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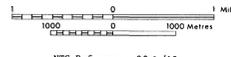
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PRELIMINARY MAP P.988  
 GEOLOGICAL SERIES  
**PALEOZOIC GEOLOGY OF THE  
 DUNNVILLE AREA**

SOUTHERN ONTARIO  
 Scale: 1:50,000  
 1.25 inches to 1 mile approximately



NTS Reference: 30 L/13  
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**LEGEND**

- DEVONIAN**
- Dundas Formation:** weakly cherty, fossiliferous limestone; minor shale
  - Onondaga Formation:** variably cherty, fossiliferous limestone; minor shale.
  - 13m Moorehouse Member:** medium-bedded, moderately cherty, very fossiliferous bioclastic limestone.
  - 13c Clarence Member:** massive, very cherty, poorly fossiliferous limestone.
  - 13e Edgecliff Member:** medium-bedded, variably cherty, very fossiliferous, bioclastic or argillaceous limestone; massive, biohermal and reefal limestone; minor shale.
  - Bois Blanc Formation:** thin- to medium-bedded, cherty, fossiliferous, bioclastic or argillaceous limestone; minor shale and dolostone; occasional glauconitic sandstone in basal part (Springvale Sandstone Member).
- DISCONFORMITY**
- Oriskany Formation:** massive, white or grey, fossiliferous, quartzose sandstone.
- SILURIAN**
- Bertie Formation:** dark brown, bituminous dolostone; grey, argillaceous dolostone; brown and cream mottled dolostone; light brown, finely laminated dolostone.
  - Salina Formation:** argillaceous dolostone, shale, evaporites.
- \*does not outcrop in the Dunville map-area

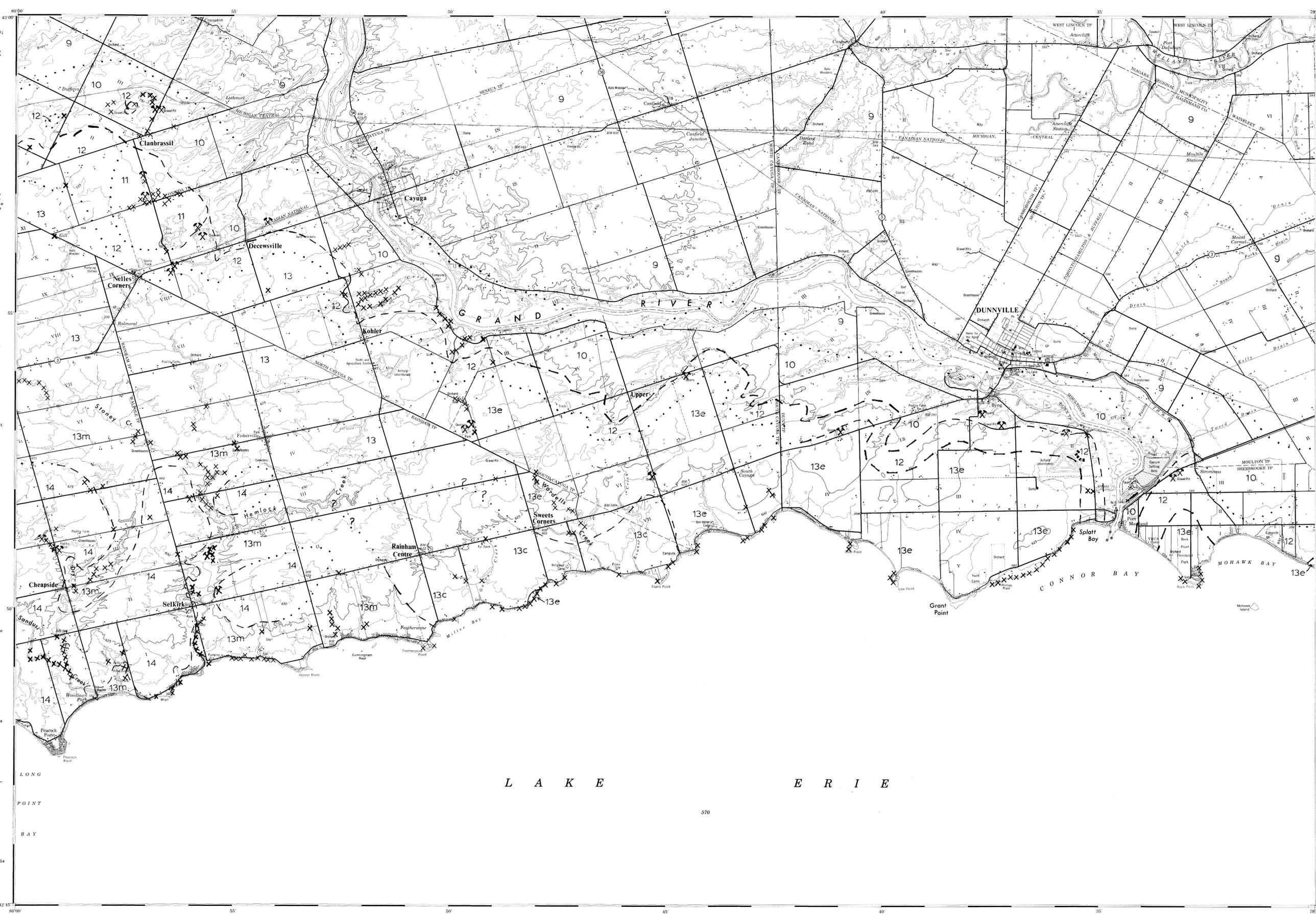
- SYMBOLS**
- X Bedrock outcrop
  - Geological boundary
  - - - Geological boundary, approximate
  - Geological boundary, interpreted
  - Q Quarry
- REFERENCES**
- Best, E.W. 1953: Pre-Hamilton Devonian Stratigraphy of South-western Ontario; unpubl. PhD thesis, University of Wisconsin, Madison, Wisconsin.
  - Fennstra, B.H. 1973: Quaternary Geology of the Dunville Area, Southern Ontario; p.199-201 in Summary of Field Work, 1973, by the Geological Branch, edited by V.G. Milne, D.F. Hewitt and W.J. Wolfe, Ontario Div. Mines, MP 56, 202p.
  - 1974: Quaternary Geology of the Dunville Area, Southern Ontario; Ontario Div. Mines Prelim. Map P.981, Geol. Ser., scale 1:50,000, Geology 1973.
  - Ouillet, G.R. 1964: Gypsum in Ontario; Ontario Dept. Mines, IMR18, 126p.
  - Hewitt, D.F. and Vos, M.A. 1972: The Limestone Industries of Ontario; Ontario Div. Mines, IMR39, 79p. Accompanied by map 2264, scale 1 inch to 16 miles.
  - Koepke, W.E. and Sanford, B.V. 1966: The Silurian Oil and Gas Fields of South-western Ontario; Geol. Surv. Canada, Paper 63-30, 138p.
  - Oliver, W.A., Jr. 1967: Stratigraphy of the Bois Blanc Formation in New York; United States Geol. Surv. Prof. Paper 584-A, 8p.
  - Sanford, B.V. 1964: Catalogue of Ontario Well Samples at the Geological Survey of Canada, Ottawa; Geol. Surv. Canada, Paper 63-46, 415p.
  - 1969: Geology Toronto-Windsor area, Ontario; Geol. Surv. Canada, Map 1263 A, scale 1:250,000.
  - Telford, P.G. and Tarrant, G.A. 1975: Paleozoic Geology of the Welland-Fort Erie Area, Southern Ontario; Ontario Div. Mines, Prelim. Map P.989 Geol. Ser., scale 1:50,000, Geology 1974.

**SOURCES OF INFORMATION**

Geology of Dunville map-sheet by P.G. Telford and G.A. Tarrant, 1974.  
 Topography from map 30 L/13 of the National Topographic Series.

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**MARGINAL NOTES**

Physiography of the area is dominated by the south and southeast flowing Grand River. However, most of the area is of low relief with only the Onondaga Escarpment and a dramatic field northeast and northwest of Cayuga exhibiting significant topography (Fennstra 1974). The Escarpment is partly buried by Pleistocene glacial and lacustrine sediments (Fennstra 1974); but in the northwest, between Kohler and Clabgrassil, it may reach heights of 50 feet (15 m) and provides a good bedrock exposure. Other outcrops are concentrated along the lakeshore and in the valleys of Sandusky, Dry, Stony, and Wardella Creeks. Two large operating quarries and numerous abandoned quarries also provide excellent exposures. There is an abundance of subsurface data available for this map-sheet area, resulting from oil and gas exploration activities (Sanford 1964).

**STRATIGRAPHY**

**Salina Formation (Upper Silurian)**  
 This unit does not outcrop in the map-sheet area but is known from subsurface data. It is 300 to 400 feet (90 to 120 m) in thickness and consists of argillaceous dolostone, shale, and evaporites (particularly gypsum). It is noteworthy that the drinmin field around Cayuga is developed only on Salina bedrock.

**Bertie Formation (Upper Silurian)**  
 This unit is composed dominantly of resistant dolostones which have produced the prominent Onondaga Escarpment. These resistant rocks also appear to have had influence upon the course of the Grand River. As the lower contact with the Salina Formation is nowhere exposed an accurate estimate of local thickness cannot be made. The lower part of the unit consists of a minimum 11 feet (3.3 m) of thick-bedded, dark brown, bituminous dolostone overlain by 6 to 8 feet (1.8 to 2.4 m) of grey, very argillaceous (weathers shaly) dolostone. In the Dunville area and northwest to Decessville this part of the unit is replaced by 4 to 10 feet (1.2 to 3 m) of medium-bedded, light and dark grey-brown laminated, very finely crystalline, often waxy dolostone with a 9 inch (22 cm) intra-formational breccia in the upper part. Throughout the Dunville map-sheet area the upper part of the unit consists of a minimum 17 feet (5 m) of medium-bedded, light brown, very finely crystalline dolostone with fine bituminous laminations and distinct vertically jointed beds. The upper contact of the Bertie with the Oriskany or Bois Blanc Formations is an erosional surface representing a major disconformity.

**Oriskany Formation (Lower Devonian)**  
 Surface outcrop of this unit is restricted to the north-western part of the map-sheet area, between Nelles Corners and Clabgrassil. The unit consists of massive, grey or white, friable, fossiliferous, quartz sandstone with rare shale and dolostone. Fossils include bryozoa, corals, and brachiopods. In an abandoned quarry south of Clabgrassil the unit is a minimum 12 feet (3.7 m) in thickness; about 10 feet (3 m) of sandstone is exposed in the Decessville quarry of Cayuga Materials and Construction Company Limited. The southeastward bedding out of the unit is also apparent in this quarry. The upper contact with the Bois Blanc Formation is sharp and disconformable.

The Oriskany may be present in the subsurface of other parts of the map-sheet area but it is difficult, in oil and gas well samples, to separate it lithologically from the Springvale Sandstone Member of the Bois Blanc Formation (see below).

**Bois Blanc Formation (? Lower Devonian)**  
 There has been some argument about definition of the Bois Blanc Formation in the Niagara Peninsula region. It included all Devonian strata between the Bertie Formation or Oriskany Formation and the Middle Devonian Dundas Formation (see below) in the Bois Blanc Formation. Oliver (1967) limited the Bois Blanc Formation to the lower part of the Oriskany sequence and suggested correlation of the overlying strata with the Onondaga Formation of New York. Sanford (1969) also used a restricted definition of the Bois Blanc, but separated the overlying strata with the Amherstburg Formation of the Michigan Basin. The present study has confirmed the restricted definition of the Bois Blanc Formation in the Dunville map-sheet area.

Definition of the Springvale Sandstone Member of the Bois Blanc Formation is also a problem. Medium- to coarse-grained, greenish grey to white, weakly fossiliferous, calcareous, quartz sandstone with interbeds of green, glauconitic sandstone, sandy limestone, dolostone, and brown chert is often developed at the base of the Bois Blanc Formation. The sandy material may be present in cracks and joints of the upper 2 feet (0.6 m) of the Bertie Formation, however, the sandstone lithology is irregularly developed and it is difficult to ascribe accurate geographic and stratigraphic limits to it. A maximum 6-foot (1.8 m) thickness of this lithology has been observed in the map-sheet area.

The remainder of the Bois Blanc Formation consists mainly of cherty limestone with shale partings and minor dolostone, and is characterized by its diversity of texture and composition. The limestones are irregularly laminated, medium- to thin-bedded, greenish grey to light grey-brown, medium- to fine-grained, argillaceous or closely bioclastic. Fossils are common and local concentrations of brachiopods, corals are developed. Light grey or brown chert is abundant as thin beds or nodules.

An entire section of the formation is nowhere exposed; a minimum 15-foot (4.5 m) thickness was measured in an abandoned quarry east-northeast of Upper. The upper contact with the Onondaga Formation is sharp and probably disconformable.

**Onondaga Formation (Middle Devonian)**  
 As previously mentioned, Oliver (1967) correlated strata overlying the Bois Blanc Formation with the Onondaga Formation of New York while Sanford (1969) referred them to the Amherstburg Formation. Oliver's interpretation, with some slight revision, is followed herein. It has been possible to subdivide the Onondaga into three distinct lithological members, also previously recognized in New York. Northwest of Sweets Corners and Rainham Centre the members cannot be separated, mainly because of lack of adequate exposures. Best (1953) actually recognized the three units in Ontario but relegated them to informal lithological zones within his more broadly defined Bois Blanc Formation.

**Edgecliff Member**  
 This unit is best exposed along the lakeshore between Rock Point and Low Point. Facies of this unit, that are distinguishable in the Welland-Fort Erie area (Telford and Tarrant 1975), are not easily recognized in the Dunville map-sheet area. The small biohermal structure, surrounded by limestones of the Clarence Member (see below), is exposed on the lakeshore south of Sweets Corners. The remainder of Edgecliff exposures consist of medium-bedded, fine- to medium-grained dark grey, very fossiliferous, bioclastic limestone with shale partings common in the upper part. Black chert is abundant as nodules or irregular thin beds. Rugose and tabulate corals are the dominant fossils; bryozoa, large crinoid stems, brachiopods, and trilobites are also present. Lack of extensive sections prevents accurate determination of thickness of the unit; 25-30 feet (7.6 to 9 m) is estimated from outcrop between Splatt Bay and Grant Point. The upper contact with the Clarence Member is not exposed.

**Clarence Member**  
 This unit is not well-exposed but is seen best along the lakeshore south of Sweets Corners. It consists of massive-bedded, dark grey-brown, fine-grained, poorly fossiliferous, extremely cherty limestone. The chert is dark grey or dark brown and occasionally opaline, occurring as thin beds and irregular nodules which may constitute over 50 percent of the rock. Upper and lower contacts of the unit are nowhere exposed so that thickness cannot be determined accurately. Best (1953) estimated a thickness of 26 feet (7.9 m) but the unit appears to be thinning or undergoing a facies change to biohermal limestone in the northeast.

**Moorehouse Member**  
 This unit is well-exposed in the southwestern part of the area, particularly along Stony and Paulock Creeks. It consists of medium-bedded, dark grey-brown or purplish brown, fine- to coarse-grained, variably cherty, very fossiliferous, bioclastic limestone. The chert is dark grey or brown, occurring as thin beds or rounded nodules. Fossils are dominantly corals, with bryozoa and brachiopods also common. The upper part of the unit is more argillaceous and less fossiliferous; brachiopods are more common in this part. Upper and lower contacts of the unit are not clearly exposed so that thickness is difficult to determine. A minimum 15-foot (4.5 m) section occurs along Menlock Creek between the lake and Selkirk.

**Bertie Formation (Middle Devonian)**  
 Outcrop of this unit occur in an irregular series of small scarps, some of which define small outcrops, in the south-western corner of the map-sheet area. The unit consists of medium-bedded, brown, fine-grained, weakly cherty, poorly fossiliferous limestone. Occasional beds are coarse-grained, crinoidal bioclastic limestone. The chert is brown or dark grey in colour, occurring as nodules or rarely as thin beds. Fossils include small solitary rugose corals, brachiopods, and trilobites. Shale partings and thin bituminous laminations may also occur. The lower 3 to 5 feet (0.9 to 1.5 m) of the unit is dark brown or black, very fine-grained, argillaceous limestone which weathers into slaty material and has a strong bituminous odour. Tentaculitid fossils are extremely abundant in this lithology. The entire thickness of the unit is not exposed in the map-sheet area; a minimum 15-foot (4.5 m) thick section was measured along Dry Creek, north of Cheapside.

**ECONOMIC GEOLOGY**  
 Dolostones of the Bertie Formation are quarried by Dunville Rock Products Limited at Byng and Cayuga Materials and Construction Company Limited at Decessville (Hewitt and Vos 1972). The latter company also excavates Oriskany sandstone in a small pit north of the main quarry. There are several other areas of extensive outcrop or low overburden where the dolostones and sandstones could be further exploited. Gypsum of the Salina Formation was mined (Koepke and Sanford 1966). Silurian strata, including sandstones of the Whirlpool, Crimby, and Thorold Formations and crinoidal dolostones of the Irondequoit Formation, are the most important reservoir rocks.

L A K E E R I E