1823 **Ranger North Liard P-66A**

Tubing Change Program

Jan-Feb. 2000

2000

RANGER OIL

RANGER NORTH LIARD P-66A

Tubing Change Program

RANGER OIL LIMITED
900, 311 - 6th Avenue S.W., Calgary, Alberta, Canada T2P 3H2 ▪ Telephone (403) 303-7300 ▪ Fax (403) 303-7626 ▪ Website: www.ranger-oil.com

RANGER OIL

January 17, 2000

National Energy Board
444 - 7th Ave. S.W.
Calgary, Alberta
T2P 0X8

ATTENTION: Mr. A.B. Graw

Dear Andy:

RE: Ranger North Liard P-66A
Tubing Replacement

Please find attached, Ranger Oil Limited's "Operations Program for a Tubing Change" on the above captioned well. This program is a continuation to the "Application to Alter" submitted and approved June 18, 1999 – your file 9211-R36-1-2RE WID #1823.

The 1999 operations were temporarily suspended to facilitate evaluation of the flow test conducted in August 1999. Results from the evaluation have resulted in Rangers decision to increase the tubing size for well production purposes. Ranger proposes to re-enter the well and replace the existing 88.9mm production string with a 114.3mm production string and associated wellhead equipment.

I have attached copies of our program. The proposed operation is designed with reference to prior screening reviews. The design is such that the well will remain isolated throughout with a tubing plug in the incoloy nipple at 2951mKB below the permanent packer at 2949mKB. Operations will therefore be benign in nature. At this time, a rig has yet to be contracted. Once a contractor has been assigned, Ranger will submit the apprpriate rig and equipment certifications.

Should you have any questions or require further information with respect to this application, please contact me at 303-7329

Thank you,

RANGER OIL LIMITED

J. Leroy Brown, P.Eng.
Senior Completions Engineer

RANGER OI L LIMITED

Fort Liard P-66A

Tubing Change Objectives

1. Confirm Well suspension status and wellbore integrity

2. Employ a service rig and equipment to pull existing 88.9mm tubing.

3. Run a casing inspection log over the 177.8mm liner and 244.5mm intermediate casing strings.

4. Run a new 114.3mm production tubing string w/a Sub Surface Safety Valve at 150m.

5. Replace the existing 88.9mm wellhead w/a temporary 114.3mm wellhead.

6. Re-suspend the well in a safe manner to await new wellhead installation and tie-in early 2000.

7. Replace the temporary wellhead w/a new 114.3mm CLADDED Wellhead. (Note: New Wellhead delivery in late March 2000.)

National Energy Board | Office national de l'énergie

CANADA

APPROVAL TO ALTER CONDITION OF A WELL

This application is to be submitted to the Chief Conservation Officer at least 45 days before commencement of operations.

Well Name: Ranger Fort Liard P-66 A Area: Liard

Operator: Ranger Oil Limited Contractor: Bonus Well Service

Drilling Rig or Unit: Precision Rig #416E Depth: 3499 m KB MD

Coordinates: Lat: 60° 35' 55.66" Long: 123° 41' 25.31"

Date ADW Issued: December 24, 1996 Date of last Operation: February 23, 1999

Elevation-KB/RT: 459.89 m (ASL) GL/Seafloor: 449.49 m

TYPE OF OPERATION

Workover

SUMMARY OF PROPOSED OPERATIONS

See attached program

As part of this application, it is anticipated that a flow and clean-up test will be required, followed by a single point AOF test to a maximum rate of 850 x $10^3 m^3$ / day. Ranger would be required to flow well for up to eight (8) days with an extended shut-in. Under these clean-up and testing conditions, it is expected we would flow a total 9500 x $10^3 m^3$ gas.

Signed: J. L. Brown *Responsible Officer* Title: Senior Completions Engineer

Name: J. L. Brown Company: Ranger Oil Limited

Date: June 7, 1999 Phone: (403) 303-7329

APPROVAL

An approved copy of this notice is to be posted at each wellsite.

Date: June 16/99 Signed: T. M. Baker *Chief Conservation Officer*

File: 9211-R36-1-2RE

WID: 1823, UWI 300P666040123 04

Well Status

Suspended ☒

Completed ☐

Abandoned ☐

RANGER OIL

June 7, 1999

National Energy Board
311 - 6 Avenue S.W.
Calgary, Alberta
T2P 3H2

ATTENTION: Mr. A.B. Graw

Dear Andy:

RE: **Ranger Fort Liard P-66A**
Approval to Alter Condition of a Well

Please find attached, Ranger Oil Limited's "Application for Approval to Alter the Condition of a Well." This application is made as a continuance to a prior approved operation conducted under your file WID #1823 dated February 12, 1999.

The previous operations were suspended due to an inability to get our workover tools through the permanent packer. Ranger proposed to re-enter the well with a service rig operation and remove the permanent packer. A bridgeplug would then be run in conjunction with a new permanent packer to shut off the lower perforations. The upper perforations would then be acidized and the well flow tested to confirm productive capability and reserves.

I have attached copies of our proposed program of operations along with our flow test requirements. Should you have any questions or require further information with respect to this application, please contact me at 303-7329.

Thank you,

RANGER OIL LIMITED

J. Leroy Brown, P.Eng.
Senior Completions Engineer

Justification for the extended flow test in Fort Liard P66A well

The extended flow will be conducted after isolating the water producing. The purposes of conducting the extended flow test are twofold:

1) To determine if the water zone is properly isolated

In the previous test conducted in July and August of 1998, it was determined that the well required a minimum drawdown of three percent before the well started to produce water. By flowing the well at 30 MMCFD, the estimated drawdown is approximately 15 percent. This higher drawdown for an extended period will provide an indication on the effectiveness of isolating the water.

2) To determine any change in OGIP as a result of isolating the lower interval

During the flow and build-up test in July and August of 1998, it was conducted with both the gas and water producing zones open. A total of 260 MMCF of gas was produced over that period. From the pressure data collected, we estimated the OGIP to be in the range of 100 to 120 BCF. This equates to reservoir withdrawal of approximately 0.25 percent.

The present test was designed to flow approximately 0.3 percent of the OGIP. It involved flowing the well at 30 MMCFD for 10 days followed by a 20-day build-up. The purpose is to achieve adequate depletion such that we can determine the OGIP.


Fort Norman
Point Leith
Sawmill Bay
Hottah Lake
Lac Ste. Thérèse
Blackwater Lake
Keller Lake
Lac Tache
Lac Grandin
Rae
Hardisty Lake
Wrigley
Fish Lake
Lac la Martre
Clive Lake
Lac La Martre
Edzo
OPEN SUMMER OF 1994
Willowlake River
Cli Lake
Little Doctor Lake
Fort Simpson
Willow Lake
Wildflower Lake
Birch Lake
Mink Lake
Mills Lake
Jean Marie River
Mackenzie R
LIARD HIGHWAY
Nahanni Butte
NAHANNI NATIONAL PARK
CANOL
Tungsten
Carmacks
Faro
Ross River
Whitehorse
Marsh Lake
Johnsons Crossing
Teslin Lake
Atlin Lake
Atlin
ALASKA HIGHWAY
Watson Lake
Lower Post
Cassia
Dease Lake
Telegraph Creek
Liard River
Toad River
Fort Liard
Trout Lake
MACKENZIE HIGHWAY
Fort Providence
Kakisa
Enterprise
Hay River
Indian Cabins
Steen River
Meander River
MACKENZIE BISON SANCTUARY
BRITISH COLUMBIA
ROCKY MOUNTAINS
SKEENA MOUNTAINS
OMINECA MOUNTAINS
Fort Nelson
Trutch
Pink Mountain
Rainbow Lake
High Level
John D'or Prairie
Fort Vermillion
ALB
Stewart
Manning
Hudson's Hope
Fort St. John
Chetwynd
Dawson Creek
Grimshaw
Peace River
New Hazelton
Terrace
Smithers
Houston
Kitimat
Burns Lake
Beaverlodge
Grande Prairie
High Prairie
Valleyview
Lesser Slave Lake
Vanderhoof
Prince George
Swan Hills
Athabasca
Whitecourt
60°N
55°N
130°W

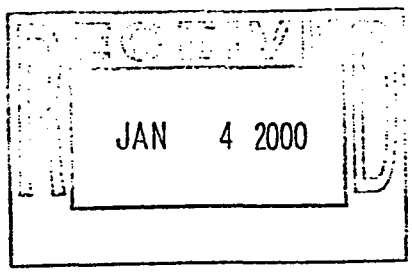
WR - E-53
P-66A
cc Leroy

NORTHWEST TERRITORIES WATER BOARD

WATER REGISTER: N3L1-1717

December 17, 1999

Mr. Leroy Brown
Senior Completions Eng.
Ranger Oil Ltd.
900, 311 - 6th Avenue S.W.
CALGARY, AB T2P 3H2



Dear Mr. Brown:

ISSUANCE OF A "B" TYPE LICENCE

Attached is a duplicate of Licence No. N3L1-1717 granted to Ranger Oil Ltd. by the Northwest Territories Water Board in accordance with the *Northwest Territories Waters Act*. The other original of this Licence has been filed with the Department of Indian Affairs and Northern Development in Yellowknife, Northwest Territories.

Also attached are general procedures for the administration of licences in the Northwest Territories. I request that you review these and address any questions to the Board's office.

In conclusion, please be advised that this letter with attached procedures, all inspection reports, and correspondence related thereto are part of the public Water Register, and are intended to keep all interested parties informed of the manner in which the Licence requirements are being met. All Water Register material will be considered when the Licence comes up for renewal or amendment.

The full cooperation of Ranger Oil Ltd. is anticipated.

Sincerely,

Gordon Wray
Chairman
N.W.T. Water Board

Attachments (2)

P.O. Box 1500, Yellowknife, NT, X1A 2R3, 2nd Floor Goga Cho Building
Phone: (867) 669-2772 Fax: (867) 669-2719

GENERAL PROCEDURES FOR THE ADMINISTRATION OF LICENCES ISSUED UNDER THE NORTHWEST TERRITORIES WATERS ACT IN THE NORTHWEST TERRITORIES

1. At the time of issuance, a copy of the Licence is placed on the Water Register in the office of the Northwest Territories Water Board in Yellowknife, and is then available to the public.

2. To enforce the terms and conditions of the Licence, the Minister of Indian Affairs and Northern Development has appointed Inspectors in accordance with Section 35(1) of the *Northwest Territories Waters Act*. The Inspectors coordinate their activities with officials of the Water Resources Division of the Department of Indian Affairs and Northern Development. The Inspector responsible for Licence No. N3L1-1717 is located in the South Mackenzie-Fort Simpson District Office.

3. To keep the Water Board and members of the public informed of the Licensee's conformity to Licence conditions, the Inspectors prepare reports which detail observations on how each item in the Licence has been met. These reports are forwarded to the Licensee with a covering letter indicating what action, if any, should be taken. The inspection reports and covering letters are placed on the public Water Register, as are any responses received from the Licensee pertaining to the inspection reports. It is therefore of prime importance that you react in all areas of concern regarding all inspection reports so that these concerns may be clarified.

4. If the renewal of Licence No. N3L1-1717 is contemplated it is the responsibility of the Licensee to apply to the Water Board for renewal of the Licence. The past performance of the Licensee, new documentation and information, and points raised during a public hearing, if required, will be used to determine the terms and conditions of any Licence renewal. Please note that if the Licence expires and another has not been issued, then water and waste disposal must cease, or you, the Licensee, would be on contravention of the *Northwest Territories Waters Act*. It is suggested than an application for renewal of Licence No. N3L1-1717 be made at least eight months in advance of the Licence expiry date.

5. If, for some reason, Licence No. N3L1-1717 requires amendment, then a public hearing may be required. You are reminded that applications for amendments should be submitted as soon as possible to provide the Water Board with ample time to go through the amendment process. The process may take up to six (6) months or more depending on the scope of the amendment requested.

....2

6. Specific clauses of your Licence make reference to the Board, Analyst or Inspector. The contact person, address, phone and fax number of each is:

BOARD:
A/Executive Assistant
Northwest Territories Water Board
P.O. Box 1500
YELLOWKNIFE, NT X1A 2R3
Phone: (867) 669-2772
Fax: (867) 669-2719

ANAYLST:
Taiga Water Laboratory
Northern Affairs Program
Department of Indian Affairs and
Northern Development
P.O. Box 1500
YELLOWKNIFE, NT X1A 2R3
Phone: (867) 669-2780
Fax: (867) 669-2718

INSPECTOR:
South Mackenzie-Fort Simpson District Office
Northern Affairs Program
Department of Indian Affairs and
Northern Development
P.O. Box 150
FORT SIMPSON, NT X0E 0N0
Phone: (867) 695-2626
Fax: (867) 695-2615

NORTHWEST TERRITORIES WATER BOARD

Pursuant to the *Northwest Territories Waters Act* and Regulations the Northwest Territories Water Board, hereinafter referred to as the Board, hereby grants to

RANGER OIL LIMITED
(Licensee)
of 900, 311 - 6TH AVENUE S.W.
CALGARY, ALBERTA T2P 3H2
(Mailing Address)

hereinafter called the Licensee, the right to alter, divert or otherwise use water subject to the restrictions and conditions contained in the *Northwest Territories Waters Act* and Regulations made thereunder and subject to and in accordance with the conditions specified in this Licence.

Licence Number	N3L1-1717 (RENEWAL)
Licence Type	"B"
Water Management Area	NORTHWEST TERRITORIES 03
Location	RANGER FORT LIARD E-53 Latitude 60°32'26" N. and Longitude123°40'48" W. NORTHWEST TERRITORIES
Purpose	WATER USE AND WASTE DISPOSAL FOR INDUSTRIAL UNDERTAKINGS IN OIL & GAS EXPLORATION AND ASSOCIATED USES
Effective Date of Licence	DECEMBER 17, 1999
Expiry Date of Licence	MARCH 31, 2001

This Licence issued and recorded at Yellowknife includes and is subject to the annexed conditions.

NORTHWEST TERRITORIES WATER BOARD

Witness

Chairman

PART A: SCOPE AND DEFINITIONS

1. Scope

a) This Licence entitles Ranger Oil Limited to use water and dispose of waste for industrial undertakings in oil and gas exploration and associated uses in the Fort Liard area at well site "Ranger Fort Liard E-53" located at 60°32'26" Latitude and 123°40'48" Longitude, Northwest Territories and to construct a bridge and undertake any associated watercourse training along an unnamed creek near the above noted well site.

b) This Licence is issued subject to the conditions contained herein with respect to the taking of water and the depositing of waste of any type in any waters or in any place under any conditions where such waste or any other waste that results from the deposits of such waste may enter any waters. Whenever new Regulations are made or existing Regulations are amended by the Governor in Council under the *Northwest Territories Waters Act*, or other statutes imposing more stringent conditions relating to the quantity or type of waste that may be so deposited or under which any such waste may be so deposited this Licence shall be deemed, upon promulgation of such Regulations, to be automatically amended to conform with such Regulations; and

c) Compliance with the terms and conditions of this Licence does not absolve the Licensee from responsibility for compliance with the requirements of all applicable Federal, Territorial and Municipal legislation.

2. Definitions

In this Licence: **N3L1-1717**

"**Act**" means the *Northwest Territories Waters Act*;

"**Regulations**" mean Regulations proclaimed pursuant to Section 33 of the *Northwest Territories Waters Act*;

"**Board**" means the Northwest Territories Water Board established under Section 10 of the *Northwest Territories Waters Act*;

"**Inspector**" means an Inspector designated by the Minister under Section 35(1) of the *Northwest Territories Waters Act*;

"**Licensee**" means the holder of this Licence;

"**Minister**" means the Minister of Indian Affairs and Northern Development;

"**Waste**" means waste as defined by Section 2 of the *Northwest Territories Waters Act;*

"**Waters**" mean waters as defined by Section 2 of the *Northwest Territories Waters Act;*

"**Artesian Aquifer**" means a water-bearing stratum, which when encountered during drilling operations, produces a pressurized flow of groundwater that reaches an elevation above the water table or above the ground surface;

"**Drilling Fluids**" mean any liquid mixture of clay, water or chemical additives pumped downhole;

"**Modification**" means an alteration to a physical work that introduces a new structure or eliminates an existing structure and does not alter the purpose or function of the work, but does not include an expansion;

"**Permeability**" means the capacity to transmit water through a medium; and

"**Sump**" means an excavation in impermeable soil for the purpose of catching or storing fluids.

PART B: GENERAL CONDITIONS

1. The Licensee shall file a report with the Board not later than March 31 of the year following the calendar year reported which shall contain the following information:

   a) the total quantity of water used in cubic metres during the drilling operations;

   b) an itemized list indicating the names, uses and quantities of all substances which were used during the drilling operation and were discharged into the drilling sump;

   c) details of work completed;

d) details on the restoration of any sumps;

e) a list of unauthorized discharges; and

f) any other details of water use or waste disposal requested by the Board within 45 days before the annual report is due.

2. Meters, devices or other such methods used for measuring the volumes of water used and waste discharged shall be installed, operated and maintained by the Licensee to the satisfaction of an Inspector.

PART C: CONDITIONS APPLYING TO WATER USE

1. The Licensee shall obtain all fresh water for camp use and well drilling from an unnamed creek near the well site or as otherwise approved by an Inspector.

2. The daily quantity of water used for all purposes shall not exceed 100 cubic metres.

3. The water intake hose used on the water pumps shall be equipped with a screen with a mesh size sufficient to ensure no entrainment of fish.

PART D: CONDITIONS APPLYING TO WASTE DISPOSAL

1. All wastes to be disposed of from the drilling operation shall be completely contained in a drilling Sump near the drill site, or at an alternate Sump location, as approved by an Inspector.

2. Sumps shall be constructed of material that normally exhibit low permeability in a manner that prevents intrusion of runoff water.

3. In the event the initial Sump does not consist of low permeability materials, the Licensee shall construct an offsite Sump to the satisfaction of an Inspector.

4. There shall be no disposal of Drilling Fluids from the Sump into any waters or onto any land surface where drilling fluids may enter any waters.

5. The Licensee shall construct and maintain the Sumps to the satisfaction of an Inspector.

6. If during the drilling, an Artesian Aquifer is encountered producing water flowing at the surface, the Licensee shall notify an Inspector immediately. A sample of not less than ten (10) litres shall be collected from the flowing source at the point of discharge from the well. Five (5) litres shall be made available to an Inspector for analysis, and the Licensee shall have the remaining five (5) litres analysed.

7. The disposal of fluids generated by an Artesian Aquifer to other than a snow bermed area requires the approval of the Inspector.

8. The sealing of an Artesian Aquifer shall be to the satisfaction of an Inspector.

9. No decant of waste or water from a Sump is permitted without prior approval of the Inspector.

PART E: CONDITIONS APPLYING TO STREAM CROSSINGS

1. The Licensee shall ensure that the construction of any permanent bridges conform to the plans submitted with the Water Licence application to the Board.

2. The removal of naturally occurring material from the bed or banks of the unnamed creeks below the ordinary high watermark for construction purposes is not permitted.

3. The Licensee shall not cut or modify any stream banks.

4. The Licensee shall erect silt fences in the unnamed creeks during construction as approved by an Inspector.

5. The Licensee shall use suitable rip-rap material which must be silt free and uncontaminated.

6. All sites affected by construction or removal activities shall be stabilized and suitable erosion control measures implemented to minimize sediment deposition into the unnamed creeks.

7. The Licensee may carry out modifications to the bridge construction without written approval from the Board providing that such modifications are consistent wit the terms of this Licence and the Licensee has notified an Inspector of such proposed modifications at least five (5) days prior to beginning the modifications and an Inspector has not rejected the proposed modifications.

8. The Licensee shall ensure that only clean snow is used on all temporary stream crossings and that no debris is left on the surfaces of the crossings.

9. Temporary stream crossings shall be notched or removed before spring break-up to facilitate natural flow.

PART F: CONDITIONS APPLYING TO MODIFICATIONS

1. The Licensee may, without written approval from the Inspector, carry out Modifications to the planned undertakings provided that such Modifications are consistent with the terms of this Licence and the following requirements are met:

   a) the Licensee has notified the Inspector in writing of such proposed Modifications at least thirty (30) days prior to beginning the Modifications;

   b) such Modifications do not place the Licensee in contravention of either this Licence or the *Act*;

   c) the Inspector has not, during the thirty (30) days following notification of the proposed Modifications, informed the Licensee that review of the proposal will

require more that thirty (30) days; and

d) the Inspector has not rejected the proposed Modifications.

2. Modifications for which all of the conditions referred to in Part E, Item 1 have not been met may be carried out only with written approval from the Inspector.

3. The Licensee shall provide to the Board as-built plans and drawings on the modifications referred to in this Licence within ninety (90) days of completion of the modifications.

PART G: CONDITIONS APPLYING TO CONTINGENCY PLANNING

1. The Licensee shall, by January 15, 2000, submit to the Board Ranger Oil's Environmental Procedures Manual.

2. The Licensee shall maintain a copy of the Environmental Procedures Manual and a copy of the Contingency Planning and Emergency Response for Fuel Spills plan on site in a readily available location to the satisfaction of the Inspector.

3. The Licensee shall ensure that petroleum products, hazardous material and other wastes associated with the project do not enter any waters.

4. If, during the period of this Licence, an unauthorized discharge of waste occurs, or if such a discharge is foreseeable, the Licensee shall:

   a) report the incident immediately via the 24 Hour Spill Report Line (867) 920-8130; and

   b) submit to an Inspector a detailed report on each occurrence not later than thirty (30) days after initially reporting the event.

NORTHWEST TERRITORIES WATER BOARD

Witness

Chairman

RANGER OIL

WELL DATA

Operator: Ranger Oil Limited

AFE #: E9D 006

Location: Unit P, Section 66

Elevations: G.L. = 449.49 m K.B. = 459.89 m K.B. - C.F. = 10.35 m

Total Depth: 3500.00mKB MD. *3000.62 mKB TVD*

Conductor Casing: 22 jts, 508 mm, 139.87 kg/m, K-55 BT&C Hallmark casing landed at 262.66 m. Cemented with 80 tonnes 0:1:0 $CaCl_2$. Lost circulation on displacement.

Surface Casing: 79 jts., 339.7 mm, 101.2 kg/m, K-55, BT&C casing landed at 1008 mKB. Cemented with 92 tonnes 0:1:0 "G" +. 2% D-13 +.5 % D69

Interm/Prod. Casing: 244.5 mm, L-80, BT&C as follows:
51 joints at 79.62 kg/m from 3115 to 2452 mKB
180 joints at 69.94 kg/m from 2452 to surface with stage collar landed at ≈1300 mKB.
Stage 1 – 17 tonnes 0:1:0 Class "G" + 35% D66 + 1.25% D-160 + .5% D-65 + .5% D-28
Stage 2 - 68 tonnes 0:1:0 Class "G" + .3% B71 + .5% D-65. Continuous returns noted throughout. Calculated cement top at 800 mKB.

Production Liner: 42 jts, 177.8mm, L-80, LT&C @ 38.7kg/m & landed at 3499.00 mKB w/liner lap to 2909.43 mKB. Cemented w/14.7 t 0:1:0 'G' + 35% Silica + .5% D65 + .3% D28 + .2% D121 + 100 l D135 + 1960 l D600 + 76 l D47. Displaced @ .6m^3/min. w/continuous returns throughout.

Wellhead: Per Attached

Casing Data:

	Size mm:	244.50	177.8	88.9	114.3
	Weight:	69.94/79.62	38.69	13.69	18.75
	Grade:	L-80	L-80	L-80	L-80
	Thread:	BT&C	LT&C	NS-CT	NS-CT
*	Drift ID mm:	216.5/212.80	156.20	72.82	97.36
	Collapse (kPa):	32,750/45,640	37,300	70,050	51,710
	Burst (kPa)	47,370/54,680	49,920	72,600	58,122
	Tension (daN)	402,600/472,400	230,900	92,070	128,127
	Capacity (m^3/m)	0.038192/0.036918	0.019961	0.00454	.007944
	Annular Volume w/				
	88.9 mm m^3/m	0.031977/0.030704	0.013751		
	114.3mm m^3/m	0.027920/0.026650	0.009700		

NOTE: 244.50mm x 79.62 kg/m casing. Special drifted to 216 mm.

Well Status: Otis 'PX' plug in the Otis 'X' nipple at 2950.98mKB. Tubing full of inhibited water. Plug tested to 28Mpa. Backpressure valve installed in tubing hanger. Annular full of inhibited fresh water.

RANGER OIL LIMITED
AUTHORIZATION FOR EXPENDITURE
Schedule of Estimated Completion Costs
(Completion, Recompletion, Workover and Abandonment)

AFE No:
Date: 15-Dec-99
Page: 1 of 1

Prepared By: J.L. Brown Signatue:

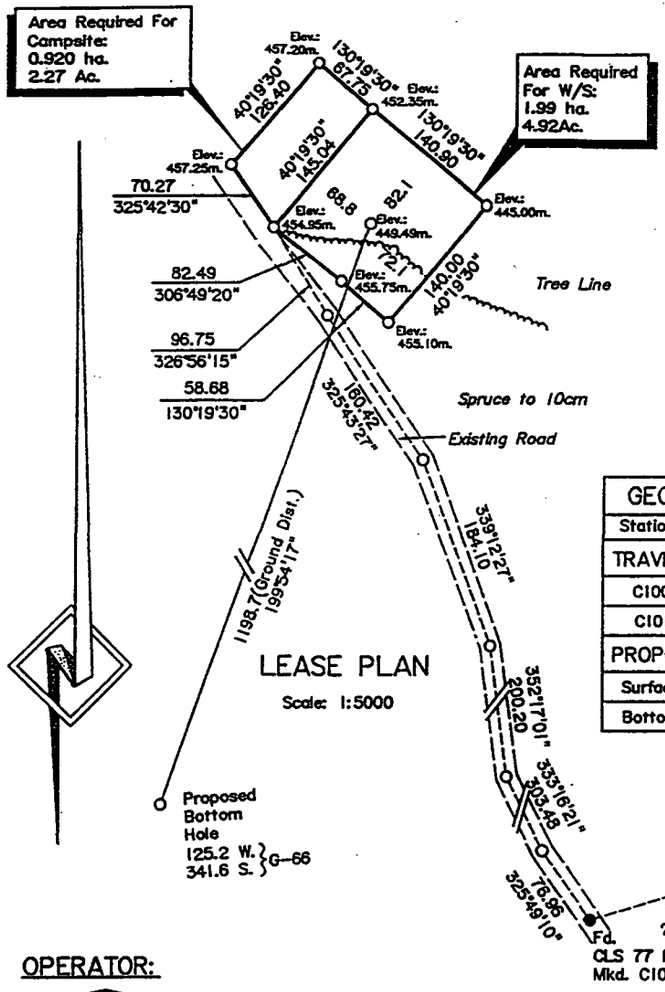
Location: 1 Ranger North Liard P-66A Tubing & wellhead replacement

Code	Items and Descriptions							Intangible	Tangible
100	Company Labour		Misc.					$1,500	
101	Company Travel and Subsistance		Fieldtrip requirements					$3,400	
156	Road and Surface Construction	20	days repair/maintenance @	$1,000 /day	I Ice Bridge		$120,000	$140,000	
403	Outside/In-house Engineering & Design		Programming/Engineering					$5,000	
322	Wellsite Engineering Supervision	15	days @	$1,800	/day			$27,000	
400	Communications	15	days @	$200	/day			$3,000	
254	Rig Move and Anchors	MI/MO	$100,000	Anchors	$5,500	RU/Tear out	$10,000	$115,500	
251	Service Rig/Snubbing Unit Costs	10	days @	$10,000	/24hr day	Water/Standby	$25,000	$125,000	
264	Underbalanced Drilling Services								
257	Crew Transportation and Subsistence								
256	Camp Costs	12	days @	$3,500	/day	MI/MO & RU/RO	$60,000	$102,000	
263	Fuel	12	days @	$1,500	/day	Trucking		$18,000	
258	Boiler Costs	12	days @	$1,000	/day			$12,000	
260	Trucking	Mob/De-mob test equ. $	80,000		Mob/De-Mob Eng. Shack, tanks, other		$100,000	$180,000	
261	Welding								
259	Bits								
262	Water - Supply and Haul	10	days water Truck @	$700 /day	Camp H2O @	$500 /day	$5,000	$12,000	
353	Load Fluid								
351	Completion Fluids and Chemicals		Inhibitor/ph reducers					$5,000	
352	Acidizing and Chemicals								
	Logging		Casing Inspection Log.					$50,000	
	Perforating (310)								
313	Wire Services - Slickline		retrieve/run/set plugs					$6,000	
323	Equipment Rentals - Surface	12	days @	$2,000	/day			$24,000	
324	Equipment Rentals - Downhole								
314	Contract Services		Misc.						
401	Safety Services		H2S safety					$15,000	
315	Fracturing								
316	Production Testing and Analysis	12	days @	$2,500	/day	MI/MO & RU/RO	$60,000	$90,000	
317	Miscellaneous - Int. Costs		5%					$81,100	
355	Fluid Disposal	100	m3 inhibited water @	$100 /m3	Trucking/Service		$15,000	$25,000	
308	Fishing Services								
320	Well Abandonment Plugs/Remedial Cementing								
158	Reclamations/Site Restorations/Surface Abandonment							$20,000	
480	Operator Overhead		3%	2%	1%			$18,200	
700	Tubing	3100	m 114.3mm @	$48.00 /m	Truck/Inspect/Torque turn/Tube test		$60,000	$60,000	$148,800
702	Downhole Equipment, Packers		Incoloy SSSV, pressure line, surface equipment			Service/Install	$25,000	$25,000	$130,000
705	Sucker Rods, Bottom Hole Pump								
706	Artificial Lift Systems, Pumpjack								
710	Production Tanks								
715	Wellhead Equipment	114.3	mm Cladded wellhead		Service/truck/pull/set WH plug		$20,000	$19,000	$260,000
	Sub Totals							$1,182,700	$538,800

TOTAL	$1,721,500

'ional Information: Costs associated w/constructing ice bridge, opening road, MO w/required equipment and personal, rig in camp, service rig & test unit. Check wellhead pressures, bleed off annulus & tubing, install BOP's, recover WH plug, release from packer, circ to cool well, POOH & lay down the 88.9mm tbg, run a casing inspection log, run 114.3mm tubing string c/w SSSV @ 150m & control line to surface , circulate, re-inhibit reduce ph level of well fluids, land in packer w/neutral weight & pressure test, install WH plug, remove BOP's, install 114.3mm cladded wellhead & PT. Rig out. Release service rig & equipment, prep lease for tie-in and surface facility tie-in.

s:/drilling/1999/workover/cost/nwt



LEASE PLAN

Scale: 1:5000

Elevations:

LEASE: 449.49 W/C

Corners:

N.: 452.35 E.: 445.00

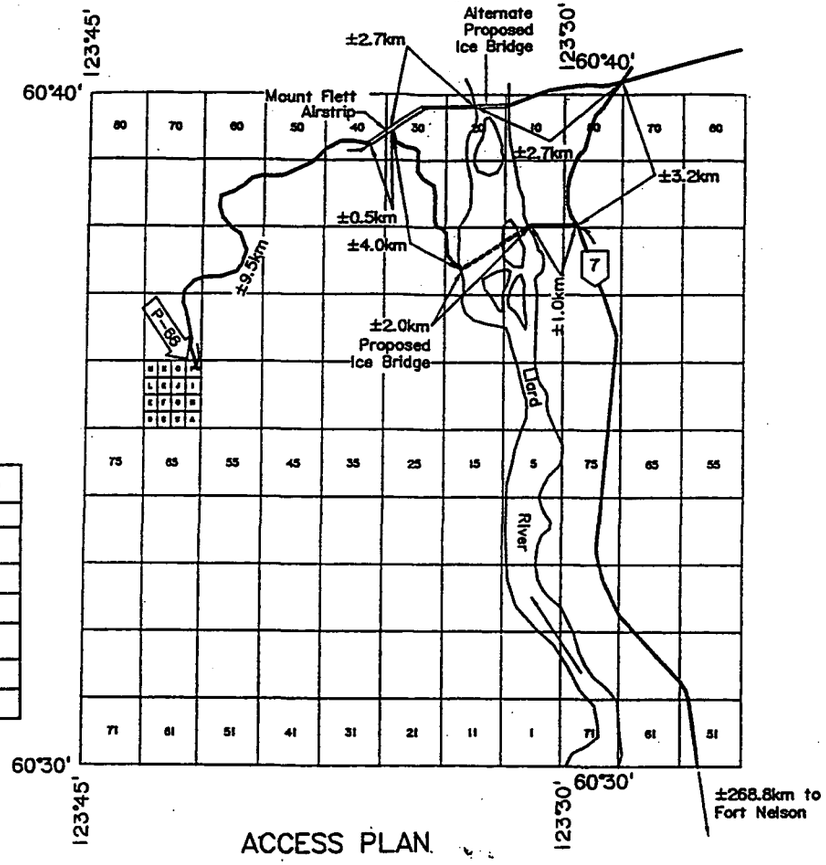
S.: 455.10 W.: 454.95

CAMPSITE:

N.: 457.20 W.: 457.25

GEODETIC AND UTM COORDINATES, (1927 NAD)

Station	Latitude	Longitude	Northings	Eastings
TRAVERSE STATIONS				
C100	60°35'27.711"	123°40'52.252"	6717223.94	462684.04
C101	60°35'25.980"	123°41'03.554"	6717172.17	462511.50
PROPOSED WELL				
Surface	60°35'55.664"	123°41'25.316"	6718093.96	462189.98
Bottom	60°35'19.098"	123°41'51.353"	6716966.91	461781.89



ACCESS PLAN

Scale: 1:150,000

NOTE:
DISTANCES ARE GROUND AND ARE IN METRES
THIS WELL IS DIRECTIONALLY DRILLED TO G-66
FROM THIS SURFACE LOCATION IN P-66 (OPTION W/C #2)

OPERATOR:

RANGER OIL

RANGER OIL LIMITED

ALBERTA LAND SURVEYORS' ASSOCIATION PERMIT NUMBER P042 J. Stuart Engineering & Surveying Ltd.

I CURTIS E. HENRIE, CERTIFY THAT THE SURVEY REPRESENTED BY THIS PLAN IS CORRECT AND TRUE TO THE BEST OF MY KNOWLEDGE AND WAS COMPLETED ON THE 19th DAY OF NOVEMBER, 1996.

CANADA LANDS SURVEYOR

RANGER FORT LIARD P-66
IN UNIT P, SECTION 66
GRID AREA 60°40', 123°30'

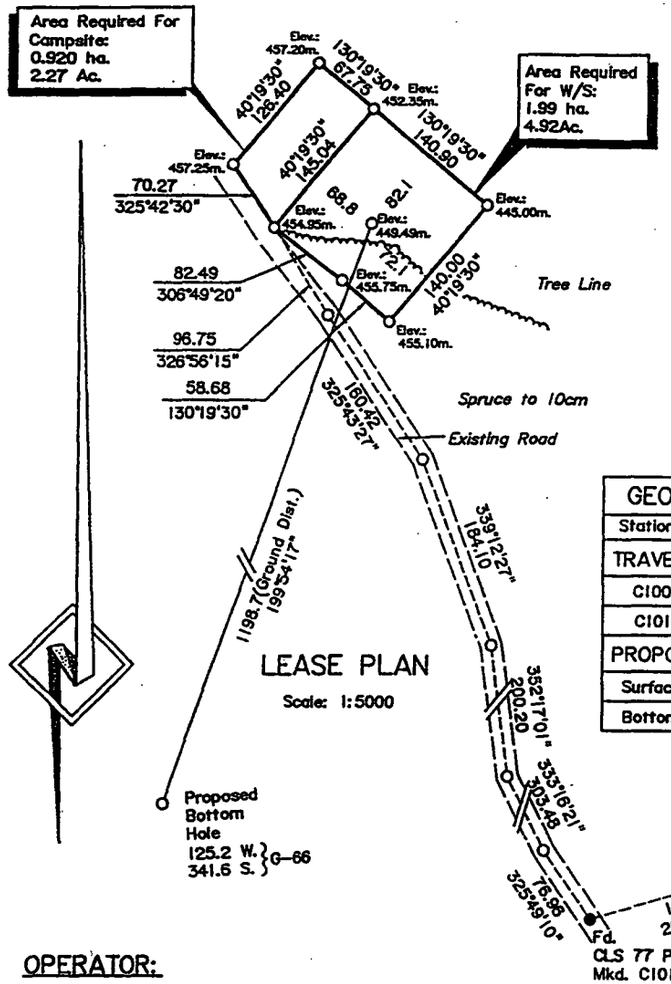
SESL

Surveyor: BL. Calculator: CH
Draftsperson: DB

Job No.: 96K048

No.	Revision	Date
4.	Moved Bottom Hole	96/12/2
3.	Lease Moved	96/11/19
2.	Well Name	96/08/14
1.	Revised A/R & Access Plan	96/08/20

STUART ENGINEERING & SURVEYING LTD. 200, 517 - 10TH AVENUE S.W. CALGARY, ALBERTA, CANADA T2R 0A8 (403) 234-9018 FAX. (403) 266-2919



LEASE PLAN

Scale: 1:5000

Elevations:

LEASE: 449.49 W/C

Corners:

N.: 452.35 E.: 445.00

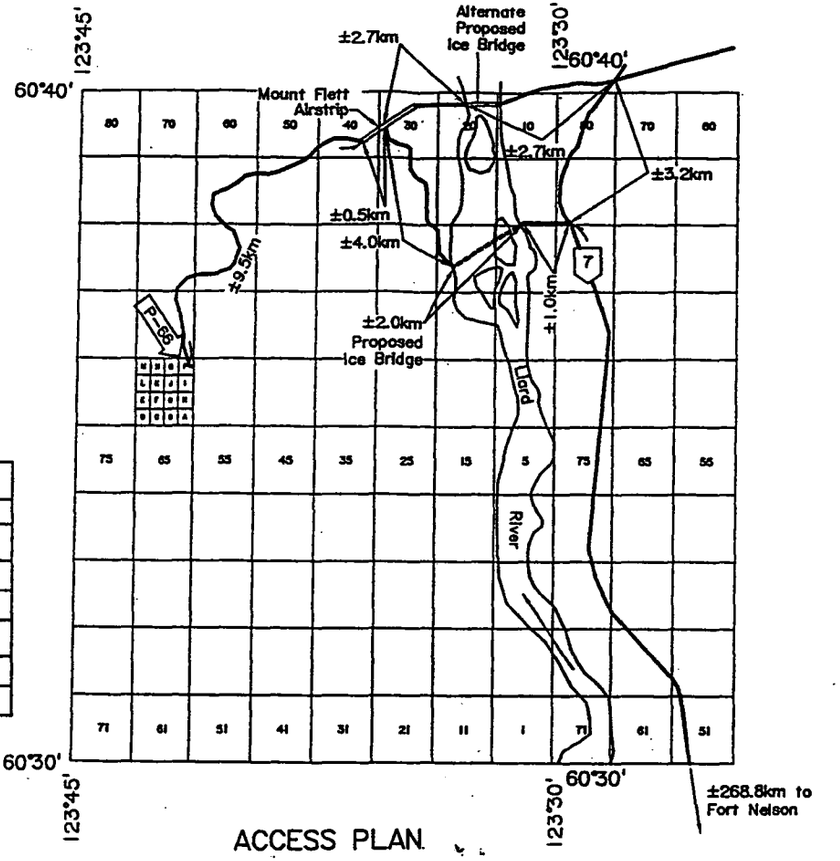
S.: 455.10 W.: 454.95

CAMPSITE:

N.: 457.20 W.: 457.25

GEODETIC AND UTM COORDINATES, (1927 NAD)

Station	Latitude	Longitude	Northings	Eastings
TRAVERSE STATIONS				
C100	60°35'27.711"	123°40'52.252"	6717223.94	462684.04
C101	60°35'25.980"	123°41'03.554"	6717172.17	462511.50
PROPOSED WELL				
Surface	60°35'55.664"	123°41'25.316"	6718093.96	462189.98
Bottom	60°35'19.098"	123°41'51.353"	6716966.91	461781.89



ACCESS PLAN

Scale: 1:150,000

NOTE:
DISTANCES ARE GROUND AND ARE IN METRES
THIS WELL IS DIRECTIONALLY DRILLED TO G-66
FROM THIS SURFACE LOCATION IN P-66 (OPTION W/C #2)

OPERATOR:

RANGER OIL

RANGER OIL LIMITED

ALBERTA LAND SURVEYORS' ASSOCIATION PERMIT NUMBER P042 J. Stuart Engineering & Surveying Ltd.

I CURTIS E. HENRIE, CERTIFY THAT THE SURVEY REPRESENTED BY THIS PLAN IS CORRECT AND TRUE TO THE BEST OF MY KNOWLEDGE AND WAS COMPLETED ON THE 19th DAY OF NOVEMBER, 1996.

CANADA LANDS SURVEYOR

RANGER FORT LIARD P-66
IN UNIT P, SECTION 66
GRID AREA 60°40', 123°30'

SESL

Surveyor: BL Calculator: CH
Draftsperson: DB

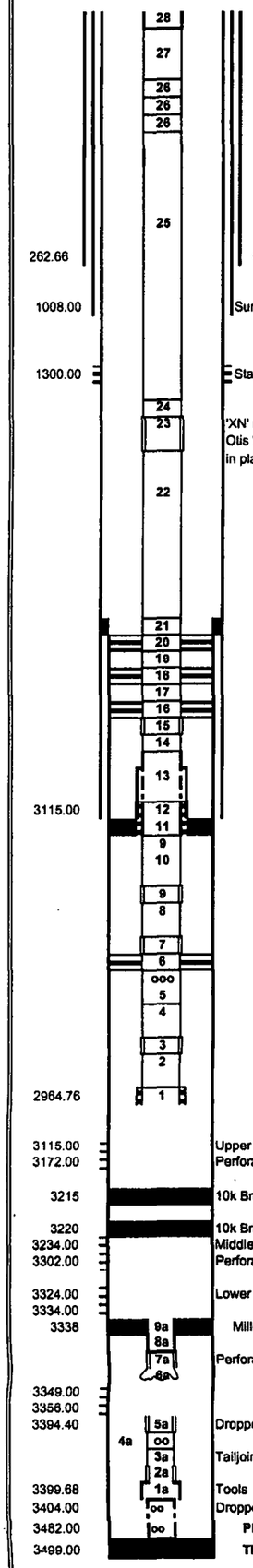
Job No.: 96K048

No.	Revision	Date
4.	Moved Bottom Hole	96/12/2
3.	Lease Moved	96/11/19
2	Well Name	96/08/14
1.	Revised A/R & Access Plan	96/08/20

STUART ENGINEERING & SURVEYING LTD. 200, 517 - 10TH AVENUE S.W. CALGARY, ALBERTA, CANADA T2R 0A8 (403) 234-9018 FAX. (403) 266-2919

Well Diagram
History

EXISTING DOWNHOLE WELL PROFILE



Location: Ranger Fort Liard P-66A **Date:** 10-Jan-00

KB (m) 459.89 **GL (m)** 449.49 **KB to CF:** 10.35 **KB to THF:** 8.60

	No. Joints	Size OD mm	Weight kg/m	Thread Collar	Grade	Landed @ mKB	Top @ mKB
Conductor Casing:	22	508.00	139.87	BT & C	K-55	262.66	Surface
Cement: Stage 1	80t 0:1:0 'G' + $CaCl_2$ w/Lost circulation on displacement.						
Surface Casing:	79	339.70	101.20	BT & C	K-55	1008.00	Surface
Stage 1	92t 0:1:0 'G' + .2% D-13 + .5% D-69						
Intermediate Casing	51	244.50	79.62	BT & C	L-80	3115.00	2452.00
	180	244.50	69.94	BT & C	L-80	2452.00	Surface
Cement: Stage 1	17t 0:1:0 'G' + .35% D86 + 1.25% D160 + .5% D65 + .5% D28						
Stage 2	68t 0:1:0 'G' + .3% B71 + .5% D65 w/continuous returns. Est. Cement top @ 800m.						
Production Liner:	42	177.80	38.70	LT & C	L80	3499.00	2909.00
Cement: Stage 1	14.7t 0:1:0 'G' + 35% Silica + .5% D65 + .3% D28 + .2% D121 + 100l D135 + 1960l D600						
	+ 76l D47 displaced @ .6m3/min w/continuous returns throughout.						
Production Tubing:	215	88.90	13.84	NS-CT	L-80	3071.00	Surface

Perforations:			
Upper Nihanni (gross interval)	3115.00	to	3172.00
Middle Nihanni (gross interval Abandon)	3234.00	to	3302.00
Lower Nihanni (w/TTG, net interval)	3324.00	to	3334.00
Lower Nihanni (w/TTG, net interval)	3349.00	to	3356.00

FINAL TUBING STRING (Bottom Up)				
Item	**Description**	**Length (m)**	**TVD mKB**	**Top mKB**
1	1 - 120.65 x 88.9mm wireline re-entry guide w/EUE thread.	0.15		2964.61
2	2 - 88.9mm x 1.89 & 3.10m L-80 EUE pup jts @ 13.69kg/m	4.99		2959.62
3	1 - 88.9mmx.49m Otis 'XN' EUE nipple w/69.85mm profile & 66.93mm No-Go.	0.43		2959.19
4	1 - 88.9mm x 3.08m L-80 EUE pup jt @ 13.69kg/m	3.08		2956.11
5	1 - 88.9mm x 1.22m L-80 EUE perforated nipple @ 13.69kg/m	1.22		2954.89
6	1 - 150.8x88.9mm L-80 NSCT casing centralizer	0.28		2954.61
7	1 - 88.9mm x .31m Otis 'X' nipple w/69.85mm profile w/EUE pin x NSCT box	0.34		2954.27
8	1 - 88.9mm x 2.96m L-80 NS-CT pup jt @ 13.69kg/m	2.95		2951.32
9	1 - 88.9mm x .34m INCOLOY 925 NSCT Otis 'X' nipple w/69.85mm profile.	0.34		2950.98
10	1 - 88.9mm x 1.25m INCOLOY 925 NSCT pup jt @ 13.69kg/m down.	1.24		2949.74
11	1 - 88.9mmx177.8mm INCOLOY 925 Guiberson Magnum perm packer (HTE)	0.94		2948.80
12	1 - 88.9mm premium latch assembly w/extra seal (High Temp. Elastomer)	0.47		2948.33
13	1 - 88.9mm NSCT 'XL' On-Off w/71.45mm 'X' profile & Alias seal.	0.77		2947.56
14	1 - 88.9mm x 2.96m L-80 NSCT tubing pup jt @ 13.69kg/m	2.96		2944.60
15	1 - 88.9mm Otis 'X' nipple w/71.45mm profile & NSCT thread.	0.31		2943.98
16	1 - 150.8x88.9mm L-80 NSCT casing centralizer	0.31		2944.29
17	1 - 88.9mm x 3.01m L-80 NSCT pup jt @ 13.69kg/m	3.01		2940.97
18	1 - 150.8x88.9mm L-80 NSCT casing centralizer	0.31		2937.66
19	1 - 88.9mm x 3.01m L-80 NSCT pup jt @ 13.69kg/m	3.00		2937.97
20	1 - 150.8x88.9mm L-80 NSCT casing centralizer	0.31		2937.35
21	1 - 88.9mm x 1.76m L-80 NSCT pup jt @ 13.69kg/m	1.76		2935.59
22	153 - 88.9mm L-80 NSCT tubing jts @ 13.69kg/m	1435.51		1500.08
23	1 - 88.9mm Otis 'X' nipple w/71.45mm profile. (Landed 1500m @ 12.7°)	0.31		1499.77
24	1 - 88.9mm x 3.03m L-80 NSCT pup jt @ 13.69kg/m	3.03		1496.74
25	157 - 88.9mm L-80 NSCT tubing jts @ 13.69kg/m	1473.04		23.70
26	3 - 88.9mm x 3.09, 1.74 & .62m L-80 NSCT pup jt @ 13.69kg/m	5.35		18.35
27	1 - 88.9mm L-80 NSCT tubing jt @ 13.69kg/m	9.50		8.85
28	1 - 88.9mm Tubing Hanger	0.25		8.60
	Dropped tools - Top Down			**Top @**
9a	1 - 73mm x 177.8mm x 1.65 m INCOLOY 925 Halliburton 'BWB' perm packer	1.65		3338.00
8a	1 - 73mm x 1.06m INCOLOY 925 NSCT pup jt @ 9.67kg/m down.	1.06		3339.65
7a	1 - 73mm x .30m INCOLOY 925 NSCT Otis 'X' nipple 'w/58.75mm profile.	0.30		3340.71
6a	1 - 73mm x 2.99m L-80 NS-CT pup jt @ 9.67kg/m	2.99		3341.01
5a	1 - 73mm x .31m Otis 'R' nipple w/55.58mm profile. EUE pin x NSCT box	0.31	2915.25	3394.40
4a	1 - 73mm x 1.24m L-80 EUE perforated nipple @ 9.67kg/m	1.24	2915.51	3394.71
3a	1 - 73mm x 3.04m L-80 EUE pup jt @ 9.67kg/m	3.04	2916.52	3395.95
2a	1 - 73mm x .49m Otis 'RN' EUE nipple w/55.58 profile & 51.05mm No-Go.	0.59	2918.99	3398.99
1a	1 - 73mm x .10m Otis wireline re-entry guide w/EUE thread.	0.10	2919.47	3399.58

Total String Length (m) (Item 6 to 22)	2956.16
KB to Tubing Hanger Flange	8.60
Tubing Landed Depth (mKB)	**2964.76**

Tubing Weight	40120	daN	**Wt. on Packer**	9000	daN	**Wt. on Hanger**	31120	daN

Wellhead	**Make:**	Rector	**W.P**	35MPa	**Type:**	Flanged	
Dual Master Valve	**Make:**	Rector	**W.P.**	35MPa	**Type:**	Flanged	
	Size:	79.375mm	**Trim**	A487			
Casing Valves	**Make:**	Rector	**W.P.**	35MPa	**Type:**	Flanged	
	Size:	79.375mm	**Trim**	A487			
Choke	**Make:**	N/A					
Surf. Casing Status:							

Well Status: Temporary well suspension effective Aug. 30, 1999.

The tubing is suspended w/an Otis 'PX' plug landed in the 'X' nipple @ 2950.98mKB. The tbg is filled w/inhibited water, topped w/Diesel & pressure tested to 28MPa. Installed a backpressure valve in the dognut. Secured.

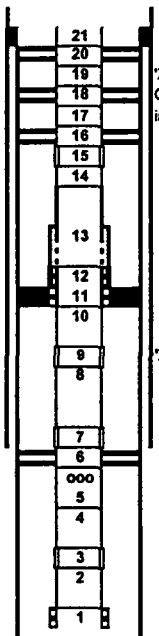
The 88.9/244.5/177.8mm annulus is filled w/inhibited water, topped w/diesel and pressure tested to 21MPa. Water, topped w/methanol & pressure tested to 21MPa. Installed a backpressure valve in the dognut. Secured.

NOTE: ***Dropped tools were pushed w/mill tools and do not represent a logged depth.***

Net Perforations: 3115-3122; 3125-3130; 3134-3148; 3152-3159; 3165-3172; 3234-3248; 3260-3272; 3276-3280; 3285-3292; 3295-3302; 3324-3334 and 3349-3356mKB

EXPANDED DOWNHOLE WELL PERFORATION PROFILE

Date: 10-Jan-00



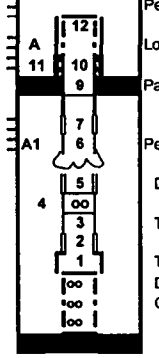
'XN' nipple w/ Otis 'XN' Plug in place

'X' nipple w/Otis 'PX' Plug in place

Perforation Interval (top down)				
Designation	Top		Bottom	Length
K	3115.00		3122.00	7.00
J	3125.00		3130.00	5.00
I	3134.00		3148.00	14.00
H	3152.00		3159.00	7.00
G	3165.00		3172.00	7.00
F	3234.00		3248.00	14.00
E	3260.00		3272.00	12.00
D	3276.00		3280.00	4.00
C	3285.00		3292.00	7.00
B	3295.00		3302.00	7.00
A	3324.00		3334.00	10.00
A1	3349.00		3356.00	7.00

FINAL TUBING STRING (Bottom Up)			Length		Top
Item	Description		m	TVD	mKB
1	1 - 120.65 x 88.9mm wireline re-entry guide w/EUE thread.		0.15		2964.61
2	2 - 88.9mm x 1.89 & 3.10m L-80 EUE pup jts @ 13.69kg/m		4.99		2959.62
3	1 - 88.9mmx.49m Otis 'XN' EUE nipple w/69.85mm profile & 66.93mm No-Go.		0.43		2959.19
4	1 - 88.9mm x 3.08m L-80 EUE pup jt @ 13.69kg/m		3.08		2956.11
5	1 - 88.9mm x 1.22m L-80 EUE perforated nipple @ 13.69kg/m		1.22		2954.89
6	1 - 150.8x88.9mm L-80 NSCT casing centralizer		0.28		2954.61
7	1 - 88.9mm x .31m Otis 'X' nipple w/69.85mm profile w/EUE pin x NSCT box		0.34		2954.27
8	1 - 88.9mm x 2.95m L-80 NS-CT pup jt @ 13.69kg/m		2.95		2951.32
9	1 - 88.9mm x .34m INCOLOY 925 NSCT Otis 'X' nipple w/69.85mm profile.		0.34		2950.98
10	1 - 88.9mm x 1.25m INCOLOY 925 NSCT pup jt @ 13.69kg/m down.		1.24		2949.74
11	1 - 88.9mmx177.8mm INCOLOY 925 Guiberson Magnum perm packer (HTE)		0.94		2948.80
12	1 - 88.9mm premium latch assembly w/extra seal (High Temp. Elastomer)		0.47		2948.33
13	1 - 88.9mm NSCT 'XL' On-Off w/71.45mm 'X' profile & Aflas seal.		0.77		2947.56
14	1 - 88.9mm x 2.96m L-80 NSCT tubing pup jt @ 13.69kg/m		2.96		2944.60
15	1 - 88.9mm Otis 'X' nipple w/71.45mm profile & NSCT thread.		0.31		2943.98
16	1 - 150.8x88.9mm L-80 NSCT casing centralizer		0.31		2944.29
17	1 - 88.9mm x 3.01m L-80 NSCT pup jt @ 13.69kg/m		3.01		2940.97
18	1 - 150.8x88.9mm L-80 NSCT casing centralizer		0.31		2937.66
19	1 - 88.9mm x 3.01m L-80 NSCT pup jt @ 13.69kg/m		3.00		2937.97
20	1 - 150.8x88.9mm L-80 NSCT casing centralizer		0.31		2937.35
21	1 - 88.9mm x 1.76m L-80 NSCT pup jt @ 13.69kg/m		1.76		2935.59
22	153 - 88.9mm L-80 NSCT tubing jts @ 13.69kg/m		1435.51		1500.08
23	1 - 88.9mm Otis 'X' nipple w/71.45mm profile. (Landed 1500m @ 12.7°)		0.31		1499.77
24	1 - 88.9mm x 3.03m L-80 NSCT pup jt @ 13.69kg/m		3.03		1496.74
25	157 - 88.9mm L-80 NSCT tubing jts @ 13.69kg/m		1473.04		23.70
26	3 - 88.9mm x 3.09, 1.74 & .52m L-80 NSCT pup jt @ 13.69kg/m		5.35		18.35
27	1 - 88.9mm L-80 NSCT tubing jt @ 13.69kg/m		9.50		8.85
28	1 - 88.9mm Tubing Hanger		0.25		8.60
		Total String Length (m) (Item 6 to 22)	2956.16		
		KB to Tubing Hanger Flange	8.60		
		Tubing Landed Depth (mKB)	**2964.76**		
	Dropped tools - Top Down				**Top @**
9a	1 - 73mm x 177.8mm x 1.65 m INCOLOY 925 Halliburton 'BWB' perm packer		1.65		3338.00
8a	1 - 73mm x 1.06m INCOLOY 925 NSCT pup jt @ 9.67kg/m down.		1.06		3339.65
7a	1 - 73mm x .30m INCOLOY 925 NSCT Otis 'X' nipple w/58.75mm profile.		0.30		3340.71
6a	1 - 73mm x 2.99m L-80 NS-CT pup jt @ 9.67kg/m		2.99		3341.01
5a	1 - 73mm x .31m Otis 'R' nipple w/55.58mm profile. EUE pin x NSCT box		0.31	2915.25	3394.40
4a	1 - 73mm x 1.24m L-80 EUE perforated nipple @ 9.67kg/m		1.24	2915.51	3394.71
3a	1 - 73mm x 3.04m L-80 EUE pup jt @ 9.67kg/m		3.04	2916.52	3395.95
2a	1 - 73mm x .49m Otis 'RN' EUE nipple w/55.58 profile & 51.05mm No-Go.		0.59	2918.99	3398.99
1a	1 - 73mm x .10m Otis wireline re-entry guide w/EUE thread.		0.10	2919.47	3399.58

3115.00	K	Upper Nihanni							
3122.00									
3125.00	J								
3130.00									
3134.00	I								
3148.00									
3152.00	H								
3159.00									
3165.00	G								
3172.00		Perforations							
3215		10K BP							
3220		10k BP							
3234.00	F	Middle Nihanni							
3248.00									
3260.00	E								
3272.00									
3276.00	D								
3280.00									
3285.00	C								
3292.00									
3295.00	B								
3302.00		Perforations							
#REF!	A	Lower Nihanni							
#REF!	11	10							
3338		Packer pushed to 3338							
3349.00									
3356.00	A1	Perforations							
3394.40		Dropped							
3399.68	4	Tailjoint							
3404.00		Tools							
		Dropped Gun							
3482.00		PBTD							
		TD							



Tubing Weight	40120	daN	Wt. on Packer	9000	daN	Wt. on Hanger	31120	daN

Wellhead	Make:	Rector	W.P	35MPa	Type:	Flanged	
Dual Master Valve	Make:	Rector	W.P.	35MPa	Type:	Flanged	
	Size:	79.375mm	Trim	A487			
Casing Valves	Make:	Rector	W.P.	35MPa	Type:	Flanged	
	Size:	79.375mm	Trim	A487			
Choke	Make:	N/A					
Surf. Casing Status:							

Well Status: Temporary well suspension effective Aug. 30, 1999.

The tubing is suspended w/an Otis 'PX' plug landed in the 'X' nipple @ 2950.98mKB. The tbg is filled w/inhibited water, topped w/Diesel & pressure tested to 28MPa. Installed a backpressure valve in the dognut. Secured.

The 88.9/244.5/177.8mm annulus is filled w/inhibited water, topped w/diesel and pressure tested to 21MPa. Water, topped w/methanol & pressure tested to 21MPa. Installed a backpressure valve in the dognut. Secured.

NOTE: ***Dropped tools were pushed w/mill tools and do not represent a logged depth.***

Net Perforations: 3115-3122; 3125-3130; 3134-3148; 3152-3159; 3165-3172; 3234-3248; 3260-3272; 3276-3280; 3285-3292; 3295-3302; 3324-3334 and 3349-3356mKB

1998	Hrs.	COMPLETION SUMMARY	Cum Cost
Initial Completion		**- Prerforate the Nahanni formation and flow test well to determine productivity and reserves.**	
20-Feb	24	Liner cemented. Drilling rig used to drill out and clean to bottom. Ran CBL-VDL log. Well ready for rig-in of completion equipment. Completion undertaken w/drilling rig. Wellbore cleaned out & ready foe csg perforating. Nipple BOP's. PT csg, liner lap & BOP's.	$189,045
21-Feb	48	Rig in testing equipment, PT surface lines, flanges. Wait on loggers.	$239,491
23-Feb	96	Rig in loggers. PT and proceed w/perforating w/19 - 127mm gun runs for a net of 15 intervals. (4 mis-runs). Wireline set packer	$456,139
27-Feb	48	Rig out loggers, rig in power tongs & tube testers. Tube test in w/88.9mm NSCT tbg. Space out, PT, circ to inhibited fluid.	$672,476
1-Mar	24	Land dognut w/9000daN compression. Install wellhead & rig in test head. Pull prong & plug. POOH. Flow well on clean-up. SI for build-up. Recovered a total of 48.88m3 H2O. Tubing volume only 13.82m3 for a total of 160.24m3 left to recover.	$699,383
2-Mar	24	Monitor build-up. Rig in Genco, run static gradient. Work slickline loose. (Stuck going up - Black substance on line.) Open well to flow.	$734,801
3-Mar	48	Cont. flowing to testers @ 463x10m3/day w/1.25% H2S & 15.7% CO2. Recovered 310.60m3 H2O. (101.48m3 new fluid.) Rig in loggers Run combination flow meter, Temp., press., Fluid Density & GR-CCL to 350m. Grease injection failure. POOH Wait on tools.	$799,673
5-Mar	48	Wait on tools. Re-run prod. logging tools above. Make 1 static pass, open well and proceed w/5 - flowing/logging passes. Shut in and proceed w/2 static logging down passes. POOH & rig out loggers. WOO. Prepare to perforate additional pay. WO tools.	$859,539
7-Mar	48	Wait on Tools. Rig in & RIH w/Through Tubing spiral gun. Concerns w/gun swelling after firing and getting stuck in hole. POOH w/gun WOO re: perforating. Rig to flow well. Flow through a 15.08mm choke @ 15440KPa and 463.768x103m3/day. SI for build-up. Noted wellhead valves not operating properly. Close well in at test unit. Top master closed after well cooled from 93 deg C.	$921,977
9-Mar	24	WO ABB. Service valves. Valve bodies pressured up. Bled off. Very little grease in bodies. Service all valves w/special HT grease. Tore down wing valve & noted minor corrosion. Ordered to tear out drilling rig. Set well plugs, downhole and in wellhead.	$969,704
10-Mar	48	Tear out the drilling rig equipment. Haul out produced fluids to disposal. Shut down operations to to evaluate well conditions/problems.	$1,000,163
17-Mar	72	Mobilize crews. Rig in complete w/testers & loggers.	$1,034,228
20-Mar	48	Rig in coil, C&A pumper, N2 pumper & frac pumper. Rig in loggers. RIH w/43mm Spiral Shogun loaded at 20spm w/9.5gr.charges. Perf 3329 - 3334mKB. RIH w/gun #2. Had 2 misruns. Perf on 3rd run, 3324 - 3329mKB. Prepare for acid coil run in AM.	$1,095,221
22-Mar	24	RIH w/38.1mm coil to 3335mKB. Pump 1m3 15% HCl layering across perf interval 3324 - 3334mKB. Soak acid. Pump N2 & flow well to recover spent acid. POOH w/coil & rig out same. Open to testers and flow on clean-up. Flow through 15.08mm @ 15140KPa.	$1,169,129
23-Mar	24	SI well . Rig in loggers. RI w/production logging tools. Temp. tool failed @ 2750m. PO & replace. RI to 3040. Tools failed. POOH. with tools at 750m, a bull plug on the wing valve blew out. Uncontroled gas flow dragged wireline out of the well, spooling same onto the ground. Logging tools impacted into the lubricator, breaking the wireline connection. Wireline exited wing valve. Closed the upper master, closed lower master w/proper turns. Safed out wellhead. Replaced upper master & 2 wing valves. WOO.	$1,187,288
24-Mar	48	Ordered to suspend operations to await a safety audit. Calgary recommended shut down for due diligence & new program.	$1,230,712
27-Mar	72	WO slickline. Run plug in Otis 'X' @ 3072.5mCF. Bleed-off to 0KPa. Fill tbg & PT tbg & ann. to 28MPa. Install wellhead backpressure valve. Well safed out. Rig out & release equipment. Any equipment left goes on standby 98-03-31.	$1,353,310
31-Mar	n/a	Operations supended. Al equipment left on location on standby until summer project start-up.	$1,366,873
Workover #1		**- re-configure wellhead and proceed w/extensive production logging/testing to determine water rate.**	**Cum Cost**
1-Jul	60	Mobilize personal & equipment from various bases in Alberta & BC. Load onto barge & transport across river to landing. Offload & move/spot equipment on lease. Rig in all equipment per program for wellhead change & flow test.	$1,547,331
6-Jul	12.5	Hold a pre-job safety & operations meeting w/all services to include Ranger Calgary personal. Check WH pressures, install backpressure valve. Re-configure wellhead to PSL-2	$1,645,489
7-Jul	48	Remove backpressure valve, proceed w/numerous pressure tests. ESD failed. WO replacement & install. PT. Rig in Genco. Run Otis "RB" pulling tool and pull prong. Chnge out to "GS" pulling tool & pull plug.	$1,814,067
9-Jul	24	RI w/48.3mm gauge ring. Tagged obstruction @ 3357mKB. POOH. SI WO daylight. Flow well 2hrs to clean-up. SI. Rec. 20.9m3 water. SI. RIH w/gradien recorders to MPP. POH. RIH w/production logging tools. Density tool failed. Make logging pass. POOH.	$1,845,913
10-Jul	96	RO production loggers. RI slickline. Run/set tandem recorders in the "RN" @ 3081.85mKB. Rig up METZ line. RI w/RTR (real time) & land above 3081m. Flow well for 24hrs. SI for realtime build-up. Monitor well to 08:30 hrs 98-07-14.	$2,058,580
14-Jul	24	POOH w/METZ line & recorder. Pull & recover LMR's. RI w/gauge ring. Run a gradient. RI w/spiral gun & land on depth. Open well @ 600e3/day & perforate 3329 - 3334mKB @ 13spm w/9gr charges. POOH. All shots fired.	$2,105,758
15-Jul	48	RI w/2nd spiral gun, perforate as above. POOH . Only 2 shots fired. RI w/3rd gun land on depth. Open well @ 600e3/day & perforate 3324 - 3329mKB @ 13spm w/9gr charges. POOH. All shots fired. RI w/RTR on METZ line. Run static pass. Flow well 4hrs to stabalized rate of 483.75e3m3/day w/H2S = 1.15%, CO2 = 16% & salinity = 135000ppm. Log up/down while flowing. METZ line stuck 3347mKB. Work line to 3335mKB and METZ line parted. Confirm no line stuck in wellhead. SI & secured. WO tools.	$2,261,154
17-Jul	72	RI w/fishing tools and fish for METZ line. Unable to work tools into small BOPs. Testing ESD failed. WO replacement.	$2,341,467
20-Jul	24	Rig in new ESD & 101.6mm BOP/lubricator. Made 4 graple runs and recovered Metz line. Spool out & recover recorders.	$2,379,275
21-Jul	24	RO fishing tools. RI w/tandem recorders on slickline. Run static down gradient 1000mcf to 3347mCF. Land @ 3345mCF. Flow well to obtain a stable flow rate. Attempt to log up. Stuck. Work line. String parted. Fish for line.	$2,467,956
22-Jul	24	Continue fishing. Recover line & recorders to surface. Proceed w/a flow test.	$2,527,953
23-Jul	48	Cont. flowing well. Stabalized flow through a 20.64mm choke & 82.55mm orifice @ 12,720KPa, 83 deg C & 590e3m3/day. SI for build-up.	$2,564,903
25-Jul	24	Rig in coil. Acid pickle. RI and tag dropped gun @ 3464mKB. Push to 3404mKB. Start out w/coil.	$2,634,918
26-Jul	96	Finish out w/coil. Rig in electricline. RI w/55.2mm gauge ring. Tagged obstruction @ 3069.50mKB. Stuck in hole. Work tools, WO well 6hrs to cool down. Work line to come off rope socket. No success. Flow well & attempt to pull No success. Pump diesel to lubricate. Work tools. Unable to release. Proceed to pump cool fluid down well to cool. Pulled free w/21m3 cool fluid pumped. WO fishing tools. Rig in coil. Fish downhole tools w/coil. Set down 1000daN onto fish. Pulled 1200daN over & came free. RI, tag @ 3061.39mCF w/1000daN. POOH & recovered 100% of fish. Perform coil cleanout to 'RN' nipple @ 3083mKB. POOH.	$2,988,748
30-Jul	24	WO slickline unit. Rig up. Run a gauge ring to 3037mCF. 'RN' nipple. POOH. Depth locator failed. SI & WO tools.	$3,028,366
31-Jul	24	WO tool repairs. O.K. Ran 53.85mm gauge, tag @ 3068mCF. Ran 56.64mm gauge. Tag 3068mCF. Made 2 wire grab runs, rec. .45m wire. made additional grapple run to Otis 'R' O.K. Run plug & set in 'R' nipple. PT failed. Pull, redress & re-set plug.	$3,053,603
1-Aug	24	Bled off WH pressure. Plug leaking. Proceed w/chemical cutter run. Tagged up @ 3073mKB. Pump water @ 100l/min. Could not get past 3073m. POOH. Ran 68.2mm gauge ring. Tagged obstruction @ 780m. Pushed to 1540mmCF. POOH w/drag to 880m then pulled free to surface. Made 73.7mm & 69.7mm gauge runs to 1507m (Otis 'X') & 3052m (Otis 'XN') respectively. No obstruction. RIH & pull prong & plug from the Otis 'X' nipple @ 3077.26mKB. Inspected. Top dogs not engauged. Run wirebrush & clean nipple.	$3,138,540

Workover #1		**- Con't.- re-configure WH and proceed w/extensive production logging/testing to determine water rate.**	**Cum Cost**
2-Aug	24	Redress & re-run plug to 3077mKB. RI w/Chem cutter. Unable to get past 3073mKB. POOH. RI & pull plug & prong. RI w/chem cutter on elec. line, log on depth & fire cutter. Pick-up. Stuck on bottom. PO of rope socket & POOH.	$3,200,437
3-Aug	24	Rig in coil tbg and RI & fish cutter. Inspect. Cutter had a burn 3' above the oxidizing tube. RI w/coil & 54mm drift. Tag up @ 3081mKB. Tail joint still in place. PO & RI w/elect line. Logged to Otis 'X' nipple @ 3073.97mKB. Tail jt. In tact. Pull tight, then poped free. PO.	$3,305,657
4-Aug	24	Rig in coil. RI w/wash tool and wash down. Unable to get past 3086mKB. PO. RI elec. line. Run a chem cutter & attempt to cut tbg @ 3075.80mKB. Fired cutter & POH. Cutter tube sheared, bottom half in nipple. Un-fishable. WOO.	$3,376,411
5-Aug	24	RI w/54mm Owen 50gr jet cutter on elec. line. Log to depth & fire. PO. Cutter fired. RI w/coil. Tag tail pipe w/9000daN. Still in place. PO.	$3,445,853
6-Aug	24	RI w/2nd - 54mm Owen 50gr jet cutter on elec. line. Log on depth, fire. PO, cutter wetted out. Misfired. RI w/50.8mm Owen 50gr jet cutter. Log on depth @ 3077.50mKB, fire. PO. Cutter wetted out, mis-run. Rig in coil. RI w/54mm Griz-gun 50gr jet cutter. Tag at damaged chemical cutter @ 3079.30mKB. Set 500 daN onto obstruction & fire Jet Cutter. RI & tag PB @ 3393.50mKB. POOH.	$3,498,950
7-Aug	24	RI & log cut-off @ 3077.80mKB. Make-up & RI w/Baker 57.9mm dummy tool on coil & work through the cutt-off. No drag/overpull. PO, recover tools. While deploying through BOP's w/loggers, tools dropped to top of master valve. Some damaged. WO tools.	$3,562,708
8-Aug	48	WO tools to 98-08-09. Rig in coil. RI w/54mm shogun gun on coil & perf 3349 - 3356mKB. Displace .7m3 28% HCl & perform 7 - 100l washes from 11.6MPa to 8.7MPa on final wash. Pull coil to 3336mKB. Displace 1m3 28% HCl & perform 10 - 100l washes from 13.8MPa to 7.1MPa on final wash.RI to 3375mKB. Start N2 and flow well @ 272e3m3/day & recover acid to surf. POOH.	$3,703,335
10-Aug	48	PO & deploy gun & circ tools out of well. Prepare too string for Baker Tools. WO tools. Pick-up & deploy Baker TTP c/w pressure recorders & knuckle joint. Work down to 3076.8m. Unable to get through packer. POOH. No visible markings on packer.	$3,903,606
12-Aug	24	Service Baker tools. Re-configure dummy packer tool to better mimick the actual packer system. Re-deploy in hole. RI w/dummy & tag up @ 3075mKB. Work in 4500daN compression. Unable to get through packer. POOH.	$3,976,042
13-Aug	24	Finish out w/dummy tool string. Rig out coil tubing. Rig in slickline. Set a dart in the Otis 'XN' nipple @ 3053mCF. RI w/3 LMR pressure recorders & land on dart. Prepare for extended flow test of well. (Note: barge landing/river levels critically low. Const. new landings.)	$4,067,561
14-Aug	72	Open well to test unit. Proceed w/step rate flows of 8hr duration w/declining rates to determine a max. water free prod rate. Initial choke set @ 25.4mm obtained an 8 hour flow rate of 600 e3m3/day @ 9650KPa & 8.5m3/hr H2O. Cut choke to 15.08mm & obtained an 8 hour flow rate of 460 e3m3/day @ 16970KPa & .35m3/hr H2O. Cut choke to 13.10mm & obtained an 8 hour flow rate of 378 e3m3/day @ 18490KPa & .3m3/hr H2O. Increase choke to 17.46mm obtained an 8 hour flow rate of 485.5 e3m3/day @ 14780KPa & 3.35m3/hr H2O. Decrease to 15.08mm choke, 11 hour flow rate was 439.11 e3m3/day @ 16670KPa w/1.25m3/hr H2O.	$4,215,487
17-Aug	216	Decrease to 13.49mm choke, extended flow rate of 108 hour was 338.35 e3m3/day @ 17780KPa w/1.75m3/hr H2O. Open to 38.1mm choke, 6hr flow rate was 536.4 e3m3/day @ 8290KPa w/15.9m3/hr H2O. Cut to 11.51mm choke, 78hr extended flow was 272.11 e3m3/day @ 19780KPa w/.3m3/hr H2O. Gastec reading yields 1.1% H2S & 15% CO2. Shut-in @ 18:00hrs 98-08-25	$4,641,002
26-Aug	48	Monitor build-up. The 5min SITP=21450Kpa. Work on new barge landings and road for equipment removal. Received orders to suspend operations 98-08-27 @ 15:00hrs. Proceed w/rig out of equipment over next several days to effect suspension. Monitor build-up.	$4,690,053
29-Aug	96	The well build-up stabalized @ 21440KPa. After 96hr build-up, rig in slickline. RI & pull BHP recorders. Got stuck @ 2715mCF. Work tools, line broke at surface. Proceed w/fishing operation. Retreived recorders after fishing for 72hrs.	$5,182,581
2-Sep	72	Inject filtered produced water down well. Run & set a plug in the Otis 'XN" @ 3060.39mKB. Fill w/inhibited fluids & PT. O.K. Install backpressure valve. PT wellhead, annulus and tbg. To 28MPa. O.K.	
5-Sep		All equipment not required is released. Left test unit & camp in place for a short winter operation. **Well Secured, Chained, Locked & Bull Plugged.**	$5,374,202
		Adjustment to actual $2,025,653	
	2256.5	**ACTUAL COST TO :** February 17, 1999 $7,399,855 **AFE Amount** $6,212,200	$7,399,855

1999	**Hrs.**	**COMPLETION SUMMARY**	**Cum Cost**
Workover #2		**- re-enter well w/coil to place a layered sand plug to shut off H2O.**	
9-Feb	72	Consultant mobilized to location. Supervised snow removal on location, airstrip & road access. Checked ice bridge thickness. re-flood as required. MO w/testers and initial required equipment. Spot & rig up.	$116,224
13-Feb	24	Pressure test all surface equipment. OK. Check WH pressures. Tbg. 0KPa. Lubricate into wellhead and open backpressure valve. SITP=18961KPa. Bled off immediately to 0. Heat expansion pressure. Retrieve backpressure valve. Rig in slickline. RIH & pull prong & plug from 'X' nipple @ 3053mCF. Wait for well fluids to stabalize for 12 hours.	$145,803
14-Feb	48	WO well stabalization. Rig in slickline. PT and run static gradient to 3050mCF. POOH & rig down. WO daylite to rig in coil. Rig in coil unit & PT as required. Shut down overnite to wait on N2.	$199,639
16-Feb	24	Check WH pressures. SITP=21500KPa, SICP=2125KPa. Open master and pump 15.2m3 hot filtered fresh water down tbg. RI w/38.1mm coil configured w/a 54mm nipple locator & 43mm tools. Pump hot filtered water down tbg/coil annulus @ 50l/min & 4000KPa. Tag Otis 'X' nipple at 3074m. Made several attempts to work through nipple w/o success. POOH.	$241,516
17-Feb	24	Check WH pressures. SITP=21700KPa. Open master and pump 15.2m3 hot filtered fresh water down tbg. RI w/38.1mm coil configured w/a 43mmx3m toolstring. Pump hot filtered water down tbg/coil annulus @ 50l/min & 4000KPa. Tag Otis 'X' nipple @ 3074m. Made several attempts to work through nipple w/o success. Pump 64m3 cold water down tbg/coil annulus. Unable to get through nipple. POOH.	$298,373
18-Feb	24	Check WH pressures. SITP=15200KPa. Open master and pump 15.2m3 hot filtered fresh water down tbg. RI w/38.1mm coil configured w/a 43mmx1m toolstring. Pump hot filtered water down tbg/coil annulus @ 50l/min. Tag Otis 'X' nipple @ 3074m. Made 8 attempts to work through nipple at various pump rates and running speeds w/o success. POOH.	$543,644
19-Feb	24	Check WH pressures. SITP=21000KPa. SICP=3100KPa. Rig in slickline. PT. Open master & RI w/gauge ring to "XN" nipple @ 3054mCF. Run and set the plug and prong in the Otis "XN" nipple. Fill tbg w/H2O inhibited w/1% MEP-426. PT to 21MPa Install the wellhead backpressure valve. Rig out testing equipment.	$579,788
20-Feb	72	RO all equipment for MO of location. Tear out test unit, camp and all other equipment & transport same to their operations base.	$669,000
23-Feb	312	**WELL SECURED, Wellhead bullpluged, Chained & locked.**	
		ACTUAL COST TO : Awaiting Finals **AFE Amount** $900,000 **Field Est.**	$669,000

1999 Workover #3	Hrs.	COMPLETION SUMMARY - re-enter well w/rig, mill packer, set BP, run new packer, production log/test.	Cum Cost
24-Jun	120	Consultant mobilized to location. Notified/mobilized services, barge in camp, testers, shacks, rig & equipment. Spot same & rig up.	$209,368
29-Jun	24	Finish rig up. Mix brine kill fluid. Pressure test wellhead and all surface test equipment. Purge system. Rig to pull backpressure valve.	$374,626
30-Jun	24	Pressure test all surface equipment. OK. Check WH pressures. Tbg. 0KPa. Lubricate into wellhead and open backpressure valve. SITP=2758KPa. Bled off immediately to 0. Heat expansion pressure. Retrieve backpressure valve. Rig in slickline. RIH & pull prong & plug from 'X' nipple @ 3053mCF. Rig out slickline. Open well and flow back ~11.8m3 H2O. Rig in slickline. PT and run static gradient to 3054mCF. Drop off recorders. POOH. Encountered hydrate problems. Pump methanol.	$423,239
1-Jul	24	Continue pumping methanol. Work tools by hand to surface & SI master valves. Wireline BOP's damaged. WO well stabalization & parts.	$488,442
2-Jul	24	Open well. Check WH pressures. SITP=21512KPa. Pump methanol down tbg. RI w/72.77mm gauge ring. Work through hydrates to 150m. RI w/gauge ring to 850mKB. POOH. RI & latch recorders. PO while running gradient. BHP @ 3054mCF = 26441KPa & 151.24° C. Rig out slickline, rig to & pump Calcium Carbonate pill. Pill bridged off. Attempt pump/flow out, no success. Tubing plugged.	$535,269
3-Jul	48	Wait on Dowell C.t.U. 24 hrs. M.I &R.U DOWELL C.T.U. & R.I.H. w/ Jet Nozzel - Tag T.O. plug @ 2848mCF	$718,187
5-Jul	24	Clean out plug from 2848mCF to 2848mCF w/ water and 7% H.C.L. acid flushes - Unable to pass so POOH w/ nozzel asssy - incomplete	$786,500
6-Jul	24	M.U & RIH w/ DOWELL Scale blaster tool on coil - Tag plug @ 285mCF and clean out to 2987 mCF	$827,630
7-Jul	24	Cont to clean to 3063mCF get stuck -work free then cont. to RIH freely to 3074mCF where we tagged solid	$935,038
8-Jul	24	POOH w/ coil - left jet and skirt in the hole. R/U Bonnetts w/line unit-RIH w/69mm G/ring tagged XN nipple@30.55mKB M/U & RIH w/ 55.9mm & 66.5mm LIB (2runs) POOH R/D W/line R/U Dowell CTU -in progress.	$985,840
9-Jul	24	RIH w/ O-Shot assy tag & work coil to engage fish - POOH- 0% recovery - R/O C.T.U- R/U Bonnetts W/line unit - M.U TaperTap fishing assy RIH tag fish POOH - No recovery -tapertap bent - Modify tapertap to shorter catch	$1,051,829
10-Jul	24	RIH w/ taper tap assy tag fish & POOH - Tool str. Had backed off - M/U O-Shot assy tag fishing tools POOH 0% recovery Rerun O/Shot tag & engage fish (something slowing us up running in) POOH - Recover tool string - sting had black dense tar like effluent coated on it Pumped 20m3 fresh filtered water down tbg to clear and shorten & rerun Taper tap assy - in progress	$1,106,709
11-Jul	24	RIH w/ taper tap - no recovery - M/U & RIH w/ 58mm O-Shot assy POOH - no recovery - Rerun O-shot assy POOH -no recovery M/U & RIH w/ 55mm Bowen magnet - POOH - no recovery -R/O W/line Mixed & pumped 1m3 cal-carb pill displaced w/ 17m3 of 1150kg/m THIX mud -well on vacuum -monitor well	$1,160,917
12-Jul	24	Mix and pump 1m3 cal/carb pill displace w/ 17m3 1150kg/m brine -well on vac. Monitor well while mixing THIX mud to build volume	$1,227,606
13-Jul	24	Cont to mix mud - 60m3 on hand - kill well w/ 17m3 mud -on vac. - R/U W/line and set otis px plug and prong in XN nipple @3060mkB POOH & R/O W/line - install BPV - N/D Well Head N/U BOPE function & P.T. APP wait on mud material from town	$1,294,295
14-Jul	24	Mix mud to build volume- 163m3- 'J' off packer pump 93m3 mud down tbg. No returns to surface POH & L.D. tbg. 15 Jts.	$1,443,284
15-Jul	24	POOH & L/D prod tbg string. 88.9mm - 13.69Kg/m NSCT (58 collars from Jt#67 to btm`. Were discarded due to pitting 100% of string was recovered w/ a piece of charge holder -12' lond was stuck in the seal assy. Seals were in poor condition	$1,530,626
16-Jul	24	P/U,M/U &RIH w/ 5.875" burn shoe assy on 89mm drill pipe off racks - Mill out packer @ 3071mKB -	$1,589,751
17-Jul	24	Mill & push pkr, to 3338mKB (changed out rig brake pads - 7hr's down) - short trip to tag pkr. POOH L/D BHA - M/I & R/U Computalog	$1,576,084
18-Jul	24	M/U & RIH w/ 154mmG/ring/J.B 3 runs w/ every run conaining a tar lie sludge - Pump 40m3 1THIX x20m3 150Kg/m brine down csg Rerun G/ring/JB to3230mKB clean run no tight spots - M/U & RIH w/ csg. Insp. Log - Log csg above and below liner top to 3230mKB M/U & RIH w/ 1778mm Guiberson 10k Perm.B.P. set @ 3220 - run second B.P. to 3015mKB wouldn't fire POOH & rerun - in progress	$1,616,357
19-Jul	24	Set second B.P @ 3215 OK POOH & R/O Computalog & RIH w/ Guiberson UNI-VI Pkr. On 89mm D.P. tag B.P. 3218mKB SLM Set Pkr @ 3207mKB & P.T. B.P. to 28mPa OK POOH & L/D Drill pipe M/I Computalog	$1,698,672
20-Jul	24	M/U Guiberson 178mm Prod. Pkr Assy and RIH on Electric W/Line - Pkr Assy stuck @ 2978mKB CR - Set Pkr & POOH w/ setting tool M/U & RIH w/ Guiberson Premium latch seal assy - Tubetest to 35mPa the 89mm NSIT tbg, in progress	$1,776,911
21-Jul	24	Sting into Pkr P.T. Ann/Pkr./Seals to 28mPa - released from Onn/Off tool - Circ. Annulus to 1% inhibitor & landed tbg. In 1000daN compression - Pressure tested tbg. To 28mPa -OK	$1,835,319
22-Jul	24	Install BPV - N/D BOPE N/U wellhead R/D Service rig & equip. ** Barge is stuck on o sand bar	$2,077,651
23-Jul	24	Tug from Ft. Liard Pulled out stuck barge Moved rig equip off location R/U Norwood Ball Catcher ESD & Corrosion coupon flange	$2,139,302
24-Jul	24	P.T. Test equip.- Remove BPV - R/U Bonnetts W/Line pull prong from 'PX' Plug @2947.5mKB - Make 5 runs w/ pulling tool to pull plug w/ no success	$2,235,273
25-Jul	24	Make 2 runs w/ pulling tool - recovered plug run #2 - plug had same tar like substance on dogs - R/O Bonnetts - M/I & R/U Dowell CTU & Pumper - P.T. pump lines & Coil 35mPa - OK RIH w// coil to3175mKB spotted 5m3 Xylene and let soak 1 Hr.	$2,226,451
26-Jul	24	Squeeze Xylene into perfs w/ water then circ out to testers - Preform 20m3 15% HCL Acid wash APP POOH w/coil and flow back	$2,393,450
27-Jul	24	Flow back well - recover 46.15m3 of fluid - M/I & R/U Treesavers and Dowell CTU / C7A units P.T. & RIH w/ Coil and proceed w/ Acid stimulation Ball Job as per dowell program droppind 100 balls every 5m3 of acid pumped total 600 balls POOH w/Coil & R/O Dowell and Treesavers. Flow back for clean up	$2,520,377
28-Jul	48	Flow well for clean up Recovered 8.47m3 over load fluid - S.I. Well recover 347 balls from catcher R/U Bonnetts W/Line and run in w/ 3 LMR & 1 Spartek recorders in `XN' nipple @ 2954mKB Shut in well & monitor pressures Tbg. =21300kPa	$2,740,708
30-Jul	24	Open well on 13.49mm choke setting for test # 1 @ 09:00hr's S.I.T.P = 21690 - Final flow rates - 439.5/10^m^/d - Tbg. Press = 18820kPa water rate of 14.43m3/d after 12 hr's - Start test # 2 @ 21:00 hr's flowing well on a 16.67mm choke setting	$2,756,042
31-Jul	24	Flow well on test #2 w/ a 16.67mm choke setting final flow rates - Tbg. Press = 17000kPa -gas rate = 581.6/10^m^/d water rate = 16.8m3/d salinity of 5% & flow-line temp of 78^C -Start flow test # 3 on a 30.16mm choke 12hr's start @ 09:00hr's Final flow rates - Tbg. Press = 9990kPa - Gas Rate = 833..8/10^m^/d Water rate of 12m3/d w/ 84000ppm salinity Flow line temp = 84^C Start flow test # 4 (8day/192hr'a) w/ choke setting of 16.67mm & initial flow rate of 709.5/10^m^/d @ 14,150kPa w/ flow-line temp.= 85^C	$2,756,043
1-Aug	168	Continue w/extended flow rate w/FTP decreasing from 14170 to 13890KPa @ 712 to 690x$10^3 m^3$/day WGR of .02$m^3/10^3 m^3$	$2,815,842
8-Aug	24	Cont flow well on test #4 flow rates @ after 192hr's = 686.99/10^ m^/d - Tbg press. =13840kPa - Water rate = 14.4m3/d -F.L.Temp -95^C Shut well in for build-up 99-08-08 @ 21:00hrs. ISIP = 19,600KPa, 30min SI = 20,340KPa and 9hr SI = 20,740KPa.	$2,908,572
9-Aug	312	Monitor well build-up to 6:00hrs. Proceed to and rig out equipment. Well shut in w/recorders on bottom to 99-08-29. Release all equipment & move to home base.	$3,034,065
29-Aug	24	Load equ/transport to location. Rig in slickline, SITP = SICP = 21800KPa. RIH & recover BH recorders. Ran/recovered static gradient.	
30-Aug	24	Run and set 'PX' plug in the otis 'X' nipple @ 2950mKB. Run prong w/one mis-run. Bled off well. Noted communication w/annulus.	
31-Aug	12	Fill tubing & annulus w/26m3 inhibited fresh water. Pressure test to 28MPa. Held OK. Install wellhead plug & PT to 28MPa. OK. Chain & lock wellhead. Rig out & release equipment.	$3,401,364
1-Sep 15-Oct		Construction on location to undertake clean-up & reclamation of lease site. released all equipment. Restorations 90% complete. Minimal operations required to final lease.	$3,950,000
		ACTUAL COST TO : Awaiting Finals AFE Amount $4,000,000 Field Est.	$3,950,000
		Total Completion & Wrkover projects	$12,018,855

Well Problems	Recommendations
i) Perforateing in the HT/HP environment resulted in several mis-runs.	Research gun designs to determine which type is best suited for HT/HP wells. Operations in Canada typically do not have to deal w/HP/HT. Look offshore.
ii) In an attempt to minimize gun runs, ran 127mmx7m guns resulting in several mis-runs due to wireline shorts.	To minimize the shorts, recommend running shorter 5m guns.
iii) Initial completion was such that the entire pay interval was perforated w/a perm packer set above by wireline after perfing. Subsequent operations required perforating below the origional perf interval w/through tubing guns.	Recommend perfing lower pay intervals first and testing seperately. Due to HT/HP, may still have to us perm packer. Recommend packer runs as low as possible. Potential use as BP if zones need abandonmnet and perf additional pays above. Run additional perm packers above .
iv) Numerous operations were attempted through the perm packer. Packer ID was such that special slim hole tools were required to be run through the tailepipe.	Recommend max ID packers. Question the packer service company. Confirm their calculations and ensure max packer ID's.

RANGER OIL

WELL DESIGN DATA SHEET

FT. LIARD P-66A DESIGN DATA

			Standard Units	Metric Units
GENERAL WELL INFORMATION				
Pressure - shut in		MPP	3,869 psi	26,675 kPa
		wellhead	3,152 psi	21,730 kPa
Temperature - shut in		MPP	302 'F	150 'C
Depth - MPP		TVD	9,108 ft	2,776.2 m
		measured	10,579 ft	3,224.5 m
Perforations		top (measured depth)	10,220 ft	3,115.0 mKB
		bottom (measured depth)	10,938 ft	3,334.0 mKB
Deviation in Pay		Max Angle	49 deg	49 deg
		Depth of Max Angle	6,467 ft	1,971 m
		Max Dogleg	9.52 deg/100ft	9.52 deg/30m
		Depth of Max Dogleg	10,295 ft	3,138.0 m
		Max Dogleg above packer	6.13 deg/100ft	6.13 deg/30m
		Depth of Max Dogleg above packer	5,502 ft	1,677.0 m
Volume to MPP		Tubing	494.00 ft3	13.99 m3
		Volume below packer	197.70 ft3	5.60 m3
		Annular volume above packer	3,439.60 ft3	97.40 m3
Gas Analysis				
	C02	(increasing slightly thru last test)	>19.4 %	>19.4 %
	H2S	(increasing slightly thru last test)	>1.5 %	>1.5 %
	CL		84,000 ppm	84,000 mg/ml
	TDS		135,000 ppm	135,000 mg/ml
SHORT TERM WELL TEST DATA				
Tubing		Size	3.5 in	88.9 mm
		Grade	L-80	L-80
Length of Test			14 days	14 days
Maximum Flow		Rate	20 mmcf/d	566 e3m3/d
		Duration	1 days	1 days
		Tubing Pressure	1580 psi	10895 kPa
		Wellhead Velocity	60 ft/s	18 m/s
		Equivalent "C" Value	145	145
		Maximum Wellhead Temperature	234 'F	112 'C
		Expected Water Gas Ratio	50 bbls/mmscf	275 m3/e3m3
		Expected Cumulative Water Prod	1000 bbls	159 m3
Extended Flow		Rate	18 mmcfd	510 e3m3/d
		Duration	4 days	4 days
		Tubing Pressure	1852 psi	12770 kPa
		Wellhead Velocity	43 ft/s	13 m/s
		Equivalent "C" Value	120	120
		Maximum Wellhead Temperature	234 'F	112 'C
		Expected Water Gas Ratio	50 bbls/mmscf	275 m3/e3m3
		Expected Cumulative Water Prod	900 bbls	143 m3
LONG TERM WELL PRODUCTION DATA				
Tubing		Size	4.5 in	114.3 mm
		Grade		
Flow Condition #1		Rate	31.1 mmscf/d	881 e3m3/d
C=100		Tubing Pressure	1650 psi	11380 kPa
		Wellhead Velocity	49 ft/s	15 m/s
		W/H Temperature (365 days)	244 'F	118 'C
		Expected WGR (at current WGR)	<70 bbls/mmscf	<385 m3/e3m3
		Equivalent Water Production Rate	<2177 bbls/d	<346 m3/d
Flow Condtion #2		Rate	39.8 mmscf/d	1127 e3m3/d
C=300		Tubing Pressure	515 psi	3550 kPa
		Wellhead Velocity	226 ft/s	69 m/s
		W/H Temperature (365 days)	244 'F	118 'C
		Expected WGR (at current WGR)	<70 bbls/mmscf	<385 m3/e3m3
		Equivalent Water Production Rate	<2786 bbls/d	<423 m3/d

10:47 AM 6/17/98

Halliburton Drilling Systems

Survey Report

Job No: 97d007s4
Date: 2/4/98
Time: 4:35 am
Wellpath ID: 97d007s4
Date Created: 1/27/97
Last Revision: 2/4/98

Calculated using the Minimum Curvature Method
Computed using WIN-CADDS REV2.2.0
Vertical Section Plane: 225.00 deg.

Survey Reference: WELLHEAD
Vertical Section Reference: WELLHEAD
Closure Reference: WELLHEAD
TVD Reference: WELLHEAD

RANGER OIL LIMITED
RANGER Fort Liard P - 66 - A
IN UNIT P SECTION 66
Cactus #26E KB: 459.89 m
97D007S4
UWI 300P666040123300

Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)	(m)	DLS (dg/30m)
04.00	38.10	207.60	2760.12	-2300.23	1111.15	800.89 S	770.52W	4.73
214.00	38.40	207.70	2767.97	-2308.08	1117.06	806.37 S	773.39W	0.92
3224.00	38.50	208.10	2775.80	-2315.91	1123.00	811.87 S	776.30W	0.80
3253.00	34.70	206.30	2799.08	-2339.19	1139.47	827.24 S	784.21W	4.08
3282.00	33.40	202.80	2823.11	-2363.22	1154.68	842.00 S	790.96W	2.43
3311.00	34.60	204.90	2847.15	-2387.26	1169.80	856.82 S	797.52W	1.74
3340.00	35.30	204.80	2870.92	-2411.03	1185.40	871.90 S	804.51W	0.73
3369.00	35.40	205.00	2894.57	-2434.68	1201.15	887.12 S	811.57W	0.16
3397.00	35.60	205.30	2917.37	-2457.48	1216.45	901.84 S	818.48W	0.28
3416.00	35.60	204.80	2932.82	-2472.93	1226.84	911.86 S	823.16W	0.46
3426.00	35.50	203.90	2940.95	-2481.06	1232.28	917.15 S	825.56W	1.60
3436.00	35.50	204.50	2949.09	-2489.20	1237.71	922.45 S	827.94W	1.05
3445.00	35.70	205.70	2956.41	-2496.52	1242.64	927.19 S	830.16W	2.42
3455.00	36.00	204.50	2964.52	-2504.63	1248.14	932.50 S	832.65W	2.29
3465.00	36.30	204.30	2972.59	-2512.70	1253.67	937.87 S	835.08W	0.97
3474.00	36.60	205.20	2979.83	-2519.94	1258.68	942.72 S	837.32W	2.04
3482.00	36.80	204.70	2986.25	-2526.36	1263.17	947.06 S	839.34W	1.35
EXTRAPOLATED TO T.D.								
3500.00	37.26	203.59	3000.62	-2540.73	1273.30	956.95 S	843.77W	1.35

Halliburton Drilling Systems

Survey Report

Job No: 97d007s4
Date: 2/2/98
Time: 5:24 am
Wellpath ID: 97d007s4
Date Created: 1/27/97
Last Revision: 2/2/98

Calculated using the Minimum Curvature Method
Computed using WIN-CADDS REV2.2.0
Vertical Section Plane: 225.00 deg.

Survey Reference: WELLHEAD
Vertical Section Reference: WELLHEAD
Closure Reference: WELLHEAD
TVD Reference: WELLHEAD

RANGER OIL LIMITED
RANGER Fort Liard P - 66 - A
IN UNIT P SECTION 66
Cactus #26E KB: 459.89 m
97D007S4
UWI 300P666040123300

Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)	(m)	DLS (dg/30m)
3095.00	43.90	219.80	2675.20	-2215.31	1044.91	742.93 S	734.79W	1.27
3122.00	40.40	214.70	2695.22	-2235.33	1062.85	757.33 S	745.77W	5.44
3138.00	36.90	208.80	2707.72	-2247.83	1072.57	765.81 S	751.03W	9.52
3157.00	37.00	208.70	2722.90	-2263.01	1083.53	775.82 S	756.53W	0.18
3185.00	37.80	209.50	2745.15	-2285.26	1099.89	790.68 S	764.80W	1.00
3195.00	38.10	209.90	2753.03	-2293.14	1105.82	796.02 S	767.85W	1.16
3204.00	38.10	207.60	2760.12	-2300.23	1111.15	800.89 S	770.52W	4.73
3214.00	38.40	207.70	2767.97	-2308.08	1117.06	806.37 S	773.39W	0.92
3224.00	38.50	208.10	2775.80	-2315.91	1123.00	811.87 S	776.30W	0.80
3253.00	34.70	206.30	2799.08	-2339.19	1139.47	827.24 S	784.21W	4.08
3282.00	33.40	202.80	2823.11	-2363.22	1154.68	842.00 S	790.96W	2.43
3311.00	34.60	204.90	2847.15	-2387.26	1169.80	856.82 S	797.52W	1.74
3340.00	35.30	204.80	2870.92	-2411.03	1185.40	871.90 S	804.51W	0.73

Halliburton Drilling Systems

Survey Report

Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)	(m)	Closure Dist. (m)	Dir. (deg.)	DLS (dg/30m)
2903.00	43.70	224.80	2539.46	-2079.57	909.53	640.40 S	645.87W	909.54	@225.24	2.39
2913.00	44.00	224.10	2546.67	-2086.78	916.46	645.34 S	650.72W	916.47	@225.24	1.71
2921.00	44.80	222.40	2552.39	-2092.50	922.05	649.42 S	654.56W	922.06	@225.23	5.38
2931.00	45.30	222.20	2559.45	-2099.56	929.12	654.66 S	659.32W	929.13	@225.20	1.56
2940.00	45.80	223.80	2565.75	-2105.86	935.54	659.35 S	663.70W	935.55	@225.19	4.16
2950.00	46.10	222.50	2572.71	-2112.82	942.72	664.60 S	668.62W	942.73	@225.17	2.94
2959.00	46.40	222.10	2578.93	-2119.04	949.22	669.41 S	672.99W	949.22	@225.15	1.39
2969.00	46.30	220.90	2585.83	-2125.94	956.44	674.82 S	677.79W	956.44	@225.13	2.62
2978.00	45.40	220.60	2592.10	-2132.21	962.88	679.72 S	682.00W	962.88	@225.10	3.08
2988.00	44.80	220.00	2599.16	-2139.27	969.94	685.12 S	686.58W	969.94	@225.06	2.21
2998.00	44.80	220.10	2606.26	-2146.37	976.96	690.51 S	691.12W	976.96	@225.03	0.21
3013.00	45.20	220.40	2616.86	-2156.97	987.53	698.61 S	697.97W	987.53	@224.97	0.91
3023.00	45.20	220.60	2623.91	-2164.02	994.60	704.00 S	702.58W	994.60	@224.94	0.43
3032.00	44.90	219.70	2630.27	-2170.38	1000.95	708.87 S	706.69W	1000.95	@224.91	2.35
3036.00	44.80	219.70	2633.10	-2173.21	1003.76	711.04 S	708.49W	1003.76	@224.90	0.75
3045.00	44.90	219.60	2639.48	-2179.59	1010.08	715.93 S	712.54W	1010.08	@224.86	0.41
3054.00	44.60	219.50	2645.88	-2185.99	1016.39	720.81 S	716.57W	1016.39	@224.83	1.03
3064.00	44.50	219.20	2653.00	-2193.11	1023.37	726.24 S	721.02W	1023.37	@224.79	0.70
3073.00	44.30	219.40	2659.43	-2199.54	1029.63	731.11 S	725.01W	1029.64	@224.76	0.81
3085.00	44.30	219.60	2668.02	-2208.13	1037.98	737.58 S	730.34W	1037.99	@224.72	0.35
3095.00	43.90	219.80	2675.20	-2215.31	1044.91	742.93 S	734.79W	1044.92	@224.68	1.27
PROJECTED TO BIT.										
3115.00	43.90	219.80	2689.61	-2229.72	1058.72	753.59 S	743.66W	1058.74	@224.62	0.00

Halliburton Drilling Systems

Survey Report

Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)	(m)	Closure Dist. (m)	Dir. (deg.)	DLS (dg/30m)
2525.00	45.60	229.40	2269.92	-1810.03	644.95	459.19 S	452.91W	644.97	@224.61	0.71
2535.00	45.50	229.00	2276.93	-1817.04	652.07	463.85 S	458.32W	652.06	@224.66	0.91
2544.00	45.30	230.30	2283.25	-1823.36	658.46	468.00 S	463.20W	658.46	@224.70	3.16
2555.00	45.20	230.30	2290.99	-1831.10	666.23	472.99 S	469.21W	666.24	@224.77	0.27
2564.00	44.80	230.20	2297.35	-1837.46	672.57	477.06 S	474.10W	672.56	@224.82	1.35
2574.00	44.80	229.00	2304.45	-1844.56	679.60	481.62 S	479.47W	679.60	@224.87	2.54
2583.00	45.30	228.10	2310.81	-1850.92	685.95	485.84 S	484.24W	685.95	@224.91	2.70
2593.00	45.90	227.10	2317.80	-1857.91	693.09	490.66 S	489.52W	693.09	@224.93	2.80
2603.00	46.70	225.50	2324.71	-1864.82	700.32	495.65 S	494.74W	700.32	@224.95	4.22
2612.00	46.70	224.10	2330.89	-1871.00	706.87	500.30 S	499.36W	706.87	@224.95	3.40
2622.00	46.50	223.50	2337.76	-1877.87	714.13	505.55 S	504.39W	714.13	@224.93	1.44
2632.00	46.60	224.10	2344.63	-1884.74	721.39	510.79 S	509.41W	721.39	@224.92	1.34
2641.00	46.30	224.50	2350.84	-1890.95	727.91	515.45 S	513.97W	727.91	@224.92	1.39
2651.00	45.70	223.80	2357.78	-1897.89	735.10	520.61 S	518.98W	735.10	@224.91	2.35
2660.00	44.90	223.40	2364.11	-1904.22	741.50	525.25 S	523.39W	741.50	@224.90	2.83
2670.00	44.30	223.30	2371.23	-1911.34	748.52	530.35 S	528.21W	748.52	@224.88	1.81
2680.00	44.30	224.70	2378.39	-1918.50	755.50	535.38 S	533.06W	755.50	@224.88	2.93
2689.00	44.30	224.70	2384.83	-1924.94	761.79	539.84 S	537.48W	761.79	@224.87	0.00
2699.00	44.50	225.30	2391.98	-1932.09	768.78	544.79 S	542.43W	768.78	@224.88	1.40
2709.00	44.60	225.80	2399.10	-1939.21	775.80	549.70 S	547.44W	775.80	@224.88	1.09
2718.00	44.70	225.40	2405.50	-1945.61	782.12	554.13 S	551.96W	782.12	@224.89	0.99
2728.00	44.80	226.60	2412.61	-1952.72	789.16	559.02 S	557.02W	789.16	@224.90	2.55
2738.00	45.10	227.60	2419.68	-1959.79	796.22	563.83 S	562.20W	796.22	@224.92	2.30
2747.00	45.40	228.00	2426.02	-1966.13	802.60	568.12 S	566.93W	802.61	@224.94	1.38
2756.00	45.40	229.30	2432.34	-1972.45	809.00	572.36 S	571.74W	809.00	@224.97	3.09
2766.00	44.80	230.00	2439.40	-1979.51	816.06	576.94 S	577.14W	816.06	@225.01	2.34
2776.00	43.80	229.30	2446.56	-1986.67	823.02	581.46 S	582.46W	823.02	@225.05	3.34
2785.00	43.00	229.80	2453.09	-1993.20	829.18	585.48 S	587.17W	829.19	@225.08	2.90
2795.00	42.50	227.90	2460.44	-2000.55	835.96	589.94 S	592.26W	835.96	@225.11	4.15
2804.00	42.20	228.20	2467.09	-2007.20	842.01	593.99 S	596.79W	842.01	@225.13	1.21
2814.00	42.20	227.00	2474.50	-2014.61	848.72	598.52 S	601.75W	848.72	@225.15	2.42
2827.00	42.40	226.80	2484.11	-2024.22	857.47	604.50 S	608.14W	857.47	@225.17	0.56
2836.00	43.20	227.60	2490.72	-2030.83	863.58	608.66 S	612.62W	863.58	@225.19	3.22
2845.00	43.40	226.90	2497.27	-2037.38	869.74	612.85 S	617.16W	869.75	@225.20	1.73
2855.00	43.30	226.50	2504.54	-2044.65	876.60	617.55 S	622.15W	876.61	@225.21	0.88
2864.00	43.10	226.10	2511.10	-2051.21	882.76	621.81 S	626.61W	882.77	@225.22	1.13
2874.00	43.30	226.50	2518.39	-2058.50	889.61	626.54 S	631.56W	889.61	@225.23	1.02
2883.00	43.40	226.40	2524.93	-2065.04	895.78	630.80 S	636.03W	895.79	@225.24	0.40
2893.00	43.30	225.80	2532.20	-2072.31	902.65	635.56 S	640.98W	902.66	@225.24	1.27

Halliburton Drilling Systems

Survey Report

Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)	(m)	Closure Dist. (m)	Dir. (deg.)	DLS (dg/30m)
2142.00	47.60	231.50	2004.13	-1544.24	370.11	275.76 S	247.66W	370.64	@221.93	2.17
2152.00	47.80	232.60	2010.86	-1550.97	377.45	280.30 S	253.49W	377.92	@222.12	2.51
2162.00	46.90	232.70	2017.63	-1557.74	384.74	284.77 S	259.34W	385.16	@222.32	2.71
2171.00	45.90	232.90	2023.84	-1563.95	391.19	288.71 S	264.53W	391.57	@222.50	3.37
2181.00	46.00	233.00	2030.79	-1570.90	398.31	293.04 S	270.26W	398.64	@222.68	0.37
2191.00	46.40	233.90	2037.71	-1577.82	405.45	297.34 S	276.06W	405.73	@222.88	2.29
2201.00	46.60	232.90	2044.60	-1584.71	412.63	301.66 S	281.88W	412.86	@223.06	2.26
2211.00	46.20	233.00	2051.49	-1591.60	419.80	306.02 S	287.66W	420.00	@223.23	1.22
2221.00	45.60	232.10	2058.45	-1598.56	426.92	310.39 S	293.37W	427.09	@223.38	2.65
2231.00	45.00	231.60	2065.49	-1605.60	433.98	314.78 S	298.95W	434.12	@223.52	2.09
2240.00	44.40	231.80	2071.88	-1611.99	440.26	318.70 S	303.92W	440.39	@223.64	2.05
2249.00	43.90	230.20	2078.34	-1618.45	446.50	322.65 S	308.79W	446.60	@223.74	4.07
2259.00	43.60	228.70	2085.57	-1625.68	453.39	327.14 S	314.05W	453.49	@223.83	3.24
2269.00	43.90	227.90	2092.79	-1632.90	460.29	331.74 S	319.21W	460.38	@223.90	1.89
2278.00	44.90	226.60	2099.22	-1639.33	466.59	336.02 S	323.83W	466.67	@223.94	4.51
2288.00	46.10	226.00	2106.23	-1646.34	473.72	340.95 S	328.99W	473.79	@223.98	3.82
2298.00	47.40	225.40	2113.08	-1653.19	481.00	346.03 S	334.20W	481.07	@224.00	4.11
2307.00	48.00	225.70	2119.14	-1659.25	487.66	350.69 S	338.96W	487.73	@224.02	2.13
2317.00	48.00	225.50	2125.83	-1665.94	495.09	355.89 S	344.27W	495.16	@224.05	0.45
2327.00	47.70	226.00	2132.54	-1672.65	502.50	361.07 S	349.58W	502.57	@224.07	1.43
2336.00	47.60	226.70	2138.60	-1678.71	509.15	365.66 S	354.39W	509.21	@224.10	1.76
2346.00	47.10	227.50	2145.38	-1685.49	516.50	370.67 S	359.78W	516.56	@224.15	2.32
2356.00	46.60	227.80	2152.22	-1692.33	523.79	375.58 S	365.17W	523.84	@224.19	1.64
2365.00	46.10	228.60	2158.43	-1698.54	530.29	379.92 S	370.02W	530.34	@224.24	2.55
2375.00	45.70	227.40	2165.39	-1705.50	537.46	384.73 S	375.36W	537.50	@224.29	2.85
2384.00	45.20	226.70	2171.70	-1711.81	543.87	389.10 S	380.05W	543.91	@224.33	2.35
2393.00	45.30	226.30	2178.04	-1718.15	550.26	393.50 S	384.69W	550.29	@224.35	1.00
2403.00	45.70	224.50	2185.05	-1725.16	557.39	398.50 S	389.77W	557.43	@224.37	4.03
2419.00	46.30	224.10	2196.16	-1736.27	568.90	406.74 S	397.81W	568.94	@224.36	1.25
2429.00	46.80	223.50	2203.04	-1743.15	576.16	411.98 S	402.83W	576.19	@224.36	1.99
2439.00	46.80	224.10	2209.89	-1750.00	583.45	417.24 S	407.88W	583.48	@224.35	1.31
2448.00	46.30	224.10	2216.07	-1756.18	589.98	421.93 S	412.42W	590.02	@224.35	1.67
2457.00	46.00	225.50	2222.31	-1762.42	596.47	426.54 S	417.00W	596.51	@224.35	3.51
2467.00	45.70	225.90	2229.28	-1769.39	603.64	431.55 S	422.13W	603.66	@224.37	1.25
2477.00	45.40	226.80	2236.28	-1776.39	610.78	436.48 S	427.30W	610.81	@224.39	2.13
2487.00	45.50	228.20	2243.29	-1783.40	617.90	441.29 S	432.59W	617.93	@224.43	3.01
2496.00	45.50	228.20	2249.60	-1789.71	624.31	445.57 S	437.34W	624.34	@224.47	0.00
2506.00	45.40	228.10	2256.62	-1796.73	631.42	450.33 S	442.64W	631.45	@224.51	0.37
2516.00	45.60	229.70	2263.63	-1803.74	638.54	455.01 S	448.02W	638.56	@224.56	3.48

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Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)		Closure Dist. (m)	Closure Dir. (deg.)	DLS (dg/30m)
1755.00	35.10	226.20	1733.05	-1273.16	95.83	94.53 S	40.95W	103.04	@203.44	4.43
1764.00	36.10	225.50	1740.37	-1280.48	101.07	98.18 S	44.75W	107.90	@204.50	3.60
1774.00	37.20	224.00	1748.39	-1288.50	107.04	102.42 S	48.95W	113.52	@205.55	4.25
1784.00	38.40	223.50	1756.29	-1296.40	113.16	106.85 S	53.19W	119.35	@206.46	3.72
1793.00	39.60	223.80	1763.29	-1303.40	118.83	110.95 S	57.10W	124.78	@207.23	4.05
1803.00	40.80	225.00	1770.93	-1311.04	125.28	115.56 S	61.61W	130.96	@208.07	4.28
1813.00	41.60	223.90	1778.45	-1318.56	131.87	120.26 S	66.23W	137.29	@208.84	3.24
1826.00	43.10	224.50	1788.06	-1328.17	140.62	126.54 S	72.33W	145.75	@209.75	3.58
1836.00	43.40	224.20	1795.34	-1335.45	147.47	131.44 S	77.12W	152.39	@210.40	1.09
1847.00	43.40	225.40	1803.33	-1343.44	155.03	136.80 S	82.45W	159.72	@211.08	2.25
1857.00	43.70	224.70	1810.58	-1350.69	161.92	141.67 S	87.32W	166.42	@211.65	1.70
1866.00	44.60	225.90	1817.04	-1357.15	168.19	146.08 S	91.76W	172.52	@212.14	4.09
1876.00	44.90	225.60	1824.14	-1364.25	175.23	150.99 S	96.82W	179.37	@212.67	1.10
1885.00	45.70	226.40	1830.47	-1370.58	181.62	155.43 S	101.42W	185.60	@213.13	3.27
1895.00	46.20	228.20	1837.42	-1377.53	188.81	160.30 S	106.71W	192.57	@213.65	4.16
1904.00	46.50	228.80	1843.64	-1383.75	195.31	164.62 S	111.58W	198.87	@214.13	1.76
1914.00	46.80	228.50	1850.50	-1390.61	202.56	169.42 S	117.04W	205.92	@214.64	1.11
1923.00	47.10	229.40	1856.65	-1396.76	209.12	173.74 S	122.00W	212.30	@215.08	2.41
1933.00	47.50	231.30	1863.43	-1403.54	216.44	178.43 S	127.66W	219.40	@215.58	4.36
1942.00	48.40	231.40	1869.46	-1409.57	223.08	182.61 S	132.88W	225.84	@216.04	3.01
1952.00	48.50	231.20	1876.09	-1416.20	230.52	187.28 S	138.72W	233.06	@216.53	0.54
1962.00	48.60	231.20	1882.71	-1422.82	237.97	191.98 S	144.56W	240.32	@216.98	0.30
1971.00	49.00	231.60	1888.64	-1428.75	244.70	196.21 S	149.85W	246.89	@217.37	1.67
1981.00	48.50	231.70	1895.23	-1435.34	252.17	200.87 S	155.75W	254.16	@217.79	1.52
1990.00	47.90	231.70	1901.23	-1441.34	258.83	205.03 S	161.02W	260.70	@218.14	2.00
2000.00	48.00	232.60	1907.93	-1448.04	266.20	209.58 S	166.88W	267.91	@218.53	2.03
2010.00	48.30	232.40	1914.60	-1454.71	273.59	214.12 S	172.79W	275.14	@218.90	1.00
2019.00	47.80	232.30	1920.61	-1460.72	280.22	218.21 S	178.09W	281.66	@219.22	1.69
2028.00	47.40	231.30	1926.68	-1466.79	286.82	222.32 S	183.31W	288.15	@219.51	2.80
2038.00	47.70	231.30	1933.43	-1473.54	294.16	226.93 S	189.07W	295.37	@219.80	0.90
2048.00	47.90	230.50	1940.15	-1480.26	301.53	231.60 S	194.82W	302.65	@220.07	1.88
2065.00	47.40	229.60	1951.60	-1491.71	314.04	239.67 S	204.45W	315.03	@220.47	1.47
2075.00	46.50	229.30	1958.43	-1498.54	321.33	244.42 S	210.00W	322.25	@220.67	2.78
2084.00	45.90	228.50	1964.66	-1504.77	327.81	248.69 S	214.90W	328.68	@220.83	2.78
2094.00	46.70	229.80	1971.57	-1511.68	335.02	253.42 S	220.37W	335.83	@221.01	3.70
2104.00	47.50	230.20	1978.37	-1518.48	342.31	258.13 S	225.98W	343.07	@221.20	2.56
2113.00	47.40	231.40	1984.46	-1524.57	348.91	262.32 S	231.12W	349.61	@221.38	2.97
2123.00	47.20	230.50	1991.24	-1531.35	356.22	266.95 S	236.82W	356.86	@221.58	2.07
2133.00	47.20	230.80	1998.04	-1538.15	363.52	271.60 S	242.50W	364.10	@221.76	0.66

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1378.00	3.00	123.50	1376.79	-916.90	-10.96	15.17 S	30.67 E	34.21	@116.32	1.02
1388.00	3.20	136.50	1386.78	-926.89	-11.00	15.51 S	31.08 E	34.73	@116.53	2.19
1398.00	3.60	151.50	1396.76	-936.87	-10.91	15.99 S	31.42 E	35.25	@116.98	2.92
1408.00	4.40	169.70	1406.73	-946.84	-10.60	16.65 S	31.64 E	35.75	@117.75	4.47
1417.00	5.20	182.00	1415.70	-955.81	-10.10	17.39 S	31.68 E	36.14	@118.77	4.33
1427.00	6.20	190.40	1425.65	-965.76	-9.33	18.38 S	31.57 E	36.53	@120.20	3.90
1436.00	6.90	197.40	1434.60	-974.71	-8.45	19.37 S	31.32 E	36.83	@121.74	3.54
1446.00	8.00	205.30	1444.51	-984.62	-7.26	20.57 S	30.84 E	37.08	@123.71	4.50
1456.00	9.30	211.40	1454.40	-994.51	-5.82	21.89 S	30.13 E	37.24	@126.01	4.77
1465.00	10.70	214.80	1463.26	-1003.37	-4.29	23.20 S	29.27 E	37.35	@128.40	5.06
1474.00	11.60	217.20	1472.09	-1012.20	-2.57	24.61 S	28.25 E	37.46	@131.06	3.37
1484.00	12.40	218.80	1481.87	-1021.98	-0.51	26.24 S	26.96 E	37.63	@134.22	2.60
1494.00	12.60	219.30	1491.63	-1031.74	1.64	27.93 S	25.60 E	37.86	@137.49	0.68
1503.00	12.80	220.00	1500.41	-1040.52	3.61	29.45 S	24.34 E	38.20	@140.43	0.84
1513.00	12.90	220.20	1510.16	-1050.27	5.83	31.15 S	22.91 E	38.67	@143.67	0.33
1523.00	13.30	219.40	1519.90	-1060.01	8.09	32.89 S	21.46 E	39.27	@146.88	1.32
1533.00	13.70	219.60	1529.63	-1069.74	10.41	34.69 S	19.97 E	40.03	@150.07	1.21
1543.00	14.50	220.60	1539.33	-1079.44	12.84	36.56 S	18.40 E	40.93	@153.28	2.51
1553.00	15.10	221.00	1548.99	-1089.10	15.38	38.49 S	16.73 E	41.97	@156.50	1.83
1562.00	15.80	223.20	1557.67	-1097.78	17.78	40.27 S	15.12 E	43.01	@159.41	3.04
1572.00	16.70	222.30	1567.27	-1107.38	20.57	42.32 S	13.22 E	44.34	@162.65	2.80
1582.00	17.50	222.80	1576.83	-1116.94	23.51	44.49 S	11.24 E	45.88	@165.83	2.44
1592.00	17.90	224.70	1586.35	-1126.46	26.55	46.68 S	9.13 E	47.57	@168.93	2.11
1602.00	18.10	225.30	1595.86	-1135.97	29.64	48.87 S	6.95 E	49.36	@171.91	0.82
1612.00	18.10	225.60	1605.37	-1145.48	32.75	51.05 S	4.73 E	51.27	@174.70	0.28
1621.00	18.60	225.00	1613.91	-1154.02	35.58	53.04 S	2.72 E	53.11	@177.06	1.78
1631.00	19.70	225.60	1623.36	-1163.47	38.86	55.35 S	0.39 E	55.35	@179.60	3.35
1640.00	20.60	226.80	1631.81	-1171.92	41.96	57.49 S	1.85W	57.52	@181.84	3.30
1650.00	21.40	226.00	1641.14	-1181.25	45.54	59.96 S	4.44W	60.13	@184.24	2.55
1659.00	22.70	226.00	1649.49	-1189.60	48.92	62.31 S	6.87W	62.69	@186.30	4.33
1668.00	24.10	225.80	1657.74	-1197.85	52.50	64.80 S	9.44W	65.48	@188.29	4.67
1677.00	25.90	226.70	1665.90	-1206.01	56.30	67.43 S	12.19W	68.52	@190.25	6.13
1687.00	27.60	226.80	1674.83	-1214.94	60.80	70.51 S	15.47W	72.19	@192.37	5.10
1697.00	28.80	226.80	1683.64	-1223.75	65.52	73.75 S	18.91W	76.13	@194.38	3.60
1707.00	29.60	227.20	1692.37	-1232.48	70.40	77.07 S	22.48W	80.29	@196.26	2.47
1717.00	30.50	226.90	1701.03	-1241.14	75.40	80.49 S	26.15W	84.63	@198.00	2.74
1727.00	31.20	226.50	1709.61	-1249.72	80.53	84.00 S	29.88W	89.16	@199.58	2.19
1736.00	32.50	226.60	1717.26	-1257.37	85.27	87.27 S	33.32W	93.42	@200.90	4.34
1746.00	33.80	226.70	1725.63	-1265.74	90.74	91.02 S	37.30W	98.37	@202.28	3.90

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963.00	4.40	164.20	962.27	-502.38	-13.47	3.65 S	22.70 E	22.99	@ 99.14	2.67
973.00	5.30	170.50	972.23	-512.34	-13.01	4.48 S	22.88 E	23.31	@101.07	3.13
983.00	5.60	176.90	982.19	-522.30	-12.42	5.42 S	22.98 E	23.61	@103.27	2.03
989.00	5.50	178.70	988.16	-528.27	-12.02	6.00 S	23.00 E	23.77	@104.62	1.00
INTERPOLATED 13 3/4 CAS. POINT										
1007.00	5.39	179.13	1006.08	-546.19	-10.84	7.71 S	23.04 E	24.29	@108.50	0.20
1019.00	4.80	179.30	1018.03	-558.14	-10.10	8.77 S	23.05 E	24.66	@110.84	1.48
1029.00	4.40	176.80	1028.00	-568.11	-9.55	9.57 S	23.08 E	24.98	@112.53	1.34
1039.00	4.00	174.50	1037.97	-578.08	-9.07	10.30 S	23.13 E	25.32	@114.01	1.30
1048.00	3.50	170.40	1046.95	-587.06	-8.71	10.89 S	23.21 E	25.64	@115.13	1.89
1058.00	3.00	169.30	1056.93	-597.04	-8.39	11.45 S	23.31 E	25.97	@116.15	1.51
1068.00	2.60	166.80	1066.92	-607.03	-8.12	11.92 S	23.41 E	26.27	@116.99	1.25
1077.00	2.00	160.40	1075.91	-616.02	-7.95	12.27 S	23.51 E	26.52	@117.56	2.17
1087.00	1.60	144.50	1085.91	-626.02	-7.85	12.55 S	23.65 E	26.77	@117.95	1.91
1097.00	1.20	128.50	1095.91	-636.02	-7.84	12.73 S	23.81 E	27.00	@118.13	1.67
1106.00	1.20	115.70	1104.90	-645.01	-7.88	12.83 S	23.97 E	27.19	@118.15	0.89
1116.00	1.10	106.10	1114.90	-655.01	-7.96	12.90 S	24.16 E	27.36	@118.10	0.65
1126.00	1.20	105.30	1124.90	-665.01	-8.06	12.95 S	24.35 E	27.56	@118.01	0.30
1136.00	1.20	114.10	1134.90	-675.01	-8.15	13.02 S	24.55 E	27.79	@117.95	0.55
1146.00	1.20	108.80	1144.90	-685.01	-8.23	13.10 S	24.74 E	27.99	@117.90	0.33
1156.00	1.30	109.60	1154.89	-695.00	-8.33	13.17 S	24.95 E	28.21	@117.84	0.30
1165.00	1.30	101.40	1163.89	-704.00	-8.43	13.23 S	25.14 E	28.41	@117.75	0.62
1175.00	1.60	98.00	1173.89	-714.00	-8.57	13.27 S	25.39 E	28.65	@117.59	0.94
1185.00	1.60	95.40	1183.88	-723.99	-8.75	13.30 S	25.67 E	28.91	@117.39	0.22
1193.00	1.30	97.90	1191.88	-731.99	-8.87	13.32 S	25.87 E	29.10	@117.25	1.15
TIE-IN FOR SIDETRACK # 3										
1203.00	1.20	94.50	1201.88	-741.99	-9.01	13.35 S	26.09 E	29.30	@117.10	0.37
1233.00	1.30	94.10	1231.87	-771.98	-9.43	13.40 S	26.74 E	29.91	@116.61	0.10
1262.00	1.40	107.80	1260.86	-800.97	-9.81	13.53 S	27.40 E	30.56	@116.27	0.35
TIE-IN FOR SIDETRACK #4										
1291.00	1.10	112.40	1289.86	-829.97	-10.08	13.74 S	28.00 E	31.19	@116.14	0.33
1310.00	0.40	110.50	1308.86	-848.97	-10.18	13.84 S	28.23 E	31.44	@116.11	1.11
1320.00	1.20	117.10	1318.85	-858.96	-10.23	13.90 S	28.36 E	31.56	@116.11	2.41
INTERPOLATED - KICK OFF POINT										
1327.00	1.66	125.42	1325.85	-865.96	-10.26	13.99 S	28.50 E	31.75	@116.14	2.16
1329.00	1.80	127.00	1327.85	-867.96	-10.27	14.02 S	28.55 E	31.81	@116.16	2.22
1339.00	2.50	120.40	1337.84	-877.95	-10.35	14.23 S	28.87 E	32.16	@116.24	2.22
1349.00	2.90	115.50	1347.83	-887.94	-10.49	14.45 S	29.28 E	32.65	@116.26	1.38
1358.00	3.10	114.40	1356.82	-896.93	-10.65	14.65 S	29.71 E	33.12	@116.24	0.69
1368.00	3.20	118.40	1366.81	-906.92	-10.83	14.89 S	30.20 E	33.67	@116.25	0.72

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Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)	(m)	Closure Dist. (m)	Dir. (deg.)	DLS (dg/30m)
586.00	1.90	122.80	585.52	-125.63	-14.00	3.69 N	16.10 E	16.52	@ 77.09	0.85
596.00	1.70	107.60	595.52	-135.63	-14.10	3.56 N	16.39 E	16.77	@ 77.75	1.55
605.00	1.90	97.90	604.51	-144.62	-14.25	3.50 N	16.66 E	17.02	@ 78.15	1.21
614.00	2.00	92.80	613.51	-153.62	-14.45	3.47 N	16.97 E	17.32	@ 78.44	0.67
624.00	2.20	88.10	623.50	-163.61	-14.71	3.47 N	17.33 E	17.67	@ 78.69	0.79
634.00	2.20	92.00	633.49	-173.60	-14.98	3.47 N	17.72 E	18.05	@ 78.93	0.45
644.00	2.20	101.00	643.49	-183.60	-15.22	3.42 N	18.10 E	18.42	@ 79.29	1.04
654.00	2.30	103.80	653.46	-193.59	-15.43	3.34 N	18.48 E	18.78	@ 79.76	0.45
663.00	2.40	113.60	662.47	-202.58	-15.59	3.22 N	18.83 E	19.10	@ 80.29	1.38
673.00	2.50	124.30	672.46	-212.57	-15.71	3.01 N	19.20 E	19.43	@ 81.08	1.40
683.00	2.40	130.50	682.45	-222.56	-15.76	2.75 N	19.54 E	19.73	@ 81.98	0.85
693.00	2.20	136.30	692.45	-232.56	-15.78	2.48 N	19.83 E	19.98	@ 82.87	0.92
702.00	1.90	144.50	701.44	-241.55	-15.75	2.23 N	20.04 E	20.16	@ 83.64	1.40
712.00	1.60	151.30	711.43	-251.54	-15.68	1.98 N	20.20 E	20.30	@ 84.41	1.09
722.00	1.20	151.40	721.43	-261.54	-15.61	1.76 N	20.32 E	20.39	@ 85.04	1.20
731.00	0.80	165.00	730.43	-270.54	-15.55	1.62 N	20.38 E	20.44	@ 85.46	1.54
741.00	0.40	183.40	740.43	-280.54	-15.49	1.52 N	20.39 E	20.45	@ 85.75	1.32
751.00	0.10	158.00	750.43	-290.54	-15.46	1.47 N	20.39 E	20.45	@ 85.87	0.94
760.00	0.30	45.00	759.43	-299.54	-15.48	1.48 N	20.41 E	20.47	@ 85.85	1.17
770.00	0.70	53.90	769.43	-309.54	-15.57	1.54 N	20.48 E	20.54	@ 85.71	1.22
780.00	0.90	64.60	779.43	-319.54	-15.70	1.61 N	20.60 E	20.67	@ 85.54	0.75
789.00	1.00	79.60	788.43	-328.54	-15.84	1.65 N	20.74 E	20.81	@ 85.45	0.89
799.00	1.10	111.10	798.43	-338.54	-15.95	1.63 N	20.92 E	20.98	@ 85.54	1.73
808.00	1.30	135.40	807.42	-347.53	-15.98	1.53 N	21.07 E	21.13	@ 85.85	1.81
818.00	1.40	155.00	817.42	-357.53	-15.94	1.34 N	21.20 E	21.24	@ 86.39	1.41
827.00	2.00	182.50	826.42	-366.53	-15.78	1.08 N	21.24 E	21.27	@ 87.09	3.32
837.00	2.50	208.80	836.41	-376.52	-15.45	0.71 N	21.13 E	21.14	@ 88.06	3.40
847.00	2.80	220.10	846.40	-386.51	-14.99	0.34 N	20.87 E	20.87	@ 89.07	1.80
857.00	2.90	219.60	856.39	-396.50	-14.50	0.04 S	20.55 E	20.55	@ 90.12	0.31
866.00	2.40	211.50	865.38	-405.49	-14.09	0.38 S	20.31 E	20.31	@ 91.07	2.08
876.00	2.10	185.40	875.37	-415.48	-13.74	0.74 S	20.18 E	20.19	@ 92.11	3.17
886.00	2.00	153.30	885.36	-425.47	-13.55	1.08 S	20.24 E	20.27	@ 93.05	3.41
896.00	2.20	123.50	895.36	-435.47	-13.53	1.34 S	20.48 E	20.52	@ 93.75	3.29
905.00	2.70	118.00	904.35	-444.46	-13.63	1.54 S	20.81 E	20.87	@ 94.22	1.84
914.00	2.70	110.50	913.34	-453.45	-13.78	1.71 S	21.20 E	21.26	@ 94.61	1.18
924.00	2.70	111.50	923.33	-463.44	-13.97	1.88 S	21.63 E	21.72	@ 94.96	0.14
934.00	2.50	130.60	933.32	-473.43	-14.08	2.11 S	22.02 E	22.12	@ 95.47	2.65
944.00	3.20	153.20	943.31	-483.42	-14.01	2.50 S	22.31 E	22.45	@ 96.39	3.93
954.00	3.60	163.70	953.29	-493.40	-13.77	3.05 S	22.53 E	22.73	@ 97.71	2.22

Halliburton Drilling Systems

Survey Report

Job No: 97D006
Date: 16/10/97
Time: 11.12 am
Wellpath ID: 97d006s4
Date Created: 27/01/97
Last Revision: 16/10/97

Calculated using the Minimum Curvature Method
Computed using PDS VER2.2.4 - BETA
Vertical Section Plane: 225.00 deg.

Survey Reference: WELLHEAD
Vertical Section Reference: WELLHEAD
Closure Reference: WELLHEAD
TVD Reference: WELLHEAD

RANGER OIL LIMITED
RANGER Fort Liard P - 66 - A
IN UNIT P SECTION 66
Cactus #26E KB: 459.89 m
97D006
UWI 300P666040123300

Measured Depth (m)	Incl (deg.)	Drift Dir. (deg.)	TVD (m)	Subsea Depth (m)	Vertical Section (m)	TOTAL Rectangular Offsets (m)	(m)	Closure Dist. (m)	Dir. (deg.)	DLS (dg/30m)
0.00	0.00	0.00	0.00	459.89	0.00	0.00 N	0.00 E	0.00	@ 0.00	0.00
First Single-Shot Directional Survey 199m										
199.00	0.50	36.40	199.00	260.89	-0.86	0.70 N	0.52 E	0.87	@ 36.40	0.08
226.00	1.75	25.00	225.99	233.90	-1.36	1.17 N	0.76 E	1.39	@ 33.05	1.40
253.00	1.50	20.40	252.98	206.91	-2.07	1.87 N	1.06 E	2.15	@ 29.44	0.31
283.00	1.75	67.40	282.97	176.92	-2.65	2.42 N	1.62 E	2.91	@ 33.78	1.32
312.00	1.90	70.40	311.96	147.93	-3.70	2.75 N	2.48 E	3.70	@ 42.05	0.18
343.00	2.00	70.40	342.94	116.95	-4.65	3.10 N	3.47 E	4.66	@ 48.23	0.10
374.00	2.25	59.40	373.92	85.97	-5.73	3.59 N	4.51 E	5.76	@ 51.43	0.46
403.00	3.00	68.40	402.89	57.00	-6.97	4.16 N	5.70 E	7.06	@ 53.87	0.88
433.00	3.30	70.90	432.84	27.05	-8.47	4.73 N	7.25 E	8.66	@ 56.85	0.33
MWD SURVEY'S										
451.00	4.40	71.30	450.80	9.09	-9.56	5.12 N	8.39 E	9.83	@ 58.59	1.63
460.00	4.30	71.10	459.77	0.12	-10.17	5.34 N	9.04 E	10.50	@ 59.40	0.34
470.00	4.30	74.20	469.75	-9.86	-10.83	5.57 N	9.75 E	11.23	@ 60.28	0.70
480.00	4.30	79.10	479.72	-19.83	-11.47	5.74 N	10.48 E	11.95	@ 61.29	1.10
490.00	4.20	87.40	489.69	-29.80	-12.05	5.83 N	11.21 E	12.64	@ 62.54	1.87
499.00	4.10	93.10	498.67	-38.78	-12.51	5.83 N	11.87 E	13.22	@ 63.85	1.41
509.00	4.10	99.30	508.64	-48.75	-12.96	5.75 N	12.58 E	13.83	@ 65.43	1.33
518.00	4.00	107.10	517.62	-57.73	-13.29	5.60 N	13.19 E	14.33	@ 66.98	1.86
528.00	3.80	114.70	527.60	-67.71	-13.57	5.36 N	13.83 E	14.83	@ 68.80	1.66
538.00	3.50	123.60	537.58	-77.69	-13.75	5.06 N	14.38 E	15.25	@ 70.63	1.92
547.00	3.20	129.50	546.56	-86.67	-13.82	4.74 N	14.81 E	15.55	@ 72.23	1.52
557.00	2.80	129.60	556.55	-96.66	-13.87	4.41 N	15.21 E	15.84	@ 73.83	1.20
566.00	2.40	130.80	565.54	-105.65	-13.91	4.15 N	15.52 E	16.07	@ 75.04	1.35
576.00	2.10	128.60	575.53	-115.64	-13.94	3.90 N	15.82 E	16.30	@ 76.16	0.94

OPERATIONAL NOTES

1. Ensure all contractor/equipment inspections conform to the current company and government safety requirements and regulations.

2. Prior to rigging into the wellhead, hold a pre-job safety meeting with all personnel outlining the line of command, WHMIS, H_2S, safety, safety clothing policy, crew responsibility for well control and pressure/well testing procedures.

3. Brief all personnel on Ranger's Site Specific Emergency Response Plan (ERP) **APPENDIX IV**.

4. Daily safety meetings are required for each shift, outlining the proposed operations for the day.

5. All surface equipment, which will be in contact with combustible fluids, will be purged prior to commencement of the flow from the well. Purging of equipment is to be undertaken per ARP 4.2.11.

6. Ensure proper equipment handling procedures are taken during handling due to the very high well operating temperatures.

7. **NO FLOW OPERATIONS ARE TO BE INITIATED IN DARKNESS.**

8. Ensure emergency service phone numbers are posted in the camp, engineer's shack and first aid shack.

9. Always maintain a current count of personnel onsite and in camp and a log of site visitors.

Wellbore Capacities

Tubular	OD mm	Drift ID mm	Capacity m^3/m	Length m	Volume m^3
244 mm	244.5	212.83	0.037994	2900	110.1
178 mm	177.8	156.24	0.019927	410	8.17
114.3mm	114.3	97.35	.007944	2949	23.43
89 mm	88.9	72.82	0.004528	3070	13.90
73 mm	73.0	59.61	0.003014	5	0.02
38 mm CT	38.1	32.56	0.000832	4000	3.33
114.3x244 annulus	----	-----	.02665/.02792	457/2452	80.63
114.3x178 annulus	----	----	.0097	40	.39
89 X 244 Annulus	----	----	0.031781	2900	92.1
89 X 178 Annulus	----	----	0.013751	170	2.34
73 X 178 Annulus	----	----	0.015770	5	0.08
38 X 89 Annulus	----	----	0.003402	2900	9.86
38 X 178 Annulus	----	----	0.0188156	320	6.02

FORT LIARD P-66A OPERATIONS PROGRAM

MOVING IN EQUIPMENT

		Full Time Personnel	Part Time Personnel
1.	Initial set-up requires the following equipment:		
i.	Wellsite Supervisor on MIRU c/w Ranger truck, mobile & M-Sat unit for Communications back-up	1	
ii.	ABB Vetco Service Truck/Service Hand – For removal/installation of backpressure valve and valve servicing.	1	
iii.	H_2S – Well has field measurements of 1 – 1.5% H_2S – 500 ppm ERP = 573 m At AOF of 710 x $10^3 m^3$/day		
	Safety equipment required: 1 Truck & H_2S air trailer 1 4 head rig rats remote sensing units (3 H_2S, 1 LEL) 2 Air compressor & air quality filters 4 Scada packs 1 Base station c/w wind sock Consumables Personal H_2S monitors.	1	
	The ERP encompasses the lease and camp.		
	Native trappers may also fall within this ERP. The Liard community is to be informed of any flow events and their anticipated duration.		
iv.	Camp & Catering – a 36 man camp is proposed for set up on the outside perimeter of the lease.	3	
	It is anticipated the facility will be fully utilized. The grocery truck will be required on start-up.		
v.	Testing equipment	4	
	134 bbl x 125 psi low stage separator (250 psi unit preferred if available) xxx flanged flowline (3" x 10,000 psi) 120' x 8" flare stack, 328' x 4.5" x 2000 psi flare line		
	Note: All test equipment is to be tested and certified to working capacity.		

vii.	First Aid Ambulance	1	
viii.	Electric Logging.		3
	Electric logging services unit with casing inspection logging capability to measure the casing thicknesses and monitor for pits: ➢ DVRT Tool ➢ Full Hole gauge rings (177.7mm & 244.5mm)		
ix.	Lowboy/Bed Truck	1	
	Transportation of miscellaneous equipment to and from site.		
x.	1 x 100 bbl Tank Trucks (1- fresh water)	1	
xi.	Service Rig c/w triplex pump and tank (96m3 Capacity) - 215,000# Hook Load	5	
	A service rig will be brought in. This unit will be required to pull tbg and run 114.3mm final production string.		
xii.	400 bbl Tanks		
	A number of storage tanks will be required to inventory fuels and store re-circulated fluids		
	TOTAL	18	3

OPERATIONS PROGRAM

DIRECTIONS: ***From Ft Nelson, N on BC Hwy # 97 to Junction 77, N on BC Hwy 77 (NWT Hwy 7) to Ft. Liard turnoff. Continue N on Hwy 7, 50km. Turn Lt., 2km to ferry landing. Barge across the Liard River and follow lease road ~15km to lease.***

1. **Equipment Mobilization**

Mobilization of equipment from their base of operations to the P-66A site will be coordinated by the Ranger Oil Limited representatives.

Ensure emergency service phone numbers are posted in the camp, engineer's shack and first aid shack.

2. **Equipment Requirements**

All equipment required to initiate the production tubing replacement is to be mobilized from their base of operations to the P-66A wellsite.

3. **Equipment Rig-Up**

i. Move in the service rig and equipment as required. Spot equipment and rig up per ARP requirements as attached in **Appendix V.** Spot additional tankage for storage of fluid.

NOTE: Hold a pre-spud meeting with all personnel on location. The meeting should address all aspects of the proposed operations.

Fill the rig tank with 125m^3 fresh water. **Contact Calgary office for instructions on chemicals required to inhibit the annulus and bring the water ph to +11.** The volume should be sufficient to ensure the full circulation of the 114.3/177.8/244.5mm annuli.

ii. Rig up the cold test unit per ARP requirements as documented in Appendix I.

NOTE: Do not tie into the well at this time.

NOTE: Equipment positioning is to consider that ≈ 1.5% H_2S gas will be produced. The camp, engineering and first aid shacks will be based at the North end of lease.

Rig in of equipment to the wellhead components shall be undertaken to ensure that no components are open to pressure from the wellbore downstream of the ESD valve.

iii. Using the rig pump, fill all surface lines, which have potential to be subjected to wellhead pressure. Pressure test all components to 1.4 & 35 MPa for 10 minutes each test. All deficiencies are to be repaired and re-tested.

NOTE: All surface equipment, which will be in contact with combustible fluids, is to be purged prior to commencement of any flow. Purging of test equipment is to be undertaken per ARP 4.2.11 attached.

No flow operations are to be initiated in darkness.

Prior to rigging into the wellhead, hold a pre-job safety meeting with all personnel outlining the line of command, WHMIS, H_2S, safety, safety clothing policy, crew responsibility for well control and pressure/well testing procedures. Ensure a total count of personnel on-site and in camp is taken at this time. Maintain a daily accounting of personnel associated with the total operation to include personnel working off-site.

6. **Wellhead Removal/BOP Installation**

i. Replacement of the tubing will not require removal of the Otis 'PX' plug in the nipple at 2950mKB. Operations will be carried out w/the well dead at all times. During operations, monitor the well for

fluid loss and gas pressure build-ups. The presents of these situations could be indicative of a plug failure.

ii. Rig in the ABB Vetco lubricator per **Appendix III** and pressure test to 28 MPa. Open the swab and master valves and confirm no pressure below. Sting in through the swab and master valves.

iii. Thread into the backpressure valve and open the bypass. Confirm that the tubing has 0 kPa behind the backpressure valve. With bypass open, bleed off any pressure and confirm plug is holding. Measure returned fluid volume and ensure tubing remains static for 15 minutes. Back out of the backpressure valve and unlatch from same. Lubricate out of wellhead. Rig out ABB equipment.

NOTE: If tubing pressure exists behind backpressure valve, attempt to bleed off to test unit. If unable to bleed off, thread the backpressure valve out of the hanger and lubricate out to recover same. Rig in slickline unit c/w full lubricator. Pressure test to 28 MPa. Run in with tools to check prong/plug integrity. Pull, redress & re-run as required. Retest as above

iv. Leave wellhead valves open and monitor tubing for signs of flow for 30min. Once well is confirmed static, remove the existing wellhead components above the tubing hanger spool.

v. Install a full set of 179mmx35 MPa Class III service rig BOP's. All equipment is to conform to ARP/NEB (AEUB) BOP minimum requirements. Refer to Appendix V for requirements/configuration.

vi. Perform a complete function and pressure test of all BOP components to 1.4 & 35 Mpa for 15 minutes each test. Pressure test the hydril to 1.4 & 28 MPa for 15 minutes. Check & ensure all accumulator pressure/volumes are maintained at regulated minimum after functioning. Any leaks in the above equipment are to be repaired and re-tested. All components must pass the testing procedures prior to proceeding.

vii. Rig in ABB Vetco wellhead lubricator on top of the BOP Hydril. Pressure test lubricator & flanges through the BOP stack w/water. Sting in through BOP stack and open the by-pass & reconfirm 0 kPa behind backpressure valve. Back out the backpressure valve and lubricate same out of BOP's. Rig out ABB equipment.

viii. Rig in rig pump. Fill the tubing string with water. Monitor the volume required to fill the tubing. Pressure test the tubing to 28Mpa.

7. Tubing Removal and Replacement

i. Once the hydrostatic column is maintained, monitor well and confirm it is dead. Pick up an 88.9 mm EUE tubing pup and thread into the dognut. Pull up and confirm the on/off tool is latched. Work string weight to activate the 'J' at latch w/neutral weight and rotate tubing to the right. Work torque into the string by successive tubing movements up and down. Release from the on/off tool. Confirm tool release with tubing movement.

ii. Bleed off any gas head and circulate the well over to the high ph inhibited water prepared in 3 (i). Discard the existing wellbore fluids to a storage tank and haul same to formal disposal.

iii. POOH laying down the tubing. **Keep hole full.** Ensure that protectors are installed and that all joints are handled with due care to the premium connections. With 50jts left in hole, pick-up a 244.5mm Baker retrievable packer c/w K-valve and on-off tool. Install the packer on top of the tubing string & RIH on 5 jts. 88.9mm tubing. Land the packer & set same w/the assistance of the tubing weight below the packer. Pressure test packer set to 28Mpa. Release from the on-off. POOH & stand back the 5 tubing jts run to set packer. Rig out BOP's. Remove the exiting tubing head assembly. Install a replacement ABB VG-SF tubing head 349mmx279mmx35Mpa w/2-52.8mmx35MP side outlets. Re-install the rig BOP's & pressure test per 6 (viii) above.

iv. RIH w/on-off on 5 jts. 88.9mm tubing. Latch the packer set in 7 (iii), open the K-valve and confirm no pressure below. Release packer & POOH laying down packer and remaining 88.9mm tubing.

v. Rig in a Baker Atlas electric wireline unit c/w full lubricator and wireline BOP's. Make a 212.8mm wireline gauge ring and junk run to top of liner at 2909mKB. Make a 156mm wireline gauge ring and junk run to top of packer at +2950mKB.

vi. Pick-up the 244.5mm Baker Atlas DVRT Casing Inspection tools and proceed w/a log of the 244.5mm casing string from 2909 to surface per direction from the logging engineer. Pick-up the 177.8mm Baker Atlas DVRT Casing Inspection tools and proceed w/a log of the 177.8mm casing string from 2950 to 2909 per direction from the logging engineer. POOH & rig out Baker Atlas. Contact Calgary w/field interpretation of inspection log. Have logs transmitted to Atlas Calgary for immediate processing.

vii. Rig up to run tubing. Rig in thread cleaning, torque turn, Gatorhawk equipment and Hallmark thread inspection service. Tally drift and RIH with new 114.3mm L-80 NSCT tubing as follows – run bottom up:

1	88.9 mm Guiberson Premium Latch Mule Shoe seal assembly **(High Temperature Elastomered)**
1	88.9mmx114.3 mm NSCT L-80 X-Over swage
1	114.3 mm L-80 NSCT tubing joint @ 18.75 kg/m
1	114.3 mm Otis "X" NSCT nipple with 96.85 mm profile
1	114.3 mm x 3.05 m L-80 NSCT tubing pup at 18.75 kg/m
xxx	114.3 mm L-80 NSCT tubing joints at 18.75 kg/m
1	114.3 mm L-80 Heavy wall flow couple
1	114.3 mm Baker Model TE-5 tubing Mounted SSSV (Inconel)
1	114.3 mm L-80 Heavy wall flow couple
15	114.3 mm L-80 NSCT tubing joints at 18.75 kg/m to surface

Gatorhawk in hole to 40 MPa. Tag top of packer and space to land w/neutral weight. Pressure test the tubing and annulus to 1.4 & 28 MPa. Release from on/off , pull 15jts to the SSSV. Tie into SSSV w/Stainless Steel control line. Gatorhawk the joints re-run to 40MPa. Install required pups for proper spacing 1jt below surface. Re-run the landing joint, latch the packer and land w/dognut. Re-pressure test tubing & annulus to confirm no leaks.

NOTE: Due to hole deviation, tubing movements will be required to work compression and tension down to packer.

xiii. Rig in ABB Vetco Grey c/w lubricator pressure tested per **Appendix III**. Run and set a 114.3mm back pressure valve in the tubing hanger. Pressure test backpressure valve to 1.4 & 35 Mpa. Remove the BOP's and **install a temporary 114.3mm wellhead**. Pressure test the wellhead valves and flanges to 1.4 and 35Mpa. Contact Calgary for confirmation on rigging out the service rig and related equipment. Release equipment and move off location. Confirm anticipated wellhead delivery and prepare for a return to location for wellhead installation.

NOTE: Cladded wellhead is expected to be delivered to location in late March.

xiv. Rig in ABB Vetco Grey c/w lubricator. Lubricate through wellhead and open backpressure valve. Confirm no pressure in tubing. Back out of the backpressure valve leaving same in place and rig out lubricator. Remove the temporary wellhead installed in 7 (xiii) above and install the cladded wellhead c/w remote actuated lower master valve. Pressure test all installed valves/flanges to 1.4 and 35Mpa. Rig out and release equipment. Cap the wellhead valves w/tapped blind flanges and needle valves. Chain & lock all valves.

Pressure Testing Procedures

Wireline Lubricator and BOP`S:

1) Assemble a night cap complete with a 12.7 mm needle valve on top of a 76.2 mm x 34475 kPa Bowen Single Hydraulic BOP.
   a) Install the above mentioned BOP on top of a Bowen 76.2 mm x 34475 kPa Hydraulic slide lock BOP c/ w the bottom rams inverted.
   b) Install a pressure line to the 12.7 mm needle valve on the slide lock BOP`S.
   c) Install a test rod into the inverted rams with the excess rod hanging out of the bottom of the BOP`S.
   d) Vent the air out the top of the BOP assembly. Pressure test the BOP to 1400 kPa low test and 34475 kPa high test holding each test for 10. minutes.
   e) After the bottom ram test is good, remove the top cap and install the bottom cap. Fill the BOP`S with fluid above the center rams and install the test rod in the center rams. Close the rams and pressure test the rams to 1400 kPa low test and 34475 kPa high test holding each test for 10.0 minutes.
   f) Test the top rams the same as the above pressure test procedure.
   g) When all the rams have been pressure tested install a grease supply hose on the 12.7 mm needle valve on the slide lock BOP`S. Install an equalizing hose on the top single BOP. Set the BOP`S on the ground beside the wellhead.

2) Pick up the assembled lubricator made up as follows from the top down.
   a) Bowen 4 tube (minimum) grease control head c/w a ball check valve.
   b) Bowen 76.2 mm x 34475 kPa integral lubricator (pick up enough lubricator to cover the bottom hole tools plus 1.0 meter.) The bottom joint of lubricator to include a 12.7 mm NPT port c/w a needle valve.
   c) Bottom cap c/w a 12.7 mm NPT port.
   d) The sinker bars required for the job should be made up and installed in the lubricator.

3) Install the Wireline in the bottom shive. Pick the sinker bar weight off the bottom cap. Remove the bottom cap and drop the sinker bars out the bottom of the lubricator. Install the tool string onto the sinker bars using the vertical make up method.
   a) Stab the lubricator into the BOP assembly.
   b) Install the complete assembly onto the wellhead utilizing the Bowen companion flange.

4) Fill the total assembly with fluid venting the air through the unpressurized grease control head. While filling the lubricator with fluid move the wireline up and down through the grease head. When the lubricator is full of fluid and there is fluid returns out the top of the grease head pull the tools to the top of the lubricator (less 10.0 mm) and activate the grease control system. Pressure up the grease head to 1.5 times the maximum pressure of the pressure test.
   a) Pressure test the total assembly to 1400 kPa low test and 34475 kPa high test for 10.0 minutes each test.
   b) Bleed the lubricator down to the confirmed wellhead pressure and open the Master valves. Insure the wellhead and lubricator assembly integrity and proceed to run in the hole with the wireline tools.

Pressure Testing Procedures

Service Rig BOP`S

1) Install the BOP`S on the test stump.

2) Close the Blind rams and pressure test same to 1400 kPa low test and 35,000 kPa high test for 10 minutes each test.

3) Open the Blind rams and install a pup slotted pup joint into the test stump. Install the Stabbing valve into the top of the pup joint.

4) Close the Pipe rams and the Stabbing valve.

5) Pressure test the Pipe rams and the stabbing valve to 1400 kPa low test and 35,000 kPa high test for 10 minutes each test.

6) Open the Pipe rams and close the Hydril.

7) Pressure test the Hydril to 1400 kPa low test and 35000 kPa high test for 10 minutes each test.

8) Bleed off the pressure to 0 kPa. Open the Hydril.

9) Turn off the Re-Charge pump at the Accumulator and bleed off the system pressure to 0 kPa. Remove the protector cap on the Pre-Charge bottle and install the test fittings and gauge. Check the Pre-Charge pressure in the bottle. Each bottle must be tested individually and have a minimum Pre-Charge pressure of 7000 kPa.

10) With the Accumulator system fully charged turn off the Pre-Charge pump. Close the pipe rams and the Hydril. Open the pipe rams. The Accumulator pressure must be above 8400 kPa.

11) Check the Nitrogen bottles. The Nitrogen pressure must not be below 12,500 kPa.

Corp/Partner Approval

RANGER OIL

Corporate and Partner Approvals

Please indicate your acceptance of the "Tubing Replacement Program"

Approved By: _____
Leroy Brown
Senior Completions Engineer
Ranger Oil Limited

Approved By: _____
Ken Kindjerski
Drilling/Completions Manager
Ranger Oil Limited

Approved By: _____
Mike Langley P. Eng.
V.P. Production and Operations
Ranger Oil Limited

Approved By: _____
Jan R. Horejsi, P. Geol.
Senior V.P. North American Operations
Ranger Oil Limited

Approved By: _____
Jim Munro, R.E.T.
Manager of Production
Canadian Forest Oil Ltd.

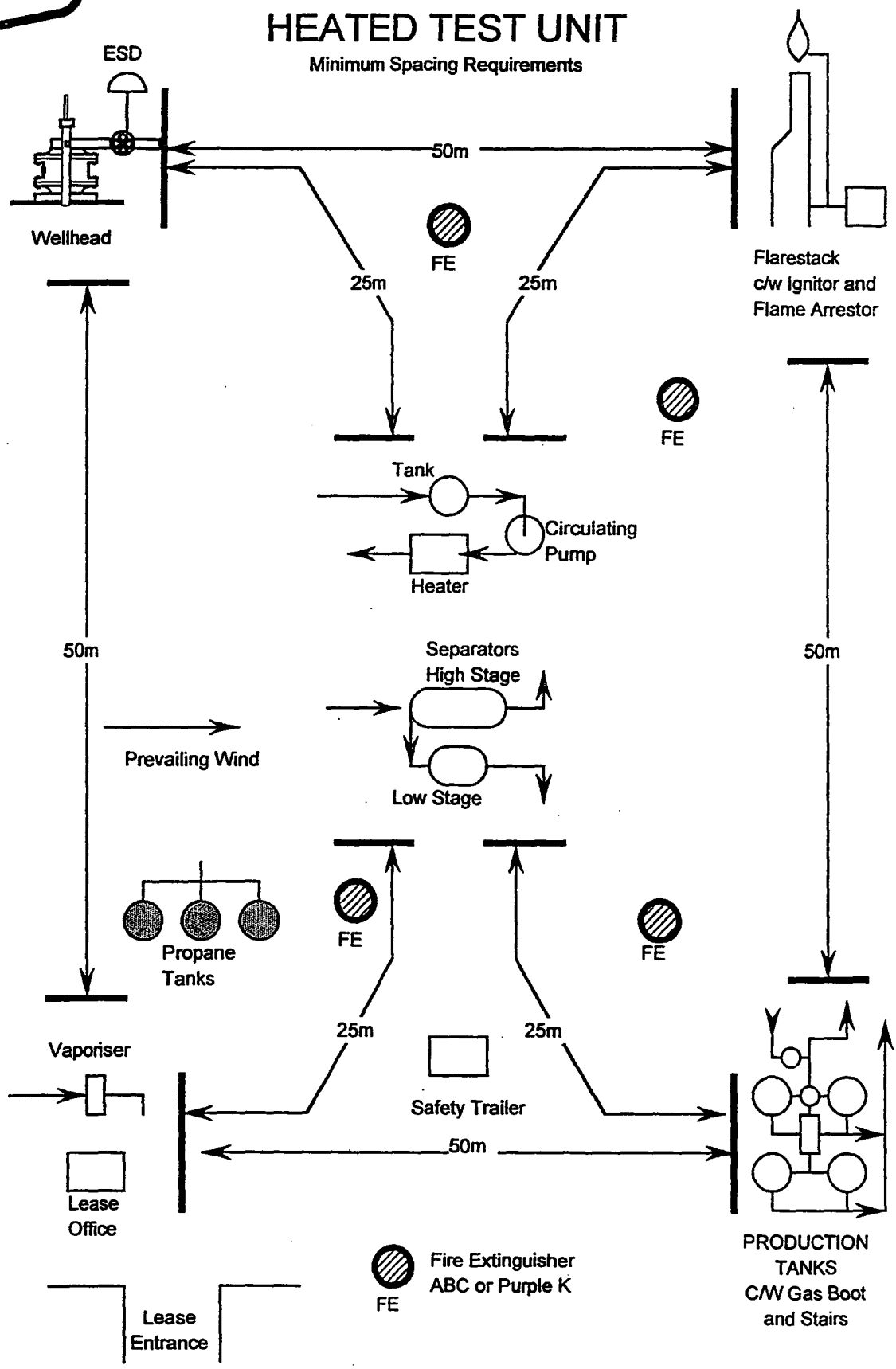
APPENDIX I

Testing Equipment Layout

RANGER OIL

SOUR WELLS
HEATED TEST UNIT

Minimum Spacing Requirements



ALL OF THE EQUIPMENT SHOWN MAY NOT BE REQUIRED

D.Saik Jun 1999

APPENDIX II

Pressure Testing Procedures

Purging Procedures

Pressure Testing Procedures

Wireline Lubricator and BOP'S:

1) Assemble a night cap complete with a 12.7 mm needle valve on top of a 76.2 mm x 35000kPa Bowen Single Hydraulic BOP.
   a) Install the above mentioned BOP on top of a Bowen 76.2 mm x 35000kPa Hydraulic slide lock BOP c/w the bottom rams inverted..
   b) Install a pressure line to the 12.7 mm needle valve on the slide lock BOP'S.
   c) Install a test rod into the inverted rams with the excess rod hanging out of the bottom of the BOP'S.
   d) Vent the air out the top of the BOP assembly. Pressure test the BOP to 1400 kPa low test and 35000kPa high test holding each test for 10.0 minutes.
   e) After the bottom ram test is good, remove the top cap and install the bottom cap. Fill the BOP'S with fluid above the center rams and install the test rod in the center rams. Close the rams and pressure test the rams to 1400 kPa low test and 35000kPa high test holding each test for 10.0 minutes.
   f) Test the top rams the same as the above pressure test procedure.
   g) When all the rams have been pressure tested install a grease supply hose on the 12.7 mm needle valve on the slide lock BOP'S. Install an equalizing hose on the top single BOP. Set the BOP'S on the ground beside the wellhead.

2) Pick up the assembled lubricator made up as follows from the top down.
   a) Bowen 4 tube (minimum) grease control head c/w a ball check valve.
   b) Bowen 76.2 mm x 35000kPa integral lubricator (pick up enough lubricator to cover the bottom hole tools plus 1.0 meter.) The bottom joint of lubricator to include a 12.7 mm NPT port c/w a needle valve.
   c) Bottom cap c/w a 12.7 mm NPT port.
   d) The sinker bars required for the job should be made up and installed in the lubricator.

3) Install the Wireline in the bottom shive. Pick the sinker bar weight off the bottom cap. Remove the bottom cap and drop the sinker bars out the bottom of the lubricator. Install the tool string onto the sinker bars using the vertical make up method.
   a) Stab the lubricator into the BOP assembly.
   b) Install the complete assembly onto the wellhead utilizing the Bowen companion flange.

4) Fill the total assembly with fluid venting the air through the unpressurized grease control head. While filling the lubricator with fluid move the wireline up and down through the grease head. When the lubricator is full of fluid and there is fluid returns out the top of the grease head pull the tools to the top of the lubricator (less 10.0 mm) and activate the grease control system. Pressure up the grease head to 1.5 times the maximum pressure of the pressure test.
   a) Pressure test the total assembly to 1400 kPa low test and 35000kPa high test for 10.0 minutes each test.
   b) Bleed the lubricator down to the confirmed wellhead pressure and open the Master valves. Insure the wellhead and lubricator assembly integrity and proceed to run in the hole with the wireline tools.

Pressure Testing Procedures

Service Rig BOP'S

1) Install the BOP'S on the test stump.

2) Close the Blind rams and pressure test same to 1400 kPa low test and 35,000 kPa high test for 10 minutes each test.

3) Open the Blind rams and install a pup slotted pup joint into the test stump. Install the Stabbing valve into the top of the pup joint.

4) Close the Pipe rams and the Stabbing valve.

5) Pressure test the Pipe rams and the stabbing valve to 1400 kPa low test and 35,000 kPa high test for 10 minutes each test.

6) Open the Pipe rams and close the Hydril.

7) Pressure test the Hydril to 1400 kPa low test and 35000 kPa high test for 10 minutes each test.

8) Bleed off the pressure to 0 kPa. Open the Hydril.

9) Turn off the Re-Charge pump at the Accumulator and bleed off the system pressure to 0 kPa. Remove the protector cap on the Pre-Charge bottle and install the test fittings and gauge. Check the Pre-Charge pressure in the bottle. Each bottle must be tested individually and have a minimum Pre-Charge pressure of 7000 kPa.

10) With the Accumulator system fully charged turn off the Pre-Charge pump. Close the pipe rams and the Hydril. Open the pipe rams. The Accumulator pressure must be above 8400 kPa.

11) Check the Nitrogen bottles. The Nitrogen pressure must not be below 12,500 kPa.

NORWARD ENERGY SERVICES
Division of Western Atlas Company

DATE: June 26, 1998

FROM: Martin Mueller
Norward Energy Services

TO: Leroy Brown
Ranger Oil Ltd.

RE: Pressure Testing Procedure for Ranger Liard Project.

Leroy:

As per your request, the following is an outline of the procedure we will use to pressure test the lines and equipment for the above noted project.

1.) Rig in of equipment to be completed, with the exception of wellhead connection, prior to pressure testing.

2.) Once rigged in, complete connection of pump to be used for testing can be made to our high pressure flow line.

3.) Pumper will be brought on line to fill flow line and line heater bundles with fluid.

4) Once H.P. System is full the chokes on the manifold can be closed and the system pressured to 35 MPa and checked for leaks.

5.) If test is good, the manifold can be opened and pressure blead down through line heater to the test unit.

6.) Once pressure is blead off the choke on the line heater will be closed and the pressure brought back to 35 MPa to test the flow line downstream of the manifold and the upstream bundles and choke of the line heater.

7.) When test is good pressure can be blead off to test unit.

8.) With chokes and back pressure valve open pump will flood test unit. When flooded back pressure valve will be closed and pressure brought up to 4500 kPa (90% of pop valve setting on test unit).

Norward Energy Services
#703, 1015 - 4th Street S.W., Calgary. Alberta T2R 1J4 Bus.: (403) 290-0264 Fax: (403) 265-6142
Mailing Address: P.O. Box 6686, Station D, Calgary, Alberta T2P 2E6

NORWARD

9.) When test on test unit is good the back pressure valve will be opened and pressure blead off to the flare line.

10.) With pressure test valve on flare line open, pumper will flood flare line. When flare line is full, pressure test valve will be closed and pressure brought up to 4500 kPa. When test is good. Pressure can be blead off and water removed from system.

11.) Once wellhead connection is made flow line will need to be retested to ensure integrity of flow line connection to wellhead.

I hope you will find this outline sufficient for your requirements. If you need any further information please contact me at our Grande Prairie Office.

Martin Mueller
Sr. Supervisor

4.2.13 PRE-TEST EQUIPMENT CHECK

ARP - The following pre-test checks should be performed:

- Ensure that an inspection check list is followed.
- Ensure that all connections are tightened.
- Ensure that the wellhead flowline and all gas lines are adequately staked or otherwise secured.
- Ensure that the wellhead ESD (if applicable) is function tested.
- Ensure that purging is completed per 4.2.11.
- Ensure that the safety meeting has been completed per 4.2.12.

NOTE: An Inspection Check List is included as Appendix V, developed by the UPITFOS Implementation Committee (1990). Applicable details of that check list are recommended.

4.2.14 PRE-TEST PRESSURE TESTING

4.2.14.1 General

ARP - Pressure testing (and test start up) should be in daylight hours only.

NOTE: Test programs should be planned to accomplish daylight pressure testing and start up. Occasionally, that is impossible. If so, the following precautions are required:

- the crew must be well rested (i.e. travelling, rigging in. followed immediately by night time start up must be avoided)
- Lighting of all test areas, all escape routes, and all safety equipment areas must be virtually that of the derrick floor of a rig. Operators and Well Testing Contractors should note that standard well test lighting is inadequate.

4.2.14.2 Wellhead To Choke

ARP - It is the Operator's responsibility to specify the pressure test medium, and hydrostatic testing is recommended over the use of wellhead gas or pressurized vapour (CO_2 or N_2). The test should be to the maximum of expected wellhead shut-in pressure. No leaks are to be tolerated. Pressure testing with gas and test start up should be in daylight hours only.

4.2.14.3 Downstream Of Choke

ARP - An inert medium or wellhead gas should be used to test pressure vessels to a minimum of planned operating pressure and a maximum of 90% of pressure relief device set pressure. Any interconnecting piping must be included. No leaks are to be tolerated.

4.2.14.4 Open Ended Piping And Production Tanks

ARP - Open ended piping (flarelines, vent lines) and production tanks should not be isolated by valves and pressured tested. Closed valves should not be in the system. Instead, leak tests of open ended piping and production tanks must be part of initial operational checks after start up. Visual inspection of connections is an alternative.

4.2.15 OPERATIONAL SAFETY

4.2.15.1 Start Up

ARP - The following generalized start up sequence should be performed:

- With wing valve closed, open the master valve and record pressures.
- Close the choke (if applicable) and open the wing valve to the choke. Perform a detailed leak check.
- Open the choke slowly to the pressure vessel. Set operating pressures immediately, and set liquid levels as soon as possible.
- Begin vessel leak checks immediately, closely followed by downstream checks. For sour wells, those performing detailed leak checks must wear respiratory equipment.
- Check H_2S concentration as soon as possible, and at regular intervals thereafter. Shut in if additional equipment or personnel are required.
- Check equipment capacities. If pressures or rates exceed capacity, decrease the rate or shut in.

NOTE: A rate preceding the actual test is appropriate to cleanup the well and to re-evaluate the programmed well performance.

4.2.15.2 Test Performance

ARP - The test should be performed according to the following generalized guidelines:

- Perform and record measurements according to the program.
- Continuously monitor safety systems and equipment. 4.2.15.3
- Continuously monitor air entrainment in tanks (per 4.2.15.3).
- Utilize the Safety Standby System for all possibly hazardous operations, and utilize a 2nd back-up person during sour hazardous operations.
- Monitor flare rates and volumes according to the flare permit (if applicable).
- Monitor and act on new or unanticipated hazards.
- Hold complete de-briefing sessions at shift changes per Note of 4.2.12.

NOTE: If the equipment or the procedure cannot safely accommodate the flow, the Well Testing Contractor's supervisor of the shift has the ultimate authority to reduce the flow or shut in the well.

F.1 HYDRAULIC PRESSURE TESTING FLOW LINES

The following procedures will be used for hydraulic pressure testing up to the choke.

- Ensure all unions are tight and the choke is closed.
- Open valves downstream of the choke to prevent over pressuring of the system downstream of the choke.
- Fill the piping to be tested with non-flammable liquid, such as water or water-methanol mix being sure to exhaust all air from a high point valve.
- Check pumping system to ensure that it has pressure relief valve on the outlet set at a pressure less than the working pressure of the line and components to be tested.
- Secure the line to be tested with chains and/or weights
- Keep all persons a safe distance from the equipment to be tested.
- Pressure test the line up to the expected maximum shut in pressure of the well.
- Release the pressure through the bleed off valve.

F.2. PRESSURING UP PROCEDURES

F.2.1 OPENING WELL TO FLOWLINES

- Check tags on wellhead valves for required turns to fully open or close valves.
- Always count turns when opening or closing a gate valve.
- Never pressure up a flowline with a ball valve.
- Never open a wellhead without knowing;
  - i) Approximate surface pressure expected
  - ii) Approximate properties of gas to be produced
  - iii) Possibility of air entrapment in tubing
  - iv) Approximate properties of any fluids to be produced
- Never pressure up unpurged equipment.

F.2.2 PRESSURING A PURGED FLOWLINE TO A HEATER CHOKE WITH WELL GAS

- Insure choke is closed – gauge in at choke
- Insure bottom master valve is fully open
- Insure wing valve is closed
- Insure safety valve is open and operational
- Slowly open top master valve – pressure up to wing valve
- Take well pressures. Check wellhead for leaks
- Slowly open wing valve until you head gas passing past valve
- Let flow line pressure up
- Check gauge at choke. Insure it has the same pressure as at the wellhead. Check equipment for leaks.

F.2.3 PRESSURING A WELL TO AN UNPURGED FLOWLINE & HEATER CHOKE

- Slightly open choke at heater
- Insure bottom master valve is fully open
- Insure wing valve is closed
- Slowly open top master – pressure well to wing valve
- Take well pressures – check wellhead for leaks
- Slowly open wing valve until gas is passing through valve
- Let gas pass through flow and separator to purge surface equipment. See purging equipment
- After purge is complete, shut choke
- Check pressure at well head and at choke to insure same pressure
- Fully open wing valve. Check equipment for leaks
- Work try lowering separator pressure
- Increase heat, if possible
- If above doesn't work, decrease the flow rate

to be outside the upper flammability limits. However, to add a safety factor of 2. we need to have maximum readings of 5% or less oxygen to be safe.

Summary of this Procedure

1. An oxygen measuring device must be used to determine when a tank is purged. The maximum allowable oxygen content must not exceed 5% oxygen after purging.

[2]4.2.11 Air Entrainment in Well Testing Systems

4.2.11.1 General

ARP Operators and Well Testing Contractors must understand and attempt to eliminate the explosive hazards of air entrainment in pipes, vessels and tanks.

NOTE: Air entrainment explosions occur upstream of the flowline choke and downstream of the flowline choke (usually in storage tanks). The fuel source is the well product, or it can be the purge medium if propane or natural gas is used to purge.

Ignition sources are not always identifiable, but possibilities include:

- Flashbacks from flares
- Static electricity
- Friction heat (from valve operation or high velocity debris)
- Localized "hot spots" in partially open (unbalanced) valves
- Spontaneous combustion at critical pressures and temperatures
- Spontaneous combustion of compounds such as sulphides
- Electrical currents from lightning and power sources (including cathodic protection).

Air sources upstream of the choke include:

- Air from dry run tubing (e.g. for underbalanced perforating).
- Coiled tubing unit operations using air.
- Swabbing, when the well goes on vacuum.
- Reaction products (e.g. hydrogen peroxide washes).

Air sources downstream of the choke include:

- Initial air, as the equipment arrived.
- Air re-introduced from the wellhead side.
- Air pulled into production tanks through open or leaking hatches when a vacuum condition exists. The vacuum can be caused by fluid withdrawal and by excessive venturi action at flare stacks when tanks are vented to flare.

4.2.11.2 Pumping, The Well String and Wellhead

ARP Dry tubing should be displaced by N_2 or $C0_2$ or alternatively the procedures of ARP 4.2.11.4 should be employed.

When dry tubing with air is opened to the formation, a cushion should be run in the string. If the well has enough energy, the cushion can be brought back to a rig tank. The returning cushion purges the tubing string. Wellhead pressure should not be allowed to build up prior to the cushion return.

NOTE: It is recognized that it is not always practical to displace tubing air prior to operations such as underbalanced perforating. Operators and Well Testing Contractors must take extra precautions when air exists in the well string.

4.2.11.3 Purging Surface Equipment

4.2.11.3.1 Purge Mediums

ARP Purging should be performed by a purge medium vapour displacing air. Non-flammable vapours are preferred. Propane or sweet gas is acceptable with extra precautions, recognizing that the purge medium will create explosive mixtures before air purging is complete.

4.2.11.3.2 Pre-Purging Procedures and Checks

ARP The following pre purging procedures and checks are required:

- Production tanks should be free from sulphide or pyrite buildings.
- Production tanks must have proper hatch seals and pre-set pressure thief hatches.
- All system elements must be electrically bonded to each other, with the wellhead or ground rods as "ground" (or "common").
- Where production tanks are vented to flare, the configuration must be:
  - (i) A vent line to flare, 89 mm (3") minimum,
  - (ii) A manual block valve in the vent line.
  - (iii) A pressure measurement tap and low pressure measurement device (ie: U tube manometer) between the tank top(s) and block valve.
  - (iv) A flame arrestor between the block valve and the flare stack (minimum Underwriters Laboratories approved).
  - (v) A regulated or manually valved tank top(s) blanket line
- The purge medium should be manifolded to a control purging/measurement point, e.g. the test separator.
- All pilots or other open flames within 50 m of the equipment to be purged must be extinguished.

NOTE If a gas boot precedes the production tank(s), it must be vented to flare. The vent line should be a minimum of 89 mm (3"). A block valve at the gas exit is required for the purging process, but, if the gas boot does not have a pressure relief device, this valve must be locked open or removed during flow.

Operators and well testing contractors must recognize that flame arrestors do not guarantee the prevention of flashbacks, and therefore that the elimination of initial air and subsequent air entrainment is required.

A gas boot is meant to strip solution gas at very low pressures. A flame arrestor should be considered in the gas boot line if a positive liquid seal cannot be maintained.

4.2.11.3.3 Purge Vapour Measurement

ARP The purge vapour should be measured.

NOTE Liquid volume to vapour or mass to vapour conversions is allowed if the liquid volume or mass vaporized is measured accurately, and if it is ensured that all of the liquid is vaporized. Numerous measurement devices are available.

4.2.11.3.4 Purge Amounts

ARP The volume to be purged must be calculated prior to purging. For purge mediums heavier than air, purging should be a minimum of 1.5 times calculated volume, and purging should be from the bottom up. For purge mediums lighter than air, purging should be a minimum of 2.5 times calculated volume, and purging should be form the top down.

NOTE Top down purging is impractical in some situations. If bottom up purging is employed with purge mediums lighter than air, a minimum of 5 times calculated volume should be displaced.

Small lines and vessels may be purged for a number of minutes instead of rigorous calculations, it is certain that the time chosen would exceed the over purge guidelines.

4.2.11.3.5 Purging With Wellhead Gas (Sweet Wells Only)

ARP The Well should be flowed slowly to the separator unit, then to the flareline, then to downstream vessels/tanks. Downstream vessels/tanks must be isolated and purged one at a time.

NOTE Production tanks that will not be vented to flare are not required to be purged.

4.2.11.3.6 Purging With Other Vapours

ARP Purging should be in a downstream sequence, flowline (and heater, if present) then separator, then flareline, then to downstream vessels/tanks. Downstream vessels/tanks must be isolated and purged one at a time.

NOTE The flowline would be purged from the wellhead to the separator unit, if the vapour were introduced at the wellhead. It is also acceptable to use the separator as a point of origin for the purge vapour. In that case, the flowline would be purged back to the wellhead (with the line disconnected at the wellhead).

4.2.11.3.7 Ending the Purge

ARP Where practical, oxygen meters are recommended for large vessel/tanks, regardless of the calculated over purge. The sensing should be performed at points other than the purge exit of the component (in case of air bypassing instead of displacement). Oxygen content must be such that the gas mixture is below its lower explosive limit.

4.2.11.3.8 Intermediate Purging

ARP Vessels/tanks should be re-purged whenever air is accidentally or operationally introduced during the test.

4.2.11.4 Opening A Well With Air In The Flowstring

ARP It is recognized that wells will sometimes be required to be opened when there is air behind the wing valve. Operators and Well Testing Contractors should consider some or all of the following procedures:

- All nonessential personnel should be removed from the test area.
- Manifolding should exist so that all vessels/tanks can be bypassed.
- It is important that the tubing be flow-purged of explosive mixtures as soon as possible after operations such as tubing conveyed perforating. The well should not be shut-in for buildup until the purge is completed because the danger of an in-line explosion is increased by pressuring up the volatile mixture.
- On sour wells, the well can initially be flowed through a by-pass directly to flare until the air is displaced from the tubing and the flare is burning steadily. This will contain possible fires in open-ended pipe. The well can then be shut-in or directed to pre-purged vessels prior to liquids arriving at surface. An operator could also obtain ERCB permission for short term flow to an unlit flare to displace air from the tubing. The flow should be sampled with a 0_2 or gas detector to verify the mixture is out of the explosive limits.
- The wing or master valve can be balanced by downstream pressure (N_2, $C0_2$, or H_20) prior to opening, to reduce friction and initial inrush.

- When wells go on vacuum during swabbing, a check valve must be inserted in the flowline system. The saver sub should be tightened, and regulated vapour to follow the swab cups back down the hole should be considered.
- All suspect lines/vessels/tanks must be repurged when the wellstring air is eliminated.

NOTE Consider notification of the commencement of operations to nearby residents respecting the potential for short term odors that may occur during start up.

(2) Alberta Recommended Practices
Volume 4 Well Testing and Fluid Handling

APPENDIX III

ABB Vetco Grey
Backpressure Valve running procedures

Tree Savers
Tool configuration/Running procedures

ABB VETCO WELLHEAD LUBRICATOR

RANGER FORT LIARD P-66A
HIGH PRESSURE LUBRICATOR RUNNING PROCEDURES

1. Confirm top and bottom master valve and wing valve are in a secure closed position.
2. Connect bleed off hose to needle valve in BHTA; bleed off any pressure above top master valve.
3. Remove hammer cap from BHTA, install lubricator adapter and lubricator.
4. Connect hydraulic hoses to lubricator and air drive hydraulic pump. Engage hydraulic pump until barrel of lubricator is full of oil and has minimum pressure in barrel (indicated by small downward movement of polish rod).
5. Open top and bottom master valve to fully open position; while watching pressure gauges on lubricator. Count turns.
6. Calculate distance between top of BPV and lubricator stinger.
7. Engage hydraulic pump, pushing polish rod down to desired depth (indicated by increments on polish rod).
8. Tag top of BPV. ID stinger threads with lead thread on stinger. Rotate polish rod counter clockwise to line up threads on BPV and stinger.
9. When threads line up, mark polish rod with paint marker and rotate polish rod clockwise (engagement of threads) approximately 6-8 turns. Stinger will make contact with BPV poppet and equalize pressure from below BPV into wellhead and lubricator.
10. Bleed off bore pressure through wing valve until pressure depleted.
11. When pressure is depleted, rotate polish rod counter clockwise 8 turns.
12. Slowly bleed hydraulic pressure from lubricator. Assist polish rod retraction into lubricator barrel with manual rod wrench.
13. Remove lubricator from top section.
14. Remove top section from wellhead.
15. Inspect and recondition tubing hanger extended neck.
16. Clean and inspect ring groove; install new ring gasket.
17. Install new wellhead top section.
18. Pressure test extended neck seal to recommended test pressure. Hold for 15 minutes at constant rate.
19. Reinstall lubricator on top section.
20. Run polish rod down and retrieve BPV.
21. Close top and bottom master valve.
22. Remove lubricator from top section.
23. Reinstall BHTA hammer cap and secure needle valve

APPENDIX IV

Site Specific
ERP

EMERGENCY NOTIFICATION CHART

Revised: November 24, 1999

Event

Cold Lake
FOREMAN
Doug Callbeck
Home: 780 826 3315
Cell: 780 826 8653
Office: 780 724 6504

Elk Point
SUPERINTENDENT
Bernie Heinrichs
Home: 780 853 8315
Cell: 780 645 8068
Office: 780 724 6520

St. Lina/Ashmont
Elk Point Gas
FOREMAN
Ron Croteau
Home: 780 724 3021
Cell: 780 645 8287
Office: 780 635 2239

N.E. B.C.
Ft. St. John
FOREMAN
Abe Garcia
Home: 250 785 3750
Cell: 250 262 9422
Office 250 787 7718

Roving
FOREMAN
Paul Lemieux
Home: 780 826 7897
Cell: 780 812 0342
Pager: 780 724 6526

Claresholm
Rich/Long Coulee
FOREMAN
Tom Badura
Home: 403 381 2199
Cell: 403 308 4040
Office: 403 625 4777

Turin
refer calls to
Causeway Energy
Corp.
403 265 1200

Development Mgr. Conventional
John Scharrer
Home: 403 240 1952
Cell: 403 819 7448
Work: 403 3037516

Operations Manager
Dennis VanSickle
Home: 403 242 6367 Cell: 403 803 3990 Office: 403 303 7562

Safety Health & Environment Advisor
Allen Oxtoby
Home: 403 240 3719 Cell: 403 804 3365
Office: 403 303 7471

Development Mgr. Heavy Oil
Jamey Fitzgibbon
Home: 403 239 5306
Cell: 403 803 5140
Work: 403 303 7539

Event

24 Hr Answering Service*
403 303 7300
ID No. 20166

Event

Alert Level 1

Vice President United States Operations
Kellam Colquitt
Home: 281 362 1343
Cell: 281 989 7887
Office:713 654 2111

Drilling & Completions Manager
Ken Kindjerski
Home: 403 547 7131
Cell: 403 620 1732
Office: 403 303 7354

Seismic
Jeff Sluggett
Home: 403 239 1859
Office: 403 303 7435

On Call/Duty List

Bentall 261 7880
Security 262 1231

Primary Media Contact
Vice President, Risk Management & Investor Relations
John Faulds
(Manager/VP's to contact if necessary)
Home: 246 9603
Cell: 813 1907 Office: 303 7723

Vice President, Production
Mike Langley
Home: 403 288 8914 Cellular: 403 860 8309 Office: 403 303 7500

Alert Level 2

Community Affairs
Barry Brisson
Home: 403 259 3546
Cell: 403 813 4194
Office: 403 303 7452

Vice President, Marketing
Ralph Gibson
(Manager/VP's to contact if necessary)
Home: 239 0192
Cell: 660 6537 Office: 303 7668

Senior Vice President, Operations
Jan Horejsi
Home: 403 240 0933 Cellular: 403 860 0767 Office: 403 303 7401
Car: 861 2865

Surface Land Conventional
Debbie Steele
Home: 403 275 9792
Office: 403 303 7317

Surface Land Heavy Oil
Pary Weiler
Home: 403 236 9222
Office: 403 303 7738

Chairman, Safety, Health & Environment Board Committee
Charles M. Carr Jr.
NOTIFICATION ONLY

President
Fred Dyment
Home: 686 6738 or 246 2347 Bus: 303 7777
Cell: 860 0699 Car: 861 2865

*- During work hours will call person asked for then to On-Call List and Calgary Contact List.
- After hours - On Call/Duty List

Alert Level 3

EMERGENCY NOTIFICATION CHART.xls

RANGER OIL LIMITED
FORT LIARD UNIT P-66A
TUBEING CHANGE
EMERGENCY RESPONSE PLAN

RANGER OIL LIMITED

EMERGENCY CONTACT NUMBERS – RANGER OIL LTD. – WELL SITE P-66A

MEDICAL AND FIRE EMERGENCY

CONTACT	PHONE NUMBER	CONTACT PERSON
Hospital Emergency	1-250-774-6916	Ft. Nelson 24 hr. (medivac to airport)
Medical Clinic	1-250-774-3171	Ft. Nelson (business hr.)
Nursing Station	1-867-770-4301	Ft. Liard
Site Medic	Operations Radio	600-700- Satellite Phone
Local RCMP Detachment	1-867-770-4221	Ft. Liard
Local Helicopter	1-867-770-3116	Deh Cho Helicopters Ft. Liard
Fire Department	1-867-770-2222	Ft. Liard
Forest Fire Emergency	1-800-661-0800 or 1-867-696-2231	Resources Wildlife Economic Development
In case of Medivac – to Ft. Nelson, land at airport and take ambulance to hospital		

Spill and Project Related Emergency

CONTACT	PHONE NUMBER	CONTACT PERSON
Ranger Calgary	1-403-303-7300	Incident Report Number Answering Service
Ranger Calgary	1-403-303-7329	Leroy Brown
Ranger Calgary	1-403-303-7471	Allen Oxtoby
Ranger Site	1-600-700-5087	(Satellite Phone)
Contractor	1-867-770-4571	Beaver Enterprises
National Energy Board	1-800-632-1663	Incident Reporting (24 hrs)
Land Use	1-867-695-2626	Kent Halvorson (Ft. Simpson)
Renewable Resources	1-867-770-3461	Mike Labine (Ft. Liard)
Fort Liard Public Rep.	1-867-770-4421	Chief Harry Deneron
Nahanni Butte Public Representative	1-867-602-2626 1-867-602-2009	Jim Betsaka Chief Leon Konisenta
Poison Centre	1-800-332-1414	24 Hr.
Canutec	1-613-593-7211	Dangerous Good Reporting
Safety Boss	1-800-882-4967	24 Hr Dispatch

IF THERE IS ANY DOUBT AS TO WHETHER THERE IS AN EMERGENCY
INITIATE THE RESPONSE PLAN.

REMEMBER, ENSURE YOUR SAFETY FIRST

WHAT TO DO FIRST AT THE SCENE OF THE EMERGENCY.

1. Do not panic. Protect yourself and others and call for help REFER TO PREVIOUS PAGE of this plan for who to call and their contact numbers.

2. Assess the situation. Activate the emergency response plan.
Minor Accident to be administered by First Aid Personnel, and transported to camp first aid centre.

SERIOUS OR CATASTROPHIC ACCIDENT
First aid administered by qualified personnel, then call ambulance, contact Senior Site Supervisor, restrict access to area. Shutdown facility and evacuate.
For an Environmental Incident contact Senior Site Supervisor, who will contact authorities.

3. If possible, and within your capability, give immediate attention to the protection of life and provide first aid to the injured.

4. Observe the H_2S and LEL ground rules. Be careful of hidden hazards like electricity when assessing the situation.

5. If possible, and within your capability, considering the nature of the emergency, take corrective action to stop or reduce the cause of the emergency. Refer to Appendix 1 for specifics on the location of equipment, shut-downs, valves, and disconnects for corrective action.

6. Call urgently needed emergency services. Keep a log of all actions taken and calls and contacts made (in order, with approximate times and information given and received).

7. The senior Ranger representative on-site becomes the On-Site Commander.

8. The On-Site Commander will give the following information to the Ranger 24 hr incident report centre:

- the nature of the emergency;
- the location of and evaluation as to the level (I,II or III) of the
- emergency;
- name, location, and phone number;
- action already taken; and,
- further action proposed

9. Request instructions for further action.

10. Continue as instructed.

Written reports may be required, refer to Ranger Corporate ERP for specific details.

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APPENDIXES

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1.0 INTRODUCTION

This Emergency Response Plan (ERP) has been prepared to provide a response to an accident, fluid spills and uncontrolled releases for wellsite activities at Ranger location P-66A. The wellsite is located north west of Fisherman Lake and approximately 40 km northwest of Fort Liard, North West Territories (NWT) within an unsettled land claim area (Parcel L362).

1.1 Scope

The ERP has been prepared to provide Ranger representatives and Contractors personnel with the information, such that in the event of an emergency situation, they may undertake the measures necessary to ensure adequate protection for the public, environment, and property in the vicinity of the P-66A well site.

In this plan, ***an emergency situation*** is considered to be any event that calls for immediate special action to prevent or minimize danger to life, property or the environment. Emergencies may include: production spills or uncontrolled releases, fire or explosion, equipment failure, vehicle accidents, environmental damage, personal injury, or fatality.

1.2 Project Summary

Well site rig operation and associated activities are scheduled to commence with logistics support the week of February 1, 2000 and extend to March 30, 2000 with site demobilization following the operation. This ERP has been prepared to support the standards for safety as set out in the Ranger Oil Limited Corporate ERP, and forms the basis of response in the event of an emergency during activities associated with the P-66A tubing change. Engineering details and project plans for the activities are included in Appendix 2 of this ERP document.

In the event of an emergency (fuel and other liquid spills, accident, gas release or fire), the prime concern is to implement the necessary emergency response actions as soon as possible. In order to accomplish this the On-Site commander directs the appropriate response actions, as outlined in this ERP.

Should an emergency occur that may result in the introduction of any production into any watercourse, land surface or escape into the atmosphere, or otherwise threaten the safety or welfare of the public, or on-site operations personnel; Ranger will mobilize all resources necessary so as to minimize the effects on the environment. To this end, Ranger will ensure all personnel are trained to provide effective response for any likely emergency situation.

Should any operation that poses a risk to personnel be underway when medivac support is interrupted due to weather conditions, the Ranger representative shall, after reviewing with Calgary, suspend operations.

2.0 AREA of OPERATIONS

The activities to be undertaken at the P-66A well site and associated area are outlined in Appendix 2 of this plan. Activities covered include equipment and personnel mobilization, de-mobilization, rig operations and necessary support activities.

A total of approximately 31 personnel will be on-site, at the camp and providing support during operations. All personnel will be given both site and project specific safety awareness orientation (i.e.: morning tailgate meetings) during the undertaking of the production test.

The well site location has restricted access and is bounded on the west by mountains. This land feature restriction should be recognized in any response planning for uncontrolled H_2S gas releases. Restricted access via only one access road to the Liard River readily defines land based evacuation strategies to be considered in the on-site application of this plan.

2.1 Potential Hazards

The P-66A well site operations program has been evaluated to identify potentially hazardous events and procedures, which are detailed within this ERP document. The following table includes potential events, site preparedness, response and contacts, to be used during the operation.

Table 2: Potentially Hazardous Events and Emergency Response Summary

EVENTS	PREPAREDNESS	RESPONSE	CONTACTS
Blowout, Flare and Production Testing	Follow procedures as Outlined in Appendix 2 Maintain operation conditions within set parameters Do not commence activities unless in compliance with specific test components	Assess situation against ERP levels On-scene commander determines response level Mobilize Safety Boss If unable to secure situation, advise Ranger ERP response team @ 24 hour number	Immediate Site Supervisor or Foreman, And the On-Scene Commander See Emergency Contact List for Ranger Drilling Dept., NEB, Safety Boss, Local Community Contacts, and the Ranger 24 hr incident report number
Wildlife Threats	Employee training on critical wildlife (eg: bears, endangered species) Animals entering work and camp location areas. Proper garbage storage And disposal (eg: sealed Containers, regular pick-Up of garbage)	Implement wildlife present response actions; stop work activities, retreat to vehicles, buildings or safe area	Site Supervisor See Emergency contacts List for Renewable Resources Contact, and the Ranger 24 hr incident report number
Spills (fuel, salt water, Hazardous chemicals)	Training for personnel (TDGR, WHMIS) Proper labeling and Marking of product Storage containers Proper design and Construction of fuel and Chemical storage Facilities Develop ERP program Including identification Of necessary sorbents, Surface booms and Support materials	Use designated ERP Program to respond To a spill situation Involving the storage, Transportation or Barge location.	See Emergency Contact List for NEB, Renewable Resources, Land Use, Ft. Liard and Nahanni Butte Public Representative, the Ranger 24 hr incident Report number, and as Appropriate use Canutec And Poison Centre Contacts

EVENTS	PREPAREDNESS	RESPONSE	CONTACTS
	Designate response Teams and reporting Procedures		
Fire (Equipment and Camp)	Personnel training and Routine fire drills Designated Fire Marshals And a Response Procedure Fire extinguishers in all Buildings (entrance, exit Points, and all high risk Areas, including camp And site vehicles Post extinguisher Locations and fire Evacuation procedures For the camp	Assess fire condition And situation against Corporate ERP levels (It is important to differentiate fires associated with testing and operations program from camp or general maintenance activities)	See Emergency Contact List for Forest numbers, As well as Ranger Calgary 24 hr incident Report number
Forest Fires	Personnel training(dry Condition, managing Open flame situations Designated Fire Marshals And a Response Procedure, including Fire drills	Identify reporting Procedure for both On-site as well as off site fires	See Emergency Contact List for Forest Fire Emergency Numbers, as well as Ranger Calgary 24 hr incident report number
Serious Accident, Life Threatening Injuries	First Aid Attendant on-Site Safety trailer on-site Establish criteria for On-site versus Medivac procedures All safety systems and Precautions reviewed	Manage situation Site Implement medivac Procedures	See Emergency Contact list for Forest Fire Emergency numbers, As well as Ranger Calgary 24 hr incident Report number 403-303-7300 Inform Ft. Nelson Hospital and ambulance Of medivac situation

3.0 RESPONSES – FIRE / EXPLOSION, PRODUCT SPILL / RELEASE

The Ranger Corporate ERP identifies three levels of response actions to be taken in the event of an emergency, each of which is described below.

RANGER 24 HOUR NOTIFICATION NUMBER IS: 403-303-7300

EMERGENCY LEVELS

LEVEL I	LEVEL II	LEVEL III
• There is no danger outside Company property • The situation can be handled entirely by company personnel	• There is no immediate danger outside company property but the potential exists for the emergency to extend beyond company property. • Outside services must be alerted (police, fire department, and other emergency groups) and kept informed of the situation.	• Safe operating control has been lost, resulting in or potentially resulting in, fatalities or severe injury to employees, contractors or the public. • Serious damage to the environment and the surrounding area or communities. • Any situation involving a fatality or severe injury to an employee or the public even though operating control has been re-established or maintained.

The actions to be taken by the On-Site Commander for each level are summarized in the following, users of this ERP should also refer to the Ranger Corporate ERP.

ON-SITE COMMANDER DUTIES / ACTIONS

LEVEL I	LEVEL II	LEVEL III
• Assess conditions. • Call area foreman or designate; identify and request immediate services needed. • Assume responsibility of On-Site Commander until relieved. • Evacuate all personnel from area. • Isolate / cordon off the area. • Shut-down facilities / isolate contain liquids.	• Assess conditions. • Call area foreman or designate; identify and request immediate services needed. • Assume responsibility of On-Site Commander until relieved. • Evacuate all personnel from area. • Shut down facilities / isolate contain liquids. • Co-ordinate response activities to gain control. • Keep the Corporate Headquarters Response Team informed of emergency status	• Assess conditions. • Call area foreman or designated; identify and request immediate services needed. • Assume resopnsibility of On-Site Commander until relieved. • Evacuate all personnel from area. • Isolate / cordon off the area. • Shut-down facility \ isolate contain liquids. • Co-ordinate response activities to gain control. • Keep Corporate Headquarters informed of emergency status. • Co-ordiante actions with territorial and federal agencies.

4.0 EVACUATION PROCEDURES

4.1 CRITERIA FOR EVACUATION

At a **LEVEL 1 – Emergency** all persons will be evacuated to the muster station. Notify On-Site Commander and undertake necessary response action – **evacuate non-essential personnel from immediate incident area.**

At a **LEVEL 2 – Emergency** all persons shall be notified and informed of the hazard. The On-site Commander directs and decides whether evacuation is required and sends person to camp to advise of emergency condition. If it is determined that evacuation is required non-essential personnel will be relocated to the designated muster station. Essential personnel only, will stay on site.

At a **LEVEL 3 – Emergency** all persons will be evacuated from the emergency planning zone (EPZ). Relocate non-essential personnel to designated muster station.

If ignited vapors or plume exists and is spreading or engulfing any inhabited area, immediate evacuation is required for an area ½ km wide to 1.0 km downwind of release. This area may be expanded as required depending on weather conditions and results of air monitoring tests.

4.2 Monitoring

Monitoring equipment included with safety equipment as described on page 1 of the Site Operations Program (Appendix 2) can be used to measure concentrations or detect the presence of flammable or explosive mixtures of hydro-carbons and H_2S vapors. For an uncontrolled Level 3 situation portable-monitoring equipment shall be used, specifically if weather conditions are unstable.

4.3 Evacuation

Level 1 – evacuate personnel from immediate incident area.
Level 2 – all non-essential personnel report to designated muster station
Level 3 – all evacuated persons will report to a designated muster station.

Safe Condition
Only when the emergency condition is under control will personnel be allowed to return to the site. Shifting of winds will not be considered sufficient reason to declare an area safe.

5.0 IGNITION GUIDELINES

The Ranger Corporate ERP acknowledges that ignition of a release may be necessary should the On-Site Commander determine that there is a threat to the safety and well being of residents or public. In specific, to prevent loss of life in the communities of Fort Liard and Nahanni Butte. The following must be taken into consideration in the decision to ignite the release and to ensure adequate safety.

Ignition Criteria

- volume and type of product released;
- wind speed and direction;
- proximity to residents and public facilities
- time required and progress of evacuation;
- area environmental conditions (ie: dry);
- surrounding land layout (topography);
- training and safety of personnel igniting release; and,
- method of ignition.

Ignition Preparation

- Personnel Protective Equipment and Clothing (Fire Retardent Clothing);
- Breathing air equipment;
- Personal gas monitoring equipment;
- Wind direction
- Ignition device and known capabilities of device; and,
- Physical capabilities and limitations of personnel.

Ignition Method

- With Personnel Protective Equipment donned, approach from upwind side within range of ignition device (flare gun);
- Determine lower explosive limit area;
- Monitoring combustion gas, move toward the release **KEEPING DISTANT OF LOWER EXPLOSIVE LIMIT AREA**; and,
- Fire to ignite release.

6.0 ADMINISTRATION

This ERP has been prepared to meet the intent and scope of emergency response detail as outlined in the Ranger Corporate ERP. Specific details as to Ranger personnel reporting responsibilities during an emergency event are outlined in this document. A copy of the Ranger Corporate ERP will also be retained on-site as back up to this document.

6.1 Manual Updating

The Supervisor of Emergency Operations is responsible for the preparation, review and updating of this manual. In addition, any employee who is involved in an Emergency Response activity, may draft up a new procedure or an amendment to an existing procedure as appropriate.

6.2 Preventative Measures

All equipment necessary to undertake the production test shall be maintained in accordance with the following requirements:

- Identification of necessary equipment standards and operating parameters (Ranger project bidding documents and workplan);
- Regular equipment inspections and testing while on-site (Contractor responsibility supervised by Ranger On-Site Supervisor);
- Regular scheduled maintenance and testing of shut down devices to ensure they are capable of operating under emergency conditions;
- Regular scheduled calibration and maintenance of all monitoring equipment to ensure accuracy of pressure, H2S and LEL reading under normal operations and emergency situations;
- Regular scheduled monitoring of roadways (surface conditions) hazardous materials and fuel storage areas (leaks or fluid loss);
- Daily safety meetings and personnel training and provision of on-site safety personnel; and;
- Kick-off orientation prior to commencement of testing. Ongoing orientation for replacement workers by Site Safety Officer.

6.3 Emergency Planning Zone (EPZ)

For this plan, the EPZ will be a zone centered on the well site up to and including the lease boundary.

6.4 Emergency Hazard Zone (EHZ)

For this plan, a EHZ will include a designated operations area beyond the lease boundary, including the camp. This should also include an area upstream and downstream of the barge landing area (suggested 100 m distance 50 m upstream and downstream on the Liard River.

6.5 Muster Stations

The muster station (for all Emergency Levels) will be designated each day at the morning tailgate meeting.

6.6 Site Plan (Appendix 1)

A site plan (Appendix 1) will be prepared to identify muster areas, and locations of emergency response equipment and emergency shutdown valves, controls or disconnects.

6.7 Emergency Response Teams

The Ranger Project Supervisor (Mr. Leroy Brown) will ensure that all employees area advised of the emergency response program in place for the site. This will include designation of an On-Site Commander and on-site associated support members of the ERP team. Essential and non-essential personnel will be identified at this time in association with the evacuation option for a Level 2 event.

6.8 Emergency Notification and Action Report

The Ranger Emergency Notification and Action Report should be used for the reporting of emergency incidents, accidents or spills that may occur during activities at the P-66A location.

Reporting spills that occur during the transportation of a Dangerous Good.
"Dangerous Occurrences" – Reporting Requirements
A spill or leak of dangerous goods in excess of the Reporting Quantity (as per following page) for each class is a dangerous occurrence if it also represents a danger to health, life, property or the environment. To avoid the need for judging the potential or danger to health, life, property or the environment, **report any spill or leak that is above the "reporting quantity".**

Other accidents or incidents that must be reported as dangerous occurrences are:

- Damage to bulk containers of dangerous goods; and,
- An unintentional fire or explosion involving dangerous goods.

To ensure all Dangerous Occurrences are properly reported follow this procedure:

1. Immediately notify your supervisor and the Site Senior Supervisor.
2. The Site Senior Supervisor or designate will immediately make the following contacts:
    - Ranger Safety and Environmental Representative;
    - The Local RCMP
    - Land Use and Renewable Resources; and,
    - National Energy Board (NEB)
3. Conduct incident investigation in coordination with Ranger safety representative.
4. Complete Ranger spill documentation.
5. Forward Dangerous Occurrence Report to Transport Canada within 30 days and copy to National Energy Board.

6.9 Vehicle Accidents or Equipment Damage

The Ranger **Emergency Notification and Action Report** must also be utilized for the reporting of traffic accidents and associated equipment. This form also includes background information for incident investigation.

SPILL REPORTING REQUIREMENTS; REPORTABLE QUANTITIES

CLASS*	DESCRIPTION	QUANTITY
1	EXPLOSIVES	Any quantity
2	Gases	Any of Poisonous (2.3) or Corrosive (2.4) Gases More than 100 liters (based on container capacity for 2.1 or 2.2 Gases
3	Flammable Liquids	More than 200 liters
4	Flammable Solids	More than 25 kg.
5	Oxidizers	Oxidizers more than 50 kg or 50 L Organic Peroxides (5.2) over 1 kg or 1 L
6	Poisonous or Infectious	Poisonous (6.1) over 5 kg or 5 L Infectious (6.2) any quantity
7	Radioactive	Any discharge of Radioactive material
8	Corrosive	More than 5 kg or 5 L
9	Miscellaneous	Over 50 kg of 9.1 Over 1 kg of 9.2 Over 5 kg or 5L of 9.3

- **Transportation of Dangerous Goods classification identified on labels located on sides of storage containers.**

6.9.1 Contractors Responsibilities

All contractors will be responsible for ensuring adequate first aid, spill and emergency response training of employees working at the site. They will further ensure that their equipment is provided with appropriate spill containment and fire fighting equipment, and meets the applicable preventative measures as outlined in Section 6.2

RANGER OIL LIMITED
WELL COMPLETION, SERVICING, & WORKOVER CHECKLIST

Ranger Oil commits to conduct its operations in a safe and environmentally responsible manner. This checklist is one tool that will ensure this goal is met.

In using the checklist, please follow these guidelines:

1) The checklist must be completed prior to commencing operations.
(Note that section 10. DERRICK must be completed prior to raising the derrick.)

2) Problems that may restrict kick detection and the ability to circulate out a kick, that could contribute to an operational failure of blowout prevention equipment, or impair ability to maintain control of the well are noted in ***Bold Italic*** print. If any of these items require "corrective action", **operations must not proceed until repairs are made.**

   For any other items that require "corrective action", repairs must be made as soon as possible. (Review with Ranger Drilling and Completions Superintendent if required)

3) A copy of the completed checklist must be forwarded to Ranger Oil after it is completed.

4) Re-entries, drilling with a service rig, and well stimulation may require additional items and equipment beyond this checklist. Please refer to ARP's, and Provincial regulations for further guidance.

5) This checklist is designed to increase the supervisors knowledge of the rig and basic safety requirements. Feed back, suggestions and additional items for this checklist are welcomed and can be forwarded to the Ranger Drilling and Completions Superintendent and/or the Safety & Environment Co-ordinator.

Ranger Oil Limited
Well Completion, Servicing, & Workover Checklist

Location: _____ Company Representative: _____

Contractor: _____ Date: _____

AFE No.: _____ Operation: _____

(☯) Indicates Satisfactory (x) Corrective Action Required (N/A) Not Applicable

1. *Accumulator*

☐ a) Accumulator
Manufacturer: _____
Pressure rating: _____ kPa
_____ - _____ gallon bottles
Usable volume (litres) _____
Volume required (litres) _____
Adequately Sized

☐ b) Operating pressure: _____ kPa

☐ c) Precharge pressure: _____ kPa

☐ d) ***Remaining Pressure:*** _____ kPa
(After function test must be >8400 kPa)

☐ e) ***Accumulator pressure gauge available and accurate***

☐ f) ***Recharge pump capable of recharging accumulator***

☐ g) Check valve installed between accumulator and recharge pump

☐ h) Accumulator Controls
Drillers position and remote controls accessible and functioning _____
Controls clearly marked _____
(Remote controls 7m from well for classes I, II & IIA and 25 m from well for class III)

☐ i) Backup Nitrogen Bottles
No. of bottles _____ ***/Required No.*** ____
Bottle size(s) _____
Bottle pressures (kPa)
_____ _____ _____

Bottle(s) properly connected _____
Nitrogen pressure gauge available and accurate _____
Nitrogen volume adequately sized ____

☐ j) Compressed gas cylinders secured and vertical

☐ k) Fire extinguisher easily accessible

☐ l) Accumulator reservoirs located inside building properly vented to the outside

2. *Manifold*

☐ a) ***Manifold - pressure rating:*** ____ kPa
Straight through OD _____
(Class II or III min 50 mm throughout)

No manifold required for Class I, only flare/vent line(s) required (2-50 mm or 1-75 mm line) to flare 50 m away. Must be connected to valve spool below BOP and securely tied down for the entire length.

☐ b) Small threaded fittings meet manifold pressure rating or can be isolated _____

☐ c) ***Manifold / casing pressure gauges accurate:***
Manifold _____ kPa Incr. _____ kPa
Casing _____ kPa Incr. _____ kPa

☐ d) Cold weather operations. Method used to winterize manifold and bleed off kill lines

- ❑ e) ***Check valve installed properly*** _____
- ❑ f) ***Kill line/bleed-off line properly secured*** _____
- ❑ g) ***Bleed off / kill line shock hose(s) proper pressure rating*** ____

  Date of last shop service _____

3. TANK

- ❑ a) Handrails and walkways adequate
- ❑ b) Lighting adequate
- ❑ c) Closed system used for circulating, swabbing or flowing sour effluent _____

4. RIG PUMP

- ❑ a) Correct pop valve shear pins and covers in place
- ❑ b) Relief line secured, not allowed to freeze, and sloped downward. No isolation valve
- ❑ c) Hoses safety chained
- ❑ d) Pulsation dampers and pressure gauges
- ❑ e) Able to hear warning horns
- ❑ f) Pump > 7 m from tank and equipped with air shut-off _____
- ❑ h) Fire extinguisher accessible
- ❑ i) Houskeeping

5. BOP's

- ❑ a) ***BOP stack - Class*** _____

  Pressure rating _____ ***kPa***
  Configuration _____
  Date of last shop test _____
  (Required every 3 years)
- ❑ b) Locking hand wheels/wrench available
- ❑ c) ***BOP stack adequately heated*** _____
- ❑ d) BOP closing lines

  Lines have properly pressure rating ____
  Lines and fittings are free of leaks _____
  Lines are fire resistant/steel _____
- ❑ e) Rams
  Installed in proper position _____
  Proper pipe ram sizing _____
- ❑ f) ***Is working spool proper pressure rating*** _____
  Are double drilled spools in use and certified for pressure rating _____
- ❑ g) ***Tubing stripper installed and operating*** (Class I gas wells only) _____
- ❑ h) ***Tubing plug or shut off device installed in tubing string during tripping operations*** (Class I gas wells only) _____
- ❑ i) ***Wireline annular preventor in use when conventional annual preventor not in service*** _____
- ❑ j) ***Closing devices available for rod preventor*** _____
- ❑ k) ***BOP's properly pressure tested and results recorded*** _____
- ❑ l) Full lubricator installed when wireline work being done

6. BOILER

- ❑ a) No clothing or flammables
- ❑ b) Sight glass guarded
- ❑ c) Boiler inspection licence on location ____
  Inspection date _____
  (Yearly inspection required)
- ❑ d) Fire extinguisher accessible
- ❑ e) WHMIS label on boiler chemical pot
- ❑ f) Diesel fuel tank has identification label

- ❑ g) No fuel leaks
- ❑ h) Boiler 25 m from well
- ❑ i) Boiler blowdown line. Warning sign posted _____. Deflecting muffler installed.
- ❑ j) Electrical requirements met (non-hazardous area)
  Light fixtures sealed _____
  Wiring well maintained _____
- ❑ k) Housekeeping

7. *PIPE RACK / LEASE AREA*

- ❑ a) Pipe Racks
  Chained together ____
  Level and securely planked _____
  Spacer between racks secure _____
  End stoppers in place _____
- ❑ b) Flare pit
  50 m from well _____
  Isolated from trees and bush
  Back wall height adequate (≈ 2)
- ❑ c) Sump (if open)
  Worker protection _____
- ❑ d) Storage tanks properly supported on matting or planks c/w ladders in good condition
- ❑ e) Electric Power Lines
  "Caution Hi Voltage Power Line" sign posted under power lines on lease and lease road _____
  Cords off ground in traffic areas _____
- ❑ f) Lease entrance signs
  Protective clothing
  Tight hole sign (if required)
  H_2S Sign (only if required)
  Note: It is an AEUB violation to post a H_2S sign on sweet well.

8. *LIGHT PLANT*

- ❑ a) Properly grounded, 2 stakes, 3 m apart
- ❑ b) Lockout procedures posted
- ❑ c) Receptacles/circuit breakers identified
- ❑ d) "Disconnect power before unplugging sign"
- ❑ e) Wiring off the ground and properly secured
- ❑ f) No fuel / oil leaks
- ❑ g) Hearing protection required sign posted ____

  Hearing protection available _____
- ❑ h) Electrical requirements met (nonhazardous area)
  Light fixtures sealed _____
  Wiring well maintained _____
- ❑ i) Fire extinguisher available (C02 required)
- ❑ j) Housekeeping

9. *RIG FLOOR*

- ❑ a) Guards on all moving parts
- ❑ b) ***Warning horn working***
- ❑ c) Stairways, and handrails in-place and in good condition.
- ❑ d) Crown saver checked _____
- ❑ e) Tugger/Winch line condition
- ❑ f) Electrical requirements met

  Class I, Division II Area
  Approved fixtures _____
  Light fixtures sealed _____
  Wiring well maintained _____
  Equipment non-incendive _____
- ❑ g) Fire extinguisher readily accessible
- ❑ h) Housekeeping
- ❑ i) Air shut-offs functioned daily _____

- ❑ j) Engine exhausts directed away from the well and end >6 m from vertical centre line of well.
- ❑ k) Condition of tongs

  Back up cable and chain condition
  Slip retaining pins installed _____
- ❑ l) Line clamps properly attached
- ❑ m) Condition of other cables
- ❑ n) Slips condition
- ❑ o) Grip matting on working area of floor
- ❑ p) Weight indicator/diaphrams safety chained
- ❑ q) Stabbing valve
  Proper cross-over / type _____
  Full opening _____
  OD x ID _____ x _____
  Valve accessible in the open position with the closing handle available
  Pressure tested to: Low _____ ***kPa***
  High _____ ***kPa***
  Carrying handle/hanger cap available if more than one person is required to handle it ____

10. DERRICK RIG FLOOR
(Inspect prior to raising)

- ❑ a) Guy lines installed in accordance with manufacturers specifications _____
- ❑ b) Wind board installed
- ❑ c) Fingers straight / chained
- ❑ d) Ladder condition
- ❑ e) Sufficient lighting/fastened independent of cords.
- ❑ f) Electrical requirements met

  (Transient Vapor area)
  Approved fixtures _____
  Light fixtures sealed _____
  Wiring well maintained _____
- ❑ g) Escape line / buggy condition
  Line double staked _____
  Adequate slack in line _____
  (buggy should touch down 10 m before pins)
  Cable path kept free of obstructions
- ❑ h) Easy rider/safety belt condition
- ❑ i) Adequate anchors installed and pull tested

11. DOGHOUSE

- ❑ a) Bulletin board
  Shut in procedure posted _____
  Emergency / ambulance phone numbers posted _____
- ❑ b) First aid kit stocked and clean
- ❑ c) Eye wash bottle
- ❑ d) Condition of hand tools
- ❑ e) No smoking / hard hat area signs posted
- ❑ f) Fire extinguisher readily accessible
- ❑ g) Electrical requirements met
  (Transient Vapor Area)
  Approved fixtures _____
  Light fixtures sealed _____
  Wiring well maintained _____
- ❑ h) Housekeeping

12. MISCELLANEOUS

- ❑ a) Emergency Phone List
  Nearest ambulance
  Land (Location) _____
  Phone No. _____
  Air (Location) _____
  Phone No. _____
  Nearest Oxygen/resuscitator available
  (Location) _____
  Phone No. _____
  Locations and phone numbers posted (post in doghouse and engineer's shack)
- ❑ b) WHMIS data sheets on location

❑ c) Personnel protective equipment requirements. All personnel have safety boots, safety glasses, hard hats, etc. Fire retardant clothing available.

❑ d) Breathing apparatus - 5 full, operable. Extra bottle of air for each pack.

13. *WELL RECORDS*

❑ a) Motor air intake shut off checked and recorded

❑ b) Rig crews trained in WHMIS

❑ c) BOP function tests
Checked daily _____
Blinds checked when out of hole _____
Recorded in tour book _____

❑ d) ***Weekly BOP drills with each crew and recorded.***

❑ e) Rig crew safety meetings recorded and minutes posted.

❑ f) TDG Documentation

Kept in separate file and sent to the Calgary office at completion of well _____
Manifests completed when returning regulated products to supplier _____
Note: Many truckers have a TDG section as part of their trucking ticket which can be used. Truck drivers TDG certificate verified _____

❑ g) Waste Management Guidelines being followed as outlined in AEUB Service Rig Inspection Manual. _____

RIG CREW BOP CERTIFICATES

CREW MEMBER	*WELL SERVICING CERTIFICATE*	CERTIFICATE NO.	EXPIRY DATE
Toolpush			
Driller			

❑ i) Has the above BOP certificate information been recorded in the tour book _____

RANGER OIL
TIME AND EVENT LOG

Name: _____ **Title:** _____

Date: _____ Page ____ of____

Telephone Summary					
Time	Conversation With	Phone #	Call Made	Rec'd Call	Note: Document All Key Events, Actions and Decisions, Not Just Telephone Calls

Remember to obtain the telephone number of those who call. Record names of businesses, agencies, and job titles of those referred to in your remarks.

RANGER OIL
INITIAL NOTIFICATION FOR INCIDENTS, ACCIDENTS & EMERGENCIES

When Receiving A Call, Please Ensure Questions Are Asked

1	Person Calling		Date of Call	Time of Call	
2	Time of Incident		Date of Incident		
3	Department?		Dept. #		Phone:
	Occupation?				
4	Type Of Incident / Description of what happened.				
5	Incident Location (LSD, plant, etc.)?				
6	What Is The Nearest Town (District)?				
7	Directions To Incident Scene?				
8	Any Injuries? ☐ Yes ☐ No Number		Severity:		
	Names				
	Where Taken:				
9	Any Serious Environmental Concerns? Spill or Release Type and Volume?				
	Area Affected?				
	Weather Conditions	Visibility	Temp °C	Wind kph	Wind Dir.	Precipitation
	Residences?				
10	What Actions Have Been Taken?				
11	Is The Situation Under Control? ☐ Yes ☐ No				
12	What Can I Do To Assist?				
13	Comments:				
14	Notifications Done Or To Be Done?	☐ Ambulance No.	☐ Police No.		
	☐ Fire No.	☐ AEUB or Equivalent No.	☐ AEP or Equivalent No.		
	☐ OH&S or WCB No.				
15	Co. Notifications	☐ Security No.	☐ Land No.	☐ Community Relations No.	
	☐ Insurance No.	☐ Safety, Health, Environment No.			

Ranger Oil Limited

Accident / Incident Report

Operating Area: _____ **Legal Description:** _____

Date: _____ **Time:** _____

On - Site Emergency Coordinator: _____

Nature of Emergency: **Level I:** [ ] **Level II:** [ ] **Level III:** [ ]

Type of Emergency

Complaint: [ ]	Bomb Threat [ ]	Vandalism / Security [ ]
Spill / Release [ ]	Vehicle Accident [ ]	Fatality [ ]
Fire / Explosion: [ ]	Environment [ ]	Other: _____
Personal Injury [ ]	Property Damage [ ]	Other:

Company Contacts Made

		Date	Time
Public Affairs: [ ]	Name:		
Insurance: [ ]	Name:		
Legal: [ ]	Name:		
Engineering: [ ]	Name:		
Drilling & Completions: [ ]	Name:		
Environment: [ ]	Name:		
Supervision / Management: [ ]	Name:		

Government Contacts Made

British Columbia	Alberta	Saskatchewan
..E.M.P.R.: [ ]	E.R.C.B.: [ ]	S.E.M.: [ ]
/.C.B.: [ ]	A.L.H.&S.: [ ]	O.H.&S.: [ ]
O.S.C.A.R.: [ ]	O.S.C.A.R.: [ ]	O.S.C.A.R.: [ ]
Oil Spill Co-op: [ ]	Oil Spill Co-op: [ ]	Oil Spill Co-op: [ ]
Prov. Emergency Program: [ ]	Public Safety Services: [ ]	Public Safety Services: [ ]
Forestry: [ ]	Forestry, Lands & Wildlife : [ ]	Forestry: [ ]
Environment: [ ]	Environment: [ ]	Environment: [ ]
Boilers Branch: [ ]	Boilers Branch: [ ]	Boilers Branch: [ ]
Energy Resources Div.:[ ]	Energy & Natural Resources:[ ]	Energy & Natural Resources:[ ]
Fish & Wildlife: [ ]	R.C.M.P.: [ ]	Fish & Wildlife: [ ]
R.C.M.P.: [ ]	Other: _____	R.C.M.P.: [ ]
Other:	Other:	Other:

Personal Contact Made: **Next - of - Kin:** [ ]

External Contacts - Services & Service Companies

Fire Services: [ ]	Residents: [ ]	Contractor Services: [ ]
Medical Aid: [ ]	Land Owners: [ ]	Ambulance: [ ]
Air Monitoring: [ ]	Municipality: [ ]	Neighbouring Producers: [ ]
Partners: [ ]	Other: _____	Other: _____
Other:	Other:	Other:

Emergency Actions

Action Taken	Date	Time

RANGER OIL LIMITED

HAZARD IDENTIFICATION/NEAR MISS REPORT

Describe Hazard or Near Miss: _____

_____

_____

_____

_____

Recommendations : _____

_____

_____

_____

_____

Potential: Injury ☐ Property Damage☐ Environmental Damage☐

_____ _____ _____

Location Date Reported by (print name–optional)

Submit to supervisor or Safety, Health & Environment Advisor 10/98

APPENDIX V

Service Operations

Class III BOP

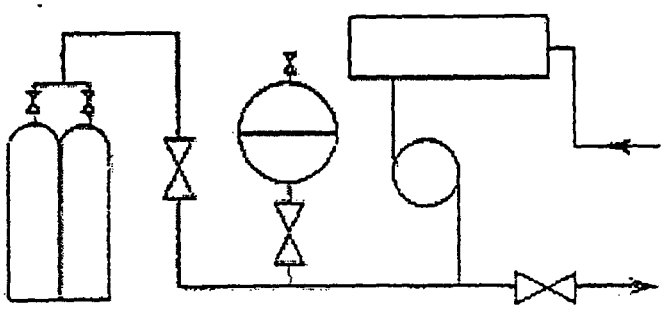
Spacing Requirements

Pressure Testing procedures

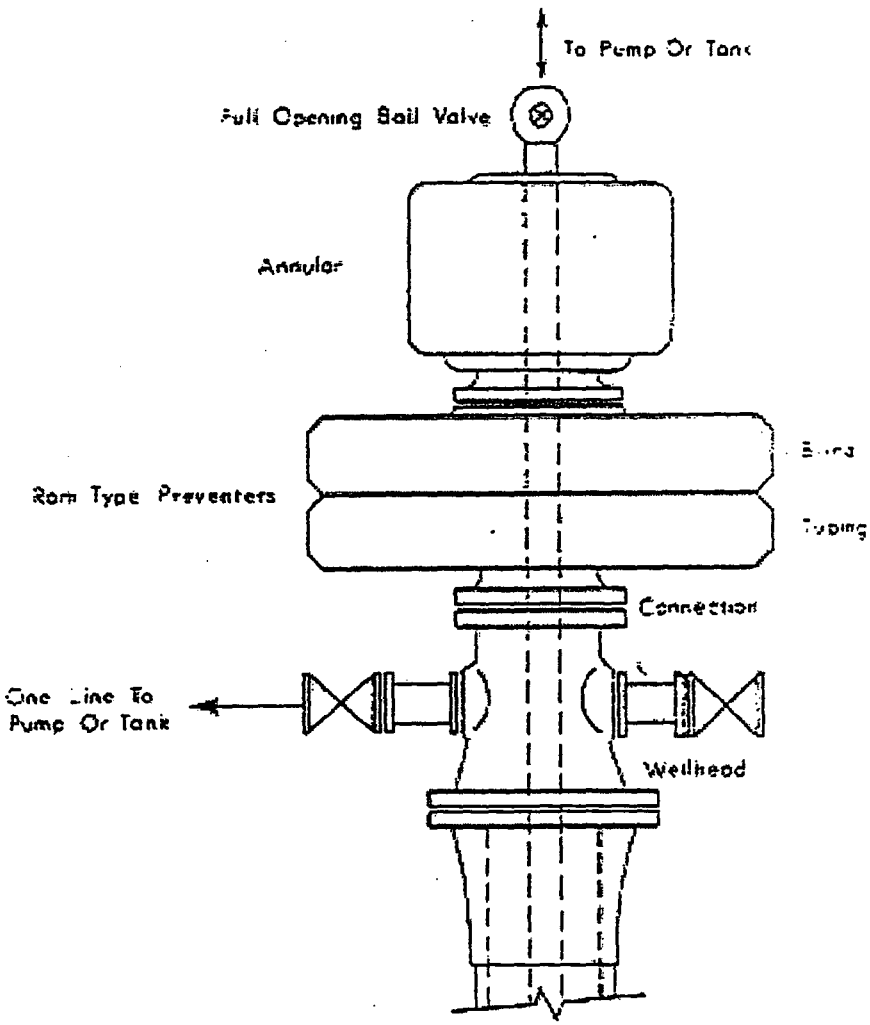
SERVICING BLOWOUT PREVENTION SYSTEMS – CLASS III

1 RATING OF PRODUCTION CASING FLANGE IS GREATER THAN 21 000 kPa, OR

2 RATING OF PRODUCTION CASING FLANGE IS LESS THAN OR EQUAL TO 21 000 kPa and H_2S CONTENT OF THE GAS IS EQUAL TO OR GREATER THAN 10 moles/kilomole



ACCUMULATOR SYSTEM



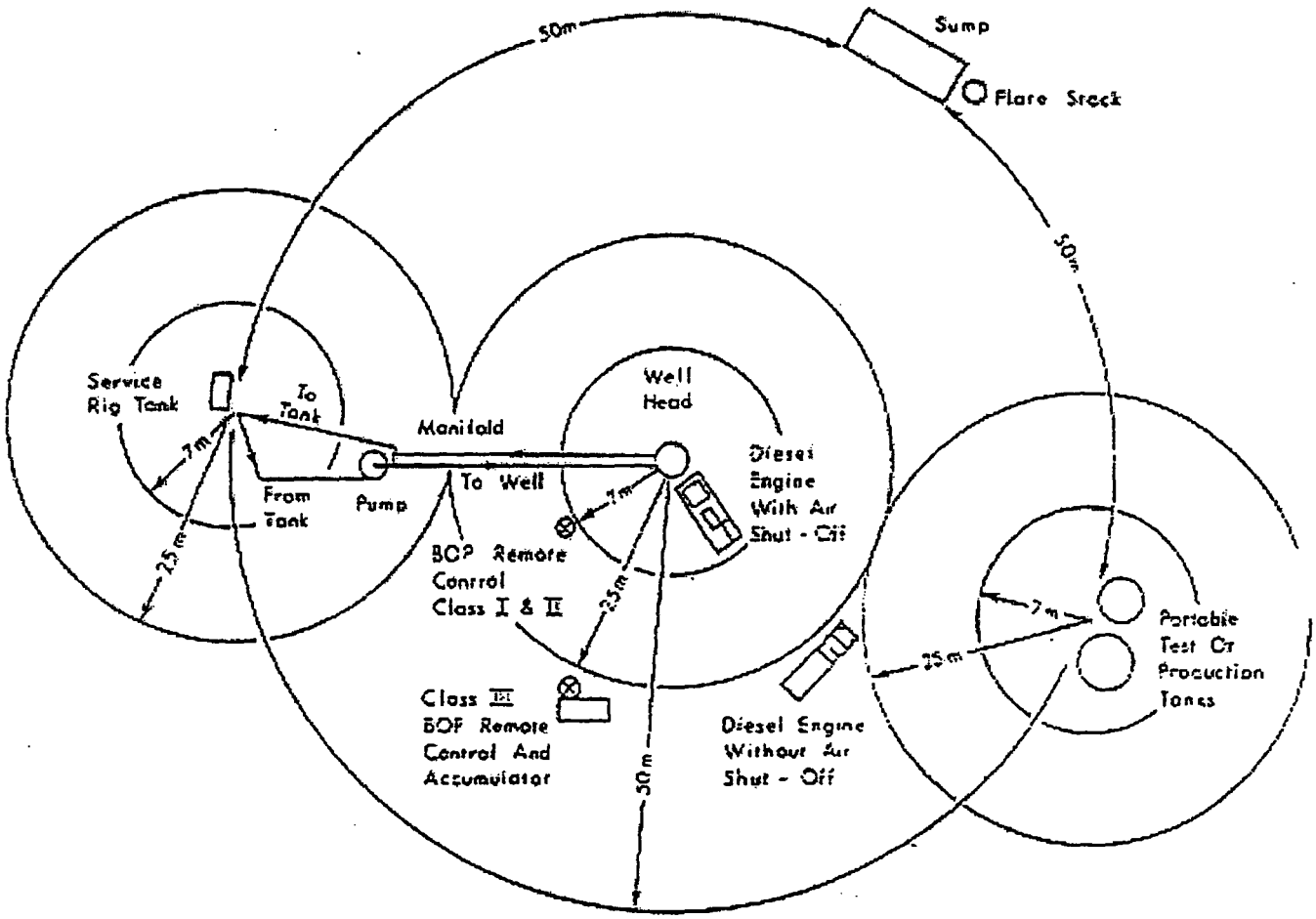
BLOWOUT PREVENTION STACK

NOTE:

1. Pressure rating of preventers is equal to or greater than the production casing flange rating, or the formation pressure, whichever is the lesser.
2. 50 mm lines throughout.
3. The positioning of the tubing and blind rams may be interchanged.

c)

EQUIPMENT SPACING FOR WELL SERVICING



Sign	NO SMOKING	Access Road Free Of Congestion	DANGER POISONOUS GAS	Sign

NOTE:
The doghouse and light plant must be positioned in accordance with smoking and open flame regulations, and regulations under the Electrical Protection Act.

(AR 51/81)

Pressure Testing Procedures

Service Rig BOP`S

1) Install the BOP`S on the test stump.

2) Close the Blind rams and pressure test same to 1400 kPa low test and 35,000 kPa high test for 10 minutes each test.

3) Open the Blind rams and install a pup slotted pup joint into the test stump. Install the Stabbing valve into the top of the pup joint.

4) Close the Pipe rams and the Stabbing valve.

5) Pressure test the Pipe rams and the stabbing valve to 1400 kPa low test and 35,000 kPa high test for 10 minutes each test.

6) Open the Pipe rams and close the Hydril.

7) Pressure test the Hydril to 1400 kPa low test and 35000 kPa high test for 10 minutes each test.

8) Bleed off the pressure to 0 kPa. Open the Hydril.

9) Turn off the Re-Charge pump at the Accumulator and bleed off the system pressure to 0 kPa. Remove the protector cap on the Pre-Charge bottle and install the test fittings and gauge. Check the Pre-Charge pressure in the bottle. Each bottle must be tested individually and have a minimum Pre-Charge pressure of 7000 kPa.

10) With the Accumulator system fully charged turn off the Pre-Charge pump. Close the pipe rams and the Hydril. Open the pipe rams. The Accumulator pressure must be above 8400 kPa.

11) Check the Nitrogen bottles. The Nitrogen pressure must not be below 12,500 kPa.

ABB Vetco Gray Canada Inc.

ABB Vetco Gray Canada Inc.
2000, 520 - 5th Avenue S.W. • Calgary, Alberta • T2P 3R7
Phone: (403) 264-4146 • Fax: (403) 269-4224
1-800-925-6024

Quotation 99-8058R1

Date: December 10, 1999

To: Ranger Oil

Attention: Mr. Leroy Brown

Reference: Liard P-66A

Delivery: 16 Weeks

Payment Terms: Net 30 Days

Quotation Validity: 90 Days

Account Representative: Mr. Greg McDonald

Per Standard ABB Vetco Gray Canada Terms And Conditions Attached

Post-it™ Fax Note 7671E	Date Dec 10	# of pages ▸ 4
To LEROY BROWN	From GREG McDONALD	
Co./Dept. RANGER OIL	Co. ABB VETCO GRAY	
Phone # 303-7329	Phone # 264-4146	
Fax # 261-7010	Fax # 269-4224	

ORIGINAL TO FOLLOW

Item	Qty	Description	Unit	Total
1.	1	ABB VG-SF tubing head: 13 5/8" 5000# x 11" 5000# c/w 2- 2 1/16" 5000# SSO L, DD, PSL-3, PR-1	8005.84	8005.84
2.	1	ABB GOF modified secondary packoff for short casing cut-off: 13 5/8" x 9 5/8" c/w snap ring L, DD, PSL-2, PR-1	980.10	980.10
3.	1	ABB GSSV tubing hanger: 11" x 4 ½" EUE extended neck, lift thread c/w 4 ½" NSCT suspension threads & 4" B.P.V threads & prep. for ¼" control line L, HH, PSL-3, PR-1	5005.00	5005.00

ABB Vetco Gray Canada Inc.

Quotation 99-8058R1
Page 2

Item	Qty.	Description	Unit	Total
4.	1	ABB GSSV adapter flange: 11" 5000# x 4 1/16" 5000# double studded c/w seal pocket, test ports & prep. for ¼" control line L, HH, PSL-3, PR-1	5070.00	5070.00
5.	1	ABB VGC gate valve: 4 1/16" 5000# flanged full opening c/w Safoco 4" actuator conversion kit and bonnet assembly L, HH, PSL-3, PR-2	56,750.00	56,750.00
6.	1	ABB VGC gate valve: 4 1/16" 5000# flanged full opening L, HH, PSL-3, PR-2	37,830.00	37,830.00
7.	1	ABB SC studded cross: 4 1/16" 5000# x 4 1/16" 5000# x 4 1/16" 5000# x 4 1/16" 5000# L, HH, PR-1, PSL-2	8060.00	8060.00
8.	1	ABB B.H.T.A bottom hole test adapter: 4 1/16" 5000# flanged c/w top cap ½" NPT tap & 4 ½" EUE internal lift threads L, HH, PR-1, PSL-2	6500.00	6500.00
9.	3	ABB VGC gate valve: 4 1/16" 5000# flanged full opening L, HH, PSL-2, PR-2	37,830.00	113,490.00
10.	2	R-24 stainless steel ring gasket	44.10	88.20
11.	9	R-39 stainless steel ring gasket	61.00	549.00
12.	1	R-54 stainless steel ring gasket	247.00	247.00
13.	1	BX-160 stainless steel ring gasket	349.20	349.20
14.	4	L7M studs c/w 2- 2HM nuts: 1 ¼" x 8" long, set of 8	59.50	238.00
		Assembly Total:		**243,162.34**

ABB Vetco Gray Canada Inc.

Quotation 99-8058R1
Page 3

Item	Qty.	Description	Unit	Total

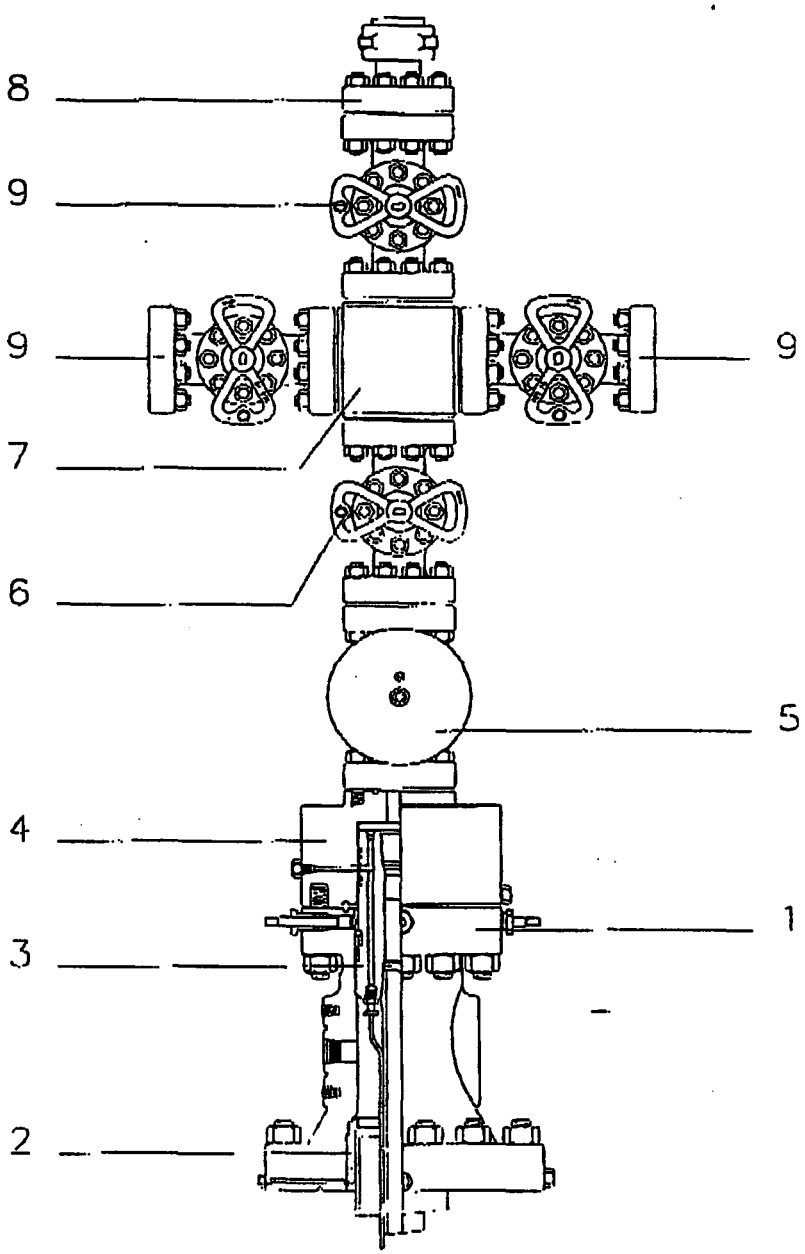
Add GST

Additional Information: Kelly Hryniw 403-264-4146

Authorization:

- No products may be returned for credit without written consent of authorized ABB VGC employee.
- Products returned over 30 days from shipment date are subject to 15% restocking charge.
- Products purchased from other O.E.M.'s are subject to their actual restocking charges
- Assemblies returned for credit that require disassembly are subject to tear down charge.
- No credit is to be given on assembly, test, and paint.
- Returned products requiring clean-up are subject to shop charge.
- Expendable items such as nipples, ring gaskets, and boltings that are part of assemblies are subject to 100% restocking charge.
- Wellheads and gate valves requiring coating for injection systems are subject to 15% restocking charge.
- Wellheads and gate valves manufactured to PSL-3 are subject to 15% restocking charge.
- Specialty or one off equipment and gate valves are subject to 100% restocking charge. Specialty items are those not considered normal stock items.

ABB Vetco Gray Canada Inc.



Quotation 99-8058R1
For: Ranger Oil
Attn: Mr. Leroy Brown
Re: Liard P-66A

ABB Vetco Gray Canada Inc.

ABB Vetco Gray Canada Inc.
2000, 520 - 5th Avenue S.W.
Calgary, Alberta, Canada
T2P 3R7
Telephone 403-264-4146
1-800-925-6024
Fax 403-269-4224

Guiberson · AVA CANADA

PACKER INSTALLATION PLAN

OPTION ""B"

PREPARED FOR	COMPANY	DATE
LEROY BROWN	RANGER OIL LIMITED	23-DEC-99
WELL NAME	**LOCATION**	**TYPE OF INSTALLATION**
LIARD RIVER	P-66A	PRODUCTION

INSTALLATION	ITEM	DESCRIPTION
		177.8mm 38.7 KG/M CASING 6.45mm STAINLESS STEEL CONTROL LINE 114.3mm NS-CT 18.75 KG/M L-80 TUBING 114.3mm NS-CT BAKER TE5 TUBING RET. SSSV C/W 96.85mm ALTERNATE NIPPLE PROFILE 114.3mm NS-CT 18.75 KG/M L-80 TUBING 114.3mm NS-CT 'X' NIPPLE c/w 96.85mm PROFILE 114.3mm NS-CT x 3.0m 18.75 KG/M L-80 PUP JOINT 114.3mm NS-CT x 88.9mm NS-CT L-80 CHANGEOVER GUIBERSON AVA 88.9mm NSCT PREMIUM LATCH SEAL ASSEMBLY c/w EXTRA SEAL UNIT AND LEAD IN SUB 76.2mm I.D. L-80 MATERIAL GUIBERSON AVA 177.8mm x 101.6mm 25.3 – 38.69 KG/M MAGNUM GT PACKER c/w ZERO GAP ELEMENT INCOLOY 925 MATERIAL GUIBERSON AVA 127.0mm 8RD LCT x 88.9mm NS-CT CROSSOVER INCOLOY 925 MATERIAL 88.9mm NS-CT 13.84 KG/M x 1.2m INCOLOY 925 PUP JOINT 88.9mm NS-CT INCOLOY 925 'X' NIPPLE c/w 69.85mm PROFILE 88.9mm NS-CT 13.84 KG/M x 3.0m L-80 PUP JOINT 88.9mm NS-CT BOX x PIN L-80 'X' NIPPLE c/w 69.85mm PROFILE 88.9mm EUE TUBING CENTRALIZER O.D. 150.81mm, I.D. 76.00mm 88.9mm EUE 13.84 KG/M x 1.2m PERFORATED PUP JOINT 88.9mm EUE 13.84 KG/M x 3.0m L-80 PUP JOINT 88.9mm EUE L-80 'XN' NIPPLE c/w 69.85mm PROFILE AND 66.93mm NO-GO 88.9mm EUE WIRELINE RE-ENTRY GUIDE MAX O.D. 120.65mm, I.D. 74.80mm

SERVICE CONTACT	SERVICE CENTER	TELEPHONE	PREPARED BY	TELEPHONE
R.POWERS	FT.ST.JOHN	250-785-5401	DH BECK	231-9330

P66A WF
a ACCS
LEROY

HALLMARK TUBULARS LTD.

November 3, 1999.

QUOTATION NO: QU-99-156

Ranger Oil Limited
900, 311 – 6th Avenue S. W.
Calgary, Alberta
T2P 3H2

LOCATION: Ranger Liard
P-66-A

ATTENTION: Mr. Leroy Brown

Dear Mr. Brown:

Hallmark Tubulars Ltd. is pleased to offer the following quotation for your consideration:

3100 Meters	114.3mm (4 ½") x 18.75kg/m (12.6#) L80 NSCT Seamless Steel Tubing Price: FOB, Guardian, Nisku. Stock, Subject to Prior Sale.	**$46.73/meter**
1 Each	114.3mm (4 ½") x 18.75kg/m (12.6#) x 2' L80 NSCT Seamless Pup Joint - Pin x Box Price : FOB, Guardian, Nisku Stock, Subject to Prior Sale	**$576.00/each**
1 Each	114.3mm (4 ½") x 18.75kg/m (12.6#) x 4' L80 NSCT Seamless Pup Joint - Pin x Box Price : FOB, Guardian, Nisku Stock, Subject to Prior Sale	**$648.00/each**
1 Each	114.3mm (4 ½") x 18.75kg/m (12.6#) x 6' L80 NSCT Seamless Pup Joint - Pin x Box Price : FOB, Guardian, Nisku Stock, Subject to Prior Sale	**$720.00/each**
1 Each	114.3mm (4 ½") x 18.75kg/m (12.6#) x 8' L80 NSCT Seamless Pup Joint - Pin x Box Price : FOB, Guardian, Nisku Stock, Subject to Prior Sale	**$775.00/each**
1 Each	114.3mm (4 ½") x 18.75kg/m (12.6#) x 10' L80 NSCT Seamless Pup Joint - Pin x Box Price : FOB, Guardian, Nisku Stock, Subject to Prior Sale	**$864.00/each**

HALLMARK TUBULARS LTD.

Terms:
1) Payment terms are Net 30 Days.

If you have any questions regarding the above quotation, please do not hesitate to contact myself at (403) 303-3718.

Regards,

HALLMARK TUBULARS LTD.

Norma MacLeod.

Norma MacLeod
Inside Sales

HALLMARK TECHNICAL SERVICES
A DIVISION OF HALLMARK TUBULARS LTD.
910 BOW VALLEY SQUARE III
255 - 5th AVENUE S.W.,
CALGARY, ALBERTA T2P 3G6
TELEPHONE: (403) 266-3807
FAX: (403) 266-6282

GST REGISTRATION No. R102251972

December 23, 1999

Ranger Oil Limited
1600, 321-6th Avenue S.W.
Calgary, Alberta
T2P 3H3

Attention: Mr. Leroy Brown

Re: Supervision Services for Ranger Ft.Liard

Leroy,

Further to our telephone conversation please find the information you have requested listed below.

External Pressure Testing

Conversation with Mr. Pat McDonald of NSPT has indicated that external connection pressure testing is not recommended. The explanation given is should pressure migrate past the primary torque shoulder damage or collapse of the pin could take place.

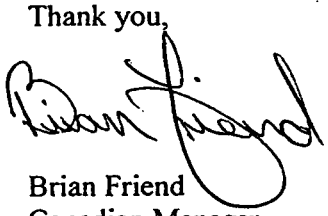
Connection Supervision Services

Connection Supervisor	$ 600.00 per day
Additional Connection Supervisor	$ 600.00 per day
Travel Charge Grande Prairie to Location and Return at 0.95 per km	
Sub Zero Thread Compound (2 Pails required)	$ 180.00
114.3mm NS-CT Stabbing Guide Per 5 Day Minimum Rental	$ 150.00
114.3mmTeflon Drift Per 5 Day Minimum Rental	$ 95.00
Environmental Wiping Rags Re cycling or Disposal Fee Included (4 Boxes required)	$ 60.00

- Technicians are equipped with Torque and Data books, depth micrometers, digital verniers, profile gauges, repair kits, flashlights and files.

Leroy, I thank you for the opportunity to provide you with this job proposal. We look forward to providing you with our services. Should I have discussion with Rig Service Equipment concerning the streamlining of equipment? If you have any questions or require additional information please give me a call.

Thank you,



Brian Friend
Canadian Manager

THREAD COMPOUND

T072

EYE IRRITANT
SKIN IRRITANT

IRRITANT POUR LES YEUX
IRRITANT POUR LA PEAU

KEEP AWAY FROM HEAT
WEAR SUITABLE GLOVES

TENIR À L'ABRI DE LA CHALEUR
PORTER DES GANTS APPROPRIÉS

HEALTH	FLAMMABILITY
1	1
PERSONAL PROTECTION	**REACTIVITY**
1	1

0-NONE 1-LOW 2-MEDIUM 3-HIGH
CLASS D, DIVISION 2, SUBDIVISION B

IF CONTACTED, FLUSH
EYES & SKIN WITH WATER
IF INGESTED, DO NOT
INDUCE VOMITING
CALL A PHYSICIAN

EN CAS DE CONTACT:
RINSER LES YEUX ET LA PEAU À L'EAU
NE PAS FAIRE VOMIR EN CAS D'INGESTION
OBTENIR DES SOINS MÉDICAUX IMMÉDIATS

SEE MATERIAL SAFETY DATA SHEET FOR PRODUCT
VOIR FICHE SIGNALETIQUE POUR CE PRODUIT

TOPCO SALES
CALGARY EDMONTON

HALLMARK TECHNICAL SERVICES

SUBZERO

API MODIFIED THREAD COMPOUND FORMULATED FOR ARCTIC ENVIRONMENTS

COMPONENTS	PERCENTAGE
Grease	36.0 ± 2.5
Powdered Graphite	18.0 ± 1.0
Lead Powder	30.5 ± 0.6
Zinc Dust	12.2 ± 0.6
Copper Flake	3.3 ± 0.3
H_2S Inhibited	

TECHNICAL DESCRIPTION

- Will not harden, dry out or evapourate
- Prevents galling during make-up and break-out
- Withstands pressures to 10,000 PSI
- Torque correction factor 1.0
- Temperature service rating -25° to +200°C

STIR BEFORE USE

MEETS REQUIREMENTS OF **API BULLETIN 5A2**
MADE IN CANADA

STIR BEFORE USE
4 litres • 4.5 kg

MANUFACTURED FOR
HALLMARK TECHNICAL SERVICES
BY TOPCO SALES

MATERIAL SAFETY DATA SHEET

WHMIS HAZARD INDEX:

INSIGNIFICANT
SLIGHT
MODERATE
3 HIGH
4 EXTREME

PRODUCT CODE:

FIRE	1
REACTIVITY	0
SPECIAL	0
TOXICITY	1

SECTION 1 LOCATION

TOPCO SALES
BAY 5, 3401 – 19 STREET N.E.
CALGARY, ALBERTA
CANADA T2E 6S8

PHONE (403) 219-0255
FAX (403) 291-3042

TRADE NAME: SUB-ZERO A.P.I. MODIFIED
HALLMARK TECHNICAL SERVICES PRODUCT

MATERIAL USE: LUBRICATE & SEAL PIPE THREADS

SECTION 2 HAZARDOUS INGREDIENTS

COMPOSITION	APPROX. CONCENTRATION	C.A.S.	EXP.LIMITS
COPPER DUST	1 – 5%	1317-38-0	N/A
GRAPHITE	15 – 25%	7782-42-5	N/A
POWDERED LEAD	25 – 40%	7439-92-1	N/A
ZINC DUST	10 – 25%	7440-66-6	N/A

SECTION 3 CHEMICAL & PHYSICAL PROPERTIES

NAME:
PETROLEUM HYDROCARBON WITH ADDITIVES

ODOUR:
) PETROLEUM

COLOUR:
COPPER PASTE

PHYSICAL STATE:
SEMI-SOLID

SPECIFIC GRAVITY:
1.8 g./c.c.

BOILING POINT:
260°C+ (500°F)

SOLUBILITY:
NONE

SECTION 4 FIRE & EXPLOSION HAZARDS

PROCEDURES:
USE WATER ONLY AS A FOG. "FIRE FIGHTERS SHOULD USE SELF-CONTAINED BREATHING APPARATUS WITH FULL FACE PIECE OPERATED IN POSITIVE PRESSURE DEMAND.

UNUSUAL FIRE & EXPLOSION HAZARDS: NONE

FLASH POINT: GREATER THAN 171°C (340°F) ASTM D-92

EXTINGUISHING AGENTS:
DRY CHEMICAL, WATERFOG, CO_2, FOAM, SAND/EARTH

SECTION 5 REACTIVITY DATA

CHEMICAL STABILITY: YES

INCOMPATIBILITY:
STRONG OXIDIZING AGENTS

\RDOUS DECOMPOSITION PRODUCTS:
.BON MONOXIDE, CARBON DIOXIDE, OXIDES OF LEAD & ZINC

SECTION 6 TOXICOLOGY

ROUTE OF ENTRY:
SKIN & EYE CONTACT

CHRONIC EFFECTS:
MAY CAUSE IRRITATION AND POSSIBLE DERMATITIS IN SENSITIVE INDIVIDUALS

ACUTE TOXICOLOGY:
NO DATA AVAILABLE

SECTION 7 PREVENTION MEASURES

GLOVES:
RUBBER OR CLOTH

EYE PROTECTION:
GOGGLES RECOMMENDED

VENTILATION:
LOCAL EXHAUST

RESPIRATORY PROTECITON:
NONE REQUIRED

LEAK & SPILL PROCEDURE:
PREVENT MATERIAL FROM ENTERING WATERCOURSES BY CONTAINING WITH SAND OR EARTH.

WASTE DISPOSAL:
DISPOSE IN COMPLIANCE WITH GOVERNMENT REGULATIONS AND LOCAL REQUIREMENTS.

STORAGE REQUIREMENTS:
COOL, DRY AREA, AWAY FROM SOURCES OF HEAT.

SECTION 8 FIRST AID MEASURES

SKIN:
WASH THOROUGHLY WITH SOAP AND WARM WATER

EYE:
FLUSH WITH WATER FOR AT LEAST 15 MINUTES

INHALATION:
VAPOUR PRESSURE IS NEGLIGIBLE. REMOVE VICTIM FROM FURTHER EXPOSURE

INGESTION:
DO NOT INDUCE VOMITING. SEEK MEDICAL ATTENTION IMMEDIATELY.

SECTION 9 PREPARATION DATE

PREPARED BY: ALAN S. HUEHN
GENERAL MANAGER
TOPCO SALES

DATE: JANUARY 1999

HALLMARK TECHNICAL SERVICES

A DIVISION OF HALLMARK TUBULARS LTD.

ISSUE 1 **DECEMBER 1999**

WHO IS HALLMARK TECHNICAL SERVICES?

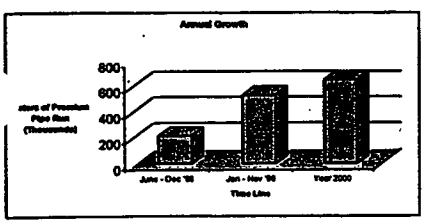
EIGHTEEN MONTHS AGO, HALLMARK TECHNICAL SERVICES, A DIVISION OF HALLMARK TUBULARS LTD. WAS CREATED. BRIAN FRIEND HEADS UP THIS NEW DIVISION AS THE CANADIAN MANAGER. BRIAN HAS 19 YEARS OF EXPERIENCE IN THE OILFIELD INDUSTRY SPECIALIZING IN CASING AND TUBING, INCLUDING ALL FACETS OF EQUIPMENT USAGE AND RUNNING TUBULARS. OUR CORE TECHNICAL TEAM HAS AN EXCESS OF 103 COMBINED YEARS OF EXPERTISE SPECIALIZING IN ALL AREAS OF THE TUBING AND CASING INDUSTRY.

A GROWING DIVISION

CURRENTLY THE HALLMARK TECHNICAL SERVICES CLIENTELE LIST EXCEEDS 60 DIFFERENT COMPANIES. TO DATE, WE HAVE BEEN AWARDED A FIVE YEAR CASING CONTRACT FOR A MAJOR OIL COMPANY, AS WELL AS A TWO YEAR CONTRACT TO PROVIDE SUPERVISION SERVICES FOR AN UPCOMING PROJECT IN THE INDUSTRY.

WE HAVE GROWN FROM TWO TO 11 FULL TIME EMPLOYEES, AND OUR GEOGRAPHIC LOCATIONS NOW INCLUDE CALGARY, EDMONTON, AND BONNYVILLE, ALBERTA.

WE, AT HALLMARK TECHNICAL SERVICES, HAVE BUILT OUR SUCCESS ON A SOLID FOUNDATION OF KNOWLEDGEABLE AND EXPERIENCED PEOPLE. THIS IS PROVEN BY OUR ANNUAL GROWTH.

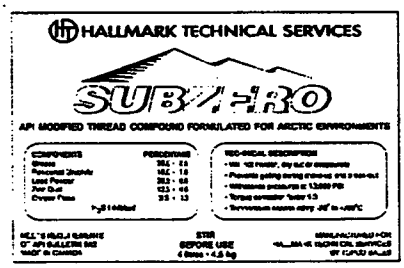


EXPANSION IN 2000

IN FEBRUARY OF 2000, HALLMARK TECHNICAL SERVICES WILL BE OPENING OUR HALIFAX DIVISION IN NOVA SCOTIA. TO DATE WE HAVE BEEN AWARDED CONTRACTS FOR FOUR OFFSHORE WELLS.

THE MEASURE OF SUCCESS

IN 18 MONTHS HALLMARK TECHNICAL SERVICES HAS RUN AN EXCESS OF 750,000 METERS OF PREMIUM PIPE.

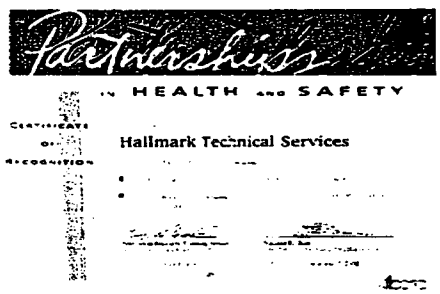


DESIGNED FOR CANADIAN CLIMATE

WE HAVE DEVELOPED, AND NOW EXCLUSIVLY MARKET **SUBZERO API COLD WEATHER THREAD COMPOUND.** MAJOR CORPORATIONS WORLDWIDE HAVE TESTED THIS PRODUCT, INCLUDING AREAS WITHIN JAPAN AND HOUSTON. THIS COMPOUND HAS BEEN SPECIFICALLY FORMULATED FOR ARCTIC ENVIRONMENTS; THE GREASE BASE CONTAINS A PARTIAL SYNTHETIC HYDRO-CARBON. THIS CHEMISTRY ALLOWS THE PRODUCT TO BE SPREAD UNIFORMLY WITHOUT THE ASSISTANCE OF HEAT DOWN TO MINUS -25°C. FOR MORE INFORMATION ON SUBZERO COLD WEATHER COMPOUND, CALL (403) 266-0050.

CERTIFIED PARTNERSHIP IN SAFETY

HALLMARK TECHNICAL SERVICES IS COMMITTED TO ENSURING THE HIGHEST LEVEL OF SAFETY STANDARDS IN OUR WORK ENVIRONMENT. WE WERE RECENTLY AWARDED THE CERTIFICATE OF RECOGNITION FOR PARTNERSHIPS IN HEALTH & SAFETY BY THE PETROLEUM TRAINING SERVICE AND THE DIRECTOR OF WORKPLACE HEALTH AND SAFETY.



WE HAVE CURRENTLY SUSTAINED AN INCIDENT FREE WORK PLACE IN EXCESS OF 500 DAYS!

CANADIAN REPRESENTATIVE

HALLMARK TECHNICAL SERVICES IS THE CANADIAN REPRESENTATIVE FOR **DRILLTEC, DRIL-QUIP, AND RICE ENGINEERING.**

OUR QUALIFIED STAFF POSSESSES 103 YEARS OF COMBINED EXPERIENCE IN THE RUNNING OF ALL PREMIUM CONNECTIONS.

WE LOOK FORWARD TO SUPPLYING YOUR COMPANY WITH OUR SERVICES IN THE FUTURE. IF YOU HAVE ANY QUESTIONS, PLEASE CALL (403) 266-0050.

910, 255 – 5th Avenue SW Calgary, Alberta T2P 3G6 Telephone (403) 266-0050

NS-CT
Recommended Make-up Torque

Outside Diameter (in)	Nominal Weight (lbs./ft)	Recommended Make-up Torque (ft-lb)** Steel Grade			
		J-55	L-80	C-95	P-110
2.375	4.60	830-1090	1090-1340	1090-1380	1090-1380
	5.10	830-1090	1090-1340	1090-1380	1090-1380
	5.80	1010-1270	1090-1450	1270-1630	1270-1630
	6.10	1010-1270	1090-1450	1270-1630	1270-1630
	7.70	1090-1450	1450-1810	1630-1990	1630-1990
2.875	6.40	1160-1520	1520-1880	1700-2070	1880-2250
	7.90	1450-1810	1810-2170	1990-2350	2170-2530
	8.60	1450-1810	1810-2170	1990-2350	2170-2530
	9.50	1630-1990	1990-2350	2170-2530	2350-2710
	9.80	1630-1990	1990-2350	2170-2530	2350-2170
	11.00	1810-2170	2170-2530	2350-2710	2530-2890
	11.65	1810-2170	2170-2530	2350-2710	2530-2890
3.500	9.20	2170-2530	2530-3250	2890-3610	3070-3790
	10.20	2170-2530	2530-3250	2890-3610	3070-3790
	12.70	2350-2710	2890-3610	3070-3790	3430-4160
	13.70	2350-2710	2890-3610	3070-3790	3430-4160
	14.70	2530-2890	3070-3790	3250-3970	3610-4340
	15.80	2530-2890	3070-3790	3250-3970	3610-4340
	16.70	2530-2890	3070-3790	3250-3970	3610-4340
4.000	10.90	2350-3070	2890-3610	3250-3970	3430-4160
	13.00	2350-3070	2890-3610	3250-3970	3430-4160
	14.80	2710-3430	3250-3970	3970-4700	4340-5060
	16.50	2710-3430	3250-3970	3970-4700	4340-5060
4.500	12.60	2890-3610	3610-4340	3970-4700	4160-5240
	13.50	2890-3610	3610-4340	3970-4700	4160-5240
	15.10	2890-3610	3610-4340	3970-4700	4160-5240
	16.90	3250-3970	4340-5420	4700-5780	5060-6140
	18.80	3250-3970	4340-5420	4700-5780	5060-6140
	21.60	3970-4700	5060-6140	5420-6500	5780-6870
	24.00	3970-4700	5060-6140	5420-6500	5780-6870

**** These torques apply also for 13CR and Duplex Stainless Steel for the given product and yield strength.**

NS-CC-FGL
Recommended Make-up Torque

Outside Diameter (inch)	Normal Weight (lb/ft)	Recommended Make-up Torque (ft-lbs)		
		Min.	Opt.	Max.
5.000	18.00	4400	5100	5700
5.500	17.00	3700	4300	5000
	20.00	5100	5900	6800
7.000	29.00	6600	7600	8600
	32.00	6600	7600	8600

This torque table is applied to all API grades and NT-Series except J and K grades of which outside diameter is 5 1/2 in. and smaller. For torque information not listed, please contact NS Pipe Technology.

NS-CT-FGL
Recommended Make-up Torque

Outside Diameter (inch)	Normal Weight (lbs/ft)	Recommended Make-up Torque (ft-lb) Steel Grade			
		J-55	L-80	C-95	P-110
2.875	6.40	1000-1220	1300-1500	1460-1660	1600-1800
3.500	9.20	1820-2020	2180-2600	2490-2890	2640-3030
	10.20	1820-2020	2180-2600	2490-2890	2640-3030
4.500	12.60	2890-3610	3610-4340	3970-4700	4160-5240

NS-CT-K1
Recommended Make-up Torque

Outside Diameter (in)	Nominal Weight (lbs./ft)	Recommended Make-up Torque (ft-lb) Steel Grade			
		J-55	L,N-80	C-95	P-110
2.375	4.60	670-870	870-1070	900-1100	900-1100
	5.10	670-870	870-1070	900-1100	900-1100
	5.80	820-1020	940-1160	1090-1300	1090-1300
	6.10	820-1020	940-1160	1090-1300	1090-1300
	7.70	940-1160	1250-1450	1390-1590	1390-1590
2.875	6.40	1000-1220	1300-1500	1460-1660	1600-1800
	7.90	1250-1450	1540-1740	1680-1880	1820-2020
	8.60	1250-1450	1540-1740	1680-1880	1820-2020
	9.50	1390-1590	1680-1880	1820-2020	1970-2170
	9.80	1390-1590	1680-1880	1820-2020	1970-2170
	11.00	1540-1740	1820-2020	1970-2170	2110-2310
	11.65	1540-1740	1820-2020	1970-2170	2110-2310
3.500	9.20	1820-2020	2180-2600	2490-2890	2640-3030
	10.20	1820-2020	2180-2600	2490-2890	2640-3030
	12.70	1970-2170	2490-2890	2640-3030	2950-3330
	13.70	1970-2170	2490-2890	2640-3030	2950-3330
	14.70	2110-2310	2640-3030	2800-3180	3110-3470
	15.80	2110-2310	2640-3030	2800-3180	3110-3470
	16.70	2110-2310	2640-3030	2800-3180	3110-3470
4.000	10.90	2350-3070	2890-3610	3250-3970	3430-4160
	13.00	2350-3070	2890-3610	3250-3970	3430-4160
	14.80	2710-3430	3250-3970	3970-4700	4340-5060
	16.50	2710-3430	3250-3970	3970-4700	4340-5060
4.500	12.60	2890-3610	3610-4340	3970-4700	4160-5240
	13.50	2890-3610	3610-4340	3970-4700	4160-5240
	15.10	2890-3610	3610-4340	3970-4700	4160-5240
	16.90	3250-3970	4340-5420	4700-5780	5060-6140
	18.80	3250-3970	4340-5420	4700-5780	5060-6140
	21.60	3970-4700	5060-6140	5420-6500	5780-6870
	24.00	3970-4700	5060-6140	5420-6500	5780-6870

NS-CC-K1
Recommended Make-up Torque

Outside Diameter (inch)	Normal Weight (lb/ft)	Recommended Make-up Torque (ft-lbs)		
		Min.	Opt.	Max.
5.000	15.00	3300	4000	4700
	18.00	4400	5100	5700
	21.40	4800	5400	6100
	23.20	4800	5400	6100
	24.10	4800	5400	6100
5.500	17.00	3700	4300	5000
	20.00	5100	5900	6800
	23.00	5100	5900	6800
	26.00	5500	6300	7200
	28.40	5500	6300	7200
6.625	24.00	5100	5900	6800
	28.00	5800	6700	7600
	32.00	5800	6700	7600
7.000	23.00	4400	5100	5700
	26.00	5800	6700	7600
	29.00	6600	7600	8600
	32.00	6600	7600	8600
	35.00	6900	8000	9000
	38.00	6900	8000	9000
	41.00	7300	8300	9400
	42.70	7300	8300	9400
	44.00	7600	8700	9700

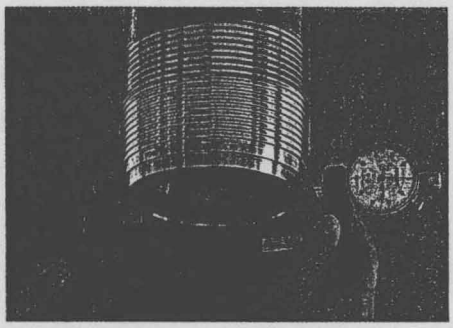
AVAILABLE SIZES (For additional information see pages 22 through 24.)

Pipe				Connection		
Size (O.D.)	Weight	Wall	Inside Diameter	Pin	Coupling	
				I.D.**	O.D.	Length
in.	lb./ft.	in.	in.	in.	in.	in.
2.375	4.60*	0.190	1.995	1.928	2.776	6.736
	5.10*	0.218	1.939	1.892	2.815	6.736
	5.80*	0.254	1.867	1.860	2.858	6.736
	6.20*	0.261	1.853	1.853	2.866	6.736
	7.70*	0.336	1.703	1.696	2.953	6.736
2.875	6.40*	0.217	2.441	2.382	3.272	7.457
	7.90*	0.276	2.323	2.316	3.370	7.457
	8.60*	0.308	2.259	2.252	3.421	7.457
	9.50*	0.340	2.195	2.187	3.469	7.457
	9.80*	0.362	2.152	2.151	3.500	7.457
	10.70	0.392	2.091	2.091	3.539	7.457
	11.00	0.405	2.065	2.065	3.559	7.457
	11.65	0.440	1.995	1.987	3.602	7.457
3.500	9.20*	0.254	2.992	2.945	3.941	8.691
	10.20*	0.289	2.922	2.895	4.000	8.691
	12.70*	0.375	2.750	2.743	4.138	8.691
	13.70	0.413	2.674	2.674	4.197	8.691
	14.70	0.450	2.600	2.600	4.248	8.691
	15.80	0.476	2.548	2.548	4.283	8.691
	16.70	0.510	2.480	2.480	4.331	8.691
4.000	10.90*	0.262	3.476	3.429	4.449	9.203
	13.00*	0.330	3.340	3.333	4.567	9.203
	14.80*	0.380	3.240	3.233	4.650	9.203
	16.50	0.430	3.140	3.140	4.728	9.203
4.500 [1]	12.60*	0.271	3.958	3.911	4.957	9.778
	13.50*	0.290	3.920	3.893	4.992	9.778
	15.10*	0.337	3.826	3.819	5.075	9.778
	16.90*	0.380	3.740	3.746	5.134	9.778
	18.80	0.430	3.640	3.640	5.228	9.778
	21.60	0.500	3.500	3.500	5.339	9.778
	24.00	0.560	3.380	3.380	5.425	9.778

* Pins are mildly swaged, stress relieved, and bored to appropriate dimensions.

** This inside diameter is the smaller of Bored Pin ID, Coupling ID or Nominal Pipe ID.

[1] 4.500" NS-CT (Coupled Tubing Connection) is not interchangeable with 4.500" NS-CC (Coupled Casing Connection).



It is possible to gauge the pin seal in the field, to check for transit damage.

SIZE	WNU		WPE WALL	NT-25CR-75	L-80	NT-80SS	NT-13CR-80	NT-13CR-85	C-90		Grades NT-13CR-90	NT-13CR-95	NT-95SS	P-110	NT-110SS	NT-22CR-110	CR-110
.500	16.70	16.70	16.29 0.510														
	4.791 A		INT PRESS	19120	20400	20400	20400	21670	22950	22950	22950	24220	24220	28050	28050	28050	28050
	2.480 ID		COLLAPSE	18670	19920	19920	19920	21160	22410	22410	22410	23650	23650	27390	27390	27390	27390
	2.355 DD		TENSION	359	383	383	383	407	431	431	431	455	455	527	527	527	527
.000	11.00	10.90	10.46 0.262														
	3.077 A		INT PRESS	8600	9170	9170	9170	9740	10320	10320	10320	10890	10890	12610	12610	12610	12610
	3.476 ID		COLLAPSE	8380	8800	8800	8800	9200	9600	9600	9600	9980	9980	11060	11060	11060	11060
	3.351 DD		TENSION	231	246	246	246	262	277	277	277	292	292	338	338	338	338
.000	13.40	13.00	12.93 0.330														
	3.805 A		INT PRESS	10830	11550	11550	11550	12270	12990	12990	12990	13720	13720	15880	15880	15880	15880
	3.340 ID		COLLAPSE	11350	12110	12110	12110	12870	13620	13620	13620	14380	14380	16650	16650	16650	16650
	3.215 DD		TENSION	285	304	304	304	323	342	342	342	361	361	419	419	419	419
.000	15.20	14.80	14.69 0.380														
	4.322 A		INT PRESS	12470	13300	13300	13300	14130	14960	14960	14960	15790	15790	18290	18290	18290	18290
	3.240 ID		COLLAPSE	12900	13760	13760	13760	14620	15480	15480	15480	16340	16340	18910	18910	18910	18910
	3.115 DD		TENSION	324	346	346	346	367	389	389	389	411	411	475	475	475	475
.000	16.90	16.50	16.39 0.430														
	4.823 A		INT PRESS	14110	15050	15050	15050	15990	16930	16930	16930	17870	17870	20690	20690	20690	20690
	3.140 ID		COLLAPSE	14390	15350	15350	15350	16310	17270	17270	17270	18230	18230	21110	21110	21110	21110
	3.015 DD		TENSION	362	386	386	386	410	434	434	434	458	458	530	530	530	530
.500	12.75	12.60	12.24 0.271														
	3.600 A		INT PRESS	7900	8430	8430	8430	8960	9480	9480	9480	10010	10010	11590	11590	11590	11590
	3.958 ID		COLLAPSE	7170	7500	7500	7500	7820	8120	8120	8120	8410	8410	9210	9210	9210	9210
	3.833 DD		TENSION	270	288	288	288	306	324	324	324	342	342	396	396	396	396
500	13.50	13.50	13.04 0.290														
	3.836 A		INT PRESS	8460	9020	9020	9020	9590	10150	10150	10150	10710	10710	12410	12410	12410	12410
	3.920 ID		COLLAPSE	8140	8540	8540	8540	8930	9300	9300	9300	9660	9660	10690	10690	10690	10690
	3.795 DD		TENSION	288	307	307	307	326	345	345	345	364	364	422	422	422	422
500	15.50	15.10	14.98 0.337														
	4.407 A		INT PRESS	9830	10480	10480	10480	11140	11800	11800	11800	12450	12450	14420	14420	14420	14420
	3.826 ID		COLLAPSE	10390	11080	11080	11080	11670	12220	12220	12220	12760	12760	14340	14340	14340	14340
	3.701 DD		TENSION	331	353	353	353	375	397	397	397	419	419	485	485	485	485
500	16.90	16.70	16.44 0.373														
	4.836 A		INT PRESS	10880	11600	11600	11600	12330	13050	13050	13050	13780	13780	15960	15960	15960	15960
	3.754 ID		COLLAPSE	11400	12160	12160	12160	12920	13680	13680	13680	14440	14440	16720	16720	16720	16720
	3.629 DD		TENSION	363	387	387	387	411	435	435	435	459	459	532	532	532	532
500	19.20	18.80	18.69 0.430														
	5.498 A		INT PRESS	12540	13380	13380	13380	14210	15050	15050	15050	15890	15890	18390	18390	18390	18390
	3.640 ID		COLLAPSE	12960	13830	13830	13830	14690	15560	15560	15560	16420	16420	19010	19010	19010	19010
	3.515 DD		TENSION	412	440	440	440	467	495	495	495	522	522	605	605	605	605
500	21.60	21.60	21.36 0.500														
	6.283 A		INT PRESS	14580	15560	15560	15560	16530	17500	17500	17500	18470	18470	21390	21390	21390	21390
	3.500 ID		COLLAPSE	14810	15800	15800	15800	16790	17780	17780	17780	18770	18770	21730	21730	21730	21730
	3.375 DD		TENSION	471	503	503	503	534	565	565	565	597	597	691	691	691	691
500	24.60	24.00	23.56 0.560														
	6.932 A		INT PRESS	16330	17420	17420	17420	18510	19600	19600	19600	20690	20690	23960	23960	23960	23960
	3.380 ID		COLLAPSE	16340	17430	17430	17430	18520	19610	19610	19610	20700	20700	23970	23970	23970	23970
	3.255 DD		TENSION	520	555	555	555	589	624	624	624	659	659	762	762	762	762

HALLMARK TECHNICAL SERVICES
A DIVISION OF HALLMARK TUBULARS LTD.
910 BOW VALLEY SQUARE III
255 - 5th AVENUE S.W.,
CALGARY, ALBERTA T2P 3G6
TELEPHONE: (403) 266-3807
FAX: (403) 266-6282

GST REGISTRATION No. R102251972

November 5, 1999

Ranger Oil Limited
1600, 321-6th Avenue S.W.
Calgary, Alberta
T2P 3H3

NOV 8 1999

Attention: Mr. Leroy Brown

Re: Ranger Liard P-66-A
Canadian Representatives for Nippon Steel Corporation

Leroy,

I have taken the liberty of putting together a brief information package concerning Hallmark Technical Services.

Hallmark Technical Services is a tubular supervision company which possess over (82) eighty two years of experience between (5) five employees. In less than 500 days HTS is responsible for successfully running over 700,000 meters of premium connections to date. Our main focus is taking care of the customers invested tubular interests from start to finish. Our independent stance to operate as a tubular supervision company has enabled us to suggest pre job, on site execution and post job streamlining procedures.

All personnel have operated or possess experience regarding Power Tongs, Torque Monitoring Computers, and Pressure testing (external and internal). Hallmark Technical employees all possess Offshore/Onshore Experience both on Drilling and Service rigs. We have the one of the lowest compensation rates in the Industry and have recorded a safety record of (0) zero accidents or medical aids in over 500 days of operation.

Leroy, I thank you for the opportunity to provide you with this job proposal and we look forward to future discussions. Should you have any questions or require additional information please give me a call.

Thank you,

Brian Friend
Canadian Manager

Ranger Oil Limited
Ranger Liard P-66-A

Connection Supervisor Per 12 hour day	$ 600.00 per day
Additional Connection Supervisor Per 12 hour day	$ 600.00 per day
Travel Charge Charges out of Grande Prairie at $ 0.85 per kilometer	
Nippon NS-CT 114.3mm Stabbing Guide 5 day minimum	$ 150.00 per 5 days
Nippon NS-CT 114.3mm Teflon Drift 5 day minimum	$ 110.00 per 5 days
Sub Zero Thread Compound 2 - 4.5 litre Pails at $ 90.00 each	$ 180.00

We would be pleased to take care of co-ordinating accessory items and all nessasary running equipment as specified by Ranger Oil Limited.

RESUMES

BRIAN FRIEND (Canadian Manager)

- 19 years experience in the Oilfield with 18 of those years being directly involved with the running of Casing and Tubing
- Brian has operated and developed Computer Torque Monitoring Systems, along with being the first person in Canada to operate the X/Y axis real time plotter which is used world wide today
- Thorough training in Conventional and Integral power tongs, versed in the operation and maintenance of handling equipment up to 750 ton, Internal and External Pressure testing, Pick Up and Lay Down Machine.
- Versed in Exxon Torque Positioning, Torque / Turns technology, Mobil Buttress and Eight Round running procedures, A.P.I. Procedures.
- Areas of operation include the Canadian Arctic, Beaufort Sea, Western Canada, Bay of Fundy, Davis Strait, East Coast Hibernia, Sable Island, Alaska, Texas, Trinidad and Tobago, and Tanzania, Africa.

WES SARGENT (Field Supervisor)

- 15 years experience in the Oilfield with 13 years being directly involved with the running of Casing and Tubing
- Managed and Developed a Computer Torque Monitoring System for a major Service company
- Extensive experience regarding deep critical sour gas wells applications
- Well versed in all premium connections and is detail oriented in all nessasary equipment required to run the product
- Well aquainted with all of the required equipment to run any Casing and Tubing string
- Wes Sargent has worked Offshore on the Hibernia and Sable Island Projects and Onshore throughout Western Canada

GUY DOW (Technical Representative)

- 16 years experience in the Oil and Gas Industry
- Drilling and Cementing back ground provides Hallmark Technical Services with a wealth of knowledge concerning down hole
- 8 years directly involved in the Casing and Tubing Industry
- Well versed in the running of Computer Torque Monitoring Systems, Conventional and Integral Power tongs, Pick Up and Lay Down Machines
- Well versed in all premium and A.P.I.connections
- Guy Dow has worked extensively throughout western Canada as well as offshore in the North Sea for 3 years and the Middle East

ALAN BOE (Technical Representative)

- 19 years experience in the Oilfield with 17 years being directly involved with the running of Casing and Tubing
- Manager of Buck On services which utilized specific procedures to ensure leak proof connections for Buttress and Eight Round
- Experienced in the running of Computer Torque Monitoring Systems, Conventional and Integral Power Tongs
- Alan Boe has worked extensively throughout western Canada as well as Hibernia, Sable Island, Beaufort Sea, and the High Arctic

Partnerships

IN HEALTH AND SAFETY

CERTIFICATE OF RECOGNITION

This certificate recognizes that

Hallmark Technical Services

In keeping with the principles of *Partnerships* has:

- developed and implemented a workplace health and safety management system and,
- met the standard for *Partnerships* through an independent evaluation of their health and safety system.

Petroleum Industry Training Service
Partner in Health and Safety

Wallace E. Baer
Director, Workplace Health & Safety

Certificate # 99-09-2341

Expiry Date: September 3, 2002

WCB Industry Code(s): 62500

Alberta
...N RESOURCES
...D EMPLOYMENT

NS Pipe Technology, Inc.

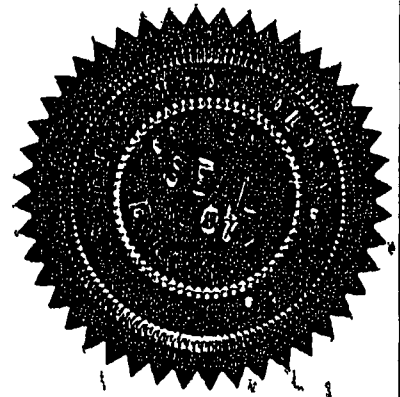
This is to recognize that **BRIAN FREIND - HALLMARK TECHNICAL SERVICES** has successfully completed a training course for Nippon Steel Corporation Premium Premium Casing and Tubing Connections Training course covered Recommended Running Proccdures for Carbon and Low Alloy Steel Running Procedures for High Alloy Steel and Field Inspection and Repair Procedures

This training course was conducted on September 1, 1998 at Houston, Texas

ISSUED BY _____
Tom McGinty - Manager Field Services and Inspection

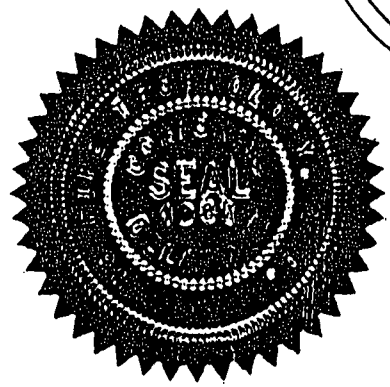
APPROVED BY _____
Yasushi Tsukano - Vice President

1100 Louisiana, Suite 4400, Houston Texas 77002 U S A



Seminars do not certify nor imply certification in any way that attendees represent Nippon Steel Corporation or NS PipeTechnology in any manner

Training Certificate



Presented to

BRIAN FRIEND OF HALLMARK TECHNICAL SERVICES

Has successfully completed a training course for

NSPJ TECHNICAL SPECIFICATION AND MOBIL PROCESS CONTROL PLAN FOR NS-CC

at

NS PIPE TECHNOLOGY, INC.

Presented this 1 st. *Day of* September *19* 98.

Signed

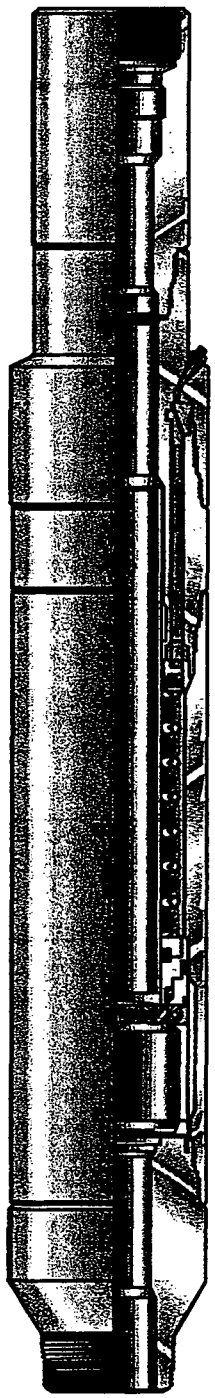
PRODUCT REPORT

March 1996

BAKER OIL TOOLS

SUBSURFACE SAFETY SYSTEMS

"T(E)5"™ Tubing Retrievable Safety Valve Product No. 824-80, 83



DESCRIPTION/APPLICATION:

The "T(E)5" is a 5000 psi working pressure tubing retrievable subsurface safety valve which brings the advantages of premium features to a standard operating environment. Now the same field-proven features that ensure high performance and extended life in premium applications are available for lower-end applications. The design features the total elimination of elastomeric compounds by utilizing premium thread connections and a thermoplastic dynamic system.

FEATURES/BENEFITS:

- Field-proven metal-to-metal sealing technology
- Short, compact, modular design
- Setting depths to 4000 ft and 20-300°F temperature ratings
- Patented radial control fluid communication system
- Optional through-flapper self-equalizing system
- Non-elastomeric rod piston actuator system

SPECIFICATIONS:

Size In. mm	Max OD In. mm	Min Valve ID In. mm	Length In. mm	Standard Seal Bore In. mm	Working Pressure PSI Kg/Cm²	Setting Depths Ft m	Temp. Rating °F °C
2-3/8	3.625	1.906	54	1.875			
60,3	92,0	48,4	1371,6	47,6			
2-7/8	4.625	2.379	57	2.313			
73,0	117,4	60,4	1447,8	58,7			
3-1/2	5.380	2.875	74	2.813	5000	to 4000	20-300°
88,9	136,6	73,0	1879,6	71,4	352	1219,2	-6,7 - 148,9
4-1/2	7.125	3.875	78	3.813			
114,3	180,9	98,4	1981,2	96,8			
5-1/2	8.375	4.625	84	4.563			
139,7	212,7	117,4	2133,6	115,8			

PR/SS/96004/3M/3-96

BAKER HUGHES

Baker Oil Tools

QUOTATION

No

C99-012-057

Customer: *Ranger Oil Ltd.*
900, 311 - 6th Ave. S.W.
Calgary, Alberta
T2P-3H3

Page 1 of: *1*
Date: *12/10/99*
Prepared By: *Andy Savell*
District: *Calgary*

Attention: *Leroy Brown/Paul Lemieux*
Telephone: *(403) 303-7300*
Fax:

Well Name:
Field:
Location:

Item No.	Qty.	Commodity No.	Description of Equipment and Services	Unit Amount	Net Amount
1.	1		*Baker Single Well SSV and SCSSV Control Panel SCSSV Capability to 10000 PSI C/W Relief Valve set @ 7500 PSI, SSV Capability to 3000 PSI, Hi and Lo Pilot Interface Logic, Solenoid of 24VDC Closure Operation, Pneumatic ESD Loop, Fail Safe Operation, Time Delay Shutdown Sequence on SCSSV, Stainless Steel Enclosure, Front and Rear Doors, Integrated Reservoir Capacity, External Bulkhead Fittings, External Sight Glass, Quick Exhaust Valves, Haskel Manual Backup Hand Pump, Technical Manual, Stand*	*$23,211.00*	*$23,211.00*
			Optional Equipment:		
1	1		*Pump Cut off Circuit*	*$2,853.00*	*$2,853.00*
2	1		*External Quick Exhaust Valve for SSV,SS c/w 6 Fusible Plugs, SS. 281Deg.F*	*$738.00*	*$738.00*
3	1		*Hi and Lo Pilot Sensor (Flowline) High Press*	*$1,833.00*	*$1,833.00*
4	1		*Remote Pneumatic ESD Station*	*$258.00*	*$258.00*
				TOTAL (This Page):	***$28,893.00***
				TOTAL (All Pages):	***$28,893.00***

PRICES ARE FIRM THROUGH DELIVERY PROVIDED ORDER IS PLACED WITHIN 30 DAYS FROM QUOTATION DATE.
This form is to be considered a cost estimate only.
Prices do not include Provincial or Federal Sales Taxes.
Quotation is governed by Baker Oil Tool's standard Terms and Conditions which are available upon request.

BAKER OIL TOOLS
QUOTATION

No
C99-11-028

Customer:	***Ranger Oil Limited***	Page 1 of:	***1***
	900, 311 -6th Ave. S.W.	Date:	***99-11-05***
	Calgary, Alberta	Prepared By:	***Fenske***
	T2P 3H2	District:	***GP***
Attention:	***LeRoy Brown***	Well Name:	***P-66-A***
Telephone:	***303-7300***	Field:	***Liard***
Fax:	***303-7626***		

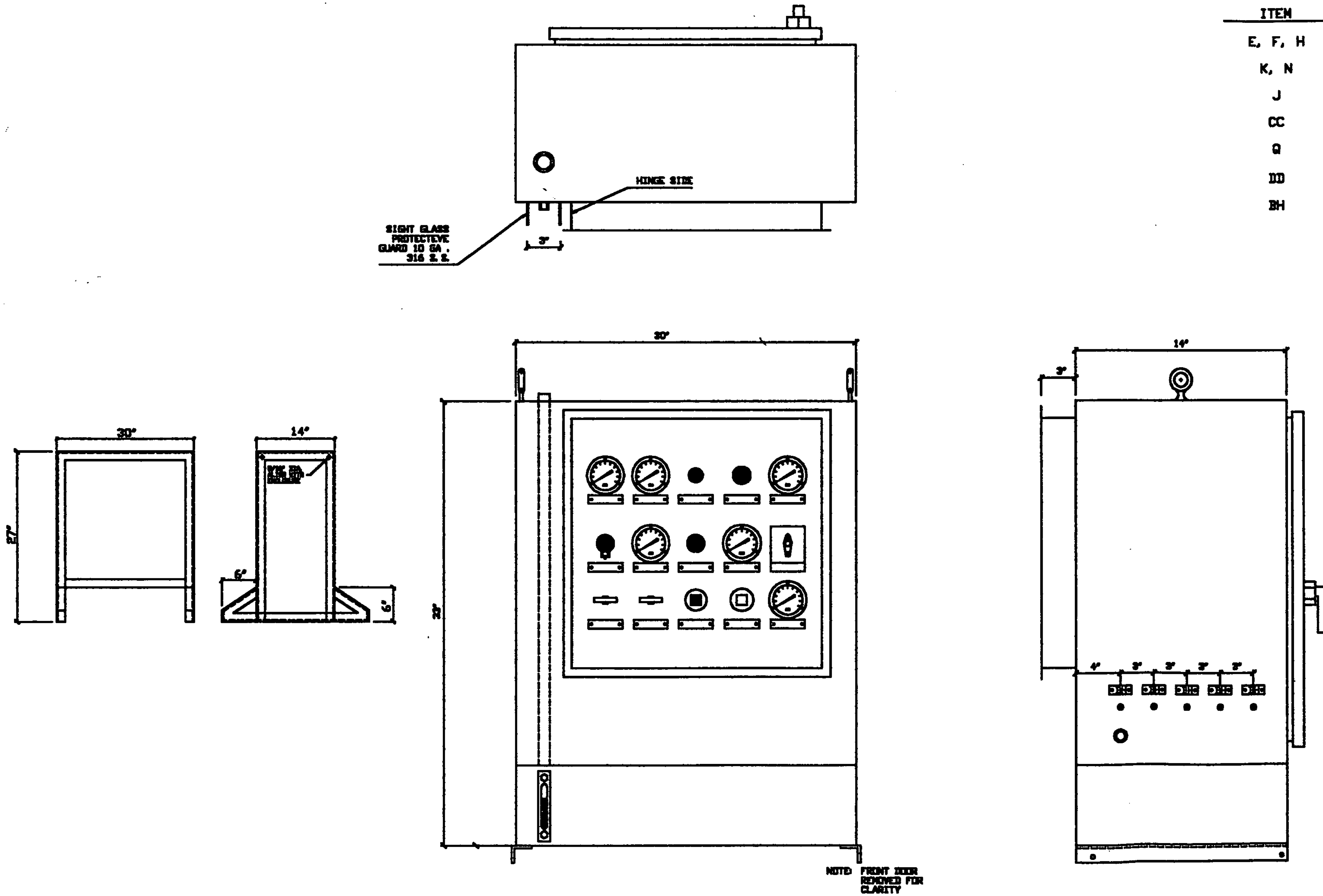
ITEM:	Size	Weight	Thread	Grade	Depth
Casing	*244.5 mm*				
Open Hole					
Drill Pipe					
Tubing	*144.3 mm*		*NSCT*		

Item No.	Qty.	Commodity No.	Description of Equipment and Services	Unit Amount	Net Amount
	2		*Flow coupling 1.5 m x 114.3 mm NSCT L-80*	*$5,410.00*	*$10,820.00*
2	1		*Baker Model TE-5 Tubng Mounted SSSV* *Size: 114.3 mm* *Material : Inconel 718*	*$88,447.00*	*$88,447.00*
3	150 ~~30~~		*Stainless Steel Control Line per meter* *Estimated 30 meters*	*$6.50*	*$195.00*
4	1		*Miscellaneous fittings Estimated cost*	*$150.00*	*$150.00*
5	6		*NSCT Thread Charge*	*$66.96*	*$401.76*
6	1		*Impreglon Coating Charge* *ID and OD of Flow Couplings*	*$716.80*	*$716.80*
7			*Baker Service Technician per day*	*$655.00*	
8			*Transportation per km*	*$1.20*	

TOTAL (This Page):	***$100,730.56***
TOTAL (All Pages):	***$100,730.56***

PRICES ARE FIRM THROUGH DELIVERY PROVIDED ORDER IS PLACED WITHIN 30 DAYS FROM QUOTATION DATE.
This form is to be considered a cost estimate only.
Prices do not include Provincial or Federal Sales Taxes.
This quotation is governed by Baker Oil Tool's standard Terms and Conditions which are available upon request.

ITEM	DETAIL
E, F, H	A
K, N	B
J	C
CC	D
Q	E
DD	J
BH	K



NOTES:

1. PANEL TO BE CONSTRUCTED OF 12 ga. 316 S.S. PLATE TO NEMA 4X SPECIFICATIONS
2. ALL DOORS TO HAVE FLAG TYPE REMOVEABLE HINGES.
3. REAR DOORS TO BE OVERLAPPING WITH 3 PT. ROLLER TYPE LATCH HANDLE.
4. FRONT DOOR TO HAVE BUTTERFLY TYPE LATCHES.

Δ	DATE	REVISION	BY	CHECKED	CUSTOMER APPROVAL

PROJECT NUMBER:

DRAWN BY: R PELAS

CHECKED:

DESIGN ENGINEER: R PELAS

PROJECT ENGINEER:

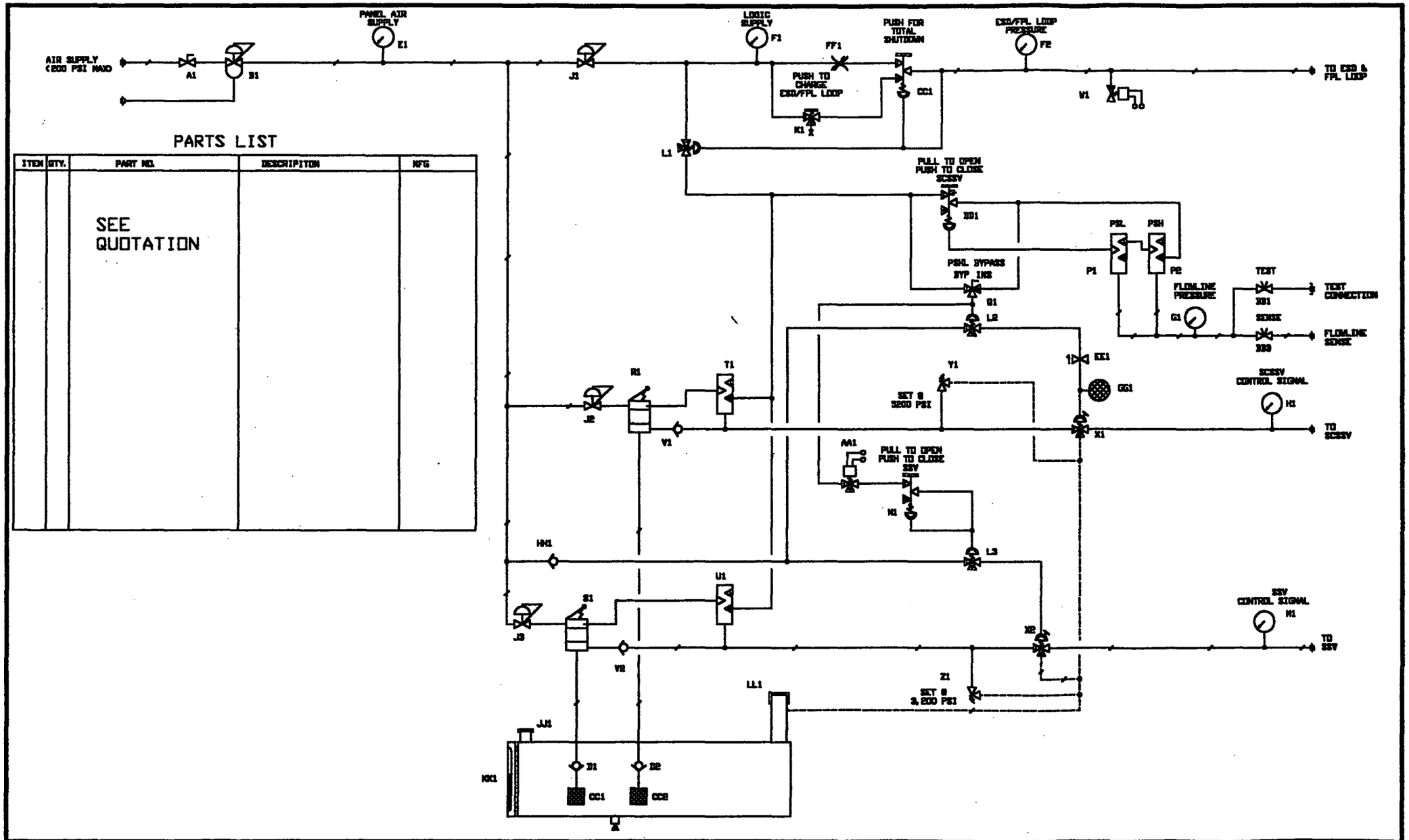
DRAWING TITLE: WELL CONTROL PANEL ENCLOSURE DRAWING

COMPANY: RANGER OIL

DATE: 12/6/99

DRAWING NUMBER: HCM-21978

SHEET 1 OF 1



PARTS LIST

ITEM	QTY.	PART NO.	DESCRIPTION	MFG
		SEE QUOTATION		

TUBING LEGEND

1/4" x .035" W.T. 316 S.S. PER ASTM A-269

3/8" x .035" W.T. 316 S.S. PER ASTM A-269

NOTES:

1. ALL TUBING AND FITTINGS TO BE 316 S.S.
2. DOUBLE FERRULE COMPRESSION FITTINGS TO BE USED ON ALL LINES.

DATE	REVISIONS	BY	CHECKED

DRAWN BY: R PELAS
CHECKED:
DESIGN ENGINEER: R PELAS
PROJECT ENGINEER: R PELAS

DRAWING TITLE: PORTABLE WELL CONTROL PANEL SCHEMATIC
DRAWN: RANGER OIL

DATE: 12/6/99
SCALE:
DRAWING NUMBER: HEM-3197A
SHEET 1 OF 1

PRODUCT REPORT

Baker Oil Tools

SURFACE SAFETY SYSTEMS

Baker Hydraulic and Pneumatic Surface Controlled Sub-Surface Safety Valves (SCSSV) Control Panels

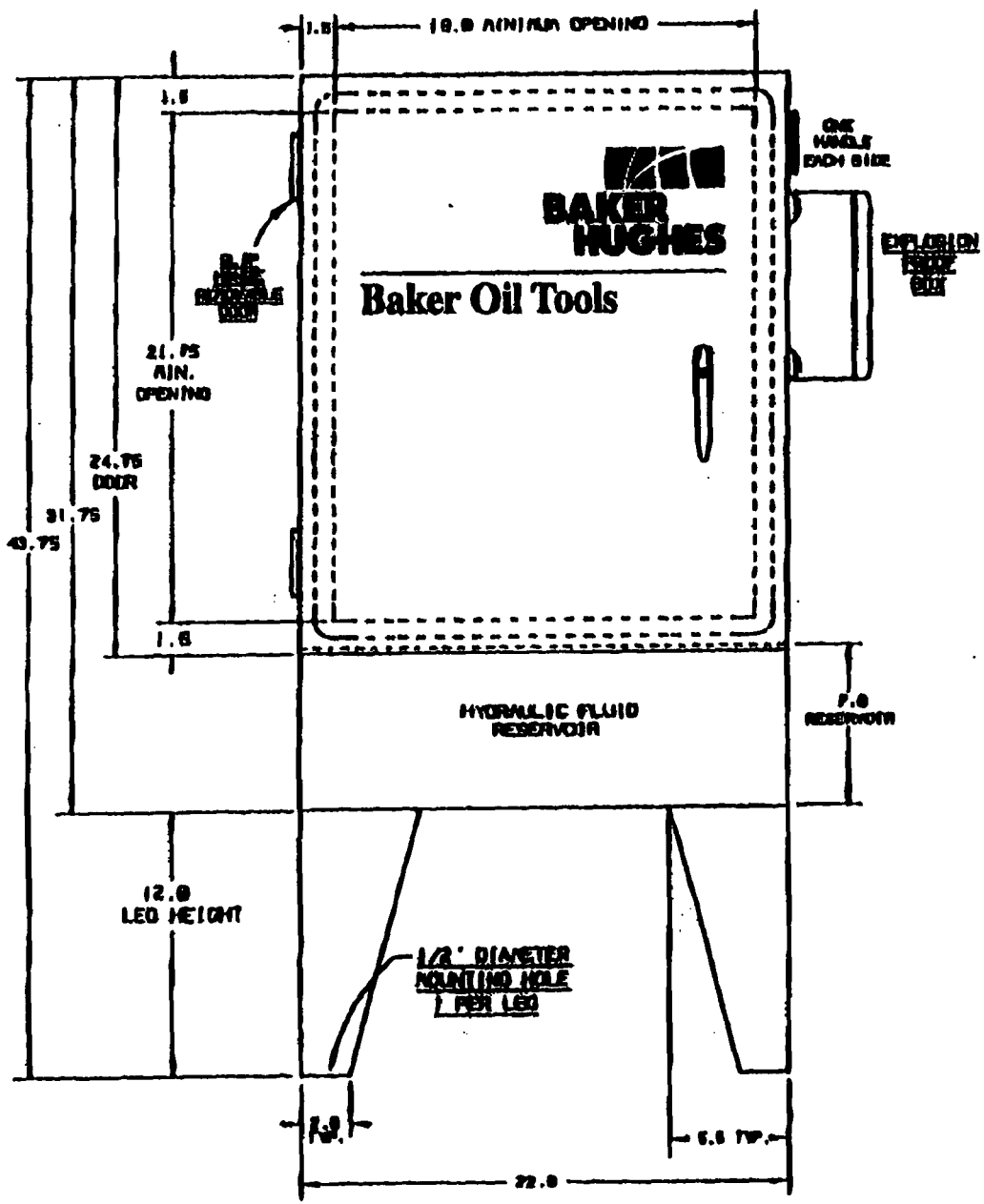
DESCRIPTION/APPLICATION:

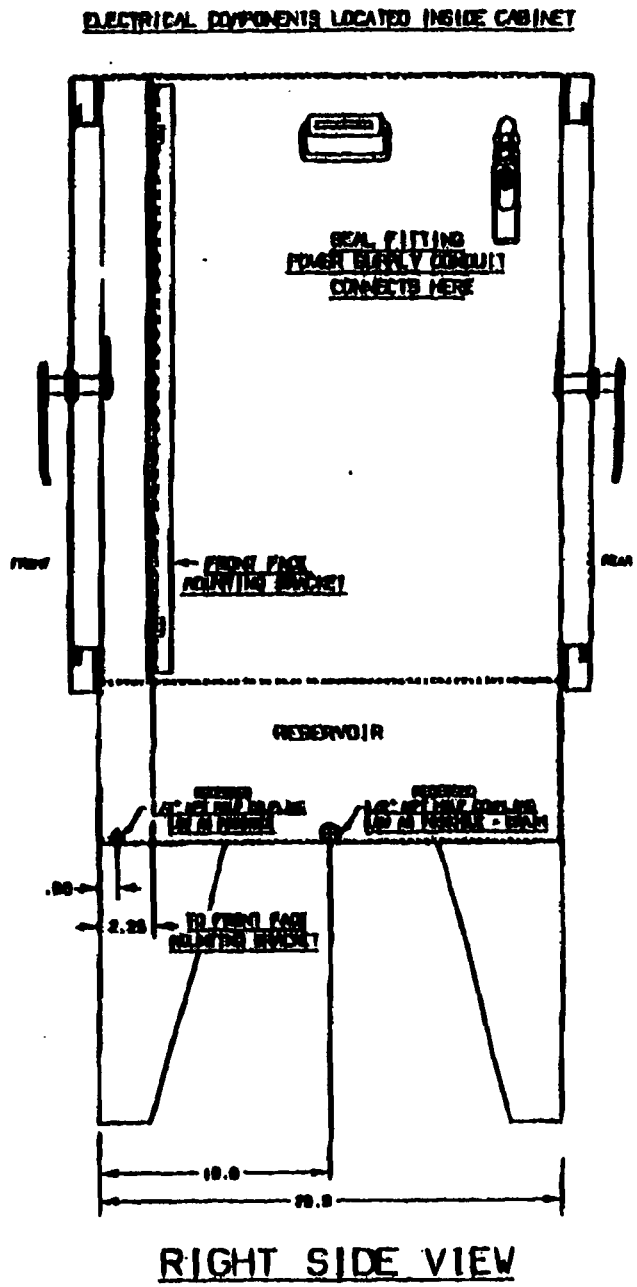
The Baker Oil Tools Surface Controlled Sub-Surface Safety Valve (SCSSV) control panels are used to operate Sub-Surface Safety Valves (SSSV) and Surface Safety Valves (SSV). These systems are designed to monitor flow line pressures and can be tied in with SCADA systems. In the event that a problem is sensed, the control panel will complete an Emergency Shutdown (ESD) in which both the SSV and the SSSV will shut in the well.

Baker Oil Tools has a complete line of SCSSV control panels. All panels are full Stainless Steel construction and built with the highest quality components for long life and durability. Baker panels can be manufactured to your specific needs from single well to multi-well panels. These systems can be tied in with SCADA systems and have remote Emergency Shutdown (ESD) applications. They are available in hydraulic and pneumatic models to suit your needs.

FEATURES/BENEFITS:

- Fusible Plug protection in case of fire
- Auxiliary ESD bulkhead connection for remote shutdown
- Bulkhead connections for flow line mounted Block and Bleed Pilots
- 316 stainless steel enclosure
- In the event of ESD, the SSV will close immediately. The SCSSV will close up to one minute (adjustable time delay) after closure of SSV.
- Pneumatically operated hydraulic pumps up to 20 000 psi with hand pump capability
- Accessories - High / Low Block and Bleed Pilots, solenoid valves for remote shutdown, explosion proof junction boxes for electrical connections and multi-well capabilities





SURFACE SAFETY SYSTEMS

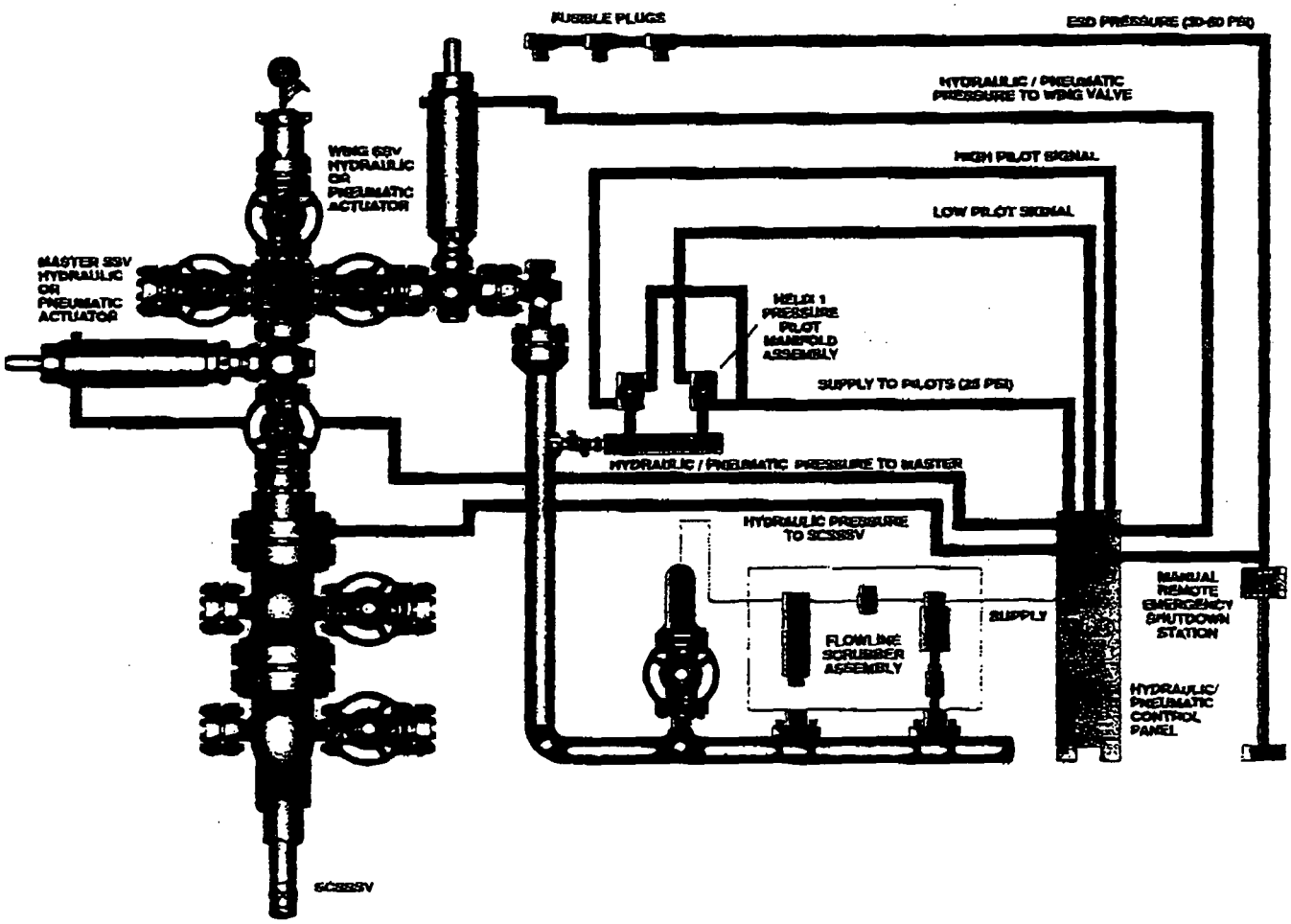
TYPICAL SAFETY SYSTEM

The subsurface and surface safety valves control the flow of the well and are fail-safe closed upon loss of their control signal.

The safety system has two main parts: the end devices, such as the safety valves; and, the control devices, such as the pilots and control panels. These devices monitor and detect the flowing conditions of the well. Under normal operating conditions, the panel sends the signal to the subsurface and surface safety valves, holding them in the open position. Should an abnormal operating condition occur, the panel blocks and bleeds the control signal allowing the safety valves to return to their fail-safe closed position.

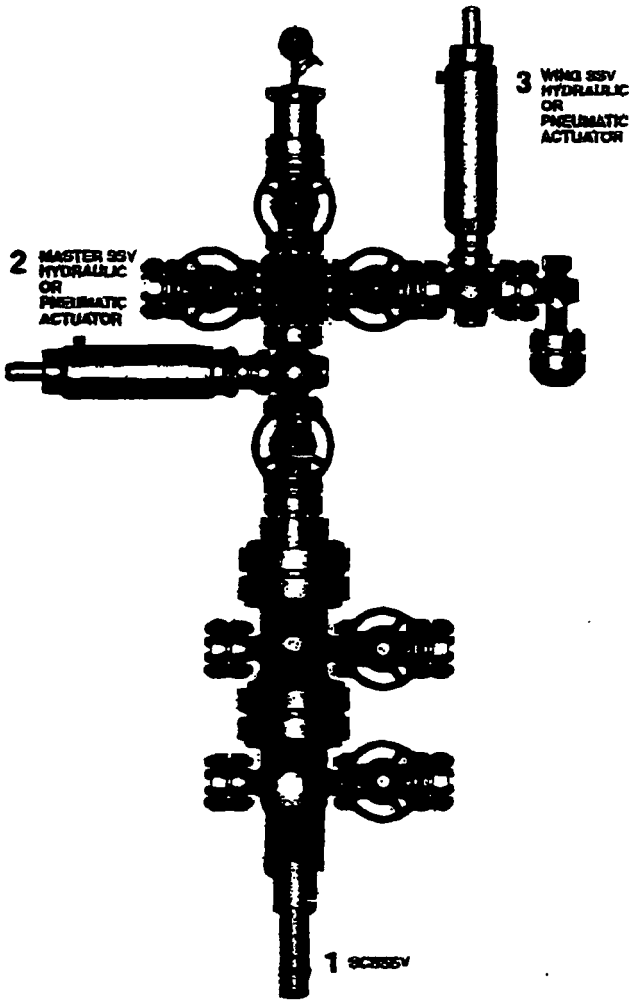
Baker Oil Tools manufactures the bonnets, actuators and pilots. A complete surface safety system, tailored to specific applications, can be supplied.

Below is an example of typical offshore safety systems components.



Typical Safety System

SURFACE SAFETY SYSTEMS



1) **Subsurface Safety Valve Tubing or Wireline Valves**

2) **Surface Safety Valve Upper Master Valve**

3) **Surface Safety Valve Outer Wing Valve**

OVERVIEW OF SURFACE SAFETY EQUIPMENT

Safety Systems is comprised of two applications: Subsurface Safety Valves and Surface Safety Systems. The Surface Safety equipment (bonnet /actuators/pilots) compliments the Subsurface Safety equipment to provide complete control of the wells. Baker Oil Tools has long been recognized as a world leader in wellhead, production, pipeline, and process safety control systems.

Surface Safety Systems manufactures actuators for applications including Christmas tree master and wing valve locations, shut down valves, header manifolds, and pipeline control valves. The tradition of excellence began over 75 years ago and reflects Baker's approach to innovative products and services. Baker's Surface Safety Systems are backed up by experienced professionals including field and shop personnel. Five major service centers – located in the Far East, Middle East, Europe, South America and the USA – provide technical service support and house spare parts inventories.

Safety Systems' primary manufacturing facilities are in Broken Arrow, Oklahoma and Aberdeen, Scotland. Each plant operates under strict quality control procedures to insure the highest possible quality is built into every product.

In addition to modern manufacturing facilities and a broad product line, Baker also offers the experience required to analyze a particular application and recommend the most appropriate equipment for the service condition of a well. All safety system requirements can be satisfied through the extensive Baker Oil Tools network of contacts located worldwide.

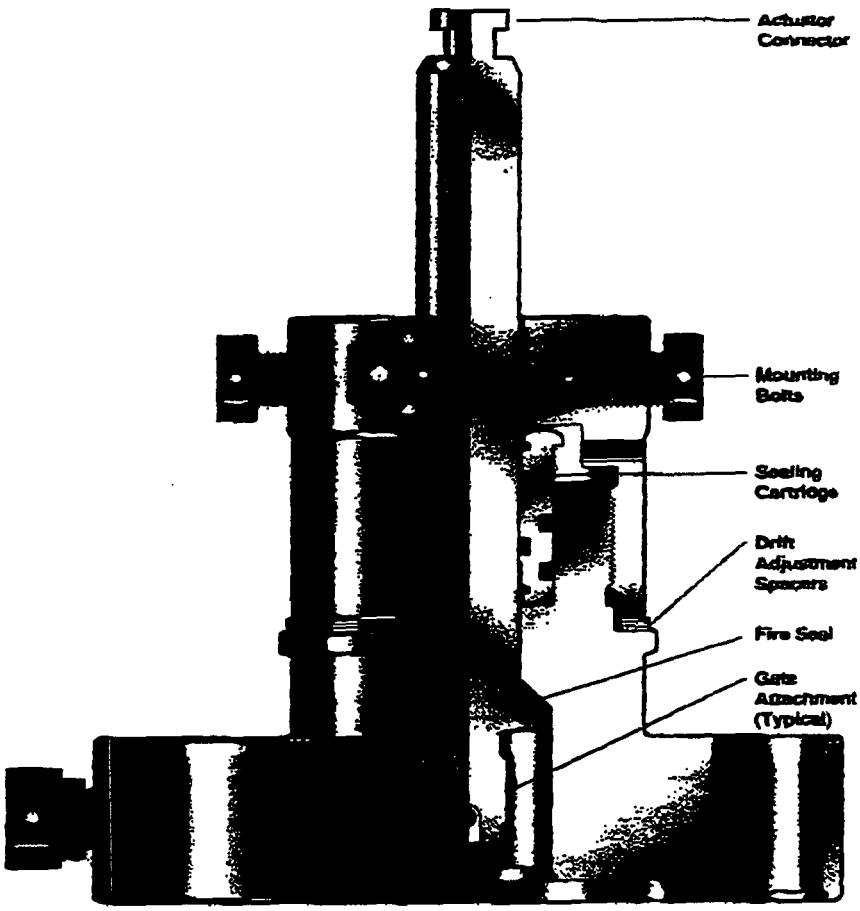
SURFACE SAFETY SYSTEMS

BONNET DESIGN

The bonnet is an integral part of the patented Quick-Disconnect system for actuators. The bonnets are easy to maintain and feature an advanced sealing system and a metal-to-metal fire seal that guarantees seal integrity even if the elastomeric seals are damaged by high temperatures. Bonnets are designed and rated for the reverse-acting or direct-acting gate valve on which they will be mounted. The bonnet and actuator assembly utilizes a two-piece stem design that completely isolates all the corrosive fluids in the valve body and bonnet. Because of their individual, completely self-contained sealing systems, a sour service bonnet may be used in conjunction with a standard service actuator, providing the control medium is acceptable. This Quick-Disconnect adds value to the Baker safety system equipment and provides savings in the short and long term.

FEATURES/BENEFITS

- Patented Quick-Disconnect design isolates all process fluids in the valve body
- Rated to match the valve specifications for service environment and applications
- Two-piece stem design makes actuator selection a matter of control pressure required and operating characteristics
- The Quick-Disconnect design provides easy access to critical seal areas for quick valve maintenance
- Wide selection of packing cartridges are available for every service environment
- Bonnets adapt to all popular gate valves with permanent drift setting capability
- Stem and packing cartridge are made of 17-4PH stainless steel as a standard
- CRA materials are available on request



Typical Bonnet Design

SURFACE SAFETY SYSTEMS

HYDRAULIC ACTUATORS

Application is the key to determining which actuator to select. Safety valves operate on pneumatic or hydraulic pressure; when pneumatic supply pressure is not available, then hydraulic pressure is utilized. Baker manufactures several different versions of hydraulic actuators to meet specific requirements. Baker hydraulic actuators use the same two-piece Quick-Disconnect design as the pneumatic actuators with the bonnet being a separate component, which isolates all the process fluids in the valve and bonnet assembly. The Quick-Disconnect feature allows actuator choice to be entirely a matter of available control pressure and desired operating parameters. Hydraulic actuator selection is also based on valve size, pressure requirements and service environment conditions.

Model "C" Hydraulic Actuator
Product No. 885-10

MODEL "C"™ HYDRAULIC ACTUATOR, Product Nos. 885-10 f/Standard Service 885-11 f/H_2S Service 885-12 f/Arctic H_2S

The Model "C" is one of the most widely used hydraulic actuators. Once mounted on the bonnet, it becomes the power unit assuring complete valve closure or opening upon loss of control pressure. Like all of Baker's actuators, it incorporates the female portion of the patented Quick-Disconnect on the shaft assembly. The Model "C" Hydraulic Actuator operates valves from the 1-13/16" to 4-1/16" range with operating pressures up to 10,000 psi and 6-3/8" range with operating pressure up to 5000 psi. The Model "C" piston assembly is located in the bottom of the actuator, which allows the spring to be totally immersed in oil for protection from corrosion. The piston assembly is available in 3" and 4" sizes. The actuator shaft, in the fail-safe position, serves as a visual indicator. The actuator is protected from over-pressurization by an external safety relief device, which is rated for the working pressure and temperature service of the actuator. The Model "C" is available in standard, H_2S and Arctic* services, with temperature ranges from -75°F to +250°F.

SPECIFICATION GUIDE

Service for 3" Piston	H_2S Service, 14D Class 1-2-3S-4/ Standard Service, 14D Class 1-2	
Maximum Control Pressure		
Mounted on 2" Valve (0303)	(0.362 x Valve Pressure) + 140 psi	
Mounted on 2-1/2" Valve (0303)	(0.416 x Valve Pressure) + 140 psi	
Mounted on 3" Valve (0303)	(0.570 x Valve Pressure) + 140 psi	
Mounted on 4" Valve (0304)	(0.827 x Valve Pressure) + 140 psi	
Maximum Operating Pressure	7500 psi	*517 bars*
Test Pressure	11,250 psi	*776 bars*
Temperature Range (Standard Service)	-20°F to 250°F	*-29°C to 121°C*
Product Weight	130 lbs	*59 kg*

SPECIFICATION GUIDE

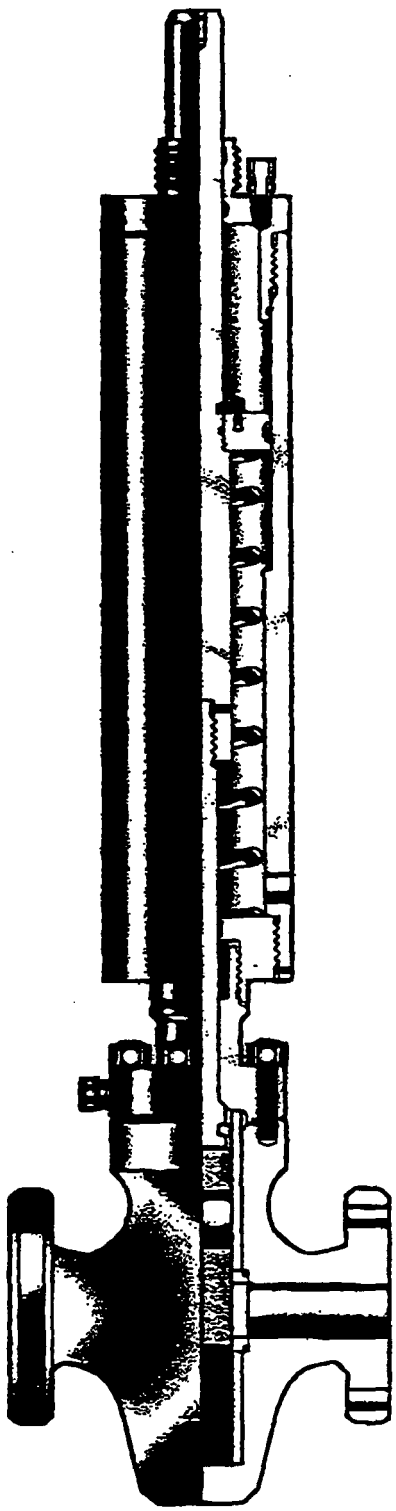
Service for 4" Piston	H_2S Service, 14D Class 1-2-3S-4/ Standard Service, 14D Class 1-2	
Maximum Control Pressure		
Mounted on 2" Valve (0403)	(0.195 x Valve Pressure) + 75 psi	
Mounted on 2-1/2" Valve (0403)	(0.224 x Valve Pressure) + 75 psi	
Mounted on 3" Valve (0403)	(0.306 x Valve Pressure) + 75 psi	
Mounted on 4" Valve (0404)	(0.450 x Valve Pressure) +75 psi	
Mounted on 6" Valve (0406)	(0.890 x Valve Pressure) + 75 psi	
Maximum Operating Pressure	7500 psi	*517 bars*
Test Pressure	11,625 psi	*801 bars*
Temperature Range (Standard Service)	-20°F to 250°F	*-29°C to 121°C*
Product Weight	238 lbs	*108 kg*

* Arctic service temperature is -75°F to 180°F.

PRODUCT REPORT

SURFACE SAFETY SYSTEMS

GateMaster™ Hydraulic Actuator Product Nos. 884-50 (Standard Service), 884-51 (H_2S Service) and 884-52 (Arctic Service)



DESCRIPTION/APPLICATION:

The Baker Oil Tools Gatemaster™ Hydraulic Actuator is used to open and close a reverse-acting or direct-acting gate valve by means of hydraulic pressure applied to a closed cylinder. The actuator is fail-safe as it incorporates a coil spring to assist the return of the piston upon the loss of hydraulic control pressure. Fail-safe return occurs independently of valve pressurization.

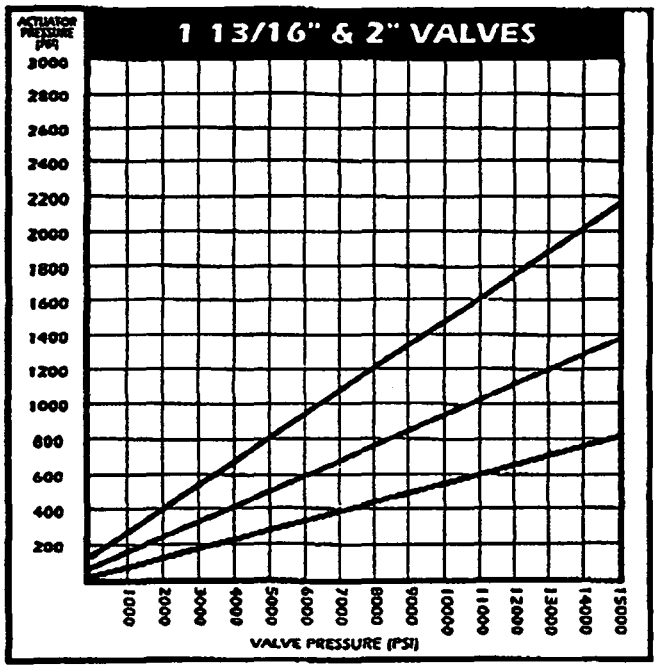
The Gatemaster™ Actuator, Baker Oil Tools' next generation hydraulic actuator, is an enhancement to its line of field-proven hydraulic actuators. We are able to offer this actuator for applications where the patented quick connection and other features of our standard actuator line are not required. The actuator and bonnet assembly do not incorporate the slotted connection between the actuator shaft and bonnet stem. The retrievable packing cartridge assembly and the bolted bonnet ring have been eliminated. The actuator is easily adapted for use with the Baker Oil Tools Self-Contained or Line Pressure Operated Safety Systems.

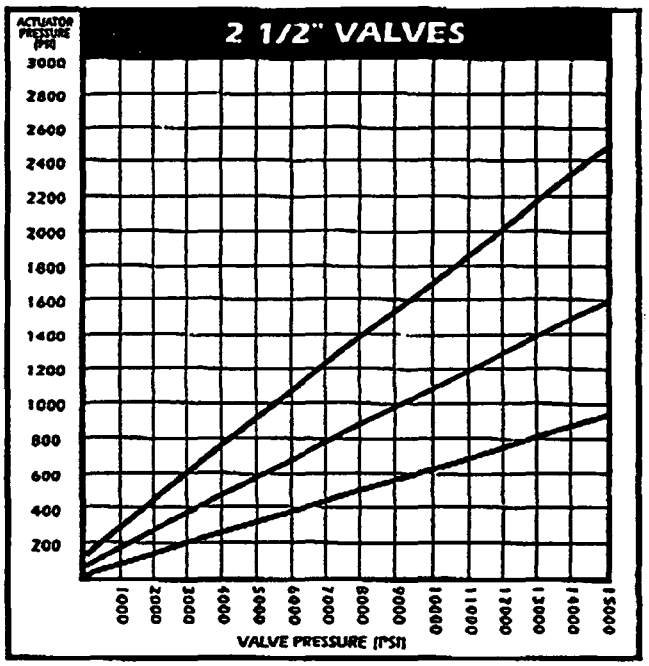
FEATURES/BENEFITS:

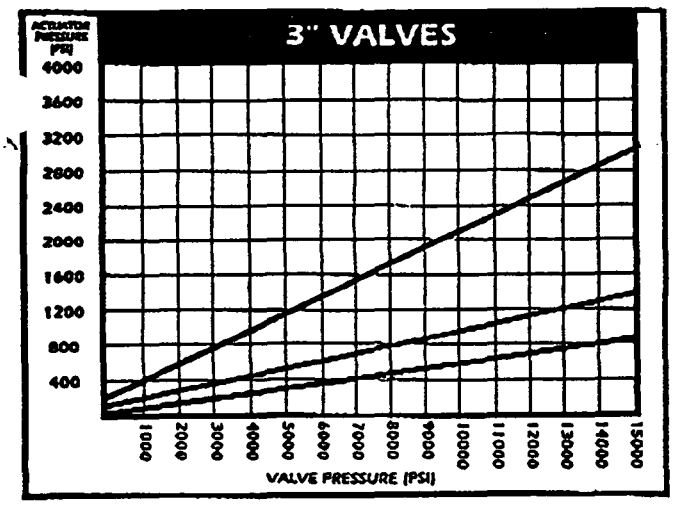
- Housing - single piece universal housing provides adaptation to valve sizes 2" through 4" and with working pressures of 5000 psi *(345 bars)* and below
- Fail-safe - the properly sized coil spring provides a reliable return stroke in the absence of flowline pressure
- Visual indication - the shaft of the Gatemaster™ Actuator extends from the top of the housing providing a quick visual indication of the valve position
- Fire seal - the bonnet assembly of the Gatemaster™ Actuator incorporates the same metal back-seat design as our standard product line and will afford protection against packing blowouts in the event of a fire
- Bonnet stem seals - the bonnet stem seal is a non-elastomeric design that eliminates the problems associated with produced fluids contacting elastomeric seals
- Drift adjustment - the permanent external drift adjustment is easily accessed when assembling the actuator and bonnet on a gate valve, eliminating the requirement to disassemble the actuator to set the valve drift
- Accessories - The GateMaster is designed to accept a wide range of standard accessories such as electric limit switches, clear stem protectors, heat sensitive lock out caps, and manual openers

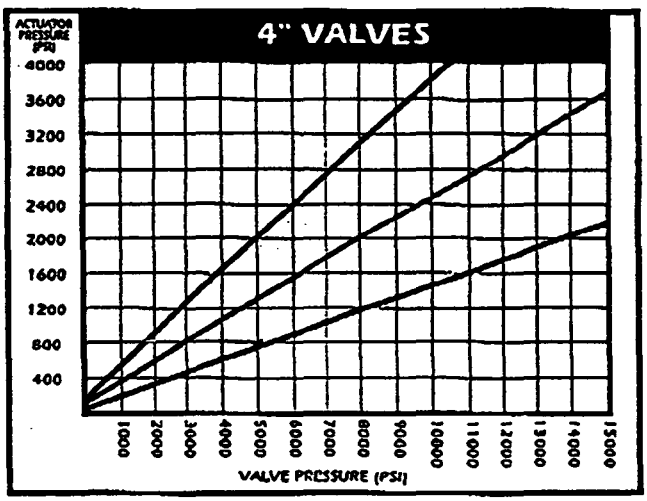
Hydraulic Piston Actuators Model SHA

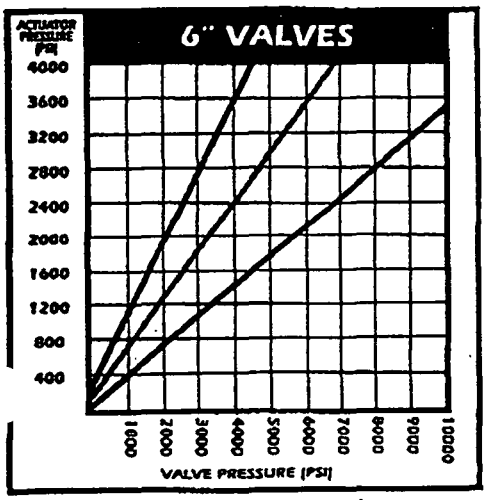
4000, 5000 & 6500 Series











ACCESSORIES

Heat sensitive lock open devices, manual handwheel overrides, hydraulic overrides, position indicators, remote control devices, actuator quick exhaust devices, stem protector, electromechanical switches, electrical indicating devices, (optional side mounted electrical indicating devices)

WARRANTY STATEMENT Products illustrated in this booklet are subject to Terms and conditions of Sale including Warranty and Limitations of Liability as shown in our Price List

SAFOCO INC

11421-A Todd Road • Houston, Texas USA • 77055
Office: 1-713-956-1595 • Fax: 1-713-956-2449

BAKER HUGHES

Baker Atlas

1200, 305 3rd Street SW
Calgary, Alberta
T2P 3E6
Tel: 403-571-1000
Fax: 403-571-1050

November 23, 1999 **BID# ccs 11537**

Ranger Oil Ltd.
900, 311 6th Ave S.W.
Calgary, AB.
T2P 3H2

Attention: Mr. LeRoy Brown

Re: Ranger Fort Liard

Baker Atlas is pleased to provide the following quotation for Cased Hole Services on the above location.

Requested Services: Loggers to supply Two (2) DVRT Tools

- Set up, Service and Mileage charged from Fort Nelson
- Standard Pressure Control equipment (0 – 7000 KPa)
- Run TWO (2) gauge ring / junk basket passes prior to logging DVRT tools, 1st run is for 177.8 mm casing down to 3100.0 mKb and the 2nd gauge ring / junk basket run is for 244.5 mm
- Log DVRT DOWN and THEN UP through 244.5 mm casing from 2900.0 mKb to surface for casing inspection of both internal and external integrity at temperatures in excess of 154° C
- Log 2nd DVRT Tool DOWN and THEN UP through 177.8 mm casing from 3100.0 mKb to 2900.0 mKb for casing inspection of both internal and external integrity at temperatures in excess of 154° C
- Satellite transmit both DVRT log's to Calgary for processing
- Process both DVRT log's, processing includes 5 field prints, 1 color EPI log and 3 Black and White EPI log's for both DVRT log's
- Price includes Northern Surcharge

Estimated Cost of Services : $ 37,000.00

NOTE:

- **A minimum of Three (3) days notice is required in order to arrange and assure availability of Crew and Equipment for this job.**

The above price is an estimate and Baker Atlas reserves the right to adjust pricing to reflect actual intervals logged and services performed. All other terms and conditions of the current Baker Alas Price Schedule (dated June 1, 1998) will apply. This service will be dispatched out of our ***Grande Prairie location,*** *please phone* ***Dwight Wojcicki @ 1-780-539-3505.*** *This quotation is valid for 90 day's pending availability of crew and equipment.*

Baker Atlas appreciates this opportunity to be of service.

Regards,
Bryan Cowan
Technical Sales Representative
Baker Atlas, Division of Baker Hughes

Service charges to provide GatorHawk External pressure testing services, to test 3000 m of 4 1/2 x 12.75# L80 NSCT to 34,400 KPA, (5000 PSI) (estimate 15 jts/hour)

Test Unit, per day, (includes 1 set of Test Packers/Seals)		$1,050.00
Operator charge, ($550/man/day x 2 men)		$1,100.00
Connection charge, per connection ($17.50 x 320 joints)		$5,600.00
Compressor rental, ($250/day x 2 days)		$ 500.00
	Subtotal	$8,250.00
	less 10% discount	$ 825.00
	Total	**$7,425.00**

Additional sets of Test Packers/ Seals will be billed at $300.00/set
Test plug sets will be provided at additional cost.

Note: The above cost includes 24 hours on location, additional and standby hours are charged @ $1,080.00 per 12 hours.

Travel charge (one way) is extra @ $1.85/km from Ft. St. John, B.C.

Accessories

Thread Protectors (rental)	**$ 4.00/set**
plus freight to site, (unless our Laydown/supervisors/computer is used, then there is no freight charge.)	
Quickee thread protectors	**$ 300.00**
Power thread washer, per day	**$ 250.00**
Cleaning Solution	**$ 1.40/liter**
Head Brushes, per set	**$ 80.00**
Cleaning Rags, per box	**$ 50.00**
Teflon Drift (per 5 day period, minimum charge)	**$ 80.00**
Stabbing guide	**$ 175.00**
Subsistence per man per day, all services	**$ 100.00**

Thank you for the opportunity to quote our services for this project.
Services will be co-ordinated out of our **Grande Prairie office,** through our manager, **Randy Gulick @ 1-888-663-1996.**

Sincerely,
FI Canada

Greg Scanlon
Technical Sales

RIG SERVICE TOOLS LTD.

HEAD OFFICE:
9525 - 62 Avenue
Edmonton, Alberta
Canada T6E 0E1

Phone: (403) 435-3451
Fax: (403) 430-6575

MAILING ADDRESS:
P.O. Box 4241
Edmonton, Alberta
Canada T6E 4T3

December 3, 1999

Ranger Oil,
900, 311 – 6 Avenue S. W.,
CALGARY, Alberta. T2P 3H2

Attention: Mr. Leroy Brown

Dear Sir:

Rig Service Tools Ltd. is pleased to provide pricing on your upcoming work at Ft Liard.

(A) Run or Pull 3 ½" / 4 ½" Tubing

1 – Clincher Power Tong c/w Integral Backup	
1 – Hydraulic Power Unit	
1 – 75 Ton YC Slip Type Elevator	
1 – Du Long Slips	
1 – Drift	
1 – Pickup Elevator	
– Meterage Charge	$ 1.00 per meter to pull or run

(B) Computer Torque Monitoring

2 – TMS Computer Systems	
2 – Flow Control Dump Valves	
– Meterage Charge	$ 1.00 per meter running charge

(C) Man Charges

Per Man per 12 hour day (Edmonton To location and return)	$ 500.00/day/man

.....2

(D) Mileage

FOB – Ft. St. John to location and return	$ 1.00 per Km per unit

(E) Pickup/Laydown Services

Pickup/Laydown Machine c/w 2 operators	$ 130.00 per hour

(F) External Pressure Testing

Basic Setup Charge	$ 600.00
Gatorhawk External Pressure Testing Unit	$ 18.00/connection
Methanol – if required	$ 2.00/litre
Damaged Packers charged as sale items	

- Inspection and repairs by customer upon return of equipment
- Equipment and personnel subject to availability
- GST not included in pricing
- Transport of External Pressure Testing Equipment customer's responsibility

Thank you for the opportunity to quote on your needs. If you have any questions, please contact Martin Grant @ (403) 264-8731.

Yours truly,

RIG SERVICE TOOLS LTD.

Martin Grant
Sales – Calgary

MG/mz

MEDIC NORTH EMERGENCY SERVICES LTD.

facsimile TRANSMITTAL

Name: Leroy Brown
Organization: Ranger Oil Ltd.
Fax: 261-7010
Phone: 303-7329
From: Sean Ivens
Date: January 18, 2000
Subject: Medical Services Price Quotation
Pages: 1

Comments:

Leroy,

The following is our price quotation for medical services in Ft. Liard, starting approximately February 01, 2000. The fees are unchanged from the last time we provided medical services to Ranger Oil.

ALS Service(complete)	$685.00/day
Mobilization	~~$1,890.00~~ } $2650
Demobilization	~~$1,890.00~~ }

Please call me if you have any questions.

Regards,

Sean Ivens

Head Office:
Tel: (867) 873-8993
Fax: (867) 873-5388
P.O. Box 2121
Yellowknife NT X1A 2P6

Regional Office:
Tel: (250) 791-1969
Fax: (250) 791-1973
P.O. Box 237
108 Mile Ranch BC V0K 2Z0

PATCH
H_2S SERVICES LTD.

Partnerships
IN HEALTH AND SAFETY
CERT. # 98-03-1035

HEAD OFFICE: #4, 7819 - 50 Avenue, Red Deer, Alberta, Canada, T4P 1M8
24 Hour Phone: (403) 346-8200 Fax: (403) 342-0342
E-mail: patchh2s@telusplanet.net
CALGARY OFFICE: (403) 266-1833 Fax: (403) 263-8002
DRUMHELLER OFFICE: (403) 823-7998 Fax: (403) 823-7993
F.S.J. OFFICE: (250) 785-6333 Fax: (250) 785-6301

CANADIAN OWNED AND OPERATED

December 6, 1999

Ranger Oil Limited
900, 321 - 6th Avenue S.W.
Calgary, Alberta
T2P 3H2

Attention: Mr. Leroy Brown

Dear Leroy:

Re: H_2S Safety Equipment & Personnel
P-66-A Workover
Flett N-61 Completion

Following are the prices for the above noted locations. These prices are the same as the January 21, 1999 bid.

If you have any questions, please call me at 266-1833.

Thank you, Leroy!!

Yours truly

PATCH H_2S SERVICES LTD.

Ed Rode
Sales Representative

ER/bt

Attach.

Proposed Price List
(All prices are on a per unit per day basis)

	BOOK	RANGER
Safety Trailer (see Attached Inventory List)	$200.00	**$130.00**
Safety Supervisor (Based on 12 Hour Shift) - Minimum Qualifications H_2S First Aid/CPR (B.C. Certification as well) High Angle Rescue WHMIS/TDG	$325.00	**$295.00**
Invert Pay	**$15.00/man/day**	
Statutory Holiday Pay	**Time & a Half**	
Shop Time for Cleaning/Repair of Equipment	**$50.00/hr.**	
Service Vehicle (4x4 - Cellular Phones & XJ's)	$65.00	**$60.00**
Mileage	$0.75/km	**$0.70/km**
Extra Self-Contained Breathing Apparatus (S.C.B.A.)	$25.00	**$12.00**
Extra Supplied Air Breathing Apparatus (S.A.B.A.)	$25.00	**$12.00**
Electronic Gas Detection Monitors		
- 4 Channel Rig Rat (H_2S) 4 Channel Monitor with 4 Remote Sensors 2 Sets Audible/Visual Alarms	$200.00	**$130.00**
- Personal H_2S Monitor	$20.00	**$10.00**
-Tri-Head $0_2/H_2S$/LEL Monitor	$60.00	**$45.00**
- L.E.L. Heads for Rig Rat	$50.00	**$35.00**
Portable Multi-Gas Detectors	$10.00	**N/C**
Communications Equipment		
- Portable VHF Intrinsically Safe Radios c/w Leather Carry Case, Quick Charger and Rubber Whip Antenna	$25.00	**$12.00**
- 35 Watt Base Station VHF Transceiver c/w Base Power Antenna & 50' Coax	$25.00	**$15.00**
- Steel Sectional Antenna Tower	$7.00	**N/C**
- 4 Watt Motorola Cellular Telephone	$35.00	**$30.00**
- Aurora Telephone System w/Yagi	$50.00	**$35.00**
On Site Mounted Command/Control Centre (Trucking at Cost)	$125.00	**At Cost**

	BOOK	RANGER
400 Watt Metal Halide High Density Lighting System c/w 15' Telescoping Mast	$25.00	N/C
Emergency Briefing Area Shelter (Heated)	$30.00	**$20.00**
Back Pack Stand c/w Vinyl Cover	$7.00	N/C
Additional 100' Extension Cord	$7.00	N/C
Additional Breathing Airline (per foot)	$0.10	N/C
Ignition Kit (Includes Tri-Head O_2/H_2S/L.E.L.)	$75.00	**$50.00**
Road Block Kits	$10.00	**$5.00**
Lease Entrance Signs (Specialty Signs at Cost)	$7.00	N/C
Breathing Air Compressor		**$70.00**
CONSUMABLES		
Multi-Gas Detector Tubes (Each) H_2S Ranges - 0-600 ppm; 0-2000 ppm; 0-40% SO_2 CO_2	$12.50	**$10.00**
Refills for Expended Air Cylinders 230 Cubic Feet	$60.00	**$55.00**
Shotgun Flares	$7.50	**$7.00**
Ammonia (per litre)	$4.00	**$3.50**
Cortron (per litre)	$8.75	**$8.00**
Accommodations	**At Cost**	
Subsistence (If no camp provided)	**$45.00/man/day**	

Upon equipment return to shop, repair and/or maintenance costs may apply if warranted (e.g. severely damaged or overly dirty).

These prices reflect a full service package.
Individual items may be charged at a slightly higher rate.

BASIC SAFETY TRAILER UNIT

We have improved on the design and added more equipment to our safety trailer. This all steel, tandem axle unit c/w a hydraulic surge braking system will serve as the best equipped hazardous environment portable unit in our industry.

TRAILER INVENTORY

9/12	230 cu. ft. breathing air cylinders cascaded with stainless steel pigtails and brass cylinder tees (reducing leak off in cold weather)
2	Hi-lo stage pressure regulators
1	High pressure transfer fill hose
1	Six outlet low pressure manifold
1	Four outlet low pressure splitter
2	3/8" x 50' Red-L OH&S approved (black) breathing airline (brass quick connect)
16	1/4" x 50' Red-L OH&S approved (black) breathing airline (brass quick connect)
6	Scott SKA packs c/w 5 minute egress cylinder (S.A.B.A.)
2	Scott 2A advanced system 30 min. self contained breathing apparatus (NFPA approved) (S.C.B.A.)
2	Spare 45 cu. ft. breathing air cylinders for S.C.B.A.
1	Oxygen Administration Kit
2	Spare 'D' size 02 cylinders
1	20# ABC low temp fire extinguisher
1	Folding stretcher
1	OH&S #3 industrial first aid kit
1	Fire blanket in water resistant vinyl cover
1	36" orange windsock
4	Windflags c/w tripods and 4 - 10' flagpoles
1	Full size rescue harness c/w 8' lanyard
1	100' fire resistant rescue rope
1	Kitagawa portable gas detector c/w 60 various H_2S tubes
1	50' x 1/2" nylon rope
1	100' - 14/3 electric extension cord c/w intrinsically safe ends
1	Flare launcher c/w flares
2	24" x 30" emergency briefing area signs
2	24" x 30" special lease entry signs
1	12 gauge shot gun c/w 12 flares
2	Rolls orange streamer tape
2	Rolls electrician's tape
1	Pair safety glasses
3	Pair earplugs
1	Roll teflon tape