Petroleum Resource Assessment of the Kandik Basin, Yukon Territory, Canada

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FOREWORD

A study of the petroleum resources of the Yukon portion of the Kandik Basin was undertaken by the Geological Survey of Canada (Calgary) in response to a request from the Government of Yukon. Assessment of petroleum resource potential is important for forming regulatory policies for these resources and for providing a basis for planning and issuing exploration rights.

EXECUTIVE SUMMARY

This study was undertaken by the Geological Survey of Canada with assistance from Greg Cave and Tim Bird on behalf of the Yukon Government as part of its ongoing oil and gas resources management program. The objective of the study was to investigate the petroleum resource potential of the Kandik Basin in the Yukon. A quantitative analysis was designed to give a numerical estimate of resources that could exist in the study area. In the absence of defined pools with established reserves, probability distribution of reservoir parameters and marginal play risk factors are used to generate a range of hydrocarbon potential estimates indicating uncertainties involved in analysis of frontier conceptual exploration plays.

The Kandik Basin is a structural depression containing Paleozoic-Mesozoic sediments that straddles the Yukon-Alaska border. The basin constitutes a fragment of cratonic North America that underwent compression forming a fold and thrust belt with southeastern vergence. The foreland rocks are unconformably overlain by an Upper Cretaceous/Tertiary nonmarine sequence. The quantitative hydrocarbon assessments were derived using the Geological Survey of Canada's (PETRIMES) assessment methodology system. The assessments included analyses of 5 conceptual plays, each of which incorporated the calculation or estimation of field size parametric data, numbers of prospects and exploration risks. Median estimates for total oil and gas potentials for all Kandik plays are 54 million m^3 of in-place oil and 38 billion m^3 of in-place gas. There are no discovered reserves in the Kandik Basin, but 3 gas fields larger than 3000 million m^3 (100 BCF) of gas are predicted. No oil pools greater than 160 million m^3 (1 billion barrels) are predicted in the oil plays. Significant gas potential is predicted for the Mesozoic and Paleozoic marine structural plays even though risk factors are substantial in the plays. Estimates for oil potential are less optimistic.

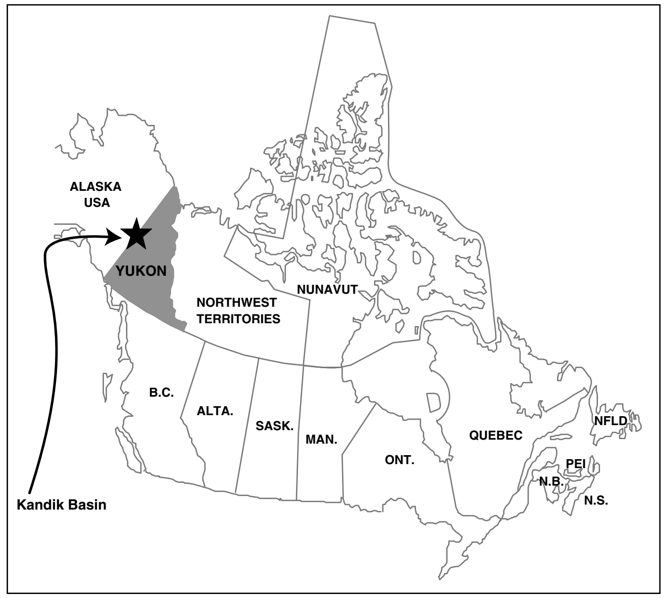
Resource estimates are quoted initially for the entire area. After numerical analysis, the total resource for the Yukon area is estimated proportionately by area and sedimentary volume, and separate cases are proposed based on location of the largest predicted field. The portion of the resource estimated to exist in the Yukon is 25.5 million m^3 oil and 24,145 million m^3 gas in the case where the largest pool exists on the Yukon side of the border. The portion of the resource estimated to exist in the Yukon is 11.3 million m^3 oil and 15,340 million m^3 gas in the case where the largest pool is located on the Alaska side of the border.º

CONTENTS

INTRODUCTION

This study was undertaken by the Geological Survey of Canada with assistance from Greg Cave and Tim Bird on behalf of the Yukon Territorial Government as part of its ongoing oil and gas resources management program. The objective of the study was to investigate the petroleum resource potential of the Kandik Basin in the Yukon (Figure 1). A quantitative analysis was designed to give a numerical estimate of resources that could exist in the study area. In the absence of defined pools with established reserves, probability distribution of reservoir parameters and marginal play risk factors are used to generate a range of hydrocarbon potential estimates indicating uncertainties involved in analysis of frontier conceptual exploration plays.

Figure 1. *Kandik Basin location map.*



Regional petroleum resource assessments have been prepared periodically for various sedimentary basins in Canada by the Geological Survey of Canada. These studies incorporate systematic basin analysis with subsequent statistical resource evaluations (Podruski, *et al.*, 1988; Wade, *et al.*, 1989; Sinclair, *et al.*, 1992; Reinson, *et al.*, 1993; Bird, *et al.*, 1994; Dixon, *et al.*, 1994). This report summarizes the assessment of oil and gas potential of Kandik Basin in northwest Yukon and east-central Alaska.

This report provides an overview of the petroleum geology of Kandik sedimentary basin and presents quantitative estimates of the oil and gas resources contained therein. This geological and resource framework will assist government agencies in evaluating land-use issues, and petroleum industry companies in pursuing future exploration opportunities.

ACKNOWLEDGMENTS

The authors would like to specially acknowledge the efforts of the United States Geological Survey as part of their petroleum resource assessment.

TERMINOLOGY

The terminology and procedures used in this report follow those outlined in Reinson, *et al.* (1993) and are summarized below.

Oil is defined as any naturally occurring liquid that, at the conditions under which it is measured or estimated, is primarily composed of hydrocarbon molecules and is readily producible from a borehole.

Natural gas is defined as any gas (at standard pressure and temperature, 101.33 kPa and 15°C) of natural origin comprised mostly of hydrocarbon molecules producible from a borehole (Potential Gas Committee, 1990). Natural gas may contain significant amounts of non-hydrocarbon gas such as H_2S, CO_2 or He. In this study, non-hydrocarbon gas was not considered due to lack of information on gas compositions in these basins.

Raw gas is unprocessed natural gas, containing methane, inert and acid gases, impurities and other hydrocarbons, some of which can be recovered as liquids. *Sales gas* or *marketable gas* is natural gas that meets specifications for end use. This usually requires processing that removes acid gases, impurities and hydrocarbon liquids. *Non-associated gas* is natural gas that is not in contact with oil in a reservoir. *Associated gas* is natural gas that occurs in oil reservoirs as free gas. *Solution gas* is natural gas that is dissolved in crude oil in reservoirs. In this report, insufficient information is available in order to differentiate non-associated, associated, and solution gas. All gas figures reported represent initial raw gas volumes.

Resource indicates all hydrocarbon accumulations known or inferred to exist. *Resource, resource endowment* and *endowment* are synonymous and can be used interchangeably. *Reserves* are that portion of the resource that has been discovered, while *potential* represent the portion of the resource that is not discovered but is inferred to exist. The terms *potential* and *undiscovered resources* are synonymous and may be used interchangeably.

Gas-in-place indicates the gas volume found in the ground, regardless of what portion is recoverable. *Initial in-place volume* is the gross volume of raw gas, before production. *Recoverable in-place volume* represents the volume expected to be recovered with current technology and costs. These definitions can be applied to oil volumes as well.

A *prospect* is defined as an untested exploration target within a single stratigraphic interval; it may or may not contain hydrocarbons. A prospect is not synonymous with an undiscovered pool. An undiscovered pool is a prospect that contains hydrocarbons but has not been tested as yet. A *pool* is defined as a discovered accumulation of oil or gas, typically within a single stratigraphic interval, that is separate, hydrodynamically or otherwise, from another hydrocarbon accumulation. A *field* consists of one or more oil and/or gas pools within a single structure or trap. Similar to most frontier regions, the assessment of Kandik petroleum resources is based on estimates of field rather than pool sizes. A *play* is defined as a family of pools and/or prospects that share a common history of hydrocarbon generation, migration, reservoir development and trap configuration.

Plays are grouped into two categories; *established* and *conceptual* plays. *Established plays* are demonstrated to exist due to the discovery of pools with established reserves. *Conceptual plays* are those that have no discoveries or reserves, but which geological analyses indicate may exist. Established plays are categorized further into *mature* and *immature* plays depending on the adequacy of play data for statistical analysis. Mature plays are those plays that have sufficient numbers of discoveries within the discovery sequence so that the *discovery process model* of the PETRIMES assessment procedure is of practical use (Lee and Tzeng, 1989; Lee and Wang, 1990; Lee, 1993). Immature plays do not have a sufficient number of discoveries with established reserves to properly apply the model. Conceptual play analysis was applied exclusively in this study due to the lack of any discovered pools with established reserves.

METHOD AND CONTENT

This report incorporates two essential components: geological basin analysis and statistical assessment. Basin analysis fundamentally describes and characterizes the exploration play. Fields and prospects in a play form a natural geological population that can be delimited areally. Once a play is defined, a numerical and statistical resource assessment is undertaken using field or prospect data from that specific play.

METHODOLOGY

The analysis of the Kandik area began with the compilation and synthesis of information on regional geology and hydrocarbon occurrence. This included a survey of National Energy Board (NEB) files and a search of pertinent publications. The NEB files contain information submitted as part of exploration agreements and often contain seismic lines and maps, sometimes with geological interpretation supplied by the operator.

The aim of this data compilation and literature survey was to analyze the basin in order to provide background for the definition of models for possible hydrocarbon occurrence. Models for hydrocarbon entrapment (play types) in the study area were developed by examining hydrocarbon systems, and where possible, using analogous discovered reservoirs to extrapolate play parameters.

Play definition and estimation of reservoir parameters formed the input for a systematic statistical analysis which allowed a quantitative analysis of undiscovered resources.

GEOLOGICAL PLAY DEFINITION

Definition of play type and play area is essential in the geological basin analysis that precedes any numerical resource evaluation procedure. A properly defined play will possess a single population of pools and/or prospects that satisfies the assumption that geological parameters within a play can be approximated by a family of lognormal distributions. A mixed population derived from an improperly defined play adds uncertainty to the resource estimate. Pools and/or prospects in a specific play form a natural geological population which is characterized by one or more of the following: age, depositional model, structural style, trapping mechanism, geometry, and diagenesis. Prospects or areas within a basin or region can be assigned to specific plays on the basis of a commonality of some or all of these geological elements.

COMPILATION OF PLAY DATA

Since conceptual plays have no defined pools or discoveries, probability distributions of reservoir parameters such as prospect area, reservoir thickness, porosity, trap fill, and hydrocarbon fraction are needed. Prospect size can then be calculated using the standard “pool”- size equation. Seismic, well, and outcrop data prove particularly useful in identifying the limits for sizes of prospect area and reservoir thickness as well as porosity limits. Geochemical data are useful in identifying prospective areas as well as the composition of the hydrocarbon accumulations, i.e. oil-vs.-gas proneness. Research in similar hydrocarbon-bearing basins is also important in order to provide reasonable constraints on reservoir parameters as well as contributing further information on other aspects of petroleum geology that may prove useful for the study.

CONCEPTUAL PLAY ANALYSIS

There are several methods for estimating the quantity of hydrocarbons that may exist in a play, region or basin (White and Gehman, 1979; Masters, 1984; Rice, 1986; Lee, 1993). Petroleum assessments undertaken by the Geological Survey of Canada are currently based on probabilistic methods (Lee and Wang , 1990) that are developed in the Petroleum Exploration and Resource Evaluation System, PETRIMES (Lee and Tzeng, 1989). The conceptual hydrocarbon plays defined in the Kandik region were analysed by applying a subjective probability approach to the reservoir parameters. The lognormal option in PETRIMES was utilized since experience indicates that geological populations of pool parameters can be adequately represented by lognormal distributions.

Conceptual resource assessments in the frontier regions use field-size estimates rather than pool-size predictions as derived from mature and immature play analysis. A field consists of one or more oil/gas pools or prospects in a single structure or trap. Probability distributions of oil and gas field sizes are computed by combining probability distributions of reservoir parameters, including prospect area, reservoir thickness, porosity, trap fill, hydrocarbon fraction, oil shrinkage, and gas expansion.

Probability distributions of oil and gas field sizes were combined with estimates of numbers of prospects (from seismic and play area mapping) and exploration risks to calculate play potential and to estimate sizes of undiscovered fields.

Exploration risks at a play or prospect level are determined on the basis of the presence or adequacy of geological factors necessary for the formation of petroleum accumulations. Essential factors are reservoir, seal, source rock, timing of hydrocarbon generation, trap closure and preservation. Appropriate marginal probabilities are assigned to each geological parameter to obtain risk factors. The Kandik plays have high probabilities of existing (low risk). Within each play, certain prospect-level risks are high and these are assigned appropriate risk factors. Exploration risk is an estimate, incorporating all risk factors, of the percentage of prospects within a play that are expected to contain hydrocarbon accumulations.

Due to the nature of conceptual assessment results, and since no discovered pool sizes can be used to constrain sizes of undiscovered accumulations, the uncertainty of oil and gas play potential and pool size estimates for a given range of probabilities is necessarily greater than the limits derived by discovery process analysis used in assessing mature plays.

EXPLORATION HISTORY

Petroleum exploration in Kandik Basin began in 1970 with the drilling of the INC Husky Amoco Black-fly YT M-55 well near the eastern margin of the basin (Inexco Oil Company, 1970) (Figure 2). The well location was centred on Black-fly Dome exposing Permian Jungle Creek sandstone. Presumably, the well was located according to geological surface mapping. In the winter of 1971, Inexco conducted a reflection and refraction seismic survey in the area (Inexco Oil Company, 1971). Approximately 180 line-kilometres of seismic data were acquired for three areas along the eastern margin of the basin (Figure 2). Inexco Husky *et al.* Porcupine YT G-31 was spudded in December, 1971 in Hart Lake carbonates in a thrusted domal structure on the northeast margin of the basin (Inexco Oil Company, 1972a). The most recent well drilled in Canada occurred in 1972 (Inexco *et al.* Mallard YT O-18) on a thrust-faulted anticline with Hart River carbonates exposed at surface (Inexco Oil Company, 1972b). None of these wells encountered hydrocarbons.

In Alaska, one well was drilled in 1976 in Kandik Basin (Louisiana Land and Exploration Doyon No. 1). It penetrates Lower Cretaceous sediments that have been repeated as thin thrust plates downhole (Johnsson et al., 1993). In 1977, two additional wells were drilled to the north in the Yukon Flats region (Louisiana Land and Exploration Numbers 2 and 3) (Figure 2). This region is not considered to be part of the Kandik Basin assessment area.

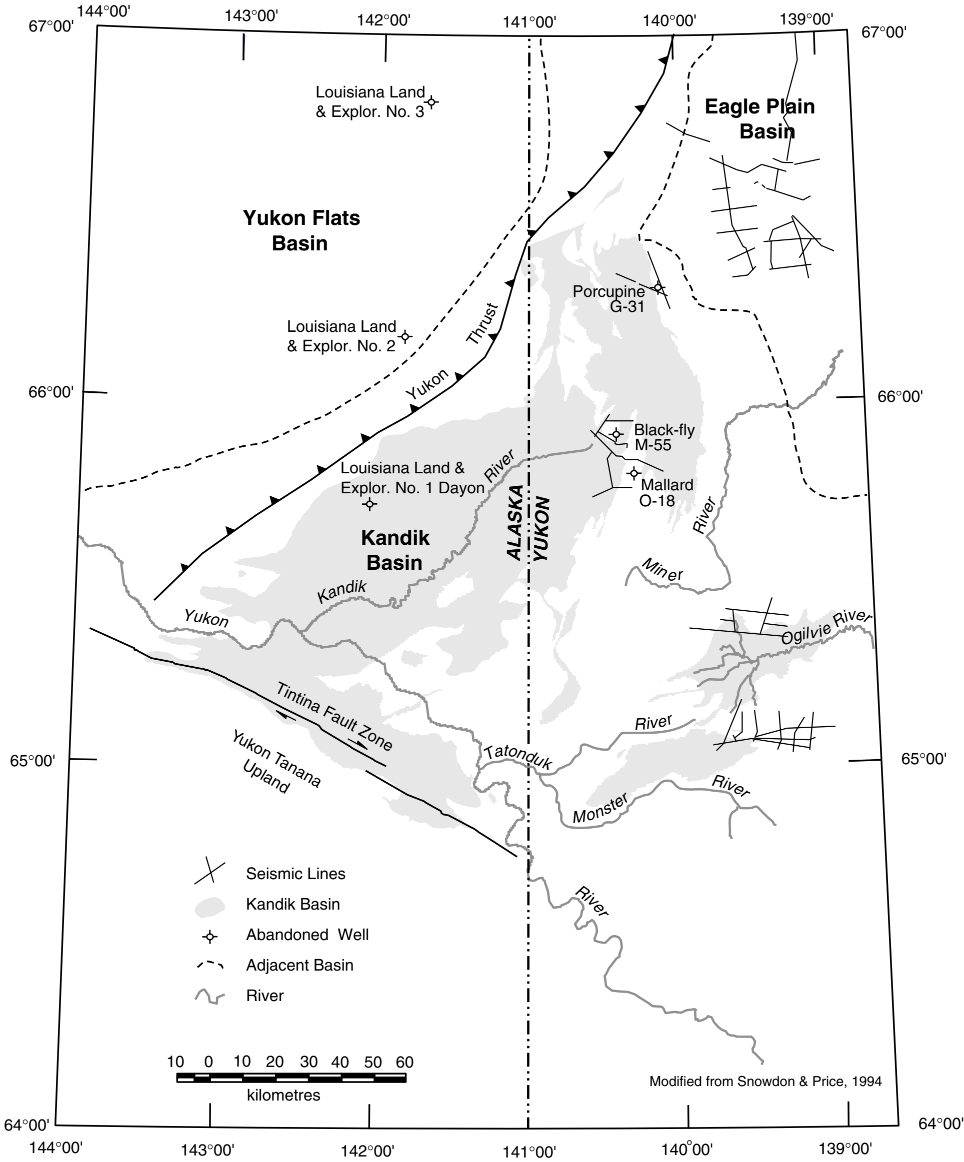
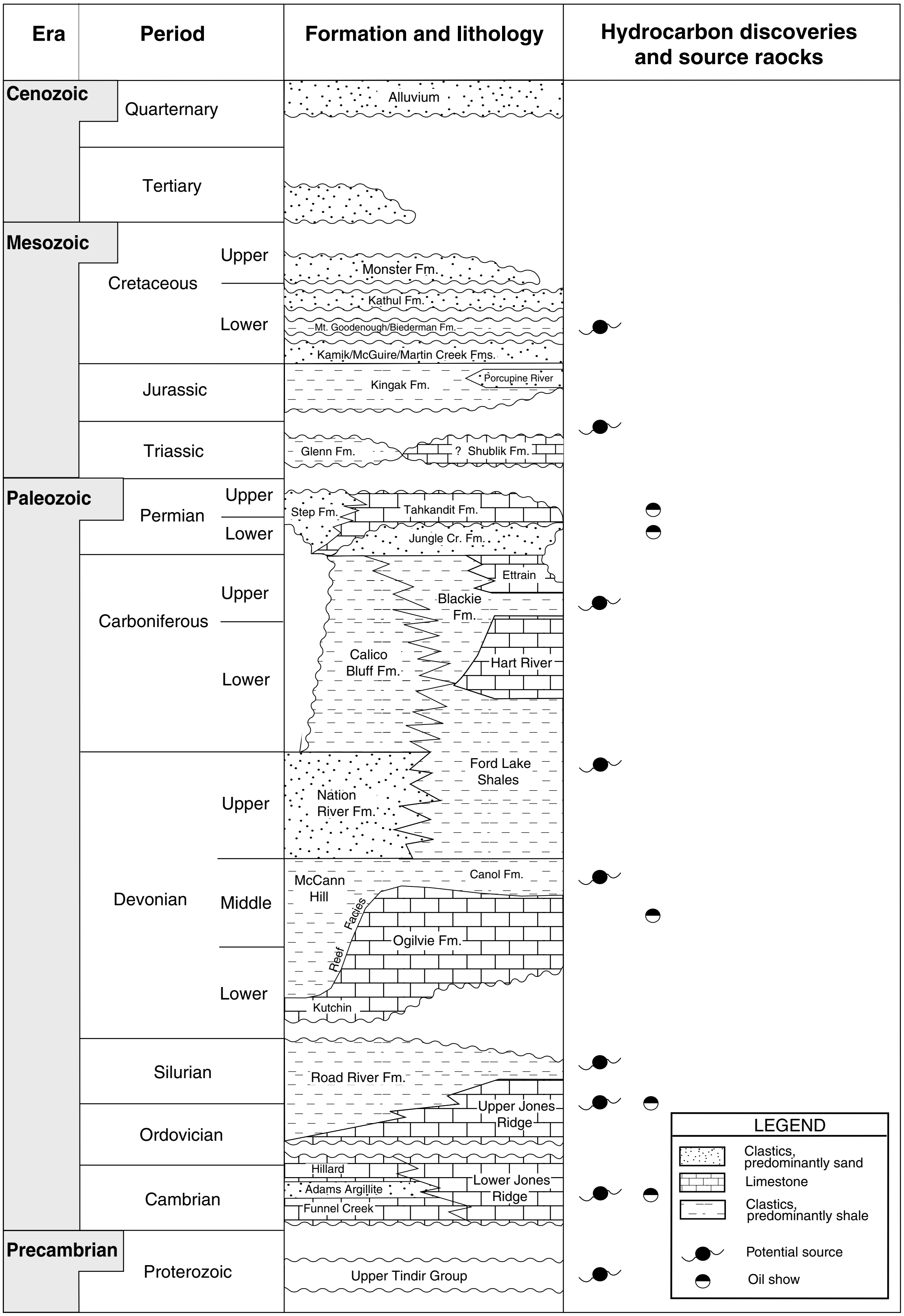


Figure 2. *Location of Kandik Basin, wells and seismic lines, and adjacent basins.*

Figure 3. *Stratigraphic Column for the Kandik Basin.*



Modified from Northern Oil & Gas Directorate, 1995

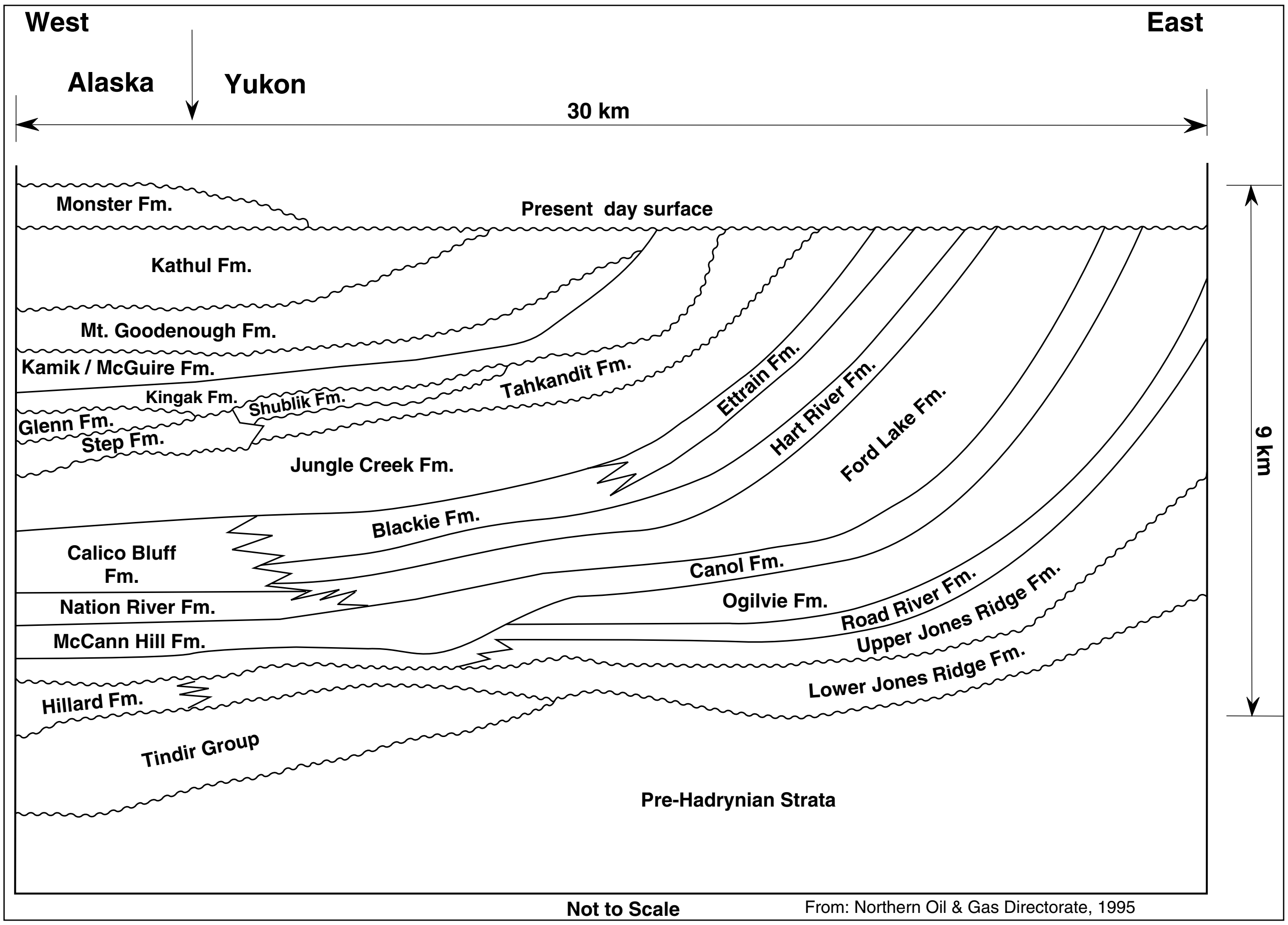
REGIONAL GEOLOGY

The Kandik Basin is a structural depression containing Paleozoic-Mesozoic sediments that straddles the Yukon-Alaska border 907 kilometres southeast of Prudhoe Bay, Alaska and 650 kilometres north-northwest of Whitehorse. The basin is elongated to the southwest so the largest portion of the basin is located in Alaska (60%). The basin is delimited by the Mesozoic sediment cover (Northern Oil and Gas Directorate, 1995) and is surrounded by outcrops of Paleozoic and Precambrian sediments (Brabb and Churkin, 1969; Norris, 1984; Dover, 1992) (Figure 2). Kandik Basin is a fragment of cratonic North America that underwent compression forming a fold and thrust belt with southeastern vergence (Norris, 1984; Dover, 1992). Paleozoic to Triassic strata southeast of Glenn Creek fault is interpreted to represent a subsiding margin sequence (Brabb and Churkin, 1969; Howell, 1996). West of the fault, poorly exposed Paleozoic rocks were thrust upon a continuous sequence of Middle Jurassic to Lower Cretaceous clastic rocks interpreted as a foreland basin fill (Johnsson *et al.*, 1993; Howell, 1996). The foreland rocks are unconformably overlain by an Upper Cretaceous/Tertiary nonmarine sequence (unnamed in Alaska, Monster Formation in the Yukon) (Brabb and Churkin, 1969; Norris, 1985, 1997; Ricketts, 1988; Dover, 1992; Johnsson *et al.*, 1993; Howell, 1996). The basin is interpreted to have formed as a structurally controlled depositional site in Albian time and was a precursor of the early Late Cretaceous Columbian orogeny (Norris, 1997). Subsequent Laramide-related compressional tectonic episodes produced the structures required for trapping of generated hydrocarbons. To the south, the Kandik rocks are bounded by the translational Tintina Fault separating crystalline igneous and metamorphic strata from basin-related sediments.

There are over 11 kilometres of Paleozoic to Recent strata contained in Kandik Basin surrounded by Precambrian to Permian outcrop belts on the basin margins (Northern Oil and Gas Directorate, 1995) (Figures 3 and 4). The Upper Proterozoic Tindir Group consists of several hundred metres of marlstones, diamictites, quartzites and siliceous carbonates (Dover, 1992; Northern Oil and Gas Directorate, 1995). Unconformably overlying these strata are numerous Paleozoic carbonate/shale cycles (Figure 4). Dolomitic limestones of the Cambrian to mid-Ordovician Jones Ridge Formation and Ordovician-Silurian Road River shales constitute the first cycle. The second cycle consists of Devonian platform carbonates of the Ogilvie Formation and cherts and argillites of the McCann Hill Formation in Alaska and Canol Shale in the Yukon. Clastic sedimentation dominated in Late Devonian time on the Paleozoic shelf with a "coarse" sandstone-rich facies represented by the Nation River Formation in the west and Ford Lake shales to the east. Carbonate/shale cyclical sedimentation resumed in Mississippian time with deposition of interbedded shale and limestone of the Calico Bluff Formation in Alaska and carbonates of the Hart River Formation in the eastern portion of the basin. Conformably overlying the Calico Bluff/Hart River package is another cycle represented by Lower to Upper Carboniferous Blackie clastics and Ettrain carbonates. The Blackie/Ettrain cycle is overlain by Permian Jungle Creek sandstones and Upper Permian carbonates of the Takhandit Formation. The Takhandit Formation grades westward into limey clastics and conglomerates of the Step Formation. A major unconformity separates Takhandit strata from its overlying Triassic Shublik limestone in the Yukon which correlates with the Glenn Formation 'oil shales' in Alaska. A thick succession of shales constituting the Kingak Formation of Jurassic age overlies the Shublik/Glenn package. Recurrent Cretaceous clastic wedges overlie Kingak shales.

These clastic wedges are separated by unconformities. The wedges include sandstones and siltstones of the Martin Creek/Keenan, McGuire, Kamik/Keenan, Mount Goodenough/Biederman, and Kathul formations. Unconformably overlying these Lower Cretaceous marine clastic wedges is an Upper Cretaceous nonmarine conglomeratic sandstone and grit known as the Monster Formation in the Yukon (unnamed in Alaska). This area was unglaciated during Pleistocene time. Quaternary to Recent alluvial sediments occur along river valleys in the area.

__Figure 4.__ Schematic stratigraphic cross-section, Kandik Basin.



PETROLEUM GEOLOGY

RESERVOIRS

Upper Proterozoic

The Upper Proterozoic Tindir Group contains interbeds of red and green shales, deep-water diamictites, sandstones, and carbonates. The several hundred metre thick unit may have sufficient fracture porosity in order to preserve hydrocarbons.

Cambro-Ordovician

The Cambro-Ordovician Jones Ridge Formation consists of a light-coloured thick-bedded to massive lower carbonate member overlain by a bioclastic limestone (Fritz, 1997). Approximate thickness is 915 metres. In Alaska, the Jones Ridge Formation is equivalent to strata that has been divided into three formations; the unfossiliferous Funnel Creek Formation consisting of light-coloured limestone similar to Jones Ridge carbonates, overlain by the Adams argillite, in turn overlain by Hillard Limestone comprised of breccia and limestone. Thicknesses for the Alaskan succession vary from 135 to 745 metres (Fritz, 1997). The limestones often show good porosity in outcrop. The limestones are commonly oolitic to pisolitic. Vuggy, intercrystalline and fracture porosity have been observed in drill cuttings. These units are variably dolomitic. A core cut in the formation gave very low porosity and permeability (Inexco Oil Company, 1972a).

Devonian

In the Devonian System, the Ogilvie Formation has been identified as a reservoir. This carbonate shelf deposit has a reefal facies to the west in Alaska. Coral-stromatoporoid buildups of bioclastic limestone have good porosity in outcrop along the Porcupine River in Alaska. Thicknesses vary from 60 to 1100 metres throughout the region. Fracture and vuggy porosity was reported in well cuttings in the Porcupine G-31 well. A core cut in the interval revealed very low porosity and permeability (Inexco Oil Company, 1972a).

Carboniferous

The oldest Carboniferous carbonate succession, known as the Hart River Formation progrades, over Ford Lake shales in the Kandik region and was deposited in shelf, slope and basin environments. Thinly laminated spicule packstone, with interbeds of sandstone and shale of the thin Hart River succession, exhibits secondary fracture porosity in parts. The Upper Carboniferous Ettrain carbonate sequence is mainly cherty ooid lime grainstones and skeletal packstone (Richards *et al.*, 1997). It was deposited on a shelf margin and upper slope environment in the Kandik region. Vuggy and intercrystralline porosity has been observed in the bioclastic dolomitic Ettrain carbonates in the Black-fly M-55 well. The Carboniferous succession varies in thickness from 450 to 1270 metres in Canada.

Permian

The lower Permian Jungle Creek Formation, consisting of terrigenous clastics and subordinate sandy to silty limestone, varies in thickness from 425 to 703 metres. This succession was deposited in a shoreline to offshore setting (Richards *et al.*, 1997). Fracture porosity and minor intercrystalline porosity were observed in well cuttings

(Black-fly M-55) in dolomitic and cherty shale, sandstone and limestone. During Late Permian time, massive, cliff-forming coarse-grained bioclastic limestones of the Takhandit Formation were deposited. The formation is dominated by offshore shelf and slope facies although basal shoreline deposits occur to the west (Richards *et al.*, 1997). The Takhandit strata grades westward into shallow marine cherty conglomerates and quartzites of the Step Formation. Potential for reservoir development exists in these late Permian deposits. Thicknesses vary from 30 to 725 metres in the Kandik region.

Cretaceous

Massive, ridge-forming fine-grained sandstones of the late Cretaceous Martin Creek Formation/Keenan quartzite may have reservoir potential due to its interpreted shoreface/nearshore depositional environment in eastern Kandik Basin (Dixon, 1997). No porosity, however, was observed in outcrop. Estimated thicknesses vary from 150 to 300 metres (Dover, 1992). The thick monotonous conglomerate and sandstone succession known as the Albian Kathul Formation or Graywacke may have reservoir potential in parts. This marine succession, interpreted as occurring as submarine fans in the Kandik region (Dixon, 1997), has thicknesses ranging from 450 to 1000 metres.

The upper Cretaceous Monster Formation (unnamed Upper Cretaceous/Tertiary in Alaska) is a poorly sorted nonmarine succession that infills piggy-back basins in the fold and thrust belt. It is a heterogeneous mixture of conglomerate, sandstone, mudstone and thin coals that have highly variable thicknesses along strike with lateral pinchouts. The probable aggregate thickness is 1980 metres (Howell, 1996). The strata is reported to be porous in Alaska (Howell, 1996). Depositional environments for this succession range from coastal fan to braided fluvial systems (Ricketts, 1988; Dover, 1992; Dixon, 1997).

SEALS

Regional top seal is provided by shales of the Mount Goodenough, McGuire, Kingak and Ford Lake formations for both Cretaceous and Paleozoic reservoirs. Lateral seals are attained at carbonate/shale facies transitions in Ogilvie/McCann and Ettrain/Blackie sequences. Another possible facies transition lateral seal could occur at the sandstone/shale zone represented by the Nation River and Ford Lake formations, respectively. Canol and Road River shales could act as top seals for Middle Devonian reservoirs. Deep-seated erosion along crests of anticlines may affect the integrity of traps by removing seals. Numerous interbedded shales and siltstones within the Late Cretaceous Monster Formation may provide adequate lateral and top seals for stratigraphic and structural trapping configurations for the formation.

TRAPS

A variety of structural and stratigraphic hydrocarbon traps occur in Lower Cretaceous to Upper Devonian and Upper Proterozoic strata. Numerous and varied stratigraphic and small structural trap configurations are anticipated in Late Cretaceous strata. Traps involving Upper Proterozoic to Lower Cretaceous reservoirs include anticlinal culminations, drag folds on thrust faults, combined structural/unconformity, overthrust traps and duplex structures. Late Cretaceous traps include simple compressional anticlines, normal and reverse fault traps, faulted anticlines, and lateral stratigraphic pinchouts.

Based on outcrop mapping information (Brabb and Churkin, 1969; Norris, 1985; Dover, 1992), and related extrapolations into areas of limited outcrop, the number of structural and stratigraphic traps within the region could number into the hundreds. The largest area of closure recognized in pre-Mid-Cretaceous strata is 75 km^2, while the largest structure affecting Late Cretaceous reservoirs has an area of closure of 21 km^2.

SOURCE ROCKS

An excellent hydrocarbon source rock has been identified in the organic-rich "oil-shales" of the Triassic lower Glenn Formation. The Glenn shale locally contains up to 10% total organic carbon (TOC) (Howell, 1996). This formation is equivalent to the petroliferous Shublik shale on Alaska's north slope. The Glenn Formation and equivalents are interpreted to have been deposited over a broad shelf region that covered a large portion of northern Alaska. The prospective hydrocarbon region in Kandik Basin is not limited by source rock distribution. Numerous other mid-Devonian to Lower Cretaceous source rocks have been identified; the kerogen-rich shales of the Canol, upper Road River and Mount Goodenough formations, and organic-rich carbonates of the Tindir Group, Jones Ridge Formation and cherty shale of the McCann Hill Formation.

A Rock-eval analysis was performed on the three Canadian wells penetrating the Paleozoic succession on the eastern margins of the basin (Snowdon and Price, 1994, Appendix I). The low TOC contents in the Paleozoic sections, with the exception of selected Ford Lake intervals, reflect the high maturity as well as the original organic content of the rocks. This is consistent with the Doyon No. 1 well in Alaska where thermal maturity data indicates overmature strata (Johnsson, et al., 1993). This thermal maturity data likely indicate that reservoirs are likely to contain gas rather than oil. Type III kerogens predominate in these rocks which indicates gas-prone source material (Snowdon and Price, 1994, Appendix I). However, a restricted area of Kandik Basin, at distances of 45 to 70 kilometres away from the wells, may have oil potential due to the presence of bitumen and oil staining in Paleozoic porous strata (Hite, 1997). Residual oil and gas potential is expected in the Mesozoic and Tertiary sections over part of the Kandik Basin in Yukon and Alaska. The thermogenic source for both oil and gas upper Cretaceous/Tertiary rocks is likely the Glenn Formation and biogenic gas could be derived from interlayered lignitic coal seams.

TIMING OF HYDROCARBON GENERATION

Trap development in Paleozoic and Mesozoic rocks most likely occurred during the Laramide orogeny, which encompasses the main and latest stage of compressional folding and thrusting. These traps developed subsequent to the primary hydrocarbon charge and migration episode. This poses a potential risk for the preservation of hydrocarbons in pre-mid-Cretaceous strata in Kandik Basin. However, trap formation is inferred to postdate hydrocarbon generation in other hydrocarbon-bearing settings such as the foothills of the Canadian Cordillera. Although this timing problem may not significantly detract from the potential in Kandik Basin, it does increase the prospect risk. Secondary hydrocarbon generation can be achieved by overthrusting, inducing continued burial of source material in subthrust positions.

Folded structures in Late Cretaceous/Tertiary rocks developed subsequent to the primary hydrocarbon generation episode. However, Late Cretaceous to Eocene normal block faulting as well as Laramide compressional structures may trap secondarily derived hydrocarbons.

HYDROCARBON SHOWS

Oil staining has been observed in outcrop in local porous zones of the Takhandit limestones, Jungle Creek calcareous sandstones, Ogilvie carbonates and Jones Ridge carbonates in the Alaska portion of the basin (Northern Oil and Gas Directorate, 1995). Reported oil shows in the Doyon well in Alaska (Northern Oil and Gas Directorate, 1995) is not confirmed by the USGS which indicates no oil or gas shows in the well (Howell, 1996).

PETROLEUM ASSESSMENT

The Kandik petroleum assessment was undertaken in order to provide quantitative estimates of total oil and gas potential and possible sizes of undiscovered fields in the region. Petroleum assessments of basins or regions are usually based on analyses of a number of exploration plays. The Kandik assessment was divided into three exploration plays based on petroleum geological considerations such as structural style, dominant reservoir lithology and thermal maturity. Six conceptual oil and gas plays were identified in Kandik Basin, of which all plays have an oil and gas component.

A statistical summary of the oil and gas potential of the Kandik Basin in given in Table 1.

Table 1. *Oil and gas potential in Kandik Basin.*

Play name	Expected no. of fields (mean)	Median play potential (in-place) (million m^3)	Mean play potential (in-place) (million m^3)	Median of largest field size (in-place) (million m^3)
OIL PLAYS				
Tertiary/Upper Cretaceous nonmarine	30	26	35	3.6
Mesozoic marine structural	*located in Alaska only, not assessed*			
Paleozoic marine structural	3	16.5	23	11
GAS PLAYS				
Tertiary/Upper Cretaceous nonmarine	30	5,863	8,012	856
Mesozoic marine structural	8	10,346	11,899	3,110
Paleozoic marine structural	10	16,913	19,647	4,839
Total Kandik Basin*	54 (oil) and 37,792 (gas)			

* The totals are statistically derived. They are from the empirical distribution table on page 70 and 72. The totals are the basin potential at >50%.

Kandik Tertiary/Upper Cretaceous NONMARINE OIL AND GAS PLAY

Play definition

This play encompasses all oil and gas prospects involved in small anticlinal structures and fault traps as well as stratigraphic traps within the Tertiary/Upper Cretaceous succession in Kandik Basin (Monster Formation in the Yukon). In the Yukon, the Monster Formation is located in two principal areas near the western margin of the Taiga-Nahoni Fold Belt (Ricketts, 1988). The eastern exposure is a east-trending synclinorium known as the Monster Synclinorium, located adjacent to the Monster River (Figure 5). The western exposure is a recumbent syncline in the footwall of the Yukon Thrust (Ricketts, 1988 and Figure 5). In Alaska, the unnamed succession is found in the southwestern portion of the basin adjacent to the Tintina fault zone and south of the Yukon River (Figure 5). Another depositional remnant is found to the northeast adjacent to the Alaska/Yukon boundary. Thermal maturity characteristics indicate oil and gas possibilities in the play. About 35% of the play area is located in the Yukon.

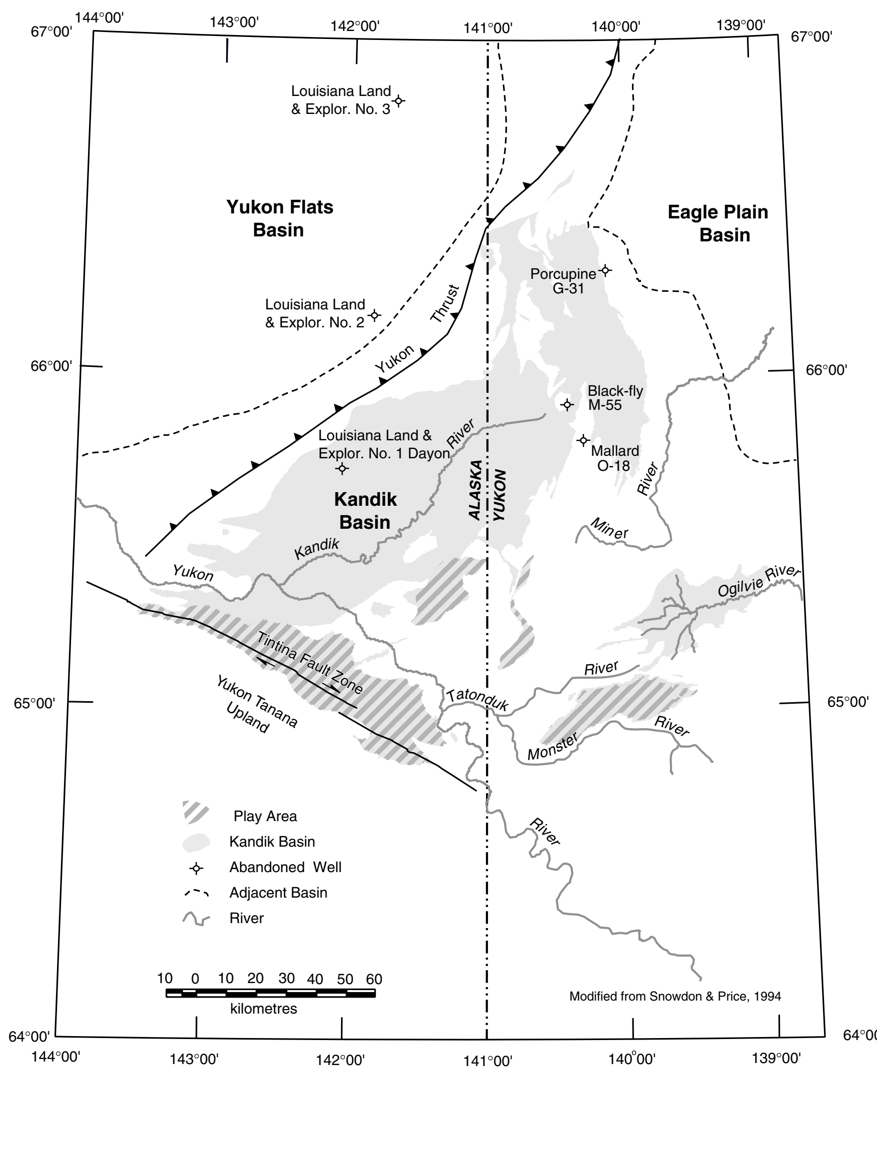


Figure 5. *Kandik Tertiary/Upper Cretaceous, nonmarine oil and gas play.*

Geology

Potential hydrocarbon traps involve Tertiary/Upper Cretaceous fluvial strata onlapping crests of anticlines and filling piggy-back basins in the fold and thrust belt. The reservoirs consist of a heterogeneous mixture of conglomerate, sandstone and mudstone with thin horizons of coal. The thicknesses of reservoir-quality clastics are highly variable with lateral pinchouts. The reservoirs are characterized by numerous stratigraphic traps and small structural configurations, such as simple compressional anticlines, normal and reverse fault traps, and faulted anticlines. The dominant source rock in the area is the Triassic Glenn shale which commonly has TOC contents of 10%. The nonmarine strata itself is immature, while underlying rocks are thermally mature. The prolific petroleum source rocks are in the oil-generating window. Interbedded coal may provide biogenic gas possibilities. The nonmarine strata is relatively porous in part, averaging about 12%.

Exploration risks

All of the Kandik plays are believed to have a high probability of existing (ie. low play risk). However, within each play, risks associated with individual prospects are evaluated in order to derive an exploration risk associated with each play. An important prospect-level risk in all Kandik plays is timing of trap formation with respect to hydrocarbon generation. In many cases, individual prospects have been unroofed by erosion compromising the entrapment structure and seal integrity of the individual trap. The fact that the Monster Formation and equivalents outcrop in the play area also adds to the risk for seal and closure. The prospect-level risk in the nonmarine play for reservoir facies is low with existence of reservoir considered to be certain (marginal probability: 1.0) (Appendix 2). The probability of charge by source rocks is considered to be high on a prospect level (0.8) (Appendix 2).

Play potential

The Tertiary/Upper Cretaceous nonmarine play has an estimated in-place median oil and gas potential of 26 million m^3 and 5.9 billion m^3, respectively (Figures 6 and 7; Table 1). The mean value of the number of predicted fields is 30 for both plays. The largest undiscovered field is expected to contain 3.6 million m^3 of oil and 856 million m^3 of gas (median values) (Figures 8 and 9, Table 1). No fields with volumes greater than 160 million m^3 of in-place oil or 3 billion m^3 of gas are predicted to occur in these nonmarine plays (Figures 8 and 9). (See Appendix 3 for computation outputs.)

Figure 6. *Estimate of in-place oil potential of the Kandik Tertiary/Upper Cretaceous nonmarine play. Median value of probabilistic assessment is 26 million m^3 of in-place oil distributed in 30 fields.*

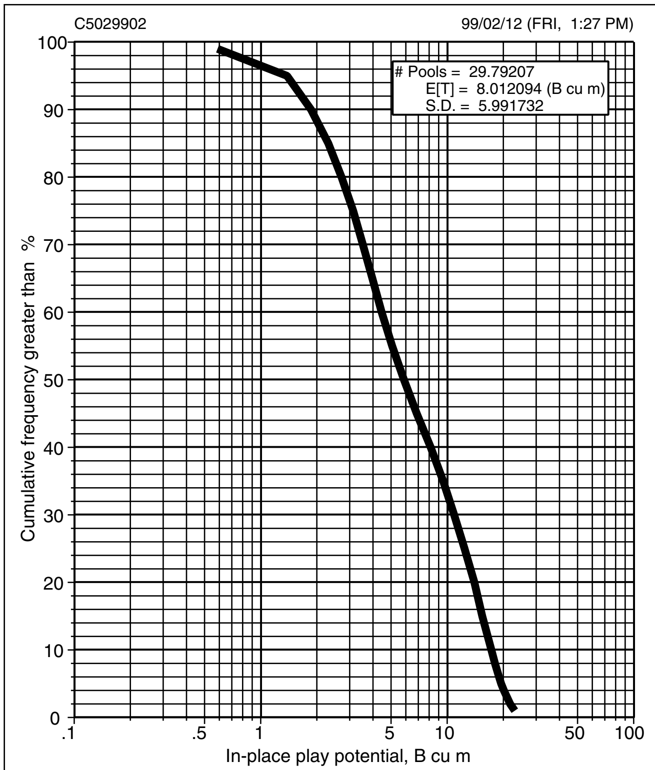


Figure 7. *Estimate of in-place gas potential of the Kandik Tertiary/Upper Cretaceous nonmarine play. Median value of probabilistic assessment is 5863 million m^3 of in-place gas distributed in 30 fields.*

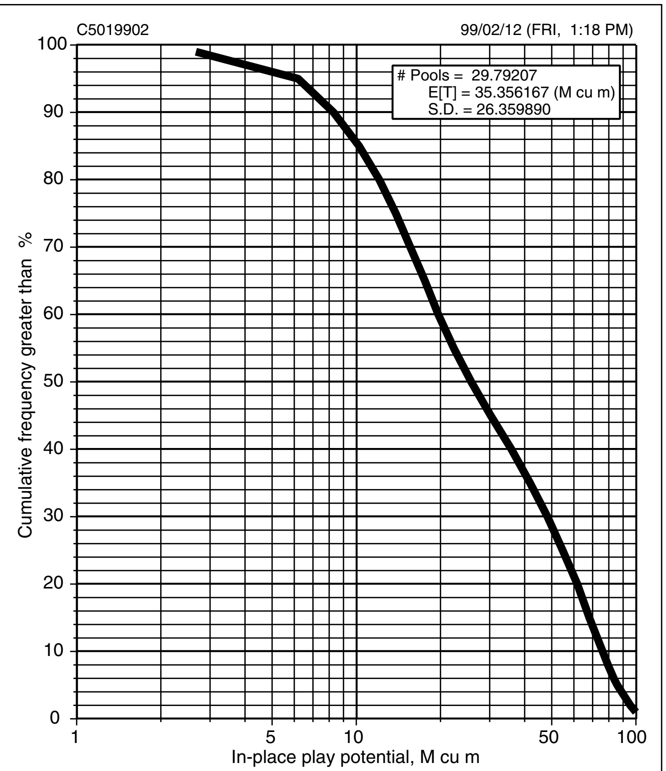


Figure 8. *Field-size-by-rank plot of the Kandik Tertiary/Upper Cretaceous nonmarine oil play. Median value of the largest predicted field size is 3.6 million m*^{3} *of in-place oil.*

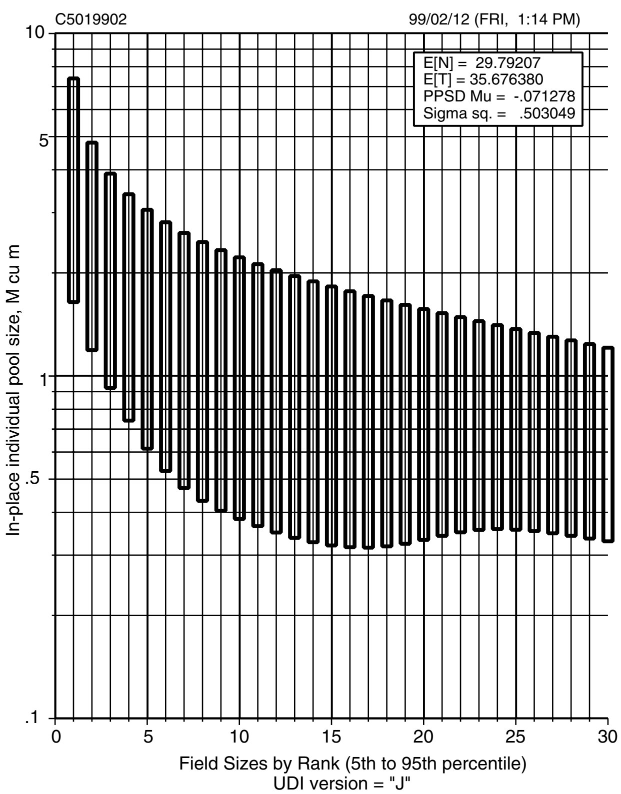
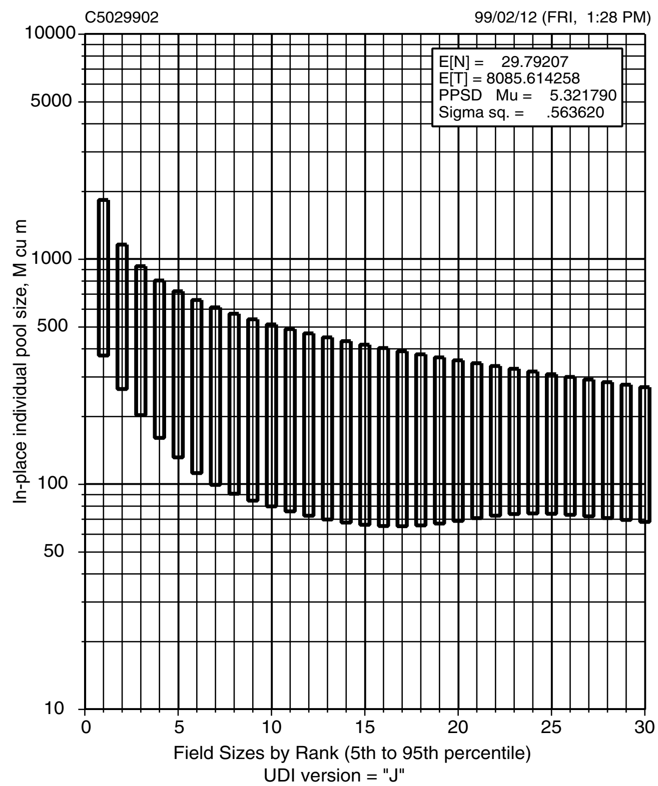


Figure 9. *Field-size-by-rank plot of the Kandik Tertiary/Upper Cretaceous nonmarine gas play. Median value of the largest predicted field size is 856 million m*^{3} *of in-place gas.*



Kandik Mesozoic

MARINE STRUCTURAL OIL AND GAS PLAY

Play definition

This hydrocarbon play encompasses all structural traps involving Jurassic and Late Cretaceous reservoirs formed during post-Aptian compressional folding and thrusting. The play area illustrated on Figure 10 covers the region expected to contain gas in Mesozoic reservoirs. About 40% of the play area is located in the Yukon. It was determined that Mesozoic rocks with thermal maturity characteristics suitable for oil generation are restricted to Alaska. Consequently, no oil assessment was attempted for this play.

Geology

Martin Creek/Keenan Quartzite and Kathul coarse clastic units constitute the principal reservoirs in the Mesozoic hydrocarbon play. These units overlie the excellent petroliferous Glenn Formation. Secondary Paleozoic source rocks also underlie these reservoirs. Mount Goodenough and McGuire shales and siltstones provide both overlying and lateral seals. Trap types in Mesozoic strata include anticlines, overthrust

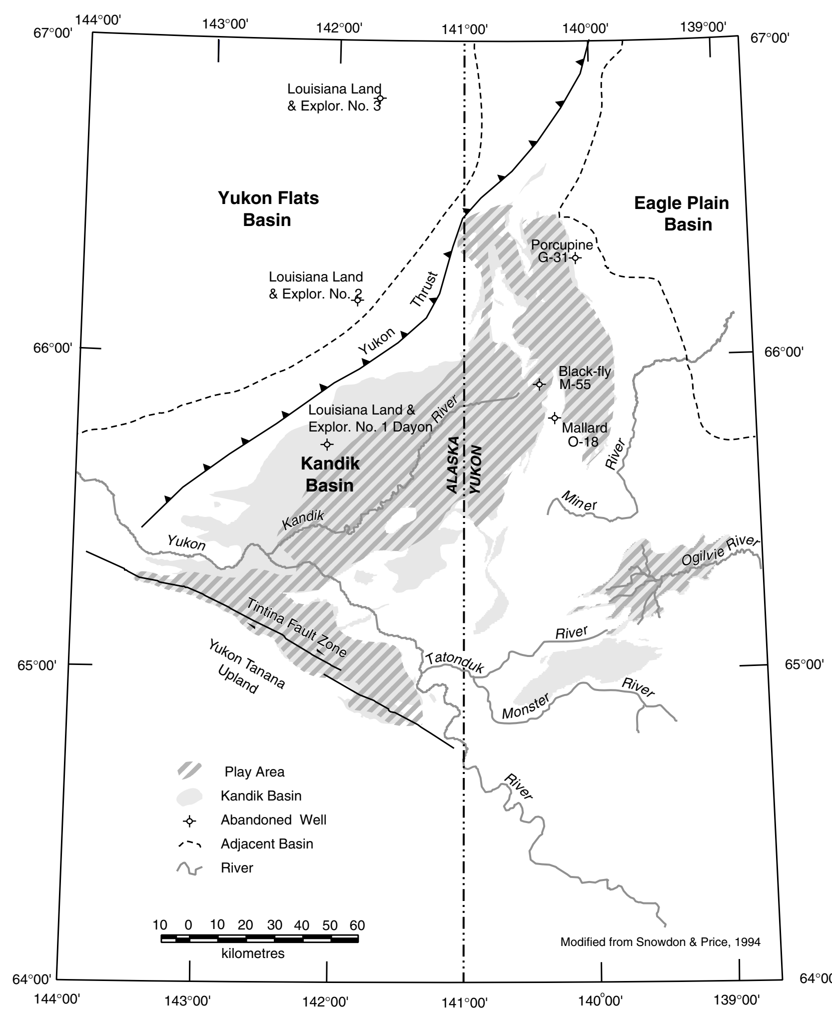


Figure 10. *Kandik Mesozoic marine structural gas play area.*

traps, drag folds on thrust faults and combined structural/unconformity traps. Porosities in these rocks are unknown, so geological analogues were used.

Exploration risks

An important exploration risk for Mesozoic prospects is presence of closure where deep-seated erosion along crests of anticlines destroyed the integrity of many traps. The prospect-level risk for presence of closure in this play is 0.5. Another significant risk thought to be important in this assessment is the presence of sufficient porosity for hydrocarbon accumulation which is reflected in the 0.5 marginal probability assigned to the presence of reservoir facies risk factor (Appendix 2). The removal of seal strata as a result of erosion is also considered to be significant in this play (Appendix 2; adequate seal: 0.4).

Play potential

Estimates of the potential for the Mesozoic marine structural gas play show a median in-place volume of 10.35 billion m^3 distributed in 8 fields (mean value) (Figures 11 and 12; Table 1). The largest undiscovered gas field is predicted to contain 3.11 billion m^3 (median value) (Figure 12). One field greater in size than 3 billion m^3 of in-place gas is predicted in this play (Figure 12).

Figure 11. *Estimate of in-place gas potential of the Kandik Mesozic marine structural play. Median value of probabilistic assessment is 10,346 million m^3 of in-place gas distributed in 8 fields.*

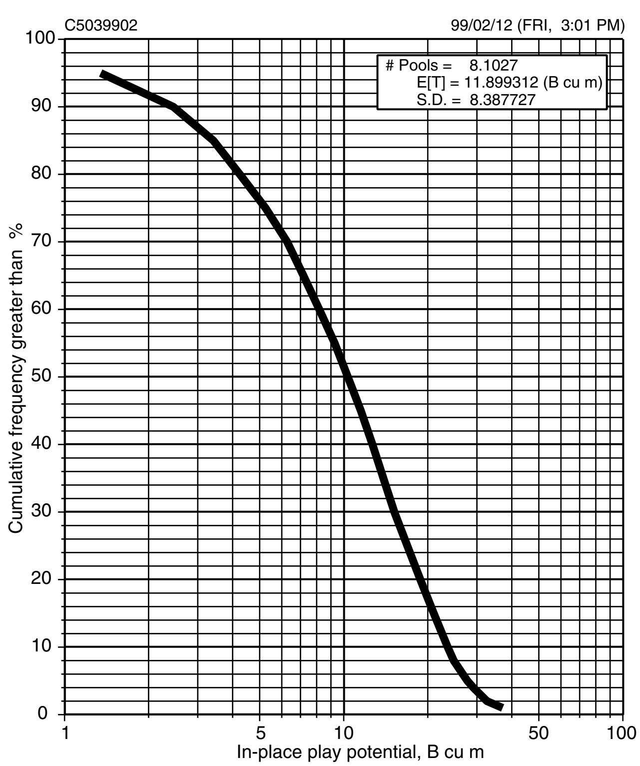
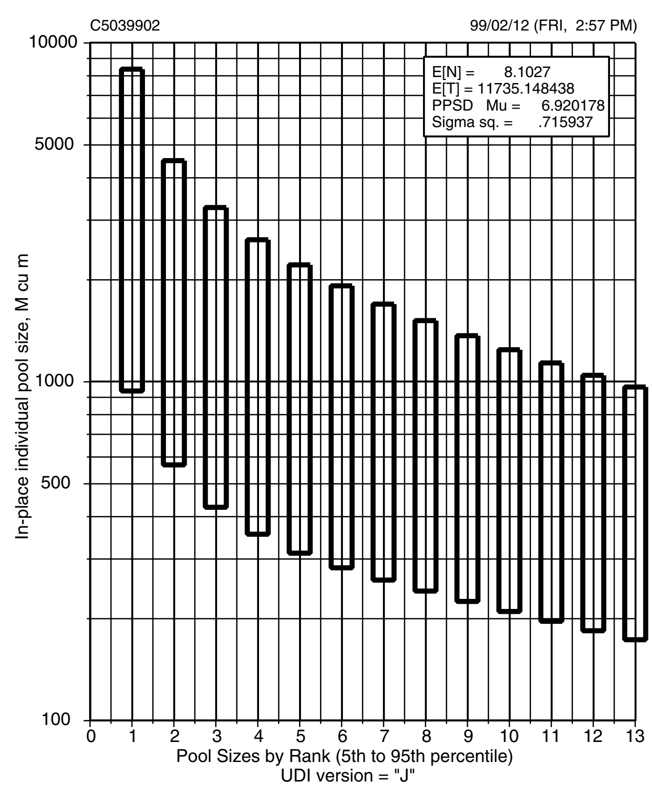


Figure 12. *Field-size-by-rank plot of the Kandik Mesozoic marine structural gas play. Median value of the largest predicted field size is 3110 million m^3 of in-place gas.*



Kandik Paleozoic
MARINE STRUCTURAL OIL AND GAS PLAY

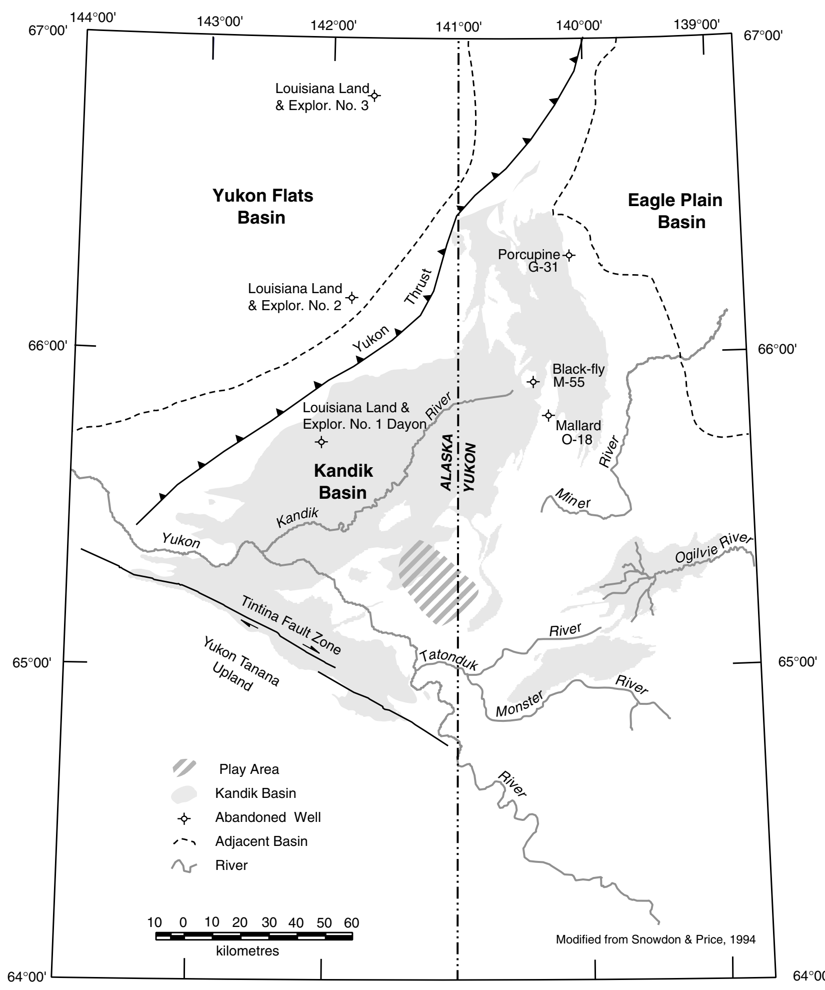
Play definition

This hydrocarbon play involves all structures and prospects of Upper Proterozoic to Permian reservoir-quality strata in, within and beneath Kandik Basin. The Paleozoic gas play area encompasses most of the Kandik Basin and neighbouring depocentres (Figure 13). The play area is limited to the west by a zone of supermature strata where no hydrocarbon potential is present (Figure 13, in the vicinity of Doyon No. 1 well; Johnsson *et al.*, 1993). The area of oil potential is much smaller due to thermal maturity considerations in surface outcrops (Figure 14; Johnsson *et al.*, 1993; Hite, 1997).

Geology

Principal prospective targets in the Paleozoic structural play are carbonates of the Cambro-Ordovician Jones Ridge Formation, Devonian Ogilvie Formation, Carboniferous Hart River and Ettrain formations and the Permian Takhandit Formation. Clastic reservoirs of the Permian Jungle Creek Formation and limestones and sandstones in the Upper Proterozoic Tindir Group are also present. These units underlie the

Figure 13. *Kandik Paleozoic marine structural oil play area.*



excellent petroliferous Glenn Formation but numerous source rock horizons are interspersed in the Paleozoic succession. The Devonian Canol Formation contains TOC's up to 7% and the upper Road River Formation has TOC contents up to 5%. Upper Paleozoic Ford Lake shales contain organic carbon contents of up to 5% (Snowdon and Price, 1994; Appendix I). Numerous compressional structures affect Paleozoic rocks, such as anticlines, drag folds on thrust faults, overthrust traps, duplex structures, and combined structural/unconformity traps. Good seals are represented by the Adams argillite in the lower Jones Ridge Formation, the Road River Formation, Ford Lake shale, Glenn shale and Biederman argillite (Figure 3). Porosities in carbonates vary from 0 to 20%. Fracture porosity is very common with lesser intercrystalline porous strata present. Thermal maturity data from wells in Canada show generally very low TOC values in the Paleozoic section which, in addition to indicating the low original organic content, denotes that the rocks are relatively high thermal maturity (Snowdon and Price, 1994). The area of oil potential is at least 50 kilometres away from these wells, and the maturity data conclusions may not be relevant in the area. The fact that more than 20 bitumen occurrences have been observed in outcrop, indicates the unrealized oil potential (Hite, 1997).

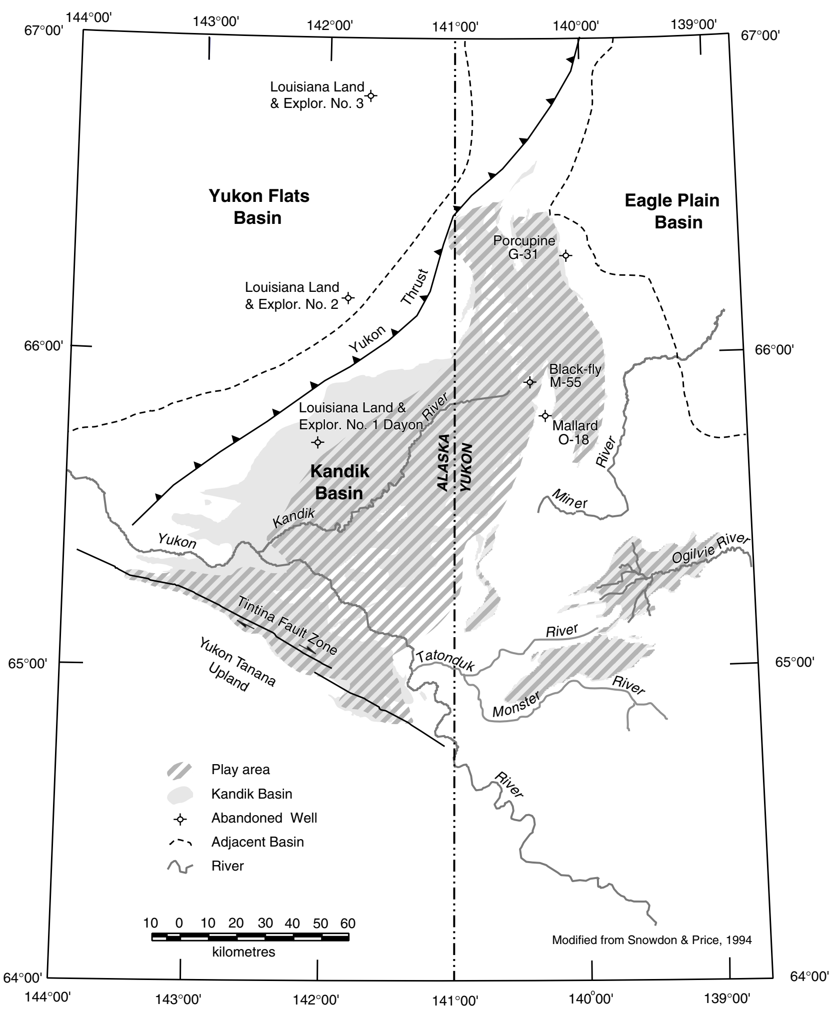


Figure 14. *Kandik Paleozoic marine structural gas play area.*

Exploration risks

Significant geologic risk factors for the Paleozoic structural play are presence of closure and adequacy of reservoir (Appendix 2). Deep erosion along crests of anticlines destroys the integrity of many structural traps. Primary porosity is generally thought to be very low, but secondary fracture porosity has been observed. Primary generation, migration and accumulation of hydrocarbons occurs before many of the compressional structures were formed. However, overthrusting may produce a secondary hydrocarbon charge that would be trapped in previously formed structures.

Play potential

This play has an estimated in-place median gas potential of 17 billion m^3 (Figure 15; Table 1). The mean value of the number of predicted fields is 10. The largest undiscovered gas field is expected to contain 5 billion m^3 of gas (median value) (Figure 16). Potential for the Paleozoic oil play 16.5 million m^3 (median in-place value) (Figure 17; Table 1). The estimate assumes a total field population of 3 (mean value), with the largest undiscovered field having an initial in-place volume of 11 million m^3 of oil (Figure 18). Two individual undiscovered gas fields of greater than 3 billion m^3 are predicted to occur in the play (Figure 16). No oil fields greater than 160 million m^3 of in-place volume are expected in the oil play.

Figure 15. *Estimate of in-place gas potential of the Kandik Paleozoic marine structural play. Median value of probabilistic assessment is 16,913 million m^3 of in-place gas distributed in 10 fields.*

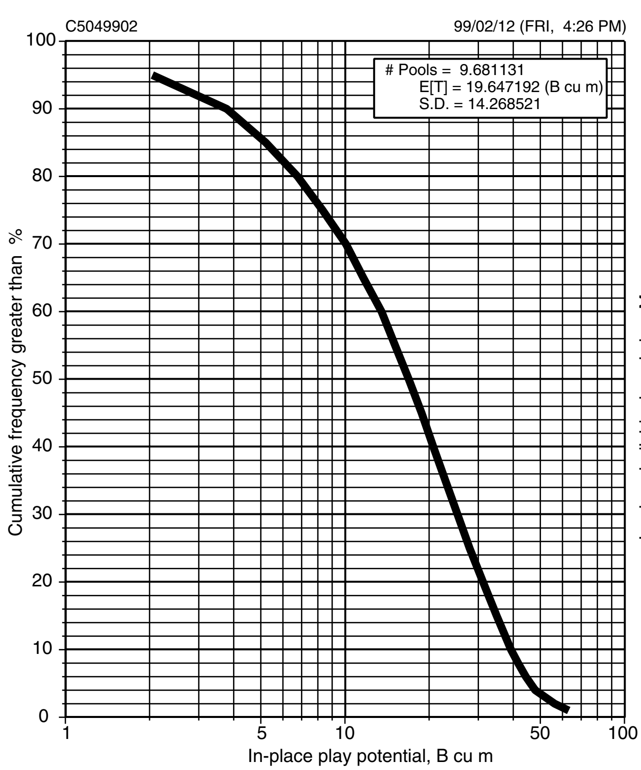


Figure 16. *Field-size-by-rank plot of the Kandik Paleozoic marine structural gas play. Median value of the largest predicted field size is 4839 million m^3 of in-place gas.*

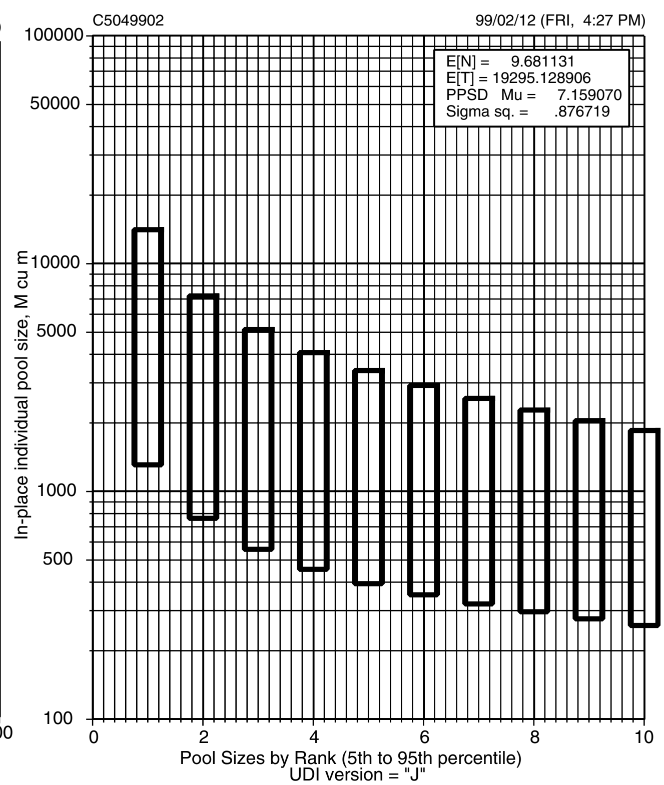
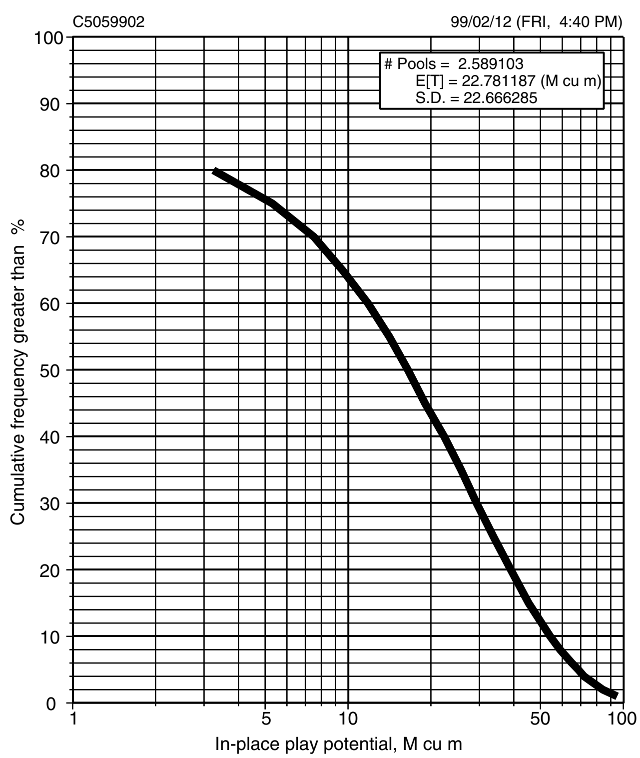
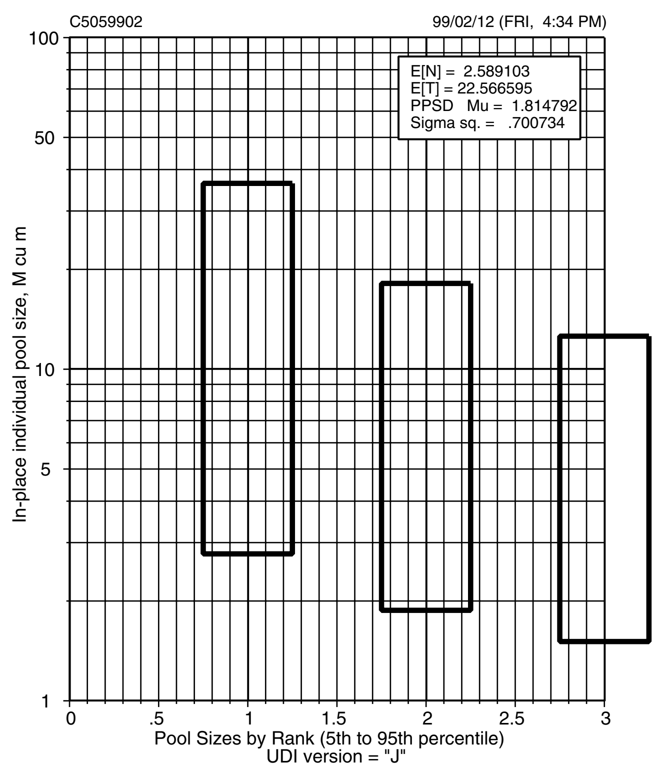


Figure 17. *Estimate of in-place oil potential of the Kandik Paleozoic marine structural play. Median value of probabilistic assessment is 16.5 million m³ of in-place oil distributed in 3 fields.*

Figure 18. *Field-size-by-rank plot of the Kandik Paleozoic marine structural oil play. Median value of the largest predicted field size is 11 million m³ of in-place oil.*





DISCUSSION OF ASSESSMENT RESULTS

Resource potential

Median estimates of total hydrocarbon potential for the Kandik Basin region (from all plays) are 54 million m^3 (340 MMbbl) of in-place oil and 38 billion m^3 (1.3 TCF) of in-place gas (Table 1; Figures 19 and 20). (Note that the total median estimates for the Kandik assessment region are not derived arithmetically by adding together the hydrocarbon potentials of individual plays. These numbers are summed using statistical techniques). High confidence (90% probability) and speculative (10% probability) estimates of total oil potential are 18 and 108 million m^3 (113 and 678 MMbbl), respectively (Figure 19). High confidence and speculative estimates of gas potential are 19 and 64 billion m^3 (657 and 2246 BCF), respectively (Figure 20). Individual field-size estimates display similar probability-dependent variations. The wide range of estimates of total potential and field sizes are typical of frontier region assessments and reflect the geological uncertainties in quantifying lightly explored or conceptual exploration plays.

Resource distributions

The highest oil potential or volume occurs in the Tertiary/Upper Cretaceous nonmarine play and highest gas potential in the Paleozoic marine structural play (Table 1). The largest individual oil and gas fields are expected to occur in the Paleozoic play, with median size estimates of 11 million m^3 (72 MMbbl) of in-place oil and 4.8 billion m^3 (170 BCF) of in-place gas. Individual field sizes for the major plays in the region (ie. plays with 8 or more expected fields) indicate that 40 to 80% of the individual play's

Table 2. *Oil and gas potential in Kandik Basin.*

Play name	Median play potential (in-place) (million m³)	Median of largest field size (in-place) (million m³)	Scenario 1 Play potential in the Yukon (million m³)	Scenario 2 Play potential in the Yukon (million m³)
OIL PLAYS				
Tertiary/Upper Cretaceous nonmarine	26	3.6	12	8.8
Mesozoic marine structural	*located in Alaska only; not assessed*			
Paleozoic marine structural	16.5	11	13.5	2.5
GAS PLAYS				
Tertiary/Upper Cretaceous nonmarine	5,863	856	2,849	1,993
Mesozoic marine structural	10,346	3,110	7,662	4,552
Paleozoic marine structural	16,913	4,839	13,634	8,795

Scenario 1: Largest undiscovered field is assumed to occur in the Yukon.

Scenario 2: Largest undiscovered field is assumed to occur outside the Yukon.

total petroleum resource is expected to occur in the five largest oil and gas fields. This resource distribution indicates a moderately concentrated hydrocarbon habitat, typical of composite craton margin or rifted passive margin basins (Klemme, 1984).

The assessment results indicate the Paleozoic structural play is expected to contain about 45% of the region's total gas resource volume and 6 of the 10 largest fields, a concentration reflecting the greater number of reservoir horizons and size of closures within the thick Paleozoic succession. In contrast, oil resource distribution differs in that about 45% of the region's oil resource is concentrated in younger Tertiary/Upper Cretaceous nonmarine rocks while 7 of the 10 largest oil fields are expected to occur in the Paleozoic marine play. This distribution illustrates the numerous small structural and stratigraphic trapping configurations in the nonmarine play in contrast with the smaller number of larger-volume structures present in the Paleozoic play (Note that if the Mesozoic oil play was assessed, the oil distribution would be slightly different, but there is sufficient information to arrive at a general conclusion).

Assessment results and exploration history

The exploration risks estimated in the assessment suggest success rates for exploratory drilling in the Kandik Basin should average about 1 in 6. The absence of discoveries among the 4 wells drilled to date is reasonable. Historically, the first significant hydrocarbon discovery in a frontier region is often preceded by many unsuccessful exploration wells. Seismic coverage is sparse in the region, so many significant structures have not been recognized. Some of the wells were drilled in less than optimum locations; Doyon No. 1 well was drilled in an area of thermally supermature sediments and it did not penetrate below the Jurassic stratal horizon.

Distribution of resources in the Yukon

Hydrocarbon plays in Kandik Basin occupy areas on both sides of the Yukon/Alaska boundary. If it can be assumed that the hydrocarbon resource is evenly distributed throughout the play areas, the proportion of resource in the Yukon can be estimated by comparing play areas between the two countries. The location of the largest field cannot be determined, so two scenarios are proposed; scenario 1 where the largest field is assumed to be in the Yukon, and scenario 2 where the largest field is in Alaska. Table 2 itemizes the diminished oil and gas potential for Kandik Basin in the Yukon Territory under the two scenarios. About 35% of the play areas for the Tertiary/Upper Cretaceous nonmarine oil and gas play is located in the Yukon (Figure 5), so the amount of oil and gas predicted, if the largest undiscovered field is assumed to be in the Yukon is 12 million m^3 and 2849 million m^3, respectively. If, however, the largest field is assumed to be in Alaska, then the potential is estimated to be 8.8 million and 1993 million m^3 of oil and gas, respectively (Table 2). The Mesozoic part of the succession has an oil and gas component, but thermal maturity considerations restrict the oil window to the Alaska portion of the basin. Consequently, no oil assessment was completed for the Mesozoic play. Natural gas potential is estimated to be 7662 and 4552 million m^3 of in-place volumes under the two scenarios under the provision that 45% of the play area is in Yukon (Figure 10). About 15% of the Paleozoic play within the oil window is found in Canada (Figure 14). If the largest field is predicted to be in Yukon, then the oil potential is 13.5 million m^3 in-place. On the other hand, the assumption that the largest field is not in the Yukon reduces the oil potential to only 2.5 million m^3. This reflects the large trapping configurations in the play producing the relatively large oil field accumulations (largest field size is predicted to be 11 million m³). In the much larger Paleozoic gas play area, 52% of the area is in Yukon (Figure 13). Scenario 1 indicates that the Yukon portion of Paleozoic gas is 13,634 million m³ in-place. Scenario 2 suggests that Yukon gas is 8,795 million m³.

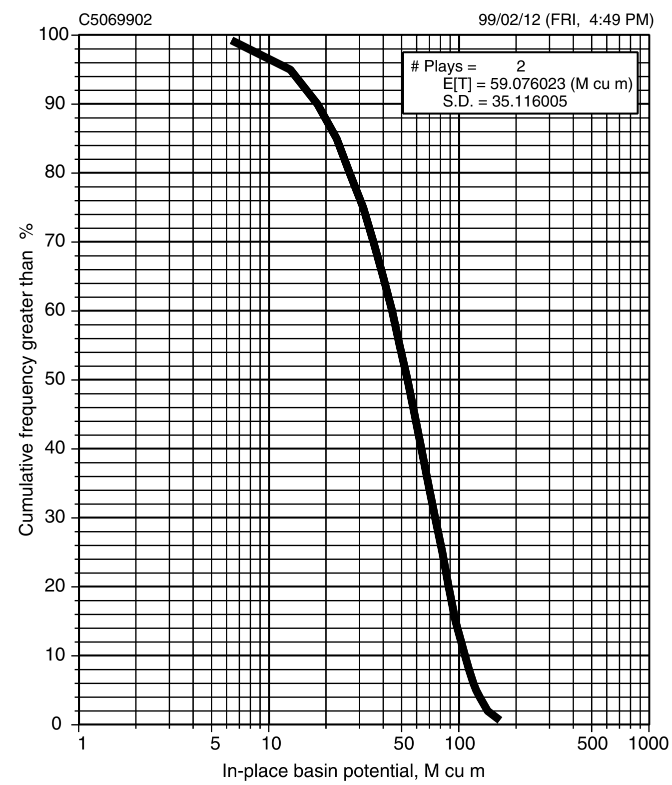


Figure 19. *Estimate of total oil potential for the Kandik region. Median value of probabilistic assessment is 54 million m³ of in-place oil.*

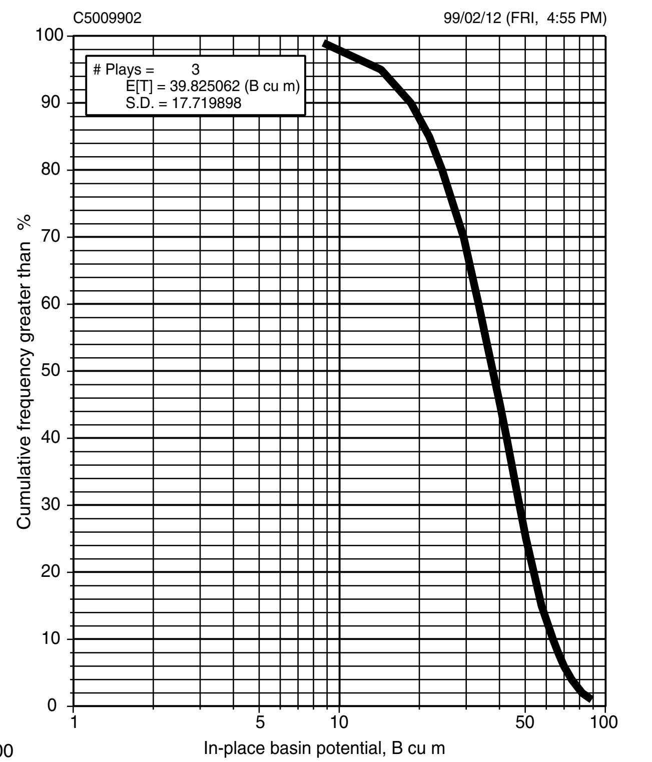


Figure 20. *Estimate of total gas potential for the Kandik region. Median value of probabilistic assessment is 37,792 million m³ of in-place gas.*

CONCLUSIONS

The oil and gas resource potential of Kandik Basin has been evaluated through regional hydrocarbon play assessments. The quantitative assessments were derived using the Geological Survey of Canada's (PETRIMES) assessment methodology system. The assessments included analyses of 5 conceptual plays, each of which incorporated the calculation or estimation of field size parametric data, numbers of prospects and exploration risks. Oil and gas volumes reported for these conceptual plays are total statistical estimates of the resource present 'in the ground', not the volumes that are economically producible. Individual field-size determinations are important in identifying which plays are attractive for exploration programs.

Median estimates for total oil and gas potentials for all Kandik plays are 54 million m^3 of in-place oil and 38 billion m^3 of in-place gas (Figs. 19, 20; Table 1). In-place oil and gas potential for all plays except the Mesozoic marine oil play, encompasses both Yukon and Alaska portions of the basin. Mesozoic marine oil potential occurs in Alaska only.

Resource estimates are quoted initially for the entire area. After the numerical analysis, the total resource for the Yukon area is estimated proportionately by area and sedimentary volume, and separate cases are proposed based on location of the largest predicted field. The portion of the resource estimated to exist in the Yukon is 25.5 million m^3 oil and 24,145 million m^3 gas in the case where the largest pool occurs on the Yukon side of the border. The portion of the resource estimated to exist in the Yukon is 11.3 million m^3 oil and 15,340 million m^3 gas in the case where the largest pool is predicted to occur on the Alaska side of the border.

The potential for significant hydrocarbon accumulations in Kandik Basin is achieved by the combined presence of numerous and diverse trapping configurations, good to excellent petroleum source rocks in favourable stratal positions and reservoir-quality strata in some parts of the stratigraphic column. However, significant risks associated with breaching of traps associated with deep-seated erosion along crests of structures, lack of porosity in Paleozoic and Mesozoic strata, and thermal maturity considerations reduces overall hydrocarbon potential. Significant gas potential is predicted for the Mesozoic and Paleozoic marine structural plays, even though risk factors are substantial in the plays. Estimates for oil potential are less optimistic. The complex geology and anticipated high exploration risks associated with the plays suggest that considerable amounts of new seismic data and exploration wells may be required to properly evaluate the region's oil and gas potential.

REFERENCES

Bird, T.D., Barclay, J.E., Campbell, R.I., and Lee, P.J., 1994. Triassic gas resources of the Western Canada Sedimentary Basin; Part I. Geological play analysis and resource assessment; Geological Survey of Canada, Bulletin 483, 66 p.

Brabb, E.E. and Churkin, M., Jr., 1969. Geologic map of the Charley River quadrangle, east-central Alaska; United States Geological Survey, Miscellaneous Geologic Investigations, Map I-573, Scale: 1:250,000.

Dixon, J., 1997. Cretaceous and Tertiary, Chapter 11; *In:* Geology and Mineral and Hydrocarbon Potential of Northern Yukon Territory and Northwestern District of Mackenzie; J.K. Norris (ed.); Geological Survey of Canada, Bulletin 422, p. 301-317.

Dixon J., Morrell, G.R., Dietrich, J.R., Procter, R.M., and Taylor, G.C., 1994. Petroleum resources of the Mackenzie Delta and Beaufort Sea; Geological Survey of Canada, Bulletin 474, 44 p.

Dover, J.H., 1992. Geologic map and fold- and thrust-belt interpretation of the southeastern part of the Charley River quadrangle, east-central Alaska; United States Geological Survey, Miscellaneous Investigations Series, Map I-1942, Scale: 1:1,000,000.

Fritz, W.H., 1997. Cambrian, Chapter 5; *In:* Geology and Mineral and Hydrocarbon Potential of Northern Yukon Territory and Northwestern District of Mackenzie; J.K. Norris (ed.); Geological Survey of Canada, Bulletin 422, p. 85-117.

Hite, D.M., 1997. A native corporation evaluates potential of Alaska's Kandik area; Oil and Gas Journal, Nov. 17, 1997, p. 89-93.

Howell, D.G., 1996. Kandik Basin; *In:* 1995 National Assessment of United States Oil and Gas Resources-Results, Methodology, and Supporting Data; D.L. Gautier, G.L. Dolton, K.I. Takahashi and K.L. Varnes (eds.); U.S. Geological Survey Digital Data Series-30, Release 2, CD-ROM.

Inexco Oil Company, 1970. Well history report, Inc Husky Amoco Black-fly YT M-55; Geological Survey of Canada internal files.

Inexco Oil Company, 1971. Operations report of reflection and refraction survey of Kandik area, Yukon Territory; Geological Survey of Canada internal files.

Inexco Oil Company, 1972a. Well history report, Inexco Husky et al Porcupine YT G-31; Geological Survey of Canada internal files.

Inexco Oil Company, 1972b. Well history report, Inexco et al Mallard YT O-18; Geological Survey of Canada internal files.

Johnsson, M.J., Howell, D.G. and Bird, K.J., 1998. Thermal maturity patterns in Alaska: Implications for tectonic evolution and hydrocarbon potential; American Association of Petroleum Geologists, Bulletin, v. 77, no. 11, p. 1874-1903.

Klemme, H.D., 1984. Field-size distribution related to basin characteristics; *In:* Petroleum Resource Assessment, C.D. Masters (ed.), International Union of Geological Sciences, Publication No. 17, p. 95-121.

Lee, P.J., 1993. Two decades of Geological Survey of Canada petroleum resource assessments; Canadian Journal of Earth Sciences, v. 30, p. 321-332.

Lee, P.J. and Tzeng, H.P., 1989. The petroleum exploration and resource evaluation system (PETRIMES): working reference guide; Institute of Sedimentary and Petroleum Geology, Calgary, Alberta, 258 p.

Lee, P. J. and Wang, P.C.C., 1990. An introduction to petroleum resource evaluation methods; Canadian Society of Petroleum Geologists, 1990 Convention on Basin Perspectives, Short Courses Program: SC-2 Petroleum Resource Evaluation, 108 p.

Masters, C.D., 1984. Petroleum resource assessment; International Union of Geological Sciences, Publication No. 17, 157 p.

Norris, D.K., 1984. Geology of the northern Yukon and northwestern District of Mackenzie; Geological Survey of Canada, Map 1581A, scale 1:500,000.

Norris, D.K.,1997. Geological setting, Chapter 3; *In:* Geology and Mineral and Hydrocarbon Potential of Northern Yukon Territory and Northwestern District of Mackenzie; J.K. Norris (ed.); Geological Survey of Canada, Bulletin 422, p. 21-64.

Northern Oil and Gas Directorate, 1995. Kandik Basin, Chapter 3, Northern Yukon; *In:* Petroleum Exploration in Northern Canada: A Guide to Oil and Gas Exploration and Potential, G.R. Morrell (ed.); Indian and Northern Affairs Canada, p. 49-53.

Podruski, J.A., Barclay, J.E., Hamblin, A.P., Lee, P.J., Osadetz, K.G., Procter, R.M., and Taylor, G.C., 1988. Conventional oil resources of Western Canada (light and medium), Part I: Resource endowment; Geological Survey of Canada, Paper 87-26, p. 1-125.

Potential Gas Committee, 1990. Definitions and procedures for estimation of potential gas resources; Potential Gas Agency, Colorado School of Mines.

Reinson, G.E., Lee, P.J., Warters, W., Osadetz, K.G., Bell, L.L., Price, P.R., Trollope, F., Campbell, R.I., and Barclay, J.E., 1993. Devonian gas resources of the Western Canada Sedimentary Basin; Part I: Geological play analysis and resource assessment; Geological Survey of Canada, Bulletin 452, p. 1- 127.

Rice, D.D., 1986. Oil and gas assessment — methods and applications; American Association of Petroleum Geology, Studies in Geology, no. 21, 267 p.

Richards, B.C., Bamber, E.W., and Utting, J., 1997. Upper Devonian to Permian, Chapter 8; *In:* Geology and Mineral and Hydrocarbon Potential of Northern Yukon Territory and Northwestern District of Mackenzie; J.K. Norris (ed.); Geological Survey of Canada, Bulletin 422, p. 201-251.

Ricketts, B.D., 1988. The Monster Formation: A coastal fan system of Late Cretaceous age, Yukon Territory; Geological Survey of Canada, Paper 86-14, 27 p.

Sinclair, I.K., McAlpine, K.D., Sherwin, D.F., and McMillan, N.J., 1992. Petroleum resources of the Jeanne D'Arc Basin and environs; Part I: Geological Framework; Geological Survey of Canada, Paper 92-8.

Snowdon, L.R. and Price, P.R., 1994. Rock-eval/TOC data for three wells in the Kandik Basin, western Yukon Territory; Geological Survey of Canada, Open File 2899, 31 p.

Wade, J.A., Campbell, G.R., Procter, R.M., and Taylor, G.C., 1989. Petroleum resources of the Scotian Shelf; Geological Survey of Canada, Paper 88-19, 26 p.

White, D.A. and Gehman, H.M., 1979. Methods of estimating oil and gas resources; American Association of Petroleum Geologists, Bulletin, v. 63, no. 12, p. 2183-2192.

APPENDIX 1

ROCK-EVAL/TOC DATA FOR THREE WELLS IN THE KANDIK BASIN, WESTERN YUKON TERRITORY

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Rock-Eval/TOC pyrolysis analyses have been carried out for the following three wells in the Kandik Basin, Yukon Territory:

- Inexco Husky Amoco Black-fly M-55 (65°54'55"N 140°25'55"W),
- Inexco Mallard YT O-18 (65°47'58.00"N 140°17'41"W), and
- Inexco Husky Porcupine G-31 (66°20'22"N 140°06'13"W).

These wells were drilled between 1970 and 1972 and "excess bag cuttings" stored at the Institute of Sedimentary and Petroleum Geology since that time were the samples used for this study. Similar work carried out in Eagle Plains Basin (Snowdon, 1988) on old cuttings yielded very good results and so the rather negative results obtained for these wells are presumed to actually be representative of the sections drilled.

The raw data are presented in Table 1 (also on diskette) and Figures 1 to 3. All depths are reported in feet because these are the units in which the wells were drilled and in which the well data are reported. The results indicate that the entire section represented in all three of these wells is at a high level of thermal maturity. With the exception of selected intervals within the Ford Lake shale in the Mallard YT O-18 well (thrust repeated) and the shallowest portion of the Porcupine G-31 well (Devonian), very few samples have total organic carbon (TOC) contents in excess of 1%. The low TOC values reflect the high maturity as well as the original organic content of these rocks.

These results are consistent with high vintrinite reflectance values (generally >2% VRo) reported by Underwood et al. (1992, Figure 8) for the Kandik River belt on the north side of the Glenn Creek Fault on the Alaska side of the border.

It must be concluded that there is no residual oil generation potential and limited to no gas generation potential for the Paleozoic sections represented in these wells. Indications from the Alaska data are that there may be some residual petroleum potential for Mesozoic and Tertiary sections over part of the Canadian portion of the Kandik Basin.

SELECTED REFERENCES

Laughland, M.M, Underwood, M.B. and Wiley, T.J. 1990. Thermal maturity, tectonostratigraphic terranes, and regional tectonic history; an example from the Kandik area, east-central Alaska; *In:* V.F. Nuccia, C.E. Barker, and S.J. Dyson (eds.) Applications of thermal maturity studies to energy exploration; Eastwood Printing and Pulishing, Denver, Colorado; p. 97-112.

Snowdon, L.R., 1988. Petroleum source rock potential and thermal maturation reconnaissance in Eagle Plain, Yukon Territory; Geological Survey of Canada Open File Report 1720, 115 p.

Underwood, J.B., Brocculeri, T., Bergfeld, D., Howell, D.G. and Pawlewicz, M.J., 1992. Statistical comparison between illite crystallinity and vitrinite reflectance, Kandik region of east-central Alaska; *In:* D.C. Bradley and C. Dusel-Bacon (eds.) Geologic Studies in Alaska, United States Geological Survey Bulletin 2041, p. 3222-237.

Underwood, M.B., Laughland, M.M. , Wiley, T.J. and Howell, D.G., 1989. Thermal maturity and organic geochemistry of the Kandik Basin region, east-central Alaska; United States Geological Survey Open File Report 89-0353, 41 p.

Other similar GSC Rock-Eval data available in GSC Open File Reports

Fowler, M.G. and Snowdon, L.R., 1988. Rock-Eval/TOC data from an additional seven wells located within the Jeanne d'Arc Basin, offshore Newfoundland; Geological Survey of Canada Open File Report 1735, 48 p.

Fowler, M.G. and Snowdon, L.R., 1989. Rock-Eval/TOC data from wells located in the southern Grand Banks and the Jeanne d'Arc basin, offshore Newfoudland; Geological Survey of Canada Open File Report 2025, 37 p.

Fowler, M.G., Snowdon, L.R., Stewart, K.R. and McAlpine, K.D., 1990. Rock-Eval/TOC data from 9 wells located offshore Newfoundland; Geological Survey of Canada Open File Report 2271, 74 p.

Fowler, M.G., Snowdon, L.R., Stewart, K.R. and McAlpine, K.D., 1991. Rock-Eval/TOC data from five wills located within the Jeanne d'Arc Basin, offshore Newfoundland; Geological Survey of Canada Open File Report 2392, 41 p.

Leckie, D.A., Kalkreuth, W.D. and Snowdon, L.R., 1987. Results of Rock-Eval/ TOC analysis of core through the Lower Cretaceous; Monkman Pass area, northeastern British Columbia; Geological Survey of Canada Open File Report #1516, 49 p.

Riediger, C.L., 1990. Rock-Eval/TOC data from the lower Jurassic "Nordegg Member", and the lower and middle Triassic Doig and Montney formations, Western Canada Sedimentary Basin, Alberta and British Columbia; Geological Survey of Canada Open File Report 2308, 27 p.

Snowdon, L.R., 1993. Rock-Eval/TOC results from 14 southwest Alberta wells, Townships 3-26: Ranges 1-8W5; Geological Survey of Canada Open File Report 2670, 190 p.

Snowdon, L.R., 1990. Rock-Eval/TOC results from 29 Beaufort-Mackenzie wells; Geological Survey of Canada Open File Report #2192, 209 p.

Snowdon, L.R., 1990. Rock-Eval/TOC data for 55 northwest and Yukon Territories wells (60-69 degrees N); Geological Survey of Canada Open File Report 2327, 211 p.

Snowdon, L.R., 1988. Petroleum source rock potential and thermal maturation reconnaissance in Eagle Plain, Yukon Territory; Geological Survey of Canada Open File Report 1720, 115 p.

Snowdon, L.R. and Fowler, M.G., 1986a. Rock-Eval/TOC data from seven wells located within the Jeanne d'Arc Basin, offshore Newfoundland; Geological Survey of Canada Open File Report #1382, 42 p.

Snowdon, L.R. and Fowler, M.G., 1986b. Oil Show Analyzer, Rock-Eval and TOC data for six Scotian Shelf wells; Geological Survey of Canada Open File Report #1403, 49 p.

INEXCO HUSKY AMOCO BLACKFLY M-55 0 6030 300 .50

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
60F	.54	.61	.74	366	.45	.29	.84	53	155
90	.77	.56	1.65	377	.92	.73	1.19	94	154
120	.82	.59	2.30	379	1.35	.95	1.38	115	168
140	.77	.54	1.89	378	1.03	.86	1.23	111	159
180	.79	.58	1.86	371	1.08	.78	1.32	98	167
240	.32	.69	.48	332	.33	.15	.20	46	62
270	.79	.51	1.27	345	.65	.62	1.31	78	165
300	.87	.49	2.28	372	1.12	1.16	1.42	133	163
330	.55	.61	1.02	371	.62	.40	.52	72	94
360	.60	.56	1.31	337	.74	.57	1.05	95	175
390	.54	.71	.76	369	.54	.22	.19	40	35
420	.44	.75	.51	0	.38	.13	.18	29	40
470	.54	.69	.78	382	.54	.24	.23	44	42
510	.49	.66	.64	369	.42	.22	.69	44	140
540	.61	.68	.82	374	.56	.26	.49	42	80
570	.53	.64	1.14	362	.73	.41	.40	77	75
600	.52	.70	.80	368	.56	.24	.39	46	75
630	.60	.63	1.45	384	.92	.53	.59	88	98
700	.90	.62	3.48	372	2.16	1.32	1.12	146	124
770	.56	.67	.83	374	.56	.27	.52	48	92
810	.59	.63	1.16	374	.73	.43	.33	72	55
840	.69	.56	1.71	394	.95	.76	.57	110	82
870	.49	.69	.75	363	.52	.23	.21	46	42
900	.56	.67	.81	372	.54	.27	.59	48	105
930	.54	.75	.55	362	.41	.14	.25	25	46
940	.53	.72	.64	366	.46	.18	.41	33	77
990	.51	.71	.80	364	.57	.23	.33	45	64
1020	.69	.69	2.03	367	1.41	.62	.27	89	39
1050	.47	.70	.63	365	.44	.19	.22	40	46
1080	.43	.77	.65	361	.50	.15	.19	34	44
1110	.51	.72	1.42	373	1.02	.40	.23	78	45
1140	.56	.68	1.39	375	.95	.44	.35	78	62
1170	.50	.69	1.01	367	.70	.31	.51	62	102
1200	.59	.70	1.79	373	1.25	.54	.49	91	83
1230	.40	.75	.51	368	.38	.13	.55	32	137
1260	.56	.52	1.19	344	.62	.57	1.31	101	233
1290	.50	.63	.70	370	.44	.26	.74	52	148
1320	.51	.69	1.19	381	.82	.37	.87	72	170
1350	.40	.69	1.34	382	.92	.42	.52	105	130
1380	.37	.70	.47	352	.33	.14	.48	37	129
1410	.31	.65	.54	368	.35	.19	.50	61	161
1440	.44	.66	.87	367	.57	.30	.30	68	68
1460	.51	.69	.99	365	.68	.31	.16	60	31
1500	.51	.63	1.52	373	.95	.57	.30	111	58
1540	.17	.73	.67	366	.49	.18	.12	105	70
1570	.15	.66	.61	401	.40	.21	.15	140	100
1590	.10	.79	.43	314	.34	.09	.12	90	120
1620	.16	.78	.67	377	.52	.15	.21	93	131
1680	.20	.73	.40	363	.29	.11	.09	55	45
1710	.32	.62	.93	372	.58	.35	.18	109	56
1740	.34	.52	.77	401	.40	.37	.23	108	67
1770	.17	.82	.62	323	.51	.11	.27	64	158
1800	.18	.80	.82	371	.66	.16	.25	88	138
1830	.23	.70	.82	373	.57	.25	.15	108	65
1830	.12	.71	.52	377	.37	.15	.10	125	83
1860	.38	.68	1.87	379	1.27	.60	.23	157	60
1890	.16	.79	.85	379	.67	.18	.38	112	237
1920	.18	.70	.84	367	.59	.25	.32	138	177
1950	.12	.78	.73	393	.57	.16	.22	133	183
1980	.05	.91	.22	327	.20	.02	.11	40	220
2010	.31	.67	.61	371	.41	.20	.16	64	51
2040	.13	.81	.26	373	.21	.05	.26	38	200
2070	.28	.69	.64	368	.44	.20	.19	71	67
2100	.09	.74	.35	0	.26	.09	.13	100	144
2130	.03	.79	.14	403	.11	.03	.22	100	733
2160	.28	.67	.33	374	.22	.11	.20	39	71
2190	.21	.71	.28	364	.20	.08	.26	38	123
2220	.14	.91	.11	336	.10	.01	.20	7	142
2250	.29	.61	.57	378	.35	.22	.57	75	196
2280	.26	.70	.30	343	.21	.09	.32	34	123
2310	.28	.75	.32	370	.24	.08	.16	28	57
2340	.28	.67	.40	373	.27	.13	.14	46	50
2370	.21	.74	.27	323	.20	.07	.13	33	61

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
2430	.25	.74	.27	325	.20	.07	.21	27	84
2460	.11	.87	.16	0	.14	.02	.29	18	263
2490	.22	.63	.27	0	.17	.10	.45	45	204
2520	.37	.77	.26	393	.20	.06	.38	16	102
2550	.27	.70	.43	369	.30	.13	.33	48	122
2580	.13	1.00	.10	0	.10	.00	.25	0	192
2610	.18	.89	.19	0	.17	.02	.29	11	161
2640	.24	.65	.40	325	.26	.14	.28	58	116
2650	.18	.71	.72	377	.51	.21	.14	116	77
2670	.03	1.00	.10	0	.10	.00	.28	0	933
2700	.15	.88	.24	0	.21	.03	.35	20	233
2730	.07	.86	.21	0	.18	.03	.09	42	128
2760	.04	1.00	.07	0	.07	.00	.11	0	275
2790	.08	1.00	.18	0	.18	.00	.26	0	325
2820	.65	.83	4.19	425	3.46	.73	.37	112	56
2850	.11	.93	.30	0	.28	.02	.21	18	190
2880	.20	.75	.44	345	.33	.11	.28	55	140
2910	.20	.73	.44	326	.32	.12	.22	60	110
2940	.23	.81	.21	0	.17	.04	.21	17	91
2970	.14	.71	.48	0	.34	.14	.11	100	78
3000	.21	.73	.30	325	.22	.08	.26	38	123
3030	.17	.65	.37	330	.24	.13	.15	76	88
3060	.05	.92	.12	0	.11	.01	.12	20	240
3090	.10	.79	.29	408	.23	.06	.13	60	130
3120	.18	.72	.47	324	.34	.13	.10	72	55
3150	.23	.78	.41	0	.32	.09	.15	39	65
3180	.15	.87	.32	0	.28	.04	.10	26	66
3210	.22	.73	.37	368	.27	.10	.18	45	81
3240	.27	.78	.73	365	.57	.16	.27	59	100
3280	.26	.80	.40	0	.32	.08	.15	30	57
3300	.30	.68	.50	327	.34	.16	.13	53	43
3330	.25	.78	.32	0	.25	.07	.14	27	55
3360	.20	.83	.75	304	.62	.13	.18	65	90
3390	.21	.79	.53	380	.42	.11	.13	52	61
3420	.20	.72	.50	380	.36	.14	.20	70	100
3450	.34	.74	.80	370	.59	.21	.21	61	61
3480	.25	.78	.49	336	.38	.11	.16	44	64
3510	.28	.73	.88	370	.64	.24	.12	85	42
3550	.31	.72	.81	374	.58	.23	.19	74	61
3570	.23	.69	.62	376	.43	.19	.10	82	43
3600	.20	.76	.54	309	.41	.13	.07	65	35
3630	.20	.71	.59	350	.42	.17	.08	85	40
3660	.33	.69	.96	380	.66	.30	.16	90	48
3690	.21	.75	.51	374	.38	.13	.14	61	66
3720	.28	.67	.84	386	.56	.28	.16	100	57
3750	.10	.74	.34	330	.25	.09	.07	90	70
3780	.20	.66	.47	386	.31	.16	.12	80	60
3810	.23	.68	.66	392	.45	.21	.34	91	147
3840	.26	.70	.64	377	.45	.19	.25	73	96
3870	.06	.79	.39	396	.31	.08	.05	133	83
3900	.45	.84	3.50	431	2.93	.57	.32	126	71
3930	.02	1.00	.16	0	.16	.00	.03	0	150
3960	.06	.92	.51	0	.47	.04	.08	66	133
3990	.04	.88	.34	0	.30	.04	.07	100	174
4030	.04	.95	.21	0	.20	.01	.05	25	125
4050	.03	.96	.26	0	.25	.01	.13	33	433
4080	.04	1.00	.28	0	.28	.00	.07	0	174
4110	.07	.96	.28	0	.27	.01	.23	14	328
4140	.03	.96	.27	354	.26	.01	.16	33	533
4170	.05	1.00	.13	0	.13	.00	.13	0	260
4200	.03	1.00	.13	0	.13	.00	.10	0	333
4230	.09	.88	.26	0	.23	.03	.12	33	133
4260	.02	1.00	.15	0	.15	.00	.13	0	650
4290	70.09	.94	.17	0	.16	.01	.23	0	0
4320	.05	1.00	.11	0	.11	.00	.13	0	260
4350	.08	.57	.28	421	.16	.12	.33	150	412
4380	.03	1.00	.09	0	.09	.00	.06	0	200
4410	.04	.95	.19	0	.18	.01	.08	25	200
4440	.08	.84	.38	0	.32	.06	.15	75	187
4470	.06	.95	.20	0	.19	.01	.08	16	133
4510	.07	.95	.20	0	.19	.01	.10	14	142
4530	.11	.95	.21	0	.20	.01	.10	9	90

INEXCO HUSKY AMOCO BLACKFLY M-55 0 6030 300 .50

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
4560	.03	1.00	.14	0	.14	.00	.16	0	533
4590	.08	.89	.37	0	.33	.04	.10	50	125
4620	.02	1.00	.09	0	.09	.00	.06	0	300
4650	.12	.80	.20	0	.16	.04	.08	33	66
4680	.10	.87	.23	379	.20	.03	.09	30	90
4710	.10	.90	.20	420	.18	.02	.05	20	50
4740	.10	.84	.32	0	.27	.05	.08	50	80
4770	.09	.82	.17	0	.14	.03	.15	33	166
4800	.16	.88	.17	0	.15	.02	.11	12	68
4830	.20	.94	.17	0	.16	.01	.16	5	80
4860	.16	.78	.27	0	.21	.06	.11	37	68
4890	.17	.88	.24	401	.21	.03	.08	17	47
4910	.25	.51	.85	387	.43	.42	.17	168	68
4950	.10	.81	.36	313	.29	.07	.14	70	140
4980	.08	1.00	.15	0	.15	.00	.06	0	75
5010	.12	.81	.21	0	.17	.04	.11	33	91
5040	.15	.72	.36	0	.26	.10	.06	66	40
5070	.21	.77	.31	0	.24	.07	.09	33	42
5100	.18	.66	.35	318	.23	.12	.10	66	55
5130	.14	.56	.18	408	.10	.08	.11	57	78
5160	.17	.78	.72	395	.56	.16	.20	94	117
5190	.09	.92	.12	0	.11	.01	.07	11	77
5200	.15	.65	.26	342	.17	.09	.21	60	140
5310	.18	.75	.20	0	.15	.05	.24	27	133
5340	.17	.67	.18	323	.12	.06	.15	35	88
5370	.18	.73	.22	380	.16	.06	.26	33	144
5400	.31	.88	1.97	374	1.74	.23	.08	74	25
5430	.22	.67	.43	386	.29	.14	.11	63	50
5460	.15	.75	.12	0	.09	.03	.14	20	93
5490	.20	.90	.10	0	.09	.01	.25	5	125
5520	.17	1.00	.07	0	.07	.00	.22	0	129
5550	.20	.75	.08	0	.06	.02	.24	10	120
5580	.18	.78	.18	0	.14	.04	.11	22	61
5610	.13	1.00	.07	0	.07	.00	.12	0	92
5640	.15	1.00	.08	0	.08	.00	.14	0	93
5670	.15	1.00	.11	0	.11	.00	.10	0	66
5700	.30	.74	.42	0	.31	.11	.06	36	20
5730	.19	.92	.12	0	.11	.01	.22	5	115
5760	.13	.82	.11	0	.09	.02	.13	15	100
5790	.25	.92	.12	0	.11	.01	.29	4	116
5820	.25	.72	.18	305	.13	.05	.19	20	76
5850	.27	.78	.36	0	.28	.08	.14	29	51
5880	.23	.82	.22	0	.18	.04	.11	17	47
5910	.26	.83	.24	0	.20	.04	.08	15	30
5940	.28	.90	.21	0	.19	.02	.14	7	50
5970	.33	.85	.20	382	.17	.03	.12	9	36
6000	.71	.81	3.54	373	2.88	.66	.14	92	19
6030	.53	.79	.62	390	.49	.13	.05	24	9

Jungle Creek Fm	-1528F
Ettrain Fm	-3887
Blackie Fm	-4644
Ford Lake Sh	-6790

INEXCO MALLARD YT O-18 010440 300 .50

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
50F	1.15	.33	3.74	382	1.22	2.52	1.19	219	103
80	.59	.89	.27	406	.24	.03	.14	5	23
110	1.40	1.00	.13	0	.13	.00	.24	0	17
140	.65	.78	.18	0	.14	.04	.10	6	15
170	.45	1.00	.10	0	.10	.00	.55	0	122
200	.35	1.00	.10	0	.10	.00	.08	0	22
230	.38	.81	.16	0	.13	.03	.07	7	18
260	.45	.74	.27	312	.20	.07	.12	15	26
290	.34	1.00	.14	0	.14	.00	.08	0	23
320	.33	.75	.24	363	.18	.06	.12	18	36
350	.45	.52	.31	361	.16	.15	.54	33	120
380	.39	.68	.25	422	.17	.08	.21	20	53
410	.27	.63	.16	312	.10	.06	.12	22	44
440	.56	.91	.22	0	.20	.02	.14	3	25
470	.33	1.00	.07	0	.07	.00	.06	0	18
500	.29	1.00	.08	0	.08	.00	.04	0	13
530	.23	.50	.12	372	.06	.06	.06	26	26
560	.32	.56	.09	368	.05	.04	.10	12	31
590	.63	.10	.71	377	.07	.64	.83	101	131
620	.34	.41	.22	385	.09	.13	.12	38	35
650	.20	.50	.10	312	.05	.05	.05	25	25
680	.28	.41	.29	367	.12	.17	.14	60	50
710	.20	.44	.18	375	.08	.10	.05	50	25
740	.19	.57	.14	373	.08	.06	.03	31	15
770	.13	.47	.17	373	.08	.09	.02	69	15
800	.14	.39	.18	390	.07	.11	.06	78	42
830	.40	.12	.81	377	.10	.71	.83	177	207
860	.10	.39	.18	372	.07	.11	.05	110	50
890	.13	.31	.16	374	.05	.11	.08	84	61
920	.10	.41	.22	371	.09	.13	.12	130	120
950	.06	.38	.08	332	.03	.05	.04	83	66
980	.07	.43	.07	324	.03	.04	.16	57	228
1010	.06	.38	.08	350	.03	.05	.02	83	33
1040	.08	.33	.09	360	.03	.06	.03	75	37
1070	.12	.52	.29	339	.15	.14	.13	116	108
1100	.06	.40	.05	380	.02	.03	.02	50	33
1130	.12	.38	.13	374	.05	.08	.03	66	25
1160	.07	.67	.06	317	.04	.02	.03	28	42
1190	.03	.38	.08	321	.03	.05	.01	166	33
1250	.06	1.00	.05	0	.05	.00	.02	0	33
1280	.06	.67	.09	0	.06	.03	.06	50	100
1310	.11	.52	.23	0	.12	.11	.19	100	172
1340	.10	.85	.13	312	.11	.02	.06	20	60
1370	.14	.82	.17	312	.14	.03	.04	21	28
1400	.14	.81	.21	424	.17	.04	.05	28	35
1430	.35	.96	.23	0	.22	.01	.06	2	17
1460	.19	.71	.28	304	.20	.08	.06	42	31
1490	.05	.75	.16	300	.12	.04	.07	80	140
1520	.07	1.00	.07	0	.07	.00	.02	0	28
1550	.16	1.00	.12	0	.12	.00	.05	0	31
1580	.19	.86	.14	303	.12	.02	.05	10	26
1610	.14	.73	.22	370	.16	.06	.05	42	35
1640	.47	.81	.26	312	.21	.05	.08	10	17
1670	.22	.62	.21	348	.13	.08	.08	36	36
1700	.32	.77	.47	0	.36	.11	.09	34	28
1730	.33	.71	.41	321	.29	.12	.10	36	30
1760	.39	.78	.18	393	.14	.04	.08	10	20
1790	.45	.63	.27	307	.17	.10	.11	22	24
1820	.36	.82	.17	311	.14	.03	.07	8	19
1850	.50	.63	.67	385	.42	.25	.13	50	26
1880	.33	.86	.14	324	.12	.02	.06	6	18
1910	.41	.67	.43	416	.29	.14	.14	34	34
1940	.20	.63	.38	385	.24	.14	.07	70	35
1970	.38	.73	.48	354	.35	.13	.12	34	31
2000	.40	.92	.12	0	.11	.01	.05	2	12
2030	.25	.58	.43	409	.25	.18	.15	72	60
2060	.33	.72	.36	379	.26	.10	.10	30	30
2090	.23	.54	.37	408	.20	.17	.12	73	52
2120	.19	.81	.21	327	.17	.04	.10	21	52
2150	.25	.68	.25	326	.17	.08	.06	32	24
2180	.26	.63	.40	394	.25	.15	.09	57	34
2210	.44	.80	.25	309	.20	.05	.06	11	13
2240	.91	1.00	.01	0	.01	.00	.06	0	6
2270	.30	.00	.01	0	.00	.01	.03	3	10
2300	.29	.67	.40	338	.27	.13	.10	44	34
2330	.35	.73	.40	0	.29	.11	.11	31	31
2360	.30	.69	.26	305	.18	.08	.11	26	36
2390	.40	.71	.35	304	.25	.10	.10	25	25
2420	.33	.81	.31	0	.25	.06	.09	18	27
2450	.33	.55	.56	395	.31	.25	.14	75	42
2480	.31	.73	.26	302	.19	.07	.09	22	29
2510	.13	.74	.19	389	.14	.05	.09	38	69
2540	.33	.65	.34	330	.22	.12	.11	36	33
2570	.25	.72	.25	349	.18	.07	.12	27	48
2630	.09	.78	.09	423	.07	.02	.12	22	133
2660	.28	.76	.33	301	.25	.08	.14	28	50
2690	.73	.83	.30	0	.25	.05	.12	6	16
2730	.65	.65	.20	305	.13	.07	.15	10	23
2750	.27	.64	.25	353	.16	.09	.11	33	40
2780	.49	.74	.27	0	.20	.07	.12	14	24
2810	.23	.89	.09	0	.08	.01	.07	4	30
2840	.19	.79	.19	0	.15	.04	.08	21	42
2870	.26	.69	.42	312	.29	.13	.12	50	46
2900	.15	.71	.21	0	.15	.06	.07	40	46
2930	.11	.90	.10	0	.09	.01	.04	9	36
2960	.18	.85	.20	312	.17	.03	.07	16	38
2990	.11	.92	.12	0	.11	.01	.04	9	36
3020	.11	.85	.13	0	.11	.02	.09	18	81
3050	.09	.83	.12	0	.10	.02	.07	22	77
3080	.42	.69	.51	426	.35	.16	.13	38	30
3110	.31	.64	.59	399	.38	.21	.18	67	58
3140	1.07	.70	.27	349	.19	.08	.17	7	15
3170	.14	.68	.19	343	.13	.06	.10	42	71
3200	.63	.71	.17	304	.12	.05	.11	7	17
3230	.14	.67	.24	339	.16	.08	.09	57	64
3260	.53	.71	.28	0	.20	.08	.16	15	30
3290	1.30	.85	.13	0	.11	.02	.13	1	10
3320	.25	.73	.22	301	.16	.06	.11	24	44
3350	.22	.71	.31	381	.22	.09	.13	40	59
3380	.15	.75	.08	0	.06	.02	.08	13	53
3440	1.41	.68	.38	319	.26	.12	.14	8	9
3470	3.48	1.00	.02	0	.02	.00	.23	0	6
3500	4.31	1.00	.02	0	.02	.00	.38	0	8
3530	4.22	.00	.01	0	.00	.01	.37	0	8
3560	3.44	.75	.08	377	.06	.02	.30	0	8
3590	3.82	.71	.07	306	.05	.02	.40	0	10
3620	4.02	.00	.01	0	.00	.01	.28	0	6
3650	.94	.82	.22	0	.18	.04	.14	4	14
3650	3.08	.00	.01	0	.00	.01	.27	0	8
3710	.54	.61	.23	312	.14	.09	.10	16	18
3740	.85	1.00	.08	0	.08	.00	.08	0	9
3770	.80	.72	.32	329	.23	.09	.15	11	18
3800	.95	.92	.12	0	.11	.01	.12	1	12
3830	.79	.77	.13	0	.10	.03	.14	3	17
3860	.51	.93	.14	0	.13	.01	.09	1	17
3890	.37	.85	.20	0	.17	.03	.10	8	27
3920	.36	.75	.28	0	.21	.07	.09	19	25
3950	1.03	.92	.13	0	.12	.01	.13	0	12
3980	.36	.85	.13	371	.11	.02	.10	5	27
4010	.71	1.00	.10	0	.10	.00	.09	0	12
4040	.51	.68	.19	302	.13	.06	.09	11	17
4070	.61	.86	.14	0	.12	.02	.07	3	11
4100	.41	.82	.17	0	.14	.03	.09	7	21
4130	.31	.93	.14	0	.13	.01	.07	3	22
4160	.47	.93	.14	301	.13	.01	.07	2	14
4190	.59	.91	.11	304	.10	.01	.07	1	11
4220	.26	1.00	.13	0	.13	.00	.06	0	23
4250	.30	1.00	.10	0	.10	.00	.05	0	16
4280	.57	.91	.11	0	.10	.01	.08	1	14
4310	.61	.82	.17	0	.14	.03	.08	4	13
4340	.55	.81	.21	312	.17	.04	.09	7	16
4370	.61	.63	.62	386	.39	.23	.14	37	22
4400	.56	.84	.19	362	.16	.03	.09	5	16
4430	.64	.60	.43	381	.26	.17	.11	26	17
4460	.60	.88	.17	343	.15	.02	.11	3	18
4490	.50	.94	.17	0	.16	.01	.09	2	18

INEXCO MALLARD YT O-18 010440 300 .50

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
4520	1.30	1.00	.10	0	.10	.00	.12	0	9
4550	.57	.82	.11	0	.09	.02	.08	3	14
4580	.47	1.00	.07	0	.07	.00	.05	0	10
4610	.84	.65	.20	331	.13	.07	.13	8	15
4640	.69	1.00	.11	0	.11	.00	.07	0	10
4670	1.02	1.00	.09	0	.09	.00	.11	0	10
4700	1.07	.78	.36	0	.28	.08	.15	7	14
4730	.84	.68	.38	331	.26	.12	.18	14	21
4760	.65	1.00	.08	0	.08	.00	.10	0	15
4790	.98	.93	.15	394	.14	.01	.14	1	14
4820	.58	.83	.12	0	.10	.02	.15	3	25
4850	.39	.92	.13	0	.12	.01	.08	2	20
4880	.75	.86	.14	0	.12	.02	.12	2	16
4910	.53	1.00	.06	0	.06	.00	.09	0	16
4940	.65	1.00	.09	0	.09	.00	.09	0	13
4970	.37	.63	.43	383	.27	.16	.09	43	24
5000	.40	.71	.17	351	.12	.05	.08	12	20
5030	.29	.85	.13	0	.11	.02	.07	6	24
5060	.25	.74	.19	308	.14	.05	.09	20	36
5090	.43	.83	.24	0	.20	.04	.21	9	48
5120	.23	.78	.23	0	.18	.05	.08	21	34
5150	.28	.79	.24	0	.19	.05	.11	17	39
5180	.31	.86	.36	391	.31	.05	.21	16	67
5210	.35	.80	.30	0	.24	.06	.11	17	31
5240	.36	.77	.35	0	.27	.08	.10	22	27
5270	.37	.71	.48	0	.34	.14	.12	37	32
5300	.29	.90	.20	0	.18	.02	.08	6	27
5330	.21	.82	.22	301	.18	.04	.08	19	38
5360	.39	.79	.29	0	.23	.06	.12	15	30
5390	.29	.69	.51	343	.35	.16	.12	55	41
5420	.22	.88	.17	0	.15	.02	.07	9	31
5450	.33	.58	.26	340	.15	.11	.08	33	24
5480	.35	.69	.26	333	.18	.08	.07	22	19
5510	.35	.70	.23	361	.16	.07	.11	19	31
5540	.21	.75	.28	301	.21	.07	.09	33	42
5570	.38	.92	.25	302	.23	.02	.07	5	18
5600	.43	.49	.82	437	.40	.42	.11	97	25
5630	.55	.50	.76	396	.38	.38	.21	69	38
5660	.38	.63	.27	368	.17	.10	.10	26	26
5690	.40	.56	.62	354	.35	.27	.12	67	30
5720	.54	.41	1.16	398	.48	.68	.56	125	103
5750	.62	.36	1.17	414	.42	.75	.21	120	33
5780	.41	.79	.38	0	.30	.08	.09	19	21
5810	.39	.76	.49	310	.37	.12	.09	30	23
5840	.58	.66	.32	302	.21	.11	.10	18	17
5870	.55	.54	.37	459	.20	.17	.11	30	20
5900	.37	.75	.32	0	.24	.08	.07	21	18
5930	.34	.63	.35	399	.22	.13	.08	38	23
5960	.48	.86	.29	0	.25	.04	.08	8	16
5990	.45	.67	.49	334	.33	.16	.11	35	24
6020	1.12	.56	1.05	392	.59	.46	.17	41	15
6050	1.42	1.00	.12	0	.12	.00	.13	0	9
6090	2.32	1.00	.03	0	.03	.00	.20	0	8
6110	2.31	.80	.15	0	.12	.03	.17	1	7
6140	.72	.52	.93	395	.48	.45	.14	62	19
6170	1.92	.74	.31	355	.23	.08	.18	4	9
6200	.89	.66	.35	335	.23	.12	.10	13	11
6230	1.28	.67	.36	354	.24	.12	.18	9	14
6260	1.57	.64	.28	353	.18	.10	.15	6	9
6290	1.14	.72	.18	0	.13	.05	.10	4	8
6320	.79	.60	.20	397	.12	.08	.13	10	16
6350	.42	.81	.27	364	.22	.05	.10	11	23
6380	.38	.77	.30	310	.23	.07	.07	18	18
6410	.37	.64	.36	0	.23	.13	.11	35	29
6440	.35	.62	.26	342	.16	.10	.12	28	34
6470	.34	.62	.29	338	.18	.11	.10	32	29
6500	.45	.55	.40	405	.22	.18	.16	40	35
6530	.59	.49	1.42	395	.70	.72	.14	122	23
6560	1.03	.76	.33	371	.25	.08	.13	7	12
6590	.59	.47	.94	421	.44	.50	.20	84	33
6620	.58	.57	.65	388	.37	.28	.12	48	20
6650	.27	.49	.61	394	.30	.31	.08	114	29
6680	.22	.83	.40	363	.33	.07	.05	31	22
6710	.71	.38	2.59	395	.99	1.60	.46	225	64
6740	.55	.52	.46	377	.24	.22	.24	40	43
6770	.55	.42	.26	375	.11	.15	.09	27	16
6800	.76	.53	.34	371	.18	.16	.08	21	10
6830	.25	.57	.14	337	.08	.06	.07	24	27
6860	.36	.25	.60	386	.15	.45	.10	125	27
6890	1.59	.49	.37	376	.18	.19	.15	11	9
6920	1.03	.48	.27	375	.13	.14	.12	13	11
6950	1.08	.66	7.00	375	4.61	2.39	.37	221	34
6980	.28	.32	.34	379	.11	.23	.11	82	39
7010	.54	.40	.58	381	.23	.35	.09	64	16
7040	.70	.34	1.11	383	.38	.73	.33	104	47
7100	.53	.58	.38	358	.22	.16	.15	30	28
7130	.96	.60	.15	404	.09	.06	.20	6	20
7160	.30	.74	.34	304	.25	.09	.14	30	46
7190	.40	.60	.43	323	.26	.17	.15	42	37
7220	.42	.64	.59	349	.38	.21	.20	50	47
7250	.25	.55	.49	424	.27	.22	.20	88	80
7280	.27	.64	.36	312	.23	.13	.12	48	44
7310	.40	.62	.45	347	.28	.17	.23	42	57
7340	.38	.73	.30	309	.22	.08	.16	21	42
7370	.38	.60	.55	390	.33	.22	.19	57	50
7410	.38	.53	.55	389	.29	.26	.21	68	55
7470	.26	.57	.47	387	.27	.20	.19	76	73
7500	.17	.63	.32	351	.20	.12	.15	70	88
7530	.15	.43	.37	447	.16	.21	.15	140	100
7550	.16	.58	.26	383	.15	.11	.15	68	93
7590	.50	.68	.19	302	.13	.06	.14	12	27
7620	.22	.65	.31	382	.20	.11	.13	50	59
7660	.34	.63	.32	302	.20	.12	.11	35	32
7690	.30	.67	.66	391	.44	.22	.21	73	70
7710	.31	.26	.94	451	.24	.70	.17	225	54
7740	.28	.59	.37	388	.22	.15	.30	53	107
7770	.44	.71	.31	0	.22	.09	.17	20	38
7800	.20	.61	.28	362	.17	.11	.16	55	80
7830	.40	.67	.39	359	.26	.13	.20	32	50
7870	.68	.70	.20	312	.14	.06	.14	8	20
7890	.31	.71	.17	311	.12	.05	.18	16	58
7920	.28	.59	.27	332	.16	.11	.19	39	67
7980	.35	.10	1.47	451	.15	1.32	.16	377	45
8010	.17	.69	.32	446	.22	.10	.22	58	129
8040	.32	.70	.54	359	.38	.16	.38	50	118
8070	.28	.72	.29	368	.21	.08	.11	28	39
8100	.92	.80	.15	306	.12	.03	.10	3	10
8130	.50	.89	.18	306	.16	.02	.08	4	16
8160	2.22	.67	.12	312	.08	.04	.16	1	7
8190	2.95	.65	.17	356	.11	.06	.25	2	8
8220	4.81	.04	9.30	436	.38	8.92	.38	185	7
8250	3.83	.60	.10	442	.06	.04	.30	1	7
8280	3.76	.54	.13	422	.07	.06	.41	1	10
8310	4.16	1.00	.03	0	.03	.00	.25	0	6
8340	2.98	.50	.12	306	.06	.06	.23	2	7
8370	1.72	1.00	.05	0	.05	.00	.13	0	7
8400	1.37	.86	.07	0	.06	.01	.13	0	9
8430	2.26	.75	.04	0	.03	.01	.12	0	5
8460	2.01	1.00	.03	0	.03	.00	.17	0	8
8490	1.92	1.00	.01	0	.01	.00	.14	0	7
8520	2.66	.57	.07	341	.04	.03	.13	1	4
8550	2.24	.60	.05	334	.03	.02	.16	0	7
8580	3.07	1.00	.04	0	.04	.00	.21	0	6
8610	3.18	1.00	.03	0	.03	.00	.17	0	5
8640	3.39	.75	.04	0	.03	.01	.25	0	7
8670	2.85	.00	.01	0	.00	.01	.15	0	5
8700	2.98	.00	.01	0	.00	.01	.15	0	5
8730	1.89	.00	.01	0	.00	.01	.11	0	5
8760	2.06	.54	.13	354	.07	.06	.16	2	7
8790	2.74	1.00	.02	0	.02	.00	.18	0	6
8820	2.79	.75	.04	307	.03	.01	.17	0	6
8850	3.01	.50	.02	0	.01	.01	.18	0	5
8880	2.57	.05	.21	426	.01	.20	.15	7	5
8910	1.31	.67	.06	432	.04	.02	.08	1	6
8940	1.05	1.00	.04	0	.04	.00	.10	0	9
8970	1.31	.75	.04	0	.03	.01	.11	0	8

Appendix 1: Rock-Eval/TOC Data for Three Wells in the Kandik Basin, Western Yukon Territory

INEXCO MALLARD YT O-18 010440 300 .50

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
9000	.78	.78	.09	0	.07	.02	.09	2	11
9030	.57	.80	.05	422	.04	.01	.16	1	28
9060	1.02	.76	.17	0	.13	.04	.18	3	17
9090	.35	.57	.07	302	.04	.03	.17	8	48
9120	.36	.54	.13	306	.07	.06	.16	16	44
9150	.48	.62	.21	323	.13	.08	.21	16	43
9180	.21	.57	.14	302	.08	.06	.20	28	95
9180	2.45	.01	1.20	414	.01	1.19	1.08	48	44
9210	.42	.58	.12	0	.07	.05	.15	11	35
9240	.77	.71	.24	0	.17	.07	.16	9	20
9270	.79	.73	.15	302	.11	.04	.22	5	27
9300	.70	.69	.16	382	.11	.05	.16	7	22
9330	.44	.78	.09	310	.07	.02	.14	4	31
9360	.62	.67	.03	312	.02	.01	.09	1	14
9390	.85	1.00	.04	0	.04	.00	.12	0	14
9420	.59	.75	.04	309	.03	.01	.09	1	15
9450	.25	.79	.42	320	.33	.09	.15	36	60
9480	9.25	.50	32.70	346	16.51	16.19	13.95	175	150
9510	.31	.46	.28	345	.13	.15	.91	48	293
9540	.29	.62	.29	353	.18	.11	.18	37	62
9570	.82	.73	.62	0	.45	.17	1.13	20	137
9600	.70	.69	.29	336	.20	.09	.24	12	34
9660	.80	.48	.87	423	.42	.45	.27	56	33
9690	14.54	.35	51.02	344	17.77	33.25	29.73	228	204
9720	.65	.58	.48	420	.28	.20	.33	30	50
9750	2.74	.67	.40	331	.27	.13	.38	4	13
9780	.71	.59	1.03	421	.61	.42	1.18	59	166
9810	.45	.55	.60	388	.33	.27	.34	60	75
9840	.32	.64	.53	361	.34	.19	.26	59	81
9870	.29	.22	.81	436	.18	.63	.18	217	62
9900	.28	.58	.19	412	.11	.08	.15	28	53
9930	5.54	.34	28.88	438	9.73	19.15	7.89	345	142
9960	.37	.74	.31	387	.23	.08	.29	21	78
9990	.20	.73	.11	337	.08	.03	.21	15	105
10020	.21	.67	.15	311	.10	.05	.18	23	85
10050	.74	.42	.84	433	.35	.49	.87	66	117
10080	.23	.50	.18	361	.09	.09	.17	39	73
10110	.28	.55	.22	341	.12	.10	.16	35	57
10140	.13	.67	.12	0	.08	.04	.18	30	138
10170	.66	.79	.19	0	.15	.04	.14	6	21
10200	.54	.33	.45	439	.15	.30	.17	55	31
10230	.65	.68	.22	384	.15	.07	.18	10	27
10260	.29	.67	.12	312	.08	.04	.19	13	65
10290	.61	.36	1.15	437	.41	.74	.23	121	37
10320	.47	.63	.48	390	.30	.18	.37	38	78
10350	.45	.55	.42	423	.23	.19	.26	42	57
10380	.46	.66	.29	335	.19	.10	.18	21	39
10410	.32	.46	.35	429	.16	.19	.16	59	50
10440	.43	.60	.20	363	.12	.08	.14	18	32

Jungle Creek Fm	-15F
Ettrain Fm	-866
Blackie Fm	-1351
Ford Lake Sh	-3401
Ford Lake Sh	-8085

INEXCO HUSKY PORCUPINE G-31 0 8700 300 .50

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
30F	1.02	.61	1.09	376	.67	.42	1.27	41	124
60	1.50	.71	.48	368	.34	.14	.32	9	21
90	1.53	.93	.27	309	.25	.02	.36	1	23
120	.75	.71	.41	0	.29	.12	1.20	16	160
150	.68	.88	.24	0	.21	.03	.34	4	50
180	.73	.43	.88	416	.38	.50	.09	68	12
210	.59	.58	.76	375	.44	.32	.45	54	76
240	.65	.76	.54	361	.41	.13	.16	20	24
270	.63	.69	.68	366	.47	.21	.21	33	33
300	.41	.77	.57	0	.44	.13	.10	31	24
330	.68	.67	.61	323	.41	.20	.11	29	16
360	.91	.75	.51	0	.38	.13	.10	14	10
390	.83	.77	.52	0	.40	.12	.11	14	13
420	.73	.73	.49	0	.36	.13	.56	17	76
450	.91	.66	.77	367	.51	.26	.41	28	45
480	1.31	.68	.72	362	.49	.23	.17	17	12
510	.67	.68	.60	347	.41	.19	.11	28	16
540	.68	.63	.95	355	.60	.35	.16	51	23
570	.82	.69	.90	0	.62	.28	.14	34	17
600	1.04	.71	.89	315	.63	.26	.14	25	13
630	1.34	.65	.79	366	.51	.28	.13	20	9
660	.86	.67	.48	368	.32	.16	.14	18	16
690	.88	.65	.78	357	.51	.27	.16	30	18
720	1.06	.70	.77	355	.54	.23	.13	21	12
750	.93	.71	.80	355	.57	.23	.11	24	11
780	.88	.71	1.01	315	.72	.29	.13	32	14
810	1.02	.64	.78	315	.50	.28	.26	27	25
840	.81	.66	.90	0	.59	.31	.11	38	13
870	1.52	.64	1.02	367	.65	.37	.16	24	10
900	.94	.69	1.21	363	.84	.37	.13	39	13
930	.54	.73	.67	383	.49	.18	.12	33	22
960	.68	.64	3.62	391	2.33	1.29	.52	189	76
990	.28	.63	.86	0	.54	.32	.14	114	50
1030	.66	.65	1.20	367	.78	.42	.20	63	30
1050	.69	.66	1.02	364	.67	.35	.13	50	18
1080	.83	.67	1.32	364	.88	.44	.16	53	19
1120	.62	.64	1.60	365	1.03	.57	.18	91	29
1140	1.64	.66	.85	369	.56	.29	.18	17	10
1170	1.54	.73	.73	329	.53	.20	.11	12	7
1200	.62	.76	3.68	354	2.80	.88	.20	141	32
1230	.42	.60	2.25	370	1.35	.90	.24	214	57
1260	.59	.72	4.87	358	3.49	1.38	.31	233	52
1290	.43	.70	3.47	367	2.42	1.05	.27	244	62
1320	.35	.62	2.17	359	1.35	.82	.31	234	88
1380	.24	.65	1.28	381	.83	.45	.18	187	75
1410	.53	.69	1.18	372	.81	.37	.18	69	33
1440	1.77	.60	.75	379	.45	.30	.31	16	17
1470	.71	.49	1.22	371	.60	.62	.24	87	33
1500	.38	.66	1.03	317	.68	.35	.16	92	42
1500	.72	.59	.70	364	.41	.29	.24	40	33
1530	.36	.56	2.58	375	1.45	1.13	.34	313	94
1590	.49	.58	2.21	382	1.28	.93	.29	189	59
1590	1.11	.60	1.56	376	.94	.62	.33	55	29
1620	.85	.69	1.67	373	1.15	.52	.31	61	36
1680	.49	.61	1.83	381	1.12	.71	.34	144	69
1710	.50	.61	1.97	385	1.20	.77	.37	154	74
1740	.80	.64	4.45	401	2.83	1.62	.47	202	58
1770	.63	.61	2.90	394	1.78	1.12	.60	177	95
1800	.56	.61	2.49	397	1.52	.97	.45	173	80
1830	.55	.60	2.64	398	1.59	1.05	.38	190	69
1860	.54	.64	1.78	383	1.14	.64	.27	118	50
1890	.53	.63	1.87	366	1.17	.70	.31	132	58
1920	.43	.67	1.92	385	1.28	.64	.43	148	100
1950	.50	.66	1.89	382	1.24	.65	.30	130	60
2000	.81	.76	4.17	368	3.18	.99	.36	122	44
2040	.63	.63	2.58	381	1.63	.95	.41	150	65
2070	.55	.59	2.33	389	1.38	.95	.38	172	69
2100	.43	.58	1.13	391	.65	.48	.27	111	62
2130	.54	.55	1.58	385	.87	.71	.27	131	50
2160	.57	.58	2.31	381	1.35	.96	.32	168	56
2190	.38	.61	1.48	380	.91	.57	.22	150	57
2220	.45	.59	1.43	382	.84	.59	.26	131	57
2250	.71	.55	.49	349	.27	.22	.25	30	35
2280	.46	.65	.40	328	.26	.14	.15	30	32
2310	.64	.63	1.10	373	.69	.41	.17	64	26
2340	.66	.64	1.79	378	1.14	.65	.30	98	45
2370	.70	.61	2.61	392	1.58	1.03	.42	147	59
2400	.55	.59	1.74	398	1.02	.72	.41	130	74
2430	.41	.68	.74	379	.50	.24	.23	58	56
2460	.75	.72	2.18	382	1.57	.61	.29	81	38
2490	.78	.60	1.39	376	.83	.56	.26	71	33
2520	.27	.49	.45	388	.22	.23	.17	85	62
2550	.40	.57	1.41	382	.80	.61	.26	152	65
2580	.55	.61	1.91	376	1.16	.75	.40	136	72
2610	.54	.67	1.31	323	.88	.43	.19	79	35
2640	.40	.72	1.03	0	.74	.29	.12	72	30
2670	.42	.60	1.54	315	.93	.61	.20	145	47
2700	.46	.55	1.48	387	.81	.67	.23	145	50
2820	.33	.59	1.21	364	.71	.50	.34	151	103
2850	.48	.60	1.22	375	.73	.49	.25	102	52
2880	.68	.59	1.49	387	.88	.61	.30	89	44
2910	.59	.60	1.86	374	1.11	.75	.58	127	98
2940	.50	.61	1.32	379	.81	.51	.21	102	42
2970	.43	.47	.80	384	.38	.42	.15	97	34
3000	.28	.58	.91	0	.53	.38	.20	135	71
3030	.33	.52	1.22	381	.64	.58	.21	175	63
3060	.18	.60	.67	346	.40	.27	.17	150	94
3090	.59	.64	.44	0	.28	.16	.10	27	16
3120	.34	.66	.41	0	.27	.14	.14	41	41
3150	.27	.57	.54	377	.31	.23	.14	85	51
3180	.23	.54	.90	0	.49	.41	.14	178	60
3210	.16	.61	.67	356	.41	.26	.12	162	75
3240	3.26	.68	.25	0	.17	.08	.32	2	9
3270	2.29	.58	.26	320	.15	.11	.28	4	12
3300	.58	.55	.51	305	.28	.23	.16	39	27
3330	.34	.53	.72	365	.38	.34	.18	100	52
3360	.60	.50	.52	375	.26	.26	.24	43	40
3390	.23	.57	.74	360	.42	.32	.26	139	113
3420	.37	.58	1.06	339	.61	.45	.21	121	56
3450	.25	.43	.37	342	.16	.21	.14	84	55
3480	.29	.54	.95	387	.51	.44	.18	151	62
3510	.55	.64	.87	312	.56	.31	.17	56	30
3540	.29	.45	.65	351	.29	.36	.21	124	72
3570	.15	.52	.56	322	.29	.27	.11	180	73
3600	.37	.65	1.34	300	.87	.47	.21	127	56
3630	.24	.75	1.68	311	1.26	.42	.18	175	75
3660	.21	.61	.33	335	.20	.13	.08	61	38
3690	.12	.60	.30	306	.18	.12	.05	100	41
3720	.14	.60	.42	303	.25	.17	.08	121	57
3750	.12	1.00	.04	0	.04	.00	.07	0	58
3780	.58	1.00	.05	0	.05	.00	.06	0	10
3810	.35	.75	.24	303	.18	.06	.11	17	31
3840	.41	.56	.45	335	.25	.20	.10	48	24
3870	.58	.50	.42	346	.21	.21	.12	36	20
3900	.37	.92	.13	0	.12	.01	.08	2	21
3930	.30	.46	.50	0	.23	.27	.07	90	23
3960	.01	1.00	.01	0	.01	.00	.04	0	400
3990	.09	.00	.01	0	.00	.01	.03	11	33
4020	.13	1.00	.07	0	.07	.00	.05	0	38
4050	.20	.71	.07	0	.05	.02	.06	10	30
4080	.12	.89	.09	0	.08	.01	.05	8	41
4110	.22	.79	.39	0	.31	.08	.08	36	36
4140	.10	1.00	.16	0	.16	.00	.08	0	80
4170	.12	1.00	.16	0	.16	.00	.06	0	50
4200	.74	.95	7.63	0	7.22	.41	.21	55	28
4230	.16	.84	.19	0	.16	.03	.10	18	62
4260	.07	.83	.06	0	.05	.01	.07	14	100
4290	.08	.27	.15	446	.04	.11	.06	137	75
4320	.16	.81	.26	420	.21	.05	.10	31	62
4350	.09	.79	.14	0	.11	.03	.12	33	133
4380	.09	.80	.15	0	.12	.03	.08	33	88
4410	.08	.79	.19	0	.15	.04	.08	50	100
4440	.08	.67	.12	0	.08	.04	.08	50	100
4470	.10	.67	.21	0	.14	.07	.07	70	70
4500	.08	1.00	.07	0	.07	.00	.05	0	62
4530	.14	.69	.16	0	.11	.05	.04	35	28

INEXCO MALLARD YT O-18 010440 300 .50

DEPTH	TOC	PI	S1+S2	TMAX	S1	S2	S3	HI	OI
4560	.13	.68	.19	0	.13	.06	.08	46	61
4590	.07	1.00	.05	0	.05	.00	.05	0	71
4620	.09	1.00	.06	0	.06	.00	.03	0	33
4650	.10	.82	.17	0	.14	.03	.05	30	50
4680	.11	.72	.18	385	.13	.05	.08	45	72
4710	.10	.80	.10	0	.08	.02	.04	20	40
4740	.09	1.00	.05	0	.05	.00	.04	0	44
4770	.07	1.00	.03	0	.03	.00	.04	0	57
4800	.11	1.00	.06	0	.06	.00	.06	0	54
4830	.15	.81	.26	0	.21	.05	.10	33	66
4860	.10	1.00	.10	0	.10	.00	.08	0	80
4870	.04	1.00	.04	0	.04	.00	.05	0	125
4920	.11	.91	.23	0	.21	.02	.16	18	145
4950	.12	1.00	.19	0	.19	.00	.09	0	75
4980	.07	1.00	.18	0	.18	.00	.06	0	85
5010	.07	1.00	.14	0	.14	.00	.06	0	85
5040	.12	1.00	.05	0	.05	.00	.04	0	33
5070	.04	1.00	.04	0	.04	.00	.07	0	174
5100	.05	1.00	.22	0	.22	.00	.07	0	140
5130	.08	1.00	.21	0	.21	.00	.08	0	100
5160	.11	.88	.25	357	.22	.03	.38	27	345
5190	.19	1.00	.11	0	.11	.00	.09	0	47
5220	.13	1.00	.16	0	.16	.00	.05	0	38
5250	.21	.87	.45	0	.39	.06	.19	28	90
5280	.05	1.00	.02	0	.02	.00	.04	0	80
5310	.06	1.00	.06	0	.06	.00	.03	0	50
5340	.07	1.00	.10	0	.10	.00	.06	0	85
5370	.10	1.00	.04	0	.04	.00	.02	0	20
5400	.13	1.00	.08	0	.08	.00	.03	0	23
5430	.14	1.00	.25	0	.25	.00	.23	0	164
5460	.18	.65	.52	380	.34	.18	.55	100	305
5490	.12	1.00	.14	0	.14	.00	.11	0	91
5520	.04	1.00	.07	0	.07	.00	.05	0	125
5550	.15	1.00	.11	0	.11	.00	.08	0	53
5580	.05	1.00	.05	0	.05	.00	.04	0	80
5610	.14	.00	.01	0	.00	.01	.12	7	85
5640	.09	.87	.08	0	.07	.01	.05	11	55
5670	.01	1.00	.01	0	.01	.00	.06	0	600
5700	.01	1.00	.02	0	.02	.00	.02	0	200
5730	.01	1.00	.08	0	.08	.00	.02	0	200
5760	.09	1.00	.07	0	.07	.00	.04	0	44
5790	.01	1.00	.05	0	.05	.00	.05	0	500
5820	.01	1.00	.02	0	.02	.00	.08	0	800
5850	.07	.69	.55	0	.38	.17	.17	242	242
5880	.01	.00	.01	0	.00	.01	.08	100	800
5910	.06	1.00	.05	0	.05	.00	.08	0	133
5940	.06	1.00	.05	0	.05	.00	.05	0	83
5970	.12	.83	.06	0	.05	.01	.11	8	91
6000	.03	1.00	.05	0	.05	.00	.06	0	200
6030	.01	1.00	.04	0	.04	.00	.03	0	300
6060	.05	.92	.25	0	.23	.02	.37	40	740
6090	.07	.44	.16	367	.07	.09	.67	128	957
6120	.16	.67	.15	332	.10	.05	.15	31	93
6150	.22	.73	.70	372	.51	.19	.64	86	290
6180	.82	.66	3.01	332	2.00	1.01	2.43	123	296
6210	.02	.89	.09	335	.08	.01	.34	501	700
6240	.13	.81	.54	304	.44	.10	.75	76	576
6270	.52	.72	1.36	399	.98	.38	.98	73	188
6300	.04	.50	.10	375	.05	.05	.27	125	675
6330	.04	.87	.08	0	.07	.01	.33	25	825
6360	.03	1.00	.08	0	.08	.00	.14	0	466
6390	.01	1.00	.08	0	.08	.00	.13	0	1300
6420	.02	.85	.13	0	.11	.02	.26	100	1300
6450	.08	.95	.20	0	.19	.01	.16	12	200
6480	.13	.73	.98	341	.72	.26	.60	200	461
6510	.03	.59	.17	406	.10	.07	.48	233	1600
6540	.01	.87	.08	0	.07	.01	.11	100	1100
6570	.03	1.00	.08	0	.08	.00	.10	0	333
6600	.01	1.00	.01	0	.01	.00	.06	0	600
6630	.02	1.00	.15	0	.15	.00	.10	0	500
6660	.45	.38	2.13	340	.82	1.31	1.59	291	353
6690	.11	.31	.39	346	.12	.27	1.01	245	918
6720	.08	.83	.46	392	.38	.08	.60	100	750
6750	.04	.67	.03	0	.02	.01	.58	251	450
6780	.06	.81	.43	337	.35	.08	.44	133	733
6810	.13	.66	.80	358	.53	.27	.58	207	446
6840	.02	1.00	.07	0	.07	.00	.44	0	2200
6870	.01	1.00	.05	0	.05	.00	.11	0	1100
6900	.01	1.00	.03	0	.03	.00	.05	0	500
6930	.01	1.00	.02	0	.02	.00	.09	0	900
6960	.01	1.00	.02	0	.02	.00	.03	0	300
6990	.01	1.00	.01	0	.01	.00	.02	0	200
7020	.02	1.00	.11	0	.11	.00	.36	0	1800
7050	.01	1.00	.01	0	.01	.00	.08	0	800
7080	.01	1.00	.03	0	.03	.00	.04	0	400
7110	.01	.89	.09	0	.08	.01	.10	100	1000
7140	.01	.94	.16	0	.15	.01	.09	100	900
7170	.05	.95	.57	0	.54	.03	.15	60	300
7200	.01	1.00	.10	0	.10	.00	.10	0	1000
7230	.01	1.00	.02	0	.02	.00	.03	0	300
7260	.02	1.00	.05	0	.05	.00	.05	0	250
7290	.09	.94	.18	368	.17	.01	.51	11	566
7320	.03	1.00	.03	0	.03	.00	.07	0	233
7350	.05	1.00	.06	0	.06	.00	.15	0	300
7380	.02	1.00	.03	0	.03	.00	.05	0	250
7410	.25	.74	1.73	413	1.28	.45	.27	180	108
7440	.01	1.00	.01	0	.01	.00	.05	0	500
7470	.04	1.00	.14	0	.14	.00	.09	0	225
7500	3.08	.40	4.55	451	1.82	2.73	.31	88	10
7530	.01	1.00	.05	0	.05	.00	.06	0	600
7560	.03	1.00	.05	0	.05	.00	.05	0	166
7590	.01	1.00	.01	0	.01	.00	.03	0	300
7620	.01	1.00	.04	0	.04	.00	.07	0	699
7650	.01	1.00	.03	0	.03	.00	.12	0	1200
7710	.01	1.00	.01	0	.01	.00	.05	0	500
7740	.01	.00	.01	0	.00	.01	.03	100	300
7770	.01	1.00	.01	0	.01	.00	.02	0	200
7800	.04	1.00	.02	0	.02	.00	.10	0	250
7830	.01	1.00	.02	0	.02	.00	.05	0	500
7860	.01	1.00	.02	0	.02	.00	.04	0	400
7890	.01	1.00	.03	0	.03	.00	.07	0	699
7920	.01	1.00	.02	0	.02	.00	.04	0	400
7950	.04	.95	.43	0	.41	.02	.15	50	375
7980	.01	1.00	.02	0	.02	.00	.03	0	300
8010	.02	1.00	.02	0	.02	.00	.04	0	200
8040	.03	1.00	.11	0	.11	.00	.07	0	233
8070	.04	1.00	.02	0	.02	.00	.03	0	75
8100	2.41	.05	1.13	412	.06	1.07	1.07	44	44
8130	.06	.75	.04	365	.03	.01	.04	16	66
8160	.15	.80	.05	0	.04	.01	.05	6	33
8190	.10	.77	.30	326	.23	.07	.15	70	150
8220	.06	.92	.12	0	.11	.01	.41	16	683
8250	.03	.67	.09	0	.06	.03	.05	100	166
8280	.01	.75	.04	0	.03	.01	.04	100	400
8310	.01	.50	.04	0	.02	.02	.02	200	200
8340	.01	.80	.05	0	.04	.01	.04	100	400
8370	.01	.40	.05	0	.02	.03	.04	300	400
8400	.01	.00	.01	0	.00	.01	.01	100	100
8430	.01	1.00	.03	0	.03	.00	.01	0	100
8460	.01	1.00	.04	0	.04	.00	.03	0	300
8490	.01	1.00	.01	0	.01	.00	.01	0	100
8520	.01	.00	.01	0	.00	.01	.01	100	100
8550	2.41	.03	1.20	415	.04	1.16	1.00	48	41
8580	.01	1.00	.04	0	.04	.00	.08	0	800
8610	.01	1.00	.01	0	.01	.00	.03	0	300
8640	.01	1.00	.05	0	.05	.00	.02	0	200
8670	.09	.68	.41	347	.28	.13	.69	144	766
8700	2.52	.03	1.25	416	.04	1.21	1.01	48	40

Devonian	-15F
Ogilvie/Road R.	-3198
Arnica Fm	-4093
Ronning Grp	-5461
Franklin Mt. Fm	-5727
Proterozoic	-8284

APPENDIX 2

INPUT DATA FOR KANDIK HYDROCARBON ASSESSMENTS

The following tables present the probability distributions of reservoir parameters, number of prospects, and marginal probabilities of geological risk factors used as input for the various conceptual statistical analyses discussed in this paper. These estimates are based on subjective opinion, partly constrained by reservoir data and information from analogous hydrocarbon-bearing basins.

1. KANDIK TERTIARY/UPPER CRETACEOUS NON-MARINE OIL PLAY

Table II.1a. *Probability distributions of reservoir parameters*

Geological variable	Unit of measurement	Probability in upper percentiles 1.00	Probability in upper percentiles 0.50	Probability in upper percentiles 0.01	Probability in upper percentiles 0.00
Area of closure	km^2	0.5	7	21	40
Reservoir thickness	m	1	6	10	20
Porosity	decimal fraction	0.05	0.12	0.22	0.25
Trap fill	decimal fraction	0.05	0.25	0.9	1.00
Oil saturation	decimal fraction	0.5	0.65	0.75	0.8
Shrinkage factor	decimal fraction	1.137	1.137	1.137	1.137

Table II.1b. *Marginal probabilities of geological risk factors*

Geological factors	Marginal probability	Play level	Prospect level
Presence of closure	0.8		x
Presence of reservoir facies	1.00		x
Adequate seal	0.7		x
Adequate timing	0.75		x
Adequate source	0.9		x

Table II.1c. *Probability distribution for number of prospects*

Geological variable	Probability in upper percentiles 0.99	Probability in upper percentiles 0.5	Probability in upper percentiles 0.00
Number of prospects	14	50	200

2. KANDIK TERTIARY/UPPER CRETACEOUS NON-MARINE GAS PLAY

Table II.2a. *Probability distributions of reservoir parameters*

Geological variable	Unit of measurement	Probability in upper percentiles 1.00	Probability in upper percentiles 0.50	Probability in upper percentiles 0.01	Probability in upper percentiles 0.00
Area of closure	km^2	0.5	7	21	40
Reservoir thickness	m	1	6	10	20
Porosity	decimal fraction	0.05	0.12	0.22	0.25
Trap fill	decimal fraction	0.05	0.25	0.9	1.00
Gas saturation	decimal fraction	0.5	0.65	0.75	0.8
Formation volume factor	decimal fraction	0.002	0.004	0.009	0.01

Table II.2b. *Marginal probabilities of geological risk factors*

Geological factors	Marginal probability	Play level	Prospect level
Presence of closure	0.8		x
Presence of reservoir facies	1.00		x
Adequate seal	0.7		x
Adequate timing	0.75		x
Adequate source	0.9		x

Table II.2c. *Probability distribution for number of prospects*

Geological variable	Probability in upper percentiles 0.99	Probability in upper percentiles 0.5	Probability in upper percentiles 0.00
Number of prospects	14	50	200

3. KANDIK MESOZOIC MARINE STRUCTURAL PLAY

Table II.3a. *Probability distributions of reservoir parameters*

Geological variable	Unit of measurement	Probability in upper percentiles 1.00	Probability in upper percentiles 0.50	Probability in upper percentiles 0.01	Probability in upper percentiles 0.00
Area of closure	km^2	0.5	9	75	80
Reservoir thickness	m	30	40	55	70
Porosity	decimal fraction	0.05	0.06	0.2	0.25
Trap fill	decimal fraction	0.05	0.25	0.9	1
Gas saturation	decimal fraction	0.7	0.75	0.85	0.9
Formation volume factor	decimal fraction	0.002	0.004	0.009	0.01

Table II.3b. *Marginal probabilities of geological risk factors*

Geological factors	Marginal probability	Play level	Prospect level
Presence of closure	0.5		x
Presence of reservoir facies	0.5		x
Adequate seal	0.4		x
Adequate timing	0.75		x
Adequate source	0.8		x

Table II.3c. *Probability distribution for number of prospects*

Geological variable	Probability in upper percentiles 0.99	Probability in upper percentiles 0.5	Probability in upper percentiles 0.00
Number of prospects	30	120	270

4. KANDIK PALEOZOIC MARINE STRUCTURAL OIL PLAY

Table II.4a. *Probability distributions of reservoir parameters*

Geological variable	Unit of measurement	Probability in upper percentiles 1.00	Probability in upper percentiles 0.50	Probability in upper percentiles 0.01	Probability in upper percentiles 0.00
Area of closure	km^2	0.5	9	75	80
Reservoir thickness	m	60	80	110	150
Porosity	decimal fraction	0.015	0.04	0.12	0.2
Trap fill	decimal fraction	0.05	0.25	0.9	1.00
Oil saturation	decimal fraction	0.7	0.75	0.85	0.9
Shrinkage factor	decimal fraction	1.137	1.137	1.137	1.137

Table II.4b. *Marginal probabilities of geological risk factors*

Geological factors	Marginal probability	Play level	Prospect level
Presence of closure	0.5		x
Presence of reservoir facies	0.3		x
Adequate seal	0.75		x
Adequate timing	0.5		x
Adequate source	0.7		x

Table II.4c. *Probability distribution for number of prospects*

Geological variable	Probability in upper percentiles 0.99	Probability in upper percentiles 0.5	Probability in upper percentiles 0.00
Number of prospects	12	60	130

5. KANDIK PALEOZOIC MARINE STRUCTURAL GAS PLAY

Table II.5a. *Probability distributions of reservoir parameters*

vGeological variable	Unit of measurement	Probability in upper percentiles 1.00	Probability in upper percentiles 0.50	Probability in upper percentiles 0.01	Probability in upper percentiles 0.00
Area of closure	km^2	0.5	9	75	80
Reservoir thickness	m	60	80	110	150
Porosity	decimal fraction	0.015	0.04	0.12	0.2
Trap fill	decimal fraction	0.05	0.25	0.9	1.00
Gas saturation	decimal fraction	0.7	0.75	0.85	0.9
Formation volume factor	decimal fraction	0.0024	0.0042	0.019	0.02

Table II.5b. *Marginal probabilities of geological risk factors*

Geological factors	Marginal probability	Play level	Prospect level
Presence of closure	0.5		x
Presence of reservoir facies	0.3		x
Adequate seal	0.75		x
Adequate timing	0.5		x
Adequate source	0.7		x

Table II.5c. *Probability distribution for number of prospects*

Geological variable	Probability in upper percentiles 0.99	Probability in upper percentiles 0.5	Probability in upper percentiles 0.00
Number of prospects	45	220	500

APPENDIX 3

OUTPUT DATA FOR KANDIK HYDROCARBON ASSESSMENTS

The following text presents the output generated by the PETRIMES hydrocarbon assessment program using the conceptual play analysis procedure. For each play, the MPRO, PSRK and PSUM modules are presented. MPRO generates the number of pools distribution and risks for the play. PSRK gives the individual pool sizes by rank and PSUM indicates the Monte Carlo simulation for the pool size distribution. (Note: In text, field sizes are indicated rather than pools. In frontier conceptual plays, insufficient geological and engineering information is available to define individual pool accumulations in single structures). PSUM modules for total oil and gas potential on a basin-scale are also presented.

PETRIMES MODULE MPRO

Number of pools distribution and risks

UAI........................**C5019902**

PLAY.....................**Tertiary/Upper Cretaceous Nonmarine Oil**

Assessor...............Peter Hannigan

Geologist.............Peter Hannigan

Remarks...............Kandik Assessment Project

Run date..............Mon., Feb. 8, 1999, 11:43 a.m.

User supplied parameters

Do you want to store on DB?	>	Y
Oil (o) or gas (g)?	>	O

A) Risks

	Geological factor			*Marginal probability*
Play level	Overall play level risk		=	1.00
Prospect level	Presence of closure	(1)		.80
	Presence of reservoir facies	(2)		1.00
	Adequate seal	(4)		.70
	Adequate timing	(5)		.75
	Adequate source	(6)		.90
	Overall prospect level risk		=	.38
Exploration risk			=	.38

B) Number of prospects distribution

Minimum	=	14
Maximum	=	200
Mean	=	78.82
S.D.	=	56.33

Frequency	*Number of prospects*
99.00	14
95	17
90	21
80	28
75	32
60	43
50	50
40	80
25	125
20	140
10	170
5	185
1	197
0	200

C) Number of pools distribution

Minimum	=	0
Maximum	=	102
Mean	=	29.79
S.D.	=	21.72

Frequency	*Number of pools*
100.00	0
99	4
95	6
90	8
80	10
75	12
60	16
50	21
40	30
25	47
20	53
10	64
5	71
1	80
0	102

Note: The number of pools distribution is saved in the database with UDI= 6201OB4

PETRIMES MODULE PSRK

Individual pool sizes by rank where n is a random variable

UAI........................ **C5019902**
PLAY..................... **Tertiary/Upper Cretaceous Nonmarine Oil**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Mon., Feb. 8, 1999, 11:44 a.m.

User supplied parameters

Do you want to store on DB?	>	Y	
Do you want to use MPRO output?	>	Y	
Min. and max. pool ranks?	>	1	71
Do you use lognornal assumption?	>	Y	
Do you want to use ppsd output?	>	Y	

A) Basic information

Type of resource	=	oil in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	=	-.71278E-01	MEAN	=	1.1975			
Statistics	sig. sq.	=	.50305	S.D.	=	.96825			
Upper percentiles	99.99%	=	.66602E-01	60.00%	=	.77805	15.00%	=	1.9422
	99.00%	=	.17884	55.00%	=	.85180	10.00%	=	2.3110
	95.00%	=	.28999	50.00%	=	.93120	8.00%	=	2.5226
	90.00%	=	.37522	45.00%	=	1.0180	6.00%	=	2.8052
	85.00%	=	.44647	40.00%	=	1.1145	5.00%	=	2.9902
	80.00%	=	.51263	35.00%	=	1.2239	4.00%	=	3.2233
	75.00%	=	.57714	30.00%	=	1.3507	2.00%	=	3.9963
	70.00%	=	.64197	25.00%	=	1.5025	1.00%	=	4.8487
	65.00%	=	.70852	20.00%	=	1.6916	.01%	=	13.020

C) Number of pools distribution

Lower support	=	0
Upper support	=	102
Expectation	=	29.79
Standard Deviation	=	21.72

D) Pool sizes by rank

Pool rank			Distribution			
1	MEAN =	3.9393	S.D. =	1.9005	P(N>=r) =	.99996
	99% =	1.1487	75% =	2.6469	10% =	6.2506
	95% =	1.6436	50% =	3.5982	5% =	7.3930
	90% =	1.9693	25% =	4.7958	1% =	10.376
2	MEAN =	2.7783	S.D. =	1.1368	P(N>=r) =	.99955
	99% =	.79711	75% =	1.9386	10% =	4.2547
	95% =	1.1891	50% =	2.6572	5% =	4.8011
	90% =	1.4365	25% =	3.4575	1% =	6.0460
3	MEAN =	2.2782	S.D. =	.93087	P(N>=r) =	.99770
	99% =	.58064	75% =	1.5681	10% =	3.5087
	95% =	.92366	50% =	2.2009	5% =	3.8982
	90% =	1.1391	25% =	2.8957	1% =	4.7259
4	MEAN =	1.9714	S.D. =	.83116	P(N>=r) =	.99225
	99% =	.43918	75% =	1.3249	10% =	3.0801
	95% =	.74113	50% =	1.9081	5% =	3.3945
	90% =	.93695	25% =	2.5581	1% =	4.0343
5	MEAN =	1.7591	S.D. =	.76792	P(N>=r) =	.98068
	99% =	.35221	75% =	1.1520	10% =	2.7890
	95% =	.61377	50% =	1.7014	5% =	3.0577
	90% =	.79294	25% =	2.3250	1% =	3.5884
6	MEAN =	1.6043	S.D. =	.72045	P(N>=r) =	.96150
	99% =	.30060	75% =	1.0258	10% =	2.5733
	95% =	.52768	50% =	1.5506	5% =	2.8103
	90% =	.69113	25% =	2.1524	1% =	3.2685
7	MEAN =	1.4882	S.D. =	.68123	P(N>=r) =	.93518
	99% =	.26950	75% =	.93261	10% =	2.4047
	95% =	.47064	50% =	1.4396	5% =	2.6178
	90% =	.61991	25% =	2.0188	1% =	3.0236
8	MEAN =	1.3984	S.D. =	.64739	P(N>=r) =	.90374
	99% =	.24975	75% =	.86235	10% =	2.2675
	95% =	.43202	50% =	1.3577	5% =	2.4618
	90% =	.56916	25% =	1.9115	1% =	2.8274
9	MEAN =	1.3270	S.D. =	.61764	P(N>=r) =	.86946
	99% =	.23606	75% =	.80780	10% =	2.1525
	95% =	.40412	50% =	1.2969	5% =	2.3312
	90% =	.53111	25% =	1.8225	1% =	2.6649
10	MEAN =	1.2685	S.D. =	.59115	P(N>=r) =	.83401
	99% =	.22553	75% =	.76449	10% =	2.0537
	95% =	.38232	50% =	1.2517	5% =	2.2194
	90% =	.50090	25% =	1.7465	1% =	2.5269
11	MEAN =	1.2200	S.D. =	.56717	P(N>=r) =	.79823
	99% =	.21679	75% =	.73014	10% =	1.9673
	95% =	.36433	50% =	1.2179	5% =	2.1219
	90% =	.47604	25% =	1.6803	1% =	2.4075
12	MEAN =	1.1794	S.D. =	.54494	P(N>=r) =	.76252
	99% =	.20934	75% =	.70389	10% =	1.8907
	95% =	.34925	50% =	1.1921	5% =	2.0356
	90% =	.45551	25% =	1.6218	1% =	2.3025
13	MEAN =	1.1456	S.D. =	.52378	P(N>=r) =	.72713
	99% =	.20303	75% =	.68576	10% =	1.8221
	95% =	.33681	50% =	1.1718	5% =	1.9585
	90% =	.43903	25% =	1.5695	1% =	2.2092

Pool rank			Distribution			
14	MEAN =	1.1174	S.D. =	.50313	P(N>=r) =	.69234
	99% =	.19790	75% =	.67622	10% =	1.7599
	95% =	.32705	50% =	1.1546	5% =	1.8888
	90% =	.42666	25% =	1.5221	1% =	2.1252
15	MEAN =	1.0938	S.D. =	.48254	P(N>=r) =	.65855
	99% =	.19406	75% =	.67579	10% =	1.7032
	95% =	.32012	50% =	1.1389	5% =	1.8252
	90% =	.41863	25% =	1.4786	1% =	2.0491
16	MEAN =	1.0740	S.D. =	.46176	P(N>=r) =	.62627
	99% =	.19161	75% =	.68413	10% =	1.6509
	95% =	.31622	50% =	1.1237	5% =	1.7668
	90% =	.41530	25% =	1.4384	1% =	1.9794
17	MEAN =	1.0566	S.D. =	.44076	P(N>=r) =	.59604
	99% =	.19065	75% =	.69866	10% =	1.6022
	95% =	.31554	50% =	1.1080	5% =	1.7126
	90% =	.41698	25% =	1.4006	1% =	1.9152
18	MEAN =	1.0406	S.D. =	.41976	P(N>=r) =	.56838
	99% =	.19123	75% =	.71439	10% =	1.5565
	95% =	.31818	50% =	1.0912	5% =	1.6620
	90% =	.42372	25% =	1.3648	1% =	1.8555
19	MEAN =	1.0247	S.D. =	.39924	P(N>=r) =	.54366
	99% =	.19329	75% =	.72641	10% =	1.5132
	95% =	.32395	50% =	1.0730	5% =	1.6142
	90% =	.43480	25% =	1.3303	1% =	1.7996
20	MEAN =	1.0082	S.D. =	.37978	P(N>=r) =	.52206
	99% =	.19659	75% =	.73224	10% =	1.4721
	95% =	.33216	50% =	1.0531	5% =	1.5689
	90% =	.44816	25% =	1.2968	1% =	1.7470
21	MEAN =	.99031	S.D. =	.36192	P(N>=r) =	.50348
	99% =	.20069	75% =	.73167	10% =	1.4328
	95% =	.34137	50% =	1.0317	5% =	1.5258
	90% =	.46055	25% =	1.2640	1% =	1.6972
22	MEAN =	.97103	S.D. =	.34601	P(N>=r) =	.48762
	99% =	.20489	75% =	.72568	10% =	1.3949
	95% =	.34961	50% =	1.0090	5% =	1.4848
	90% =	.46898	25% =	1.2320	1% =	1.6500
23	MEAN =	.95050	S.D. =	.33213	P(N>=r) =	.47400
	99% =	.20838	75% =	.71557	10% =	1.3584
	95% =	.35513	50% =	.98550	5% =	1.4456
	90% =	.47223	25% =	1.2004	1% =	1.6051
24	MEAN =	.92912	S.D. =	.32008	P(N>=r) =	.46211
	99% =	.21055	75% =	.70267	10% =	1.3231
	95% =	.35714	50% =	.96165	5% =	1.4078
	90% =	.47074	25% =	1.1696	1% =	1.5623
25	MEAN =	.90738	S.D. =	.30954	P(N>=r) =	.45145
	99% =	.21113	75% =	.68810	10% =	1.2890
	95% =	.35595	50% =	.93789	5% =	1.3714
	90% =	.46576	25% =	1.1397	1% =	1.5215
26	MEAN =	.88567	S.D. =	.30016	P(N>=r) =	.44160
	99% =	.21031	75% =	.67272	10% =	1.2562
	95% =	.35238	50% =	.91452	5% =	1.3363
	90% =	.45855	25% =	1.1108	1% =	1.4823

Pool rank	Distribution	
27 MEAN = .86433	S.D. = .29162	P(N>=r) = .43225
99% = .20847	75% = .65714	10% = 1.2246
95% = .34734	50% = .89172	5% = 1.3026
90% = .45013	25% = 1.0829	1% = 1.4443
28 MEAN = .84354	S.D. = .28371	P(N>=r) = .42318
99% = .20599	75% = .64172	10% = 1.1944
95% = .34152	50% = .86964	5% = 1.2704
90% = .44117	25% = 1.0561	1% = 1.4080
29 MEAN = .82341	S.D. = .27626	P(N>=r) = .41427
99% = .20319	75% = .62667	10% = 1.1654
95% = .33537	50% = .84832	5% = 1.2396
90% = .43210	25% = 1.0303	1% = 1.3732
30 MEAN = .80396	S.D. = .26917	P(N>=r) = .40543
99% = .20025	75% = .61210	10% = 1.1375
95% = .32916	50% = .82775	5% = 1.2101
90% = .42314	25% = 1.0054	1% = 1.3402
31 MEAN = .78520	S.D. = .26238	P(N>=r) = .39663
99% = .19729	75% = .59805	10% = 1.1107
95% = .32304	50% = .80792	5% = 1.1817
90% = .41441	25% = .98147	1% = 1.3088
32 MEAN = .76710	S.D. = .25585	P(N>=r) = .38783
99% = .19435	75% = .58450	10% = 1.0849
95% = .31706	50% = .78883	5% = 1.1544
90% = .40596	25% = .95835	1% = 1.2787
33 MEAN = .74963	S.D. = .24954	P(N>=r) = .37903
99% = .19148	75% = .57145	10% = 1.0599
95% = .31127	50% = .77037	5% = 1.1281
90% = .39781	25% = .93601	1% = 1.2499
34 MEAN = .73274	S.D. = .24344	P(N>=r) = .37023
99% = .18869	75% = .55885	10% = 1.0358
95% = .30567	50% = .75260	5% = 1.1026
90% = .38995	25% = .91439	1% = 1.2221
35 MEAN = .71640	S.D. = .23754	P(N>=r) = .36141
99% = .18598	75% = .54669	10% = 1.0125
95% = .30027	50% = .73543	5% = 1.0780
90% = .38237	25% = .89346	1% = 1.1953
36 MEAN = .70057	S.D. = .23181	P(N>=r) = .35259
99% = .18335	75% = .53493	10% = .98985
95% = .29504	50% = .71873	5% = 1.0542
90% = .37504	25% = .87317	1% = 1.1694
37 MEAN = .68522	S.D. = .22625	P(N>=r) = .34377
99% = .18079	75% = .52352	10% = .96791
95% = .28998	50% = .70262	5% = 1.0311
90% = .36795	25% = .85346	1% = 1.1443
38 MEAN = .67030	S.D. = .22086	P(N>=r) = .33494
99% = .17830	75% = .51245	10% = .94661
95% = .28506	50% = .68694	5% = 1.0087
90% = .36106	25% = .83431	1% = 1.1199
39 MEAN = .65580	S.D. = .21562	P(N>=r) = .32611
99% = .17586	75% = .50168	10% = .92590
95% = .28027	50% = .67165	5% = .98692
90% = .35436	25% = .81568	1% = 1.0963
40 MEAN = .64167	S.D. = .21053	P(N>=r) = .31728
99% = .17346	75% = .49119	10% = .90575
95% = .27558	50% = .65667	5% = .96574
90% = .34782	25% = .79753	1% = 1.0733
41 MEAN = .62789	S.D. = .20558	P(N>=r) = .30846
99% = .17111	75% = .48095	10% = .88613
95% = .27100	50% = .64203	5% = .94513
90% = .34143	25% = .77985	1% = 1.0510
42 MEAN = .61445	S.D. = .20077	P(N>=r) = .29964
99% = .16879	75% = .47095	10% = .86700
95% = .26650	50% = .62770	5% = .92505
90% = .33517	25% = .76258	1% = 1.0293
43 MEAN = .60132	S.D. = .19609	P(N>=r) = .29081
99% = .16650	75% = .46117	10% = .84834
95% = .26208	50% = .61373	5% = .90547
90% = .32904	25% = .74571	1% = 1.0082
44 MEAN = .58848	S.D. = .19154	P(N>=r) = .28199
99% = .16424	75% = .45160	10% = .83012
95% = .25774	50% = .60008	5% = .88637
90% = .32302	25% = .72924	1% = .98756
45 MEAN = .57591	S.D. = .18710	P(N>=r) = .27318
99% = .16201	75% = .44221	10% = .81232
95% = .25346	50% = .58675	5% = .86772
90% = .31711	25% = .71309	1% = .96745
46 MEAN = .56361	S.D. = .18278	P(N>=r) = .26436
99% = .15979	75% = .43300	10% = .79493
95% = .24923	50% = .57369	5% = .84949
90% = .31129	25% = .69726	1% = .94783
47 MEAN = .55154	S.D. = .17856	P(N>=r) = .25554
99% = .15759	75% = .42395	10% = .77790
95% = .24507	50% = .56089	5% = .83168
90% = .30556	25% = .68173	1% = .92866
48 MEAN = .53971	S.D. = .17446	P(N>=r) = .24672
99% = .15541	75% = .41505	10% = .76124
95% = .24095	50% = .54834	5% = .81425
90% = .29991	25% = .66652	1% = .90993
49 MEAN = .52810	S.D. = .17045	P(N>=r) = .23790
99% = .15323	75% = .40628	10% = .74493
95% = .23687	50% = .53601	5% = .79718
90% = .29432	25% = .65165	1% = .89161
50 MEAN = .51669	S.D. = .16655	P(N>=r) = .22908
99% = .15107	75% = .39765	10% = .72894
95% = .23282	50% = .52390	5% = .78047
90% = .28880	25% = .63719	1% = .87368
51 MEAN = .50548	S.D. = .16274	P(N>=r) = .22027
99% = .14891	75% = .38913	10% = .71326
95% = .22881	50% = .51200	5% = .76410
90% = .28333	25% = .62319	1% = .85614
52 MEAN = .49445	S.D. = .15903	P(N>=r) = .21145
99% = .14675	75% = .38072	10% = .69789
95% = .22482	50% = .50030	5% = .74805
90% = .27791	25% = .60937	1% = .83896

Pool rank		Distribution			
53 MEAN =	.48361	S.D. =	.15542	P(N>=r) =	.20263
99% =	.14460	75% =	.37242	10% =	.68279
95% =	.22085	50% =	.48878	5% =	.73231
90% =	.27254	25% =	.59578	1% =	.82212
54 MEAN =	.47293	S.D. =	.15189	P(N>=r) =	.19382
99% =	.14244	75% =	.36422	10% =	.66797
95% =	.21689	50% =	.47746	5% =	.71688
90% =	.26720	25% =	.58228	1% =	.80562
55 MEAN =	.46242	S.D. =	.14846	P(N>=r) =	.18501
99% =	.14027	75% =	.35612	10% =	.65339
95% =	.21295	50% =	.46631	5% =	.70173
90% =	.26189	25% =	.56897	1% =	.78945
56 MEAN =	.45208	S.D. =	.14511	P(N>=r) =	.17620
99% =	.13810	75% =	.34811	10% =	.63893
95% =	.20902	50% =	.45535	5% =	.68687
90% =	.25662	25% =	.55592	1% =	.77359
57 MEAN =	.44190	S.D. =	.14184	P(N>=r) =	.16741
99% =	.13593	75% =	.34019	10% =	.62473
95% =	.20510	50% =	.44457	5% =	.67229
90% =	.25138	25% =	.54312	1% =	.75803
58 MEAN =	.43188	S.D. =	.13866	P(N>=r) =	.15862
99% =	.13375	75% =	.33238	10% =	.61066
95% =	.20120	50% =	.43396	5% =	.65797
90% =	.24617	25% =	.53056	1% =	.74278
59 MEAN =	.42203	S.D. =	.13556	P(N>=r) =	.14985
99% =	.13156	75% =	.32466	10% =	.59709
95% =	.19730	50% =	.42354	5% =	.64390
90% =	.24101	25% =	.51822	1% =	.72782
60 MEAN =	.41234	S.D. =	.13254	P(N>=r) =	.14111
99% =	.12937	75% =	.31706	10% =	.58407
95% =	.19343	50% =	.41331	5% =	.63007
90% =	.23588	25% =	.50612	1% =	.71315
61 MEAN =	.40283	S.D. =	.12960	P(N>=r) =	.13239
99% =	.12718	75% =	.30958	10% =	.57134
95% =	.18958	50% =	.40327	5% =	.61631
90% =	.23081	25% =	.49425	1% =	.69876
62 MEAN =	.39350	S.D. =	.12673	P(N>=r) =	.12373
99% =	.12500	75% =	.30222	10% =	.55870
95% =	.18576	50% =	.39344	5% =	.60259
90% =	.22580	25% =	.48263	1% =	.68466

Pool rank		Distribution			
63 MEAN =	.38436	S.D. =	.12393	P(N>=r) =	.11513
99% =	.12283	75% =	.29501	10% =	.54622
95% =	.18198	50% =	.38382	5% =	.58915
90% =	.22085	25% =	.47125	1% =	.67085
64 MEAN =	.37542	S.D. =	.12120	P(N>=r) =	.10662
99% =	.12067	75% =	.28796	10% =	.53400
95% =	.17826	50% =	.37443	5% =	.57633
90% =	.21600	25% =	.46013	1% =	.65733
65 MEAN =	.36669	S.D. =	.11853	P(N>=r)=	.98225E-01
99% =	.11854	75% =	.28107	10% =	.52207
95% =	.17459	50% =	.36527	5% =	.56410
90% =	.21123	25% =	.44928	1% =	.64409
66 MEAN =	.35818	S.D. =	.11594	P(N>=r) =	.89969E-01
99% =	.11644	75% =	.27436	10% =	.51041
95% =	.17100	50% =	.35637	5% =	.55214
90% =	.20658	25% =	.43870	1% =	.63115
67 MEAN =	.34990	S.D. =	.11340	P(N>=r) =	.81893E-01
99% =	.11438	75% =	.26785	10% =	.49905
95% =	.16750	50% =	.34772	5% =	.54032
90% =	.20205	25% =	.42840	1% =	.61850
68 MEAN =	.34186	S.D. =	.11093	P(N>=r) =	.74034E-01
99% =	.11237	75% =	.26155	10% =	.48798
95% =	.16409	50% =	.33934	5% =	.52872
90% =	.19765	25% =	.41840	1% =	.60612
69 MEAN =	.33407	S.D. =	.10851	P(N>=r) =	.66437E-01
99% =	.11040	75% =	.25546	10% =	.47722
95% =	.16078	50% =	.33125	5% =	.51744
90% =	.19339	25% =	.40870	1% =	.59391
70 MEAN =	.32654	S.D. =	.10616	P(N>=r) =	.59145E-01
99% =	.10850	75% =	.24960	10% =	.46676
95% =	.15758	50% =	.32344	5% =	.50646
90% =	.18929	25% =	.39932	1% =	.58191
71 MEAN =	.31928	S.D. =	.10386	P(N>=r) =	.52204E-01
99% =	.10665	75% =	.24396	10% =	.45663
95% =	.15450	50% =	.31592	5% =	.49580
90% =	.18534	25% =	.39025	1% =	.56921

E) The mean of the potential = 35.600

PETRIMES MODULE PSUM

Monte Carlo sum simulation pool size distribution

UAI........................ **C5019902**
PLAY..................... **Tertiary/Upper Cretaceous Nonmarine Oil**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Mon, Feb. 8, 1999, 11:52 a.m.

User supplied parameters

Do you want to store in data base ?	>	Y
Oil (o) or gas (g) ?	>	O
British or S.I. unit of measurement?	>	Si
Recoverable resources?	>	N
Do you want to use MPRO output?	>	Y
Do you assume lognormal distribution?	>	Y
Do you want to use PPSD output?	>	Y
Do you compute conditional potential?	>	N

A) Basic information

Type of resource	=	oil in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	=	-.71278E-01	MEAN	=	1.1975					
Statistics	sig. sq.	=	.50305	S.D.	=	.96825					
Upper percentiles	99.99%	=	.66602E-01	60.00%	=	.77805		15.00%	=	1.9422	
	99.00%	=	.17884	55.00%	=	.85180		10.00%	=	2.3110	
	95.00%	=	.28999	50.00%	=	.93120		8.00%	=	2.5226	
	90.00%	=	.37522	45.00%	=	1.0180		6.00%	=	2.8052	
	85.00%	=	.44647	40.00%	=	1.1145		5.00%	=	2.9902	
	80.00%	=	.51263	35.00%	=	1.2239		4.00%	=	3.2233	
	75.00%	=	.57714	30.00%	=	1.3507		2.00%	=	3.9963	
	70.00%	=	.64197	25.00%	=	1.5025		1.00%	=	4.8487	
	65.00%	=	.70852	20.00%	=	1.6916		.01%	=	13.020	

C) Number of pools distribution

Lower support	=	0
Upper support	=	102
Expectation	=	29.79207
Standard Deviation	=	21.72389

D) Summary statistics for 4,000 simulations

Play resource		(M cu m)
Minimum	=	.2604936
Maximum	=	133.8290
Expectation	=	35.35617
Standard Deviation	=	26.35989

Empirical distribution

Greater than percentage	*Play potential*	*Greater than percentage*	*Play potential*	*Greater than percentage*	*Play potential*
100.00	.26049	50.00	25.778	8.00	79.421
99.00	2.6692	45.00	30.255	6.00	83.338
95.00	6.1935	40.00	35.876	5.00	85.769
90.00	8.2957	35.00	41.825	4.00	88.858
85.00	10.235	30.00	48.267	2.00	95.461
80.00	12.090	25.00	54.705	1.00	100.97
75.00	13.848	20.00	61.714	.01	130.86
70.00	15.603	15.00	68.121	.00	133.53
65.00	17.592	10.00	76.017		
60.00	19.649				
55.00	22.331				

PETRIMES MODULE MPRO

Number of of pools distribution and risks

UAI........................ **C5029902**
PLAY..................... **Tertiary/Upper Cretaceous Nonmarine Gas**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Fri., Feb. 5, 1999, 1:29 p.m.

User supplied parameters

Do you want to store on db?	>	Y
Oil (o) or gas (g) ?	>	G

A) Risks

	Geological factor		*Marginal probability*
Play level	overall play level risk	=	1.00
	Prospect level presence of closure	(1)	.80
	Presence of reservoir facies	(2)	1.00
	Adequate seal	(4)	.70
	Adequate timing	(5)	.75
	Adequate source	(6)	.90
	Overall prospect level risk	=	.38
Exploration risk		=	.38

B) Number of prospects distribution

Minimum	=	14
Maximum	=	200
Mean	=	78.82
S.D.	=	56.33

Frequency	*Number of prospects*
99.00	14
95	17
90	21
80	28
75	32
60	43
50	50
40	80
25	125
20	140
10	170
5	185
1	197
0	200

C) Number of pools distribution

Minimum	=	0
Maximum	=	102
Mean	=	29.79
S.D.	=	21.72

Frequency	*Number of pools*
100.00	0
99	4
95	6
90	8
80	10
75	12
60	16
50	21
40	30
25	47
20	53
10	64
5	71
1	80
0	102

Note: The number of pools distribution is saved in the database with UDI= 6201GB4

PETRIMES MODULE PSRK

Individual pool sizes by rank where n is a random variable

UAI........................ **C5029902**

PLAY..................... **Tertiary/Upper Cretaceous Nonmarine Gas**

Assessor............... Peter Hannigan

Geologist............. Peter Hannigan

Remarks............... Kandik Assessment Project

Run date .... Mon., Feb. 8, 1999, 11:22 a.m.

User supplied parameters

Do you want to store on DB?	>	Y	
Do you want to use MPRO output?	>	Y	
Minimum and maximum pool ranks?	>	1	71
Do you use lognornal assumption?	>	Y	
Do you want to use PPSD output?	>	Y	

A) Basic information

Type of resource	=	gas in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	=	5.3218	MEAN	=	271.40			
Statistics	sig. sq.	=	.56362	S.D.	=	236.14			
Upper percentiles	99.99%	=	12.550	60.00%	=	169.29	15.00%	=	445.81
	99.00%	=	35.705	55.00%	=	186.32	10.00%	=	535.88
	95.00%	=	59.556	50.00%	=	204.75	8.00%	=	587.95
	90.00%	=	78.231	45.00%	=	225.01	6.00%	=	657.88
	85.00%	=	94.037	40.00%	=	247.64	5.00%	=	703.91
	80.00%	=	108.85	35.00%	=	273.44	4.00%	=	762.12
	75.00%	=	123.40	30.00%	=	303.53	2.00%	=	956.84
	70.00%	=	138.12	25.00%	=	339.73	1.00%	=	1174.1
	65.00%	=	153.32	20.00%	=	385.15	.01%	=	3340.3

C) Number of pools distribution

Lower support	=	0
Upper support	=	102
Expectation	=	29.79
Standard Deviation	=	21.72

D) Pool sizes by rank

Pool rank		Distribution	
1	MEAN = 948.46	S.D. = 488.29	P(N>=r) = .99996
	99% = 255.69	75% = 618.65	10% = 1536.3
	95% = 373.60	50% = 856.25	5% = 1835.0
	90% = 452.40	25% = 1160.6	1% = 2626.9
2	MEAN = 654.53	S.D. = 283.40	P(N>=r) = .99955
	99% = 173.68	75% = 444.93	10% = 1022.4
	95% = 265.21	50% = 621.21	5% = 1161.9
	90% = 323.97	25% = 820.85	1% = 1483.1
3	MEAN = 530.58	S.D. = 228.74	P(N>=r) = .99770
	99% = 124.19	75% = 355.47	10% = 833.74
	95% = 202.99	50% = 508.89	5% = 931.99
	90% = 253.44	25% = 680.39	1% = 1142.7
4	MEAN = 455.46	S.D. = 202.24	P(N>=r) = .99225
	99% = 92.412	75% = 297.38	10% = 726.33
	95% = 160.80	50% = 437.53	5% = 805.03
	90% = 206.09	25% = 596.73	1% = 966.47
5	MEAN = 403.88	S.D. = 185.46	P(N>=r) = .98068
	99% = 73.162	75% = 256.46	10% = 653.86
	95% = 131.70	50% = 387.52	5% = 720.73
	90% = 172.72	25% = 539.33	1% = 853.78
6	MEAN = 366.52	S.D. = 172.98	P(N>=r) = .96150
	99% = 61.864	75% = 226.83	10% = 600.47
	95% = 112.23	50% = 351.26	5% = 659.17
	90% = 149.34	25% = 497.04	1% = 773.44
7	MEAN = 338.58	S.D. = 162.78	P(N>=r) = .93518
	99% = 55.112	75% = 205.08	10% = 558.90
	95% = 99.433	50% = 324.71	5% = 611.48
	90% = 133.10	25% = 464.44	1% = 712.23
8	MEAN = 317.07	S.D. = 154.08	P(N>=r) = .90374
	99% = 50.847	75% = 188.76	10% = 525.22
	95% = 90.818	50% = 305.18	5% = 572.96
	90% = 121.59	25% = 438.36	1% = 663.40
9	MEAN = 299.97	S.D. = 146.49	P(N>=r) = .86946
	99% = 47.900	75% = 176.15	10% = 497.05
	95% = 84.622	50% = 290.74	5% = 540.85
	90% = 113.01	25% = 416.77	1% = 623.12
10	MEAN = 286.03	S.D. = 139.78	P(N>=r) = .83401
	99% = 45.641	75% = 166.17	10% = 472.94
	95% = 79.798	50% = 280.03	5% = 513.43
	90% = 106.21	25% = 398.40	1% = 589.02
11	MEAN = 274.46	S.D. = 133.74	P(N>=r) = .79823
	99% = 43.772	75% = 158.27	10% = 451.90
	95% = 75.829	50% = 272.02	5% = 489.58
	90% = 100.64	25% = 382.44	1% = 559.59
12	MEAN = 264.79	S.D. = 128.18	P(N>=r) = .76252
	99% = 42.180	75% = 152.26	10% = 433.30
	95% = 72.510	50% = 265.94	5% = 468.54
	90% = 96.054	25% = 368.36	1% = 533.80
13	MEAN = 256.72	S.D. = 122.92	P(N>=r) = .72713
	99% = 40.836	75% = 148.11	10% = 416.67
	95% = 69.780	50% = 261.13	5% = 449.76
	90% = 92.380	25% = 355.79	1% = 510.92
14	MEAN = 250.00	S.D. = 117.82	P(N>=r) = .69234
	99% = 39.746	75% = 145.93	10% = 401.65
	95% = 67.642	50% = 257.08	5% = 432.84
	90% = 89.625	25% = 344.42	1% = 490.40
15	MEAN = 244.37	S.D. = 112.79	P(N>=r) = .65855
	99% = 38.929	75% = 145.83	10% = 387.96
	95% = 66.125	50% = 253.40	5% = 417.44
	90% = 87.841	25% = 334.03	1% = 471.82
16	MEAN = 239.60	S.D. = 107.75	P(N>=r) = .62627
	99% = 38.409	75% = 147.73	10% = 375.36
	95% = 65.272	50% = 249.81	5% = 403.31
	90% = 87.102	25% = 324.42	1% = 454.86
17	MEAN = 235.43	S.D. = 102.70	P(N>=r) = .59604
	99% = 38.206	75% = 151.06	10% = 363.65
	95% = 65.125	50% = 246.12	5% = 390.23
	90% = 87.476	25% = 315.41	1% = 439.25
18	MEAN = 231.56	S.D. = 97.690	P(N>=r) = .56838
	99% = 38.329	75% = 154.66	10% = 352.67
	95% = 65.702	50% = 242.18	5% = 378.02
	90% = 88.974	25% = 306.88	1% = 424.77
19	MEAN = 227.75	S.D. = 92.814	P(N>=r) = .54366
	99% = 38.765	75% = 157.42	10% = 342.30
	95% = 66.964	50% = 237.89	5% = 366.53
	90% = 91.438	25% = 298.67	1% = 411.24
20	MEAN = 223.78	S.D. = 88.205	P(N>=r) = .52206
	99% = 39.468	75% = 158.75	10% = 332.46
	95% = 68.760	50% = 233.22	5% = 355.65
	90% = 94.414	25% = 290.73	1% = 398.52
21	MEAN = 219.52	S.D. = 83.980	P(N>=r) = .50348
	99% = 40.339	75% = 158.62	10% = 323.07
	95% = 70.780	50% = 228.20	5% = 345.33
	90% = 97.179	25% = 282.95	1% = 386.51
22	MEAN = 214.95	S.D. = 80.212	P(N>=r) = .48762
	99% = 41.233	75% = 157.25	10% = 314.05
	95% = 72.590	50% = 222.90	5% = 335.51
	90% = 99.063	25% = 275.35	1% = 375.14
23	MEAN = 210.11	S.D. = 76.914	P(N>=r) = .47400
	99% = 41.977	75% = 154.93	10% = 305.36
	95% = 73.803	50% = 217.41	5% = 326.13
	90% = 99.788	25% = 267.89	1% = 364.34
24	MEAN = 205.08	S.D. = 74.039	P(N>=r) = .46211
	99% = 42.438	75% = 151.98	10% = 296.96
	95% = 74.246	50% = 211.84	5% = 317.11
	90% = 99.456	25% = 260.63	1% = 354.08
25	MEAN = 199.99	S.D. = 71.514	P(N>=r) = .45145
	99% = 42.563	75% = 148.64	10% = 288.86
	95% = 73.983	50% = 206.31	5% = 308.44
	90% = 98.342	25% = 253.58	1% = 344.29
26	MEAN = 194.92	S.D. = 69.258	P(N>=r) = .44160
	99% = 42.388	75% = 145.13	10% = 281.08
	95% = 73.199	50% = 200.87	5% = 300.10
	90% = 96.732	25% = 246.77	1% = 334.91

Pool rank			Distribution					
27 MEAN	=	189.94	S.D.	=	67.200	P(N>=r)	=	.43225
99%	=	41.995	75%	=	141.57	10%	=	273.62
95%	=	72.092	50%	=	195.57	5%	=	292.10
90%	=	94.852	25%	=	240.22	1%	=	325.83
28 MEAN	=	185.11	S.D.	=	65.290	P(N>=r)	=	.42318
99%	=	41.467	75%	=	138.06	10%	=	266.47
95%	=	70.813	50%	=	190.45	5%	=	284.46
90%	=	92.856	25%	=	233.93	1%	=	317.16
29 MEAN	=	180.43	S.D.	=	63.490	P(N>=r)	=	.41427
99%	=	40.870	75%	=	134.63	10%	=	259.62
95%	=	69.465	50%	=	185.51	5%	=	277.17
90%	=	90.836	25%	=	227.88	1%	=	308.88
30 MEAN	=	175.92	S.D.	=	61.779	P(N>=r)	=	.40543
99%	=	40.245	75%	=	131.32	10%	=	253.06
95%	=	68.104	50%	=	180.75	5%	=	270.18
90%	=	88.844	25%	=	222.06	1%	=	301.01
31 MEAN	=	171.57	S.D.	=	60.142	P(N>=r)	=	.39663
99%	=	39.614	75%	=	128.13	10%	=	246.75
95%	=	66.763	50%	=	176.17	5%	=	263.48
90%	=	86.905	25%	=	216.47	1%	=	293.56
32 MEAN	=	167.39	S.D.	=	58.569	P(N>=r)	=	.38783
99%	=	38.991	75%	=	125.06	10%	=	240.67
95%	=	65.456	50%	=	171.77	5%	=	257.03
90%	=	85.031	25%	=	211.07	1%	=	286.43
33 MEAN	=	163.35	S.D.	=	57.053	P(N>=r)	=	.37903
99%	=	38.382	75%	=	122.11	10%	=	234.82
95%	=	64.192	50%	=	167.52	5%	=	250.83
90%	=	83.224	25%	=	205.87	1%	=	279.59
34 MEAN	=	159.45	S.D.	=	55.589	P(N>=r)	=	.37023
99%	=	37.790	75%	=	119.26	10%	=	229.17
95%	=	62.971	50%	=	163.43	5%	=	244.85
90%	=	81.485	25%	=	200.84	1%	=	273.02
35 MEAN	=	155.69	S.D.	=	54.173	P(N>=r)	=	.36141
99%	=	37.215	75%	=	116.52	10%	=	223.71
95%	=	61.793	50%	=	159.49	5%	=	239.07
90%	=	79.809	25%	=	195.98	1%	=	266.68
36 MEAN	=	152.05	S.D.	=	52.801	P(N>=r)	=	.35259
99%	=	36.658	75%	=	113.87	10%	=	218.42
95%	=	60.655	50%	=	155.66	5%	=	233.48
90%	=	78.192	25%	=	191.27	1%	=	260.56
37 MEAN	=	148.52	S.D.	=	51.473	P(N>=r)	=	.34377
99%	=	36.117	75%	=	111.30	10%	=	213.30
95%	=	59.554	50%	=	151.96	5%	=	228.07
90%	=	76.627	25%	=	186.70	1%	=	254.65
38 MEAN	=	145.10	S.D.	=	50.185	P(N>=r)	=	.33494
99%	=	35.590	75%	=	108.81	10%	=	208.34
95%	=	58.485	50%	=	148.38	5%	=	222.83
90%	=	75.110	25%	=	182.27	1%	=	248.92
39 MEAN	=	141.77	S.D.	=	48.936	P(N>=r)	=	.32611
99%	=	35.075	75%	=	106.39	10%	=	203.52
95%	=	57.445	50%	=	144.88	5%	=	217.74
90%	=	73.634	25%	=	177.97	1%	=	243.36

Pool rank			Distribution					
40 MEAN	=	138.54	S.D.	=	47.725	P(N>=r)	=	.31728
99%	=	34.570	75%	=	104.03	10%	=	198.83
95%	=	56.429	50%	=	141.47	5%	=	212.80
90%	=	72.197	25%	=	173.78	1%	=	237.97
41 MEAN	=	135.39	S.D.	=	46.548	P(N>=r)	=	.30846
99%	=	34.074	75%	=	101.74	10%	=	194.27
95%	=	55.436	50%	=	138.13	5%	=	207.99
90%	=	70.793	25%	=	169.70	1%	=	232.74
42 MEAN	=	132.32	S.D.	=	45.405	P(N>=r)	=	.29964
99%	=	33.585	75%	=	99.504	10%	=	189.84
95%	=	54.462	50%	=	134.87	5%	=	203.32
90%	=	69.421	25%	=	165.73	1%	=	227.65
43 MEAN	=	129.33	S.D.	=	44.295	P(N>=r)	=	.29081
99%	=	33.104	75%	=	97.318	10%	=	185.52
95%	=	53.507	50%	=	131.69	5%	=	198.77
90%	=	68.078	25%	=	161.85	1%	=	222.70
44 MEAN	=	126.41	S.D.	=	43.215	P(N>=r)	=	.28199
99%	=	32.628	75%	=	95.180	10%	=	181.30
95%	=	52.568	50%	=	128.60	5%	=	194.33
90%	=	66.761	25%	=	158.07	1%	=	217.89
45 MEAN	=	123.55	S.D.	=	42.165	P(N>=r)	=	.27318
99%	=	32.158	75%	=	93.087	10%	=	177.19
95%	=	51.644	50%	=	125.57	5%	=	190.00
90%	=	65.468	25%	=	154.36	1%	=	213.20
46 MEAN	=	120.75	S.D.	=	41.143	P(N>=r)	=	.26436
99%	=	31.692	75%	=	91.036	10%	=	173.18
95%	=	50.735	50%	=	122.62	5%	=	185.78
90%	=	64.197	25%	=	150.74	1%	=	208.62
47 MEAN	=	118.02	S.D.	=	40.148	P(N>=r)	=	.25554
99%	=	31.231	75%	=	89.023	10%	=	169.25
95%	=	49.837	50%	=	119.72	5%	=	181.66
90%	=	62.946	25%	=	147.19	1%	=	204.16
48 MEAN	=	115.34	S.D.	=	39.179	P(N>=r)	=	.24672
99%	=	30.773	75%	=	87.046	10%	=	165.42
95%	=	48.950	50%	=	116.89	5%	=	177.63
90%	=	61.714	25%	=	143.71	1%	=	199.80
49 MEAN	=	112.71	S.D.	=	38.236	P(N>=r)	=	.23790
99%	=	30.317	75%	=	85.101	10%	=	161.67
95%	=	48.074	50%	=	114.11	5%	=	173.70
90%	=	60.498	25%	=	140.32	1%	=	195.55
50 MEAN	=	110.13	S.D.	=	37.317	P(N>=r)	=	.22908
99%	=	29.864	75%	=	83.188	10%	=	158.00
95%	=	47.205	50%	=	111.38	5%	=	169.84
90%	=	59.298	25%	=	137.03	1%	=	191.39
51 MEAN	=	107.60	S.D.	=	36.422	P(N>=r)	=	.22027
99%	=	29.413	75%	=	81.303	10%	=	154.40
95%	=	46.344	50%	=	108.71	5%	=	166.08
90%	=	58.110	25%	=	133.84	1%	=	187.32
52 MEAN	=	105.12	S.D.	=	35.550	P(N>=r)	=	.21145
99%	=	28.962	75%	=	79.446	10%	=	150.88
95%	=	45.489	50%	=	106.08	5%	=	162.39
90%	=	56.934	25%	=	130.70	1%	=	183.34

Pool rank			Distribution					
53 MEAN	=	102.68	S.D.	=	34.701	P(N>=r)	=	.20263
99%	=	28.512	75%	=	77.613	10%	=	147.43
95%	=	44.639	50%	=	103.50	5%	=	158.77
90%	=	55.769	25%	=	127.62	1%	=	179.45
54 MEAN	=	100.28	S.D.	=	33.874	P(N>=r)	=	.19382
99%	=	28.061	75%	=	75.805	10%	=	144.04
95%	=	43.793	50%	=	100.96	5%	=	155.23
90%	=	54.613	25%	=	124.56	1%	=	175.64
55 MEAN	=	97.924	S.D.	=	33.068	P(N>=r)	=	.18501
99%	=	27.610	75%	=	74.021	10%	=	140.72
95%	=	42.952	50%	=	98.467	5%	=	151.76
90%	=	53.466	25%	=	121.55	1%	=	171.91
56 MEAN	=	95.607	S.D.	=	32.284	P(N>=r)	=	.17620
99%	=	27.159	75%	=	72.260	10%	=	137.42
95%	=	42.113	50%	=	96.018	5%	=	148.36
90%	=	52.327	25%	=	118.60	1%	=	168.26
57 MEAN	=	93.329	S.D.	=	31.520	P(N>=r)	=	.16741
99%	=	26.706	75%	=	70.522	10%	=	134.19
95%	=	41.278	50%	=	93.612	5%	=	145.03
90%	=	51.197	25%	=	115.71	1%	=	164.68
58 MEAN	=	91.091	S.D.	=	30.776	P(N>=r)	=	.15862
99%	=	26.252	75%	=	68.808	10%	=	131.00
95%	=	40.446	50%	=	91.250	5%	=	141.76
90%	=	50.076	25%	=	112.88	1%	=	161.17
59 MEAN	=	88.892	S.D.	=	30.052	P(N>=r)	=	.14985
99%	=	25.798	75%	=	67.119	10%	=	127.92
95%	=	39.618	50%	=	88.933	5%	=	138.56
90%	=	48.964	25%	=	110.11	1%	=	157.74
60 MEAN	=	86.734	S.D.	=	29.347	P(N>=r)	=	.14111
99%	=	25.344	75%	=	65.457	10%	=	124.97
95%	=	38.795	50%	=	86.660	5%	=	135.41
90%	=	47.862	25%	=	107.39	1%	=	154.38
61 MEAN	=	84.618	S.D.	=	28.660	P(N>=r)	=	.13239
99%	=	24.891	75%	=	63.823	10%	=	122.09
95%	=	37.978	50%	=	84.435	5%	=	132.28
90%	=	46.773	25%	=	104.72	1%	=	151.08
62 MEAN	=	82.545	S.D.	=	27.991	P(N>=r)	=	.12373
99%	=	24.439	75%	=	62.219	10%	=	119.23
95%	=	37.169	50%	=	82.257	5%	=	129.16
90%	=	45.699	25%	=	102.12	1%	=	147.86

Pool rank			Distribution					
63 MEAN	=	80.517	S.D.	=	27.339	P(N>=r)	=	.11513
99%	=	23.989	75%	=	60.649	10%	=	116.41
95%	=	36.369	50%	=	80.130	5%	=	126.12
90%	=	44.641	25%	=	99.570	1%	=	144.70
64 MEAN	=	78.536	S.D.	=	26.704	P(N>=r)	=	.10662
99%	=	23.544	75%	=	59.114	10%	=	113.66
95%	=	35.582	50%	=	78.056	5%	=	123.22
90%	=	43.602	25%	=	97.085	1%	=	141.62
65 MEAN	=	76.605	S.D.	=	26.085	P(N>=r)	=	.98225E-01
99%	=	23.104	75%	=	57.618	10%	=	110.97
95%	=	34.808	50%	=	76.037	5%	=	120.45
90%	=	42.585	25%	=	94.663	1%	=	138.60
66 MEAN	=	74.724	S.D.	=	25.482	P(N>=r)	=	.89969E-01
99%	=	22.671	75%	=	56.164	10%	=	108.35
95%	=	34.051	50%	=	74.076	5%	=	117.75
90%	=	41.593	25%	=	92.305	1%	=	135.65
67 MEAN	=	72.897	S.D.	=	24.894	P(N>=r)	=	.81893E-01
99%	=	22.247	75%	=	54.754	10%	=	105.80
95%	=	33.313	50%	=	72.175	5%	=	115.08
90%	=	40.628	25%	=	90.014	1%	=	132.78
68 MEAN	=	71.126	S.D.	=	24.321	P(N>=r)	=	.74034E-01
99%	=	21.832	75%	=	53.391	10%	=	103.32
95%	=	32.595	50%	=	70.335	5%	=	112.47
90%	=	39.692	25%	=	87.791	1%	=	129.97
69 MEAN	=	69.412	S.D.	=	23.763	P(N>=r)	=	.66437E-01
99%	=	21.429	75%	=	52.077	10%	=	100.90
95%	=	31.900	50%	=	68.560	5%	=	109.93
90%	=	38.788	25%	=	85.639	1%	=	127.20
70 MEAN	=	67.757	S.D.	=	23.219	P(N>=r)	=	.59145E-01
99%	=	21.037	75%	=	50.812	10%	=	98.567
95%	=	31.229	50%	=	66.851	5%	=	107.46
90%	=	37.916	25%	=	83.558	1%	=	124.48
71 MEAN	=	66.162	S.D.	=	22.690	P(N>=r)	=	.52204E-01
99%	=	20.659	75%	=	49.600	10%	=	96.303
95%	=	30.582	50%	=	65.208	5%	=	105.07
90%	=	37.079	25%	=	81.551	1%	=	121.60

E) The mean of the potential = 8069.9

PETRIMES MODULE PSUM

Monte Carlo sum simulation pool size distribution

UAI........................ **C5029902**
PLAY..................... **Tertiary/Upper Cretaceous Nonmarine Gas**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Mon, Feb. 8, 1999, 11:31 a.m.

User supplied parameters

Do you want to store in database?	>	Y
Oil (o) or gas (g)?	>	G
British or S.I. init of measurement?	>	Si
Recoverable resources?	>	N
Do you want to use MPRO output?	>	Y
Do you assume lognormal distribution?	>	Y
Do you want to use PPSD output?	>	Y
Do you compute conditional potential?	>	N

A) Basic information

Type of resource	=	Gas in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	= 5.3218	MEAN	=	271.40			
Statistics	sig. sq.	= .56362	S.D.	=	236.14			
Upper percentiles	99.99%	= 12.550	60.00%	=	169.29	15.00%	=	445.81
	99.00%	= 35.705	55.00%	=	186.32	10.00%	=	535.88
	95.00%	= 59.556	50.00%	=	204.75	8.00%	=	587.95
	90.00%	= 78.231	45.00%	=	225.01	6.00%	=	657.88
	85.00%	= 94.037	40.00%	=	247.64	5.00%	=	703.91
	80.00%	= 108.85	35.00%	=	273.44	4.00%	=	762.12
	75.00%	= 123.40	30.00%	=	303.53	2.00%	=	956.84
	70.00%	= 138.12	25.00%	=	339.73	1.00%	=	1174.1
	65.00%	= 153.32	20.00%	=	385.15	.01%	=	3340.3

C) Number of pools distribution

Lower support	=	0
Upper support	=	102
Expectation	=	29.79207
Standard Deviation	=	21.72389

D) Summary statistics for 4,000 simulations

Play resource		(B cu m)
Minimum	=	.5316375E-01
Maximum	=	30.73407
Expectation	=	8.012095
Standard Deviation	=	5.991732

Empirical distribution

Greater than percentage	*Play potential*	*Greater than percentage*	*Play potential*	*Greater than percentage*	*Play potential*
100.00	.53164E-01	55.00	5.0684	10.00	17.255
99.00	.58677	50.00	5.8628	8.00	18.034
95.00	1.3841	45.00	6.8648	6.00	18.966
90.00	1.8623	40.00	8.1568	5.00	19.469
85.00	2.3044	35.00	9.5152	4.00	20.131
80.00	2.7130	30.00	10.897	2.00	21.757
75.00	3.1337	25.00	12.386	1.00	23.032
70.00	3.5305	20.00	13.987	.01	29.965
65.00	3.9703	15.00	15.414	.00	30.657
60.00	4.4512				

PETRIMES MODULE MPRO

Number of pools distribution and risks

UAI........................ **C5039902**
PLAY..................... **Mesozoic Marine Structural Gas**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Tue., Feb. 9, 1999, 10:38 a.m.

User supplied parameters

Do you want to store on db?	>	Y
Oil (o) or gas (g) ?	>	G

A) Risks

	Geological factor		*Marginal probability*
Play level	Overall play level risk	=	1.00
Prospect level	Presence of closure	(1)	.50
	Presence of reservoir facies	(2)	.50
	Adequate seal	(4)	.40
	Adequate timing	(5)	.75
	Adequate source	(6)	.80
	Overall prospect level risk	=	.06
Exploration risk		=	.06

B) Number of prospects distribution

Minimum	=	30
Maximum	=	270
Mean	=	135.05
S.D.	=	70.31

Frequency	*Number of prospects*
99.00	30
95	38
90	47
80	65
75	75
60	102
50	120
40	150
25	195
20	210
10	240
5	255
1	267
0	270

C) Number of pools distribution

Minimum	=	0
Maximum	=	34
Mean	=	8.10
S.D.	=	5.04

Frequency	*Number of pools*
98.51	0
95	1
90	2
80	3
75	4
60	6
50	7
40	9
25	12
20	13
10	15
5	17
1	21
0	34

Note: The number of pools distribution is saved in the database with UDI= 6201GB4

PETRIMES MODULE PSRK

Individual pool sizes by rank where n is a random variable

UAI........................ **C5039902**
PLAY..................... **Mesozoic Marine Structural Gas**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Tue., Feb. 9, 1999, 10:40 a.m.

User supplied parameters

Do you want to store on DB?	>	Y	
Do you want to use MPRO output?	>	Y	
Minimum and maximum pool ranks?	>	1	17
Do you use lognornal assumption?	>	Y	
Do you want to use PPSD output?	>	Y	

A) Basic information

Type of resource	=	Gas in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	=	6.9202	MEAN	=	1448.3			
Statistics	sig. sq.	=	.71594	S.D.	=	1481.3			
Upper percentiles	99.99%	=	43.528	60.00%	=	817.14	15.00%	=	2433.6
	99.00%	=	141.43	55.00%	=	910.37	10.00%	=	2994.5
	95.00%	=	251.74	50.00%	=	1012.5	8.00%	=	3324.4
	90.00%	=	342.34	45.00%	=	1126.1	6.00%	=	3773.4
	85.00%	=	421.25	40.00%	=	1254.6	5.00%	=	4072.2
	80.00%	=	496.73	35.00%	=	1402.8	4.00%	=	4453.7
	75.00%	=	572.19	30.00%	=	1578.0	2.00%	=	5755.5
	70.00%	=	649.67	25.00%	=	1791.6	1.00%	=	7248.7
	65.00%	=	730.80	20.00%	=	2063.8	.01%	=	23552.

C) Number of pools distribution

Lower Support	=	0
Upper Support	=	34
Expectation	=	8.10
Standard Deviation	=	5.04

D) Pool sizes by rank

Pool rank			Distribution					
1 MEAN	=	3695.9	S.D. =	2598.1	P(N>=r)	=	.98513
99%	=	455.89	75% =	2035.3	10%	=	6663.4
95%	=	939.68	50% =	3109.6	5%	=	8369.3
90%	=	1295.9	25% =	4626.3	1%	=	13145.
2 MEAN	=	2190.1	S.D. =	1257.2	P(N>=r)	=	.94261
99%	=	280.48	75% =	1299.3	10%	=	3788.2
95%	=	568.58	50% =	1988.5	5%	=	4494.8
90%	=	799.76	25% =	2830.0	1%	=	6209.7
3 MEAN	=	1637.7	S.D. =	894.28	P(N>=r)	=	.87564
99%	=	218.88	75% =	980.74	10%	=	2806.0
95%	=	426.31	50% =	1517.4	5%	=	3268.5
90%	=	596.97	25% =	2142.5	1%	=	4320.4
4 MEAN	=	1335.2	S.D. =	710.41	P(N>=r)	=	.79570
99%	=	188.28	75% =	804.22	10%	=	2274.7
95%	=	355.07	50% =	1247.4	5%	=	2625.7
90%	=	491.80	25% =	1754.9	1%	=	3395.4
5 MEAN	=	1138.4	S.D. =	593.32	P(N>=r)	=	.71252
99%	=	169.61	75% =	691.52	10%	=	1928.3
95%	=	312.14	50% =	1068.2	5%	=	2214.0
90%	=	427.55	25% =	1497.2	1%	=	2826.1
6 MEAN	=	996.52	S.D. =	509.82	P(N>=r)	=	.63161
99%	=	156.53	75% =	611.51	10%	=	1678.0
95%	=	282.54	50% =	937.39	5%	=	1920.1
90%	=	383.10	25% =	1308.5	1%	=	2430.7
7 MEAN	=	886.84	S.D. =	446.26	P(N>=r)	=	.55543
99%	=	146.41	75% =	549.85	10%	=	1485.0
95%	=	259.97	50% =	835.31	5%	=	1695.5
90%	=	349.21	25% =	1161.3	1%	=	2134.9
8 MEAN	=	797.82	S.D. =	395.85	P(N>=r)	=	.48477
99%	=	137.88	75% =	499.25	10%	=	1329.5
95%	=	241.28	50% =	751.72	5%	=	1516.0
90%	=	321.32	25% =	1041.6	1%	=	1902.4
9 MEAN	=	723.12	S.D. =	354.76	P(N>=r)	=	.41951
99%	=	130.24	75% =	455.95	10%	=	1200.5
95%	=	224.87	50% =	681.06	5%	=	1368.1
90%	=	297.06	25% =	941.33	1%	=	1713.3

Pool rank			Distribution				
10 MEAN	=	659.18	S.D. =	320.60	P(N>=r)	=	.35912
99%	=	123.17	75% =	418.07	10%	=	1091.3
95%	=	210.00	50% =	620.24	5%	=	1243.4
90%	=	275.39	25% =	855.79	1%	=	1555.7
11 MEAN	=	603.87	S.D. =	291.76	P(N>=r)	=	.30316
99%	=	116.59	75% =	384.74	10%	=	997.64
95%	=	196.47	50% =	567.49	5%	=	1137.0
90%	=	255.92	25% =	782.09	1%	=	1422.1
12 MEAN	=	555.85	S.D. =	267.09	P(N>=r)	=	.25145
99%	=	110.54	75% =	355.52	10%	=	916.73
95%	=	184.25	50% =	521.67	5%	=	1045.2
90%	=	238.54	25% =	718.25	1%	=	1307.6
13 MEAN	=	514.11	S.D. =	245.79	P(N>=r)	=	.20419
99%	=	105.04	75% =	330.02	10%	=	846.48
95%	=	173.36	50% =	481.91	5%	=	965.48
90%	=	223.20	25% =	662.84	1%	=	1208.5
14 MEAN	=	477.83	S.D. =	227.25	P(N>=r)	=	.16182
99%	=	100.12	75% =	307.89	10%	=	785.28
95%	=	163.74	50% =	447.47	5%	=	896.03
90%	=	209.77	25% =	614.69	1%	=	1122.1
15 MEAN	=	446.27	S.D. =	211.02	P(N>=r)	=	.12479
99%	=	95.752	75% =	288.73	10%	=	731.82
95%	=	155.31	50% =	417.64	5%	=	835.27
90%	=	198.05	25% =	572.79	1%	=	1046.6
16 MEAN	=	418.78	S.D. =	196.76	P(N>=r)	=	.93448E-01
99%	=	91.883	75% =	272.15	10%	=	685.00
95%	=	147.93	50% =	391.79	5%	=	781.95
90%	=	187.86	25% =	536.29	1%	=	980.09
17 MEAN	=	394.77	S.D. =	184.19	P(N>=r)	=	.67827E-01
99%	=	88.459	75% =	257.76	10%	=	643.90
95%	=	141.47	50% =	369.34	5%	=	735.02
90%	=	178.97	25% =	504.41	1%	=	921.40

E) The mean of the potential = 11688.

PETRIMES MODULE PSUM

Monte Carlo sum simulation pool size distribution

UAI........................ **C5039902**

PLAY..................... **Mesozoic Marine Structural Gas**

Assessor............... Peter Hannigan

Geologist............. Peter Hannigan

Remarks............... Kandik Assessment Project

Run date .... Tue., Feb. 9, 1999, 10:42 a.m.

User supplied parameters

Do you want to store in data base?	>	Y
Oil (o) or gas (g)?	>	G
British or S.I. unit of measurement?	>	Si
Recoverable resources?	>	N
Do you want to use MPRO output?	>	Y
Do you assume lognormal distribution?	>	Y
Do you want to use PPSD output?	>	Y
Do you compute conditional potential?	>	N

A) Basic information

Type of resource	=	Gas in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal Pool Size Distribution

Summary	mu	=	6.9202	MEAN	=	1448.3			
Statistics	sig. sq.	=	.71594	S.D.	=	1481.3			
Upper percentiles	99.99%	=	43.528	60.00%	=	817.14	15.00%	=	2433.6
	99.00%	=	141.43	55.00%	=	910.37	10.00%	=	2994.5
	95.00%	=	251.74	50.00%	=	1012.5	8.00%	=	3324.4
	90.00%	=	342.34	45.00%	=	1126.1	6.00%	=	3773.4
	85.00%	=	421.25	40.00%	=	1254.6	5.00%	=	4072.2
	80.00%	=	496.73	35.00%	=	1402.8	4.00%	=	4453.7
	75.00%	=	572.19	30.00%	=	1578.0	2.00%	=	5755.5
	70.00%	=	649.67	25.00%	=	1791.6	1.00%	=	7248.7
	65.00%	=	730.80	20.00%	=	2063.8	.01%	=	23552.

C) Number of pools distribution

Lower Support	=	0
Upper Support	=	34
Expectation	=	8.10270
Standard Deviation	=	5.04106

D) Summary statistics for 4,000 simulations

Play Resource		(B cu m)
Minimum	=	.0000000E+00
Maximum	=	52.91261
Expectation	=	11.89931
Standard Deviation	=	8.387727

Empirical distribution

Greater than percentage	*Play potential*	*Greater than percentage*	*Play potential*	*Greater than percentage*	*Play potential*
100.00	.00000E+00	55.00	9.2813	10.00	23.576
95.00	1.3471	50.00	10.346	8.00	24.782
90.00	2.4531	45.00	11.517	6.00	26.703
85.00	3.4132	40.00	12.676	5.00	27.741
80.00	4.2462	35.00	13.871	4.00	29.131
75.00	5.2509	30.00	15.184	2.00	32.587
70.00	6.2718	25.00	16.898	1.00	37.087
65.00	7.1735	20.00	18.813	.01	50.187
60.00	8.1729	15.00	21.016	.00	52.640

PETRIMES MODULE MPRO

Number of pools distribution and risks

UAI........................ **C5059902**
PLAY..................... **Paleozoic Marine Structural Oil**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Hydrocarbon Assessment
Run date .... Wed., Feb. 10, 1999, 9:17 a.m.

User supplied parameters

Do you want to store on db?	>	Y
Oil (o) or gas (g)?	>	O

A) Risks

	Geological factor		*Marginal probability*
Play level	Overall play level risk	=	1.00
Prospect level	Presence of closure	(1)	.50
	Presence of reservoir facies	(2)	.30
	Adequate seal	(4)	.75
	Adequate timing	(5)	.50
	Adequate source	(6)	.70
	Overall prospect level risk	=	.04
Exploration risk		=	.04

B) Number of prospects distribution

Minimum	=	12
Maximum	=	130
Mean	=	65.76
S.D.	=	34.48

Frequency	*Number of prospects*
99.00	12
95	16
90	21
80	31
75	36
60	51
50	60
40	74
25	95
20	102
10	116
5	123
1	129
0	130

C) Number of pools distribution

Minimum	=	0
Maximum	=	17
Mean	=	2.59
S.D.	=	2.08

Frequency	*Number of pools*
84.77	0
80	1
75	1
60	2
50	2
40	3
25	4
20	4
10	5
5	7
1	9
0	17

Note: The number of pools distribution is saved in the database with UDI= 6201OB4

PETRIMES MODULE PSRK

Individual pool sizes by rank where n is a random variable

UAI........................ **C5059902**

PLAY..................... **Paleozoic Marine Structural Oil**

Assessor............... Peter Hannigan

Geologist............. Peter Hannigan

Remarks............... Kandik Hydrocarbon Assessment

Run date.............. Wed., Feb. 10, 1999, 9:19 a.m.

User supplied parameters

Do you want to store on DB?	>	Y	
Do you want to use MPRO output?	>	Y	
Minimum and maximum pool ranks?	>	1	7
Do you use lognornal assumption?	>	Y	
Do you want to use PPSD output?	>	Y	

A) Basic information

Type of resource	=	Oil in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	=	1.8148	MEAN	=	8.7160			
Statistics	sig. sq.	=	.70073	S.D.	=	8.7821			
Upper percentiles	99.99%	=	.27297	60.00%	=	4.9665	15.00%	=	14.620
	99.00%	=	.87582	55.00%	=	5.5268	10.00%	=	17.950
	95.00%	=	1.5494	50.00%	=	6.1398	8.00%	=	19.905
	90.00%	=	2.1001	45.00%	=	6.8208	6.00%	=	22.563
	85.00%	=	2.5785	40.00%	=	7.5903	5.00%	=	24.330
	80.00%	=	3.0352	35.00%	=	8.4769	4.00%	=	26.583
	75.00%	=	3.4910	30.00%	=	9.5235	2.00%	=	34.260
	70.00%	=	3.9583	25.00%	=	10.798	1.00%	=	43.042
	65.00%	=	4.4470	20.00%	=	12.420	.01%	=	138.10

C) Number of pools distribution

Lower Support	=	0
Upper Support	=	17
Expectation	=	2.59
Standard Deviation	=	2.08

D) Pool sizes by rank

Pool rank			Distribution								
1	MEAN	=	14.473	S.D.	=	12.123	P(N>=r)	=	.84769
	99%	=	1.4049	75%	=	6.7462	10%	=	28.099
	95%	=	2.7736	50%	=	11.385	5%	=	36.345
	90%	=	3.9402	25%	=	18.392	1%	=	59.702
2	MEAN	=	8.0055	S.D.	=	5.3850	P(N>=r)	=	.63840
	99%	=	1.0273	75%	=	4.2000	10%	=	14.817
	95%	=	1.8746	50%	=	6.8195	5%	=	18.141
	90%	=	2.5649	25%	=	10.432	1%	=	26.361
3	MEAN	=	5.7884	S.D.	=	3.5845	P(N>=r)	=	.44541
	99%	=	.86275	75%	=	3.1921	10%	=	10.463
	95%	=	1.5090	50%	=	5.0489	5%	=	12.577
	90%	=	2.0165	25%	=	7.5517	1%	=	17.521
4	MEAN	=	4.6088	S.D.	=	2.7119	P(N>=r)	=	.29034
	99%	=	.76208	75%	=	2.6288	10%	=	8.1893
	95%	=	1.2960	50%	=	4.0700	5%	=	9.7523
	90%	=	1.7036	25%	=	5.9926	1%	=	13.303
5	MEAN	=	3.8656	S.D.	=	2.1877	P(N>=r)	=	.17602
	99%	=	.69194	75%	=	2.2643	10%	=	6.7709
	95%	=	1.1526	50%	=	3.4434	5%	=	8.0142
	90%	=	1.4968	25%	=	5.0042	1%	=	10.792
6	MEAN	=	3.3548	S.D.	=	1.8371	P(N>=r)	=	.98683E-01
	99%	=	.63993	75%	=	2.0095	10%	=	5.8016
	95%	=	1.0492	50%	=	3.0097	5%	=	6.8346
	90%	=	1.3497	25%	=	4.3238	1%	=	9.1182
7	MEAN	=	2.9842	S.D.	=	1.5868	P(N>=r)	=	.50980E-01
	99%	=	.59987	75%	=	1.8223	10%	=	5.1009
	95%	=	.97122	50%	=	2.6941	5%	=	5.9848
	90%	=	1.2399	25%	=	3.8302	1%	=	7.9248

E) The mean of the potential = 22.460

PETRIMES MODULE PSUM

Monte Carlo sum simulation pool size distribution

UAI........................ **C5059902**

PLAY..................... **Paleozoic Marine Structural Oil**

Assessor............... Peter Hannigan

Geologist............. Peter Hannigan

Remarks............... Kandik Hydrocarbon Assessment

Run date .... Wed., Feb. 10, 1999, 9:23 a.m.

User supplied parameters

Do you want to store in data base?	>	Y
Oil (o) or gas (g)?	>	O
British or S.I. unit of measurement?	>	Si
Recoverable resources?	>	N
Do you want to use MPRO output?	>	Y
Do you assume lognormal distribution?	>	Y
Do you want to use PPSD output?	>	Y
Do you compute conditional potential?	>	N

A) Basic information

Type of resource	=	Oil in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	=	1.8148	MEAN	=	8.7160			
Statistics	sig. sq.	=	.70073	S.D.	=	8.7821			
Upper percentiles	99.99%	=	.27297	60.00%	=	4.9665	15.00%	=	14.620
	99.00%	=	.87582	55.00%	=	5.5268	10.00%	=	17.950
	95.00%	=	1.5494	50.00%	=	6.1398	8.00%	=	19.905
	90.00%	=	2.1001	45.00%	=	6.8208	6.00%	=	22.563
	85.00%	=	2.5785	40.00%	=	7.5903	5.00%	=	24.330
	80.00%	=	3.0352	35.00%	=	8.4769	4.00%	=	26.583
	75.00%	=	3.4910	30.00%	=	9.5235	2.00%	=	34.260
	70.00%	=	3.9583	25.00%	=	10.798	1.00%	=	43.042
	65.00%	=	4.4470	20.00%	=	12.420	.01%	=	138.10

C) Number of pools distribution

Lower Support	=	0
Upper Support	=	17
Expectation	=	2.58910
Standard Deviation	=	2.08093

D) Summary statistics for 4,000 simulations

Play Resource		(M cu m)
Minimum	=	.0000000E+00
Maximum	=	186.0671
Expectation	=	22.78119
Standard Deviation	=	22.66628

Empirical distribution

Greater than percentage	*Play potential*	*Greater than percentage*	*Play potential*	*Greater than percentage*	*Play potential*
100.00	.00000E+00	45.00	19.036	8.00	58.894
80.00	3.2428	40.00	22.360	6.00	65.001
75.00	5.3183	35.00	25.746	5.00	68.595
70.00	7.5177	30.00	29.313	4.00	71.985
65.00	9.5438	25.00	33.722	2.00	84.207
60.00	11.822	20.00	39.023	1.00	94.959
55.00	14.124	15.00	45.287	.01	170.86
50.00	16.507	10.00	54.242	.00	184.55

PETRIMES MODULE MPRO

Number of pools distribution and risks

UAI........................ **C5049902**
PLAY..................... **Paleozoic Marine Structural Gas**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Fri., Feb. 5, 1999, 2:23 p.m.

User supplied parameters

Do you want to store on DB?	>	Y
Oil (o) or gas (g)?	>	G

A) Risks

	Geological factor		*Marginal probability*
Play level	Overall play level risk	=	1.00
Prospect level	Presence of closure	(1)	.50
	Presence of reservoir facies	(2)	.30
	Adequate seal	(4)	.75
	Adequate timing	(5)	.50
	Adequate source	(6)	.70
Overall prospect level risk		=	.04
Exploration risk		=	.04

B) Number of prospects distribution

Minimum = 45
Maximum = 500
Mean = 245.87
S.D. = 133.17

Frequency	*Number of prospects*
99.00	45
95	60
90	78
80	113
75	131
60	185
50	220
40	276
25	360
20	388
10	444
5	472
1	495
0	500

C) Number of pools distribution

Minimum = 0
Maximum = 39
Mean = 9.68
S.D. = 6.07

Frequency	*Number of pools*
98.72	0
95	2
90	2
80	4
75	5
60	7
50	9
40	11
25	14
20	15
10	18
5	21
1	25
0	39

Note: The number of pools distribution is saved in the database with UDI= 6201GB4

PETRIMES MODULE PSRK

Individual pool sizes by rank where n is a random variable

UAI........................ **C5049902**

PLAY..................... **Paleozoic Marine Structural Gas**

Assessor............... Peter Hannigan

Geologist............. Peter Hannigan

Remarks............... Kandik Assessment Project

Run date .... Mon., Feb. 8, 1999, 12:26 p.m.

User supplied parameters

Do you want to store on DB?	>	Y	
Do you want to use MPRO output?	>	Y	
Minimum and maximum pool ranks?	>	1	21
Do you use lognornal assumption?	>	Y	
Do you want to use PPSD output?	>	Y	

A) Basic information

Type of resource	=	Gas in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu	=	7.1591	MEAN	=	1993.1			
Statistics	sig. sq.	=	.87672	S.D.	=	2360.8			
Upper percentiles	99.99%	=	39.521	60.00%	=	1014.2	15.00%	=	3393.2
	99.00%	=	145.60	55.00%	=	1143.0	10.00%	=	4268.5
	95.00%	=	275.60	50.00%	=	1285.7	8.00%	=	4791.9
	90.00%	=	387.27	45.00%	=	1446.3	6.00%	=	5512.9
	85.00%	=	487.17	40.00%	=	1629.9	5.00%	=	5998.1
	80.00%	=	584.66	35.00%	=	1844.3	4.00%	=	6622.9
	75.00%	=	683.70	30.00%	=	2100.8	2.00%	=	8796.1
	70.00%	=	786.86	25.00%	=	2417.8	1.00%	=	11354.
	65.00%	=	896.31	20.00%	=	2827.4	.01%	=	41827.

C) Number of pools distribution

Lower Support	=	0
Upper Support	=	39
Expectation	=	9.68
Standard Deviation	=	6.07

D) Pool sizes by rank

Pool rank			Distribution			
1	MEAN =	5932.0	S.D. =	4618.2	P(N>=r) =	.98716
	99% =	584.13	75% =	3061.1	10% =	11013.
	95% =	1309.8	50% =	4838.8	5% =	14101.
	90% =	1868.4	25% =	7423.9	1% =	23048.
2	MEAN =	3379.7	S.D. =	2093.3	P(N>=r) =	.95184
	99% =	342.55	75% =	1905.1	10% =	6012.4
	95% =	762.48	50% =	3017.3	5% =	7223.8
	90% =	1116.3	25% =	4400.8	1% =	10233.
3	MEAN =	2481.1	S.D. =	1452.2	P(N>=r) =	.89747
	99% =	260.61	75% =	1414.4	10% =	4368.9
	95% =	557.36	50% =	2270.3	5% =	5140.3
	90% =	815.06	25% =	3279.4	1% =	6928.6
4	MEAN =	1996.1	S.D. =	1137.5	P(N>=r) =	.83296
	99% =	220.44	75% =	1143.2	10% =	3496.3
	95% =	455.29	50% =	1845.5	5% =	4071.2
	90% =	659.20	25% =	2656.1	1% =	5352.5
5	MEAN =	1683.5	S.D. =	941.39	P(N>=r) =	.76518
	99% =	195.97	75% =	970.10	10% =	2935.0
	95% =	393.85	50% =	1565.1	5% =	3396.7
	90% =	563.97	25% =	2245.7	1% =	4400.1
6	MEAN =	1460.6	S.D. =	803.73	P(N>=r) =	.69783
	99% =	178.97	75% =	848.60	10% =	2534.3
	95% =	351.95	50% =	1362.4	5% =	2921.4
	90% =	498.80	25% =	1948.5	1% =	3748.3
7	MEAN =	1291.0	S.D. =	699.97	P(N>=r) =	.63274
	99% =	166.18	75% =	757.18	10% =	2228.9
	95% =	320.96	50% =	1206.6	5% =	2562.6
	90% =	450.60	25% =	1719.5	1% =	3266.9
8	MEAN =	1155.4	S.D. =	618.12	P(N>=r) =	.57084
	99% =	155.96	75% =	684.39	10% =	1985.6
	95% =	296.55	50% =	1081.1	5% =	2278.9
	90% =	412.65	25% =	1535.2	1% =	2892.6
9	MEAN =	1043.2	S.D. =	551.53	P(N>=r) =	.51254
	99% =	147.28	75% =	623.56	10% =	1785.2
	95% =	276.11	50% =	976.31	5% =	2046.9
	90% =	380.97	25% =	1382.2	1% =	2590.8
10	MEAN =	947.61	S.D. =	496.21	P(N>=r) =	.45783
	99% =	139.50	75% =	570.80	10% =	1616.3
	95% =	258.05	50% =	886.39	5% =	1852.4
	90% =	353.19	25% =	1252.1	1% =	2340.8
11	MEAN =	864.73	S.D. =	449.53	P(N>=r) =	.40638
	99% =	132.22	75% =	523.97	10% =	1471.4
	95% =	241.50	50% =	807.93	5% =	1686.4
	90% =	328.02	25% =	1139.6	1% =	2129.6
12	MEAN =	792.04	S.D. =	409.63	P(N>=r) =	.35780
	99% =	125.31	75% =	482.03	10% =	1345.7
	95% =	226.11	50% =	738.86	5% =	1542.8
	90% =	304.94	25% =	1041.5	1% =	1948.3
13	MEAN =	727.98	S.D. =	375.17	P(N>=r) =	.31176
	99% =	118.75	75% =	444.45	10% =	1235.7
	95% =	211.82	50% =	677.86	5% =	1417.6
	90% =	283.80	25% =	955.27	1% =	1791.1
14	MEAN =	671.41	S.D. =	345.14	P(N>=r) =	.26813
	99% =	112.61	75% =	410.95	10% =	1139.0
	95% =	198.70	50% =	624.01	5% =	1307.6
	90% =	264.62	25% =	879.36	1% =	1653.7
15	MEAN =	621.48	S.D. =	318.77	P(N>=r) =	.22705
	99% =	106.95	75% =	381.26	10% =	1053.6
	95% =	186.81	50% =	576.56	5% =	1210.7
	90% =	247.41	25% =	812.44	1% =	1532.8
16	MEAN =	577.42	S.D. =	295.48	P(N>=r) =	.18884
	99% =	101.80	75% =	355.09	10% =	978.23
	95% =	176.15	50% =	534.83	5% =	1124.9
	90% =	232.08	25% =	753.41	1% =	1425.9
17	MEAN =	538.55	S.D. =	274.83	P(N>=r) =	.15393
	99% =	97.147	75% =	332.11	10% =	911.45
	95% =	166.65	50% =	498.17	5% =	1048.9
	90% =	218.53	25% =	701.34	1% =	1331.0
18	MEAN =	504.26	S.D. =	256.46	P(N>=r) =	.12273
	99% =	92.972	75% =	311.95	10% =	852.23
	95% =	158.22	50% =	466.00	5% =	981.29
	90% =	206.58	25% =	655.38	1% =	1246.5
19	MEAN =	473.97	S.D. =	240.08	P(N>=r) =	.95563E-01
	99% =	89.235	75% =	294.27	10% =	799.64
	95% =	150.76	50% =	437.74	5% =	921.14
	90% =	196.04	25% =	614.79	1% =	1171.1
20	MEAN =	447.18	S.D. =	225.43	P(N>=r) =	.72573E-01
	99% =	85.892	75% =	278.75	10% =	752.86
	95% =	144.15	50% =	412.89	5% =	867.48
	90% =	186.75	25% =	578.88	1% =	1103.6
21	MEAN =	423.43	S.D. =	212.31	P(N>=r) =	.53694E-01
	99% =	82.898	75% =	265.08	10% =	711.18
	95% =	138.28	50% =	390.98	5% =	819.53
	90% =	178.54	25% =	547.05	1% =	1043.1

E) The mean of the potential = 19252

PETRIMES MODULE PSUM

Monte Carlo sum simulation pool size distribution

UAI........................ **C5049902**
PLAY..................... **Paleozoic Marine Structural Gas**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Mon., Feb. 8, 1999, 12:30 p.m.

User supplied parameters

Do you want to store in data base?	>	Y
Oil (o) or gas (g)?	>	G
British or S.I. unit of measurement?	>	Si
Recoverable resources?	>	N
Do you want to use MPRO output?	>	Y
Do you assume lognormal distribution?	>	Y
Do you want to use PPSD output?	>	Y
Do you compute conditional potential?	>	N

A) Basic information

Type of resource	=	Gas in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Lognormal pool size distribution

Summary	mu= 7.1591	MEAN =	1993.1
Statistics	sig. sq.= .87672	S.D. = 2360.8	
Upper percentiles	99.99% = 39.521	60.00% = 1014.2	15.00% = 3393.2
	99.00% = 145.60	55.00% = 1143.0	10.00% = 4268.5
	95.00% = 275.60	50.00% = 1285.7	8.00% = 4791.9
	90.00% = 387.27	45.00% = 1446.3	6.00% = 5512.9
	85.00% = 487.17	40.00% = 1629.9	5.00% = 5998.1
	80.00% = 584.66	35.00% = 1844.3	4.00% = 6622.9
	75.00% = 683.70	30.00% = 2100.8	2.00% = 8796.1
	70.00% = 786.86	25.00% = 2417.8	1.00% = 11354.
	65.00% = 896.31	20.00% = 2827.4	.01% = 41827.

C) Number of pools distribution

Lower Support	=	0
Upper Support	=	39
Expectation	=	9.68113
Standard Deviation	=	6.06573

D) Summary statistics for 4,000 simulations

Play Resource		(B cu m)
Minimum	=	.0000000E+00
Maximum	=	88.45324
Expectation	=	19.64719
Standard Deviation	=	14.26852

Empirical distribution

Greater than percentage	*Play potential*	*Greater than percentage*	*Play potential*	*Greater than percentage*	*Play potential*
100.00	.00000E+00	55.00	15.118	10.00	39.259
95.00	2.0462	50.00	16.913	8.00	41.636
90.00	3.7767	45.00	18.805	6.00	44.377
85.00	5.2121	40.00	20.708	5.00	46.125
80.00	6.7709	35.00	22.870	4.00	47.935
75.00	8.3232	30.00	25.281	2.00	56.281
70.00	10.083	25.00	27.924	1.00	63.176
65.00	11.639	20.00	31.190	.01	87.401
60.00	13.520	15.00	34.899	.00	88.348

PETRIMES MODULE PSUM

Monte Carlo sum simulation pool size distribution

UAI........................ **C5069902**
PLAY..................... **All oil plays**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Hydrocarbon Assessment Project
Run date .... Wed., Feb. 10, 1999, 9:25 a.m.

User supplied parameters

Do you want to store in data base?	>	Y
Oil (o) or gas (g)?	>	O
British or S.I. unit of measurement?	>	Si
Recoverable resources?	>	N
Do you compute conditional potential?	>	N

A) Basic information

Type of resource	=	Oil in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Play potential distribution

Summary	MEAN	=	35.356	S.D.	=	26.360				
Statistics	M cu m									
Upper percentiles	100.00%	=	.26049	55.00%	=	22.331		8.00%	=	79.421
	99.00%	=	2.6692	50.00%	=	25.778		6.00%	=	83.338
	95.00%	=	6.1935	45.00%	=	30.255		5.00%	=	85.769
	90.00%	=	8.2957	40.00%	=	35.876		4.00%	=	88.858
	85.00%	=	10.235	35.00%	=	41.825		2.00%	=	95.461
	80.00%	=	12.090	30.00%	=	48.267		1.00%	=	100.97
	75.00%	=	13.848	25.00%	=	54.705		.01%	=	130.86
	70.00%	=	15.603	20.00%	=	61.714		.00%	=	133.53
	65.00%	=	17.592	15.00%	=	68.121				
	60.00%	=	19.649	10.00%	=	76.017				

Summary	MEAN	=	22.781	S.D.	=	22.666				
Statistics	M cu m									
Upper percentiles	100.00%	=	.00000E+00	45.00%	=	19.036		8.00%	=	58.894
	80.00%	=	3.2428	40.00%	=	22.360		6.00%	=	65.001
	75.00%	=	5.3183	35.00%	=	25.746		5.00%	=	68.595
	70.00%	=	7.5177	30.00%	=	29.313		4.00%	=	71.985
	65.00%	=	9.5438	25.00%	=	33.722		2.00%	=	84.207
	60.00%	=	11.822	20.00%	=	39.023		1.00%	=	94.959
	55.00%	=	14.124	15.00%	=	45.287		.01%	=	170.86
	50.00%	=	16.507	10.00%	=	54.242		.00%	=	184.55

C) Number of plays distribution

Lower Support	=	2
Upper Support	=	2
Expectation	=	2.00000
Standard Deviation	=	.00000

D) Summary statistics for 4,000 simulations

Basin Resource		(M cu m)
Minimum	=	1.004136
Maximum	=	230.8910
Expectation	=	59.07602
Standard Deviation	=	35.11600

Empirical distribution

Greater than percentage	*Basin potential*
100.00	1.0041
99.00	6.6484
95.00	12.995
90.00	18.044
85.00	22.758
80.00	26.648
75.00	31.401
70.00	35.550
65.00	39.943
60.00	44.584

Greater than percentage	*Basin potential*
55.00	48.811
50.00	53.735
45.00	58.499
40.00	63.556
35.00	68.987
30.00	75.052
25.00	81.907
20.00	88.392
15.00	96.063
10.00	107.81

Greater than percentage	*Basin potential*
8.00	113.08
6.00	119.34
5.00	123.39
4.00	128.82
2.00	141.76
1.00	158.26
.01	228.51
.00	230.65

PETRIMES MODULE PSUM

Monte Carlo sum simulation pool size distribution

UAI........................ **C5009902**
PLAY..................... **All gas plays**
Assessor............... Peter Hannigan
Geologist............. Peter Hannigan
Remarks............... Kandik Assessment Project
Run date .... Tue., Feb. 9, 1999, 11:18 a.m.

User supplied parameters

Do you want to store in data base?	>	Y
Oil (o) or gas (g)?	>	G
British or S.I. unit of measurement?	>	Si
Recoverable resources?	>	N
Do you compute conditional potential?	>	N

A) Basic information

Type of resource	=	Gas in-place
System of measurement	=	S.I.
Unit of measurement	=	M cu m (19)

B) Play potential distribution

Summary	MEAN	=	8.0121	S.D.	=	5.9917			
Statistics	B cu m								
Upper percentiles	100.00%	=	.53164E-01	55.00%	=	5.0684	8.00%	=	18.034
	99.00%	=	.58677	50.00%	=	5.8628	6.00%	=	18.966
	95.00%	=	1.3841	45.00%	=	6.8648	5.00%	=	19.469
	90.00%	=	1.8623	40.00%	=	8.1568	4.00%	=	20.131
	85.00%	=	2.3044	35.00%	=	9.5152	2.00%	=	21.757
	80.00%	=	2.7130	30.00%	=	10.897	1.00%	=	23.032
	75.00%	=	3.1337	25.00%	=	12.386	.01%	=	29.965
	70.00%	=	3.5305	20.00%	=	13.987	.00%	=	30.657
	65.00%	=	3.9703	15.00%	=	15.414			
	60.00%	=	4.4512	10.00%	=	17.255			

Summary	MEAN	=	11.899	S.D.	=	8.3877			
Statistics	B cu m								
Upper percentiles	100.00%	=	.00000E+00	55.00%	=	9.2813	10.00%	=	23.576
	95.00%	=	1.3471	50.00%	=	10.346	8.00%	=	24.782
	90.00%	=	2.4531	45.00%	=	11.517	6.00%	=	26.703
	85.00%	=	3.4132	40.00%	=	12.676	5.00%	=	27.741
	80.00%	=	4.2462	35.00%	=	13.871	4.00%	=	29.131
	75.00%	=	5.2509	30.00%	=	15.184	2.00%	=	32.587
	70.00%	=	6.2718	25.00%	=	16.898	1.00%	=	37.087
	65.00%	=	7.1735	20.00%	=	18.813	.01%	=	50.187
	60.00%	=	8.1729	15.00%	=	21.016	.00%	=	52.640

Summary Statistics	MEAN B cu m	= 19.647	S.D.	=	14.269			
Upper percentiles	100.00%	= .00000E+00	55.00%	=	15.118	10.00%	=	39.259
	95.00%	= 2.0462	50.00%	=	16.913	8.00%	=	41.636
	90.00%	= 3.7767	45.00%	=	18.805	6.00%	=	44.377
	85.00%	= 5.2121	40.00%	=	20.708	5.00%	=	46.125
	80.00%	= 6.7709	35.00%	=	22.870	4.00%	=	47.935
	75.00%	= 8.3232	30.00%	=	25.281	2.00%	=	56.281
	70.00%	= 10.083	25.00%	=	27.924	1.00%	=	63.176
	65.00%	= 11.639	20.00%	=	31.190	.01%	=	87.401
	60.00%	= 13.520	15.00%	=	34.899	.00%	=	88.348

C) Number of plays distribution

Lower Support	=	3
Upper Support	=	3
Expectation	=	3.00000
Standard Deviation	=	.00000

D) Summary statistics for 4,000 simulations

Basin Resource:	(B cu m)	
Minimum	=	3.575542
Maximum	=	127.3692
Expectation	=	39.82506
Standard Deviation	=	17.71990

Empirical distribution

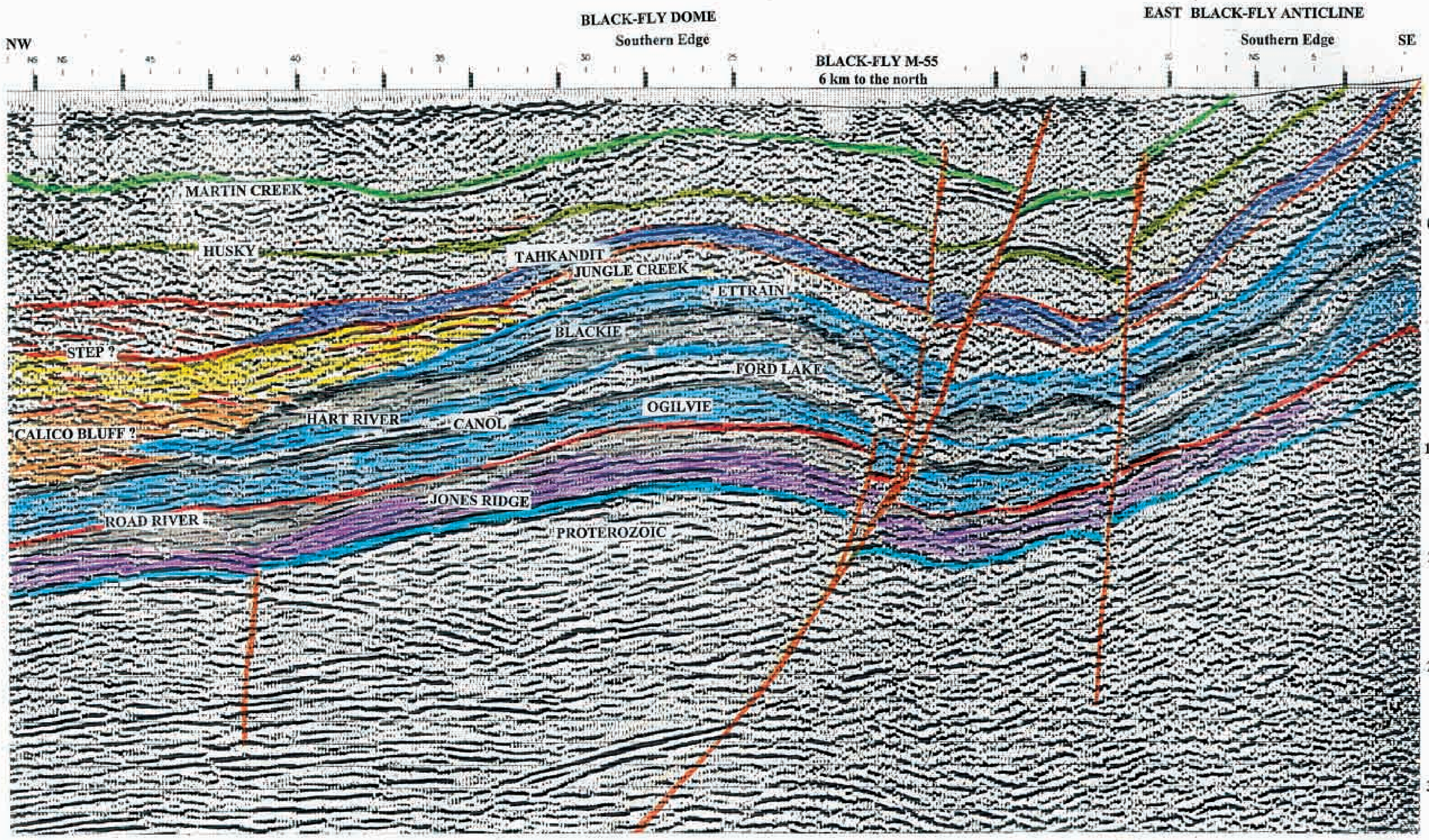
Greater than percentage	*Basin potential*
100.00	3.5755
99.00	8.7087
95.00	14.364
90.00	18.606
85.00	21.788
80.00	24.371
75.00	26.736
70.00	29.342
65.00	31.304
60.00	33.410

Greater than percentage	*Basin potential*
55.00	35.507
50.00	37.792
45.00	40.209
40.00	42.599
35.00	45.007
30.00	47.562
25.00	50.351
20.00	53.837
15.00	57.578

Greater than percentage	*Basin potential*
10.00	63.604
8.00	66.507
6.00	69.935
5.00	72.304
4.00	74.742
2.00	81.795
1.00	88.927
.01	125.89
.00	127.22

APPENDIX 4

SEISMIC LINE C-3 INEXCO OIL COMPANY 1973
INTERPRETATION NATIONAL ENERGY BOARD 1999



Seismic Line C-3 Inexco Oil Company 1973