PENNSYLVANIA AMERICAN WATER

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December 3, 2024

VIA ELECTRONIC FILING

Rosemary Chiavetta, Secretary
Pennsylvania Public Utility Commission
Commonwealth Keystone Building
400 North Street
Harrisburg, PA 17105-3265

In re: Application of Pennsylvania-American Water Company under Section 1102(a) of the Pennsylvania Public Utility Code, 66 Pa. C.S. § 1102(a), for approval of (1) the transfer, by sale, of substantially all of the East Dunkard Water Authority's assets, properties and rights related to its water system to Pennsylvania-American Water Company, and (2) the right of Pennsylvania-American Water Company to begin to offer or furnish water service to the public in Dunkard, and portions of Monongahela, Greene, Cumberland, Perry, and Whiteley Townships, all in Greene County, Pennsylvania
Docket No. A-2024-3049759

In re: Filing by Pennsylvania-American Water Company under Section 507 of the Pennsylvania Public Utility Code, 66 Pa. C.S. § 507, of the Asset Purchase Agreement By and Among East Dunkard Water Authority, and Pennsylvania-American Water Company, as Amended – Docket No. U-2024-

Dear Secretary Chiavetta:

On behalf of Pennsylvania-American Water Company, I am filing the attached Joint Stipulation of Fact between Pennsylvania-American Water Company, East Dunkard Water Authority, the Office of Consumer Advocate and the Office of Small Business Advocate.

Should you have any questions, please feel free to contact me.

Sincerely,

Elizabeth Rose Triscari

Enclosure
cc: The Honorable Administrative Law Judge Eranda Vero *(via electronic mail)*
All Parties on the Attached Certificate of Service *(via electronic mail)*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

In re: Application of Pennsylvania-American Water Company under Section 1102(a) of the Pennsylvania Public Utility Code, 66 Pa. C.S. § 1102(a), for approval of (1) the transfer, by sale, of substantially all of the East Dunkard Water Authority's assets, properties and rights related to its water system to Pennsylvania-American Water Company, and (2) the right of Pennsylvania-American Water Company to begin to offer or furnish water service to the public in Dunkard, and portions of Monongahela, Greene, Cumberland, Perry, and Whiteley Townships, all in Greene County, Pennsylvania.	:	Docket No. A-2024-3049759
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CERTIFICATE OF SERVICE

I hereby certify that I am this day serving the above-referenced Joint Stipulation of Facts upon the persons and in the manner indicated below, which service satisfies the requirements of 52 Pa. Code §1.54 (relating to service by a party).

Service in the manner listed below addressed as follows on December 3, 2024

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Attorney for *Pennsylvania-American Water Company*

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Administrative Law Judge
Eranda Vero

In re: Application of Pennsylvania-American Water Company under Section 1102(a) of the Pennsylvania Public Utility Code, 66 Pa. C.S. § 1102(a), for approval of (1) the transfer, by sale, of substantially all of the East Dunkard Water Authority's assets, properties and rights related to its water system to Pennsylvania-American Water Company, and (2) the right of Pennsylvania- American Water Company to begin to offer or furnish water service to the public in Dunkard, and portions of Monongahela, Greene, Cumberland, Perry, and Whiteley Townships, all in Greene County, Pennsylvania.	:	Docket No. A-2024-3049759
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JOINT STIPULATION OF FACTS

Pennsylvania-American Water Company ("PAWC" or the "Company"), the East Dunkard Water Authority ("EDWA"), the Office of Consumer Advocate ("OCA"), and the Office of Small Business Advocate ("OSBA") (singularly, a "Stipulating Party" and collectively, the "Stipulating

Parties"), file this Joint Stipulation of Facts ("Stipulation") in the above-captioned proceedings.[1] In support of the Stipulation, the Stipulating Parties represent as follows:

I. PROCEDURAL HISTORY

1. On October 30, 2023, PAWC and the Pennsylvania Department of Environmental Protection ("DEP" or the "Department") filed a Joint Application at Docket No. P-2023-3043950 ("PUC Receivership Proceeding"), requesting an *Ex Parte* Emergency Order in Regard to Receivership of EDWA.

2. On October 30, 2023, Chairman Stephen M. DeFrank issued an *Ex Parte* Emergency Order authorizing PAWC to serve as Receiver for EDWA. This Order was ratified by the Pennsylvania Public Utility Commission ("Commission") in a Ratification Order entered on November 20, 2023.

3. In addition, PAWC was appointed as Receiver of EDWA by the Commonwealth Court of Pennsylvania ("Commonwealth Court") by Order dated February 8, 2024, at Docket Nos. 557 M.D. 2022 and 490 N.D. 2023 (consolidated) ("Commonwealth Court Receivership Proceeding").

4. On April 8, 2024, PAWC filed a 60-day Initial Status Report at Docket No. P-2023-3043950, followed by quarterly status reports on July 5, 2024 and October 2, 2024. These status reports were also filed concurrently with the Commonwealth Court and DEP.

5. On June 21, 2024, PAWC filed the instant application requesting, *inter alia*, Commission approval of its acquisition of substantially all the assets, properties and rights of EDWA owned and used in connection with its water system ("System") and the right to offer,

[1] This Stipulation is being filed contemporaneously with a Joint Petition for Unanimous Settlement of All Issues ("Settlement") in this matter.

render, furnish and supply water service in the areas served by EDWA, including Dunkard Township and portions of Cumberland, Greene, Monongahela, Perry and Whitely Townships, all in Greene County, Pennsylvania. PAWC filed an amended application on July 2, 2024. The application, as amended, is referred to herein as the "Application."

6. On June 28, 2024, Rebecca Lyttle, Esq., entered her Notice of Appearance on behalf of the OSBA. On July 10, 2024, attorney Lyttle filed a Protest and Notice of Intervention on behalf of the OSBA. On July 15, 2024, attorney Lyttle filed an Amended Protest.

7. Notice of the Application was published in the Pennsylvania Bulletin on July 6, 2024. 54 *Pa.B.* 3862.

8. On July 22, 2024, PAWC filed a System Evaluation and Improvements Plan at Docket No. P-2023-3043950. This plan was also filed with the Commonwealth Court and DEP. This plan identified short-term improvements to be initiated and/or completed during the term of PAWC's Receivership and long-term improvements to be initiated after closing on the acquisition.

9. Also on July 22, 2024, the OCA filed its Notice of Intervention. The OCA is represented in this matter by Melanie J. El Atieh, Esq. and Christine Maloni Hoover, Esq.

10. On July 23, 2024, the Commission issued an Initial Telephonic Prehearing Conference Notice notifying the parties that a Call-in Telephonic Prehearing Conference was scheduled for August 6, 2024. Administrative Law Judge Eranda Vero (the "ALJ") issued a Prehearing Conference Order on that same date.

11. Also on July 23, 2024, PAWC filed proof that notice of the Application had been published as required by a Secretarial Letter dated June 22, 2024.

12. PAWC, the OCA and the OSBA filed Prehearing Memoranda.

13. The Prehearing Conference was held as scheduled on August 6, 2024. No litigation schedule was established at that time. Instead, the parties were granted a 30-day period in which to pursue informal discovery and settlement negotiations. The parties committed to providing a status report within 30 days.

14. The parties provided a status report on September 6, 2024. The parties reported that they were actively involved in negotiations and did not find it necessary to establish a litigation schedule. They requested an additional 30 days to conduct discovery and negotiations and committed to providing another status report within 30 days. The ALJ granted this request by e-mail of September 9, 2024, which was memorialized in the ALJ's Prehearing Order issued on September 19, 2024. The Prehearing Order directed the parties to submit a status report to the ALJ every 30 days beginning October 7, 2024, until they are ready to propose a litigation schedule or reach a resolution of the issues raised in the Application.

15. On October 7, 2024, the parties attempted to e-mail a status report to the ALJ, advising her that the parties had reached an agreement in principle in this matter. Upon realizing that technical issues had prevented that email from being delivered, a subsequent email was successfully delivered to the ALJ on October 10, 2024 advising the same.

16. On December 3, 2024, EDWA filed a Petition to Intervene, which is unopposed.

II. JOINT STIPULATION

17. Considering that the Stipulating Parties have reached a Settlement prior to the introduction of any testimony in this matter, and in view of the need for substantial evidence supporting the decision of the ALJ and the Commission, the Stipulating Parties hereby jointly stipulate to the veracity of the facts set forth in **Appendix A**.

18. The Stipulating Parties waive cross-examination of witnesses.

19. This Stipulation is presented by the Stipulating Parties in conjunction with the Settlement, which is intended to settle all issues in the above-captioned proceedings. If the Commission rejects or otherwise modifies the Settlement, the Stipulating Parties reserve their respective procedural rights to submit testimony and exhibits and cross-examine witnesses at on-the-record evidentiary hearings.

20. This Stipulation is being presented in conjunction with the Settlement only to resolve issues in the above-captioned proceedings. Regardless of whether this Stipulation is approved, no adverse inference shall be drawn, nor shall prejudice result to any stipulating Party in this or any future proceeding as a consequence of this Stipulation, or any of its terms or conditions.

21. Attached hereto as **Appendix B** is a proposed "Order Granting Joint Stipulation of Facts" for consideration by the Honorable Administrative Law Judge Eranda Vero.

III. CONCLUSION AND REQUEST FOR RELIEF

WHEREFORE, the Stipulating Parties, by their respective counsel, respectfully request that the Honorable Administrative Law Judge Eranda Vero approve this Joint Stipulation of Facts.

[Signatures appear on next page.]

Respectfully submitted,

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On behalf of the East Dunkard Water Authority

APPENDIX A

JOINT STIPULATION OF FACT

JOINT STIPULATION OF FACTS

Parties

1. Pennsylvania-American Water Company ("PAWC") is a subsidiary of American Water Works Company, Inc. ("American Water"). It is the largest regulated public utility corporation duly organized and existing under the laws of the Commonwealth of Pennsylvania, engaged in the business of collecting, treating, storing, supplying, distributing, and selling water to the public, and collecting, treating, transporting and disposing of wastewater for the public.

2. East Dunkard Water Authority ("EDWA") is a municipal authority established on December 6, 2010 under the laws of the Commonwealth of Pennsylvania.

3. PAWC is currently the Receiver of EDWA, as authorized by the Pennsylvania Public Utility Commission ("Commission") by Order dated November 1, 2023 following a Joint Application by PAWC and the Pennsylvania Department of Environmental Protection ("DEP" or the "Department") at Docket No. P-2023-3043950 ("PUC Receivership Proceeding"), and upon having been named Receiver by the Commonwealth Court of Pennsylvania ("Commonwealth Court") by Order dated February 8, 2024, Docket Nos. 557 MD 2022 and 490 ND 2023 (consolidated) ("Commonwealth Court Receivership Proceeding").

4. The Office of Consumer Advocate (the "OCA") is a Commonwealth agency created by Act 161 of 1976 to represent the interests of consumers before the Commission. 71 P.S. § 309-2.

5. The Office of Small Business Advocate (the "OSBA") is a Commonwealth agency created by Act 181 of 1988 to represent the interests of small businesses before the Commission. 73 P.S. § 399.41.

The EDWA Water System

6. As of June 2024, EDWA furnished water service to approximately 1,492 residential customers, 79 commercial customers and 92 public fire hydrants. A map of its service territory was included in Amended Appendix R of the Application.

7. In 2020, DEP received multiple complaints of poor water quality from customers of EDWA. In October 2020, DEP put EDWA under a Corrective Action Plan ("CAP") to identify and resolve the issues causing the water quality complaints. **Exhibit 1**.

8. On April 5, 2024, PAWC (as the receiver for East Dunkard) submitted Standard Operating Procedures ("SOPs") to DEP, with a request to utilize the SOPs in lieu of the 2020 CAP. DEP subsequently terminated the 2020 CAP and directed EDWA to implement the SOPs. **Exhibit 2**.

9. In 2021, the Commission's Bureau of Investigation and Enforcement ("I&E") commenced an investigation of, and filed a Complaint against, EDWA. I&E alleged, *inter alia*, that EDWA was in violation of 66 Pa. C.S. § 1501. Specifically, I&E alleged that EDWA failed to provide adequate, efficient, safe and reasonable service to its customers because it had: discolored/dirty water, no pressure or low pressure, and poor facilities that leaked. On September 26, 2022, EDWA and I&E entered into a settlement agreement in which EDWA agreed to pay a civil penalty of $325,000 and was directed to improve its facilities. In its Opinion and Order, the Commission dismissed the Complaint and rejected the Settlement Agreement due to lack of jurisdiction and the case was closed.

10. The Parties incorporate by reference the records in the PUC Receivership Proceeding and the Commonwealth Court Receivership Proceeding. These Proceedings demonstrate that EDWA is a troubled system with a long history of water quality issues and environmental non-compliance.

11. DEP sent EDWA thirteen Notices of Violation between August 2021 and August 2022. **Exhibit 3**.

12. In early 2022, EDWA had to issue boil water advisories to customers on two occasions due to treatment breakdowns at the plant. After repeated failures of EDWA to correct the problems at the plant, DEP issued an Administrative Order dated August 25, 2022. This Order required EDWA to correct numerous "significant deficiencies" in EDWA's operations. **Exhibit 4**.

13. EDWA repeatedly failed to meet the compliance deadlines in the Administrative Order and several Field Orders issued by DEP. On December 15, 2022, the Commonwealth Court issued an Order requiring EDWA to take certain corrective actions outlined in the Administrative Order.

14. In late October 2023, EDWA's water treatment plant was not able to produce potable water for several days. Storage reserves in the distribution system eventually were depleted and customers were without water for multiple days. When the issue was resolved and the System restored to capacity, customers were subject to a boil water advisory for over a month.

15. PAWC assumed operations of the System as Receiver on February 9, 2024, and has been operating the System on a continuous basis ever since. PAWC has made numerous short-term improvements to the System and its operations, as outlined in its Status Reports filed at Docket No. P-2023-3043950.

The Transaction

16. On July 23, 2023, PAWC and EDWA entered into an Asset Purchase Agreement to transfer all the assets, properties and rights of EDWA's System (other than the Excluded Assets) to PAWC (the "Transaction"). That agreement was subsequently amended (as amended, the

"APA"). The July 23, 2023 agreement, the First Amendment dated November 3, 2023, the Second Amendment dated January 25, 2024, and the Third Amendment dated June 13, 2024 were attached to the Application as Amended Appendix A. The Fourth Amendment dated as of November 22, 2024 is attached as **Exhibit 5**.

17. The purchase price for the System is $5,000,000.

18. The Transaction was negotiated at arm's length; PAWC and EDWA are not affiliated with each other.

19. The depreciated original cost of the System is estimated to be approximately $6,000,000.

PAWC's Legal Fitness

20. PAWC has a good history of complying with the Code and other applicable laws, including environmental laws. There are no pending legal proceedings that would suggest that PAWC is not legally fit to provide service to customers of the System.

PAWC's Financial Fitness

21. PAWC has a long-demonstrated history of financial stability. PAWC had total assets of approximately $7.3 billion as of December 31, 2023. Application Appendix H. PAWC had net income of approximately $300 million for the 12 months ending December 31, 2023. Application Appendix J. PAWC has the financial stability and wherewithal to acquire the System and operate it in the public interest.

PAWC's Technical Fitness

22. As of May 31, 2024, PAWC furnished service to approximately 685,242 water customers and 98,033 wastewater customers in Pennsylvania. A map of PAWC's current service territory is included in Application Appendix C.

23. PAWC does not presently provide wastewater service to any of the System's water customers.

24. PAWC currently employs approximately 1,150 professionals with expertise in all areas of water and wastewater utility operations, including engineering, regulatory compliance, water and wastewater treatment plant operation and maintenance, distribution and collection system operation and maintenance, materials management, risk management, human resources, legal, accounting, and customer service. PAWC has the expertise, the record of environmental compliance, the commitment to invest in necessary capital improvements and resources, and the experienced managerial and operating personnel necessary to provide safe and reliable water service to the residents of the service area.

25. A 50-person team of American Water corporate engineers has handled a wide variety of system assessments, treatment process evaluations and design reviews for water and wastewater treatment systems in order to improve operations and prioritize capital improvements.

26. PAWC is experienced in undertaking and completing water and wastewater system acquisitions with public and private sector owners and successfully integrating those assets into its business operations. Recent examples include: Winola Water Company, Delaware Sewer Company, Clean Treatment Sewage Company, Nittany Water Company, Wildcat Park Corporation, and Sewer Authority of the City of Scranton. In all these examples, PAWC quickly

improved the reliability and safety of those systems by investing the necessary capital to move the systems toward regulatory compliance.

Impacts of the Transaction

27. EDWA's water assets will be operated and managed as a satellite system from PAWC's nearby Uniontown Operations District.

28. The integration of EDWA's System into PAWC's existing operations creates opportunities for functional and operational consolidation, and associated efficiencies and cost savings. Efficiencies will result from shared supervisory staff, equipment and back-office support, as well as lower costs from vendors through leveraged purchasing power.

29. EDWA will wind up operations and will eventually be dissolved following closing on the Transaction (the "Closing").

30. The APA contemplates that, if a balance remains on EDWA's loan from the Pennsylvania Infrastructure Investment Authority ("PENNVEST") at Closing, the balance will be paid from the proceeds of the purchase price. PAWC is currently evaluating whether the PENNVEST loan can be assigned and transferred to PAWC at Closing for the outstanding amount of the loan. If such a transfer is possible, an adjustment or reduction in purchase price will be required and the purchase price reduction will be allocated to pay the balance on the PENNVEST loan.

31. Pursuant to a Subrecipient Agreement between EDWA and Greene County, EDWA received a Community Development Block Grant ("CDBG") of $1,939,341, which is being used for several projects. PAWC does not believe it can receive assignment of the CDBG. Under the Subrecipient Agreement, if, after all or any part of the funds has been paid, and EDWA decides to terminate or alter the activities, Greene County can, in its sole discretion, require repayment or

redirection of the funds theretofore paid. If Greene County exercises its discretion to require repayment of the funds, the sale proceeds would be used for repayment.

32. The Transaction will make EDWA's customers part of a system with a large customer base, allowing them to share the costs of improving and operating the System with many other customers, thereby stabilizing or reducing per-customer costs over the long term.

33. PAWC will adopt EDWA's existing rates at closing. As a result, the Transaction will have no immediate impact on the rates for service to EDWA's existing customers (except as discussed in the following paragraph). Rates to EDWA's existing customers will not increase until PAWC files a base rate case that includes the System. At this time, it is unknown when PAWC will file that base rate case.

34. EDWA identified five locations where multiple dwellings are on one meter: two small modular home communities and three single family dwellings with an additional dwelling or modular home on the same parcel. A schedule that shows what each of the above-referenced customers are currently paying to EDWA, and that confirms what each customer will pay under the *pro forma* tariff supplement, is attached as **Exhibit 6**.

35. PAWC prepared a five-year capital plan for EDWA. The budget estimate for investment projects was $6,862,888 and the budget estimate for recurring projects was $9,333,275 for a total of $16,196,163 over five years. **Exhibit 7**.

36. PAWC also prepared a System Evaluation and Improvements Plan dated July 22, 2024, listing projects to be initiated or completed during PAWC's Receivership and projects to be initiated or completed after closing on the Transaction. This Plan was filed at Docket No. P-2023-3043950. It is attached as **Exhibit 8**.

37. PAWC will make multiple safety improvements to the System, including but not limited to:

- Providing employees with an overall work safety environment that is compliant with OSHA regulations.
- Providing employees with appropriate personal protection equipment and safety training.
- Providing liquid chemical secondary containment, venting pipes, labeling and registration meeting DEP standards.
- Providing chlorine gas feed system modifications to meet DEP standards.
- Ultimately eliminating the use of toxic chlorine gas and the hazards presented to employees and the local community.
- Providing a potable water supply for in-plant use that meets DEP disinfection standards.
- Remedying slip/fall hazards, including poor housekeeping, missing handrails on stairs, improper work platforms, missing life rings and rescue hooks, missing kick plates/toe guards, inadequate lighting, and unpassable vehicular access roads.
- Providing labeling of confined spaces and equipment/training for hazardous atmosphere testing.
- Providing electrical/mechanical safety improvements, including arc flash labeling, replacement of faulty outlets, installation of guards on rotating parts, and installation of electrical shock protection mats.
- Providing safe vehicles meeting Pennsylvania inspection requirements.
- Providing safety management best practices, including emergency evacuation plans, pre-job safety tailgate talks, and near miss reporting.

38. The Transaction will have no immediate effect on rates for service to PAWC's existing water customers. Rates to PAWC's existing water customers will not increase until PAWC files a base rate case that includes the System. At this time, it is unknown when PAWC will file that base rate case.

39. The Transaction will expand PAWC's customer base, allowing the costs of operating and improving PAWC's system to be shared with a greater number of customers.

40. The balance of any sale proceeds after outstanding indebtedness is paid will be held in escrow for the purposes of covering pre-Closing claims against EDWA, any PAWC indemnity

claims, and PAWC's receivership costs, to be disbursed in the priority as provided for in the Second Amendment.

EXHIBIT 1

OCTOBER 2020 EAST DUNKARD WATER AUTHORITY

CORRECTIVE ACTION PLAN

EAST DUNKARD WATER AUTHORITY

CORRECTIVE ACTION PLAN

November 2020

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

On October 6th, 2020, East Dunkard Water Authority (the Authority) received a request from the Pennsylvania Department of Environmental Protection (the Department) to prepare and submit a Corrective Action Plan (CAP) as a result of multiple customer complaints of water quality problems and test result levels that exceeded the Secondary Maximum Contaminant Limits (MCL) for Manganese (Appendix A). While to this date the Authority has not had any samples tested which exceed any Health Advisory Levels (HAL), it is an utmost priority of the Authority and the Department to ensure that water supplied to East Dunkard customers is and continues to be safe and of high quality. As such, the Authority and the Authority's Engineers, Harshman CE Group (HCEG), have prepared the following CAP to rigorously monitor for any potential problems, ensure that the proper required responses to any problems are followed, and implement measures to improve and ensure the quality of the water the Authority provides.

The measures proposed by the Authority include:

- aggressive daily monitoring at the treatment plant for iron and manganese in the raw, settled, and finished water to confirm that the problem is not the current treatment chain
- reactive testing in the distribution system for iron and manganese whenever there is a break, hydrant use, or other shock to the system that disturbs existing sediment deposits in the lines
- continuing reactive testing of resident's water at their residence when they notify the Authority or HCEG of an ongoing water quality issue
- implementing a proactive flushing plan to fully flush any existing sediments in the lines, which involves
    - comprehensively identifying the areas that are currently difficult or impossible to flush with flow sufficient to scour sediment
    - installing additional control infrastructure and booster pumps as necessary to achieve scouring flow
    - executing the final developed flushing program while simultaneously inspecting and cleaning the water storage tanks
- installing line identification markers in the field to reduce the chance of impacts from excavation
- installing approximately 2,000 linear feet of 10" plastic main line from the water plant to the Griffin Tank parallel to the existing ductile iron pipe, fully transitioning the system to plastic pipe.

The following plan outlines these proposals in greater detail.

2. CORRECTIVE ACTION PLANS

2.1 Acknowledgements

2.1.1 The Authority acknowledges the Secondary Maximum Contaminant Levels (MCL) for iron and manganese are 0.3 mg/L and 0.05 mg/L, respectively. Per the Department's request, any time secondary MCLs are exceeded, the Authority will notify the Department within one-hour of receiving sample results. In Pennsylvania, Secondary MCLs are enforceable regulatory levels and exceeding the levels is considered a violation and would require notification of DEP and be reported in the annual Consumer Confidence Report with the sample results. A complete list of Primary and Secondary MCLs is included in Appendix B.

Public Notification is not required unless the results also exceed a Health Advisory Level (HAL). In 2004, The United States Environmental Protection Agency (EPA) published a Drinking Water Health Advisory for Manganese (Appendix C). For manganese, the 10-day HAL for infants is 0.3 mg/L. If any manganese samples exceed that limit, the Authority will be required to issue a Tier 1 Do Not Consume Notice to their customers and notify the Department within 1 hour.

2.1.2 The Authority acknowledges that line breaks are typically caused by landslides, contractor errors, or issues not causally related to overall pipe condition. Whenever water customers lose water because of a break, the Authority will notify the Department within 1-hour. The Authority should also ensure that the Departments *Policy for Determining When Loss of Positive Pressure Situations in the Distribution System Require One-Hour Reporting to the Department and issuing a Tier 1 Public Notification.* The Policy and the appropriate Tier 1 Public Notification is included in Appendix D.

2.2 Monitoring and Testing

The goal of the Authority is to be as accommodating to residents' concerns as possible and ensuring the adequate supply of safe drinking water. As part of the proactive residential water testing that the Authority began in November 2019, the finished water at the water treatment plant was tested on 12/9/2019 and 8/7/2020. On both dates the Iron and Manganese levels of the finished water were either less than the method of detection level (MDL) or the value was between the method detection and practical quantitation limits. A summary of the Iron and Manganese results are shown in Table 1 and the complete results along with their chain of custody documentation are included in Appendix E)

Table 1: Summary of water testing results collected from the Water Treatment Plant finished water by Harshman CE Group and analyzed by H&H Water Controls.

Tests	12/09/2019	08/07/2020	Secondary MCL
Iron (Fe) (mg/L)	MD < 0.03	P 0.05	0.3 mg/L
Manganese (Mn) mg/L	P 0.03	MD <0.01	0.05 mg/L
MD – Indicates less than method detection limit. P – Estimated value between method detection and practical quantitation limit.			

On October 21, 2020, the Authority purchased equipment to be able to do benchtop testing for Iron (Fe) and Manganese (Mn). A Hach Iron (Ferrous) Color Disc Test Kit, Model IR-18C, 0.2-7 mg/L and a Hach Manganese Test Kit Model MN-5 were purchased for this purpose (Product Sheets are included in Appendix F)

2.2.1 Proposed testing at the Water Treatment Plant

Now that the authority has purchased the equipment to be able to conduct benchtop tests for Iron and Manganese more cost effectively than laboratory testing, the Authority will test the raw, settled, and finished water daily for at least the first 30 days. After that initial period, we will determine if daily tests are warranted or weekly or monthly testing. This data will be used by HCEG and plant equipment suppliers, Tonka Waters, to validate previous testing and the effectiveness of the current treatment chain for managing the levels of Manganese present in the raw water. If modifications to the treatment chain were deemed necessary, those options would be discussed and pursued at that time.

While the Authority staff is conducting daily iron and manganese testing of the raw, settled, and finished water:

- If, at any time, the bench top samples are greater than 50% of the MCL, the authority will also collect a sample to be verified by H&H Water Controls lab.
- If any MCLs are exceeded, the Authority will notify DEP within 1 hour.
- If the Health Advisory Level (HAL) of 0.3 mg/L if exceeded, the Authority will notify DEP within 1 hour and Issue a Tier 1 Do Not Consume Notice.

A data log sheet with the above limits and appropriate contact information is included in Appendix F.

2.2.2 Proposed testing during shock events including breaks, leaks, hydrant use.

When the Authority determines a break, leak, or hydrant use has taken place. The Authority will collect samples as soon as possible upon arrival to the location. The sample should be collected and tested prior to any reactive flushing of the effected lines. Additional samples can be taken during or after flushing, but the first sample should always be tested prior to sampling to determine if any of the bulleted limits in section 3.2.1 have been exceeded and if any further actions (lab verification, DEP notification, and/or Tier 1 Notices) are required.

The Authority should also ensure that the Departments *Policy for Determining When Loss of Positive Pressure Situations in the Distribution System Require One-Hour Reporting to the Department and issuing a Tier 1 Public Notification.* If customers loose water because of a break, the Authority should notify the Department within 1-hour. The Policy and the appropriate Tier 1 Public Notification is included in Appendix D.

2.2.3 Proposed increased residential testing from complaints.

HCEG was authorized by the Authority in November 2019 to test the water of any resident who requested testing. This information was published on the Authority's website www.eastdunkardwater.com under a link on the main page titled *Engineering Company Info on Water Quality.* The announcement outlines the process for issuing complaints and having their water tested. The full body of the public announcement is included in this report in Appendix G. In addition to this procedure, the residents can continue using the traditional option of contacting the plant directly with complaints or issues; if testing was or is requested that information was and is forwarded to HCEG. HCEG has a standardized complaint form that is completed by HCEG staff that receives the call. That complaint form is given to a technician trained to collect the samples who then follows up with the resident and, if authorized by the resident, collects samples from the residence as soon as possible.

At this time, the information regarding the complaint and testing procedure will be moved to a more easily noticeable location on the home page of the Authority website. In addition, the service has been perceived by the residents as only available during business hours. To address this concern, we will amend the process to include information clarifying after-hours testing/complaint options. Also, up to this point, all residential testing has been collected and delivered to the laboratory for testing. As a cost savings measure, the Authority will obtain set of iron and manganese testing kits for use by HCEG when

complaints are received. With that equipment, HCEG staff can benchtop test for iron and manganese immediately at the residence to determine if any of the bulleted limits in section 3.2.1 have been exceeded and if any further actions (lab verification, DEP notification, and/or Tier 1 Notices) are required.

The goal of the Authority is to be as accommodating to residents' concerns as possible and ensuring the adequate supply of safe drinking water.

2.3 Proactive Line Flushing Program

It is known that there are existing sediments in the distribution system that are currently impossible to completely flush from the system for multiple reasons. The system is largely comprised of dead-end lines of varying line diameters that traverse steeply undulating terrain creating many low points in the lines. Additionally, many of the dead-end lines run up a valley terminate at houses located much higher in the valley than where that line segment began. Often the ends of these lines have insufficient pressure to achieve sediment scouring velocities.

All factors considered, achieving a completely flushable system involves: further identification of areas that are currently unflushable with sufficient flow to scour sediment; installation of additional infrastructure (possibly including pumps, gate valves, blow off valves, and or hydrants) where needed, and also inspecting and cleaning the tanks to ensure that build up sediments within the storage tanks are not propagating out into the distribution system. Those three parts are each discussed further in the following sections.

2.3.1 Pressure/Flow Modeling

A practical and comprehensive list of problematic areas and necessary upgrades will necessarily be developed as the first step achieving a fully flushable system. This can be accomplished through computerized modeling of the system that simulates field conditions and could also possibly be done with pressure/flow gauges in the field. The field testing may require additional infrastructure be installed on the lines to enable attaching the necessary gauges.

2.3.2 Installation of additional control infrastructure

Once the list of problem areas and necessary upgrades is developed as discussed in Section 3.4.1, that infrastructure will be installed on the lines.

2.3.3 Tank Cleaning

Tank inspection and cleaning (as necessary) is part of the final implementation phase of the project. Lines would be systematically flushed beginning at the treatment plant and working out through the system. The tanks will be cleaned simultaneously as the lines are being flushed where possible. As the lines leading to the tanks are flushed, the tanks will be cleaned, and the flushing plan will proceed onward from the lines leaving the tanks.

In November 2019, the Authority received two quotes inspection and cleaning of the primary storage tank, the Griffin Tank (Appendix H). The quotes are estimates because the price of cleaning is unknown until inspection can take place, and the most cost-effective option is to have a single mobilization that involves both inspection and cleaning. Cleaning the tanks will be contracted during the proactive flushing process.

2.4 Line Marking Program

One final proposal that has been discussed is the purchasing and installation of line markers. Currently the only physical traces of the lines visible on the surface of the ground are valve covers and hydrants. While the Authority responds to PA One Calls when they come in, accidental line strikes have still occurred in the past. The Authority will purchase and install line markers beginning in areas with the highest potential for conflicts from excavation: where lines cross roadways, where lines run parallel to roads, and where lines are adjacent to other underground utilities. In addition to being an added layer of prevention of accidental impacts from excavation, the markers will serve as physical field identification of line locations that would assist the future generation of staff with operation and maintenance of the line. A quote received for line markers has been included in Appendix I.

2.5 Line Replacement

The only remaining non-plastic line in the distribution system is the main trunk line from the plant to the Griffin Tank. Approximately 1900-2000 linear feet of 10” ductile iron pipe begins just outside the water treatment plant, crosses under State Route Eighty Eight, under a railroad, and traverses up several hundred feet of steep embankment where it ties into newer plastic line. This portion of line was not replaced as part of previous grants due to the high cost of replacement due to the previously mentioned crossings and difficult terrain. It is believed that the lining of the pipe was damaged during at the connection point in 2012 when plant upgrades were being completed. This has been considered over the years as a potential source of iron into the system when the Authority began receiving brown/dirty water complaints. Laying a new parallel plastic line has been proposed as a solution to eliminate a potential source of iron to the water supply, create a second connection between the

plant and primary water tank, and allow for inspection of the iron line. Extensive details pertaining to the line replacement proposal have been included in Appendix J.

3. POTENTIAL FUNDING SOURCES

In November 2019, the Authority met with Representative Pam Snyder's Office to discuss concerns and complaints received from constituents and identify possible State funding opportunities. Two opportunities were discussed at that time, the PA Small Water & Sewer Grant, and the PA H2O Grant. The Authority was unable to submit a competitive application in 2019 but will pursue those opportunities if they become available again.

In January of 2020 East Dunkard met with the Greene County Board of Commissioners and the County Planning Department to discuss funding possibilities at the County level. The Authority has been continuously working with the County Planning Department since that time and is pursuing a Competitive Grant Submission in February of 2021.

Appendix A DEP Request for Corrective Action Plan

sc@harshmanllc.com

From: Thomas, John <johnt@pa.gov>
Sent: Tuesday, October 6, 2020 9:25 AM
To: sc@harshmanllc.com; eastdunkard@gmail.com
Cc: Diehl, Renee (DEP); Miller, Patricia; Kaufman, Andrew
Subject: East Dunkard - Call Summary and Corrective Action Plan

Below is a brief summary of our conversation on October 5 and what the Department is requesting from the Authority at this time:

- The secondary MCLs for iron and manganese are 0.3 mg/L and 0.05 mg/L respectively. Any time these levels are exceeded in a sample the Department should be notified within one-hour of receiving sample results. Note that Public Notification is not required for these unless a Health Advisory Level (HAL) is also exceeded. Since secondary standards are enforceable in PA, these would be considered violations and would need to be reported as such in your CCR along with the sample results.
    - The manganese 10-day HAL for infants is 0.3 mg/L. If any manganese sample exceeds that limit, the Authority would be required to issue a Tier 1 Do Not Consume Notice to their customers in addition to the one-hour notification to the Department.
- The Department advises that the Authority sample for iron and manganese (at minimum) on a routine basis at the entry point and whenever dirty water complaints are received. These can be benchtop samples as opposed to lab samples provided that any elevated levels (>1/2 the MCLs) be followed-up with a confirmation lab sample. At this time, the Authority does not have equipment for benchtop sampling. Note that sampling for complaints should not follow flushing to adequately provide accurate information (not to restrict the potential of additional sampling following the flush).
- The treatment manufacturer was consulted regarding iron and manganese treatment, and the result of that investigation indicated that water leaving the plant was not a concern.
- Dirty water complaints reportedly typically follow some form of shock to the system such as a fire event or line break. Many occur in valleys where precipitates settle most readily.
- Line breaks are typically caused by landslides, contractor errors, or other issues not directly related to the overall pipe condition. Whenever customers lose water service as a result, the Department should be notified within 1-hour. The Authority should also ensure that they are following the Department's Policy for Determining When Loss of Positive Pressure Situations in the Distribution System Require One-Hour Reporting to the Department and Issuing Tier 1 Public Notification.
- The Authority is currently unable to conduct a full-system, unidirectional flush due to hydraulic and topographic limitations. Engineers are working towards a flow-model of the system to determine how these issues can be resolved. Currently the system is flushed reactively in response to issues instead of proactively.
- The only noted non-plastic line in the distribution system is at the Rt 88 & railroad crossing near the plant, but the Authority is considering running a parallel line to enable this to be taken offline for investigation and redundancy.
- The Authority is also working on plans to have the tanks inspected and cleaned as necessary.

To address the dirty water and MCL exceedance concerns, the Department requests a Corrective Action Plan be submitted within the next 30-days. This plan should include a summary of the treatment plant investigation and any actions the Authority is taking or is planning to take to address this issue (flushing, line replacement, tank cleaning, and any additional activities).
Should you have any questions or concerns, please contact me as listed below.
JT

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Southwest Regional Office

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Appendix B Primary and Secondary Maximum Contaminant Levels

Maximum Contaminant Levels, Maximum Residual Disinfectant Levels, and Treatment Technique Requirements

The Bureau of Safe Drinking Water has created the following fact sheet to aid interested parties in knowing the specific limits for all currently regulated contaminants as well as the treatment techniques that are defined in Chapter 109; Pennsylvania Safe Drinking Water Regulations. The contaminants are organized by contaminant groups, followed by the Treatment Technique requirements organized by source type and/or section they are contained in the regulation.

Title 25, Pa. Code, Chapter 109, Safe Drinking Water Regulations, defines Maximum Contaminant Levels (MCL), Maximum Residual Disinfectant Levels (MRDL), and Treatment Techniques (TT) as:

Maximum Contaminant Level (MCL): the maximum permissible level of a contaminant in water which is delivered to a user of a public water system and includes the primary and secondary MCLs established under the Federal Safe Drinking Water Act, and MCLs adopted under the act. For MCLs incorporated into this chapter by reference, the term refers to the numerical value and the means of determining compliance with that value and does not refer to the U.S. Environmental Protection Agency (EPA) applications to specific types of public water systems or sources.

Maximum Residual Disinfectant Level (MRDL): the maximum permissible level of a disinfectant added for water treatment that may not be exceeded at the consumer's tap without an unacceptable possibility of adverse health effects. The consumer's tap means the entry point for bottled water and vended water systems, retail water facilities, and bulk water hauling systems.

Treatment Technique (TT): a requirement which specifies a specific treatment method known to cause a reduction in the level of a contaminant which cannot practically be regulated by establishing an MCL. The term includes treatment technique requirements established under the federal act, and treatment technique requirements adopted under the act.

The following units of measurements are used in this document:

mrem/yr	millirems/year	
mg/L	milligrams per liter	Equivalent of parts per million
µg/L	micrograms per liter	Equivalent of parts per billion
pCi/L	picocuries per liter	
T.O.N.	threshold odor number	
NTU	nephelometric turbidity unit	

PRIMARY CONTAMINANT MCLs

Disinfection Byproducts:

Total Trihalomethanes (TTHMs) (Bromodichloromethane, Bromoform, Chlorodibromomethane, and Chloroform)	0.080	mg/L
Haloacetic Acids (HAA5) (Bromoacetic acid, Chloroacetic acid, Dibromoacetic acid, Dichloroacetic acid, Trichloroacetic acid)	0.060	mg/L

***E. coli*:**

A system complies with the MCL for *E. coli* unless:

- The system has an *E. coli*-positive check sample following a total coliform-positive routine sample.
- The system has a total coliform-positive check sample following an *E. coli*-positive routine sample.
- The system fails to take all required check samples following an *E. coli*-positive routine sample.
- The system fails to test for *E. coli* when any check sample tests positive for total coliform.

Inorganic Chemicals (IOCs):

Antimony	0.006	mg/L	Cyanide (free CN)	0.2	mg/L
Arsenic	0.010	mg/L	Fluoride	2	mg/L
Asbestos (Fibers longer than 10µm)	7 million	fibers/L	Lead **	0.005	mg/L
Barium	2	mg/L	Mercury	0.002	mg/L
Beryllium	0.004	mg/L	Nitrate (as Nitrogen)	10	mg/L
Cadmium	0.005	mg/L	Nitrite (as Nitrogen)	1	mg/L
Chromium (Total)	0.1	mg/L	Selenium	0.05	mg/L
Copper **	1.0	mg/L	Thallium	0.002	mg/L

** The lead and copper primary MCLs are applicable only to bottled, vended, retail, and bulk water hauling systems.

Synthetic Organic Chemicals (SOCs):

Alachlor	0.002	mg/L	Ethylene Dibromide (EDB)	0.00005	mg/L
Altrazine	0.003	mg/L	Glyphosate	0.7	mg/L
Benzo(a)pyrene (PAHs)	0.0002	mg/L	Heptachlor	0.0004	mg/L
Carbofuran	0.04	mg/L	Heptachlor epoxide	0.0002	mg/L
Chlordane	0.002	mg/L	Hexachlorobenzene	0.001	mg/L
2,4-D	0.07	mg/L	Hexachlorocyclopentadiene	0.05	mg/L
Dalapon	0.2	mg/L	Lindane	0.0002	mg/L
1,2-Dibromo-3-chloropropane (DBCP)	0.0002	mg/L	Methoxychlor	0.04	mg/L
Di(2-ethylhexyl) adipate	0.4	mg/L	Oxamyl (Vydate)	0.2	mg/L
Di(2-ethylhexyl) (phthalate)	0.006	mg/L	PCBs (Polychlorinated biphenyls)	0.0005	mg/L
Dinoseb	0.007	mg/L	Pentachlorophenol	0.0001	mg/L
Dioxin (2,3,7,8-TCDD)	0.00000003	mg/L	Picloram	0.5	mg/L
Diquat	0.02	mg/L	Simazine	0.004	mg/L
Endothall	0.1	mg/L	Toxaphene	0.003	mg/L
Endrin	0.002	mg/L	2,4,5-TP (Silvex)	0.05	mg/L

Volatile Organic Chemicals (VOCs):

Benzene	0.005	mg/L	Ethylbenzene	0.7	mg/L
Carbon Tetrachloride	0.005	mg/L	Styrene	0.1	mg/L
Chlorobenzene	0.1	mg/L	Tetrachloroethylene	0.005	mg/L
o-Dichlorobenze	0.6	mg/L	Toluene	1	mg/L
p-Dichlorobenze	0.075	mg/L	1,2,4-Trichlorobenzene	0.07	mg/L
1,2-Dichloroethane	0.005	mg/L	1,1,1-Trichloroethane	0.2	mg/L
1,1-Dichloroethylene	0.007	mg/L	1,1,2-Trichloroethane	0.005	mg/L
cis-1,2-Dichloroethylene	0.07	mg/L	Trichloroethylene	0.005	mg/L
trans-1,2-Dichloroethylene	0.1	mg/L	Vinyl chloride	0.002	mg/L
Dichloromethane	0.005	mg/L	Xylenes (total)	10	mg/L
1,2-Dichloropropane	0.005	mg/L			

Radionuclides:

Beta Particles and photon emitters	4	millirems/year	Radium 226 and Radium 228 (combined)	5	pCi/L
Gross Alpha* (Alpha Particles)	15	pCi/L	Uranium	30	µg/L

* Gross Alpha MCL excludes Radon and Uranium particle activity.

SECONDARY CONTAMINANTS MCLs

Aluminum	0.2	mg/L	Odor	3	T.O.N.
Chloride	250	mg/L	pH*	6.5–8.5	
Color	15	color units	Silver	0.1	mg/L
Corrosivity	Non-corrosive		Sulfate	250	mg/L
Foaming Agents	0.5	mg/L	Total Dissolved Solids	500	mg/L
Iron	0.3	mg/L	Zinc	5	mg/L
Manganese	0.05	mg/L			

* The pH MCL represents a "reasonable goal for drinking water quality."

MRDLs

Chlorine (as Cl_2)	4.0	mg/L	Chlorine Dioxide (as ClO_2)	0.8	mg/L
Chloramines (as Cl_2)	4.0	mg/L			

TREATMENT TECHNIQUE REQUIREMENTS

Surface Water and Groundwater Under the Direct Influence of Surface Water (GUDI)

All Filtration Types Shall Provide Continuous Filtration and Disinfection

Log Removal and Inactivation for Giardia, Viruses, and Cryptosporidium

- For *Giardia* lamblia cysts, provide at least 99.9% (3.0-log) removal and inactivation.
- For enteric viruses, provide at least 99.99% (4.0-log) removal and inactivation. Unless a facility is awarded removal credit for viruses through a permit, 4.0-log inactivation must be provided.
- For *Cryptosporidium* oocysts, **Bin 1** sources as determined by source water monitoring conducted in accordance with requirements of the Long-Term 2 Enhanced Surface Water Treatment Rule provide:
  - At least 99% (2-log) removal of *Cryptosporidium* oocysts.
- For *Cryptosporidium* oocysts, **Bin 2** sources as determined by source water monitoring conducted in accordance with requirements of the Long-Term 2 Enhanced Surface Water Treatment Rule provide at least 99% (2-log) removal of *Cryptosporidium* oocysts and:
  - 1-log additional treatment at facilities using conventional, slow sand, or diatomaceous earth filtration.
  - 1.5-log additional treatment at facilities using direct filtration.
  - Additional treatment as determined by the Department of Environmental Protection (DEP) for a total of 4.0-log removal and inactivation for alternative filtration technologies.
- For *Cryptosporidium* oocysts, **Bin 3** sources as determined by source water monitoring conducted in accordance with requirements of the Long-Term 2 Enhanced Surface Water Treatment Rule provide at least 99% (2-log) removal of *Cryptosporidium* oocysts and:
  - 2-log additional treatment at facilities using conventional, slow sand, or diatomaceous earth filtration.
  - 2.5-log additional treatment at facilities using direct filtration.
  - Additional treatment as determined by DEP for a total of 5.0-log removal and inactivation for alternative filtration technologies.
- For *Cryptosporidium* oocysts, **Bin 4** sources as determined by source water monitoring conducted in accordance with requirements of the Long-Term 2 Enhanced Surface Water Treatment Rule provide at least 99% (2-log) removal of *Cryptosporidium* oocysts and:
  - 2.5-log additional treatment at facilities using conventional, slow sand, or diatomaceous earth filtration.
  - 3-log additional treatment at facilities using direct filtration.
  - Additional treatment as determined by DEP for a total of 5.5-log removal and inactivation for alternative filtration technologies.

Bin Classification Reporting

Failure to report the Bin classification to DEP for approval within six months after completing the source water monitoring is a treatment technique violation.

Inactivation Requirements

The combined total effect of the disinfection processes used in a filtration plant shall achieve **at least 1.0-log (90%) and 3.0-log (99.9%) inactivation of Giardia cysts and viruses respectively** and the disinfectant residual concentration in the water delivered to the distribution system shall **not be less than .20 mg/l.** The log inactivation shall be calculated at least once per day during expected peak hourly flow.

- Failure to achieve the minimum log inactivation for more than four hours constitutes a breakdown in treatment and is a treatment technique violation.
- Failure to maintain the minimum entry point residual for more for more than four hours is a treatment technique violation.
- Log inactivation for Giardia shall be calculated whenever the residual disinfectant concentration at the entry point falls below the minimum specified value and continue to be calculated every four hours until the residual disinfectant concentration at the entry point is at or above the minimum value.

Turbidity Performance Standards

- For public water systems using surface water or GUDI sources and using any conventional or direct filtration, the **combined filter effluent turbidity shall not exceed 0.3 NTU in 95% of the monthly samples and 1 NTU at any time**.
- For public water systems using surface water or GUDI sources and using slow sand filtration or diatomaceous earth filtration, the **combined filter effluent turbidity shall not exceed 1.0 NTU in 95% of the monthly samples and 2.0 NTU at any time**.
- For public water systems using surface water or GUDI sources and using membrane filtration, the **combined filter effluent turbidity shall not exceed 0.15 NTU in 95% of the monthly samples and 1 NTU at any time.**

Recycling of Waste Stream

Public water systems that use surface water and GUDI sources and provide conventional filtration or direct filtration treatment and recycle spent filter backwash water, thickener supernatant, or liquids from dewatering processes shall return these recycled flows through the processes of the system's existing conventional or direct filtration system.

Enhanced Coagulation/Enhanced Softening

Public water systems that use surface water and GUDI sources and use conventional filtration treatment shall provide enhanced coagulation or enhanced softening to improve removal (optimize treatment) of disinfection byproduct precursors as measured by total organic carbon (TOC). A certain percentage of the TOC must be removed from the source water unless the system meets alternative compliance criteria. The required TOC removal percentage is based on the source water levels of the TOC and alkalinity. The alternative compliance criteria include source TOC levels, treated TOC levels, disinfection byproduct levels (TTHMs and HAA5s), specific ultraviolet (UV) light absorption levels, alkalinity levels and magnesium removal levels.

The TOC removal requirements are as follows:

Source Water TOC (mg/L)	Source Water Alkalinity (mg/L)		
	0 to 60	> 60 to 120	> 120
> 2.0 to 4.0	35.0%	25.0%	15.0%
> 4.0 to 8.0	45.0%	35.0%	25.0%
> 8.0	50.0%	40.0%	30.0%

The following alternative compliance criteria can be applied if the removal requirements are not met:

1. Source water TOC is less than 2.0 mg/L,
2. Treated water TOC is less than 2.0 mg/L,
3. The following three running annual averages (RAA) are met:
   a. The source water TOC is 4.0 mg/L or less,
   b. The source alkalinity is greater than 60 mg/L,
   c. Distribution system TTHMs are 0.040 mg/L or less **and** HAA5s are 0.030 mg/L or less,
4. TTHM levels are 0.040 mg/L or less and HAA5 levels are 0.030 mg/L and the water system uses only chlorine for primary and residual disinfection,
5. Source water SUVA (Specific Ultraviolet Absorbance) values are 2.0 L/mg-m or less, as a RAA,
6. Finished water SUVA values are 2.0 L/mg-m or less, as a RAA,

Ground Water Sources

- Community water systems shall provide **continuous disinfection** of groundwater sources not under the direct influence of surface water.
  - Maintain at each groundwater entry point a residual disinfectant concentration no less than 0.40 mg/L free chlorine or other minimum approved by DEP.
  - Non-transient noncommunity and transient noncommunity systems that demonstrate 4.0-log disinfection shall maintain their DEP approved minimum residual at the entry point.

All Systems Specified in the Treatment Technique Description

Acrylamide and Epichlorohydrin

Public water systems using chemicals containing Acrylamide and/or Epichlorohydrin in the water treatment process shall certify that the following specified levels have not been exceeded.

- Acrylamide = 0.05% dosed at 1 mg/L (or equivalent)
- Epichlorohydrin = 0.01% dosed at 20 mg/L (or equivalent)

Distribution Disinfectant Residuals

A water system using a chemical disinfectant shall maintain a minimum residual disinfectant concentration throughout the distribution system of at least 0.2 mg/L (or another level approved by DEP for systems using an alternate oxidizing disinfectant treatment). Applies to all community water systems as well as non-transient noncommunity water systems that use a chemical disinfectant and transient noncommunity water systems that have installed 4-log treatment. Failure to do so results in a treatment technique violation.

- Free chlorine for systems using chlorine.
- Total chlorine for systems using chloramines.
- Both free and total chlorine for sampling locations in a mixing zone.
- Both free and total chlorine when a system using chloramines is conducting a free chlorine burn.
  - For a system collecting less than 40 samples per month and uses only groundwater sources, the treatment technique is met when no more than one sample collected per month is less than the minimum level for two consecutive months.
  - For a system that collects 40 or more samples per month or that uses surface water or GUDI sources, the treatment technique is met when no more than 5% of the samples collected per month are less than the minimum level for two consecutive months.
  - A water supplier that fails to meet the minimum level at any sample location for two consecutive months shall conduct a distribution system investigation within 60 days.

Optimal Corrosion Control Treatment for Lead and Copper

Community and non-transient noncommunity water systems shall provide **optimal corrosion control treatment (OCCT)** which minimizes the lead and copper concentrations at the user's tap while ensuring the treatment does not cause the system to violate a Primary Maximum Contaminant Level (PMCL).

- A **small** (≤ 3,300 population served) **or medium** (3,301 to 50,000 population served) **water system** is deemed to have optimized corrosion control treatment if the system does not exceed either the action level of 0.015 mg/L for lead or the action level of 1.3 mg/L for copper during each of two consecutive 6-month monitoring periods.
- A **water system** is deemed to have optimized corrosion control if the system demonstrates to DEP that for two consecutive 6-month monitoring periods that the system does not exceed the action level of 0.015 mg/L for lead or the action level of 1.3 mg/L for copper **and** the difference between the 90th percentile tap water **lead** level and the highest source water **lead** concentration is less than 0.005 mg/L.
- A water system (large, medium or small) that installs new corrosion control facilities or modifies existing treatment facilities is deemed to have optimized corrosion control if the system operates the treatment facilities in compliance with water quality parameter performance requirements specified by DEP in a permit.

Revised Total Coliform Rule

Assessments

Failure of a public water system to conduct an assessment by the due date or complete a corrective action laid out in an assessment by the provided due date are considered treatment technique violations.

Seasonal Systems

A seasonal system that fails to complete the approved start-up procedure prior to serving water to the public incurs a treatment technique violation.

For more information, visit www.dep.pa.gov.

Appendix C EPA Drinking Water Health Advisory for Manganese

United States
Environmental Protection
Agency

Drinking Water Health Advisory for Manganese

Drinking Water Health Advisory for Manganese

Prepared by:

U.S. Environmental Protection Agency
Office of Water (4304T)
Health and Ecological Criteria Division
Washington, DC 20460

http://www.epa.gov/safewater/

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CONTENTS

ABBREVIATIONS

ALS	Amyotrophic lateral sclerosis
CDC	Centers for Disease Control and Prevention
CJD	Creutzfeldt-Jakob Disease
g	gram
kg	kilogram
IOM	Institute of Medicine
L	liter
m^3	cubic meters
mg	milligram
mL	milliliter
mM	millimolar
Mn	manganese
min	minute
mmol	millimole
MMT	methylcyclopentadienyl manganese tricarbonyl
MND	motor neuron disease
NTP	National Toxicology Program
OST	Office of Science and Technology
OW	Office of Water
ppm	parts per million
PWS	public water system
RfD	Reference Dose
SDWA	Safe Drinking Water Act
SMCL	secondary maximum contaminant level
UCM	unregulated contaminant monitoring
µg	microgram
µmol	micromole

FOREWORD

The Drinking Water Health Advisory Program, sponsored by the Health and Ecological Criteria Division of the Office of Science and Technology (OST), Office of Water (OW), provides information on the health and organoleptic (color, taste, odor, etc.) effects of contaminants in drinking water. This Drinking Water Health Advisory contains Health Advisories as well as aesthetic properties (e.g., taste, odor, color) of manganese in drinking water.

A Drinking Water Health Advisory is not an enforceable standard for action. This Health Advisory describes nonregulatory concentrations of the contaminant in water that are expected to be without adverse effects on both health and aesthetics. Health Advisories serve as technical guidance to assist Federal, State, and local officials responsible for protecting public health when emergency spills or contamination situations occur. They are not to be construed as legally enforceable Federal standards. They are subject to change as new information becomes available. This draft supersedes any previous draft advisories for this chemical.

This Document is based, in part, on the Health Effects Support Document for Manganese (U.S. EPA, 2003a), the ATSDR's final Toxicological Profile for Manganese (ATSDR, 2000), and the Institute of Medicine's Dietary Reference Intakes for Manganese (IOM, 2002). The sections on analytical method and treatment technology are based on the Contaminant Candidate List Preliminary Regulatory Determination Support Document for Manganese (U.S. EPA, 2001).

EXECUTIVE SUMMARY

The EPA Office of Water is issuing this health advisory to provide guidance to communities that may be exposed to drinking water contaminated with high manganese (Mn) concentrations. The advisory provides guidance on the concentrations below which potential health and organoleptic problems would unlikely occur. This Drinking Water Health Advisory does not mandate a standard for action; rather it provides practical guidelines for addressing Mn contamination problems. The advisory provides an analysis of the current health hazard information and information on the organoleptic (i.e., taste and odor) associated with Mn-contaminated water, because organoleptic problems will affect consumer acceptance of water resources.

Manganese is a naturally-occurring element that can be found ubiquitously in the air, soil, and water. Manganese is an essential nutrient for humans and animals. Adverse health effects can be caused by inadequate intake or over exposure. Manganese deficiency in humans is thought to be rare because manganese is present in many common foods.

The greatest exposure to manganese is usually from food. Adults consume between 0.7 and 10.9 mg/day in the diet, with even higher intakes being associated with vegetarian diets (Freeland-Graves et al., 1987; Greger, 1999; Schroeder et al., 1966).

Manganese intake from drinking water is normally substantially lower than intake from food. At the median drinking-water level of 10 ：g/L determined in the National Inorganic and Radionuclide Survey (NIRS), the intake of manganese from drinking water would be 20 ：g/day for an adult, assuming a daily water intake of 2 L. Exposure to manganese from air is generally several orders of magnitude less than that from the diet, typically around 0.04 ng/day on average (U.S. EPA, 1990), although this can vary substantially depending on proximity to a manganese source.

Although manganese is an essential nutrient at low doses, chronic exposure to high doses may be harmful. The health effects from over-exposure of manganese are dependent on the route of exposure, the chemical form, the age at exposure, and an individual's nutritional status. Regardless, the nervous system has been determined to be the primary target organ with neurological effects generally observed. Many of the reports of adverse effects from manganese exposures in humans are from inhalation exposures in occupational settings.

Although there are substantial data supporting the neurological effects of *inhaled* manganese in both humans and animals, there are few data for the association between *oral* exposure to manganese and toxic effects. For example, several epidemiological studies (Kondakis et al., 1989; He et al., 1994) associate adverse neurological effects with exposure to manganese from drinking water; however, due to a lack of qualitative and quantitative details of the exposure scenario, these studies cannot be used for quantitative assessment. On the other hand, rodents do not provide a good experimental model for manganese neurotoxicity. Therefore, the assessment in this document focuses more on what is believed to be a safe oral intake of manganese for the general human population. Finally, it is important to emphasize that

individual requirements for, as well as adverse reactions to, manganese may be highly variable. The lifetime health advisory derived from the reference dose is estimated to be an intake for the general population that is not associated with adverse health effects; this is not meant to imply that intakes above the reference dose are necessarily associated with toxicity. Some individuals may, in fact, consume a diet that contributes more than 10 mg Mn/day without any cause for concern.

There were no studies found that reported exposure to elevated inorganic manganese with cancer in humans. Cancer studies in animals have provided equivocal results. Therefore, there are little data to suggest that inorganic manganese is carcinogenic.

As an element, manganese cannot go through metabolic transformation, but it can exist in many oxidative states and can be converted from one oxidative state to another within the body. Manganese is almost entirely excreted in the feces, only a small proportion being eliminated in the urine (Davis and Greger, 1992). Fecal manganese is comprised of unabsorbed dietary manganese and manganese excreted in bile.

Groups possibly sensitive to manganese would be those who absorb greater amounts of manganese or those who excrete less. These would include the very young (who may absorb more and excrete less), the elderly, and those with liver disease (with impaired biliary excretion).

In order to enhance consumer acceptance of water resources, this advisory recommends reducing manganese concentrations to or below 0.050 mg/L, the EPA's Secondary Maximum Contaminant Level (SMCL) for Mn. The SMCL is based on staining and taste considerations. It is not a federally enforceable regulation, but is intended as a guideline for States. States may establish higher or lower levels depending on the local conditions, such as unavailability of alternate water sources or other compelling factors, provided that public health and welfare are not adversely affected. The lifetime health advisory value of 0.3 mg/L will protect against concerns of potential neurological effects. In addition, this document provides a One-day and 10-day HA of 1 mg/L for acute exposure. However, it is advised that for infants younger than 6 months, the lifetime HA of 0.3 mg/L be used even for an acute exposure of 10 days, because of the concerns for differences in manganese content in human milk and formula and the possibility of a higher absorption and lower excretion in young infants.

1.0 INTRODUCTION

Manganese is a naturally-occurring element that can be found ubiquitously in the air, soil, and water. Manganese is also an essential nutrient for humans and animals (Leach and Harris, 1997; U.S. EPA, 2003a). Adverse health effects can be caused by inadequate intake or over exposure (See a review by Keen et al., 1999 and Keen et al., 2000). The main exposure of humans to manganese is from ingestion of food. Manganese deficiency in humans appears to be rare because manganese is present in many common foods. Manganese is essential to the proper functioning of both humans and other animals as it is required by many cellular enzymes (e.g., manganese superoxide dismutase, pyruvate carboxylase) and can serve to activate many others (e.g., kinases, decarboxylases, transferases, hydrolases, etc.; Hurley et al., 1984; Wedler, 1994; WHO, 2002).

Although manganese is an essential nutrient at low doses, chronic exposure to high doses may be harmful. There are substantial data supporting the neurological effects of *inhaled* manganese in both humans and animals, however, there are little data for the association between *oral* exposure to manganese and toxic effects.

There is a need for EPA to issue a health advisory to provide guidance to communities on the concentrations for avoiding health and organoleptic problems. This Drinking Water Health Advisory does not mandate a standard for action; rather it provides practical guidelines for addressing Mn contamination problems. The advisory provides an analysis of the current health hazard and organoleptic (i.e., taste and odor) information associated with Mn-contaminated water, because organoleptic problems will affect consumer acceptance of water resources.

Uses

Manganese is used principally in the manufacture of iron and steel alloys, manganese compounds, and as an ingredient in various products (ATSDR, 2000; IPCS, 1999). Manganese dioxide and other manganese compounds are used in products such as batteries, glass, and fireworks. Potassium permanganate is used as an oxidant for cleaning, bleaching, and disinfection purposes (ATSDR, 2000; HSDB, 2001). Potassium and manganese greensands are used in some locations for potable water treatment (ATSDR, 2000). Methylcyclopentadienyl manganese tricarbonyl (MMT), an organic manganese compound, is used as an octane-enhancing agent in unleaded gasoline in Canada, the United States, Europe, Asia, and South America (Lynam et al., 1999). Other manganese compounds are used in fertilizers, varnish, fungicides, and as livestock feeding supplements (HSDB, 2001).

2.0 MANGANESE IN THE ENVIRONMENT

Manganese is one of the most abundant metals on the earth's surface, making up approximately 0.1% of the earth’s crust. Manganese is not found naturally in its pure (elemental) form, but is a component of over 100 minerals (ATSDR, 2000).

2.1 Water

Manganese is naturally occurring in many surface and ground water sources and in soils that may erode into these waters. However, human activities are also responsible for much of the manganese contamination in water in some areas.

Ambient manganese concentrations in sea water have been reported to range from 0.4 to 10 ：g/L (ATSDR, 2000), with an average of about 2 ：g/L (Barceloux, 1999). Levels in freshwater typically range from 1 to 200 ：g/L (Barceloux, 1999). ATSDR reported that a U.S. river water survey found dissolved manganese levels of less than 11 to more than 51 ：g/L (ATSDR, 2000). The United States Geological Survey's National Ambient Water Quality Assessment (NAWQA) has gathered limited data since 1991 on representative study basins around the U.S. This report indicates a median manganese level of 16 ：g/L in surface waters, with 99th percentile concentrations of 400 to 800 ：g/L (Leahy and Thompson, 1994; USGS, 2001). Higher levels in aerobic waters are usually associated with industrial pollution.

Overall, the detection frequency of manganese in U.S. ground water is high (approximately 70% of sites assayed have measurable manganese levels) due to the ubiquity of manganese in soil and rock, but the levels detected in ground water are generally below levels of public health concern (U.S. EPA 2003a). Similarly, manganese is detected in about 97% of surface water sites (at levels far below those likely to cause health effects) and universally in sediments and aquatic biota tissues (at levels which suggest that it does not bioaccumulate; U.S. EPA 2003a).

Between 1984 and 1986, the National Inorganic and Radionuclide Survey (NIRS) collected data from 989 U.S. community public water systems (PWSs) served by ground water in 49 states and found that 68% of the ground water PWSs reported detectable levels of manganese, with a median concentration of 10 ：g/L. Supplemental survey data from PWSs supplied by surface waters in five states reported occurrence ranges similar to those of ground water PWSs.

2.2 Soil

Manganese constitutes approximately 0.1% of the earth's crust, and is a naturally occurring component of nearly all soils (ATSDR, 2000). Natural levels of manganese range from less than 2 to 7,000 ppm, with a geometric mean concentration of 330 ppm (Shacklette and Boerngen, 1984). The estimated arithmetic mean concentration is 550 ppm. Accumulation of manganese occurs in the subsoil rather than on the soil surface (ATSDR, 2000). An estimated 60–90% of soil manganese is associated with the sand fraction (WHO, 1981, as cited in ATSDR, 2000).

No published reports quantify exposure to manganese associated with soil ingestion. Assuming a concentration range of < 2 to 7,000 mg/kg soil and average ingestion of 50 mg soil/day, the average manganese intake of a 70-kg adult would be <0.0014 to 5 ：g/kg-day. The corresponding intake for a 10-kg child consuming 100 mg of soil/day would be <0.02 to 70 ：g/kg-day (U.S. EPA, 2003a).

2.3 Air

Air levels of manganese compounds vary widely depending on the proximity of point sources such as ferroalloy production facilities, coke ovens, or power plants. Average ambient levels near industrial sources have been reported to range from 220 to 300 nanograms of manganese per cubic meter (ng Mn/m^3), while levels in urban and rural areas without point sources have been reported to range from 10 to 70 ng Mn/m^3 (Barceloux, 1999). Existing data indicate that little difference is found between ambient manganese levels in areas where MMT is used in the gasoline and areas where MMT is not used (Lynam et al., 1999). The U.S. EPA estimated 40 ng Mn/m^3 as an average annual background concentration in urban areas based on measurements in 102 U.S. cities (U.S. EPA, 1990).

2.4 Food

Manganese is found in a variety of foods including many nuts, grains, fruits, legumes, tea, leafy vegetables, infant formulas, and some meat and fish. Food is the most important source of manganese exposure in the general population (ATSDR, 2000; IOM, 2002; U.S. EPA, 2003a).

Heavy tea drinkers may have a higher manganese intake than the general population. An average cup of tea may contain 0.4 to 1.3 mg manganese (ATSDR, 2000). In addition to dietary sources, approximately 12% of the adult population of the U.S. consumed manganese supplements in 1986 (Moss et al., 1989). The median amount of manganese in these dietary supplements was determined to be 2.4 mg/day, similar to the amount of the element consumed in the diet (based on survey information from the Third National Health and Nutrition Estimation Survey; IOM, 2002).

Freeland-Graves et al. (1987) have suggested a daily intake range of 3.5 to 7 mg Mn/day for adults based on a review of human studies. After reviewing dietary surveys, Greger (1999) presented a range for average intakes from adult Western and vegetarian diets of 0.7 to 10.9 mg Mn/day.

Infant formulas contain 50 to 300 ：g/L manganese (Collipp et al., 1983), compared to human milk which contains approximately 3.5 to 15 ：g/L manganese (ATSDR, 2000; U.S. EPA, 1997). Assuming an intake of 742 millilitres (mL) of breast milk/day (U.S. EPA, 1996a), a breast-fed infant would have an estimated daily manganese intake of 2.6 to 11.1 ：g/day. An infant consuming the same volume of infant formula would have an estimated daily manganese intake of 37.1 to 223 ：g/day. Assuming an average weight of 6 kg for an infant of age 6 months, the weight-adjusted average daily intake would range from 0.4 to 1.85 ：g/kg-day for breast-fed infants. The corresponding weight-adjusted intake for a formula-fed infant would be 6.2 to 37.2 ：g/kg-day. Given the high manganese content of milk-based formula, the underexposure of infants to manganese appears less probable than their overexposure (Davidsson et al., 1989a; Dörner et al., 1987; Keen et al., 1986). Once solid foods are introduced, however, the contribution of manganese intake from milk becomes less significant.

In addition to concentration, an important consideration for determining human exposure to manganese from food is bioavailability (Kies, 1994). Several factors can influence the degree to which manganese in foods is absorbed following ingestion. These include intake of dietary fiber, oxalic acids, tannins, and phytic acids, which tend to decrease manganese absorption (Gibson, 1994; U.S. EPA, 2003a), as well as possibly sex-specific iron status (low iron can result in increased manganese absorption; Finley, 1999 while high levels of iron can inhibit manganese uptake). In addition, the status of the GI tract (e.g., the presence of material in the GI tract - fed vs fasted) also affects bioavailability.

Manganese Intake

Adequate Intake (AI) values have been determined for manganese by the Food and Nutrition Board of the Institute of Medicine as follows: 3 :g/day for infants 0-6 months, 0.6 mg/day for infants 7-12 months, 1.2 mg/day for children 1-3 years, 1.5 mg/day for children 4-8 years, 1.9 mg/day for boys 9-13 years, 2.2 mg/day for boys 14-18 years, 1.6 mg/day for girls 9-18 years, 2.3 mg/day for men 19 years or older, 1.8 mg/day for women 19 years or older, 2 mg/day during pregnancy, and 2.6 mg/day during lactation (IOM, 2002).

Adequate Manganese Intakes for Men, Women and Children

Age Group	Males	Females
Infants, 0-6 months	3 :g/day	3 :g/day
Infants, 7-12 months	0.6 mg/day	0.6 mg/day
Children, 1-3 years	1.2 mg/day	1.2 mg/day
Children, 4-8 years	1.5 mg/day	1.5 mg/day
Boys, 9-13 years	1.9 mg/day	--
Boys, 14-18 years	2.2 mg/day	--
Girls, 9-18 years	--	1.6 mg/day
Adults, $19 years	2.3 mg/day	1.8 mg/day
Women, pregnant (lactating)	--	2 mg/day (2.6 mg/day)

According to IOM, the AI for infants (newborn to 6 months) was set based on "an average manganese concentration of 0.0035 mg/L in human milk" and an average milk consumption of 0.78 L/day. As indicated previously, the manganese concentration in human milk varies. For example, ATSDR (2000) listed a manganese concentration in human milk ranging from 0.003 to 0.01 mg/L, and U.S. EPA (1997), from 0.007 to 0.015 mg/L. Assuming an intake of 0.78 liters milk per day, an infant (0 to 6 months) would ingest 0.003 to 0.012 mg Mn/day from human milk (using the minimum and maximum values in the two concentration ranges); the AI set by the IOM (i.e., 0.003 mg/day) is at the lower end of this range.

Tolerable Upper Intake

The IOM (2002) also set a tolerable upper intake level of 11 mg/day for adults, based on a recent review (Greger, 1999) which stated that the average manganese intake for adults eating typical Western and vegetarian diets in various surveys ranged from 0.7 to 10.9 mg Mn/day. Davis and Greger (1992) reported that women given daily supplements of 15 mg manganese (as an amino acid-chelated manganese supplement) for 90 days experienced no effects other than a significant increase in lymphocyte manganese-dependent superoxide dismutase, a "biomarker" that increases in direct relation to manganese exposure (Greger 1998, 1999). There are insufficient data to set tolerable upper intakes for infants or children.

2.5 Environmental Fate

Manganese compounds may be present in the atmosphere as suspended particulates resulting from industrial emissions, soil erosion, volcanic emissions, application of manganese-containing pesticides, and the burning of MMT-containing gasoline (IPCS, 1999). Early analysis of emissions suggested that manganese from combustion of MMT is emitted primarily as manganese tetroxide (Mn_3O_4; Ter Haar et al., 1975, as cited in ATSDR, 2000). However, more recent testing suggests that when very low levels of MMT are combusted (i.e., concentrations comparable to the currently allowed levels), manganese is emitted primarily as manganese phosphate and sulfate. The reported formal charge of the emitted manganese is +2.2, with a mass median aerodynamic diameter of 1 to 2 microns (Ethyl Corporation, 1997, as cited in Lynam et al., 1999). Uncombusted MMT rapidly decomposes to manganese oxide, carbon dioxide, and organic compounds in the atmosphere and has a half-life of only a few seconds in the presence of sunlight (Lynam et al., 1999; Zayed et al., 1999). Because particle size is small, atmospheric manganese distribution can be widespread. These particles will eventually settle out into surface waters or onto soils via the process of dry deposition. Little information is available on the chemical reactions of atmospheric manganese, but it is expected to react with sulfur and nitrogen dioxide. The half-life of manganese in air is only a few days (ATSDR, 2000).

The primary sources for surface and ground water releases are industrial facility effluent discharge, landfill and soil leaching, and underground injection. Manganese, in the form of potassium permanganate, may be used in drinking water treatment to oxidize and remove iron, manganese, and other contaminants (ANSI/NSF, 2000). Transport and partitioning of manganese in water is dependent on the solubility of the manganese form. In surface waters, manganese occurs in both dissolved and suspended forms, depending on such factors as pH, anions present, and oxidation-reduction potential (ATSDR, 2000). Often, manganese in water will settle into suspended sediments. Anaerobic groundwater often contains elevated levels of dissolved manganese. The divalent form (Mn^{2+}) predominates in most water at pH 4–7, but more highly oxidized forms may occur at higher pH values or result from microbial oxidation (ATSDR, 2000). It can bioaccumulate in lower organisms (e.g., phytoplankton, algae, mollusks, and some fish), but not in higher organisms, and biomagnification in food-chains is not expected to be significant (ATSDR, 2000). Little information is available on the biodegradation of manganese-containing compounds in water, but factors such as pH and temperature are important for microbial activities.

Approximately 91% of environmental manganese is released to soil. The main source of this release is land disposal of manganese-containing wastes. The ability of manganese compounds to adsorb to soils and sediments is contingent upon the cation exchange capacity and organic content of the soil or sediment. Adsorption can vary widely based on differences in these two factors. Oxidative microbial activity may increase the precipitation of manganese minerals and increase the dissolution of manganese in subsurface environments.

2.6 Summary

The greatest exposure to manganese is usually from food. Adults consume between 0.7 and 10.9 mg/day in the diet, with even higher intakes being associated with vegetarian diets (Freeland-Graves et al., 1987; Greger, 1999.; Schroeder et al., 1966) or the consumption of large amounts of tea.

Manganese intake from drinking water is normally substantially lower than intake from food. At the median drinking-water level of 10 ：g/L determined in the National Inorganic and Radionuclide Survey (NIRS), the intake of manganese would be 20 ：g/day for an adult, assuming a daily water intake of 2 L. Exposure to manganese from air is generally several orders of magnitude less than that from the diet, typically around 0.04 ng/day on average (U.S. EPA, 1990), although this can vary substantially depending on proximity to a manganese source.

3.0 CHEMICAL AND PHYSICAL PROPERTIES

Manganese can exist in multiple oxidative states; the most environmentally and biologically important manganese compounds are those that contain Mn^{2+}, Mn^{4+}, and Mn^{7+} (U.S. EPA, 1994). The physical and chemical properties of different manganese compounds vary substantially, as demonstrated in Table 1 on the next page.

ORGANOLEPTIC PROPERTIES

At concentrations exceeding 0.1 milligrams per litre (mg/L), the manganese ion imparts an undesirable taste to beverages and stains plumbing fixtures and laundry (Griffin, 1960). When manganese (II) compounds in solution undergo oxidation, manganese precipitates, resulting in encrustation problems. At concentrations as low as 0.02 mg/L, manganese can form coatings on water pipes that may later slough off as a black precipitate (Bean, 1974). The U. S. and a number of other countries have set secondary standards of 0.05 mg/L for manganese. This is an aesthetic level above which problems with discoloration may occur.

Table 1.
Chemical and Physical Properties of Manganese and Common Manganese Compounds

	Mn	$MnC1_2$	Mn_3O_4	MnO_2	$KMnO_4$
CAS No.	7439-96-5	2145-07-3	1317-35-7	479-93-7	7722-64-7
Valance	0	+2	+2 and +3	+4	+7
Molecular Weight	54.9	125.8	228.8	86.9	158
Synonyms	Elemental manganese	Manganese dichloride; Manganese chloride; Manganese (II) chloride	Manganese oxide; Manganese (II,III) oxide; Manganese tertoxide	Manganese dioxide; Black dioxide; Cement black; Manganese peroxide; Manganese (IV) oxide	Potassium permanganate; permanganic acid, potassium salt
Physical State (25°C)	Solid	Solid	Solid	Solid	Solid
Boiling Point (°C)	1962	1190	—	—	—
Melting Point (°C)	1244	650	1564	535 (loses oxygen)	240
Density (g/cm^3)	7.4	2.98	4.86	5.026	2.703
Vapor Pressure (20°C)	1.9	—	—	—	—
Water Solubility (g/100 mL)	Decomposes	723 (25°C)	insoluble	insoluble	63.8 (20°C)
Log Octanol/Water Partition – Coefficient (Log K_{ow})	—	—	—	—	—
Taste Threshold	—	—	—	—	—
Odor Threshold (air)	—	—	—	—	—
Conversion Factor	—	—	—	—	—

— No date available.

4.0 TOXICOKINETICS

The absorption, distribution, metabolism and excretion of manganese in the body are reviewed, discussed, and summarized in Greger (1999), Kies (1994), U.S. EPA (1984; 1993; 2003a), and ATSDR (2000). Age, chemical species, dose, route of exposure, and dietary conditions all affect manganese absorption and retention (Lönnerdal et al., 1987). Uptake of dietary manganese appears to be influenced by several dose-dependent processes: biliary excretion, intestinal absorption, and intestinal elimination.

4.1 Absorption

Manganese speciation and the route of exposure affects its absorption (Andersen et al., 1999; Tjälve et al., 1996). Thomson et al. (1971) and Gibbons et al. (1976) reported that the divalent form of manganese is absorbed most efficiently. However, as Bales et al. (1987) reported, the efficiency of absorption also varies for different manganese salts with manganese

chloride more efficiently absorbed than the sulfate or acetate salts. Recent studies show that significant differences exist in the amounts of manganese that are absorbed across different exposure routes, with inhaled manganese being absorbed more rapidly and to a greater extent than ingested manganese (Roels et al., 1997; Tjälve et al., 1996). Very little manganese is absorbed through the skin. Absorption of manganese via inhalation, intratracheal instillation, or intravenous infusion bypasses the control processes of the gastrointestinal tract. Absorption from inhalation exposure is mainly a function of particle size with smaller particles reaching the lower airways where they can be absorbed and larger particles deposited in the upper airways where they are subject to possible mucociliary transport to the throat followed by entrance into the gastrointestinal tract.

From animal experiments, it is known that inhaled manganese (even the insoluble MnO_2) is transported in a retrograde direction from the olfactory epithelium to the striatum of the brain (Gianutsos et al., 1997; Roels et al., 1997). During its uptake through the olfactory nerve endings (Bench et al., 2001; Brenneman et al., 2000; Tjälve et al., 1996; Vitarella et al., 2000) it may damage the astrocytes (Henriksson and Tjälve, 2000). After peroral uptake, manganese, like all other metals, is filtered from the blood by the choroid plexus (Ingersoll et al., 1995; Zheng et al., 1991). The retrograde transport of manganese through the olfactory epithelium directly into
certain regions of the central nervous system or the brain could explain why the safe dose following inhalation exposure is much lower than after oral ingestion (Wang et al., 1989). The following sections discuss absorption of manganese following oral exposure only.

Absorption of manganese across the gastrointestinal tract is regulated by normal physiological processes to help maintain manganese homeostasis. Manganese absorbed in the divalent form from the gut via the portal blood is complexed with plasma proteins that are efficiently removed by the liver. A 7-week study in which 7 adult males ingested high- fiber diets containing 12.0 to 17.7 mg Mn/day (0.17 to 0.25 mg/kg-day) found that an average of 7.7% $\pm$ 6.3% of the manganese was absorbed during weeks 5 to 7, with no measurable net retention of manganese (Schwartz et al., 1986). Similarly, an average absorption of 8.4% $\pm$ 4.7% was observed in 7 adults ingesting infant formula containing manganese (Sandström et al., 1986).

Manganese retention may be greater for young animals and infants (Keen et al., 1986) due to the fact that the biliary system, the primary route of excretion, is not completely developed in human infants (Lönnerdal, 1994). Keen et al. (1986) demonstrated a strong effect of age on
intestinal manganese uptake and retention. Sprague-Dawley rat pups were fasted overnight and then intubated with 0.5 mL of human milk containing 0.005 mg ^{54}Mn/mL. Manganese retention was highest ($\geq$ 80%) in pups less than 15 days old. In older pups (16-19 days old), the average retention was 40%. Lönnerdal et al. (1987) showed that manganese uptake from brush border membranes was higher in 14-day-old rats than in 18-day-old rats. Although Rehnberg et al. (1985) found that younger animals had a slower distal intestinal transit time than older animals (potentially contributing to a higher proportional uptake), Bell et al. (1989) showed that the uptake rate was similar in pre- and post-weanling animals, suggesting that age-dependent differences in manganese retention were not due to immature intestinal transport mechanisms. Fechter (1999) determined that neonatal mice are unable to maintain manganese homeostasis until 17-18 days of age. When considered together, these data indicate that human infants, at

certain ages, may not have developed the capacity to completely excrete manganese following ingestion.

Davidsson et al. (1989b) studied whole-body retention of ^{54}Mn in adult humans after intake of radiolabeled infant formula. These authors observed reproducible retention figures at day 10, after repeated administrations of the labeled formula to six subjects. Absorption ranged from 0.8-16%, with a mean value of 5.9 $\pm$ 4.8%. This range corresponds to a 20-fold difference between the highest and lowest values. Retention at day 10 ranged from 0.6-9.2%, with a mean value of 2.9 $\pm$ 1.8%, when measured in 14 healthy individuals. These results suggest substantial variation in absorption between individuals.

The absorption of manganese is closely linked to iron absorption; iron-deficient diets lead to an increased absorption of both iron and manganese (Finley, 1999; Sandström et al., 1986; Thomson et al., 1971). Rehnberg et al. (1982) administered dietary Mn_3O_4 (450, 1,150, or 4,000 ppm Mn) to young rats. These authors amended the basal diets with varying levels of iron, and demonstrated that iron deficiency promoted the intestinal absorption of manganese. Conversely, manganese absorption was inhibited by large amounts of dietary iron. Absorption is also related inversely to the level of calcium in the diet (Lutz et al., 1993; McDermott and Kies, 1987; Kies, 1994; Schroeder et al., 1966). Johnson et al. (1991) studied the absorption of radiolabeled manganese from various plant foods in adult men and women and reported that the absorption values ranged from 1.4 to 5.5% and were significantly lower than the mean values of 7.8 to 10.2% from controls ($MnC1_2$ dissolved in water). Certain constituents of tea, such as tannins, can result in reduced manganese absorption (Freeland-Graves and Llanes, 1994). Other factors can also influence the degree to which manganese in foods is absorbed upon ingestion. These include intake of dietary fiber, oxalic acids, and phytic acids as well as contents in the gut, which tend to decrease manganese absorption (Gibson, 1994; U.S. EPA, 2003a).

4.2 Distribution

Manganese is present in all tissues of the body, the highest levels usually being found in the liver, kidney, pancreas, and adrenals (Sumino et al., 1975; Tipton and Cook, 1963). Intermediate concentrations occur in the brain, heart and lungs (ATSDR, 2000), with accumulations preferential in certain regions of the brain in infants and young animals (Kontur and Fechter, 1988; Zlotkin and Buchanan, 1986). The lowest concentrations of manganese are observed in bone and fat. Some data suggest that tissues rich in mitochondria (for example, liver, kidney, and pancreas) contain higher levels of manganese (Kato, 1963; Maynard and Cotzias, 1955).

After absorption into the blood system by routes other than the gastrointestinal tract, manganese is apparently oxidized, and the trivalent manganese binds to transferrin. Transferrin-bound trivalent manganese is not as readily removed by the liver, as are protein complexes with divalent manganese. Thus, manganese delivered by routes other than the gastrointestinal tract would be available for uptake into tissues for a longer period of time than the orally administered manganese, leading to quantitative differences in tissue uptake (Andersen et al., 1999).

Factors that may alter tissue distribution include co-exposure to other metals (Shukla and Chandra, 1987) and the chemical form (Gianutsos et al., 1985). Age may also be a factor. Animal studies have shown that manganese crosses the blood-brain barrier in neonates at a rate four times higher than that in adults (Mena, 1974).

4.3 Metabolism

As a metallic element, manganese does not undergo metabolic conversion to other products. However, manganese has the potential to exist in several oxidation states in biological systems. Circumstantial evidence from the study of manganese-containing enzymes and from electron spin trapping experiments suggests that manganese undergoes conversion from Mn(II) to Mn(III) within the body (ATSDR, 2000). The conversion from Mn(II) to Mn(III) appears to be catalyzed by the "-globulin protein ceruloplasmin (Andersen et al., 1999).

A small fraction of absorbed manganese is present as the free ion. However, manganese readily forms complexes with a variety of organic and inorganic ligands. The complexes formed include 1) low molecular weight complexes with bicarbonate, citrate or other ligands; 2) an exchangeable complex with albumin; and 3) tightly bound complexes with proteins such as transferrin and "$_2$-macroglobulin. In addition, manganese can assume a structural role in metalloproteins such as mitochondrial superoxide dismutase, pyruvate decarboxylase, and liver arginase. Manganese also plays a catalytic or regulatory role in enzymatic reactions involving select hydrolases, dehydrogenases, kinases, decarboxylases and transferases.

4.4 Excretion

Manganese is almost entirely eliminated in the feces, with only a small proportion (0.1-2%) being excreted in the urine (Davis and Greger, 1992). Fecal manganese is comprised of unabsorbed dietary manganese plus manganese excreted in bile. In humans, elimination is biphasic, with half-lives of 13 and 37 days (Davidsson et al., 1989b; Sandström et al., 1986). Sweat, hair and the milk of lactating mothers also contribute to excretion (Roels et al., 1992).

5.0 HEALTH EFFECTS DATA

Manganese is an essential element for many living organisms, including humans. It is necessary for proper functioning of some enzymes (manganese superoxide dismutase) and for the
activation of others (kinases, decarboxylases, etc). Adverse health effects can be caused by inadequate intake or over exposure. Manganese deficiency in humans appears to be rare because manganese is present in many common foods. Animals experimentally maintained on manganese-deficient diets exhibit impaired growth, skeletal abnormalities, reproductive deficits, ataxia of the newborn, and defects in lipid and carbohydrate metabolism (Keen et al., 1999; Hurley and Keen, 1987; U.S. EPA, 1984).

The health effects from over-exposure of manganese are dependent on the route of exposure, the chemical form, the age at exposure, and an individual's nutritional status.

Irrespective of the exposure route, the nervous system has been determined to be the primary target with neurological effects generally observed.

5.1 Human Studies

Humans are exposed to inorganic manganese compounds in food and water, but there are few reports of adverse effects in humans from ingesting excess manganese. Most human studies reporting adverse effects are of inhalation exposure. There is conclusive evidence from occupational studies in humans that inhalation exposure to high levels of manganese compounds can lead to a disabling syndrome of neurological effects referred to as "manganism." Although it
is typical for symptoms to occur after several years of exposure, some individuals may begin to show signs after 1-3 months of exposure (Rodier, 1955).

5.1.1 Short-term Exposure Studies

Neurological

Kawamura et al. (1941) reported health effects resulting from the ingestion of manganese-contaminated well water for an estimated 2-3 months by 25 individuals. The source of contamination was identified as leachate from approximately 400 dry cell batteries buried near
the drinking water well. The concentration of manganese in the well water was analyzed 7 weeks after the first case appeared and was determined at that time to be ~14 mg Mn/L (as Mn_3O_4). However, when re-analyzed 1 month later, the levels were decreased about half. Therefore, the actual exposure was probably to drinking water containing ~28 mg Mn/L or higher. Assuming a daily water intake of 2 L, with a minimum of 2 mg Mn from food, a dose of at least 58 mg Mn/day is estimated. This exposure level is quite uncertain and it is estimated that it is around 25-30 times the level considered to be safe and adequate by the Food and Nutrition Board of the Institute of Medicine (IOM, 2002).

Health effects reported by Kawamura et al. (1941) included lethargy, increased muscle tonus, tremor and mental disturbances. Out of 25 people examined, 15 had symptoms. Five cases were considered severe, 2 cases were categorized as moderate, and 8 cases were described as mild. The most severe symptoms were observed in the elderly. Younger people were less affected, and symptoms of intoxication were completely absent in young children (age 1 to 6 years). Three deaths occurred, including one from suicide. Upon autopsy, the concentration of manganese in the brain of one person was found to be 2 to 3 times higher than concentrations measured in two unexposed individuals (controls). Extreme macroscopic and microscopic changes were seen in the brain tissue, especially in the globus pallidus. Although there were also
elevated levels of zinc in the well water, the authors concluded that the zinc appeared to have no relation to the observed symptoms or tissue pathology. This conclusion was largely based on the observation of morphological changes in the corpus striatum, which are characteristic of manganese poisoning, but are not a feature of zinc poisoning.

While toxicity in the Kawamura et al. (1941) study is attributed to manganese, several

aspects of the observed health effects are inconsistent with traits of manganism observed in humans following chronic inhalation exposure. Inconsistencies include the rapid onset of symptoms and rapid progression of the disease. Two adults who came to tend the members of one family developed symptoms within 2 to 3 weeks. The course of the disease was very rapid, progressing in one case from initial symptoms to death in 3 days. Some survivors recovered prior to significant decreases in the manganese concentration of the well water which resulted when the dry-cell batteries were removed from the site. This pattern contrasts with the longer latency period and irreversible damage caused by inhalation exposure to manganese (as observed in several occupational exposure studies; ATSDR, 2000). These observations may represent differences in the pharmacokinetics of ingested versus inhaled manganese, but there is little information to support this conclusion. Although the individuals in the Kawamura et al. (1941) study were clearly exposed to high levels of manganese, it is possible that additional factors contributed to the observed effects (ATSDR, 2000; U.S. EPA, 1993).

Symptoms resembling Parkinson's disease have also been noted in an individual who ingested 1.8 mg/kg-day potassium permanganate for 4 weeks (Bleich et al., 1999; Holzgraefe et al., 1986). The symptoms occurred 9 months after the exposure.

5.1.2 Long-term Exposure Studies

Neurological

The neurological effects of inhaled manganese have been well documented in humans chronically exposed to elevated levels in the workplace (ATSDR, 2000; Canavan et al., 1934; Cook et al., 1974; Roels et al., 1999). The syndrome known as “manganism” is caused by exposure to very high levels of manganese dusts or fumes and is characterized by a “Parkinson-like syndrome” including weakness, anorexia, muscle pain, apathy, slow speech, monotonous tone of voice, emotionless “mask-like” facial expression, and slow clumsy movement of the limbs. In general, these effects are irreversible. Some motor functions may already be affected following chronic exposure to levels of manganese $\leq$ 1 mg/m^3 (if the inhaled manganese is respirable), but individuals in these situations have not shown the overt, clinical symptoms of those exposed to much higher levels (Mergler et al., 1994; Roels et al., 1992).

By the oral route, manganese is often regarded as one of the least toxic elements, although there is some controversy as to whether the neurological effects observed with inhalation exposure also occur with oral exposure. Several case reports of oral exposure to high doses of manganese have described neurological impairment as an effect, but the quantitative and
qualitative details of exposure necessary to establish direct causation are lacking. An individual who took large mineral supplements over several years displayed symptoms of manganism (Banta and Markesbery, 1977).

An epidemiological study was conducted in Greece to investigate the possible correlation between long-term (i.e., more than 10 years) manganese exposure from drinking water and neurological effects in elderly people (Kondakis et al., 1989). The levels of manganese in the drinking-water of 3 different geographical areas were 3.6-14.6 ：g/L in the control area and 81-253 ：g/L and 1800-2300 ：g/L in the manganese-containing areas. The total population in

the three areas being studied range from 3200 to 4350 people. The study included only individuals over the age of fifty drawn from a random sample of 10% of all households. The number of subjects sampled were 62, 49, and 77 for control, low-, and high-exposed groups. The authors performed a neurological examination of the subjects (weakness/fatigue, gait disturbances, tremors, dystonia, etc.) and expressed the results as composite scores. They found no differences in the manganese content in the blood, but a statistically-significant difference in both the manganese content in the hair and composite neurological scores between the high-exposed area (concentrations 1800-2300 ：g/L) and the control area, suggesting neurological impairment in the high exposed area. The investigators estimated a dietary intake of 5-6 mg/day (personal communication), but data were not provided. Because of the uncertainty in the amount of manganese in the diet, and possible exposure from other sources such as dust, and little information on nutritional status and other possible confounding variables, it is difficult to estimate the total exposure to manganese.

The incidence of motor neuron disease (MND) in a small Japanese town was positively correlated with a significantly increased manganese concentration in local rice and a low magnesium concentration in the drinking-water (Iwami et al., 1994). The study did not provide good estimates of overall exposure to manganese in either the control population or the population with MND; therefore, development of the disease could not be conclusively attributed
to manganese exposure. The simultaneous exposure to manganese and the deficiency of other essential minerals was possibly the reason for the enhanced incidence of neurotoxicological symptoms found in this study in Japan and in another population in Guam (Florence and Stauber, 1989; Yoshida et al., 1988).

There was also some speculation on a link between mineral deficiency, enhanced oral manganese uptake and Mn-catalyzed denaturation of copper-free prion protein to the pathogenic prion protein (Brown et al., 2000), which might explain the enhanced occurrence of some prion diseases in certain world regions (Purdey, 2000).

Goldsmith et al. (1990) investigated a Parkinson's disease cluster within southern Israel in which the prevalence of the disease was increased among persons 50 to 59 years old, suggesting an early onset. Well water and soils in the region reportedly contained high levels of manganese, although no quantitative data were provided. In addition, the manganese-containing fungicide Maneb was commonly used in the area. Several factors limit the use of this study for evaluation of the human health effects of excess manganese exposure. Lack of environmental concentration data prevent reliable estimation of exposure rates. Potentially confounding factors include the high levels of aluminum, iron, and other metals in the soil and water, and the use of the herbicide paraquat in the area (ATSDR, 2000). Paraquat is structurally related to N-methyl-4-phenyl-1,2,3,6-tetrahydropyridine (MPTP), which causes irreversible symptoms of parkinsonism in humans.

Contrary to the above studies, another long-term drinking-water study in a rural northern area of Germany (Vieregge et al., 1995) found no neurological effects following ingestion of increased manganese. No significant differences in neurological tests were found in older people (41 subjects older than 40 years with a mean age of 57.5) consuming well water containing at least 0.3 mg/L of manganese (0.3 to 2.16 mg/L of manganese) for 10 to 40 years. The control

group (74 subjects, mean age 56.9 years) was exposed to water containing less than 0.05 mg/L of manganese. Subjects of both groups were randomly selected and matched with respect to age, sex, nutritional habits, and drug intake. However, like the Kondakis et al. (1989) study, this study lacks exposure data from other routes and sources, and the manganese concentration range in the water was very broad.

Two other studies involving ingestion exposure to manganese reported no increases in adverse health effects. In one area of Japan, a manganese concentration of 0.75 mg/L in the drinking-water supply had no apparent adverse effects on the health of consumers (Suzuki, 1970). No signs of toxicity were observed in patients given 30 mg of manganese citrate (9 mg of manganese) per day for many months (Schroeder et al., 1966).

One epidemiological study has been identified which attempts to link potential overexposure to ingested manganese with neurotoxicity in children. Adverse neurological effects (decreased performance in school and in neurobehavioral examinations of the WHO core test battery) were reported in 11- to 13-year-old children who were exposed to excess manganese through ingestion of contaminated water and consumption of food made of wheat fertilized with sewage water (He et al., 1994; Zhang et al., 1995). The exposed and control groups were both from farming communities and were matched for age, sex, grade, family income level, and parental education level. The average manganese concentration of the drinking-water was 0.241 mg/L for the exposed area compared to the control level of 0.04 mg/L. However, the total exposure data, including manganese exposure from food, water and air, exposure duration, as well as other confounding factors and the nutritional status of the children were not well-characterized.

A recently published case study (Woolf et al., 2002) reported increased manganese levels in the hair and blood of a 10-year-old child exposed to increased manganese in drinking water. The child had been ingesting drinking water supplied by a well for 5 years prior to a clinic visit for evaluation of over-exposure to manganese. In addition, the family lived in a house near a toxic waste dump. An evaluation of the well water performed four months prior to the child's health assessment indicated that manganese and iron levels in the water were both elevated, with concentrations of 1.21 (reference level, 0.05 mg/L) and 15.7 mg/L, respectively. The child's whole blood and serum manganese levels were 3.82 ：g/100 mL (reference normal, <1.4 ：g/100 mL) and 0.90 ：g/100 mL (reference normal, <0.265 ：g/100 mL), respectively. The child's hair manganese level was 3,091 ppb of washed, acid-digested hair (reference normal, <260 ppb hair). Although the child's 16-year-old brother did not exhibit elevated blood manganese, he did have increased manganese in his hair. The 10-year-old did not exhibit any clinical effects of manganese over-exposure (cogwheeling, abnormally high muscle tone, fixed facies, etc.) and had good balance with closed eyes, although he did have trouble coordinating rapid alternating motor movements (this deficiency is consistent with the test performance of occupational workers chronically exposed to airborne manganese). Magnetic resonance imaging (MRI) of the child's brain did not indicate any hyperintense signaling of the globus pallidus, basal ganglia, mid-brain or pons, which would indicate manganese deposition in these areas of the brain. Selective deposition of manganese in the globus pallidus and basal ganglia has been shown to occur in children and adults with chronic manganese overexposure (Devenyi et al., 1994; Hauser et al., 1996). The absence of the signaling argues against manganese toxicity. Results from a battery of neuropsychologic tests on the child indicated that global cognition was unimpaired.

However, the child had difficulties in both visual and verbal memory, which the study authors considered consistent with a deficit in free retrieval skills. The family was counseled to use bottled water for drinking and cooking; one month after the initial test, the child's whole blood manganese level was reduced to 1.71 ：g/100 mL (Woolf et al., 2002). It is difficult to determine the total exposure from this study.

Results from studies of an Aboriginal population in Groote Eylandt have been cited as additional evidence for a relationship between elevated manganese exposure, violent behavior, and adverse health effects. The soil on this Australian island is exceptionally high in manganese (40,000 to 50,000 ppm), and the fruits and vegetables grown in the region are reported to contain elevated concentrations of the element. High alcohol intake, anemia, and a diet deficient in zinc and several vitamins (Florence and Stauber, 1989) may contribute to increased uptake and
retention of manganese. The proportion of arrests in this native population is the highest in Australia, and high incidences of stillbirths and congenital malformations, as well as a high occurrence of Parkinson-like neurobehavioral syndrome, have been observed (Cawte and Florence, 1989; Kilburn, 1987). Clinical symptoms consistent with manganese intoxication are present in about 1% of the inhabitants. Quantitative data on oral intake have not been reported, but elevated concentrations of manganese have been determined in the blood and hair of the Aborigines (Stauber et al., 1987). However, Stauber et al. (1987) did not find a correlation between hair levels of manganese and the severity of neurological symptoms in individuals. A study of the neurologic status of the Aborigines in Groote Eylandt identified two general syndromes. One syndrome is characterized by muscle atrophy and weakness, while the other is characterized by ataxia and oculomotor disturbances (Kilburn, 1987). Although an association of
adverse health effects with elevated manganese exposure is suggested by these observations, the small population of Groote Eylandt and the difficulty in defining an appropriate control population have prevented the identification of statistically-significant trends (U.S. EPA, 1993).

Several of the studies above utilized hair analysis as a method for estimating exposure to manganese. ATSDR (2000) has outlined several potential limitations to the use of hair analysis. The normal cycle of hair growth and loss restricts its usefulness to a period of a few months following exposure. External contamination of hair by dye, bleaching agents, or other materials may result in values which are not representative of absorbed doses. Further, the affinity of manganese for pigmented tissue may result in variations of manganese concentration with hair color.

Kihira et al. (1990) have associated manganese with amyotrophic lateral sclerosis (ALS). Spinal cord samples from ALS patients were found to have higher manganese concentrations in the lateral fasciculus and anterior horn than in the posterior horn. ALS patients also exhibited a positive correlation between manganese and calcium spinal cord content, while controls exhibited a negative correlation. It was suggested that an imbalance between manganese and calcium in ALS patients plays a role in functional disability and neuronal death. This study needs to be interpreted with caution, however, because it is not conclusive that the high manganese concentrations in these patients preceded the onset of the disease.

Creutzfeldt-Jakob Disease (CJD) clusters in central Slovakia have occurred near areas of

high manganese in conjunction with low copper (Purdey, 2000). The level of manganese in natural uncultivated pasture in CJD-endemic areas was 210 ppm dry weight in comparison to CJD-free areas where the level was 85 ppm dry weight. The levels of manganese in pine needles and some specific crops were also measured and were approximately 1.5-16 times greater in the CJD-endemic regions (Purdey, 2000). It was suggested that manganese replaces copper in CNS prion proteins (PrP) causing a protease-resistant, misfolded PrP. Brown et al. (2000) determined that manganese can replace copper in recombinant PrP and reported that the PrP appears less stable and quickly converts to a misfolded form. Although the manganese-loaded PrP initially had a similar structure and activity as copper-loaded PrP, aging of the manganese-loaded PrP caused it to become proteinase-resistant and lose function.

Reproductive and Developmental Studies

Male workers afflicted with clinically identifiable symptoms of manganism also have loss
of libido and impotence from occupational exposure to manganese for 1-21 years (Emara et al., 1971; Mena et al., 1967; Rodier, 1955; Schuler et al., 1957). Impaired fertility, as measured by fewer children/married couple, has been observed in male workers exposed for 1-19 years to manganese dust at levels that did not produce obvious manganism (0.97 mg/m^3; Lauwerys et al., 1985).

Three groups of men occupationally exposed to manganese for l or more years (63 miners or ore processors, 38 electric welders in mechanical fields, and 110 electric welders in shipbuilding) were reported to have increased semen liquification time and decreased sperm count and viability (Wu et al., 1996). Matched controls consisted of 99 men who were employed in the same occupation, but were not exposed to manganese or other reproductive toxins. Manganese levels, as well as those of a few other metals, were increased in the semen of the exposed group. Although this study suggests that manganese exposure may cause sperm toxicity, a stepwise regression analysis of the other metals present indicated that the higher nickel
concentrations were also associated with lesser semen volume and a greater percentage of deformed sperm. This prevents any conclusive link between manganese and reproductive function.

By contrast, no significant differences in reproductive outcome were found between exposed men and matched controls in a reproductive epidemiology study involving 314 men in a manganese plant (Jiang et al., 1996). The geometric mean airborne manganese concentration was 0.145 mg/m^3 as MnO_2. The incidences of sexual dysfunction were evaluated through researchers' questions and judged by the occurrence of two positive responses to three potential conditions: impotence, abnormal ejaculation (early ejaculation or non-ejaculation), and lack of sexual desire.

No information was found regarding reproductive effects in women following manganese exposure.

Studies are limited regarding developmental toxicity in humans following oral exposures to manganese. Kilburn (1987) reported an increased incidence in birth defects and stillbirths in a

small population of indigenous peoples in Groote Eylandt, Australia. Although the area was rich in manganese deposits and ingestion of excess amounts of the metal was suspected, the study

suffered from a lack of exposure data, small sample sizes, and no suitable control group. Further,
inhalation exposure to manganese could not be ruled out.

Cancer and Mutagenicity Studies

Mutagenicity

The genotoxic potential of high manganese exposure in humans is not known (IPCS, 1999). Elias et al. (1989) found an increase in the incidence of chromosomal aberration in metal active gas welding workers who had been welding for 10-24 years. Occupational exposure to nickel, as well as manganese, was reported. Since nickel is known to cause chromosomal aberration via inhalation, the results could not be attributed solely to the influence of manganese.

Carcinogenicity

No studies are available on the potential carcinogenicity of high exposure to manganese in humans (ATSDR, 2000).

Variation In Human Sensitivity

Individuals that have an impaired excretion and increased retention would be sensitive to manganese toxicity. Reasons for such susceptibility are genetic make-up, developmental stage, age, health and nutritional status. First, individuals with decreased excretion or impaired liver function can be at risk from exposure to excess manganese because the liver is the main organ for excreting manganese. This group may include the elderly who may have declining organ function, the very young who may have immature and developing organs, and those with liver disease. For example, Devenyi et al. (1994) reported observable neurological signs associated with manganese toxicity in individuals with chronic liver disease. Hauser et al. (1996) reported changes in brain MRI scans in liver failure patients which were identical to those observed in cases of manganese intoxication. Second, individuals with increased retention of manganese may be more sensitive to manganese toxicity including those whose nutritional status causes increased uptake of manganese. For example, the very young are considered a potential sensitive population due to the increased retention of manganese in animals (Keen et al., 1986; Kostial et al., 1978; Rehnberg et al., 1980) and humans (Zlotkin and Buchanan, 1986). This increased retention leads to increased manganese in the tissue, especially in the brain (Kontur and Fechter, 1985, 1988; Kostial et al., 1978; Kristensson et al., 1986; Miller et al., 1975; Rehnberg et al., 1981). This is a concern because the nervous system is the primary target organ. Although some data suggest that infants are potentially more susceptible to the toxic effects of manganese, evidence indicates that individual susceptibility varies greatly. The Kawamura et al. (1941) study suggested that young children (age 1 to 6 years) may be less sensitive to manganese toxicity than adults or older people. Current information is not sufficient to quantitatively assess the susceptibility of the young compared to adults.

Although studies are mixed, the majority have also suggested that the elderly (50 years of age or over) are more susceptible to manganese neurotoxicity than the general population (Kawamura et al., 1941; Rodier, 1955; Tanaka and Lieben, 1969). Loss of neuronal cells due to

aging and/or accumulated damage from other environmental neurotoxicants, as well as less effective homeostatic control, may contribute to this increased susceptibility (Silbergeld, 1982).

5.2 Animal Studies

5.2.1 Short-term Exposure Studies

Lethality

Acute lethality of manganese in animals appears to vary depending on the chemical species and whether exposure is via gavage or dietary ingestion (ATSDR, 2000). Single-dose oral LD_{50} values in adult rats exposed by gavage ranged from 331 mg Mn/kg-day (as manganese chloride; Kostial et al., 1989) to 1,082 mg Mn/kg-day (as manganese acetate; Smyth et al., 1969), while a 14-day exposure of rats to 1,300 mg Mn/kg-day (as manganese sulfate) in feed resulted in no deaths (NTP, 1993).

Manganese compounds administered by parenteral routes generally result in mortality at lower doses. For example, Larsen and Grant (1997) administered a single intravenous dose of 150, 200, 300, or 400 ：mol/kg in saline to male mice (5/group). These doses correspond to 8.2, 11, 16, and 22 mg Mn/kg, respectively. These study authors reported an LD_{50} value of 300 ：mol/kg (16 mg Mn/kg). LD_{50} values for the intraperitoneal route ranged from 14 to 64 mg Mn/kg.

Age may be a factor in susceptibility to acute manganese toxicity. Kostial et al. (1978) found that $MnCl_2$ produced the greatest oral toxicity in the youngest and oldest groups of exposed rats. Roth and Adleman (1975) proposed that the increased susceptibility of older rats may result from a decrease in adaptive responsiveness, which is characteristic of the aging process. Increased susceptibility of younger rats may reflect high intestinal absorption and body retention of manganese.

General Toxicity

In a 14-day oral exposure study, NTP (1993) administered diets containing 0, 3, 130, 6,250, 12,500, 25,000, or 50,000 ppm manganese sulfate monohydrate to F344 rats (5/sex/dose). All rats survived the exposure period. Statistically-significant differences in manganese-treated rats included reduced body weight gain (57% decrease) and final body weight (13% decrease) in the high-dose males when compared to the control group. Decreased leukocyte and neutrophil counts and reduced liver weight were observed in high-dose males and females. The high-dose groups also exhibited diarrhea during the second week of the study. Manganese concentrations in the livers of animals receiving the 50,000 ppm diet were more than twice those of the controls. The NOAEL and LOAEL values based on decreased weight gain (males) and hematological changes were approximately 650 and 1,300 mg Mn/kg-day, respectively.

NTP (1993) also administered diets containing 0, 3, 130, 6,250, 12,500, 25,000, or 50,000 ppm manganese sulfate monohydrate to $B6C3F_1$ mice (5/sex/dose) for 14 days. However, study animals were poorly randomized at the beginning of the study, and no effects clearly attributable to manganese exposure were identified.

Exon and Koller (1975) reported that rats administered as little as 6 mg Mn/kg-day as Mn_3O_4 in feed for 28 days gained only 44% as much weight as control rats over the duration of the study. Since no histopathological changes were observed in the exposed animals, the authors suggested that the decrease in body weight gain might have been due to manganese interference in metabolism of calcium, phosphorous, and iron.

Hepatic

Shukla et al. (1978) administered a dose of 16 mg $MnC1_2 \cdot 4H_2O$/kg (4.4 mg Mn/kg) in drinking water (dose calculated by investigators) to rats for 30 days and evaluated the effect on hepatic enzyme activity. Treated rats revealed significantly decreased succinic dehydrogenase, alcohol dehydrogenase, and $-amylase activity when compared with controls. In contrast, manganese exposure resulted in significantly increased activities of monoamine oxidase (MAO), adenosine triphosphatase, arginase, glutamate pyruvate transaminase (alanine aminotransferase or ALT), ribonuclease, glucose-6-phosphatase, and "-amylase activity in the livers of treated rats.

Hietanen et al. (1981) studied the effect of manganese on hepatic and extrahepatic enzyme activities. Male Wistar rats were exposed to 0.5% Mn (as $MnC1_2$) in the drinking water for 1, 4, or 6 weeks. Assuming an average body weight of 0.35 kg and average water consumption of 0.045 L/day (U.S. EPA, 1986a), this corresponds to an exposure of 0.7 mg Mn/kg-day. Changes in the activity of several enzymes, including aryl hydrocarbon hydroxylase, ethoxycoumarin ?-deethylase, and epoxide hydrase, were observed at 1 week but not at 6 weeks. Enzyme activities were increased in the liver, and decreased in the intestines and kidney.

Neurological

The central nervous system is the chief target of manganese toxicity. Oral doses ranging from 1 to 150 mg per kg of body weight per day produced a number of neurological effects in rats and mice, mainly involving alterations in neurotransmitter and enzyme levels in the brain. These changes were sometimes accompanied by clinical signs, such as changes in coordination and activity level (ATSDR, 2000).

Deskin et al. (1980) studied neurological alteration induced by manganese chloride in neonatal CD rats. Rats were intubated with 1, 10 or 20 mg Mn/kg-day from birth to 24 days old. Manganese administration (10 and 20 mg/kg-day) resulted in a significant elevation of manganese in the hypothalamic area and corpus striatum, but neurochemical alterations (a decrease in dopamine concentration and turnover) were observed only in the hypothalamic area. The highest dose also resulted in an increase in monoamine oxidase activity in the hypothalamus of treated rats. A subsequent study by Deskin et al. (1981) using the same protocol (but doses of 10, 15 or 20 mg/kg-day) reported a significant elevation in serotonin levels in the hypothalamus, but not the striatum, following exposure to 20 mg/kg-day.

Kontur and Fechter (1988) intubated neonatal Long-Evans rats daily with 0, 25 or 50 mg/kg-day manganese chloride ($MnCl_2 \cdot 4H_2O$) for 14 or 21 days. The level of manganese in the brain was increased at both 14 and 21 days, but was greater at 14 days. However, monoamine and metabolite levels were not altered by manganese treatment in any brain region. The authors suggest that the different results from short-term studies reported by different laboratories may be because of species or strain differences, the dosing regimen or vehicle, the route of administration, or the time points chosen for testing.

Kimura et al. (1978) provided rats with diets supplemented with 564 ppm of manganese as $MnC1_2$ for 3 weeks. Assuming a food consumption factor of 5% (i.e., 5g diet per l00 g body weight per day), this corresponds to a daily dose of 28 mg Mn/kg-day. The study authors reported that brain serotonin levels were decreased in manganese-treated rats. Monoamine oxidase activity was unchanged, but l-amino-acid decarboxylase activity in the brain was decreased by manganese treatment. Histopathological analysis of the brain was not conducted. Blood serotonin levels were increased in treated rats, and this change was accompanied by decreased blood pressure.

5.2.2 Long-term Exposure Studies

General Toxicology

Chronic ingestion of 1-2 mg Mn/kg-day produced changes in appetite and reduction in hemoglobin synthesis in rabbits, pigs, and cattle (Hurley and Keen, 1987). Transient effects on biogenic amine levels and activities of dopamine $-hydroxylase and monoamine oxidase in rat brain have been noted with long-term exposures to manganese (Eriksson et al., 1987; Lai et al., 1984; Subhash and Padmashree, 1990). An increase in physical activity level and a transient increase in dopaminergic function were observed in rats given 40 mg Mn/kg-day for 65 weeks (Nachtman et al., 1986). Two-year oral exposures to extremely high doses (1800-2250 mg/kg-day as $MnSO_4$) in male and female mice resulted in hyperplasia, erosion, and inflammation of the forestomach; no effects were seen in rats (NTP, 1993).

Mitochondria-rich organs, such as the liver and pancreas, are hypothesized to be most affected by oral exposure to manganese because of the interaction of manganese with mitochondrial enzymes. Wassermann and Wassermann (1977) reported ultrastructural changes of the liver cells in rats exposed to 200 mg/L of manganese chloride in their drinking water for 10 weeks. Assuming water consumption of 0.05 L/day and an average body weight of 0.35 kg (U.S. EPA, 1986a), this level of exposure corresponds to an average daily dose of approximately 12 mg Mn/kg-day. Increased metabolic activity was inferred from an increased amount of rough endoplasmic reticulum, the occurrence of multiple rough endoplasmic cisternae and prominent Golgi apparatus, and large Golgi vesicles filled with osmiophilic particles in the biliary area of the liver cell. The authors attributed this apparent increase in metabolic activity to biochemical processes related to the nutritional requirement for manganese, and homeostatic processes triggered by increased exposure. They noted that other observed liver effects, including the presence of glycogenosomes in the biliary area, groups of collagen fibers in the Disse's spaces, and degenerative changes in some centrilobular liver cells, may either be direct toxic phenomena or secondary responses to the effect exerted by manganese on other target tissues. ATSDR (2000) evaluated these data and designated 12 mg Mn/kg-day as the NOAEL in

this study.

In a 13-week study, NTP (1993) administered diets containing manganese sulfate at 0, 1,600, 3,130, 6,250, 12,500, or 25,000 ppm (mg $MnSO_4 \cdot H_2O$ per kg diet) to F344 rats (l0/sex/dose). The baseline concentration of manganese in the control diets was approximately 92 ppm. Mean daily intake of manganese sulfate monohydrate ranged from 98 mg/kg-day (32 mg Mn/kg-day) for the low-dose to 1,669 mg/kg-day (542 mg Mn/kg-day) for the high-dose males. For females, the range was 114 mg/kg-day (37 mg Mn/kg-day) for the low-dose group and 1,911 mg/kg-day (621 mg Mn/kg-day) for the high-dose group. No rats died during the study, and no clinical or histopathology findings were attributed to manganese exposure. Females receiving diets with $\geq$6,250 ppm manganese sulfate experienced decreased body weight gain. Absolute and relative liver weights were decreased in males receiving diets with $\geq$1,600 ppm, and in females in the highest dose group only. Hematological effects were also reported. All groups of exposed males exhibited a significantly increased neutrophil count. Lymphocyte counts were decreased in males receiving $\geq$6,250 ppm in the diet and females in the three highest dose groups. The low dose of 1,600 ppm (about 32 mg Mn/kg-day) was identified as the LOAEL for this study, based on effects on liver weight and neutrophil counts in male rats.

In a concurrent 13-week study, NTP (1993) administered diets containing manganese sulfate (monohydrate) at 0, 3,130, 6,250, 12,500, 25,000, or 50,000 ppm to $B6C3F_1$ mice (10/sex/dose). The baseline concentration of manganese in the control diets was approximately 92 ppm. Mean daily intake of manganese sulfate monohydrate ranged from 328 mg/kg-day (107 mg Mn/kg-day) for the low-dose to 8,450 mg/kg-day (2,746 mg Mn/kg-day) for the high-dose group. No deaths were attributed to manganese exposure. Both male and female mice in the highest dose group exhibited significantly decreased body weight gain. The male mice in the highest dose group also had decreased relative and absolute liver weights. Both sexes at the highest dose exhibited decreased hematocrit and hemoglobin concentrations. The NTP report suggests that these findings may indicate microcytic anemia, which may have resulted from a sequestration or deficiency of iron. Males receiving $\geq$25,000 ppm also exhibited significantly lower leukocyte counts, although this finding was of questionable relevance to manganese exposure. No clinical findings were attributed to manganese exposure. The LOAEL for this study was 3,130 ppm (107 mg Mn/kg-day), based on significantly decreased body weight gain in male mice.

Komura and Sakamoto (1991) investigated the effect of different forms of manganese on potential adverse effects following ingestion exposure to the element. Male mice (8/group) were exposed either to a control diet containing 130 mg Mn/kg, or a diet supplemented with an additional 2,000 mg Mn/kg as $MnCl_2 \cdot 4H_2O$, $Mn(CH_3COO)_2 \cdot 4H_2O$, $MnCO_3$, or MnO_2. Assuming an average food consumption of 13% of body weight, the average daily dose from the control diet was approximately 17 mg Mn/kg-day, while the average daily dose from the manganese-enriched diet was 276 mg Mn/kg-day. The duration of treatment was 100 days. The mice were tested for spontaneous motor activity after 30 days. Blood and tissues were analyzed at the termination of the experiment. No significant difference in food intake among groups was seen. Body weight gain and red and white blood cell count was decreased in groups that received $Mn(CH_3COO)_2 \cdot 4H_2O$ or $MnCl_2 \cdot 4H_2O$. Motor activity was reduced in the $MnCO_3$ group. Tissue manganese concentrations in groups receiving supplemental manganese were 2 to 3 times that of controls. A LOAEL of 276 mg Mn/kg-day was identified in this study based on

decreased weight gain and hematological effects.

Hepatic

Leung et al. (1982) administered 1,000, 10,000, or 20,000 mg $MnC1_2$.•$4H_2O$/L in drinking water to female Wistar rats. Exposure was initiated at conception by administration of manganese-containing drinking water to the dams, and continued through age 60 days. The estimated doses were 38.9, 389, and 778 mg Mn/kg-day (U.S. EPA, 1993). Treated rats exhibited liver necrosis and ultrastructural alterations that resembled human cholestasis. A LOAEL of 38.9 mg Mn/kg-day was identified in this study based on hepatic necrosis.

Suzuki et al. (1975) administered 250, 500, or 1,000 mg of MnO_2 in saline to 4 kg monkeys (*Macaca mullata*, age not specified) by subcutaneous injection. Injections were given once a week for 9 weeks. Estimated time-averaged doses correspond to 5.6, 11, and 23 mg Mn/kg-day. At autopsy, manganese-treated monkeys had irregular arrangement of hepatic cords and lymphocytic infiltration.

Neurological

Neurotoxicity is a known effect of long-term exposure to inhaled manganese in humans and animals, but the potential for neurotoxicity resulting from oral exposure is less well characterized. The only report of neurobehavioral toxicity in primates from orally administered manganese is by Gupta et al. (1980). Muscular weakness and lower limb rigidity were observed in 4 male rhesus monkeys given oral doses of manganese chloride (25 mg $MnCl_2$•$4H_2O$/kg, 6.9 mg Mn/kg-day) for 18 months. Histologic analysis showed degenerated neurons in the substantia nigra of the exposed animals at autopsy. There were no biochemical data. This study is of limited use for risk assessment because only one dose level was evaluated.

Studies involving oral exposures of manganese in drinking water or by gavage in neonatal rodent pups have reported changes in brain neurochemistry but generally do not show significant adverse effects on neurological development (ATSDR, 2000). Dorman et al. (2000) reported on neurological changes in rat pups dosed for 21 days postnatally with 11 or 22 mg Mn/kg-day by mouth in drinking water. The high dose group had significant increases in brain striatal DA (dopamine) and DOPAC (dihydroxyphenylacetic acid) concentrations and exhibited significant increases in the startle response, in the absence of pathological lesions. Because manganese is an essential nutrient in developing infants, the potential adverse effects from manganese deficiency may be of greater concern than potential toxicity from over-exposure.

Chandra et al. (1979) evaluated the neurological effects of manganese in mice exposed from birth. Neonatal mice were initially exposed by nursing from dams given 5 mg/mL $MnCl_2$ in their drinking water. After weaning at 25 days, the mice received manganese in their drinking water. Average exposures to manganese were determined to be 0.030 mg Mn/day for 60 days, 0.036 mg Mn/day through the 90th day, 0.075 mg Mn/day through the 120th day and 0.090 mg Mn/day for the interval between 150 and 180 days. Assuming a body weight of 0.03 kg at adulthood, the average daily dose at the termination of the experiment was approximately 3 mg Mn/kg-day. Elevated levels of striatal dopamine, norepinephrine, and homovanillic acid were

observed at 60 and 90 days of age, with a concomitant increase in spontaneous locomotor activity. Exposure past 90 days did not influence motor activity. Chandra et al. (1979) proposed that the hyperactivity observed in these mice was an early behavioral effect of excess manganese exposure that resulted from elevated dopamine and norepinephrine levels. The study authors further suggested that the observed hyperactivity may be comparable to the psychomotor excitement observed in the early stages of human manganism.

Chandra and Shukla (1981) exposed male albino rats to 1,000 mg/L $MnCl_2 \cdot 4H_2O$ (436 mg Mn/L) in drinking water. Assuming water consumption of 0.049 L/day and an average adult body weight of 0.35 kg, this level of exposure corresponds to an average daily dose of 61 mg Mn/kg-day. Levels of catecholamines, homovanillic acid, manganese, and the activity of monoamine oxidase were determined in the corpus striatum at time intervals up to 360 days. The investigators found initial increases in dopamine, norepinephrine, and homovanillic acid levels. This initial increase was followed by a period of normal levels. After 300 days, a decrease in all levels was observed. These changes were not correlated with the tissue concentration of manganese. The authors suggested that the decreased locomotor activity observed during later periods of manganese exposure may be related to lowered dopamine and norepinephrine levels in the brain, and that this stage of chronic toxicity may correspond to the later neurologic phase of motor dyskinesia in humans. Ali et al. (1981) conducted concurrent behavioral studies, and found an initial increase in spontaneous locomotor activity followed by a decrease during later periods of manganese exposure.

Purdey (2000) examined an endemic of sheep scrapie (a form of transmissible spongiform encephalopathy) in North Central/Eastern Iceland. Purdey reported high (200 ppm dry weight) levels of manganese in the herbage of areas where the sheep had suffered from a high incidence of scrapie for decades. Areas that were scrapie free had a mean level of 80 ppm dry weight of manganese in the herbage. These data, along with the data on CJD in humans (Purdey, 2000; Brown et al., 2000), suggest a link between high manganese and low copper in the etiology of these degenerative neurologic diseases, but further data are needed to support the hypothesis.

Reproductive and Developmental Studies

Reproductive Effects

The results of several studies in rats and mice indicate that the ingestion of high dose of manganese can delay reproductive maturation in male animals (ATSDR, 2000). Testosterone levels were reduced in male rats given an oral dose of 13 mg Mn/kg-day for 100-224 days (Laskey et al., 1982), while delayed growth of the testes was observed in young rats ingesting 140 mg Mn/kg-day for 90 days (Gray and Laskey, 1980). These effects do not appear to be severe enough to affect male reproductive function (ATSDR, 2000). Several studies which found effects on male reproductive organs, however, did not assess reproductive performance (IPCS, 1999).

Laskey et al. (1982) found a slight decrease in pregnancy rate but no significant effect on litter size, ovulations, resorption, or fetal weight when male and female rats were exposed to 130 mg Mn/kg-day (as Mn_3O_4) in the diet for 90-100 days prior to breeding.

The results of most studies indicate that oral exposure to manganese does not result in reproductive toxicity in the female rodent (e.g., rats and mice) and rabbit (See also ATSDR, 2000), although increased postimplantation loss was observed in female rats in at least one study (Szakmáry et al., 1995).

Developmental Effects

Results from several developmental studies in rodents and rabbits are equivocal. Data from the majority of these studies indicate that manganese exposure during part or all of gestation results in increased manganese levels in the pups (Järvinen and Ahlström, 1975; Kontur and Fechter, 1988), but generally causes either no measurable effect (Grant et al., 1997), transient
effects such as weight decreases and hyperactivity (Pappas et al., 1997), or reversible effects on skeletal and organ development (Szakmáry et al., 1995). Joardar and Sharma (1990) administered varying levels of $MnSO_4$ (10.25, 20.25, and 61.00 mg/100 g bw) and $KMnO_4$ (6.5, 13, and 36 mg/100 g bw) to mice by gavage over a 3-week period. Sperm head abnormalities and the percentage of abnormal sperm were significantly increased in all treated groups.

Cancer and Mutagenicity Studies

Mutagenicity

Laboratory evidence for the mutagenicity and genotoxicity of high dose manganese exposure is equivocal. Joardar and Sharma (1990) administered varying levels of $MnSO_4$ (10.25, 20.25, and 61.00 mg/100 g bw) and $KMnO_4$ (6.5, 13, and 36 mg/100 g bw) to mice over a 3-week period. The frequencies of chromosomal aberrations and micronuclei in bone marrow cells were significantly increased. Dikshith and Chandra (1978) administered repeat oral doses of 0.014 mg Mn/kg-day (as $MnC1_2$) to albino rats for 180 days with no significant chromosomal damage noted in either bone marrow or spermatogonial cells.

In vitro bacterial gene mutation tests have yielded both positive and negative results, while *in vitro* tests with fungi and mammalian cells have been predominantly positive. Manganese chloride produced an increased frequency of mutations in *Salmonella typhimurium* strain TA1537, but induced negative results in other strains; manganese sulfate was reported to be both positive and negative in separate studies in Salmonella strain TA97, but negative in other strains (IPCS, 1999). Positive results were obtained with various manganese compounds in *Phytobacterium fischeri* and *Escherichia coli*, as well as in *Saccharomyces cerevisiae* and hamster embryo cells (ATSDR, 2000). In spite of these results, the genotoxic potential of manganese in humans is not known (IPCS, 1999).

Carcinogenicity

No animal studies are available that have investigated the potential carcinogenicity of manganese following inhalation or dermal exposure (ATSDR, 2000). A 2-year oral study of manganese sulfate in rats and mice produced equivocal evidence of carcinogenicity (NTP, 1993). In rats fed manganese sulfate (30-331 mg Mn/kg-day in males, 26-270 mg Mn/kg day in females), no treatment-related increases in tumor incidence were reported. In mice fed manganese sulfate (63-722 mg Mn/kg-day in males, 77-905 mg Mn/kg-day in females), the incidence of follicular cell adenoma of the thyroid was increased slightly in high-dose animals compared to controls. These increases were not statistically significant, and the tumors were observed at the end of the study only. However, follicular cell adenoma of the thyroid appears with low frequency in historical control male mice of this strain. Thus, the significance of these results and their relevance to typical human oral exposure to manganese is questionable.

Stoner et al. (1976) tested manganese sulfate in a mouse lung adenoma screening bioassay. These investigators exposed 6- to 8-week-old Strain A/Strong mice of both sexes (10/sex) to 6, 15 or 30 mg $MnSO_4$/kg via intraperitoneal injection. Doses were administered three times a week for a total of 21 injections. The cumulative doses were 132, 330 and 660 mg $MnSO_4$/kg, corresponding to 42.9, 107.2 and 214.4 mg Mn/kg. Observation continued for 22 weeks after the dosing period, and the mice were sacrificed at 30 weeks. The percentage of mice with tumors was elevated at the highest dose level, but the difference was not significant when compared with the vehicle controls. An apparent increase in the average number of pulmonary adenomas per mouse was noted both at the middle and high doses, but the increase was significant only at the high dose (660 mg $MnSO_4$/kg; $p < 0.05$). Although the study results are suggestive of carcinogenic activity, they do not conclusively meet the positive-response criteria (increased tumor incidence and an observable dose-response relationship) for the interpretation of lung tumor data in this mouse strain (Shimkin and Stoner, 1975).

6.0 QUANTIFICATION OF TOXICOLOGICAL EFFECTS

Limitations of Using Rodent Data In Assessing Neurotoxicity of Manganese

There are considerable species differences between rodents and primates in nutritional requirements as well as neurotoxicity of manganese. Therefore, rodents are of limited value in assessing the neurobehavioral effects associated with extrapyramidal deficits (Chandra, 1983).

Manganese has a propensity for accumulation in the melanin pigment (Lyden et al., 1985) and there is a relative lack of neuromelanin in rodents. This may explain the fact that neurologic effects (e.g., tremor, gait disorders) seen in primates are often preceded or accompanied by psychologic symptoms (e.g., irritability, emotional lability) but are not apparent in rodents.

Contributing to the difficulties in interpreting the toxicologic data from exposure of rodents to manganese is the substantial difference in species' requirements for this dietary element. The estimated requirement for rats is 50 mg Mn/kg diet (Rogers, 1979). Assuming a

food consumption equivalent to 5% of body weight (U.S. EPA, 1986a), this corresponds to a requirement for about 2.5 mg Mn/kg body weight (bw)/day. In contrast, the adequate intake for men and women (including lactating women) is about 2.3 -2.6 mg Mn/day, or about 0.03 - 0.07 mg Mn/kg bw/day, assuming a reference body weight of 70 kg. The dietary requirement for manganese in humans, then, is about two orders of magnitude lower than for rodents, suggesting that data derived from rodent studies may not be appropriate for use in deriving quantitative estimates of manganese levels that might be expected to result in adverse effects in humans.

As discussed above, rodent studies are limited in their use as a database from which to extrapolate effects in humans from over-exposure to manganese, because rodents do not exhibit the same neurologic deficits that humans do following exposure to manganese. On the other hand, the optimal levels of oral exposure to manganese for humans have not been well defined. For example, the available epidemiological studies in drinking water are of limited use in quantitative assessment of manganese toxicity, because of a lack of total exposure data. Balance studies are also not useful because short and moderate-tem manganese balance studies are found not to be proportional to manganese intakes (Greger, 1999). Therefore, the health advisories (acute and chronic) are based on human dietary studies (See Sections below).

Dose Response and Risk Characterization

Manganese is a ubiquitous element that is essential for normal physiologic functioning in all animal species. Several disease states in humans have been associated with both deficiencies and excess intakes of manganese. Thus any quantitative risk assessment for manganese must take into account aspects of both the essentiality and the toxicity of manganese. In humans, many data are available providing information about the range of essentiality for manganese. In addition, there are many reports of toxicity to humans exposed to manganese by inhalation; much less is known, however, about oral intakes resulting in toxicity. As discussed above, rodents do not provide a good experimental model for manganese toxicity, and only one limited study in primates by the oral route of exposure is available (Gupta et al., 1980). The following assessment, therefore, focuses more on what is known to be a safe oral intake of manganese for the general human population. Finally, it is important to emphasize that individual requirements for, as well as adverse reactions to, manganese may be highly variable. The reference dose is estimated to be an intake for the general population that is not associated with adverse health effects; this is not meant to imply that intakes above the reference dose are necessarily associated with toxicity. Some individuals may, in fact, consume a diet that contributes more than 10 mg Mn/day without any cause for concern.

Determination of Health Advisories

Health Advisories (HAs) are generally determined for one-day, ten-day and life time exposure if adequate data are available that identify a sensitive noncarcinogenic end point of toxicity. The HAs for noncarcinogenic toxicants are derived using the following formula:

$$HA = \frac{(NOAEL \text{ or } LOAEL) \times (BW)}{(UF)\ (L/day)} = mg/L\ (\therefore g/L)$$

where:

NOAEL or LOAEL = No- or Lowest-Observed-Adverse-Effect Level (in mg/kg bw/day).

BW = assumed body weight of a child (10 kg) or an adult (70 kg).

UF = uncertainty factor (10, 100, 1,000 or 10,000) in accordance with EPA or NAS/ODW guidelines.

L/day = assumed daily water consumption of a child (1 L/day) or an adult (2 L/day).

One-day HA

No suitable information was found in the available literature for determining the One-day HA for manganese. The Ten-day HA for a child of 1 mg/L, calculated below is recommended for use as a conservative estimate for a 1-day exposure for both children and adults.

Ten-day HA

The adequate intake for a child 7 to 12 months old is 0.6 mg/day, and that from a 1 to 3-year-old is 1.2 mg/day (IOM, 2002). Taking the upper end of the adequate intake for a 10 kg child (up to 1 mg/day), and assuming the manganese comes from a maximum of 1 liter of formula per day, this would correspond to a manganese concentration of 1 mg/L. This 10-day HA for a child should also be protective of adults.

The Ten-day HA for a 10-kg child is calculated as follows:

$$\text{1- and 10-day HA} = \frac{1\ mg/day}{1\ L/day} = l\ mg/L$$

However, it is advised that for infants younger than 6 months, the lifetime HA of 0.3 mg/L be used even for an acute exposure of 10 days, because of the concerns for differences in manganese content in human milk and formula and the possibility of a higher absorption and lower excretion in young infants.

Lifetime Health Advisory

Lifetime health advisories are only developed for chemicals that are not likely to carcinogenic to humans. The Lifetime HA represents that portion of an individual's total exposure that is attributed to drinking water and is considered protective of noncarcinogenic adverse health effects over a lifetime exposure. The Lifetime HA is derived in a three-step process. Step 1 determines the Reference Dose (RfD), formerly called the Acceptable Daily Intake (ADI). The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious health effects during a lifetime, and is derived from the NOAEL (or LOAEL), identified from a chronic (or subchronic) study, divided by an uncertainty factor(s). From the RfD, a Drinking Water Equivalent Level (DWEL) can be determined (Step 2). A DWEL is a medium-specific (i.e., drinking water) lifetime exposure level, assuming 100% exposure from that medium, at which adverse, noncarcinogenic health effects would not be expected to occur. The DWEL is derived from the multiplication of the RfD by the assumed body weight of an adult and divided by the assumed daily water consumption of an adult. The Lifetime HA in drinking water alone is determined in Step 3 by factoring in other sources of exposure, e.g., the relative source contribution (RSC). The RSC from drinking water is based on actual exposure data or, if data are not available, a value of 20% is assumed.

Step 1: Determination of Reference Dose (RfD)

Choice of Principal Study and Critical Effect

Manganese is an essential trace element that is required for normal physiologic function in humans and animals. Excess exposure to manganese, particularly via the inhalation route, is associated with neurotoxicological symptoms that resemble parkinsonism. Thus, derivation of the RfD must consider issues of both essentiality and toxicity.

The RfD is not based on rodent studies, because rodents do not exhibit the same neurologic deficits that humans do following exposure to manganese. For example, manganese at high doses induces Parkinson-like symptoms in humans and primates, but not in rodents. Because of the species difference in the response to manganese exposure, rodents are not good models for manganese toxicity studies. More details on these species differences can be seen in IRIS (U.S. EPA, 1997).

The oral toxicity data on which risk assessments may be based are quite limited in scope. It is recognized that the information available in humans is inherently more useful than data obtained from laboratory animals, especially non-primates. However, the toxicity data in humans following ingestion of large amount of manganese are not suitable for a quantitative assessment (For details, See Section 5.1.2 Long-term Exposure).

Dose-Response Assessment

Based on the dietary information described by WHO (1973), Schroeder et al. (1966), and NRC (1989), EPA estimated that an intake of 10 mg Mn/day (0.14 mg Mn/kg-day, assuming a body weight of 70 kg) in the diet is safe for a lifetime of exposure. This level of manganese represents

a NOAEL for chronic ingestion of manganese by humans. Application of a UF of 1 was used to derive the dietary RfD of 0.14 mg Mn/kg-day (U.S. EPA, 1997). The use of 1 as the UF is based on the following considerations. Manganese is an essential trace element for human health. The information used to derive the RfD was collected from many large human populations consuming normal diets over an extended period of time. The available data suggest that as long as physiological systems are not overwhelmed, humans exert effective homeostatic control over manganese so that body burden is kept relatively constant even when the concentration of manganese in the diet varies.

Application of Modifying Factor in Water

U.S. EPA (1997) has recommended the use of a modifying factor of 3 when assessing exposure to manganese from drinking water. Four reasons for this recommendation have been outlined:

- While toxicokinetic data suggest that there is no significant difference in absorption of manganese from food versus water, uptake of manganese from water appears to be greater in fasted individuals.

- The study by Kondakis et al. (1989) raises concern for possible adverse health effects associated with a lifetime consumption of drinking water containing 2 mg/L of manganese.

- Evidence exists that neonates absorb more manganese from the gastrointestinal tract, and excrete less of the absorbed manganese. Additional evidence suggests that absorbed manganese more easily crosses the blood-brain barrier in neonates. However, this evidence comes from animal studies; similar absorption studies in human neonates have not been performed, although Collipp et al. (1983) observed increased hair manganese levels in infants fed prepared formula compared with infants fed breast milk.

- Infant formula typically contains a much higher concentration of manganese than human or cows' milk. Powdered formula reconstituted with drinking water represents an additional source of manganese intake for a potentially sensitive population.

The potential impacts on children, when considered in conjunction with the likelihood that the most adverse effects of manganese (e.g., those seen in manganese miners or others with chronic overexposure to inhaled manganese) are likely to be irreversible and not manifested for many years after exposure, warrant caution until more definitive data are available (U.S. EPA, 1997). Recent data indicate, however, that in contrast to the symptoms of manganism, preclinical neurological effects of inhalation exposure of occupational workers to excess manganese are reversible (Roels et al., 1999). Similarly, symptoms of oral exposure to excess manganese in compromised individuals (e.g., individuals with liver disease who could not excrete manganese in the bile) were resolved when the exposure to excess manganese was decreased (Devenyi et al., 1994; Fell et al., 1996). These data indicate that the human body can recover from certain adverse effects of overexposure to manganese if the exposure is stopped

and the body can clear the excess. Significant uncertainty still exists, however, concerning at what level of manganese intake these preclinical neurological symptoms might occur.

The RfD for chronic exposure to manganese in drinking water is therefore calculated as follows:

$$RfD = \frac{10\ mg/day}{1 \times 70\ kg} = 0.14\ mg/kg\text{-}day$$

where:

10 mg/person-day = chronic no adverse effect level per person from dietary intake

1 = uncertainty factor

70 kg = assumed body weight of adult

Step 2: Determination of the Drinking Water Equivalent Level (DWEL)

$$DWEL = \frac{(0.14\ mg/kg\text{-}day)(70\ kg)}{3\ (2\ L/day)} = 1.6\ mg/L\ (1600\ \mu g/L)$$

where:

0.14 mg/kg-day = RfD

70 kg = assumed body weight of adult

2 L/day = assumed water consumption by 70-kg adult

3 = modifying factor for assessing exposure to manganese from drinking water (mainly for bioavailability concerns)

Step 3: Determination of the Lifetime HA

The Lifetime HA = (1.6 mg/L)(20%) = 0.3 mg/L (rounded from 0.32 mg/L)

where

1.6 mg/L = DWEL

20% = relative source contribution for manganese in drinking water

Evaluation of Carcinogenic Potential

- Available data are equivocal regarding carcinogenic potential of manganese.
- Based on the Draft Guidelines for Carcinogen Risk Assessment (U.S. EPA, 2003b; 1999), there is inadequate information to assess the human carcinogenic potential for manganese.
- Based on 1986 Guidelines for Carcinogen Risk Assessment (U.S. EPA, 1986b) manganese has been classified in Group D: Not classified as to human carcinogenicity.

7.0 ANALYTIC METHODS AND TREATMENT TECHNOLOGY

Analytical Methods

Manganese can be measured by several well-documented analytical methods as shown in the Table 7-1.

Treatment Technology

The technologies include conventional treatment, ion exchange, reverse osmosis, lime softening, and chemical precipitation.

Conventional treatment usually includes pre-treatment steps of chemical coagulation, rapid mixing, and flocculation, followed by flocculation removal via sedimentation or flotation. After clarification, the water is then filtered. Common filter media include sand, and dual- and tri-media (e.g., silica sand, garnet sand, or anthracitic coal).

Ion exchange involves the selective removal of charged inorganic species from water using an ion-specific resin. The surface of the ion exchange resin contains charged functional groups that hold ionic species by electrostatic attraction. As water containing contaminant ions passes through a column of resin beds, charged ions on the resin surface are exchanged for the contaminant species in the water.

Reverse osmosis (RO) is similar to other membrane processes, such as ultrafiltration and nanofiltration, since water passes through a semi-permeable membrane. However, in the case of RO, the principle involved is not filtration. Instead, it involves the use of applied hydraulic pressure to oppose the osmotic pressure across a non-porous membrane, forcing the water from the concentrated solution side to the dilute solution side. The water does not travel through pores, but rather dissolves into the membrane, diffuses across, then dissolves out into the permeate. Most inorganic and many organic contaminants are rejected by the membrane and will be retained in the concentrate.

In the lime-softening process, the pH of the water being treated is raised sufficiently to precipitate calcium carbonate and, if necessary, magnesium hydroxide. Calcium and magnesium

ions in water cause hardness. After mixing, flocculation, sedimentation, and pH readjustment, the softened water is filtered.

Results of a preliminary technology assessment and review indicate that all of the above-mentioned techniques remove manganese from water. However, data indicate that chemical precipitation is the most effective option.

Table 7-1: Analytical Methods for Manganese

Method	Type	Method Detection Limit (µg/L)
EPA 200.7	Inductively Coupled Plasma Optical Emission Spectrometry (ICP)/Atomic Emission Spectrometry	1.0
SM 3120 B	ICP/Atomic Emission Spectrometry	Estimated Detection Limit (EDL) 2.0
EPA 200.8	ICP/Mass Spectrometry	0.02
SM 3111B	Atomic Absorption, direct aspiration	Instrument Detection Level (IDL) 10 Optimum conc. range 100-10,000
EPA 200.9	Stabilized Temperature Graphite Furnace AA Spectrometry	0.3
SM 3113 B	Atomic Absorption, Furnace	EDL 0.2 Optimum conc. range 1-30

8.0 OTHER CRITERIA, GUIDANCE AND STANDARDS

- There is no current Maximum Contaminant Level (MCL) for manganese.

- OSHA (1998) has established a maximum permissible air exposure limit for manganese fumes at no greater than 5 mg/m^3 and elemental or inorganic manganese at no greater than 0.2 mg/m^3, averaged over any 8-hour period in the workplace environment.

- The World Health Organization (WHO) has established a provisional guideline value for manganese of 0.5 mg/L. This guideline is provisional because there is some evidence of a potential hazard, but available information on health effects is limited. Concentrations of this substance at or below the health-based guideline value may affect appearance, taste, or odor of water.

- EPA recommends a concentration of manganese in drinking water not to exceed 0.05 mg/L (ppm). This recommendation is to avoid staining of clothing and fixtures and is believed to be more than adequate to protect human health.

- The Food and Drug Administration (FDA) also recommends 0.05 mg/L of manganese in bottled water.

- EPA has also established rules setting limits on the amount of manganese factories can discharge to the water.

9.0 REFERENCES

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Appendix D Department Positive Pressure Policy

DEPARTMENT OF ENVIRONMENTAL PROTECTION
Bureau of Safe Drinking Water

DOCUMENT NUMBER:	393-2129-003
TITLE:	Policy for Determining When Loss of Positive Pressure Situations in the Distribution System Require One-Hour Reporting to the Department and Issuing Tier 1 Public Notification
EFFECTIVE DATE:	Upon publication of notice as final in the *Pennsylvania Bulletin*
AUTHORITY:	Pennsylvania's Safe Drinking Water Act (35 P.S. § 721.1 *et seq.*) and regulations at Title 25 Pa. Code Chapter 109
POLICY:	Public water suppliers and Department of Environmental Protection (Department or DEP) staff should follow the guidance and procedures presented in this document to respond to loss of positive pressure situations in the distribution system.
PURPOSE:	The purpose of this document is to establish uniform instructions and protocol for responding to loss of positive pressure situations in the distribution system to ensure the protection of public health.
APPLICABILITY:	This guidance will apply to all public water systems.
DISCLAIMER:	The policies and procedures outlined in this guidance are intended to supplement existing requirements. Nothing in the policies or procedures shall affect regulatory requirements. The policies and procedures herein are not an adjudication or a regulation. DEP does not intend to give this guidance that weight or deference. This document establishes the framework, within which DEP will exercise its administrative discretion in the future. DEP reserves the discretion to deviate from this policy statement if circumstances warrant.
PAGE LENGTH:	10 pages
DEFINITIONS:	See Title 25 Pa. Code Chapter 109

POLICY FOR DETERMINING WHEN LOSS OF POSITIVE PRESSURE SITUATIONS IN THE DISTRIBUTION SYSTEM REQUIRE ONE-HOUR REPORTING TO THE DEPARTMENT AND ISSUING TIER 1 PUBLIC NOTIFICATION

I. PURPOSE:

This document is intended to provide a policy to public water suppliers and Department of Environmental Protection (Department or DEP) staff for evaluating and responding to possible contamination of water distribution systems during loss of positive pressure situations caused by a physical disruption (i.e., line breaks, valve repairs, new construction, etc.) or an operational disruption (i.e., pump failure, power outage, telemetry failure, extreme fire flows, source outage, depletion of storage, etc.). This policy provides uniform procedures to ensure water supplies are safe for potable use during a loss of positive pressure situation and after pressure is restored.

II. BACKGROUND:

Any disruption of a water distribution system that results in a loss of positive pressure may allow contaminants to enter the distribution system. Water suppliers can minimize contamination by implementing acceptable DEP and water industry standards and practices. Pursuant to Chapter 109 of DEP's regulations and *Public Water Supply Manual - Part II*, water suppliers shall adhere to the most recent edition of the American Water Works Association (AWWA) Standard C-651, Disinfecting Water Mains, when repairing or replacing water mains to ensure that water quality is not compromised or degraded. Standard C-651 includes procedures for adequate flushing, disinfection, and microbiological testing. Refer to Section V for more information about Standard C-651.

In certain situations, additional measures may be necessary in order to protect public health. This guidance will discuss when one-hour reporting to DEP and issuance of Tier 1 public notification (PN) may be warranted.

III. APPLICABLE REGULATIONS OF TITLE 25 PA. CODE CHAPTER 109 (SAFE DRINKING WATER):

A. **§ 109.4.** Requirement to effectively operate and maintain public water system facilities and to take whatever investigative or corrective action is necessary to assure that safe and potable water is continuously supplied to users.

B. **§ 109.408.** Tier 1 public notice.

C. **§ 109.602(a) - (c).** Acceptable design.

D. **§ 109.606.** Chemicals, materials and equipment.

E. **§ 109.607.** Pressures.

F. **§ 109.701(a)(3).** One-hour reporting requirements.

G. **§ 109.702.** Operation and maintenance plan. (a) A community water supplier shall develop an operation and maintenance plan for the community water system. The

operation and maintenance plan must generally conform to the guidelines contained in the Department's *Public Water Supply Manual* and contain at least the following information: ... (3) Procedures for repairing and replacing water mains that conform to the Department and water industry standards.

H. **§ 109.709.** Cross-connection control program.

I. **§ 109.710.** Disinfectant residual in the distribution system.

J. **§ 109.711.** Disinfection of facilities prior to placing them into service. ... (b) After repairing a facility or performing other activities which place the facility out of service, and before returning the facility to service, the public water supplier shall disinfect the facilities in accordance with the most recent procedures established by the American Water Works Association.

IV. OTHER APPLICABLE REFERENCES:

A. *Public Water Supply Manual - Part II: Community System Design Standards*, DEP #383-2125-108, May 6, 2006. All DEP publications are available on DEP's eLibrary website at www.depgreenport.state.pa.us/elibrary/.

B. *Policy for Issuing and Removing Water Supply Warnings*, DEP #383-2129-005, October 3, 2009.

C. Latest standards issued by the American Water Works Association (AWWA) and the American National Standards Institute (ANSI), including the most recent edition of ANSI/AWWA Standard C651 - Disinfecting Water Mains.

AWWA Standards are copyrighted materials. To place an order, please call AWWA Customer Service at 800-926-7337.

Individual AWWA Standards may also be ordered online from AWWA's website at www.awwa.org.

D. *Disinfection of Pipelines and Storage Facilities Field Guide*, AWWA, 2006.

E. *Recommended Standards for Water Works*, Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers, most recent edition. These Standards are otherwise known as 10 State Standards.

V. POLICY:

A. **One-Hour Reporting Requirements for Loss of Positive Pressure Situations.**

Under § 109.701(a)(3)(iii), a public water supplier shall report the circumstances to the Department within 1 hour of discovery when circumstances exist which may adversely affect the quantity or quality of drinking water including, but not limited to, a situation that causes a loss of positive water pressure in any portion of the distribution system

where there is evidence of contamination or a water supplier suspects a high risk of contamination.

To clarify this requirement, **a water supplier shall notify DEP within 1 hour if ANY of the following circumstances occur**:

1. A loss of positive pressure within the distribution system is caused by a situation other than a main break, including (but not limited to) a power outage, pump failure, source outage, or depletion of storage. Situations such as these are likely to result in widespread impacts, increasing the likelihood of potential pathways for contamination, and making it extremely difficult to fully and effectively evaluate the situation to rule out the risk of contamination within all affected portions of the distribution system.

2. A loss of positive pressure within the distribution system is caused by a main break, repair, or replacement **AND**:

   - There is evidence of contamination **OR**,
   - A high risk of contamination.

   Each main break, repair, or replacement needs to be evaluated on a case-by-case basis to determine whether there is evidence of or a high risk of contamination. These evaluations are considered process control decisions as defined in Title 25 Pa. Code Chapter 302 (Administration of the Water and Wastewater Systems Operators' Certification Program). Section 302.104(a) requires process control decisions to be made by an appropriately certified operator, and § 302.901(a)(5) identifies Class E as the appropriate classification for water distribution systems.

   Therefore, it is critical to note that a Class E Distribution certified operator needs to be on site if possible, or at a minimum, be available for consultation by phone with someone who is on site and can clearly convey observations in order to evaluate each situation. **If a Class E certified operator is not available to evaluate the risk of contamination, the situation is considered to be a high risk for contamination and the 1-hour reporting requirement applies.**

   Some examples of evidence of contamination within the distribution system include, but are not limited to:

   - Changes to the physical characteristics of the water, such as unusual discoloration, taste or odor, or increased temperature due to backflow from a hot water heater.

   - Changes to the water chemistry as evidenced by field test results.

Some examples of situations with a high risk of contamination include, but are not limited to:

- A flooded trench that cannot be properly dewatered or remedied by best management practices where the water level is at or above the level of the pipe being repaired.
- Evidence of contamination of nearby soils from leaking sewer lines near the site of the main break.
- Evidence of contamination of nearby soils from failing on-lot septic systems near the site of the main break.
- Evidence of contamination caused by back flow or a cross connection entering the distribution system in the area of the main break or other impacted area.
- High system unaccounted for water loss (i.e., > 20%) due to leaks in the distribution system.
- Low system water storage as a result of a main break, which causes loss of service to customers, including any customers located outside of the immediate area surrounding the break, such as those located in lower pressure zones or a higher elevation.
- Evidence of contamination caused by a stream or river crossing.
- Any condition that allows contaminated water to enter the distribution system.

Section 109.701(a)(3)(iii) provides that if there is loss of positive pressure in "any portion of the distribution system", the 1-hour reporting requirement may apply. During a repair completed while maintaining positive pressure in the immediate area, other portions of the distribution system, including higher elevations or other lower pressure zones, may be vulnerable to a loss of pressure. The Class E certified operator evaluating the situation should consider the need to monitor pressure in areas of the system outside the immediate area surrounding the break. **If any portion of the distribution system experiences a loss of positive pressure, a potential public health threat may exist; therefore, that portion of the system needs to be evaluated to determine if the 1-hour reporting requirement applies.**

3. Repairs to a main break associated with a loss of positive pressure cannot be completed as per the requirements under Standard C-651 and this policy. Section 109.711 requires public water suppliers to follow the most recent procedures established by AWWA for disinfection of facilities before returning the facility to service after repair. Therefore, all public water suppliers should have access to a copy of the standard; at a minimum, they should ensure that their

staff and/or contractors conducting repairs have access to **and** are following Standard C-651 for any main break repairs.

4. Special bacteriological samples collected as per Standard C-651 and this policy are positive for *E. coli*.

It is important to note that distribution pressures should be monitored using all available data, and the need for 1-hour reporting should be routinely re-evaluated, throughout any situation with the potential for loss of pressure in the distribution system. For example, a main break may be repaired under reduced operating pressure, but if the operator determines that positive pressure has been lost in any portion of the distribution system during the repair, that portion of the system needs to be evaluated to determine whether the 1-hour reporting requirement applies. If so, the time clock for 1-hour reporting would begin upon that determination.

B. Tier 1 PN Requirements for Loss of Positive Pressure Situations.

For any of the situations listed above, a water supplier shall also consult with DEP regarding the need for and issuance of Tier 1 PN in the form of a Boil Water Advisory (BWA) or some other water supply warning, as provided in 25 Pa. Code § 109.408(b)(3). Tier 1 PN will generally be required for situations meeting the criteria in items V.A.2, 3, or 4 above. Situations meeting the criteria in V.A.1 above may require a Tier 1 PN.

Refer to DEP's *Policy for Issuing and Removing Water Supply Warnings* for more information about PN and additional follow-up actions. For example, additional follow-up actions for a BWA may include: repairing/replacing water lines, establishing and maintaining higher chlorine residuals, flushing lines, collecting check samples, etc.

C. Best Management Practices for Main Breaks Which Result in a Loss of Positive Pressure (ANSI/AWWA Standard C-651).

Pursuant to 25 Pa. Code Chapter 109 and DEP's *Public Water Supply Manual - Part II*, water suppliers shall adhere to DEP and water industry standards and practices when repairing or replacing water mains to ensure that water quality is not compromised or degraded. Industry standards and practices include procedures for adequate flushing, disinfection, and microbiological testing. Practical application procedures based on the standard may also be found in AWWA's field guide entitled, *Disinfection of Pipelines and Storage Facilities.*

D. Best Management Practices Checklist for Main Breaks Which Result in a Loss of Positive Pressure (ANSI/AWWA Standard C-651).

The following checklist summarizes the best management practices to address main breaks resulting in a loss of positive pressure. It is important to note that this checklist is intended only to summarize the key points in AWWA Standard C-651; it is not intended

to be used in place of following the standard. Please refer to AWWA Standard C-651 for more details and full procedures.

1. Minimize entry of contaminants:

☐ Isolate the affected main segment.

☐ Shut off all affected service connections that lack adequate backflow prevention, where practical.

☐ Dewater excavation trenches prior to repairs. Disinfect wet trenches where practical or where evidence of contamination exists.

2. Disinfect the pipe:

☐ Swab or spray pipe interiors and associated fittings with a 1% solution of hypochlorite prior to installation.

☐ Where practical or where evidence of contamination exists, disinfect the entire affected main segment using one of the chlorination methods in Standard C-651. Refer to Standard C-651 for detailed disinfection procedures.

Note: Leaks or breaks that are repaired with clamping devices while the main remains full of pressurized water may present little danger of contamination and therefore may not require disinfection.

3. Remove contaminants and dechlorinate chlorinated-waste discharge:

☐ Flush the affected main segment until discolored water is eliminated and the disinfectant residual concentration in the water exiting the main is no higher than the residual disinfectant concentration in the distribution system.

☐ Dechlorinate the chlorinated-waste discharge by applying an adequate amount of reducing agent to thoroughly neutralize the chlorine residual remaining in the water. Refer to Standard C-651 for information about dechlorination procedures.

4. Determine effectiveness of procedures:

☐ Measure the disinfectant residual concentration to verify establishment of an acceptable residual.

☐ Collect special follow-up total coliform bacteriological samples in accordance with Standard C-651 to confirm that contamination did not occur during repair or replacement activities. Refer to Table 1 for the minimum number of required samples. Bacteriological samples must be analyzed by an appropriately accredited environmental laboratory.

Representative sampling locations must be downstream of the main break or repair. If the direction of flow is unknown, samples must be taken both up and downstream.

Table 1: Minimum # Daily Samples Required for Line Repair	
Population Affected[1]	**Minimum # of Samples**
1 – 500	1
501 – 1,000	2
1,001 – 2,000	3
2,001 – 3,000	4
3,001 – 4,000	5
4,001 – 5,000	6
5,001 – 7,500	7
7,501 – 10,000	8
10,001 – 25,000	9
25,001 – 50,000	10
> 50,000	11

[1]Population affected = # service connections x 2.7 people

☐ Sampling shall be continued until **two consecutive days of negative samples** are obtained.

☐ If follow-up total coliform sample results are negative for two consecutive days, go to check list item #5 and record the details in your Repair Log.

Where practical or where evidence of contamination exists, repaired or replaced water mains must be completely installed, flushed, disinfected, and satisfactory bacteriological sample results received prior to returning the main to service.

As per Standard C-651, and as per the properly certified operator's best professional judgment, after the appropriate disinfection and flushing procedures have been completed, the existing main may be returned to service prior to the completion of bacteriological analysis in order to minimize the time customers are without water.

☐ If any follow-up total coliform samples are positive, ensure that the lab is also analyzing the samples for *E. coli*.

- ☐ **If results are total coliform-positive only**, continue flushing, disinfecting, and collecting follow-up samples until samples are negative for total coliform bacteria.
- ☐ **If results are positive for *E. coli***, notify DEP within 1 hour and issue a BWA as soon as possible, but no later than 24 hours. Refer to DEP's *Policy for Issuing and Removing Water Supply Warnings* for additional information about follow-up actions.

5. Complete recordkeeping:

☐ Record details of the main break in a Repair Log, including all follow-up coliform sample results. Retain the Repair Log on site and make it available to DEP upon request.

If a water supplier cannot comply with Standard C-651 and this policy for responding to a loss of positive pressure situation, water quality may be compromised. The water supplier shall notify DEP within 1 hour of discovery of the loss of positive pressure to discuss whether Tier 1 PN is necessary.

E. Special Considerations.

In certain situations, if it is in the best professional judgement of an appropriately certified Class E operator, the collection of bacteriological samples may be avoided. In order to avoid collecting bacteriological samples, **all of the following criteria must be met**:

- There is no evidence of contamination or a high risk of contamination.
- All repair parts are disinfected in accordance with Standard C-651, or if service connections are shut off, the main is disinfected utilizing the slug chlorination method.
- Any area of repair is flushed thoroughly and background disinfectant residual levels of at least 0.2 mg/L (as required by 25 Pa. Code § 109.710) are re-established.
- The water supplier has had no Level 1 or Level 2 assessments triggered under the Revised Total Coliform Rule in the last year.
- The water supplier is in compliance with the requirements of Pennsylvania's Water and Wastewater Systems Operators' Certification Act and associated regulations. Specifically, an available operator with the appropriate level of certification must make all process control decisions related to repairing or replacing the water main.
- The crew must utilize written standard operating procedures that are in conformance with Standard C-651 and this policy.

F. Maintain a Repair Log for Loss of Positive Pressure Situations.

Water suppliers should record details of the loss of positive pressure event in their repair log. This log should include:

- Date, location, and cause of the loss of positive pressure.
- If the cause is a main break, the type of repair needed to correct the break.
- Time it was discovered.
- Population affected.
- Time of notification to DEP, name and phone number of DEP representative notified, and summary of conversation.
- Length of time required to repair.
- Type of disinfection method used.
- Date and time disinfectant residuals were detected.
- Date and time coliform bacteria samples were collected, or an indication that appropriate criteria were met to avoid bacteriological sampling.
- Results of the coliform bacteria samples and the date results were obtained.

The log should be made available to DEP upon request.

VI. DEP FIELD OPERATIONS REGIONAL OFFICES:

For more information, call the DEP regional office in your area or contact:

Department of Environmental Protection
Bureau of Safe Drinking Water
P.O. Box 8467
Harrisburg, PA 17105-8467
717-787-9633

To determine the contact information for your local DEP office, consult the DEP document number 3930-FM-BSDW0560, available at the following link:

www.depgreenport.state.pa.us/elibrary/GetDocument?docId=1422467&DocName=DEP%20OFFICE%20AND%20COUNTY%20HEALTH%20DEPARTMENT%20CONTACT%20INFORMATION%20BY%20COUNTY.PDF.

Appendix E Complete Laboratory Testing Results from November 2019 – November 2020

East Dunkard Water Authority Residential Water Testing Results Summary

Testing Parameter	Testing Limits QL	Testing Limits MDL	Maximum Contaminant Level (MCLs)	Water Plant Tap off Main Line to Griffin Tank 12/9/19 Location 1	466 Davistown Road Kitchen Sink 11/8/19 Location 2	487 Davistown Road Kitchen Sink 11/8/19 Location 3	437 Steele Hill Road Kitchen Sink 11/11/19 Location 4	137 School House Road Kitchen Sink 11/14/19 Location 5	189 Mt. Joy Road Outside Hose Bib 11/18/19 Location 6	584 Taylortown Rd Exterior Yard Hydrant 11/18/19 Location 7
Total Suspended Solids	25.0	5.0		MD	P 5.0	MD	MD	MD	MD	MD
Total Disolved Solids	25.0	10.0	500 mg/L	171.0	207.0	208.0	248.0	241.0	165.0	241.0
Iron	0.1	0.03	0.3 mg/L	MD	0.1	0.1	P 0.05	P 0.04	0.1	0.1
Manganese	0.04	0.01	0.05 mg/L	P 0.03	0.2	0.1	0.04	0.04	0.2	0.1
Aluminum	0.1	0.03	0.2 mg/L	MD	0.2	MD	P 0.04	P 0.04	0.1	0.1
Chloride		3.0	250 mg Cl/L	20.0	17.5	17.5	21.5	19.0	16.0	20.5
Cadmium	0.001	0.0004	0.005 mg/L	MD	MD	MD	MD	MD	MD	MD
Chromium	0.01	0.001	0.1 mg/L	MD	MD	MD	MD	MD	MD	MD
Selenium	0.01	0.003	0.05 mg/L	MD	MD	MD	MD	MD	MD	MD
Zinc	0.25	0.01	5.0 mg/L	MD	MD	MD	MD	MD	MD	MD
Lead*	0.005	0.005	0.005 mg/L	MD	MD	MD	MD	MD	MD	MD
Copper*	0.05	0.01	1.0 mg/L	MD	MD	MD	MD	MD	MD	MD

Notes:

mg/L	milligrams per liter or parts per million
µg/L	micrograms per liter or parts per billion
QL	Quantitation Limit, the
MDL	Method Detection Level, the smallest ammount detectable by the given method
P	Estimated value between method detection and practical quantitation limit.
MD	Indicates less than method detection limit

Cell Colors

- Below Limits
- Equal to Limit
- Above Limit

H&H WATER CONTROLS, INC.
565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 354958

Report Date: 01/09/2020
H&H Sample No: 19-16575.1-2-3
P.O. Number:
Collection Date: 12/09/2019
Collection Time: 13:30
Collected By: SC
Received Date: 12/09/2019
Sample Id: Water Plant Lab Faucet

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97)2	Total Suspended Solids	10.0	5.0	MD <5.0	mg/L	1212191550et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	171.0	mg/L	1213191640ns
SM22 3111BFe (99)	Iron	0.1	.03	MD <0.03	mg/L	1212191051cs
SM22 3111B (99)	Manganese	.04	.01	P 0.03	mg/L	1212191208cs
SM22 3111D (99)	Aluminum	.1	.03	MD <0.03	mg/L	1213191420cs
SM22 4500Cl-B(97)	Chloride		3.0	20.0	mg Cl-/L	1217191651cs
SM 3113BCd(04) OE	Cadmium	.001	.0004	MD<0.0004	mg/L	1226191526cs
SM 3113BCr (04) OE	Chromium	.01	.001	MD<0.001	mg/L	0106201557cs
SM 3113BSe(04) OE	Selenium	.01	.003	MD<0.003	mg/L	1220191203cs
SM22 3111BZn(99)	Zinc	.25	.01	MD <0.01	mg/L	1212191653cs
SM 3113BPb(04) OE	Lead	.005	.0005	MD<0.0005	mg/L	1219191729cs
SM22 3111BCu(99)	Copper	.05	.01	MD <0.01	mg/L	1212191459cs

*QL = Quantitation Limit
*MDL = Method Detection Level

MD-Indicates less than method detection limit. P-Estimated value between method detection and practical quantitation limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

EXHIBIT 1

H&H WATER CONTROLS INC.
565 ROUTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 16575

Page 1 of 1

Customer Name: East Dunkard Water Authority

Billing Address: P.O. Box 241 2790 S. Eighty Eight Road

City: Dilliner | State: PA | Zip Code: 15327

Telephone No.: 724-943-3713 | Fax No.: 724-943-4195

Contact Person: Sam Carroll | E-Mail: sc@harshmanllc.com

Project Name: EDWA: Water Treatment Plant

Sampled By: Samuel N Carroll

Turn Around Time:
- ☐ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.:

Send Results By:
- ☐ Mail
- ☐ Fax
- ☑ E-Mail

Lab Containers # (Lab Use Only): 1 2 3

Analysis Requested

	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium
1	Water Plant Lab Faucet	12/9/2019	1:30PM	G	DW	1	1	1
2								
3								
4								
5								
6								
7								
8								
9								

Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4 — 2 2

Sample Matrix Key
- DW = Drinking Water
- WW = Wastewater
- GW = Groundwater
- SW = Stormwater
- SL = Sludge
- W = Well
- SP = Spring
- ST = Stream
- PD = Pond
- PL = Pool
- OL = Other

Comments:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 Samuel N Carroll	12-9-19	1535	2 GP - H+H Water	12-9-19	1535
3			4		
5			6		

FIELD TESTS: pH:_____ Temp:_____ DO:_____ Cl_2:_____ FLOW:_____ OTHER:_____

Condition (Lab Use Only)
Temp: 9.5 °C # of Bottles: 3
Iced: yes
pH Checked? Preserved At Lab?

Receipt Information
Performed By: GP

Preservation Comments:

H&H WATER CONTROLS, INC.
565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No.	354181

Report Date: 12/05/2019
H&H Sample No: 19-16326.1-2-3
P.O. Number:
Collection Date: 11/08/2019
Collection Time: 11:24
Collected By: SC
Received Date: 11/08/2019
Sample Id: 466 Davistown Rd
Kitchen Sink

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97)3	Total Suspended Solids	12.5	5.0	P 5.0	mg/L	1112191430ns
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	207.0	mg/L	1115191600dh
SM22 3111BFe (99)	Iron	0.1	.03	0.1	mg/L	1125191451cs
SM22 3111B (99)	Manganese	.04	.01	0.2	mg/L	1125191558cs
SM22 3111D (99)	Aluminum	.1	.03	0.2	mg/L	1126191138cs
SM22 4500Cl-B(97)	Chloride		3.0	17.5	mg Cl-/L	1127191420cs
SM 3113BCd(04) OE	Cadmium	.001	.0004	MD<0.0004	mg/L	1120191603cs
SM 3113BCr (04) OE	Chromium	.01	.001	MD<0.001	mg/L	1119191622cs
SM 3113BSe(04) OE	Selenium	.01	.003	MD 0.003	mg/L	1121191549cs
SM22 3111BZn(99)	Zinc	.25	.01	MD <0.01	mg/L	1125191650cs
SM 3113BPb(04) OE	Lead	.005	.0005	MD<0.0005	mg/L	1122191739cs
SM22 3111BCu(99)	Copper	.05	.01	MD <0.01	mg/L	1125191054cs

*QL = Quantitation Limit
*MDL = Method Detection Level

P-Estimated value between method detection and practical quantitation limit.
MD-Indicates less than method detection limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

H&H WATER CONTROLS, INC.
565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 354182

Report Date: 12/05/2019
H&H Sample No: 19-16326.4-5-6
P.O. Number:
Collection Date: 11/08/2019
Collection Time: 11:40
Collected By: SC
Received Date: 11/08/2019
Sample Id: 487 Davistown Rd
Kitchen Sink

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97)4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	1112191430ns
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	208.0	mg/L	1115191600dh
SM22 3111BFe (99)	Iron	0.1	.03	0.1	mg/L	1125191451cs
SM22 3111B (99)	Manganese	.04	.01	0.1	mg/L	1125191558cs
SM22 3111D (99)	Aluminum	.1	.03	MD <0.03	mg/L	1126191138cs
SM22 4500Cl-B(97)	Chloride		3.0	17.5	mg Cl-/L	1127191420cs
SM 3113BCd(04) OE	Cadmium	.001	.0004	MD<0.0004	mg/L	1120191603cs
SM 3113BCr (04) OE	Chromium	.01	.001	MD<0.001	mg/L	1119191622cs
SM 3113BSe(04) OE	Selenium	.01	.003	MD<0.003	mg/L	1121191549cs
SM22 3111BZn(99)	Zinc	.25	.01	MD <0.01	mg/L	1125191650cs
SM 3113BPb(04) OE	Lead	.005	.0005	MD<0.0005	mg/L	1122191739cs
SM22 3111BCu(99)	Copper	.05	.01	MD <0.01	mg/L	1125191054cs

*QL = Quantitation Limit
*MDL = Method Detection Level

MD-Indicates less than method detection limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

EXHIBIT 1

WATER CONTROLS INC.
SOUTH, CARMICHAELS, PA 15320
.2278 Fax: 724.966.7924
hwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 16326

Ward Water Authority

Billing Address: P.O. Box 241 2790 South Eighty Eight Rd
City: Delmont | State: PA | Zip Code: 15327
Telephone No.: 724-993-3713 | Fax No.: 724-993-4195
Contact Person: Sam Carroll | E-Mail: SC@harshmanllc.com
Project Name: ED: 466 Davistown Road
Sampled By: Sam Carroll Samuel N Carroll

Turn Around Time:
- ☐ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.

Send Results By:
- ☐ Mail
- ☐ Fax
- ☐ E-Mail

Lab Containers # (Lab Use Only): 1 2 3

Sample Matrix Key
DW = Drinking Water
WW = Wastewater
GW = Groundwater
SW = Stormwater
SL = Sludge
W = Well
SP = Spring
ST = Stream
PD = Pond
PL = Pool
OL = Other

	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	Analysis Requested: TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium	Comments:
1	466 Davistown Road Kitchen Sink	11/8/2019	1124 AM	G	DW	1	1	1	
2									
3									
4									
5									
6									
7									
8									
9									

Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4 — 2 2

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 X Samuel N Carroll	11-8-19	1242	2 Ward Waterwater	11-8-19	1242
3			4		
5			6		

FIELD TESTS: pH:_____ Temp:_____ DO:_____ Cl_2:_____ FLOW:_____ OTHER:_____

Condition (Lab Use Only)
Temp: 4.6°C # of Bottles: PS 1 - 3 Bottles
Iced: Yes
pH Checked? ☑ Yes ☐ No
Preserved At Lab? ☐ Yes ☑ No

Receipt Information
Performed By: CP

Preservation Comments:

EXHIBIT 1

H&H WATER CONTROLS INC.
565 ROUTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 16326

Page 2 of 2

Customer Name: East Dunkard Water Authority

Billing Address: PO Box 241 2790 South Eighty Eight Rd

City: Dilliner | State: PA | Zip Code: 15327

Telephone No.: 724-943-3713 | Fax No.: 724-943-4195

Contact Person: Sam Carroll | E-Mail: sc@harshmanllc.com

Project Name: ED: 487 Davistown Rd

Sampled By: Sam Carroll Samuel M Carroll

Turn Around Time:
- ☐ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.

Send Results By:
- ☐ Mail
- ☐ Fax
- ☐ E-Mail

Lab Containers # (Lab Use Only): 4, 5, 6

Analysis Requested

	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium						
1	487 Davistown Rd Kitchen Sink	11/8/19	11:40 AM	G	DW	1	1	1						
2														
3														
4														
5														
6														
7														
8														
9														
	Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4						2	2						

Sample Matrix Key
- DW = Drinking Water
- WW = Wastewater
- GW = Groundwater
- SW = Stormwater
- SL = Sludge
- W = Well
- SP = Spring
- ST = Stream
- PD = Pond
- PL = Pool
- OL = Other

Comments:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 Samuel M Carroll	11-8-19	1242	2 E P H&H Water	11-8-19	1242
3			4		
5			6		

Condition (Lab Use Only)
Temp: 4.6 °C # of Bottles: pg 2-3 Bottles
Iced: yes
pH Checked? ☑ Yes ☐ No
Preserved At Lab? ☐ Yes ☑ No

Receipt Information
Performed By: EP

Preservation Comments:

FIELD TESTS: pH:_____ Temp:_____ DO:_____ Cl_2:_____ FLOW:_____ OTHER:_____

EXHIBIT 1

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 354183

Report Date: 12/05/2019
H&H Sample No: 19-16337.1-2-3
P.O. Number:
Collection Date: 11/11/2019
Collection Time: 15:20
Collected By: JH
Received Date: 11/11/2019
Sample Id: 437 Steele Hill Rd
Kitchen Sink

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97)4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	1112191430ns
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	248.0	mg/L	1115191600dh
SM22 3111BFe (99)	Iron	0.1	.03	P 0.05	mg/L	1125191451cs
SM22 3111B (99)	Manganese	.04	.01	0.04	mg/L	1125191558cs
SM22 3111D (99)	Aluminum	.1	.03	P 0.04	mg/L	1126191138cs
SM22 4500Cl-B(97)	Chloride		3.0	21.5	mg Cl-/L	1127191420cs
SM 3113BCd(04) OE	Cadmium	.001	.0004	MD<0.0004	mg/L	1120191603cs
SM 3113BCr (04) OE	Chromium	.01	.001	MD<0.001	mg/L	1119191622cs
SM 3113BSe(04) OE	Selenium	.01	.003	MD<0.003	mg/L	1121191549cs
SM22 3111BZn(99)	Zinc	.25	.01	MD <0.01	mg/L	1125191650cs
SM 3113BPb(04) OE	Lead	.005	.0005	MD<0.0005	mg/L	1122191739cs
SM22 3111BCu(99)	Copper	.05	.01	MD <0.01	mg/L	1125191054cs

*QL = Quantitation Limit
*MDL = Method Detection Level

P-Estimated value between method detection and practical quantitation limit.
MD-Indicates less than method detection limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

EXHIBIT 1

H&H WATER CONTROLS INC.
TE 88 SOUTH, CARMICHAELS, PA 15320
4.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 16337

Name: East Dunkard Water Authority

Billing Address: P.O. Box 241 2790 S. Eighty Eight Road

City: Dilliner | State: PA | Zip Code: 15327

Telephone No.: 724-943-3713 | Fax No.: 724-943-4195

Contact Person: Sam Carroll | E-Mail: sc@harshmanllc.com

Project Name: East Dunkard Residential Sampling

Sampled By: James Harshman

Turn Around Time:
- ☐ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.:

Send Results By:
- ☐ Mail
- ☐ Fax
- ☐ E-Mail

Lab Containers # (Lab Use Only): 1 2 3

Analysis Requested

Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium	Comments:
1 437 Steele Hill Rd - KITCHEN SINK	11/11/19	3:20 PM	G	DW	1	1	1	
2								
3								
4								
5								
6								
7								
8								
9								
Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4					2	2		

Sample Matrix Key
- DW = Drinking Water
- WW = Wastewater
- GW = Groundwater
- SW = Stormwater
- SL = Sludge
- W = Well
- SP = Spring
- ST = Stream
- PD = Pond
- PL = Pool
- OL = Other

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 [signature]	11-11-19	1555	2 Pie Hill Water	11-11-19	1555
3			4		
5			6		

Condition (Lab Use Only)
Temp: 14.1°C # of Bottles: 3
Iced: yes
pH Checked? ☑ Yes ☐ No
Preserved At Lab? ☐ Yes ☑ No

Receipt Information
Performed By: [signature]
Preservation Comments:

FIELD TESTS: pH:_____ Temp: _____ DO: _____ Cl_2: _____ FLOW: _____ OTHER: _____

EXHIBIT 1

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 354184

Report Date: 12/05/2019
H&H Sample No: 19-16369.1-2-3
P.O. Number:
Collection Date: 11/14/2019
Collection Time: 09:20
Collected By: MM
Received Date: 11/14/2019
Sample Id: 137 School House Kitchen Sink

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97)4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	1115191430ns
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	241.0	mg/L	1115191600dh
SM22 3111BFe (99)	Iron	0.1	.03	P 0.04	mg/L	1125191451cs
SM22 3111B (99)	Manganese	.04	.01	0.04	mg/L	1125191558cs
SM22 3111D (99)	Aluminum	.1	.03	P 0.04	mg/L	1126191138cs
SM22 4500Cl-B(97)	Chloride		3.0	19.0	mg Cl-/L	1127191420cs
SM 3113BCd(04) OE	Cadmium	.001	.0004	MD<0.0004	mg/L	1120191603cs
SM 3113BCr (04) OE	Chromium	.01	.001	MD<0.001	mg/L	1119191622cs
SM 3113BSe(04) OE	Selenium	.01	.003	MD<0.003	mg/L	1121191549cs
SM22 3111BZn(99)	Zinc	.25	.01	MD <0.01	mg/L	1125191650cs
SM 3113BPb(04) OE	Lead	.005	.0005	MD<0.0005	mg/L	1122191739cs
SM22 3111BCu(99)	Copper	.05	.01	MD <0.01	mg/L	1125191054cs

*QL = Quantitation Limit
*MDL = Method Detection Level

P-Estimated value between method detection and practical quantitation limit.
MD-Indicates less than method detection limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

EXHIBIT 1

H&H WATER CONTROLS INC.
)UTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 16369

Page 1 of 1

Customer Name: HARSHMAN CE GROUP

Billing Address: 100 COURSON HILL RD

City: WASHINGTON | State: PA | Zip Code: 15301

Telephone No.: 724 503 4125 | Fax No.:

Contact Person: SAM CARROLL | E-Mail: SC@HARSHMANHILL.com

Project Name: EAST DUNKARD WATER AUTHORITY - 137 SCHOOL HOUSE

Sampled By: MATT MALIK

Turn Around Time:
- ☑ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.:

Send Results By:
- ☐ Mail
- ☐ Fax
- ☐ E-Mail

Lab Containers # (Lab Use Only): 1 2 3

	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	Analysis Requested: TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium
1	WATER FROM KITCHEN SINK - 137 SCHOOL HOUSE	11/14/19	9:20 AM	G	DW	1	1	1
2								
3								
4								
5								
6								
7								
8								
9								

Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4 — 2 2

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
Matthew J. Malik	11/14/19	13:05	2 GPE Hillwater	11-14-19	1005
			4		
			6		

FIELD TESTS: pH:_____ Temp:_____ DO:_____ Cl_2:_____ FLOW:_____ OTHER:_____

Condition (Lab Use Only)
Temp: 15.8 °C # of Bottles: 3
Iced: yes
pH Checked?
Preserved At Lab?

Receipt Information
Performed By: CJ
Preservation Comments:

Sample Matrix Key
- DW = Drinking Water
- WW = Wastewater
- GW = Groundwater
- SW = Stormwater
- SL = Sludge
- W = Well
- SP = Spring
- ST = Stream
- PD = Pond
- PL = Pool
- OL = Other

Comments:

H&H WATER CONTROLS, INC.
565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No.	354185

Report Date: 12/05/2019
H&H Sample No: 19-16403.1-2-3
P.O. Number:
Collection Date: 11/15/2019
Collection Time: 18:20
Collected By: BL
Received Date: 11/18/2019
Sample Id: 189 Mt. Joy Rd
Outside Pool House Bib

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97)4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	1120191455et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	165.0	mg/L	1121191600ns
SM22 3111BFe (99)	Iron	0.1	.03	0.1	mg/L	1125191451cs
SM22 3111B (99)	Manganese	.04	.01	0.2	mg/L	1125191558cs
SM22 3111D (99)	Aluminum	.1	.03	0.1	mg/L	1126191138cs
SM22 4500Cl-B(97)	Chloride		3.0	16.0	mg Cl-/L	1127191420cs
SM 3113BCd(04) OE	Cadmium	.001	.0004	MD<0.0004	mg/L	1120191603cs
SM 3113BCr (04) OE	Chromium	.01	.001	MD<0.001	mg/L	1119191622cs
SM 3113BSe(04) OE	Selenium	.01	.003	MD<0.003	mg/L	1121191549cs
SM22 3111BZn(99)	Zinc	.25	.01	MD <0.01	mg/L	1125191650cs
SM 3113BPb(04) OE	Lead	.005	.0005	MD<0.0005	mg/L	1122191739cs
SM22 3111BCu(99)	Copper	.05	.01	MD <0.01	mg/L	1125191054cs

*QL = Quantitation Limit
*MDL = Method Detection Level

MD-Indicates less than method detection limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

EXHIBIT 1

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 354186

Report Date: 12/05/2019
H&H Sample No: 19-16403.4-5-6
P.O. Number:
Collection Date: 11/18/2019
Collection Time: 15:15
Collected By: JH
Received Date: 11/18/2019
Sample Id: 584 Taylortown Rd
Exterior Hydrant-Yard

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97)4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	1120191455et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	241.0	mg/L	1121191600ns
SM22 3111BFe (99)	Iron	0.1	.03	0.1	mg/L	1125191451cs
SM22 3111B (99)	Manganese	.04	.01	0.1	mg/L	1125191558cs
SM22 3111D (99)	Aluminum	.1	.03	0.1	mg/L	1126191138cs
SM22 4500Cl-B(97)	Chloride		3.0	20.5	mg Cl-/L	1127191420cs
SM 3113BCd(04) OE	Cadmium	.001	.0004	MD<0.0004	mg/L	1120191603cs
SM 3113BCr (04) OE	Chromium	.01	.001	MD<0.001	mg/L	1119191622cs
SM 3113BSe(04) OE	Selenium	.01	.003	MD<0.003	mg/L	1121191549cs
SM22 3111BZn(99)	Zinc	.25	.01	MD <0.01	mg/L	1125191650cs
SM 3113BPb(04) OE	Lead	.005	.0005	MD<0.0005	mg/L	1122191739cs
SM22 3111BCu(99)	Copper	.05	.01	MD <0.01	mg/L	1125191054cs

*QL = Quantitation Limit
*MDL = Method Detection Level

MD-Indicates less than method detection limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

EXHIBIT 1

H&H WATER CONTROLS INC.
UTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 16403

Page 1 of 2

Customer Name: EAST DUNKARD WATER AUTHORITY

Billing Address: P.O. Box 241 2790 S. Eighty Eight Rd

City: DILLNER | State: PA | Zip Code: 15327

Telephone No.: 724-943-3713 | Fax No.: 724-943-4195

Contact Person: SAM CARROLL | E-Mail: SC@HARSHMANLLC.COM

Project Name: ED RESIDENTIAL TESTING - 189 MT. JOY RD.

Sampled By: BRYAN W. LOWE

Turn Around Time:
- ☐ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.:

Send Results By:
- ☐ Mail
- ☐ Fax
- ☐ E-Mail

Lab Containers # (Lab Use Only): 1 2 3

Sample Matrix Key: DW = Drinking Water; WW = Wastewater; GW = Groundwater; SW = Stormwater; SL = Sludge; W = Well; SP = Spring; ST = Stream; PD = Pond; PL = Pool; OL = Other

	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	Analysis Requested: TSS-TDS-chloride	Fe-Mn-AL-Pb-Cu-Zn-Cd-Cr	Selenium	Comments
1	OUTSIDE POOL HOSE BIB	11/15/19	6:20 PM	G	DW	1	1	1	
2	189 MT. JOY RD.								
3									
4									
5									
6									
7									
8									
9									

Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
	111819	1555	2 Pace Hathwater	111819	1555
			4		
			6		

FIELD TESTS: pH:_____ Temp:_____ DO:_____ Cl_2:_____ FLOW:_____ OTHER:_____

Condition (Lab Use Only): Temp: 5.8 °C # of Bottles: PGI - 3 Bottles
Iced: yes
pH Checked? ☐Yes ☐No
Preserved At Lab?

Receipt Information
Performed By: GP
Preservation Comments:

EXHIBIT 1

H&H WATER CONTROLS INC.
'UTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 16403

Page 2 of 2

Customer Name: East Dunkard Water Authority

Billing Address: P.O. Box 241 2790 S. Eighty Eight Rd

City: Dilliner | State: PA | Zip Code: 15327

Telephone No.: 724-943-3713 | Fax No.: 724-943-4195

Contact Person: Sam Carroll | E-Mail: sc@harshmanllc.com

Project Name: ED Residential Testing - 584 Taylortown Rd

Sampled By: JAMES HARSHMAN

Turn Around Time:
☐ Normal (10-12 Business Days)
☐ Rush (Surcharges May Apply)

Purchase Order No.

Send Results By:
☐ Mail
☐ Fax
☐ E-Mail

Lab Containers # (Lab Use Only): 4 | 5 | 6

	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium							Comments:
1	EXTERIOR FROST FREE HYDRANT IN YARD														
2	AT 584 TAYLORTOWN RD.	11/18/19	3:15 PM	G	DW	1	1	1							
3															
4															
5															
6															
7															
8															
9															
	Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4						2	2							

Sample Matrix Key
- DW = Drinking Water
- WW = Wastewater
- GW = Groundwater
- SW = Stormwater
- SL = Sludge
- W = Well
- SP = Spring
- ST = Stream
- PD = Pond
- PL = Pool
- OL = Other

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1. [signature]	11/18/19	1555	2 [signature] Hoffwater	11/18/19	1555
3			4		
5			6		

FIELD TESTS: pH:____ Temp:____ DO:____ Cl_2:____ FLOW:____ OTHER:____

Condition (Lab Use Only)
Temp: 5.8 °C
# of Bottles: Pg2 - 3 Bottles
Iced: yes
pH Checked?
Preserved At Lab?

Receipt Information
Performed By:

Preservation Comments:

East Dunkard Water Authority Residential Water Testing Results Summary

Testing Parameter	Testing Limits QL	Testing Limits MDL	Maximum Contaminant Level (MCLs)	Water Plant Entry Point	121 Rocky Run Road	Davistown Road	1294 Garards Fort Road	237 Old Dairy Road
Address				Water Plant Entry Point	121 Rocky Run Road	Davistown Road	1294 Garards Fort Road	237 Old Dairy Road
Customer								
Sampling Location				Tap off Main Line to Griffin Tank	Garage Hose Bib	Service Pit Between Yoney and Hitt	Outdoor Hose Bib	Outside Hose Bib
Date Sampled				08/07/20	08/07/20	08/07/20	08/07/20	08/19/20
				Location 1	Location 2	Location 3	Location 4	Location 5
Primary Contaminants: Primary contaminents are ones that present a risk to human health.								
Cadmium	0.001	0.0004	0.005 mg/L	<MD	<MD	<MD	<MD	<MD
Chromium	0.01	0.001	0.1 mg/L	<MD	<MD	<MD	<MD	<MD
Selenium	0.01	0.003	0.05 mg/L	<MD	<MD	<MD	<MD	<MD
Zinc	0.25	0.01	5.0 mg/L	<MD	<MD	<MD	<MD	<MD
Lead	0.005	0.005	0.005 mg/L	<MD	<MD	<MD	<MD	<MD
Copper	0.05	0.01	1.0 mg/L	<MD	<MD	<MD	<MD	P 0.01
Secondary Contaminants: although not usually health threatening, may be displeasing to consumers.								
Total Suspended Solids	25.0	5.0		<MD	<MD	<MD	<MD	<MD
Total Disolved Solids	25.0	10.0	500 mg/L	257.0	257.0	220.0	218.0	145.0
Iron	0.1	0.03	0.3 mg/L	P 0.05	0.1	P 0.04	0.1	<MD
Manganese	0.04	0.01	0.05 mg/L	<MD	P 0.01	<MD	<MD	<MD
Aluminum	0.1	0.03	0.2 mg/L	0.1	P0.06	P0.07	0.1	P0.09
Chloride		3.0	250 mg Cl/L	17.5	17.5	12.5	21.0	15.0

Notes:

mg/L	milligrams per liter or parts per million
µg/L	micrograms per liter or parts per billion
QL	Quantitation Limit, the
MDL	Method Detection Level, the smallest ammount detectable by the given method
P	Estimated value between method detection and practical quantitation limit.
<MD	Indicates less than method detection limit

Cell Colors

- Below Limits
- Equal to Limit
- Above Limit

H&H WATER CONTROLS, INC.
565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No.	360046

Report Date: 09/03/2020
H&H Sample No: 20-18658.1-2-3
P.O. Number:
Collection Date: 08/07/2020
Collection Time: 10:40
Collected By: SC
Received Date: 08/07/2020
Sample Id: Water Plant Entry Point

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97) ^4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	0810201510et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	257.0	mg/L	0807201700ns
SM22 3111B Fe (99)	Iron	0.075	0.03	P 0.05	mg/L	0819201329cs
SM22 3111B Mn (99)	Manganese	0.03	0.01	MD <0.01	mg/L	0819201441cs
SM22 3111D Al (99)	Aluminum	0.1	0.03	0.1	mg/L	0820201020cs
SM22 4500Cl-B(97)	Chloride		3.0	17.5	mg Cl-/L	0824201325sc
SM22 3111B Cu (99)	Copper	0.03	0.01	MD <0.01	mg/L	0821201355cs
SM21 3113BPb(04)OE	Lead	0.003	0.0005	MD<0.0005	mg/L	0818201620cs
SM22 3111B Zn (99)	Zinc	0.08	0.01	MD <0.01	mg/L	0821201201cs
SM21 3113BSe(04)OE	Selenium	0.008	0.003	MD <0.003	mg/L	0902201649cs
SM21 3113BCd(04)OE	Cadmium	0.001	0.0004	MD<0.0004	mg/L	0908201202cs
SM21 3113BCr(04)OE	Chromium	0.008	0.001	MD <0.001	mg/L	0903201706cs

*QL = Quantitation Limit
*MDL = Method Detection Level

^# after the Method No is for internal lab use only. Page 1 of 2

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

Revision 5
June 1, 2020

H&H WATER CONTROLS INC.
565 Route 88 South
Carmichaels, PA 15320
724-966-2278

Report Data Qualifiers

T-Sample did not meet thermal preservation requirement.

C-Sample did not meet chemical preservation requirement.

R-Received and analyzed outside hold time.

A-Sample analyzed outside hold time.

B-CBOD did not meet depletion criteria.

B-BOD did not meet depletion criteria.

P-Indicates an estimated value between Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).

D-Indicates Sample Dilution necessary.

SD-Sample Duplicate (RPD) percent recovery is outside acceptable limit.

MS-Matrix Spike percent recovery is outside acceptable limit.

ND-Indicates Analyte was Not Detected (ND)

M-Indicates over the Maximum Contaminant Level (MCL)

MD-Indicates less than Method Detection Limit

J-Indicates less than Quantitation Limit.

(>)Indicates highest sample dilution was greater than 200.

E-Estimated

LA-Indicates Alkalinity result is less than 20.

MR-Sample does not meet Method Requirements.

H&H WATER CONTROLS, INC.
565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No.	360047

Report Date: 09/03/2020
H&H Sample No: 20-18658.4-5-6
P.O. Number:
Collection Date: 08/07/2020
Collection Time: 10:40
Collected By: SC
Received Date: 08/07/2020
Sample Id: 121 Rocky Run Road

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97) ^4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	0810201510et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	257.0	mg/L	0807201700ns
SM22 3111B Fe (99)	Iron	0.075	0.03	0.1	mg/L	0819201329cs
SM22 3111B Mn (99)	Manganese	0.03	0.01	P 0.01	mg/L	0819201441cs
SM22 3111D Al (99)	Aluminum	0.1	0.03	P 0.06	mg/L	0820201020cs
SM22 4500Cl-B(97)	Chloride		3.0	17.5	mg Cl-/L	0824201325sc
SM22 3111B Cu (99)	Copper	0.03	0.01	MD <0.01	mg/L	0821201355cs
SM21 3113BPb(04)OE	Lead	0.003	0.0005	MD<0.0005	mg/L	0818201620cs
SM22 3111B Zn (99)	Zinc	0.08	0.01	MD <0.01	mg/L	0821201201cs
SM21 3113BSe(04)OE	Selenium	0.008	0.003	MD <0.003	mg/L	0902201649cs
SM21 3113BCd(04)OE	Cadmium	0.001	0.0004	MD<0.0004	mg/L	0908201202cs
SM21 3113BCr(04)OE	Chromium	0.008	0.001	MD <0.001	mg/L	0903201706cs

*QL = Quantitation Limit
*MDL = Method Detection Level

^# after the Method No is for internal lab use only. Page 1 of 2

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

Revision 5
June 1, 2020

H&H WATER CONTROLS INC.
565 Route 88 South
Carmichaels, PA 15320
724-966-2278

Report Data Qualifiers

T-Sample did not meet thermal preservation requirement.

C-Sample did not meet chemical preservation requirement.

R-Received and analyzed outside hold time.

A-Sample analyzed outside hold time.

B-CBOD did not meet depletion criteria.

B-BOD did not meet depletion criteria.

P-Indicates an estimated value between Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).

D-Indicates Sample Dilution necessary.

SD-Sample Duplicate (RPD) percent recovery is outside acceptable limit.

MS-Matrix Spike percent recovery is outside acceptable limit.

ND-Indicates Analyte was Not Detected (ND)

M-Indicates over the Maximum Contaminant Level (MCL)

MD-Indicates less than Method Detection Limit

J-Indicates less than Quantitation Limit.

(>)Indicates highest sample dilution was greater than 200.

E-Estimated

LA-Indicates Alkalinity result is less than 20.

MR-Sample does not meet Method Requirements.

EXHIBIT 1

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 360048

Report Date: 09/03/2020
H&H Sample No: 20-18658.7-8-9
P.O. Number:
Collection Date: 08/07/2020
Collection Time: 11:15
Collected By: SC
Received Date: 08/07/1920
Sample Id: Yoney Hitt Service Pit

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97) ^4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	0810201510et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	220.0	mg/L	0807201700ns
SM22 3111B Fe (99)	Iron	0.075	0.03	P 0.04	mg/L	0819201329cs
SM22 3111B Mn (99)	Manganese	0.03	0.01	MD <0.01	mg/L	0819201441cs
SM22 3111D Al (99)	Aluminum	0.1	0.03	P 0.07	mg/L	0820201020cs
SM22 4500Cl-B(97)	Chloride		3.0	12.5	mg Cl-/L	0824201325sc
SM22 3111B Cu (99)	Copper	0.03	0.01	MD <0.01	mg/L	0821201355cs
SM21 3113BPb(04)OE	Lead	0.003	0.0005	MD<0.0005	mg/L	0818201620cs
SM22 3111B Zn (99)	Zinc	0.08	0.01	MD <0.01	mg/L	0821201201cs
SM21 3113BSe(04)OE	Selenium	0.008	0.003	MD <0.003	mg/L	0902201649cs
SM21 3113BCd(04)OE	Cadmium	0.001	0.0004	MD<0.0004	mg/L	0908201202cs
SM21 3113BCr(04)OE	Chromium	0.008	0.001	MD <0.001	mg/L	0903201706cs

*QL = Quantitation Limit
*MDL = Method Detection Level

^# after the Method No is for internal lab use only. Page 1 of 2

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

Revision 5
June 1, 2020

H&H WATER CONTROLS INC.
565 Route 88 South
Carmichaels, PA 15320
724-966-2278

Report Data Qualifiers

T-Sample did not meet thermal preservation requirement.

C-Sample did not meet chemical preservation requirement.

R-Received and analyzed outside hold time.

A-Sample analyzed outside hold time.

B-CBOD did not meet depletion criteria.

B-BOD did not meet depletion criteria.

P-Indicates an estimated value between Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).

D-Indicates Sample Dilution necessary.

SD-Sample Duplicate (RPD) percent recovery is outside acceptable limit.

MS-Matrix Spike percent recovery is outside acceptable limit.

ND-Indicates Analyte was Not Detected (ND)

M-Indicates over the Maximum Contaminant Level (MCL)

MD-Indicates less than Method Detection Limit

J-Indicates less than Quantitation Limit.

(>)Indicates highest sample dilution was greater than 200.

E-Estimated

LA-Indicates Alkalinity result is less than 20.

MR-Sample does not meet Method Requirements.

EXHIBIT 1

H&H WATER CONTROLS INC.
565 ROUTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 18658

Page 1 of 2

Customer Name: East Dunkard Water Authority

Billing Address: PO Box 241 2790 S. Eighty Eight Rd

City: Dilliner | State: PA | Zip Code: 15327

Telephone No.: 724-943-3713 | Fax No.: 724-943-4195

Contact Person: Sam Carroll | E-Mail: sc@harshmanllc.com

Project Name: EDWA Water testing

Sampled By: Samuel N. Carroll

Turn Around Time:
- ☐ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.

Send Results By:
- ☐ Mail
- ☐ Fax
- ☑ E-Mail

Lab Containers # (Lab Use Only): 1 2 3 4 5 6 7 8 9

Total Bottles (12)

Analysis Requested

#	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium
1	Water Plant Entry Point	Aug 7 2020	10:40AM	G	DW	1	1	1						
2	121 Rocky Run Road	Aug 7, 2020	10:40AM	G	DW				1	1	1			
3	Yoney Hitt Service Pit	Aug 7, 2020	14:15AM	G	DW							1	1	1
4														
5														
6														
7														
8														
9														
	Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4					2	2		2	2		2	2	

Sample Matrix Key
- DW = Drinking Water
- WW = Wastewater
- GW = Groundwater
- SW = Stormwater
- SL = Sludge
- W = Well
- SP = Spring
- ST = Stream
- PD = Pond
- PL = Pool
- OL = Other

Comments:

	Relinquished By / Company Name	Date	Time		Received By / Company Name	Date	Time
1	Samuel N Carroll	8-7-20	1315	2	H&H Water	8-7-20	1315
3				4			
5				6			

FIELD TESTS: pH:____ Temp:____ DO:____ Cl_2:____ FLOW:____ OTHER:____

Condition (Lab Use Only)
Temp: 17.3 °C # of Bottles: pg 1 - 9 Bottles
Iced: yes
pH Checked? ☑ Yes ☐ No
Preserved At Lab? ☐ Yes ☑ No

Receipt Information
Performed By: [initials]

Preservation Comments:

EXHIBIT 1

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 360049

Report Date: 09/03/2020
H&H Sample No: 20-18658.10-12
P.O. Number:
Collection Date: 08/07/2020
Collection Time: 11:41
Collected By: SC
Received Date: 08/07/2020
Sample Id: 1294 Garards Fort Roac

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97) ^4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	0810201510et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	218.0	mg/L	0807201700ns
SM22 3111B Fe (99)	Iron	0.075	0.03	0.1	mg/L	0819201329cs
SM22 3111B Mn (99)	Manganese	0.03	0.01	MD <0.01	mg/L	0819201441cs
SM22 3111D Al (99)	Aluminum	0.1	0.03	0.1	mg/L	0820201020cs
SM22 4500Cl-B(97)	Chloride		3.0	21.0	mg Cl-/L	0824201325sc
SM22 3111B Cu (99)	Copper	0.03	0.01	MD <0.01	mg/L	0821201355cs
SM21 3113BPb(04)OE	Lead	0.003	0.0005	MD<0.0005	mg/L	0818201620cs
SM22 3111B Zn (99)	Zinc	0.08	0.01	MD <0.01	mg/L	0821201201cs
SM21 3113BSe(04)OE	Selenium	0.008	0.003	MD <0.003	mg/L	0902201649cs
SM21 3113BCd(04)OE	Cadmium	0.001	0.0004	MD<0.0004	mg/L	0908201202cs
SM21 3113BCr(04)OE	Chromium	0.008	0.001	MD <0.001	mg/L	0903201706cs

*QL = Quantitation Limit
*MDL = Method Detection Level

^# after the Method No is for internal lab use only. MD-Indicates less than method detection limit. Page 1 of 1

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

EXHIBIT 1

H&H WATER CONTROLS INC.
565 ROUTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 1-18-18)

Login Number: 18658

Customer Name: East Dunkard Water Authority

Billing Address: P.O. Box 241 27905 Eighty Eight Road

City: Dilliner | State: PA | Zip Code: 15301

Telephone No.: 724-943-3713 | Fax No.: 724-943-4195

Contact Person: Sam Carroll | E-Mail: sc@harshmanllc.com

Project Name: EDWA Water Testing

Sampled By: Samuel N Carroll

Turn Around Time:
- ☐ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.:

Send Results By:
- ☐ Mail
- ☐ Fax
- ☑ E-Mail

Lab Containers # (Lab Use Only): 10 | 11 | 12

Analysis Requested

	Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium
1	1294 Garrards Fort Road	Aug 7 2020	11:41AM	G	DW	1	1	1
2								
3								
4								
5								
6								
7								
8								
9								

Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4 — 2 | 2

Sample Matrix Key
- DW = Drinking Water
- WW = Wastewater
- GW = Groundwater
- SW = Stormwater
- SL = Sludge
- W = Well
- SP = Spring
- ST = Stream
- PD = Pond
- PL = Pool
- OL = Other

Comments:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 Samuel N Carroll	8-7-20	1315	2 WE H&H Water	8-7-20	1315
3			4		
5			6		

Condition (Lab Use Only)
Temp: 17.3 °C # of Bottles: PS 2-3 Bottles
Iced: Yes
pH Checked? ☑ Yes ☐ No
Preserved At Lab? ☐ Yes ☑ No

Receipt Information
Performed By:

Preservation Comments:

FIELD TESTS: pH:_____ Temp:_____ DO:_____ Cl_2:_____ FLOW:_____ OTHER:_____

EXHIBIT 1

H&H WATER CONTROLS, INC.

565 Route 88 South
Carmichaels, PA 15320

Telephone: (724) 966-2278 Fax: (724) 966-7924
PA Lab # 30-00287

Report No. 360050

Report Date: 09/03/2020
H&H Sample No: 20-18753.1-2-3
P.O. Number:
Collection Date: 08/19/2020
Collection Time: 10:25
Collected By: SC
Received Date: 08/19/2020
Sample Id: 237 Old Dairy Road

Ship To East Dunkard Water Authority
2790 S. EightyEight Road
P.O. Box 241
Dilliner, PA 15327

LABORATORY ANALYSIS REPORT

Method No.	Parameter	QL*	MDL*	Results	Units	Date / Time / By
SM22 2540D(97) ^4	Total Suspended Solids	25.0	5.0	MD <5.0	mg/L	0820201500et
SM22 2540C (97)	Total Dissolved Solids	25.0	10.0	142.0	mg/L	0821201540ns
SM22 3111B Fe (99)	Iron	0.075	0.03	MD <0.03	mg/L	0831201150cs
SM22 3111B Mn (99)	Manganese	0.03	0.01	MD <0.01	mg/L	0831201422cs
SM22 3111D Al (99)	Aluminum	0.1	0.03	P 0.09	mg/L	0831201642cs
SM22 4500Cl-B(97)	Chloride		3.0	15.0	mg Cl-/L	0824201325sc
SM22 3111B Cu (99)	Copper	0.03	0.01	P 0.01	mg/L	0821201355cs
SM21 3113BPb(04)OE	Lead	0.003	0.0005	MD<0.0005	mg/L	0825201044cs
SM22 3111B Zn (99)	Zinc	0.08	0.01	MD <0.01	mg/L	0821201201cs
SM21 3113BSe(04)OE	Selenium	0.008	0.003	MD 0.003	mg/L	0902201649cs
SM21 3113BCd(04)OE	Cadmium	0.001	0.0004	MD<0.0004	mg/L	0908201202cs
SM21 3113BCd(04)OE	Cadmium	0.001	0.0004	MD<0.0004	mg/L	0908201202cs
SM21 3113BCr(04)OE	Chromium	0.008	0.001	MD <0.001	mg/L	0903201706cs

*QL = Quantitation Limit
*MDL = Method Detection Level

^# after the Method No is for internal lab use only. Page 1 of 2

Debra A. Harris
Laboratory Director
H&H WATER CONTROLS, INC.

Revision 5
June 1, 2020

H&H WATER CONTROLS INC.
565 Route 88 South
Carmichaels, PA 15320
724-966-2278

Report Data Qualifiers

T-Sample did not meet thermal preservation requirement.

C-Sample did not meet chemical preservation requirement.

R-Received and analyzed outside hold time.

A-Sample analyzed outside hold time.

B-CBOD did not meet depletion criteria.

B-BOD did not meet depletion criteria.

P-Indicates an estimated value between Method Detection Limit (MDL) and the Practical Quantitation Limit (PQL).

D-Indicates Sample Dilution necessary.

SD-Sample Duplicate (RPD) percent recovery is outside acceptable limit.

MS-Matrix Spike percent recovery is outside acceptable limit.

ND-Indicates Analyte was Not Detected (ND)

M-Indicates over the Maximum Contaminant Level (MCL)

MD-Indicates less than Method Detection Limit

J-Indicates less than Quantitation Limit.

(>)Indicates highest sample dilution was greater than 200.

E-Estimated

LA-Indicates Alkalinity result is less than 20.

MR-Sample does not meet Method Requirements.

EXHIBIT 1

H&H WATER CONTROLS INC.
565 ROUTE 88 SOUTH, CARMICHAELS, PA 15320
724.966.2278 Fax: 724.966.7924
hnhwc@windstream.net

CHAIN OF CUSTODY / SAMPLE ANALYSIS REQUEST
(REVISION 6-1-20)

Login Number: 18753

Customer Name: East Dunkard Water Authority

Billing Address: PO Box 241 2790 S. Eighty Eight Rd

City: Dilliner | State: PA | Zip Code: 15327

Telephone No.: 724-943-3717 | Fax No.: 724-943-4195

Contact Person: Sam Carroll | E-Mail: sc@harshmanllc.com

Project Name: EDWA Water Testing

Sampled By: Samuel N Carroll

Turn Around Time:
- ☑ Normal (10-12 Business Days)
- ☐ Rush (Surcharges May Apply)

Purchase Order No.:

Send Results By:
- ☐ Mail
- ☐ Fax
- ☑ E-Mail

Lab Containers # (Lab Use Only)

1	2	3

Analysis Requested

Sample Description / Location	Collection Date	Collection Time	C=Composite or G=Grab	Matrix (see key)	Container Type (see key)	TSS-TDS-Chloride	Fe-Mn-Al-Pb-Cu-Zn-Cd-Cr	Selenium
1 237 Old Dairy Road	Aug 19, 2020	10:25 AM	G	DW	P	1	1	1
2								
3								
4								
5								
6								
7								
8								
9								

Container Size/Volume (in mL): 500 500 500

Preservative Used: 1 = HCl 2 = HNO_3 3 = H_2SO_4 4 = $Na_2S_2O_3$: 2 2

Sample Matrix Key
DW = Drinking Water
WW = Wastewater
GW = Groundwater
SW = Stormwater
SL = Sludge
W = Well
SP = Spring
ST = Stream
PD = Pond
PL = Pool
OL = Other

Container Key
P = Plastic
G = Glass

Comments:

Relinquished By / Company Name	Date	Time	Received By / Company Name	Date	Time
1 Samuel N Carroll	8-19-20	1100	2 GPJ Hach Water	8-19-20	1100
3			4		
5			6		

Condition (Lab Use Only)
Temp: 15.2 °C # of Bottles: 3
Iced: ☑ Yes ☐ No
pH Checked? ☑ Yes ☐ No
Preserved At Lab? ☐ Yes ☑ No

Receipt Information
Performed By:

Preservation Comments:

FIELD TESTS: pH:_____ Temp: _____ DO: _____ Cl_2: _____ FLOW: _____ OTHER: _____

Appendix F Hach Test Kit Product Specifications and Data Log Sheet

East Dunkard Water Authority Iron & Manganese Testing Results			**If finished water Mn ≥0.025 mg/L or Fe ≥ 0.15 mg/L Collect Sample for H&H to Test**			
DEP Daytime: DEP After hrs: HCEG:			**If finished water exceeds either MCL, Notify DEP & HCEG within 1 hour.**			
Month:			**If finished Mn ≥ 0.3 mg/L this is a health emergency! Immediately issue Tier 1 DO NOT CONSUME Public Notification and Notify DEP**			
Day	Manganese (Mn) MCL = 0.05 mg/L			Iron (Fe) MCL = 0.3mg/L			Initials
	Raw	Settled	Finished	Raw	Settled	Finished	
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
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26							
27							
28							
29							
30							
31							

Iron, Ferrous, Test Kit

IR-18C (2667200)

DOC326.97.00063

EXHIBIT 1

Test preparation

CAUTION: ⚠ Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

- Analyze samples immediately after collection.
- Put the color disc on the center pin in the color comparator box (numbers to the front).
- Use the indoor light color disc when the light source is fluorescent light. Use the outdoor light color disc when the light source is sunlight.
- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- If the color match is between two segments, use the value that is in the middle of the two segments.
- If the color disc becomes wet internally, pull apart the flat plastic sides to open the color disc. Remove the thin inner disc. Dry all parts with a soft cloth. Assemble when fully dry.
- Undissolved reagent does not have an effect on test accuracy.
- To verify the test accuracy, use a standard solution as the sample.
- This test kit measures ferrous iron. To determine ferric iron (Fe^{3+}), subtract the ferrous iron result from a total iron test.

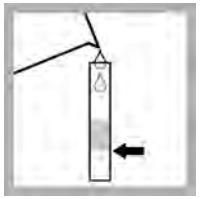
Replacement items

Description	Unit	Item no.
Ferrous Iron Reagent Powder Pillows	100/pkg	103769
Color disc, iron, indoor light, 0–7 mg/L	each	9261000
Color disc, iron, outdoor light, 0–7 mg/L	each	9263700
Color comparator box	each	173200
Plastic viewing tubes, 18 mm, with caps	4/pkg	4660004
Vial with 2, 5, 10, 15, 20 and 25-mL marks	each	219300

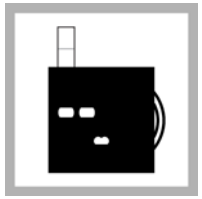
Optional items

Description	Unit	Item no.
Caps for plastic viewing tubes (4660004)	4/pkg	4660014
Glass viewing tubes, glass, 18 mm	6/pkg	173006
Stoppers for 18-mm glass tubes and AccuVac Ampuls	6/pkg	173106
Water, deionized	500 mL	27249

Test procedure—Iron, ferrous (0–7 mg/L Fe^{2+})



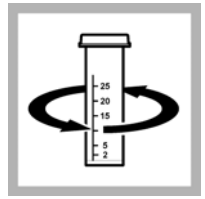
1. Fill a tube to the first line (5 mL) with sample.



2. Put the tube into the left opening of the color comparator box.

3. Fill the vial to the 25-mL mark with sample.

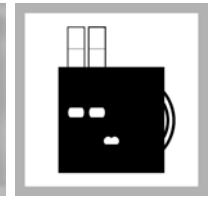
4. Add one Ferrous Iron Reagent Powder Pillow to the vial.



5. Swirl to mix. A orange color develops if ferrous iron is in the sample.

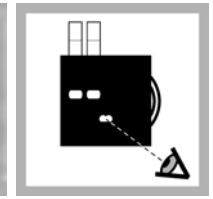
6. Wait 3 minutes.

7. Fill a second tube to the first line (5 mL) with the prepared sample.



8. Put the second tube into the color comparator box.

9. Hold the color comparator box in front of a light source. Turn the color disc to find the color match.



10. Read the result in mg/L in the scale window.

Manganese Test Kit

MN-5 (146700)

DOC326.97.00065

EXHIBIT 1

Test preparation

CAUTION: ⚠ Review the Safety Data Sheets (MSDS/SDS) for the chemicals that are used. Use the recommended personal protective equipment.

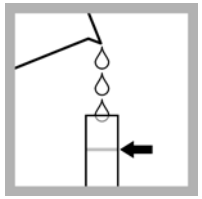
- Put the color disc on the center pin in the color comparator box (numbers to the front).
- Use sunlight or a lamp as a light source to find the color match with the color comparator box.
- Rinse the tubes with sample before the test. Rinse the tubes with deionized water after the test.
- If the color match is between two segments, use the value that is in the middle of the two segments.
- If the color disc becomes wet internally, pull apart the flat plastic sides to open the color disc. Remove the thin inner disc. Dry all parts with a soft cloth. Assemble when fully dry.
- Undissolved reagent does not have an effect on test accuracy.
- To verify the test accuracy, use a standard solution as the sample.
- The long-path adapter for the low range test shows the color in the tubes from top to bottom. Make sure the light source is above the tubes during the color match.
- To determine total manganese, digest the sample with heat and acid. Refer to the *Water Analysis Guide* for more information.

Replacement items

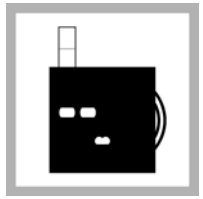
Description	Unit	Item no.
Citrate Buffer Powder Pillows for Manganese, 25 mL	100/pkg	98399
Sodium Periodate Powder Pillows for Manganese, 25 mL	100/pkg	98499
Bottle, square, 29 mL	6/pkg	43906
Color comparator box	each	173200
Color disc, manganese, 0–3 mg/L	each	9262700
Glass viewing tubes, glass, 18 mm	6/pkg	173006
Long-path adapter	each	2412200
Stoppers for 18-mm glass tubes and AccuVac Ampuls	6/pkg	173106

Test procedure—Manganese (0–3 mg/L Mn)

1. Install the long-path adapter in the color comparator box.



2. Fill a tube to the top line with sample.



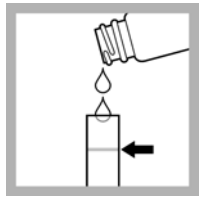
3. Put the tube into the left opening of the color comparator box.

4. Fill a bottle to the shoulder with sample.

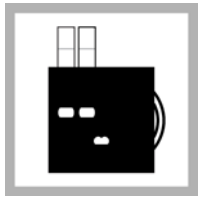
5. Add one Citrate Buffer Powder Pillow for Manganese. Swirl to mix.

6. Add one Sodium Periodate Powder Pillow for Manganese. Swirl to mix.

7. Wait 2 minutes. A pink color develops if manganese is in the sample. Read the result within 8 minutes.



8. Fill a second tube to the top line with the prepared sample.



9. Put the second tube into the color comparator box.

10. Hold the color comparator box below a light source. Turn the color disc to find the color match.

11. Read the result in mg/L in the scale window.

Appendix G Public Announcement of Availability of Water Testing

"If you have an issue with the clarity or quality of your water:

- *please call Harshman CE Group 724-503-4125 ASAP*
- *with your permission they will come and sample your water for lab testing*
- *they will also notify the Water Authority staff*
- *the Water Authority staff will come out and flush the lines to clean the water*

East Dunkard Water Authority continues to take proactive steps to ensure that all customers have safe clean water. In recent years we have invested over $100,000 in upgrading our system to resolve known issues. These improvements have reduced the number of problems; however, more work remains.

We have two planned investment projects for upgrades to the system, and we are pursuing two State funded grants with the help of our local State Representatives. Securing grant funding will help to keep rates as low as possible for our customers.

When a disturbance in the water system, like a line breaks or the hydrants are used for a fire, temporary issues with water quality are expected nearby. When an issue occurs, the Water Authority restores water quality by flushing the lines in that area."

Appendix H Tank Inspection Quotes

LIQUID ENGINEERING

Fax – (406) 651-0120

Proposal Number
54494

Please reference the Proposal Number above on all Purchase Orders issued.

Scope of Work - In-Service Clean & Inspect

This Potable Water System Proposal is made this date, by and between **East Dunkard Water Association** of the state of **Pennsylvania**, (hereinafter "Client") and **Liquid Engineering Corporation, of Billings, MT**, (hereinafter "LEC"). LEC will provide all labor, specialty equipment and insurance to evaluate your facilities.

In-Service Inspection

Interior and exterior inspections will review structural, sanitary, safety, security and any installed coating conditions. Reporting will be provided based on water tank inspection criteria, referencing applicable OSHA, EPA, AWWA, TCEQ and NFPA requirements. Minimum items examined will include ladders, shell, roof, vent, manways, welds, seams, foundation, anchors, safety systems, hatches, external overflow and plumbing.

Underwater interior video documentation will be completed with real-time closed circuit high-resolution color underwater video equipment. All pertinent findings will be recorded on DVD format (including dive maintenance technician's findings and narrative summary).

Services will include detailed interior video documentation of the potable water tank(s) / clearwell(s) as described on page two (2).

Underwater Operations – All Dive Maintenance Technicians and associated in-tank equipment are fully disinfected in accordance with AWWA Standard C652-02. All system entries will be conducted in accordance with applicable OSHA regulations pertaining to Diving and Confined Space; including 1910.401 thru 1910.441. Specialty equipment may include but is not limited to; appropriate OSHA climbing and personal fall protection, AWWA and ADCI approved commercial diving equipment dedicated to in-service potable water operations.

In-Service Cleaning

In-service removal of accumulated bottom sediment is accomplished using LEC's proprietary HydroDyne™ cleaning equipment. Normal cleaning prices provided include removal of sediment accumulations up to the first three inches (3") in depth or cubic yards given on reservoir information breakout.[1] Material that cannot be vacuumed with LEC's HydroDyne™ (e.g., concrete, gravel, misc. materials or compact sediment requiring the use of a hand nozzle), is considered debris. Cleaning includes up to one hour of debris removal per tank at no additional charge.[2]

For normal cleaning operations client shall make available an approved discharge location (sewer, cofferdam, etc.) within 300' of the reservoir access hatch. (Site-specific discharge recommendations can be provided by LEC upon request).

Deliverable – Prioritization Schedule

The deliverable provided on site will consist of LEC's on site report, summary recommendations and Immediate Needs Assessment™, which documents discrepancies that require urgent action, and is supplemented by the interior DVD documentation.

LIQUID ENGINEERING

Proposal Number
54494
Please reference the Proposal Number above on all Purchase Orders issued.

Assumptions - Based upon information obtained via the systems interview conducted for your facility, the following assumptions were made. Should conditions vary from those stated, additional charges could apply.

- Prior to arrival, and during underwater operations, water level in tanks/clearwells to remain full.[3]
- Client's Point-of-Contact will be available for access, as well as authorization of any additional requested work.
- Facilities are accessible with LEC's standard truck/trailer combo (overall length – Crew Cab = 23' / Trailer = 22').[4]
- Access into tanks/clearwells are sufficient for man entry (i.e. 24" dia), with no obstructions in the hatchway.
- Exterior inspections will be performed from the ground, installed ladders, and exterior roof while utilizing installed ANSI & OSHA-certified personal fall protection equipment, without additional scaffolding or rigging.
- There are no special discharge requirements (i.e. long distances / permits).

Miscellaneous

All services provided by LEC will be completed in a professional workmanlike manner according to the Terms and Conditions of this Proposal. Any alteration or deviation from the Terms and Conditions of this Proposal, or additional services, involving additional costs, will be completed only upon written authorization by Client or Client's Authorized Representative.

This Proposal is contingent upon weather, delays or other matters beyond LEC's control. Client will carry fire, tornado, and other necessary insurance. LEC will provide all other required insurance coverage, including, but not limited to, General Liability, Employer Liability and Workmen's Compensation Insurance during all operations (certificate of insurance available upon request).

Reservoir Information

Tank	Capacity	Dimensions	Type	Cubic Yards Included
Griffin	360,000	40' high x 39' dia	Aquastore – o/g	10.5 (3 inches)

LIQUID ENGINEERING

Proposal Number
54494
Please reference the Proposal Number above on all Purchase Orders issued.

Costing	
Cleaning / Inspection & Reporting Sub-Total	$ 3,210.00
Scheduling Discount (Based on 100% scheduling cooperation)	($ 420.00)
Cleaning / Inspection & Reporting (after discount)	**$ 2,790.00**

(Prior written approval will be obtained from Client's Authorized Representative for any additional charges outside the Scope described herein).

1. Bottom sediment in excess of three inches or cubic yards stated above will be removed at $42.00 per cubic yard.
2. Debris removal in excess of one hour per tank will be charged at a rate of $425.00 per hour.
3. Unscheduled delays, which are a direct result of the utility's obligations (i.e. access and water level), may incur standby/mobilization charges.
4. Access requiring portable set-up (i.e. truck only), will incur an additional setup/tear-down charge.

Pricing above does not include Local, State or Franchise Taxes - if any.

This Proposal, when executed by both parties, shall constitute a binding agreement between the parties. The persons signing on behalf of Client and LEC hereby represent and certify that they are fully empowered to bind the respective parties to this Contract. Client acknowledges that payment for onsite work is due and payable **Net 30 upon completion of on site work.** Progress billing will be applied on any contract whose duration is longer than ten (10) days. A finance charge on past-due accounts is computed at a periodic rate of 1.5% per month, which is an annual percentage rate of 18%.

In the event Liquid Engineering Corporation is required to bring suit to enforce its rights under this Agreement, to collect any and all payments due and owing under this Agreement, or to otherwise determine, protect or enforce its rights and remedies under the Agreement or at law or equity, Liquid Engineering Corporation will be entitled to recover from the client its reasonable attorney's fees, expert fees, costs and expenses incurred in connection therewith.

East Dunkard Water Association
Route 88 Box 241
Dilliner, PA 15327

Accepted & Agreed per Costing Breakdown
Attached Hereto and by Reference Included Here Under

By: _____

Title: _____

Date: _____

LIQUID ENGINEERING CORPORATION
P.O. Box 80230
Billings, MT 59108

(800) 438-2187 Voice / **(406) 651-0120 Fax**

By: Fred Muller - **Fred Muller**

Title: **President**

Date: **November 26, 2019**

Note: This proposal may be withdrawn if not accepted within 90 days from the above LEC signature date.

LIQUID ENGINEERING

Proposal Number
54494
Please reference the Proposal Number above on all Purchase Orders issued.

Billing / Invoice Requirements

Please return Accounting / Billing information to Fax – (406) 651-0120 or web@liquidengineering.com

Customer Name: **East Dunkard Water Association, PA**

_____

Contact for Accounting/Billing

Name:_____ Title: _____

Phone: _____

Preferred Delivery Method: ____Fax, ____Email, ____Postal Mail ____Other _____

Is a Purchase Order required? ____ Yes, ____ No (Please forward PO when issued)

Fax: _____

Email: _____

Address _____

City _____ State _____ Zip Code _____

Additional Notes/Instructions:

_____

_____

_____

_____

_____

_____

Proposal Quote:

ROBOTIC ON-LINE CLEANING & SURVEY INSPECTION

ONE GROUND LEVEL GLASSED FUSED STORAGE TANK

Prepared for:

Jim Holbert-Plant Manager
East Dunkard Water Authority
P.O. Box 241
2790 S. EightyEight Rd.
Dilliner, Pa 15327
PHONE (724) 943-3713
Email:eastdunkard@gmail.com

Prepared by:

Rusty Goeller- Co-Founder, V.P.
Scantron Robotics-Robotic Cleaning Solutions
Dec 4, 2019

I. OVERVIEW:

I. Proposed Project Work:

SCANTRON ROBOTICS INC/Robotic Cleaning Solutions. utilizes Remote Operated Vehicles (ROV) machines to provide both inspection and cleaning services for tanks, reservoirs, clear-wells, cooling towers, service water tanks, de-min tanks, raw water tanks, clarifier tanks, resin tanks, etc., **"on-line".** This quote is pursuant to our email and telephone correspondence. Please accept this proposal as a response to the East Dunkard Water Authority (EDWA) for Scantron's on-line robotic technology to clean and survey/inspect the following:

Project Overview:

- One On-line robotic cleaning and survey/inspection of: ("One Three hundred & sixty thousand (360,000) Ground Level Glass Fused Potable Water Storage Tank")
- The Glass Fused tank is for supplying potable drinking water storage
- The tanks measurements are: 39'w X 40'h
- The tank was constructed back in 2012
- The last cleaning and inspection-Never
- The amount of sediment contained on the floor of tank is unknown.

Our recommendation would be to first perform an inspection survey of the aforementioned potable water storage tank by using our "free swimming" Inspection ROV. The inspection survey will help to establish an understanding of the current condition of the reservoir and levels of sedimentation (pockets or concentrated areas) to create a baseline (roadmap) for our approach to cleaning. This can only be done if water visibility allows for an inspection survey.

SCANTRON ROBOTICS INC.
Crawler- Cleaning Crawler "In Action"
Upon completion of the inspection services, we would utilize our Remote Operated Vehicle (ROV) Cleaning Crawler to extract and remove all of the accumulated sedimentation that has built up in the Storage Tank over the years. Scantron's robotic technology is designated for on-line cleaning and inspections. Our Robotic Cleaning Machine is customized with a high-resolution camera system and uses a power brush system to break-up and remove the sedimentation that has accumulated. The sediment will then be pumped out of tank into mesh bags containing de-chlorinating pucks which would allow discharge into sanitary system or a method of remediation provided by **EDWA** WTP.

SEAMOR "Free Swimming" Inspection ROV
There is no draining required while the SEAMOR inspection services are conducted. The systems remain on-line and in service. The "SEAMOR ROV" will inspect the internal infrastructure of the reservoirs to include vents and screens, interior walls, intake pipes, out-flow pipes, tank floor, valves, cathotic protection system, and sediment accumulations.

SCOPE OF WORK:

The following is the scope of work and deliverables for all SCANTRON's cleaning services:

Step I:

- Perform a survey inspection of the aforementioned "Storage Tank" to:
  - Identify sediment accumulation levels and areas of concentration
  - To provide a roadmap and approach for the robotic cleaning process.
  - Live viewing of both the inspection and cleaning services will be available, and we will record and deliver the video footage of the services (DVD or USB Stick) for your records

Step II:

- Perform Robotic Cleaning Process your system remains on-line to:
  - Remove/Clean sediment accumulation levels
  - Review Internal floor
  - Evaluate the floor condition of the tank, check for cracks or leaks on floor.
  - Scantron will utilize a closed looped pumping process (Robot to disposal outlet) by pumping sediment through cleaning crawler's 3''discharge hose then to designated sediment discharge area provided by **EDWA** WTP.
  - This remediation process will be provided by: **EDWA** WTP.
  - Deliver video footage (DVD or USB Stick) of the inspection and cleaning services for your records.

II. BUDGET PROPOSAL

As an outline of our pricing model for this project, the cleaning services with supporting resources will be billed on a per diem or day rate basis. We also charge a one-time fixed project fee for mobilization, and demobilization. Our variable costs for supporting materials/equipment are inclusive. This quote is based on two (2) to three (3) 10-hour shifts to complete depending on sediment depth. The client "only" pays for time on-site.

Services and Items	Estimated Completion Time (Shifts) 2 to 3	Rate (USD)
1 Scantron's on-line Cleaning & Inspection Crawler Service are based 2 to 3 DAYS at $3,700.00 per day:	**$3,700.00**	**$3,700.00**
Mobilization and Demobilization Fee: One Time Fee: $2,500.00	**$2,500.00**	**$2,500.00**
2 Delays Caused by: HSWA WTP & (Client) Per-hour: $400.00	**$400.00**	**$400.00**
Total: + Tax if applicable		**$**

1. *Estimated Completion Time based on 8-hour workday, with a 1day minimum.*
2. *Delay Rates are per hour.*

TERMS AND CONDITIONS:

If there are conditions or circumstances beyond that which has been discussed or collected in advance, we reserve the right to change the mandatory minimum charges outlined above. The Payment terms for this project will be: "Based on price listed above Net 15 day's full payment after completion of the ON-SITE services." There is a Mandatory minimum charge of one per diem day at the cost outlined above, before the project commences. Each additional service day will be billed at the aforementioned rate, and any additional hours of service required beyond a complete service day will be billed at $400.00 USD Dollars per hour.

III. CONTRACT INITIATION:

SCANTRON ROBOTICS INC. agrees to provide the Services described in Section I, for the costs outlined in Section II. This proposal is valid for thirty (30) days. To initiate this contract please sign the specified proposal below scan and return via email to rusty@scantronrobotics.com:

RCS-SCANTRON ROBOTICS INC.
2593 Lakewood Road
Gibsonia, Pa. 15044

Toll Free: 724-444-4217
Cell: 412-576-9910

Company Name: _____

Printed Name: _____ Date: _____

Signature: _____ Date: _____

Thank you for providing this opportunity to **SRI & RCS**.

Sincerely,

Rusty Goeller
CO-Founder V.P.
Scantron Robotics Inc.
RCS-CEO
Phone: (724-444-4217)
Toll Free: 1-877-757-1537
Email: rusty@scantronrobotics.com
Internet: http://www.scantronrobotics.com

STANDARD TERMS AND CONDITIONS:

1.Scantron Robotics Inc (SRI). Robotic Cleaning Solutions (RCS) agrees to provide Client with the services set forth in the proposal pursuant to the terms and conditions ("Terms and Conditions") set forth herein. Together, the proposal and the Terms and Conditions shall constitute the complete agreement between SRI/RCS and the Client ("Agreement") for the services described in the proposal. If there is a conflict between the proposal and these Terms and Conditions, these Terms and Conditions shall control. b) Client shall designate in writing a person to acts as its Authorized Representative with respect to this Agreement. c) Client shall provide all information and criteria as to Client's requirements, objectives, and expectations for SRI services including all numerical criteria that are to be met and all standards for development, design, or construction.

2 Billing and Payment a) Client agrees to pay SRI/RCS in accordance with the rates, charges, and/or amount set forth in the attached proposal. Invoices for SRI/RCS services will be submitted either periodically or upon completion of such services, at the election of SRI/RCS. All such invoices shall be due and payable upon receipt unless both parties agree in writing to different terms. b) In the event payment is not timely made, the overdue balance shall bear interest at 1.5percent per month or the maximum lawful allowable rate, whichever is higher. c)Client's failure to pay any invoice due to SRI/RCS within agreed upon terms will constitute a breach of this Agreement. Without waiving any other claim or right against Client, SRI/RCS may elect to terminate its performance of services upon failure by Client to pay amounts owed SRI when due by providing Client with a written notice of SRI intent to cease, suspend, and/or terminate work in-progress or to be provided on a future date. In the event of a termination by SRI/RCS, Client shall pay SRI/RCS for all services performed as of the date offer termination, as well as all reasonable costs incurred as a result of such termination, including, but not limited to, interest, lost profits, and reasonable legal fees. The waiver by SRI/RCS of any of its rights pursuant to the terms and conditions of this Agreement in any one or more instance shall not constitute a waiver of any other rights hereunder or of such rights on any future occasion.

3.Right of Entry a) Client hereby grants to SRI/RCS and its agents, staff, consultants, and contractor or subcontractors permission and the right to enter upon the subject worksite for the purpose of performing all acts, studies, and research, and work contemplated and in accordance with the proposal made pursuant to the terms and conditions recited herein ("Right of Entry"). Should Client not own the site, Client warrants and represents by acceptance of the proposal that it has authority and permission of the site owner and any site occupant to grant SRI/RCS this Right of Entry. b) Client represents and acknowledges that it is now and shall remain in control of the site at all times. SRI/RCS shall have no responsibility or liability for any aspect or condition of the site, now existing or hereafter arising or discovered. SRI/RCS does not, by this Agreement, assume any responsibilities or liability with respect to the site.

4.Site Disturbance Resulting from Work a) Client hereby recognizes that the use of equipment necessary to perform SRI/RCS services may affect, alter, or damage the terrain, vegetation, buildings, structures, and equipment in, at, or upon the site. SRI/RCS shall not be liable to Client for such effect, alteration, or damage. SRI/RCS will take reasonable precautions to limit such effects, alterations and damage. b) Client shall provide SRI/RCS with all previous studies, plans, or other documents pertaining to the work in Client's possession or reasonably obtainable by Client, in support of SRI/RCS services. SRI/RCS will use reasonable care, to locate subsurface structures in the vicinity of SRI/RCS subsurface explorations. Client recognizes that it is impossible for SRI/RCS to assure the sufficiency of such information. Accordingly, Client waives any claim against SRI/RCS, and agrees to defend, indemnify and hold SRI/RCS harmless from any claim or liability for injury or loss allegedly arising from errors, omissions, or inaccuracies in documents or other information provided to SRI/RCS from Client, or from SRI/RCS reasonable reliance on such documents or information.

5. Standard of Care SRI/RCS shall perform its services in a professional manner consistent with the standard of care applicable to similar services in the jurisdiction where the project is located (“Standard of Care”). Client agrees that SRI/RCS is providing no warranty or guarantee, either expressed or implied, in connection with its services or the performance of those services, unless expressly contained in these Terms and Conditions.

6.Insurance
SRI/RCS represents and warrants that its staff is protected by Worker's Public Liability and Property Damage insurance policies. Client agrees that SRI/RCS will not be liable or responsible to Client for any loss, damage, or liability beyond the amounts, limits, exclusions, and conditions of such insurance.
7.Construction Observation Services a) Client agrees that any and all construction services related to SRI/RCS services will be performed by a contract retained by Client (“Contract”), and that SRI/RCS shall have no responsibility or obligation for the performance of Contract. b) The purpose of SRI/RCS site visits will be to enable SRI/RCS to better carry out the duties and responsibilities specifically assigned to SRI/RCS in this Agreement. SRI/RCS shall not, during such visits, or at any time, or as a result of SRI/RCS observations of Contract work, supervise, direct, or have control over Contract work, nor shall SRI/RCS have authority over or responsibility for the means, methods, techniques, equipment choice and usage, sequences, schedules, or procedures of construction selected by Contract, for safety precautions and programs incident to Contract work, nor for any failure of Contract to comply with laws and regulations applicable to Contract furnishing and performing its work, including, but not limited to, those under the Occupational Safety and Health Act of 1970. Accordingly, SRI/RCS neither guarantees the performance of any Contract nor assumes responsibility for any Contract failure to furnish and perform its work in accordance with the Contract Documents. c) It shall be Client’s responsibility to notify the appropriate federal, state, or local public authorities or agencies, as required by law or otherwise of any condition that could in anyway constitute a danger or threat to public health, safety, or the environment, arising out of, or in any way related to work performed in accordance with SRI/RCS services.

8. Documents
All logs, digital camera or sonic depictions obtained by visual inspection, camera, or any other manner or use, field data, field notes, laboratory test data, calculations, estimates, and other documents prepared by SRI/RCS shall constitute SRI/RCS instruments of service and shall remain the property of SRI/RCS. SRI/RCS will retain all pertinent records relating to the services performed for a minimum period of five (5) years following submission, during which period, the records will be made available to Client at SRI/RCS office at all reasonable times. Copies will be prepared by SRI/RCS for Client for reasonable cost of reproduction.

9. Governing Laws This Agreement shall be governed and interpreted by the laws of the United States of America, excluding any rule or principle that would refer to and apply the substantive law of another State or jurisdiction. b) Each provision of this Agreement is severable and distinct from and independent of every other provision hereof. If one provision is declared void or unenforceable, the remaining provisions shall remain in effect. The terms contained in Section 9 shall survive the termination or expiration of this Agreement.

10.Indemnification
To the fullest extent allowed by law, Client shall indemnify and hold SRI/RCS, its affiliates, directors, officers, employees and agents harmless from and against all claims, losses, damages, liabilities, costs, attorney fees and expenses sustained or incurred, directly or indirectly, to the extent arising out of or relating to this Agreement, including, but not limited to, the negligent acts, errors, omissions, the treatment, storage, disposal or transportation of toxic or hazardous waste or contaminating substance, violation of any federal, state, or local statute, regulation, or

ordinance relating to hazardous waste and environmental contamination by Client, its affiliates, officers, employees, contractors and agents in the performance of professional Services by Engineer and its Sub-consultants.

11.Confidentiality
As a result of the performance of SRI/RCS services, SRI/RCS may have access to information and materials of a highly sensitive nature belonging to Client, including confidential information. SRI/RCS agrees that SRI/RCS shall not, without Client's prior written consent, disclose, make commercial or other use of, or give or sell to any person, firm, or corporation, any confidential information received directly or indirectly from Client or acquired or developed in the course of the performance of this Agreement unless: (1) required to do so pursuant to applicable law; or (2) it is rightfully in the possession of SRI/RCS from a source other than Client prior to the time of disclosure of the information to SRI/RCS under this Agreement; or (3) it was in the public domain prior to the time of the SRI/RCS receipt; or (4) it was independently developed by SRI/RCS prior to the time of receipt.

12.Claims and Disputes a) Any and all claims, disputes or other matter in question arising out of or related to the services provided by SRI shall be subject to mediation as a condition precedent to dispute resolution. If such matter relates to or is the subject of a lien arising out of the services, the SRI/RCS or the Client may proceed in accordance with applicable law to comply with the lien notice or filing deadlines prior to resolution of the matter by mediation or by dispute resolution. Unless the parties mutually agree otherwise, mediation shall be administered by the SASK & PA Arbitration Association in accordance with its Construction Industry Mediation Procedures in effect on the date of the Agreement. The parties shall share the mediator's fee and any filing fees equally. The mediation shall be held in a place mutually agreed upon.
b) If the parties do not resolve a dispute through mediation, the dispute shall be subject to[arbitration which, unless the parties mutually agree otherwise, shall be administered by the SASK & PA Arbitration Association in accordance with its Construction Industry Arbitration Rules in effect on the date of the Agreement] [or] [litigation in a court of competent jurisdiction in the state or jurisdiction in which the designated SRI /RCS Agent is located or resides.

13.Limitation of Liability a) SRI/RCS and Client waive consequential damages for claims, disputes or other matters in question arising out of or relating to SRI/RCS services. b) To the fullest extent permitted by law, the total liability of SRI/RCS, its officers, directors, employees, agents, and contractors to Client, for any and all injuries, claims, losses, expenses, or damages whatsoever arising out of or in any way related to SRI/RCS services, the project or this Agreement shall not exceed the total compensation received from SRI/RCS under this Agreement.

14.Force Majure Delays
In the event that SRI/RCS services are interrupted due to causes beyond its control, SRI/RCS shall be compensated by Client for the labor, equipment and other costs SRI/RCS incurs in order to maintain its workforce for Client's benefit during the interruption (reference service & items). Notwithstanding the foregoing, SRI/RCS shall not hold Client responsible for damages or delays caused by acts of God or other circumstances beyond Client's control, and which could not reasonably be anticipated or prevented

THEREFORE, intending to be legally bound for the East Dunkard WTP & the Client and SRI/RCS execute this Agreement this ____ day of _____, 2019.

Appendix I Line ID Marker Quotes

Flexible Line Markers with Direct Printing

EXHIBIT 1

Technical Data Sheet

Part #

ACP-066, ACP-072, ACP-078

Scope

This specification covers the minimum material, mechanical and performance requirements of the fiberglass composite pipeline and cable marker as manufactured by ACP International.

This product shall be used to provide daytime and nighttime delineation for utilities or other marking applications requiring assured long-term outdoor durability, vandal resistance, and impact resistance.

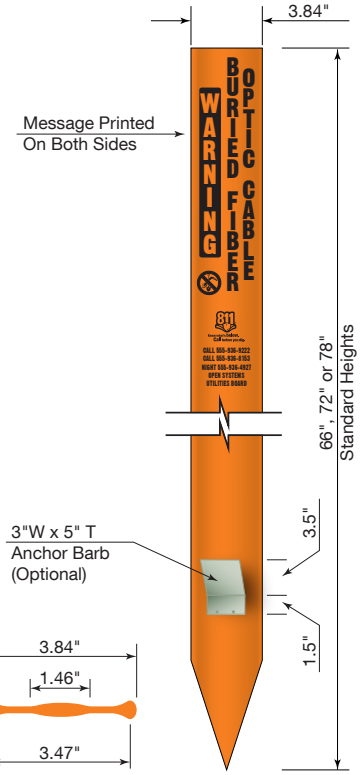
Flexible Line Markers

Flexible Line Markers

The U.S. Department of Transportation requires the use of markers to indicate the approximate location of underground pipelines. Markers are located at road, railroad and navigable waterway crossings. Markers do not indicate the depth of the pipeline.

Specifications for the Flexible Line Marker covers the minimum material, mechanical and performance requirements of the fiberglass composte pipeline and cable marker as manufactured by ACP International.

This product shall be used to provide daytime and nighttime delineation for utilities or other marking application requiring assured long-term outdoor durability, vandal resistance, and impact resistance.



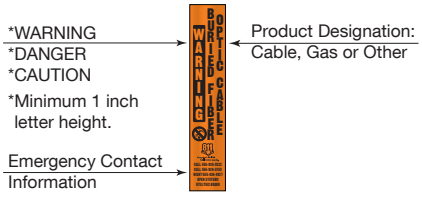
Recommended AWPA Uniform Color Code for Marking Underground Facilities

Underground Utility Markers will adhere to the following color codes:

- Electric
- Gas - Oil - Steam
- Communication CATV
- Water
- Sewer
- Reclaimed Water
- Proposed Excavation
- Parks and Recreation

Marker Display

- The material transported through the pipeline or the type of underground utility.
- The name of the pipeline operator.
- Toll-free emergency telephone number.



Specification Sheet

Flexible Line Markers with Direct Printing

ACP INTERNATIONAL	Drawn By:	Approved By:	Date:	Sheet No.:
	J.Y. Rollins	M. Prince	09/04/2018	1 of 2

ACP International/SA-SO/Jim's Work/Marketing Projects/technical drawings/flexible line markers/flexible_line_markers_direct.ai

Flexible Line Markers

Technical Description, Design and Material

The ACP International fiberglass composite pipeline and cable marker shall be a single piece, with single or double-sided print.The marker shall be capable of simple, permanent installation by a single person using a manual driving tool. The marker, upon proper installation shall resist displacement from wind, vehicle and livestock impact forces. The marker shall be of a constant I-Beam design and have a thicker middle cross sectional design that is reinforced by longitudinal ribs along each edge that shall protect both sides of the marker in the post driving process and also provide structural rigidity. The bottom end of the marker shall be pointed for ease of ground penetration.

The marker will be constructed of a durable, UV resistant, continuous glass fiber reinforced thermosetting composite material which is resistant to impact, ozone, and hydrocarbons within a service temperature of -80º F to +160º F.

The marker shall be designed to bend underneath the form of most cars and flex back undamaged into its upright position with a recommended embedment depth of 18-24" (depending on the softness of the ground) for all lengths of marker.

The marker shall come in white, orange, yellow, blue, brown, green, red, and purple. Custom colors or heights shall be available upon request.

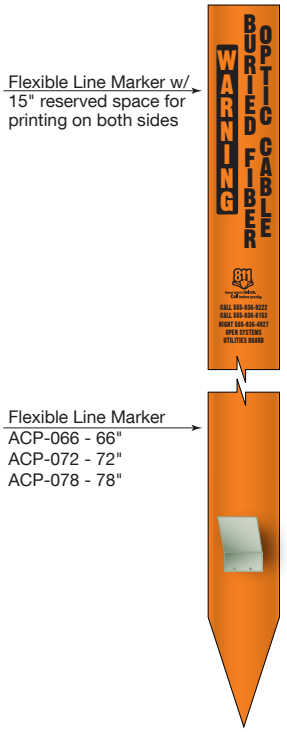
The marker shall be pigmented throughout the entire-cross section as to produce a uniform color, which is an integral part of the material. UV-resistant materials shall be incorporated in the construction to inhibit fading or cracking of the delineator upon field exposure.

Dimensions

All markers shall be 3.84" wide and weigh 0.55 lbs. per foot.

Printing Options: Direct Print

• Outdoor rated enamel ink (one color)



Description	ASTM Standard	Rating
Ultimate Tensile Strength, PSI	D-638 / D-3916	75,000
Ultimate Compressive Strength, PSI	D-695	50,000
Specific Gravity	D-792	1.8
Weight % Glass Reinforcement	D-2584	60
Barcol Hardness		

Specification Sheet

Flexible Line Markers with Direct Printing

ACP INTERNATIONAL	Drawn By:	Approved By:	Date:	Sheet No.:
	J.Y. Rollins	M. Prince	09/04/2018	2 of 2

ACP International/SA-SO/Jim's Work/Marketing Projects/technical drawings/flexible line markers/flexible_line_markers_direct.ai

Technical Description, Design, and Material

The ACP International fiberglass composite pipeline and cable marker shall be a single piece, double-sided. The marker shall be capable of simple, permanent installation by a single person using a manual driving tool. The marker, upon proper installation, shall resist displacement from wind, vehicle, and livestock impact forces. The marker shall be of a constant I-Beam design and have a thicker middle cross sectional design that's reinforced by longitudinal ribs along each edge that shall protect both sides of the marker in the post driving process and also provide structural rigidity. The bottom end of the marker shall be pointed for ease of ground penetration.

The marker will be constructed of a durable, UV resistant, continuous glass fiber reinforced, thermosetting composite material which is resistant to impact, ozone, and hydrocarbons within a service temperature of -80º F to + 160º F.

The marker shall be designed to bend underneath the form of most cars and flex back undamaged into its upright position with a recommended embedment depth of 18-24" (depending on the softness of the ground) for all lengths of marker.

The marker shall come in white, orange, yellow, blue, brown, green, red, and purple. Custom colors or lengths shall be available upon request.

The marker shall be pigmented throughout the entire-cross section as to produce a uniform color, which is an integral part of the material. UV resistant materials shall be incorporated in the construction to inhibit fading or cracking of the delineator upon field exposure.

Dimensions

All markers shall be 3.84" wide and weigh .55 lbs per foot. Markers shall also be produced in custom lengths of 62", 84", and 90".

Part #	Length
ACP-066	66"
ACP-072	72"
ACP-078	78"

Mechanical Properties

Description	ASTM Standard	Rating
Ultimate Tensile Strength, PSI	D-638 / D-3916	75,000
Ultimate Compressive Strength, PSI	D-695	50,000
Specific Gravity	D-792	1.8
Weight % Glass Reinforcement	D-2584	60
Barcol Hardness	D-2583	50
Flexural Strength, PSI	D-4476 / D-790	60,000
Flexural Modulus, PSI	D-4476 / D-790	3,300,000

The marker should be able to withstand a resistance/flexibility test in both hot and cold situations. In the hot test, condition the marker to a minimum of two hours at 140º F ± 3º F for at least two hours, The unit shall then be held at the bottom end in a vertical position and the top end bent 90º such that it parallels the floor. The marker shall return to within 5º of the upright position within 30 seconds. The bend test shall be repeated three times in quick succession, completing the test within 2.5 minutes of post removal from the conditioning temperature.

The same resistance/flexibility test should be repeated on the same type of marker but its temperature conditioning should be set at -40º F ± 3º F.

There shall also be a test for cold impact resistance. The marker shall be conditioned for a minimum of two hours at -40º F ± 3º F. A minimum two-pound spherical weight should be dropped a distance of five feet through a virtually frictionless vertical guide to impact the surface of the marker at its mid section. The surface of the post being struck by the steel ball shall be in a horizontal position with the post supported and held in position in both ends. The post shall be subjected to five impact tests concentrated near the middle of the post within 10 minutes from the removal of the environmental chamber. Excessive fracturing, cracking, or splitting of the posts shall constitute failure.

The same cold impact resistance test shall be repeated by striking another marker flush against a flat solid surface three times within two minutes after its removal from the conditioning chamber. To strike the marker it should be manually swung through a 90º arc, and the marker shall not fracture or shatter upon impact.

The marker should also be capable of self erecting and remaining functional after being subjected to a series of ten impacts by a typical passenger sedan at 35 m.p.h. The marker should retain a minimum of 60% of its sheeting.

IMPORTANT NOTICE: ACP International and SA-SO (a division of ACP International) trusts that the user of the product has the most accurate knowledge of how the product might be most efficiently or safely utilized in any given application or environment.

ACP International and SA-SO also trust that the above technical data and product information is based on thorough and accurate testing of the product, but are not liable for any loss or damage to the product (or any other product, employee, or building from which the product might come into direct or indirect contact) resulting from an intentional or unintentional mishandling of the product.

ACP International
521 N. Great Southwest Pkwy.
Arlington, Texas 76011 U.S.A.
P: (817) 640-0992
F: (817) 633-3131
Online: www.acpinternational.com

SA-SO
525 N. Great Southwest Pkwy.
Arlington, Texas 76011 U.S.A.
P: (972) 641-4911
F: (972) 660-3684
Online: www.sa-so.com

Last Modified

5/8/2019 5:59:09 PM

QUOTATION

EXHIBIT 1

ACP INTERNATIONAL
521 N. Great Southwest Pkwy
Arlington, TX 76011
817-640-0992

Q20 -24183

Quoted to SAM CARROLL **Cust Code**
P 724-503-4125 **F**
Email sc@harshmanllc.com
Company HARSHMAN CE GROUP, LLC

Date 01/10/2020
Quoted by Jonathan Jones
Lead Time 2-6 WEEKS
Terms

	Part # / Size	Description	Qty	UM	Unit Price	Total Price
1	ACP066-**1 66”	BLUE LINE MARKER WITH DIRECT PRINT SINGLE SIDED, TEXT TBD	500	EA	13.68	6840.00
2	NOTES	ABOVE PRICING FOR 1 SIDED QUANTITY 100-999 ONLY QTY 10-99: $19.16 EACH / QTY 1000+ $11.70 EACH				
3	ACP066-***2 66”	BLUE LINE MARKER WITH DIRECT PRINT DOUBLE SIDED, TEXT TBD	500	EA	14.95	7475.00
4	NOTES	ABOVE PRICING FOR 2 SIDED QUANTITY 100-999 ONLY QTY 10-99: $21.79 EACH / QTY 1000+ $12.68 EACH				

SHIP TO ADDRESS

Company:
Attention:
Address only:
Inst. Ste, etc:
Ship To Phone:
Ship To City:
Ship to State: **Zip**

Subtotal **$14,315.00**
Freight Estimate
Total Quote **$14,315.00**

Ship to for Freight Estimate

Shipping Via BEST WAY
Shipping Terms PrePay & Add
Transit Time

Freight estimates are only valid for 14 days.
A quote not accepted within ninety (90) days is subject to review.
Custom products are NOT returnable, refundable or cancelable.

Appendix J Ductile Iron Pipe Details and Replacement Proposal

harshman CE GROUP, LLC

100 Courson Hill Road
Washington, PA 15301
T: 724-825-5577
F: 724-229-8255

December 4, 2019

East Dunkard Water Authority
Main Trunk Service Line Replacement Project

PA Small Water & Sewer Grant Application

Project Description:

(a) Detailed project description:

The main trunk service line for clean water leaving the East Dunkard Water Authority plant was damaged in 2012 when plant upgrades were being completed. The damage was not addressed at the time. Since that time customers throughout the system experience significant water quality issues in the form of very discolored water heavy laden with iron. The damage to the trunk service line included fractures to the cement lining of the ductile iron pipe, which has resulted in iron being continually transmitted throughout the water system. Presently, whenever there are any changes to water pressure in the system, iron deposits are released resulting in very dirty water to customers. This has been an ongoing problem since 2012 and the damaged main line needs replaced. However, the replacement of this line is complicated and expensive. Nearly 2,000-ft of 10-inch line, bored beneath a state route and a railroad, that can only be offline for hours at a time, must be replaced entirely.

Replacement of the existing ductile iron pipe, which is the only iron pipe in the entire water distribution system, will prevent the transmission of iron into the clean drinking water. Since the existing main trunk line cannot be taken out of service without interruption of service to all of the customers, the new plastic line will be installed parallel to the existing line. Upon decommissioning of the ductile iron line, the Authority will have eliminated any possible source for iron contamination into the service water of customers. Once that is accomplished, through their regular maintenance and flushing of the network, we expect to see all existing iron contamination systematically removed from the system. This has been a tremendous problem to customers since 2012. With the installation of this project, we expect a major and necessary improvement in water quality will be accomplished for East Dunkard's customers.

(b) The specific location of the project area:

The project is located at the East Dunkard Water Treatment Plant with a physical address of 2790 South Eighty Eight Road, Dilliner, PA. A project drawing is provided attached.

(c) The project will result in a substantiated positive economic development impact:

Presently, with the main trunk line is disrepair, the problems of iron contamination into the system and at customer's houses and businesses can be expected to continue. These conditions are a huge detriment to public relations, business development, and economic growth. However, with the replacement of this main line to plastic and elimination of the iron source, customers throughout the system will soon have clean consistent drinking water. We expect this to be an encouragement to economic growth for the area.

(d) The estimated start and end dates of construction:

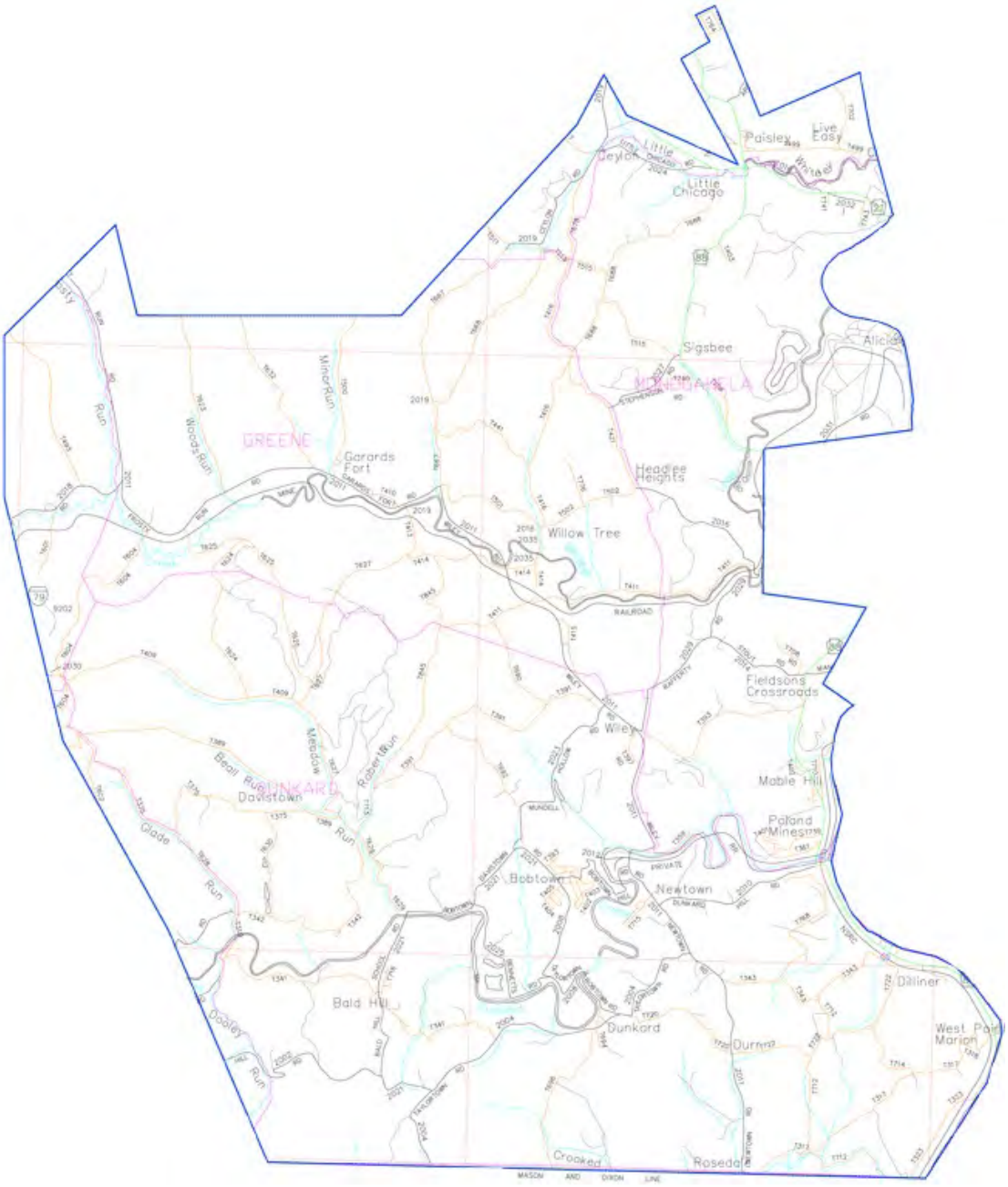
Construction will begin as soon as practically possible after availability of grant funds. Final engineering and permitting will be partially funded by the grant funds and is expected to commence around May of 2020 after the grant is awarded. With an accelerated schedule, the Authority would expect to see construction begin in the Fall of 2020 and completed before 2021. Final restoration may need to carry over into the spring of 2021 for weather considerations.

(e) The names of the municipalities that will potentially benefit from the project:

The East Dunkard Water Authority provides drinking water and fire protection water services throughout many parts of southeastern Greene County PA, servicing 1,650 customers in Dunkard Township, Greene Township, and portions of Monongahela Township, Cumberland Township, Perry Township, & Whiteley Township. The Authority was established in 1969. The first upgrade to the treatment plant occurred in 1982. Most recently the treatment plant was updated in 2012. The Authority owns, operates, and maintains approximately 230 miles of water line throughout the listed municipalities. A service area map follows on the next page:

harshman
CE GROUP, LLC

East Dunkard Water Authority Service Area Map:



harshman CE GROUP, LLC

(f) The project promotes the most efficient management of water resources and protects the health and safety of the citizens of the commonwealth:

The purpose of this project is to improve the water quality to approximately 1,650 customers throughout southeastern Greene County.

(g) the sound management practices implemented by the applicant in the past five years to enhance the long-term sustainability of the system including but not limited to energy efficiency improvements, water conservation, full cost pricing, asset management, and the installation of non-structural alternatives to minimize the amount of storm water that infiltrates the system:

Since 2012 the Authority has invested well over $100,000 researching, mapping, evaluating, and installing improvements to the system to improve the water quality and eliminate the issue of dirty water from iron deposits. The water existing the plant is continuously monitored and is historically documented as clean with no iron issues. Orthophosphate is regularly added, and permitted secured through PADEP, to reduce corrosivity and prevent the release of historical iron scale into the system. A new backwash pump was installed at a cost of $75,000 to prevent pressure deviations in the system and reduce the occasions of dirty water, with measured success. At this point the Authority has done everything possible with the exception of the great task of replacing the ductile iron main trunk line. This is financially infeasible without grant funds. Therefore, this request is both urgent and necessary.

(h) whether the project serves existing populations or new development

The purpose of this project is to improve the water quality to approximately 1,650 existing primarily residential customers throughout southeastern Greene County. There are also many business customers on the system. Once the project is complete, with the improvement of water quality, it is expected that new customers will be added. However at this time, the project serves existing customers.

CC: File 14.042.09

harshman
CE GROUP, LLC

harshman CE GROUP, LLC

100 Courson Hill Road
Washington, PA 15301
T: 724-825-5577
F: 724-229-8255

December 4, 2019

East Dunkard Water Authority
Main Trunk Service Line Replacement Project

PA Small Water & Sewer Grant Application

Permits

This project is expected to require the following permits:

- PA DEP – Water Quality (distribution system modifications)
- PennDOT – Highway Occupancy Permit (road boring)
- Conservation District / PA DEP – NPDES (for earth disturbance)

Sincerely,

James Harshman, PE
Engineer for East Dunkard Water Authority

CC: File 14.042.23

harshman CE GROUP, LLC

100 Courson Hill Road
Washington, PA 15301
T: 724-825-5577
F: 724-229-8255

December 4, 2019

East Dunkard Water Authority
Main Trunk Service Line Replacement Project

PA Small Water & Sewer Grant Application

Cost Estimate

Item	Qty	Unit	$/Unit	Total $		
Mobilization & Demobilization	1	LS	$ 10,000.00	$ 10,000.00		
Construction Survey	1	LS	$ 5,000.00	$ 5,000.00		
Traffic Control	1	LS	$ 15,000.00	$ 15,000.00		
Clearing & Grubbing	1	LS	$ 7,500.00	$ 7,500.00		
10" C900 Plastic Water Main	1900	LF	$ 95.00	$ 180,500.00		
State Route & RR Boring w/ Casing	120	LF	$ 825.00	$ 99,000.00		
Restoration	1	LS	10000	$ 10,000.00	**DCED**	**East Dunkard Water**
					PA SWS Grant	**Authority Funds**
				Construction SubTotal	$ 327,000.00	$ 277,950.00	$ 49,050.00
				Construction Contingency (10%)	$ 32,700.00	$ 27,795.00	$ 4,905.00
						$ -	$ -
				Engineering (15%)	$ 53,955.00	$ 45,861.75	$ 8,093.25
				Construction Inspections (10%)	$ 28,776.00	$ 24,459.60	$ 4,316.40
				Legal (7%)	$ 25,179.00	$ 21,402.15	$ 3,776.85
				Total Project Estimate	**$ 467,610.00**	**$ 397,468.50**	**$ 70,141.50**
				Project Share Percentages/Match Contribution		85%	15%

James Harshman, PE
Engineer for East Dunkard Water Authority

CC: File 14.042.23

EXHIBIT 2

APRIL 8, 2024 LETTER FROM DEP CEASING OCTOBER 2020 CORRECTIVE ACTION PLAN AND USING PAWC'S APRIL 5, 2024 STANDARD OPERATING PROCEDURES

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Southwest Regional Office

April 8, 2024

Via Electronic Mail

East Dunkard Water Authority, in care of its Receiver, Pennsylvania-American Water Company
2790 South Eighty-Eight Road
East Dunkard PA 15327

Re: East Dunkard Water Authority
PWSID No. 5300012
Greene County
August 20, 2021 Field Order
Cessation of Obligations Under November 2020 Corrective Action Plan

Dear Sirs and Madams:

This letter is in regard to the East Dunkard Water Authority's (East Dunkard) obligations under the November 2020 Corrective Action Plan prepared by Harshman CE Group, LLC (2020 CAP). On April 5, 2024, Pennsylvania American Water Company, acting as receiver for East Dunkard, submitted Standard Operating Procedures (SOPs) to the Department with a request to utilize the submitted SOPs in lieu of the existing 2020 CAP. After review and consideration of these SOPs, the Department is terminating East Dunkard's obligation to continue to implement the 2020 CAP as of the date of this letter. As of this date, East Dunkard should implement the submitted SOPs in lieu of the previous 2020 CAP.

Thank you for your prompt attention to this matter. If you have any questions regarding this letter, please contact me at rediehl@pa.gov or 412-442-4210.

Sincerely,

Renee L. Diehl
Program Manager
Southwest Safe Drinking Water Program

c: Region

Daniel J Hufton

From: Brandy M Braun
Sent: Friday, April 5, 2024 2:52 PM
To: Renee Diehl
Cc: Daniel J Hufton; Ryan A Hardgrove; Timothy Berdar; Timothy J Patterson
Subject: East Dunkard SOPs
Attachments: EDWA SOP - Boil Water Advisory Guidance.pdf; EDWA SOP - Main Break Disinfection - Routine Breaks.pdf; EDWA SOP - Water Quality Notifications - Flushing.pdf; EDWA SOP - Water Quality Notifications - General.pdf

Renee,
Please see the attached SOPS that were developed by the PAWC designated ORCs and AOs providing compliance oversight at East Dunkard Water Authority. We request the Departments consideration to use these SOPs in place of the requirements listed in the 2020 EDWA CAP. The CAP aims to address customer complaints and disturbances in the distribution system, and we believe that the processes we have implemented, documented in the attached SOPs, eliminate the need for the CAP.

Please let me know if you have any questions or concerns with our process to ensure reliable service and improved water quality to the customers of EDWA.

Sincerely,
Brandy

Brandy M. Braun
Director, Water Quality and Environmental Compliance
Pennsylvania American Water Company
852 Wesley Drive
Mechanicsburg, PA 17055
C: 724.986.3617

SOP #	2499-OPERATIONS-EDWA-SOP-OPS MGMT-1	**Effective**	04/05/24
Task	Issuing a Boil Water Advisory Guidance		
For Roles	Water Quality Supervisor, System Superintendent, Local Operations Supervisors for Production and Field Operations		
Site	East Dunkard Water Authority (EDWA)		
Frequency	As Needed		
Owner	Tim Berdar, Tiffany Reed		

Contents

Overview

This guidance describes the protocol for issuing a Boil Water Advisory (BWA) during situations that pose an imminent risk to public health upon short-term exposure. This protocol references DEP guidance documents and Safe Drinking Water regulations from 25 Pa. Code §109.

ℹ **Note:** In accordance with the February 8, 2024, Commonwealth Court Order, Pennsylvania American Water (PAAW) is currently serving as East Dunkard Water Authority's (EDWA's) operator in responsible charge (ORC).

Deficiencies that may Require a Boil Water Advisory

- Loss of positive pressure in distribution system caused by a situation other than a main break, such as a power outage, pump failure, source outage, or depletion of storage.
- Loss of positive pressure in distribution system **and** there is evidence or high risk of contamination. These determinations should be made by or in consultation with a Class E certified operator.
    - Evidence of contamination. Some examples of evidence of contamination within the distribution system include but are not limited to:
        - Changes to the physical characteristics of the water, such as unusual discoloration, taste or odor, or increased temperature due to backflow from a hot water heater.
        - Changes to the water chemistry as evidenced by field test results.
    - High-risk situations:
        - A flooded trench that cannot be properly dewatered below the level of the pipe being repaired.
        - Nearby leaking sewer lines or failing on-lot septic systems.
        - High unaccounted for water loss (>20%) due to leaks near the break.
        - Low water service that results in loss of service to customers.
        - Evidence of contamination caused by a stream or river crossing near the site of the main break.
        - Any condition that allows contaminated water to enter the distribution system.
- E. coli contamination.
    - If an E. coli-positive check sample follows a total coliform-positive sample.
    - If a total coliform-positive check sample following an E. coli-positive sample.
    - Failure to take all required check samples following an E. coli-positive sample.
    - Failure to test for E. coli when any check samples test positive for total coliform.
- Failure of a key treatment process involving filtration or disinfection.
    - Examples: Non-detectable residual at the entry point, exceedance of 1 NTU at the combined filter effluent, operating beyond permitted design capacity, etc.
- Waterborne disease outbreak, unusual loading of microbes in source water, or other situations that may have serious adverse effects on public health.

Safety

Reference any site-specific guidance.

JSAs

N/A

Equipment Checklist

N/A

Process

1. Notify DEP

Step	Action	Comment
1.	⚠ **Important:** Notify DEP **within 1 hour** of discovering the situation.	You must speak directly to a DEP employee or leave a message with DEP's emergency hotline (see Appendix E for phone numbers).
2.	**Consult with DEP and comply** with all public notice requirements.	

2. Distribute the Advisory

Step	Action	Comment
1.	Distribute the advisory to all affected customers **as soon as possible, but no later than 24 hours** after discovering the violation.	Distribution: • Direct delivery: Hand delivery, email, automated telephone dialing system, etc. • Use broadcast media to reach non-residential customers. Post the full advisory on a website and/or record it on a dedicated phone line. • Make a good-faith effort to properly notify critical customers. See Business Performance Critical Customer Procedure.
2.	Send a copy of the advisory and its certification form to DEP **within 10 days**.	

3. Complete Corrective Actions

<table>
<tr><th>Step</th><th>Action</th><th>Comment</th></tr>
<tr><td>1.</td><td>Complete corrective actions necessary to return to compliance.</td><td>Corrective actions may include:
Repairing, replacing, or optimizing treatment processes and mains.
Flushing lines and storage tanks, conducting cross-connection surveys, and/or using an alternate source.
ⓘ Note: Repair main breaks in accordance with ANSI/AWWA Standard C-651-05.</td></tr>
<tr><td>2.</td><td>Before collecting total coliform samples:
Displace/flush water from distribution system to achieve satisfactory water quality results.
Restore affected storage tank levels and distribution system pressures to normal operation.</td><td></td></tr>
<tr><td>3.</td><td>Obtain total coliform-negative samples on two consecutive days.</td><td>Collect samples in the affected area, a minimum of 12 hours apart. See below.
<table><tr><th colspan="2">Minimum # Check Samples Required Each Day to Lift a BWA</th></tr><tr><th>Population Affected*</th><th>Minimum # of Samples</th></tr><tr><td>1 – 500</td><td>1</td></tr><tr><td>501 - 1,000</td><td>2</td></tr><tr><td>1,001 – 2,000</td><td>3</td></tr><tr><td>2,001 – 3,000</td><td>4</td></tr><tr><td>3,001 – 4,000</td><td>5</td></tr><tr><td>4,001 – 5,000</td><td>6</td></tr><tr><td>5,001 – 7,500</td><td>7</td></tr><tr><td>7,501 – 10,000</td><td>8</td></tr><tr><td>10,001 – 25,000</td><td>9</td></tr><tr><td>25,001 – 50,000</td><td>10</td></tr><tr><td>> 50,000</td><td>11</td></tr></table>*Population affected = # service connections x 2.7 people.
(DEP follows the chart generally, but they could require more samples under extreme circumstances)</td></tr>
</table>

4. Lift Advisory

Step	Action	Comment
1.	Once corrective actions are completed, contact DEP. • If DEP required specific corrective actions, you must **receive approval from DEP** to lift notice. • If not, directly notify DEP that **corrective actions were completed, and the advisory has been lifted.**	
2.	Issue a 'Lift Notice' to affected customers **as soon as possible, but no later than 24 hours.**	The Lift Notice should be distributed in the same manner as the initial BWA. Make a good faith effort to notify critical customers.
3.	Send a copy of the Lift Notice and its certification form to DEP **within 10 days**.	

References

DEP Guidance

- Policy for Issuing and Removing Water Supply Warnings
- Policy for Determining When Loss of Positive Pressure Situations in the Distribution System Require One-Hour Reporting to the Department and Issuing Tier 1 Public Notification

DEP Safe Drinking Water Regulations

- § 109.408. Tier 1 public notice—categories, timing and delivery of notice
- § 109.301. General monitoring requirements.

Forms

- Public Notification Certification Form

BOIL WATER ADVISORY CHECKLIST

EVENT DESCRIPTION

System / PWSID: _____

Description of affected area: _____

Description of event: _____

_____

Alternative water supply provided? (circle one) Yes No

Population affected (service connections x 2.7): _____

# of bacteria samples required*: _____

*See Appendix A: Required Bacteria Samples

Advisory Type (circle one): Mandatory Precautionary

*See Appendix B: Advisory Types

INTERNAL NOTIFICATIONS

⚠ **Important:** Initial conference call must be held **within 30 minutes of discovery of situation** that may require a BWA.

☐ When a BWA is deemed necessary, a conference call must be held with the following functional groups included:

- Operations
- Water Quality
- External Affairs
- Government Affairs.

Other internal notifications may include major accounts managers and GIS.

REGULATORY NOTIFICATIONS

⚠ **Important:** With the exception of DEP- and PUC-required notifications, all communication with public officials, critical customers, and general customer population should be coordinated and occur.

☐ DEP notification is required within 1 hour of the event (Water Quality/Operations)

Date/time/name of person notified at DEP: _____

☐ PUC notification is required if greater than 2,500 customers or 5% of the PWSID (Operations)

Date/time/name of person notified at PUC: _____

☐ Health Department (county-dependent) notification is required if the affected area includes eating and drinking establishments (Water Quality)

Date/time/name of person notified at Health Department: _____

☐ Municipal officials and other government agencies (Government Affairs/Operations)

CUSTOMER NOTIFICATION

⚠ **Important:** Goal for customer notification is **1 hour** from time of determination that BWA is necessary.

☐ Draw map of affected area for customer notification (Operations)

☐ Send customer notification map to GIS for creation of public access map (Operations)

☐ Draft customer notification script, public notification, critical customer talking points (External Affairs)

WQ Approval: _____ Operations Approval: _____

*See Appendix C: Suggested Notification Scripts and Appendix D: Critical Customer Talking Points

☐ Launch customer notification (Operations)

Date/Time: _____

☐ Issue Press Release (website, social media, local media, etc.) (External Affairs)

SAMPLE COLLECTION

☐ Identify appropriate # of representative sample locations (Water Quality to Operations)

Consider the following:

- Who will collect samples?
- Will samples be collected outside of normal business hours?
  - If so, will the chosen sites be available?
- What time should samples be collected in order to lift BWA as quickly as possible?
- What method will be used for analysis (Colilert 18- or 24-hour)?

☐ Samples must be collected on two consecutive days at least 12 hours apart.

LIFTING BOIL WATER ADVISORY

☐ Complete necessary corrective actions (Operations)

- flushing, replenish storage, etc.

☐ Collect required bacteria samples (Water Quality/Operations)

- # dependent on population, 2 days of sampling, 12 hours apart

☐ Draft BWA lift notice, including any corrective actions customers must take (External Affairs)

- Internal flushing, filter changes, etc. required for mandatory BWA **OR**
- No action required for precautionary BWA

☐ Obtain regulatory approval to lift BWA, if required, and identify approver _____ (Water Quality)

☐ Launch customer notification (Operations)

☐ Date/Time: _____

☐ Issue Press Release (website, social media, local media, etc.) (External Affairs)

☐ Submit PN Certification forms (Water Quality or External Affairs)

Appendix A: Required Bacteria Samples

Minimum # Check Samples Required Each Day to Lift a BWA	
Population Affected*	**Minimum # of Samples**
1 – 500	1
501 - 1,000	2
1,001 – 2,000	3
2,001 – 3,000	4
3,001 – 4,000	5
4,001 – 5,000	6
5,001 – 7,500	7
7,501 – 10,000	8
10,001 – 25,000	9
25,001 – 50,000	10
> 50,000	11

*Population affected = # service connections x2.7 people

Appendix B: Advisory Types

Advisory Type	Comments
Precautionary Boil Water Advisory	• Issued when the water system experiences a loss in positive water pressure, typically due to a serious main break or low storage tank levels. • A loss of positive water pressure indicates the existence of conditions that could allow contamination to enter the distribution system. • This is the most common type of advisory, which is issued as a precaution until water samples are collected and analyzed to confirm that water quality has not been affected.
Mandatory Boil Water Advisory	• Issued when contamination is confirmed in the water system or a treatment technique violation has occurred, such as loss of chlorine feed or increased turbidity levels in filtered water. • Customers are instructed to boil the water to kill bacteria and other organisms in the water until the issue is resolved and the notice can be lifted. • Contamination from organisms, such as bacteria, viruses, and parasites, can cause symptoms, including nausea, cramps, diarrhea, and associated headaches.

Appendix C: Suggested Customer Notification Scripts

Issue Notice

⚠ **Important:** Do not delay launching a customer notification due to lack of tanker location information.

Attention EDWA customers: The company has issued a **[PRECAUTIONARY OR MANDATORY]** boil water advisory for customers in **[LOCATION]** due to **[BRIEF DESCRIPTION OF EVENT]**. Water should be boiled for a minimum of one minute before consumption and food preparation until further notice.

To ease this inconvenience, potable water tankers will be available **[LIST LOCATION AND TIME DEPLOYED]**. Tankers will be available from **[LIST TIME TANKERS ARE AVAILABLE]** daily until the advisory is lifted. Customers are asked to bring their own containers to fill. Until we have final guidance from DEP, you may need to remove this language from a notice to our customers. Check with your water quality supervisor for an answer.

For more information on the advisory and a map of the affected area, log on to our website at: www.pennsylvaniaamwater.com, and select Alert Notifications. EDWA is working diligently to resolve the issue and will contact all affected customers when the advisory is lifted. Thank you for your patience and cooperation.

Mandatory Lift

EDWA has lifted the boil water advisory for customers in your area. Results of water testing have confirmed that water quality meets drinking water standards, so there is no longer a need to boil your water.

Please be aware that customers are advised to flush their household pipes before using any water for drinking, cooking, or washing dishes. Pipes can be flushed by running all cold-water faucets in your home for at least five minutes – at one time – with the highest water flow possible. Customers should flush automatic ice makers by making and discarding at least three batches of ice.

For more flushing recommendations, visit our website at: www.pennsylvaniaamwater.com and select Alert Notifications. We want to thank you for your patience and cooperation during this event.

Precautionary Lift

EDWA has lifted the boil water advisory for customers in your area. Results of water testing have confirmed that water quality meets drinking water standards, so customers no longer need to boil their water and may resume normal usage at this time.

For more information, please visit our website at: www.pennsylvaniaamwater.com and select Alert Notifications.

Appendix D: Frequently Asked Questions

What is a boil water advisory?

A boil water advisory is a public notification advising customers to boil tap water before consuming it. Advisories are issued when an event has occurred with the potential to adversely affect water quality or a situation has occurred where there is known degradation of the water quality. There are two types: precautionary and mandatory.

- **Precautionary boil water advisory:** Issued when the water system experiences a loss in positive water pressure, typically due to a serious main break or low storage tank levels. A loss of positive water pressure indicates the existence of conditions that could allow contamination to enter the distribution system. This is the most common type of advisory, which is issued as a precaution until water samples are collected and analyzed to confirm that water quality has not been affected.
- **Mandatory boil water notice:** Issued when contamination is confirmed in the water system. Customers are instructed to boil the water to kill bacteria and other organisms in the water until the issue is resolved and the notice can be lifted. Contamination from organisms, such as bacteria, viruses, and parasites, can cause symptoms, including nausea, cramps, diarrhea, and associated headaches.

What actions do I need to take?

If notified of a boil water advisory, **DO NOT DRINK THE WATER WITHOUT BOILING IT FIRST**. Bring all water to a rolling boil, let it boil for one minute, and cool before using; or use bottled water. You should use boiled or bottled water for drinking, making ice, washing dishes, brushing teeth, and food preparation until you are notified that the advisory has been lifted.

We also recommend the following steps:

- Throw away uncooked food or beverages or ice cubes if made with tap water during the day of the advisory.
- Keep boiled water in the refrigerator for drinking.
- Do not swallow water while you are showering or bathing.
- Provide pets with boiled water after cooling.
- Do not use home filtering devices in place of boiling or using bottled water. Most home water filters will not provide adequate protection from microorganisms.
- Use only boiled water to treat minor injuries. When showering or bathing, avoid allowing the water to come in contact with an open wound.
- Do not wash salad items with tap water during the period. Use bottled water or freshly boiled and cooled tap water.
- To ease inconvenience, EDWA typically provides alternate water sources by placing a water tanker at locations within the affected area. The locations will be listed on the company's

website, news releases, social media, and other communications. Customers are asked to bring their own containers when visiting a tanker for drinking water.

- You may also receive a recorded call from the company about this event, shortly.

How long does a boil water advisory last until it can be lifted?

According to PA Department of Environmental Protection (DEP) guidelines, water samples must be collected to test for bacteria in the distribution system. The first samples are taken on the day when the issue (e.g., main break) has been corrected, and then another set of samples are taken in the next 24 hours. Two consecutive days of "clean" test results are required before DEP will allow the advisory to be lifted. (The process takes 24 hours for test results to come back from the laboratory, so final lab results to lift an advisory can take several days after the event.)

You will be notified when the corrective actions have been completed and you no longer need to boil your water. This information will also be provided on Pennsylvania American Water's website under Alerts Notification.

What should I do once the advisory is lifted?

Customers under a precautionary boil water advisory can resume normal water usage when the notice is lifted without taking additional measures. If you experience cloudy or discolored water, you should run your faucets for a few minutes until the water runs clear.

Should I flush my house pipes?

The company will notify you if it is necessary to flush household pipes and provide instruction for steps to take prior to using the water in the event of a mandatory boil water notice. Flushing simply means letting the water run to ensure that no contaminated water remains in your pipes. If customers are advised to flush household plumbing, the guidelines will likely include:

- Run all cold-water faucets in your home for at least five minutes at one time with the highest water flow possible to prevent splashing or flooding of the drains.
- To flush automatic ice makers, make three batches of ice and discard.
- Run water softeners through a regeneration cycle. Follow the manufacturer's guidelines specified in the owner's manual.
- Run drinking water fountains and water coolers with direct water connections for at least five minutes at the highest flow rate possible.
- Change refrigerator filters.

Can I use the water for showering and bathing?

Yes. Just be careful not the drink the water while you shower or bathe.

Can I use the water for laundry?

If you only have discolored or dirty water due to the main break, then do not use the water to do laundry until the discoloration or dirty water has cleared up.

Can I use the water for washing dishes?

You should NOT use the dishwasher, because the water temperature doesn't reach the boiling point. Dishes should be hand-washed with water that has been boiled first. Or, you can use hot, soapy water and add one tablespoon of bleach per gallon as a precaution, and rinse dishes in cooled water that has been boiled first.

Do I still need to boil my water if I have a filter system on my faucet or refrigerator?

Most point-of-use filters are designed to improve the aesthetics of water (improve taste and odor), and not to remove harmful bacteria. You can learn about the capability of your filter by contacting the manufacturer. If in doubt, you should boil your water or use bottled water even if you have a filtering system.

Appendix E: DEP Office and County Health Department Contact Information by County

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

DEP OFFICE AND COUNTY HEALTH DEPARTMENT CONTACT INFORMATION BY COUNTY

Call 800-541-2050 after 4 pm and before 8 am

County	First Three Digits of Public Water System ID #	DEP Office Address	DEP Office Phone #	DEP Office Fax #
Adams	701	York District Office 150 Roosevelt Ave., Ste. 200 York, PA 17401	717-771-4481	717-845-3496
Allegheny	502	Southwest Regional Office 400 Waterfront Dr. Pittsburgh, PA 15222	412-442-4217	412-442-4242
Armstrong	503	Knox District Office White Memorial Building P.O. Box 669 Knox, PA 16232-0669	814-797-1191	814-797-2706
Beaver	504	Beaver Falls District Office 715 15th St. Beaver Falls, PA 15010	724-847-5270	724-847-5281
Bedford	405	Altoona District Office 3001 Fairway Dr. Altoona, PA 16602	814-946-7292	814-949-7938
Berks	306	Reading District Office 1005 Cross Roads Blvd. Reading, PA 19605	610-916-0100	610-916-0110
Blair	407	Altoona District Office 3001 Fairway Dr. Altoona, PA 16602	814-946-7292	814-949-7938
Bradford	208	Mansfield District Office 600 Gateway Dr. Mansfield, PA 16933	570-662-0830	570-662-0843
Bucks	109	Southeast Regional Office 2 E. Main St. Norristown, PA 19401	484-250-5980	484-250-5971
Butler	510	New Castle District Office 121 North Mill St. New Castle, PA 16101	724-656-3160	724-656-3267
Cambria	411	Cambria District Office 286 Industrial Park Rd. Ebensburg, PA 15931	814-472-1900	814-472-1861

NOTE: SDWA Corrections should be sent to: FAX 717-787-9549 or FAX 717-772-5630

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Call 800-541-2050 after 4 pm and before 8 am

County	First Three Digits of Public Water System ID #	DEP Office Address	DEP Office Phone #	DEP Office Fax #
Cameron	612	Moshannon District Office 186 Enterprise Dr. Philipsburg, PA 16866	814-342-8200	814-342-8216
Carbon	313	Pottsville District Office 5 W. Laurel Blvd. Pottsville, PA 17901	570-621-3118	570-621-3430
Centre	414	Northcentral Regional Office 208 W. Third St., Ste. 101 Williamsport, PA 17701	570-327-3490	570-327-3565
Chester	115	Southeast Regional Office 2 E. Main St. Norristown, PA 19401	484-250-5980	484-250-5971
Clarion	616	Knox District Office White Memorial Building P.O. Box 669 Knox, PA 16232-0669	814-797-1191	814-797-2706
Clearfield	617	Moshannon District Office 186 Enterprise Dr. Philipsburg, PA 16866	814-342-8200	814-342-8216
Clinton	418	Moshannon District Office 186 Enterprise Dr. Philipsburg, PA 16866	814-342-8200	814-342-8216
Columbia	419	Northcentral Regional Office 208 W. Third St., Ste. 101 Williamsport, PA 17701	570-327-3490	570-327-3565
Crawford	620	Northwest Regional Office 230 Chestnut St. Meadville, PA 16335	814-332-6899	814-332-6121
Cumberland	721	York District Office 150 Roosevelt Ave., Ste. 200 York, PA 17401	717-771-4481	717-845-3496
Dauphin	722	Southcentral Regional Office 909 Elmerton Ave. Harrisburg, PA 17110	717-705-4708	717-705-4930
Delaware	123	Southeast Regional Office 2 E. Main St. Norristown, PA 19401	484-250-5980	484-250-5971

NOTE: SDWA Corrections should be sent to: FAX 717-787-9549 or FAX 717-772-5630

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Call 800-541-2050 after 4 pm and before 8 am

County	First Three Digits of Public Water System ID #	DEP Office Address	DEP Office Phone #	DEP Office Fax #
Elk	624	Warren District Office 321 N. State St. North Warren, PA 16365	814-723-3273	814-723-0964
Erie Note: address & phone number differ depending on system type	625	*For Community/ Nontransient PWS:* Northwest Regional Office 230 Chestnut St. Meadville, PA 16335 *For Transient PWS:* Erie Co. Health Dept. Drinking Water Program 606 W. Second St. Erie, PA 16507	Meadville: 814-332-6899 Erie CHD: 814-451-6700	Meadville: 814-332-6121 Erie CDH: 814-451-6775
Fayette	526	New Stanton District Office 131 Broadview Rd. New Stanton, PA 15672	724-925-5500	724-925-5557
Forest	627	Knox District Office White Memorial Building P.O. Box 669 Knox, PA 16232-0669	814-797-1191	814-797-2706
Franklin	728	Southcentral Regional Office 909 Elmerton Ave. Harrisburg, PA 17110	717-705-4708	717-705-4930
Fulton	429	Southcentral Regional Office 909 Elmerton Ave. Harrisburg, PA 17110	717-705-4708	717-705-4930
Greene	530	New Stanton District Office 131 Broadview Rd. New Stanton, PA 15672	724-925-5500	724-925-5557
Huntingdon	431	Altoona District Office 3001 Fairway Dr. Altoona, PA 16602	814-946-7292	814-949-7938
Indiana	532	Knox District Office White Memorial Building P.O. Box 669 Knox, PA 16232-0669	814-797-1191	814-797-2706
Jefferson	633	Knox District Office White Memorial Building P.O. Box 669 Knox, PA 16232-0669	814-797-1191	814-797-2706

NOTE: SDWA Corrections should be sent to: FAX 717-787-9549 or FAX 717-772-5630

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Call 800-541-2050 after 4 pm and before 8 am

County	First Three Digits of Public Water System ID #	DEP Office Address	DEP Office Phone #	DEP Office Fax #
Juniata	434	Southcentral Regional Office 909 Elmerton Ave. Harrisburg, PA 17110	717-705-4708	717-705-4930
Lackawanna	235	Scranton District Office 321 Spruce St., Ste. 300 Scranton, PA 18503	570-963-4521	570-963-3421
Lancaster Note: address & phone number differ depending on location within county	736	*Lancaster City and Municipalities to its West* Southcentral Regional Office 909 Elmerton Ave. Harrisburg, PA 17110 *Municipalities East of Lancaster City* Reading District Office 1005 Cross Roads Blvd. Reading, PA 19605	Southcentral Regional Office 717-705-4708 Reading District Office 610-916-0100	Southcentral Regional Office 717-705-4930 Reading District Office 610-916-0110
Lawrence	637	New Castle District Office 121 North Mill St. New Castle, PA 16101	724-656-3160	724-656-3267
Lebanon	738	Southcentral Regional Office 909 Elmerton Ave. Harrisburg, PA 17110	717-705-4930	717-705-4930
Lehigh	339	Bethlehem District Office 4530 Bath Pike Bethlehem, PA 18017	610-861-2070	610-861-2072
Luzerne	240	Northeast Regional Office 2 Public Square Wilkes-Barre, PA 18701-1915	570-826-2511	570-830-3017
Lycoming	441	Northcentral Regional Office 208 W. Third St., Ste. 101 Williamsport, PA 17701	570-327-3490	570-327-3565
McKean	642	Warren District Office 321 N. State St. North Warren, PA 16365	814-723-3273	814-723-0964
Mercer	643	Northwest Regional Office 230 Chestnut St. Meadville, PA 16335	814-332-6899	814-332-6121
Mifflin	444	Altoona District Office 3001 Fairway Dr. Altoona, PA 16602	814-946-7292	814-949-7938

NOTE: SDWA Corrections should be sent to: FAX 717-787-9549 or FAX 717-772-5630

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Call 800-541-2050 after 4 pm and before 8 am

County	First Three Digits of Public Water System ID #	DEP Office Address	DEP Office Phone #	DEP Office Fax #
Monroe	245	Pocono District Office 2174B Route 611 Swiftwater, PA 18370	570-895-4040	570-895-4041
Montgomery	146	Southeast Regional Office 2 E. Main St. Norristown, PA 19401	484-250-5980	484-250-5971
Montour	447	Northcentral Regional Office 208 W. Third St., Ste. 101 Williamsport, PA 17701	570-327-3490	570-327-3565
Northampton	348	Bethlehem District Office 4530 Bath Pike Bethlehem, PA 18017	610-861-2070	610-861-2072
Northumberland	449	Northcentral Regional Office 208 W. Third St., Ste. 101 Williamsport, PA 17701	570-327-3490	570-327-3565
Perry	750	Southcentral Regional Office 909 Elmerton Ave. Harrisburg, PA 17110	717-705-4708	717-705-4930
Philadelphia	151	Southeast Regional Office 2 E. Main St. Norristown, PA 19401	484-250-5980	484-250-5971
Pike	252	Pocono District Office 2174B Route 611 Swiftwater, PA 18370	570-895-4040	570-895-4041
Potter	653	Mansfield District Office 600 Gateway Dr. Mansfield, PA 16933	570-662-0830	570-662-0843
Schuylkill	354	Pottsville District Office 5 W. Laurel Blvd. Pottsville, PA 17901	570-621-3118	570-621-3430
Snyder	455	Northcentral Regional Office 208 W. Third St., Ste. 101 Williamsport, PA 17701	570-327-3490	570-327-3565
Somerset	456	Cambria District Office 286 Industrial Park Rd. Ebensburg, PA 15931	814-472-1900	814-472-1861

NOTE: SDWA Corrections should be sent to: FAX 717-787-9549 or FAX 717-772-5630

3930-FM-BSDW0560 Rev. 12/2019

Call 800-541-2050 after 4 pm and before 8 am

County	First Three Digits of Public Water System ID #	DEP Office Address	DEP Office Phone #	DEP Office Fax #
Sullivan	257	Mansfield District Office 600 Gateway Dr. Mansfield, PA 16933	570-662-0830	570-662-0843
Susquehanna	258	Scranton District Office 321 Spruce St., Ste. 300 Scranton, PA 18503	570-963-4521	570-963-3421
Tioga	259	Mansfield District Office 600 Gateway Dr. Mansfield, PA 16933	570-662-0830	570-662-0843
Union	460	Northcentral Regional Office 208 W. Third St., Ste. 101 Williamsport, PA 17701	570-327-3490	570-327-3565
Venango	661	Northwest Regional Office 230 Chestnut St. Meadville, PA 16335	814-332-6899	814-332-6121
Warren	662	Warren District Office 321 N. State St. North Warren, PA 16365	814-723-3273	814-723-0964
Washington	563	New Stanton District Office 131 Broadview Rd. New Stanton, PA 15672	724-925-5500	724-925-5557
Wayne	264	Scranton District Office 321 Spruce St., Ste. 300 Scranton, PA 18503	570-963-4521	570-963-3421
Westmoreland	565	New Stanton District Office 131 Broadview Rd. New Stanton, PA 15672	724-925-5500	724-925-5557
Wyoming	266	Northeast Regional Office 2 Public Square Wilkes-Barre, PA 18701-1915	570-826-2511	570-830-3017
York	767	York District Office 150 Roosevelt Ave., Ste. 200 York, PA 17401	717-771-4481	717-845-3496
Out-of-State	999	Rachel Carson State Office P.O. Box 8467 Harrisburg, PA 17105-8467	717-772-4018	717-772-5630

NOTE: SDWA Corrections should be sent to: FAX 717-787-9549 or FAX 717-772-5630

- 6 -

Review Record

Date	Version	Reviewer	Comments/Changes	Previous Replaced
04/05/24	3	B. Braun	Clarify note to court order wording.	
03/27/24	2	B. Braun	Expand on evidence of contamination.	
03/25/24	1	T. Berdar	General review.	

EAST DUNKARD WATER AUTHORITY

SOP #	2499-OPERATIONS-EDWA-SOP-OPS MGMT-4	**Effective**	04/05/24
Task	Main Break Disinfection - Routine Breaks		
For Roles	Water Quality Supervisor, System Superintendent, Local Operations Supervisors for Production and Field Operations		
Site	East Dunkard Water Authority (EDWA)		
Frequency	As Needed		
Owner	Tim Berdar, Tiffany Reed		

Contents

Overview

Use this procedure to disinfect water mains and properly flush the area, after a main break is repaired. This procedure will help you comply with federal, state, and local laws and regulations. This includes:

- Disinfecting the new piping, fittings, connections, etc.
- Flushing the main.
- Collecting and analyzing samples.
- Interpreting sample results.
- Making the required notifications.

ℹ **Note:** In accordance with the February 8, 2024, Commonwealth Court Order, Pennsylvania American Water (PAAW) is currently serving as East Dunkard Water Authority's (EDWA's) operator in responsible charge (ORC).

Background

Contamination can enter the potable water distribution system when a main is shut down and depressurized during repair. It is important to repair, disinfect, and flush the main in a sanitary manner. When a main is isolated and wholly or partly dewatered for repair, you must:

- Disinfect the main before placing it back in service.
- Disinfect all surfaces that contact potable water.

For more detail, refer to the American Water Works Association (AWWA) Standard for Disinfecting Water Mains – AWWA C651-14 and Field Dechlorination – AWWA C655-18 (Appendix A).

Safety

Reference any site-specific guidance.

JSAs

N/A

Equipment Checklist

N/A

Process

1. Disinfecting

Disinfect all new piping, fittings, valves, hydrant connections, gaskets, etc. with hypochlorite solution. Generously spray/swab the full length of the pipe interior.

ℹ **Note:** Water main leaks or breaks repaired in-service with clamping or other devices while the water main remains pressurized, present little danger of contamination and do not require disinfection.

Step	Action	Comment	See
1.	Mix a **3% chlorine solution.**	Used approved disinfectant (NSF-approved bleach solution). The AWWA recommends a 1% minimum strength chlorine solution. We recommend using a 3% solution as that strength: • Is easier to dilute. • Accounts for some loss of strength due to aging (for example, if excess solution is stored in crew trucks. Example to mix a 3% chlorine solution: • Use “Purebright bleach” (6% chlorine). • Mix ½ gallon of bleach with ½ gallon of water.	
2.	Transfer the solution into an approved **1-gallon garden sprayer.**		
3.	Use the sprayer to spray disinfectant to **all interior portions** of: • **Replacement pipes** • **Valves** • **Hydrants** • **Fittings.**		
4.	If desired, you may use an **approved bucket and clean mop** to swab the pipe interior.		

5.	Continue until you have cleaned **all the pipe interior** that you can reasonably reach.		

2. Flushing

You must dechlorinate any chlorinated disinfection solution before you discharge it to sanitary or storm sewers or any surface or groundwater. You can use chemical or non-chemical dichlorination methods, based on whether the disinfection solution is considered high- or low-chlorine.

Dechlorination Method	Disinfection Solution Strength
Chemical	High-chlorine (> 4mg/L)
Non-chemical	Low-chlorine (≤ 4mg/L)

Step	Action	Comment	See
1.	Start with the **main still isolated.**		
2.	Open any **valves and hydrants** needed to maintain unidirectional flow to the hydrants.		
3.	Determine the **average diameter** of the isolated main.		
4.	Use the **water main break flushing chart** to match the: • **Main diameter size.** • Corresponding **size of the isolated main.**	This number represents the velocity (flow) in GPM needed to scour the inside of the main at a 3-foot-per-second (FPS) flowrate. See Water Main Break Flushing Chart.	
5.	Use the **water main break flushing chart** to: • Estimate the **system pressure** at the location of the repair. • Match the **closest option** in the chart	This number indicates the approximate flow rate from a fire hydrant using the 4-inch steamer nozzle.	
6.	Estimate the **linear footage** of the main segment that has been isolated during the shutdown. Use the linear footage and select the **closest match** in the water main break flushing chart.	This denotes the length of time for the isolated main to be flushed. ℹ **Note:** Water pressure and main diameter do not impact the length of time required to flush the main. The denoted time automatically assumes three full pipe volumes will be flushed.	

7.	Where **hydrants do not exist or are not available,** install the following to help with water sampling and testing: • **2-inch corporation stop.** • **2-inch service line.**	For example, where insertion valves have been used. ℹ **Note:** A 2-inch tap will not achieve the desired flushing velocities but is acceptable where other flushing options are not available.	
8.	Continue to flush until **chlorine residuals in the flushed water are consistent with residuals in the local area** of the distributions system.	We recommend using unidirectional flow, but you do not have to keep the main in unidirectional flow until samples are read. You can place the main back into service after the following are complete: repaired, all valves opened, disinfected, flushed and samples collected.	

3. Testing Free Chlorine

Step	Action	Comment	See
1.	Turn on the **digital chlorine meter.**		
2.	Use a **Kimwipe** to wipe the sample cell clean.		
3.	Dry the **sample cell** and place it into the meter with the triangle (▼) facing you.		
4.	Press the **button** to zero the meter.		
5.	Remove the **sample cell**. Add **one powder pillow** or **one squeeze from the free chlorine dispenser.**		
6.	Recap the sample cell, swirl it, and **allow 30 seconds** reaction time.		
7.	Place the **sample cell back into the meter** with the triangle (▼) facing you.		
8.	Press the **result button** and read the result immediately.	ℹ **Note:** Read the result within one minute.	

4. Making Notifications

Notify the following.

Local Notifications

Notify the mayor or town administrator within one hour of the occurrence of the incident.

Our internal notifications will focus on the local superintendent/ORC and our PAAW Water Quality Team. Any external notifications will be made via External Affairs.

Troubleshooting

N/A

Documentation/Recordkeeping

N/A

References

AWWA Standard C655-18: Field Dechlorination

Refer to AWWA Standard C655-18: Field Dechlorination

Water Main Break Flushing Chart

Water Main Break Flushing Chart						
Flushing FLOW Required for Pipe Diameter (GPM @ 3 fps)						
6-inches	8-inches	12-inches	16-inches	20-inches	24-inches	30-inches
264	460	1,055	1,866	2,907	4,220	6,594
Flush TIME @ 3 fps (for all pipe sizes)						
100 Ft.	250 Ft.	500 Ft.	1,000 Ft.	2,000 Ft.	2,500 Ft.	3,000 Ft.
2 Minute	4 Minutes	8 Minutes	17 Minutes	33 Minutes	42 Minutes	50 Minutes
Approximate Flow Through 4-inch Steamer Nozzle (GPM)						
40 psi	50 psi	60 psi	75 psi	100 psi	125 psi	150 psi
1,450	1,635	1,804	2,035	2,375	2,680	2,960
Approximate Flow Through 2-inch Nozzle (GPM)						
40 psi	50 psi	60 psi	75 psi	100 psi	125 psi	150 psi
234	264	291	329	384	433	478
* 2-inch service tap may be used only when hydrant is not available (this will not achieve required 3 fps velocity for pipe over 8-inch diameter)						

Example:

1,000 LF of 8-inch water main isolated and dewatered/depressurized to replace 3-foot section of pipe to facilitate repair. Normal water pressure on this segment of pipe is 75 psi.

An 8-inch pipe requires 460 GPM to achieve 3 FPS flushing velocity. A pipeline with 75 psi can achieve 2,035 GPM flow through 4-inch FH steamer nozzle. Hydrant to be opened about 25% to achieve the required 460 GPM flow required (460 GPM / 2,035 GPM = .22 or 22%). A 1,000 LF section of pipe will need to be flushed for 17 minutes to flush three full pipe volumes.

Review Record

Date	Version	Reviewer	Comments/Changes	Previous Replaced
04/05/24	4	B. Braun	Clarify note to court order wording.	
03/30/24	3	B. Braun	Restructure content.	
03/27/24	2	B. Braun	Restructure content.	
03/26/24	1	T. Reed, T. Berdar	Review	

Acknowledgements

I have reviewed and approved this SOP	
Area Supervisor:	
Operators:	

I am aware of this SOP	
Sr. Supervisor:	
Superintendent:	
Sr. Manager:	

EAST DUNKARD WATER AUTHORITY

SOP #	2499-OPERATIONS-EDWA-SOP-OPS MGMT-3	**Effective**	04/05/24
Task	Water Quality Notifications - Flushing		
For Roles	Water Quality Supervisor, System Superintendent, Local Operations Supervisors for Production and Field Operations		
Site	East Dunkard Water Authority (EDWA)		
Frequency	As Needed		
Owner	Tim Berdar, Tiffany Reed		

Contents

Overview

Use this procedure to handle water quality notifications that involve flushing. This includes:

- Handling visual notifications.
- Closing out notifications.

ℹ **Note:** In accordance with the February 8, 2024, Commonwealth Court Order, Pennsylvania American Water (PAAW) is currently serving as East Dunkard Water Authority's (EDWA's) operator in responsible charge (ORC).

Background

This process starts when a customer contacts the EDWA with a complaint about their water quality:

Water Quality concerns are received in the EDWA office during business hours, by the on-call operator after hours, and through social media inquiries.

- The EDWA employee receiving the call enters the complaint into the tracking spreadsheet.
- The EDWA employee notifies the appropriate PAAW employee.
- Staff handle the complaint based on the type of water quality issue and their job roles.

ℹ **Note:** After the customer call, the EDWA employee then determines whether they create a flush order. The EDWA employee assigns the order to a crew and a T&D technician is called to investigate and possibly open a hydrant to flush the main out. If the EDWA field operations employee notices that the problem doesn't clear up, or there may be a distribution-related issue, the EDWA field operations employee notifies the superintendent.

Water Quality Notification Types and Responsibilities

Water Quality Notifications		
Type	**Handled By**	**Comments**
Visual	EDWA employee	⚠ **Important:** A contact attempt for all visual notifications must be made within one business day, not including weekends. If a customer requires us to contact them outside of normal business hours (i.e., weekends), the on-call Operations Field Service superintendent is responsible for contacting the customer. If the complaint is non-visual, the PAAW WQ Supervisor on call will be responsible for contacting the customer. The customer can see indicators of possible water quality issues, such as: • Discolored water. • Cloudy water. • Stains on laundry. ℹ **Note:** EDWA employees handle only visual water quality notifications.

Safety

Reference any site-specific guidance.

JSAs

N/A

Equipment Checklist

N/A

Process

1. Handling Visual Notifications

⚠ **Important:** All visual notifications must be contacted within one business day.

EDWA receives the notification, researches customer information, contacts the customer, and adds notes in the notification in the spreadsheet. If an order is attached, then local operations is responsible for closing the work order before the EDWA employee closes the notification.

Step	Action	Comment	See
1.	The EDWA Team receives an **alert via email (or phone)**.	The EDWA employee receives the email (or call) first. They will determine whether a flush order is needed. They will not automatically schedule a flush order for a particle and stained laundry notification. If needed, the EDWA employee schedules the order within 30 minutes and responds to the complaint.	
2.	The EDWA Team performs the **following steps before calling** the customer back.		
3.	Search the **customer's area** for alerts.	Reviewing the area's alert history allows us to better understand the complaint.	
4.	Select the following for the customer's location: • **Street** • **Municipality.**		
5.	Review your **search results**.		
6.	From the notification, copy the customer's **account number**.	Entering the account number allows you to access the account notes for that premise.	
7.	Review the customer's **account notes**.	Check older notes. Look for previous similar complaints. For example: • Is this an ongoing issue? • Does the customer submit unjustified or internal complaints?	

8.	The EDWA employee notifies the ORC of the area of the **WQ complaint.**		
9.	The ORC identifies **a hydrant or blowoff** in the area.		
10.	The ORC notifies the EDWA employee of: • Which **hydrant or blowoff** needs to be open. • The **rate of flow** to clear/address the system disturbance		
11.	The EDWA employee opens **the needed hydrant or blowoff at the rate of flow** determined by the ORC.		
12.	Once the blowoff or hydrant is open, the EDWA employee **reports their findings** back to the ORC.		
13.	The ORC decides from the findings **the amount of time that the hydrant or blowoff needs to be open** to resolve the complaint.		
14.	The EDWA employee visits the area of the complaint and notifies the ORC that the **complaint has been resolved.**	Typically, employees are on site while flushing. If an extended flushing period is needed, we would continue flushing and recheck to confirm it is complete. Employees would leave the hydrant or blowoff site and periodically return every few hours to monitor flushing operations. In lower-flow situations, the monitoring period may be extended at the ORC's discretion.	
15.	If the **complaint has not been resolved**, flushing continues until: • The issue has been **resolved**. • The customer has been **satisfied**.		
16.	Once the customer is satisfied, the EDWA employee **closes the hydrant or blowoff.**		

17.	Call the customer to make sure: • The issue has been **resolved**. • The customer has **no extended issues**.	PAAW WQ attempts to call back within the next business day. Extended issues means that either the issue persists after a flush or a new issue appears. If a customer requires us to contact them outside of normal business hours (i.e., weekends), the EDWA employee on call is responsible for contacting the customer. ℹ **Note:** The EDWA employee may be delayed in completing the investigative flush in the appropriate timeline. If you call the customer before the flush is completed: • Advise the customer that we will be out to flush (if we are flushing) the area for them or inform them if there is a main break in their area. • Give the customer your direct number in case they have extended issues.	
18.	Return to the spreadsheet and enter **comments** into the notification.		
19.	If an order is attached to the complaint, then the EDWA employee must **close out the order before they can close out the spreadsheet notification.**	The order is the initial EDWA employee flush order. Sometimes you must follow up with the ORC to have the order closed.	

2. Addressing Extended Issues with Iron and Manganese

Step	Action	Comment	See
1.	If the customer reports extended issues, collect a **wet chemistry sample.**	Collect the sample from the hydrant or blowoff closest to the customer's property. Analyze the sample in-house for iron and manganese. This provides your baseline results. Continue flushing.	
2.	The ORC determines the **appropriate amount of flushing.**	Base the decision on the volume of water flushed as well as the sample's color and clarity.	
3.	After flushing is complete, collect **another process control sample from the same flushing point.**	If manganese sample results are less than or equal to 50% of the health advisory level (HAL) (0.15 mg/L), cease flushing. If manganese sample results are greater than 50% of the HAL (0.155 mg/L), collect an additional sample to be analyzed by an accredited laboratory. ⓘ **Note:** We are evaluating trigger levels for iron and manganese as part of the receivership. Levels will be adjusted as appropriate.	
4.	If the extended issue persists, the ORC schedules an **internal meeting with PAAW leadership** to determine the next steps.		
5.	Add the results of your review to the **tracking spreadsheet.**		

Troubleshooting

N/A

Documentation/Recordkeeping

An EDWA employee maintains records in the spreadsheet.

References

N/A

Review Record

Date	Version	Reviewer	Comments/Changes	Previous Replaced
04/05/24	5	B. Braun	Clarify note to court order wording.	
04/02/24	4	B. Braun	Extended Issues Fe/Mn review.	
03/30/24	3	B. Braun	Structure for Extended Issues Fe/Mn section.	
03/27/24	2	B. Braun	Notification types. Comment for team.	
03/25/24	1	T. Reed, T. Berdar	Review	

Acknowledgements

I have reviewed and approved this SOP	
Area Supervisor:	
Operators:	

I am aware of this SOP	
Sr. Supervisor:	
Superintendent:	
Sr. Manager:	

EAST DUNKARD WATER AUTHORITY

SOP #	2499-OPERATIONS-EDWA-SOP-OPS MGMT-2	**Effective**	04/05/24
Task	Water Quality Notifications - General		
For Roles	Water Quality Supervisor, System Superintendent, Local Operations Supervisors for Production and Field Operations		
Site	East Dunkard Water Authority (EDWA)		
Frequency	As Needed		
Owner	Tim Berdar, Tiffany Reed		

Contents

Overview

Use this procedure to handle general water quality notifications. This includes:

- Handling visual notifications.
- Handling non-visual notifications.
- Closing out notifications.

Note: In accordance with the February 8, 2024, Commonwealth Court Order, Pennsylvania American Water (PAAW) is currently serving as East Dunkard Water Authority's (EDWA's) operator in responsible charge (ORC).

Background

This process starts when a customer contacts the call center with a complaint about water quality:

- The call center enters the complaint into the spreadsheet.
- The spreadsheet automatically emails a notification to all staff who handle water quality complaints.
- Staff handle the complaint based on the type of water quality issue and their job roles.

Note: After the customer call, the EDWA employee then determines whether they create a flush order. The EDWA employee assigns the order to a crew and a T&D technician is called to investigate and possibly open a hydrant to flush the main out. If the EDWA field operations employee notices that the problem doesn't clear up, or there may be a distribution-related issue, the EDWA field operations employee notifies the superintendent.

Water Quality Notification Types and Responsibilities

Water Quality Notifications		
Type	**Handled By**	**Comments**
Visual	EDWA employee	**Important:** A contact attempt for all visual notifications must be made within one business day, not including weekends. If a customer requires us to contact them outside of normal business hours (i.e., weekends), the on-call Operations Field Service superintendent is responsible for contacting the customer. If the complaint is non-visual, the PAAW Water Quality (WQ) Supervisor on call will be responsible for contacting the customer. The customer can see indicators of possible water quality issues, such as: • Discolored water. • Cloudy water. • Stains on laundry. **Note:** EDWA employees handle only visual water quality notifications.

Non-Visual	PAAW WQ Staff	⚠ **Important:** All non-visual notifications must be completed within one business day, not including weekends. If a customer requires us to contact them outside of normal business hours (i.e., weekends), the on-call PAAW WQ Supervisor is responsible for contacting the customer. Any issue that is not visual to the customer, such as: • Bitter taste. • Boil alert. • External research media stories. • Illness or LSLR Flushing Inq Notifications have been issued: An expert will attempt to contact customer within 1 to 4 hours. • Iron. • Lead. • Moving organisms. • Odor/taste. • Particles. • Slippery/slimy. • General Request Notification (ex's Annual-Detailed WQ Report, Basic WQ Summary table, FAQs) has been issued: An expert will attempt to contact customer in one business day. All non-credit-related issues: an EDWA employee handles credits, WQ handles the rest. This can also include more general inquiries, including questions on: • Water quality reports. • Any lead pipe replacement projects. ⓘ **Note:** The superintendent handles non-visual water quality notifications.

Safety

Reference any site-specific guidance.

JSAs

N/A

Equipment Checklist

N/A

Process

1. Handling Visual Notifications

⚠ **Important:** All visual notifications must be contacted within one business day.

EDWA receives the notification, researches customer information, contacts the customer, and adds notes in the notification in the spreadsheet. If an order is attached, then local operations is responsible for closing the work order before the EDWA employee closes the notification.

Step	Action	Comment	See
1.	The EDWA Team receives an **alert via email (or phone)**.	The EDWA employee receives the email (or call) first. They will determine whether a flush order is needed. They will not automatically schedule a flush order for a particle and stained laundry notification. If needed, the EDWA employee schedules the order within 30 minutes and responds to the complaint.	
2.	The EDWA Team performs the **following steps before calling** the customer back.		
3.	Search the **customer's area** for alerts.	Reviewing the area's alert history allows us to better understand the complaint.	
4.	Select the following for the customer's location: • **Street** • **Municipality.**		
5.	Review your **search results**.		
6.	From the notification, copy the customer's **account number**.	Entering the account number allows you to access the account notes for that premise.	
7.	Review the customer's **account notes**.	Check older notes. Look for previous similar complaints. For example: • Is this an ongoing issue? • Does the customer submit unjustified or internal complaints?	

8.	Call the customer to make sure: • The issue has been **resolved**. • The customer has **no extended issues**.	We try to call back within the next business day. Extended issues means that either the issue persists after a flush or a new issue appears. If a customer requires us to contact them outside of normal business hours (i.e., weekends), the PAAW WQ Supervisor on call is responsible for contacting the customer. If the complaint is non-visual, the PAAW WQ employee on call will be responsible for contacting the customer. ℹ **Note:** The EDWA employee may be delayed in completing the investigative flush in the appropriate timeline. If you call the customer before the flush is completed: • Advise the customer that we will be out to flush (if we are flushing) the area for them or inform them if there is a main break in their area. • Give the customer your direct number in case they have extended issues.	
9.	Return to the spreadsheet and enter **comments** into the notification.		
10.	If an order is attached to the complaint, then the EDWA employee or PAAW WQ must **close out the order before the EDWA employee can close out the spreadsheet notification.**	The order is the initial EDWA representative flush order. Sometimes you must follow up with the superintendent to have the order closed.	

2. Non-Visual Notifications

Important: PAAW WQ Supervisors are expected to make initial contact with the customer within one business day. If a customer requires us to contact them outside of normal business hours (i.e., weekends), then the PAAW WQ Supervisor on call will be responsible for contacting the customer.

PAAW WQ handles the customer contact and review process.

Step	Action	Comment	See
1.	PAAW WQ supervisors or their delegate make the **initial call**.	The same circumstances apply: • Check notes. • Call customer. • The PAAW WQ Team updates the notification in the spreadsheet. **Note:** PAAW WQ supervisors or their delegates call the customers for non-visual notifications	
2.	PAAW WQ managers handle any **further escalations**.	For example, an escalation may occur when the customer is irate, and has not received a response from the assigned PAAW WQ supervisor or their delegate.	

Troubleshooting

N/A

Documentation/Recordkeeping

An EDWA employee maintains records in the spreadsheet.

References

N/A

Review Record

Date	Version	Reviewer	Comments/Changes	Previous Replaced
04/05/24	3	B. Braun	Clarify note to court order wording.	
03/27/24	2	B. Braun	Update WQ Notifications, Visual section.	
03/25/24	1	T. Reed, T. Berdar	Review.	

Acknowledgements

I have reviewed and approved this SOP	
Area Supervisor:	
Operators:	

I am aware of this SOP	
Sr. Supervisor:	
Superintendent:	
Sr. Manager:	

EXHIBIT 3

DEP NOTICES OF VIOLATION AGAINST EDWA BETWEEN AUGUST 2021 AND AUGUST 2022

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

August 11, 2021

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7019 1640 0002 0924 6069

East Dunkard Water Authority
Mr. James Holbert
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID #5300012
Greene County

Dear Mr. Holbert:

On July 20 and 21, 2021, a routine partial inspection of the above facility found multiple significant deficiencies as noted in a separate Notice of Violation also dated August 11, 2021. In addition to the significant deficiencies, several other **violations** were noted during the inspection including the following:

1. (a) The alarms and shutdowns are not being tested quarterly.
   (b) 25 PA Code, Chapter 109.703(c)

2. (a) Turbidity alarms have been set above regulatory requirements.
   (b) 25 PA Code, Chapters 109.602

3. (a) The plant is not staffed continuously during operation and does not have automated shutdowns.
   (b) 25 PA Code, Chapter 109.4

4. (a) The IFE turbidimeters are not continuously monitored due to being capped at 2.5 NTU.
   (b) 25 PA Code, Chapter 109.301

5. (a) The Griffin Tank chlorine analyzer is inoperable and not continuously monitoring chlorine residuals. Additionally, until Department notification, grab samples were not being collected every four hours.
   (b) 25 PA Code, Chapter 109.1305

6. (a) Operators do not filter-to-waste for one full filter volume and until turbidity levels are less than 0.30 NTU.
   (b) 25 PA Code, Chapters 109.703(b)

7. (a) The system does not have a filter bed evaluation program.
   (b) 25 PA Code, Chapter 109.703(b)(5)

8. (a) There is no flow meter at the Griffin Tank Entry Point.
   (b) 25 PA Code, Chapter 109.4

9. (a) The system is not conducting operational/performance monitoring for phosphate, as per Special Condition A of their permit.
   (b) 25 PA Code, Chapters 109.703(a)

10. (a) The CFE turbidimeter has been capped at 1.0 NTU.
    (b) 25 PA Code, Chapter 109.703(5)

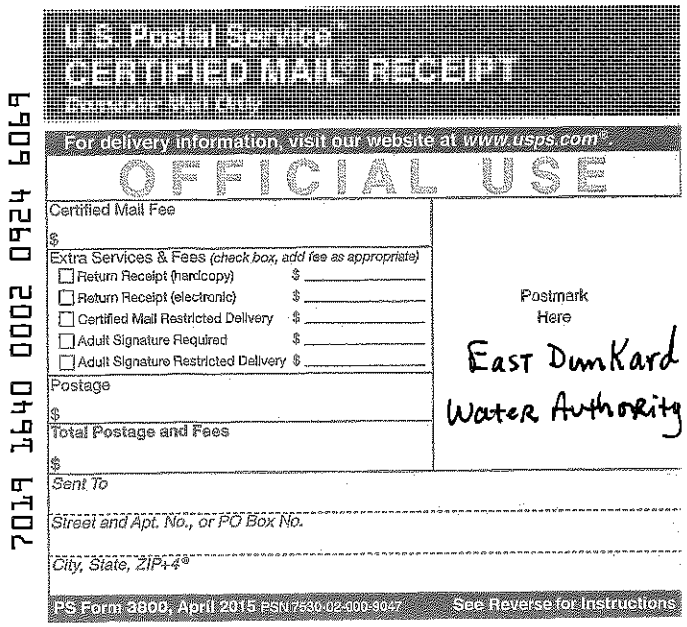
This letter is only intended to inform you of the existence of **violations** and of the ways in which you may move into compliance with the law. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection.

If you have any questions concerning this matter, please contact me by email at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program



Norman

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

East Dunkard Water Authority
MR. James Holbert
P.O. Box 241
Dilliner, PA. 15327

9590 9402 6421 0303 0342 99

2. Article Number (Transfer from service label)

7019 1640 0002 0924 6069

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X [signature] ☐ Agent ☐ Addressee

B. Received by (Printed Name) [James Holbert] C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☒ No

AUG 16 2021

USPS 15

3. Service Type

- ☐ Adult Signature
- ☐ Adult Signature Restricted Delivery
- ☐ Certified Mail®
- ☐ Certified Mail Restricted Delivery
- ☐ Collect on Delivery
- ☐ Collect on Delivery Restricted Delivery
- d Mail
- d Mail Restricted Delivery
- ($500)
- ☐ Priority Mail Express®
- ☐ Registered Mail™
- ☐ Registered Mail Restricted Delivery
- ☐ Signature Confirmation™
- ☐ Signature Confirmation Restricted Delivery

PS Form 3811, July 2020 PSN 7530-02-000-9053 Domestic Return Receipt

EXHIBIT 3

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

9590 9402 6421 0303 0342 99

United States Postal Service

• Sender: Please print your name, address, and ZIP+4® in this box•

Department of Environmental Protection
New Stanton District Office
PO Box 133
New Stanton, PA 15672

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

August 11, 2021

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7019 1640 0002 0924 6045

East Dunkard Water Authority
Mr. James Holbert
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID #5300012
Greene County

Dear Mr. Holbert:

On July 20 and 21, 2021, an inspection of the above facility found the following violations:

1. (a) The Department was not notified of the variable speed mixer failure in the clarifier.
   (b) 25 PA Code, Chapter 109.701(a)(3)

2. (a) The Department was not notified when the chlorine analyzer at Griffin Tank Entry Point was disabled during the storm on July 17, 2021.
   (b) 25 PA Code, Chapter 109.701(a)(3)

3. (a) The system failed to provide filter-to-waste for a full filter until volume after backwashes and filter startup or obtain approval for an alternate method and failed to provide a filter bed evaluation program. Additionally, the system had turbidity spikes in July 2021 with no identifiable cause and numerous turbidity spikes on both CFE and IFE during the past 12 months that reached the set limits of the recording equipment.
   (b) 25 PA Code, Chapters 109.4

4. (a) When the chlorine analyzer at the Griffin Tank became inoperable on July 17, 2021, the system failed to collect grab samples every four hours until the analyzer was repaired or replaced.
   (b) 25 PA Code, Chapter 109.4

EXHIBIT 3

5. (a) The system failed to utilize EPA Method 334.
   (b) 25 PA Code, Chapter 109.304(a)

6. (a) The system chronically fails to accurately report hours of operation.
   (b) 25 PA Code, Chapter 109.4

The Department has determined that these violations meet the definition of a **significant deficiency** as described in Title 25 PA Code Section 109.1 of the Department's regulations. Regulatory requirements for responding to a significant deficiency at a public water system are contained in Title 25 PA Code Section 109.717. In order to comply with Title 25 PA Code Section 109.717, it is recommended you:

- Consult with the Department regarding the appropriate corrective action for any significant deficiency **within 30 days** of the date of this letter.
- Respond in writing to significant deficiencies **within 45 days** of the date of this letter, indicating how and on what schedule the system will address significant deficiencies.
- Correct all significant deficiencies **within 120 days** of the date of this letter.
- Notify the Department that a significant deficiency has been corrected **within 30 days** of completion of the corrective action.

Any violation of 25 PA Code, Chapter 109.4 or Title 25 PA Code Section 109.717 could result in further enforcement action, including civil and criminal penalties. Each day the violation continues constitutes a separate offense.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

August 23, 2021

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7019 1640 0002 0924 6090

East Dunkard Water Authority
Mr. James Holbert
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID #5300012
Greene County

Dear Mr. Holbert:

On August 16, 2021 an administrative inspection of the above system found the following violation(s):

1. (a) The actions and/or inactions of the operators led to the water system experiencing an imminent threat or priority violation; the operator did not check the turbidity data after the alarm went off on August 10, 2021.
(b) 25 PA Code, Chapter 109.4

2. (a) The Department was not notified until 1:04 PM on August 11, 2021 that a primary MCL had been exceeded on August 10, 2021.
(b) 25 PA Code, Chapter 109.4

The Department has determined that these violations meet the definition of a **significant deficiency** as described in Title 25 PA Code Section 109.1 of the Department's regulations. Regulatory requirements for responding to a significant deficiency at a public water system are contained in Title 25 PA Code Section 109.717. In order to comply with Title 25 PA Code Section 109.717, it is recommended you:

- Consult with the Department regarding the appropriate corrective action for any significant deficiency **within 30 days** of the date of this letter.
- Respond in writing to significant deficiencies **within 45 days** of the date of this letter, indicating how and on what schedule the system will address significant deficiencies.

- Correct all significant deficiencies **within 120 days** of the date of this letter.
- Notify the Department that a significant deficiency has been corrected **within 30 days** of completion of the corrective action.

Any violation of 25 PA Code, Chapter 109.4 or Title 25 PA Code Section 109.717 could result in further enforcement action, including civil and criminal penalties. Each day the violation continues constitutes a separate offense.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by email at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

September 24, 2021

NOTICE OF VIOLATION

CERTIFIED MAIL NO: 7019 1640 0002 0924 9947

East Dunkard Water Authority
Larry Vincies
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID #5300012
Dilliner, Greene County

Dear Larry Vincies,

On August 30 and 31, and September 2, 7, and 9, 2021 a routine complete inspection of the above system found the following violations:

1. (a) The water system failed to provide 1-hour notification to the Department informing them that a priority violation exists relating to the conventional filtration; the water system failed to notify the Department within 1 hour of turbidity exceedances on August 10, 2021.
(b) 25 Pa. Code 109.701(a)(3).

2. (a) The water system failed to comply with an Order issued by Department; the water system violated Field Order #53-21-1627-022 for failure to provide entry point chlorine for August 20-23, 2021, for not including "any relevant events or factors which affect sample results, such as backwashes or calibrations...clearly indicated on these data submissions;" for operating without personnel prior to alarm verification; and for not providing SOPs for Tier 1 Public Notices and 1-hour notifications.
(b) 25 Pa. Code 109.4(4).

3. (a) Violations exist that are deemed to be a significant deficiency relating to the treatment plant or treatment processes; the staff has not been properly trained how to use SCADA.
(b) 25 Pa. Code 109.4.

4. (a) Violations exist that are deemed to be a significant deficiency relating to the conventional filtration treatment; there is a significant lack of waste-holding capacity, there are mud balls forming on the filter, the media is uneven and the sand and

EXHIBIT 3

anthracite have mixed, the CFE turbidimeter remains in the wrong location, and the backwashing SOP is insufficient.
(b) Pa. Code 109.4.

5. (a) Violations exist that are deemed to be a significant deficiency relating to the chlorine treatment; there is no reliable fan in the chlorine room and no leak-detection alarm; there is no SCBA for the gas chlorine; a face mask with cartridge filters is used instead of an SCBA, but the location of additional cartridges is unknown; CT parameters are not collected at the end of the disinfection segment; and an SOP for changing chlorine cylinders is absent.
(b) 25 Pa. Code 109.4.

The Department has determined that these violations meet the definition of a **significant deficiency** as described in Title 25 PA Code Section 109.1 of the Department's regulations. Regulatory requirements for responding to a significant deficiency at a public water system are contained in Title 25 PA Code Section 109.717. In order to comply with Title 25 PA Code Section 109.717, it is recommended you:

- Consult with the Department regarding the appropriate corrective action for any significant deficiency **within 30 days** of the date of this letter.
- Respond in writing to significant deficiencies **within 45 days** of the date of this letter, indicating how and on what schedule the system will address significant deficiencies.
- Correct all significant deficiencies **within 120 days** of the date of this letter.
- Notify the Department that a significant deficiency has been corrected **within 30 days** of completion of the corrective action.

Any violation of 25 PA Code, Chapter 109.4 or Title 25 PA Code Section 109.717 could result in further enforcement action, including civil and criminal penalties. Each day the violation continues constitutes a separate offense.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program

INSP# 3273363
ENF# 398624
EXHIBIT 3

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

October 28, 2021

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7019 1640 0002 0924 5079

East Dunkard Water Authority
Mr. Larry Vincies
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID #5300012
Greene County

Dear Mr. Vincies:

Section 708(a)(3) of the Safe Drinking Water Regulations, 25 Pa. Code § 109.708(a)(3), requires community water suppliers serving 10,000 persons or more to submit to the Department a certification, on a certification form provided by the Department, verifying completion of the Uninterrupted System Service Plan (USSP) by August 17, 2021.

The USSP must be completed on the USSP forms provided by the Department and maintained by the system to ensure that safe and potable water is continuously supplied to users.

The Department has conducted a review of the records of the East Dunkard Water Authority public water system and has determined that East Dunkard Water Authority failed to develop and/or submit a USSP Certification Form to the Department by August 17, 2021.

In order to regain compliance with the PA Safe Drinking Water Regulations, the Department requests that East Dunkard Water Authority develop a USSP and submit the USSP Certification Form to the Department by November 30, 2021. Templates for the USSP Form can be found at http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=54646. Templates for the USSP Certification Form can be found at http://www.depgreenport.state.pa.us/elibrary/GetFolder?FolderID=54647.

This letter is only intended to inform you of the existence of a **violation** and of the ways in which you may move into compliance with the law. It neither imposes nor waives any

enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection.

If you have any questions concerning this matter, please contact me by email at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

November 2, 2021

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7019 1640 0002 0924 5109

East Dunkard Water Authority
Larry Vincies
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID #5300012
Greene County

Dear Mr. Vincies:

The Safe Drinking Water Act requires any person that operates a public water system to test the water for certain contaminants on a routine basis and issue public notification (PN) to the consumers whenever the water fails to meet Pennsylvania standards or whenever there is a failure to have the testing performed on time. A review of our records indicates that you have either failed to have certain water tests performed on time, or your laboratory has not submitted the test results to this office.

Our records indicate that you did not sample and/or report your drinking water correctly for free chlorine during the June 2021, August 2021, and September 2021 monitoring periods. Failure to conduct required monitoring is a violation of Title 25 Pa. Code, Chapter 109.

A Tier 3 Public Notification (PN) should be issued within one year of each violation date in accordance with Chapter 109, Subchapter D, Public Notification. Public Notice should be issued in accordance with Sections 109.407, 109.410 and 109.411 of Title 25 of the Pennsylvania Code.

To assure your compliance with the Safe Drinking Water Act, the Department requests that you complete the following activities:

1. If you did conduct this monitoring as required, submit the results to DEP as soon as possible. Please note that failure to report monitoring results within 10 days of the end of the monitoring period is a violation of Title 25 Pa. Code, Chapter 109.701(a)(1) and 109.810(a).

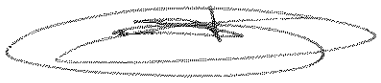
2. If you did not conduct this monitoring as required, issue a PN to your customers within one calendar year of each violation date. Once the PN is issued, complete the attached PN certification form and submit it, along with a copy of your PN, to this office within 10 days of issuing the PN in accordance with Section 109.701(a)(4) of Title 25 of the

Pennsylvania Code. Enclosed is a copy of a Tier 3 PN template that you can complete and deliver to each customer and/or employee.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions regarding this information, please contact me at 724.925.5424 or via email at ernorman@pa.gov.

Sincerely,



Eric John Norman
Sanitarian
Safe Drinking Water Program

Enclosures: Instructions 3930-FM-BSDW0196a
Form 3930-FM-BSDW0196b

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

December 13, 2021

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7019 1640 0002 0924 5253

East Dunkard Water Authority
Larry Vincies
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID #5300012
Greene County

Dear Mr. Vincies:

On August 11, 2021, the Department notified you that the following violation met the definition of a **significant deficiency**:

1. (a) The system failed to provide filter-to-waste for a full filter until volume after backwashes and filter startup or obtain approval for an alternate method and failed to provide a filter bed evaluation program. Additionally, the system had turbidity spikes in July 2021 with no identifiable cause, and numerous turbidity spikes on both CFE and IFE during the past 12 months which reached the set limits of the recording equipment.
   (b) 25 PA Code, Chapters 109.4

2. (a) The system failed to utilize EPA Method 334.
   (b) 25 PA Code, Chapter 109.304(a)

3. (a) The system chronically fails to accurately report hours of operation.
   (b) 25 PA Code, Chapter 109.4

Title 25 Pa. Code Section 109.717 requires public water systems to correct significant deficiencies within 120 days of being notified in writing by the Department, which means the significant deficiencies were to be corrected by December 10, 2021.

Failure to correct a significant deficiency within 120 days violates Section 109.717. To assure your system is in compliance with the Safe Drinking Water Act requirements, the Department requests that you complete the following activities:

1. Correct the significant deficiency specified above and notify the Department when completed.

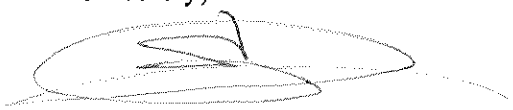
2. **Issue a Tier 2 public notice within thirty (30) days of receipt of this Notice. Public Notice should be issued in accordance with Sections 109.407, 109.409 and 109.411.**

3. Submit a certification that the public notification requirements have been fulfilled and a copy of the notice to this office within ten (10) days of issuing the public notice in accordance with 40 CFR 141.31(d) and Section 109.701(a)(4) of Title 25 of the Pennsylvania Code. Enclosed is a copy of a Tier 2 Public Notification template and a blank certification form.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone 724.925.5425.

Sincerely,



Eric Norman
Sanitarian
Safe Drinking Water Program

Enclosures
Form 3930-FM-BSDW0155

3930-FM-BSDW0155 10/2015

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

Tier 2 Public Notice

FAILURE TO COMPLETE SIGNIFICANT DEFICIENCY CORRECTIVE ACTIONS

A system's failure to take corrective action within the required timeframe or be in compliance with a state-approved corrective action plan and schedule for a significant deficiency is a treatment technique violation and requires Tier 2 notification. You must provide public notice to persons served as soon as practical but within 30 days after you learn of the violation. You must issue a repeat notice every three months for as long as the violation persists.

Community systems must use one of the following methods:

- Hand or direct delivery
- Mail, as a separate notice or included with the bill

Noncommunity systems must use one of the following methods:

- Posting in conspicuous locations
- Hand delivery
- Mail

In addition, both community and noncommunity systems must use *another* method reasonably calculated to reach others if they would not be reached by the first method. Such methods could include newspapers, e-mail, or delivery to community organizations. If you mail, post, or hand deliver, print your notice on your system's letterhead, if available.

The notice on the reverse is appropriate for mailing, posting, or hand delivery. If you modify this notice, you must still include all required PN elements and leave the mandatory language unchanged (see below).

Mandatory Language
Mandatory language on health effects and special notice language must be included as written (with blanks filled in) and are presented in this notice in italics and with an asterisk on either end.

You must also include standard language to encourage the distribution of the public notice to all persons served. This language is also presented in this notice in italics and with an asterisk on either end.

Corrective Action
In your notice, describe corrective actions you are taking. Listed below are some steps commonly taken by water systems with treatment technique violations. Depending on the corrective action you are taking, you can use one or more of the following statements, if appropriate, or develop your own text:

- Although we did not meet our deadline, we are now in consultation with the state to develop a corrective action plan.
- The significant deficiency has been identified and addressed.
- We have implemented a short term plan to address the immediate issue while we pursue the long-term solution.

PN Certification

Send a copy of each type of notice and the certification form (3930-FM-BSDW0076) to DEP within ten days after you issued the notice.

Template Form Field Instructions

When you place your cursor in the blank form fields in the following template, look at the bottom, left corner of your computer (just above the START button) for instructions on the information you should enter in that field. For example, if you place your cursor over the first blank form field in the template, the instructions will read "Insert system name."

3930-FM-BSDW0155 10/2015

FAILURE TO COMPLETE SIGNIFICANT DEFICIENCY CORRECTIVE ACTIONS

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

ESTE INFORME CONTIENE INFORMACIÓN IMPORTANTE ACERCA DE SU AGUA POTABLE. HAGA QUE ALGUIEN LO TRADUZCA PARA USTED, O HABLE CON ALGUIEN QUE LO ENTIENDA.

_____ recently violated a drinking water requirement. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we did (are doing) to correct this situation.

A routine inspection conducted on _____ by the DEP found _____

We were required to take action to correct this deficiency. However, we failed to take this action by the deadline established by DEP.

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. However, if you have specific health concerns, consult your doctor.

- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water. General guidelines on ways to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from EPA's Safe Drinking Water Hotline at 1-800-426-4791.

What does this mean?

This is not an emergency. If it had been, you would have been notified within 24 hours.

Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

These symptoms, however, are not caused only by organisms in drinking water, but also by other factors. If you experience any of these symptoms and they persist, you may want to seek medical advice.

What is being done?

_____

_____

We anticipate resolving the problem within _____ (or the problem was resolved on _____).

For more information, please call _____ of _____ at _____

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by _____.

PWS ID #: _____ Date distributed: _____

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

January 21, 2022

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7020 2450 0001 5246 5038

East Dunkard Water Authority
Jerry Dorsey
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID No. 5300012
Greene County

Dear Mr. Dorsey:

On January 18, 2022 a routine partial inspection of the above system found the following violation:

1. (a) The water system is chronically failing to test alarm and shutdown capabilities.
(b) 25 Pa. Code 109.703(c)

The Department has determined that this violation meets the definition of a **significant deficiency** as described in Title 25 PA Code Section 109.1 of the Department's regulations. Regulatory requirements for responding to a significant deficiency at a public water system are contained in Title 25 PA Code Section 109.717. In order to comply with Title 25 PA Code Section 109.717, it is recommended you:

- Consult with the Department regarding the appropriate corrective action for any significant deficiency **within 7 days** of the date of this letter.
- Respond in writing to significant deficiencies **within 15 days** of the date of this letter, indicating how and on what schedule the system will address significant deficiencies.
- Correct all significant deficiencies **within 30 days** of the date of this letter.
- Notify the Department that a significant deficiency has been corrected **within 30 days** of completion of the corrective action.

Any violation of 25 PA Code, Chapter 109.4 or Title 25 PA Code Section 109.717 could result in further enforcement action, including civil and criminal penalties. Each day the violation continues constitutes a separate offense.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

January 21, 2022

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7020 2450 0001 5246 5038

East Dunkard Water Authority
Jerry Dorsey
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID No. 5300012
Greene County

Dear Jerry Dorsey:

Chapter 109. Safe Drinking Water, Subchapter C. Monitoring Requirements §109.301(12)(v), requires a community water system using conventional filtration to monitor for disinfection byproduct (DBP) precursors in accordance with 40 CFR 141.135(b)(1). Unless a system can meet alternate compliance criteria, systems must meet the percent reduction of TOC specified in 40 CFR 141.135(b)(2). Our records indicate that East Dunkard Water Authority did not meet this requirement for the 3rd calendar quarter (July-September) of 2021 since the removal ratio was calculated as less than 1.0 and no alternative compliance criteria was met; this constitutes a treatment technique violation of 40 CFR 141.135(c)(v).

To assure your compliance with the Safe Drinking Water Act, the Department requests that you complete the following activities:

1. Issue a Tier 2 public notice (PN) within thirty (30) days. Public Notification should be issued in accordance with Sections 109.407, 109.409 and 109.411 of Title 25 of the Pennsylvania Code. Submit a certification that the public notification requirements have been fulfilled and a copy of the notice to this office within 10 days of issuing the public notice in accordance with Section 109.701(a)(4) of Title 25 of the Pennsylvania Code.

As of January 21, 2022, the Department has not received a Tier 2 public notice or a Certification Form. **Please issue the PN within seven (7) days of receipt of this Notice of Violation.** A public notice template will be attached. Then, submit a certification form that the public notification requirements have been fulfilled and a copy of the notice to this office within 10 days of issuing the public notice. A certification form will be attached.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone at 724.925.5425.

Sincerely,

Eric Norman
Sanitarian
Safe Drinking Water Program

Enclosures:
Form 3800-FM-WSFR0195
Form 3930-FM-BSDW0076

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

EXHIBIT 3

PUBLIC NOTIFICATION (PN) CERTIFICATION FORM

Public Water System Name: _____ PWSID Number: _____

Date of Violation/Situation: _____

Description of Violation/Situation: _____

_____

Notified DEP (or CHD) within 1 hour Date or NA: _____

Consulted with DEP within 24 hours Date or NA: _____

PN Level: ☐ Tier 1 ☐ Tier 2 ☐ Tier 3

Type of notice addressed by this certification: ☐ Initial ☐ Repeat

Methods and date of public notice deliveries to customers:

Method: _____ Date: _____
Method: _____ Date: _____
Method: _____ Date: _____
Method: _____ Date: _____

☐ The public notice included the required elements: a description of the violation/situation; potential health effects; the population at risk; if alternate water supplies need to be used; when the violation/situation occurred; when the system will resolve the violation/situation; what is being done to correct the problem; actions consumers can take; water system contact information; and language encouraging broader distribution of the notice.

☐ A copy of each type of notice that was distributed is attached to this certification form

Certified by:

As a representative of the Public Water System (PWS) indicated above, I certify that public notification addressing the above violation/situation was distributed to all customers in accordance with the prescribed content, format, deadlines and delivery requirements outlined in Chapter 25 Pa. Code Chapter 109 Subchapter D of the Department of Environmental Protection (DEP)'s regulations.

Signature: _____ Date: _____

Print Name and Title: _____

Phone Number: _____

Complete and submit this form to your local DEP office **within 10 days** of issuing the public notification described above. DEP District Office and County Health Department contact information can be found within DEP document number 3930-FM-BSDW0560, which can be located by searching for document number 3930-FM-BSDW0560 in DEP's eLibrary at the following link: http://www.depgreenport.state.pa.us/elibrary/Search .

For DEP use only. Checked by: _____ **Date:** _____

3800-FM-WSFR0195 Rev. 7/2009

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

ESTE INFORME CONTIENE INFORMACIÓN IMPORTANTE ACERCA DE SU AGUA POTABLE. HAGA QUE ALGUIEN LO TRADUZCA PARA USTED, O HABLE CON ALGUIEN QUE LO ENTIENDA.

_____Has Violated a Treatment Technique

Our water system recently violated a drinking water standard. Although this was not an emergency, as our customers, you have a right to know what happened, what you should do, and what we are doing to correct this situation.

We routinely monitor your water for the presence of drinking water contaminants. Testing results we received on September 2011 show that our system did not meet the requirements for the removal of total organic carbon (TOC). The standard for TOC is a removal ratio running annual average (computed quarterly) of 1.0. Removal ratio is the TOC removal achieved divided by the required TOC removal. The 3rd quarter running annual average TOC removal ratio was 0.981. See table below.

Contaminant	Required Running Annual Average for Ratio of Removal	Achieved Running Annual Average for Ratio of Removal	Quarter out of Compliance	Expected Return to Compliance Date
TOC		_____	_____	_____

* Although we were in quarterly compliance during the fourth quarter of 2011, our running annual average compliance is not expected to be attained for a couple more quarters.

What should I do?

- **You do not need to use an alternative (i.e., bottled water) water supply.** However, if you have specific health concerns, consult your doctor.

What does this mean?

- **This is not an immediate risk. If it had been, you would have been notified immediately.**

  Total organic carbon provides a medium for the formation of disinfection byproducts. These byproducts include trihalomethanes (TTHMs) and haloacetic acids (HAAs). Drinking water containing these byproducts in excess of the MCL over long periods of time may lead to adverse health effects, liver or kidney problems, or nervous system effects, and may lead to an increased risk of getting cancer. However, the levels for TTHMs and HAA5s were in compliance during this time frame.

What happened? What was done?

_____. We anticipate resolving the problem within_____.

For more information, please contact _____at _____.

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by _____.

PWS ID#: _____ Date distributed: _____

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

January 21, 2022

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7020 2450 0001 5246 5038

East Dunkard Water Authority
Jerry Dorsey
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID No. 5300012
Greene County

Dear Mr. Dorsey:

On September 24, 2021, the Department notified you that the following violations met the definition of a **significant deficiency**:

1. (a) The water system failed to comply with an Order issued by Department; the water system violated Field Order No. 53-21-1627-022 for failure to provide entry point chlorine for August 20-23, 2021, for not including "any relevant events or factors which affect sample results, such as backwashes or calibrations...clearly indicated on these data submissions," for operating without personnel prior to alarm verification, and for not providing SOPs for Tier 1 Public Notices and 1-hour notifications.
(b) 25 Pa. Code 109.4(4).

2. (a) Violations exist that are deemed to be a significant deficiency relating to the conventional filtration treatment; there is a significant lack of waste-holding capacity, there are mud balls forming on the filter, the media is uneven and the sand and anthracite have mixed, the CFE turbidimeter remains in the wrong location, and the backwashing SOP is insufficient.
(b) Pa. Code 109.4.

3. (a) Violations exist that are deemed to be a significant deficiency relating to the chlorine treatment; there is no reliable fan in the chlorine room and no leak-detection alarm, there is no sufficient SCBA for the gas chlorine, a face mask with cartridge filters is used instead of an SCBA but the location of additional cartridges is unknown, and an SOP for changing chlorine cylinders is absent.
(b) 25 Pa. Code 109.4.

Title 25 Pa. Code Section 109.717 requires public water systems to correct significant deficiencies within 120 days of being notified in writing by the Department, which means the significant deficiencies were to be corrected by January 21, 2022.

Failure to correct a significant deficiency within 120 days violates Section 109.717. To assure your system is in compliance with the Safe Drinking Water Act requirements, the Department requests that you complete the following activities:

1. Correct the significant deficiency specified above and notify the Department when completed.

2. **Issue a Tier 2 public notice within thirty (30) days of receipt of this Notice. Public Notice should be issued in accordance with Sections 109.407, 109.409 and 109.411.**

3. Submit a certification that the public notification requirements have been fulfilled and a copy of the notice to this office within ten (10) days of issuing the public notice in accordance with 40 CFR 141.31(d) and Section 109.701(a)(4) of Title 25 of the Pennsylvania Code. Enclosed is a copy of a Tier 2 Public Notification template and a blank certification form.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone at 724.925.5425.

Sincerely,

Eric Norman
Sanitarian
Safe Drinking Water Program

Enclosures
Form 3930-FM-BSDW0155
Form 3930-FM-BSDW0076

3930-FM-BSDW0155 10/2015

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

Tier 2 Public Notice

FAILURE TO COMPLETE SIGNIFICANT DEFICIENCY CORRECTIVE ACTIONS

A system's failure to take corrective action within the required timeframe or be in compliance with a state-approved corrective action plan and schedule for a significant deficiency is a treatment technique violation and requires Tier 2 notification. You must provide public notice to persons served as soon as practical but within 30 days after you learn of the violation. You must issue a repeat notice every three months for as long as the violation persists.

Community systems must use one of the following methods:

- Hand or direct delivery
- Mail, as a separate notice or included with the bill

Noncommunity systems must use one of the following methods:

- Posting in conspicuous locations
- Hand delivery
- Mail

In addition, both community and noncommunity systems must use *another* method reasonably calculated to reach others if they would not be reached by the first method. Such methods could include newspapers, e-mail, or delivery to community organizations. If you mail, post, or hand deliver, print your notice on your system's letterhead, if available.

The notice on the reverse is appropriate for mailing, posting, or hand delivery. If you modify this notice, you must still include all required PN elements and leave the mandatory language unchanged (see below).

Mandatory Language
Mandatory language on health effects and special notice language must be included as written (with blanks filled in) and are presented in this notice in italics and with an asterisk on either end.

You must also include standard language to encourage the distribution of the public notice to all persons served. This language is also presented in this notice in italics and with an asterisk on either end.

Corrective Action
In your notice, describe corrective actions you are taking. Listed below are some steps commonly taken by water systems with treatment technique violations. Depending on the corrective action you are taking, you can use one or more of the following statements, if appropriate, or develop your own text:

- Although we did not meet our deadline, we are now in consultation with the state to develop a corrective action plan.
- The significant deficiency has been identified and addressed.
- We have implemented a short term plan to address the immediate issue while we pursue the long-term solution.

PN Certification

Send a copy of each type of notice and the certification form (3930-FM-BSDW0076) to DEP within ten days after you issued the notice.

Template Form Field Instructions

When you place your cursor in the blank form fields in the following template, look at the bottom, left corner of your computer (just above the START button) for instructions on the information you should enter in that field. For example, if you place your cursor over the first blank form field in the template, the instructions will read "Insert system name."

3930-FM-BSDW0155 10/2015

FAILURE TO COMPLETE SIGNIFICANT DEFICIENCY CORRECTIVE ACTIONS

IMPORTANT INFORMATION ABOUT YOUR DRINKING WATER

ESTE INFORME CONTIENE INFORMACIÓN IMPORTANTE ACERCA DE SU AGUA POTABLE. HAGA QUE ALGUIEN LO TRADUZCA PARA USTED, O HABLE CON ALGUIEN QUE LO ENTIENDA.

_____ recently violated a drinking water requirement. Although this is not an emergency, as our customers, you have a right to know what happened, what you should do, and what we did (are doing) to correct this situation.

A routine inspection conducted on _____ by the DEP found _____

We were required to take action to correct this deficiency. However, we failed to take this action by the deadline established by DEP.

What should I do?

- There is nothing you need to do. You do not need to boil your water or take other corrective actions. However, if you have specific health concerns, consult your doctor.
- If you have a severely compromised immune system, have an infant, are pregnant, or are elderly, you may be at increased risk and should seek advice from your health care providers about drinking this water. General guidelines on ways to lessen the risk of infection by *Cryptosporidium* and other microbial contaminants are available from EPA's Safe Drinking Water Hotline at 1-800-426-4791.

What does this mean?

This is not an emergency. If it had been, you would have been notified within 24 hours.

Inadequately treated water may contain disease-causing organisms. These organisms include bacteria, viruses, and parasites which can cause symptoms such as nausea, cramps, diarrhea, and associated headaches.

These symptoms, however, are not caused only by organisms in drinking water, but also by other factors. If you experience any of these symptoms and they persist, you may want to seek medical advice.

What is being done?

_____

_____

We anticipate resolving the problem within _____ (or the problem was resolved on _____).

For more information, please call _____ of _____ at _____

Please share this information with all the other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, and businesses). You can do this by posting this notice in a public place or distributing copies by hand or mail.

This notice is being sent to you by _____.

PWS ID #: _____ Date distributed: _____

EXHIBIT 3

3930-FM-BSDW0076 Rev. 4/2019

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

PUBLIC NOTIFICATION (PN) CERTIFICATION FORM

Public Water System Name: _____ PWSID Number: _____

Date of Violation/Situation: _____

Description of Violation/Situation: _____

_____

Notified DEP (or CHD) within 1 hour Date or NA: _____

Consulted with DEP within 24 hours Date or NA: _____

PN Level: ☐ Tier 1 ☐ Tier 2 ☐ Tier 3

Type of notice addressed by this certification: ☐ Initial ☐ Repeat

Methods and date of public notice deliveries to customers:

Method: _____ Date: _____

Method: _____ Date: _____

Method: _____ Date: _____

Method: _____ Date: _____

☐ The public notice included the required elements: a description of the violation/situation; potential health effects; the population at risk; if alternate water supplies need to be used; when the violation/situation occurred; when the system will resolve the violation/situation; what is being done to correct the problem; actions consumers can take; water system contact information; and language encouraging broader distribution of the notice.

☐ A copy of each type of notice that was distributed is attached to this certification form

Certified by:

As a representative of the Public Water System (PWS) indicated above, I certify that public notification addressing the above violation/situation was distributed to all customers in accordance with the prescribed content, format, deadlines and delivery requirements outlined in Chapter 25 Pa. Code Chapter 109 Subchapter D of the Department of Environmental Protection (DEP)'s regulations.

Signature: _____ Date: _____

Print Name and Title: _____

Phone Number: _____

Complete and submit this form to your local DEP office **within 10 days** of issuing the public notification described above. DEP District Office and County Health Department contact information can be found within DEP document number 3930-FM-BSDW0560, which can be located by searching for document number 3930-FM-BSDW0560 in DEP's eLibrary at the following link: http://www.depgreenport.state.pa.us/elibrary/Search .

For DEP use only. Checked by: _____ **Date:** _____

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

January 31, 2022

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7019 1640 0002 0924 6212

East Dunkard Water Authority
Jerry Dorsey
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID No. 5300012
Greene County

Dear Mr. Dorsey:

On January 25, 2022 a routine partial inspection of the above system found the following violations:

1. (a) Circumstances exist with the conventional filtration treatment that adversely affect the quantity or quality of the water being produced.
   (b) 25 Pa. Code 109.4

2. (a) The water system is failing to provide at least 1.0 log inactivation of Giardia for more than 4 hours at the entry point
   (b) 25 Pa. Code 109.202(c)

3. (a) The public water supplier failed to provide 1-hour notification to DEP informing them of an imminent threat situation that is occurring with the conventional filtration treatment.
   (b) 25 Pa. Code 109.701(A)(3)

On January 26, 2022 administrative inspection 3312206 of the above system found the following violation:

1. (a) The water system failed to comply with an Order issued by DEP.
   (b) 25 Pa. Code 109.4(4)

On January 26, 2022 administrative inspection 3312456 of the above system found the following violation:

1. (a) The water system failed to comply with an Order issued by DEP.
   (b) 25 Pa. Code 109.4(4)

On January 31, 2022 administrative inspection 3314106 of the above system found the following violation:

1. (a) The water system failed to comply with an Order issued by DEP.
   (b) 25 Pa. Code 109.4(4)

The Department has determined that this violation meets the definition of a **significant deficiency** as described in Title 25 PA Code Section 109.1 of the Department's regulations. Regulatory requirements for responding to a significant deficiency at a public water system are contained in Title 25 PA Code Section 109.717. In order to comply with Title 25 PA Code Section 109.717, it is recommended you:

- Consult with the Department regarding the appropriate corrective action for any significant deficiency **within 30 days** of the date of this letter.
- Respond in writing to significant deficiencies **within 45 days** of the date of this letter, indicating how and on what schedule the system will address significant deficiencies.
- Correct all significant deficiencies **within 120 days** of the date of this letter.
- Notify the Department that a significant deficiency has been corrected **within 30 days** of completion of the corrective action.

Any violation of 25 PA Code, Chapter 109.4 or Title 25 PA Code Section 109.717 could result in further enforcement action, including civil and criminal penalties. Each day the violation continues constitutes a separate offense.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Southwest Regional Office

August 2, 2022

NOTICE OF VIOLATION

***Via Certified Mail No.* 7019 1120 0002 0678 3445**

East Dunkard Water Authority
2790 South Eighty-Eight Road
Dilliner PA 15327

AND

East Dunkard Water Association
2790 South Eighty-Eight Road
Dilliner PA 15327

Re: Violations of the Pennsylvania Safe Drinking Water Act and Regulations
Violations of DEP March 21, 2022 Administrative Order
East Dunkard Water Authority and East Dunkard Water Association
PWSID No. 5300012
Greene County

Dear Sir and/or Madam:

On March 21, 2022 the Pennsylvania Department of Environmental Protection (Department) issued an Administrative Order (Order) to the East Dunkard Water Authority and the East Dunkard Water Association (collectively, East Dunkard) regarding violations of the Lead and Copper Rule at East Dunkard's public water system. The Order required East Dunkard to conduct its first round of initial lead and copper tap sampling at 40 sites within its distribution system no later than June 30, 2022. Prior to conducting the sampling, the Order required East Dunkard to complete a materials evaluation for its system and submit a revised sample site location plan to identify a sufficient number of priority lead and copper tap sampling sites as required under Section 109.1103(g) of the Department's regulations, 25 Pa. Code § 109.1103(g).

East Dunkard failed to complete an adequate materials evaluation to identify a sufficient number of priority lead and copper tap sampling sites. Instead, East Dunkard submitted to the Department a revised sample site location plan that included multiple lower tier sites without demonstrating that additional higher priority sites did not exist. Following multiple requests from the Department for revisions to the plan, East Dunkard has not submitted an adequate materials evaluation and sample site location plan to the Department to date.

Additionally, because it failed to complete an adequate materials evaluation and sample site location plan, East Dunkard failed to conduct its first round of initial lead and copper tap sampling at 40 sites of the highest available priority within its distribution system no later than June 30, 2022. The results for the lead and copper tap sampling East Dunkard did conduct were not submitted to the Department by July 10, 2022, nor have they been submitted to the Department as of the date of this Notice of Violation. The Department requests that East Dunkard have its certified laboratory submit the sample results to the Department no later than August 10, 2022.

East Dunkard's failure to comply with the Department's March 21, 2022 Order was a violation of Section 13(a) of the Safe Drinking Water Act, 35 P.S. § 721.13(a). To come into compliance with the law, East Dunkard is requested to do the following in accordance with the requirements of 25 Pa. Code § 109.1103 and the Department's Order: complete an adequate materials evaluation; submit a revised sample site location plan; and conduct all future lead and copper tap sampling as required under the Order and submit the results to the Department within either the first 10 days following the month in which the result is received or the first 10 days following the end of the required monitoring period, whichever is shorter. The Department requests that East Dunkard complete the materials evaluation and submit a revised sample site location plan by September 1, 2022.

By way of further guidance with respect to the materials evaluation and sample site location plan, East Dunkard is requested to continue with its materials evaluation and further revise its sample site location plan until either: 1) a sufficient number of tier 1 locations (40) is identified; or 2) East Dunkard has confirmed through evaluation of all single family residences that no additional tier 1 locations exist. If the latter of these occurs, then East Dunkard is requested to perform the same evaluation for all potential tier 2 locations to get to 40 sample sites before it would include any tier 3 locations in its sample site location plan.

Any violation of the Pennsylvania Safe Drinking Water Act, 35 P.S. §§ 721.1-721.17, or the regulations at Title 25 Pa. Code Chapter 109 subjects a person to a variety of potential enforcement actions, including civil and criminal penalties. Each day the violation continues constitutes a separate offense.

This Notice of Violation is neither an order nor any other final action of the Department. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

If you have any questions regarding this information, please contact me at 724-925-5504 or via email at gguenther@pa.gov.

Sincerely,

Gail Guenther

Gail Guenther
Environmental Protection Compliance Specialist
Safe Drinking Water Program
Southwest Regional Office

c: Region

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

August 23, 2022

NOTICE OF VIOLATION

CERTIFIED MAIL NO. 7020 2450 0001 5246 7988

East Dunkard Water Authority
P.O. Box 241
Dilliner, PA 15327

Re: Violation of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority
PWSID No. 5300012
Greene County

Dear Sir and/or Madam:

On August 3, 2022, a follow-up inspection of the above facility found multiple violations including the following:

1. (a) Mudballs or other debris are visible on top the filter media.
   (b) 25 PA Code, Chapter 109.4

2. (a) Floc carry over onto the filters is visible without the aid of a spotlight.
   (b) 25 PA Code, Chapters 109.4

3. (a) The clarifier is not functioning properly.
   (b) 25 PA Code, Chapter 109.4

4. (a) The backwash flow does not appear even across the entire filter bed.
   (b) 25 PA Code, Chapter 109.4

This letter is only intended to inform you of the existence of **violations** and of the ways in which you may move into compliance with the law. It neither imposes nor waives any enforcement action available to the Department under any of its statutes. If the Department determines that an enforcement action is appropriate, you will be notified of the action.

This Notice of Violation is neither an order nor any other final action of the Department of Environmental Protection.

If you have any questions concerning this matter, please contact me by e-mail at ernorman@pa.gov or by telephone at 724.925.4525.

Sincerely,

Eric John Norman
Sanitarian
Safe Drinking Water Program

EXHIBIT 4

AUGUST 25, 2022 DEP ADMINISTRATIVE ORDER AGAINST EDWA

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Southwest Regional Office

August 25, 2022

Via Hand Delivery

East Dunkard Water Authority
2790 South Eighty-Eight Road
Dilliner PA 15327

Re: Administrative Order
Violations of the Pennsylvania Safe Drinking Water Act and Regulations
East Dunkard Water Authority and East Dunkard Water Association
PWSID No. 5300012
Greene County

Dear Sir and/or Madam:

Please find enclosed an Administrative Order of the Department directed to the East Dunkard Water Authority and the East Dunkard Water Association. You should review the Order immediately; it contains corrective action obligations and deadlines, some of which begin upon receipt.

If you have any questions, please contact me at 412-442-4210 or via email at rediehl@pa.gov.

Sincerely,

Renee L. Diehl
Program Manager
Safe Drinking Water Program
Southwest Regional Office

c: Region

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION

In The Matter Of:

East Dunkard Water Authority 2790 South Eighty-Eight Road Dilliner, PA 15327 Greene County PWS ID No. 5300012	:	Violations of the Pennsylvania Safe Drinking Water Act and the Rules and Regulations Promulgated Pursuant Thereto
and	:	
East Dunkard Water Association 2790 South Eighty-Eight Road Dilliner, PA 15327 Greene County	:	

ADMINISTRATIVE ORDER

NOW, this 25th day of August, 2022, the Commonwealth of Pennsylvania, Department of Environmental Protection (Department) issues this Administrative Order after it has found and determined the following:

A. The Department is the agency with the duty and authority to administer and enforce the Pennsylvania Safe Drinking Water Act, Act of May 1, 1984, P.L. 206, *as amended*, 35 P.S. §§ 721.1-721.17 (SDWA); Section 1917-A of the Administrative Code of 1929, Act of April 9, 1929, P.L. 177, *as amended*, 71 P.S. § 510-17 (Administrative Code); and the rules and regulations promulgated thereunder (Regulations).

B. The East Dunkard Water Authority (Authority) is a municipal water authority with a mailing address of P.O. Box 241, Dilliner, PA 15327. The Authority's physical office address is 2790 South Eighty-Eight Road, Dilliner, PA 15327.

C. The East Dunkard Water Association (Association) is a Pennsylvania non-profit public corporation with a mailing address of 2790 South Eighty-Eight Road, P.O. Box 241, Dilliner, PA 15327. The Association's physical office address is 2790 South Eighty-Eight Road, Dilliner, PA 15327.

D. The Authority and the Association are each a "person" and a "supplier of water" as those terms are defined in Section 3 of the SDWA, 35 P.S. § 721.3; and a "person" and "public water supplier" as those terms are defined in Section 109.1 of the Regulations, 25 Pa. Code § 109.1. The Authority and the Association are collectively referred to as the "Responsible Parties".

E. The Authority operates and maintains a municipal drinking water system serving approximately 4,200 customers in the following municipalities in Greene County, Pennsylvania: Dunkard Township, Greene Township, and portions of Monongahela, Cumberland, Perry and Whiteley Townships (East Dunkard System). The East Dunkard System consists of a surface water source (the Monongahela River), a conventional filtration water treatment plant including disinfection, water pumping facilities, water storage facilities, and a distribution system.

F. Pursuant to a lease between the Association and the Authority dated October 13, 2011, the Authority leases certain distribution piping, storage tanks, booster pump stations and fire hydrants, as more particularly described in Exhibit "A" of said lease, from the Association. The Authority owns the remainder of the East Dunkard System.

G. The Authority operates the East Dunkard System pursuant to multiple public water supply permits issued by the Department and has been assigned Public Water System Identification Number (PWS ID No.) 5300012. The Association, as an owner of a portion of the East Dunkard System, and the Authority, as an owner of a portion of the East Dunkard System

and the operator of the East Dunkard System, are jointly and severally responsible as public water suppliers for the East Dunkard System.

H. The East Dunkard System is a "system" as that term is defined in Section 109.1 of the Regulations, 25 Pa. Code § 109.1, and, more specifically, is a "public water system" and a "community water system" as those terms are defined in Section 3 of the SDWA, 35 P.S. § 721.3, and Section 109.1 of the Regulations, 25 Pa. Code § 109.1.

General Requirements

I. Sections 109.4(2), 109.4(3), and 109.4(4) of the Regulations, 25 Pa. Code §§ 109.4(2), 109.4(3), and 109.4(4), require a public water supplier to, respectively, provide treatment adequate to assure that the public health is protected; provide and effectively operate and maintain public water system facilities; and take whatever investigative or corrective action is necessary to assure that safe and potable water is continuously supplied to the users.

Significant Deficiencies

J. A "significant deficiency" is defined as "[a] defect in design, operation or maintenance, or a failure or malfunction of the sources, treatment, storage or distribution system that the Department determines to be causing, or has the potential for causing the introduction of contamination into the water delivered to consumers." 25 Pa. Code § 109.1.

K. When the Department identifies one or more significant deficiencies at a water system, Section 109.717 of the Regulations, 25 Pa. Code § 109.717, requires a public water supplier, among other things, to: 1) consult with the Department within 30 days of receiving written notification regarding appropriate corrective action for identified significant deficiencies; 2) respond in writing to the Department within 45 days with a plan and schedule to address the

significant deficiencies; and 3) correct the significant deficiencies within 120 days of receiving written notification from the Department.

Department Inspections, Notices of Violation and Field Orders

L. (1) On July 20 and 21, 2021, the Department conducted an inspection of the East Dunkard System (July 21, 2021 inspection). On July 27, 2021, the Department conducted an administrative inspection of the East Dunkard System, including telephone conversations with the Authority's consulting engineer and certified operator (July 27, 2021 inspection).

(2) On August 11, 2021, the Department issued two (2) Notices of Violation (NOVs) to the Authority: one NOV identified significant deficiencies and the other NOV identified other violations that were not significant deficiencies (collectively, "August 11, 2021 NOV"). On August 12, 2021, the Department issued a Field Order to the Authority (August 12, 2021 Field Order). On August 16, 2021, the Department conducted an administrative inspection of the East Dunkard System (August 16, 2021 inspection). On August 20, 2021, the Department issued a Field Order to the Authority (August 20, 2021 Field Order). On August 23, 2021, the Department issued an NOV to the Authority (August 23, 2021 NOV). On August 30 and 31 and September 2, 7 and 9, 2021, the Department conducted a sanitary survey inspection of the East Dunkard System (2021 Sanitary Survey inspection).

(3) On September 24, 2021, the Department issued an NOV to the Authority (September 24, 2021 NOV).

(4) On October 28, 2021, the Department conducted an administrative inspection of the East Dunkard System in follow-up to the 2021 Sanitary Survey inspection (October 28, 2021 inspection).

(5) On December 13, 2021, the Department issued an NOV to the Authority (December 13, 2021 NOV).

(6) On January 18, 2022, the Department conducted an inspection of the East Dunkard System (January 18, 2022 inspection). On January 21, 2022, the Department issued three (3) NOVs to the Authority: two of the NOVs were significant deficiency NOVs and the other NOV identified other violations that were not significant deficiencies (collectively, "January 21, 2022 NOV"). On January 25, 2022, the Department conducted an inspection of the East Dunkard System (January 25, 2022 inspection). On January 25, 2022, the Department issued a Field Order to the Authority (January 2022 Field Order). On January 26, 2022, the Department conducted two (2) administrative inspections of the East Dunkard System (January 26, 2022 inspections). On January 31, 2022, the Department issued an NOV to the Authority (January 31, 2022 NOV).

(7) On February 4, 2022, the Department conducted an administrative inspection of the East Dunkard System (February 4, 2022 inspection). On February 23, 2022, the Department conducted an administrative inspection of the East Dunkard System (February 23, 2022 inspection).

(8) On March 11, 2022, the Department issued a Field Order to the Authority (March 2022 Field Order). On March 16, 2022, the Department conducted an inspection of the East Dunkard System (March 16, 2022 inspection). On March 30, 2022, the Department conducted an inspection of the East Dunkard System (March 30, 2022 inspection).

(9) On April 6, 2022, the Department conducted an inspection of the East Dunkard System (April 6, 2022 inspection). On April 7, 2022, the Department conducted an inspection of the East Dunkard System (April 7, 2022 inspection).

(10) On August 3, 2022, the Department conducted an inspection of the East Dunkard System (August 3, 2022 inspection).

(11) In addition to the inspections listed above, the Department has conducted multiple, additional inspections and issued additional NOVs.

July 21, 2021 Inspection

M. During the July 21, 2021 inspection, the Department cited the following violations, among others:

Failure to Provide One-Hour Notification

N. Section 109.701(a)(3)(iii)(B) of the Regulations, 25 Pa. Code § 109.701(a)(3)(iii)(B), requires a public water supplier to provide one-hour notification to the Department any time circumstances exist which may adversely affect the quality or quantity of drinking water, including a failure, significant interruption or breakdown in key water treatment processes.

O. During the July 21, 2021 inspection, the Authority informed the Department that it failed to report to the Department, within one hour of discovery, that the variable speed mixer in the East Dunkard System's clarifier was inoperable, and had been inoperable for at least one year, in violation of 25 Pa. Code § 109.701(a)(3)(iii)(B). The Department also cited this violation in its 2021 Sanitary Survey inspection report.

P. On July 20, 2021, the Authority informed the Department that the chlorine analyzer at the Griffin Tank entry point had been disabled on July 17, 2021 during a storm, which the Authority failed to report to the Department within one hour of discovery, in violation of 25 Pa. Code § 109.701(a)(3)(iii)(B).

Failure to Continuously Monitor and Record Chlorine Residual Disinfectant Concentration

Q. Section 109.301(1)(i)(D) of the Regulations, 25 Pa. Code § 109.301(1)(i)(D), requires a public water supplier providing filtration and disinfection of surface water sources to continuously monitor and record the chlorine residual disinfectant concentration of the water being supplied to the distribution system. If the continuous monitoring or recording equipment fails, a public water supplier may substitute grab sampling or manual recording every four hours in lieu of continuous monitoring.

R. During the July 21, 2021 inspection, the Authority informed the Department that the Authority had neither been continuously monitoring and recording the chlorine residual disinfectant concentration at the East Dunkard System nor collecting grab samples every four hours since the chlorine analyzer at the Griffin Tank entry point had become disabled on July 17, 2021, in violation of 25 Pa. Code § 109.301(1)(i)(D).

Failure to Perform Sampling and Analysis in Accordance with EPA Method 334.0

S. Section 109.304(a) of the Regulations, 25 Pa. Code § 109.304(a), requires a public water supplier to perform sampling and analysis in accordance with analytical techniques adopted by the Environmental Protection Agency (EPA) or methods approved by the Department. Both the EPA and the Department adopted EPA Method 334.0 for quality assurance of the analysis of chlorine residual disinfectant concentration in drinking water.

T. Section 109.304(c) of the Regulations, 25 Pa. Code § 109.304(c), provides that, other than a water operator who has been certified under the Water and Wastewater Systems Operators' Certification Act, Act of 1968, P.L. 1052, No. 322, *as amended*, 63 P.S. §§ 1001-1016, (certified operator) or an accredited laboratory, a person who takes measurements for

chlorine residual disinfectant concentration must use a standard operating procedure (SOP) approved by a certified operator.

U. On July 21, 2021, the Department reviewed the Authority's records, which showed that the Authority had been chronically failing to perform sampling and analysis for chlorine residual disinfectant concentration in accordance with EPA Method 334.0 by not completing analyst demonstrations of capability, initial/routine verification of handheld/benchtop analysis equipment, and initial/routine verification of on-line analysis equipment, in violation of 25 Pa. Code § 109.304(a). The Department also cited this violation in its July 21, 2021, 2021 Sanitary Survey and January 18, 2022 inspection reports. Additionally, during the January 18, 2022 inspection, the Authority's staff was not yet using SOPs approved by its certified operator, in violation of 25 Pa. Code § 109.304(c). The Authority has subsequently resolved this violation.

Failure to Filter-To-Waste

V. Section 109.703(b)(1) of the Regulations, 25 Pa. Code § 109.703(b)(1), requires a public water supplier using conventional filtration of a surface water source to filter-to-waste for one full filter volume of water and until the filter bed effluent turbidity is less than 0.30 NTU (Nephelometric Turbidity Units) at the normal production flow rate before returning a filter to service, unless an alternate operating technique is properly utilized and complete documentation is maintained.

W. On July 21, 2021, the Authority informed the Department that it failed to filter-to-waste for a full filter volume of water and until turbidity levels were less than 0.30 NTU after filter backwashes and/or upon treatment plant start-up, in violation of 25 Pa. Code

§ 109.703(b)(1). This violation also is cited in the Department's 2021 Sanitary Survey and January 18, 2022 inspection reports.

Failure to Maintain Mechanical Equipment

X. On July 21, 2021, the Authority informed the Department that it had failed to maintain the variable speed mixing system for the clarifier, in violation of 25 Pa. Code § 109.4(3).

Y. During the 2021 Sanitary Survey inspection, the mechanical equipment for the variable speed mixing system was not functioning, and as of the January 18, 2022 inspection, the Authority had not resolved this violation. During the April 7, 2022 inspection, the mixing system was functional. During an April 11, 2022 call with the Department, the Authority informed the Department that it had taken temporary measures to restore the mixer to service but was awaiting parts and equipment fabrication to be able to effect long-term repair. During the August 3, 2022 inspection, the clarifier was not functioning properly. As of the August 3, 2022 inspection, the parts and fabricated equipment were still not obtained.

Failure to Address Turbidity

Z. Section 109.602(a) of the Regulations, 25 Pa. Code § 109.602(a), requires that a public water system be designed to provide an adequate and reliable quantity and quality of water to the public, and to ensure that the system will be capable of providing water that, among other things, meets the filtered water turbidity performance requirements set forth in 25 Pa. Code § 109.202(c).

AA. Section 109.202(c)(1)(i)(A)(IV)(-b-) of the Regulations, 25 Pa. Code § 109.202(c)(1)(i)(A)(IV)(-b-), requires that the filtered water turbidity for a public water system

using conventional filtration and serving fewer than 10,000 people be less than or equal to 1 NTU at all times, measured under 25 Pa. Code § 109.301(1).

AB. Section 109.301(1)(i)(C) of the Regulations, 25 Pa. Code § 109.301(1)(i)(C), requires a public water supplier providing filtration and disinfection of surface water sources to continuously monitor the turbidity level of the Combined Filter Effluent (CFE) using an analytical method specified in the federal regulations and record the results at least every fifteen minutes while the plant is operating.

AC. Section 109.303(b) of the Regulations, 25 Pa. Code § 109.303(b), requires that the samples taken to determine a public water system's compliance with treatment technique and performance monitoring requirements be taken at a point that is as close as practicable to each treatment technique process and that is not influenced by subsequent treatment processes or appurtenances.

AD. On July 21, 2021, the Authority was not accurately conducting continuous monitoring of the turbidity level of the CFE because the East Dunkard System's CFE turbidimeter is located within the clearwell, which is located subsequent to chemical addition, in violation of 25 Pa. Code § 109.303(b). The Department also cited this violation in its 2021 Sanitary Survey and January 18, 2022 inspection reports.

AE. Section 109.602(c) of the Regulations, 25 Pa. Code § 109.602(c), provides that the Department's *Public Water Supply Manual* (Manual) sets forth design standards which the Department finds to be acceptable designs. Alternate designs may be used only if demonstrated to be effective and approved by the Department.

AF. Section IV.D.2.j. of Part II - Community System Design Standards of the Manual (Document Number 383-2125-108) requires that all turbidimeters consistently determine and indicate the turbidity of the water in NTUs.

AG. During the July 21, 2021 inspection, the Authority informed the Department that it had capped the individual filter effluent (IFE) turbidimeters at 2.5 NTU and the CFE turbidimeter at 1.0 NTU, preventing the turbidimeters from consistently determining and indicating the actual turbidity of the East Dunkard System's water, in violation of 25 Pa. Code §§ 109.602(a) and 109.602(c).

AH. In preparation for the July 21, 2021 inspection, the Department reviewed the Authority's records, which showed that the East Dunkard System had experienced numerous turbidity spikes recorded on both the IFE and CFE turbidimeters during the previous twelve months. During the July 21, 2021 inspection, the Authority was unable to demonstrate that it had investigated or corrected the cause(s) of the turbidity spikes, in violation of 25 Pa. Code §§ 109.4(2), 109.4(3), and 109.4(4).

Failure to Implement a Filter Bed Evaluation Program

AI. Section 109.703(b)(5) of the Regulations, 25 Pa. Code § 109.703(b)(5), requires a public water supplier with filtration facilities to implement a filter bed evaluation program, acceptable to the Department, which includes an evaluation of filter media, filter bed expansion, valves, surface sweep and sampling of filter turbidities over one entire filter run.

AJ. During the July 21, 2021 inspection, the Authority did not have a filter bed evaluation program for the East Dunkard System, in violation of 25 Pa. Code § 109.703(b)(5). The Department also cited this violation in its 2021 Sanitary Survey and January 18, 2022 inspection reports. On July 5, 2022, the Authority submitted a filter bed evaluation program to

the Department; however, the Department identified some deficiencies which the Authority needs to address for the filter bed evaluation program to be considered complete.

Failure to Be Equipped with Plant Shutdown Capabilities

AK. Sections 109.602(g) and 109.602(i) of the Regulations, 25 Pa. Code §§ 109.602(g) and 109.602(i), require, among other things, a public water system that provides filtration of surface water sources to be equipped with specified shutdown capabilities if the facility is not staffed continuously while the plant is operating.

AL. Pursuant to 25 Pa. Code § 109.602(i), these shutdown capabilities are required for the following parameters: IFE turbidity, CFE turbidity, entry point disinfectant residuals, and water levels to maintain adequate contact time (CT) for Giardia inactivation.

AM. During the July 21, 2021 inspection, the Authority informed the Department that, although the East Dunkard System's surface water filtration treatment plant was not staffed continuously, it was not equipped with shutdown capabilities that meet the requirements of 25 Pa. Code § 109.602(i), in violation of 25 Pa. Code §§ 109.602(g) and 109.602(i). The Department also cited this violation in its August 20, 2021 Field Order, 2021 Sanitary Survey inspection report, September 24, 2021 NOV, January 18, 2022 inspection report, January 21, 2022 NOV, January 2022 Field Order and January 26, 2022 inspection report.

Failure to Conduct Quarterly Testing of the Alarm Capabilities

AN. Section 109.703(c)(1) of the Regulations, 25 Pa. Code § 109.703(c)(1), requires the Authority to test the alarm capabilities at least quarterly and document the results in the plant's operational log.

AO. During the July 21, 2021 inspection, the Authority informed the Department that it was chronically failing to conduct quarterly testing of the alarm capabilities, in violation of

25 Pa. Code § 109.703(c)(1). The Department cited this violation again in its August 20, 2021 Field Order, January 18, 2022 inspection report, January 21, 2022 NOV and February 4, 2022 inspection report. In its January 21, 2022 NOV, the Department identified this violation as a significant deficiency, informed the Authority of its obligations under 25 Pa. Code § 109.717, and requested that the Authority notify the Department within 30 days of completing the corrective action for this significant deficiency.

AP. The Department identified the violations described in Paragraphs O, P, U, W, AD, AH and AJ, above, as significant deficiencies in its July 21, 2021 inspection report, the August 11, 2021 NOV and/or the September 24, 2021 NOV. The August 11, 2021 NOV also informed the Authority of its obligations under 25 Pa. Code § 109.717, and requested that the Authority notify the Department within 30 days of completing the corrective action for each significant deficiency.

AQ. The December 13, 2021 NOV informed the Authority of, among other things, its failure to correct the significant deficiencies identified in Paragraphs U, W, AD, AH and AJ, above, within 120 days, which was December 10, 2021, in violation of 25 Pa. Code § 109.717. In the December 13, 2021 NOV, the Department requested that the Authority: correct each of the significant deficiencies, notify the Department when completed, issue Tier 2 Public Notice to its customers within thirty days, and submit a copy of the Public Notice and a certification form to the Department within ten days of issuance.

August 12, 2021 Field Order

AR. On August 11, 2021, at 1:04 p.m., the Authority notified the Department that, on the evening of August 10, 2021, the Authority had experienced a power outage at its water treatment plant. For more than one hour that evening, the Authority pumped water from its

clearwell to the distribution system with a turbidity of 1 NTU or greater. Because the Authority had, at that time, capped its CFE turbidimeter, located in the clearwell, at 1.0 NTU, the turbidimeter was unable to record turbidities above 1 NTU.

AS. The East Dunkard System's turbidity readings of 1.0 NTU for more than one hour were indicative of a breakdown of filtration treatment adequate to ensure the protection of public health and a failure to provide and effectively operate and maintain public water system facilities, in violation of 25 Pa. Code §§ 109.202(c)(1)(i)(A)(IV)(-b-), 109.4(2) and 109.4(3).

AT. In addition, the Authority failed to notify the Department of this breakdown in treatment, as described in Paragraph AS, above, within one hour, in violation of 25 Pa. Code §§ 109.701(a)(3)(i) and 109.701(a)(3)(iii)(B), which the Department cited in its August 16, 2021 and 2021 Sanitary Survey inspection reports and September 24, 2021 NOV.

AU. On August 12, 2021, the Department issued Field Order No. 21-9540-001 to the Authority (August 12, 2021 Field Order), citing the violations described in Paragraphs AS and AT, above, and directing the Authority to: issue a Tier 1 public notice in the form of a boil water advisory, flush the affected portions of the East Dunkard System, conduct total coliform sampling, and take other appropriate actions necessary to correct the violations.

AV. In the August 23, 2021 NOV, the Department identified the violations outlined in Paragraphs AS and AT, above, as significant deficiencies, informed the Authority of its obligations under 25 Pa. Code § 109.717, and requested that the Authority notify the Department within 30 days of completing the corrective action for each significant deficiency.

August 16, 2021 Inspection

AW. Section 13(a) of the SDWA, 35 P.S. § 721.13(a), provides that it is the duty of any person to proceed diligently to comply with any order issued pursuant to Section 5 of the Act.

AX. On August 16, 2021, the Department inspected the East Dunkard System and, as of that date, the Authority had not complied with the August 12, 2021 Field Order. Specifically, the Authority failed to correctly or fully complete the required public notice, flushing, and coliform sampling, in violation of the August 12, 2021 Field Order and 35 P.S. § 721.13(a).

August 20, 2021 Field Order

AY. As described in Paragraph AM, above, the Authority continued its practice of failing to continuously staff its surface water treatment plant while the water treatment plant was operating, despite the water treatment plant not being equipped with shutdown capabilities for IFE turbidity, CFE turbidity, entry point disinfectant residuals, and water levels to maintain adequate contact time (CT) for Giardia inactivation, in violation of 25 Pa. Code §§ 109.602(g) and 109.602(i).

AZ. As a result, on August 20, 2021, the Department issued Field Order No. 53-21-1627-022 (August 20, 2021 Field Order) to the Authority, which directed the Authority, among other things, to submit to the Department daily its IFE and CFE turbidity readings, entry point free chlorine disinfectant residual readings, and 1-Log Giardia inactivation calculation data as well as information regarding relevant events or factors that might affect the Authority's monitoring data.

BA. Although the Authority installed an automatic shutdown system subsequent to the issuance of the August 20, 2021 Field Order, the automatic shutdown system is inadequate

because it only shuts down the operation of the East Dunkard System's high service pumps. It neither prevents water from entering the distribution system (from the Griffin tank) if a chlorine disinfectant residual is not maintained at the entry point nor meets the minimum contact time requirements.

BB. In the August 20, 2021 Field Order, the Department also cited the Authority for its failure to provide and effectively operate and maintain the public water system facilities and failure to take the necessary investigative or corrective action at the East Dunkard System to assure that safe and potable water was continuously supplied to the consumers, including the failure to properly complete the public notification, flushing and coliform sampling as directed in the August 12, 2021 Field Order, in violation of the August 12, 2021 Field Order, 35 P.S. § 721.13(a) and 25 Pa. Code §§ 109.4(3), 109.(4) and 109.411(b).

2021 Sanitary Survey Inspection

BC. During the 2021 Sanitary Survey inspection, the Department cited the following violations, among others:

Failure to Program Software Correctly

BD. During the 2021 Sanitary Survey inspection, the East Dunkard System's filter software was not programmed to utilize turbidity as a parameter to determine when filter-to-waste should end and water production to the clearwell should begin, but instead, simply operated off a timed program. Further, the Authority indicated that it had not maintained its backwash program for years and the East Dunkard System's filter software turbidity readings were approximately one-half of the recently calibrated IFE turbidimeters' readings. The above conditions were in violation of 25 Pa. Code § 109.4.

Lack of Filter Waste-Holding Capacity

BE. During the 2021 Sanitary Survey inspection, in addition to the filter-related violations observed during the July 21, 2021 inspection, the East Dunkard System had: 1) a significant lack of filter waste-holding capacity in the clarifier and the sludge and backwash lagoon; 2) mud balls forming on the filter(s); 3) uneven filter media and the sand and anthracite had mixed in the filter(s); 4) an insufficient filter backwashing SOP; and 5) installed the CFE turbidimeter in the wrong location, in violation of 25 Pa. Code § 109.4.

BF. Also during the 2021 Sanitary Survey inspection, the sludge blanket in the upflow-solids-contact clarifier at the East Dunkard System extended beyond the freeboard, and the sludge in the backwash lagoon was filled to the top of the riser, in violation of 25 Pa. Code § 109.4.

BG. In addition, the Authority was not cleaning the lagoon frequently enough to prevent excessive sludge buildup and water short circuiting, in violation of 25 Pa. Code § 109.4.

BH. The January 18, 2022 inspection report documented that the Authority still lacked an adequate filter backwashing SOP and, because of the lack of waste-holding capacity at that time, the Authority was not performing filter backwashes as often as needed, in violation of 25 Pa. Code § 109.4. In late March and early April 2022, the Authority cleaned out the lagoon and the clarifier.

Failure to Provide Appropriate Safety Equipment

BI. During the 2021 Sanitary Survey inspection, the East Dunkard System lacked appropriate safety equipment and procedures in the treatment plant, in violation of 25 Pa. Code §§ 109.4 and 109.602. Specifically, the East Dunkard System did not have a reliable, working

exhaust fan or leak-detection alarm in the chlorine room, and had no self-contained breathing apparatus (SCBA). Further, the Authority had no SOP for changing its chlorine cylinders.

BJ. Prior to the Department's January 18, 2022 inspection, the Authority procured a SCBA unit, but had not fully resolved these violations because the age and inspection history of the unit were unknown, replacement cartridges for the face mask could not be located, the exhaust fan had not been repaired or replaced, and the Authority still did not have an automatic chlorine leak detector with an alarm.

BK. Prior to the March 16, 2022 inspection, the Authority installed a new fan in the chlorine gas room but no longer had a SCBA unit. In April 2022, the Authority informed the Department that it had obtained a new SCBA unit and masks and was making arrangements to train and fit staff to use the equipment.

Failure to Provide Secondary Containment

BL. Section V.C.2.d.(2) of Part II - Community System Design Standards of the Manual requires liquid chemical storage tanks to have an overflow and a receiving basin or drain capable of receiving accidental spills or overflows.

BM. During the 2021 Sanitary Survey inspection, the DelPAC tanks, orthophosphate drums and caustic soda storage lacked an overflow and a receiving basin or drain capable of receiving accidental spills or overflows to prevent an accidental discharge, in violation of 25 Pa. Code § 109.602(c). The Department cited this violation again in its January 18, 2022 inspection report, among others. As of the date of this Order, the Authority has only demonstrated secondary containment for the caustic soda storage.

Failure to Prevent Unauthorized Access to the Pump Station

BN. Section VI.B.1.d. of Part II - Community System Design Standards of the Manual requires a pumping station to be protected to prevent vandalism and entrance by animals or unauthorized persons.

BO. During the 2021 Sanitary Survey inspection, the Bald Hill pump station was not locked or otherwise protected against unauthorized access, in violation of 25 Pa. Code § 109.602(c).

Failure to Provide Cross-Connection Controls

BP. During the 2021 Sanitary Survey inspection, cross-connection controls were not in place between potable and non-potable water in the water treatment plant, in violation of 25 Pa. Code § 109.608. Specifically, there were hoses on the ground in the plant that could allow cross-connections between chemicals and taps. The Authority has subsequently resolved this violation.

Failure to Inspect or Clean Clearwells

BQ. Section 109.602(b) of the Regulations, 25 Pa. Code § 109.602(b), requires designs of public water facilities to conform to accepted standards of engineering and design in the water supply industry and to provide protection from failures of source, treatment, equipment, structures or power supply.

BR. During the 2021 Sanitary Survey inspection, the Authority informed the Department that it was not inspecting or cleaning the water storage clearwells on a routine basis, contrary to the recommendation of American Water Works Association (AWWA) Standard M42 and in violation of 25 Pa. Code §§ 109.4 and 109.602(b). As of the January 18, 2022 inspection, the Authority had not resolved this violation.

Failure to Maintain O&M Plan

BS. Section 109.702(a) of the Regulations, 25 Pa. Code § 109.702(a), requires a community water supplier to develop an operation and maintenance plan (O&M plan) in accordance with the guidelines contained in the Manual.

BT. During the 2021 Sanitary Survey inspection, the Authority's existing O&M plan did not contain all of the required elements, in violation of 25 Pa. Code § 109.702(a). On July 5, 2022, the Authority submitted an O&M plan to the Department; however, the Department identified some deficiencies, which the Authority needs to address for the O&M plan to be complete.

Failure to Maintain Comprehensive Monitoring Plan

BU. Section 109.718(a) of the Regulations, 25 Pa. Code § 109.718(a), requires a community water supplier to develop a comprehensive monitoring plan that contains specified minimum elements to assure that all sources, purchased interconnections and entry points are included in compliance monitoring for the system.

BV. During the 2021 Sanitary Survey inspection, the Authority did not have a comprehensive monitoring plan that contained all of the required elements, in violation of 25 Pa. Code § 109.718(a). On July 5, 2022, the Authority submitted a comprehensive monitoring plan to the Department; however, the Department identified some deficiencies which the Authority needs to address for the comprehensive monitoring plan to be considered complete.

Failure to Submit Certification for USSP

BW. Section 109.708(a) of the Regulations, 25 Pa. Code § 109.708(a), requires a community water supplier to submit to the Department a certification verifying completion of an uninterrupted system service plan (USSP) for the public water system to ensure operation of the

sources, treatment and pumping facilities necessary to ensure that safe and potable water is continuously supplied to users of the public water system. For a public water system that serves a population of 4,200, the USSP certification should have been submitted by August 17, 2020.

BX. As of the 2021 Sanitary Survey inspection, the Authority failed to submit to the Department a certification verifying completion of a USSP for the East Dunkard System containing all of the required elements, in violation of 25 Pa. Code § 109.708(a).

BY. As of the October 28, 2021 inspection, the Authority still had not submitted to the Department a certification verifying that the Authority had completed a USSP for the East Dunkard System containing all of the required elements, in violation of 25 Pa. Code § 109.708(a). In the October 28, 2021 inspection report, the Department requested that the Authority submit a USSP certification form to the Department no later than November 30, 2021. Also, in the October 28, 2021 NOV, the Department requested that the Authority develop a USSP for the East Dunkard System and submit the USSP certification form to the Department by November 30, 2021. On July 5, 2022, the Authority submitted a USSP to the Department; however, the Department identified some deficiencies which the Authority needs to address for the USSP to be considered complete. Although the Authority submitted the certification of its completion of a USSP for the East Dunkard System as required by 25 Pa. Code § 109.708(a) on July 13, 2022, the Authority did not confirm that the deficiencies identified by the Department were addressed.

Failure to Maintain Updated Emergency Response Plan

BZ. Section 109.707(a) of the Regulations, 25 Pa. Code § 109.707(a), requires a community water supplier to develop an emergency response plan that conforms to the guidelines contained in the Manual and contains specified minimum elements. Section

109.707(c) of the Regulations, 25 Pa. Code § 109.707(c), requires a public water supplier to review and update its emergency response plan at least annually.

CA. As of the 2021 Sanitary Survey inspection, the Authority had not updated its emergency response plan since at least 2016, in violation of 25 Pa. Code § 109.707(c). On July 5, 2022, the Authority submitted an emergency response plan to the Department; however, the Department identified some deficiencies, which the Authority needs to address for the emergency response plan to be considered complete.

CB. In the September 24, 2021 NOV, the Department identified the violations described in Paragraphs BE, BG and BI, above, as significant deficiencies, informed the Authority of its obligations under 25 Pa. Code § 109.717 regarding these significant deficiencies, and requested that the Authority notify the Department within 30 days of completing the corrective action for each significant deficiency.

CC. In the January 21, 2022 NOV, the Department informed the Authority of, among other things, its failure to correct the significant deficiencies identified in Paragraphs BE, BG and BI, above, within 120 days of notice, which was provided on January 21, 2022, in violation of 25 Pa. Code § 109.717. In the January 21, 2022 NOV, the Department requested that the Authority: correct each of the significant deficiencies, notify the Department when completed, issue Tier 2 Public Notice to its customers within thirty days, and submit a copy of the Public Notice and a certification form to the Department within ten days of issuance.

January 23, 2022 Turbidity Spike

CD. On January 23, 2022, IFE turbidity readings on filters 3 and 4 at the East Dunkard System exceeded 1.0 NTU (as high as 4.08 NTU), and the CFE turbidity readings exceeded

1.0 NTU (as high as 1.25 NTU), indicating a breakdown in treatment, in violation of 25 Pa. Code §§ 109.4 and 109.202(c)(1)(i)(A)(IV)(-b-).

CE. The Authority failed to notify the Department within one hour of the breakdown in treatment at the East Dunkard System, in violation of 25 Pa. Code § 109.701(a)(3)(iii)(B).

CF. Additionally, the Authority did not submit the daily IFE and CFE turbidity data for January 23, 2022 to the Department as required, in violation of the August 20, 2021 Field Order and 35 P.S. § 721.13(a). Only after the Department contacted the Authority on January 25, 2022 and requested the missing data, did the Authority submit that information to the Department.

January 25, 2022 Inspection and Field Order

CG. On January 25, 2022, after the Authority submitted data showing the turbidity spikes that occurred on January 23, 2022, the Department conducted an inspection at the East Dunkard System and at that time, circumstances existed with the conventional filtration treatment that adversely affected the quantity or quality of the water being produced, in violation of 25 Pa. Code § 109.4, as more specifically described in Paragraphs CH, CJ and CK, below.

CH. Although turbidity readings at the East Dunkard System on January 23, 2022 had exceeded the automatic shutdown setpoints, the plant did not shut down, in violation of 25 Pa. Code § 109.4. Additionally, the Authority failed to provide one-hour notification to the Department of this imminent threat situation occurring with the conventional filtration treatment, in violation of 25 Pa. Code § 109.701(a)(3)(i).

CI. Section 109.202(c)(1)(ii)(A) of the Regulations, 25 Pa. Code § 109.202(c)(1)(ii)(A), requires that the combined total effect of disinfection processes utilized in

a filtration plant must achieve at least 1.0-log inactivation of Giardia cysts and 3.0-log inactivation of viruses, also known as "LogG".

CJ. On January 25, 2022, the Authority submitted data that showed that it failed to provide at least 1.0-log inactivation of Giardia at the East Dunkard System for more than four hours that morning, in violation of 25 Pa. Code §§ 109.4 and 109.202(c)(1)(ii)(A). The Authority also failed to provide one-hour notification to the Department of this imminent threat situation occurring with the conventional filtration treatment, in violation of 25 Pa. Code § 109.701(a)(3)(i).

CK. During the January 25, 2022 inspection, the Authority informed the Department that employees of the Authority, who are not certified operators, were making process control decisions for the East Dunkard System without using SOPs or consulting with the Authority's certified operator, in violation of 25 Pa. Code § 109.4.

CL. On January 25, 2022, the Department issued Field Order No. 22-55-1627-029 to the Authority (January 2022 Field Order) citing the violations described in Paragraphs CD, CE, CG, CH, CJ and CK, above, as well as the Authority's failure to have automatic shutdown capabilities installed at the proper locations, in violation of 25 Pa. Code § 109.4. The January 2022 Field Order, which is attached hereto and marked as Appendix A, once again, directed the Authority, among other things, to: 1) not operate the East Dunkard System without: i) a properly certified operator present; ii) staff using SOPs written by a certified operator; or iii) making process control decisions in consultation with a certified operator; and 2) increase and maintain the free chlorine residual at the entry point to at least 1.5 mg/L until receiving written approval from the Department to reduce it .

CM. In the January 31, 2022 NOV, the Department identified the violations described in Paragraphs CG, CH and CJ, above, as significant deficiencies, informed the Authority of its obligations under 25 Pa. Code § 109.717 regarding these significant deficiencies, and requested that the Authority notify the Department within 30 days of completing the corrective action for each significant deficiency.

January 26, 2022 Administrative Inspections

CN. On January 26, 2022, the Authority informed the Department that it had failed to submit turbidity data, chlorine residual data, and 1-Log Giardia inactivation data for January 22, 2022, in violation of the August 20, 2021 Field Order. Additionally, the Authority failed to submit the daily turbidity and chlorine disinfectant residual data for January 23, 2022 to the Department until January 25, 2022, and failed to include information regarding relevant events or factors which affected that data, in violation of the August 20, 2021 Field Order.

CO. During the second January 26, 2022 inspection, the Authority informed the Department that on January 25 and 26, 2022, the Authority had operated the plant without the plant being staffed continuously while the plant was in operation, in violation of the August 20, 2021 Field Order, January 2022 Field Order, 35 P.S. § 721.13(a) and 25 Pa. Code § 109.4.

CP. In the January 31, 2022 NOV, the Department identified the violation described in Paragraph CO, above, as a significant deficiency, informed the Authority of its obligations under 25 Pa. Code § 109.717 regarding this significant deficiency, and requested that the Authority notify the Department within 30 days of completing the corrective action for the significant deficiency.

February 4, 2022 Inspection

CQ. On January 30, 2022 and February 3, 2022, the turbidity readings at the East Dunkard System were erratic. For example, on February 3, 2022, the IFE turbidity on Filter 4 had readings as high as 10 NTU.

CR. As documented in the February 4, 2022 inspection report, the Authority failed to provide information regarding relevant events or factors affecting its erratic turbidity readings on January 30, 2022 and February 3, 2022, in violation of the August 20, 2021 Field Order, 35 P.S. § 721.13(a) and 25 Pa. Code § 109.4.

CS. The Authority failed to provide one-hour notification to the Department of the Authority's failure to meet the treatment technique requirements for turbidity on January 30, 2022 and February 3, 2022, as described in Paragraph CR, above, in violation of 25 Pa. Code § 109.701(a)(3).

CT. In addition, on February 4, 2022, the Authority informed the Department that it allowed uncertified staff to make process control decisions at the East Dunkard System on January 30, 2022 and February 4, 2022, in violation of the January 2022 Field Order, 35 P.S. § 721.13(a) and 25 Pa. Code § 109.4.

CU. On February 4, 2022, the Authority informed the Department that the free chlorine disinfectant residual concentration at the entry point to the East Dunkard System on February 3, 2022 was less than 1.5 mg/L from 11:32 a.m. to 9:22 p.m., in violation of the January 2022 Field Order, 35 P.S. § 721.13(a) and 25 Pa. Code § 109.4.

February 23, 2022 Administrative Inspection

CV. On February 22, 2022, the Authority failed to include information regarding relevant events or factors which affected the February 21, 2022 data that the Authority submitted

to the Department on February 22, 2022, in violation of the August 20, 2021 Field Order, 35 P.S. § 721.13(a) and 25 Pa. Code § 109.4.

March 11, 2022 Field Order

CW. On March 10, 2022, the IFE turbidities for filters 1, 2 and 4 exceeded 1 NTU at the East Dunkard System, indicating a breakdown in treatment. The high turbidity water entered the clearwell, was not properly flushed and was capable of entering the distribution system.

CX. On March 11, 2022, the Department issued Field Order 22-52-1627-032 (March 2022 Field Order) to the Authority for the breakdown in treatment and failure to provide and effectively operate and maintain the public water facilities at the East Dunkard System on March 10, 2022, in violation of 25 Pa. Code §§ 109.4(2), 109.4(3) and 109.4(4). Additionally, the March 2022 Field Order cited the Authority for allowing employees of the Authority who are not certified operators to make process control decisions for the East Dunkard System without using SOPs approved by the certified operator or consulting with the certified operator, in violation of the January 2022 Field Order, 35 P.S. § 721.13 and 25 Pa. Code § 109.4. Finally, the March 2022 Field Order cited the Authority's failure to notify the Department within one hour of the high turbidity results indicating a breakdown in treatment, in violation of 25 Pa. Code § 109.701(a)(3).

CY. The March 2022 Field Order, which is attached hereto and marked as Appendix B, once again directed the Authority, among other things, to not operate the water treatment plant without: i) a certified operator present; ii) staff using SOPs written by the certified operator; or iii) making process control decisions in consultation with the certified operator.

CZ. The violations described in Paragraphs O, P, R, U, W, X, AD, AG, AH, AJ, AM, AO, AQ, AS, AT, AX, AY, BB, BD, BE, BF, BG, BH, BI, BM, BO, BP, BR, BT, BV, BX, BY,

CA, CC, CD, CE, CF, CG, CH, CJ, CK, CL, CN, CO, CR, CS, CT, CU, CV and CX, above, constitute public nuisances under Section 12 of the SDWA, 35 P.S. § 721.12, and subject the Authority and the Association to civil penalty liability under Section 13(g) of the SDWA, 35 P.S. § 721.13(g).

ORDER

NOW therefore, pursuant to its authority under Sections 5 and 13(a) of the SDWA, 35 P.S. §§ 721.5 and 721.13(a), and Section 1917-A of the Administrative Code, 71 P.S. 510-17, the Department hereby orders the Authority and the Association (collectively, the "Responsible Parties"), jointly and severally, to complete the following actions in accordance with the deadlines specified below:

1. The Responsible Parties shall comply with all corrective action requirements and deadlines set forth in Paragraphs 2-15, below, but may cease compliance with the requirements of Paragraphs 3, 4, 5, 6, 7, 10, 12 and 13 if and at such time as the Responsible Parties:

a. are obtaining all water for the East Dunkard System from SPWA or another permitted public water system;

b. have permanently removed the water treatment plant from service; and

c. have submitted a request to the Department to rescind their Public Water Supply Permits for the intake, water treatment plant and associated facilities.

2. Beginning immediately upon receipt of this Order, all process control decisions at the East Dunkard System shall be made by either: (a) an appropriately certified operator; (b) staff operating under Standard Operating Procedures (SOPs) approved by the "operator-in-responsible-charge," as defined in 25 Pa. Code § 302.101, for the East Dunkard System; or (c) staff operating in consultation with the certified operator for the East Dunkard System as any and

all "process control decisions," as defined in 25 Pa. Code § 302.101, are made. All SOPs shall conform to the requirements outlined in 25 Pa. Code § 302.1204.

3. Beginning immediately upon receipt of this Order, and continuing unless and until the Department has confirmed in writing that the Responsible Parties have installed automatic shutdowns as required under 25 Pa. Code § 109.602(g), the Responsible Parties shall not operate the water treatment plant at the East Dunkard System without the water treatment plant being staffed continuously while the plant is operating. Should the Responsible Parties elect to install new automatic shutdowns at the water treatment plant, the Responsible Parties shall install one or more shutdown devices at all location(s) as necessary to prevent water that does not meet regulatory requirements from entering the distribution system and shall maintain normal operating pressures in accordance with 25 Pa. Code § 109.607. Prior to the installation of new automatic shutdowns, the Responsible Parties shall submit to the Department a complete, accurate and technically sufficient Public Water Supply Permit application.

4. Beginning immediately upon receipt of this Order, after each backwash and at each startup, the Responsible Parties shall filter-to-waste for: a) at least one full filter volume; and b) until turbidity levels are less than 0.30 NTU in accordance with 25 Pa. Code § 109.703(b)(1).

5. Beginning immediately upon receipt of this Order, the Responsible Parties shall utilize the average of IFE turbidity readings from all active filters for the determination of compliance with the Safe Drinking Water Regulations, including but not limited to 25 Pa. Code § 109.202(c)(1)(A), and reporting requirements related to the CFE turbidity. This requirement shall remain in effect until the Department confirms in writing that a CFE turbidimeter is

properly located before additional chemical treatment and storage, or an alternative that has been approved by the Department in writing has been implemented.

6. Beginning immediately upon receipt of this Order, pursuant to 25 Pa. Code §§ 109.302(a) and 109.302(b), the Responsible Parties shall sample for iron and manganese at all of the East Dunkard System's Revised Total Coliform Rule (RTCR) sample sites at the same date and time that RTCR monitoring is conducted each month. As each interconnection with SPWA or another permitted public water system is placed into operation, the Responsible Parties shall ensure that the interconnection zone is represented in the RTCR sample site plan or shall submit to the Department a revised plan within ten (10) days from the date of issuance of the operation permit for that particular interconnection. The Responsible Parties shall continue to conduct the iron and manganese sampling until notified in writing by the Department to cease. Analysis for iron and manganese shall be conducted by an accredited laboratory using an EPA Standard Method for Drinking Water. The Responsible Parties shall electronically submit the sample results to the Department on a monthly basis through the Drinking Water Electronic Lab Reporting (DWELR) system by the 10th day of the following month. If the sample results exceed the Maximum Contaminant Level for iron or manganese, or if the manganese finished water sample results are above the EPA Health Advisory Level of 0.3 mg/L, the Responsible Parties shall notify the Department within one (1) hour of their receipt of the exceeding sample result(s) in accordance with 25 Pa. Code § 109.701(a)(3)(iii), and shall consult with the Department within twenty-four (24) hours of their receipt of the exceeding sample result(s) concerning corrective actions.

7. a. No later than October 14, 2022, the Responsible Parties shall obtain a complete evaluation of all filters at the East Dunkard System (Filter Evaluation) and submit a

written report with the results of the evaluation, along with recommended improvements, to the Department (Filter Evaluation Report). The Filter Evaluation and the Filter Evaluation Report shall be completed by an independent third-party consultant selected by the Responsible Parties and qualified to assess the performance of, diagnose problems with, and recommend improvements for public water system filters. The Responsible Parties shall notify the Department at least seven (7) days in advance of the date(s) the Filter Evaluation will take place, so that Department representatives, if available, may be present for the Filter Evaluation.

b. No later than November 14, 2022, the Responsible Parties shall submit to the Department for approval a Filter Corrective Action Plan for the filters, which shall contain a schedule to implement the improvements identified in the Filter Evaluation Report required under Paragraph 7.a., above. The Filter Corrective Action Plan shall include a submission date for either: i) an application for a Public Water Supply Permit pursuant to 25 Pa. Code § 109.503(b)(1) if the improvements identified in the Filter Evaluation Report include any "substantial modifications," as that term is defined in 25 Pa. Code § 109.1, which require a permit amendment; or ii) a written request for a minor permit amendment pursuant to 25 Pa. Code § 109.503(b)(2) if the improvements do not include any "substantial modifications. The Responsible Parties shall implement the Filter Corrective Action Plan as approved by the Department in accordance with the schedule approved by the Department.

8. No later than September 30, 2022, the Responsible Parties shall complete an Emergency Response Plan for the East Dunkard System that meets all the requirements of 25 Pa. Code § 109.707. The Responsible Parties shall notify the Department within 24 hours of completion, implement the Emergency Response Plan, maintain the Emergency Response Plan on-site, and provide it to the Department upon request.

9. No later than September 30, 2022, the Responsible Parties shall submit to the Department a revised Uninterrupted System Service Plan (DEP Form No. 3910-FM-BSDW0575) that addresses the deficiencies identified by the Department and a replacement certification verifying completion of an Uninterrupted System Service Plan (DEP Form No. 3910-FM-BSDW0576) for the East Dunkard System that meets all the requirements of 25 Pa. Code § 109.708(a). If the revised Uninterrupted System Service Plan and replacement certification identify deficiencies at the East Dunkard System, the Responsible Parties, within six (6) months from the date of the Uninterrupted System Service Plan certification, shall comply with the requirements of 25 Pa. Code § 109.708(c).

10. a. No later than October 14, 2022, the Responsible Parties shall obtain a complete evaluation of the clarifier system (Clarifier Evaluation) at the East Dunkard System and submit a written report with the results of the evaluation, along with recommended improvements, to the Department (Clarifier Evaluation Report). The Clarifier Evaluation and the Clarifier Evaluation Report shall be completed by an independent third-party consultant selected by the Responsible Parties and qualified to assess the performance of, diagnose problems with, and recommend improvements for public water system clarifier systems. The Responsible Parties shall notify the Department at least seven (7) days in advance of the date(s) the Clarifier Evaluation will take place, so that Department representatives, if available, may be present for the Clarifier Evaluation.

b. No later than November 14, 2022, the Responsible Parties shall submit to the Department for approval a Clarifier Corrective Action Plan for repair of the clarifier system at the water treatment plant, which shall contain a schedule to implement the improvements identified in the Clarifier Evaluation Report required under Paragraph 10.a., above.

c. In the event the Department determines that a permit is required for the clarifier system improvements, the Responsible Parties shall submit an application for a Public Water Supply Permit to the Department within sixty (60) days from the date of Department notification that a permit is required and shall complete the improvements within thirty (30) days from the date the permit is issued. In the event the Department determines that a permit is not required for the clarifier system improvements, the Responsible Parties shall complete the improvements within thirty (30) days from the date of Department notification that no permit is required.

11. No later than September 30, 2022, the Responsible Parties shall develop, implement and submit to the Department a comprehensive monitoring plan that meets all of the requirements of 25 Pa. Code § 109.718.

12. No later than September 30, 2022, the Responsible Parties shall develop and submit to the Department a filter bed evaluation program that meets all of the requirements of 25 Pa. Code § 109.703(b)(5) using the Department's Filter Bed Evaluation Program Results Form (DEP Form No. 3910-FM-BSDW0571). By October 31, 2022, the Responsible Parties shall implement the filter bed evaluation program, including modifications by the Department, if any. The Responsible Parties shall submit a copy of the results of the first two quarterly filter bed evaluations to the Department by the 10th day of the month following the quarter in which the filter bed evaluation was conducted.

13. No later than December 30, 2022, the Responsible Parties shall install an overflow and a receiving basin or drain capable of receiving accidental spills or overflows for the DelPAC tanks and orthophosphate drums at the water treatment plant to prevent accidental discharge in the event of a spill or overflow.

14. In the event the Department makes a written request for revisions to any submittal required by this Order, the Responsible Parties shall provide the requested revisions to the Department within the time requested.

15. Permit applications shall be submitted to the appropriate regional office of the Department as per the application instructions. Any other submittal required by this Order shall be submitted to the attention of:

Gail Guenther
Environmental Protection Compliance Specialist
PA Department of Environmental Protection
Southwest Regional Office
400 Waterfront Drive
Pittsburgh PA 15222
RA-EPSWSDW@pa.gov

Any person aggrieved by this action may appeal the action to the Environmental Hearing Board (Board) pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. § 7514, and the Administrative Agency Law, 2 Pa.C.S. Chapter 5A. The Board's address is:

Environmental Hearing Board
Rachel Carson State Office Building, Second Floor
400 Market Street
P.O. Box 8457
Harrisburg, PA 17105-8457

TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984.

Appeals must be filed with the Board within 30 days of receipt of notice of this action unless the appropriate statute provides a different time. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

A Notice of Appeal form and the Board's Rules of Practice and Procedure may be obtained online at http://ehb.courtapps.com or by contacting the Secretary to the Board at 717-

787-3483. The Notice of Appeal form and the Board's rules are also available in Braille and on audiotape from the Secretary to the Board.

IMPORTANT LEGAL RIGHTS ARE AT STAKE. YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD AT 717-787-3483 FOR MORE INFORMATION. YOU DO NOT NEED A LAWYER TO FILE A NOTICE OF APPEAL WITH THE BOARD.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST BE FILED WITH AND RECEIVED BY THE BOARD WITHIN 30 DAYS OF RECEIPT OF NOTICE OF THIS ACTION.

FOR THE COMMONWEALTH OF PENNSYLVANIA, DEPARTMENT OF ENVIRONMENTAL PROTECTION:

Renee Diehl
Environmental Protection Program Manager
Safe Drinking Water Program
Southwest Regional Office

APPENDIX

A

3800-FM-WSFR0007 Rev. 8/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-55-1627-029
LOCATION	**MUNICIPALITY**	**COUNTY**
2790 South Eighty-Eight Road / Dilliner, PA 15327	Dunkard Township	Greene
PERSON TO WHOM ORDER IS DIRECTED		**TELEPHONE NUMBER**
East Dunkard Water Authority		(724) 943-3713
MAILING ADDRESS		
PO Box 241 / Dilliner, PA 15327		
NAME AND TITLE OF PERSON SERVED		**DATE ORDER SERVED**
Tracy Pekar, Vice-Chair		1/25/2022

The Commonwealth of Pennsylvania, the Department of Environmental Protection ("Department"), has made the following Findings of Fact:

1. The Department is the agency with authority to administer and enforce the Pennsylvania Safe Drinking Water Act, the Act of May 1, 1984, P.L. 206, No. 43, 35 P.S. §§721.1-721.19 ("SDWA"), and Section 1917-A of the Administrative Code, the Act of April 9, 1929, P.L. 177, as amended, 71 P.S. §510-17, and the regulations of the Environmental Quality Board adopted pursuant thereto.
2. The person named above to whom this order is directed ("Recipient") owns and/or operates a public water system at the location identified above.
3. The undersigned authorized representative of the Department conducted an inspection of the public water system identified above on 1/25/2022.
4. The operation of this water system with the violation(s) identified in this Order is a violation of the Sections of the Department's regulations cited herein and the SWDA and constitutes a public nuisance under Section 12 of the SDWA, 35 P.S. §721.12.
5. Section 13 of the SDWA, 35 P.S. §721.13, provides that the Department may assess a civil penalty of up to Five Thousand Dollars ($5,000.00) per day for each violation of the SDWA.

Description of Violation:

The water treatment plant experienced a breakdown in treatment on January 23, 2022, as indicated by individual filter effluent turbidities on filters 3 & 4 exceeding 1.0 NTU (as high as 4.08 NTU) between 08:07 AM and 12:19 PM. Additionally, the combined filter effluent turbidity exceeded 1.0 NTU with readings as high as 1.25 NTU during that same time period. This data is indicative of a breakdown of adequate filtration treatment to ensure that public health is protected and a failure to provide and effectively operate and maintain public water system facilities.

Location of Violation:

East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:

25 Pa. Code §§ 109.4(2), 109.4(3), and 109.4(4)

☐ White – Water Supplier ☐ Yellow – District Office ☐ Pink – Litigation ☐ Goldenrod – Central Office

3800-FM-WSFR0007 Rev. 8/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER *(continuation)*

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-55-1627-029

Description of Violation:

The Certified Operator for the East Dunkard Public Water System informed the Department that the non-certified plant staff that were present at the water treatment plant during the turbidity treatment breakdown were making process control decisions without either standard operating procedures or without his knowledge/approval .

Location of Violation:

East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:

25 Pa. Code §§ 109.4(2), 109.4(3), and 109.4(4)

Description of Violation

The public water supplier failed to notify the Department within one (1) hour of the high turbidity results, which indicated a breakdown in treatment.

Location of Violation:

East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:

25 Pa. Code §§ 109.701(a)(3) and 109.408(b)(2)

☐ White – Water Supplier ☐ Yellow – District Office ☐ Pink – Litigation ☐ Goldenrod – Central Office

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER *(continuation)*

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-55-1627-029

Description of Violation:

The public water supplier failed to provide and effectively operate and maintain public water facilities by failing to ensure that the combined total effect of disinfection processes utilized in its filtration plant is achieving at least a 90% inactivation of Giardia cysts and a 99.9% inactivation of viruses, as determined by CTs and measurement methods established by the EPA. On January 25, 2022, East Dunkard Water Authority provided data to the Department indicating that the *Giardia* inactivation for the system was 0.76 log (<90% inactivation) at 8:11 AM. 1.0 log inactivation of Giardia cysts has not yet been restored and more than 4-hours have passed.

Location of Violation:

East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:

25 Pa. Code §§ 109.4, 109.202(c)(1)(ii).

Description of Violation:

The water treatment plant is a surface water treatment facility that is operated unmanned but is not equipped with automatic shut-down capability at the proper locations. Currently, the water treatment plant is designed to shut down operations of the high service pumps after a turbidity exceedance; however, on January 23, 2022, the individual filter effluent turbidity increases failed to cease operations of the facility. Additionally, the entry point chlorine residual shutdown is not located at the entry point to the distribution system, therefore, inadequately disinfected water would not be prevented from entering the distribution system.

Location of Violation

East Dunkard Water Treatment Plant and Entry Point

Provisions of Regulation, Statute or Permit Violated

25 Pa. Code §§ 109.4, 109.703(c)(1)

☐ White – Water Supplier ☐ Yellow – District Office ☐ Pink – Litigation ☐ Goldenrod – Central Office

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pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER *(continuation)*

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-55-1627-029

Pursuant to Sections 5, 10 and 12 of the SDWA, 35 P.S. §§721.5, 721.10 and 721.12; and Section 1917-A of the Administrative Code of 1929, 71 P.S. §510-17, it is hereby ordered that the owner shall perform the corrective actions listed below within the designated time.

Corrective Action/Abatement Schedule Required:

1. Effective immediately upon receipt of this Field Order, East Dunkard Water Authority shall not operate the water treatment plant without the presence of: a) a Certified Operator, b) staff operating under Standard Operating Procedures written by the Certified Operator, or c) staff operating the facility while consulting with the Certified Operator whenever process control decisions are being made.
2. As soon as possible, but no later than 24 hours after receipt of this Field Order, the public water supplier shall issue a Tier 1 public notification (PN) in the form of a Boil Water Advisory to all persons served by the East Dunkard Water Authority public water system in accordance with the provisions of 25 Pa. Code Sections 109.407, 109.408 and 109.411. Copies of the Tier 1 PN along with the certification form shall be submitted to the Department within ten (10) days of issuance in accordance with 25 Pa. Code Section 109.701(a)(4). The public water supplier shall maintain the Tier 1 PN until the Department notifies the public water supplier in writing that the Boil Water Advisory may be lifted.
3. Within 24 hours of receipt of this Field Order, East Dunkard Water Authority shall investigate and address the causes of the increases in filtrate turbidity and decrease in *Giardia* inactivation. East Dunkard Water Authority shall provide the Department with a summary of necessary improvements to restore and ensure ongoing compliance with these requirements, including a timeframe to correct the identified issues.
4. Within 24-hours of completion of the upgrades/improvements needed to ensure compliance with the treatment technique requirements for turbidity and *Giardia* inactivation, East Dunkard Water Authority shall provide water at the entry point to the distribution system that meets the turbidity and log inactivation requirements of 25 Pa. Code Section 109.202. Additionally, East Dunkard Water Authority shall increase and maintain the free chlorine residual at the entry point to at least 1.5 mg/L but no greater than 4 mg/L until receiving written permission from DEP to reduce it.
5. Within 24 hours of restoring a continuous supply of safe and potable water to the distribution system, East Dunkard Water Authority shall flush the improperly treated water from affected storage tanks and the distribution system. When flushing, the water supplier shall not violate the Clean Streams Law by discharging chlorinated water to storm drains, streams or any other water of the Commonwealth as that term is defined in 35 P.S. Section 691.1.
6. Once the corrective actions noted above are completed, East Dunkard Water Authority shall collect and analyze the number of daily total coliform samples specified in the "Policy for Issuing and Removing Water Supply Warnings" (No. 383-2129-005) (copy attached) for the population affected [6 samples per day based upon the population of 4,200] until results from the samples collected on two (2) consecutive days are negative for coliforms. Results of these daily samples shall be reported to DEP by East Dunkard Water Authority within one (1) hour of notification of the analytical results from the accredited laboratory. East Dunkard Water Authority shall email the sample results to the Department within 1-hour of receipt to ra-epswsdw@pa.gov.
7. East Dunkard Water Authority shall maintain the Tier 1 PN until receiving written permission from DEP to lift it, which shall not occur until the Department has determined that the East Dunkard Water Authority has adequately demonstrated that appropriate monitoring and treatment standards are being met for water entering the distribution system and coliform samples over two consecutive days demonstrate the absence of coliform bacteria.
8. The water supplier shall issue a "Problem Corrected" Tier 1 PN in accordance with 25 Pa. Code Section 109.408(b)(5) as soon as possible, but no later than 24 hours after the corrective actions have been completed and the notice is approved by the Department.

EXHIBIT 4

NOTICE OF APPEAL RIGHTS

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD AT 717-787-3483 FOR MORE INFORMATION.

The undersigned person hereby acknowledges receipt of this order and any attachment(s) hereto. This signature does not constitute an acknowledgement that any or all of the violations listed above have occurred or continue to occur.	Department Representative (Name & Title - Please Print) John W. Thomas, Environmental Group Mgr. Telephone Number: (412) 442-4209
Received by: emailed to Tracy Pekar (tjpekar@yahoo.com)	Department Representative's Signature:

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☐ White – Water Supplier ☐ Yellow – District Office ☐ Pink – Litigation ☐ Goldenrod – Central Office

APPENDIX

B

EXHIBIT 4

3800-FM-WSFR0007 Rev. 8/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-52-1627-032

LOCATION	MUNICIPALITY	COUNTY
2790 South Eighty-Eight Road / Dilliner, PA 15327	Dunkard Township	Greene

PERSON TO WHOM ORDER IS DIRECTED	TELEPHONE NUMBER
East Dunkard Water Authority	(724) 943-3713

MAILING ADDRESS
PO Box 241 / Dilliner, PA 15327

NAME AND TITLE OF PERSON SERVED	DATE ORDER SERVED
Tracy Pekar, Vice-Chair	March 11, 2022

The Commonwealth of Pennsylvania, the Department of Environmental Protection ("Department"), has made the following Findings of Fact:

1. The Department is the agency with authority to administer and enforce the Pennsylvania Safe Drinking Water Act, the Act of May 1, 1984, P.L. 206, No. 43, 35 P.S. §§721.1-721.19 ("SDWA"), and Section 1917-A of the Administrative Code, the Act of April 9, 1929, P.L. 177, as amended, 71 P.S. §510-17, and the regulations of the Environmental Quality Board adopted pursuant thereto.
2. The person named above to whom this order is directed ("Recipient") owns and/or operates a public water system at the location identified above.
3. The undersigned authorized representative of the Department conducted an inspection of the public water system identified above on March 11, 2022.
4. The operation of this water system with the violation(s) identified in this Order is a violation of the Sections of the Department's regulations cited herein and the SWDA and constitutes a public nuisance under Section 12 of the SDWA, 35 P.S. §721.12.
5. Section 13 of the SDWA, 35 P.S. §721.13, provides that the Department may assess a civil penalty of up to Five Thousand Dollars ($5,000.00) per day for each violation of the SDWA.

Description of Violation:

The water treatment plant experienced a breakdown in treatment on March 10, 2022, as indicated by individual filter effluent turbidities on filters 1, 2, and 4 exceeding 1.0 NTU (as high as 3.93 NTU) beginning at approximately 9 PM on March 10, 2022. The increased turbidity water entered the clearwell and was not properly flushed by draining the clearwell prior to pumping water into the Griffin tank and distribution system. This data is indicative of a breakdown of adequate filtration treatment to ensure that public health is protected and a failure to provide and effectively operate and maintain public water system facilities.

Location of Violation:

East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:

25 Pa. Code §§ 109.4(2), 109.4(3), and 109.4(4)

☐ White – Water Supplier ☐ Yellow – District Office ☐ Pink – Litigation ☐ Goldenrod – Central Office

3800-FM-WSFR0007 Rev. 8/2008

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER *(continuation)*

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-52-1627-032

Description of Violation:

An employee who operates the East Dunkard Water Treatment Plant, but is not a certified operator, informed the Department that the non-certified plant staff that were present at the water treatment plant during the turbidity treatment breakdown were making process control decisions without either following standard operating procedures or without East Dunkard's Certified Operator's knowledge/approval.

Location of Violation:

East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:

25 Pa. Code §§ 109.4(2), 109.4(3), and 109.4(4)

Description of Violation:

The public water supplier failed to comply with Field Order 22-52-1627-029, issued on January 25, 2022, which required that the "East Dunkard Water Authority shall not operate the water treatment plant without the presence of: a) a Certified Operator, b) staff operating under Standard Operating Procedures written by the Certified Operator, or c) staff operating the facility while consulting with the Certified Operator whenever process control decisions are being made."

Location of Violation:

East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:

Section 13(a) of the Pennsylvania Safe Drinking Water Act, 35 P.S. § 721.13

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DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER *(continuation)*

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-52-1627-032

Description of Violation:
The public water supplier failed to notify the Department within one (1) hour of the high turbidity results, which indicated a breakdown in treatment.

Location of Violation:
East Dunkard Water Treatment Plant

Provisions of Regulation, Statute or Permit Violated:
25 Pa. Code §§ 109.701(a)(3) and 109.408(b)(2)

Description of Violation:

Location of Violation:

Provisions of Regulation, Statute or Permit Violated:

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DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF SAFE DRINKING WATER

FIELD ORDER *(continuation)*

(PLEASE PRINT AND PRESS FIRMLY)

SYSTEM NAME	PWS ID No.	CASE NUMBER
East Dunkard Water Authority	5300012	22-52-1627-032

Pursuant to Sections 5, 10 and 12 of the SDWA, 35 P.S. §§721.5, 721.10 and 721.12; and Section 1917-A of the Administrative Code of 1929, 71 P.S. §510-17, it is hereby ordered that the owner shall perform the corrective actions listed below within the designated time.

Corrective Action/Abatement Schedule Required:

1. Effective immediately upon receipt of this Field Order, East Dunkard Water Authority shall not operate the water treatment plant without the presence of: a) a Certified Operator, b) staff operating under Standard Operating Procedures written by the Certified Operator, or 3) staff operating the facility while consulting with the Certified Operator whenever process control decisions are being made.
2. As soon as possible, but no later than 24 hours after receipt of this Field Order, the public water supplier shall issue a Tier 1 public notification (PN) in the form of a Boil Water Advisory to all persons served by the East Dunkard Water Authority public water system in accordance with the provisions of 25 Pa. Code Sections 109.407, 109.408 and 109.411. Copies of the Tier 1 PN along with the certification form shall be submitted to the Department within ten (10) days of issuance in accordance with 25 Pa. Code Section 109.701(a)(4). The public water supplier shall maintain the Tier 1 PN until the Department notifies the public water supplier in writing that the Boil Water Advisory may be lifted.
3. Within 24 hours of receipt of this Field Order, East Dunkard Water Authority shall investigate and address the causes of the increases in filtrate turbidity. East Dunkard Water Authority shall provide the Department with a summary of necessary improvements to restore and ensure ongoing compliance with these requirements, including a timeframe to correct the identified issues.
4. As soon as possible, but no later than 24 hours after receipt of this Field Order, East Dunkard Water Authority shall provide water at the entry point to the distribution system that meets the turbidity requirements of 25 Pa. Code Section 109.202. Additionally, East Dunkard Water Authority shall increase and maintain the free chlorine residual at the entry point to at least 1.5 mg/L, but no greater than 4 mg/L, until receiving written authorization from the Department to reduce it.
5. Within 24 hours of restoring a continuous supply of safe and potable water to the distribution system, East Dunkard Water Authority shall flush the improperly treated water from affected storage tanks and the distribution system. When flushing, the water supplier shall not violate the Clean Streams Law by discharging chlorinated water to storm drains, streams or any other water of the Commonwealth as that term is defined in 35 P.S. Section 691.1.
6. Once the corrective actions noted above are completed, East Dunkard Water Authority shall collect and analyze the number of daily total coliform samples specified in the "Policy for Issuing and Removing Water Supply Warnings" (No. 383-2129-005) (copy attached) for the population affected [6 samples per day based upon the population of 4,200] until results from the samples collected on two (2) consecutive days are negative for coliforms. Results of these daily samples shall be reported to DEP by East Dunkard Water Authority within one (1) hour of notification of the analytical results from the accredited laboratory. East Dunkard Water Authority shall email the sample results to the Department within 1-hour of receipt to ra-epswsdw@pa.gov.
7. East Dunkard Water Authority shall maintain the Tier 1 PN until receiving written authorization from DEP to lift it, which shall not occur until the Department has determined that the East Dunkard Water Authority has adequately demonstrated that appropriate monitoring and treatment standards are being met for water entering the distribution system and coliform samples over two consecutive days demonstrate the absence of coliform bacteria.
8. The water supplier shall issue a "Problem Corrected" Tier 1 PN in accordance with 25 Pa. Code Section 109.408(b)(5) as soon as possible, but no later than 24 hours after the corrective actions have been completed and the notice is approved by the Department.

EXHIBIT 4

NOTICE OF APPEAL RIGHTS

Any person aggrieved by this action may appeal, pursuant to Section 4 of the Environmental Hearing Board Act, 35 P.S. Section 7514, and the Administrative Agency Law, 2 Pa. C.S. Chapter 5A, to the Environmental Hearing Board, Second Floor, Rachel Carson State Office Building, 400 Market Street, P.O. Box 8457, Harrisburg, PA 17105-8457, 717-787-3483. TDD users may contact the Board through the Pennsylvania Relay Service, 800-654-5984. Appeals must be filed with the Environmental Hearing Board within 30 days of receipt of written notice of this action unless the appropriate statute provides a different time period. Copies of the appeal form and the Board's rules of practice and procedure may be obtained from the Board. The appeal form and the Board's rules of practice and procedure are also available in Braille or on audiotape from the Secretary to the Board at 717-787-3483. This paragraph does not, in and of itself, create any right of appeal beyond that permitted by applicable statutes and decisional law.

IF YOU WANT TO CHALLENGE THIS ACTION, YOUR APPEAL MUST REACH THE BOARD WITHIN 30 DAYS. YOU DO NOT NEED A LAWYER TO FILE AN APPEAL WITH THE BOARD.

IMPORTANT LEGAL RIGHTS ARE AT STAKE, HOWEVER, SO YOU SHOULD SHOW THIS DOCUMENT TO A LAWYER AT ONCE. IF YOU CANNOT AFFORD A LAWYER, YOU MAY QUALIFY FOR FREE PRO BONO REPRESENTATION. CALL THE SECRETARY TO THE BOARD AT 717-787-3483 FOR MORE INFORMATION.

The undersigned person hereby acknowledges receipt of this order and any attachment(s) hereto. This signature does not constitute an acknowledgement that any or all of the violations listed above have occurred or continue to occur.	Department Representative (Name & Title - Please Print) John W. Thomas, Environmental Group Mgr. Telephone Number: (412) 442-4209
Received by: emailed to Tracy Pekar, Authority Vice-Chair at tjpekar@yahoo.com	Department Representative's Signature:

Page 5 of 5 Pages

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EXHIBIT 5

AMENDMENT 4 TO THE ASSET PURCHASE AGREEMENT BEWTEEN PENNSYLVANIA-AMERICAN WATER COMPANY AND EAST DUNKARD WATER AUTHORITY

FOURTH AMENDMENT TO ASSET PURCHASE AGREEMENT

DATED NOVEMBER 22, 2024

THIS FOURTH AMENDMENT TO ASSET PURCHASE AGREEMENT ("Fourth Amendment") is made as of the 22nd day of November, 2024, by and between the EAST DUNKARD WATER AUTHORITY, a municipal authority organized and existing under the laws of the Commonwealth of Pennsylvania, having a mailing address of P.O. Box 241, 2790 South Eighty Eight Road, Dilliner, Pennsylvania ("**Seller**"), and Pennsylvania-American Water Company, a corporation organized and existing under the laws of the Commonwealth of Pennsylvania, with a business address of 852 Wesley Drive, Mechanicsburg, PA 17055 ("**PAWC**") (Seller and PAWC are alternatively referred to hereafter individually as "Party" and collectively as the "Parties").

RECITALS:

WHEREAS, Seller and PAWC entered into that certain Asset Purchase Agreement dated as of July 23, 2023, as amended by that First Amendment dated as of November 3, 2023 and that Second Amendment dated January 25, 2024 and that Third Amendment dated June 13, 2024 (the "Agreement"); and

WHEREAS, Seller and Buyer desire to amend certain provisions of the Agreement to become effective upon the date of this Fourth Amendment; and

WHEREAS, the Seller and Buyer desire to reaffirm all other provisions of the Agreement not specifically amended by this Fourth Amendment; and

WHEREAS, capitalized terms not otherwise defined in this Fourth Amendment have the meaning ascribed to such terms in the Agreement.

NOW, THEREFORE, for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Parties to this Fourth Amendment, intending to be legally bound, agree as follows:

1. Article 9.1(r) of the Agreement is deleted in its entirety.

2. All other provisions, terms, and conditions of the Agreement not specifically amended by this Fourth Amendment remain in full force and effect. Seller and Buyer reaffirm the Agreement as amended by this Fourth Amendment.

3. Neither Party to this Fourth Amendment may assign any right or delegate any performance under this Fourth Amendment without the prior written consent of the other Party. A purported assignment or purported delegation without prior written consent is void.

4. The laws of the Commonwealth of Pennsylvania (without giving effect to its conflicts of law principles) govern all matters arising and relating to this Fourth Amendment, including torts.

5. This Fourth Amendment may be executed in any number of counterparts which, taken together, is one and the same agreement. This Fourth Amendment becomes effective when it has

been executed by each Party and delivered to both Parties. To evidence the fact that it has executed this Fourth Amendment, a Party may send a copy of its executed counterpart to the other Party by electronic transmission. Such Party is deemed to have executed and delivered this Fourth Amendment on the date it sent such electronic transmission. In such event, such Party shall forthwith deliver to the other Party an original counterpart of this Fourth Amendment executed by such Party.

IN WITNESS WHEREOF, the Parties have duly executed this Fourth Amendment on the date first written above.

EAST DUNKARD WATER AUTHORITY

By: _____

Printed: _____

Its: _____

PENNSYLVANIA-AMERICAN WATER COMPANY

By: 

Printed: Justin Ladner

Its: President

3. Neither Party to this Fourth Amendment may assign any right or delegate any performance under this Fourth Amendment without the prior written consent of the other Party. A purported assignment or purported delegation without prior written consent is void.

4. The laws of the Commonwealth of Pennsylvania (without giving effect to its conflicts of law principles) govern all matters arising and relating to this Fourth Amendment, including torts.

5. This Fourth Amendment may be executed in any number of counterparts which, taken together, is one and the same agreement. This Fourth Amendment becomes effective when it has been executed by each Party and delivered to both Parties. To evidence the fact that it has executed this Fourth Amendment, a Party may send a copy of its executed counterpart to the other Party by electronic transmission. Such Party is deemed to have executed and delivered this Fourth Amendment on the date it sent such electronic transmission. In such event, such Party shall forthwith deliver to the other Party an original counterpart of this Fourth Amendment executed by such Party.

IN WITNESS WHEREOF, the Parties have duly executed this Fourth Amendment on the date first written above.

EAST DUNKARD WATER AUTHORITY

By: Jerry Dorsey

Printed: Jerry Dorsey

Its: Chairman

PENNSYLVANIA-AMERICAN WATER COMPANY

By: _____

Printed: _____

Its: _____

EXHIBIT 6

MULTIPLE DWELLINGS ON ONE METER BILLING COMPARISON

.

	As Billed by East Dunkard				Pro Forma Tariff			
Address	Usage (Gallons)	Water Charges	Pennvest Charge	Total Amount Billed	Service Charge	Usage (100 Gallons)*	Usage Charge	PAWC would bill
432 Mapletown Road	3802	67.31	17.54	84.85	35.04	38	1.31	84.82
165 School Bus Road	1421	36.12	17.54	53.66	35.04	14	1.31	53.38
0 Holbert Stretch Road	11936	173.86	17.54	191.40	35.04	119	1.31	190.93
273 Holbert Stretch Road	10690	157.54	17.54	175.08	35.04	107	1.31	175.21
132 Sigsbee Road	16360	251.82	17.54	269.36	55.04	164	1.31	269.88

*PAWC bills in 100 gallons increments. For illustrative purposes, usage amounts shown are rounded to the nearest 100 gallons.

EXHIBIT 7

PENNSYLVANIA-AMERICAN WATER COMPANY FIVE-YEAR CAPITAL PLAN FOR EAST DUNKARD WATER AUTHORITY

Investment Project (IP) Budget Estimate

	2024	2025	2026	2027	2028	
IP Level CAPEX	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
Distribution System						
Distribution system CAP implementation		$ 308,944	$ 308,944			$ 617,888
Priority main replacements	$ 300,000	$ 875,000	$ 150,000			$ 1,325,000
Remote Stations (Tanks/Boosters) SCADA Replacement			$ 1,080,000			$ 1,080,000
Production facilities						
Plant SCADA replacement	$ 765,000					$ 765,000
Filter Corrective Action Plan improvements	$ 250,000					$ 250,000
Clarifier Corrective Action Plan improvements	$ 250,000					$ 250,000
Chemical feed system T2 improvements & CL2 gas elimination			$ 1,000,000	$ 1,000,000		$ 2,000,000
Plant intake improvements		$ 162,500	$ 162,500			$ 325,000
Install permanganate feed system		$ 125,000	$ 125,000			$ 250,000
Total Yearly IP CAPEX	**$ 1,565,000**	**$ 1,471,444**	**$ 2,826,444**	**$ 1,000,000**	$ -	**$ 6,862,888**

Recurring Project (RP) Budget Estimate

	2024	2025	2026	2027	2028	
RP Level CAPEX	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Total**
A - Mains - New						
B - Mains - Replaced / Restored				$ 1,500,000	$ 1,500,000	$ 3,000,000
C - Mains - Unscheduled	$ 75,000	$ 75,000	$ 50,000	$ 40,000	$ 40,000	$ 280,000
D - Mains - Relocated		$ 170,000		$ 120,000		$ 290,000
E - Hydrants, Valves, and Manholes - New	$ 35,000	$ 35,000	$ 35,000	$ 40,000	$ 40,000	$ 185,000
F - Hydrants, Valves, and Manholes - Replaced	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 75,000	$ 375,000
G - Services and Laterals - New	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 15,000	$ 75,000
H - Services and Laterals - Replaced	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 35,000	$ 175,000
I - Meters - New	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 5,000
J - Meters - Replaced				$ 90,000	$ 90,000	$ 180,000
K - ITS Equipment and Systems	$ 20,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 24,000
L - SCADA Equipment and Systems		$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 100,000
M - Security Equipment and Systems		$ 260,000				$ 260,000
N - Offices and Operations Centers		$ 70,000				$ 70,000
O - Vehicles	$ 315,000					$ 315,000
P - Tools and Equipment	$ 165,500	$ 127,000	$ 71,000	$ 71,000	$ 71,000	$ 505,500
Q - Process Plant Facilities and Equipment	$ 1,046,125	$ 500,000				$ 1,546,125
R - Capitalized Tank Rehab & Painting	$ 98,000	$ 257,300	$ 398,800	$ 348,500	$ 525,000	$ 1,627,600
S - Engineering Studies	$ 120,050	$ 200,000				$ 320,050
Total Yearly RP CAPEX	**$ 2,000,675**	**$ 1,846,300**	**$ 706,800**	**$ 2,361,500**	**$ 2,418,000**	**$ 9,333,275**
Total Yearly IP and RP CAPEX	**$ 3,565,675**	**$ 3,317,744**	**$ 3,533,244**	**$ 3,361,500**	**$ 2,418,000**	**$ 16,196,163**

EXHIBIT 8

PENNSYLVANIA-AMERICAN WATER COMPANY
SYSTEM EVALUATION AND IMPROVEMENT PLAN
DATED JULY 22, 2024

EAST DUNKARD WATER AUTHORITY
SYSTEM EVALUATION AND IMPROVEMENTS PLAN
JULY 22, 2024

1. BACKGROUND

On February 8, 2024, the Pennsylvania Commonwealth Court ("Court") issued an Order appointing Pennsylvania-American Water Company ("PAWC") as a Receiver for the East Dunkard Water Authority ("Authority") and the Authority's property, facilities and assets, including the East Dunkard Public Water System ("System").

Paragraph 5(e) of the Order requires PAWC to conduct an evaluation of the System; identify deficiencies in the System's physical conditions, facilities and operational procedures; identify and prepare a plan of capital and operational procedures; identify and prepare a plan of capital and operational improvements to: (i) improve System performance and compliance with applicable law, (ii) address or anticipate the obsolescence of portions of the System, (iii) reduce the cost of operating the System, (iv) provide cost savings or efficiency innovations to the System, or (v) comply with existing or anticipated changes to applicable laws and regulations; and report the results of such evaluation to the Court, the Pennsylvania Department of Environmental Protection ("Department"), the Pennsylvania Public Utility Commission ("Commission")and Authority ("the Improvements Plan").

Paragraph 5(f) of the Order further requires that the capital and operational improvements be designated in terms of their regulatory classification. As defined in the Order, "Department Mandated Improvements" are those reasonably required to bring the System into compliance and maintain compliance with requirements of the Pennsylvania Safe Drinking Water Act and regulations and other applicable environmental, health and safety laws, and "Commission Approved Projects" are those additional improvements identified in the Improvements Plan as reviewed and approved by the Commission.

This document provides the System Evaluation and Improvements Plan required by the Order. Section 2 references the previously-reported conditions found and actions taken as reported in the 60-Day Initial Status Report and the 2nd Quarter Status Report. Section 3 discusses the nomenclature used in this report for the timing and regulatory classification of the improvements, as well as the nature of the associated benefits. Section 4 describes the results of the System Evaluation and presents the future capital and operational improvements that will comprise the ongoing Improvements Plan.

2. 60-DAY INITIAL STATUS REPORT & 2ND QUARTER STATUS REPORT

Paragraph 5(t) of the Order required PAWC to submit an initial status report within sixty (60) days of assuming operations, and then quarterly thereafter. PAWC met this requirement by submitting the 60-day Initial Status Report on April 8, 2024 and the 2nd Quarter Status Report on July 3, 2024. These reports provided a description of the conditions of the System found upon assumption of Receivership operations by PAWC on February 9, 2024

and the corrective actions taken through the first 60 days of Receivership and the 2nd quarter of 2024, respectively. For brevity, those previously reported findings and accomplishments are not repeated in this report, but are incorporated herein by reference.

The next quarterly status report (3rd Quarter 2024) will provide an update on the System conditions and further actions taken in that timeframe, as well as a description of any progress on the future capital and operational improvements presented in this Improvements Plan.

3. NOMENCLATURE

This section describes the nomenclature used in this Improvements Plan regarding the timing and regulatory classification of improvements and the nature of associated benefits.

3.1 Timing of Improvements

PAWC's evaluation has identified improvements that range in importance from critical compliance/safety items that need to be done in the short-term to operational efficiency/design improvements that have a longer lead time. PAWC has made numerous corrective actions already under the Receivership[1], and will continue to do so for the critical short term items. The longer term improvements will take more time, likely beyond the term of the Receivership. These longer term improvements are expected to be undertaken by PAWC after closing of the July 23, 2023 Asset Purchase Agreement between PAWC and the Authority, should such closing occur. For the purposes of this report, the following designations are used for the timing of the improvements:

- "*RECEIVER*", indicating a short-term improvement to be initiated and/or completed during the term of the Receivership; and
- "*POST CLOSE*", indicating a long-term improvement to be initiated after closing of the acquisition transaction.

3.2 Regulatory Classification

For the purposes of this report, the following designations are used for the regulatory classification of the improvements:

- "DEP MANDATED", indicating a Department Mandated Improvement, as defined in Section 1 above; and
- "PUC APPROVED", indicating a Commission Approved Project, as defined in Section 1 above.

[1] See details in the 60-day Initial Status Report dated April 8, 2024.

3.3 Nature of Benefits

The Court Order specifies that the operational and capital improvements in the Improvements Plan be classified according to the nature of their benefits. For purposes of this report, the following designations are used for the nature of the benefits:

- "A", improve System performance and compliance with applicable law;
- "B", address or anticipate the obsolescence of portions of the System;
- "C", reduce the cost of operating the System;
- "D", provide cost savings or efficiency innovations to the System; or
- "E", comply with existing or anticipated changes to applicable laws and regulations.

4. SYSTEM EVALUATION & IMPROVEMENTS PLAN

This section describes the results of PAWC's System Evaluation and identifies deficiencies in the System's physical conditions, facilities and operational procedures that still need to be remedied. This section is organized in the following order of components of the System: (4.1) Physical Assets; (4.2) Operational Procedures; (4.3) Compliance Program; and (4.4) Safety Program.

4.1 Physical Assets

PAWC has observed and evaluated the physical assets of the System. The sections below describe the condition of each group of assets, the deficiencies found and the planned improvements.

4.1.1 Water Treatment Plant Facility

The water treatment plant is capable of producing drinking water that meets state and federal regulations, however there are numerous design deficiencies and opportunities for treatment and reliability improvements at the facility.

4.1.1.1 Raw water intake: The plant has a single intake structure with no redundancy and a manual bar screen that is susceptible to clogging with debris. When the intake screen is clogged, a manual bypass pumping operation is set up and divers are used to manually dislodge the debris. During high river flows, the use of divers is restricted due to safety concerns. To improve reliability and safety, a new intake with state-of-the-art dual passive screens with automatic back flushing capability is needed.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B,D***

4.1.1.2 Pre-oxidation: There are no provisions for pre-oxidation of iron and manganese in the treatment process. This can lead to poor removal of these contaminants in the treatment plant and their subsequent precipitation in the distribution system, leading to water quality complaints. In the short term, PAWC is improving the chlorine feed system to be able to feed for pre-oxidation. However use of pre-chlorine can contribute to higher levels of disinfection by-products. A long-term solution utilizing a permanganate feed system is needed.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A***

4.1.1.3 Liquid chemical feed units: The existing liquid chemical feed pumps for polyaluminum chloride (coagulant), sodium hydroxide (pH adjustment) and polyphosphate-orthophosphate blend (corrosion control) were single units with no redundancy and were in poor condition. These liquid chemical feed systems do not meet industry best practices nor American Water's design standards. To provide immediate relief, PAWC replaced the current pump units with new skid-mounted, dual diaphragm pump units for improved reliability and redundancy. In the long term, the liquid chemical storage and feed systems need to be completely replaced with state-of the-art facilities incorporating the latest Department design guidelines and American Water standards.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B***

4.1.1.4 Chlorine gas feed system: The chlorine gas feed system is in poor condition, has no redundancy and lacks required safety features. PAWC obtained an emergency permit from the Department to make short-term improvements for safety and reliability, and is in the process of installing the new equipment.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

Chlorine gas is a toxic gas that presents a safety risk to employees and the local community in the event of a gas leak. A long term solution replacing the toxic gas with a safer liquid sodium hypochlorite feed system is needed.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B***

4.1.1.5 Clarifier: The clarifier is operating adequately and producing good settled water quality. However, questions remain about the condition of the structure and equipment beneath the water surface, and effective management of the solids blanket in the unit is still a work in progress. When conditions allow, PAWC plans to do a controlled plant shutdown where the clarifier can be emptied, removed of all solids and thoroughly inspected. This process may identify future long-term improvements that would improve

the condition or operation of this unit.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = TBD[2]***

4.1.1.6 Settled water valve: This valve controls the flow between the clarifier and filter units. The valve does not fully close when necessary and needs to be replaced. This valve will be replaced with a new valve and electric actuator as part of the Phase II Plant Improvements Project ("Phase II project") under the Greene County Community Development Block Grant ("CDBG"). A permit application for the Phase II project was submitted to the Department on April 19, 2024, and the Department issued the Construction Permit (No. 3024505MA) on June 18, 2024.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

4.1.1.7 Filter valves, piping & instrumentation: The Phase II project includes several upgrades to remedy design deficiencies in the filter operations: (1) The 26 valves controlling the water flow through the filter units have pneumatic actuators. The actuators are aging and are prone to operational mishaps due to the pneumatic controllers. Each actuator will be replaced with electric powered actuators which are more reliable and require less maintenance, and each actuator will be connected to the Supervisory Control and Data Acquisition ("SCADA") System. (2) The four individual filter units currently have no means to measure the incoming flow, filtered flow, or filter-to-waste flow rates, all of which are valuable parameters to control filter operations. The project will include the installation of these 3 flow meter types on each of the filter units. (3) The filtration unit currently has no means to monitor the Combined Filter Effluent ("CFE") turbidity readings. This will be remedied by modifying the filtered water piping to provide a representative CFE sampling point, installing a tap and common service saddle and corporation, and installing a new Lovibond turbidimeter that will continuously monitor CFE turbidity. (4) The settled water turbidimeter and the four Individual Filter Effluent ("IFE") turbidimeters are based on outdated technology and are no longer supported by their manufacturer (HACH). The project will include replacement of each turbidimeter with a new, state-of-the-art, Department-approved unit manufactured by Lovibond. (5) The filter units currently have no means to monitor the loss of head through each unit, another very important parameter for filter operation control. The project will include the installation of a differential pressure gauge on each filter that is connected to SCADA to provide real-time loss of head data.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

[2] To be determined.

4.1.1.8 Plant finished water monitoring: There is currently no means to monitor the pH of the finished water leaving the plant, resulting in poor operational control of the sodium hydroxide feed system. Additionally, the finished water chlorine residual analyzer is an outdated instrument. The Phase II project will include the installation of two pH probes, one to continuously monitor the clearwell prior to chemical addition, and another on the high service piping to continuously monitor pH of water leaving the plant. A new HACH CL17sc chlorine residual analyzer will be installed to replace the outdated model.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

4.1.1.9 Plant clearwell: The Department has previously noted during inspections that the plant clearwell does not have a means to drain the contents. This can become important if the treatment process is impaired and off-specification water in the clearwell needs to be wasted quickly. This is a longer term project that will be considered once the Phase II project is completed.

- ***Timing = POST CLOSE, DEP MANDATED = None, Benefits = A***

4.1.1.10 Plant entry point: The Griffin water tank serves as the entry point location for the water system. There is a dedicated transmission main between the plant and Griffin tank, from which no customer service connections are tapped. Disinfection contact time ("CT") is achieved in the clearwell and transmission main prior to the tank. The entry point to the system is currently on the effluent pipe from the tank. A continuous chlorine residual analyzer is in place at this location to monitor chlorine concentration and associated CT value. There is currently no means to automatically shut down water flow into the system at the entry point if the chlorine concentration or CT value goes below regulatory standards. There is also no means to take the Griffin tank out of service for routine inspection and maintenance. Finally, the entry point water quality monitoring instrumentation is located in a below-grade vault that is not easily accessible.

Based on Department guidance, the entry point will need to be redesignated to the influent pipe of the tank, in order to provide a location for an automatic shutdown on loss of minimum chlorine residual or CT that would not result in a depressurization of the distribution system. The Phase II project will address these deficiencies as follows: (1) a new valve with an automated electric actuator in a new valve vault will be installed on the 10-inch transmission main entering the Griffin tank and connected into the SCADA system; (2) new manually operated valves and bypass piping will be installed

to allow the tank to be taken out of service easily; (3) a new above-ground building enclosure will be constructed to house the new water quality analyzer (Depolox 400M) and the relocated SCADA system panel from the existing vault; and (4) SCADA programming will be done to ensure that the automated valve shuts down flow into the Griffin tank if regulatory parameters are not met at the new entry point analyzer.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B,D***

4.1.1.11 Plant potable water supply: PAWC discovered that the plant's potable water supply was tapped off the plant's 10-inch transmission main rather than the 6-inch distribution main as originally believed. The tap location is before the point on the 10-inch main where regulatory disinfection and CT requirements are met for Giardia log inactivation, thereby making the plant water supply not potable. PAWC immediately advised all employees that the water was not for human consumption, posted all sinks at the plant as "non-potable water" and is providing bottled water to employees until a permanent solution can be made. Plans are being made to relocate the tap location to the 6-inch distribution main in front of the plant.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.1.1.12 Plant laboratory: The laboratory facility at the plant is in poor condition. A project is proceeding with funding under the CDBG to make several improvements to the laboratory, including new countertops and cabinets, new fume hood, and new analytical equipment.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,D***

4.1.1.13 Plant SCADA system: The process control system architecture consists of a top-level High Tide SCADA system communicating with individual Process Logic Controllers ("PLC") located at the raw water pump station, the high service pump station, the filtration units, several online water quality analyzers, and the remote boosters stations and storage tanks. The system is operable, but the technology is dated, difficult to maintain and is not compatible with PAWC's statewide SCADA platform. In the long term, PAWC will plan to replace all of the PLCs and SCADA components with new technology that is compatible with PAWC's platform.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B,D***

4.1.1.14 Plant wastewater facilities: The plant has a single membrane-lined wastewater lagoon that accepts all of the plant wastewater, including sludge blowdowns from the clarifier, filter backwash water, and filter-to-waste water. The lagoon was reconstructed in 2014 and is adequately serving its intended purpose of settling solids from the wastewater prior to discharge to

the Monongahela River under National Pollutant Discharge Elimination System Permit ("NPDES") No. PA0021971. However, there is currently no safe means to obtain samples of treated effluent required by the permit. A project is proceeding with funding under the CDBG to install a floating ramp/dock on the lagoon to allow safe access to the sampling point.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,D***

Furthermore, the process for removal of sludge from the lagoon is time consuming and costly. Because there is only one lagoon, the solids must be removed while the lagoon remains in service. This requires removal of the sludge in liquid form which is an inefficient process. In the long term, plans should be made to evaluate the current facility and identify potential opportunities to improve the efficiency of the process through capital and/or operational modifications.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,C,D***

4.1.2 Water Distribution System

The distribution system consists of approximately 230 miles of water mains; associated valves and hydrants; customer services and meters; six booster pump stations; and ten finished water storage tanks.

4.1.2.1 Water mains: The water mains are primarily C900 polyvinyl chloride ("PVC") in composition, with some limited areas of asbestos-cement ("AC") pipe as well. The only known metallic pipe in the system is a 10-inch ductile iron section of the transmission main that runs from the plant to Griffin tank. Many of the leaks that PAWC has discovered have been on the customer service connections to the PVC main pipes. It is suspected that these connections will continue to be a source of leaks in the future. Work to understand the priority areas for improvement in the water main system is ongoing.

At this time, the highest priority main replacement that has been identified is the approximately 2,000 feet section of 10-inch ductile iron transmission main. The Authority believes that the lining of this pipe might have been damaged at the connection point back in 2012 during treatment plant upgrades. This coincides with the beginning of the discolored water customer complaints; therefore the Authority believes this pipe section could be contributing to the problem. Plans are underway to investigate options for replacing this section of the transmission main.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B***

4.1.2.2 Distribution system valves, hydrants and blowoffs: The distribution system is made up of relatively small main pipes that serve a remote service area. In many areas of the system, the pipes terminate at dead-ends with little or no pipe looping in the system. As a result, it is very difficult to carry out a comprehensive flushing program to remove sediment from the system and maintain good water quality.

Updated system mapping in Geographic Information System ("GIS") format has been prepared by the Authority's consultant as a funded project under the CDBG. The second phase of this project will be the identification of additional valve, hydrant and blow-off locations needed in the distribution system to improve operational reliability and flushing ability, and the installation of these components. GIS mapping will be updated accordingly. The design work for this portion of the project is underway.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,D***

4.1.2.3 Distribution system pump stations: The distribution system includes six (6) remote pump stations that serve higher gradients in the service area. Basic information on the pump stations is shown below in Table 1.

Table 1 – Pump station information

NAME	CAPACITY[a]	AGE	CONDITION	EMERGENCY POWER
Bald Hill	60	Older	Poor	No
Bealls Run	unknown[b]	Older	Poor	No
Davistown	100	Newer	Fair	Yes
Laurel Run	51	Older	Fair	No
Rocky Hollow	300	Newer	Good	Yes
Willow Tree[c]	200	Newer	Good	Yes

a) Gallons per minute.
b) Station is very small.
c) Station has a rechlorination facility that is not used.

PAWC has reviewed Department documents, including the Sanitary Survey report dated September 9, 2021, and conducted a field assessment of each station to identify operational and/or design deficiencies. Results for each station are presented below.

(1) Bald Hill Pump Station: This is an older station in poor condition. It is also situated very close to a public roadway with little protection from vehicle accidents (see photos).

Short-term needs include replacement of both pumps, and repair SCADA

communication issues. PAWC has secured an emergency permit from the Department to replace the pumps at the station. The new pumps were ordered and received from the manufacturer and plans are currently being made to retain a contractor to install them. SCADA work will proceed once the pumps are replaced.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

Long-term needs include installation of check valves; installation of security fencing and concrete-filled bollards for protection; installation of an additional fire hydrant to allow temporary pump-around in case of pump station outage; addition of a connection for a portable generator; and installation of new SCADA platform equipment . Eventually this station should be replaced in a new location with a facility that is designed to meet current Department regulations..

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B,C***

(2) Bealls Run Pump Station: This is also an older station in poor condition (see photos). Long-term needs include installation of a permanent top and security fencing; installation of an additional fire hydrant to allow temporary pump-around in case of pump station outage; addition of a connection for a portable generator; and installation of new SCADA platform equipment. These improvements will likely be done during the complete replacement of the current facility.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B,C***

(3) Davistown Pump Station: This is a newer station in fair condition (see photos). Short-term needs include replacement of pumps and variable frequency drives, and installation of electric surge protection. These improvements are being planned for 2024 under the CDBG.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

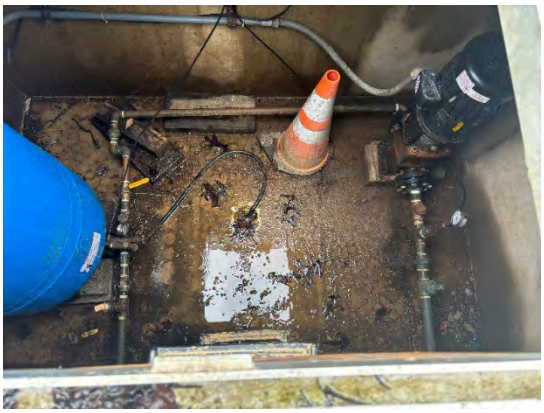
Long-term needs include installation of air release valves; replacement of heater and enclosure; extension of security fence around incoming electrical equipment; access road improvements; and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B***

(4) Laurel Run Pump Station: This is an older station in fair condition (see photos). Long-term needs include replacement of electric service; installation of safety steps; replacement of interior piping; installation of security fencing; installation of an additional fire hydrant to allow temporary pump-around in case of pump station outage; addition of a connection for a portable generator; and installation of new SCADA

platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,B,C***



(5) Rocky Hollow Pump Station: This is a newer station in relatively good condition (see photos). Short-term needs include replacement of variable frequency drives and installation of electric surge protection. These improvements are being planned for 2024 under the CDBG.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

Long-term needs include installation of air release valves, extension of security fence around incoming electrical equipment, and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A***

(6) Willow Tree Pump Station: This is a newer station in relatively good condition (see photos). PAWC has already replaced four (4) failed variable frequency drives to restore station operation. Additional short-term needs include installation of electric surge protection and line reactors. These improvements are being planned for 2024 under the

CDBG.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,B***

Long-term needs include installation of air release valves and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A***

4.1.2.4 Distribution system storage tanks: The distribution system includes eleven (11) water storage tanks. Basic information on the tanks is shown below in Table 2.

Table 2 –Storage tank information

NAME	CAPACITY[(a)]	AGE	CONDITION
Abel	250,000	Older	Poor
Alicia	113,000	Newer	Good
Bald Hill	30,000	Newer	Good
Bobtown	300,000	Newer	Good
Clark (new)	109,000	Newer	Good
Clark (old)	110,000	Older	Poor
Donley	200,000	Older	Poor
Griffin (new)	360,000	Newer	Good
Griffin (old)	360,000	Older	Poor
Sugar Grove (new)	140,000	Newer	Good
Sugar Grove (old)	140,000	Older	Poor

a) Gallons.

The tanks were cleaned and inspected in September 2023 by Aqueous Infrastructure Management ("AIM") under a project funded by the CDBG. PAWC has reviewed the summary report prepared by AIM and the Department's Sanitary Survey report dated September 9, 2021. We also

conducted a field assessment of each tank to identify operational and/or design deficiencies. Results for each tank are presented below.

(1) Abel Tank: This is an older tank in poor condition (see photo). The tank is in need of rehabilitation including painting; installation of a new valve pit; gate/fence replacement and other security improvements; access road improvements; and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP Mandated , Benefits = A,B***

(2) Alicia Tank: This is a newer tank in good condition (see photo). The tank is in need of security enhancements; minor leaks fixed; access road improvements; removal of the old valve pit (safety hazard); and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,D***

(3) Bald Hill Tank: This is a newer tank in good condition (see photo). The tank is in need of security enhancements; overflow pipe modifications; access road improvements; and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,D***

(4) Bobtown Tank: This is a newer tank in good condition (see photo). The tank is in need of security enhancements; electrical service replacement; overflow pipe modifications; site grading and access road improvements; and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,D***

(5) New Clark Tank: This is a newer tank in good condition (see photo). The tank is in need of security enhancements; overflow pipe modifications; access road improvements; and installation of new

SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,D***

(6) Old Clark Tank: This is an older tank in poor condition (see photo). A hydraulic modeling analysis is required to determine if this older tank needs to remain in service along with the new one. If the tank is not needed, it should be decommissioned and removed. If it is needed, the tank should be rehabilitated including painting and related security and SCADA improvements.

- ***Timing = POST CLOSE, Regulatory = TBD , Benefits = TBD***

(7) Donley Tank: This is an older tank in poor condition (see photo). The tank is in need of rehabilitation including painting; installation of a new

valve pit; gate and fence replacement and other security improvements; access road improvements; and installation of new SCADA platform equipment

- ***Timing = POST CLOSE, Regulatory = DEP Mandated , Benefits = A,B***

(8) New Griffin Tank: This is a newer tank in good condition (see photo). PAWC has already improved the access road to this tank. There are short-term improvements planned for the tank under the plant entry point project (see Section 4.1.1.10). No other improvements are needed.

(9) Old Griffin Tank: This is an older tank in poor condition (see photo) that is not currently in service. A hydraulic modeling analysis is required

to determine if there is a need to put this older tank back in service together with the new one. If the tank is not needed, it should be decommissioned and removed. If it is needed, the tank should be rehabilitated including painting.

- ***Timing = POST CLOSE, Regulatory = TBD , Benefits = TBD***

(10) New Sugar Grove Tank: This is a newer tank in good condition (see photo). The tank is in need of security enhancements; overflow pipe modifications; access road improvements; and installation of new SCADA platform equipment.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,D***

(11) Old Sugar Grove Tank: This is an older tank in poor condition (see photo). A hydraulic modeling analysis is required to determine if this older tank needs to remain in service along with the new one. If the tank is not needed, it should be decommissioned and removed. If it is needed, the tank should be rehabilitated including painting, along with related security and SCADA improvements.

- ***Timing = POST CLOSE, Regulatory = TBD , Benefits = TBD***

4.1.2.5 Customer meters: The Badger meters currently in use are approximately 11-12 years old. The Authority has experienced issues with dead batteries on these units and PAWC is also investigating potential issues with stuck/inoperable meters in the customer billing process. Pending the results of our investigation, the customer meters may need to be replaced to ensure accurate customer billing.

- ***Timing = POST CLOSE, Regulatory = TBD, Benefits = TBD***

4.2 Operational Procedures

PAWC has observed and evaluated the operational practices of the System. Many operational improvements have already been implemented, as documented in the 60-day Initial Status Report and 2nd Quarter Status Report. The sections below describe additional operational improvements that have been identified.

4.2.1 Chemical dosing

The most efficient means to feed chemicals at a water treatment plant is to have the chemical feed pumps automatically react to changes in plant flow via the SCADA system ("flow pacing"). The plant's current chemical feed system is not capable of flow pacing. Operators must manually adjust chemical feed pumps

in response to plant flow changes. The new liquid and gas chemical feed pumps being installed by PAWC (Sections 4.1.1.3 and 4.1.1.4) will be capable of flow pacing once installed. PAWC has performed programming to allow the new liquid chemical feed pumps to operate in flow-pace mode. PAWC will do the same programming with the new chlorine gas feed system once it is fully in place.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A,C,D***

4.2.2 Unattended Plant Operation

The Authority has been required to staff the treatment plant 24/7/365 since the Department issued their Administrative Order dated August 25, 2022. Prior to this, the Authority had routinely been running the plant unattended for one or more shifts per day. However, the Department found in their Administrative Order that the plant did not have the requisite alarms, controls and automatic shutdowns needed for unattended operation under the regulations. The requirement to staff the plant full time has put additional strain on the Authority's minimal resources.

Based on the work that has been done to date and the future work planned under the Phase II plant project, PAWC believes that the plant will eventually have all of the features needed to again consider unattended operation. Once all equipment is in place, PAWC plans to assess the plant for its ability to run unattended while meeting all regulatory requirements. Should the assessment prove successful, PAWC would then propose an unattended operations plan to the Department for approval.

- ***Timing = TBD, Regulatory = DEP MANDATED, Benefits = A,C,D***

4.2.3 Purchased water

Since early 2023, the Authority has been purchasing water at considerable expense from the Southwestern Pennsylvania Water Authority. The purchased water was required to serve a portion of the northern service area and was due to equipment failures at the Authority's Willow Tree pump station. PAWC has made improvements to the pump station to restore its operation, as documented in the 60-day Initial Status Report. A portion of the purchased water has already been curtailed and PAWC is planning to make operational changes to shut down the remainder in the near future.

- ***Timing = RECEIVER, Regulatory = None, Benefits = C,D***

4.2.4 Distribution system flushing

As discussed in Section 4.1.2.2, the Authority's distribution system has received customer complaints of poor water quality. During this time, the Authority did not maintain a regular system flushing program. A proactive, unidirectional

flushing program will be key to removing sediment from the distribution system piping and restoring reliably good water quality to customers. Once the capital improvements discussed under Section 4.1.2.2 are complete, PAWC will design a system-wide flushing program using hydraulic modeling and begin implementation.

- ***Timing = TBD, Regulatory = DEP MANDATED, Benefits = A***

4.2.5 Emergency generator reliability

As discussed in the 60-day Initial Status Report, PAWC began a regular preventative maintenance ("PM") program on the System's emergency generators. In addition to regular PM, PAWC plans to perform a series of initial load bank tests on each generator to test their ability to operate effectively under load.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.2.6 Distribution system pump stations

Identified operational improvements at the pump stations include cleaning each facility; clearing brush and vegetation along fence lines; maintaining pump spare parts; exercising gate valves and emergency generators regularly; and maintaining connection to the SCADA system.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.2.7 Distribution system storage tanks

Identified operational improvements at the storage tanks include clearing brush and vegetation along fence lines; installation of water sample taps at the tank's inlet and outlet; regular calibration of the tank level transmitters; and maintaining connection to the SCADA system.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.2.8 Operations & Maintenance Manual and Emergency Response Plan

PAWC will revise and update the Operations & Maintenance Manual and the Emergency Response Plan upon closing of the acquisition.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A***

4.2.9 Non-revenue water ("NRW")

In order to provide a baseline of performance, PAWC will perform a Water Audit Analysis using the American Water Works Association Water Audit Software. If necessary, an NRW improvement program will be prepared following the baseline work.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A,C,D***

4.3 Compliance Program

PAWC has observed and evaluated the compliance program of the System. Many compliance improvements have already been implemented, as documented in the 60-day Initial Status Report and 2nd Quarter Status Report. The sections below describe additional compliance program improvements that have been identified.

4.3.1 SCADA-related

Compliance calculations for CT are currently done manually by the operators. Following the entry point improvements discussed in Section 4.1.1.10, PAWC will endeavor to add SCADA programming that would calculate CT in real-time and tie it into the SCADA alarms and shutdowns.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.3.2 NPDES Permit renewal

As discussed in the 60-day Initial Status Report, the plant's NPDES discharge permit expires May 31, 2024 and the renewal permit application was not submitted to the Department 180 days prior to the expiration date, as required by Department regulations. PAWC prepared the permit renewal application and submitted it to the Department on April 14, 2024. The permit application is currently under Department review.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.3.3 Filter Bed Evaluation ("FBE") program

PAWC submitted the results of the 1st quarter and 2nd quarter 2024 FBE's to the Department. This quarterly program will continue.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.3.4 Comprehensive Monitoring Plan ("CMP")

PAWC is revising the CMP for the System and will submit it to the Department in the 3rd quarter of 2024.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

4.3.5 PFAS[3] Initial Sampling

PAWC collected the first set of PFAS samples in the 1st and 2nd quarters of 2024. This quarterly sampling/testing program will continue.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = E***

[3] Perfluoroalkyl and polyfluoroalkyl substances.

4.3.6 Lead and Copper Rule Revisions ("LCRR")

PAWC is making plans to comply with the lead service line inventory requirement of the LCRR due by October 16, 2024.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = E***

4.3.7 AWIA[4] Risk Assessment

Risk assessment under the AWIA was due by June 30, 2021. PAWC will conduct the risk assessment within 180 days of the closing of the acquisition.

- ***Timing = POST CLOSE, Regulatory = DEP MANDATED, Benefits = A***

4.4 Safety Program

PAWC has observed and evaluated the safety program of the System. Many safety improvements have already been implemented, as documented in the 60-day Initial Status Report and 2nd Quarter Status Report. The section below describes an additional safety program improvement that has been identified.

4.4.1 Electrical arc flash

As discussed in the 60-day Initial Status Report, PAWC has begun to implement an OSHA[5]-compliant electrical arc flash protection program. Remaining work under this program includes data collection, isolation distance calculations, and safety labeling at the Willow Tree pump station and the water treatment plant.

- ***Timing = RECEIVER, Regulatory = DEP MANDATED, Benefits = A***

[4] America's Water Infrastructure Act of 2018.
[5] Occupational Safety and Health Administration.

APPENDIX B

FORM OF ORDER

APPROVING JOINT STIPULATION OF FACTS

BEFORE THE
PENNSYLVANIA PUBLIC UTILITY COMMISSION

Administrative Law Judge
Eranda Vero

In re: Application of Pennsylvania-American Water Company under Section 1102(a) of the Pennsylvania Public Utility Code, 66 Pa. C.S. § 1102(a), for approval of (1) the transfer, by sale, of substantially all of the East Dunkard Water Authority's assets, properties and rights related to its water system to Pennsylvania-American Water Company, and (2) the right of Pennsylvania- American Water Company to begin to offer or furnish water service to the public in Dunkard, and portions of Monongahela, Greene, Cumberland, Perry, and Whiteley Townships, all in Greene County, Pennsylvania.	:	Docket No. A-2024-3049759
In re: Filing by Pennsylvania-American Water Company under Section 507 of the Pennsylvania Public Utility Code, 66 Pa. C.S. § 507, of the Asset Purchase Agreement By and Among East Dunkard Water Authority, and Pennsylvania-American Water Company, as Amended	:	Docket No. U-2024-_____, *et al*.

ORDER APPROVING JOINT STIPULATION OF FACT

On December 3, 2024, Pennsylvania-American Water Company, the East Dunkard Water Authority, the Office of Consumer Advocate, and the Office of Small Business Advocate (collectively, the "Stipulating Parties") filed a "Joint Stipulation of Facts" ("Stipulation") in the above-captioned proceedings. Each of the Stipulating Parties agreed to the veracity of the facts as

listed in **Appendix A** of the Stipulation in order to provide the Pennsylvania Public Utility Commission with the factual basis necessary for rendering a decision in the above-captioned proceeding. The Stipulation is attached to this Order.

As this request is reasonable, it will be granted.

THEREFORE, IT IS ORDERED:

1. That the Stipulation, filed on December 3, 2024, is APPROVED; and

2. The facts listed therein are admitted into the record of these proceedings on the terms and conditions set forth in the Stipulation.

Date: _____

_____
Eranda Vero
Administrative Law Judge

VERIFICATION

I, Michael Salvo hereby state that the facts above set forth above in the attached Joint Stipulation of Facts are true and correct to the best of my knowledge, information and belief, and that I expect to be able to prove the same at a hearing held in this matter. I understand that the statements made herein are made subject to the penalties of 18 Pa. Cons. Stat. §4904 relating to unsworn falsification to authorities.

Michael Salvo, Director, Business Development
Pennsylvania-American Water Company

Dated: December 3, 2024