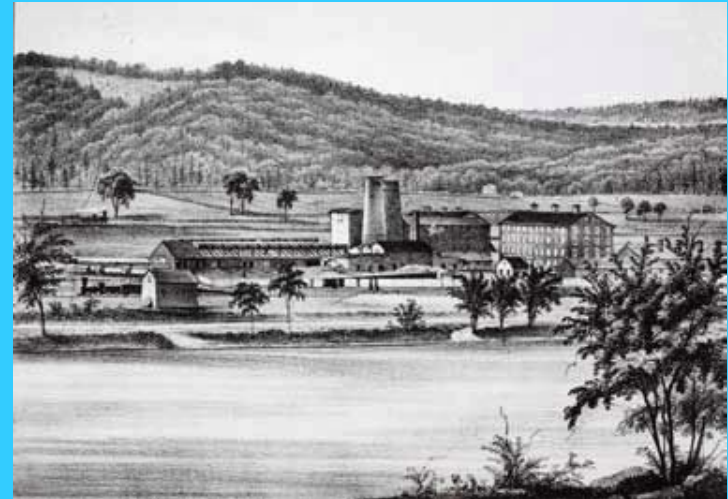


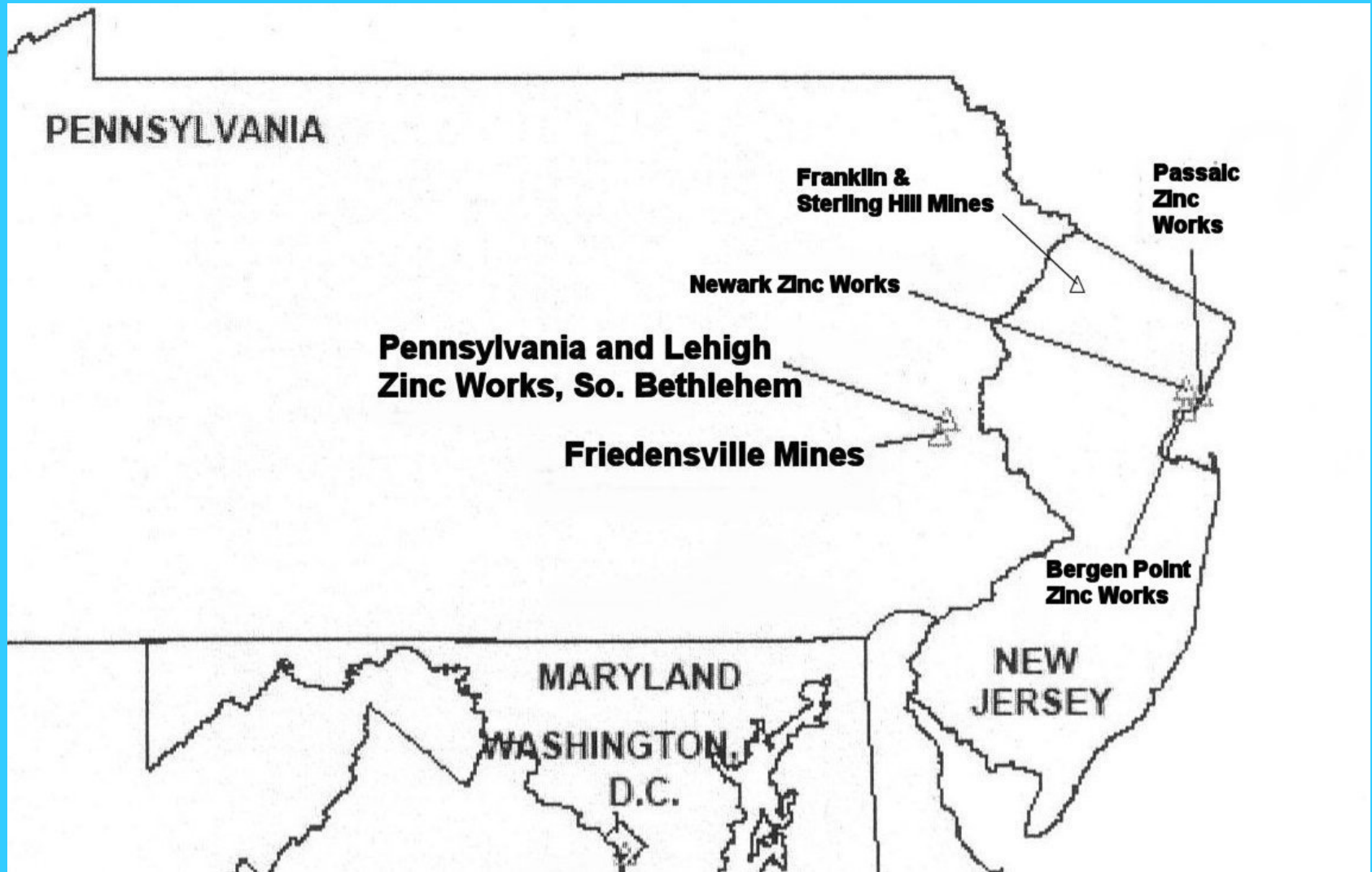


THE HISTORY OF THE FRIEDENSVILLE MINING DISTRICT AND THE BIRTH OF THE U. S. ZINC INDUSTRY

L. Michael Kaas and Mark W. Connar
AIMME 150TH Anniversary, Bethlehem, PA - October 3, 2021



ZINC MINES AND SMELTERS, 1850-1890



(Modified from Bleiwas and DiFrancesco, 2010)



1847 EXPLORATION MAP FRIEDENSVILLE, PA

Theodore Roepper identified the Zinc minerals on Ueberroth Farm

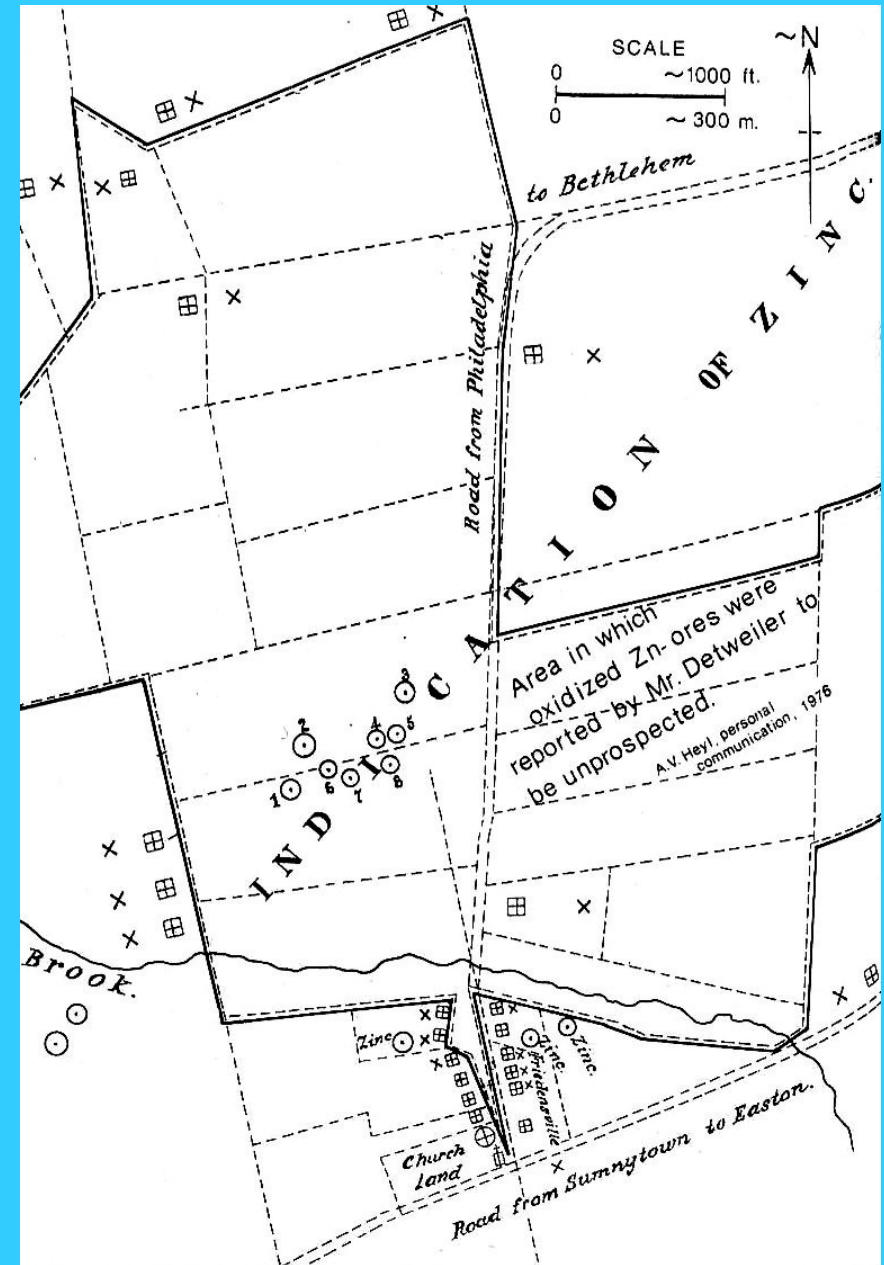
He became Lehigh Univ. Professor of Geology and Mineralogy

REFERENCES.

⊞ × Buildings and outbuildings
 ⚓ Church.
 ⊕ Schoolhouse.
 ⊙ Shafts.

N ^o 1 Shaft.	37 feet. Depth through zinc ore	31 feet.
2	42	30
3	13	9
4	53	46
5	27	16
6	30	22
7	33	24
8	22	12

In none of the Shafts has the zinc ore been penetrated. (That is, the bottom is in ore)



(Wittman, 1847; Smith, 1977)



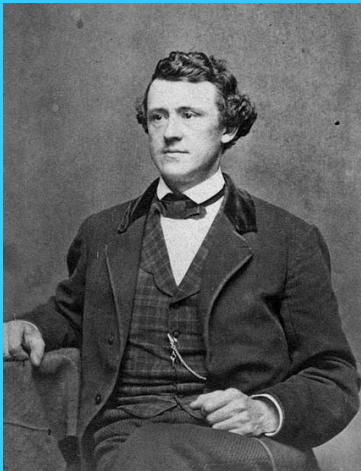


Samuel Wetherill as a Young Man

SAMUEL WETHERILL

1853 WETHERILL AND GILBERT ZINC WORKS,
SOUTH BETHLEHEM, PA

FIRST U.S. LARGE SCALE ZINC OXIDE
PRODUCTION



Joseph Wharton, ca1850

JOSEPH WHARTON

1854 PHILADELPHIA INVESTORS SEND WHARTON TO
TAKE OVER MINES & WETHERILL'S OXIDE PLANT
FIRST U. S. METALLIC ZINC SMELTER
(1860-1863)

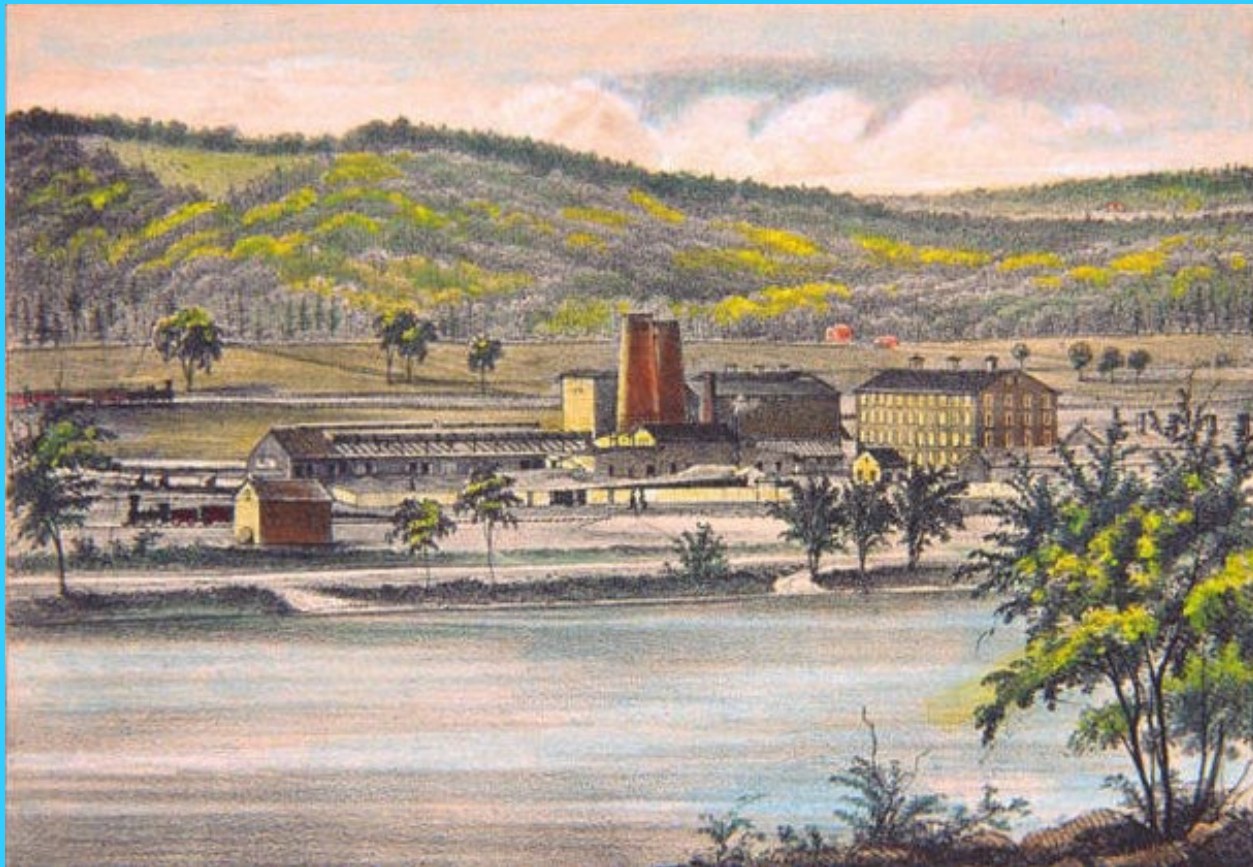


(Photos Courtesy So. Bethlehem Hist. Soc.; Wikipedia)

1853 WETHERILL AND GILBERT ZINC WORKS, SOUTH BETHLEHEM, PA

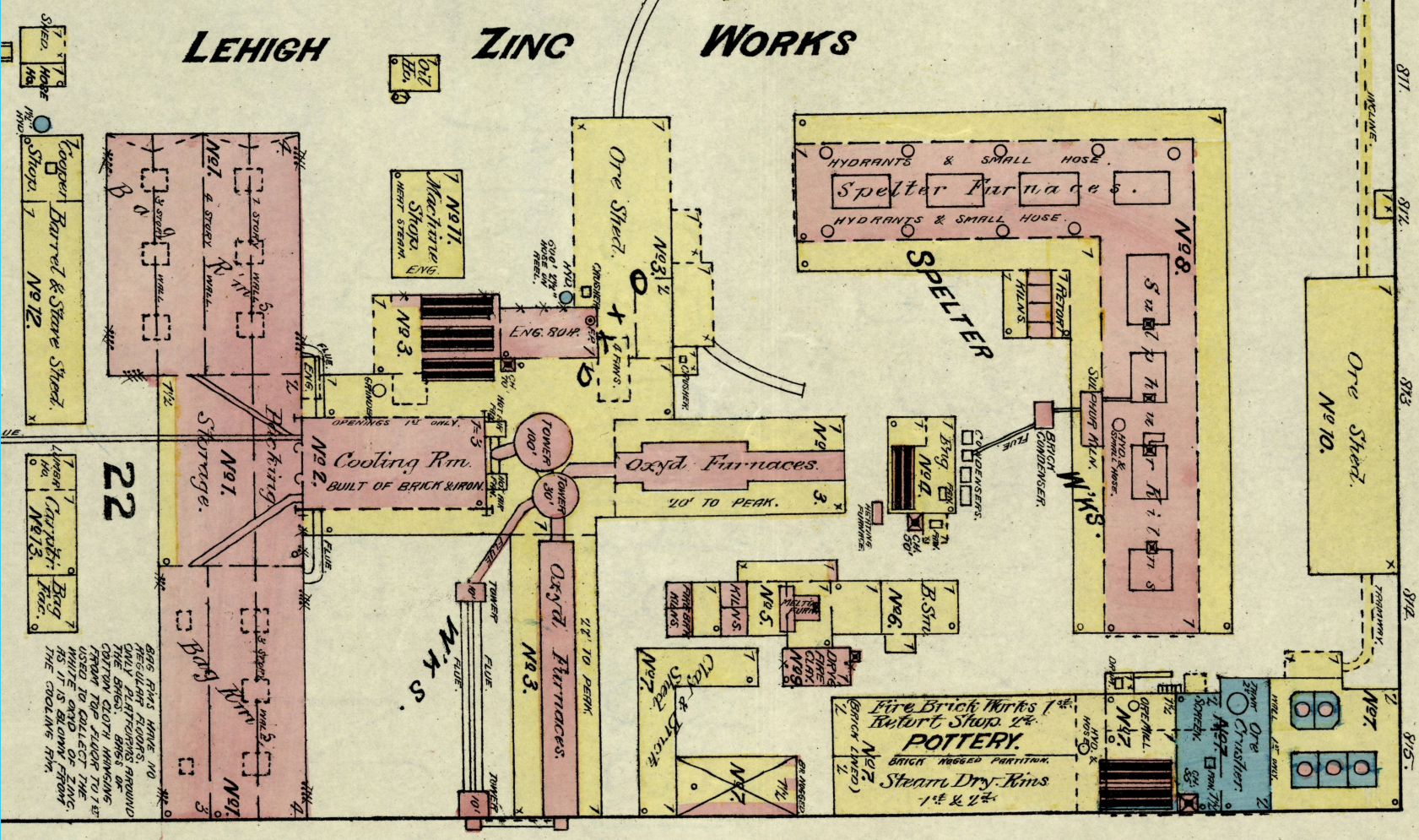
WETHERILL PROCESS: WETHERILL'S OXIDE FURNACE PATENT
SAMUEL T. JONES' BAG HOUSE PATENT

PENNSYLVANIA AND LEHIGH ZINC COMPANY (PLZC) OPERATES THE FRIEDENSVILLE MINES, CONTRACTS WITH WETHERILL FOR OXIDE



(Henry, 1860)

1854 PHILADELPHIA QUAKER PLZC INVESTORS TAKE OVER
1860 JOSEPH WHARTON DEVELOPS THE ZINC SMELTER



(1885 Sanborn Insurance Map)



THE FRIEDENSVILLE MINES, 1853-1893

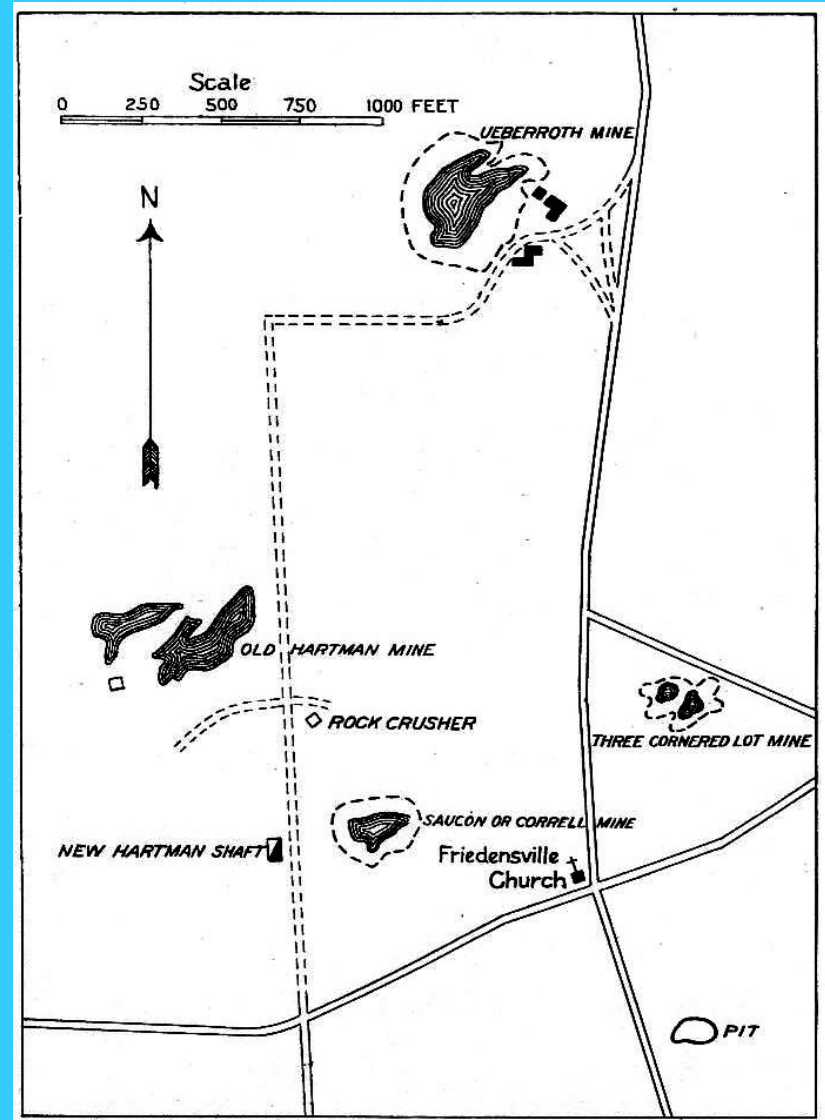
Pennsylvania and Lehigh Zinc Co. &
Lehigh Zinc Co. (1853-1876/1881)

Ueberroth Mine
Old Hartman Mine
Three Cornered Lot Mine
New Hartman Mine

Passaic Zinc Co. (1853-1875)
Correll Mine

Bergen Point Zinc Co. (1875-1881)
Correll Mine

Friedensville Zinc Co. (1881-1893)
All Mines



(Miller, 1924, Figure 4)



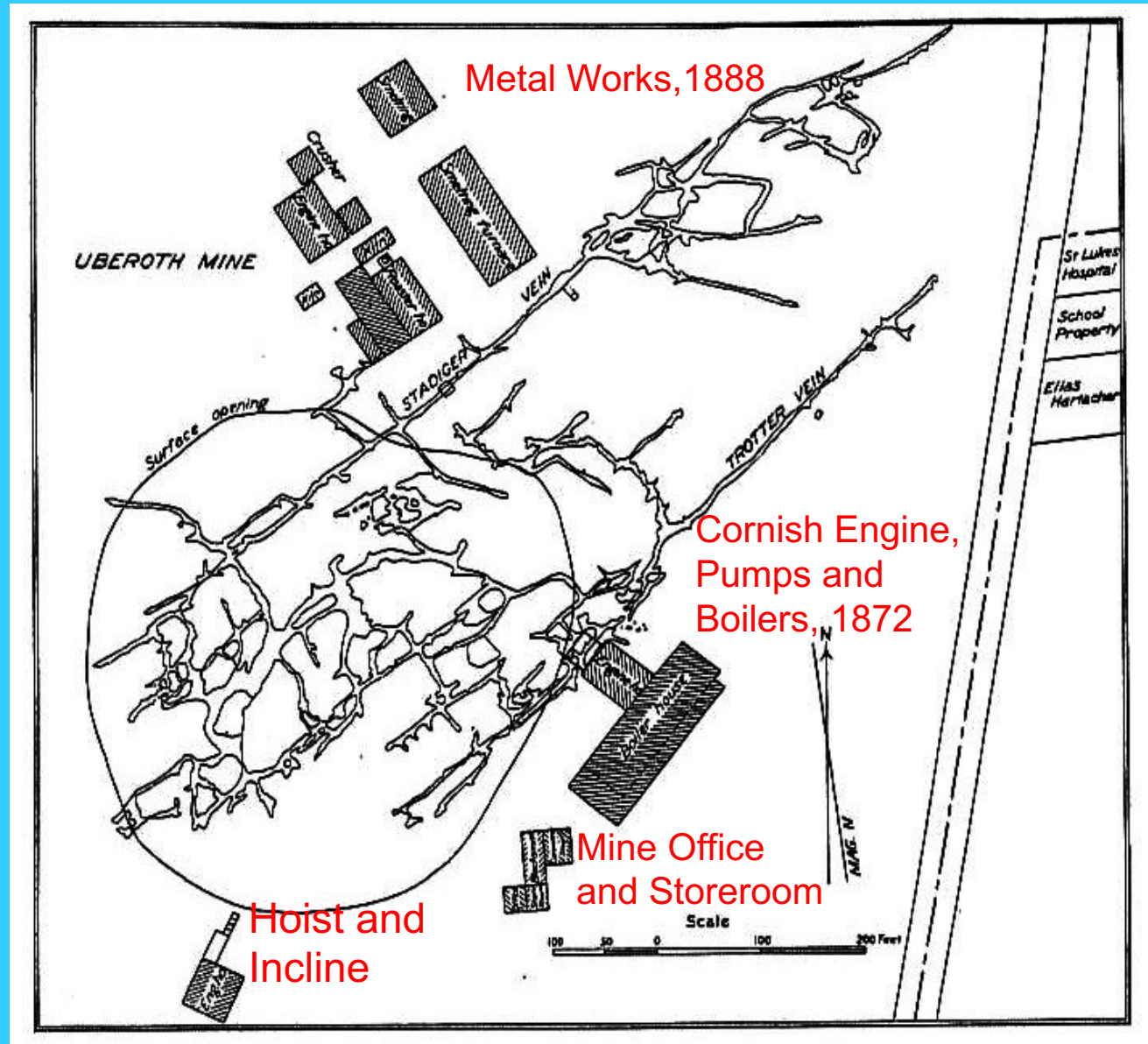
UEBERROTH MINE (1853-1891)

Vertical “Veins”
in Dolomite
and Limestone

Initial Mining
in the Surface
Pit

Underground
Workings
Followed the
Veins

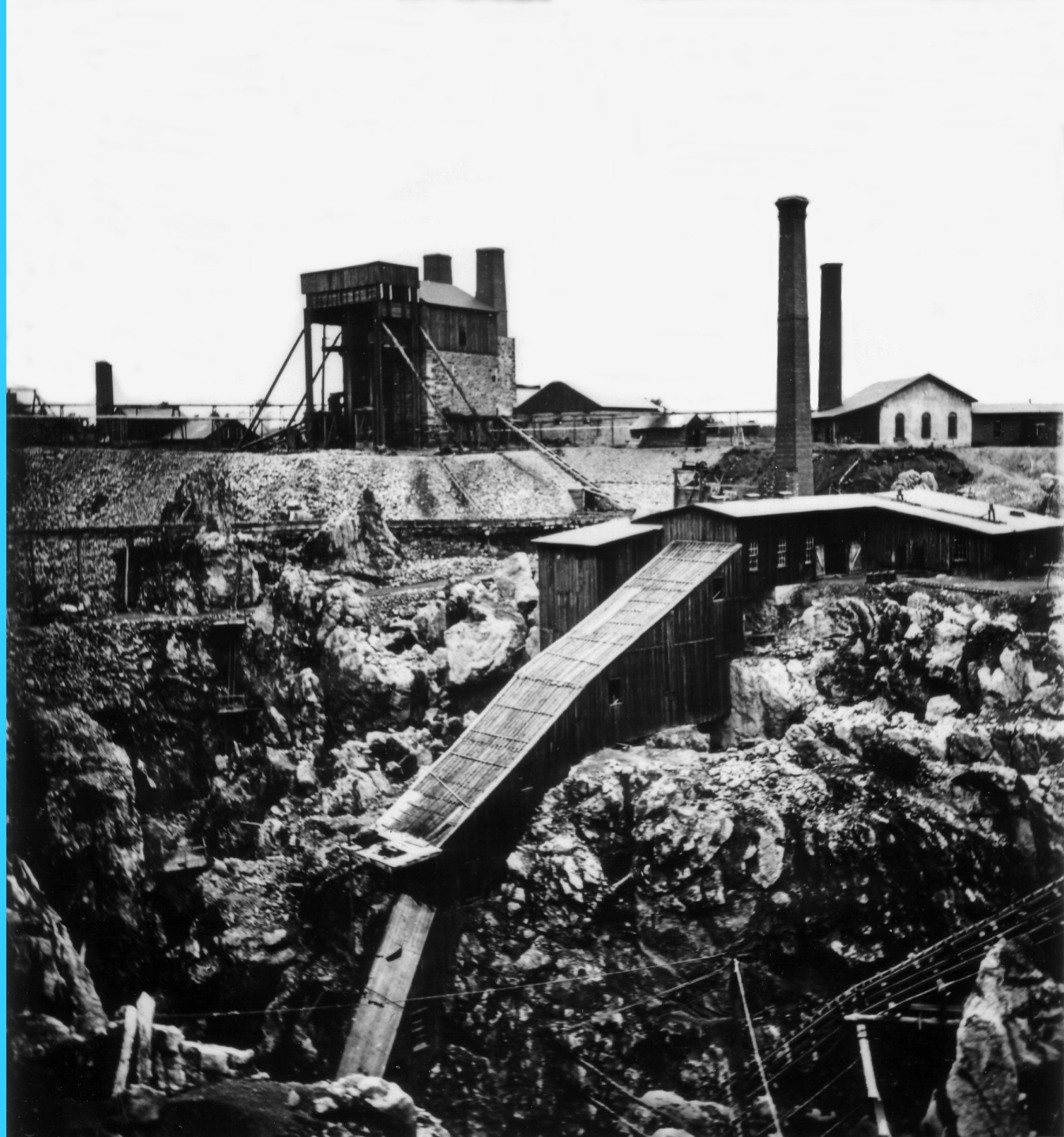
**WATER BECAME
A HUGE PROBLEM**



(Miller, 1924, Figure 5)



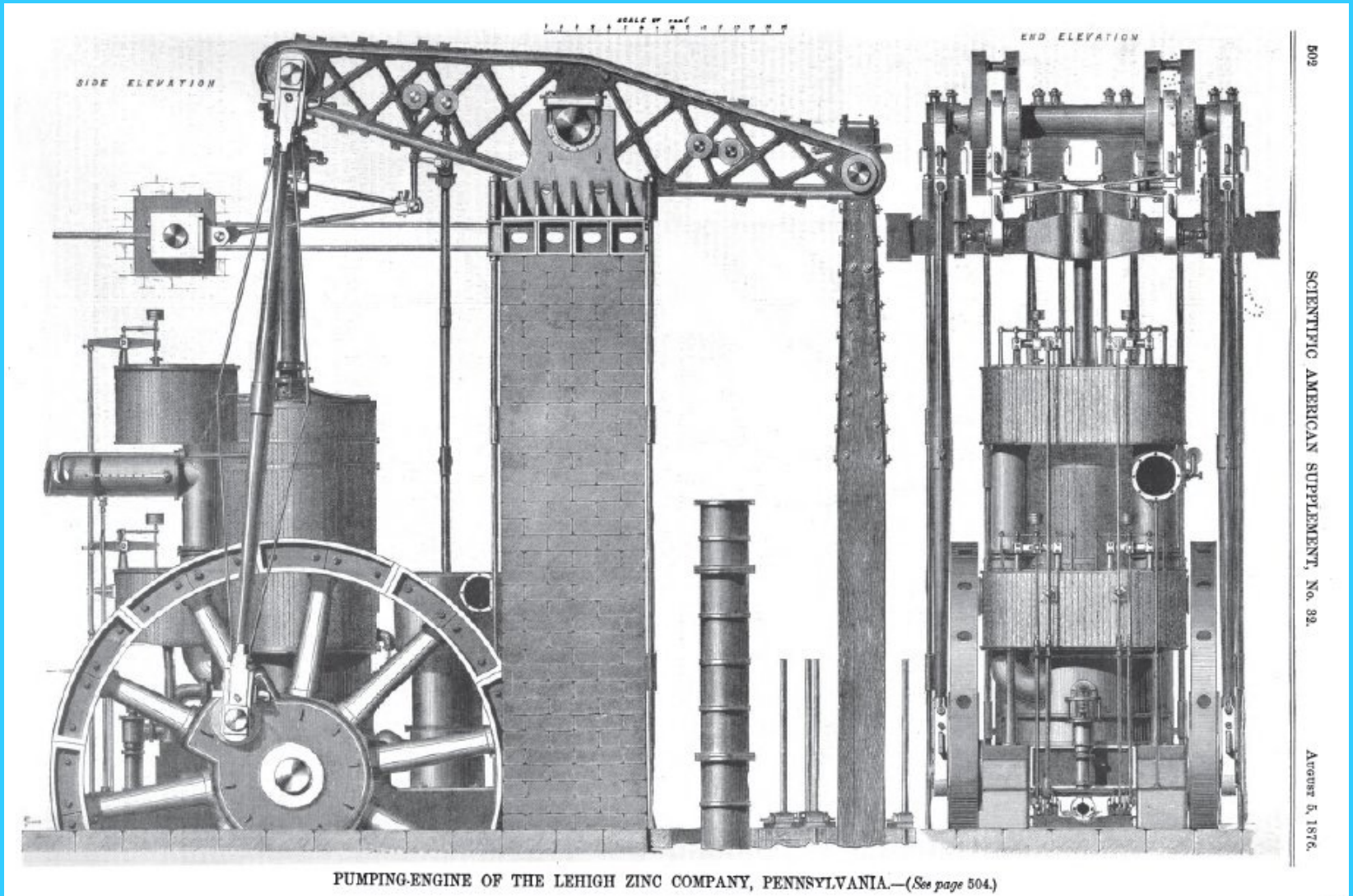
UEBERROTH MINE AND MILL, CA1876



(Miller, 1924, Plate II A)



“THE PRESIDENT” CORNISH BEAM ENGINE AT THE UEBERROTH, 1872



(Scientific American Supplement, 5 August, 1876)



ALL MINES CLOSE BY 1893 – 1899 NJ ZINC ACQUIRES PROPERTY

NEW HARTMAN MINE DURING NJ ZINC EXPLORATION, 1916-17



(Library of Congress)



THE REBIRTH OF FRIEDENSVILLE

1945 NJ ZINC DECISION TO DEVELOP THE FRIEDENSVILLE MINE

1947-1952 SHAFT SINKING (1261 FEET), 3 PUMP STATIONS

1958 MINE PRODUCTION BEGINS

1966 GULF AND WESTERN, INC. ACQUIRES NJ ZINC

1970-1974 SHAFT DEEPENED (2072 FEET), PUMPS ADDED

SEPTEMBER 18, 1983 FRIEDENSVILLE MINE CLOSES BECAUSE OF DEPRESSED ZINC PRICES AND HIGH OPERATION COSTS

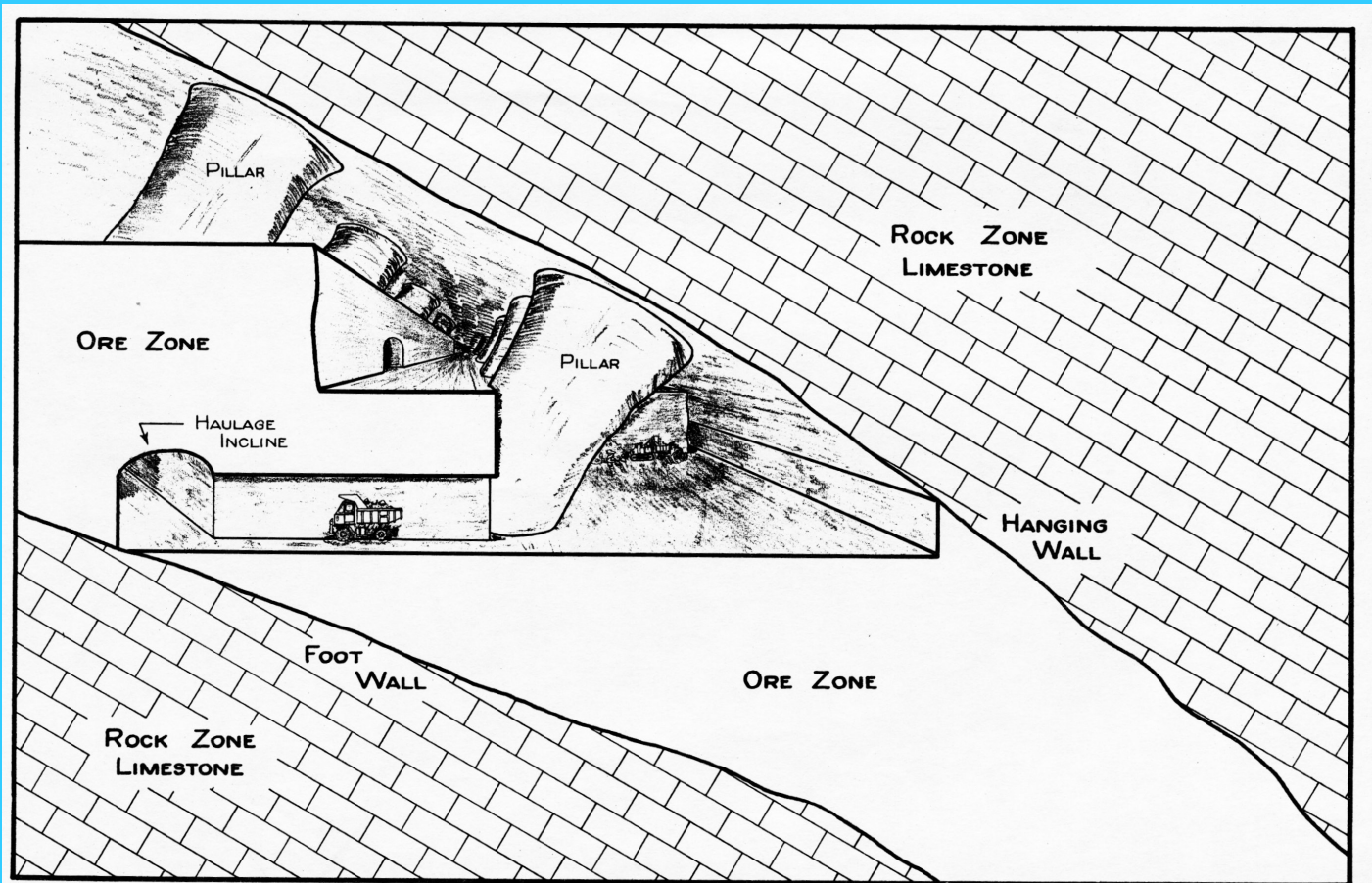
1984 STABLER LAND COMPANY ACQUIRES NJ ZINC PROPERTY FOR REDEVELOPMENT (1680 ACRES)

2012 STABLER DONATES REMAINING LAND TO LEHIGH UNIVERSITY

REDEVELOPMENT CONTINUES BY LEHIGH



NJZ FRIEDENSVILLE MINING METHOD

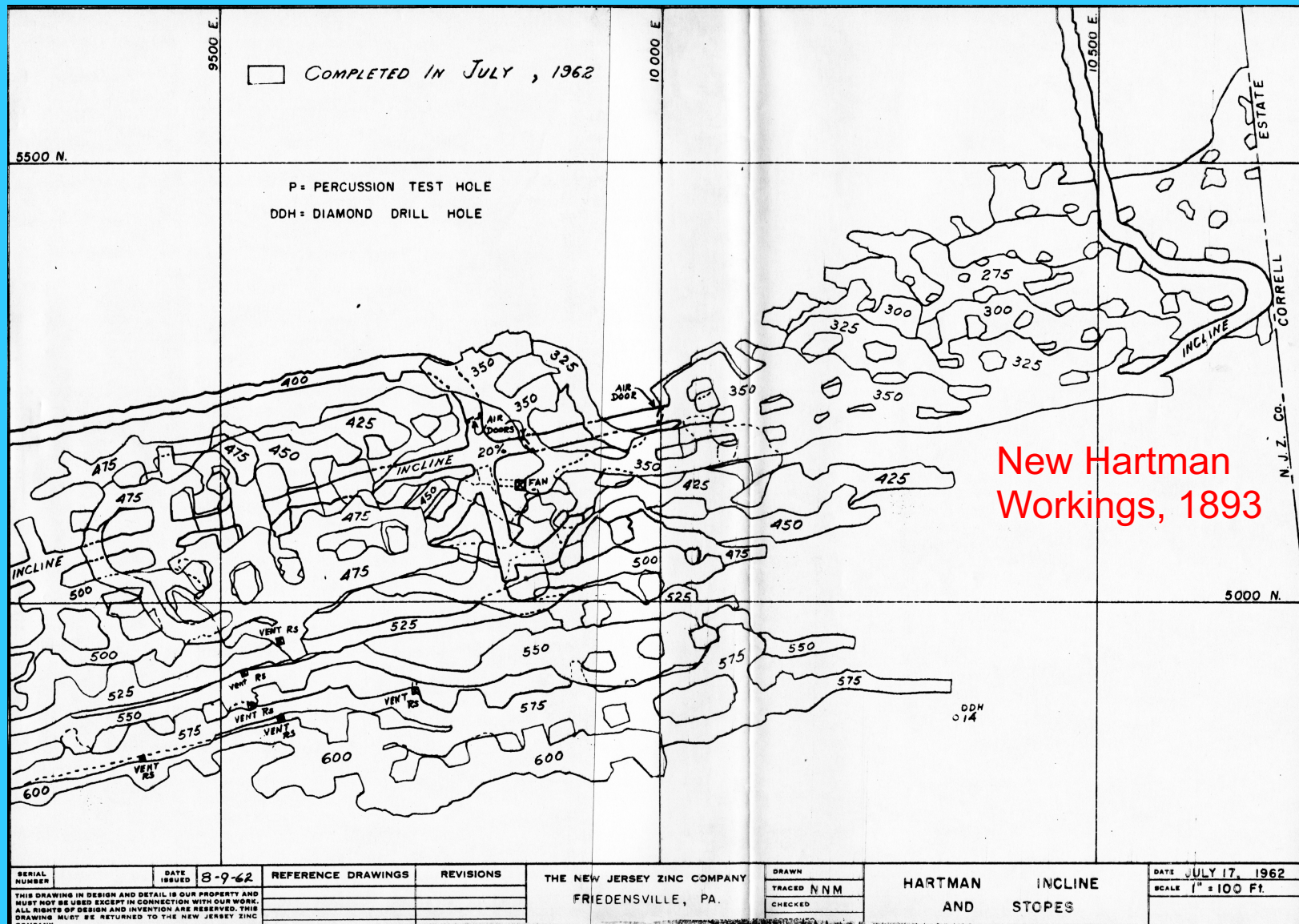


CROSS SECTION
SHOWING
PROPOSED MINING SYSTEM
FOR FRIEDENSVILLE
- LOOKING EASTERLY -

(New Jersey Zinc Company, 1962)



NJZ FRIEDENSVILLE MINE UPPER LEVELS, 1962



<table border="1"> <tr> <td>SERIAL NUMBER</td> <td>DATE ISSUED</td> <td>8-9-62</td> </tr> </table>	SERIAL NUMBER	DATE ISSUED	8-9-62	<table border="1"> <tr> <td>REFERENCE DRAWINGS</td> <td>REVISIONS</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	REFERENCE DRAWINGS	REVISIONS			THE NEW JERSEY ZINC COMPANY FRIEDENSVILLE, PA.	<table border="1"> <tr> <td>DRAWN</td> <td>HARTMAN</td> <td>INCLINE</td> </tr> <tr> <td>TRACED</td> <td>NNM</td> <td>AND</td> </tr> <tr> <td>CHECKED</td> <td></td> <td>STOPS</td> </tr> </table>	DRAWN	HARTMAN	INCLINE	TRACED	NNM	AND	CHECKED		STOPS	<table border="1"> <tr> <td>DATE</td> <td>JULY 17, 1962</td> </tr> <tr> <td>SCALE</td> <td>1" = 100 Ft.</td> </tr> </table>	DATE	JULY 17, 1962	SCALE	1" = 100 Ft.
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(New Jersey Zinc Company, 1962)

WATER WAS STILL A COSTLY PROBLEM

Three stages of pumps raised 35,000 gallons per minute up the shaft



Mining Engineer, Mayo Lanning, next to a water fissure (ca1954)

(Photo courtesy, Bob Lanning)



NJZ FRIEDENSVILLE MINE



(Clockwise) Mine and Mill, Scaling the Back from a "Giraffe,"
Underground Pump Station, Loading Ore (Photos Courtesy
Ken Cox, ca1976)



FRIEDENSVILLE PRODUCTION ESTIMATES

1853-1893 Period (Based on Miller, 1924; Smith, 1977)

Est. Total Production (All Mines): 800,000 tons ore
Ueberroth Mine 450,000 tons ore
Old Hartman Mine: 200,000 tons ore
Correll Mine: 100,000 tons ore
Three Cornered Lot Mine: 50,000 tons ore
Average Ore Grade: 30% Zinc
Hand-Picked Sphalerite Grade: 45% Zinc

1958-1983 Period (Based on Metsger, 1973; Smith, 1977)

Friedensville Mine Capacity 2000-2200 tpd ore
Friedensville Mill Capacity 2500 tpd ore
Est. Total Ore Production (25 years): 14,000,000 tons
Est. Total Zinc Production: Over 900,000 tons
Ore Grade: 5.5-6.5% Zn



FRIEDENSVILLE MINES TODAY



(Google Earth Image 2013, annotations by author)



HISTORIC FRIEDENSVILLE VILLAGE



DEMOLISHED, 2017



(Clockwise from Upper Left) Friedensville Church, ca 1839; Ueberroth Mine Superintendent's House, ca 1840; David Hartman House, ca 1870; and New Jersey Zinc Employee Housing, ca 1950 (Kaas Photos, 2012)



Recreating The President Engine



HOUSE OF THE PRESIDENT – THEN AND NOW



Photo – Connor (2018)

Preservation Status – 2021

- The existing President Engine House and the area surrounding the structure is a 19th century mining industry time capsule.
- Protection, preservation, interpretation and recognition of this engine house and its surroundings is of vital importance because:

**“ Why Saving
the Location is
Important.....”**

- It is the only structure and physical setting remaining of one of the earliest industrial age enterprises in the Lehigh Valley;
- The engine house is part of the largest and most powerful single cylinder rotative steam engine ever built anywhere in the world;
- It is a unique structure as the only surviving example in the United States of a “house-built” Cornish-style pumping engine house, hence, an international extension of a UNESCO World Heritage Landscape.
- Long Historical Connection with Lehigh University, the property owner.





PRESERVING THE ENGINE HOUSE

Lehigh University funding a study of the ruins with match funding provided by:

Keystone Historic Preservation Grant (State of PA) – 2 Grants (2019 and 2020)

Louis J Appell, Jr. Preservation Fund for Central PA (National Trust)

Contractors/Consultants:

Vegetation Removal - Keystone Siteworks

PM, 3D Scan, Pump Shaft Evaluation – Borton Lawson

Architectural Assessment – Whitman, Requardt & Assoc.

Engine House Structural Analysis and Construction Drawings – Keast & Hood

The only surviving example of a Cornish style Pumping Engine House in the United States



Challenge: Recreate the Engine as an operating machine in a virtual world

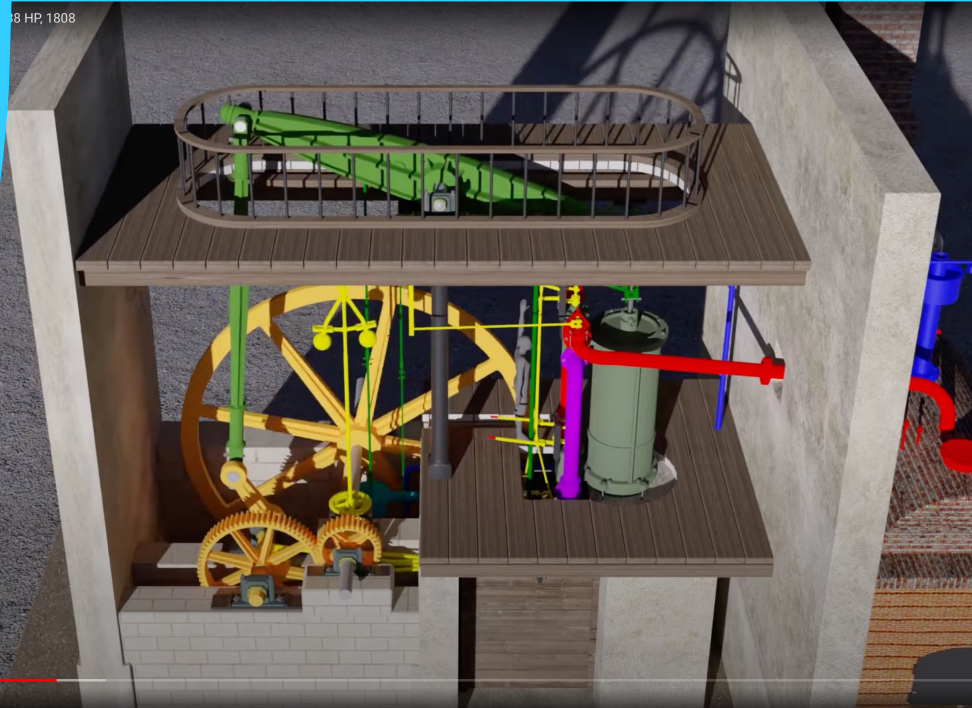
Meet the Artist:

Guy Janssen

- Resident of Schelle, Belgium
- Master's Degree in Engineering Sciences from the Catholic University of Leuven (KU Leuven) and a Master's Degree in Nuclear Engineering from the Polytechnic Institute Grenoble.
- Retired after long career with Tractebel.
- Fascination with steam and other foundational mechanical equipment has led to Guy's hobby of modeling equipment.
- He has a well-developed series of stationary and marine steam engine animated models on *YouTube* starting with Savery, Newcomen, Boulton & Watt, others and now also The President:

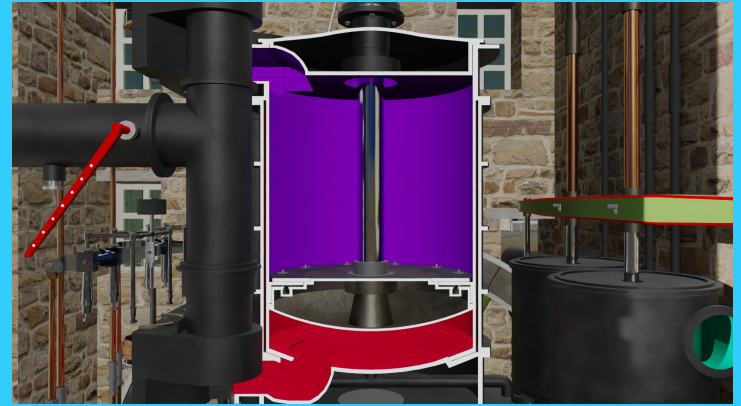
<https://www.youtube.com/playlist?list=PLeafkeA7JwX4cvb3B1mDDWYKOA9Vji8Tx>

- Guy uses Blender 2.9x, which is a community-based open-source software, to create these animated models .
- He is currently experimenting with interactive modeling using the gaming functionality in Blender.





And the rest of the movie.....



***The President Pump
Preservation Fund***

Lehigh University

**Development and Alumni
Relations**

306 S. New Street

Suite 500

Bethlehem, PA 18015-1652

800-523-0565

<http://give.lu/prespump>



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Robert Lanning, Springfield, MO
Dr. Gerard Lennon, Lehigh University
Dr. R. Damian Nance, Stratford, CT

Artists:

Guy Janssen, Schelle, Belgium
Alexander Karnes, Hanover, MA

Community and Historical Societies:

Kelly Butterbaugh, Coopersburg, PA
Coopersburg PA Historical Society
Cornish American Heritage Society
Cornish Cousins of the SouthEast
Lehigh County Historical Society, Allentown, PA
Northampton County Historical Society, Easton, PA
South Bethlehem Historical Society, Bethlehem, PA
Upper Saucon Township

Libraries and Museums:

Allentown, PA Public Library
Bethlehem, PA Public Library
Department of the Interior Library, Washington DC
Easton, PA Public Library
Lafayette College, Special Collections, Easton, PA
Landis Valley Village and Farm Museum, Lancaster, PA
Lehigh University, Special Collections, Bethlehem, PA
Library of Congress, Washington DC
Moravian Church Archives, Bethlehem, PA
Penn State, State College, PA, Earth and Sciences Library
National Canal Museum, Easton, PA
National Museum of Industrial History, Bethlehem, PA
Swarthmore College, Swarthmore, PA, Quaker Archives
Upper Saucon Township Library
USGS Library, Reston, VA

Acknowledgements



Lehigh University Student TE “Lehigh Park” Project Team



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Mike’s Paper on the Friedensville Mines.....

**The History of Zinc Mining in Friedensville Pennsylvania,” L. M. Kaas,
Mining History Journal, Vol. 23, 2016, pp. 17-42.**

Download:

www.mininghistoryassociation.org/Journal/MHJ-v23-2016-Kaas.pdf

And Visit Us and View the Movie At.....

www.friedensvilleminesh heritage.org



*AIME 150th Anniversary – Bethlehem PA
October 3, 2021*