Alternative Pollution Abatement of the Old Forge Borehole and Duryea Breach Discharge Outfalls to The Lackawanna River

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Pennsylvania Abandoned Mine Reclamation Conference

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Today's Speakers

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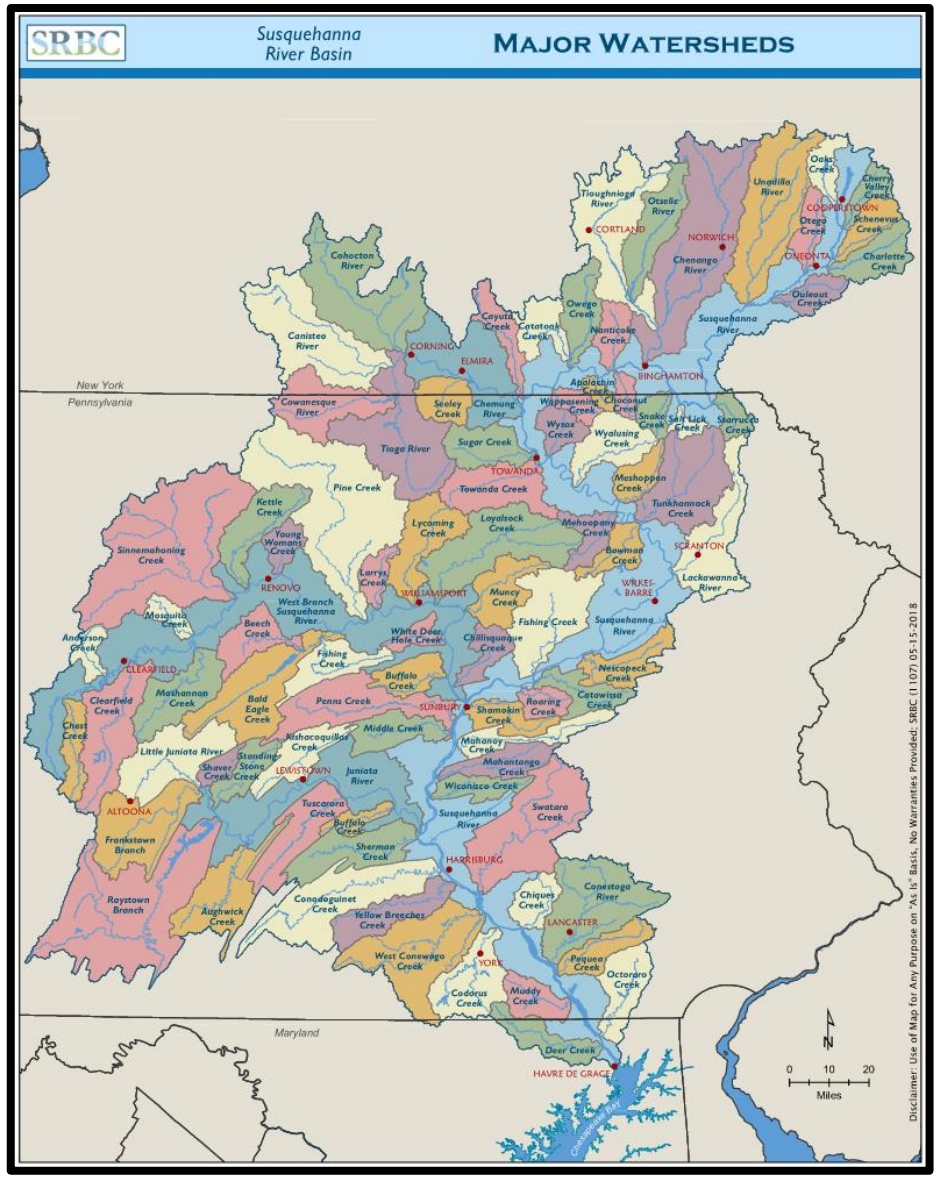
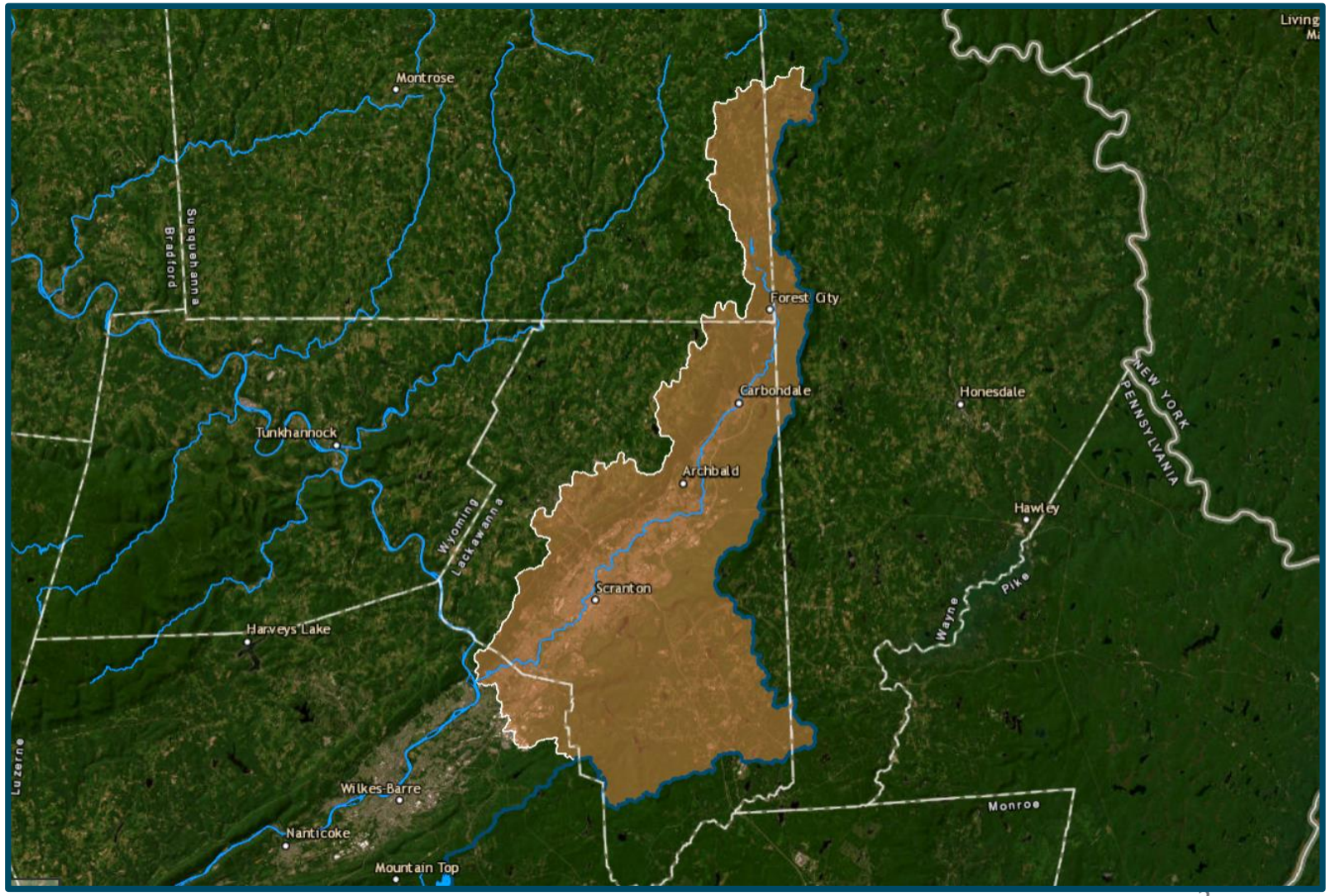
Lackawanna River Location



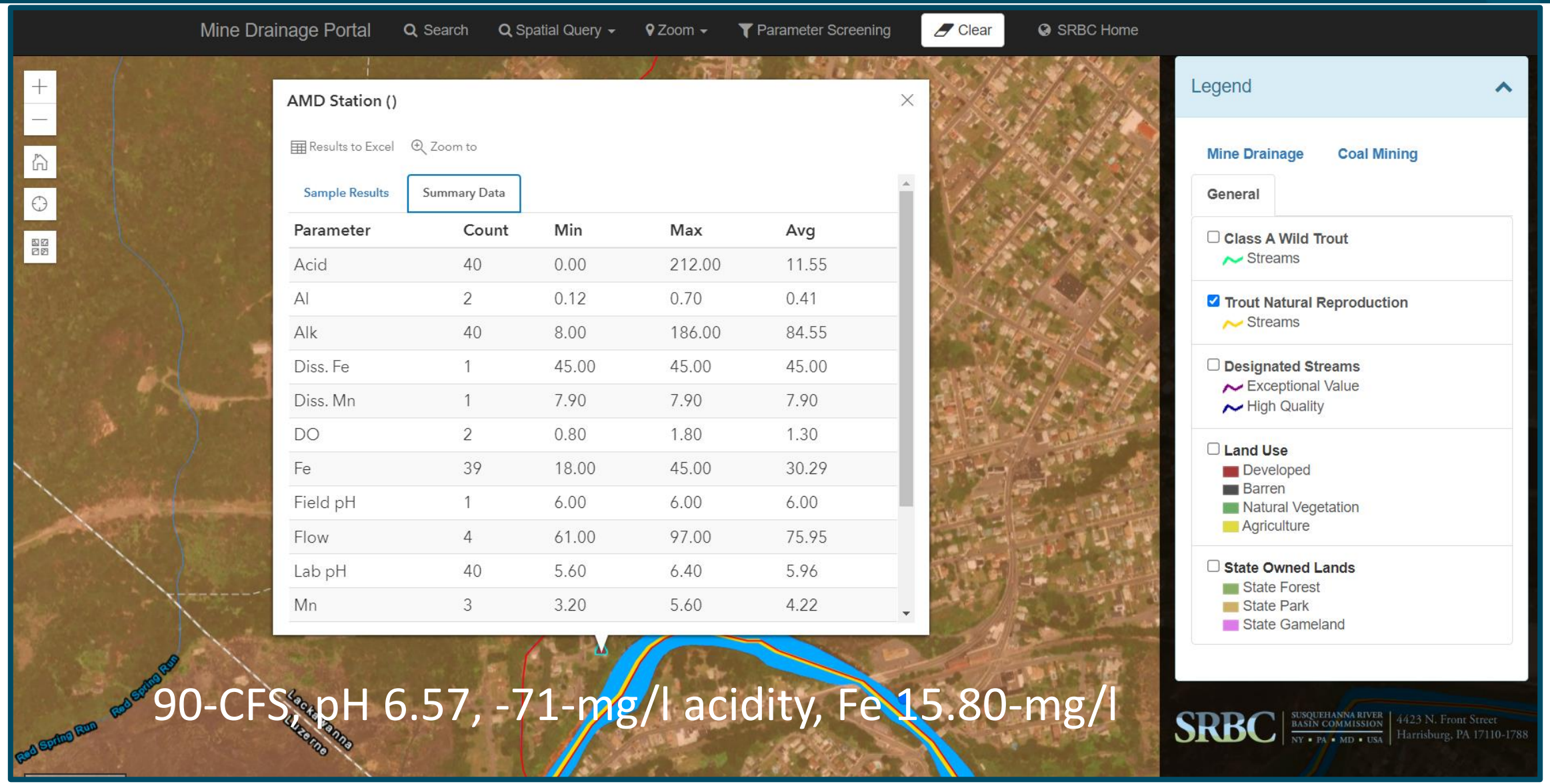


Old Forge Borehole and Duryea Breach

Old Forge Borehole

Duryea Breach

Old Forge Quantity and Quality

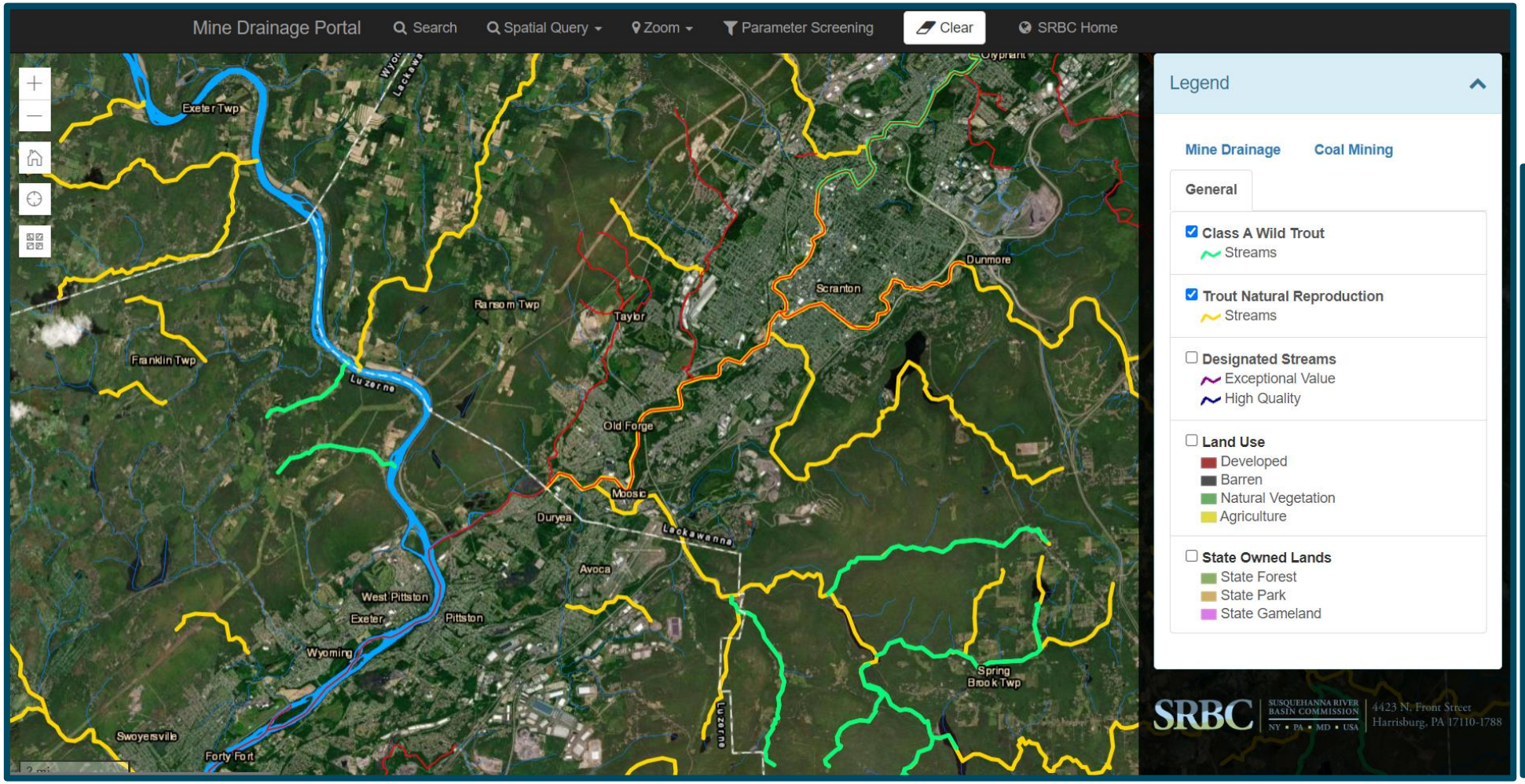


90-CFS, pH 6.57, -71-mg/l acidity, Fe 15.80-mg/l

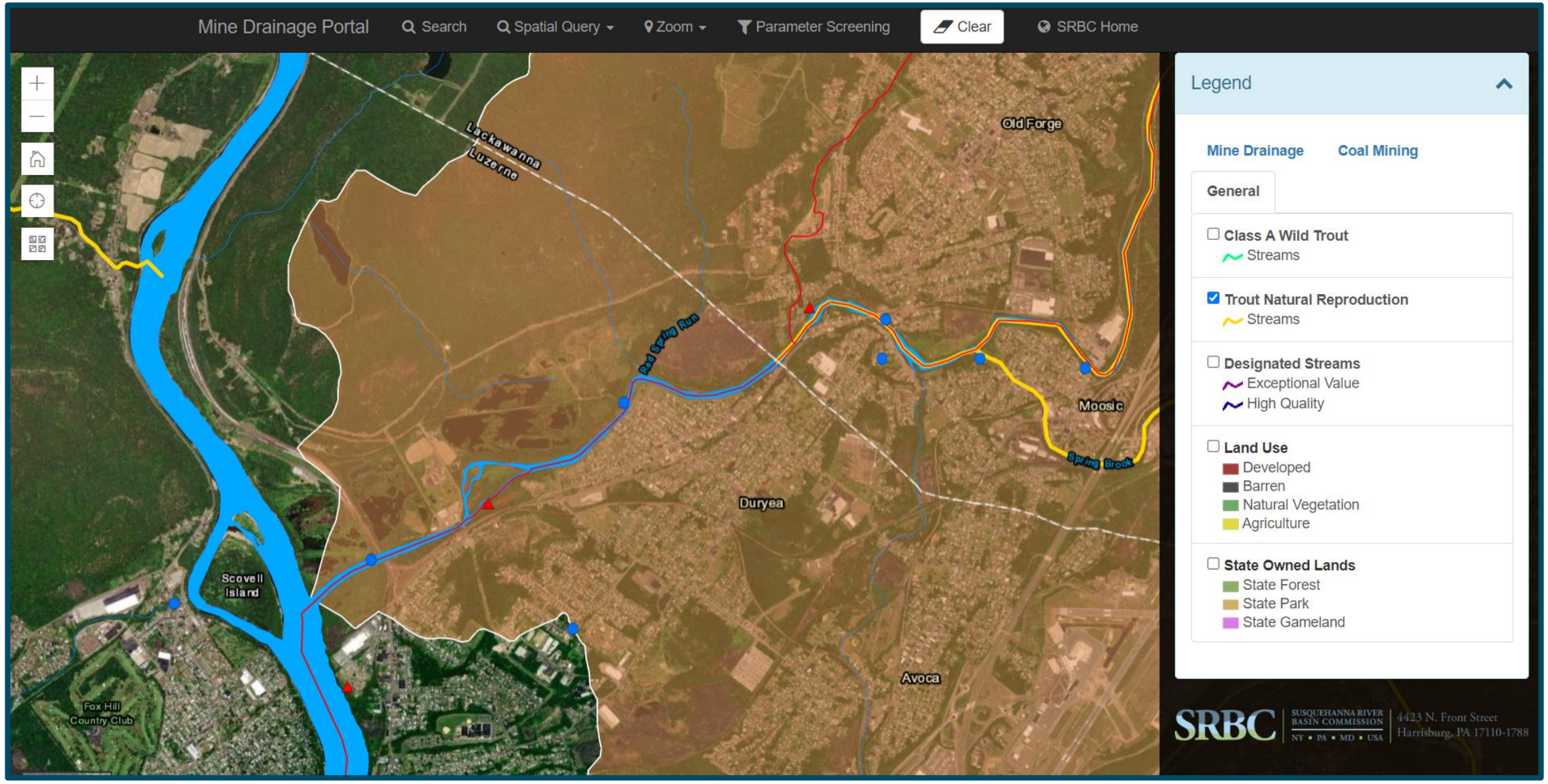
Duryea Quantity and Quality

22-CFS, pH 6.21, -66-mg/l acidity, Fe 19.60-mg/l

Lackawanna River Upstream Quality



Lackawanna River Downstream Impact



Visual Impact to the Susquehanna River

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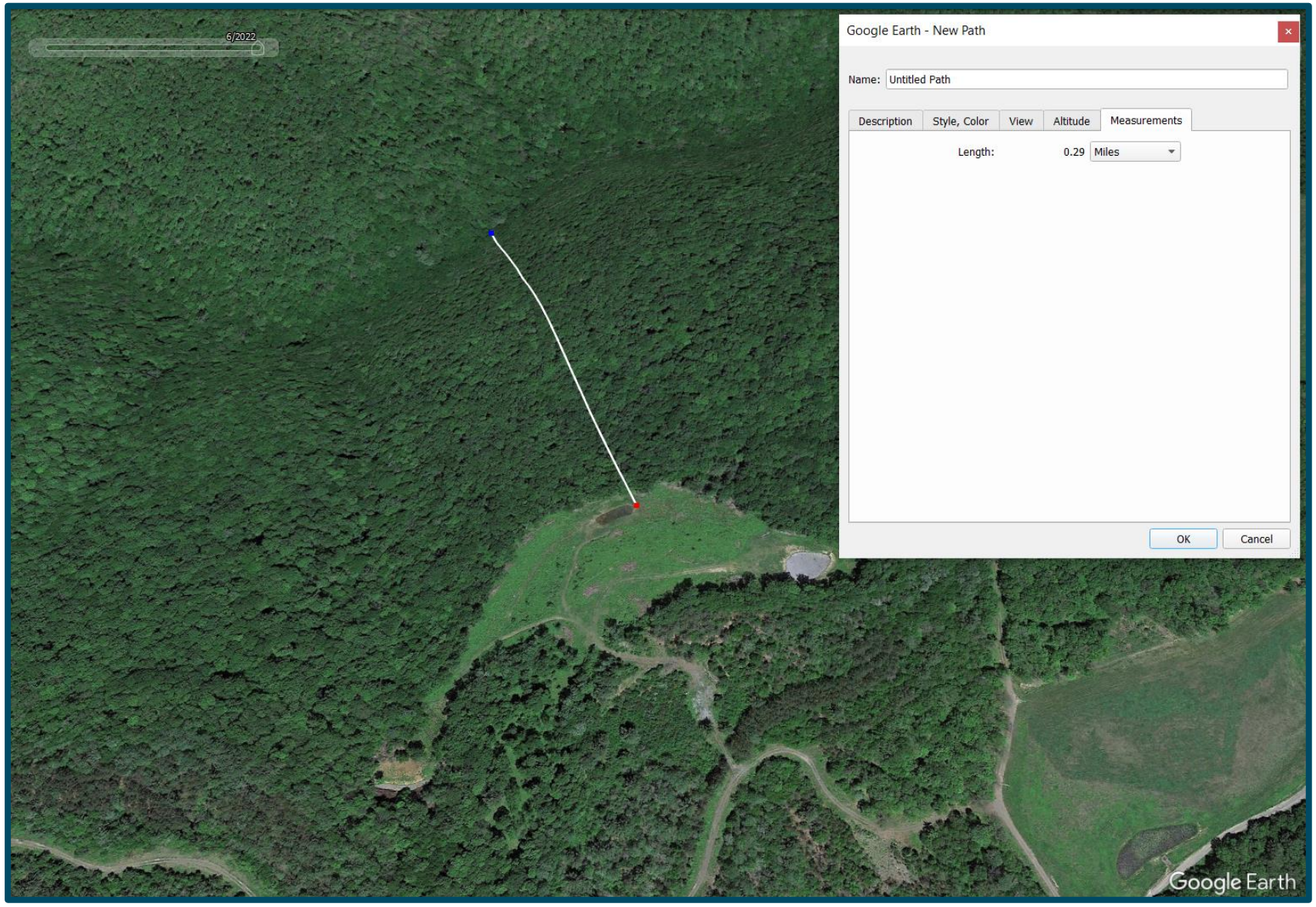
- Discharges are circumneutral/net alkaline.
- Only impact is iron hydroxide.
- Visual impact to the Lackawanna and Susquehanna is significant.
- Lackawanna could be Class A through lower reach.
- Cost/Benefit keeps the treatment stalled (estimates of $150 million).

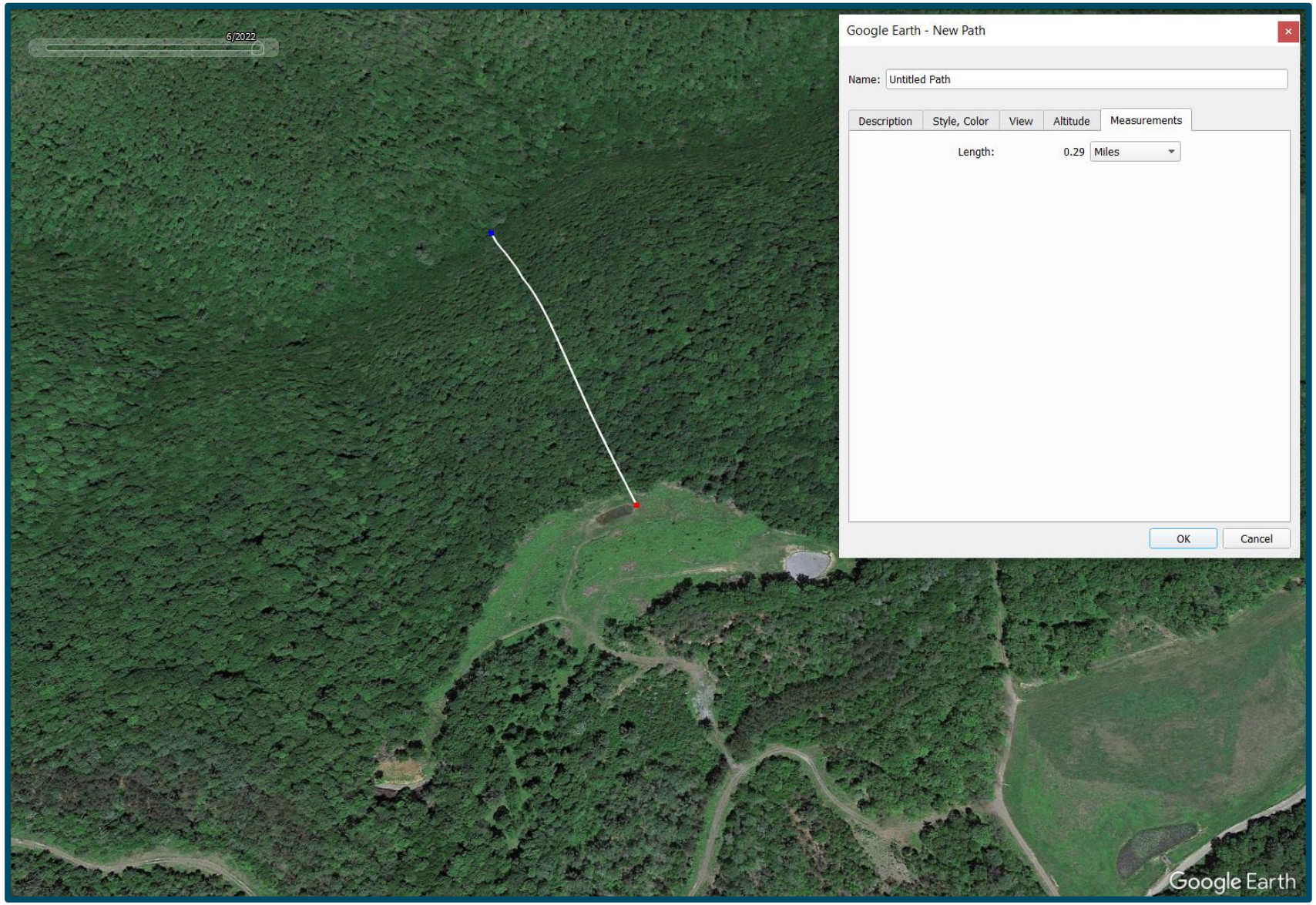
Origin of the Level Spreader Idea

- Little Birch Island Run Systems.
- LBI now Class A Brook
- Coal seams well away from the stream (1,600').
- Started to theorize, was it necessary to build that system, but instead use the forest buffer to "deal with" the discharge.
- Build level spreader to test idea. We have never seen discharge water make it to the stream.



Could Something Similar / Different Work OF/DB

- Could the solution be to merely capture the OF and DB and remove them from the Lackawanna River.
- Utilize available property to treat the best you can passively with ponds/wetlands.
- However, instead of discharging to the Lackawanna River, pipe the effluent and level spread into the Mighty Susquehanna and let dilution kill it?



The Mix Numbers Say the Answer is Yes (2/23/2012)

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Station	Q (CFS)	Fe (mg/l)	Fe (lbs/day)
OFB	65.0	14.27	5003
DB	11.3	20.25	1230
SR US	7880.0	0.098	4166
SR DS	7956.3	0.242	10399
	WQS Fe	1.50	

Station	Q (CFS)	Fe (mg/l)	Fe (lbs/day)
OFB	65.0	5.00	1753
DB	11.3	5.00	305
SR US	7880.0	0.098	4166
SR DS	7956.3	0.145	6224
	WQS Fe	1.50	

Station	Q (CFS)	Fe (mg/l)	Fe (lbs/day)
OFB	65.0	5.00	1753
DB	11.3	20.25	1230
SR US	7880.0	0.098	4166
SR DS	7956.3	0.167	7149
	WQS Fe	1.50	

Station	Q (CFS)	Fe (mg/l)	Fe (lbs/day)
OFB	750.0	14.27	57735
DB	11.3	20.25	1230
SR US	7880.0	0.098	4166
SR DS	7956.3	1.49	63131
	WQS Fe	1.50	

Quality Summary

- Mixing raw and untreated Old Forge and Duryea Breach with Susquehanna River:
  - Susquehanna Fe concentration increases from 0.098 to 0.242 mg/l

- Mixing partially treated Old Forge (~ 5 mg/l Fe) and untreated Duryea Breach with Susquehanna River:
  - Susquehanna Fe concentration increases from 0.098 to 0.167 mg/l

- Mixing partially treated Old Forge and Duryea Breach with Susquehanna River:
  - Susquehanna Fe concentration increases from 0.098 to 0.145 mg/l

- What would Old Forge concentration have to be to push Susquehanna River Fe concentration to near 1.50 mg/l?
  - 750-cfs, which is about 500-percent higher that its max flow.

So Where Do You Do It?

- Get Duryea on the north side of the Lackawanna River. Two options.
- Using a mix of County Line River Land Corporation Property, Pagnotti, Duryea Borough, Denaples, Allegheny Sanitary Landfill Property, construct treatment/conveyance.
- Place effluent into level spreader across SR, if necessary.

Other Site Possibilities

- Solar on what isnt used for the passive treatment systems and convenance.
- So much water offers the ability to create hydropower.
- Would produce about 5-tons per day of iron hydroxide which could be sold.
  - Would make two redundant treatment systems. You use one for treatment initially, then when full, adjust flow to System #2 while iron hydroxide is dried and prepped for shipment from System #1. Then when System #2 is full, you flip the flow in perpetuity.
- I doubt there is REE in these waters since the water is net alkaline. I have only seen commodity level REEs in waters that are very acidic as you need the acid to leach from the surrounding geology.

Speaker Contact Information / Questions

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