Discovery Site of Sudbury Mining Camp, Sudbury

Coordinates (46.52110° –81.5337°)

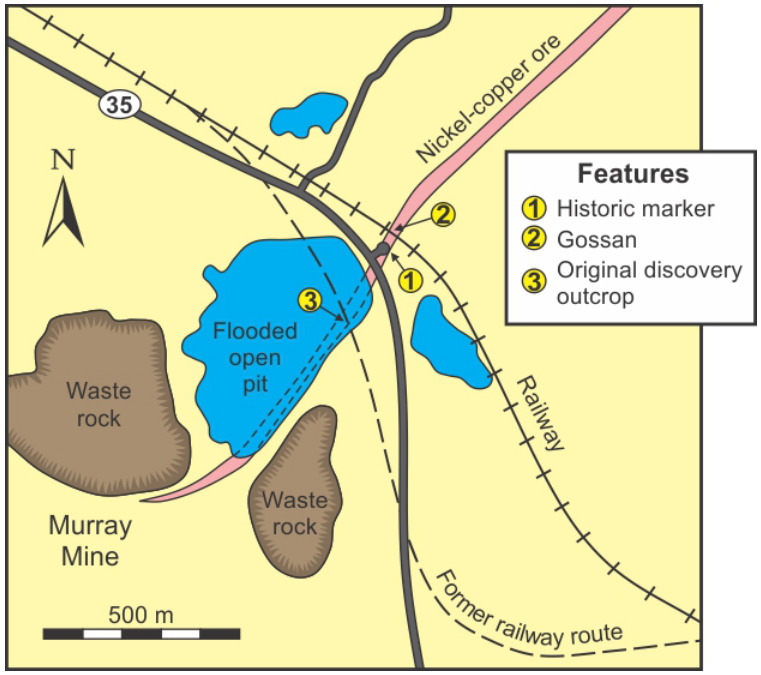
Birthplace of a World Famous Mining District

Aerial view of Murray Mine open pit prior to flooding.

(Left) Roadside historic marker.

It all started here. In 1883, nickel-copper ore was discovered near this site during construction of the Canadian Pacific Railway. The discovery led to development of the nearby Murray Mine. Within a few years many more discoveries were made and Sudbury became Canada's first major mining camp. Within 30 years of the discovery, Sudbury was the nickel capital of the world and the economic engine of northern Ontario. To date, Sudbury mines have produced a third of a trillion dollars of metal at today's prices. This quiet spot commemorates the discovery, and rusty rocks in the rail cut call to mind the original ore that was found. Across the road are the workings of Sudbury's first and now depleted Murray Mine.

Discovery Site of Sudbury Mining Camp, Sudbury



(Left) Map of the Discovery area.

How to get there

The discovery site is on Regional Road 35 about 5 km northwest of Sudbury city centre. The historic marker is at a large paved pullout on the east side of the highway opposite the flooded open pit of the former Murray Mine. A short trail leads to the railway and rusty outcrop.

Discovery! In the early 1880s, construction of the Canadian Pacific Railway (CPR) across Canada was under way. The route selected for the railway west of Ottawa passed through the rocky and lake-filled region of Sainte-Anne-des-Pins. In 1883, Tom Flanagan, a blacksmith for the CPR construction crew, noticed copper-bearing rock on a hillside. Alfred Selwyn, director of the Geological Survey of Canada, took samples when the CPR cut through the area in 1884, and identified valuable ore. The surface exposure of a large body of iron, nickel, and copper ore was found nearby, and the Murray Mine was born. Prospectors flooded into the area and, in a short time, many other discoveries were made. The distinctive rusty weathered surface of these iron-rich ores made prospecting easy. In 1886, the Copper Cliff Mine started operations. This led to the first smelting operation in 1888. Experiments in 1889 on nickel-steel alloys demonstrated the value of nickel in the production of high-quality steel. The use of this steel in battleship armour plate in the British and United States navies, in the construction industry, and for coins provided for a booming market for nickel. By 1910, Sudbury was producing 80% of the world's nickel. In two decades, Sudbury had changed from a remote mining camp to the world's leading nickel producer.

Discovery Site of Sudbury Mining Camp, Sudbury

A view of the Canadian Pacific Railway and the Murray Mine from Geological Survey of Canada, Annual Report 1889-1890. The original discovery site is located where the rail line cuts through the low ridge in the upper right of the photograph. This discovery site now lies within the mined out area of the open pit of the Murray Mine which is now flooded with water.

Original historical site marker along the former road. This site was later mine and the road, rail line, and marker relocated to their present positions. Courtesy of City of Greater Sudbury Historical Database.

The original discovery outcrop – mined out

The Sudbury Discovery historic marker stands beside a large paved pullout along Regional Road 35 about 5 km northwest of Sudbury city centre. From the pullout, the view to the west across the road encompasses the water-filled open pit of the former Murray Mine, Sudbury's first nickel mine. A short trail leads in the opposite direction to the rail bed of the Canadian Pacific Railway.

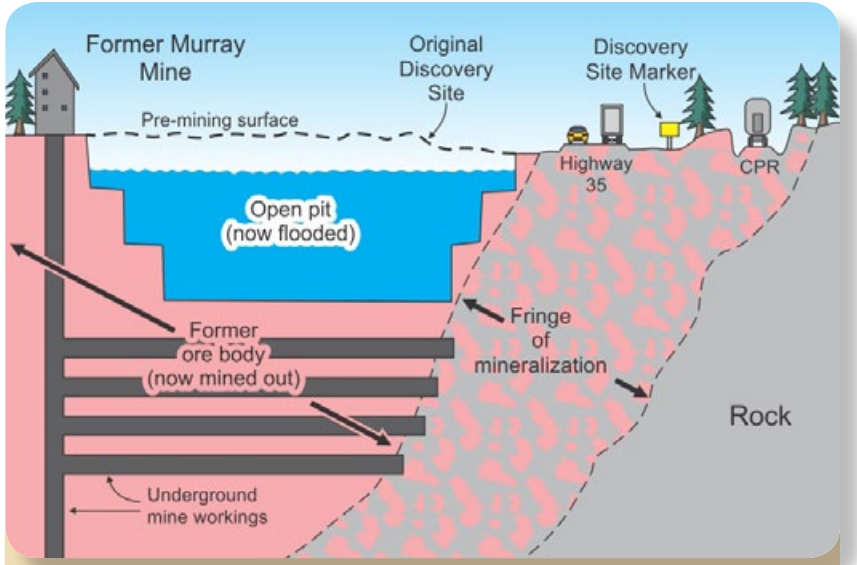
The railway route is blasted through low rock outcrops. Where the trail meets the railway, the rock is a rusty orange-brown colour, the weathered exposure of iron-nickel-copper mineralization. You might guess that this is the original outcrop that Tom Flanagan discovered in 1883. Surprisingly, this is not the case, though this rock is likely very similar to the original discovery outcrop.

In the mid 1970s the railway, historic marker, and road were relocated to their present location so that the ore of the upper part of the Murray deposit could be mined. Nickel-copper mineralization extends from the mine to the northeast, and the rock cuts for the newly relocated railway route expose this mineralization.

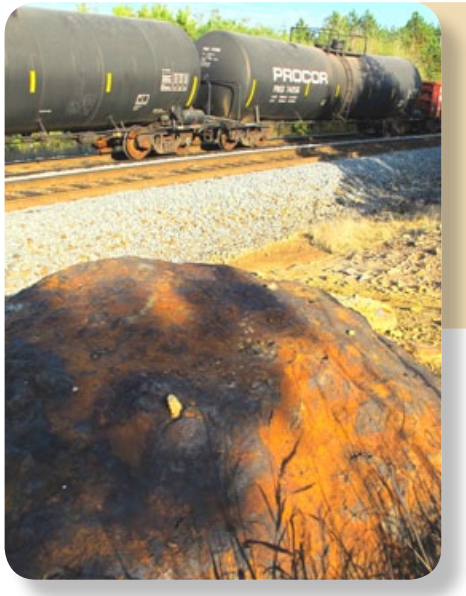
Discovery Site of Sudbury Mining Camp, Sudbury

Rusty rocks – a prospector's clue to Sudbury ore

Prospectors will tell you that rusty outcrops are a sought-after clue in the search for many types of ore. Sudbury ores, though mined for their nickel and copper content, contain abundant iron. The dominant iron-bearing mineral is pyrrhotite, a chemical combination of iron and sulphur. When weathered at the surface, the sulphide minerals react with water and oxygen, leaving iron oxide and hydroxide minerals as a rusty coating on the rock surface. Thus prospectors look for rusty rocks, hoping that the iron-bearing minerals are associated with minerals containing other metals.



A cartoon showing the geological relationships between the Murray Mine, its orebody, and the discovery site.



Outcrop of rusty weathering iron-rich nickel-copper mineralization where the trail meets the railway.

The pitted and earthy coating on the rock reflects the presence of iron sulphide minerals within the rock.

Discovery Site of Sudbury Mining Camp, Sudbury

Sudbury's ancient meteor strike

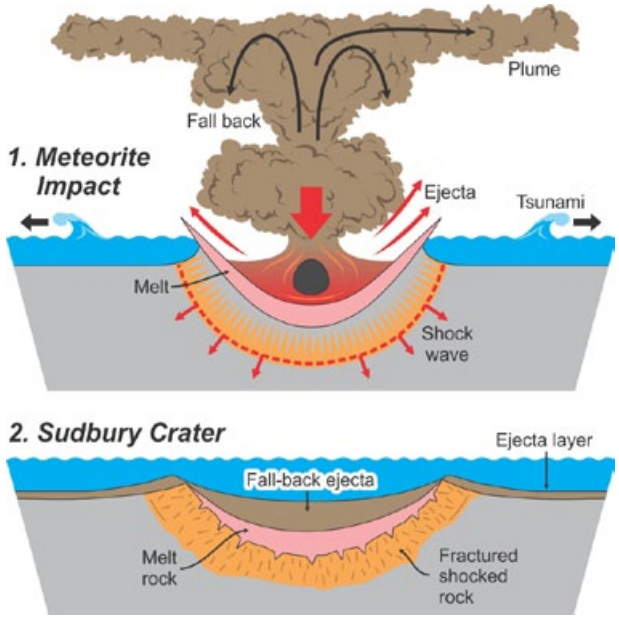
Geological evidence suggests that a 10 km diameter meteorite struck the Earth 1.85 billion years ago near the present site of Sudbury. The impact created a circular crater 6 km deep and 200 km in diameter below the shallow coastal waters of an ancient continent.

After impact, the crater was partially filled with explosion-related debris, beneath which a vast layer of molten rock several kilometers thick, which formed from the melted crust, lined the floor of the ancient crater. Metal-rich liquid separated from the melt rock and sank to the crater floor, forming Sudbury's famous ores of nickel, copper, platinum and other metals.

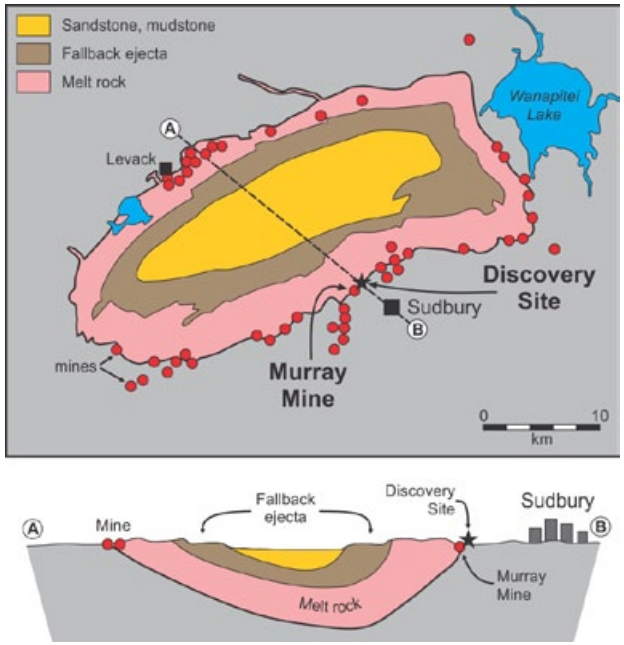
Today, the rocks that formed from the melted crust are exposed in a ring 20 km wide and 60 km long that outlines the remnants of the ancient crater. The original crater was circular, but the Sudbury region was squeezed by a continental collision 1.8 billion years ago, and the crater was deformed into a bath tub shape. Since that time, much of the crater has been eroded.

An artist's impression of a meteorite hitting a coastal area.
Courtesy of NASA.

Discovery Site of Sudbury Mining Camp, Sudbury



A cartoon showing the origin of the Sudbury impact crater.



Mines throughout the Sudbury mining district, like the Murray Mine, are located close to the ancient wall of the meteor crater. Lower diagram shows subsurface cross-section along line A-B.

A great detective game – prospecting for ore along the crater wall

The early prospectors recognized that many nickel ores occurred along the outer edge of this ring of melted or igneous rocks. Today's exploration geologists, looking for more nickel-copper ore in the Sudbury area, continue to focus their attention in the same area. The consistent location of many of Sudbury's ores is interpreted to reflect the ancient separation of heavy metal-rich liquids from the rocks melted within the crater, and the sinking of the heavy metal liquid into depressions on the crater wall. Finding these ore-filled pockets is a great detective game for geologists and for geophysicists.

On the crater wall

Rocks along the rail line near the Discovery marker display a transition from coarse-grained melt rock (norite) to dark volcanic rock. This transition marks the boundary between the meteorite crater and older volcanic rocks. The rusty mineralization and the ores of the Murray Mine lie along the ancient crater wall.

Discovery Site of Sudbury Mining Camp, Sudbury

(Left) The trail from the historic marker leads to rusty mineralized outcrop. The trail follows the ancient crater wall. Rocks to the east are greenish volcanic rocks that are outside the crater. Rocks to the west are melt rock that filled the crater.

Sudbury – a world class mining district and hub for the mining services industry

Sudbury is an astonishingly rich mining district. By every measure it is huge. The district has produced more than 8 million tonnes each of nickel and copper, and over 3200 tonnes of silver, 300 tonnes of platinum, and 100 tonnes of gold. Based on today's metal prices, more than 77 mines have produced an estimated CDN$ 330 billion worth of metal in the past century.

Mining is no longer a business of prospectors digging at hillsides with pick and shovel. The era of steam-powered equipment in the early 20th century gave way to machinery powered by compressed air and the present era of using powerful electric and hydraulic motors. Specialized mining equipment is made right here in the Sudbury area and used around the world. Over the last 50 years the expertise and experience from Sudbury mining supply companies has transformed Sudbury into a global mining technology and service centre for North America.

(Right) The melt rock has a "salt-and-pepper" texture of intergrown crystals of dark- and light-coloured minerals. Geologists refer to this rock as norite, a type of gabbro.

Sudbury Main page