NORTH DAKOTA STRATIGRAPHIC COLUMN

AGE MILLIONS OF YEARS BEFORE PRESENT	'HE]	SYSTEM		INCE	ROCK UNIT			
	ERATHEM			SERIES	SEQUENCE	GROUP	FORMATION	MEMBER
0.01-				Holocene			ОАНЕ	RIVERDALE PICK CITY AGGIE BROWN MALLARD ISLAND
		QUATERNARY		Pleistocene	TEJAS	COLEHARBOR	WEST CENTRAL EAST SNOW SCHOOL DAHLEN HORSESHOE VALLEY CHURCH MEDICINE HILL CAMP GG CANDO	ERN RED RIVER VALLE SHERACK POPLAR RIVER BRENNA FALCONER HUOT ARGUSVILLE WILE RED LAKE FALLS S FERRY AFTON MARCOUX
·2.6 —			ENE	Pliocene			(Unnamed Unit)	
5.3 —	CENOZOIC		PALEOGENE NEOGENE	Miocene			ARIKAREE	
23.0 -				Oligocene		WHITE RIVER	BRULE	
33.9 -		TERTIARY					CHADRON	SOUTH HEART CHALKY BUTTES
55.8 -				Eocene		~~~~~~	GOLDEN VALLEY	CAMELS BUTTE
				Paleocene		FORT UNION	SENTINEL BUTTE	BEAR DEN
							BULLION CREEK	
							SLOPE	
							CANNONBALL	
							LUDLOW	
65.5—							HELL CREEK	BREIEN
						MONTANA	FOX HILLS	COLGATE ≷ LINTON BULLHEAD TIMBER LAKE TRAIL CITY
								ODANAH
							PIERRE	DEGREY
		SU		Upper	ZUNI			GREGORY
		CEOT	CEOC		Z			PEMBINA
		CRETACEOUS						GAMMON
						COLORADO	NIOBRARA	
	MESOZOIC						CARLILE	
	DZC				-	COLORADO	GREENHORN	
	ES						BELLE FOURCHE	
99.6 -	Μ					DAKOTA	MOWRY	
145.5-							NEWCASTLE	
				Lower			SKULL CREEK	
							INYAN KARA	
							SWIFT	
				UDASSIC			RIERDON	
		J		URASSIC			PIPER	BOWES FIREMOON TAMPICO KLINE



DUPEROW SUMMARY

DRILL STEM TESTS AND PRODUCTION MAPPING

Prepared by Travis Stolldorf

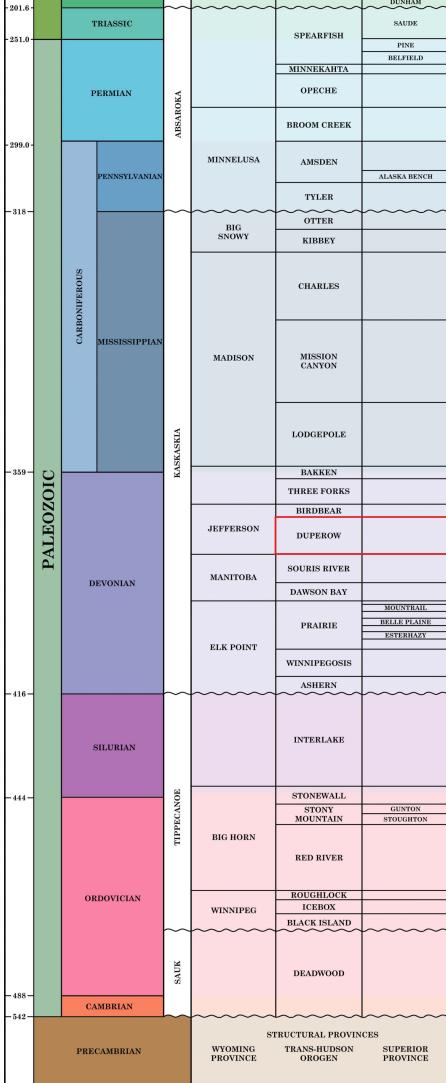
In order to better facilitate petroleum exploration and development in the Williston Basin, the North Dakota Geological Survey (NDGS) has published a series of production-related maps and corresponding data sets. These maps sets include production and drill stem test (DST) results with an accompanying 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.

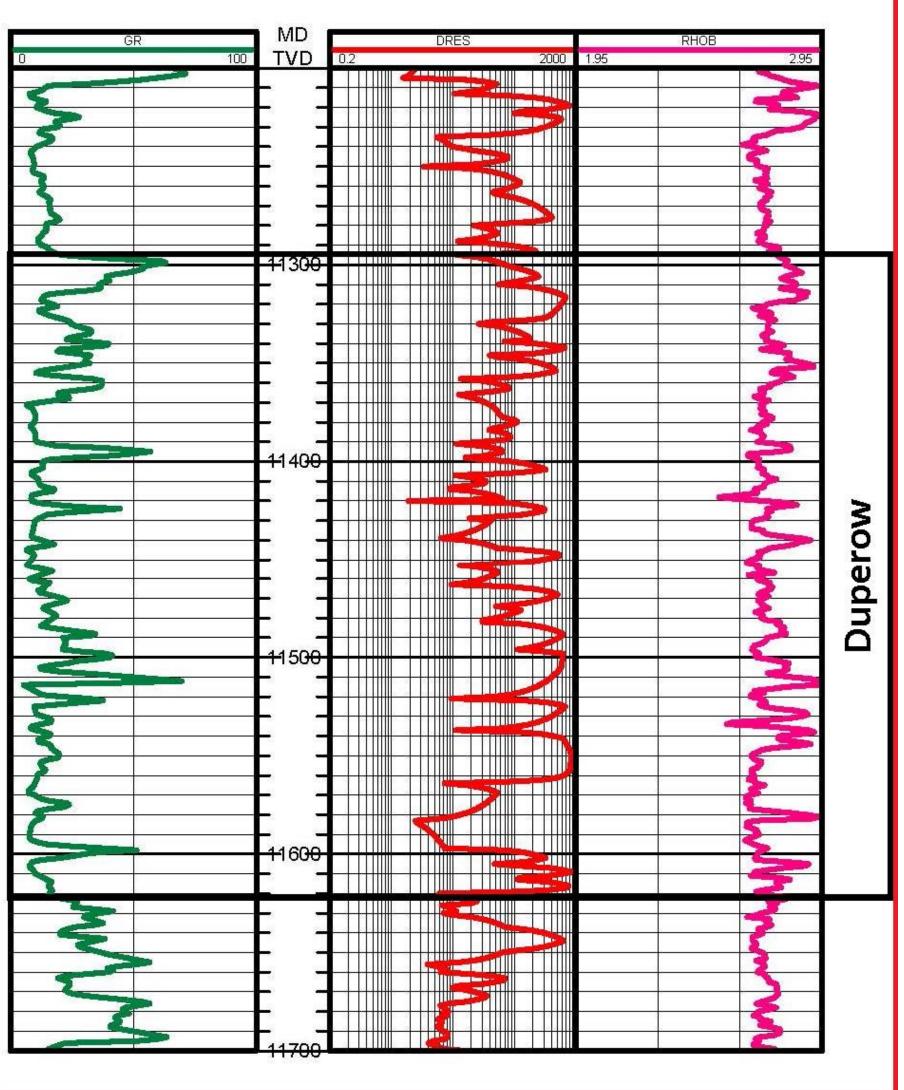
Prior to this project, over 55% of the DST results in the state did not have an associated geologic interval. The NDGS utilized a series of filters in Petra and Excel to unite formation tops with DST results. Now over 95% of DST results are associated with a geologic interval. After removing failed (misrun) 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 Duperow 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 Duperow Formation is highlighted by the red box on the North Dakota Stratigraphic Column on the left. A representative log of the Duperow Formation is shown below along with a map showing the well's approximate location.

ZABOLOTNY 1-3-4A API: 33007002210000 T144N R98W S3





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

