

SOLUTION MINING RESEARCH INSTITUTE

105 Apple Valley Circle
Clarks Summit, Pennsylvania, USA

Telephone: 570-585-8092 ♦ Fax: 570-585-8091
www.solutionmining.org ♦ smri@solutionmining.org

Technical
Conference
Paper



Late Ordovician and Silurian Strata of the Niagara Region: An Economic and Historical Geology Overview

Goodman Ph.D., William
RESPEC, Macedon, NY, USA

Spring 2005 Conference
17-20 April
Syracuse, New York, USA

LATE ORDOVICIAN AND SILURIAN STRATA OF THE NIAGARA REGION: AN ECONOMIC AND HISTORICAL GEOLOGY OVERVIEW

By:

William M. Goodman, Ph.D. RESPEC, P.O. Box 485, Macedon, NY, 14502

ABSTRACT

Late Ordovician and Silurian strata of the Niagara Region of New York have been studied extensively since the 1820s. The mineral resources provided by these strata have played prominently in the economic development of western New York since the Industrial Revolution.

The gorges cut by the Niagara and Genesee Rivers, separated by approximately 130 kilometers (80 miles) in an east-west direction, provide spectacular exposures of the same Upper Ordovician and Lower Silurian strata. Economically notable formations exposed in the gorges include the Queenston Formation, the Medina Group, and the Lockport Group. The Clinton Group, which separates the Medina and Lockport Groups, does not contain mineral resources that are currently of economic importance.

The Queenston Formation is a natural gas reservoir in central New York where it consists predominantly of white, pink, and red sandstone. Where sandstone is the predominant lithology, the formation also has the potential to serve as a brine injection target. The Queenston Formation becomes progressively shalier to the west. In the Rochester area and points west along the outcrop belt, the formation contains increasing percentages of shale, and the permeability of the formation declines by orders of magnitude from its presumed peak permeability area near Auburn, Cayuga County.

The Medina Group, which directly overlies the Queenston Formation, is also a major natural gas reservoir in western New York. It is a nonconventional reservoir typified by low permeabilities and an updip water seal. Brackish to saline waters occur in these strata within 100 feet of the ground surface. Locally, the brines emanate from surface springs, possibly pushed updip by pressure from expanding gas. In the early years of development, these "Medina" brines were important for food preservation. The brines were bitter, however, and were replaced by purer brines from the Salina Group by the 1820s as the Erie Canal expanded westward.

The dolostones of the Lockport Group cap the major waterfalls in Rochester and at Niagara Falls. These strata are quarried extensively between Wayne County and Niagara County for use in asphalt and road construction. These strata were also explored for oil and gas, but the majority of the gas production occurs farther west in Ohio.

The Silurian Salina Group evaporites overlie the Lockport Group, but they are not exposed in the river gorges. At their updip terminus, the Salina Group formations subcrop beneath thick glacial deposits. Outcrops of the salt beds do not exist because they were deposited in the basin center that, for the most part, remains deeply buried. Salt beds do come close to outcrop belt near Syracuse, New York, but they are dissolved by actively circulating groundwater. Salt mines and drill cores provide the best direct views of the economically important bedded salt deposits.

Commercial exploitation of the Salina Group salts and brines in New York dates back to the late 18th century. Brine operations first began in the Syracuse area and then extended west. Successful underground mining of the bedded salt deposits has been ongoing in the Genesee Valley since 1885 and in the Cayuga Valley since the early 1920s.

Outcrops of the gypsum-bearing shales at the top of the Salina Group occur sporadically along the base of the Onondaga Escarpment. Gypsum quarrying started first in the eastern half of the salt district. These gypsum deposits in the Camillus Formation were economically important from the time of their discovery in 1792 until the twentieth century. Early gypsum operations (i.e., in existence before the first systematic geological survey of western New York in 1838) were established from east to west in Madison, Onondaga, Cayuga, Ontario, and Monroe Counties. The dark-colored gypsum produced east of Monroe County was used primarily for agricultural purposes. Lighter-colored gypsum deposits in Monroe County and points west were mined underground for wall plaster.