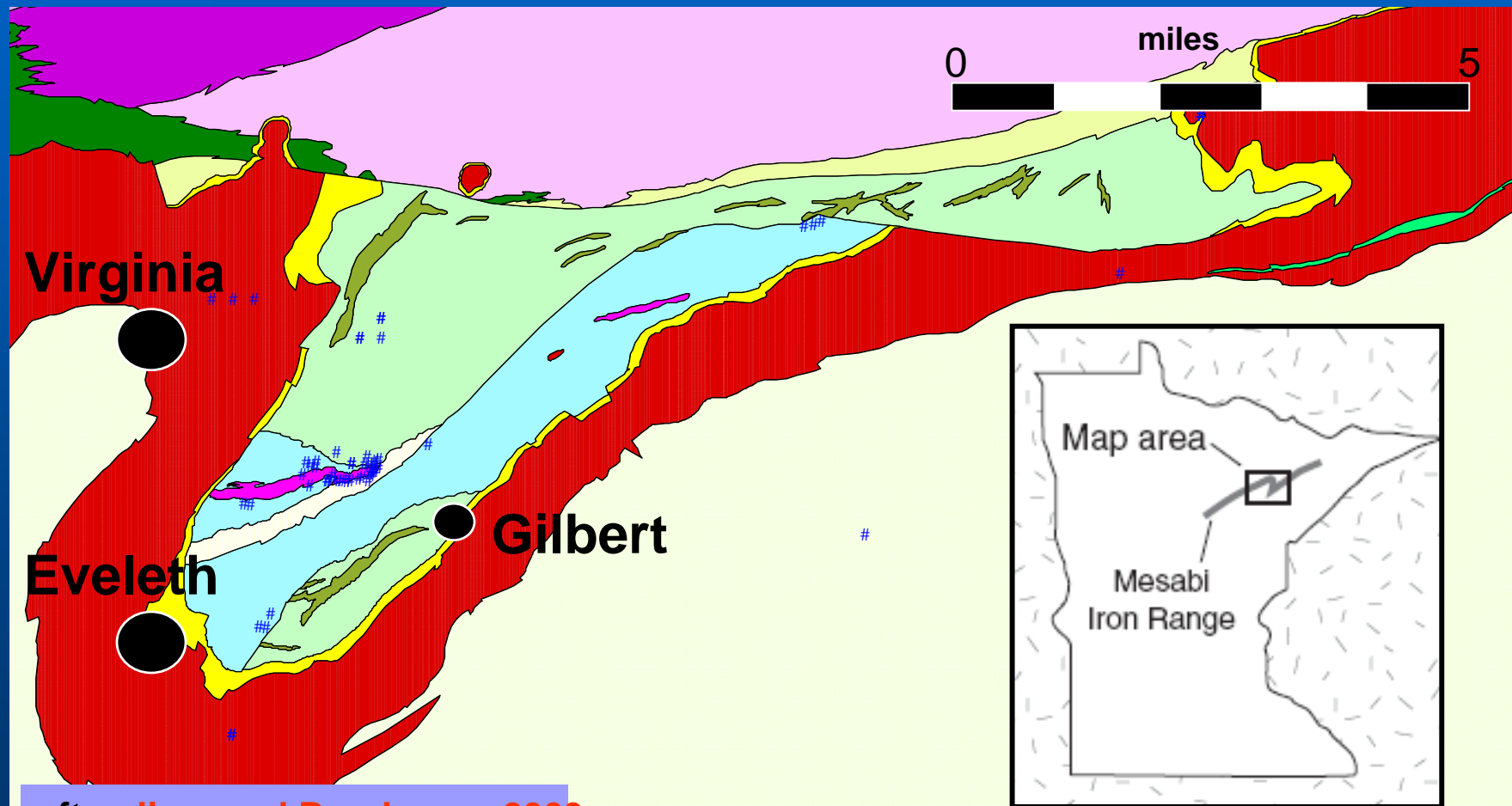


# GOLD MINERALIZATION IN THE VIRGINIA HORN GREENSTONE TERRAIN, ST. LOUIS COUNTY, MINNESOTA

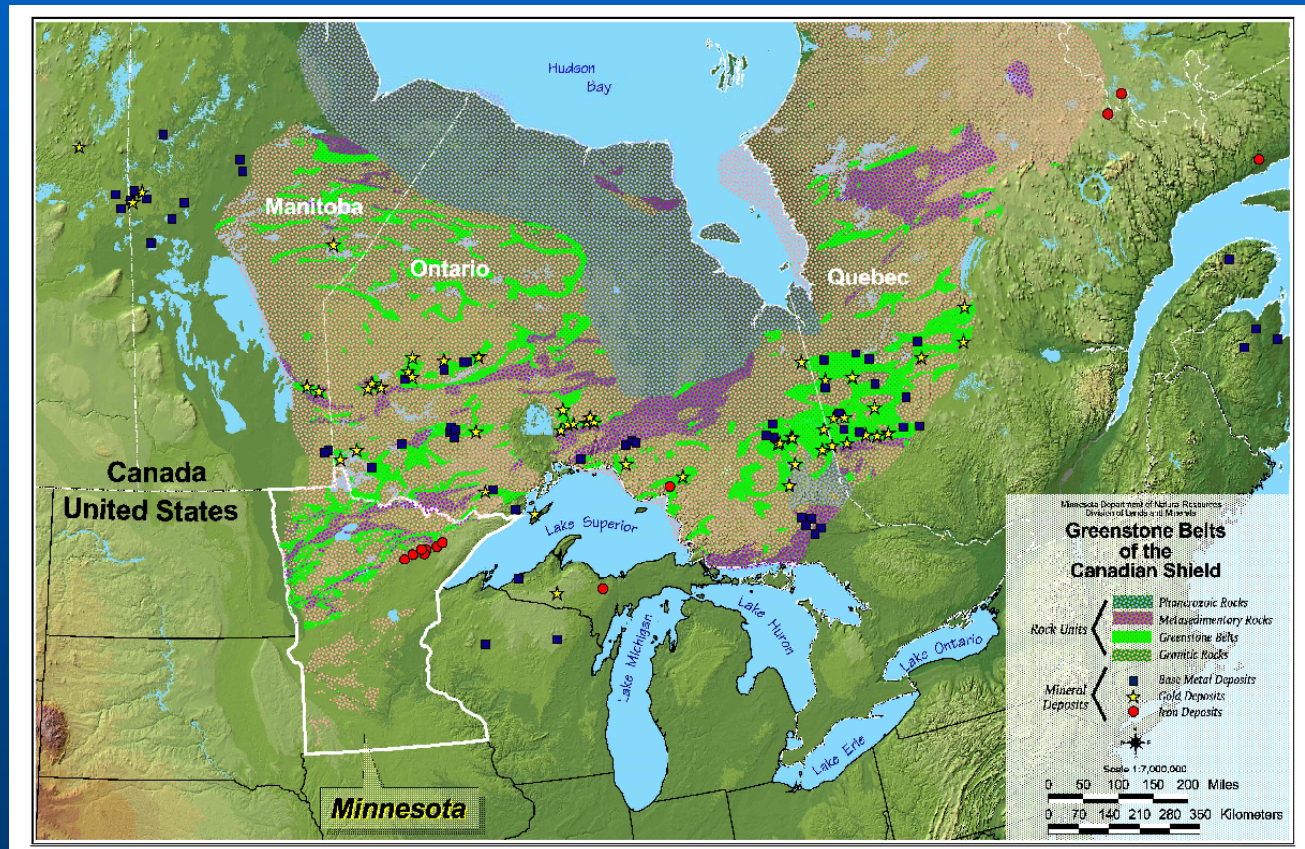
Don Elsenheimer  
Minnesota DNR  
(651) 359-5433  
[donald.elsenheimer@dnr.state.mn.us](mailto:donald.elsenheimer@dnr.state.mn.us)

# Virginia Horn Greenstone Belt



after [Jirsa and Boerboom, 2003](#)

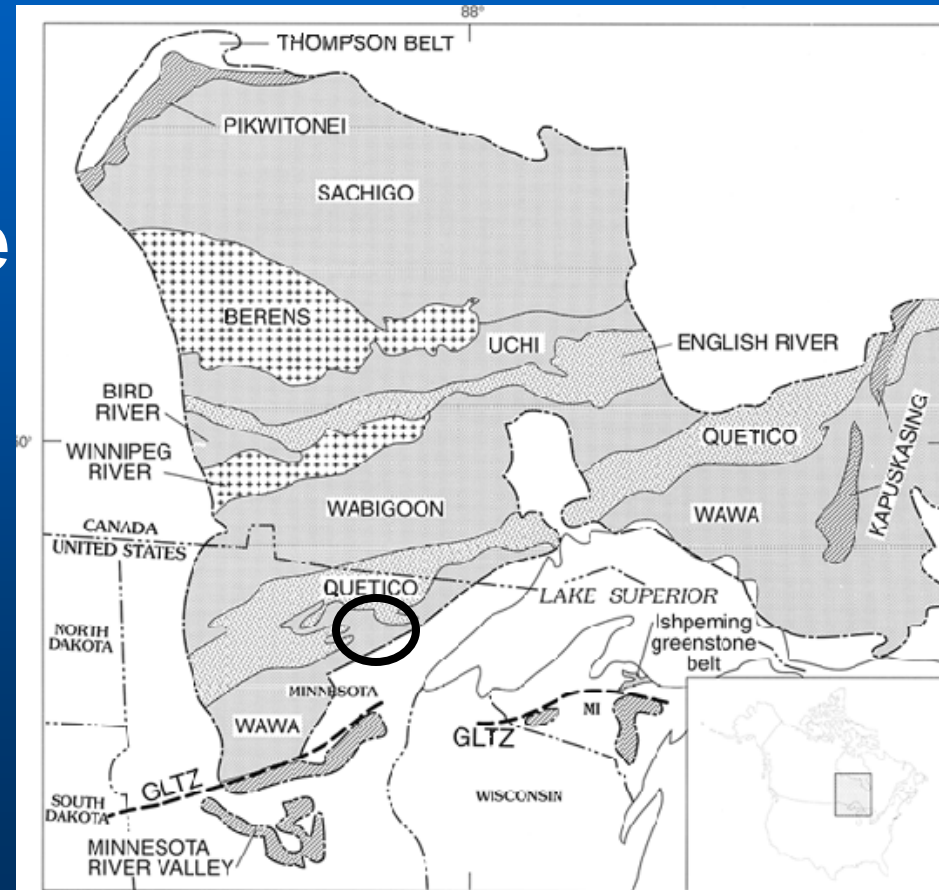
# Superior Province Greenstone





# Virginia Horn Greenstone Belt

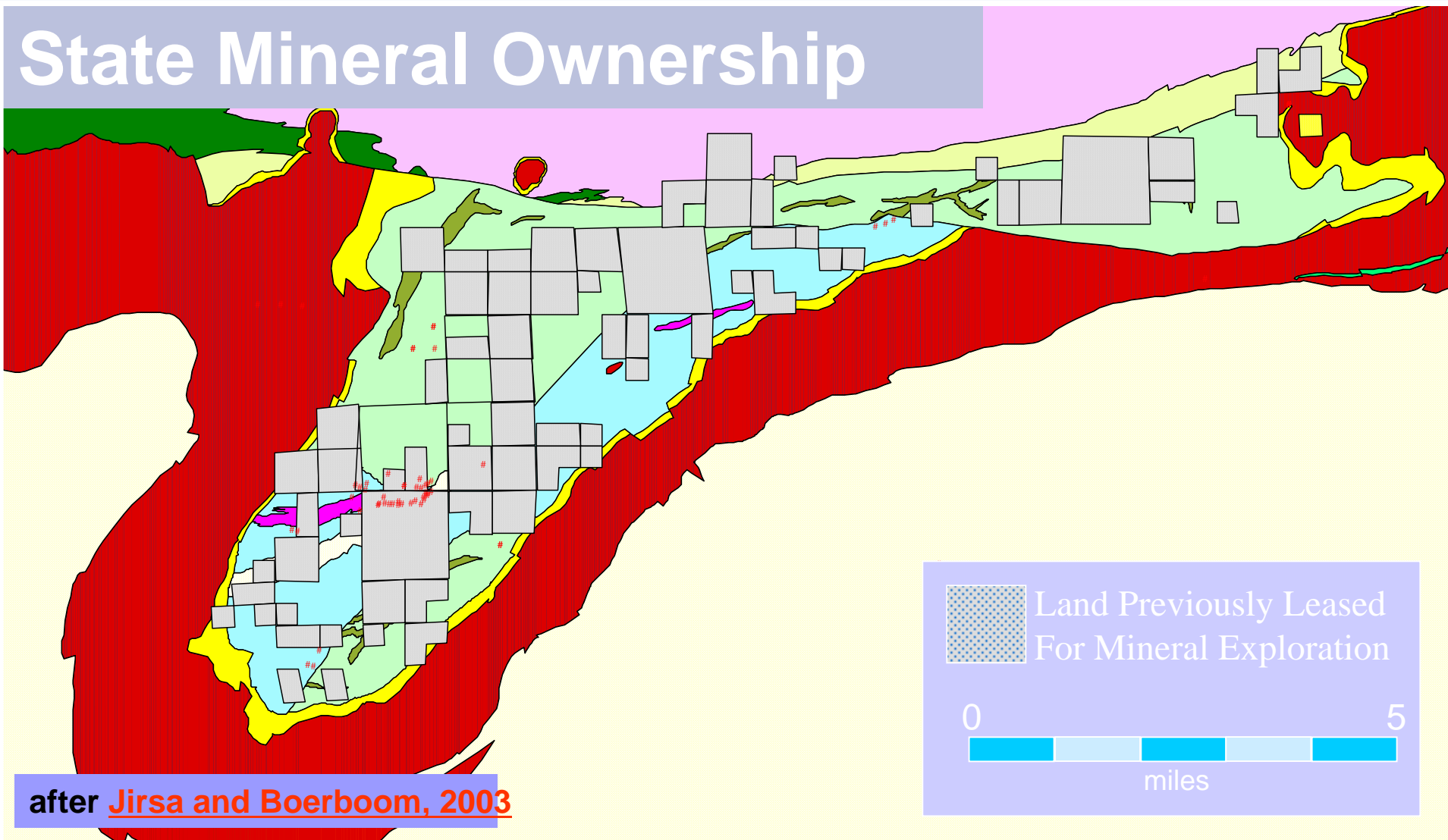
- Wawa Subprovince, Superior Province
- Gold Discovered 1937





# Basis for Previous Exploration

## State Mineral Ownership

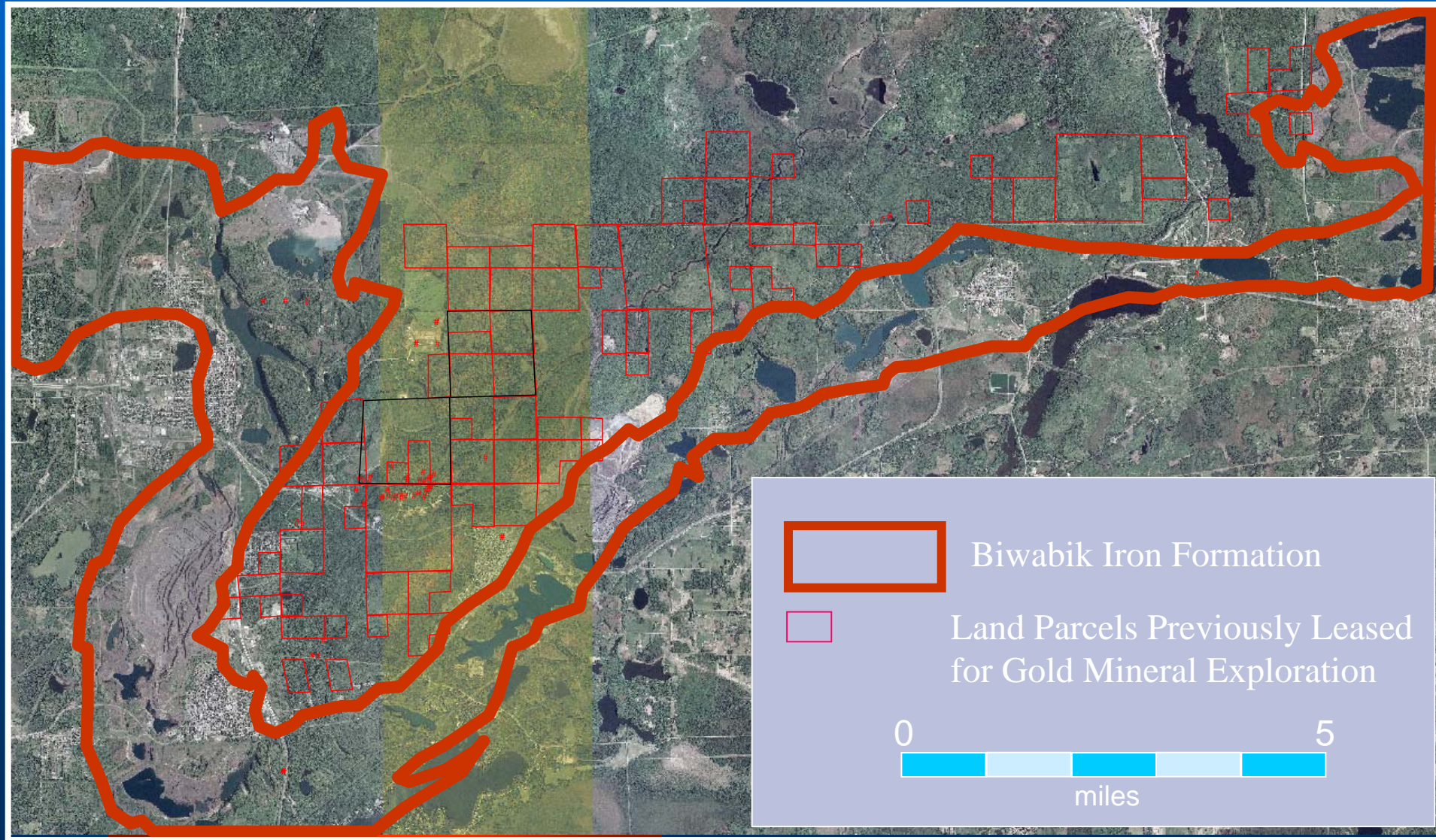


after [Jirsa and Boerboom, 2003](#)

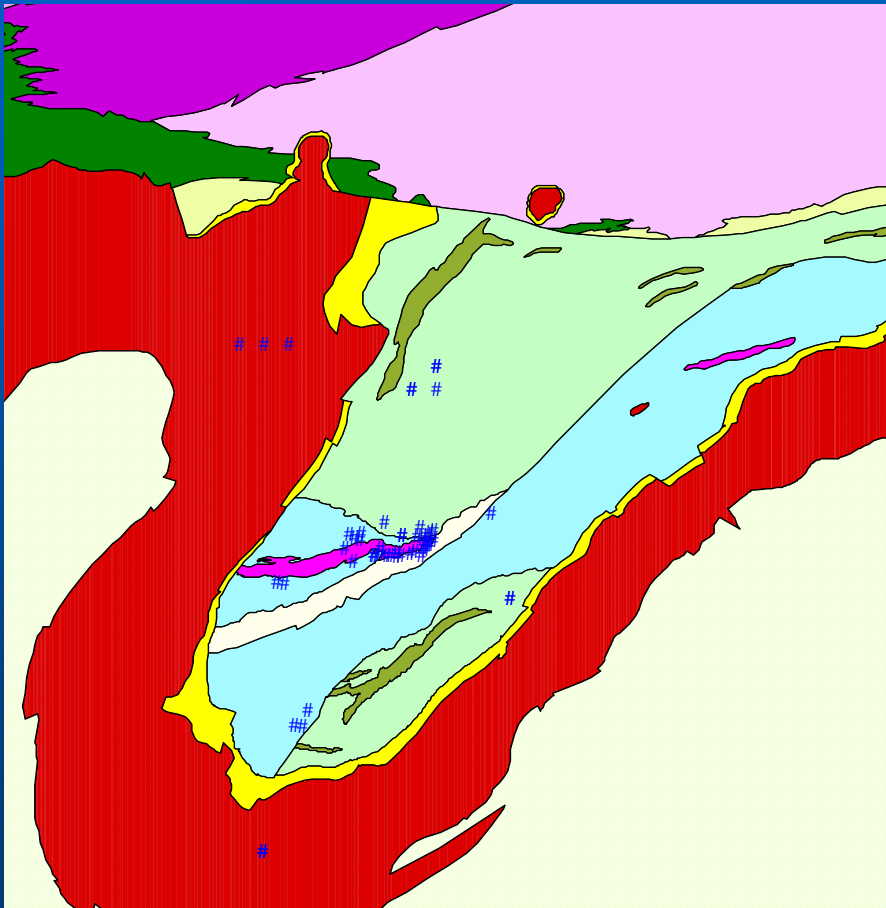




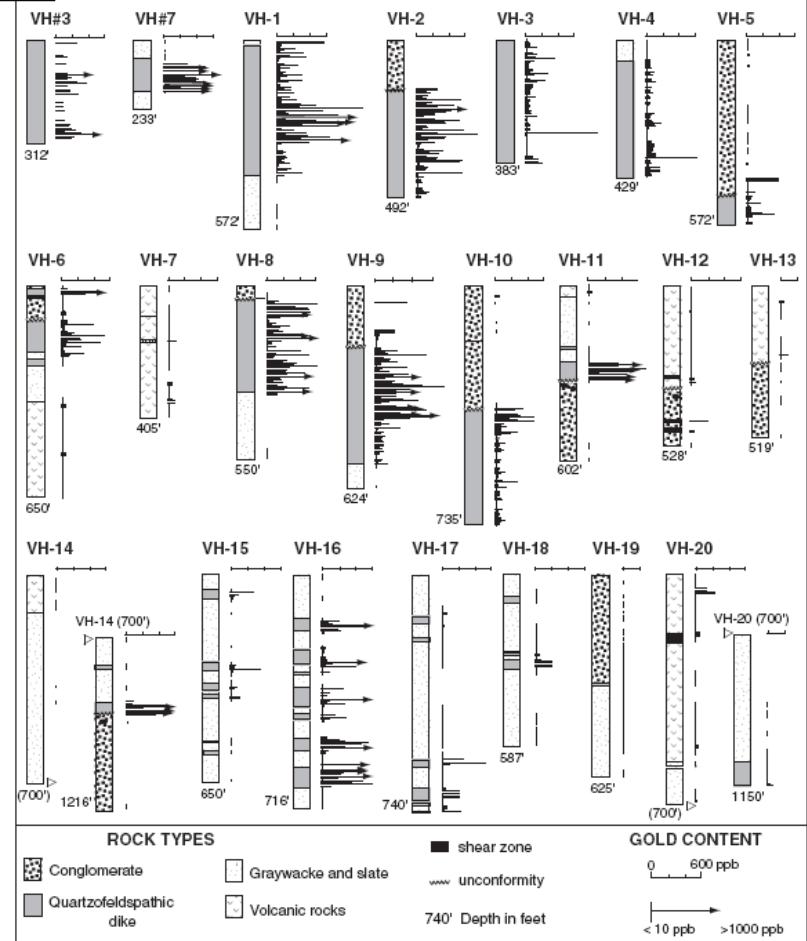
# Virginia Horn Greenstone Belt



# Virginia Horn Gold Exploration



after [Jirsa and Boerboom, 2003](#)





# End of the Initial Era

- 53 Drill Holes
- Varying gold grades
- 40% drop in gold prices
- All state mineral leases terminated



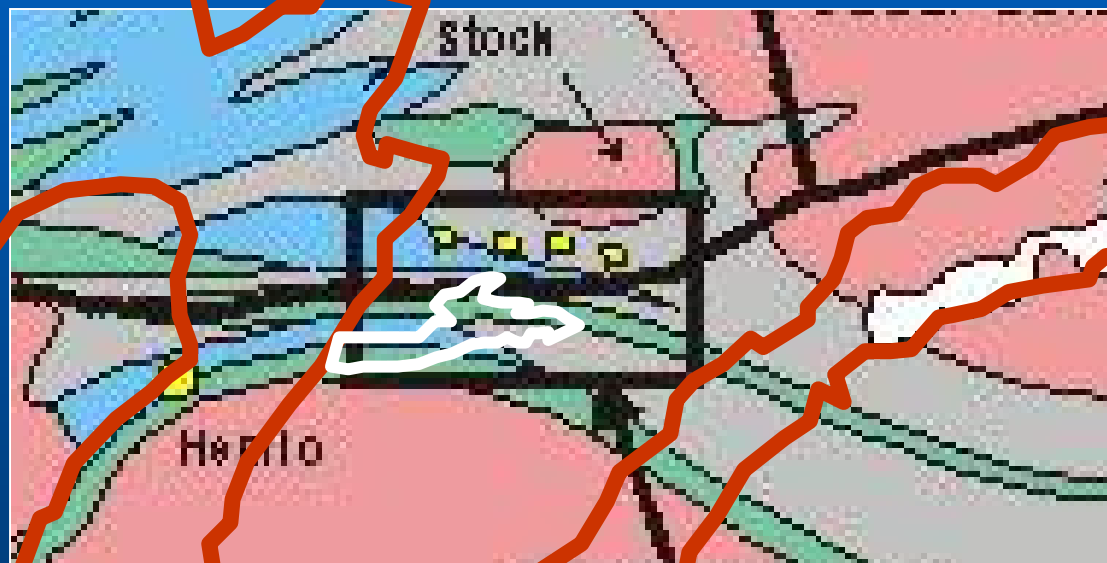


# Why return to the Virginia Horn?

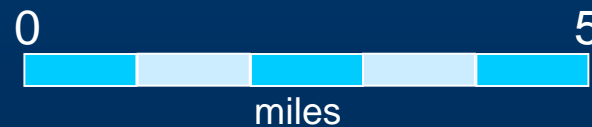
- Area Relatively Unexplored
- Maps and Models Produced After 1991
- DNR Project Work



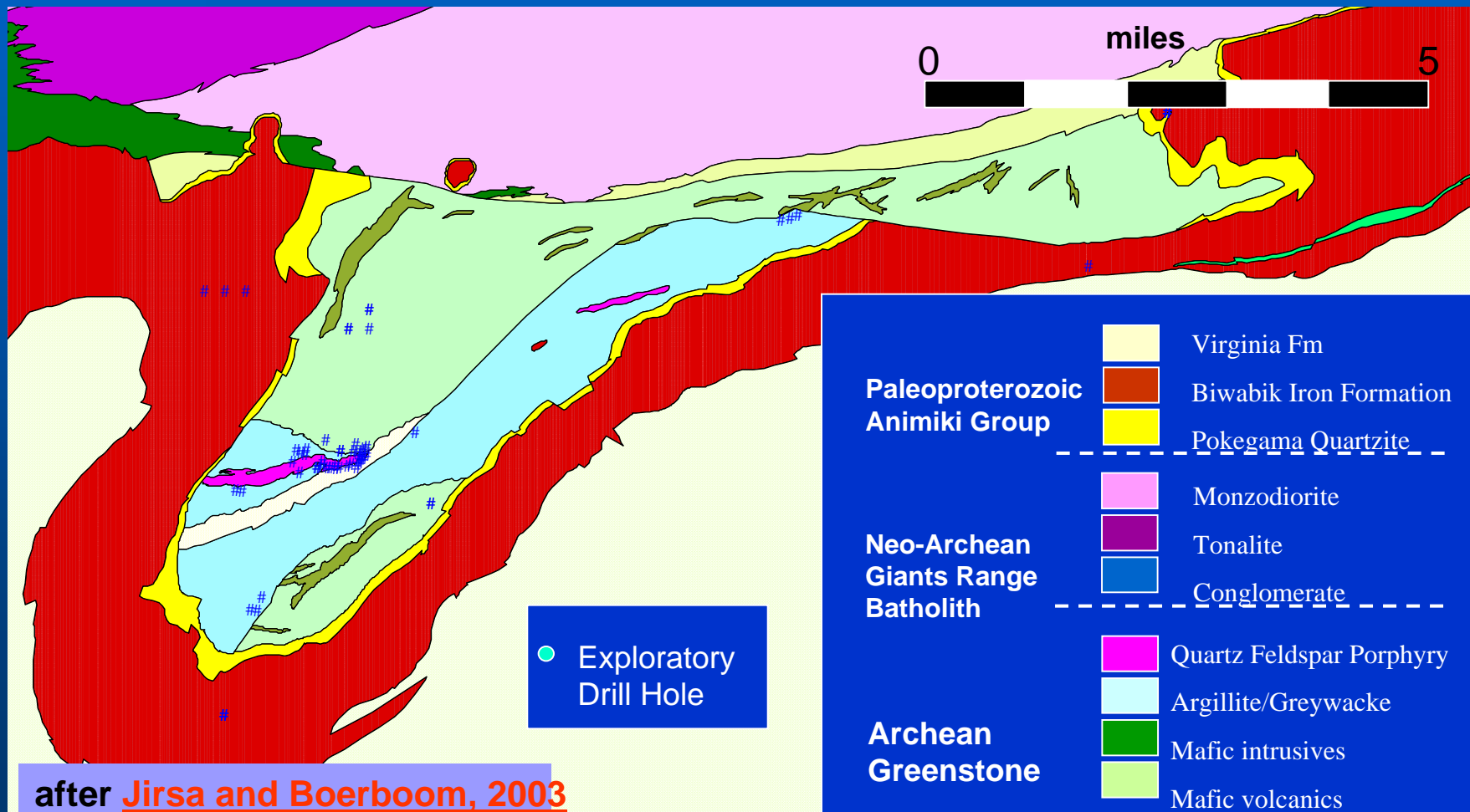
# Extent of Exploration



**Hemlo Gold Deposit**  
684 tons Au @ 7.7g/t

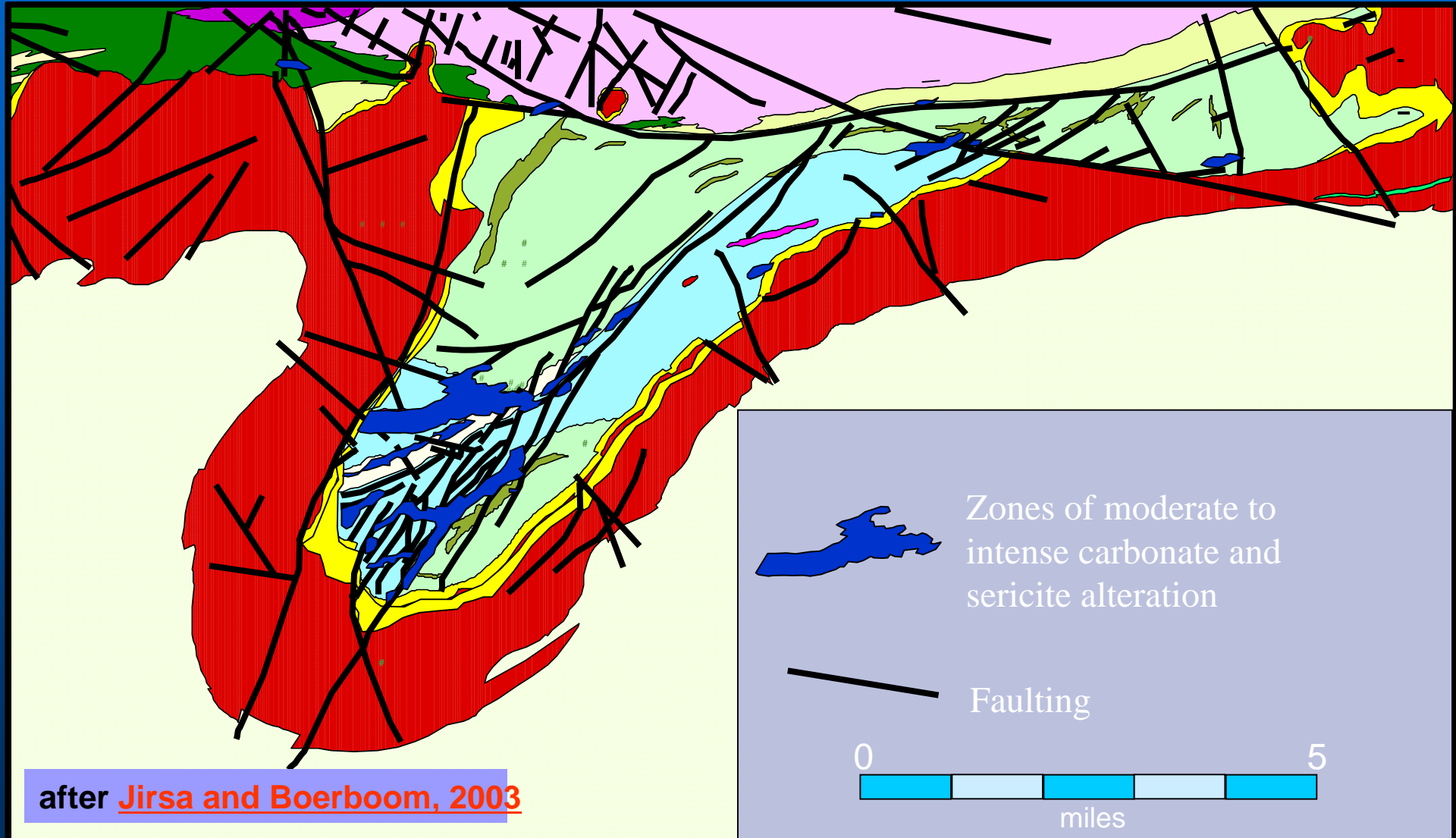


# Virginia Horn – New MGS Mapping





# Virginia Horn – New MGS Mapping





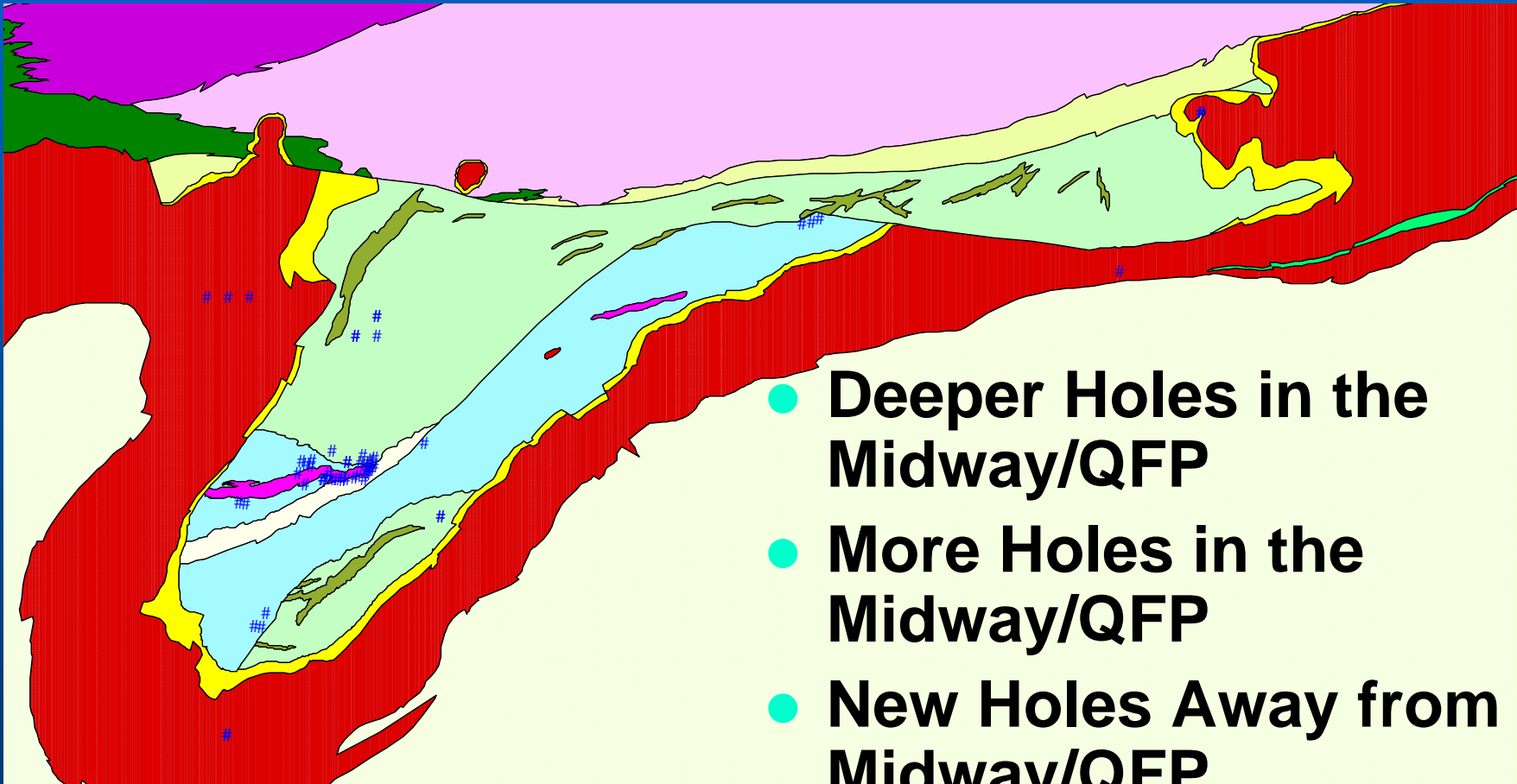


# New Gold Mineralization Model

- As a result of the new mapping, the Virginia Horn has been reinterpreted as a Timiskaming-type Deposit.
- The most productive lode-gold district in North America (Porcupine Mining Camp) is a Timiskaming-type Deposit.



# Targeted Prospects

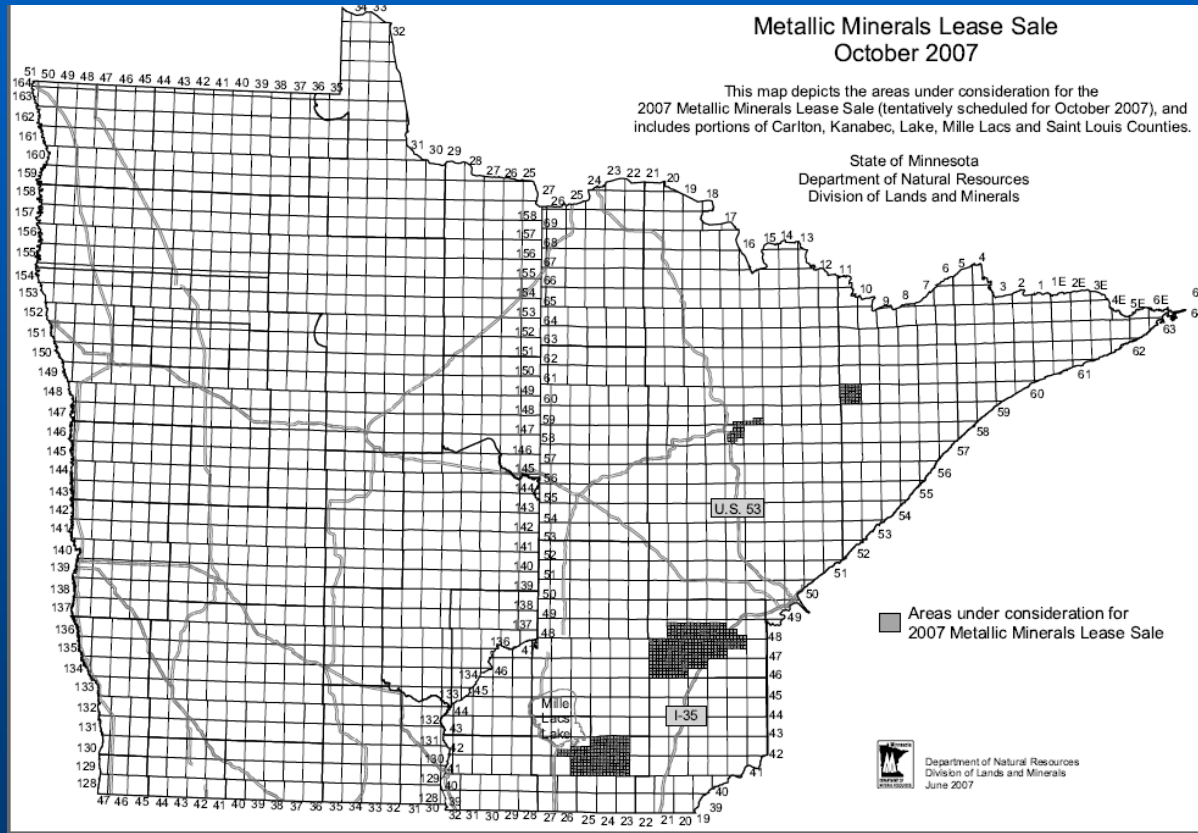


- Deeper Holes in the Midway/QFP
- More Holes in the Midway/QFP
- New Holes Away from Midway/QFP

after [Jirsa and Boerboom, 2003](#)

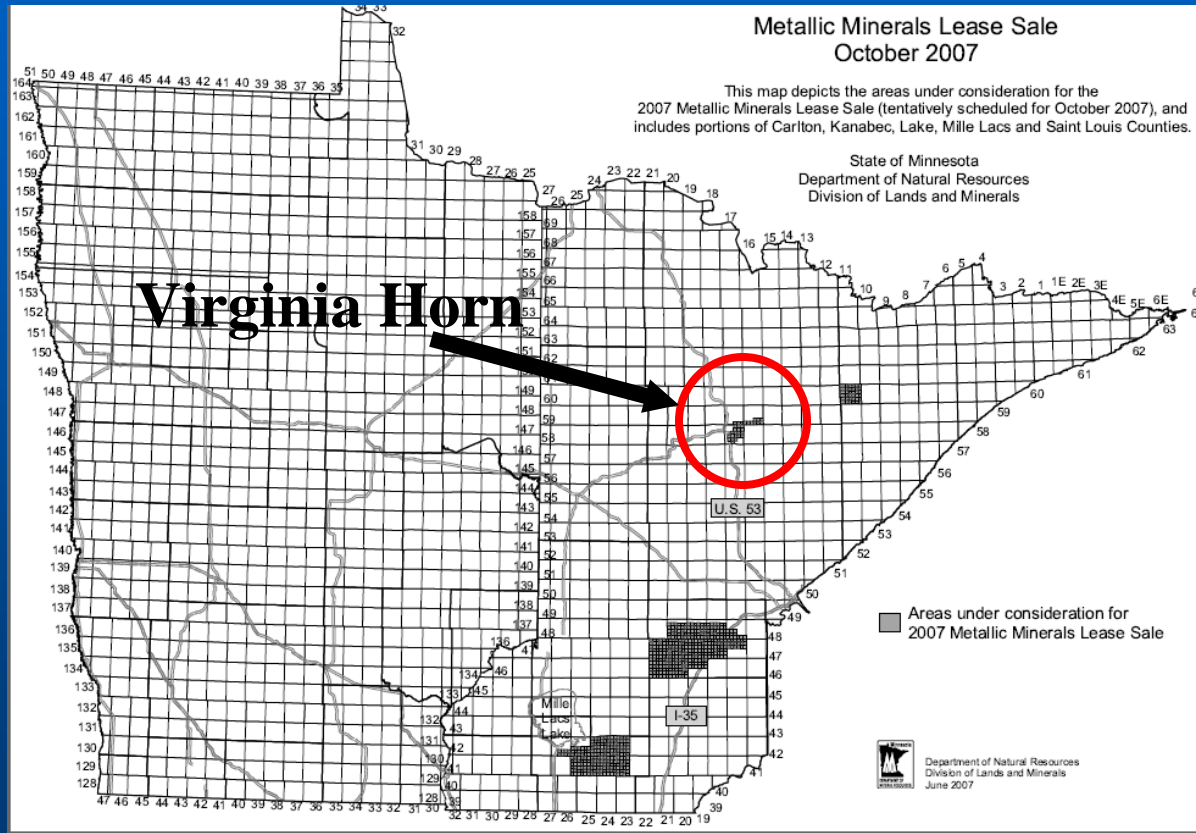


# Metallic Minerals Lease Sale






# Metallic Minerals Lease Sale







# Public Access to Mineral Data



## Public Access to Minerals Data

[ATTRIBUTE SEARCH](#)[MAP-BASED SEARCH](#)[HOW TO SEARCH](#)[ABOUT...](#)

### Welcome to 100 years of Minnesota non-ferrous mineral information.

This index references more than 12,000 unpublished mineral exploration documents, collected over a period of 100 years. Original documents are on file at the [Minnesota Department of Natural Resources](#), the University of Minnesota's [Minnesota Geological Survey](#), and the University of Minnesota's [Natural Resources Research Institute](#).

These public documents provide a rich source of information for future exploration, environmental research, and historical minerals research. For many areas of the state, they contain our only view of bedrock terrain, deeply buried as it is by glacial material.

An extremely wide range of information is covered by documents in the index, as a glance at the Attribute Search page will show, from large regional surveys to data on individual drillholes. Documents may be maps or other drawings; may include text or tabular information on geophysics, geochemistry or other characteristics. Each document has been individually catalogued and, where possible, placed in context of other related documents from the same exploration program. For each document, cataloguing staff have noted when the work was done, by whom, where, and the type and method of work. Cataloguing [guidelines](#). (PDF, 6pp, 105kb)

Some of the documents in this index have been generously donated by mineral exploration companies; others were submitted in fulfillment of mineral lease requirements. And some documents are present because of disclosure requirements related to re-examination and sampling of drill core housed at the Department of Natural Resources Drill Core Library in Hibbing, Minnesota. The Library contains more than two million feet of mineral samples available for analysis.

Efforts to improve access to records of Minnesota's historical mineral exploration have been partially funded by a grant from the [Legislative Commission on Minnesota Resources - Future Resources Fund](#). Thanks also to the Institute for Minnesota Archaeology's From Site to Story project and website, and the Minnesota Historical Society's Visual Resources Database for inspiration.

### Web browser requirements and recommendations

To make full use of this site's features, follow these REQUIREMENTS:

- a version 4.0+ browser from [Netscape](#) (except version 4.6 or 6.x+) or Microsoft [Internet Explorer](#)
- PC or UNIX platform; unfortunately, this site is not supported on the Macintosh
- java and javascript MUST be enabled in your browser

*One important note is that many versions of Windows ship with an inadequate JVM (Java Virtual Machine) so even the latest version of Internet Explorer will not work with the mapping interface. The solution is to download an updated version from Microsoft at: <http://www.microsoft.com/java/download.htm>.*

and these RECOMMENDATIONS:



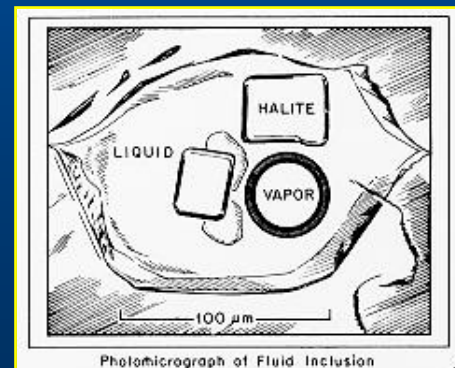
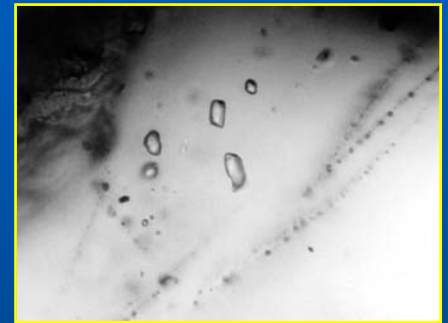
# New Data in 2007 by MN DNR

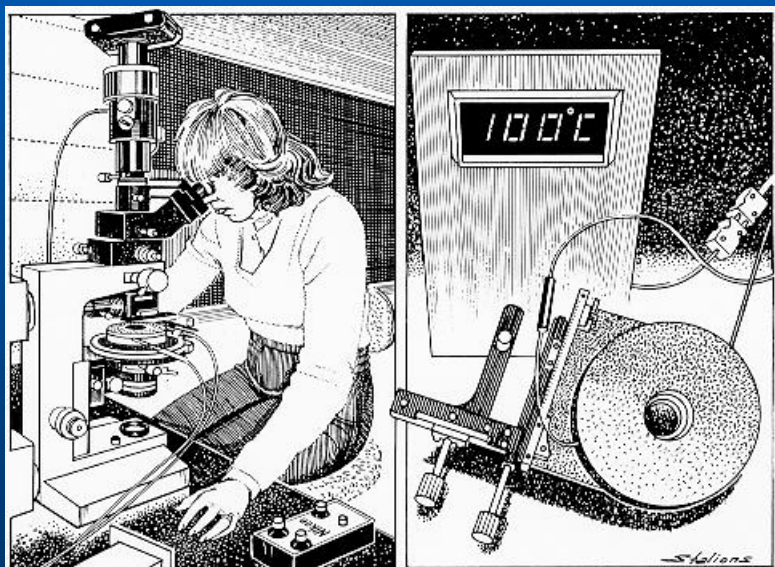
- **GIS Mapping**
  - Six summary maps
  - GIS layers
- **Mineralogy and Geochemistry**
  - 40 New assay intervals
  - Gold associations with pyrite and arsenopyrite
- **Fluid Inclusions**



# Fluid Inclusions

- Dr. Andrew Conly,  
Lakehead University
- Fluid composition
- Fluid temperatures
- Mineralization Marker
- Ore Formation





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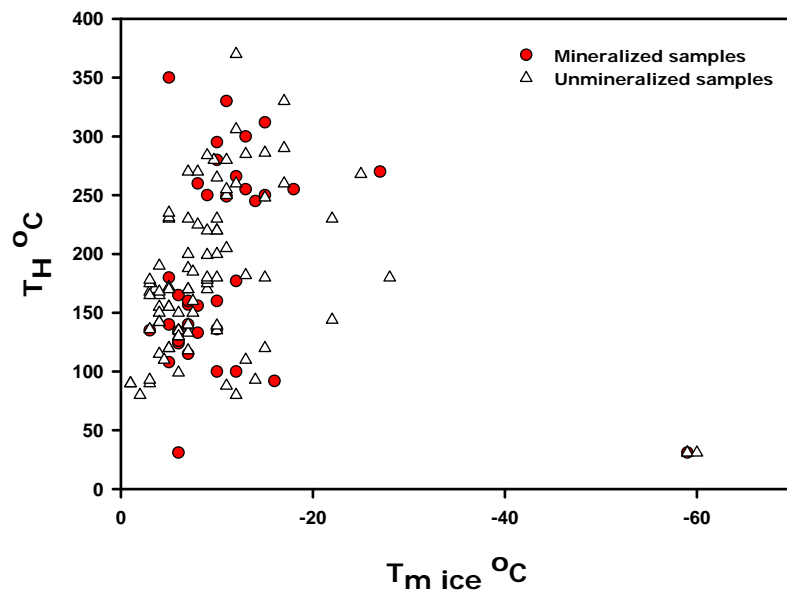
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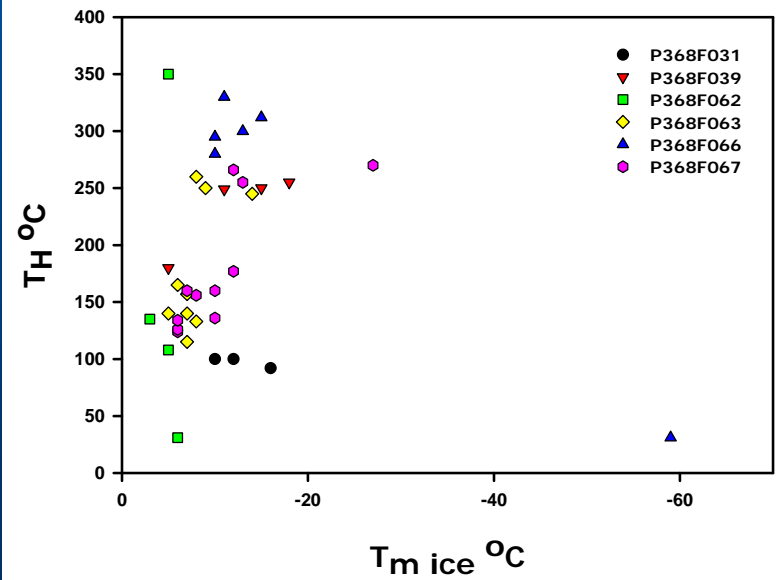


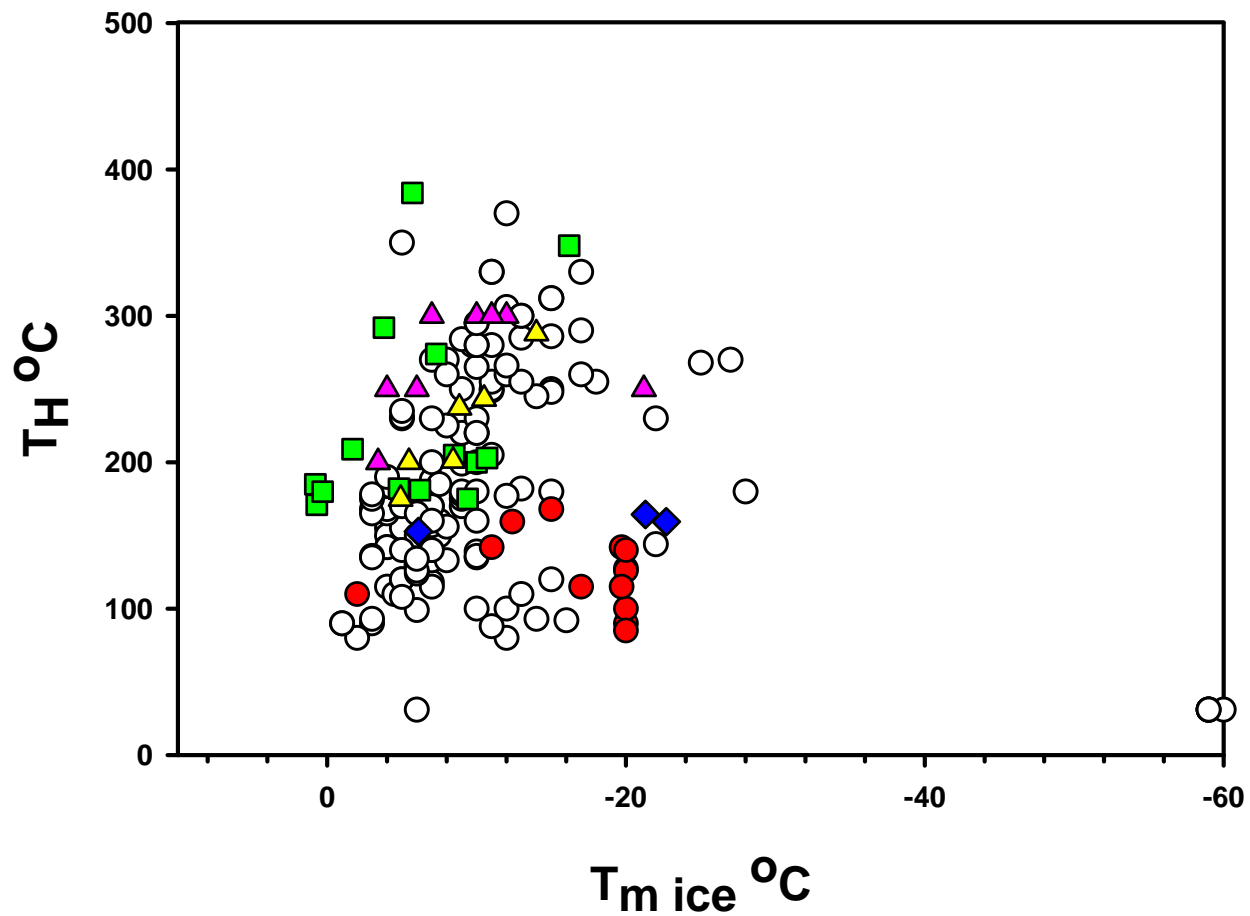


Comparison mineralized and umineralized samples



Mineralized samples





- This Study, Virginia Horn Greenstone Terrain Minnesota USA
- Pamour Gold Mine Porcupine Ontario, Walsh et al. 1988
- McInTyre-Hollinger Gold Deposit Timmins Ontario, Smith et al. 1984
- ◆ Campbell-Red Lake Gold Deposit, Chi et al. 2003
- ▲ Hemlo Gold Mine Marathon Ontario, recent studies Sep 2006
- ▲ Hemlo Gold Mine Marathon Ontario, Fleet et al. 1991

# Summary

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