West Branch Susquehanna Restoration Symposium IV

July 19th, 2008

Bennett Branch Watershed AMD Projects Tour

Clearfield and Elk Counties, Pennsylvania

Tour Hosts

Eric Cavazza, PA DEP Bureau of Abandoned Mine Reclamation

John Dzemyan, PA Game Commission

Ken Rowe, Bennett Branch Watershed Association

Foundation for Pennsylvania Watersheds

Tour Itinerary

9:00 AM
•Depart Nittany Lion Inn
•Drive up to Bennett Branch Watershed (Dents Run Project Sites) via scenic Quehanna Highway

10:30 (Dents Run Project Area)
•Gilbert Farm Elk View Overlook
•P&N Coal Active Mine Site
•PA 3895 Passive Treatment System

10:45
•Mine Box Cut
•PA 1934 Discharge 17 Lime Dosers
•PA 3898 Porcupine II Reclamation Site

12:00 Noon
•Lunch at Stone Wall Elk Viewing Area

1:00 PM
•Depart Dents Run Project Area

1:30 (Hollywood/Tyler Project Area)
•Proposed Hollywood/Tyler Active Treatment Facility
•Historic Coke Ovens

2:45
•Mill Run Borehole

3:30
•Depart and drive to Nittany Lion Inn via I-80 and Rt. 322

5:00
•Arrive at Nittany Lion Inn

Tour Driving Route

(A) Depart from **State College**

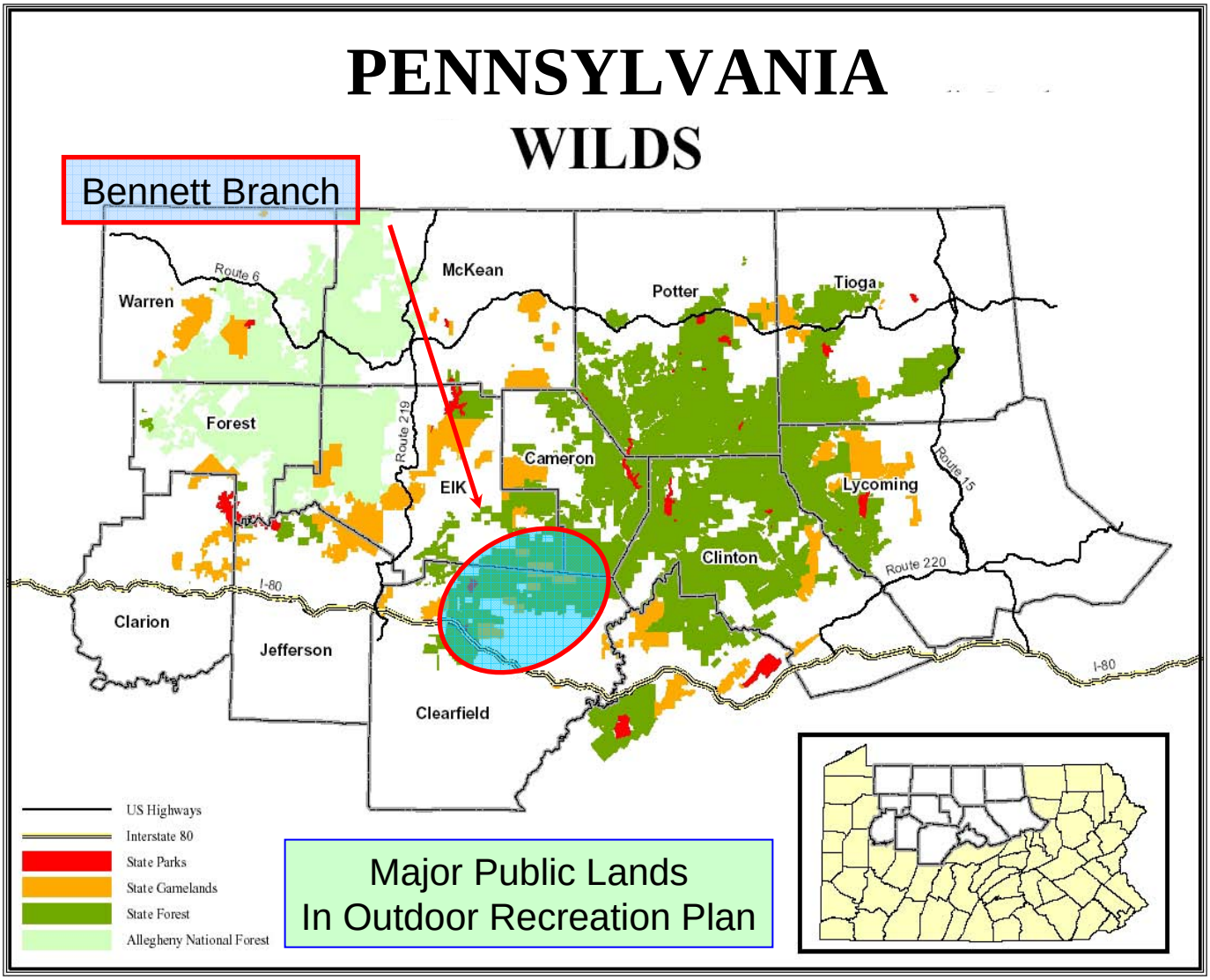
(B) Rt 220 to I-80 to Rt 144 at Snow Shoe to Rt 879 to scenic **Quehanna Highway** (turns into Wykoff Run Rd)

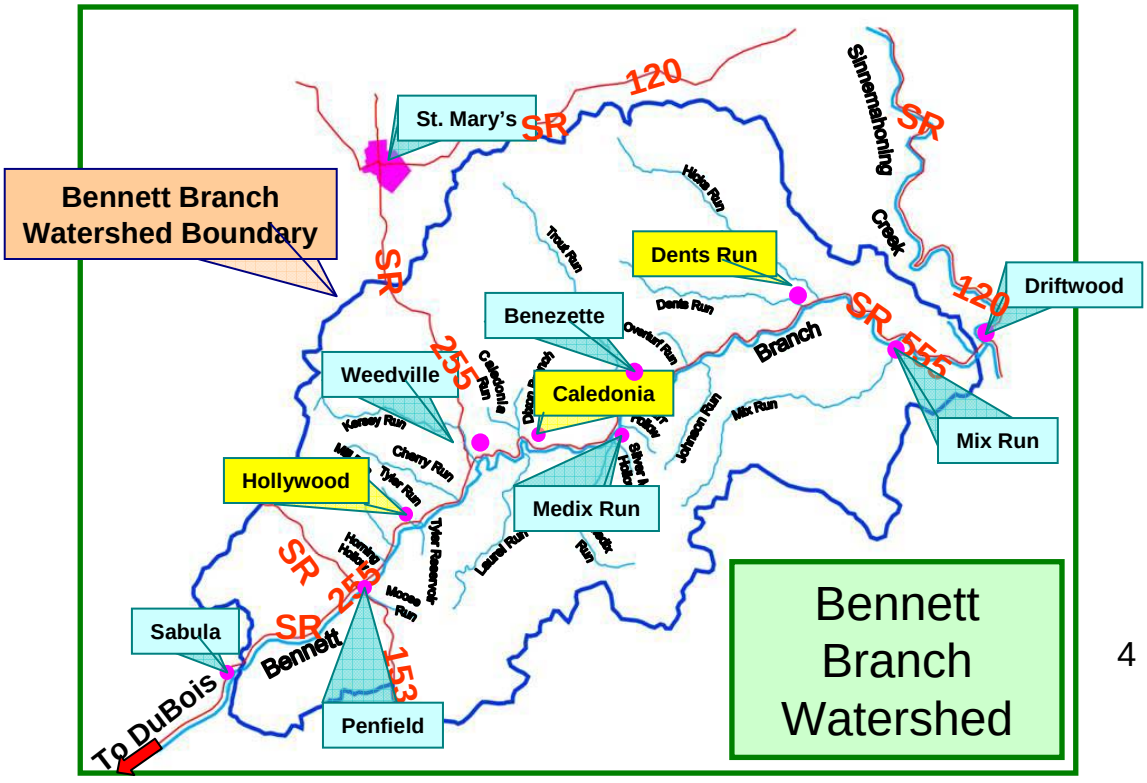
(C) Rt 120 to Rt 555 to Winslow Hill Rd in Benezette to **Dents Run project area**

(D) Rt 555 becomes Rt 255 to **Hollywood/Tyler project area**

(E) Rt 153 to I-80 to Rt 322 back to **State College**

PENNSYLVANIA WILDS





Bennett Branch Watershed Facts

•Watershed size: 387 square miles of which approximately 16 square miles have been deep mined

• Watershed is sparsely populated, wooded, mountainous, with deeply cut valleys with steep side slopes

• Stream drops ~ 900 feet from headwaters near Sabula to mouth at Driftwood. Total length of main stem is approximately 38 miles, the lower 33 miles are impacted by acid mine drainage.

• The average daily flow at the mouth at Driftwood was 454 MGD or 315,000 gpm. (SL-195, 1976)

•Much of the land is State owned: State Game Lands and Elk & Moshannon State Forests

•Drains to the Sinnemahoning Creek, a tributary to the West Branch Susquehanna River

•Much of PA's growing elk herd is located in the watershed

•Enormous potential for growth in tourism and other outdoor recreation

Bennett Branch Watershed Mining History

•Coal mining began in the middle to late 1800s

•By early 1900s, extensive underground mining began – most mines closed down by the late 1960s – Some limited deep mining continues today

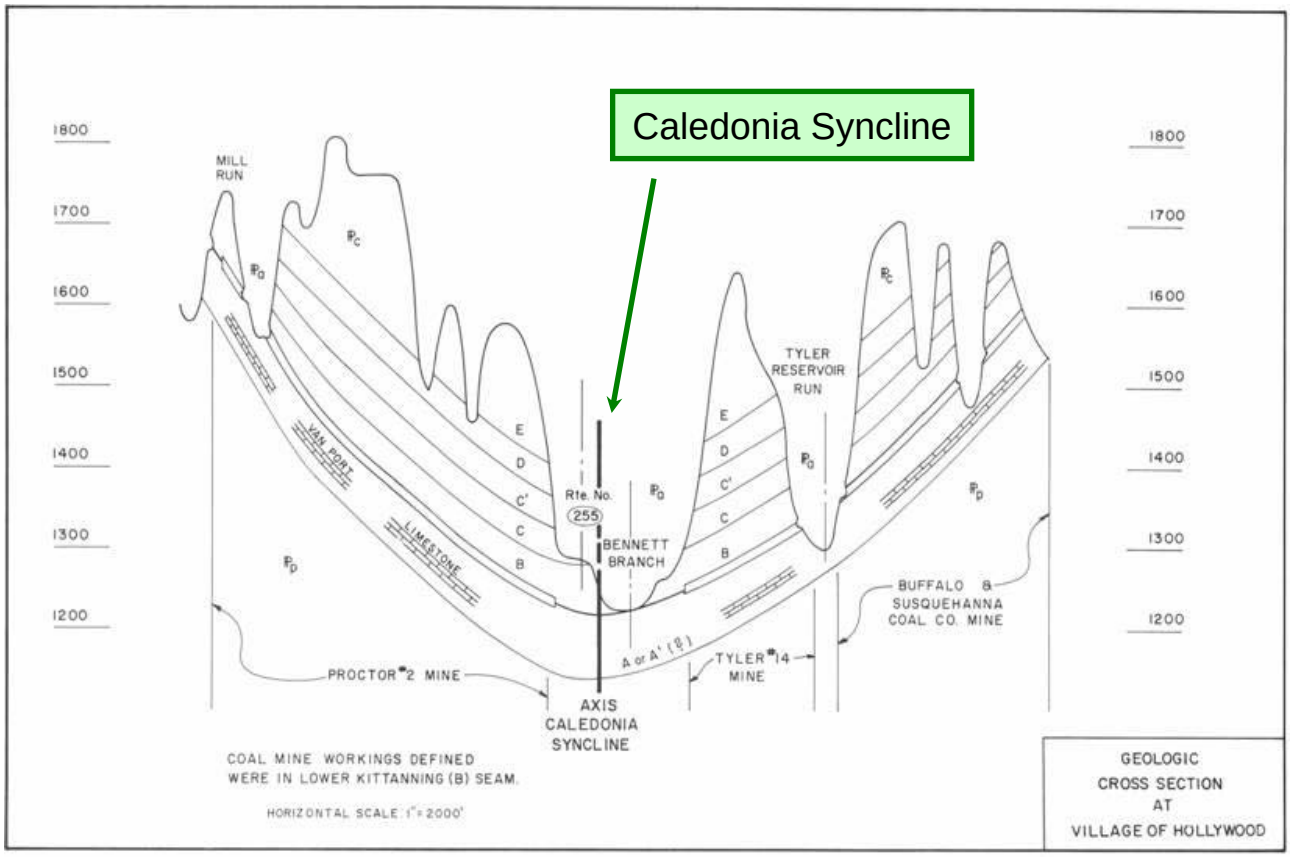
•Surface or strip mining began in the 1940s and continues, to a limited extent, today

•Most mining on the Middle Kittanning (C) Lower Kittanning (B) or Clarion Coal (A) Seams

•Most underground mines were developed up-dip to allow for the gravity draining of mine water

•Many mines (surface and deep) were abandoned and left unreclaimed

Structural Geology within the Bennett Branch Watershed



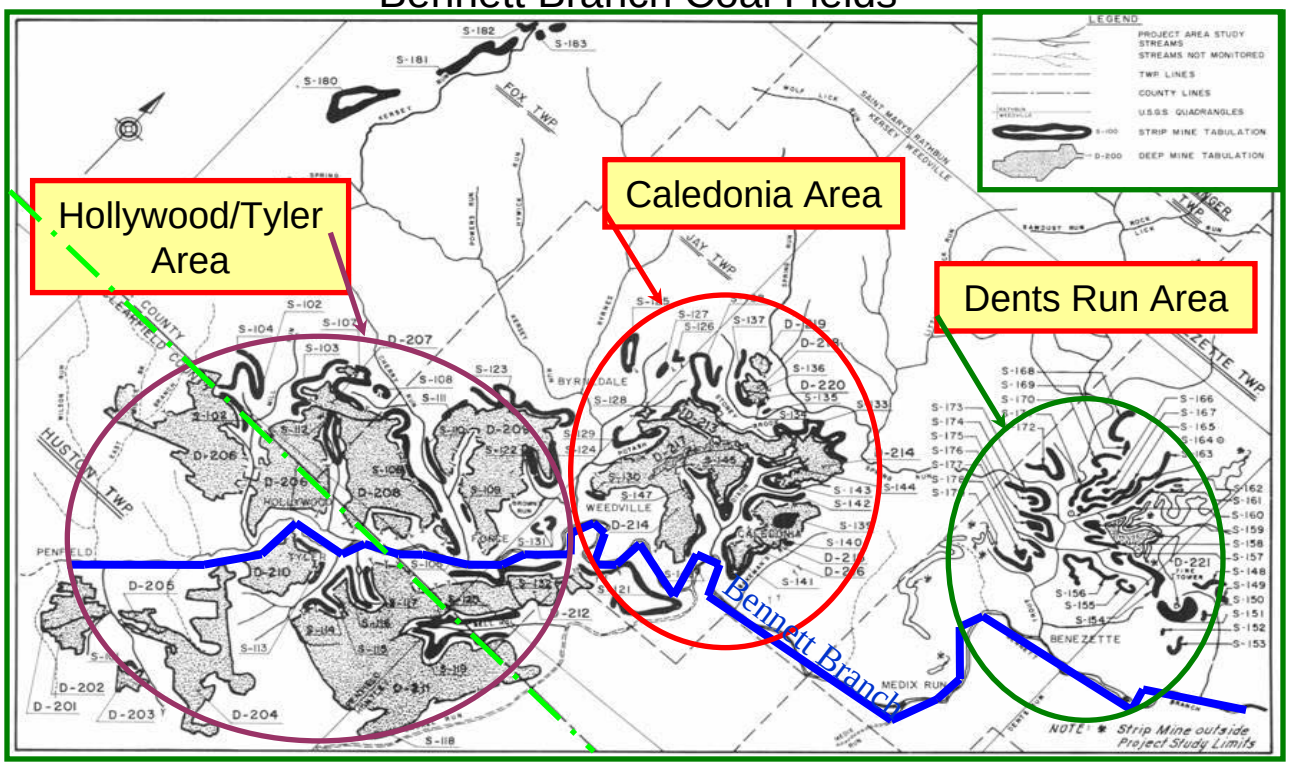
Watershed can be divided into three distinct areas in need of AMD abatement

1) Hollywood/Tyler Area
   - •On average, contributes ~ 29% of the acid load to the Bennett Branch

2) Caledonia Area
   - •Contributes ~ 24% of the acid load

3) Dents Run Area
   - •Contributes ~ 34% of the acid load

Bennett Branch Coal Fields



So why restore the Bennett Branch?

- Restoration of the Bennett Branch is a priority of the Governor and an integral part of the PA Wilds Initiative.

- The Bennett Branch is a wild and scenic river that is almost totally dead as a result of the adverse impacts of acid mine drainage.

- The mine drainage problems are localized to three distinct areas of the watershed, and due to the geology, are amenable to conventional mine drainage treatment technology.

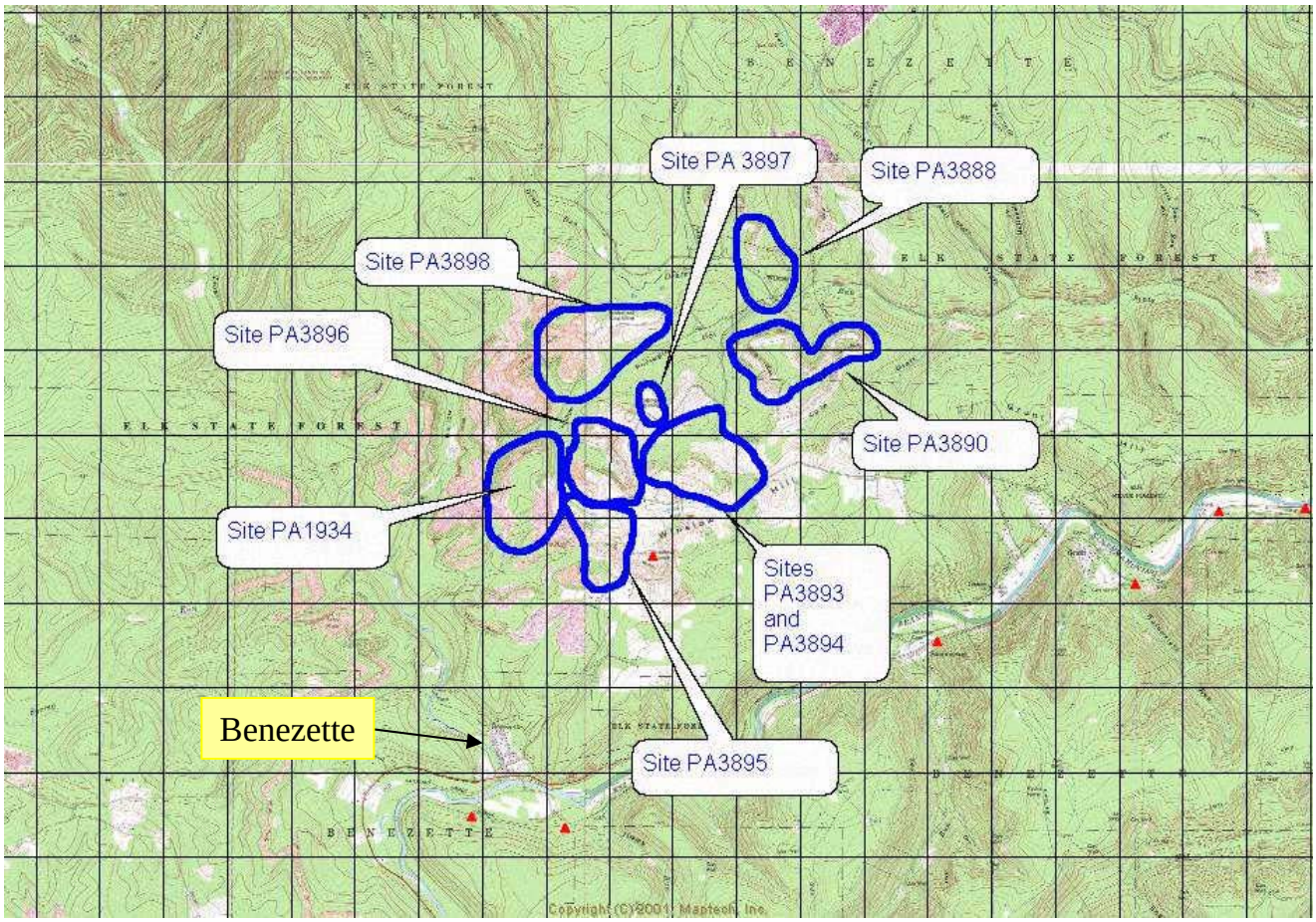
Bennett Branch Watershed Restoration Project Implementation Goals

1) **Restoration of the main stem of the Bennett Branch**
   - •A viable sport fishery will be re-established
   - •Increased recreation opportunities
   - •Restoration of 33 miles of AMD impaired stream

2) Local economic benefits
   - • Increased tourism
   - • Resource recovery from treatment facility sludge
   - • Potential for industrial re-use of the treated water

3) Foundational effort in the restoration of the West Branch Susquehanna River

Dents Run Restoration Project Area



Dents Run Restoration Project Background

•Elk County Conservation District submitted a request to BAMR to restore the water quality in the Dents Run Watershed in 1993.

•BAMR began monitoring discharges and stream quality.

•BAMR began working with various partners to develop a comprehensive watershed restoration plan.

•Cost estimates to restore the watershed were too high for DEP alone to fund.

•Due to the high cost, BAMR made a request to the Corps of Engineers to evaluate the proposed project for funding.

•In 2001, the COE received approval to fund a portion of the work under the Section 206 Program.

Dents Run Restoration Plan Development

•Plan included a combination of surface reclamation and passive treatment.

•Limestone reserves within the project area provided an opportunity to incorporate alkaline addition.

•Mineable reserves of Upper and Middle Kittanning Coal within the limestone extraction area provided an opportunity to partner with the mining industry in project implementation.

P&N Coal Active Mine Site

•Partnership with active mining industry (P&N Coal)

•Mining Upper and Middle Kittanning Coal

•Mining 500,000 tons of limestone for alkaline addition and passive treatment

•Will reclaim several AML features

•Provided a low cost source of alkaline material bringing the overall project cost in line with available funding sources

•PA-DEP-BAMR is funding a pass-through grant in the amount of $3,028,000 to the Bennett Branch Watershed Association to purchase limestone for alkaline addition at the numerous reclamation project sites within Dents Run

Corps of Engineers Passive Treatment System at PA 3895

Phase 1 – Designed by Biomost, Inc.
Contractor: Berner Construction, Inc.
Contract amount: $ 407,477
Construction completed in Early 2007
Treating highly acidic deep mine discharges

Phase 2 – Designed by Biomost, Inc.
Contractor: Singleton Enterprises
Construction started - Fall 2007 – Anticipated completion – Summer 2008
Contract amount: $ ~600,000

Mine Box Cut

•Pass-through grant to BBWA that is funding P&N Active Coal Mining Project is also funding the construction of a large alkaline trench at the Seep 17 discharge, which is the largest pollutional discharge in the Dents Run Watershed

•Cost: $328,000

•Construction of the trench and limestone purchase is ongoing

PA 1934 Discharge 17 Lime Dosers

•Discharge is the largest source of AMD pollution in the Dents Run Watershed

•Two Swedish Lime Dosers installed in Spring 2008 on discharge to add pulverized limestone

•Design and construction by Lime Doser Consultants, LLC

•Capital cost: $ 239,100

•Estimated annual lime usage: 175–200 tons

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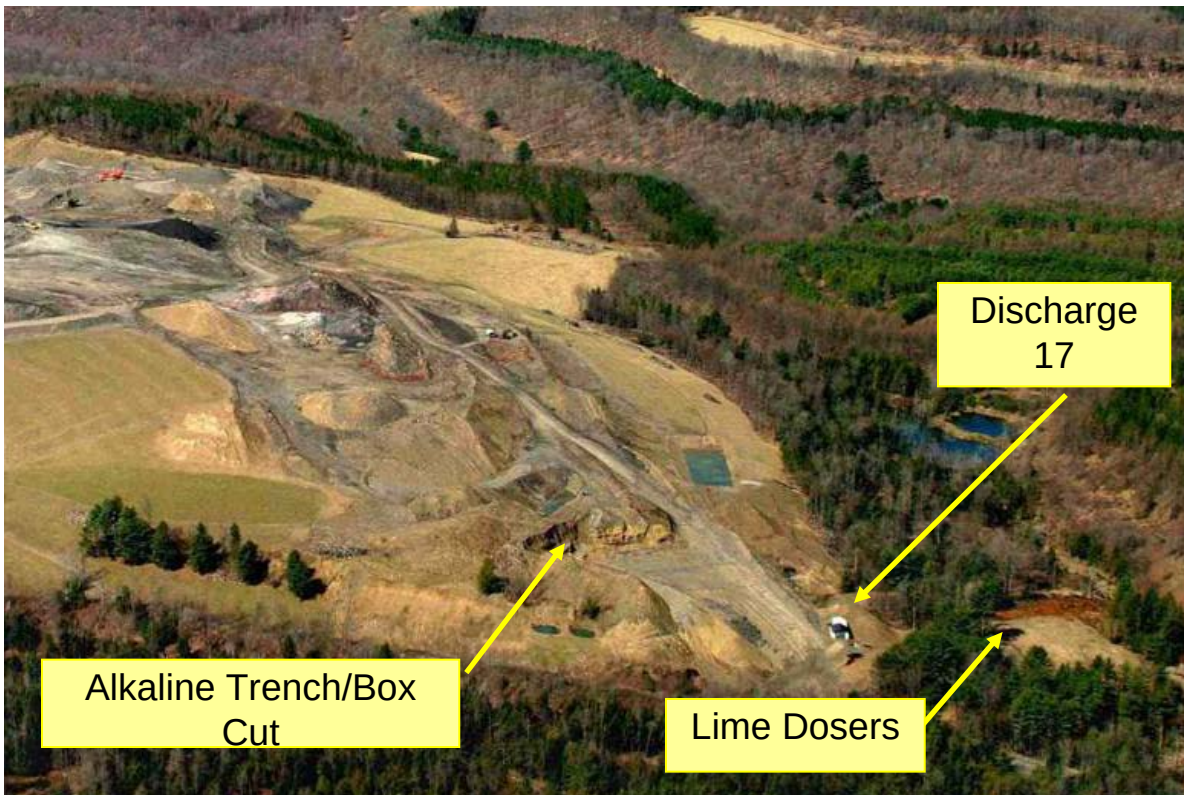
•Annual chemical cost: $ 10,000 - $20,000



PA 3898 Porcupine II Reclamation Site

•Contractor: P&N Coal Co.

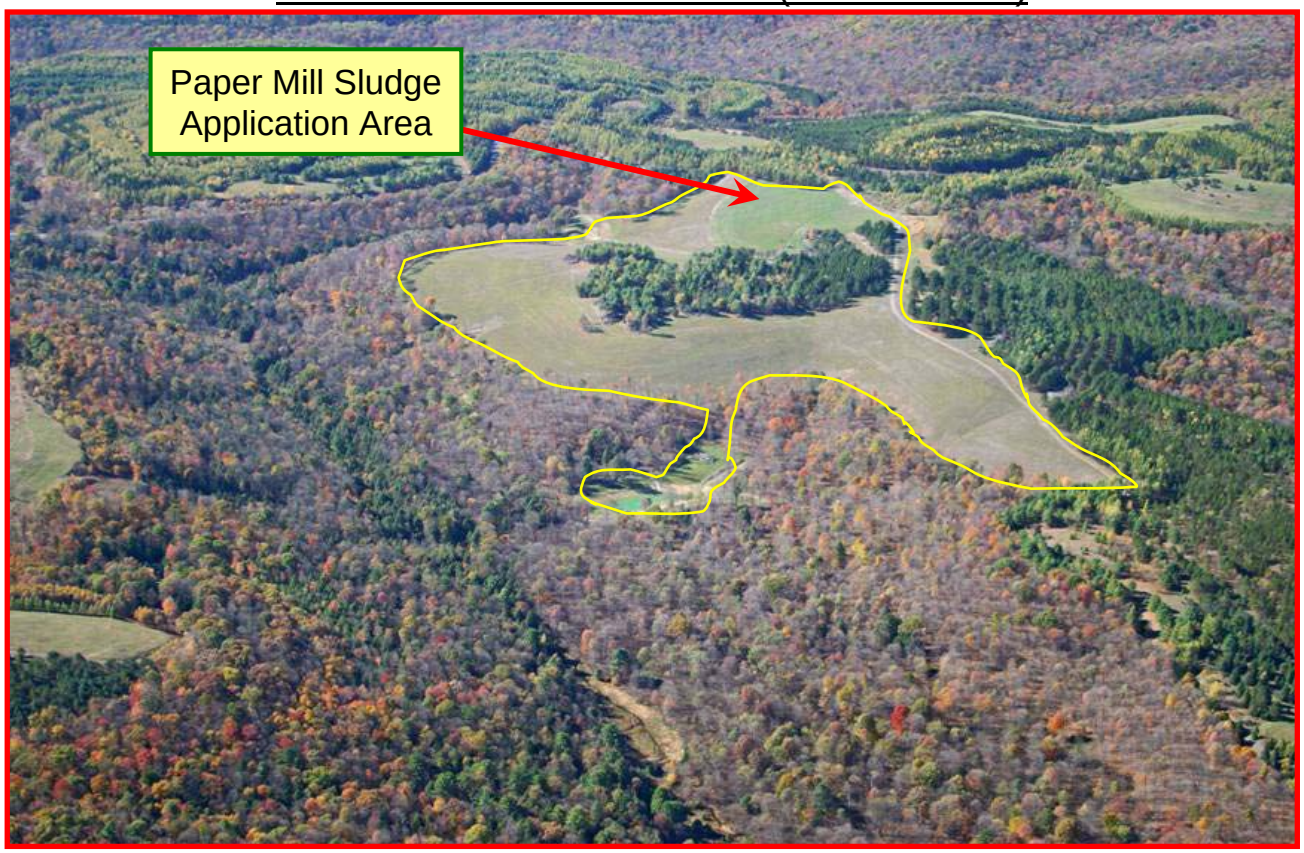
•Contract cost: $ 1,156,042.41

•Reclaimed 52 acres of abandoned surface mine on State Game Lands 311

- •489,000 CY of grading w/alkaline addition
- •Included the incorporation of paper pulp sludge on 8.2 acres from Johnsonburg Paper Mill to increase soil pH and organics

•Construction was completed in 2007

Post-Reclamation Aerial View (October 2007)



Proposed Hollywood/Tyler Active Treatment Facility

1) Project Consultant Design Team

- •Civil & Environmental Consultants, Inc., Pittsburgh, PA
- •N.A. Water Systems, Pittsburgh, PA
- •Collective Efforts, LLC – Wexford, PA

2) Project Design Status

- •Final Conceptual Design Report completed April 2006
- •Preliminary Design completed August 2006
- •Final Design (Construction Plans and Specifications) completed January 2008

Preliminary Design Values

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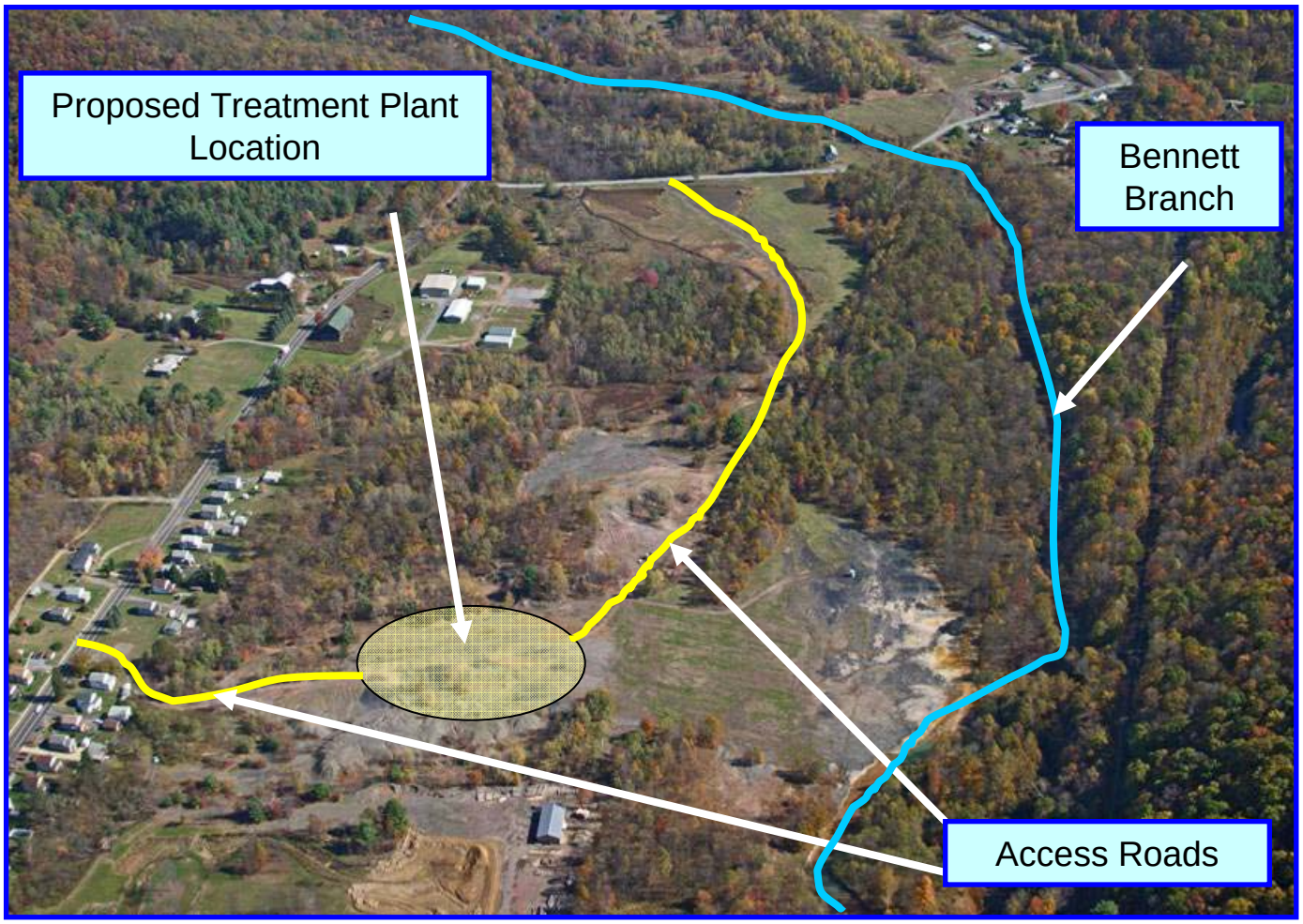
Flow……5,000 gpm (7.2 MGD)
Acidity…… 171.1 mg/l
Fe…….. 33.6 mg/l
Mn…….. 2.8 mg/l
Al…… 4.5 mg/l



Proposed Hollywood/Tyler Active Treatment Facility (continued)

1) Collection Systems

•Over 18,000 ft of gravity sewer
•Sealing of 3 Mill Run Boreholes (MIR1)
•2 – 500’ directional boreholes to drain Proctor No. 2 Mine
•Backup mine dewatering pumps
•New wet mine seals at all AMD discharge locations

2) Major Treatment Components

- •Ferrous oxidation reactors (2)
- •180 ft diameter clarifier
- •Sludge conditioning reactors (2)
- •4.5 Acre polishing pond

3) Other Site Features

- •Access road from SR255 and Tyler Road
- •Fenced with gates
- •Control building with parking
- •Trail access around plant area
- •Backup sludge lagoons

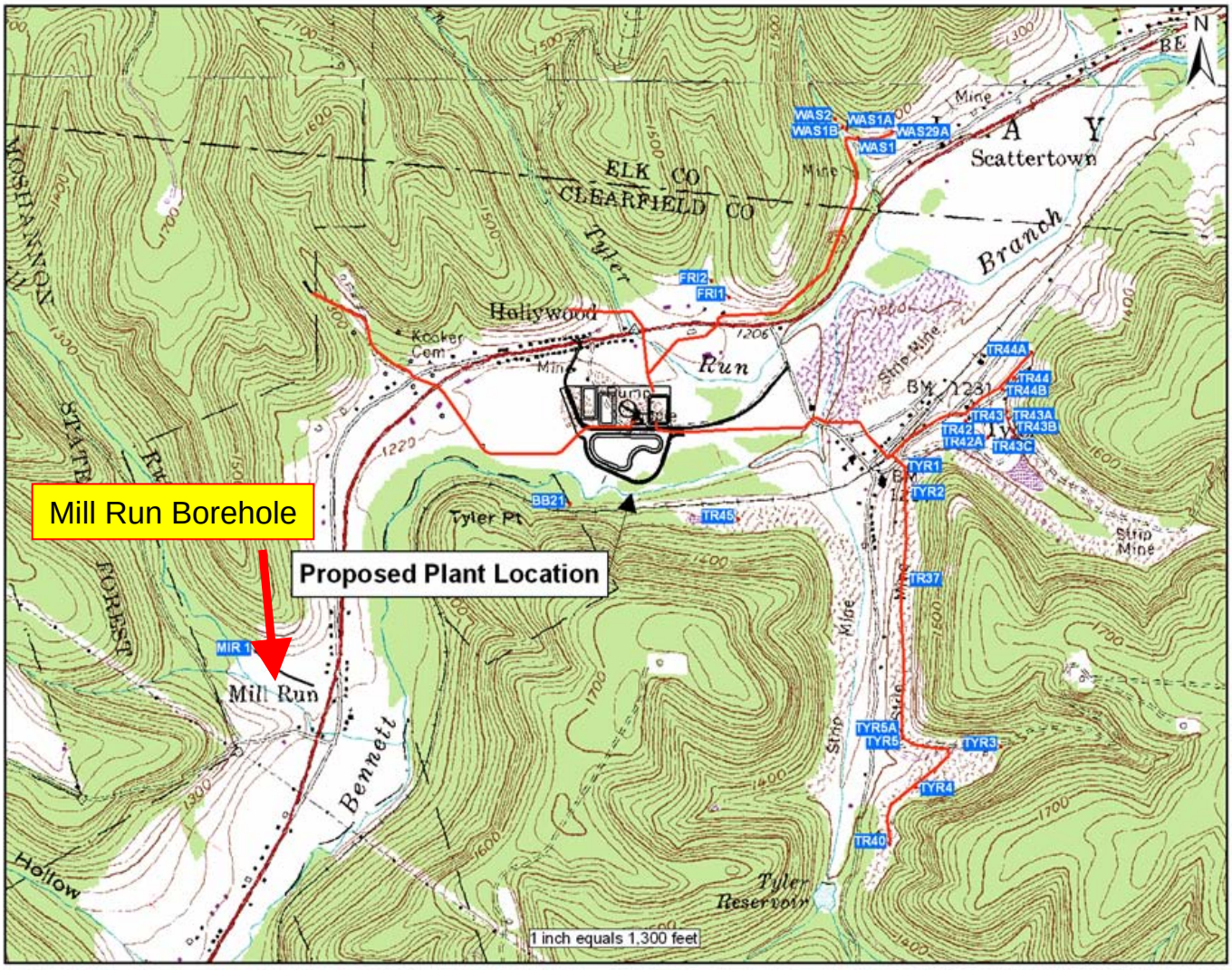
4) Major Equipment

•Influent Pumps Mounted in Collection Pit of Equalization Pond
•Dual Surface Aerators for Ferrous Iron Oxidation
•Clarifier with Centerwell Pumping and Flocculating Feedwell
•Submersible Centerwell Pumps
•Lime Silo System – Dry Lime Storage, Slurry System and Delivery Pumps
•Dual Sludge Conditioning Reactors
•Polymer System – Dry Storage, Wetting, Ageing, and Delivery Pumps
•Utility Water Storage and Pumps
•Waste (Blowdown) Sludge Pumps to Disposal Boreholes
•Electrical Motor Control Center and Programmable Logic Controller

5) Sludge Disposal

•Injection to abandoned Proctor No. 2 Mine
•Conveyance through small diameter (less than 4”) pipe
•Currently 2 proposed injection locations
•10 to 40 years of disposal volume in the deep mine

Hollywood/Tyler Active Treatment Facility and Pipeline Locations and Mill Run Borehole



Bennett Branch Watershed Restoration Project Funding Summary (as of Feb 2008)

Completed Projects:	$ 5,249,988
Projects in Construction:	$ 10,494,336
Projects in Design:	$ 17,489,000
Projects in Planning:	$ 4,272,000
Total:	$ 37,505,324