NORTH DAKOTA

	TF	3	A	TIG	R	RAPHIC COLUMN			
E OF YEARS RESENT	HEM	SYSTEM			ROCK UNIT				
AGE MILLIONS OF YEARS BEFORE PRESENT	ERATHEN			SERIES	SEQUENCE	GROUP	FORMATION	MEMBER	
-0.01-	H	XX		Holocene			OAHE WEST CENTRAL EAST	RIVERDALE PICK CITY AGGIE BROWN MALLARD ISLAND ERN JRED RIVER VALLEY	
		VITATEBNIABV	AIEKINAI	Pleistocene	$\left. ight. ight. ight. ight.$ TEJAS	COLEHARBOR		SHERACK POPLAR RIVER BRENNA FALCONER HUOT ARGUSVILLE	
-2.6-		110	P				SNOW SCHOOL DAHLEN GARDAR CHURCHE MEDICINE HILL CANDO CANDO	RED LAKE FALLS S FERRY ST. HILAIRE AFTON MARCOUX	
-5.3			NEOGENE	Pliocene			(Unnamed Unit) ARIKAREE		
- 23.0 - - 33.9 -	C		N	Oligocene		WHITE RIVER	BRULE CHADRON	SOUTH HEART	
## O	SENOZOIC	TERTIARY		Eocene		~~~~	GOLDEN VALLEY	CAMELS BUTTE	
- 55.8 -	CEN		PALEOGENE			FORT UNION	SENTINEL BUTTE	BEAR DEN	
				Paleocene			BULLION CREEK		
							SLOPE		
							CANNONBALL LUDLOW		
-65.5-					ZUNI		HELL CREEK		
		CRETACEOUS		Upper		MONTANA	FOX HILLS	BREIEN COLGATE ≷ LINTON BULLHEAD TIMBER LAKE	
								TRAIL CITY	
								ODANAH	
							PIERRE	DEGREY	
								PEMBINA	
						COLORADO	NIOBRARA	GAMMON	
	MESOZOIC						CARLILE		
	ESO.						GREENHORN BELLE FOURCHE		
- 99.6 -	M					DAKOTA	MOWRY NEWCASTLE		
				Lower			SKULL CREEK		
-145.5-							INYAN KARA		
			JURASSIC				SWIFT		
							RIERDON	BOWES FIREMOON TAMPICO	
							PIPER	KLINE PICARD POE	
- 201.6 - - 251.0 -			Т	RIASSIC			SPEARFISH	SAUDE	
201.0							MINNEKAHTA	PINE BELFIELD	
			PERMIAN				ОРЕСНЕ		
- 299.0 -					ABSAROKA	MININELLICA	BROOM CREEK		
		CARBONIFEROUS		PENNSYLVANIAN	4	MINNELUSA	AMSDEN	ALASKA BENCH	
-318-				MISSISSIPPIAN	~~	BIG SNOWY	OTTER		
							KIBBEY		
						MADISON	CHARLES		
							MISSION CANYON		
					KASKASKIA		LODGEPOLE		
– 359 –	OIC						BAKKEN THREE FORKS		
	ozo	D		EVONIAN		JEFFERSON	THREE FORKS BIRDBEAR		
	PALEOZOIC					I MAGON	DUPEROW SOURIS RIVER		
						MANITOBA	DAWSON BAY	MOUNTRAIL	
						ELK POINT	PRAIRIE	BELLE PLAINE ESTERHAZY	
							WINNIPEGOSIS ASHERN		
-416-									
		SILURIAN					INTERLAKE		
– 444 –					TIPPECANOE		STONEWALL	GUNTON	
						BIG HORN	STONY MOUNTAIN	GUNTON STOUGHTON	
					~		RED RIVER		
			OR	DOVICIAN		WINNIPEG	ROUGHLOCK ICEBOX BLACK ISLAND		
			CAMBRIAN				~~~~		
-488-							DEADWOOD		
-542-					-		TRUCTURAL PROVIN		
		I	PRE	CAMBRIAN		WYOMING PROVINCE	TRANS-HUDSON OROGEN	SUPERIOR PROVINCE	

North Dakota Geological Survey

Geologic Investigations No. 233

INTERLAKE SUMMARY

DRILL STEM TESTS AND PRODUCTION MAPPING

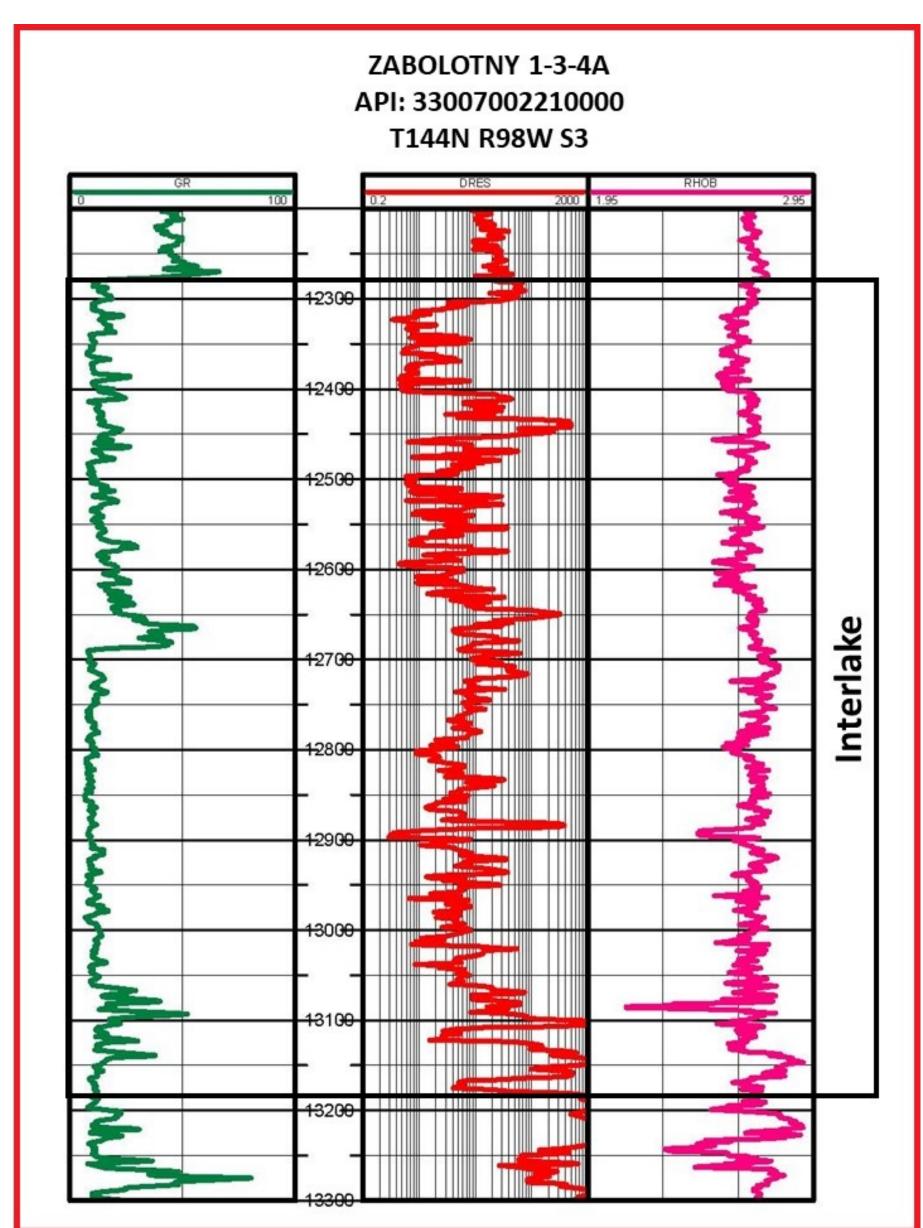
Travis D. Stolldorf 2020

In order to better facilitate petroleum exploration and development in the Williston Basin, the North Dakota Geological Survey (NDGS) has published a series of production-related maps and corresponding data sets. These maps sets include production and drill stem test (DST) results with an accompanying spreadsheet for easy data extraction. The primary goal of this project is to create a database showing the distribution of hydrocarbons within each productive unit.

Prior to this project, over 55% of the DST results in the state did not have an associated geologic interval. The NDGS utilized a series of filters in Petra and Excel to unite formation tops with DST results. Now over 95% of DST results are associated with a geologic interval. After removing failed (misrun) DSTs, the remaining DST results were then separated into three groups. The first group (Positive DSTa) contains wells that have recovered oil or gas (in either the drill pipe or the sampler), or those that list oil or gas as the primary component of the fluid/gas mixture (e.g. 10' mud cut oil) in the description. Secondly, Positive DSTb wells display results for oil or gas as the secondary component of the fluid/gas mixture (e.g. 50' gas cut mud). Although Positive DSTb wells do show signs of hydrocarbons, the hydrocarbon signal is considered weaker than those in the Positive DSTa group. Lastly, the Negative DST results have no indication of hydrocarbons. Detailed information for each DST (time-pressure data, interval depths, fluid and gas recovery information) can be accessed through the well file database maintained by the North Dakota Industrial Commission (NDIC) Oil and Gas Division.

Production for each well was determined using the NDIC's Production Pools and associated monthly production totals. The production pools utilized are shown on the Production Map for each interval. Cumulative production for each well was calculated through September 2019.

This project is a summary of the Interlake Formation's production and drill stem test results. Map sets include a production map, cumulative production map and DST results in North Dakota's portion of the Williston Basin. The Interlake Formation is highlighted by the red box on the North Dakota Stratigraphic Column on the left. A representative log of the Interlake Formation is shown below along with a map showing the well's approximate location.



References

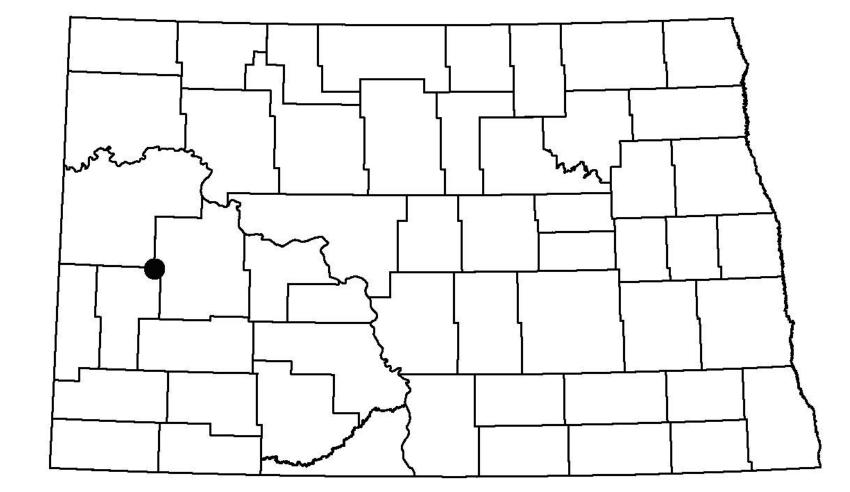
Murphy, E.C., Nordeng, S.H., Juenker, B.J., and Hoganson, J.W., 2009, North Dakota Stratigraphic Column, North Dakota Geological Survey, MS-91, 1p.

Edward C. Murphy, State Geologist

Lynn D. Helms, Director Dept, Mineral Resource

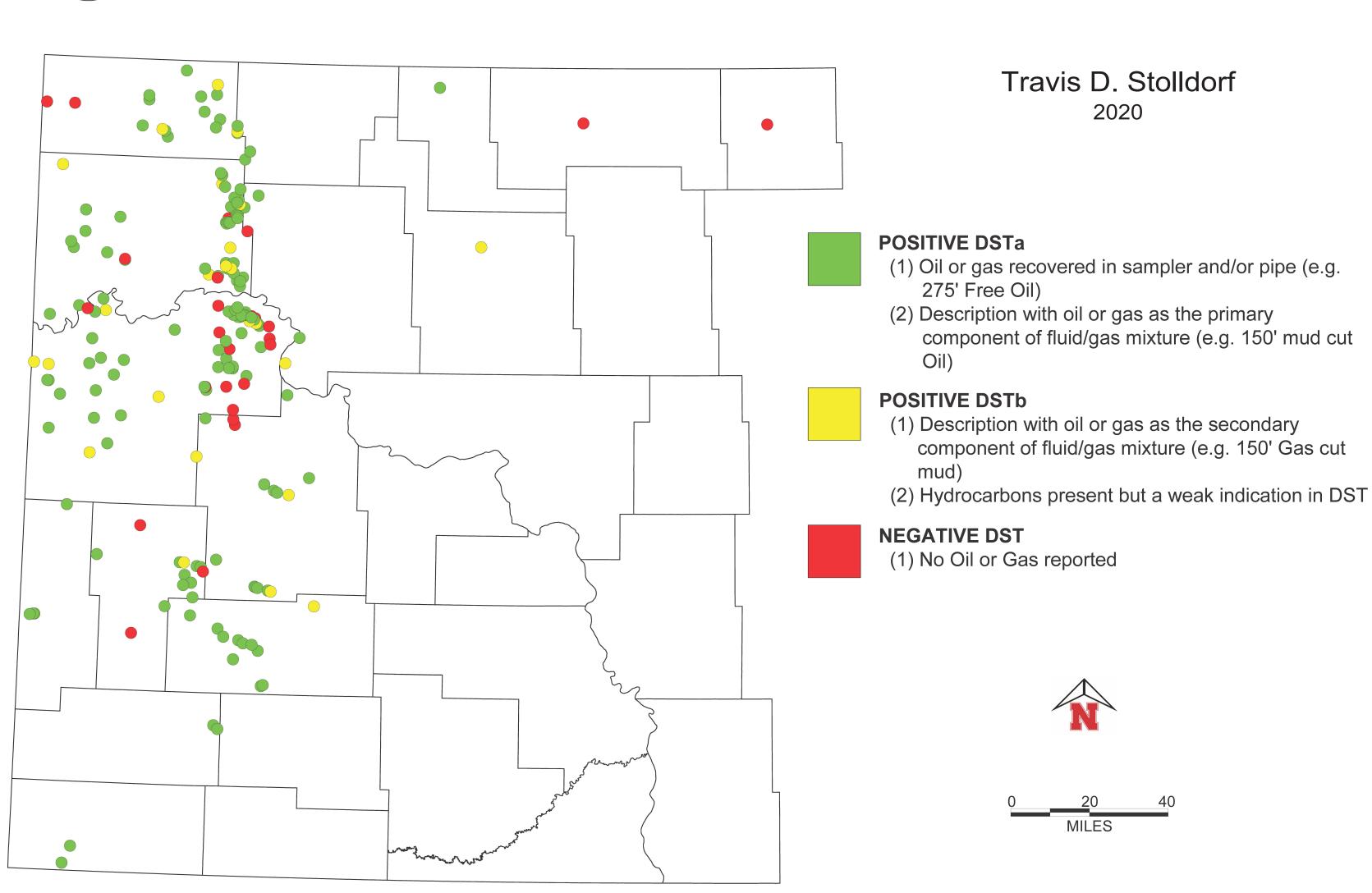
North Dakota Industrial Commission, Department of Mineral Resources, Oil and Gas Statistics, retrieved October 2019, https://www.dmr.nd.gov/oilgas/

NORTH DAKOTA LOCATION MAP



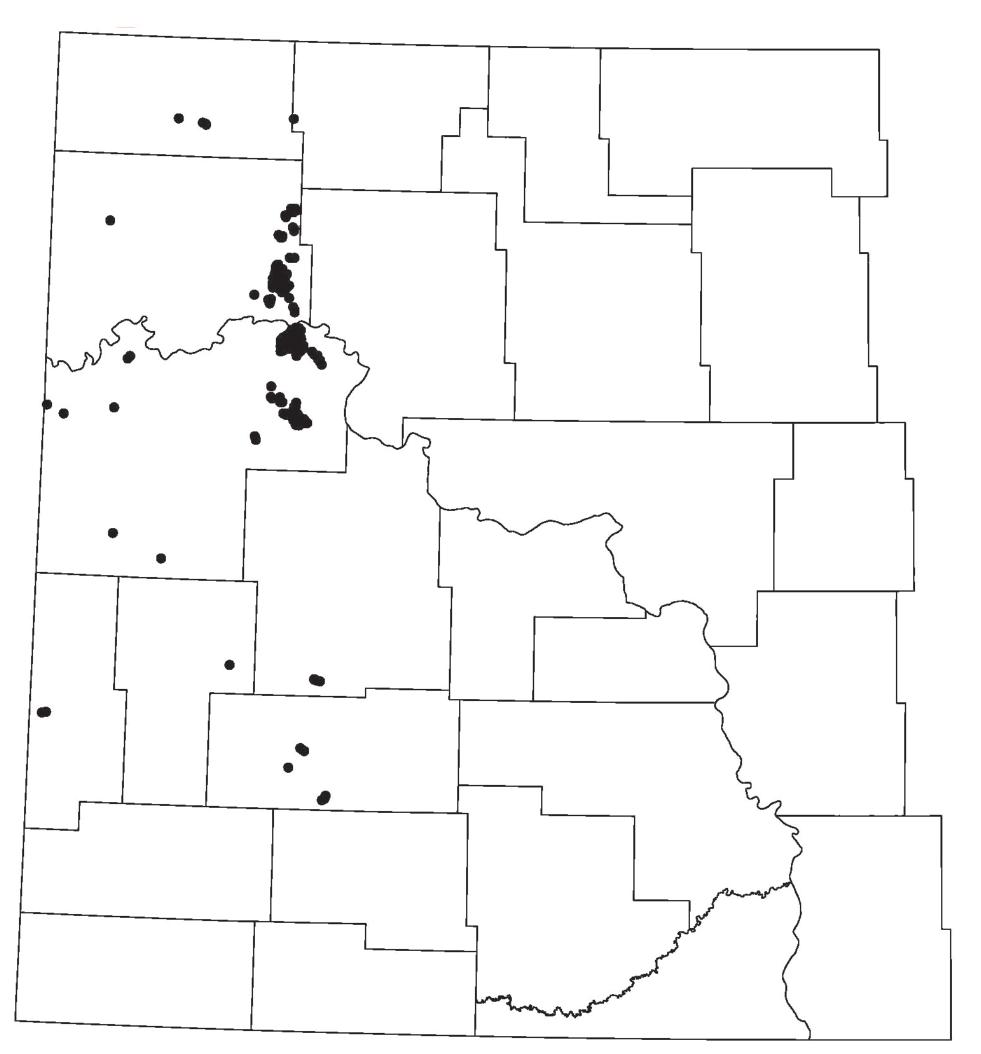


SILURIAN INTERLAKE DRILL STEM TEST RESULTS





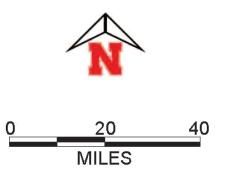
SILURIAN INTERLAKE OIL PRODUCTION



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Silurian Interlake Production

NDIC Production Pools Utilized
Silurian
Interlake





SILURIAN INTERLAKE CUM OIL PRODUCTION

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