North Dakota Update

June 23, 2021

NDPGA

- Research Project

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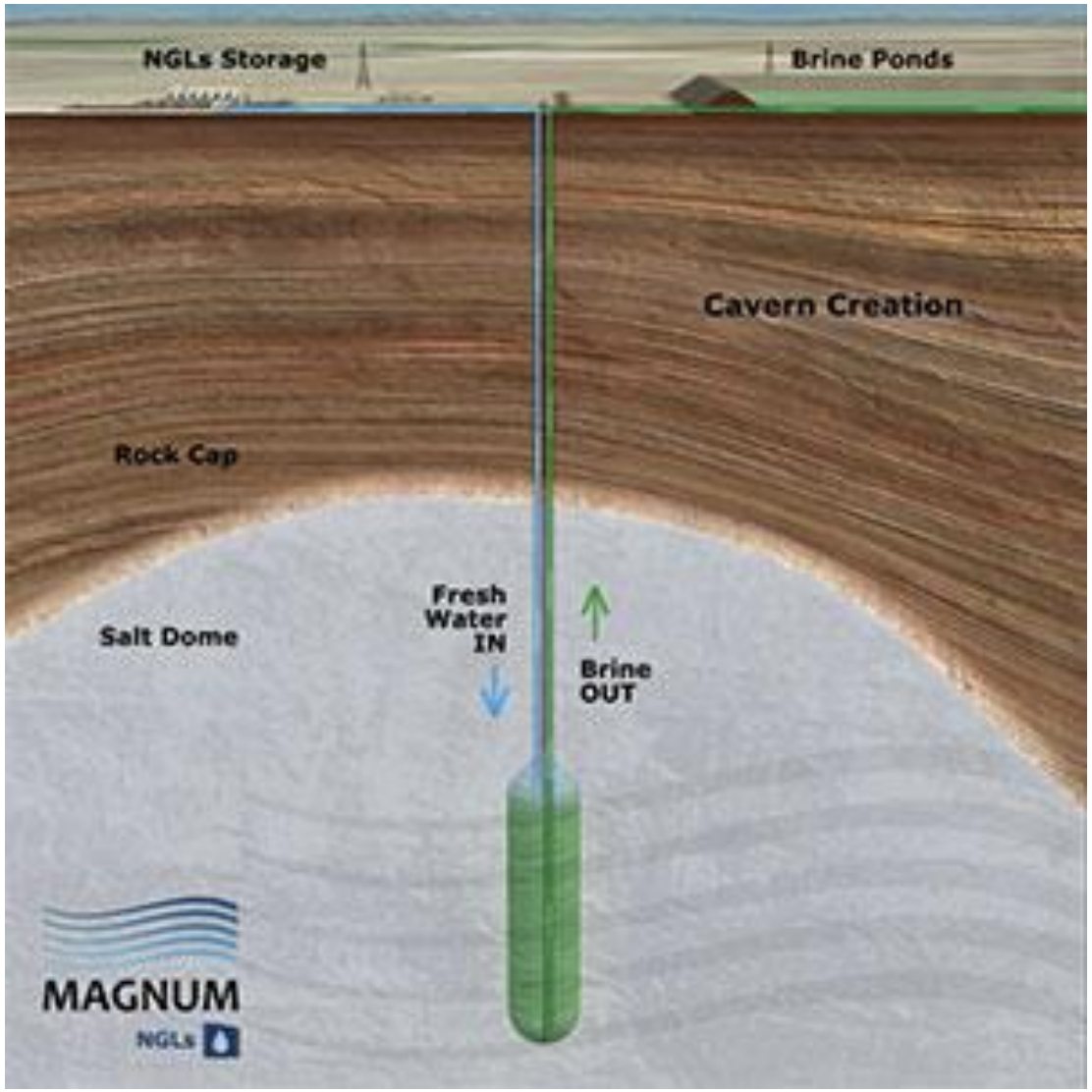
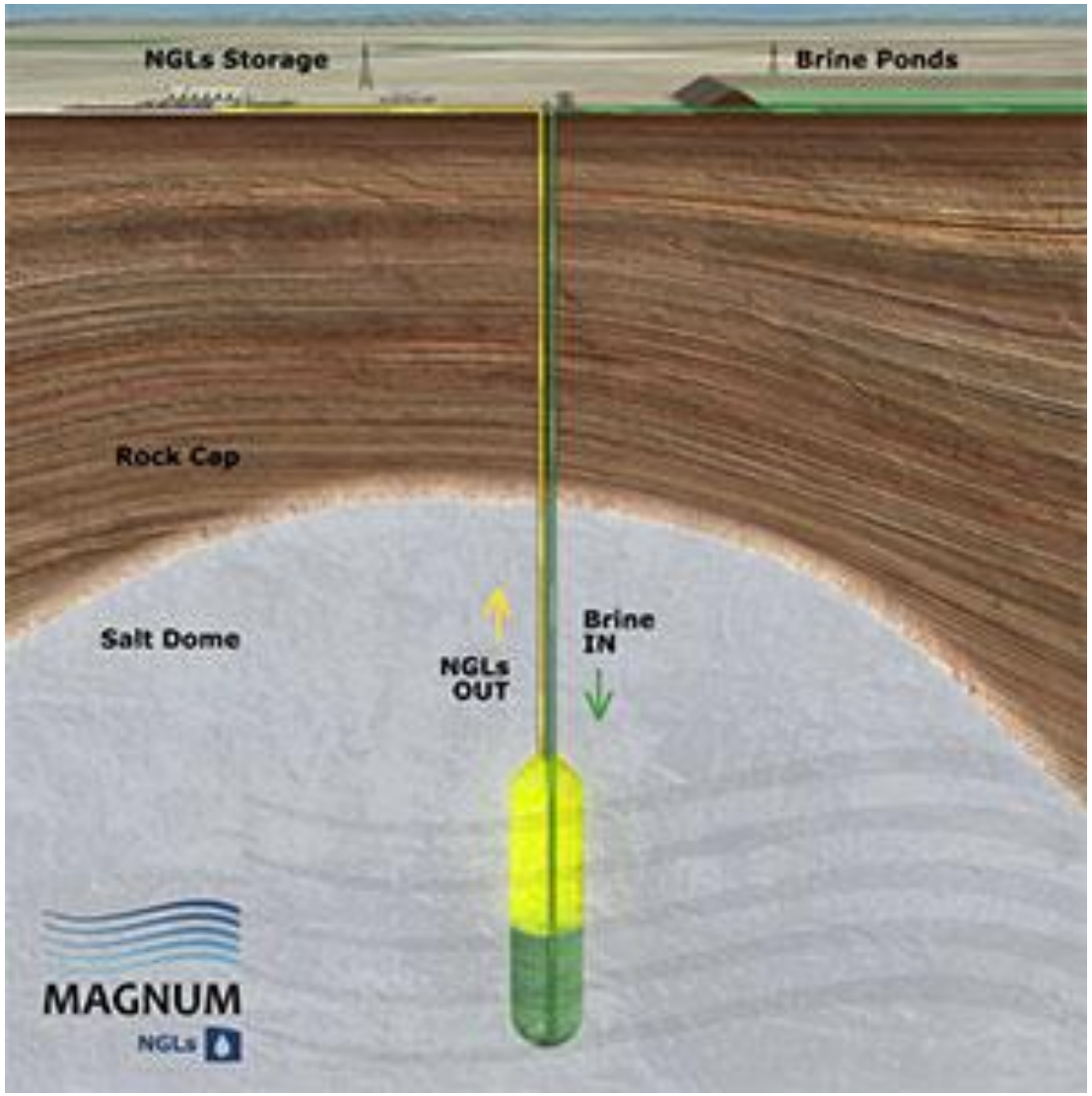
Mont Belvieu, Texas - half of America's propane is stored in underground salt caverns.

Conway, Kansas - 30 percent of the propane stored in the US. Propane stored in Conway is also held in underground salt caverns dug out in the 1940s, and is a major pipeline distribution point for propane headed to the Midwest. The storage facility has a holding capacity of over 4 million barrels of propane and other refined petroleum products.

Mentor, MN - Hess Midstream operates an underground propane storage cavern and a rail and truck loading and unloading facility on 40 acres in Mentor, Minnesota. Approximately 325,000 barrels of propane can be stored on site to mitigate the impact on operations of seasonal variation in demand. The terminal also has a dehydration facility, and rail and truck loading racks capable of injecting and withdrawing 6,000 barrels of propane per day.

Delta, Utah, - capacity of 500,000 barrels of propane stored in salt caverns. Magnum NGLs site filled a supply void created more than five years ago when an underground propane storage facility in Moab, Utah, closed after it failed a mechanical integrity test. Those caverns stored about 5 million gallons of propane and butane. "There's not really a lot of storage options in this region," says Justin Turner, head of corporate development for Turner Gas. "We were extremely pleased to have it become available – that facility has become an extension of our office.
"From a logistics and operational standpoint, it gives our customers security in regard to availability and price," Turner says. "It gives us flexibility to serve existing and new customers, and if there are winter shortages we will have that product available."


NGLs Storage
Brine Ponds
Cavern Creation
Rock Cap
Salt Dome
Fresh Water IN
Brine OUT
MAGNUM
NGLs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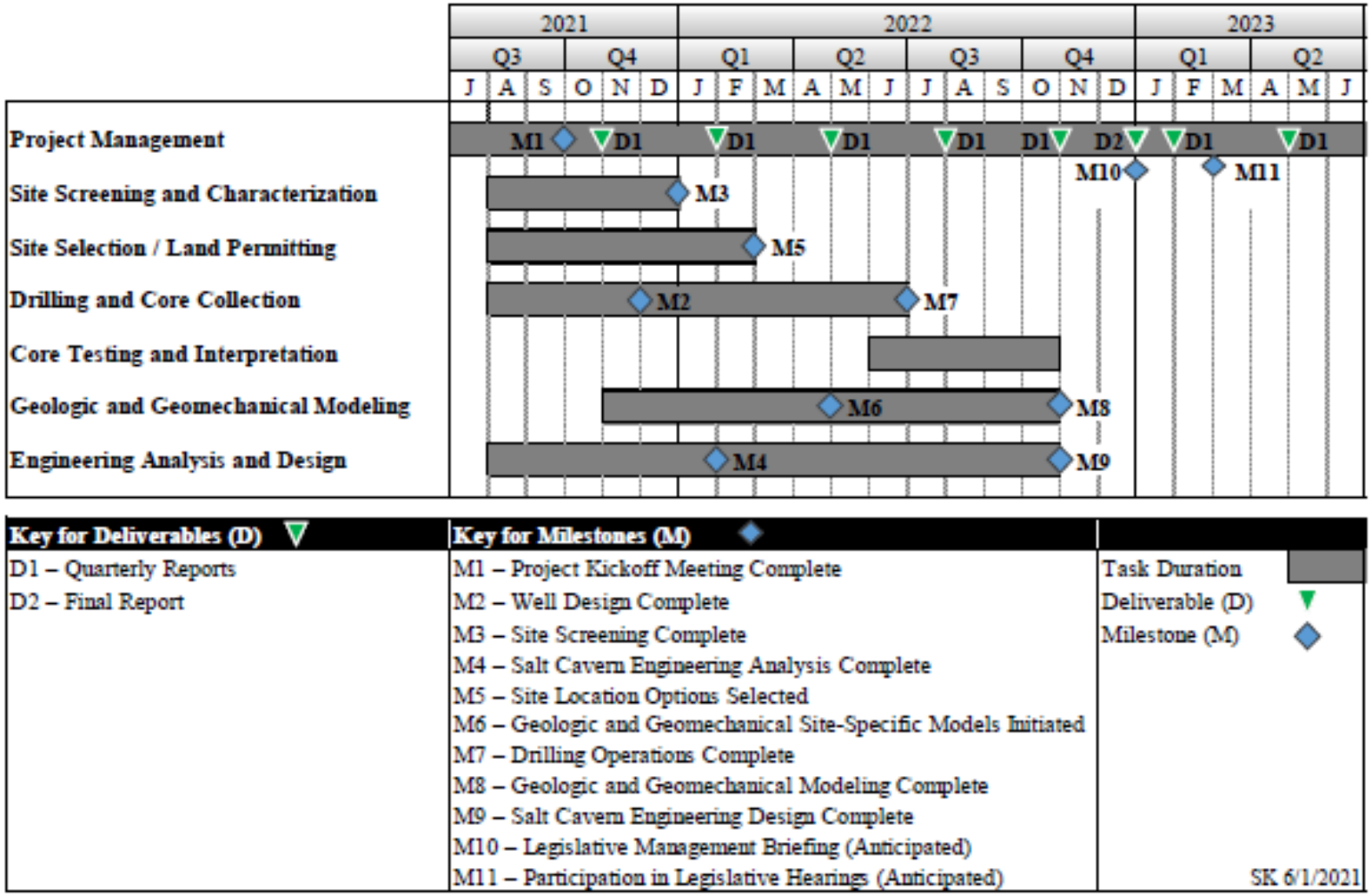


Figure 1. Project timetable.

$10,000,000

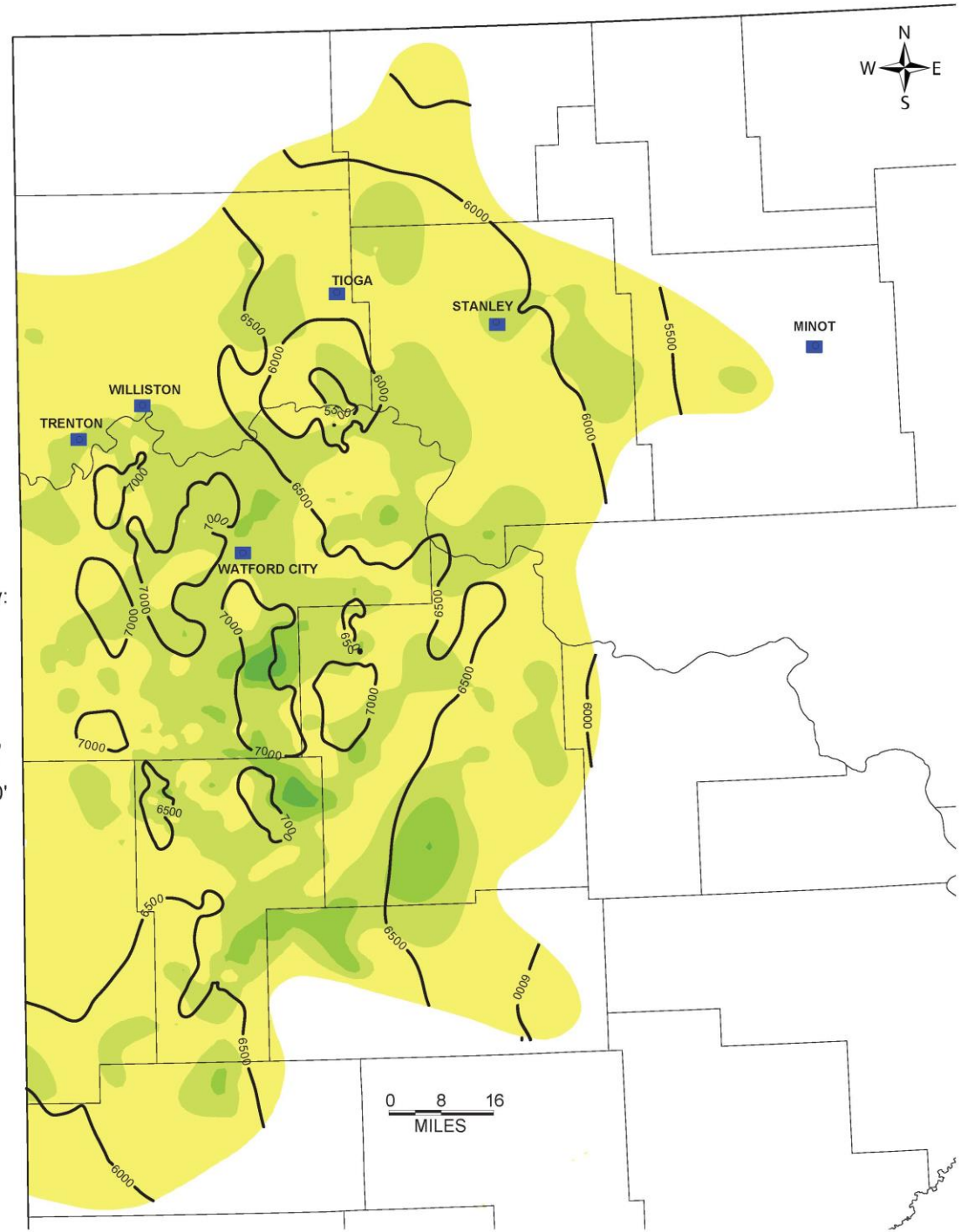
DUNHAM SALT ISOPACH with DUNHAM SALT STRUCTURE OVERLAYMENT

Prepared by the
North Dakota Geological Survey:

Travis Stolldorf
Ned Kruger
Tim Nesheim
Ed Murphy

Isopach Contour Interval = 50'

Structure Contour Interval = 500'



PINE SALT ISOPACH with PINE SALT STRUCTURE OVERLAYMENT

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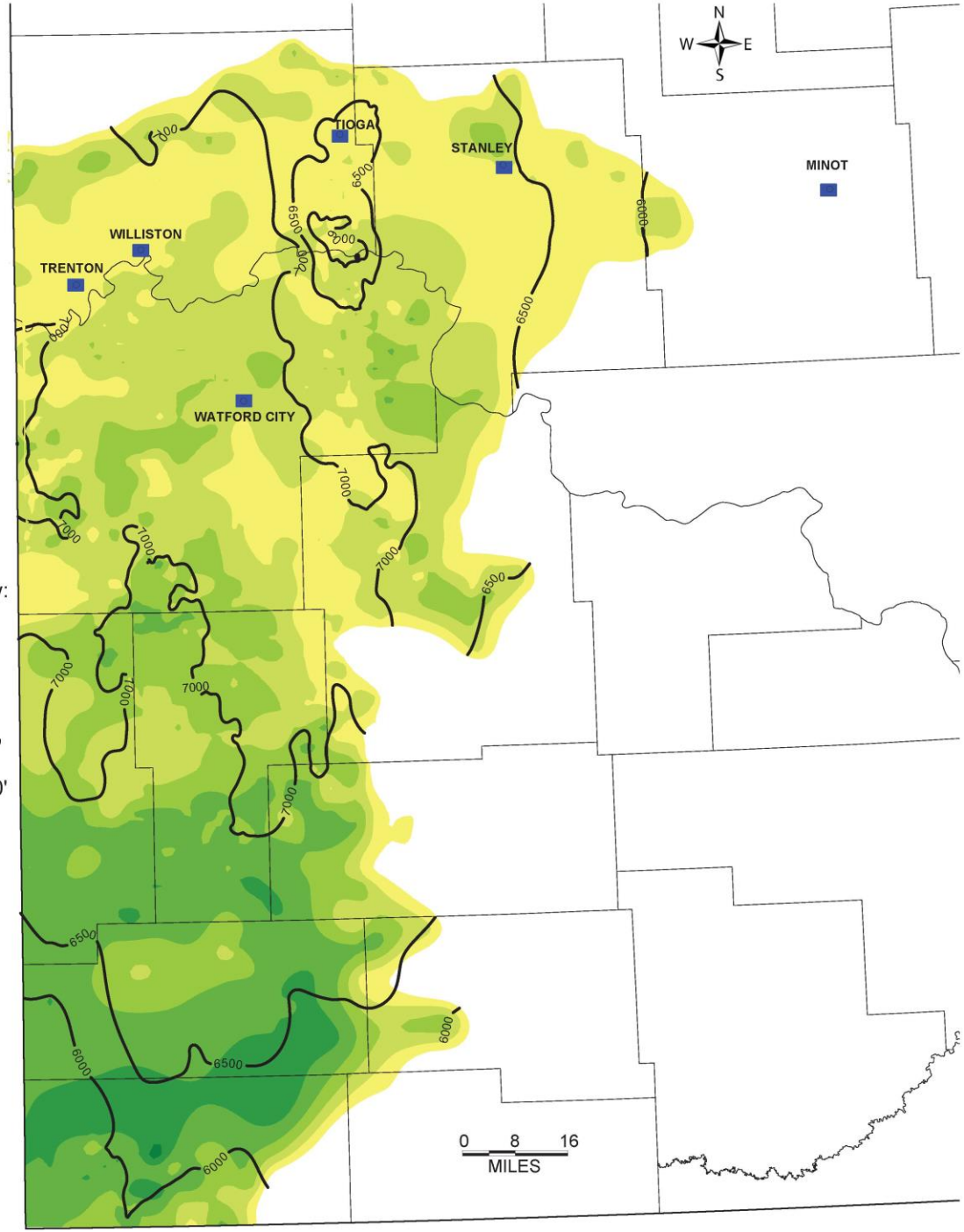
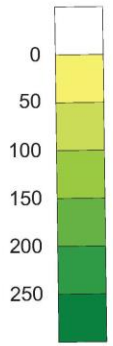


THICKNESS
(FEET)



OPECHE 'A' SALT ISOPACH with OPECHE 'A' SALT STRUCTURE OVERLAYMENT

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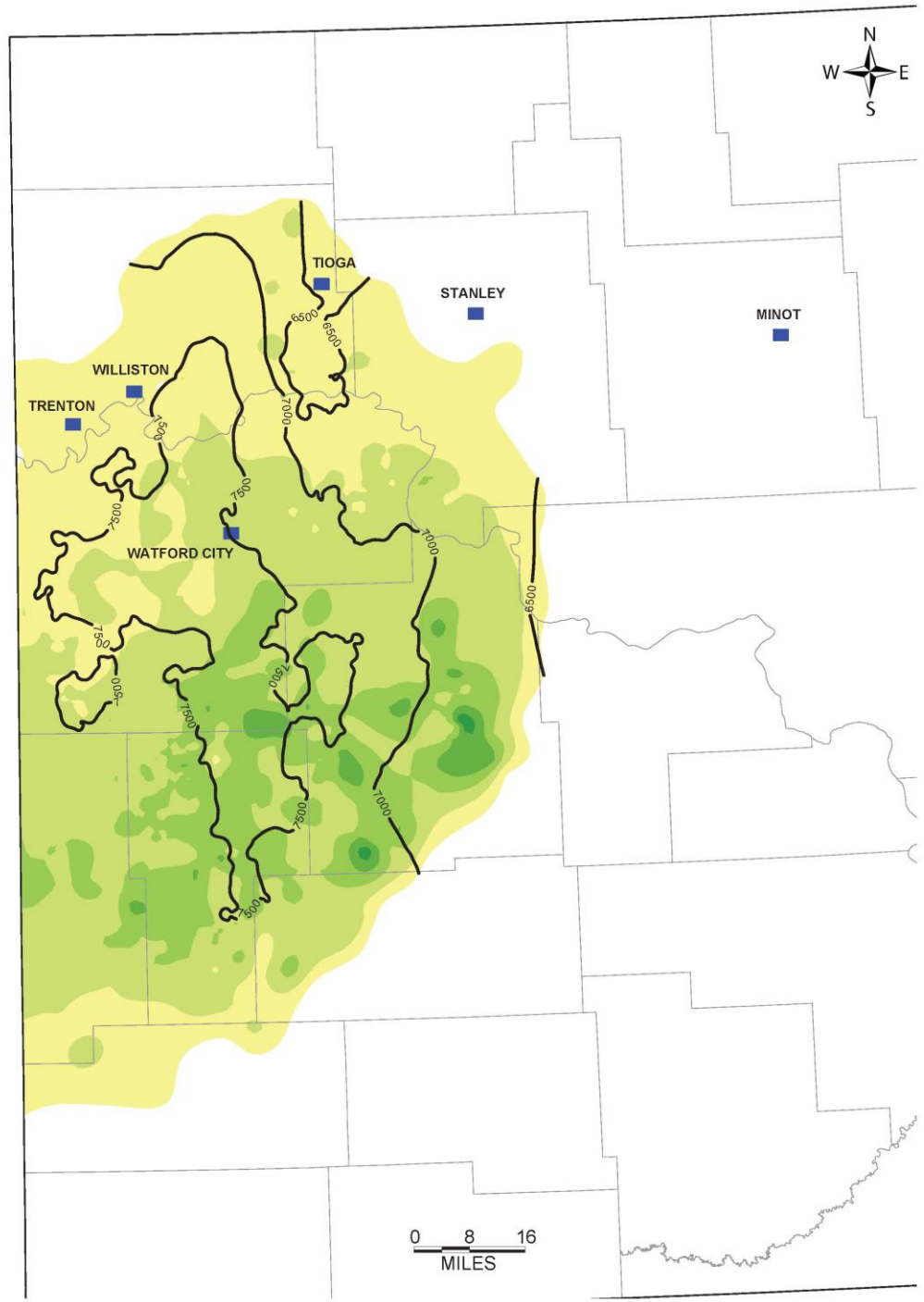

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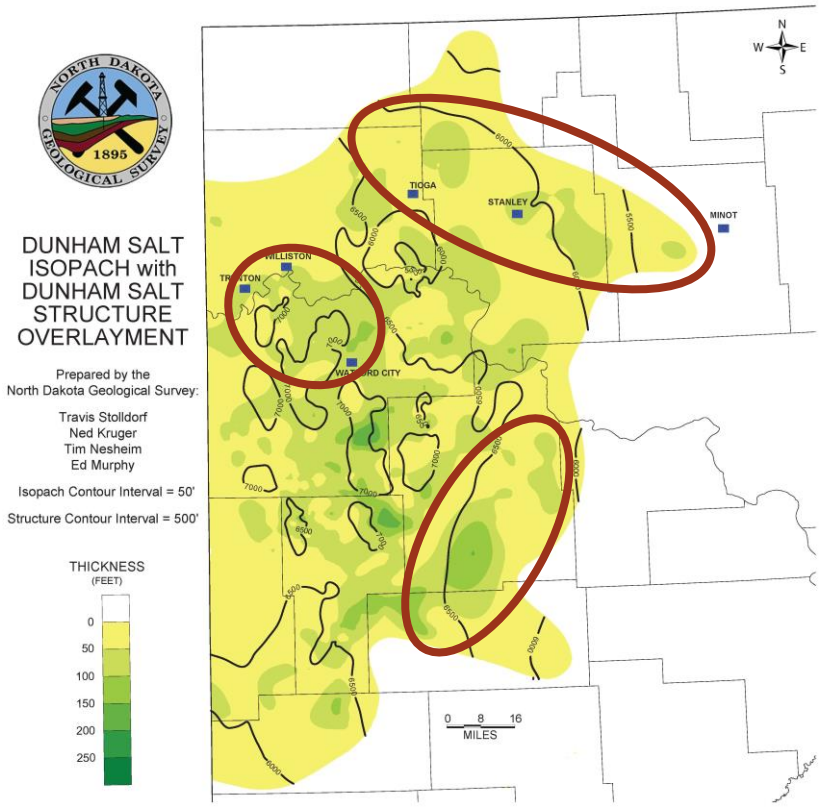

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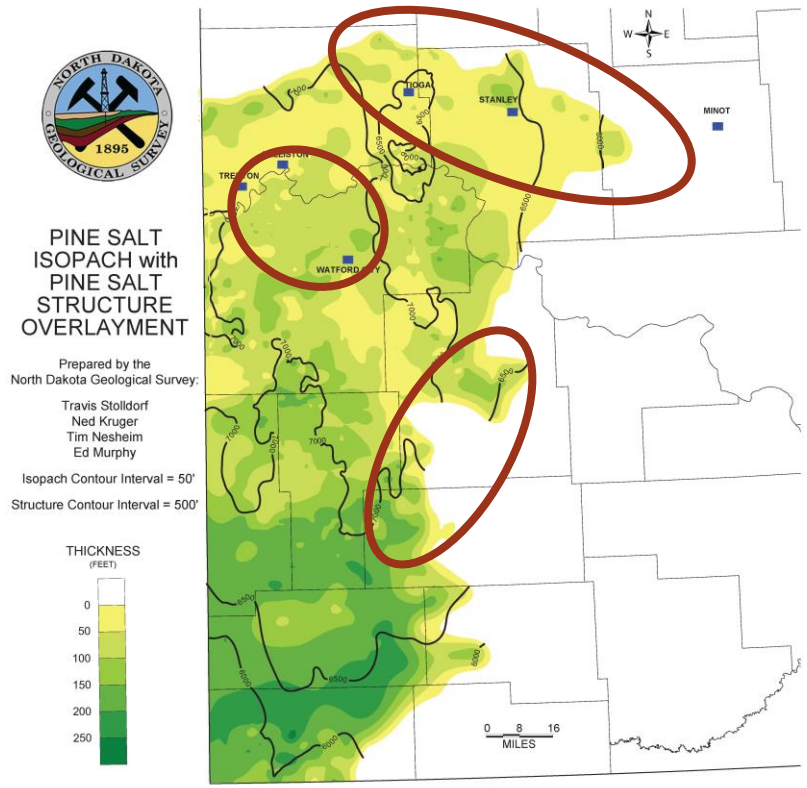

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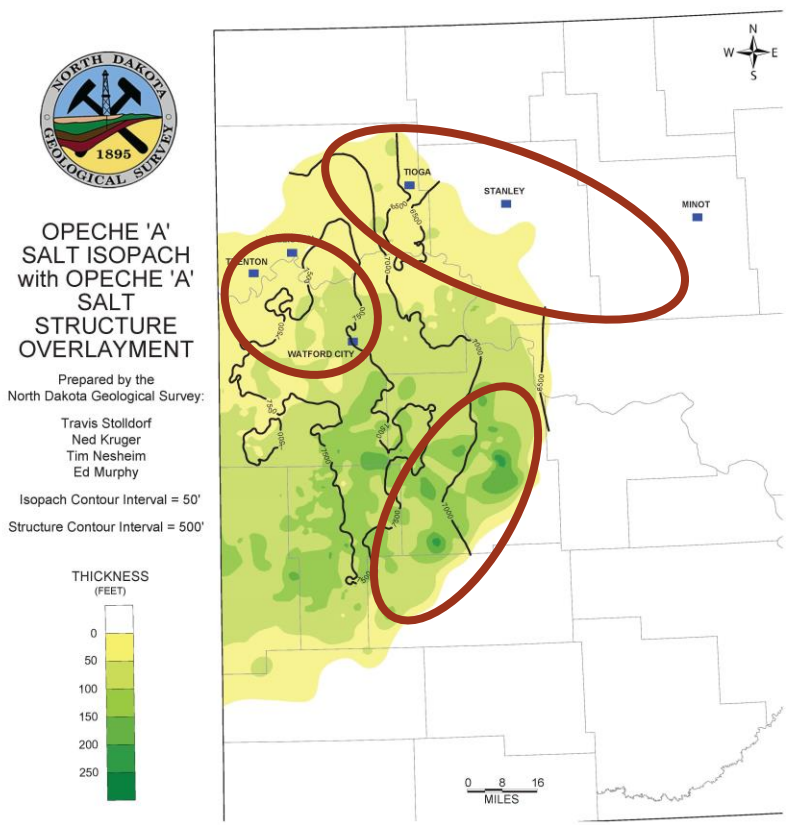

Historical data from throughout the United States suggests cavern development costs for gas storage may be as much as $10 to $12 million per billion standard cubic feet (Bscf) or $60 per barrel of working capacity.

Costs are highly dependent on the size and nature of the petrochemical/energy facility that is being served by the cavern and the regulations governing salt cavern siting, permitting, construction, and operation. A maximum cavern height, given known salt thicknesses within the region of interest, may be approximated as 100 ft.
A vertically oriented cylindrical cavern with a height and diameter of 100 ft would enable the storage of approximately 140,000 barrels. Fifteen to twenty caverns of this size would be required to meet the total volume of 2.5 million barrels needed for a petrochemical facility (2/3 size of Conway, KS propane storage).
A horizontal gallery with a length of 2,500 ft and height (cylinder diameter) of 50 ft would have a capacity of approximately 900,000 barrels. Three such caverns would be needed to meet the overall objective of 2.5 million barrels.

Preliminary engineering assessments evaluated major equipment/components, including compression, brine pumps, surface brine ponds, and electrical needs are estimated to be $200,000,000.

Additional labor and maintenance operating costs were roughly estimated to be $1 million/year. Depending on uptime, total annual utility requirements could exceed $5 million/year.

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Sixty-seventh Legislative Assembly of North Dakota
In Regular Session Commencing Tuesday, January 5, 2021

SENATE BILL NO. 2065

(Energy and Natural Resources Committee)
(At the request of the Industrial Commission)

AN ACT to create and enact chapter 38-25 of the North Dakota Century Code, relating to the jurisdiction
of the industrial commission to regulate the permitting and amalgamation of the underground storage of oil or gas; and to amend and reenact sections 15-05-09 and 15-05-10 of the North Dakota Century Code, relating to oil and gas leases and royalties from oil leases.

38 - 25 - 07. Permit requirements - Storage in salt cavern.

38 - 25 - 08. Amalgamating property interests.

Timetable for adopting NDIC Rules

August 24, 2021 – NDIC approval to proceed with rulemaking

September 9, 2021 – publication of notice of rulemaking

October 11, 2021 – rulemaking hearings Bismarck and Dickinson
October 12, 2021 – rulemaking hearings Williston and Minot
October 22, 2021 – deadline for rulemaking comments

November 30 – NDIC approval of rule amendments

January 27, 2022 – file rule amendments with Legislative Counsel

March 2, 2022 – Administrative Rules Committee hearing

April 1, 2022 – rule amendments become final

North Dakota
Department of Mineral Resources

www.dmr.nd.gov

Phone: 701.328.8020 **Email: oilandgasinfo@nd.gov**
Mailing Address: 600 East Boulevard Ave. Dept 405; Bismarck, ND 58505