Seasonal Recharge and Groundwater Storage in a Below Drainage Mine-pool

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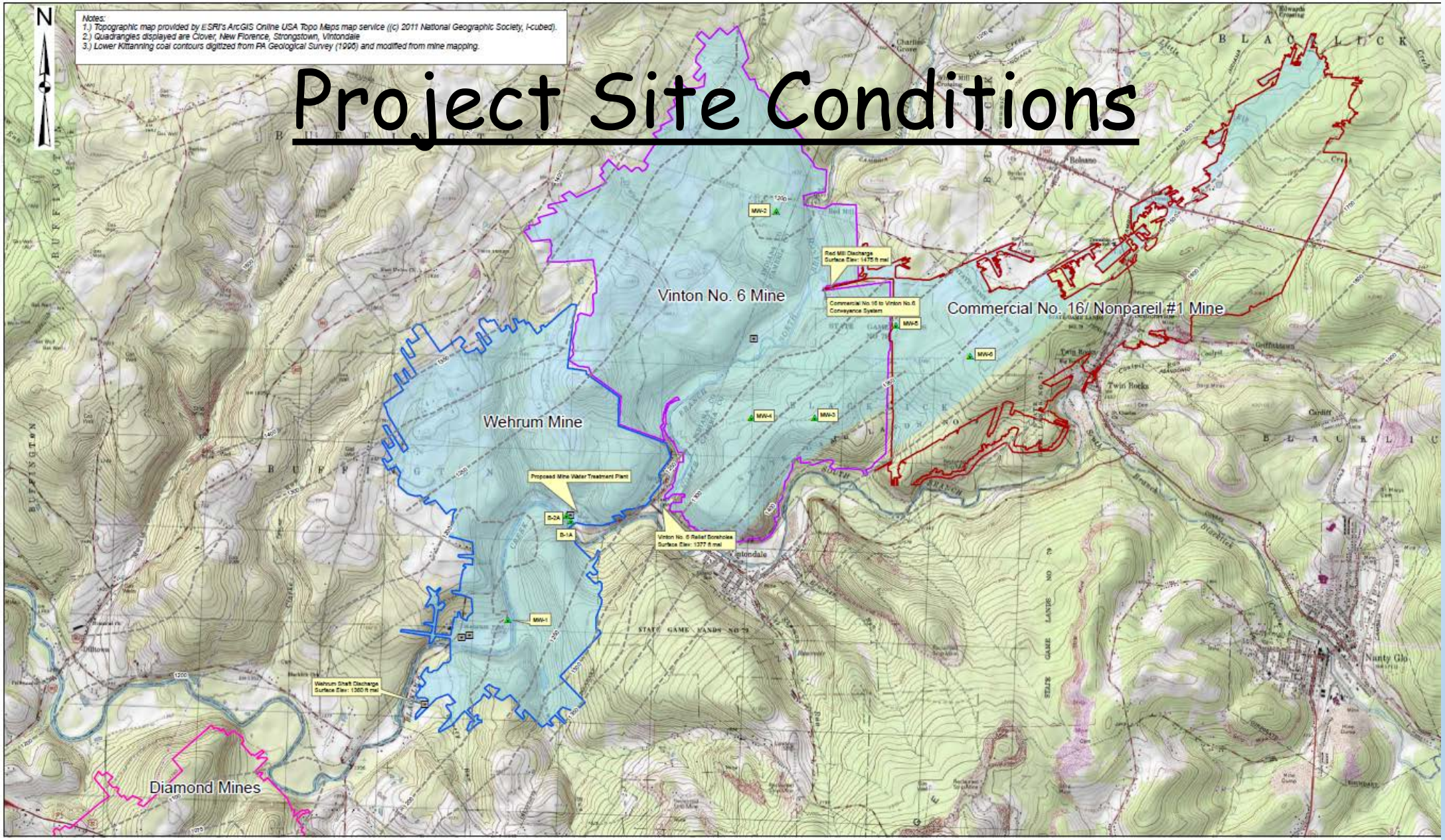
Project Objectives and Constraints

- Overall Objective – Manage discharges from several contiguous abandoned mine-pools that currently degrade Blacklick Creek Pennsylvania watershed.
- Strategy – Collect and convey discharges to a central treatment facility.
- Considerations –
  - Sizing and location of treatment facility
  - Collection and conveyance system
  - Sludge disposal
  - Mine-pool Seasonal Characteristics

Project Site Conditions



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Legend
- PADEP_MW_2016
- shafts
- Approx. Extent of Mine Pool
- Lower Kittanning Bottom of Coal Elevation

Date:	Project No.:	Scale:
January 12, 2017	112C07166	1 inch = 1,500 feet
Drawn by: HAT	Checked by: TAG	0 1,000 2,000 4,000 Feet

BUREAU OF ABANDONED MINE RECLAMATION
BLACKLICK CREEK TREATMENT FACILITY
BLACKLICK, BUFFINGTON, & EAST WHEATFIELD TOWNSHIPS CAMBRIA & INDIANA COUNTIES

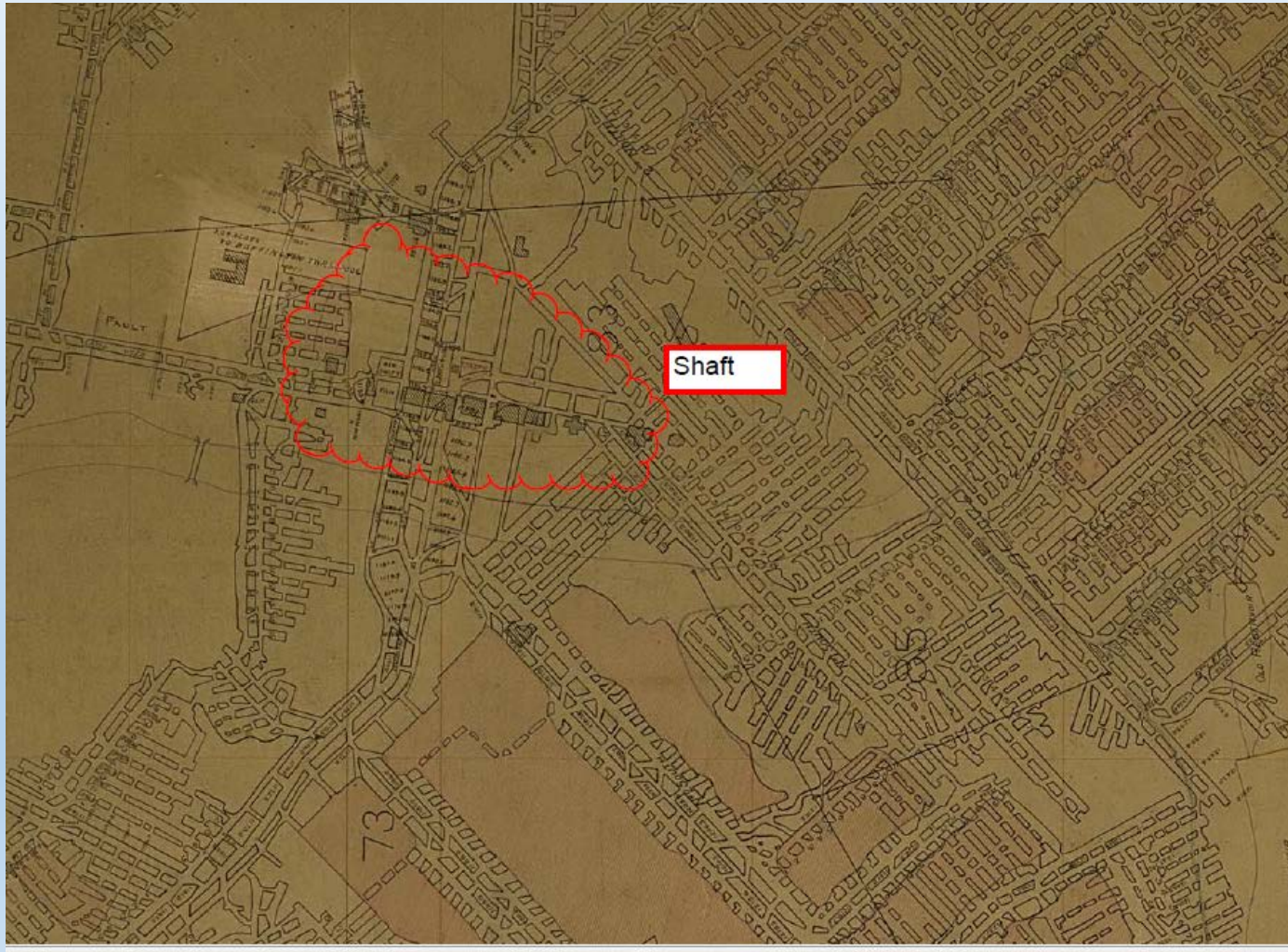
Task No. AMD 32(2246)101.1

PROJECT LOCATION MAP

FIGURE 1

Project Methodology

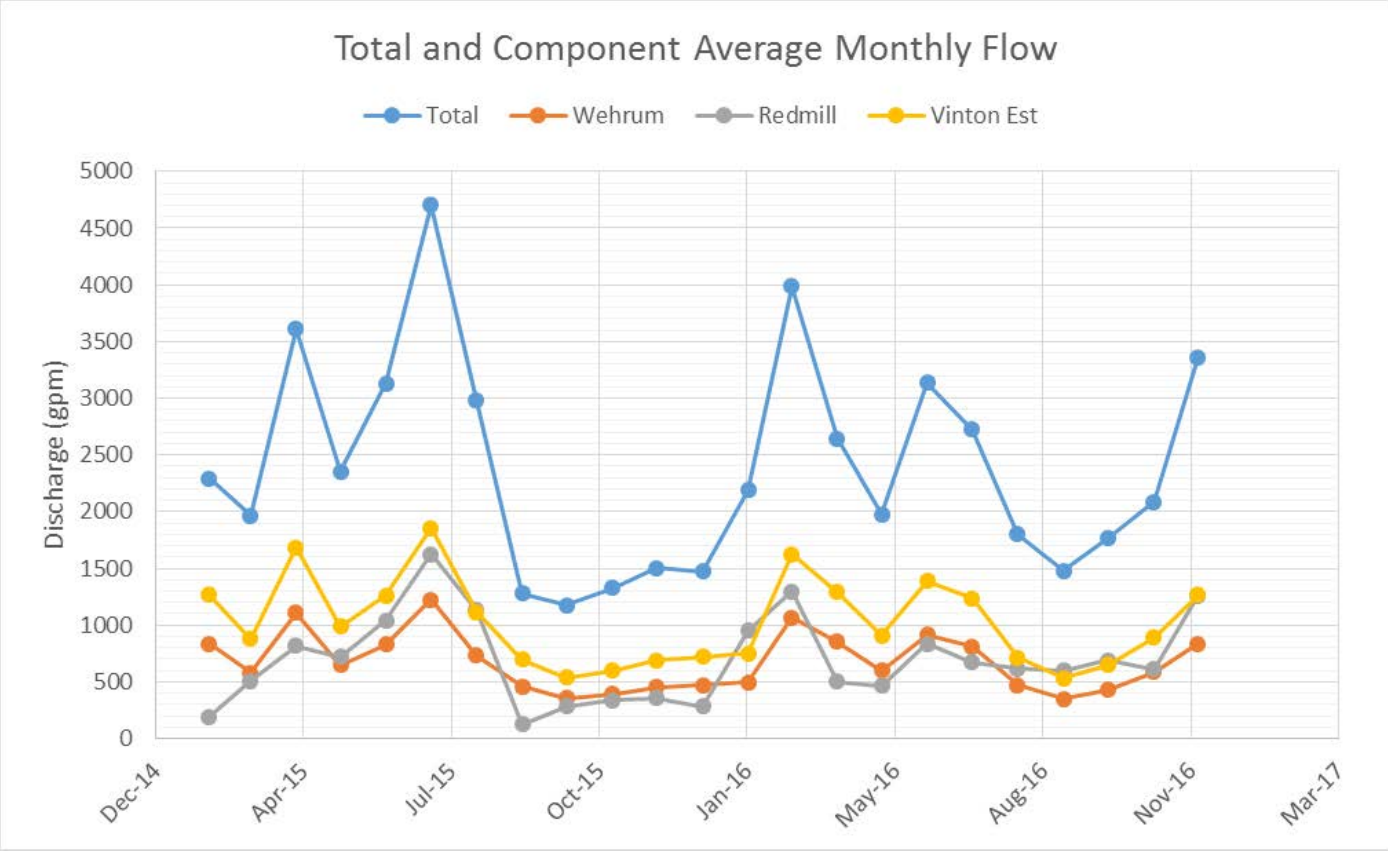
- Instrument Existing Discharges
  - Long term Steady State Conditions
  - Short term and Seasonal Fluctuations
- Mine Maps
- Mine-pool Storage Estimates
- Barrier Leakage and Discharge
- Candidate Sludge Disposal Areas
- Pumps and Facilities

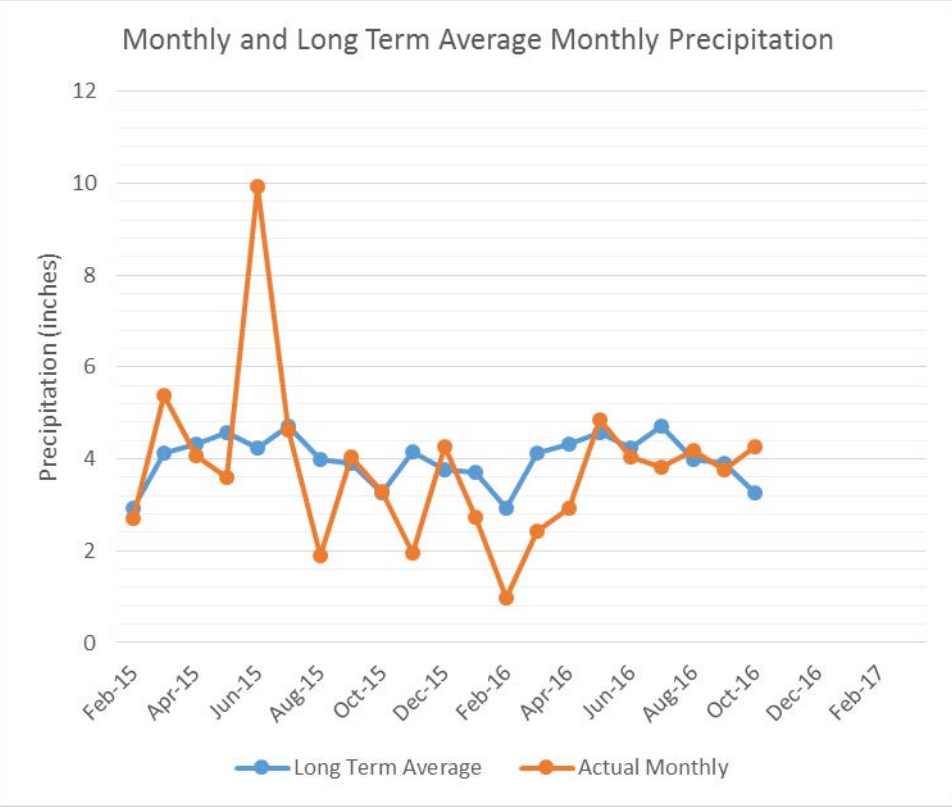


Typical Weir Setup for Discharge Measurements and Wehrum Shaft Artesian Discharge

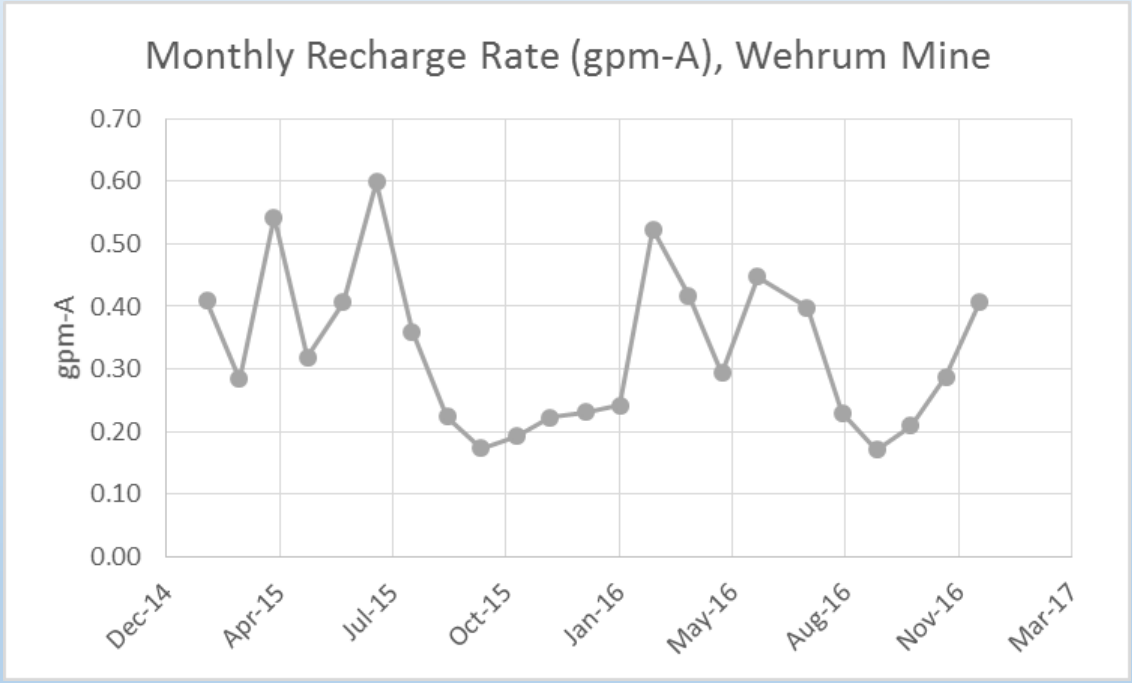
Vinton Mine Discharge - 3 Sisters

Monthly Summary Discharge And Precipitation

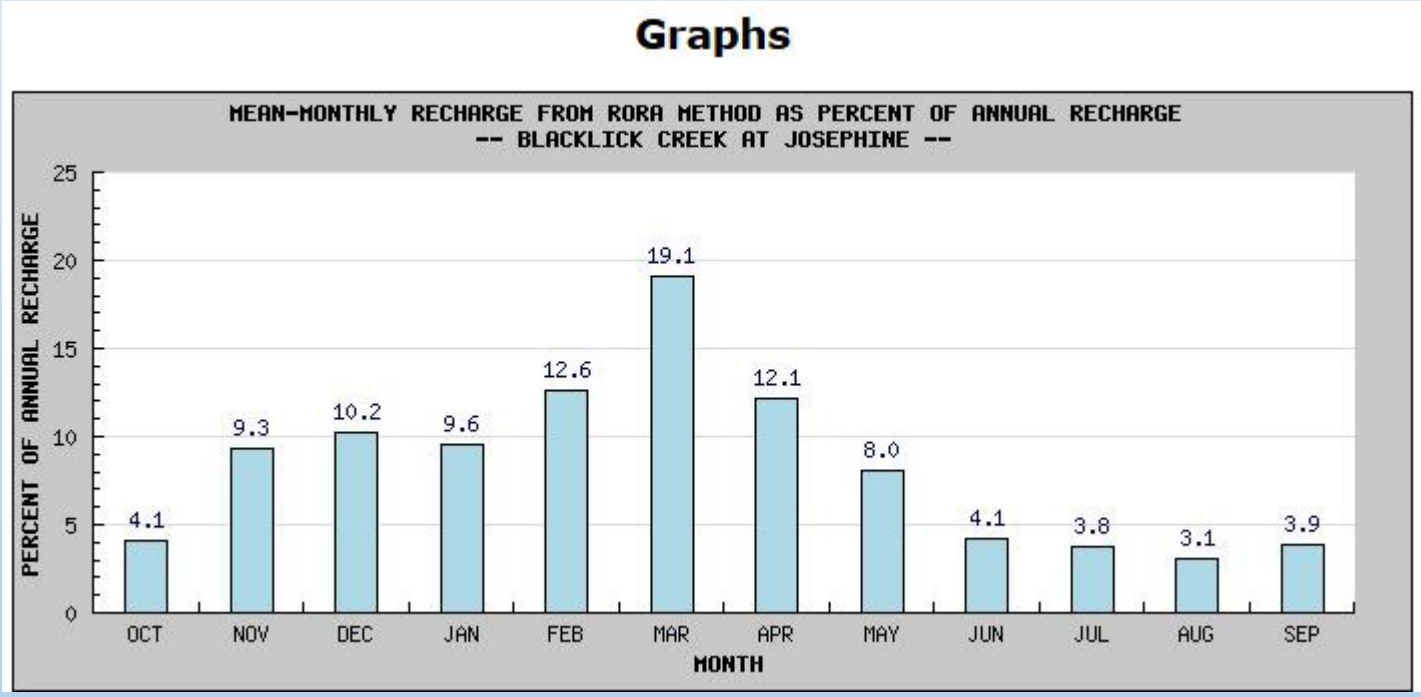




Minepool Recharge and Seasonal Recharge, Blacklick Creek Watershed



Wehrum Mine Data



USGS Recharge Monthly Percent of Total, Blacklick Creek Watershed

Summary Flow/Discharge

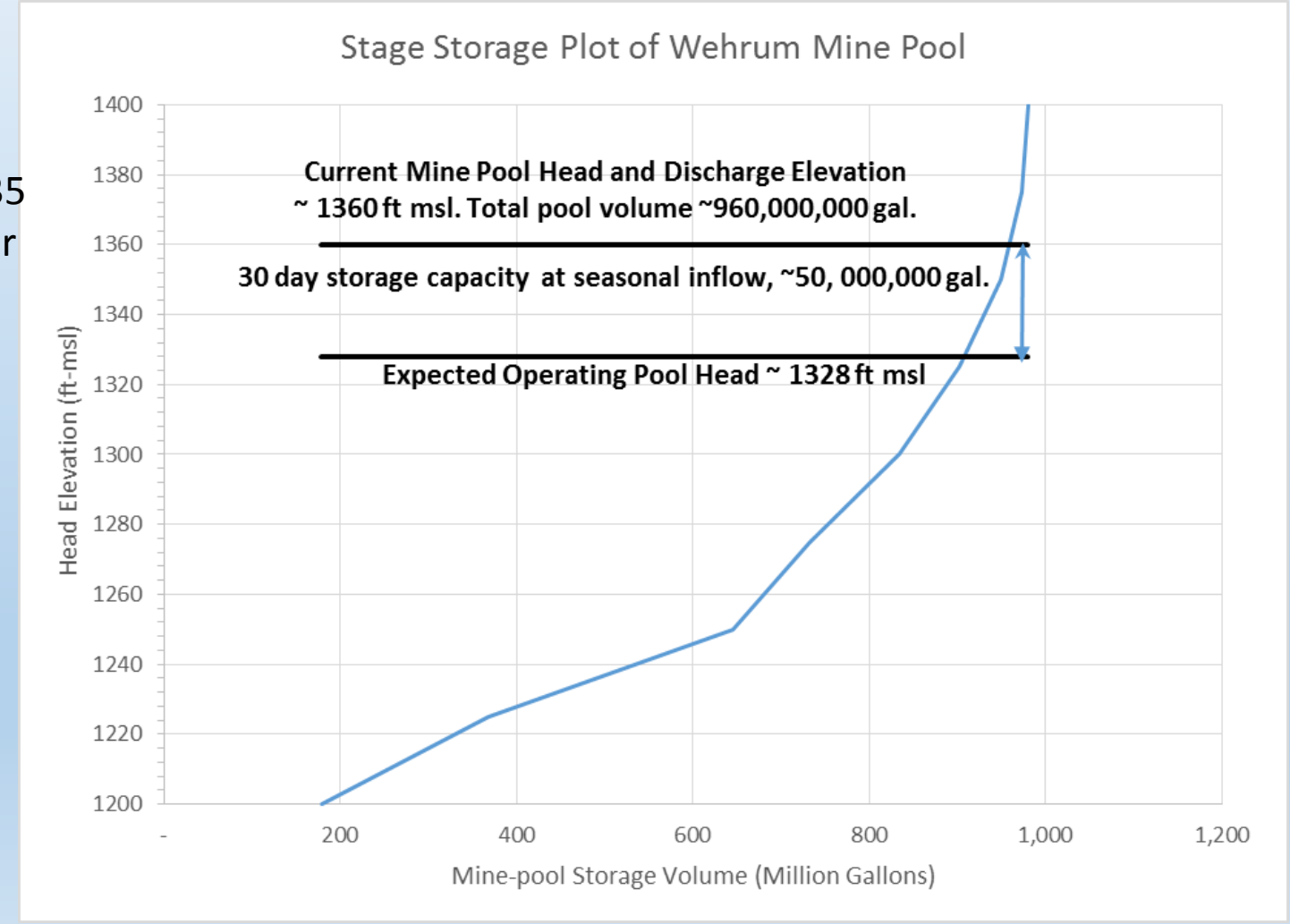
	Units	Wehrum	Vinton No. 6*	Jackson Hill**	Vinton No. 3**	Red Mill (Commercial No. 16)	Vinton Combined Flow	Total Flow to Treatment Plant
Average Flow	gpm	711	1,080	73	157	744	2,054	2,765
75th Percentile	gpm	936	1,422	100	213	975	2,710	3,646
90th Percentile	gpm	1,144	1,738	120	492	1,389	3,739	4,883
Maximum Measured Flow	gpm	2,366	3,595	120	770	2,515	7,000	9,366

Mine-pool Storage Estimates

- Thirty day storage estimates are based on the period of peak seasonal inflow.
- Assume mine-pool is approximately at steady state conditions.
- Unmined areas consist of solid coal and are presumed to have negligible water storage capacity.
- Coal structure contours were generated using elevations recorded on the mine maps and georeferenced accordingly.
- Water storage volume estimates are based on void space calculations. The addition of water stored by compressional effects under fully flooded, confined conditions was neglected as a minor component.

Mine-pool Storage Estimates

Vinton mine requires 135 million gallon storage for 30 day inflow.



Mine-pool will remain mostly flooded

Findings and Recommendations

- Seasonal recharge varies by a factor of 2x to 3x
- Conservative estimation of recharge rates are similar to “rule of thumb” values for mine inflow in similar geology.
- Mine-pool management includes provision to maintain available storage to accommodate 30 day of recharge at peak seasonal inflow
- *Treatment plant and extraction pumps should be sized accordingly to manage seasonal inflow.*
- Drawdown schedule should recognize potential for subsidence.
- Work on-going, specifics subject to revision.

Questions?

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