

Mission 2007

Geology

Hydrocarbon Reserves

An explanation of the relativistic factors given in the types of hydrocarbons section of the play summary is available as a table here.

Play	Oil MMBO	Gas BCFG	NGL MMBNGL	Sum Total	Fraction Oil	Fraction Gas	Fraction NGL	Comparative Oil	Comparative Gas	Comparative NGL	Relative Importance
Topset	15447.05	4259.66	35.33	19742.04	0.782	0.216	0.002	1.959	0.378	0.061	Oil, greatly
Turbidite	5328.05	4665.2	272.5	10265.75	0.519	0.454	0.027	1.299	0.796	0.899	Oil, slightly
Wedge	1677.69	864.32	19.94	2561.95	0.655	0.337	0.008	1.639	0.591	0.264	Oil
Thomson	805.1	1332.28	111.51	2248.89	0.358	0.592	0.05	0.896	1.038	1.679	NGL
Kemik	173.78	305.38	25.59	504.75	0.344	0.605	0.051	0.862	1.06	1.717	NGL
Undeformed Franklinian	286.71	740.46	71.37	1098.54	0.261	0.674	0.065	0.653	1.181	2.2	NGL, greatly
Deformed Franklinian	130.55	1213.86	66.18	1410.59	0.093	0.861	0.047	0.232	1.507	1.589	NGL & Gas
Thin-Skinned Thrust-Belt	2883.88	2749.66	28.51	5662.05	0.509	0.486	0.005	1.275	0.851	0.171	Oil, slightly
Ellesmerian Thrust-Belt	0	1167.65	23.76	1191.41	0	0.98	0.02	0	1.716	0.675	Gas, greatly
Niguanak-Aurora two-dome	1107.04	1178.96	51.49	2337.49	0.474	0.504	0.022	1.185	0.883	0.746	Oil, slightly
Average Fractions					0.4	0.571	0.03				

Brief procedure to determine the amount of oil and gas in a certain trap:

- Determine the range of drainage area. Drainage area is from where oil and gas flow to the trap.
- Find out the loss of oil and gas during migration. This process is generally more complex for gas because gas can move more freely and can be absorbed by oil and water.
- Compare the volume of the trap with the volumes of oil and gas and determine the remaining amount of oil and gas in the trap.

For the real calculation, some geological information on the region is needed. We can get some factors from that information and estimate the amount of petroleum resource in a specific trap.

However, this procedure is actually a simplification of the real process, and the point is that it deals the process of formation and migration of oil and gas as if it were an event that happened in a moment. So, actually the geological factors in the calculation should be able to reflect the difference made by the time taken for formation and migration. It takes the assumption that it is possible to make this simplification, and we should think about its validity.

Division in plays

The total area considered for study in the 1999 hydrocarbon potential assessment of the ANWR 1002 Area by the USGS considers Federal lands, Native lands, and State waters up to the 3-mile boundary under Federal jurisdiction.

The 1002 Area was divided by a line along the Marsh Creek anticline on its western half and along other geologic elements on its eastern half. The area to west is the undeformed region, with rocks that are generally horizontal, and to the east is the deformed region, which is crossed by faults and folds.

Only potential accumulations larger than 50 million barrels of oil (MMBO) in-place were considered. Smaller accumulations of hydrocarbons were not included in the assessment because it is non-economic to produce them.

Technically recoverable oil is not evenly distributed through the territory. Nearly 80 percent of the resources are expected to be concentrated in the north-west undeformed area of the 1002 area.

Region	95-percent probability	5-percent probability	Mean
Undeformed area	3.4 BBO	10.2 BBO	6.4 BBO
Deformed area	0 BBO	3.2 BBO	1.2 BBO
1002 area*	4.3 BBO	11.8 BBO	7.7 BBO
Total assessment area	5.7 BBO	16.0 BBO	10.4 BBO

BBO: Billion barrels of oil

*: excluding State and Native areas

Source: BIRD, K. (1999). Geographic and Geologic Setting. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

It is expected to find most of the oil in several accumulations of over 100 million barrels (the size of already developed accumulations in north Alaska), not on a single large reservoir.

Plays:

Topset Play:

Source: HOUSEKNECHT, D.W. & SCHENK, C.J. (1999). Topset Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: The most likely hydrocarbon source rocks are Hue Shales in the Hue-Thompson petroleum system, and Tertiary mudstones in the Canning-Sagavanirktok petroleum system. It is also possible that hydrocarbons generated in the Shublik formation of the Ellesmerian petroleum system migrated and accumulated in the Topset play.

Reservoir: Sandstones in the Topset reservoir were deposited in both marine-shelf and non-marine environments and are the best reservoir rocks in the 1002 area. Their porosity commonly ranges between 20 to 30%, and their permeability between 500 and 1,000 millidarcies.

Traps: There are several types of traps in the Topset play. Anticlines with four-way closure are few but they are the largest structures observed in the play; they are located just north of the trend of the Marsh Creek anticline and farther north in the 1002 area. Growth anticlines, product of the rollover of strata and rotational growth folding, appear on the edges of Eocene and Oligocene shelves; many have four-way closure. Growth faults are the most common structure in the area, and their presence increases towards the north-east. There are also up-dip shelf-edge pinchouts and stratigraphic lenses, but they are difficult to detect using existing seismic data.

Timing: The generation of oil in the Hue Shale unit probably occurred 40 Ma in the southern border of the Topset play, migrated northward through time, and occurred 10 Ma in the northern boundary. The generation of oil in the Canning Formation probably started 10 Ma in the north and east of the play and continues to the present.

Reservoir thickness: Minimum: 50 feet; median: 150 feet; maximum: 500 feet.

Trap depth: Minimum: 1,000 feet; median: 5,000 feet; maximum: 10,000 feet.

Water saturation: 5%, corresponding to fine- to very fine-grained sandstone.

Number of prospects: (Number of traps with four-way closure, capable of holding hydrocarbons) Minimum: 40; median: 80; maximum: 125.

Types of Hydrocarbons: Mean total volumes of in-place resources: 15,447.05 Million Barrels of Oil; 4,259.66 Billion Cubic Feet of associated-dissolved and non-associated Gas; 35.33 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: Oil is the dominate resource with a relativistic factor of 1.959. It is the type of petroleum of most significance in this play.

Turbidite Play:

Source: HOUSEKNECHT, D.W. & SCHENK, C.J. (1999). Turbidite Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: The most likely hydrocarbon source rocks are Hue Shales in the Hue-Thompson petroleum system, and Tertiary mudstones in the Canning-Sagavanirktok petroleum system. Turbidite rocks (sedimentary deposits from turbid currents) are ideally placed to receive oil migrating from Hue-Thomson and Canning-Sagavanirktok petroleum systems since they are directly in contact or a short distance above these source rocks.

Reservoir: The sandstones in the Turbidite play are of moderate to good reservoir-quality. The best ones are amalgamated channel facies, which are a concentration of relatively clean (clay-free) sandstone. They can be very thick but relatively narrow and thus hard to detect. Their porosity is usually between 10 and 20%, and their permeability between 100 and 500 millidarcies.

Traps: The traps in the Turbidite play are hard to define because of their stratigraphic nature. There are two major indicators of the presence of traps, mounds and channels. In both of them, it is inferred that sandstones are encased in mudstones, therefore forming a stratigraphic trap.

Timing: The potential rocks of this play are Paleocene and Eocene aged turbidite facies. Formation in the Hue Shale probably started 40 Ma (late Eocene), and more recently in the Canning Formation.

Reservoir thickness: Minimum: 50 feet; median: 120 feet; maximum: 400 feet.

Trap depth: Minimum: 7,000 feet; median: 12,500 feet; maximum: 18,000 feet.

Water saturation: 6%, corresponding to very fine-grained sandstone.

Number of prospects: Minimum: 25; median: 60; maximum: 100.

Types of Hydrocarbons: Mean total volumes of in-place resources: 5,328.05 Million Barrels of Oil; 4,665.20 Billion Cubic Feet of associated-dissolved and non-associated Gas; 272.50 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: Oil is the dominate resource with a relativistic factor of 1.299. The three resources in this play, however, have similar comparative ratios so they are all fairly significant as petroleum resources in the Turbidite play.

Wedge Play:

Source: HOUSEKNECHT, D.W. & SCHENK, C.J. (1999). Wedge Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: The most likely hydrocarbon source rocks are Hue Shales in the Hue-Thompson petroleum system, and Tertiary mudstones in the Canning-Sagavanirktok petroleum system. It is also possible that hydrocarbons generated in the Shublik formation of the Ellesmerian petroleum system migrated and accumulated in the Wedge play. This play is ideally placed to receive oil migrating from Hue-Thomson and Canning-Sagavanirktok petroleum systems because hydrocarbons formed in lower strata may migrate along the erosional surface at the base of the Wedge play, directly on top of which lie the reservoir rocks.

Reservoir: The nature of the sandstones in the Wedge play is unknown. It is possible that sediments eroded from the Staines tongue of the Sagavanirktok Formation deposited in the wedge, but their structure is uncertain. There is no direct evidence for the quality of the reservoirs, but it is inferred that it may be intermediate between turbidite and Topset sandstones because of the close relationship between their depositional environments. There are no samples available, but from similarities with the Turbidite play, the porosity was given the values: minimum: 10%; median: 18%; maximum: 30%.

Traps: Traps are thought to be stratigraphic, consisting of mudstones embedded and/or overlying reservoir rocks.

Timing: The potential rocks of this play are Paleocene and Eocene aged turbidite facies. Formation in the Hue Shale probably started 40 Ma (late Eocene), and more recently in the Canning Formation.

Reservoir thickness: Minimum: 50 feet; median: 100 feet; maximum: 400 feet.

Trap depth: Minimum: 5,000 feet; median: 9,000 feet; maximum: 14,000 feet.

Water saturation: 4%, corresponding to fine-grained sandstone.

Number of prospects: (All traps were counted based on the assumption that they are all stratigraphic and don't need four-way closure to hold oil) Minimum: 10; median: 15; maximum: 35.

Types of Hydrocarbons: Mean total volumes of in-place resources: 1,677.69 Million Barrels of Oil; 864.32 Billion Cubic Feet of associated-dissolved and non-associated Gas; 19.94 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: Oil is the dominate resource with a relativistic factor of 1.639. Oil is the predominate resource in this play, but there are relatively significant amounts of Gas as well.

Thomson Play:

Source: SCHENK, C.J. & HOUSEKNECHT, D.W. (1999). Thomson Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: The Thompson play is formed by porous sandstones composed of carbonate clasts of Franklinian age. The source of hydrocarbons is considered to be the Hue Shale of the Hue-Thomson petroleum system and the Shublik Formation of the Ellesmerian petroleum system. They are in close proximity to the reservoir rocks, so migration of oil to them could have easily happened. Hydrocarbons are present in the Point Thomson area, immediately west of the play, so there is a high probability for the presence of hydrocarbons in this region.

Reservoir: The reservoir rock for this play is the Thomson sandstone, from the early Cretaceous, which lies directly over the Lower Cretaceous unconformity. It contains large quantities of carbonates, and is very uniform in character. The depositional environments probably range from trenches to shorelines. The porosity is thought to have a minimum value of 10% and a maximum value of 30%.

Traps: There are several types of traps in the Thomson play, all related to the method of deposition of the sandstones over the Mikkelsen High. The sandstones could have been deposited as blocks, as it is observed in the Kuparuk River Field in Prudhoe Bay. It could also have been deposited in the valleys formed by the channels that drained the Mikkelsen High during the Lower Cretaceous, or as a sheet of sediments resulting from a rise in sea level that caused marine sediments to be deposited over terrestrial strata.

Reservoir thickness: Minimum: 40 feet; median: 120 feet; maximum: 340 feet.

Trap depth: Minimum: 12,000 feet; median: 15,000 feet; maximum: 18,000 feet. They provide an estimate for the hydrocarbon proportion in the play (90% oil, 10% gas)

Water saturation: 6%

Number of prospects: Maximum: 15.

Types of Hydrocarbons: Mean total volumes of in-place resources: 805.10 Million Barrels of Oil; 1,332.28 Billion Cubic Feet of associated-dissolved and non-associated Gas; 111.51 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: NGL is the dominate resource with a relativistic factor of 1.679. Compared to the amounts of NGL in other plays, this play has NGL as its predominate resource.

Kemik Play:

Source: SCHENK, C.J. & HOUSEKNECHT, D.W. (1999). Kemik Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: The Kemik play is composed of sandstones deposited in a shallow marine environment. The Kemik Sandstone is a lithic arenite, with chert and quartz as the main lithic grain types. It was probably formed from the the Ivishak Formation, the Lisburne Group and the Kekiktuk Formation. Hydrocarbons probably migrated into this rocks from the Hue Shale of the Hue Thomson petroleum system. There are traces of hydrocarbons in Kemik Sandstone in several outcrops, indicating that they either migrated through or have been reservoired in these rocks.

Reservoir: The Kemik Sandstone may be coarser-grained in the north of the 1002 area, indicating a nearshore marine depositional environment, than it is on the south, where it is a fine-grained shallow-marine sandstone. The sandstone is probably present as valley fills and depositions from rivers and estuaries. There may also be little reservoir-type sandstones as much of the area was thought to be a lagoon during the depositional time; this increases the risk associated with the play. The porosity is estimated by the values: minimum: 10%, median: 16%, maximum: 26%.

Traps: Traps in the Kemik Play are possibly large stratigraphic structures from the pinch-out of the Kemik Sandstone to the north of the outcrop belt. They could also be valley-fill reservoirs with overlying mudstones. There is also the possibility of finding structural traps created when the Kemik Sandstones were involved in the displacement of normal-faulting.

Reservoir thickness: Minimum: 40 feet; median: 70 feet; maximum: 180 feet.

Trap depth: Minimum: 12,000 feet; median: 15,000 feet; maximum: 18,000 feet.

Water saturation: 6%, corresponding to very fine-grained sandstone.

Number of prospects: Minimum: 15; median: 24; maximum: 40.

Types of Hydrocarbons: Mean total volumes of in-place resources: 173.78 Million Barrels of Oil; 305.38 Billion Cubic Feet of associated-dissolved and non-associated Gas; 25.59 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: NGL is the dominate resource with a relativistic factor of 1.717. Compared to the amounts of NGL in other plays, this play has NGL as its predominate resource.

Undeformed Franklinian Play:

Source: KELLEY, J.S., GROW, J.A. & NELSON, P.H. (1999). Undeformed Franklinian Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: There are no known source rocks in the Franklinian sequence, so any hydrocarbons would have to come from overlying younger formations. The Cretaceous Hue Shale and the Canning Formation of the Brookian Sequence, which lies directly on top of Franklinian rocks, are the most probable source rocks and seals for this play. It could also have been charged from the Triassic Shublik Formation to the west.

Reservoir: The predominant rock type in this play is the Proterozoic Katakturak Dolomite (Sedimentary rock with more than 90% mineral dolomite, $\text{CaMg}(\text{CO}_3)_2$), which dips uniformly to the south. Good reservoirs in the Undeformed Franklinian Play could exist in fractured carbonates with increased porosity due to dissolution of minerals. This porosity, along with porosity due to fracture of the rocks, is probably of Cretaceous age. It ranges from 8 to 20%, with a median of 14%. Because of the poor quality of the seismic data available for the Franklinian rocks, it is difficult to assess this play.

Traps: There are only two possible locations in the Undeformed Franklinian play where a fault could have caused a fold capable of holding hydrocarbons. Other possible traps are buried hills with heights that range from 100 to 400 feet. Stratigraphical and structural traps are also possible but there are not observable with the current seismic data.

Reservoir thickness: Minimum: 50 feet; maximum: 300 feet.

Trap depth: Minimum: 13,000 feet; median: 17,000 feet; maximum: 21,000 feet.

Water saturation: 2%, corresponding to carbonates.

Number of prospects: Minimum: 6; median: 12; maximum: 24.

Types of Hydrocarbons: Mean total volumes of in-place resources: 286.71 Million Barrels of Oil; 740.46 Billion Cubic Feet of associated-dissolved and non-associated Gas; 71.37 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: NGL is the dominate resource with a relativistic factor of 2.20. Compared to the amounts of NGL in other plays, this play has NGL as its predominate resource.

Deformed Franklinian Play:

Source: GROW, J.A., POTTER, C.J., NELSON, P.H., PERRY, W.J. & KELLEY, J.S. (1999). Deformed Franklinian Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: There are no known source rocks in the Franklinian sequence, so any hydrocarbons would have to come from overlying younger formations. The Cretaceous Hue Shale and the Canning Formation of the Brookian Sequence, which lies directly on top of Franklinian rocks, are the most probable source rocks and seals for this play. It could also have been charged from the Triassic Shublik Formation to the west, or footwall source rocks (rocks beneath a fault) of the Hue Shale and Canning Formation could have charged the hanging walls (rocks above a fault).

Reservoir: The predominant rock type in this play is the Proterozoic Katakaturak Dolomite (Sedimentary rock with more than 90% mineral dolomite, $\text{CaMg}(\text{CO}_3)_2$), like for the Undeformed Franklinian play. Because of the intense faulting and folding in this area, fractured carbonates reservoirs are probable in this play, facilitating the formation and access to potential reservoirs. The values for porosity range from 8 to 20%, with a median of 14%.

Traps: On the top, the Brookian Turbidite and the Hue Shale are the most likely seals. Most of the prospects mapped in this play were bounded by faults and needed sealing faults to achieve a significant size, but studies of carbonate reservoirs have shown that faults in carbonate rocks are not good seals, giving a low probability of trap formation. There are a few four-way closures mapped on this play.

Reservoir thickness: Minimum: 160 feet; median: 300 feet; maximum: 800 feet.

Trap depth: Minimum: 9,000 feet; median: 10,500 feet; maximum: 13,000 feet.

Water saturation: 2%, corresponding to carbonates.

Number of prospects: Minimum: 5; median: 12; maximum: 20.

Types of Hydrocarbons: Mean total volumes of in-place resources: 130.55 Million Barrels of Oil; 1,213.86 Billion Cubic Feet of associated-dissolved and non-associated Gas; 66.18 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: NGL and Gas are the dominate resources with relativistic factors of 1.507 and 1.589. Compared to other plays, Oil is not very significant in this play, although there is a greater quantity of it than both NGL and Gas.

Thin-Skinned Thrust-Belt Play:

Source: PERRY, W.J., POTTER, C.J. & NELSON, P.H. (1999). Thin-Skinned Thrust Belt Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source and Reservoir: The Thin-Skinned Thrust-Belt Play consists of a region of Brookian strata within the thin-skinned thrust belt. When the Brookian rocks lie directly on the pre-Mississippian basement, the region is composed of Cretaceous Hue Shales or mud-rich Paleocene rocks; when Ellesmerian or Beaufortian rocks are present, it lies between the Kingak and pebble shale interval. The structures in this play are younger than the generation of hydrocarbons, but they may have been charged from the undeformed area, or Tertiary source rocks could have generated hydrocarbons.

Traps: Seismic profiles show several four-way closures in this play, and anticlinal and overlapping structures in two dimensions that could form prospective traps if they present four-way closure.

Reservoir thickness: Minimum: 90 feet; median: 130 feet; maximum: 700 feet.

Trap depth: Minimum: 1,000 feet; median: 4,000 feet; maximum: 12,500 feet.

Water saturation: 6%, corresponding to very fine-grained sandstone.

Number of prospects: Minimum: 17; median: 40; maximum: 60.

Types of Hydrocarbons: Mean total volumes of in-place resources: 2,883.88 Million Barrels of Oil; 2,749.66 Billion Cubic Feet of associated-dissolved and non-associated Gas; 28.51 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: Oil is the dominate resource with a relativistic factor of 1.275. This play also contains relatively large quantities of gas as well, at a factor of .851.

Ellesmerian Thrust-Belt Play:

Source: GROW, J.A., POTTER, C.J., NELSON, P.H. & PERRY, W.J. (1999). Ellesmerian Thrust-Belt Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

Source: Source rock prospects for this play include the Shublik Formation, Hue Shale, and Canning Formation, charging the reservoir rocks from footwall source rocks (rocks beneath a fault) to hanging wall reservoirs (rocks above a fault). From vitrinite reflectance mapping, it was concluded that most of this play lies below the oil generation window, making this a 100% gas play.

Reservoir: Potential reservoirs for the Ellesmerian Thrust-Belt play only include the sandstones of the Ivishak and Sag River Formations, Kekiktuk Conglomerate, and carbonates in the Lisburne Group because the Jurassic and Lower Cretaceous rocks of the Ellesmerian formation (Kingak Shale, Kemik Sandstone, and Pebble Shale) are too thin. The mean value for porosity is 11%.

Traps: The subsurface continuations of the Sadlerochit Mountains, two anticlines dipping to the east, are large prospect traps in this play. There are four others, and they all require cross faults for closure, as well top seals. Possible top seals are the Kingak Shale, Hue Shale or silstones of the Canning Formation.

Reservoir thickness: Median: 300 feet; maximum: 1,500 feet.

Trap depth: Minimum: 2,000 feet; maximum: 17,000 feet.

Water saturation: 3.5%, corresponding to an intermediate between fine sands and carbonates.

Number of prospects: Minimum: 4; maximum: 8.

Types of Hydrocarbons: Mean total volumes of in-place resources: 0 Million Barrels of Oil; 1,167.65 Billion Cubic Feet of associated-dissolved and non-associated Gas; 23.76 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: Gas is the dominate resource with a relativistic factor of 1.716. There is no Oil resource in this play, but there are the largest Gas resources of all the plays.

Niguanak-Aurora Play:

Source: GROW, J.A., POTTER, C.J., NELSON, P.H. & PERRY, W.J. (1999). Niguanak-Aurora Play. In The Oil and Gas Resource Potential of the 1002 Area, Arctic National Wildlife Refuge, Alaska. By ANWR Assessment Team, U.S. Geological Survey Open-File Report 98-34.

This play is composed of two very large structures, the Aurora dome and Niguanak high, located to the north-east of the 1002 area. The uncertainties of the structures present caused the play to be assessed in two scenarios: one with two large prospects, one for each structure, and another with multiple prospects inside each structure.

Source: Lower Cretaceous Pebble shale, Hue shale and the Tertiary Canning Formation, all of the Brookian sequence, may occur around over and on the flanks of the two structures that compose the play, and may have charged them.

Reservoir: The internal deformations in these two structures make it difficult to determine their composition, but the high densities and velocity values measured suggest that they are composed mainly of Franklinian rocks, with some components of Beaufortian and Ellesmerian rocks. The porosity has a minimum value of 5%, a mean of 10% and a maximum of 20% for both scenarios.

Traps: The north-verging Niguanak thrust fault system separates the Aurora dome on the north and the Niguanak dome on the south. There may be stacked thrust sheets of rock within both structures where hydrocarbons could be trapped in basement carbonates or sandstones of the Franklinian, Beaufortian and/or Ellesmerian origin.

Reservoir thickness: Minimum: 50 feet; median: 150 feet; maximum: 300 feet (both scenarios).

Trap depth: Minimum: 2,000 feet; maximum: 17,000 feet.

Water saturation: 2.5%, corresponding to carbonates.

Number of prospects: Many prospect scenario: Minimum: 1; median: 10, maximum: 20. Two-dome scenario: 2.

Types of Hydrocarbons: Mean total volumes of in-place resources: 1,107.04 Million Barrels of Oil; 1,178.96 Billion Cubic Feet of associated-dissolved and non-associated Gas; 51.49 Million Barrels of Natural Gas Liquids from all types of Gas. Comparison to other plays: Oil is the dominate resource with a relativistic factor of 1.185. Compared to other plays, there are also large volumes of both NGL and Gas as well in this play.

