



## **White Paper: Utilization of Mine Influenced Water for Natural Gas Extraction Activities**

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**Title:** Establishment of a Process for Evaluating the Proposed Use of Mine Influenced Water (MIW) for Natural Gas Extraction.<sup>1</sup>

**Short Title:** Utilization of MIW for Natural Gas Extraction Activities

**Goals:**

1. Promote the voluntary use of MIW by the oil and gas industry and establish a framework in which MIW can be used for natural gas extraction
2. Establish a process for DEP to review and evaluate proposals for use of MIW for natural gas extraction activities

**Background:** Selected DEP staff were divided into work groups tasked with preparing draft materials for review and approval by a DEP executive team. The staff collaborated to develop solutions to technical issues arising from use of MIW for natural gas extraction, such as identifying potential sources of MIW and developing storage options to help make MIW a practicable water source for the industry. Staff also addressed legal issues of liability and permitting requirements, and developed several possible frameworks for using MIW sources for natural gas extraction. Because the use of MIW will necessarily involve the expertise of various DEP programs, issues of program integration and coordination between multiple deputates were resolved in order to establish a process for evaluating proposals.

A draft of this White Paper was made available to stakeholders and interested persons, and DEP held several webinars with interested members of the public to discuss issues and obtain comments on the draft. DEP staff have reviewed those comments and made revisions to this final paper based on those comments.

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<sup>1</sup> Disclaimer: The process and options outlined in this paper are intended to supplement existing requirements. Nothing in the process and options outlined below shall affect statutory or regulatory requirements. The process and options herein are not an adjudication or a regulation. There is no intent on the part of DEP to give the process or options that weight or deference. This document establishes the framework within which DEP will exercise its administrative discretion in the future. DEP reserves the right to deviate from the process and options outlined in this paper if circumstances warrant.

## **I. Establishment of a Process for the Oil and Gas Industry to Utilize MIW**

For purposes of this white paper, MIW may include water contained in a mine pool or a surface discharge of water caused by mining activities that pollutes, or may create a threat of pollution to, waters of the Commonwealth. MIW may also include surface waters that have been impacted by pollutional mine drainage.

This paper outlines: (i) a process for DEP review of proposals to utilize MIW; (ii) possible options for storing MIW used for natural gas extraction activities; and, (iii) potential solutions to address long-term liability issues. DEP is available to any interested parties to discuss potential sites and technical issues, to help structure a project with respect to permitting requirements and liability issues, and to assist with developing partnerships between oil and gas industry representatives and local watershed organizations or other organizations involved in MIW treatment or abandoned mine reclamation efforts.

### **A. Process for DEP Review and Evaluation of Proposals for Use of MIW**

1. An interested party (e.g. oil and gas operator, MIW treatment operator, watershed association) will initiate the evaluation process by identifying a potential MIW source. DEP encourages the use of sources the Department has identified as a priority for treatment. However, any source of MIW may be considered for use in natural gas extraction.

2. Interested parties are encouraged to meet with DEP staff to discuss prospective MIW sources at abandoned or active mine sites and potential methods for obtaining MIW acceptable for use in natural gas extraction.

3. If no data on the water quality of the MIW source is available, the interested party will need to conduct sampling of the MIW at prospective MIW sites and provide sampling data to the Department for use in evaluating any proposal to use MIW for natural gas extraction.

4. If the proposal will involve pumping MIW from an abandoned mine pool, a hydrologic analysis of potential impacts from pumping activities will need to be performed and submitted to the Department for use in evaluating the proposal.

5. The interested party will need to identify its anticipated method of storage and the location of all storage facilities for the MIW used for natural gas extraction.

6. If a discharge of MIW to surface waters will occur as part of the project, the interested party should develop proposed treatment facility options to be reviewed by the Department for consistency with DEP standards as part of the evaluation process. (Note that new treatment facilities may be required to obtain a Water Quality Management Permit prior to construction.)

7. If the project will involve partnering with another entity such as a third-party service company or a nonprofit watershed group, the interested party should provide the Department with a description of the anticipated roles of the parties. Information regarding relevant property rights or leases should be provided to assist with the Department's evaluation of the proposal.

8. Proposals should be submitted with at least the following specific information:
- a. Name of interested party
  - b. Name(s) of oil and gas operators that will be using the MIW for natural gas extraction, if known
  - c. Name of third party service company, if applicable.
  - d. Name of watershed group and/or other non-profit partner, if applicable.
  - e. MIW site location (point(s) of use and/or withdrawal)
  - f. Proposed MIW discharge(s) and/or mine pool(s) to be utilized
  - g. Volume of MIW discharge and/or mine pool to be utilized
  - h. Characterization (chemistry) of MIW discharge or mine pool water (Appendix A parameters should be sampled if proposing storage in a nonjurisdictional impoundment)
  - i. Whether the MIW will be obtained from an existing treatment facility
  - j. Whether treatment of the MIW will be undertaken, and if so what type of MIW treatment is proposed (passive or active treatment). Expected water quality to be produced from the treatment
  - k. Identification of the landowner(s)
  - l. Time frame for use of the MIW
  - m. Classification of the watershed(s) where the MIW will be stored
  - n. Distance from the MIW discharge to the storage facility or end use
  - o. Method of transportation from source to storage and use area and any handling precautions or spill prevention measures
  - p. If withdrawal from a mine pool is proposed, information on the extent of the mine pool, mining history and mine pool recharge rate and an evaluation to determine potential for mine subsidence or impacts to individual water supplies or receiving streams as a result of planned withdrawal
  - q. Identity of any other planned users of the MIW source

The written proposal for use of MIW should be submitted by the interested party to:

Director  
Bureau of Abandoned Mine Reclamation  
PA Department of Environmental Protection  
286 Industrial Park Road  
Ebensburg, PA 15931

Copies of the proposal will be distributed to a selected team of DEP staff for evaluation based on the nature of the proposal. That team would consist of at least two additional staff members from several DEP program areas including the Office of Oil and Gas Management, Water Management and Active and Abandoned Mine Operations, as well as a representative from the Department's Office of Chief Counsel.

The team will notify the interested party shortly after receipt of the interested party's proposal if the proposal package contains all the information necessary for the Department to

properly evaluate the proposal, or if it needs to be supplemented. Once DEP has the necessary information, the staff will evaluate the viability of the proposal from a technical perspective. The review team will make itself available to meet with the interested party to discuss technical issues related to the proposal, as well as permitting requirements and liability issues. The Department's written response to a proposal will specifically address the viability of the source for use in natural gas extraction activities. The response may also include guidance on permits that may be needed, including approvals for water withdrawals from the Susquehanna River Basin Commission, and means of addressing potential long-term liability for treatment of the proposed MIW source.

Basic descriptions of two proposed projects to use MIW for natural gas extraction previously received by the Department are in Appendix B; these are being provided as examples.

## **B. Storage Options for MIW prior to use by the Oil and Gas Industry for Well Development in Natural Gas Operations**

There are several available options for MIW storage prior to use for natural gas extraction.

### **Option 1: Nonjurisdictional Impoundment**

This option would allow operators to store MIW in nonjurisdictional impoundments. See 25 Pa. Code § 105.3(a). In order to store MIW in a nonjurisdictional impoundment, the operator must demonstrate that the MIW will not result in water pollution. 25 Pa. Code § 105.3(a)(3). To make this demonstration, the operator would need to establish that the quality of the MIW being stored prior to use meets the parameters in Appendix A. This option may require changes to the operator's well permit. It may also entail additional requirements in the operator's Water Management Plan regarding the location of such nonjurisdictional impoundments and periodic testing to ensure that the MIW being used continues to meet the parameters of Appendix A. This testing should be conducted at the source prior to storage in the impoundment.

Preliminary storage standards for MIW to be stored in nonjurisdictional impoundments in Appendix A were developed using the parameters from the Environmental Protection Agency's NPDES requirements for mine drainage wastewater characterization, in-stream criteria, drinking water standards, and human health and aquatic life criteria for toxic substances. Parameters not considered a significant constituent of MIW, or covered by other parameters in the table, were removed from the original list of parameters in EPA's NPDES requirements for mine drainage.

### **Option 2: Centralized Impoundment**

This option would allow operators to store MIW in a centralized impoundment dam for oil and gas activities. To construct such an impoundment, an operator is required to obtain a "Dam Permit for a Centralized Impoundment Dam for Oil and Gas Activities." This permit is authorized by 25 Pa. Code Chapter 105 and administered by the Office of Oil and Gas Management. Under this option, an operator would not be required to establish that the source of MIW meets the parameters in Appendix A. This option may require changes to the operator's

well permit or Water Management Plan regarding the storage of MIW in such impoundments. The storage facility must be restored within 9 months of completion of drilling of the last well serviced by the storage facility. See 58 Pa.C.S. § 3216(c).

### **Option 3: On-Site Pits and Tanks**

Operators may store treated or untreated MIW in pits or tanks at the well site where it will be used, in accordance with 25 Pa. Code Chapter 78. Under this option, an operator would not be required to establish that the source of MIW meets the parameters in Appendix A.

### **Option 4: MIW Source**

Some existing treatment facilities for MIW may have polishing ponds or aerobic wetlands as part of the treatment system. These areas could be considered a storage option and used as an access point for the treated MIW water. This option is conditioned on the drawdown of water having no impact on the functions of the wetland or polishing pond. In some situations abandoned mine land pits may be utilized for storage if there is no prior history of contamination. In most cases, these pits are under an obligation by DEP to reclaim them, and the remediation will not be delayed or dismissed because of this activity.

## **C. Potential Solutions to Long-term Liability Issues**

A key concern for anyone considering the use of MIW for natural gas extraction activities is the potential to incur long-term liability for treating a MIW discharge collected and treated for such use. The Clean Streams Law contains broad provisions regarding responsibility of landowners and “land occupiers” to correct conditions on their land which present a danger or pollution to waters of the Commonwealth. 35 P.S. § 691.316. In the mining context, Pennsylvania courts have interpreted the Clean Streams Law as imposing long-term treatment liability on mine operators who pump abandoned mine pools to facilitate active mining operations. Although the mine operator was not responsible for creating the adjacent abandoned mine pool, the act of pumping water from abandoned mine pool to facilitate its new underground mining operation has been determined to create a legal obligation to treat the resulting discharge.

The treatment of MIW is costly and requires staff or volunteers to perform maintenance. One potential solution is the establishment of trust funds to promote the ongoing treatment. This is not something DEP is mandating, but DEP believes discussion should be encouraged between the end users in the oil & gas industry and the MIW treatment plant facility operators, which may be non-profit organizations or government entities.

There are several possible solutions for addressing the potential for long-term liability being incurred by users of MIW for hydraulic fracturing water.

### **Option 1: Environmental Good Samaritan Act Determination**

The project could be structured to fit within the Environmental Good Samaritan Act, 27 Pa.C.S. §§ 8101 et seq. (EGSA). The EGSA provides certain protections from civil liability

under state law to landowners or providers of equipment, materials or services at no charge or at cost for a “water pollution abatement project”—defined essentially as treatment of water pollution on abandoned mine lands or treatment of MIW. The protection provided by the EGSA includes liability for operating and maintaining water pollution abatement facilities constructed as part of an EGSA project. A for-profit company can qualify as an Environmental Good Samaritan under EGSA as long as it meets the criteria in § 8105. (*Note: This section may be modified in the future pending proposed state legislation (SB 1346, 2012.)*)

## **Option 2: Consent Order and Agreement**

Through the use of a Consent Order and Agreement, DEP could agree not to hold the person using MIW for natural gas extraction activities liable for long-term treatment of the MIW source, so long as specific conditions are met by the operator. These conditions would vary, depending on the nature of the project. One goal of the Commonwealth would be to ensure long-term treatment of any MIW discharge after the use of the MIW source for natural gas extraction has ended. As a matter of policy, the Department seeks to develop funding sources that generate funds sufficient to operate and maintain treatment facilities for polluttional sources of MIW. In situations where the Department has already constructed and is operating a treatment system for a targeted MIW source, achieving the Department’s goals may simply involve sale of the treated MIW water to those proposing to use it for natural gas extraction and putting the sale proceeds into a trust fund used to generate sufficient funds to operate and maintain the treatment facility. In situations where treatment facilities must be constructed by the operator proposing to use the MIW source, this may involve ultimate transfer of the treatment facility, either to the department or a non-profit watershed group, at the conclusion of the operator’s need for the MIW.

## **D. Further Support for Use of MIW for Natural Gas Extraction**

The Department will support adoption of polices by the Susquehanna River and Delaware River Basin commissions that will incentivize the use of MIW for natural gas extraction. These may include prioritized reviews of MIW sources, and encouraging operators to first consider available MIW sources prior to seeking freshwater withdrawals. The Department also plans to work with all partners to compile existing inventories of MIW and active mining sources and make the multiple databases available on DEP’s website. If appropriate, a general permit covering the use of MIW for natural gas extraction may be developed; a more long-term solution may involve future revisions to Oil and Gas regulations to directly address the management of MIW for use in natural gas extraction.

## Appendix A

<b>PRELIMINARY RESULTS TABLE STORAGE STANDARDS FOR MIW STORED IN NONJURISDICTIONAL IMPOUNDMENTS</b>		
<b>PARAMETER</b>	<b>Units</b>	<b>MIW STORAGE STANDARDS FOR NONJURISDICTIONAL IMPOUNDMENTS</b>
Alkalinity	mg/L	Minimum of 20 mg/L
Aluminum	mg/L	0.2
Ammonia	mg/L	1.0
Arsenic	µg/L	10.0
Barium	mg/L	2.0
Bromide	mg/L	0.2
Cadmium	µg/L	5.0
Chloride	mg/L	250
Chromium	µg/L	100
Copper	mg/L	1.0
Iron	mg/L	0.3
Lead	µg/L	15
Manganese	mg/L	0.5
Nickel	µg/L	470
pH		6.5-8.5
phenol	µg/L	5.0
Selenium	µg/L	50
Specific Conductance (Conductivity)	µmho/cm	1,000
Sulfate	mg/L	250
TDS	mg/L	500
TSS	mg/L	45
Zinc	mg/L	5.0

Note 1: The above maximum concentrations are standards to qualify for storage in nonjurisdictional impoundments. These are standards for storage, not the level of treatment that may be considered necessary by operators for use of MIW in the well development process for a particular well site. Additional requirements for storage in special protection (HQ and EV) watersheds may be applicable.

Note 2: All metals reported as Total.

# Appendix B

Summaries of proposals received for the use of MIW in hydraulic fracturing.

## Mine Pool Site

A property owner submitted an application to use MIW from a mine pool. The 13-page package included a brief overview followed by responses to the specific information requested in the white paper. Attachments included maps of the mine site and associated flooding, monitoring reports including water characteristics, a diversion well schematic, and a copy of the deed to the property.

The proposal specified the use of 500,000 gallons per day pumping at approximately 700 gallons per minute. Laboratory analysis shows that some treatment might be necessary to raise the pH and reduce sulfates. Options for the treatment of the water include pumping the water into storage trailers and either actively treat the water or leave untreated for the consumer to treat at their drill site, or passive treatment through a limestone diversion well. These options will dictate the type of storage – either water storage trailers or a fresh water impoundment. Distances to either of these options will be no more than 100 yards.

There are no discharges from the mine pool. Use of MIW from the mine pool is anticipated to be over a six to 10 year time period. While the applicant does not have a monitoring plan, they would follow any and all requirements from DEP.

## Third Party Provider

A third party provider submitted an application to use a mine pool as a water source in partnership with an organization that is responsible to contract for the operation of the existing primary treatment plant. Their seven-page application opened with a narrative followed by responses to the questions as specified in the white paper.

The treatment process being proposed will produce water which can be stored in a non-jurisdictional impoundment. It will meet or exceed standards proposed in the draft WMGP-123. The third party provider will provide secondary treatment to meet the requirements of gas customers. This will require additional equipment to be brought to the site.

In order to address low flow conditions for the creek, the pool is pumped at a high rate for nine months to create void space to store water for the remaining three months of the year. During operation, the plant discharges approximately 2,000 gallons per minute. The proposal calls for up to 600 gallons per minute to be split from the influent to the third party provider on an increasing basis for advanced treatment. The rate of pumping will remain the same and no additional parts of the mine will be dewatered. There is no potential for mine subsidence or impacts to individual water supplies. Monitoring of the plant will be on terms agreed to by DEP and the existing trust.