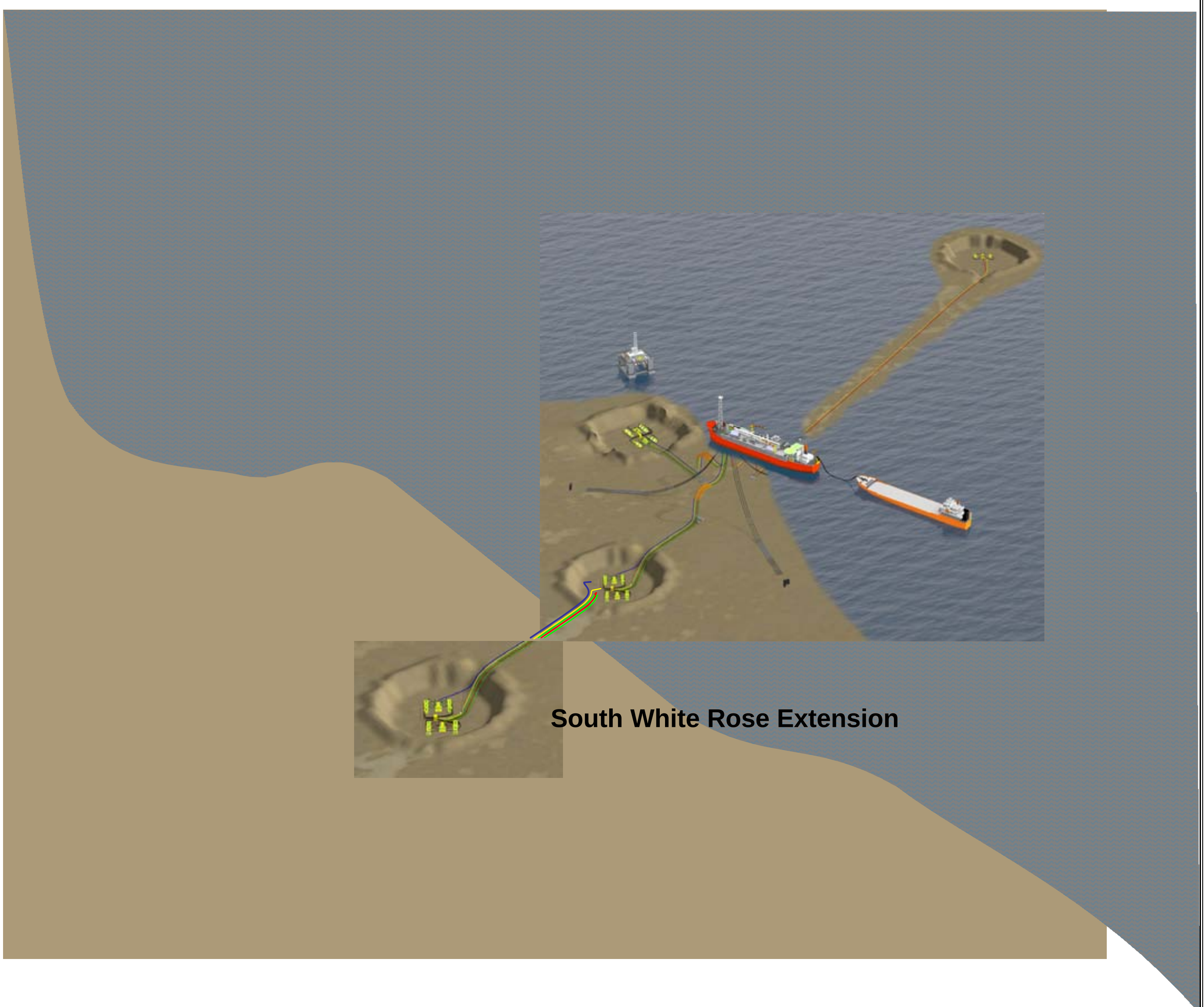
White Rose Development Plan Amendment

South White Rose Extension Tie-back

Supplemental Information



December 2006

Husky Document No. SX-DVG-RP-0002

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1.0 Introduction

On September 29, 2006, Husky Energy submitted to the Canada – Newfoundland and Labrador Offshore Petroleum Board (C-NLOPB) an Amendment to its White Rose Development Plan, **White Rose Development Plan Amendment – South White Rose Extension Tie-back** (SX-DVG-RP-0001). Supporting documents also submitted were **Review of the White Rose Benefits Plan and its Application to the SWRX Tie-back** (WR-RP-00264) (submitted September 29, 2006) and **Safety Assessment of the South White Rose Expansion Project** (SX-HSE-RP-0001) (submitted October 11, 2006).

Following submission of the Development Plan Amendment and supporting documents, the C-NLOPB conducted a Completeness Review and on October 26, 2006 issued a request for additional information (C-NLOPB File:8010) (Husky Reference No. 003979504). This supplemental report addresses the request for additional information received from the C-NLOPB.

2.0 Supplemental Information

2.1 Canada-Newfoundland and Labrador Benefits Plan Amendment

Specific information requests from the C-NLOPB are shown in bold text with the responses following.

Section 3.0 of the Benefits Plan Amendment refers to Statutory Requirements. Husky Energy's Commitments in this regard are discussed in some detail in subsection 3.2. A commitment to the fundamental principle of providing "First Consideration to services provided from the within the Province and to goods manufactured in the Province" is not presented in this subsection. A clear statement supporting this fundamental principle is required.

Consistent with the *Canadian Charter of Rights and Freedoms*, individuals resident in the province are to be given first consideration for training and employment opportunities in the work program for which this plan is submitted. Also, first consideration is to be given to services provided from within the province and to goods manufactured in the province whose services and goods are competitive in terms of fair market price, quality and delivery.

The discussion of Research and Development and Education and Training in subsections 3.4 and 4.5 is not adequate as a commitment by Husky to comply with the Board's Guidelines for Research and Development Expenditures October 2004 is not stated and is required.

Husky recognizes that expenditures on R&D and Education and Training contribute greatly to the sustainability of the oil and gas industry in the province. Husky has been a strong supporter of the R&D community and the many local training institutions in the province since the beginning of the White Rose project and has spent over $16 million in these areas to date. Husky also acknowledges the legislative requirement for expenditures related to R&D in the province contained in Section 45 of the *Atlantic Accords Act*; specifically: in section 45

(3)(c)….. *expenditures shall be made for research and development to be carried out in the Province and for education and training to be provided in the Province*. Husky will continue to support the local R&D community and Educational Institutions in line with the October 2004 R&D Guidelines established by the Board.

Subsection 4.4 of the Benefits Plan Amendment provides a preliminary estimate of the work, expressed in person hours, which will take place in Newfoundland for SWRX. In order to assess this information an understanding of the total estimated amount of work, expressed in person hours, is required. Further, it should be clarified as to whether the hours stated are direct, indirect or a combination of both.

The estimate provided in the submission is for direct person hours related to work which will be carried out in the province. Indirect hours have not been factored into this figure. It is difficult to provide an estimate for total hours associated with the SWRX project at this stage since sufficient detail has yet to be generated regarding the scope of work. The Newfoundland person hour estimate is based on historical data collected during the subsea fabrication and installation phase of White Rose for work that was carried out in the province. This data has been extrapolated for areas of similar work activities identified in the SWRX scope of work with the assumption that this work will also be captive to the province as well. As the FEED work proceeds, more detail will become available as to the full extent of hours required for the project. Husky commits to providing updated person hour estimates to the Board in a timely manner as this information becomes available.

2.2 Development Plan Amendment

The following supplemental information is provided using the same numbering scheme as that used in the request for further information received from the C-NLOPB on October 26, 2006. Specific information requests from the C-NLOPB are shown in bold text with the responses following.

1. **A listing of all reports and data used by the proponent in the preparation of the Development Plan Amendment.**

Following is a listing of reports and data used in the preparation of the Development Plan Amendment:

SeaRose Debottlenecking Study (WR-DVG-RP-0001). 2006. Report prepared for Husky Energy by SGS Canada.

Safety Assessment of South White Rose Expansion Project (SX-HSE-RP-001). 2006. Report prepared for Husky Energy by W.S. Atkins.

South White Rose Extension Subsea Control Modification Basis (SX-S-93-U-TN-0002-001). 2006. Report prepared by Husky Energy.

South White Rose Extension Flow Assurance (SX-DVG-RP-0003). 2006. Report prepared for Husky Energy by Xodus Technology.

2. **Section 3.3 Petrophysics: The following should be provided for wells drilled since the original development plan submission:**

a. **the methods used to adjust core analysis data to reflect subsurface conditions; and**

b. **assumptions and methods used in interpreting log data, including water resistivity values, porosity and permeability relationships, procedures to calibrate logs and to calculate porosity, permeability and water saturation.**

Reservoir Porosity and K_Air Permeability
Overburden Compaction Factor

Standard core analysis may incorporate systematic errors in porosity because these values are measured at low pressure (e.g. 2758 Kpa), which lead to an over-estimation of porosity. At surface conditions pore volumes tend to expand with the decrease in confining pressure. Additional core analysis was undertaken to correct for the overburden.

Porosity and permeability measurements were taken on thirteen core plugs from WhiteRose A-17 and N-30. This work was carried out by Hycal Laboratories as a supplement to special core analysis work. The measurements were taken using CMS-300 equipment. Measurements were taken using a series of increasing pressures intended to simulate and span reservoir pressures existing in the White Rose Field.

The resulting data series have been trended to extract equations. These equations link the decrease in reservoir porosity and permeability to an increase to overburden or reservoir-equivalent pressures, and to the original porosity and permeability of each sample. These equations will provide the basis for adjusting all “as measured” lab porosities and permeabilities to those representing the same rock under reservoir conditions.

Work Method

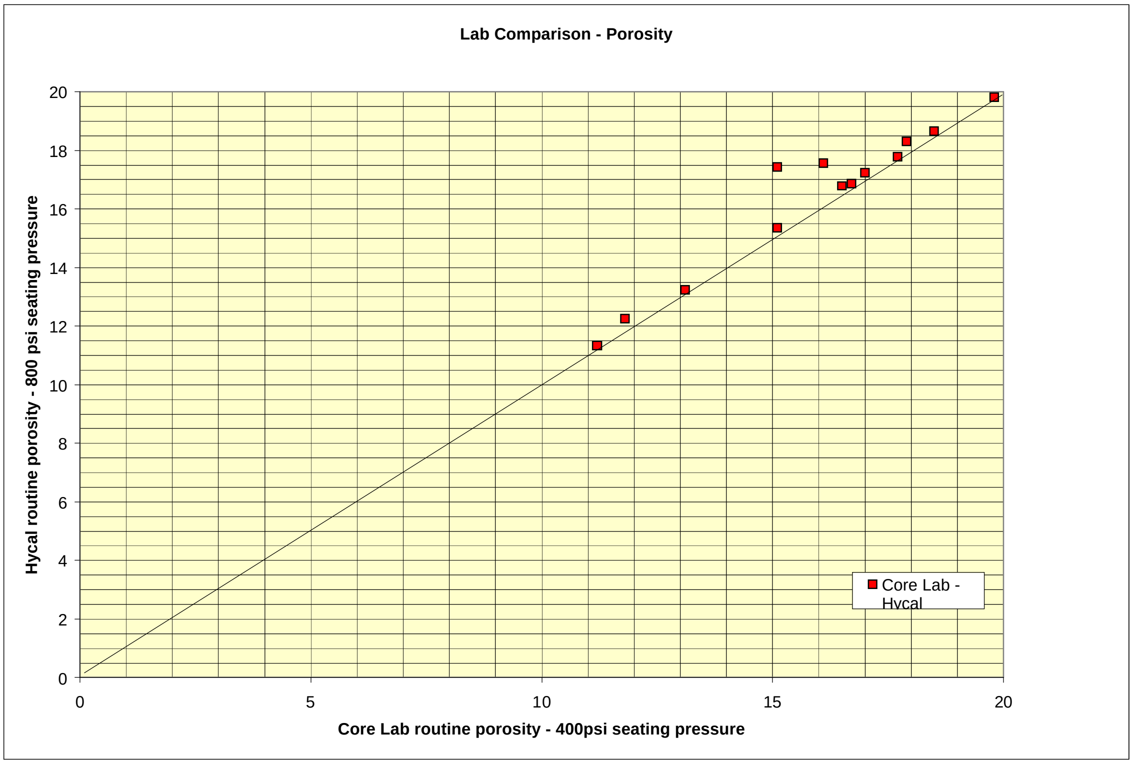
Hycal measured the porosity and permeability for each plug at requested overburden pressures of 800, 1740, 3480, 5370 and 7250 psi (Table 2.1). Rock and pore volume varied, plug by plug and acted to reduce this pressure by a small amount. These overburden pressures were converted to kpa. The overburden pressures applied for the permeability calculations are different than those applied for the porosity calculations.

These plugs have previously been measured by Core Laboratories under routine or lab conditions, but Core Lab routinely uses 400 psi seating pressure. The Core Lab values of porosity and permeability were added to Table 2.1 to see whether the values were in the right range, and whether there was any systematic difference between the “routine” values reported by Core Lab and Hycal (Figure 2.1).

These systematic differences in methodology were found to exist. The Hycal porosities and permeabilities measured at 800psi were higher than the Core Lab values measured on the same plugs at a lower seating pressure of 400psi.

Table 2.1 Hycal and Core Lab Measurements

Sample I.D.	Depth	Requested Overburden psi	Act. Overbur. During Pore Vol psi	kpa	Pore Volume cc	Porosity 1 %	Act. OverBur. During Perm psi	kpa	Air Perm md
Core Lab Value	**29**		**400**	2758		**17.7**	**400**	2758	**96.8**
880803	29	800	746	5143.67	12.6111	17.78	896	6177.92	117.32
880803	29	1740	1610	11100.95	12.4305	17.57	1756	12107.62	116.51
880803	29	3480	3318	22877.61	12.2852	17.4	3463	23877.385	113.83
880803	29	5370	5153	35529.935	12.1806	17.28	5306	36584.87	111.83
880803	29	7250	6989	48189.155	12.112	17.2	7151	49306.145	110.41



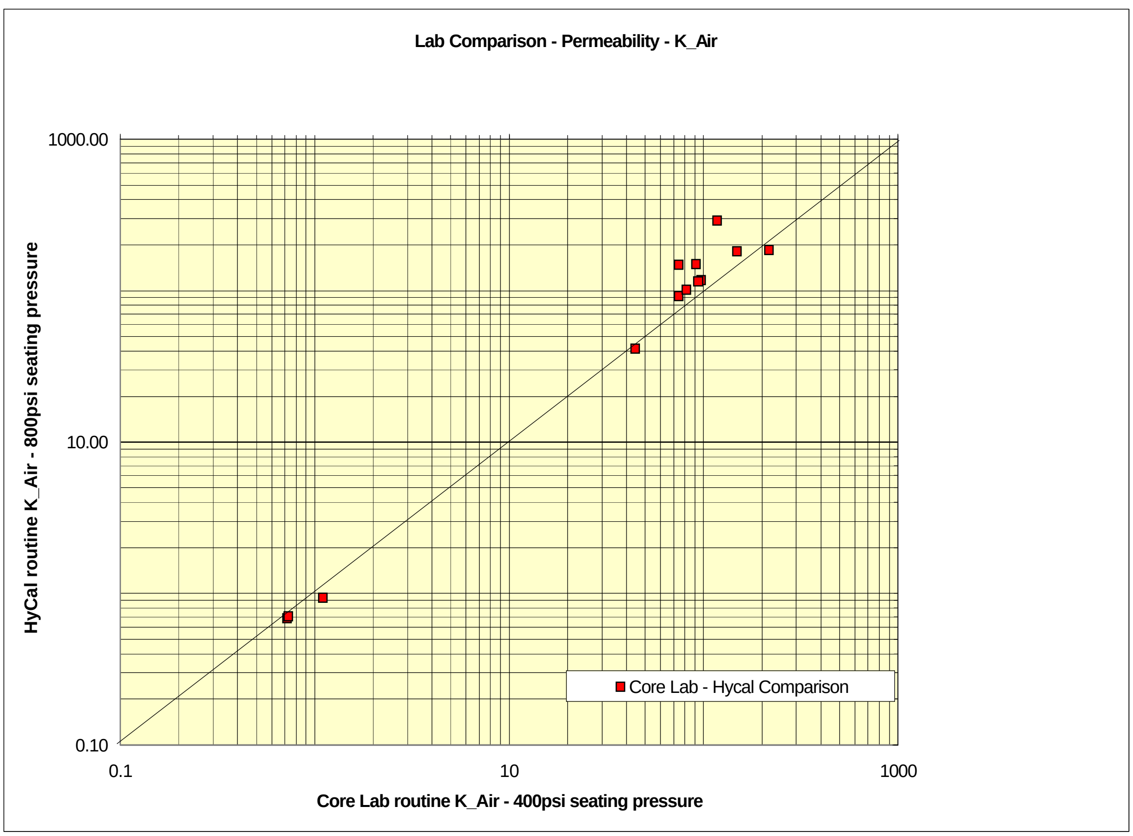


Figure 2.1 Core Lab - Hycal Comparison

Overburden Correction

Core porosity and permeability at low pressure versus core porosity and permeability at simulated overburden pressure is shown in Figures 2.2 and 2.3.

Core porosity measurements measured under laboratory conditions when applying 400psi or 2758kPa seating pressure (CoreLab practice) should be adjusted using the following equation:

$$\phi @ 30.000\ Kpa = 1.0191(\phi @ 2758\ Kpa) - 0.8695$$

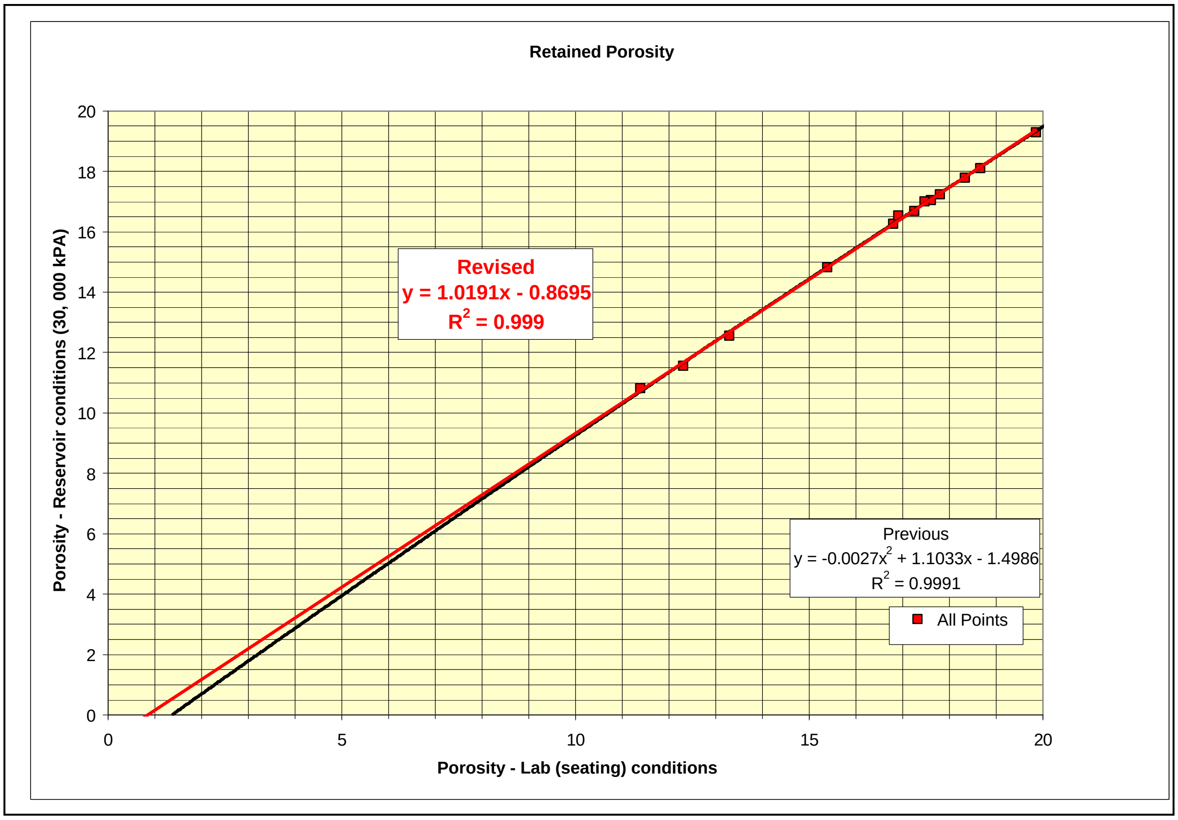


Figure 2.2 Core Porosity and Permeability at Low Pressure

For the 13 samples analyzed the reservoir porosity averaged 96.5% of laboratory values.

Core permeability measurements measured under laboratory conditions when applying 400psi or 2758kPa seating pressure (CoreLab practice) should be adjusted using the following equation:

$$K @ 30,000\ Kpa = 0.7088\,(K @ 2758\ Kpa)^{1.0442}$$

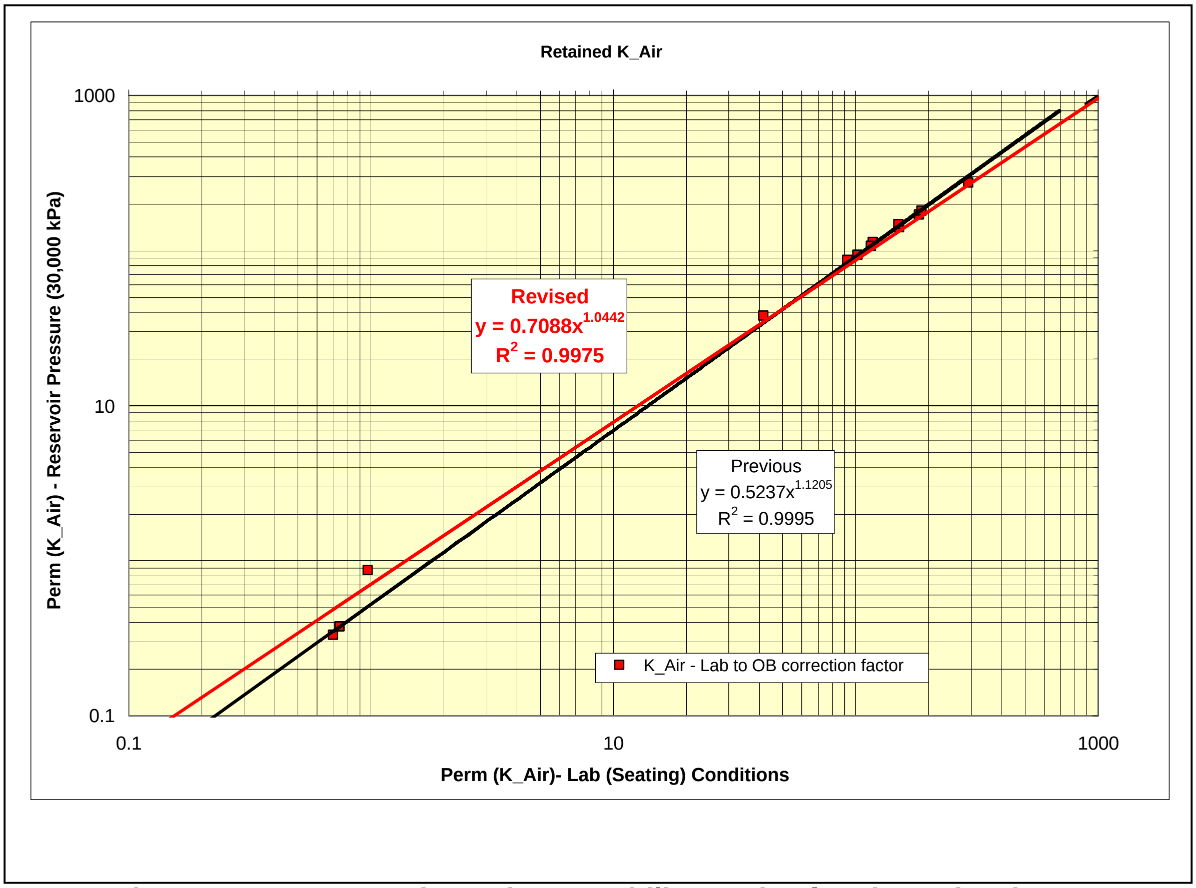


Figure 2.3 Core Porosity and Permeability at Simulated Overburden Pressure

For the 13 samples measured, the reservoir permeability averages 87.2% of laboratory values.

Methods used in the Petrophysics of the White Rose Field
Permeability calculation

For all the wells in the White Rose Field that have core, Figure 2.4 illustrates the core porosity-permeability relationship.

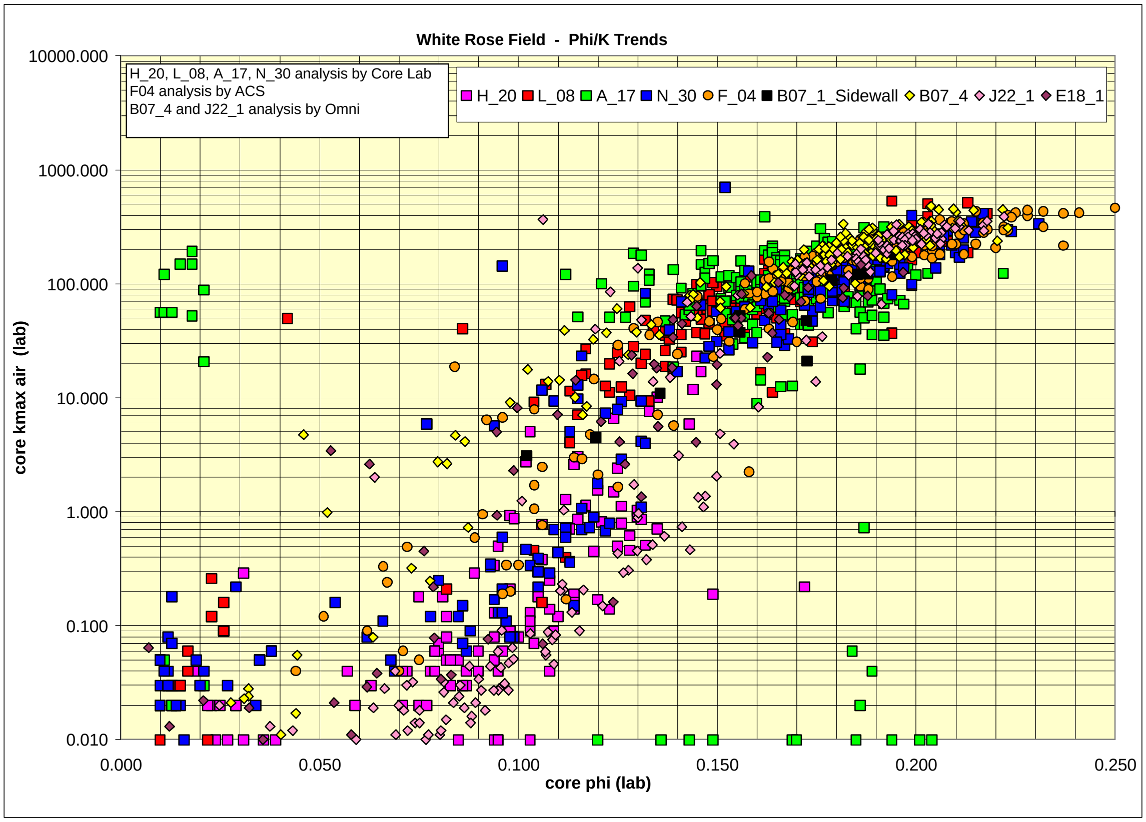


Figure 2.4 Core Porosity-Permeability Relationship for White Rose Wells

Husky's standard practice is to correct the core porosity and permeability for the over-burden pressure and link the core permeability with other attributes such as porosity and depositional facies.

On Figure 2.5 the porosity-permeability relationship shows two different trends: one mainly for the better laminated sand (colored in blue) and the second trend for the bioturbated sand facies (colored in green). The generated permeability from the porosity and given deposition facies assignment is illustrated in the following equations:

For shale, bioturbated sand, calcite:

$$k = 10^{\left(-2.1890 + 0.567 f + 84.1 f^{2} + 656.31 f^{3}\right)}$$

For laminated sand:

$$k = 10^{\left(-2.301 + 40.02 f - 84.056 f^{2}\right)}$$

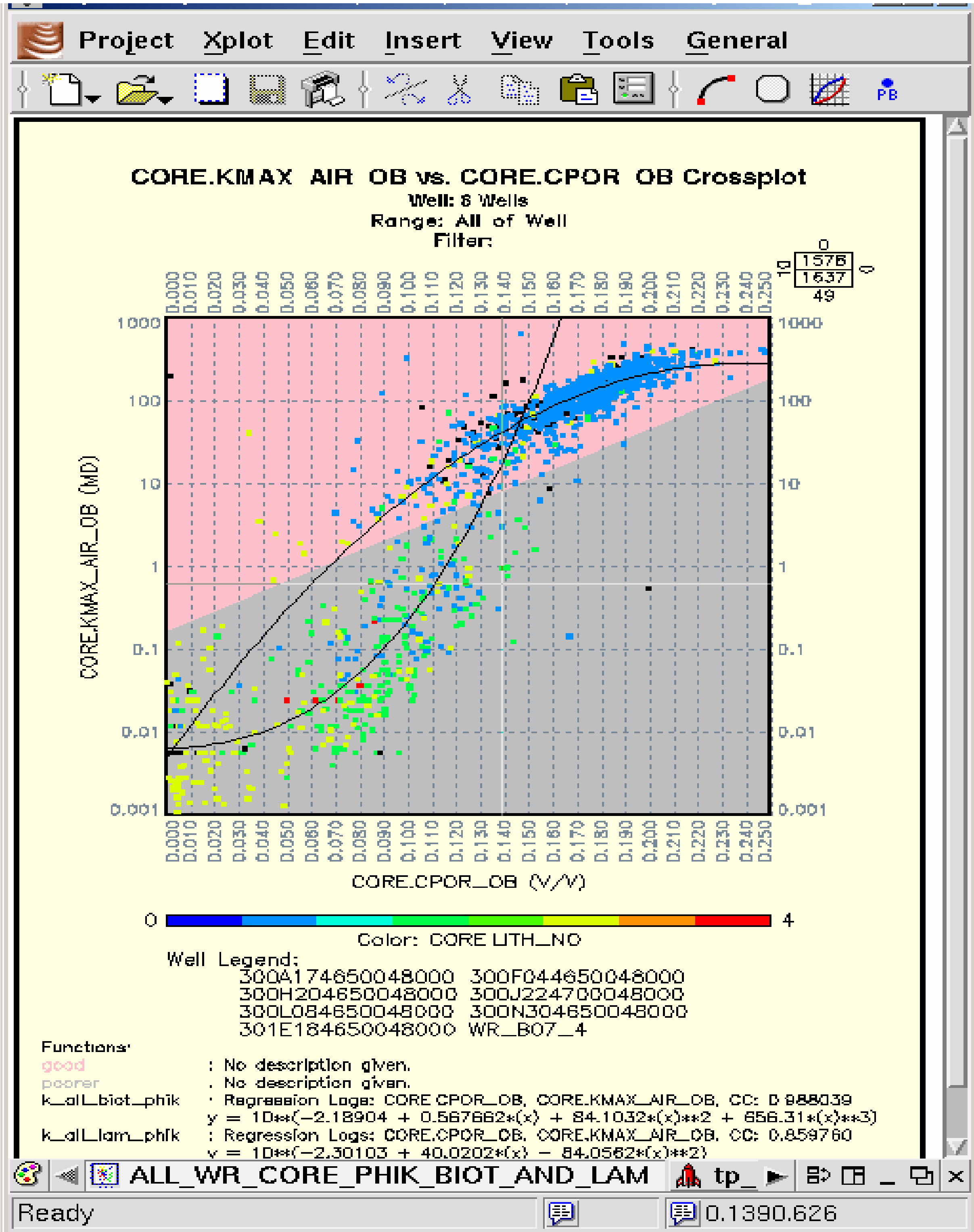


Figure 2.5 Porosity-Permeability Relationship

Formation Water Resistivity

The water salinity was determined using the modular dynamic tester water samples gathered in the well L-08. The samples were obtained using the optical fluid analyzer and resistivity measurement to minimize the mud filtrate contamination.

Table 2.2 indicates the values obtained for each samples. At 25 degree C, the resistivities varied from a low of 0.212 to a high 0.565 ohm-m. Sample number 208 was used because this sample indicated the lowest PH, above 7.

Table 2.2 Values from Formation Water Testing

Sample #	Sample Depth	Sample Tritium Conc	Mud Tritium Conc	Sample Tritium Contam	Contam Sample Rw@25	Contam Sample Conc	Sample pH	Mud Salinity	Corrected Formation Salinity PPM	Corrected Formation Resistivity Rw @ 25
	(m)	(pCi/ml)	(pCi/ml)	(%)	(ohm-m)	(ppm)		(ppm)	(ppm)	(ohm-m)
199	3047	10874	42345	25.7	0.135	47,100	8	133,267	17,327	0.339
311	3047	10294	42345	24.3	0.156	39,960	8	133,267	9,992	0.565
315	3047	9722	42345	23.0	0.144	43,746	8	133,267	17,068	0.344
208	3094.5	2853	38058	7.5	0.171	36,000	7.7	133,267	28,118	0.218
233	3094.5	2870	38058	7.5	0.167	36,972	7.8	133,267	29,118	0.212
248	3094.5	2970	38058	7.8	0.173	35,500	7.9	133,267	27,225	0.224

Note: The Rw used for the Avalon field study was 0.218 @ 25°C, 0.082 @ Formation Temperature of 100°C, which is 28,118 NaCl equivalent.

Electrical Properties M and N

Special core analyses were undertaken using core from L08 to determine the correct cementation exponent "m" and saturation exponent "n" to be used in determining water saturation using the log evaluation software.

The reported average values for M and N, using an 'a'=1 are:

The Cementation exponent M=1.78
The Saturation exponent N=1.86

By knowing the M and N values it will be easy for the petrophysicist to use the Pickett Plot in the water leg to determine the formation water resistivity.

3. Section 3.4 Resource in Place: The following should be provided:

i. the parameters and assumptions used;

Table 2.3 lists the parameters and assumptions used to determine resources in place.

Table 2.3 Parameters and Assumptions Used to Determine Resources in Place

SWRX P50 Input Parameters*		
OIL	BRV (e^6m^3)	250
	N:G (v/v)	0.60
	POR (v/v)	0.17
	S_w (v/v)	0.20
	FVF	1.35
GAS	BRV (e^6m^3)	283
	N:G (v/v)	0.65
	POR (v/v)	0.17
	S_w (v/v)	0.21
	FVF	0.0047

* these most likely inputs were derived from local well control coupled with geological interpretation.

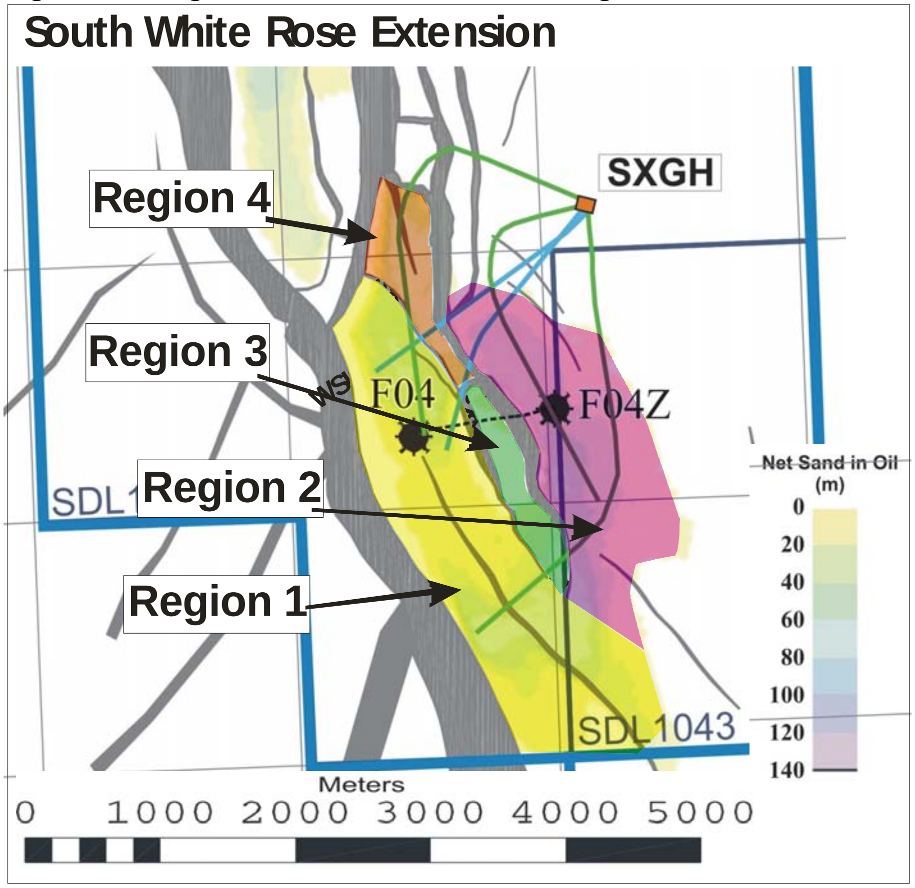
ii. **the oil and gas in place estimates for each fault block in the south west extension area;**

In general, we feel that all fault blocks in the SWRX region are connected and we have not differentiated in terms of oil and gas in place on a block by block basis. However based on the C-NLOPB request, Table 2.4 is an approximation of the oil and gas in place on a fault block by fault block basis. The region or fault block numbering is illustrated in Figure 2.6.

Table 2.4 Deterministic Block by Block in Place

Deterministic Block-by-Block In Place		
	Oil	Gas
	mmbbl	bcf
Region 1	49.0	131.1
Region 2	19.7	0.0
Region 3	0.1	26.0
Region 4	22.2	17.9
Total	91.0	175.0

Figure 2.6 Region or Fault Block Numbering



iii. the gas-in-place need to distinguish between solution gas and gas cap; and

The gas-in-place values included in the original submission only included gas-cap gas. Table 2.5 indicates both gas-cap and solution gas in place for SWRX.

Table 2.5 Gas Cap and Solution Gas in Place for SWRX

Gas-In-Place Detailed (P50)	
OGIP (bcf)	175
Sol'n Gas (bcf)	62

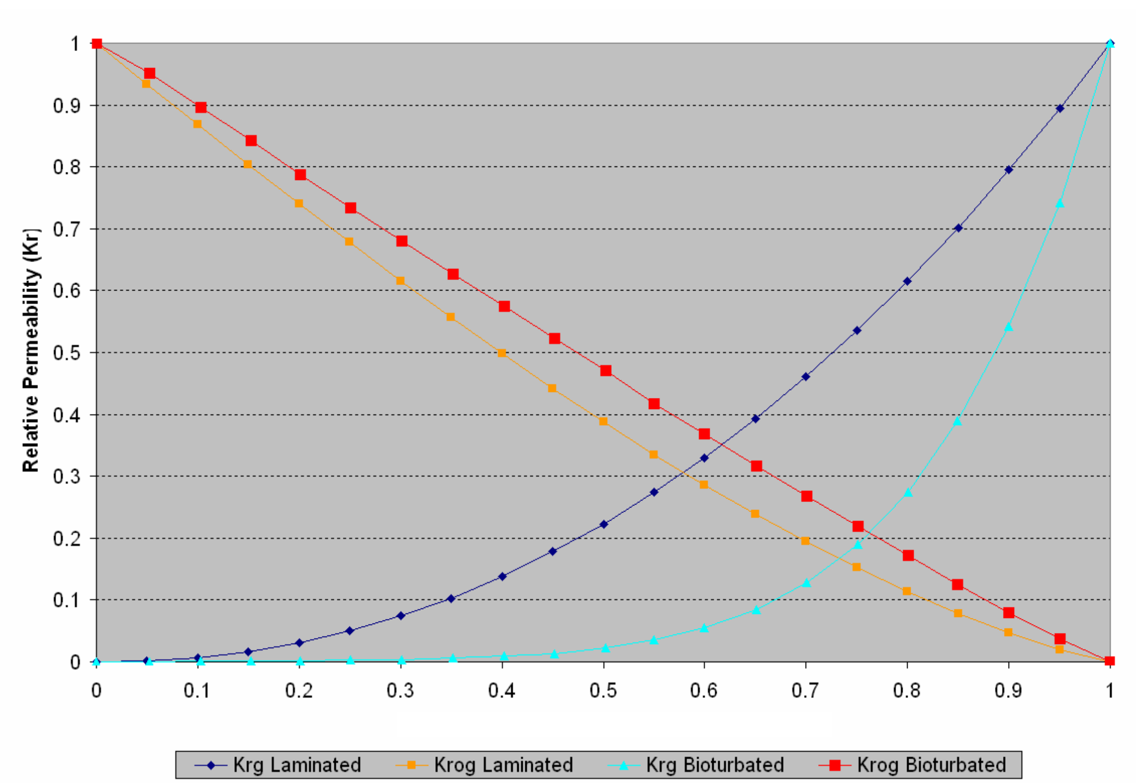
iv. for gas cap gas, an estimate of the natural gas liquids, including condensate and liquids that may be produced during processing of the gas, along with an estimate of the gas-in-place remaining once these liquids are extracted.

This request is very similar to Condition 15 from White Rose Decision Report 2001.01. Husky received dispensation from Condition 15 due to the highly subjective procedure required for estimating the quantity of coned gas (and the liquids associated with that gas). Appendix A provides the documentation that was submitted in support of Condition 15 by Husky on December 17, 2004 along with the C-NLOPB approval letter dated July 6, 2005. Considering the fact that the procedure for estimating NGL's would be fraught with the same shortcomings as those identified in the Condition 15 approval, Husky requests that this item be retracted.

4. Figure 4.3: Please confirm that the x-axis is water saturation as opposed to gas saturation.

The x-axis of Figure 4.3 should be labeled as gas saturation as opposed to water saturation and is updated and included below.

Figure 4.3 White Rose Oil-Gas Relative Permeability Curves



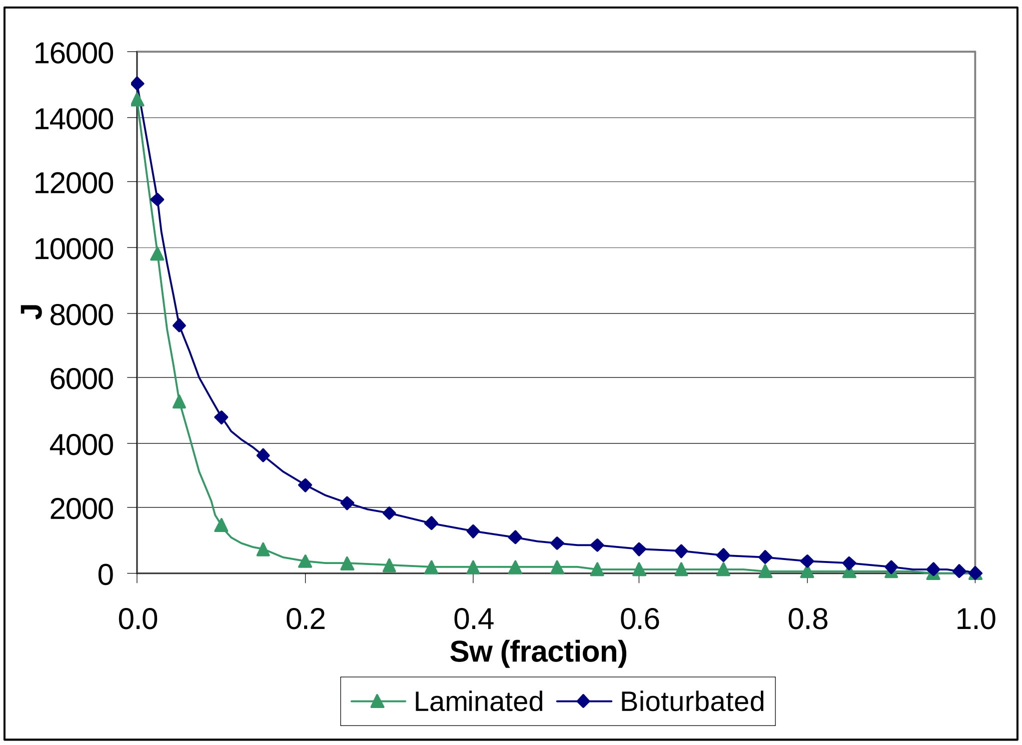
5. Section 4.1.5: Please provide the J function curves in graphical and tabular format.

The normalized J function curve data for both the laminated and bioturbated facies are provided in Table 2.6 and displayed in Figure 2.7. The irreducible water saturation applied for the laminated facies was 10% and for the bioturbated facies 25% was used.

Table 2.6 White Rose J Function Table for Laminated and Bioturbated Facies

Sw (fraction)	J - Laminated	J - Bioturbated
0.00	14500	15000
0.03	9793	11456
0.05	5244	7629
0.10	1465	4788
0.15	728	3644
0.20	396	2700
0.25	294	2119
0.30	238	1838
0.35	196	1556
0.40	185	1275
0.45	174	1094
0.50	163	938
0.55	151	844
0.60	136	750
0.65	120	656
0.70	101	563
0.75	89	469
0.80	72	375
0.85	54	281
0.90	36	188
0.95	18	94
1.00	0	0

Figure 2.7 White Rose J Function Curves for Laminated and Bioturbated Facies



6. **Section 4.2.1: Displacement Strategy: Please elaborate if any alternate displacement strategy was considered, such as gas injection, and why it was rejected.**

   Gas injection was considered as a secondary recovery technique for the South White Rose Extension area. Due to the saturated nature of the reservoir fluids and the large gas cap associated with the area, an extremely large amount of injection gas was required to maintain voidage and result in oil recovery additional to primary recovery. The gas processing capacity required to support such a recovery scheme would require an order of magnitude greater gas processing capacity than what is currently available for the entire Sea Rose FPSO.

7. **Section 4.3.2: Production Injection Constraints: Please provide any studies conducted in support of the vertical flow performance tables to assess pressure losses from the wellhead to the FPSO.**

   PROSPER, a Petroleum Experts Limited's software, was used to build vertical flow performance (VFP) tables for producing wells. Pressures were calculated for flow paths from perforations to wellheads and via subsea flowlines to the SDC subsea manifold.

   A criteria of 5500 kPa was used as a minimum tie-in pressure at the SDC subsea manifold to allow unrestricted flow from SWRX to the FPSO. PROSPER's built-in vertical and horizontal multiphase flow correlations were matched to actual flow data for existing producing wells and subsea flowlines. The best matched correlations were used to produce VFP tables for Eclipse simulation.

   Table 2.7 presents the vertical flow performance table for a generic SWRX producer with 0% Water Cut, First Node Pressure of 5500 kPa, Gas Oil Ratio of 133 m3/m3 and a liquid Rate range of 300 to 3000 m3/day.

Table 2.7 Vertical Life Performance Curve

SWRX - VERTICAL LIFT PERFORMANCE CURVE (Total GOR 133 m3/m3, Water Cut 0%, First Node Pressure 5500 kPa a)							
Liquid Rate (m3/day)	Oil Rate (m3/day)	VLP Pressure (kPa a)	Tie-In Pressure (kPa a)	Tie-In Temperature (deg C)	dP Friction (kPa)	dP Gravity (kPa)	Injection Depth (m)
300	300	21219	5525	33	31	15478	2902
600	600	19311	5537	52	116	13484	2902
900	900	19058	5560	64	247	13185	2902
1200	1200	19087	5595	71	423	13071	2902
1500	1500	19270	5642	77	642	13049	2902
1800	1800	19567	5699	81	901	13088	2902
2100	2100	19947	5767	84	1198	13168	2902
2400	2400	20396	5846	86	1531	13277	2902
2700	2700	20903	5934	88	1897	13409	2902
3000	3000	21462	6033	90	2294	13559	2902

8. **Section 4.3.3: Production Injection Performance: For the White Rose extension area a table should be provided showing for each fault block the initial oil in place and the oil recovered at the end of the prediction period.**

The original oil in place by fault block was also requested in clarification point 3 of this document and is repeated here for reference. The recoverable oil by fault block is included in Table 2.8. Refer to Figure 2.6 in Response 3 for a map that shows the region numbers.

Table 2.8 SWRX Fluid in Place and Recoverable Oil by Fault Block

	OOIP (mmbbl)	Recoverable Oil (mmbbl)
Region 1	49.0	13.8
Region 2	19.7	5.6
Region 3	0.1	0.0
Region 4	22.2	5.0
Total	91.0	24.4

9. Section 4.4: Production Forecasts: In addition to the figure referenced, forecasts of the production and/or injection of oil, gas and water, on an annual basis for the field should be provided in tabular format. This information should be provided for SWRX area as well as the entire White Rose Field.

Table 2.9 Annual Production History for White Rose Excluding SWRX

Year	Field Oil Rate Sm3/d	Field Oil Cumulative Sm3	Produced Water Rate Sm3	Produced Water Cumulative Sm3	Water Injection Rate Sm3/d	Water Injection Cumulative Sm3	Field Gas Rate Sm3/d	Field Gas Cumulative Sm3
2005	1,479	540,000	2	847	1,994	727,710	198,365	72,403,328
2006	13,705	5,542,400	22	8,821	18,902	7,627,118	1,895,780	764,363,207
2007	15,900	11,345,900	39	23,093	24,721	16,650,426	2,450,841	1,658,920,068
2008	15,944	17,165,300	674	269,108	25,415	25,926,790	2,899,123	2,717,100,130
2009	15,899	22,968,499	3,836	1,669,300	29,636	36,744,051	3,587,205	4,026,430,040
2010	11,700	27,238,905	8,333	4,710,847	29,644	47,564,068	3,007,831	5,124,288,340
2011	7,825	30,095,029	10,548	8,560,827	25,321	56,806,181	1,968,992	5,842,970,530
2012	5,361	32,051,861	12,080	12,970,033	22,972	65,190,876	1,531,724	6,402,049,750
2013	3,978	33,503,653	13,203	17,789,048	21,928	73,194,435	1,278,956	6,868,868,510
2014	3,111	34,639,171	14,077	22,927,185	21,373	80,995,681	1,093,228	7,267,896,670
2015	2,553	35,570,905	14,744	28,308,579	20,951	88,642,838	963,626	7,619,620,160
2016	2,163	36,360,276	15,299	33,892,842	20,747	96,215,495	874,204	7,938,704,640
2017	1,866	37,041,323	15,715	39,628,789	20,576	103,725,851	796,786	8,229,531,350
2018	1,625	37,634,432	15,976	45,460,037	20,332	111,147,115	727,632	8,495,117,070
2019	1,434	38,157,679	16,262	51,395,684	20,211	118,524,121	668,704	8,739,194,110
2020	1,279	38,624,400	16,533	57,430,314	20,145	125,876,988	618,260	8,964,859,020
2021	1,129	39,036,629	16,347	63,397,102	19,699	133,067,149	567,345	9,171,939,780

Table 2.10 Annual Production History for White Rose Including SWRX

	Field Oil Rate Sm3/d	Field Oil Cumulative Sm3	Produced Water Rate Sm3/d	Produced Water Cumulative Sm3	Water Injection Rate Sm3/d	Water Injection Cumulative Sm3	Field Gas Rate Sm3/d	Field Gas Cumulative Sm3
2005	1479	540,000	2	847	1994	727,710	198,365	72,403,328
2006	13705	5,542,400	22	8,821	18902	7,627,118	1,895,780	764,363,207
2007	15900	11,345,900	39	23,093	24721	16,650,426	2,450,841	1,658,920,068
2008	15944	17,165,300	674	269,108	25415	25,926,790	2,899,123	2,717,100,130
2009	15899	22,968,499	3,836	1,669,300	29636	36,744,051	3,587,205	4,026,430,040
2010	14595	28,295,562	8,134	4,638,308	34954	49,502,340	3,764,442	5,400,451,218
2011	10717	32,207,183	10,440	8,448,763	36142	62,694,340	3,892,010	6,821,034,704
2012	7047	34,779,409	13,846	13,502,724	34661	75,345,555	3,592,465	8,132,284,536
2013	4767	36,519,199	16,328	19,462,390	29722	86,194,234	2,258,457	8,956,621,436
2014	3591	37,829,964	17,466	25,837,511	27890	96,374,209	1,736,573	9,590,470,626
2015	2909	38,891,711	18,351	32,535,640	27030	106,240,217	1,471,875	10,127,704,926
2016	2452	39,786,527	19,062	39,493,430	26631	115,960,595	1,311,949	10,606,566,136
2017	2104	40,554,392	19,527	46,620,655	26211	125,527,612	1,174,723	11,035,340,106
2018	1845	41,227,643	19,997	53,919,567	26027	135,027,456	1,073,785	11,427,271,756
2019	1626	41,820,998	20,285	61,323,464	25767	144,432,344	987,632	11,787,757,526
2020	1452	42,350,840	20,640	68,857,062	25654	153,795,982	910,087	12,119,939,246
2021	1291	42,821,904	20,613	76,380,855	25239	163,008,362	836,668	12,425,323,076

10. In addition to the development cost data, an economic assessment should be provided in accordance with Section 3.9 of the Board's Development Plan Guidelines. This would include a presentation of:

- **the project's anticipated net income;**
- **the project's anticipated rate of return; and**

- **the project's anticipated royalty and taxes to be paid to the Government of Canada and the Government of Newfoundland and Labrador.**

A sensitivity analysis based on capital cost, operating cost, production forecasts and oil and/or gas price should be included. Capital costs (including breakdown of drilling costs) and operating costs should be provided on an annual basis and should be included for the SWRX area as well as the entire White Rose Field. In addition, all of the assumptions used in the economic analysis noted above should be provided such as oil prices, inflation rates and exchange rates and a sensitivity analysis base on capital cost, operating cost, production forecasts and oil and/or gas price should be included.

Refer to correspondence between Chris Laing and John Crocker dated November 20, 2006 (Husky Ref. No. HUS-CPB-DG-LTR-00002) and November 27, 2006 (Husky Ref. No. 003981614).

11. **Section 4.5 Reserves: The following should be provided:**

- **the assumptions and parameters used (the economic cut-off criteria for estimating the reserves should be clearly stated)**

The South White Rose extension area is a tie-back to the existing White Rose development currently producing to the Sea Rose FPSO. It could not economically support the fixed operating and capital costs associated with the Sea Rose. Economic cut-off criteria were therefore not applied to the SWRX reserves since they could not exist without the combined development.

- **the oil reserves for each fault block in the south west extension area.**

This was requested in clarification point Number 8 of this document and is provided under that section as Table 2.8.

12. **The drilling schedule for all planned wells in the SWRX area should be provided.**

The South White Rose Extension wells will most likely be drilled in the following order, but are subject to change based on data obtained from any particular well. (Refer to Figure 4.4 in the Development Plan Amendment document):

a. WSI3 – deviated water injector

b. WSP2 – horizontal production well

c. WSI2 – horizontal water injector

d. WSP3 – horizontal production well

e. WSP1 – horizontal production well

13. **The document states that a water production rate of 28,000 m3/d was considered in the full field reservoir simulation model. If this is assumed to be equivalent to the**

maximum anticipated produced water discharge rate (note that Figure 4.8, page 52 appears to indicate a lesser maximum) then it will be less than the 30,000 m3/d maximum assessed in the WR Comprehensive Study Report. However, the maximum anticipated PW discharge rate is not stated explicitly in the document and this should be clarified.

The maximum produced water rate limit of 28,000 m^3/d used in the simulation is based on functional specification. This limit is stated as a production/injection constraint in Section 4.3.2 of the Development Plan Amendment but this limited is not reached in any of the reported simulation runs. The 28,000 m^3/d maximum is based on current design specifications and is consistent with the current Sea Rose FPSO design specification. The simulation results indicate that this maximum design criterion is not a limiting factor for depletion planning.

14. **Environmental assessment matters associated with the SWRX are intended to be covered in a portion of the "Husky White Rose Development Project: New Drill Centre Construction and Operations Program Environmental Assessment" currently in progress. The document indicates that the number of wells associated with the SWRX initially will be 5 but could increase to a total of 8 and that the SWR drill centre would be designed to expand to 16. However, the environmental assessment describes a maximum of 8 wells in the SWR drill centre. This discrepancy must be removed, either by amending the document or by modifying the environmental assessment document. We note that we have advised Husky personnel on a number of occasions that EAs should be scoped as widely as reasonably foreseeable in order to minimize the potential for additional future assessments.**

    The SWRX modular manifold will have slots for up to 8 wells. However, the glory hole will be large enough to support another 8-well manifold should future exploration activities identify resources that can be accessed from the SWRX glory hole. It is acknowledged that the New Drill Centre Construction and Operations Environmental Assessment currently in progress indicates a maximum of 8 wells for the SWRX drill centre. The Environmental Assessment will be revised to include the potential for an additional 8 wells in the SWRX glory hole (total of 16).

15. **We note that the preliminary schedule (Figure 2.6, page 15) appears to allocate one year to development drilling. We assume that this refers to the "base case" of 5 wells. This should be stated explicitly and/or the figure should be modified to include the possibility of the additional wells described elsewhere in the text.**

    The drilling schedule presented in Figure 2.6 of the Development Plan Amendment refers to the five wells that are currently planned for the SWRX Tie-back.

16. **On Page 10, the document references increased dimensions resulting from enhancements to the original White Rose Development glory hole design. The first item "The depth will allow equipment to be…" needs to be properly explained.**

    Following a review of the glory hole construction and installation processes for the core White Rose Development, it was determined that it was necessary to increase the depth of future glory holes in order to address operational issues. Conceptually, the top of the glory hole and elevation of the equipment will remain stationary relative to the seabed. The bottom of the glory hole will be lowered by one to two m. This creates a "sump" at the bottom of the glory hole that creates a void for unplanned incidental drilling spoils. Also, the ROVs will then generally operate one m higher off the glory hole floor, thus minimizing the stirring up of sediment during ROV activities.

17. In addition, on page 13, Husky references "Iceberg protection measures applied to the current White Rose Development will also be applied to the SWRX…". It would be useful to either repeat the measures or give a better reference to the measures being referred to in the current plan. This is not dealt with in the new safety study. Is Husky relying on a previous safety study?

The iceberg protection measures for subsea equipment that are referenced in the Amendment are the same as those used for the current White Rose development. Specifically, in addition to use of glory holes and weak link technology for subsea installations, active iceberg management will be employed. The *White Rose Ice Management Plan* (WR-DAC-PR-0003 D1) will apply to the new SWRX drill centre.

Iceberg risk studies completed for White Rose include a *Glory Hole Iceberg Scour Risk Evaluation* (C-Core R-03-018-011) which identified glory hole design parameters that would minimize the risk of iceberg scour. The design of the new glory hole remains within the design parameters described in the evaluation. The study, *Iceberg Risk to Pipelines at White Rose* (C-Core 00-C45 V2), is currently being reviewed to confirm that the risk of damage to flowlines does not exceed Husky's Target Levels of Safety (1×10^{-3}) as a result of adding SWRX.

The C-NLOPB also requested the following additional information (not numbered):

- **A copy of the most recent seismic cube.**

This information has been provided to the C-NLOPB as a Part II document as per the letter sent to Mr. Wayne Chipman on November 9, 2006 (Husky Ref. No. HUS-CPB-WR-LTR-00308).

- **A copy of the reservoir simulation model which includes the history match data.**

A copy of the reservoir simulation model, including the history match data, was provided to the C-NLOPB in July 2006.

Appendix A

Report on Condition 15 and Related Correspondence