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

Decision Rationale
Total Maximum Daily Loads
Cooks Run Watershed
For Acid Mine Drainage Affected Segments

/S/
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Date: 4/9/03

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I. Introduction

The Clean Water Act (CWA) requires a Total Maximum Daily Load (TMDL) be developed for those waterbodies identified as impaired by the state where technology-based and other controls will not provide for attainment of water quality standards. A TMDL is a determination of the amount of a pollutant from point, nonpoint, and natural background sources, including a margin of safety, that may be discharged to a water quality-limited waterbody without violating water quality standards.

The Pennsylvania Department of the Environmental Protection (PADEP), Bureau of Watershed Conservation, submitted the *Cooks Run Watershed TMDL*, dated March 1, 2003 (TMDL Report), to EPA for final Agency review on March 14, 2003. This report included Total Maximum Daily Loads (TMDLs) for three metals (aluminum, iron, and manganese) and pH, and addresses four segments on Pennsylvania's 1996 Section 303(d) list of impaired waters, including Cooks Run, Rock Run, Camp Run, and Crowley Hollow.

EPA's rationale is based on the TMDL Report and information contained in the attachments to the report. Our review determined that the TMDL meets the following eight regulatory requirements pursuant to 40 CFR Part 130.

1. The TMDLs are designed to implement the applicable water quality standards.

2. The TMDLs include a total allowable load as well as individual wasteload allocations (WLAs) and load allocations (LAs).

3. The TMDLs consider the impacts of background pollutant contributions.

4. The TMDLs consider critical environmental conditions.

5. The TMDLs consider seasonal environmental variations.

6. The TMDLs include a margin of safety (MOS).

7. There is reasonable assurance that the proposed TMDLs can be met.

8. The TMDLs have been subject to public participation.

II. Summary

Table 1 presents the 1996, 1998, proposed 2000, and proposed 2002 Section 303(d) listing information for the four water quality limited segments. It is important to note that although Table 1 includes five 1996 segments, only four count towards the TMDL milestone commitments under the requirements of the 1997 TMDL lawsuit settlement agreement. Cooks Run (Basin) is comprised of Cooks Run and its tributaries.

Table 1. 303(d) Sub-List

State Water Plan (SWP) Subbasin: 09-B Cooks Run Basin								
Year	***Miles***	***Segment ID***	***DEP Stream Code***	***Stream Name***	***Designated Use***	***Data Source***	***Source***	***EPA 305(b) Cause Code***
1996	3.3	Not placed on GIS	23988	Cooks Run	HQ-CWF CWF	305(b) Report	RE	Metals
1998	3.3	Not placed on GIS	23988	Cooks Run	HQ-CWF CWF	305(b) Report	AMD	Metals
2000	3.35	960601-1035-TAS	23988	Cooks Run	HQ-CWF CWF	Unassessed Waters Project	AMD	Metals, pH, siltation
2002	No additional assessment				HQ-CWF CWF	Unassessed Waters Project	AMD	Metals, pH, siltation
1996	6.8	Not placed on GIS	23988	Cooks Run (Basin)	EV/HQ-CWF CWF	305(b) Report	RE	Metals
1998	6.8	Not placed on GIS	23988	Cooks Run (Basin)	EV/HQ-CWF CWF	305(b) Report	AMD	Metals
1996	1.2	Not placed on GIS	23994	Rock Run	CWF	305(b) Report	RE	Metals
1998	1.2	Not placed on GIS	23994	Rock Run	CWF	305(b) Report	AMD	Metals
2000	1.82	990601-1320-TAS	23994	Rock Run	CWF	Unassessed Waters Project	AMD	Metals, pH
2002	No additional assessment				CWF	Unassessed Waters Project	AMD	Metals, pH
1996	2.0	Not placed on GIS	23992	Camp Run	CWF	305(b) Report	RE	Metals
1998	2.0	Not placed on GIS	23992	Camp Run	CWF	305(b) Report	AMD	Metals

State Water Plan (SWP) Subbasin: 09-B Cooks Run Basin								
Year	***Miles***	***Segment ID***	***DEP Stream Code***	***Stream Name***	***Designated Use***	***Data Source***	***Source***	***EPA 305(b) Cause Code***
2000	3.85	990601-1240-TAS	23992	Camp Run	CWF	Unassessed Waters Project	AMD	Metals, pH
2002	No additional assessment				CWF	Unassessed Waters Project	AMD	Metals, pH
1996	3.1	Not placed on GIS	23989	Crowley Hollow	CWF	305(b)	RE	Metals
1998	3.14	7136	23989	Crowley Hollow	CWF	Unassessed Waters Project	AMD	Metals
2000	3.14	990601-1140-TAS	23989	Crowley Hollow	CWF	Unassessed Waters Project	AMD	Metals, pH, siltation
2002	No additional assessment				CWF	Unassessed Waters Project	AMD	Metals, pH, siltation
2000	**0.79**	**990601-1240-TAS**	**23993**	**Cow Hole**	**CWF**	**Unassessed Waters Project**	**AMD**	**Metals, pH**
2002	**No additional assessment; combined listing with Camp Run**				**CWF**	**Unassessed Waters Project**	**AMD**	**Metals, pH**

CWF = Cold Water Fishes
RE = Resource Extraction
AMD = Acid Mine Drainage
See Attachment E, *Excerpts Justifying Changes Between the 1996, 1998, and Draft 2000 Section 303(d) Lists*
The use designation for the stream segments in this TMDL can be found at PA Title 25 Chapter 93

As shown in the above table, siltation was added as a cause of impairment during a 1999 survey on Cooks Run and Crowley Hollow. It was assumed that coal fines washed into the creek and were deposited on the streambed, therefore hindering aquatic life. However, further field investigations conducted in November 2001 revealed that siltation due to coal fines was not the cause of impairment, and that there was no basis for the siltation listing on the 303(d) list. As such, TMDLs are not necessary for siltation in the Cooks Run Watershed.

The TMDLs were developed using a statistical procedure to ensure that water quality standards are met 99 percent of the time, as required by Pennsylvania's water quality standards at Pennsylvania Title 25, Chapter 93.5(b). Table 2 summarizes the TMDLs for Cooks Run as determined by PADEP.

Table 2. TMDL Summary

Segment	*Parameter*	*TMDL (lbs/day)*	*WLA[1] (lbs/day)*	*LA[2] (lbs/day)*	*MOS[3] (lbs/day)*
CR04 Cooks Run	Al	0.7	0	0.7	implicit
	Fe	12.1	0	12.1	implicit
	Mn	11.4	0	11.4	implicit
	Acidity	119.1	0	119.1	implicit
RR Rock Run	Al	4.5	0	4.5	implicit
	Fe	4.5	0	4.5	implicit
	Mn	7.0	0	7.0	implicit
	Acidity	0.0	0	0.0	implicit
CR03 Cooks Run	Al	13.0	0	13.0	implicit
	Fe	15.7	0	15.7	implicit
	Mn	25.9	0	25.9	implicit
	Acidity	360.7	0	360.7	implicit
FRAN Fran Contracting Discharge	Al	0.1	0	0.1	implicit
	Fe	0.1	0	0.1	implicit
	Mn	0.1	0	0.1	implicit
	Acidity	0.0	0	0.0	implicit
CAR Camp Run	Al	1.9	0	1.9	implicit
	Fe	2.8	0	2.8	implicit
	Mn	2.2	0	2.2	implicit
	Acidity	0	0	0	implicit
CR02 Cooks Run	Al	5.9	0	5.9	implicit
	Fe	15.4	0	15.4	implicit
	Mn	20.1	0	20.1	implicit
	Acidity	302.7	0	302.7	implicit
CWR Crowley Hollow Run	Al	2.9	0	2.9	implicit
	Fe	6.2	0	6.2	implicit
	Mn	5.6	0	5.6	implicit
	Acidity	0.0	0	0.0	implicit
CR01 Cooks Run	Al	22.1	0	22.1	implicit
	Fe	22.1	0	22.1	implicit
	Mn	34.5	0	34.5	implicit
	Acidity	1966.9	0	1966.9	implicit

[1] WLA = Waste Load Allocation
[2] LA = Load Allocation
[3] MOS = Margin of Safety

The TMDL is a written plan and analysis established to ensure that a waterbody will attain and maintain water quality standards. The TMDL is a scientifically-based strategy which considers current and foreseeable conditions, the best available data, and accounts for uncertainty with the inclusion of a MOS value. Conditions, available data, and the understanding of the natural processes can change more than anticipated by the MOS. The option is always available to refine the TMDL for resubmittal to EPA for approval. PADEP's Unassessed Waters Protocol, PADEP's method of conducting biological assessments of Pennsylvania's waters, was developed in 1996 and implementation began in 1997. PADEP's goal is a statewide assessment of surface waters in Pennsylvania. After completion of the initial assessments, the long-range goal is to reassess all waters on a five-year cycle. Therefore, while the TMDL should not be modified at the expense of achieving water quality standards expeditiously, the TMDL may be modified when warranted by additional data or other information.

III. Background

The Cooks Run Watershed is located in northwestern Clinton County and eastern Cameron County, about 10 miles west of Renovo, Pennsylvania. Cooks Run flows 11.6 miles south/southeast from its headwaters near Jericho in Grove Township, Cameron County, to its confluence with the West Branch Susquehanna River. The 26 square mile watershed is relatively uninhabited as approximately 91 percent of the watershed lies within the Sproul State Forest. Forested land makes up about 95.7 percent of the watershed, and disturbed land (abandoned coal mines, quarries, etc.) make up four percent.

The Cooks Run Watershed lies within the Mountainous High Plateau and Pittsburgh Low Plateau Sections of the Appalachian Plateau Province. There is a vertical drop in the watershed of 1520 feet from its headwaters to its mouth. Interbedded sedimentary rock and sandstone (77 percent and 23 percent, respectively) make up the watershed, and the predominant soil association in the watershed is the Hazelton-Dekalb-Buchanan series, which accounts for 86 percent of the soil coverage. This soil association is characterized by highly permeable, well-drained soils derived from the weathering of sandstone and shale. The Hazelton-Cookport-Ernest series makes up 14 percent of the watershed, with this association being moderately well-drained with low porosity. The average annual precipitation is 40 inches, and the climate is characterized by warm summers and long, cold winters, with frequent and sometimes rapid temperatures changes.

Coal mining and timber production were the primary landuses throughout the early half of the 20th century, and some timber production still occurs in the watershed. Although much of the logging was completed by 1914 due to a forest fire, mining continued until the 1970's. Evidence indicates that the discharges on Cooks Run at Onion Run and Bear Hollow resulted from underground mining during the early 20th century. Underground mining practices continued in the watershed until surface mining took over in the 1950s.

There have been various studies within the watershed to assess the biological community and water quality. In an aquatic investigation performed by the Pennsylvania Department of Environmental Resources (PADER), it was acknowledged that Cooks Run upstream of Rock Run had excellent stream conditions. There was a high diversity of benthic macroinvertebrates, brook and brown trout existed and, chemically, the water quality was excellent. Below this point there was severe degradation from mine drainage in Rock Run, Camp Run, and Crowley Hollow, and very few benthic macroinvertebrates and no fish were found. Historical data indicates that Rock Run, Camp Run, and Cooks Run above the mouth of Crowley Hollow were excellent quality streams until permitted mining took place. A geologic investigation of Camp, Cooks, and Rock Run areas noted that Camp Run and Rock Run are adversely being affected by acid conditions from mining. Finally, a Special Protection Evaluation Report identified portions of Rock and Camp Runs, and Cooks Run below Rock Run and Crowley Hollow Run as severely degraded by AMD from the Fran Contracting, Inc. (FRAN) mining areas.

There are no active mining operations in the Cooks Run Watershed. Avery Coal Company (Westport Tipple, Permit No. 18841601) is at the Stage II bond release status, and Fran Contracting, Inc. (Permit No. 4674SM21) is at the bond forfeiture status. For purposes of these TMDLs only, point sources are identified as permitted discharge points and nonpoint sources are identified as other discharges from abandoned mine lands which includes tunnel discharges, seeps, and surface runoff. Abandoned and reclaimed mine lands and bond forfeiture mines were treated in the allocations as nonpoint sources because there are no National Pollutant Discharge Elimination System (NPDES) permits associated with these areas. As such, the discharges associated with these landuses were assigned LAs (as opposed to WLAs). The decision to assign LAs to abandoned and reclaimed mine lands does not reflect any determination by EPA as to whether there are unpermitted point source discharges within these landuses. In addition, by approving these TMDLs with mine drainage discharges treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting requirements. Each segment on the Section 303(d) list will be addressed as a separate TMDL. The TMDLs are expressed as long-term averages. See the *Cooks Run Watershed TMDL* report, Attachment D, for TMDL calculations.

The Surface Mining Control and Reclamation Act of 1977 (SMCRA, Public Law 95-87) and its subsequent revisions were enacted to establish a nationwide program to, among other things, protect the beneficial uses of land or water resources, and public health and safety from the adverse effects of current surface coal mining operations, as well as promote the reclamation of mined areas left without adequate reclamation prior to August 3, 1977. SMCRA requires a permit for the development of new, previously mined, or abandoned sites for the purpose of surface mining. Permittees are required to post a performance bond that will be sufficient to ensure the completion of reclamation requirements by the regulatory authority in the event that the applicant forfeits. Mines that ceased operating by the effective date of SMCRA, (often called “pre-law” mines) are not subject to the requirements of SMCRA.

These TMDLs were completed by PADEP to meet the 2003 sixth year TMDL milestone commitments under the requirements of the 1997 TMDL lawsuit settlement agreement.

Sixth year milestones include the development of TMDLs for 20% of the waters listed on Pennsylvania's 1996 Section 303(d) list of waters impaired by the effects of acid mine drainage (AMD) or 40 waters since 2001, and 60% of waters listed impaired by non-AMD related impacts or 27 waters since 2001. Delisted waters may count for 20% of the requirement.

Computational Procedure

The TMDLs were developed using a statistical procedure to ensure that water quality standards are met 99 percent of the time as required by Pennsylvania's water quality standards. The Cooks Run TMDL allocates loadings to four sampling points along Cooks Run, to three tributaries, and to discharges originating from the FRAN mining areas. The TMDLs are based on data collected between April 1980 and September 2001, where between 8 to 88 data samples were obtained in the Cooks Run Watershed for each of the sampling points.

Evaluation of the Cooks Run data set at the FRAN sampling point disclosed no significant correlation between concentrations and flow. Such an analysis almost always produces little or no correlation and discloses no critical condition. Analyses of the data could not determine a critical flow. PADEP felt that the available data for other points in this watershed did not have enough paired flow/parameter data to calculate correlations.

The flow values used to calculate loading at each sampling point consisted of either actual data or extrapolations. For points CR01, CWR, CAR, RR, and FRAN, mean flow value was based on the more consistent subset of data collected at these points. Due to spotty or inconsistent data at points CR02, CR03, and CR03, these flow values were extrapolated from a linear regression equation based on flow values from CR01, CWR, CAR, RR and FRAN. ArcView v3.2 was used to delineate the watersheds and determine watershed areas upstream of each sampling point, and a flow versus area regression was computed to determine flow.

TMDLs for each parameter were determined using a Monte Carlo simulation, @RISK.[1] For each source and pollutant, it was assumed that the observed data are lognormally distributed. Each pollutant source was evaluated separately using @RISK.

The existing and allowable long-term average loads were computed using the mean concentration from @RISK multiplied by the average flow. Using the sample parameters, mean and standard deviation, based on collected data, the simulation performs 5000 iterations and predicts an existing long-term average concentration. This analysis shows whether or not the existing data is from a population where water quality standards are exceeded more than one percent of the time. A second simulation of 5000 iterations is performed to calculate the percent reduction necessary to meet the criteria 99 percent of the time. Finally, using the

[1]@RISK - Risk Analysis and Simulation Add-in for Microsoft Excel®, Palisade Corporation, Newfield, NY.

calculated percent reductions, a final simulation is run to confirm that the target value for a long-term average concentrations will result in meeting water quality criteria 99 percent of the time.

IV. Discussions of Regulatory Requirements

EPA has determined that these TMDLs are consistent with statutory and regulatory requirements and EPA policy and guidance.

1. The TMDLs are designed to implement the applicable water quality standards.

Water quality standards are state regulations that define the water quality goals of a waterbody. Standards are comprised of three components, including designated uses, criteria necessary to protect those uses, and antidegradation provisions that prevent the degradation of water quality. All of the stream segments evaluated in the Cooks Run Watershed have been designated by Pennsylvania as cold water fishes with criteria protecting the aquatic life uses. The designations for these stream segments can be found at Pennsylvania Title 25 § 93.9. To protect the designated uses, as well as the existing uses, the water quality criteria shown in Table 3 apply to all evaluated segments. The table includes the instream numeric criterion for each parameter and any associated specifications.

Table 3. Applicable Water Quality Criteria

Parameter	***Criterion Value (mg/l)***	***Duration***	***Total Recoverable/ Dissolved***
Aluminum (Al)	0.75	Maximum	Total Recoverable
Iron (Fe)	1.5 0.3	30-day Average Maximum	Total Recoverable Dissolved
Manganese (Mn)	1.0	Maximum	Total Recoverable
pH	6.0 - 9.0	Inclusive	N/A
Sulfate (SO_4)	250*	Maximum	N/A

*Applicable at potable water supply

Pennsylvania Title 25 § 96.3(c) requires that water quality criteria be achieved at least 99 percent of the time, and TMDLs expressed as long-term average concentrations are expected to meet these requirements; that is, the statistical Monte Carlo simulation used to develop TMDLs and LAs for each parameter results in a determination that any required percent pollutant reduction assures that the water quality criteria will be met instream at least

99 percent of the time. The Monte Carlo simulation used 5000 iterations where each iteration was independent of all other iterations, and the observed data were assumed to be lognormally distributed for each source and pollutant.

EPA finds that these TMDLs will attain and maintain the applicable narrative and numerical water quality standards. For iron, the TMDL endpoint was expressed as total recoverable iron because on all monitoring data it was expressed as total recoverable iron.

The pH values shown in Table 3 were used as the TMDL endpoints for these TMDLs. In the case of freestone streams with little or no buffering capacity, the allowable TMDL endpoint for pH may be the natural background water quality. These values can get as low as 5.4 (Pennsylvania Fish and Boat Commission). However, PADEP chose to set the pH standard between 6.0 to 9.0, inclusive, which is presumed to be met when the net alkalinity is maintained above zero. This presumption is based on the relationship between net alkalinity and pH, on which PADEP based its methodology to addressing pH in the watershed. See *Cooks Run Watershed TMDL* report, Attachment D. A summary of the methodology is presented as follows.

The parameter of pH, a measurement of hydrogen ion acidity presented as a negative algorithm of effective hydrogen ion concentration, is not conducive to standard statistics. Additionally, pH does not measure latent acidity that can be produced from hydrolysis of metals. For these reasons, PADEP is using the following approach to address the stream impairments noted on the Section 303(d) list due to pH.

The concentration of acidity in a stream is partially dependent upon metals. For this reason, it is extremely difficult to predict the exact pH values which would result from treatment of acid mine drainage. Therefore, net alkalinity will be used to evaluate pH in these TMDL calculations. This methodology assures that the standard for pH will be met because net alkalinity is able to measure the reduction of acidity. When acidity in a stream is neutralized or is restored to natural levels, pH will be acceptable ($\geq$6.0). Therefore, the measured instream alkalinity at the point of evaluation in the stream will serve as the goal for reducing total acidity at that point.

The methodology that is used to calculate the required alkalinity (and, therefore, pH) is the same as that used for other parameters such as iron, aluminum, and manganese that have numeric water quality criteria. EPA finds this approach to pH to be reasonable.

PADEP also has an alkalinity standard, where alkalinity (of minimum 20 mg/l calcium carbonate except were natural conditions are less) is related to but not identical to pH. Alkalinity is a measure of the buffering capacity of the water. Adequate buffering prevents large swings in pH with additions of small amounts of acid. Although many of the AMD-impacted streams are naturally low in alkalinity, available monitoring data does not always include upstream waters not impacted by AMD. In the Cooks Run TMDL, however, PADEP's pH calculations are modified to use net alkalinity, instead of total alkalinity, based on an upstream reference point

CR05. Cooks Run above point CR05 is in attainment of its designated uses, as is Cooks Run CR06, and thus both points were included as reference points for all other points downstream. PADEP used the net instream alkalinity from CR05 (13.93 mg/l) which is more protective than that of CR06 (11.0 mg/l). As PADEP does not list waters for inadequate alkalinity, TMDLs are not being developed for alkalinity but PADEP should monitor the waters for alkalinity and if, after these TMDLs are implemented, alkalinity is less than 20mg/l of natural conditions, PADEP should list the waters for alkalinity and develop TMDLs.

2. The TMDLs include a total allowable load as well as individual WLAs and LAs.

For purposes of these TMDLs only, point sources are identified as permitted discharge points and **nonpoint sources are identified as other discharges from abandoned mine lands which include tunnel discharges, seeps,** and surface runoff. Abandoned and reclaimed mine **lands and bond forfeiture mines** were treated in the allocations as nonpoint sources because there are no NPDES permits associated with these areas. As such, the discharges associated with these land uses were assigned LAs (as opposed to WLAs). The decision to assign LAs to abandoned and reclaimed mine lands does not reflect any determination by EPA as to whether there are unpermitted point source discharges within these landuses. In addition, by approving these TMDLs with mine drainage discharges treated as LAs, EPA is not determining that these discharges are exempt from NPDES permitting **requirements. There are no current mining operations in the Cooks Run Watershed, as the two permitted dischargers in the watershed are at the Stage II bond release and bond forfeiture status. As such, all allocations are to nonpoint sources only.**

The LA for each sampling point was computed using water-quality sample data collected from that point. The instream TMDLs for sampling points CR04, RR, CAR, CWR consist of LAs made to the watershed area above those points. The instream TMDLs for sampling point CR03 consists of a LA to the watershed area between sample points CR03 and CR04; point FRAN consists of a LA applied to the FRAN Discharge; point CR02 consists of a LA to the watershed area between CR02 and CR03; point CR01 consists of a LA to the watershed area between CR01 and CR02. The LA made to CAR on Camp Run also addresses Cow Hole, a tributary of Camp Run.

PADEP performed a Monte Carlo simulation **on Cooks Run** to determine the allowable load for each parameter that would meet water quality standards 99 percent of the time. Then, the allowable loads **for Cooks Run and its tributaries** were summed, and then these loads were compared to the calculated allowable loads. If a load was less than the calculated load, a reduction was identified for Cooks Run, **in addition to the reductions necessary in its tributaries.** Table 4 presents a summary of the allowable loads for the Cooks Run Watershed. **Note the reductions identified for points CR01, CR02, and CR03 along Cooks Run, and Camp Run above CAR, are the reductions necessary after upstream reductions have been made.**

Table 4. Summary Table for Cooks Run Watershed

Station	*Parameter*	*Measured Sample Data*		*Allowable*		*Reduction Identified %*
		Conc. (mg/L)	*Load (lbs/day)*	*LTA Conc. (mg/L)*	*Load (lbs/day)*	
CR04 Cooks Run	Al	0.95	67.7	0.01	0.7	90
	Fe	1.88	134.1	0.17	12.1	91
	Mn	0.20	14.3	0.16	11.4	19
	Acidity	3.97	283.1	1.67	119.1	59
	Alkalinity	12.27 (13.65)*	874.9 (973.3)*			
RR Rock Run	Al	1.92	32.0	0.27	4.5	86
	Fe	0.27	4.5	0.27	4.5	0
	Mn	0.42	7.0	0.42	7.0	0
	Acidity	22.65	377.8	0	0	100
	Alkalinity	0	0			
CR03 Cooks Run	Al	0.64	59.2	0.14	13.0	0
	Fe	1.27	117.5	0.17	15.7	0
	Mn	0.28	25.9	0.28	25.9	0
	Acidity	8.88	821.3	3.90	360.7	0
	Alkalinity	8.30 (18.56)*	767.7 (1716.6)*			
FRAN Fran Contracting Discharge	Al	200.35	33.4	0.40	0.1	99.8
	Fe	180.74	30.1	0.54	0.1	99.7
	Mn	43.48	7.3	0.43	0.1	99
	Acidity	2081.18	347.1	0	0	100
	Alkalinity	0	0			
CAR Camp Run	Al	2.49	23.7	0.20	1.9	0
	Fe	0.29	2.8	0.29	2.8	0
	Mn	0.87	8.3	0.23	2.2	0
	Acidity	28.50	271.0	0	0	0
	Alkalinity	0	0			
CR02 Cooks Run	Al	2.30	272.0	0.05	5.9	96
	Fe	3.20	378.4	0.13	15.4	93
	Mn	0.45	53.2	0.17	20.1	53
	Acidity	15.97	1889.0	2.56	302.7	70
	Alkalinity	6.94 (25.65)*	820.7 (3033.4)*			
CWR Crowley Hollow Run	Al	20.81	286.4	0.21	2.9	99
	Fe	44.63	614.2	0.45	6.2	99
	Mn	6.77	93.2	0.41	5.6	94
	Acidity	363.88	5007.4	0	0	100
	Alkalinity	0.15	2.1			
CR01 Cooks Run	Al	3.13	432.0	0.16	22.1	0
	Fe	5.14	709.5	0.16	22.1	0
	Mn	1.20	165.6	0.25	34.5	23
	Acidity	64.79	8942.8	14.25	1966.9	20
	Alkalinity	2.05 (74.47)*	283.0 (10,278.9)*			

* Alkalinity used as water quality standards, TMDL Report, Attachment D

LTA = Long-Term Average

It is important to note that PADEP calculated the TMDLs using pollutant concentrations instead of loadings and determined the long-term average concentration that could occur, and still attain and maintain water quality standards. The resultant concentration was converted to a long-term average load by multiplying by the 50th percentile flow. Assuming the sample set is lognormally distributed, the long-term average is related to the LA (or WLA) by the coefficient of variation of the sample set. EPA finds this approach reasonable.

PADEP allocated only to nonpoint sources as there are no current mining operations within the watershed. Federal regulations require that subsequent to TMDL development and approval, point sources permitted effluent limitations be water quality-based.[1] In addition, PA Title 25, Chapter 96, Section 96.4(d) requires that WLAs shall serve as the basis for determination of permit limits for point source discharges regulated under Chapter 92 (relating to NPDES permitting, monitoring and compliance). Therefore, no new mining may be permitted within the watershed without reallocation of the TMDL.

Surface water monitoring for AMD and/or mining sites typically includes sulfates. Inspection of the monitoring data included in the TMDL Report, Attachment G, discloses high sulfate concentrations. However, Sampling Point CR01 at the mouth of Crooks Run sulfate concentrations greater than 250 mg/l have not been found since December 1993. The sulfate criterion is applicable only at potable water intakes and as the criterion is met at the Crooks Run mouth, no downstream water intakes are affected by sulfates from Crooks Run.

3. The TMDLs consider the impacts of background pollutant contributions.

Cooks Run and its tributaries are located in an area that was extensively mined and logged. Mine drainage from Rock Run, Camp Run, and Crowley Hollow have resulted in severe degradation of water quality in the watershed, and geologic investigations show that these segments have been adversely affected by acid conditions from mining. Further, discharge from the FRAN mining areas has caused severe degradation of water quality at Camp Run and downstream to Cooks Run. The TMDLs were developed using instream data which account for existing background conditions.

4. The TMDLs consider critical environmental conditions

The reductions specified in this TMDL apply at all flow conditions. A critical flow condition could not be identified from the data used for this analysis. The average flow for each sampling site was used to derive loading values for the TMDL.

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[1]It should be noted that technology-based permit limits may be converted to water quality-based limits according to EPA's *Technical Support Document For Water Quality-based Toxics Control,* March 1991, recommendations.

5. The TMDLs consider seasonal environmental variations.

All sample sets included data points from various seasons, which together with the lack of correlations between flow and concentration, indicate that PADEP considered seasonal variations to the extent that data were available.

6. The TMDLs include a MOS.

The Clean Water Act and Federal regulations require TMDLs to include a MOS to take into account any lack of knowledge concerning the relationship between effluent limitations and water quality. EPA guidance suggests two approaches to satisfy the MOS requirement. First, it can be met implicitly by using conservative model assumptions to develop the allocations. Alternately, it can be met explicitly by allocating a portion of the allowable load to the MOS.

PADEP used an implicit MOS in these TMDLs by assuming the treated instream concentration variability to be the same as the untreated stream's concentration variability. This is a more conservative assumption than the general assumption that a treated discharge has less variability than an untreated discharge. By retaining variability in the treated discharge, a lower average concentration is required to meet water quality standards 99 percent of the time than if the variability of the treated discharge is reduced.

With respect to iron, PADEP identified an additional implicit MOS in the analysis and TMDL development by treating the iron water quality criterion as if the 1.50 mg/L were a maximum value instead of a thirty-day average value.

With respect to pH, State water quality standards state that if the naturally occurring pH values are outside the water quality range, the naturally occurring pH becomes the standard for the waterbody. PADEP, however, based the required net alkalinity value using the water quality standard in lieu of the background value, which also provides an implicit MOS.

7. There is reasonable assurance that the proposed TMDLs can be met.

The *Recommendations* section highlights what can be done in the watershed to eliminate and/or treat pollutant sources. PADEP's Bureau of Abandoned Mine Reclamation (BAR) is currently conducting various projects to address acid mine drainage in the Cooks Run Watershed. The objective of this work is to create a high alkaline environment that ground or surface water will come in contact with before reaching AMD. For example, a portion of Cooks Run has been diverted from contact with an AMD discharge at Bear Hollow, and high alkaline material will be added to mine subsidence areas responsible for the seep at Bear Hollow. This treatment will be replicated elsewhere if results are successful. BAR and the Allegheny Mountain Chapter of Trout Unlimited (AMCTU) are doing a pilot study to place a passive treatment system at the Fran Contracting Discharge, and this project involves using sulfate-reducing bacteria to treat AMD. According to the AMCTU, reducing sulfate has shown to be an effective way to treat AMD that contains dissolved heavy metals. A treatment system is planned

for Rock Run, which involves the excavation of an upstream pond, filling it with limestone, and then diverting Rock Run through the pond to increase alkalinity before the stream contacts AMD.

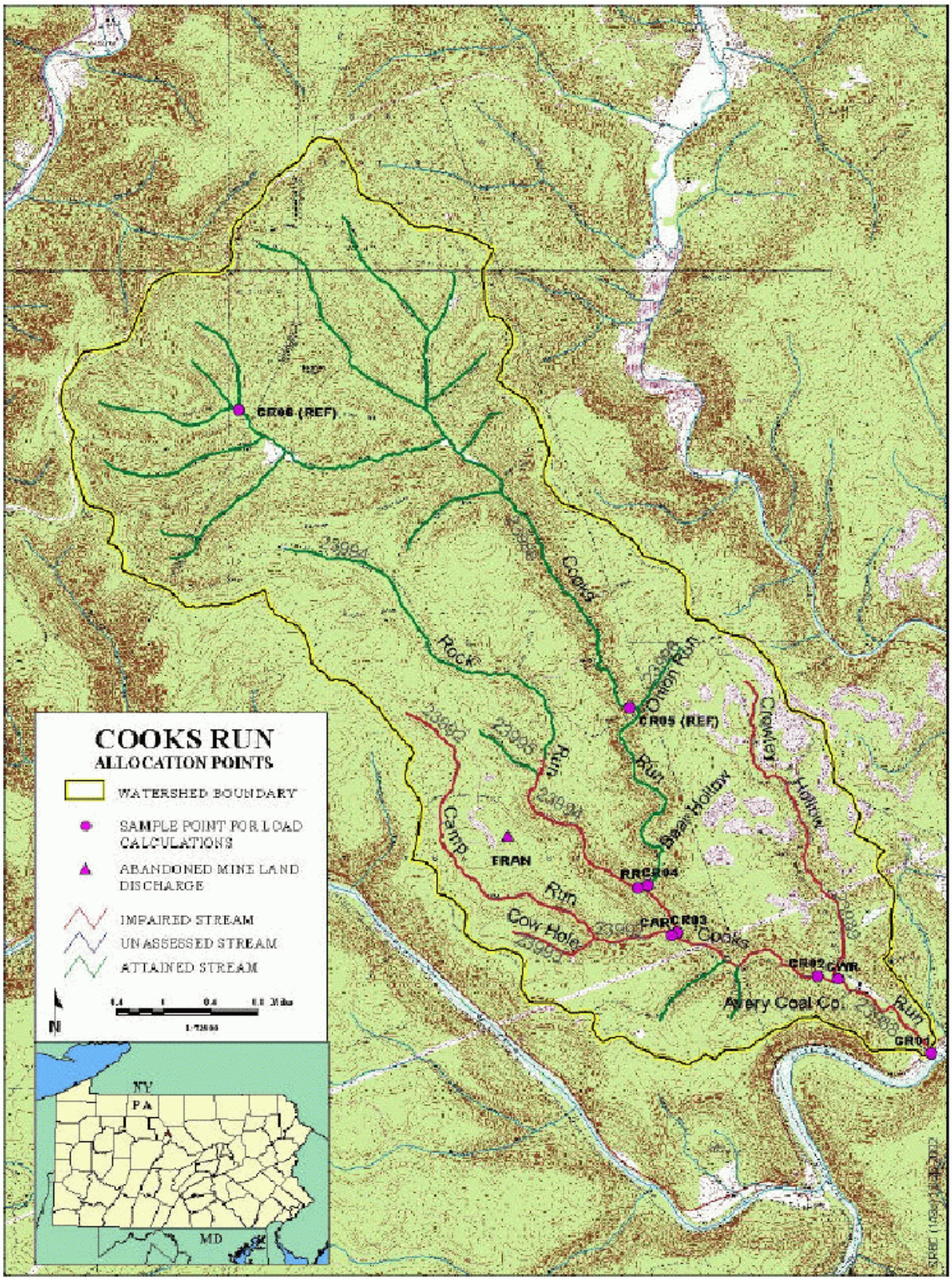
8. The TMDLs have been subject to public participation.

PADEP public noticed the draft TMDLs in the *Pennsylvania Bulletin* on December 14, 2002, and in the *Renovo Record* on December 31, 2002 and January 29, 2003. Public meetings were held on January 8, 2003 and February 10, 2003, at the First Christian Church in Big Run, PA, and at the Renovo Borough Hall in Renovo, PA to discuss the proposed TMDLs. Only EPA commented on the draft TMDL Report during the public comment period.

Although not specifically stated in the TMDL Report, PADEP routinely posts the approved TMDL report their web site: www.dep.state.pa.us/watermanagement_apps/tmdl/

Attachment A

Cooks Run Watershed Map


COOKS RUN
ALLOCATION POINTS
WATERSHED BOUNDARY
SAMPLE POINT FOR LOAD CALCULATIONS
ABANDONED MINE LAND DISCHARGE
IMPAIRED STREAM
UNASSESSED STREAM
ATTAINED STREAM
N
NY
PA
MD
CR08 (REF)
CR05 (REF)
ERAN
RRCR04
FARCR03
CR02
Avery Coal Co.
CR01
Cooks Rock Run
Camp Run
Cow Hole Run
Bear Hollow Run
Crawley Hollow Run
Green Run
Cooks Run