**CONNECTICUT GEOLOGICAL SURVEY
DEPARTMENT OF ENERGY AND
ENVIRONMENTAL PROTECTION**

*NATIONAL GEOLOGICAL AND GEOPHYSICAL
DATA PRESERVATION PROGRAM, FY2020
Grant Award No. G20AP00071-01*

**Bedrock Mines and Quarries of Connecticut Database Update
to National Geologic Mapping Schema [GeMS] in support of
U.S. Critical Minerals Mapping Initiative**

Grantee
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ABSTRACT

*CONNECTICUT BEDROCK MINING SITES DATABASE*
A Comprehensive Inventory of Active and Historic Bedrock Mines and Quarries in Connecticut (2022). Developed by the Connecticut Geological Survey, Department of Energy and Environmental Protection. Contributors: Harold Moritz, Randolph Steinen, Taryn Isenburg, Zachary Klang, Rebekah Kennedy, David Vohra, Madison Rosen, Margaret Thomas, Madison Knox, Charles Kaiser, Charles Merguerian, Earl Manning, Evan Tam, Brian Clark.

GOALS AND ACCOMPLISHMENTS

NGGDPP PRIORITY 2:
BEDROCK MINES AND QUARRIES MAP OF CONNECTICUT UPDATE TO NATIONAL GEOLOGIC MAPPING SCHEMA [GEMS] IN SUPPORT OF U.S. CRITICAL MINERALS MAPPING INITIATIVE

The primary goals of this project were: (1) update the Connecticut Bedrock Mines and Quarries Map and convert the existing ArcGIS shapefiles to the National GeMS format geodatabase in support of Connecticut critical minerals information development for the USGS National Geological and Geophysical Preservation Program (NGGDPP) and Earth Mapping Resources Initiative (EarthMRI); (2) preserve Connecticut mining information and make it both discoverable and accessible to the public in support of the Connecticut economy, land use planning for conservation & development, pollution prevention, hazards assessments, and cultural preservation.
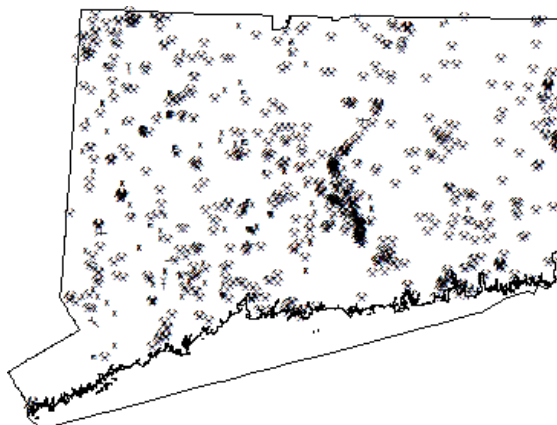
COMPARISON OF ACCOMPLISHMENTS TO GOALS ESTABLISHED FOR THE PERIOD

The accomplishments and deliverables for this project far exceed the goals established for the period. The no-cost project extension allowed for completion of GeMS compliant metadata, internal review necessary for designation of the geodatabase as State Survey Bulletin 119, and relevant web content development. Although originally intended as an update to the existing Bedrock Mines and Quarries Map of Connecticut (1987) it became clear during the early stages of the project that hundreds of updates to the published map were needed. Scientific literature research, online sources, and site visits expanded the project, and provided documentation of 1070 mining sites (including 426 sites not previously cataloged), attribute information was expanded, and areas of disturbed land were mapped. These enhancements along with format conversion to GeMS produced a new comprehensive geodatabase of active and historic bedrock mining sites for Connecticut. The *Connecticut Bedrock Mining Sites Database* is available as a downloadable GIS geodatabase in GeMS format; an interactive map is in preparation.

SUMMARY

The *Connecticut Bedrock Mining Sites Database* (2022) is a comprehensive inventory of active and historic bedrock mines and quarries for the State of Connecticut. This work is integral to the mission of the Connecticut Geological and Natural History Survey, contributes to the National Assessment of Critical Minerals for the USGS Earth Mapping Resources Initiative and the National Geological and Geophysical Data Preservation Program.

This geodatabase was produced by Connecticut Geological Survey staff, interns, and volunteers. Contributors include Harold Moritz, Randolph Steinen, Taryn Isenburg, Zachary Klang, Rebekah Kennedy, David Vohra, Madison Rosen, Margaret Thomas, Madison Knox, Charles Kaiser, Charles Merguerian, Earl Manning, Evan Tam, and Brian Clark. A full list of data sources and references is included in the metadata.

CTBedrockMining2022.gdb supersedes all previously published Connecticut bedrock mining maps. It includes enhancements to site location and commodity data, activity status, host rock, citations, and validation method, as well as reconciliation of duplicate sites and other information. Area features identify disturbed land and tailings piles resulting from mining activities. The geodatabase is a synthesis of modern and historic data, incorporating Survey archival information and mine plans, scientific reports, landscape analyses and field inspections for 1070 mining sites in Connecticut as of the year 2022 (ver. 1.01), including 426 sites not previously recognized or located.

This work supports the Connecticut economy, land use planning for conservation & development, pollution prevention, hazards assessments, and cultural preservation. The database is suitable for geologic and environmental mapping and analysis purposes at 1:24,000 scale. Note that many sites recorded in this database are located on private property and no permission is inherently granted to visit them. Any physical access to these sites is limited to the landowners' permission. This material is based upon work supported in part by the U.S. Geological Survey National Geological and Geophysical Preservation Program under Grant No. G20AP00071-01.

INTRODUCTION
Connecticut has a rich mining history, starting in early colonial times, with critical production of munitions and copper coins during the revolutionary war, continuing through the brownstone boom in architectural design of the 1800's, and granite and marble use in government buildings and National monuments. Historic operations include copper, silver, lead, cobalt, tungsten, iron/siderite and pig iron, garnet, REE pegmatites, uranium, barite, feldspar, mica, graphite, and possibly gold. Modern mining commodities in Connecticut are basalt and diabase (traprock), granite and granitic gneiss, marble, sand & gravel, and clay. Modern uses include but are not limited to crushed rock for aggregate in the construction industry, landscaping, pharmaceuticals, building stone, industrial processes, brick manufacture, and jewelry.

Over the past few years, there has been a renewed focus on Connecticut mining data. The interest has originated from a variety of sources, including educators, treasure hunters, litigators, historians, archaeologists, and land use planners. From a geohazards perspective, land subsidence has been identified in areas of historic mining with poor reclamation and insufficient site mapping now developed as modern residential housing. Other more geographically extensive mining related hazards are associated with the production of crushed stone for coarse aggregate in the manufacture of concrete. Aggregate containing pyrrhotite, a deleterious sulfide mineral, has been used in concrete production in north central and northeastern Connecticut, causing the foundations of homes, municipal buildings, and condominium complexes to crumble. In response to a Connecticut crumbling concrete crisis, Connecticut PA21-120 requires geologic source reports for quarry sites where aggregate mining is proposed for use in Connecticut concrete.

Many of the critical minerals identified for the U.S. have an impact on environmental quality and human health, so mapping sources of these minerals, especially Arsenic, Chromium, Cadmium, Iron, Lithium, Lead, Manganese, Mercury, Nickel, and Uranium, in Connecticut is essential information for the Dept. of Energy and Environmental Protection, the Health Department, Office of Policy and Management,

Regional Councils of Governments, and Municipalities for environmental decision making as well as for land use planning for conservation and development.

The Connecticut Bedrock Mining Sites Database supersedes earlier Connecticut Survey resource mapping, including The Bedrock Mines and Quarries of Connecticut map (Altamura, 1987) sourced from a 1:24,000 scale set of quadrangle compilation sheets prepared for the State Survey in 1972 by Charles Smith, of Wesleyan University. https://www.sciencebase.gov/catalog/item/5294d093e4b01cca2b11df4a

The Connecticut Bedrock Mining Sites Database is the product of extensive research which includes reconciliation of State Geological Survey file information with online data available through the USGS, Mineral Resources Program, the US Mine Safety and Health Administration (MSHA) data, mindat.org, and other sources, as well as original historical accounts and scientific citations. Validation of site characteristics was performed using hillshade maps derived from high resolution lidar data and aerial photography followed by field site visits. The resulting geodatabase provides detailed information for 1070 bedrock mining sites in Connecticut, inclusive of locations of U.S. Critical Minerals and non-fuel mineral resources.

STATISTICS & COMMODITY NOTES
1070 total site records (points) with 655 mining excavation areas (polygons) identified

ACTIVE SITES
- 77 active sites, all surface workings, located with 0 uncertainty.
- 69 are extracting bedrock; 7 are extracting minerals/metals and bedrock; 1 is extracting minerals.
    - 1 site is working in calc-silicate rock, 48 are in gneiss/granite/gabbro, 6 are in marble, 1 is in pegmatite, 8 are in quartzite, 1 is in schist, and 12 are in trap rock

ALL SITES

- 650 bedrock commodity only sites; 73 combined minerals/metals and bedrock sites; 241 minerals sites; 106 metallic commodities sites
    - Of the 73 combined minerals/metals and bedrock sites, 72 are in marble with lime, Ca/Mg carbonate minerals, and bedrock commodities. Some examples with formal names include the Conklin Marble Quarry (Canaan), the Connecticut Agstone Co. Quarry (Danbury), the Connecticut Lime Company Quarry (North Canaan), the Redding Marble Co. Quarry (Redding), and Woodsworth's Marble Quarry (Salisbury). The only record not in marble is the Midwood Quarry/ Burgundy Hill Garnet Mine, which extracted garnet from metamorphic rock before becoming a bedrock quarry.

    - Of the 241 mineral sites, the majority (139 sites) were producing feldspar from pegmatite. Some examples include the East Selden Quarry (East Hampton), Howe Quarry (Glastonbury), Gillette Quarry (Haddam), the Feldspar Corp. Quarry (Middletown), and the Case Quarry (Portland). Other minerals sought/extracted include quartz (32 sites, including the US Silica Lantern Hill Quarry (North Stonington) and the Southford Quarry (Southbury)), general mineral/ gem/ fossil specimens (19 sites, including the Mt. Tom Beryl Prospect (East Haddam), and the Spinelli Samarskite Prospect (Glastonbury)), muscovite (15 sites, including the Knapp Prospect (Canton) and the Bailey Prospects (East Hampton)), and barite (10 sites, including the Jinny Hill Mine (Cheshire)).

Of the 106 metallic sites, the most common metals extracted were copper (32 sites, including the Bristol Copper Mine, the Newgate Copper Mine, and the Tallman Copper Mine), iron (27 sites including the Tuttle Mine, the Salisbury Mine, and the Cream Hill Mines), and nickel (19 sites including the Hodges Mine and Pool Mine). Less common metals were lead (9 sites including the Canton Lead Mine), and cobalt (7 sites including Brown's Shaft, part of the Chatham Co & Ni Mines).

- 5 sites in shale, 40 in brownstone, 4 in calc-silicate rock, 457 in granite/gneiss/gabbro, 2 in limestone, 72 in marble, 154 in bedrock hosting ore deposits, 174 in pegmatite, 39 in quartzite, 22 in schist, 90 in traprock, and 11 in verde antique (serpentinite). Most common rock quarried is granite/gneiss/gabbro.

    Some examples from the bedrock hosting ore deposits include lead from the Harts Mine (Berlin) and Canton Lead Mine, copper from the Bristol Copper Mine and Tallman Mine, nickel and cobalt from Brown's Shaft (part of the Chatham Co and Ni Mines in East Hampton), and tungsten from the Trumbull Tungsten Mine.

- 57 sites with underground workings: 24 of which are classified strictly as mines; 18 as shafts;15 others with a combination of operations, including mines, prospects, and quarries. Exclusive of those sites, there are 238 prospects, and 775 quarries.
- ~92% of all records are located with minor to no uncertainty.

    872 sites located with 0 uncertainty (Location confidence meters = 0); 115 sites located with minor uncertainty (Location confidence meters = 10-25). 44 sites located with moderate uncertainty (location confidence meters = 30-100), and 39 sites located with major uncertainty (location confidence meters >100).

MAPPING DETAIL

Data quality and completeness for the Connecticut Bedrock Mining Sites Database is supported by extensive research and field visits conducted by the project team, with a minimum site identification area of five square meters. Attribute information includes location, commodity, activity status, host rock, citations, and validation method. The database consists of two distinct but related layers: the mining sites represented by geographic locations as feature points with associated attributes, and a polygon layer which depicts the extent of excavation associated with mining activities. The polygons were drawn from visual inspection of modifications to the landscape by mining activities, using aerial photography and high resolution hillshade mapping derived from lidar data. Polygon areas also include tailings piles where evident. Small prospect pits and shafts were digitized onscreen at a scale of 1:2,000 or 1:5,000. Larger mining and quarry operations were digitized at a scale of 1:24,000. Polygons were not digitized for historic sites that are filled, overprinted by development, reclaimed, or have low location confidence.

CITATION

Connecticut Geological and Natural History Survey, 2022, *Connecticut Bedrock Mining Sites Database:* Department of Energy and Environmental Protection, Hartford, CT. CGNHS Bull.119, ver. 1.01, GIS geodatabase [GeMS]; PDF. https://portal.ct.gov/deep/geology/connecticut-bedrock-mining-sites-database-2022

PRODUCTS

- ❖ Connecticut Bedrock Mining Sites Database CGNHS Bull. 119, 2022 [GeMS geodatabase]
- ❖ NGGDPP format metadata uploaded to the Registry of Scientific Collections.
- ❖ Publication of Connecticut Bedrock Mining Sites Database, pdf & GIS data: www.sciencebase.gov ; https://portal.ct.gov/deep/geology/connecticut-bedrock-mining-sites-database-2022