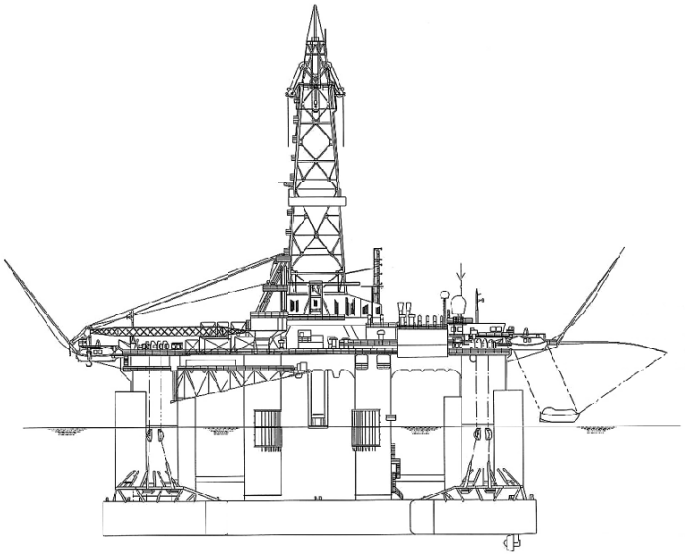
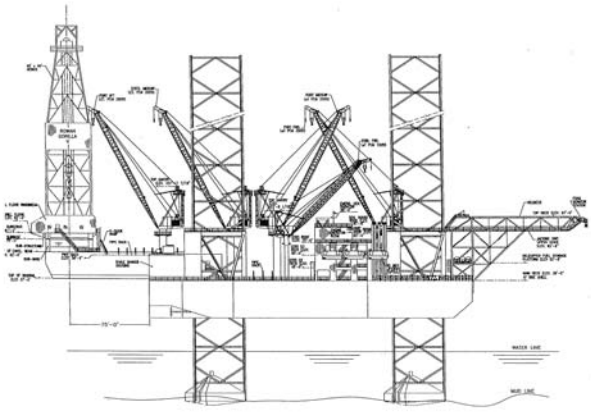
Husky Delineation/Exploration Drilling Program for Jeanne d'Arc Basin Area

Project Description





Husky Oil

Husky Delineation/Exploration Drilling Program for Jeanne d'Arc Basin Area

Project Description

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Table of Contents

Page

Table of Contents ii
Table of Tables iii
Table of Figures iii
1.0 Introduction 1
2.0 The Operator 3
2.1. Operator Contacts 3
2.2. Operator Objectives 4
3.0 Project Overview 4
3.1. Name and Location of Proposed Project 7
3.2. Alternatives to Project/Alternative Means within Project 7
3.3. Personnel 9
3.4. Mobile Offshore Drilling Units 9
3.4.1. Semi-submersible 10
3.4.2. Jack-up 11
3.5. Logistic Support 13
3.5.1. Marine Support Vessels 13
3.5.2. Helicopter Support 13
3.5.3. Shorebase Facilities 13
3.6. Information on Consultations 14
3.7. Project Components/Structures/Activities 15
3.7.1. Project Phases 16
3.7.2. Project Scheduling 16
3.7.3. Site Plans 16
3.7.4. Description of Waste Discharges and Air Emissions and Treatment 16
3.7.5. Drilling Muds 16
3.7.6. Produced Water 21
3.7.7. Grey/Black Water 21
3.7.8. Machinery Space Discharges 21
3.7.9. Bilge Water 21
3.7.10. Deck Drainage 21
3.7.11. Ballast Water 22
3.7.12. Cooling Water 22
3.7.13. Garbage 22
3.7.14. Miscellaneous 22
3.7.15. Seismic Survey Equipment 23

3.7.16. Waste Management Plan....23
3.7.17. Onsite Environmental/Ice Observers....23
3.7.18. Project Site Information....24
3.7.18.1. Environmental Features....24
3.7.18.2. Species at Risk....24
3.7.18.3. Land Use....24
3.7.18.4. Navigable Waters....25
3.7.18.5. Fish and Fish Habitat....25
3.8. Effects of the Environment on the Project....25

Table of Tables

Page

Table 3.1 Vertical Well Mud Scenarios....19
Table 3.2 Deviated Twin Wells....20
Table 3.3 Mud/Cuttings Treatment System....21

Table of Figures

Page

Figure 1.1 Location of Proposed Project on the Grand Banks....2
Figure 3.1 Schematic of a Vertical Well Scenario....5
Figure 3.2 Schematic of a Twin Well Scenario....6
Figure 3.3 Husky Acreage in the Jeanne d'Arc Basin....8
Figure 3.4 Typical Semi-submersible Drill Rig *GSF Grand Banks*....11
Figure 3.5 *Rowan Gorilla VI* operating with 673' leg length over production platform....12
Figure 3.6 Schematic of a Typical Vertical Well Abandonment (Cape Race N-68)....17

1.0 Introduction

Husky Oil Operations Limited is considering undertaking a delineation/exploration drilling program (Delineation/Exploration Drilling Program for Jeanne d'Arc Basin Area) at several possible sites on the Grand Banks within exploration licenses. The sites are situated in the Jeanne d'Arc Basin in about 120 metres of water, about 340 km southeast of St. John's (Figure 1.1). Drilling operations are scheduled to commence in July 2005, depending on rig availability and regulatory approval.

The Project will require authorizations pursuant to Section 138 (1) (b) of the *Canada-Newfoundland Atlantic Accord Implementation Act* and Section 134 (1) (a) of the *Canada-Newfoundland and Labrador Atlantic Accord Implementation Newfoundland and Labrador Act*. Subject to Section 5 (1) (d) of the *Canadian Environmental Assessment Act* (*CEA Act*), the Canada-Newfoundland Offshore Petroleum Board (C-NOPB, also referred to as "the Board") is a responsible authority (RA) and federal environmental assessment coordinator (FEAC) and must undertake a screening level environmental assessment (EA) of the Project.

Legislation that is relevant to the environmental aspects of this Project include

- *Canada-Newfoundland Atlantic Accord Implementation Acts*
- *Canadian Environmental Assessment Act*
- *Oceans Act*
- *Fisheries Act*
- *Navigable Waters Protection Act*
- *Canada Shipping Act*
- *Species at Risk Act*
- *Migratory Birds Convention Act*
- *Canadian Environmental Protection Act*

There is no federal funding for this Project. Federal lands are involved and they are administered by the C-NOPB, a federal-provincial agency operating under the *Accord Acts.* A Drilling Program Authorization (DPA) and one or more Approvals to Drill a Well (ADW) are required to operate a drilling program in the offshore.

This Project Description is based upon information available at the time of writing. Not all Project details are presently known because not all contractors and suppliers have been selected and the specific number and location of wells are yet to be finalized but will be within the scope outlined in this document. Nonetheless, this Project Description is an accurate reflection of the Proponents' present level of knowledge.

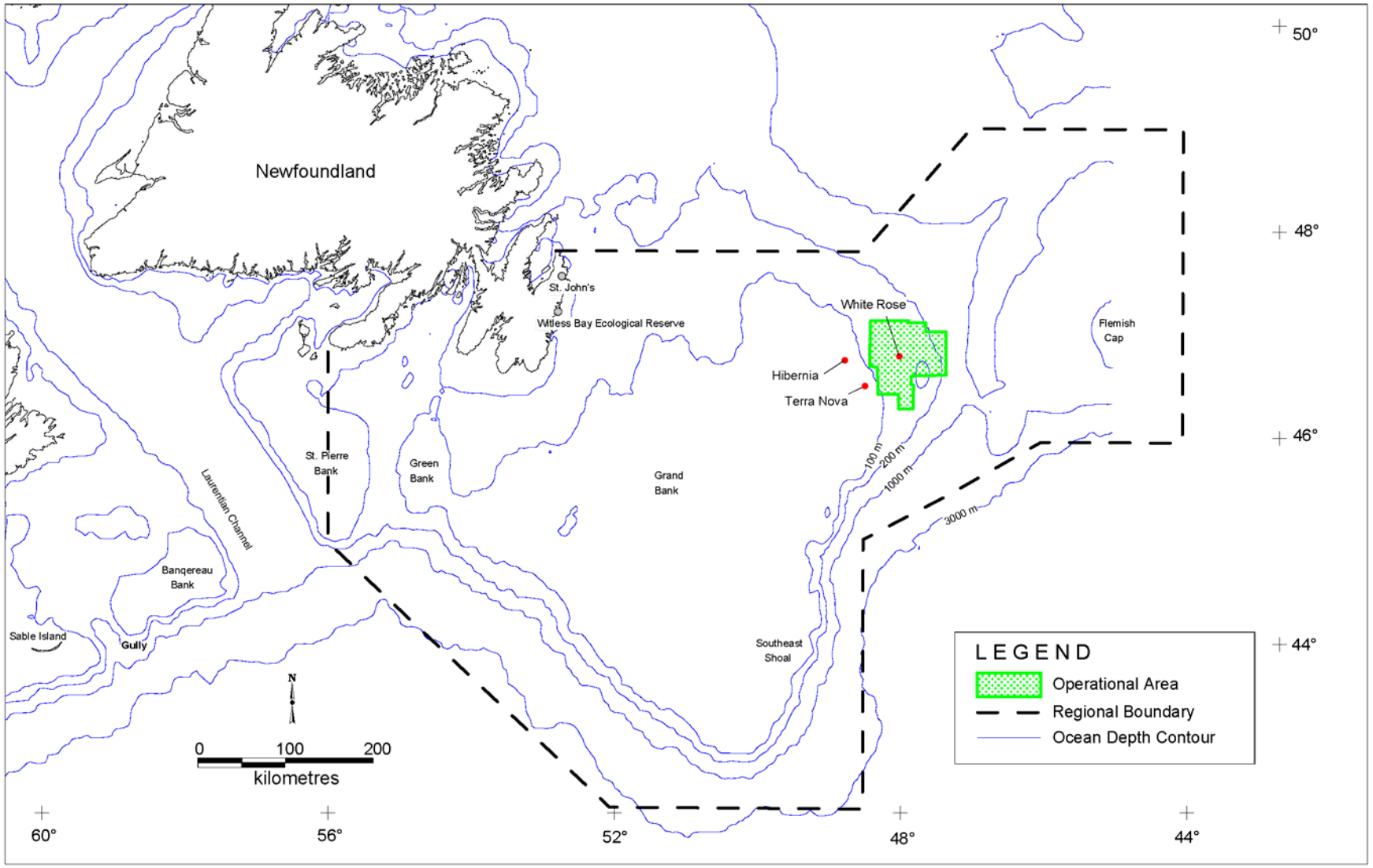

Figure 1.1 Location of Proposed Project on the Grand Banks.

2.0 The Operator

Headquartered in Calgary, Alberta, Husky Oil Operations Limited (the Operator) is a Canadian-based integrated energy company serving global customers, committed to maximizing returns to its shareholders in an ethical and socially responsible way, through the dedicated effort of its people. It is involved in:

- Exploration and development of crude oil and natural gas,
- Production, purchase, transportation, refining and marketing of crude oil, natural gas and natural gas liquids and sulfur, and
- Transportation and marketing of refined products.

The Operator is the management and operating company for the Operator's seven Significant Discovery Areas (SDA) and nine Exploration Licenses, offshore Newfoundland. The White Rose field, the largest of the Operator's SDA's, is estimated to contain approximately 230 million barrels of recoverable reserves.

2.1. Operator Contacts

Operator Contacts concerning this application are:

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2.2. Operator Objectives

The long-term goals of the Operator are to:

- Execute a cost-effective program, while maintaining health, safety and environmental responsibilities and meeting all due diligence requirements.
- Minimize and phase capital expenditure.
- Re-establish and maintain cost-effective relationships with suppliers and contractors, creating long-term mutual benefits and a local infrastructure.
- Effectively conduct core business activities.
- Optimize synergy opportunities with other operators in the area.
- Conduct operations with a moderate, cost effective, risk profile.

East Coast drilling operations are managed from the local offices of the Operator and supported using the established logistics infrastructure and resources in St. John's, Newfoundland.

3.0 Project Overview

During 2005 to 2007 Husky Oil plans to evaluate ten oil and gas targets with a combination of vertical and deviated (twin) wells in Jeanne d'Arc Basin (Figures 3.1 and 3.2).

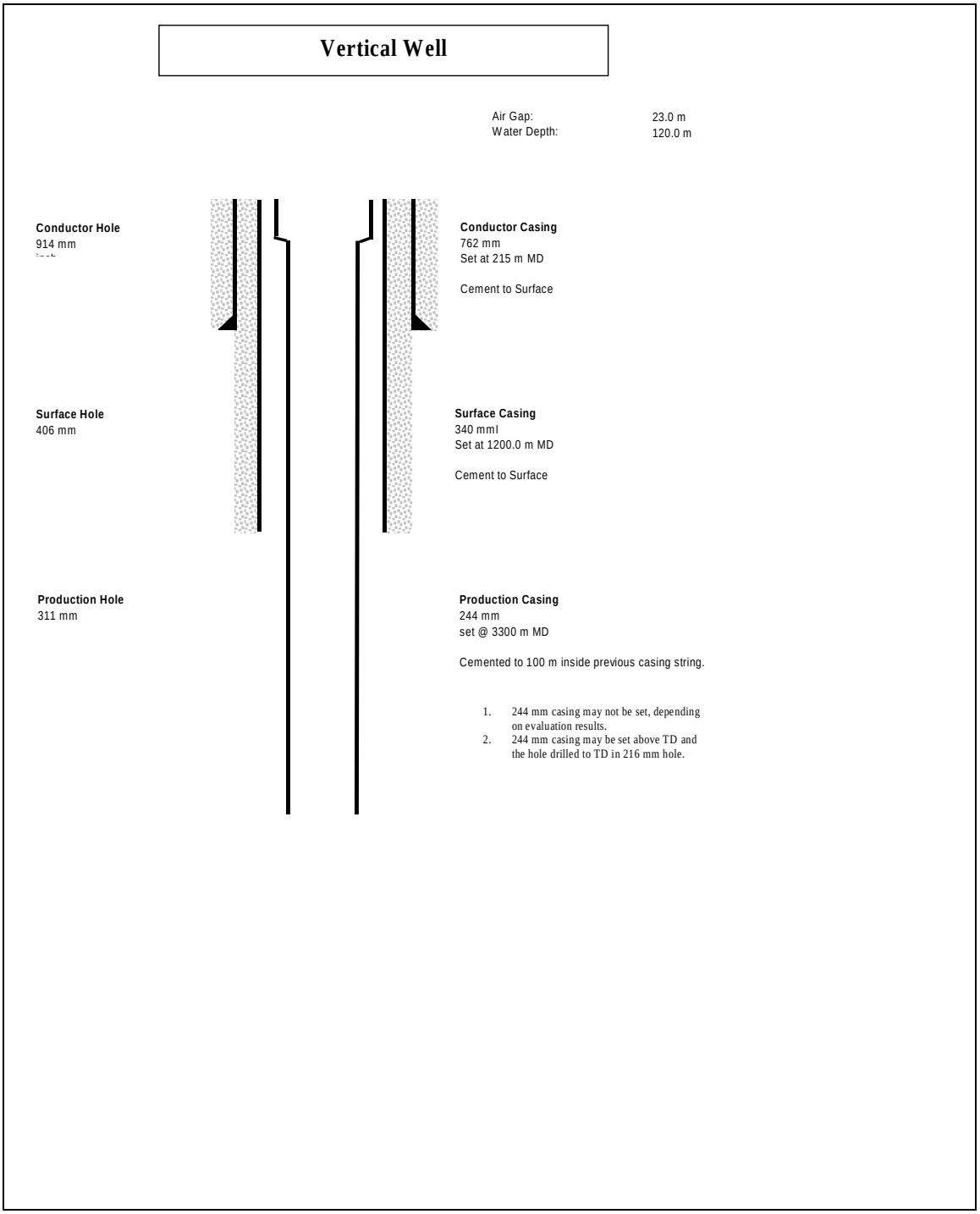

Figure 3.1 Schematic of a Vertical Well Scenario.

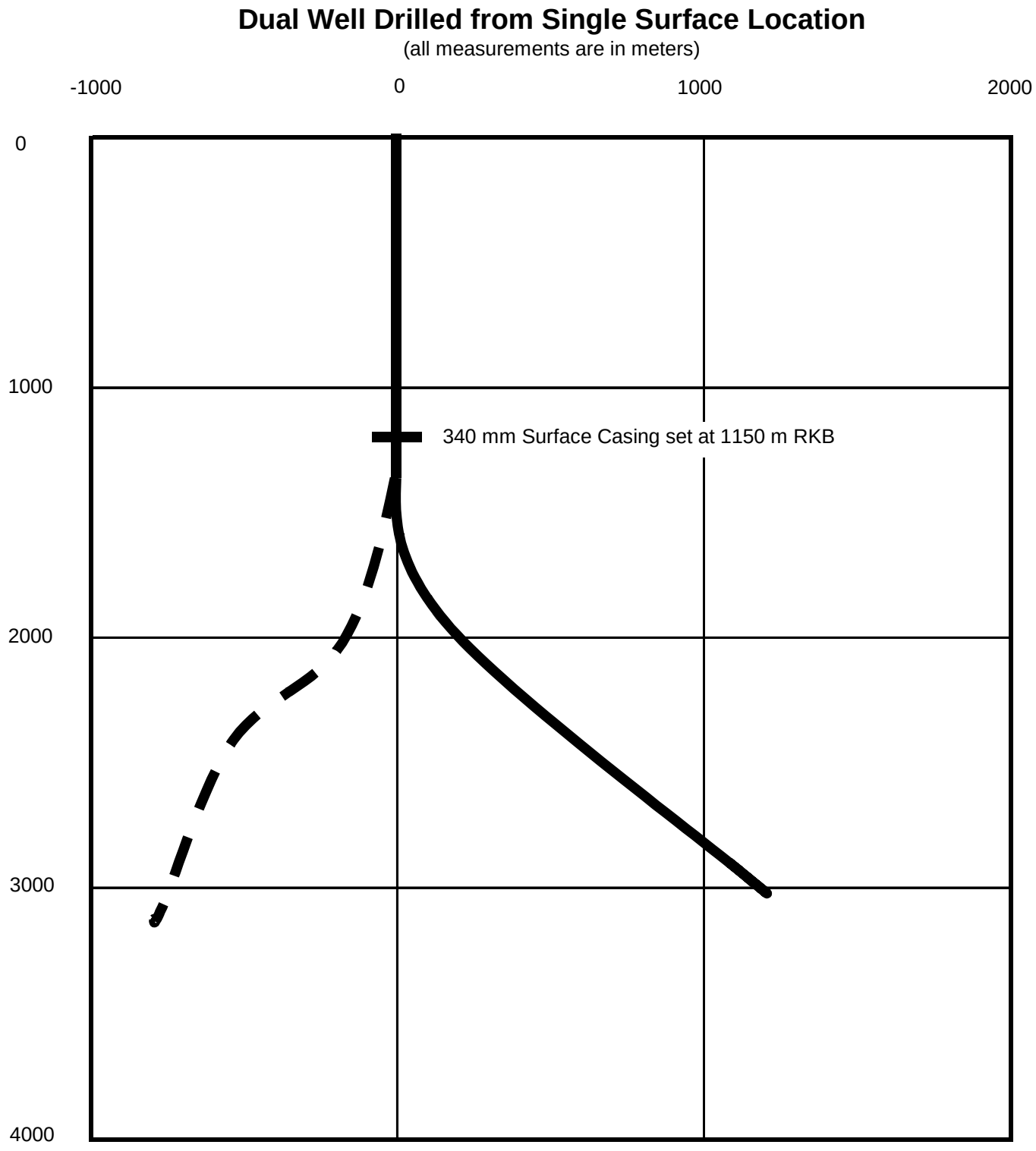

Figure 3.2 Schematic of a Twin Well Scenario.

The Operator's drilling contractor will maintain a marine shore base in the St. John's area during the 2005-7 drilling campaign. The re-supply of drilling equipment and materials will be performed from this location. The transport of personnel to and from St. John's and the Operating Area will be conducted mainly by helicopter, but in isolated situations, supply boats may be used. The Operating Area as defined in this EA encompasses all of the Operator's land holdings offshore Newfoundland that are being considered in this EA. No new shore-based facilities will be constructed for this operation.

Consistent with the legislative requirements of the *Canada Newfoundland Atlantic Accord Implementation Acts*, Husky Oil Operations Limited is committed to enhancing the business opportunities for Canada and Newfoundland as outlined in the Company's Canada-Newfoundland and Labrador Benefits G/L outlined in the Benefits Plan. Consequently, Husky will utilize the services of Newfoundland and other Canadian companies and personnel wherever possible.

3.1. Name and Location of Proposed Project

The official name of the Project is the Husky Delineation/Exploration Drilling Program for Jeanne d'Arc Basin Area. It is located on the northeastern Grand Banks (Figures 1.1 and 3.3). All proposed wells are within 40 km of previous exploratory drilling in the area and are encompassed within White Rose and Trave SDAs, EL1044, 1045, 1090 and 1091.

3.2. Alternatives to Project/Alternative Means within Project

The alternative to the Project is to not drill any wells in these locations but to seek oil and gas elsewhere in order to satisfy market demand. However, Husky has been awarded rights to explore in these areas through a regulated competitive bidding process and is now seeking to fulfill commitments made as part of this process.

Alternative means evaluated within the Project include the use of a semi-submersible vs. a jack-up. Within the oil and gas industry, these rig types are all considered MODU or mobile offshore drilling units because they move under their own power and/or can be towed between locations. While there are some differences between rig types, their overall environmental "footprints" and emissions are similar. The semi-submersible and jack-up approaches were selected because they provided the best:

1. technological solution given environmental conditions likely to be encountered,
2. scheduling given availability of other suitable vessel types, and
3. economics compared to other qualified vessels.

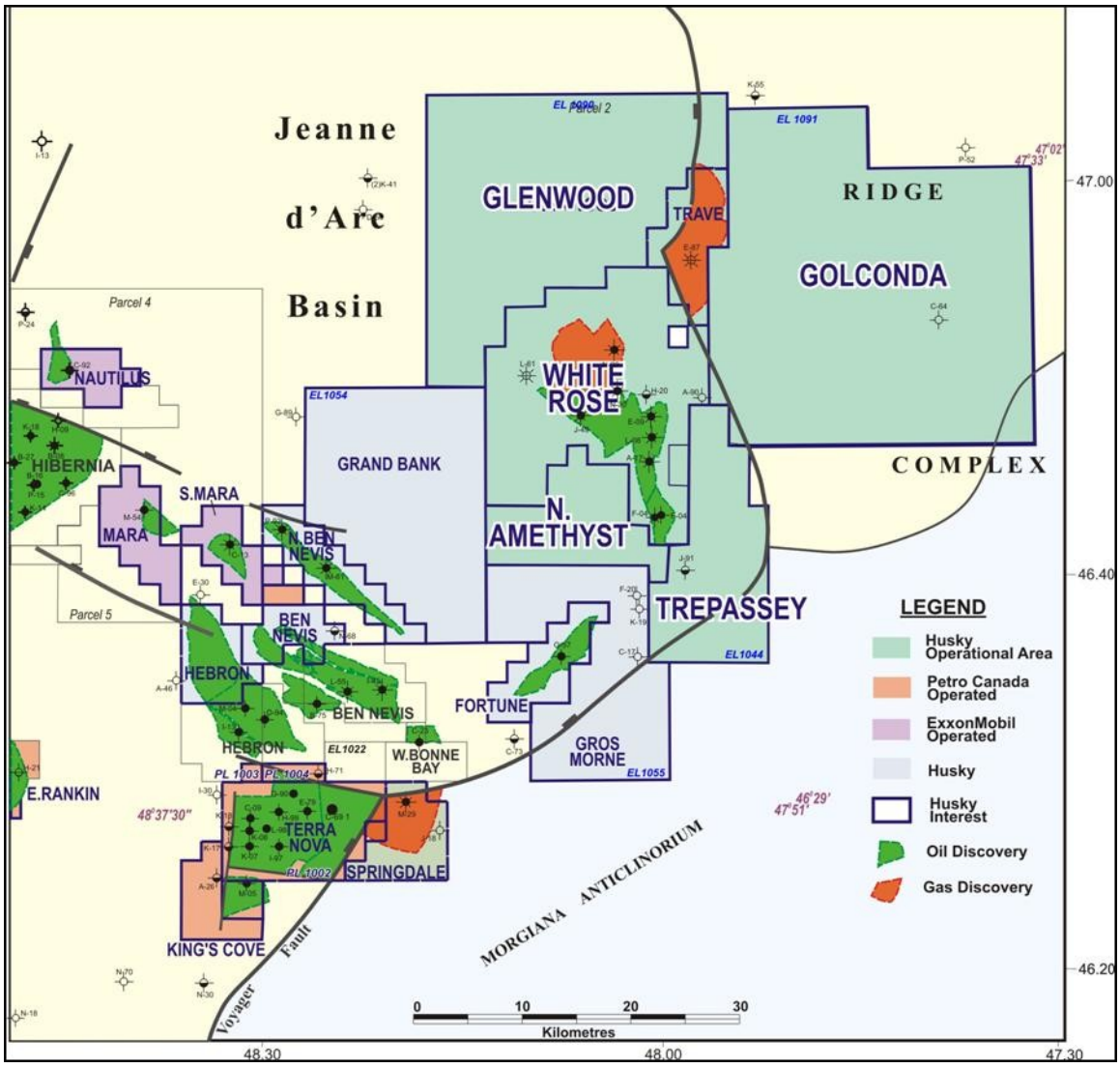

Figure 3.3 Husky Acreage in the Jeanne d'Arc Basin.

Of potential offshore drilling rigs, the rig will be selected through a competitive bidding process to maximize synergy with other projects.

Another alternative within the Project is the use of vertical wells (i.e., one well per one hole) vs. dual side-track wells where there are two wells drilled per one hole.

Alternatives are discussed further in the EA to follow.

3.3. Personnel

The overall project will be managed by Husky's East Coast Operations General Manager located in St. John's. The Operations General Manager has the authority to effectively manage the overall operational aspects of the project on an ongoing basis. Day-to-day drilling operations will be directed by the Husky Oil Drilling Manager. The shore-based drilling operations management team in addition includes the Sr. Drilling Engineer, Senior Completions and Testing Engineer, Logistics Manager, Administration Manager, HS&E Manager and the Public Affairs Manager.

Offshore, the Management team consists of the Sr. Drilling Supervisor (Husky's offshore representative), the designated Offshore Installation Managers, and Supply Vessel Masters.

3.4. Mobile Offshore Drilling Units

Two types of MODU or moveable drilling rigs will be assessed in the EA: (1) semi-submersible, and (2) jack-up. The primary difference between the two types is that the semi-submersible floats and is anchored to the bottom with eight or more anchors whereas the jack-up sits on legs on the bottom. Drilling and abandonment procedures, and emissions are similar.

In this Project Description and ensuing EA it is necessary to describe and consider typical rigs because contracts are not in place for the duration of the drilling program, and rig and contractor selection is not yet final. Thus, this Project Description and ensuing EA consider the semi-submersible *GSF Grand Banks* operated by Global Santa Fe and the jack-up *Rowan Gorilla VI* operated by Rowan Companies, Inc., as offshore drilling rigs typical of East Coast operations. This approach is valid because both rigs have been approved for operations on the East Coast for several years and have met Canadian regulatory requirements, including the *Offshore Waste Treatment Guidelines* (NEB, C-NOPB and C-NSOPB 2002).

3.4.1. Semi-submersible

The *GSF Grand Banks* rig, an East Coast typical rig, has been operating in the Grand Banks area since July 2002. Prior to this it was operating in the British sector of the North Sea. The *GSF Grand Banks* is a rectangular, twin hull, column stabilized, MODU, constructed to an Aker #3.2 design. There are two 29.5 ft. (9.0 m) diameter corner stability columns plus two 24.3 ft. (7.4 m) diameter intermediate stability columns rising from each hull to support the main deck. The deck is arranged with the drilling mast in the centre and modules on the perimeters, housing the living quarters, equipment, storage area and workshops.

The *GSF Grand Banks* was built in 1984 to comply with the 1979 Rules for Building and Classing Offshore Mobile Drilling Units. The unit has the capability of drilling in 1,500 feet (457 m) of water to a depth of 25,000 feet (7,620 m), and can be used for exploration or appraisal wells, completion and template drilling (Figure 3.4).

The *GSF Grand Banks* Principal Characteristics and Dimensions are as follows:

Lower Hulls (two)

Overall length	88.9 m
Overall width	67.2 m
Depth	7.2 m
Width	13.2 m

Main deck

Length overall	253.0 ft.	(77.1 m)
Width overall	244.5 ft.	(74.5 m)

Normal Drafts

Transit at Shallow Draft	7.2 m
Drilling	22.0 m

Stability Columns (diameters)

Four corner	29.5 ft.	(9.0 m)
Four intermediate	24.3 ft.	(7.4 m)

Heights

Keel – lower	113’ 2”	(34.4 m)
Keel – upper	123’ 8”	(37.8 m)
Keel – third	133’ 10”	(40.8 m)
Keel – drill floor	147’ 8”	(45.1 m)
Keel – Hdeck	144’ 5”	(44.0 m)

Maximum Variable Deckload
6,283 s.t. (operating)

Figure 3.4 Typical Semi-submersible Drill Rig *GSF Grand Banks*.

Detailed specifications of the MODU systems and equipment have been described in the *GSF Grand Banks* Safety Case filed with the C-NOPB in support of Husky's previous Drilling Program Work Authorization application. The rig has a valid Certificate of Fitness issued by DNV for Canadian waters and has been inspected by the CA. In addition, a Transport Canada Marine Safety Inspection has been conducted as part of the requirements for a Letter of Compliance issued by that agency. Several previous Husky drilling EAs (Jeanne d'Arc Basin Program, Lewis Hill Program) have been conducted based on this rig.

3.4.2. Jack-up

A typical East Coast jack-up rig, the *Rowan Gorilla VI* (LeTourneau Hull No. 220, Class Super Gorilla), is a Self-Elevating Mobile Offshore Drilling Unit built in Vicksburg, Mississippi, 2000. (Figure 3.5). The unit is provided with accommodation for 120 persons including a six-person sickbay. The unit has been designed and built to class in accordance with the rules of the American Bureau of Shipping (ABS)

and Det Norske Veritas (DNV) and in accordance with the regulations of the United States Coast Guard (USCG), the Health & Safety Executive (United Kingdom) and the Norwegian Petroleum Directorate (NPD). The unit also conforms to the regulations of IMO, MARPOL, Norwegian Maritime Directorate, the C-NOPB and the C-NSOPB.

Figure 3.5 *Rowan Gorilla VI* operating with 673' leg length over production platform.

Dimensions

Overall Length (including heliport)	398.4	Ft.	(121.4	m)
Hull Length (between perpendiculars (LBP))	306.0	Ft.	(93.3	m)
Hull Width	300.0	Ft.	(91.4	m)
Hull Depth (at side)	36.0	Ft.	(11.0	m)
Maximum Overall Length of Spud Legs	674.19	Ft.	(205.5	m)
Variable Load – Drilling	13,767	Kips	(6,244	tonnes)
Gross Register Tonnage	19,526	Tons	(14,576	tonnes)
Net Register Tonnage	5,857	Tons	(4,372	tonnes)

Max. Draft Afloat (607 Ft. Legs)	21.00	Ft.	(6.4 m)
Max. Displacement Prior to Elevation (607 Ft. Legs)	60,789.9	Kips	
Max. Draft Prior to Elevation (607 Ft. Legs)	20.09	Ft.	(6.1 m)
Max. Displacement Afloat (607 Ft. Legs)	63,632.6	Kips	
Max. Draft Afloat (607 Ft. Legs)	21.00	Ft.	(6.4 m)
Max. Displacement Prior to Elevation (573 Ft. Legs)	60,048.07	Kips	
Max. Draft Prior to Elevation (573 Ft. Legs)	19.85	Ft.	(6.05 m)
Max. Displacement Afloat (573 Ft. Legs)	63,632.6	Kips	
Max. Draft Afloat (573 Ft. Legs)	21.00	Ft.	(6.4 m)
Bow to CL Fwd. Leg Spacing	58.50	Ft.	(17.8 m)
Longitudinal Leg Spacing	189.00	Ft.	(57.6 m)
Transverse Leg Spacing	218.00	Ft.	(66.4 m)
Diameter of Spud Can (maximum effective)	57.07	Ft.	(17.4 m)
Height of Spud Can (base of trunk to top of trunk)	27.84	Ft.	(8.5 m)
Footing Area of Spud Can (one can)	2,616.50	Sq. Ft.	(243.1 m^2)
Volume of Spud Can (one can, to base of trunk)	41,104	Cu. Ft.	(1,163.9 m^3)

3.5. Logistic Support

3.5.1. Marine Support Vessels

Anchor Handling Tug Supply (AHTS) and Supply/Standby vessels will be Canadian-flagged and Canadian-crewed and will be managed from the Contractor's office in St. John's, Newfoundland. Letters of Compliance for each chartered standby vessel will be in place prior to Work commencing.

3.5.2. Helicopter Support

Cougar Helicopters Inc. (CHI) have been contracted to provide helicopter support for the Project and will have a dedicated AS-332L Super Puma and/or Sikorsky S-91 for Husky Oil based in St. John's to service the Company's requirements. Cougar Helicopter Inc. will also provide all auxiliary flight services including First Response Equipment and technicians, alternate landing site at Long Pond complete with weather station, aviation fuel, helicopter passenger transportation suits and an aircraft maintenance and passenger loading terminal located at the St. John's Airport. Flight following service will be contracted by Cougar Helicopters Inc. from Avflow Aviation Services.

3.5.3. Shorebase Facilities

The Project will be managed and operational decisions will continue to be made from Husky Oil Operations Limited's existing Regional Office in St. John's at Suite 801, 235 Water Street. A. Harvey and Company Ltd. will provide dock facilities to support Project activity. The existing facilities are capable of servicing multiple operations with the existing infrastructure including office

space, crane support, bulk storage and consumable (fuel, water) storage and delivery capability. The existing infrastructure and activity at the Harvey's facility enables the industry to optimize the utilization of supply vessels and other logistic assets. Warehouse facilities will be provided by Project contractors as required and will consist primarily of storage for tubular goods, and the equipment belonging to the drill rig which can be stored onshore.

Operation and co-ordination service of all aeronautical and marine voice and data communication services will be provided from a central facility (contract being finalized) in St. John's. The primary communications link between the drill rig and the Project Operations office in St. John's will be via a dedicated C-Band satellite service. Independent backup communications systems will be provided by high quality HF radio service, available through the coastal radio station. Details on communications systems are outlined in the Alert and Emergency Response Plans currently on file with C-NOPB.

3.6. Information on Consultations

As part of the White Rose Development Plan Application, which included an assessment of development activities such as well drilling, Husky conducted very extensive consultations with numerous organizations. These included federal agencies, particularly Fisheries and Oceans and Environment Canada; provincial departments such as Environment and Labour, and Fisheries, Food and Aquaculture; municipal governments including St. John's, Clarenville and Marystown; special interest groups including the Natural History Society; and the general public at various locations. A detailed list of meetings, totaling well over 100 is contained in the report entitled "White Rose Oilfield Development Public Consultation Report" and summarized in the Comprehensive Study Report. The White Rose Development Plan Application also went through a series of Commission hearings that were open to the public.

In addition, Husky briefed the following parties on the nature of the Jeanne d'Arc Basin exploratory drilling project, including a description of proposed activities, locations and timing.

- Transport Canada (23 April 2002)
- C-NOPB (12 April 2002)
- Transport Canada, C-NOPB, Det Norse Veritas (7 May 2002)
- Environment Canada (May 2002)
- Fisheries & Oceans Canada (May 2002)

For the presently proposed program, the following organizations will be contacted during the preparation of the environmental assessment:

- Natural History Society
- Environment Canada
- Fisheries and Oceans
- ONE OCEAN
- Fish, Food and Allied Workers (FFAW)
- FPI
- and others

Environmental concerns expressed during some of the meetings on the White Rose Project that could be of relevance to exploratory drilling included those associated with the discharge of waste including drilling muds and cuttings (more so synthetic based muds as opposed to water based muds), produced water, any oily discharges (particularly accidental oil spills) fishery exclusions, and attraction of several species of seabirds to the rig. The general consensus of the meetings was that offshore oil could be developed on the Grand Banks in an environmentally responsible manner and in coexistence with the fishing industry. These issues were addressed during the White Rose Development Application review process and will be considered in the environmental assessment together with issues that arise from the specific consultations planned for the exploration program.

3.7. Project Components/Structures/Activities

For some wells, the proposed drill rig will be a semi-submersible, which is typically moored using an eight point anchoring system (e.g., Stevin NK3 anchors). For other wells, the drill rig may be a jack-up which does not require anchors. The rig will be supplied and supported by two or three supply boats operating from Harvey's wharf in St. John's Harbour. The supply boats (anchor-handling) will have a range of 12-15,000 HP and be capable of storing and delivering drilling fluids and diesel fuel. On average there will be two supply boat trips per week between the base and the rig. Helicopter support may consist of about six trips per week ferrying personnel and light supplies and equipment.

The expected or typical conductor setting depth will be 215 m (measured depth from the rotary table or MD). The expected or typical surface casing depth will be up to about 1,200 m (MD) (Figure 3.1). Final total well depths will range up to 3,550 m MD (Tables 3.1and 3.2).

Well abandonment procedures will consist of the removal of any wellhead and associated equipment. Offshore wells are abandoned in two stages. During the first stage, the wellbore is isolated using mechanical and cement plugs in accordance with existing regulations. During the second stage the wellhead and any associated equipment items are removed from the seabed. Removal of the wellhead will routinely involve the use of mechanical cutters. In some circumstances, however, subsurface cutting using shaped charges may be required.

3.7.1. Project Phases

For the purposes of this EA, the project is considered to consist of two phases: (1) the drilling of exploration/delineation wells, inclusive of routine activities such as vertical seismic profiling (VSP), and testing, and (2) abandonment.

3.7.2. Project Scheduling

The first well is planned for 2005. Drilling will commence in July 2005 and last about 40 days per well. Testing, if conducted, can be expected to take about 20 days per well. In general, the scheduling window for drilling will be between July and December when ice will not hinder operations. Execution and scheduling of subsequent wells will largely be dependent on exploration success encountered by the initial wells. All wells will be suspended or abandoned and the drilling program terminated by the end of 2007.

3.7.3. Site Plans

Site locations are presented in Figure 3.3. Conductor, graphics of the rigs, and abandoned well are shown in Figures 3.1, 3.4, 3.5 and 3.6, respectively. Note that a well head will only be left in place in the event of an unscheduled well suspension. Otherwise the well will be abandoned at least one meter below the sea floor as shown in Figure 3.6.

3.7.4. Description of Waste Discharges and Air Emissions and Treatment

Waste discharges will include drill muds and cuttings, produced water, grey and black water, ballast water, bilge water, deck drainage, discharges from machinery spaces, cement, blowout preventer (BOP) fluid (not released when using a jack-up rig), and air emissions. All discharges will be in compliance with the *Offshore Waste Treatment Guidelines* (*OWTG*). Details are provided in the following sections.

3.7.5. Drilling Muds

It is planned that all of the wells will be drilled to depth using non-toxic water-based muds (WBM). However, some conditions may be encountered that would potentially require the use of synthetic-based muds (SBM) and thus this assessment also considers SBM.

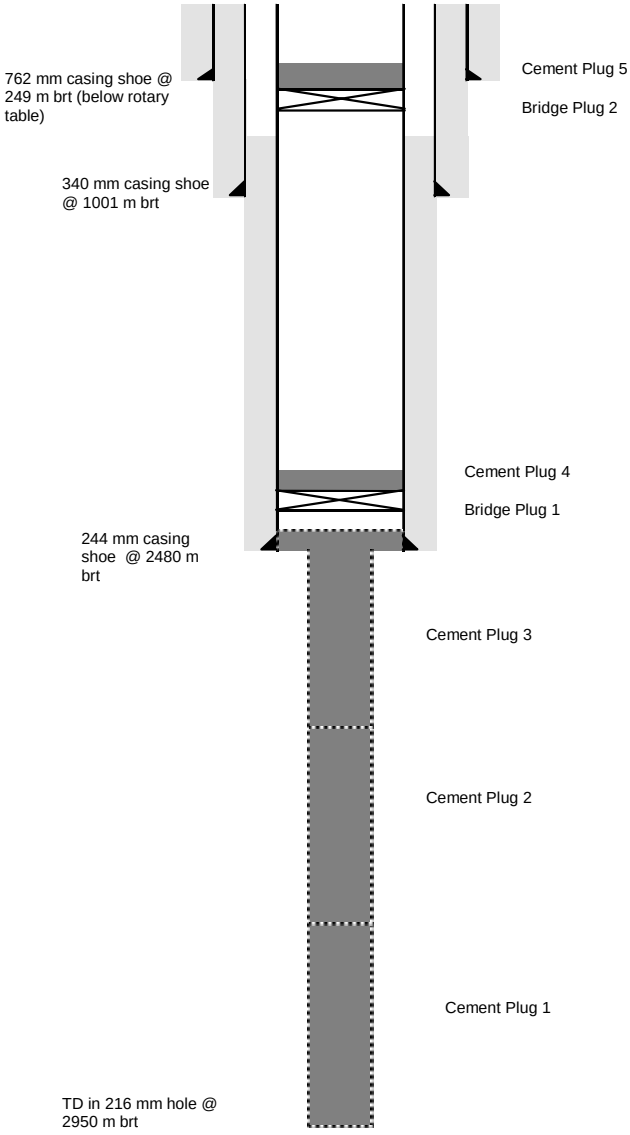

Figure 3.6 Schematic of a Typical Vertical Well Abandonment (Cape Race N-68). Well head and casings cut about 1 m below sea floor.

Components and additives typically differ somewhat by well, the specific conditions encountered in drilling, and by the depth and purpose for drilling. Typical formulations for water based drilling mud and the quantities likely to be used when drilling a vertical well hole for the surface and intermediate casings, and the conductor are provided in Tables 3.1 and 3.2.

The first part of the hole (i.e., the surface casing and conductor) is drilled without the riser in place and thus the drilling mud and associated cuttings are discharged directly to the marine environment. Approximately 230 m^3 of cuttings will be discharged per well during this stage of the drilling (see Table 3.2).

During the drilling of the hole for the intermediate casing, the riser and associated BOP are in place and mud is transported back to the rig. Cuttings are then removed from the drilling mud in successive separation stages through shakers, hydrocyclones, and centrifuges. After passing through the solids control system (Table 3.3), the cleaned cuttings are then discharged overboard through a cuttings shute. The recovered mud is then reconditioned and reused. Up to 175 m^3 of cleaned cuttings could be discharged during the installation of the intermediate casing (see Table 3.2). If it becomes necessary to switch over to SBMs, then there would also be a bulk discharge of the WBM associated with this activity. All discharges of mud and cuttings will be in accordance with the C-NOPB *OWTG* – August 2002 Revision.

The deviated twin well approach uses less mud and results in lower total volumes of discharged cuttings than individual vertical wells (e.g., roughly 288 vs. 406 m^3 total cuttings per well) (Tables 3.1 and 3.2).

As discussed previously, it is anticipated that SBM will not be required to drill the anticipated simple holes. SBM will be recycled and reused or brought to shore for disposal when spent. Treatment equipment is contained in Table 3.3.

All drilling fluid and solid discharges will be in accordance with the *OWTG* and subject to approval by C-NOPB.

Table 3.1 Vertical Well Mud Scenarios.

	Unit	Casing Strings			Totals (1 Well)	10 Well Totals	Notes
		Conductor	Surface	Main			
Hole Section	millimeters	914	406	311			
Mud System		Gel / Seawater	Gel / Seawater	WBM			1. RT to seafloor is assumed
Depth (see Note 1)	meters RT	215	1200	3300			to be 143-m. This will vary
Gauge Open Hole Volume	m^3	47.2	127.5	159.5			depending on the MODU
Washout	%	50.0%	25.0%	10.0%			selected. Cuttings volumes
Products							are independent of this
Barite	MT (metric ton)	30	60	220	310	3100	measurement.
Bentonite (gel)	MT	20	70		90	900	
Biocide	L (litre)			400	400	4000	2. Vertical wells can be
Caustic Soda	kg			1125	1125	11250	drilled efficiently to total
Corrosion Inhibitor	L			200	200	2000	depth with WBM (water-
Defoamer	L	20	40	200	260	2600	based mud).
Drilling Detergent	L		100	300	400	4000	
Fluid Loss Reducer (Starch)	kg (kilogram)			1021	1021	10210	
Fluid Loss Reducer (PAC)	kg			1816	1816	18160	
Kelzan XCD (Viscosifier)	kg			3000	3000	30000	
Lime	kg	200	400		600	6000	
PEG (Glycol Inhibitor)	L			31200	31200	312000	
PHPA (Inhibitor)	kg			3632	3632	36320	
Potassium Chloride (Inhibitor)	kg			75000	75000	750000	
Oxygen Scavenger	L			1135	1135	11350	
SAPP	kg		454		454	4540	
Soda Ash	kg	200	375	1250	1825	18250	
Drilled Cuttings Weight	MT	184	414	456	1055	10549	
Cuttings Volume	m^3	71	159	175	406	4057	

Table 3.2 Deviated Twin Wells.

	Unit	Casing Strings				Totals (1 well)	5 Well Total	Notes
		Conductor	Surface	Main	SideTrack			
Hole Section	millimeters	914	406	311	311			
Mud System		Gel / Seawater	Gel / Seawater	SBM	SBM			1. RT to seafloor is
Depth	meters RT	215	1150	3200	3550			assumed to be 143-m.
Gauge Open Hole Volume	m^3	47.2	121.0	155.7	182.3			This will vary depending
Washout	%	50.0%	25.0%	5.0%	5.0%			on the MODU selected.
Products								Cuttings volumes are
Barite	MT (metric ton)	30	60	346	405	841	4205	independent of this
Bentonite	MT	20	70			90	450	measurement.
Calcium Chloride	kg			10865	12720	23585	117925	
Defoamer (WBM)	L (litre)	20	40			60	300	2. Deviated wells require
Drilling Detergent	L		100			100	500	SBM (synthetic based
Emulsifiers (Primary & Secondary)	L			2050	2400	4450	22250	mud) in the 311-mm
Fluid Loss Reducers (SBM - HTHP)	kg (kilogram)			2255	2640	4895	24475	section for efficient
Kelzan XCD	kg			100	100	200	1000	drilling and reduced
Lime	kg	200	400	1845	2160	4605	23025	well bore rugosity.
PureDrill IA-35 / IA-35LV	m^3			99	116	216	1079	A smooth, in-gauge
SAPP	kg		454			454	2270	wellbore improves the
Soda Ash	kg	200	375			575	2875	quality of wireline logs.
Viscosifier (SBM - Organophillic clay)	kg			2255	2640	4895	24475	
Wetting Agent (SBM)	L			1435	1680	3115	15575	
Drilled Cuttings Weight	MT	184	393	425	498	1500	7502	
Cuttings Volume	m^3	71	151	164	191	577	2886	

Table 3.3 Mud/Cuttings Treatment System.

Equipment	No.	Type	Characteristics
Shale Shakers (Primary)	3 (minimum)	Thule VSM 300 or equivalent	1,000 gpm design flowrate or more
Desilter	1	Swaco or equivalent	16 x 4 in cones Dedicated Mission 6 x 8 centrifugal pump driven by electric motor of 125 hp. Maximum flowrate of 800 gpm.
Centrifuges (Decanting)	2 or more	To be determined	To be determined
Enhanced cuttings cleaning equivalent to the *GSF Grand Banks* for SBM only.			

3.7.6. Produced Water

If hydrocarbons are present and testing is conducted then small amounts of produced water may be discharged by atomizing with hydrocarbons and flared. If the flare capacity is exceeded, then small amounts of treated produced water will be brought ashore for disposal.

3.7.7. Grey/Black Water

The rig will accommodate about 85-120 personnel. It will discharge about 40 m^3 of grey water per day. Black water or sewage will be macerated to 6 mm particle size or less and discharged as per the OWTG. Estimated amounts of black water are up to 19 m^3 per day.

3.7.8. Machinery Space Discharges

Machinery space drainage will be through a closed system and treated to 15 mg/L of oil or less.

3.7.9. Bilge Water

Bilge water will be treated to *OWTG* standards (15 mg/L or less).

3.7.10. Deck Drainage

Any deck drainage such as the rotary table floor and machinery spaces will undergo treatment as per *OWTG*.

3.7.11. Ballast Water

Water used for stability purposes in both supply boats and drilling rigs is stored in dedicated tanks and thus does not normally contain any oil. If oil is suspected in the ballast water it will be tested and if necessary treated to *OWTG* standards.

3.7.12. Cooling Water

Top drives and drawworks on rigs are cooled by pumping water through a set of heat exchangers; the water is then discharged overboard in accordance with *OWTG*. Other equipment is cooled through a closed loop system which may use chlorine as a biocide. Water from closed systems will be tested prior to discharge and will comply with the *OWTG*. Any proposals for alternate biocides will be submitted to C-NOPB for consideration prior to use.

3.7.13. Garbage

All trash and garbage, including organic waste from galleys, will be containerized and transported to shore for disposal in approved landfills. Combustible waste such as oil rags and paint cans will be placed in hazardous materials containers for transport to shore. The rig will have a recycling program with an estimated total garbage-recycling rate of 5-10%.

3.7.14. Miscellaneous

When drilling with semi-submersibles, BOP test fluid (glycol/water) is released at intervals (typically three pressure and three function tests per 40-day drilling). About 1.0 m^3 is released per test (Husky 2000). There is no release of BOP test fluid when drilling with jack-ups.

Excess chemicals or chemicals in damaged containers will not be discharged into the sea but returned to shore on supply boat. Any spent or excess acids will be neutralized as approved by C-NOPB and discharged. No other substances not discussed above or covered in the *OWTG* will be discharged without prior notification and approval of the C-NOPB.

Additional information on discharges and treatment is contained in the environmental assessment sections.

3.7.15. Seismic Survey Equipment (Geohazard and VSP Surveys)

Geohazard/well site surveys and vertical seismic profiling (VSP) using an airgun array may be conducted as part of the drilling activities. The VSP is used to assist in further defining a petroleum resource. The array is similar to that employed by 2-D or 3-D seismic surveys but typically is smaller and deployed in a small area for a 12 to 18 hour period. Well site or geohazard surveys may also deploy a small array and sonar; they are used to identify and avoid unstable areas prior to drilling.

3.7.16. Waste Management Plan

The waste streams will be managed according to the Husky Waste Management Plan. The purpose of the Husky Waste Management Plan is to provide guidance on effectively dealing with waste from the facility and avoiding environmental pollution. The Husky Waste Management Plan has been submitted to the C-NOPB as part of the DPA requirements. Wherever possible, waste streams will be kept independent of one another so as not to create the additional problem of expensive decontamination or separation onshore.

3.7.17. Onsite Environmental/Ice Observers

An onsite Environmental Observer will also be on board the Drilling Unit to record and report 24-hour weather, oceanographic and ice parameters. During the potential ice infested water periods, two Environmental/Ice Observers will be stationed on the Drilling Unit to assist the Drilling Operations personnel in strategic and tactical planning along with the recording and reporting the weather and oceanographic duties. As part of these duties these personnel will also assist in vessel monitoring under the Project Collision Avoidance Procedures outlined in the Alert and Emergency Response Plan.

The environmental observers will also conduct seabird and marine mammal observations on a daily basis in accordance with established protocols. The data compiled from these observations will be provided to the Canadian Wildlife Service, Fisheries and Oceans Marine Mammals Section and researchers at Memorial University of Newfoundland.

In addition, an Oceanographic Monitoring Program will again be conducted in accordance with the C-NOPB *Guidelines Respecting Physical Environment Programs.* The program will be the same as previous ones and include the installation of current meters and a wave-sensing device.

3.7.18. Project Site Information

3.7.18.1. Environmental Features

The project has the potential to affect air, water, plankton, fish and fish habitat, fisheries, marine birds and mammals through emissions and discharges, both routine and accidental. There are no known special or unique areas in the Project Area. A description of the physical and biological environment of the northeastern Grand Banks and potential Project interactions and effects are included in the EA. A valued ecosystem component (VEC) approach is used in the EA. VECs in the area include seabirds, marine mammals and commercial fisheries. Effects on VECs including cumulative effects (within the Project and with existing and planned projects) are assessed in the EA to follow. Focus is on sensitive species, areas and times, including *SARA* species.

3.7.18.2. Species at Risk

Species listed under Schedule I of the *Species at Risk Act* (*SARA*) that may occur to varying degrees in the Project Area include:

- Leatherback turtle (*Dermochelys coriacea*) (endangered)
- Northern wolffish (*Anarchichas denticulatus*) (threatened)
- Spotted wolffish (*Anarchichas minor*) (threatened)
- Atlantic wolffish (*Anarchichas lupus*) (special concern)
- Ivory Gull (*Pagophila eburnea*) (special concern)

3.7.18.3. Land Use

Current and past uses of the area include marine shipping, oil and gas activity, defence-related ship traffic, and commercial fisheries. Hunting of murres, waterfowl, and seals has occurred for many years further inshore from the Project Area.

There are no known sources of contamination in the Project Area although there is a continuing problem on the Grand Banks and the approaches to the Gulf of St. Lawrence in general with oily discharges from disreputable ships. Previous disturbance of the seabed may have occurred from bottom trawling or dredging activity associated with commercial fisheries.

The closest protected areas are Cape St. Mary's and Witless Bay which are about 350 and 400 km to the west of the Project Area. The closest urban centre is St. John's, about 340 km to the west.

3.7.18.4. Navigable Waters

The physical presence of the rig and supply boats affects navigable waters on the Grand Banks to a small degree. The Project Area is close to major North Atlantic shipping lanes and may receive ship traffic from fishing vessels, tankers, freighters, naval vessels, private yachts and others. The detailed physical characteristics of the waterway are provided in following sections (see Physical Oceanography).

3.7.18.5. Fish and Fish Habitat

The proposed Project Area is on the Grand Banks, a region known to support large and diverse commercial fisheries. In recent years, the most valuable commercial species in the vicinity of the Project Area is snow crab.

Bottom fish habitats appear typical of that area of the Grand Banks. Fish and fish habitat, and fisheries will be covered in detail in the EA to follow.

3.8. Effects of the Environment on the Project

Effects of the physical environment on the project include those caused by wind, ice, waves, and currents. A description of these components, including extreme events, will be contained in the EA to follow.

Effects of the biological environment on the project are primarily those related to biofouling. Biofouling may affect rig stability and corrosion and may also affect the interior of pipes as well as water intakes and outlets. The biofouling community will be discussed under ‘Fish and Fish Habitat VEC’ in the EA to follow.