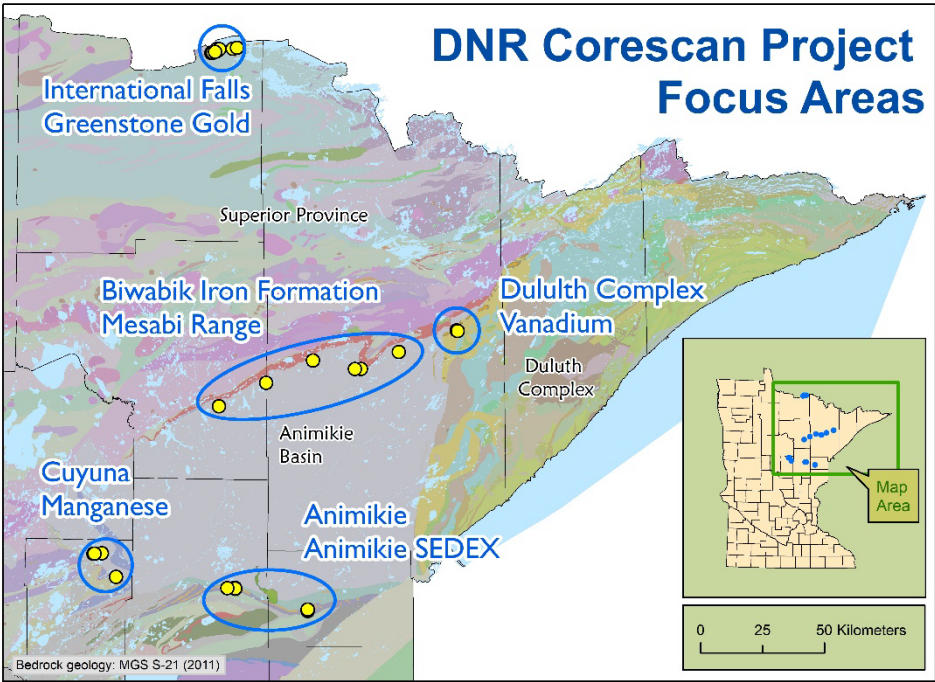


# DNR Corescan Project

The Minnesota Department of Natural Resources (MnDNR) operates a public drill core repository in Hibbing that archives more than one million meters (3 million feet) of core. Over the decades, MnDNR and exploration company geologists have used hand lenses and mineral assays to identify previously unrecognized mineralization in this archived drill core. Much more recently, a technique called hyperspectral imaging has been adapted for the analysis of geological materials like drill core. This promising new technology has the potential to take geologists and drill core repositories from hand lenses and assays into the 21<sup>st</sup> century.

In 2019, the MnDNR hired an Australian company called Corescan to obtain hyperspectral core imagery data from archived core in its Drill Core Library (DCL).



Over a five week production run, thirty-two (32) DCL drill cores were scanned. These cores were from five different focus areas in Northern Minnesota. Each focus area highlighted a distinct mineral resource or potential mineral resource. A total of 16,376 feet (4,991 meters) of DCL core was scanned.

## Project Goals

- Evaluate the techniques effectiveness in better understanding the mineral potential of Minnesota, particularly on state-managed mineral rights and school trust lands.
- Explore the potential of the technique to support the state’s active iron mining industry.
- Support MnDNR land management decisions, particularly in areas of historical exploration and high mineral potential.
- Assess how much value the hyperspectral core imaging technique adds to Drill Core Library operations.
- Collect hyperspectral core data that supports geological research on questions of local, regional, and international importance.

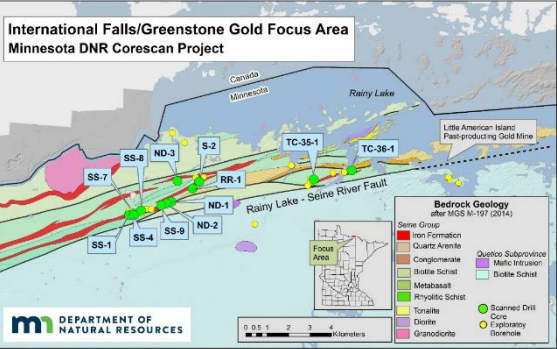
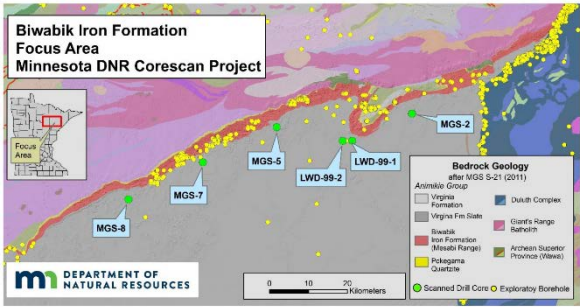
Focus Area	Corescan Job Number	Target	Number of cores	Total length (feet)	Total length (meters)
Biwabik Iron Formation/Mesabi Range	JA0467	Iron	6	4,911	1,497
International Falls/Greenstone Gold	JA0469	Gold	12	6,881	2,097
Cuyuna Manganese	JA0464	Manganese	5	1130	344
Duluth Complex Vanadium	JA0466	Vanadium	3	2099	640
Animikie & Animikie SEDEX	JA0492 (Animikie) JA0465 (Animikie SEDEX)	Copper, Zinc	6	1355	413
		Total	32	16,376	4,991

For more information, visit: [DNR Corescan Project Home Page](https://mndnr.gov/corescan) (mndnr.gov/corescan)

Project Focus Areas

Biwabik Iron Formation/Mesabi Range (JA0467)

The Biwabik Iron Formation is actively mined by Minnesota’s taconite industry, which produces about 40 million tons of high-grade iron ore pellets annually. Hyperspectral core imaging of complete transects of this iron formation may highlight the potential benefits of this tool for this industry in areas such as ore grade control, mineral processing, and pellet production.

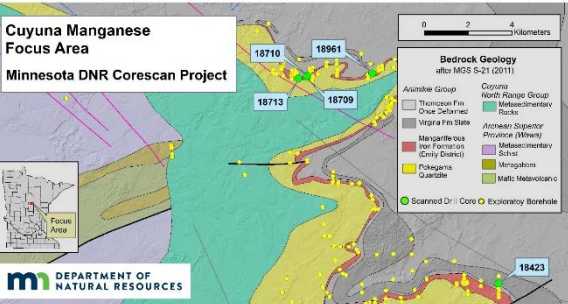
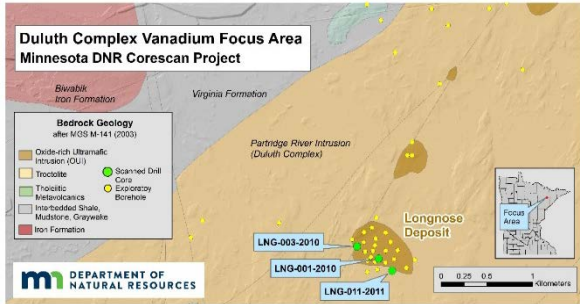


International Falls/Greenstone Gold (JA0469)

The International Falls area along the U.S.-Canadian Border has a 130 year history of gold exploration, was the location of Minnesota’s only producing gold mine, and is 50km from the Rainy River gold mine in Northwestern Ontario. Recent bedrock mapping of this Archean Superior Province greenstone terrane and the reanalysis of archived core suggests that new gold mineralization models should be considered. Hyperspectral core imaging may shed light on relevant mineralogical and geochemical gold associations, particularly with respect to underreported tourmaline occurrences.

Duluth Complex Vanadium (JA0466)

In the Duluth Complex, a series of small oxide-rich ultramafic intrusions host significant titanium reserves. Some of these intrusions have secondary enrichment of vanadium, which is a high-value critical mineral. A new hydrometallurgical process was recently developed that removes the magnesium impurities that have historically limited development of these resources. The primary goal of scanning core from this focus area was to determine whether hyperspectral imaging can track variations in vanadium content within a titanium ore body with copper-nickel mineralization.



Cuyuna Manganese (JA0464)

The Cuyuna Range was home to significant iron mining operations from 1905 to 1984. One of the largest undeveloped manganese deposits in North America is located in the Cuyuna Range’s Emily District. Manganese is a critical mineral. Core from this area was scanned to determine whether hyperspectral core imaging could provide useful geological information within this manganese-rich iron formation, and to identify potential minerals or mineral textures that shed light on how this ore body formed.

Animikie/Animikie SEDEX (JA0492/JA0465)

Limited bedrock drilling along the southern edge of the Animikie Basin in Carlton and Aitkin Counties has previously identified the potential for a specific type of copper-zinc mineral deposit (SEDEX). Core from this area was scanned to see if hyperspectral imaging could identify minerals or mineral textures that are associated with this type of mineralization. This work also may shed light on the potential mineral information that might be gained from other under-documented core within the DCL archive.

