pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION
BUREAU OF MINING PROGRAMS

Standard Operating Procedure (SOP)[1] for District Mining Operations
Hydrologic Assessment and Completion Reports for Underground Coal Mines
SOP No. BMP-010
May 11, 2020

BACKGROUND

In consultation with OSMRE, DMO staff agreed that hydrologic reviews at the time of bond releases for underground coal mining operations should be systematic and thorough. The existing Technical Guidance Document 563-2504-411 Processing Completion Reports for Coal Mining Operations lacked the necessary specificity regarding hydrologic reviews and the information provided by the operator at the time of the review. This SOP supplements that TGD and includes a checklist to be used by staff in the completion process.

OSMRE recommended modeling this process on that of West Virginia's Post Underground Mining Assessment (PUMA) requirements. Most of the additional information required from the PUMA that is not required in the TGD is part of the permit application. This SOP outlines the process of hydrologic review that should take place as part of the bond release process for underground mines.

PROGRAM SPECIFIC PRACTICES

Maps

As part of this completion review, the reviewer confirms that the maps submitted with the bond release request contain the following:

- Topographical features (proposed surface contours if not returned to pre-mining conditions).
- Limits of mining.
- Coal seam elevations and contours.
- Areas of known water inundation.
- Location of all boreholes (both vertical and horizontal).
- Borehole sealing status and anticipated procedures for certifying the closure of remaining open boreholes.
- Piezometer(s)/monitoring points installed for monitoring of the mine pool elevation.
- Adjacent mining operations, including nearby stabilized mine pool elevations and

[1] Disclaimer: The process and procedures outlined in this SOP are intended to supplement existing requirements. Nothing in the SOP shall affect regulatory requirements. The process, procedures and interpretations herein are not an adjudication or a regulation. There is no intent on the part of the Department to give the rules in this SOP that weight or deference. This document establishes the framework within which the Department will exercise its administrative discretion in the future. The Department reserves the discretion to deviate from this policy statement if circumstances warrant.

projected mine pool elevations for active mines.
- Mine barriers.
- Internal barrier widths adjacent to other mine workings, if applicable.
- Outcrop barrier widths.
- Injection well sites.
- Dewatering sites.
- Areas of stream restoration and their status.

Hydrology

Staff should complete the hydrogeologic balance portion of the review within 30 days of receipt. Below are specific items that should be included in the permit files or completion report and reviewed.

A. Monitoring data

- Existing data. New samples may not be necessary for evaluating the bond release request, as long as the appropriate points have been sampled by DMO staff during the last 90 days.
- Evaluation of pollutional trend. The field inspector determines whether a pattern of violations exists and if a pollution trend may be occurring. This information is provided to the main reviewer who may need to take additional actions to either confirm a pollutional trend or no trend.
- Water Loss/Impact Investigations. Any water loss/impact investigations should be reviewed to identify hydraulic connectivity with surrounding water supply wells and Waters of the Commonwealth (I.e., stream, wetlands, lakes, etc.).
- Evaluation of historical water level data from piezometers installed around the facility to identify the pre-mining water level elevation and what effects mining operations had on the local groundwater regime.

B. Streams

- Past stream dewatering events.
- Stream remediation due to subsidence, dewatering, or pollutional events.

C. Post-mining Mine Pool

- Existing mine pool elevation for the facility and any nearby underground mines.
- Anticipated mine pool elevations.
- Determination if the mine pool attained equilibrium and if so how much fluctuation has been observed since equilibrium was established. Ascertain seasonal fluctuations.
- Calculation of the difference be the projected mine pool elevation and the current elevation. If the mine pool has reached equilibrium and the elevation is significantly different from the anticipated elevation, identify possible causes.
- Requirements for monitoring (i.e., frequency of monitoring, number of monitoring locations, etc.).
- Mine pool level maintenance to control artesian or other adverse effects.
- Injection sites.
- Associated injection volumes affecting mine pool elevations.

- Evaluation of all water sources introduced to the mine void.

D. Discharges

- Identification of all seeps or discharges on the down dip end of the mine.
- Descriptions of all groundwater discharge(s) from the permit and associated mining limits.
- All available water data.

E. Previous Mined Areas

- Identification of adjacent, and overlying or underlying mines.
- Hydraulic head calculations reflecting the effects from superjacent, subjacent, and adjacent mining extents.
- Potential barrier interaction between mines.
- Fracture-induced permeability increases from multiple seam and longwall mining.
- Barrier evaluation comparing existing dimensions and potential hydraulic heads to originally approved values in permit.

F. Pump Stations

- Identification of pump stations, pump rates, and water qualities.

The attached checklist can be utilized during the completion of the hydrologic assessment to ensure a through review prior to approval or rejection.

VERSIONS	
Date	Description
05-11-2020	New document

Hydrologic Assessment for Completion Report
Underground Coal Mining
Checklist

COMPANY INFORMATION	
Applicant's Name:	
Operation Name	
Operation Address:	
Permit Number:	
Contact's Name:	
Contact's Phone Number and email address:	

Below is a list of information that must be supplied by the operator or examined from the file and reviewed as part of the hydrologic assessment and completion review process. Significant deficiencies or omissions should be remedied before the completion report can be approved or any bond released. Include remarks on the review in the comments. Indicate if items are satisfactory or if a problem is evident that must be resolved or preclude bond release. Place this document in the permit file associated with this application.

	MAP CONTENT	COMMENTS
☐	Topographical Features	
☐	Limits of Mining	
☐	Coal seam elevations and contours	
☐	Areas of known water inundation	
☐	Location of all vertical and horizontal boreholes	
☐	Piezometer(s)/monitoring points for monitoring of the mine pool	
☐	Adjacent mining operations (active and inactive)	
☐	Adjacent mine pool elevations (stabilized or projected)	
☐	Mine barriers	
☐	Internal barrier widths adjacent to other mine workings	
☐	Outcrop barrier widths	
☐	Injection well sites	
☐	Dewatering sites	
☐	Areas of stream restoration	
☐	AMD treatment system	

HYDROLOGY		COMMENTS
Monitoring Data Review		
☐	Existing data (Locations sampled within previous 90 days)	
☐	Evaluation of pollution trend (i.e., pattern of violations, data trend)	
☐	Water loss/impact investigations review	
☐	Historical water level evaluation	
Streams Review		
☐	Mining-related stream dewatering events	
☐	Stream remediation resulting from subsidence, dewatering or pollution events	
Post-Mining Mine Pool		
☐	Existing mine pool elevations for operation and adjacent mines	
☐	Anticipated mine pool elevation	
☐	Current status of mine pool (i.e., stabilized, increasing, decreasing) and evaluation of season trend (graphs)	
☐	Comparison of current and predicted mine pool elevation	
☐	Requirements for monitoring	
☐	Mine pool level maintenance	
☐	Injection sites	
☐	Associated injection volumes and effect on mine pool elevation	
☐	Evaluation of water sources introduced to the mine void	
Discharges		
☐	Identification of seeps and discharges down dip of mine	
☐	Groundwater discharge(s) from the operation (related to mining limits)	
☐	Review of all available water data	
Previous Mined Areas		
☐	Identification of adjacent and overlying or underlying mines	
☐	Hydraulic head calculations reflecting effects from superjacent, subjacent and adjacent mines	
☐	Potential barrier interactions between mines	
☐	Fracture induced permeability increases from multiple seams and longwall mining	

HYDROLOGY		COMMENTS
☐	Barrier evaluation comparing existing dimensions and potential hydraulic heads to originally approved values	
Pump Stations		
☐	Identification of pump stations, pumping rates and water quality	

Additional Comments:

Reviewers names and date: