

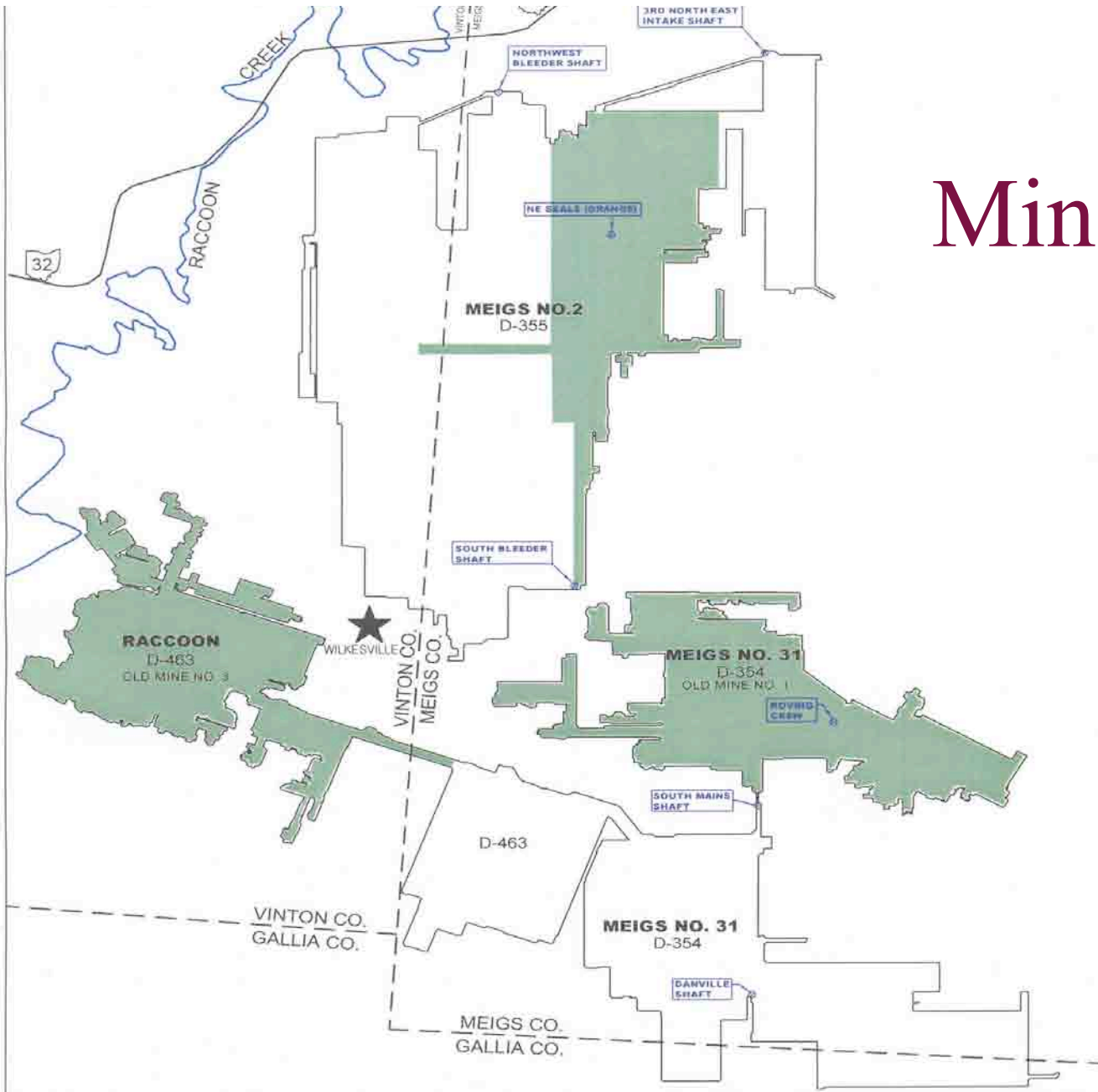
Meigs Mine Pool Complex

Hydrologic affects and
early flooding conditions

December 6, 2007

ARC

Mine Plan



LEGEND

- Room and Pillar
- Lonewall



MINE FOOT PRINT AND PLAN

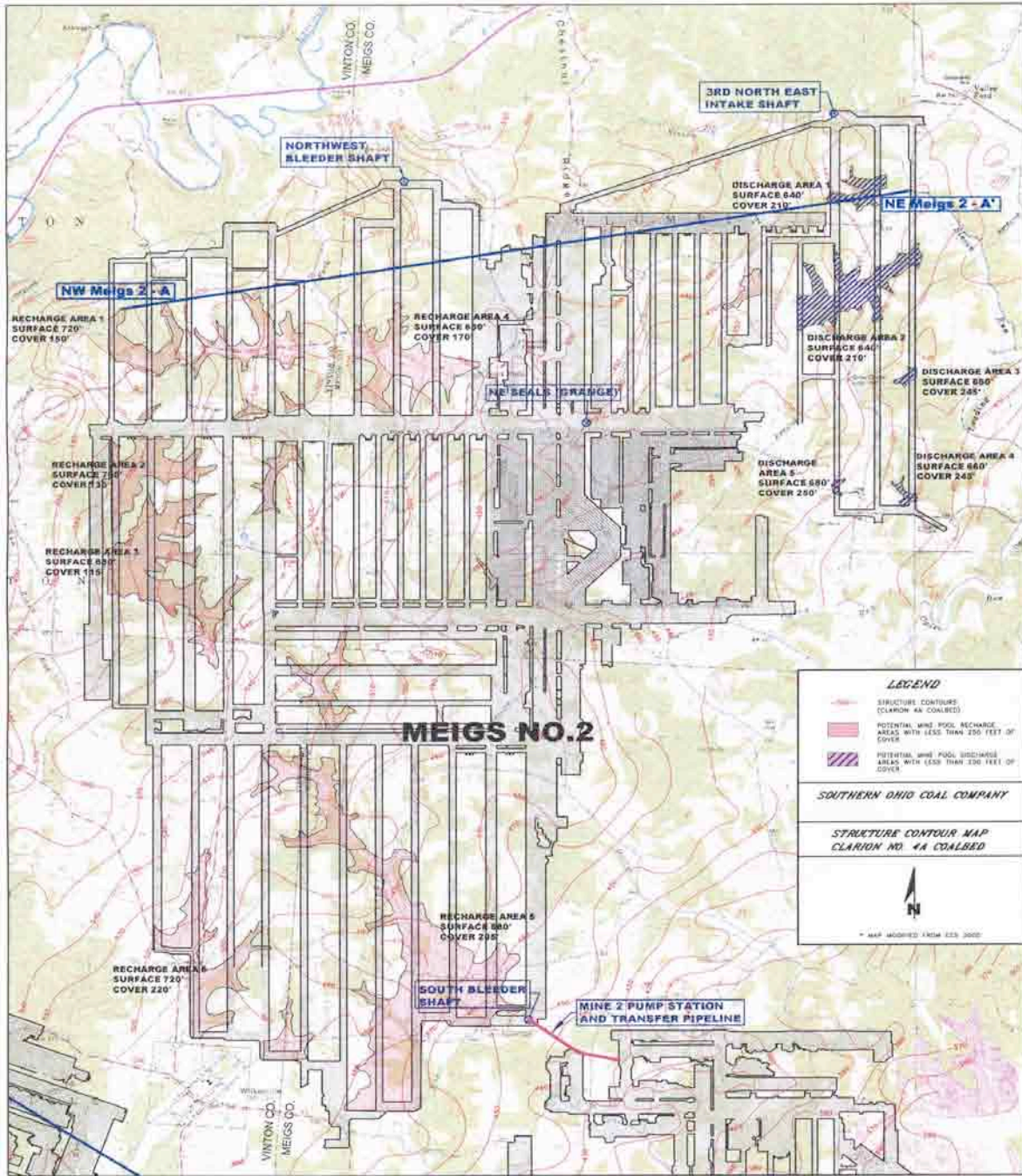
Southern Ohio Coal Company
Meigs Mine No. 2, Meigs Mine No. 3 and
Raccoon Mine

Factoids

- Mining for room and pillar began in 1972
- Permitted in 1984 and 1985
- Foot print of mine is 23,500 acres (37.6 sq mi)
- Land surface is rural with forests and agriculture
- Currently mine pool not yet being pumped
- Shadow area drains into the Raccoon Creek and Leading Creek watersheds

Hydrology

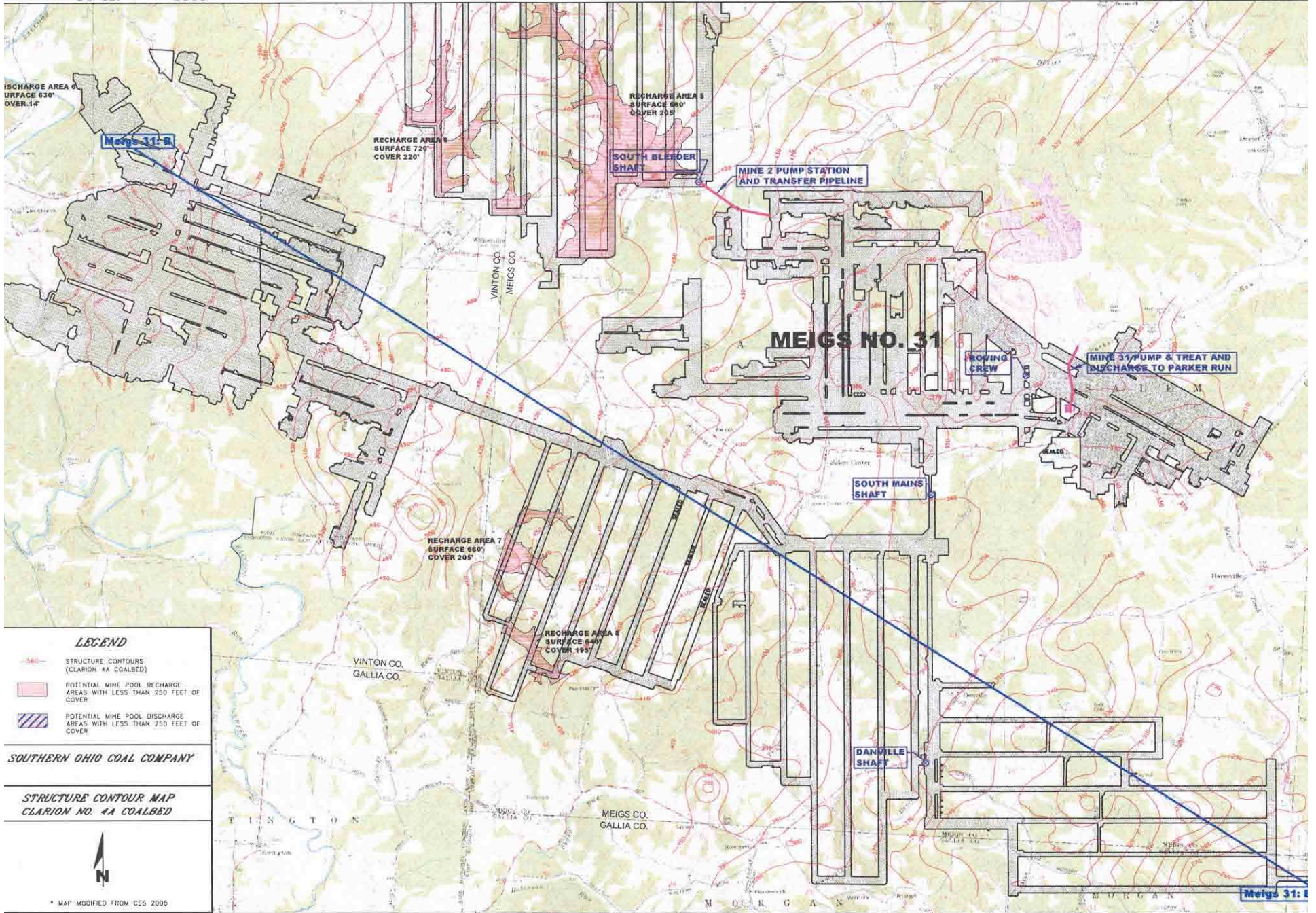
- Coal dips at 30 ft/mi. to the South East
- Mine complex below drainage up to western side at Raccoon Creek (611 ft msl)
- 1350-ft of unmined ground between Meigs 2 and 31
- Meigs 31 and Raccoon hydrologically connected
- No limestone strata over Meigs 2
- Vanport LS strata over Meigs 31



Meigs 2 map



MEIGS NO. 31 MINE



LEGEND

- STRUCTURE CONTOURS (CLARION 4A COALBED)
- POTENTIAL MINE POOL RECHARGE AREAS WITH LESS THAN 250 FEET OF COVER
- POTENTIAL MINE POOL DISCHARGE AREAS WITH LESS THAN 250 FEET OF COVER

SOUTHERN OHIO COAL COMPANY

STRUCTURE CONTOUR MAP
CLARION NO. 4A COALBED



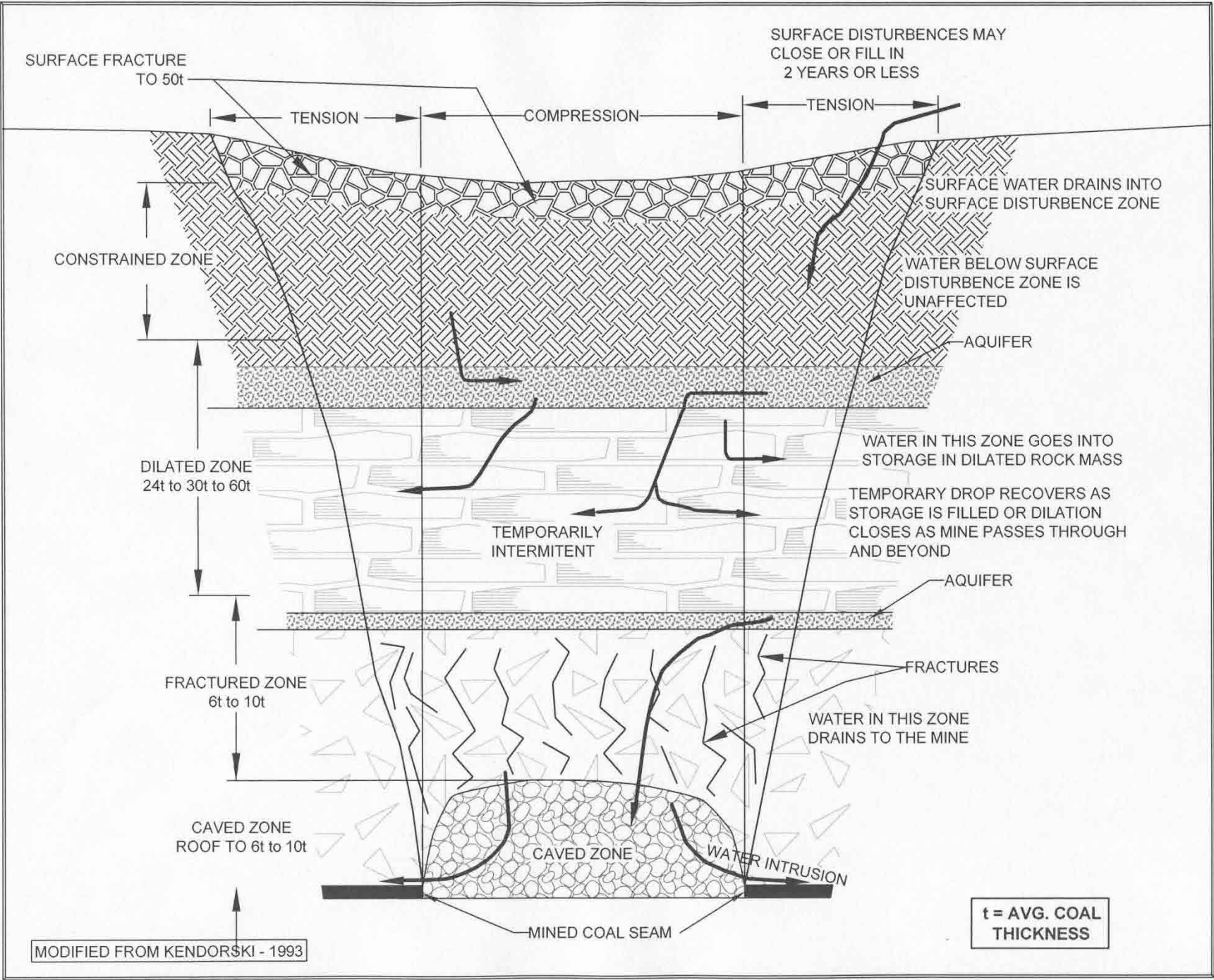
* MAP MODIFIED FROM CES 2005

Surface affects from Mining

R & P produce few if any subsided features.

LWM: controlled subsidence occurs
immediately with predictable affects.

Company is held accountable.



Hydrology affects from subsidence at the Meigs Mine

- Near surface water table lowered.
- Wells and springs dewatered.
- Increased secondary permeability and porosity.*
- Stream beds fractured, with water loss.
- In areas of low cover, water enters directly into mine.
- Otherwise, water disappears but emerges at lower elevation.
- Creation of mine pool



Trib to Sisson Run, 200 feet
to coal. Mined in 2002

Trib to Zinns Run. ~100
feet to coal. Mined in
1999.



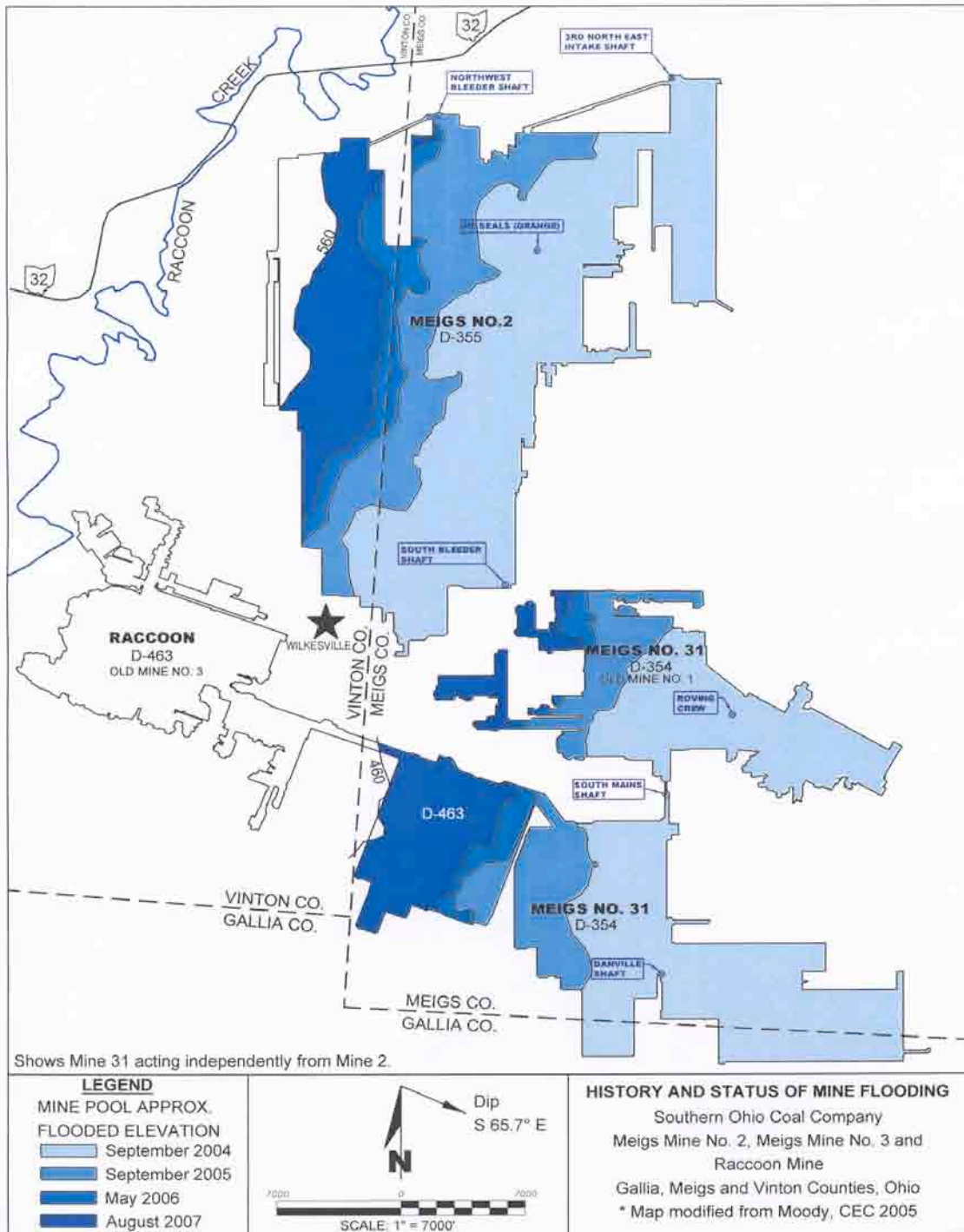
Dewatered Streams

Mine pool characteristics

Final pool elevation

Meigs 2:
83% flooded

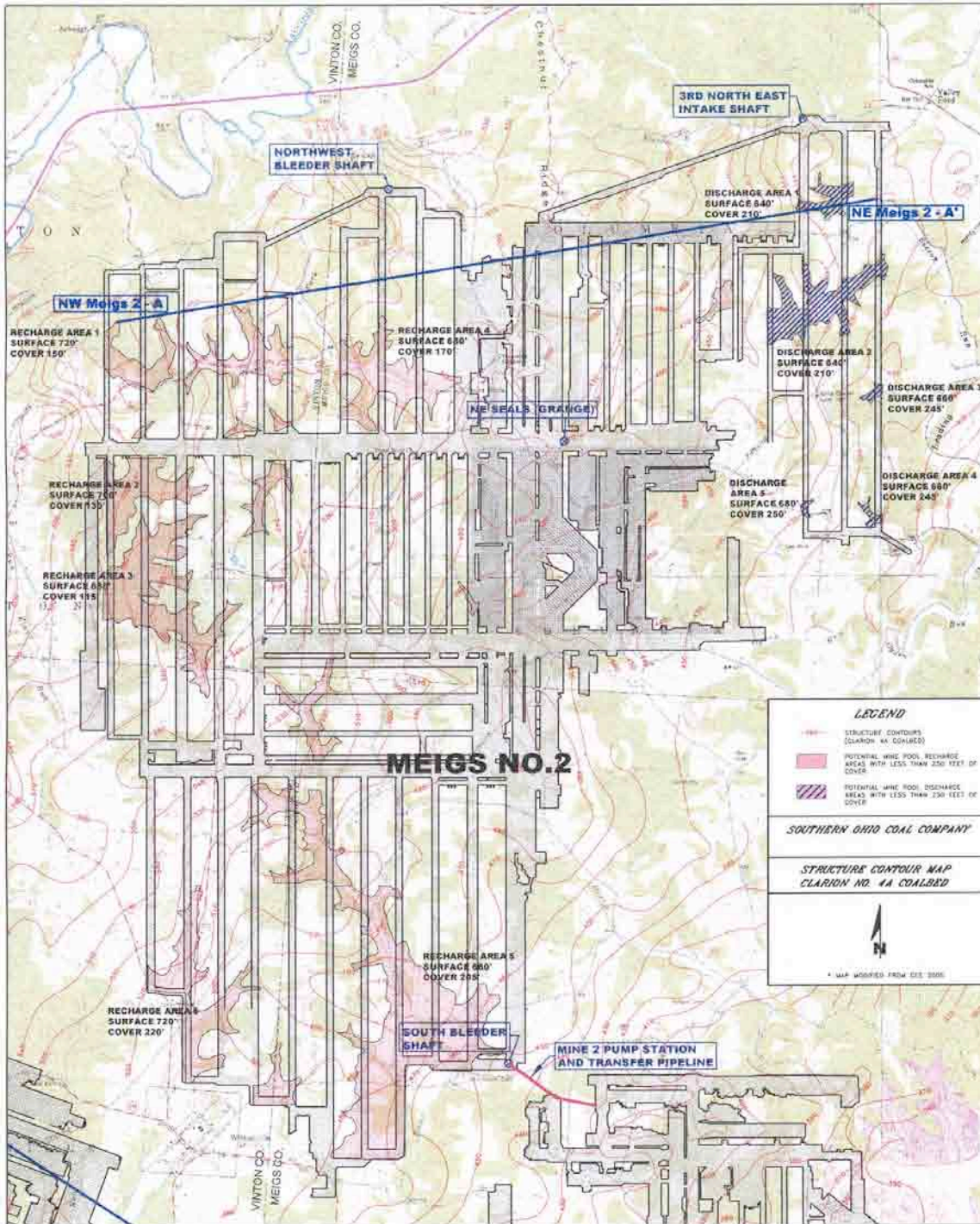
Meigs 31:
55% flooded.



Mine pool information

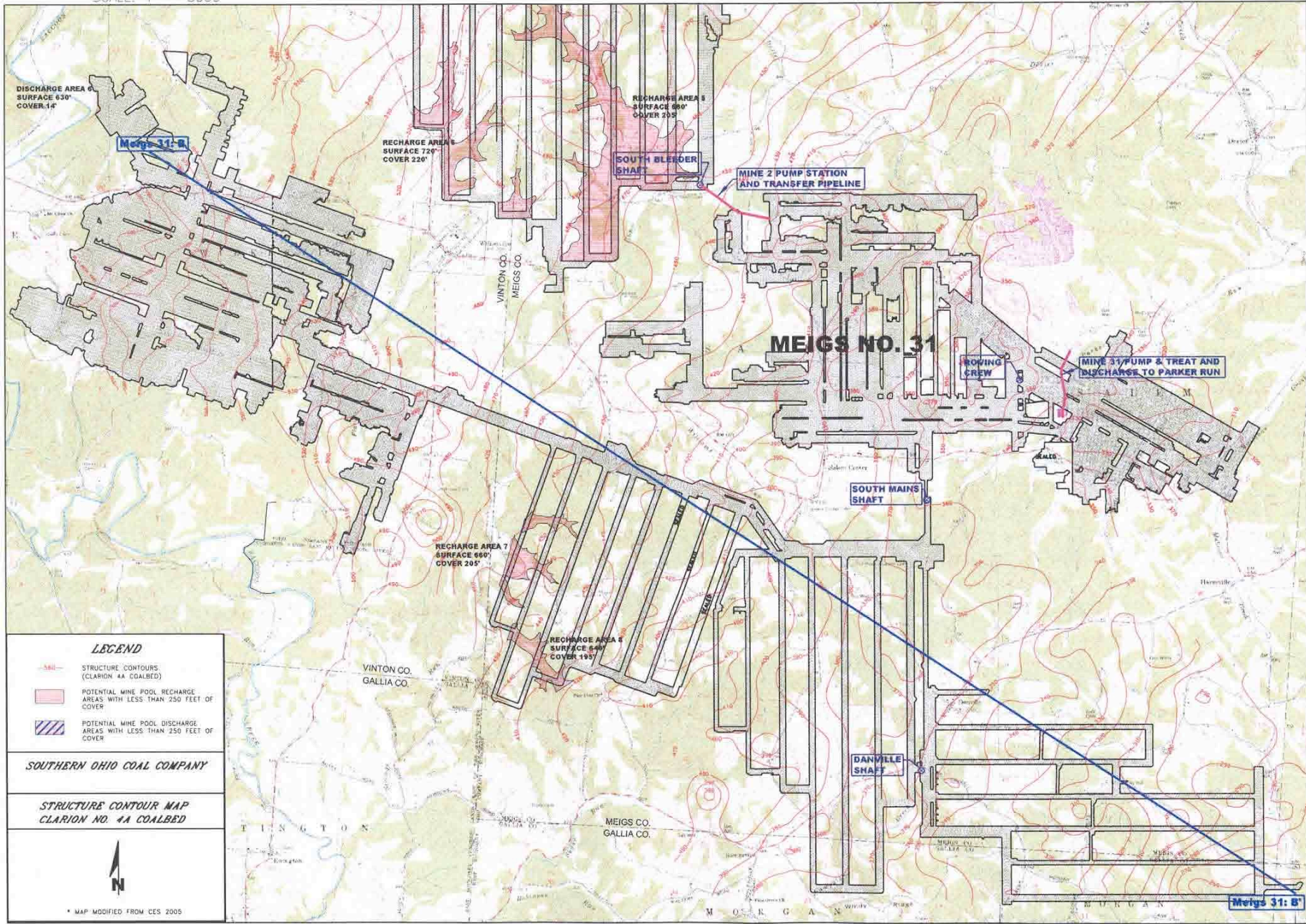
- Rising since 2002.
- Average rate ~ 1.64 feet/month.
- CONSOL will establish a control elevation.
 - Meigs2: 560' msl
 - Meigs 31: 460' msl
- Meigs 2 and 31 have different pool elevations.
- Pumped begins in 2008.
- Pumping station: Meigs 2 South Bleeder shaft.

Meigs No. 2 MAP





MEIGS NO. 31 MINE



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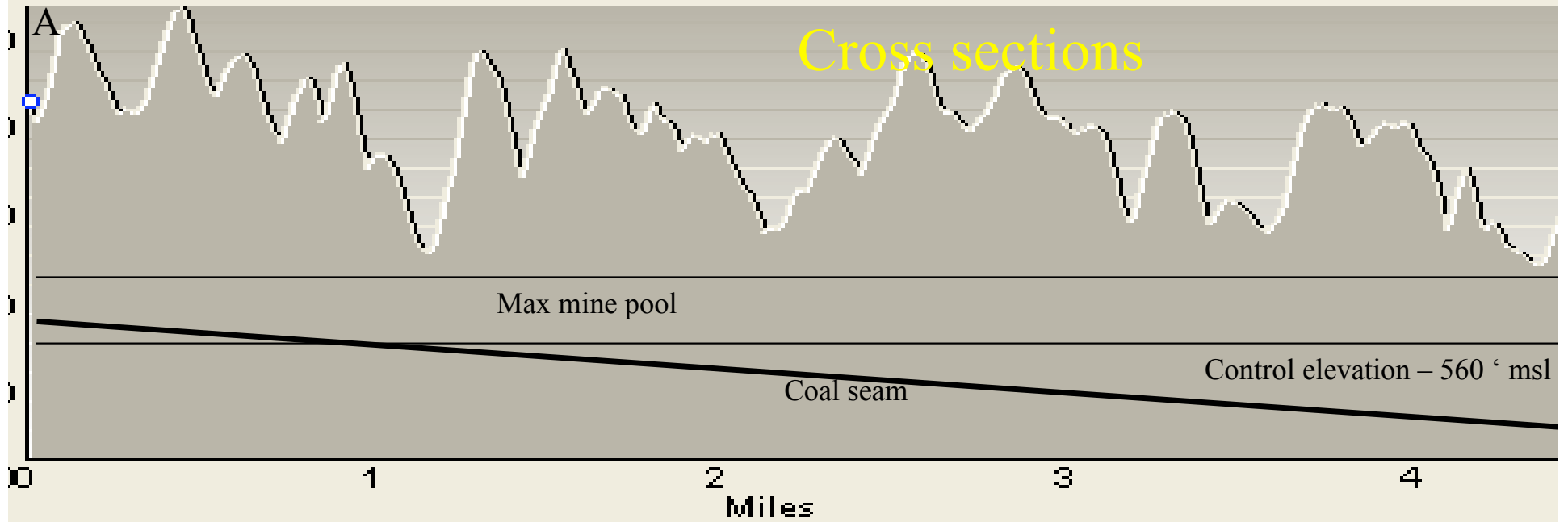
SOUTHERN OHIO COAL COMPANY

**STRUCTURE CONTOUR MAP
CLARION NO. 4A COALBED**

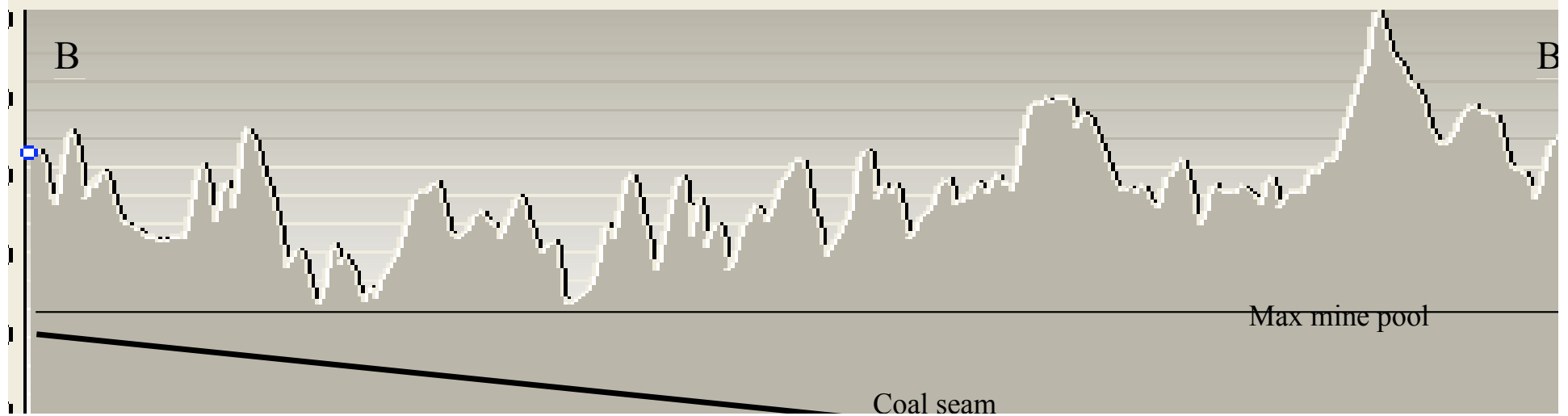
* MAP MODIFIED FROM CES 2005

Meigs 31: B'

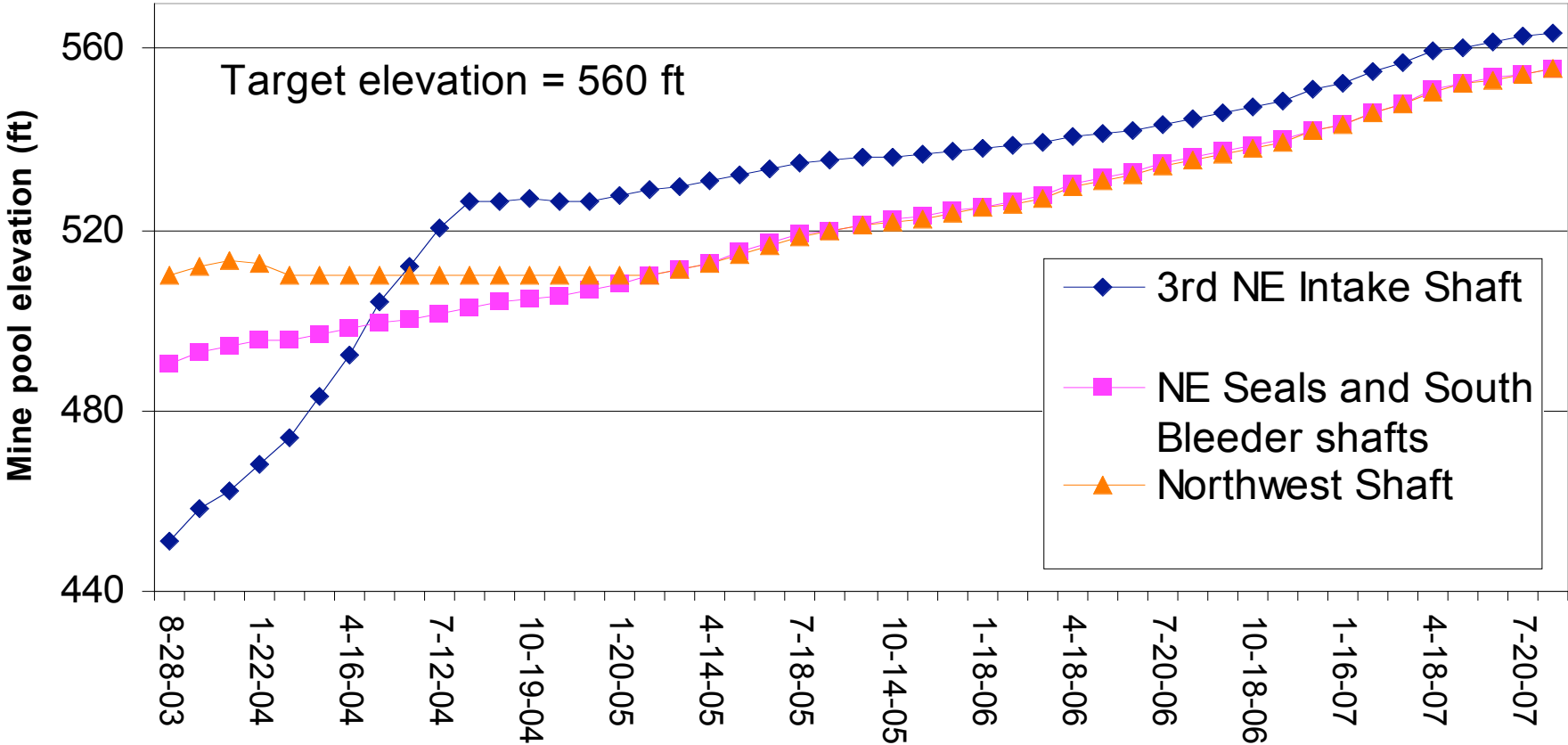
Meigs Mine 2 cross section A – A'



Meigs Mine 31 cross section B – B'

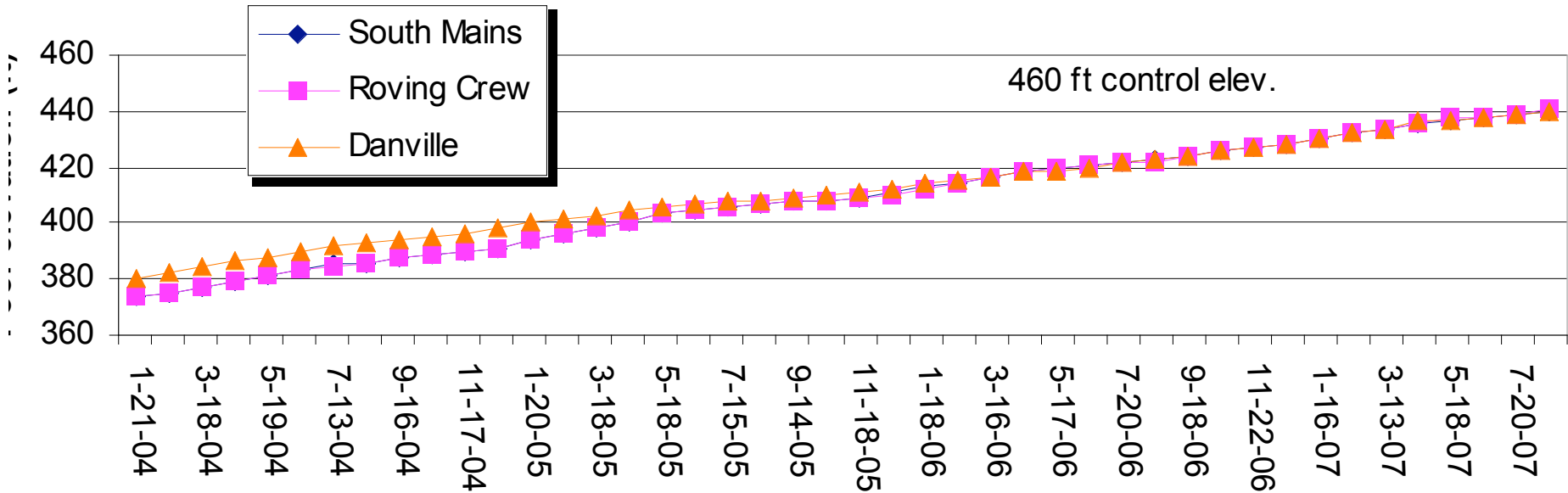


Meigs 2 Hydrographs



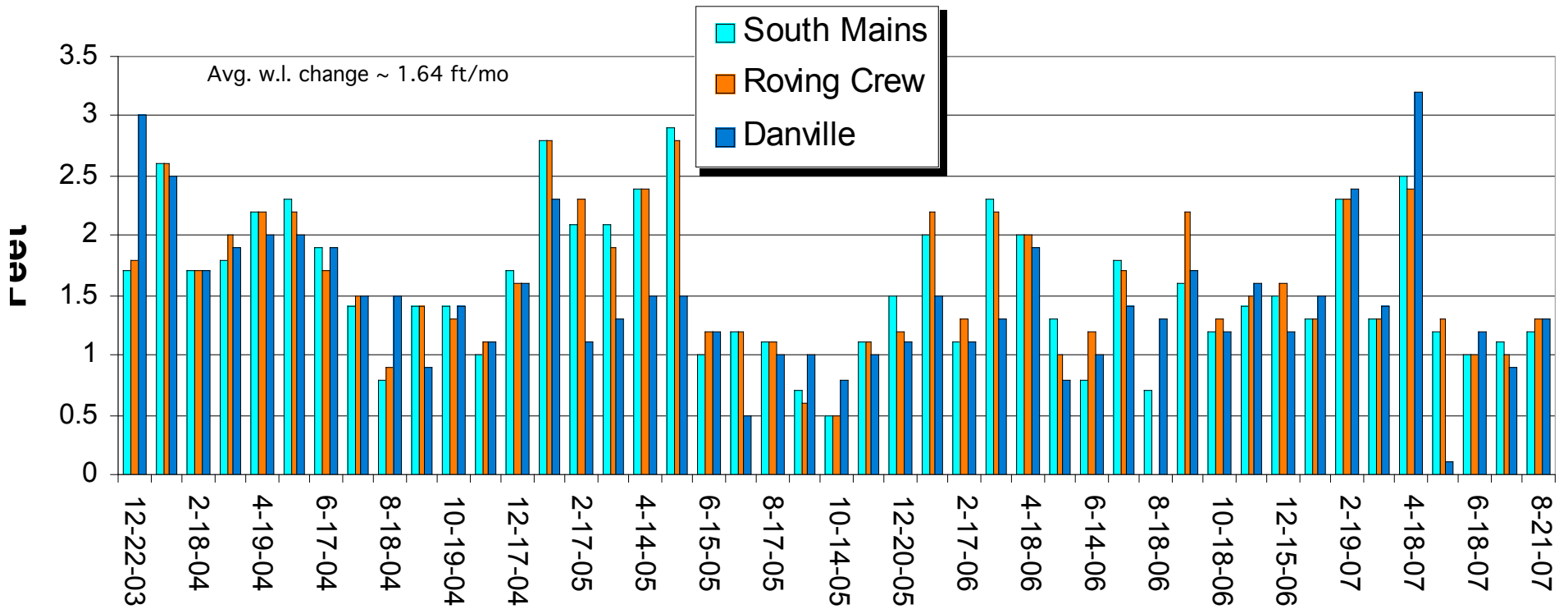
Meigs 31 hydrograph

Meigs 31 Hydrograph



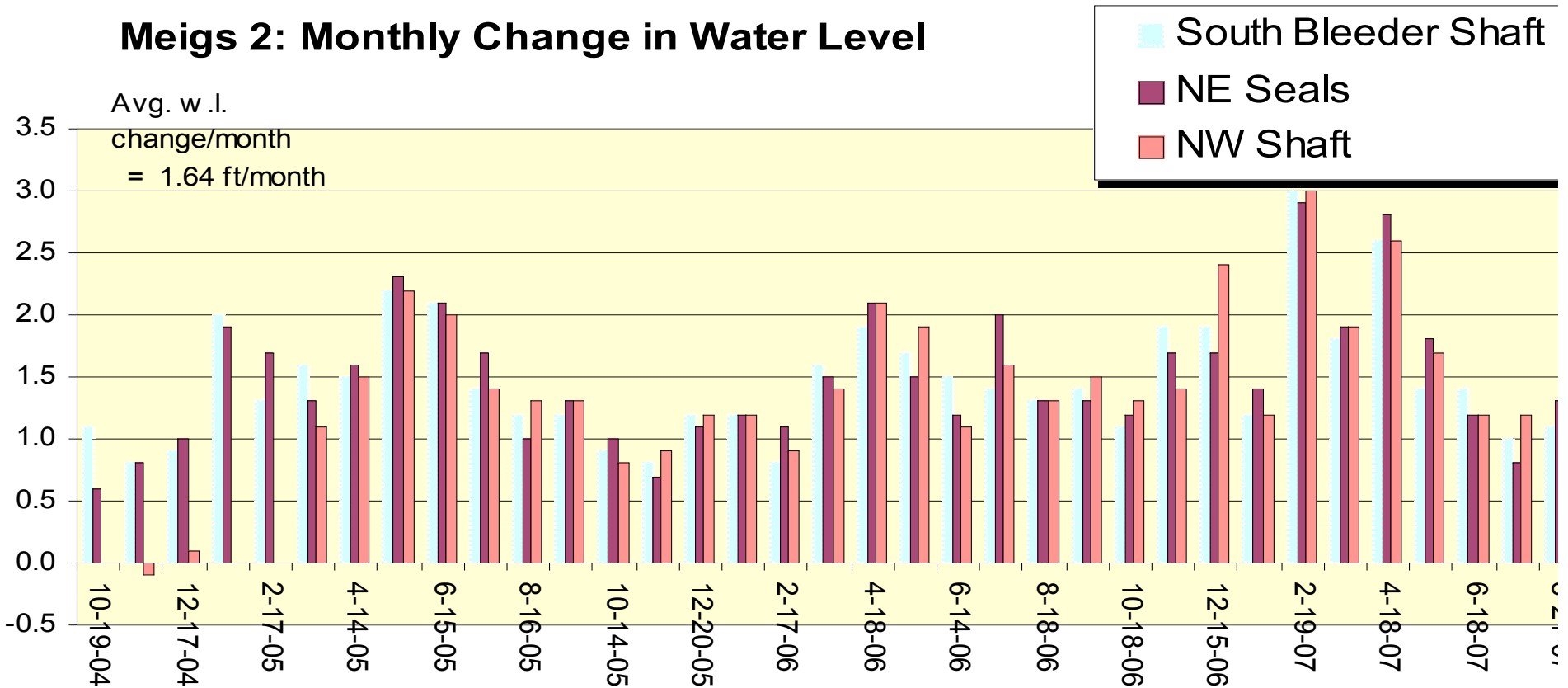
Seasonal variation

Meigs 31: Monthly Change in Water Level



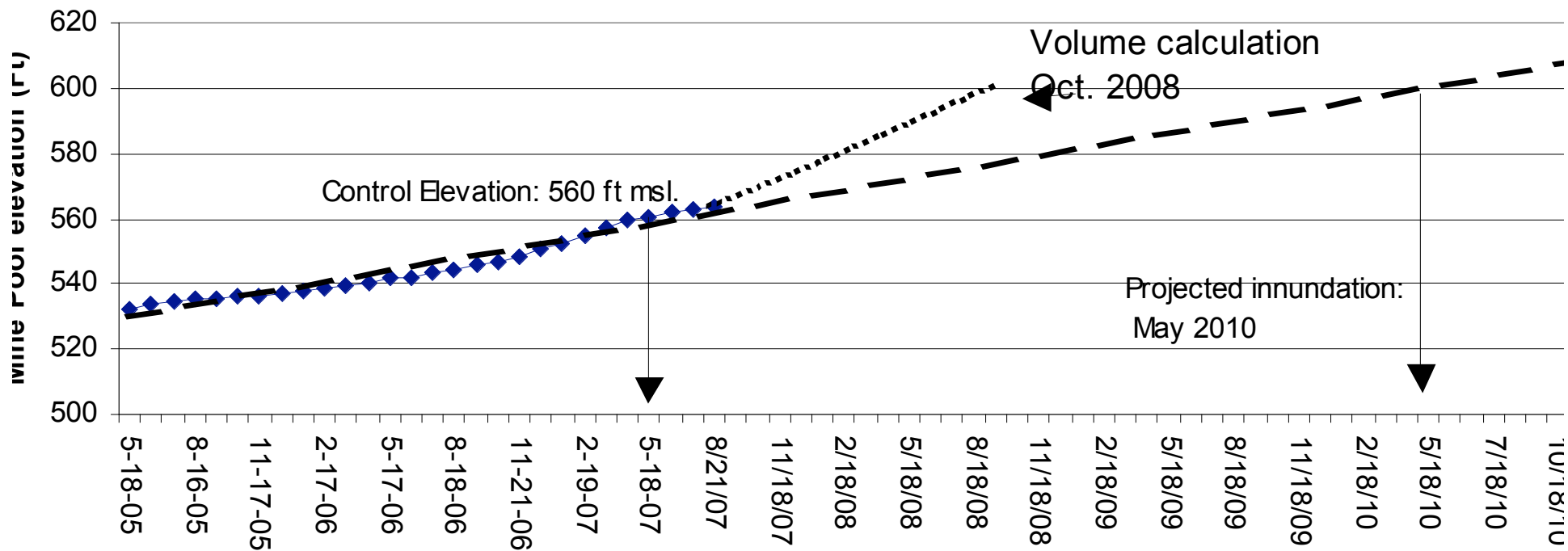
Recharge varies

Meigs 2: Monthly Change in Water Level

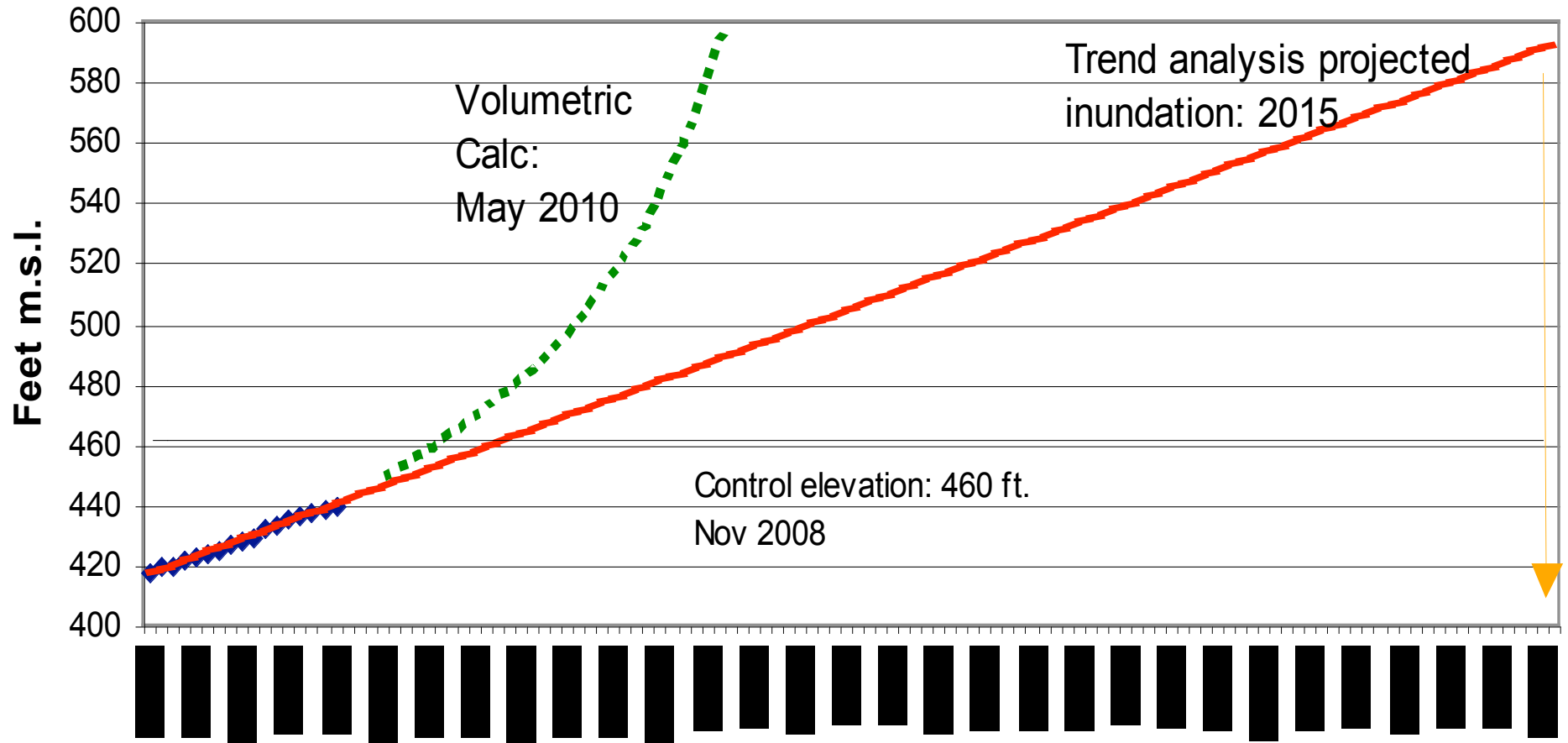


Meigs 2 inundation date

Meigs 2: 3rd NE Intake shaft projected inundation



Meigs 31: trend line inundation estimate



Water Quality of the Pool

- Pyrite oxidation ceases in the flooded sections.
- After initial flush, quality improves.
- Alkaline strata (Meigs 31 only) in the roof provides neutralization.
- Dilution and influx of alkalinity provides dilution.
- Some short circuiting occurs in the flow path resulting in better W.Q.
- Sulfate reduction and cation exchange occurs along the flow path.

Analysis of Pool Water Quality

	PH	Acidity (Mg/L)	Alkalinity (Mg/L)	Iron (Mg/L)	SO4 (Mg/L)
Meigs No. 2	3 – 5	3000 – 5000	0 – 75	200 – 3000	> 5000
Meigs No. 31	6 – 7	5 – 100	200 – 400	100 – 200	1000 - 3000

Future projections for w.q.

Each mine pool volume pumped will have a corresponding improvement in water quality of 50%.

Meigs 2: approximately 52 years for the iron level to achieve direct discharge standards < 3.0 mg/L.

Meigs 31: projected to take 40 years to reach < 3 mg/L Fe.

The partially flooded mine pool and incomplete mixing, would result in less optimistic predictions, Fe = 35 mg/L after 22 years. (CEC 2005)

Future Scenarios

Abundant water.

Abundant costs for pumping and treating.

Establishment of a trust fund for long-term treatment.

The End





Long wall



Geology

Allegheny and Conemaugh Formations

- Brush Creek LS
- Mahoning SS,
- Upper Freeport coal, Lower Freeport coal, Middle Kittanning coal , Strasburg, Lower Kittanning coal
- Vanport LS and minor shale over Meigs 31.
- **Clarion Coal (average 6-ft thick)**

geology continued....

Near surface sandstones are massive and friable with very little clay or shales to promote healing of fractures.

Overburden thickness ranges from

---from 100 to 400 feet over Meigs 2.

---90 to 640 feet over Meigs 31