In-stream dosers and permanent treatment facilities and is needed to address questions vital to the long-term environmental integrity of the watershed. After two (2) years, water quality samples (grab) will be collected on a quarterly basis at the same eight (8) locations. Specifically, grab samples will be collected at locations upstream of the dosers and at the tributary mouths. Water quality sampling techniques will follow the OSR's Standard Operating Procedures (SOP) that adhere to scientifically sound, quality-assured field methods.

Field parameters will include: temperature (°C), dissolved oxygen (ppm), specific conductance (µS/cm), and total dissolved solids (TDS) (mg/L) using a YSI 556 multi-parameter probe (Yellow Springs Instruments, Yellow Springs, OH, USA), and turbidity via transparency tube. Stream discharge will be measured using the area-velocity technique with an OTT MF pro Flow Meter. Additionally, grab water samples will be collected at each site and stored on ice until analysis at a laboratory approved by the WVDEP. Parameters to be analyzed include: pH, alkalinity, acidity, conductivity, sulfates, and total suspended solids along with total and dissolved metals (iron, magnesium, aluminum, calcium, and manganese).

Additionally, in-stream data loggers located at the mouths of the LFLS, Maple Run, Little Sandy Creek and Sandy Creek will record pH, conductivity, and temperature at 20 minute intervals. Data will be downloaded monthly during water quality grab sample events.

B. Benthic macroinvertebrate and fish sampling

In an effort to determine the efficacy of the AMD treatment and overall stream health of the Sandy Creek watershed, benthic macroinvertebrate and fish surveys will be conducted. Following start-up of the permanent In-stream dosers, benthic macroinvertebrate surveys will be conducted every six (6) months for a period of two (2) years at the tributary Mouths (Figure 9). After two (2) years, benthic sampling will be conducted on a yearly basis. Fish surveys will be conducted six (6) months following start-up of the permanent treatment systems, then one (1) year (18 months), and every two (2) years thereafter (Figure 9). Survey and collection procedures will follow the WVDEP's Watershed Assessment Branch's (WAB) protocol. The WAB's protocol can found at: http://www.dep.wv.gov/WWE/watershed/Pages/WBSOPs.aspx

X. Watershed Permit

OSR will obtain an NPDES permits at the mouths of Maple Run and LFLS. These in-stream NPDES permits will supersede all individual OSR site NPDES permits covered under the variance. It is anticipated that the initial in-stream permit limits will be equal to the in-stream interim criteria established in the variance application (for Maple Run, pH (3.3-9.0 s.u.), 2 mg/L total iron, and 12 mg/L dissolved aluminum; for Left Fork Little Sandy Creek, pH (2.5-9.0 s.u.), 14 mg/L total iron, and 33 mg/L dissolved aluminum). Upon each triennial review, as required by the variance, the stream conditions and compliance history shall be reviewed and the in-stream limits shall be adjusted appropriately, but under no circumstances may they be made worse than the original criteria as established in the variance without justification and approval by the DEP.

A. Baseline Monitoring

Prior to the in-stream treatment study WAB has collected water quality samples, benthics, and fish according to the proposed monitoring and assessment plan described above.

Attachment 6

Sandy Creek EPA Approval Letter

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

FEB 2 0 2018

Mr. Scott Mandirola, Director
Division of Water and Waste Management
West Virginia Department of Environmental Protection
601 57th Street, S.E.
Charleston, West Virginia 25304

Dear Mr. Mandirola:

On June 2, 2016, the West Virginia Legislature approved revisions to the State's water quality standards rule (47CSR2 Requirements Governing Water Quality Standards). Those revisions were then signed by the Governor on June 7, 2016. The West Virginia Department of Environmental Protection's (WVDEP) General Counsel certified on June 8, 2016 that the regulations were duly adopted in accordance with State law. In accordance with Section 303(c)(2)(A) of the Clean Water Act (CWA), 33 U.S.C. §1313(c)(2)(A), and 40 CFR §131.20(c), WVDEP forwarded the amended regulation to the Environmental Protection Agency, Region III, on June 8, 2016, and we received it on June 9, 2016. Included in this submittal is a variance that applies to the Left Fork of Little Sandy Creek and Maple Run watersheds in Preston & Taylor Counties, West Virginia. The purpose of this letter is to approve the Left Fork of Little Sandy Creek and Maple Run variance pursuant to CWA §303(c) and the implementing regulation at 40 CFR §131.

West Virginia adopted the variance based on human-caused conditions which prevent the full attainment of the designated use and cannot be immediately remedied, or would cause more environmental damage to correct than leave in place (see 40 CFR 131.10(g)(3)). The regulation identifies: the discharges that will be addressed by the variance; the geographic area to which this variance will apply; interim instream criteria that will be in place during the term of the variance; a requirement for re-evaluation during each triennial review throughout the variance period; and an expiration date (i.e., July 1, 2025), absent any action by the WVDEP Secretary to review the variance. The variance applies to Maple Run and the Left Fork of Sandy Creek, and provides for interim criteria for iron, pH, and dissolved aluminum. All other applicable criteria continue to apply.

Along with the submittal of the variance, West Virginia provided information supporting the variance as well as information on restoration measures to be implemented throughout the watershed. West Virginia subsequently revised this supplemental information to provide more details about the implementation of the variance and submitted this information to the EPA on July 19, 2017.

The WVDEP, Division of Land Restoration's Office of Special Reclamation (OSR) looked at several options to determine the best approach for addressing the impaired conditions in the Left Fork of Little Sandy Creek and Maple Run. There are three bond forfeiture sites managed by OSR that are subject to this variance. An active treatment site has been constructed at one site, and three other active treatment sites are proposed but have yet to be constructed. OSR determined that due to the abandoned mine drainage in the watershed, these active treatment sites alone will not improve water quality to the point where designated uses are being achieved. WVDEP then decided that a combination of the active treatment with passive treatment (i.e., instream lime dosers), could address both abandoned mine drainage and the bond forfeiture mine discharges more effectively. EPA has determined that the variance can result in optimal water quality improvement given the constraints. When fully implemented, the combination of active and passive treatment restoration measures implemented during the term of the variance are expected to restore 9.2 miles of Little Sandy and 5 miles of Sandy Creek.

EPA has also determined that the variance term is warranted to allow for all restoration measures to be fully implemented and fully effective, including the construction and optimization of the active treatment sites and placement and optimization of both instream lime dosers. Due to the long-term, multifaceted acid mine drainage problem in the watershed, it is difficult to determine precisely how long it will take the water quality, and subsequently aquatic life, to be restored. The supplemental information includes plans for monitoring and assessment throughout the variance term. Based on that information, the variance will be re-evaluated during each triennial review throughout the variance term, and the WVDEP Secretary can remove or modify the variance should they find it is no longer needed or no longer effective. Any future new or revised variances would need to be submitted to EPA for review and approval in accordance with CWA Section 303(c).

Section 7(a) of the Endangered Species Act (ESA) states that each Federal agency shall ensure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. EPA has determined that West Virginia's adoption of this variance will have no effect on any ESA-listed species or criterial habitat as there are no listed threatened or endangered aquatic species in the Left Fork Little Sandy Creek or Maple Run watersheds.

If you have any questions regarding this action, please do not hesitate to contact me or have your staff contact Denise Hakowski, at 215-814-5726.

Sincerely,

Catharine McManus, Acting Director
Water Protection Division

cc: Laura Cooper (WVDEP)
John E. Schmidt (USFWS)

Attachment 7

U.S. Senator Capito Letter

United States Senate

COMMITTEE ON ENVIRONMENT AND PUBLIC WORKS
WASHINGTON, DC 20510–6175

November 9, 2023

The Honorable Michael S. Regan
Administrator
US Environmental Protection Agency
1200 Pennsylvania Avenue, NW
Washington, DC 20004

Dear Administrator Regan:

I am reaching out to request your support for an innovative environmental partnership aimed at safeguarding the hundreds of Appalachian watersheds damaged by the ongoing effects of pre-law acid mine drainage (AMD). The traditional regulatory approach only addresses discharges from mines that were permitted after 1977 while in most watersheds, the bulk – often more than 90 percent of the AMD pollution load – comes from pre-1977, abandoned mine discharges. Specifically, we urge the US Environmental Protection Agency (Agency or EPA) to consider a strategy that addresses all sources of AMD in an impaired watershed ("Watershed Strategy") not only the post-1977 law AMD sources ("point source strategy"). The latter focus has been practiced for decades at significant cost to taxpayers with little or no stream recovery. This appears inconsistent with the primary objective of the Federal Water Pollution Control Act: "*to restore and maintain the chemical, physical and biological integrity of the Nation's waters*."[1]

The Muddy Creek Restoration Project demonstrated the Watershed Strategy at full scale over a period of five years. Muddy Creek previously contributed 50 percent of the AMD load to the Cheat River in Northern West Virginia. The Cheat River and Cheat Lake are now a major whitewater and fishery resource. The Muddy Creek Watershed Project restored 19 miles of these tributaries of the Cheat Watershed, which were dead under the previous point source strategy. Equally important, the costs of building and maintaining the Watershed Strategy have proven less than the previous point source strategy.

The environmental benefits of the Watershed Strategy could not have been demonstrated without the leadership of the EPA and its innovative permitting strategy to approve a water quality variance in 2017. The project had already made substantial progress in its earliest stages.[2] However, the EPA's recent changes in the variance requirements have raised concerns among

[1] 33 U.S.C. 1251(a) (emphasis added).
[2] Letter from EPA Region III to West Virginia Department of Environmental Protection (June 15, 2017), https://dep.wv.gov/WWE/Programs/wqs/Documents/EPA%20Documents/EPA%20approval%20Muddy(Martin)Creek%20062117.pdf

the stakeholders involved and the resulting uncertainty may provide an insurmountable obstacle to allowing the application of the Watershed Strategy to other Appalachian streams.

The Agency needs to issue guidance that would facilitate the application of this successful Watershed Strategy to other impaired watersheds in the historic mining districts of the Appalachians.

For decades, the Lower Muddy Creek watershed had been impacted by AMD from orphaned closed mines predating the creation of the EPA and the Office of Surface Mining, Reclamation, and Enforcement, as well as relevant environmental statutes. Past and present AMD pollution impairs not only Muddy Creek but the entire Cheat River, of which the Creek is a tributary.

In 2011 a coalition of the West Virginia Department of Environmental Protection (WVDEP), the West Virginia Office of Special Reclamation (OSR), the environmental nongovernmental organization the Friends of the Cheat, Southwestern Energy, and West Virginia University Water Research Institute formed to pursue innovative solutions to ensure the long-term health of the Muddy Creek Watershed and the well-being of the Lower Cheat River.

Initially, the WVDEP installed many individual point source AMD treatment units on Bond Forfeiture sites. Unfortunately, this proved expensive and did not result in any stream recovery because it failed to address the fact that over 95 percent of the AMD load reporting to the Cheat River was from pre-1977 law, abandoned coal mines. The project sponsors determined that the best way to treat the pollution problem was to look at the entire watershed holistically rather than treat individual, regulated, pollution sources. Thus, US EPA Region III worked with the WVDEP to develop a first-of-its-kind permit in West Virginia to improve water quality, regardless of its origin, to the extent needed to meet the stream's designated uses.

At the outset, West Virginia was apprehensive about the project's potential cost and time requirements. This concern stemmed from the need to secure and maintain multiple NPDES permits at Bond Forfeiture sites, which posed a seemingly insurmountable obstacle for the critical conservation work undertaken by the Muddy Creek Restoration Project. Project sponsors recognized that if the Watershed Strategy performed as expected, maintaining the multiple point source infrastructure would double the operating cost without any additional benefit to the stream. This obstacle not only impeded the coalition's efforts to restore the integrity of Muddy Creek and its surrounding ecosystem but also hindered their ability to protect and improve water quality for communities in the area.

Fortunately, the EPA issued a variance in 2017, removing the need for a multitude of NPDES permits that would have added an extra layer of administrative complexity and potential obstacles for the project's conservation goals.

The Muddy Creek Restoration Project has been instrumental in revitalizing West Virginia's water resources and mitigating the adverse effects of legacy pollution. Through a comprehensive approach that involved active community engagement and innovative conservation strategies, the project has significantly improved the water quality in Muddy Creek and the receiving Cheat River and Cheat Lake: 19.2 miles in total.

I am grateful for the support the EPA extended to our state in 2017 by granting a variance that allowed the State to bypass an arduous process to secure multiple NPDES permits. The Agency's decision facilitated the swift implementation of the project and enabled the coalition to direct resources more effectively toward the restoration efforts.

The results speak for themselves, per an EPA press release from September 2021:

> "Before treatment, in 2015, results from an electroshock fish survey near the mouth of Muddy Creek showed no fish. In 2019, after treatment had begun, a survey detected 143 fish of nine different species. Median pH values increased from 4.3 to 7.3 following treatment. Since June 2018, Muddy Creek has been net alkaline. Median aluminum and iron concentrations decreased from 10 and 9 milligrams per liter (mg/L), respectively, to 1 mg/L. The median discharge of acidity into the Cheat River decreased from 11,800 pounds per day (lbs/day) to -1,100 lbs/day calcium carbonate equivalent. Sensitive game fish species, notably walleye, have been caught in the Cheat River closer to the mouth of Muddy Creek. Whitewater boaters downstream from Muddy Creek perceive the improvement as a decrease in turbidity. FOC continues to monitor Muddy Creek through regular water quality and benthic macroinvertebrate sampling, focused on assessing and quantifying watershed improvements from AMD treatment projects in the Muddy Creek watershed."[3]

Despite the success of this project, there is still much work to be done. However, the EPA's recent changes in the variance requirements could re-impose the requirement for individual National Pollutant Discharge Elimination System permits and therefore stall the progress made to date—jeopardizing the efforts of numerous individuals and organizations involved in this critical restoration work and leaving the Cheat and other watersheds impaired.

Therefore, I am urging the EPA to act swiftly to provide a roadmap to the project sponsors on how to acquire another variance from the Agency. Immediate action is necessary so that the State of West Virginia can access Infrastructure Investment and Jobs Act funding to continue this vital project. This roadmap would serve as a guide for West Virginia in navigating the complex process of obtaining the necessary regulatory approvals to continue the Muddy Creek Restoration project. The State of West Virginia and its partners understand the importance of this work in addressing AMD pollution and preserving the Cheat River watershed. With the assistance of the EPA, my constituents hope to address AMD and restore miles of streams.

I am confident that with your support, this project can serve as a model of sustainability and environmental stewardship, setting a precedent for similar initiatives across the country. Your prompt attention to this matter is greatly appreciated, and I am eager to discuss this issue further with you at your earliest convenience.

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[3] Office of Water, U.S. Environmental Protection Agency, *Nonpoint Source Success Story by EPA*, https://www.epa.gov/system/files/documents/2021-09/wv_cheatr_muddycr_1870_508.pdf (last visited November 7, 2023).

Should you or your staff require any additional information or support from my office to facilitate this process, please do not hesitate to reach out to Joe Brown on my staff at 202-224-6176 or Joe_Brown@epw.senate.gov. Thank you for your attention to this matter, and I look forward to your prompt and positive consideration of our request.

Sincerely,

Shelley Moore Capito
Ranking Member
Environment and Public Works Committee

Attachment 8

EPA Administrator Ortiz Letter

REGION 3 ADMINISTRATOR
PHILADELPHIA, PA 19103

December 20, 2023

The Honorable Shelley Moore Capito
United States Senate
Washington, D.C. 20510

Dear Senator Capito:

Thank you for your November 9, 2023, letter to U.S. Environmental Protection Agency (EPA) Administrator Michael S. Regan regarding ongoing efforts by the West Virginia Department of Environmental Protection (WVDEP) and a diverse group of stakeholders to restore West Virginia watersheds impacted by acid mine drainage (AMD). As outlined in your letter, WVDEP and its partners are implementing an innovative restoration strategy within the Muddy Creek watershed where AMD discharges are treated by in-stream dosing or diverted to a centralized water treatment system designed to reduce pollutant concentrations to levels that attain West Virginia water quality standards (WQS). This watershed-scale treatment strategy employs a holistic approach to water quality restoration by accounting for both point sources as well as non-point sources of AMD pollution.

EPA agrees that this watershed-scale approach has achieved excellent results in the Muddy Creek watershed. As noted in your letter, water quality in nearly 20 stream miles has been significantly improved; a remarkable achievement given these same waters previously ranked among the most degraded in the state. With the centralized treatment system and the instream treatment now fully operational, concentrations of iron, aluminum and pH levels in some point source discharges that previously exceeded applicable water quality criteria by two or three on orders of magnitude now routinely attain WQS. Though still impaired, these waters are witnessing biologic uplift and the return of aquatic species for the first time in generations. Additionally, the treatment system installed in the Muddy Creek watershed also has the ability to extract critical rare earth metals which can be recycled into a wide array of important commercial and industrial supply chains which, in return can provide a source of revenue to help offset treatment costs.

EPA is pleased to have worked closely with WVDEP to develop and approve WQS variances and a National Pollutant Discharge Elimination System permit to facilitate the watershed-scale treatment approach that has been implemented in Muddy Creek. These types of regulatory tools, which can facilitate compliance with the Clean Water Act requirements, will play a critical role in the application of innovative watershed-scale treatment within other watersheds across the state. In your letter, you express concern that the 2015 revisions to EPA's WQS regulation, which added explicit WQS variance requirements, may hinder broader application of these watershed-scale approaches beyond Muddy Creek. The Part 131 regulation, as revised in 2015, outlines a comprehensive regulatory structure for

WQS variances to provide regulatory certainty and accountability that variances are appropriately used to make progress toward attaining designated uses.

EPA does not view the new WQS variance provisions in 40 CFR Part 131 to be an obstacle to further progress in watershed-scale AMD treatment. The Agency wholeheartedly supports the innovation and collaboration that has enabled efforts to restore the Muddy Creek watershed to succeed. Further, we are fully committed to working with WVDEP on the development of WQS variances and/or other regulatory tools in other locations in the state, where appropriate and beneficial to facilitate WV's progress in addressing AMD impacts to its waters.

In October, EPA staff traveled to West Virginia for a tour of the Muddy Creek watershed and discussed options for applying a similar restoration approach to other AMD-impacted watersheds. Coordination meetings between EPA and WVDEP technical staff have also been scheduled and will be held at recurring intervals to ensure forward momentum.

Again, thank you for your letter. If you have further questions, please contact me or your staff may contact Catherine A. Libertz, Director, Water Division, at 215-814-2737.

Sincerely,

Adam Ortiz
Regional Administrator