Canada Nova Scotia Offshore Petroleum Board

Economic Analysis of Eagle Discovery

Contents

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April 2008

1. Introduction

This report presents a screening level economic analysis of a possible development of the Eagle discovery, offshore Nova Scotia. The Eagle discovery requires further appraisal and as such the parameters for the reservoir and its development are highly uncertain. The economic analysis presents possible development scenarios for the discovery under different assumptions for future economic parameters including gas prices and development unit costs and assuming a successful appraisal program. The analysis should be taken as indicative only, the outcome of an appraisal program may result in radically different reservoir parameters than those assumed in the scenarios presented here; similarly gas prices and development costs may be significantly different.

This analysis does not represent a valuation of the prospect; it is simply an evaluation of future possible outcomes. The readers of this report should form their own view about the range of recoverable reserves from the reservoir, the productivity of the reservoir and the likely development scenarios including the number of wells and well parameters, together with the gas prices and commercial terms that will be prevalent at the time of the development.

2. Eagle Discovery Overview

The Eagle discovery is located offshore Nova Scotia in the vicinity of Sable Island and is 22km from the Venture platform and 50km from the Thebaud central processing platform which is part of Sable Offshore Energy Project (SOEP).

The discovery is at a reservoir depth of approximately 1600 metres and the water depths vary across the field from 50 to 60 metres. The reservoir is a normally pressured chalk reservoir of the Wyandot formation, the chalk is of low permeability and the discovery well (E-21, drilled in 1972) tested gas from three separate tests at rates of between 1.3 and 1.6 mmscfd from 4 zones following acid treatment of the well.

The Canada Nova Scotia Offshore Petroleum Board estimates the recoverable reserves and areal extent of the reservoir at three levels of probability and the mean level as shown below:

Case	Probability of Exceedance	Reserves(bcf)	Areal Extent (km^2)
P90	90%	283	40
P50	50%	471	48
P10	10%	720	60

Note: areal extents shown are for the inputs for the extremes of the distribution

The mean reserves estimate is 489 bcf.

3. Drilling and Appraisal

A major uncertainty with the development of the Eagle reservoir is the low permeability and therefore low well productivity encountered in the reservoir chalk. The development of the reservoir will require that techniques are employed to improve the productivity of the wells; likely techniques include the use of horizontal wells and fracturing of the wells, alone or in combination. Industry experience for analogous fields indicates that such techniques, if successful, could improve the productivity of an individual well to between 10 and 30 mmscfd, for the purpose of this economic analysis we have assumed as a base case that an average individual well rate of 15 mmscfd is achieved after the application of techniques to improve reservoir productivity.

In order to prove the areal extent of the reservoir and the techniques for improving reservoir productivity it will be necessary to perform further appraisal of the discovery. The economic analysis assumes that two appraisal wells are required to achieve these twin objectives and we have assumed that the first well is drilled in April 2009, with the second well following shortly after. The well report for the E-21 well shows that the well was drilled to 4660 metres and reached bottom hole in 50 days from dropping anchor (the well was drilled by the semisubmersible Sedco H), and reached the depth of target Eagle reservoir and at approximately 1600 metres in only 10 days from dropping anchor. The analysis of the well therefore indicates that drilling times will be quick and wells relatively low cost. For the purpose of the economic analysis we have conservatively assumed each of the appraisal wells has a total time of 45 days (including rig mobilisation and demobilisation) and that the cost of each well is $27 Million, this total time allows for extensive testing of techniques for productivity improvement.

The reservoir has a fairly large areal extent and due to being relatively shallow it is not possible to reach all possible reservoir locations from a single drilling centre, we have therefore assumed a two centre development. Despite this it will still be necessary to drill fairly high angle wells to reach all parts of the reservoir and for our analysis have assumed an average development well measured depth of 2630 metres with a time to drill and complete of 75 days for each well and an average cost of a completed development well of $40.0 Million. The table below shows the areal extent, assumed number of wells and total drilling and completion cost for each reserves case, all costs are presented in Canadian Dollars, base 1 January 2008, in all cases it is assumed the appraisal wells are reused for development and includes the cost of drilling and later completion of the appraisal wells.

Reserves Case	Reservoir Areal Extent (km^2)	Number of Appraisal Wells	Additional Development Wells	Total Estimated Drilling & Completion Cost ($Million 2008)
P90	40	2	5	265
P50	48	2	9	425
P10	60	2	15	664

Overall we believe these total drilling cost estimates to be realistic and conservative, with modern drilling techniques it is likely that average well times (and therefore costs) can be reduced, this must however be balanced against the low productivity of the wells which may require more wells, and the increasing cost of drilling in the current high resource price environment. A more definitive estimate can, however, only be obtained by further appraisal of the reservoir to determine both its extent and the achievable well productivity.

4 Field Development

As discussed above, the development of the Eagle discovery will require a two drilling centre development. For the purpose of this analysis we have assumed that one drilling centre is a simple wellhead platform, with commingled flow transporting produced gas to a field drilling and an unmanned processing platform at an approximate distance of 4 kilometres and from which the other wells are drilled. We further assume that one of the initial appraisal wells is sited at one of the drilling centres and recompleted and the other appraisal well is completed as a subsea production well and tied back by a flowline to the central processing platform.

For all reserves case, our analysis assumes that the field is developed as a satellite to the Sable Offshore Energy Project (SOEP) and flows directly to the Thebaud central processing platform 50 kilometres to west. We have assumed that preliminary dehydration is performed on the Eagle processing platform, with further processing of gas taking place on the Thebaud platform. This development method is similar to the existing SOEP complex satellite fields, and would be subject to negotiation of suitable processing tariffs at Thebaud and transportation tariffs to the onshore plant at Goldboro. In our analysis we have assumed a combined transport and processing tariff of $0.6 / mscf, this is based on a breakeven analysis over providing full process facilities at Eagle.

Alternative development options are of course possible, including transport via the Venture field, and onward via Thebaud, or a full processing option with subsea tie-in to the pipeline from Venture to Thebaud. A further option maybe to transport through the planned Deep Panuke platform and pipeline.

For our analysis we have assumed development approval takes place in 2011, with development start in January 2012 and first production starting between September 2013 and November 2013 dependent on reserves scenario. For each reserves case we have assumed a plateau production rate of 13% of recoverable reserves per annum and that 50% of reserves are produced on plateau, after which the field goes into decline. The table below summarises non-drilling the capital and operating cost (including tariffs) and production rates for each reserves case:

Reserve Case	Capital Cost ($Million 2008)	Peak Operating Cost ($Million 2008)	Plateau Production Rate (mmscfd)
P90	285	40	101
P50	354	58	168
P10	446	83	256

5 Economic Assumptions

Cash flows for the field development scenarios for each reserves case have been developed for different assumptions as to future economic conditions, in particular gas prices and cost inflation, and accounting for the effects of royalty and federal and provincial income taxes.

For the analysis we have used four different price cases, as our base price case we have used the NYMEX forward curve for Henry Hub gas at 19 March 2008, and for the other cases have taken a percentage of this case (-40%, -20% and +20%). In each case we have taken the average annual price and deducted $0.50 from the Henry Hub price to determine the netback price at the onshore delivery point at Goldboro. The netback prices used are shown in the table below:

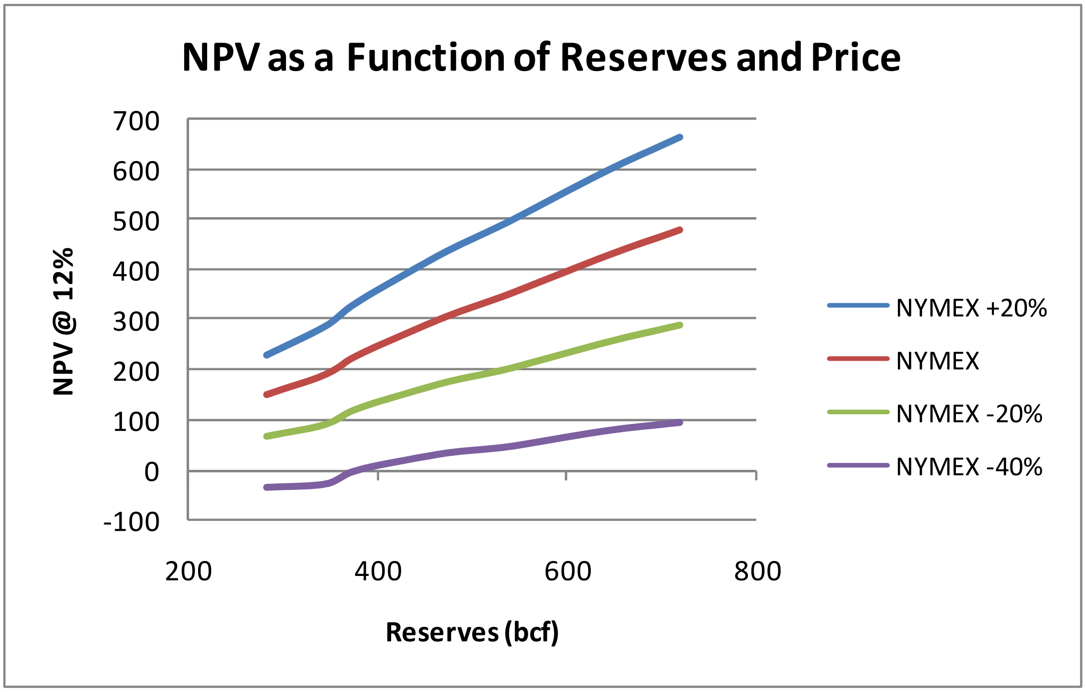
Year	NYMEX	NYMEX -40%	NYMEX -20%	NYMEX +20%
2009	8.50	5.10	6.80	10.20
2010	8.05	4.83	6.44	9.66
2011	8.05	4.83	6.44	9.66
2012	8.15	4.89	6.52	9.78
2013	8.32	4.99	6.66	9.98
2014 Onwards	+2%	+2%	+2%	+2%

For the small amount of liquids we used a price of $70 / bbl inflating at 2% per annum from 2012, we used an exchange rate of parity between the US and Canadian Dollars and cost inflation of 3% per annum from 2009, thus is real terms prices decline in all cases.

6 Economic Analysis Results

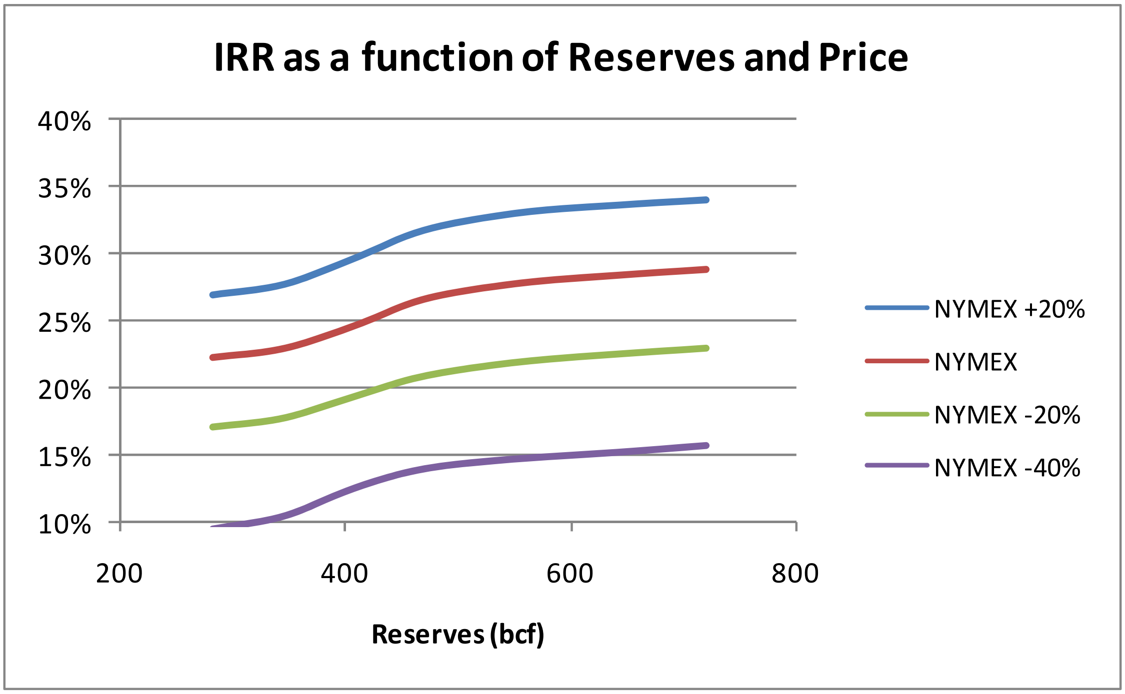
The results of the cash flow analysis (post royalty and taxes) for the different reserves and price cases and the assumptions shown above are shown in the tables below which show the NPV discounted at 12%, with a discount date of 1 July 2008 and the internal rate of return (IRR) for each price and reserves case modelled:

NPV @ 12% - 1 July 2008



	NYMEX +20%	NYMEX	NYMEX – 20%	NYMEX -40%
P90	228	150	68	-33
P50	434	305	175	33
P10	665	480	291	94

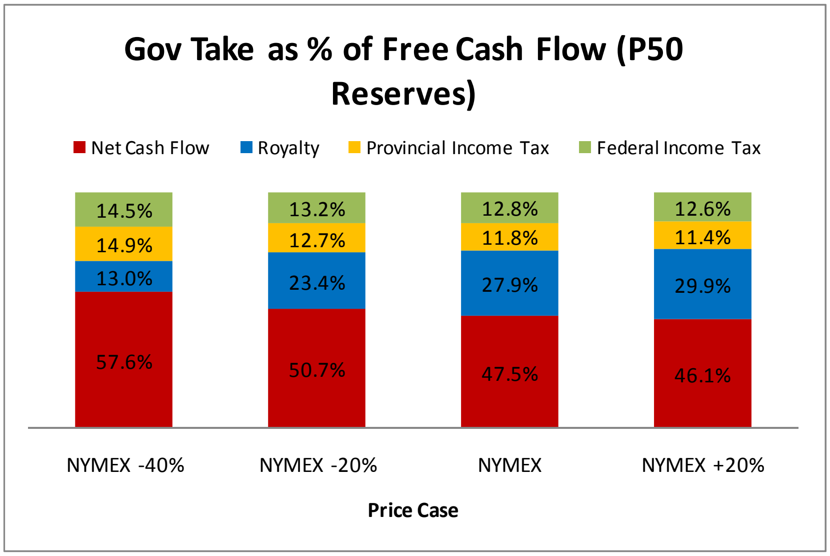
Internal Rate of Return



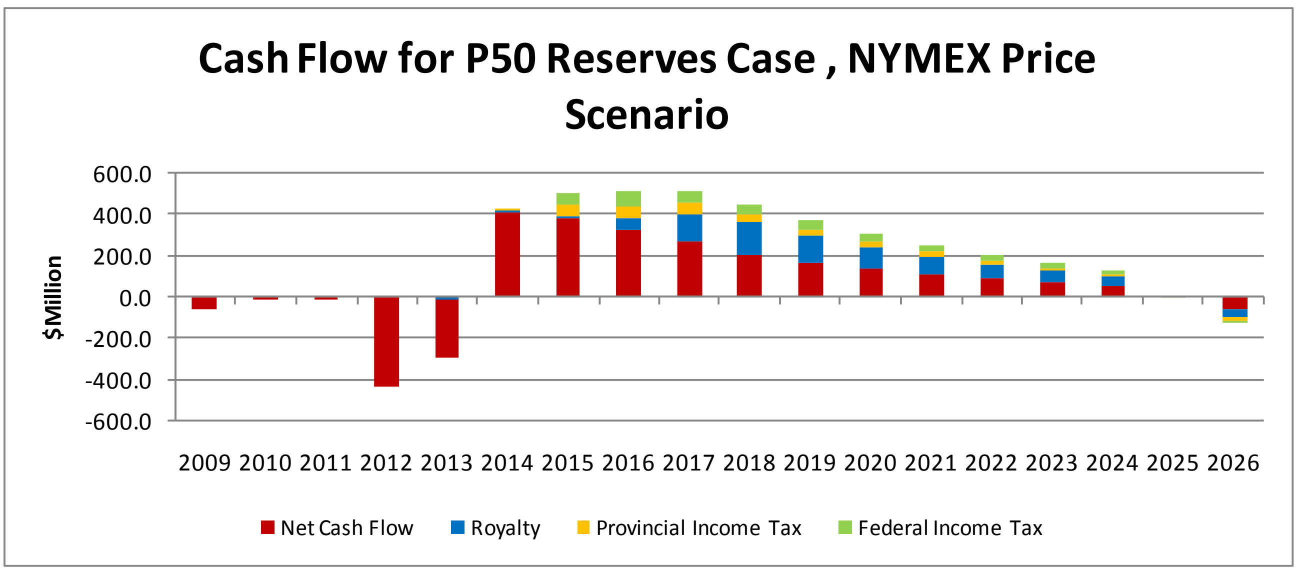
	NYMEX +20%	NYMEX	NYMEX – 20%	NYMEX -40%
P90	26.9%	22.3%	17.0%	9.6%
P50	31.8%	26.6%	20.9%	14.0%
P10	34.0%	28.8%	22.9%	15.7%

7 Government Take

The chart below shows the government take from Royalty, Provincial and Federal Income Taxes as a percentage of pre-government take cash flow, as a function of price case. This illustrates the responsiveness of the royalty regime that results in royalty taking 13% of cash flow in the low price case and increasing to 29.9% in the high price case. Likewise total government take increase from 43.4% at the low price case to 53.9% at the high price case, similar effects are seen with respect to reserves.

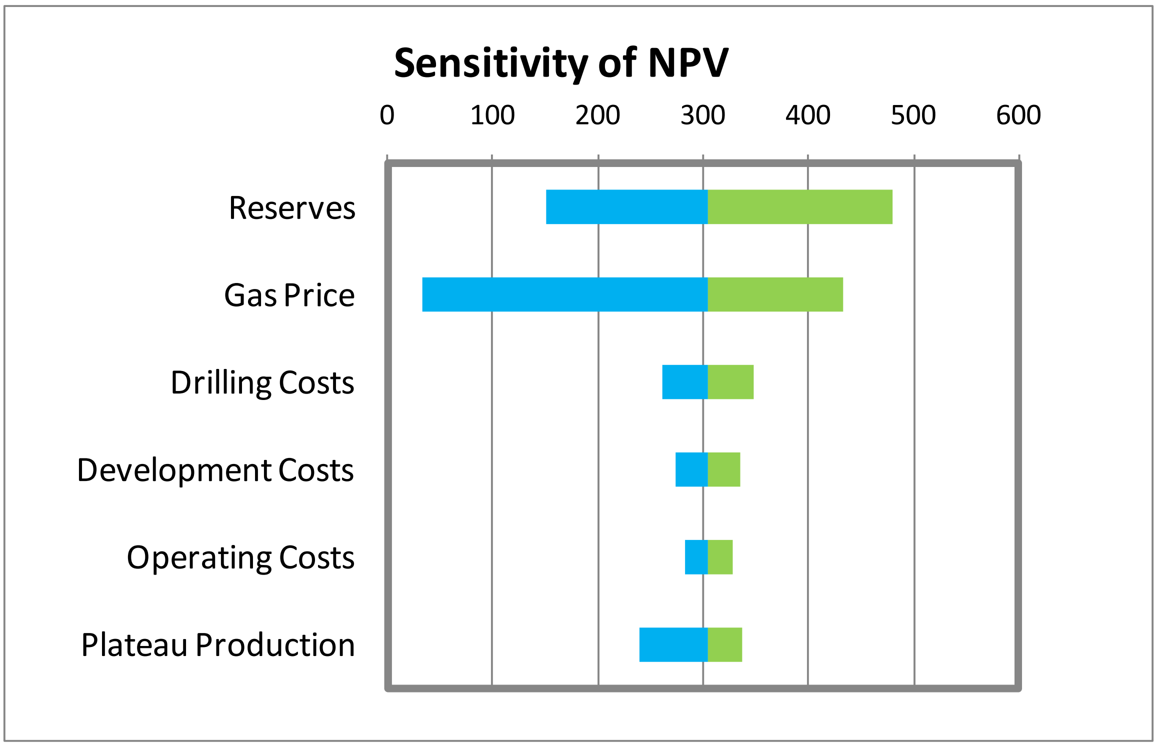


The cash flow chart below illustrates the variation in government take by year, and illustrates that the higher royalty rates come in later years once the participants have substantially recovered their capital investment.



8 Sensitivity Analysis

The chart below shows the sensitivity of the NPV at 12% to different factors. As can be seen the sensitivity to price and reserves are by far the biggest influences, followed by the plateau production rate and then the cost factors. This illustrates that establishing the well productivity is a significant factor in determining the viability of the Eagle discovery.



	Variation		NPV @ 12% ($ Million)	
	down	Up	down	up
Reserves	60%	153%	150	480
Price	60%	120%	33	434
Drilling Costs	70%	130%	349	261
Development Costs	75%	125%	334	275
Operating Costs	75%	125%	328	282
Plateau Production	70%	130%	239	337

Appendix Cash Flow for Each Reserves Case (all costs and revenue are nominal / money of the day)

P50 Reserves NYMEX Price Case

	Start Date	Cash Flow ($ Million)	Disc @ 12.0%	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Gas Production (bcf)	25-Oct-13	461.6								8.7	59.0	60.0	60.2	59.5	51.3	42.0	34.4	28.1	23.0	18.8	15.4	1.2	
Liquids Production (mbbl)	25-Oct-13	1.4								0.0	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	
Gas Revenue		4581.2	1497.2							78.2	543.8	564.1	576.9	582.2	512.2	427.4	357.5	297.4	248.1	207.0	173.2	13.3	
Liquids Revenue		110.8	36.2							1.9	13.1	13.6	14.0	14.1	12.4	10.3	8.6	7.2	6.0	5.0	4.2	0.3	
Total Revenue		4692.0	1533.4							80.1	556.9	577.7	590.9	596.3	524.6	437.7	366.1	304.6	254.1	212.0	177.3	13.6	
Seismic																							
Wildcat																							
Appraisal	1-Apr-09	-57.0	-48.1			-57.0																	
Development Planning	26-Mar-10	-6.4	-4.8				-6.0	-0.4															
Facilities & Pipelines	15-Jan-12	-408.6	-233.9						-229.4	-179.2													
Development Drilling	23-Jan-12	-439.2	-245.6						-204.8	-181.3	-53.0												
Operations	25-Oct-13	-707.1	-217.7							-10.8	-70.5	-73.4	-75.8	-77.5	-72.1	-65.1	-59.5	-54.7	-50.9	-47.8	-45.4	-3.8	
Royalty		-823.2	-230.3							-1.6	-11.1	-11.6	-54.3	-137.3	-155.9	-128.1	-105.2	-85.5	-69.4	-55.8	-44.6	-3.3	40.6
Provincial Income Tax		-348.0	-113.9								-13.9	-60.3	-61.1	-51.9	-40.8	-34.3	-28.7	-23.8	-19.6	-16.0	-13.0	-0.3	15.7
Federal Income Tax		-377.1	-119.0									-51.9	-72.5	-61.6	-48.5	-40.7	-34.1	-28.2	-23.3	-19.0	-15.4	-0.4	18.7
Abandonment	1-Mar-26	-126.5	-15.5																				-126.5
Total Costs		-3293.1	-1228.8			-57.0	-6.0	-0.4	-434.2	-372.9	-148.6	-197.2	-263.7	-328.3	-317.3	-268.3	-227.6	-192.2	-163.1	-138.6	-118.4	-7.8	-51.6
Net Cash Flow		1398.9	304.5			-57.0	-6.0	-0.4	-434.2	-292.9	408.4	380.5	327.2	268.0	207.3	169.4	138.5	112.4	91.1	73.4	58.9	5.8	-51.6

P90 Reserves NYMEX Price Case

	Start Date	Cash Flow ($ Million)	Disc @ 12.0%	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Gas Production (bcf)	22-Sep-13	277.3								9.8	36.1	36.1	36.2	35.4	30.0	24.5	20.1	16.4	13.4	11.0	8.5	
Liquids Production (mbbl)	22-Sep-13	0.8								0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	
Gas Revenue		2744.5	912.3							88.8	332.3	338.9	346.7	346.3	298.9	249.4	208.6	173.5	144.8	120.8	95.5	
Liquids Revenue		66.4	22.1							2.1	8.0	8.2	8.4	8.4	7.2	6.0	5.0	4.2	3.5	2.9	2.3	
Total Revenue		2810.9	934.4							91.0	340.3	347.1	355.0	354.7	306.2	255.4	213.7	177.7	148.3	123.7	97.8	
Seismic																						
Wildcat																						
Appraisal	1-Apr-09	-57.0	-48.1			-57.0																
Development Planning	26-Mar-10	-5.8	-4.4				-5.5	-0.4														
Facilities & Pipelines	15-Jan-12	-327.5	-188.3						-198.1	-129.4												
Development Drilling	21-May-12	-248.5	-141.9						-133.8	-114.8												
Operations	22-Sep-13	-498.2	-153.8							-12.9	-48.7	-50.1	-51.7	-52.6	-49.0	-45.2	-42.1	-39.5	-37.5	-36.0	-32.8	
Royalty		-391.4	-107.2							-1.8	-6.8	-6.9	-12.9	-50.7	-70.9	-72.0	-58.6	-47.0	-37.4	-29.4	-21.6	24.7
Provincial Income Tax		-197.4	-65.1								-4.2	-33.8	-38.2	-34.2	-25.4	-18.9	-15.7	-12.9	-10.5	-8.4	-6.3	11.0
Federal Income Tax		-205.4	-64.6									-16.0	-45.4	-40.6	-30.2	-22.5	-18.7	-15.3	-12.4	-10.0	-7.4	13.1
Abandonment	1-Mar-25	-82.0	-11.3																			-82.0
Total Costs		-2013.2	-784.6			-57.0	-5.5	-0.4	-331.9	-258.9	-59.7	-106.8	-148.2	-178.1	-175.5	-158.6	-135.1	-114.7	-97.9	-83.8	-68.1	-33.1
Net Cash Flow		797.7	149.8			-57.0	-5.5	-0.4	-331.9	-167.9	280.7	240.3	206.9	176.6	130.6	96.9	78.6	63.0	50.4	39.9	29.7	-33.1

P10 Reserves NYMEX Price Case

	Start Date	Cash Flow ($ Million)	Disc @ 12.0%	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Gas Production (bcf)	15-Nov-13	705.6								5.6	61.9	88.0	92.0	91.7	85.4	70.0	57.4	46.8	38.3	31.3	25.7	11.4	
Liquids Production (mbbl)	15-Nov-13	2.1								0.0	0.2	0.3	0.3	0.3	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0	
Gas Revenue		7061.5	2202.7							50.6	570.1	827.4	881.9	897.1	852.1	712.6	596.1	495.8	413.7	345.2	288.7	130.1	
Liquids Revenue		170.8	53.3							1.2	13.8	20.0	21.3	21.7	20.6	17.2	14.4	12.0	10.0	8.3	7.0	3.1	
Total Revenue		7232.3	2256.0							51.9	583.8	847.4	903.3	918.8	872.7	729.9	610.5	507.8	423.7	353.5	295.7	133.3	
Seismic																							
Wildcat																							
Appraisal	1-Apr-09	-57.0	-48.1			-57.0																	
Development Planning	26-Mar-10	-7.2	-5.4				-6.7	-0.5															
Facilities & Pipelines	15-Jan-12	-516.2	-294.0						-268.3	-247.9													
Development Drilling	13-Feb-12	-736.7	-380.1						-192.1	-180.7	-240.9	-123.0											
Operations	15-Nov-13	-1006.9	-299.8							-7.5	-76.6	-101.5	-108.1	-111.1	-108.5	-96.7	-87.0	-78.6	-71.9	-66.4	-62.1	-30.8	
Royalty		-1382.2	-373.3							-1.0	-11.7	-16.9	-58.3	-214.1	-263.7	-218.2	-180.2	-147.5	-120.6	-98.2	-79.6	-34.8	62.5
Provincial Income Tax		-545.8	-169.8								-0.5	-82.9	-95.5	-79.0	-68.6	-58.1	-49.0	-40.8	-33.9	-28.0	-23.1	-9.7	23.4
Federal Income Tax		-602.5	-182.2									-53.4	-113.4	-93.8	-81.5	-69.1	-58.2	-48.5	-40.3	-33.3	-27.4	-11.5	27.8
Abandonment	1-Mar-26	-189.6	-23.3																				-189.6
Total Costs		-5044.0	-1776.0			-57.0	-6.7	-0.5	-460.4	-437.2	-329.6	-377.8	-375.4	-497.9	-522.2	-442.2	-374.4	-315.4	-266.7	-225.9	-192.1	-86.7	-76.0
Net Cash Flow		2188.2	479.9			-57.0	-6.7	-0.5	-460.4	-385.4	254.3	469.6	527.9	420.9	350.5	287.7	236.1	192.4	157.0	127.6	103.6	46.5	-76.0