

NORTH DAKOTA STRATIGRAPHIC COLUMN



STONEWALL and STONY MOUNTAIN (GUNTON) SUMMARY

DRILL STEM TESTS AND PRODUCTION MAPPING

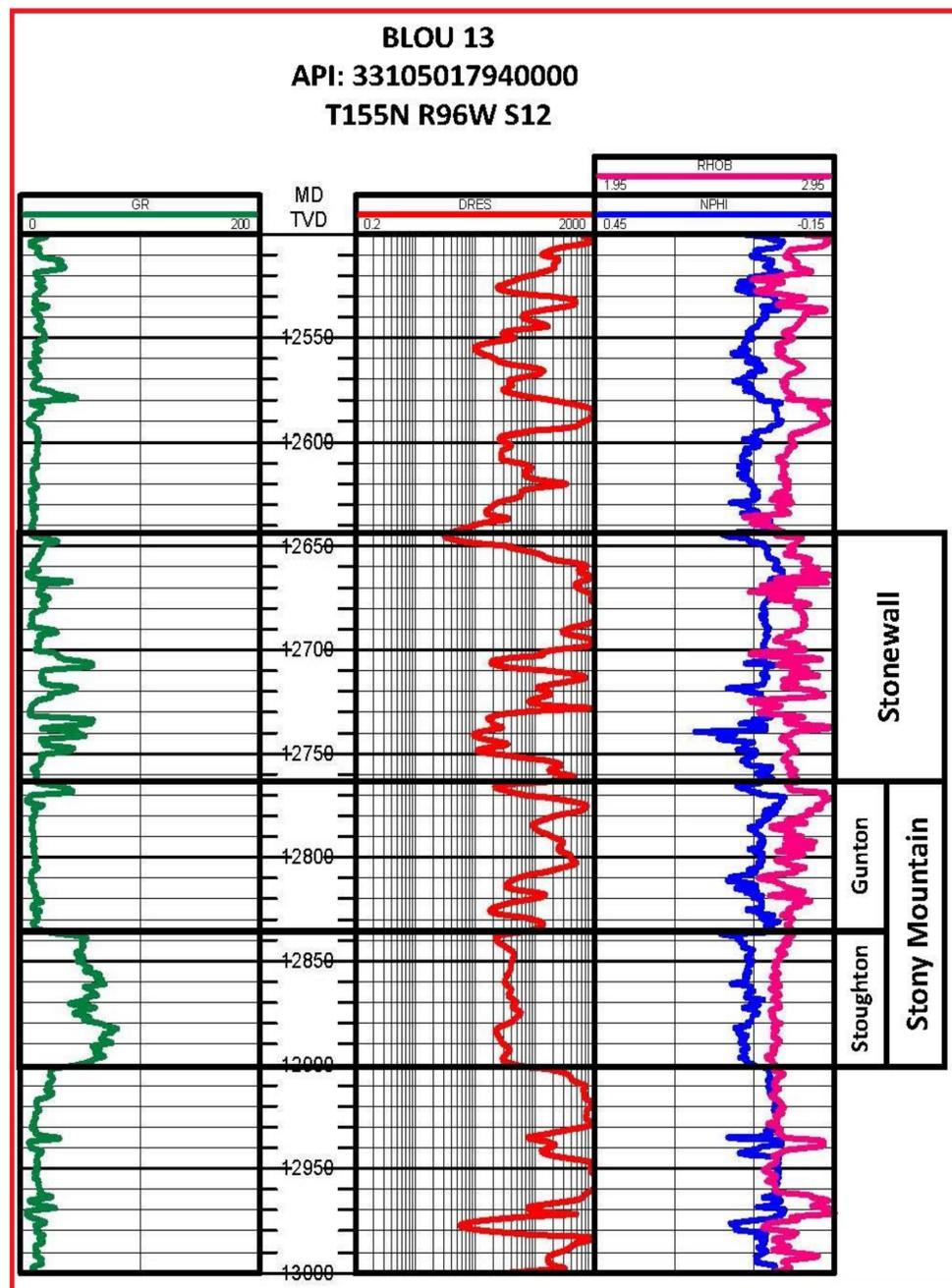
Prepared by
Travis Stoldorf

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 Stonewall and Stony Mountain Formations' 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 Stonewall and Stony Mountain Formations are highlighted by the red box on the North Dakota Stratigraphic Column on the left. A representative log of the Stonewall and Stony Mountain Formations is shown below along with a map showing the well's approximate location.



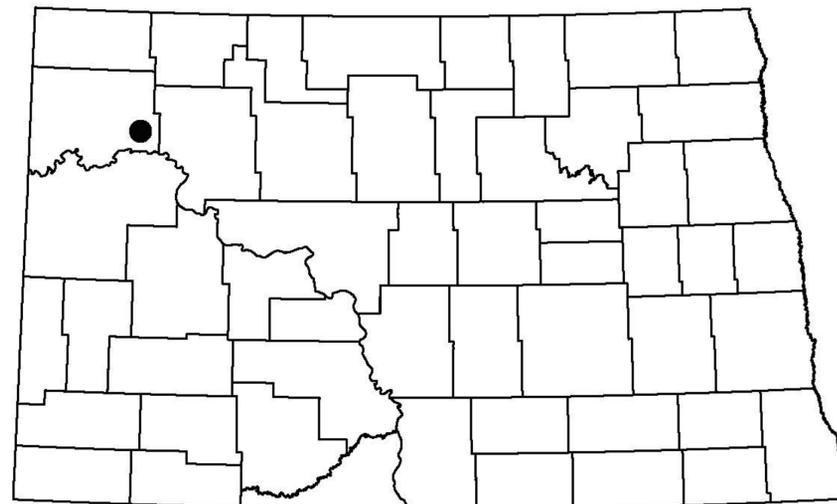
The Stony Mountain formation is separated into two members. The Gunton Member is the primary hydrocarbon reservoir of the Stony Mountain Formation.

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.

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



AGE MILLIONS OF YEARS BEFORE PRESENT	ERATHEM	SYSTEM	SEQUENCE	ROCK UNIT						
				GROUP	FORMATION	MEMBER				
							MEMBER	FORMATION	GROUP	
0.01	QUATERNARY	Holocene	TEAMS	OAHE	RIVERDALE PICK CITY AGUE BROWN MALLARD ISLAND					
Pleistocene				COLEHARBOR	WEST CENTRAL EASTERN SIOUX POPAG RIVER BROWN FALCONER BROOK SIOUXVILLE WYLLIE RED LAKE FALLS	RED RIVER VALLEY				
				(Unnamed Unit)	SNOW SCHOOL DAMEL HORNHORN VALLEY MEDICINE HILL CAMP DRAFTON CAMP	ST. BELLAIRE MADISON				
2.6	INDIGENE	Pliocene	TEAMS							
5.3				Miocene	ARIKAREE					
23.0				Oligocene	WHITE RIVER	BRULE				
35.5	CENOZOIC	Eocene	TEAMS	CHADRON	SOUTH HEART CHALKY BUTTES					
55.8				GOLDEN VALLEY	CAMELS BUTTE	BEAR DEN				
65.5				TERTIARY PALEOCENE	FORT UNION	SENTINEL BUTTE				
	BULLION CREEK									
	SLOPE									
	CANNONBALL									
	LUDLOW									
	65.5	CRETACEOUS	Upper			ZUNI	HELL CREEK	BEELEN COLGATE & LINTON BULLHEAD TIMBER LAKE TRAIL CITY		
FOX HILLS										
MONTANA				ODANAH						
PIERRE				DEGREY GREGORY PEMBINA GAMMON						
COLORADO				NIOBRARA						
				CARLILE						
				GREENHORN						
				BELLE FOURCHE						
99.6				Lower	DAKOTA		MOWRY			
							NEWCASTLE			
							SKULL CREEK			
							INYAN KARA			
145.5	JURASSIC		ABNAROKA	SWIFT						
				RIERDON	BOWEN FERRISSON TAMPICO KLINE PICARD KOE DUNHAM					
				PIPER						
				TRIASSIC	SPEARFISH	SAUDE PINE BELFIELD				
					MINNEKAHTA					
					OPECHE					
				201.6	PERMIAN		ABNAROKA	BROOM CREEK		
								MINNELUSA	AMSDEN ALASKA BENCH	
								TYLER		
								OTTER		
251.0	PENNSYLVANIAN		ABNAROKA	KIBBEY						
				CHARLES						
299.0	CARBONIFEROUS MISSISSIPPIAN		KANSASKIA	MISSION CANYON						
				LODGEPOLE						
				MADISON	BAKKEN					
					THREE FORKS					
					BIRDBEAR					
				JEFFERSON	DUPEROW					
				MANITOBA	SOURIS RIVER					
					DAWSON BAY					
					PRAIRIE	MOUNTAIN BELLE PLAISE ESTERILIZ				
				318	ELK POINT		KANSASKIA	WINNIPEGOSIS		
ASHERN										
359	DEVONIAN		KANSASKIA	INTERLAKE						
				STONEWALL						
				STONY MOUNTAIN	GUNTON STOUGHTON					
				RED RIVER						
416	SILURIAN		TIPPECANOE	ROUGHLOCK						
				ICEBOX						
				BLACK ISLAND						
444	ORDOVICIAN		TIPPECANOE	WINNIPEG						
				DEADWOOD						
488	CAMBRIAN		SAUK							
542	PRECAMBRIAN			STRUCTURAL PROVINCES	WYOMING PROVINCE	TRANS-HUDSON OROGEN	SUPERIOR PROVINCE			