



December 13, 1990

GENERAL DRILLING PROGRAM

PARAMOUNT et al CAMERON

B - 25 60° 10' 117° 30'
M - 73 60° 10' 117° 15'
F - 61 60° 10' 117° 15'
F - 19 60° 10' 117° 30'

PARAMOUNT et al SWEDE

A - 52 60° 20' 117° 30'
G - 21 60° 20' 117° 30'

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Distribution :

Besler/Jeffries	2 Field + 2 Office
Geology	1
Partners	
COGLA	5

A.1 WELL INFORMATION SUMMARYS

Name : PARAMOUNT et al CAMERON
 Location : B - 25 60° 10' N 117° 30' W
 Province : North West Territories
 K. B. Elevation : 758.0 m (actual)
 G. L. Elevation : 754.30 m (surveyed)
 Projected T. D. : 1513 mKB.
 Primary Objective : Sulphur Point - gas
 Secondary Objective : Keg River and Slave Point
 Spud : March 20, 1990 Rig Released : March 23, 1990
 Re-enter : Approximately - January 17, 1991
 Drilling Authority : # 1415
 Classification : Exploratory
 Permit or Lease : Federal - Exploration Licence #312
 UWI : 300B256010117300

AFE No. :	16380	Paramount W. I. :	74.0%
AFE Amount :	\$767,400	Tarragon W. I. :	25.0%
AFE Days :	14	Camco W. I. :	1.0%

HOLE AND CASING PROFILE

Surface : 311.2 mm hole to 395 m with 244.5 mm casing landed at 393.7 mKB and cemented back to surface with 30 t Class "G" + 2% CaCl₂.
 Main : 222.2 mm hole to 1560? m with 139.7 mm casing cemented back to approx. 1200 m with T-E-L Master and 1200 to 390 m with LITE Master.

DRILLING FLUID

Surface : Spud with water, mud up to a Gel-Lime slurry as hole conditions dictate.
 Main : Drill out and ahead with air as far as possible. At +/- 1250? m, mud up to a Gel-chemical system with filtrate control.

CORES

None.

D. S. T.'s

Three possible in Slave Point and Sulphur Point on penetration and Keg River after logs.

LOGS

Phasor DISFL-GR	T. D. to surface casing
CNL-LDT-GR-XYCal	T. D. to surface casing
BHC Sonic-GR-Cal	T. D. to surface casing
Microlog	T. D. to 100 m above Slave Point
Velocity Survey	

A.2 WELL INFORMATION SUMMARYS

Name : PARAMOUNT et al CAMERON
 Location : M - 73 60° 10' N 117° 15' W
 Province : North West Territories
 K. B. Elevation : 775.0 m (estimated)
 G. L. Elevation : 771.45 m (surveyed)
 Projected T. D. : 1625 mKB.
 Primary Objective : Sulphur Point - gas
 Secondary Objective : Keg River and Slave Point
 Spud: Approximately - February 9, 1991
 Drilling Authority : #
 Classification : Exploratory
 Permit or Lease : Federal - Exploration Licence #312
 UWI : 300M736010117150

AFE No. :	16580	Paramount W. I. :	88.5%
AFE Amount :	\$	Camenco W. I. :	1.0%
AFE Days :		Lite W. I. :	2.5%
		Quinterra W. I. :	2.0%
		Trilogy W. I. :	4.0%
		Oilco W. I. :	2.0%

HOLE AND CASING PROFILE

Surface : 311.2 mm hole to 390 m with 244.5 mm casing cemented back to surface with 30 t Class "G" + 2% CaCl₂.

Main : 222.2 mm hole to 1625 m with 139.7 mm casing cemented back to approx. 1200 m with T-E-L Master and 1200 to 390 m with LITE Master.

DRILLING FLUID

Surface : Spud with water, mud up to a Gel-Lime slurry as hole conditions dictate.

Main : Drill out and ahead with air as far as possible. At +/- 1300 m, mud up to a Gel-chemical system with filtrate control.

CORES

Two 9 or 18 m cores possible in Slave Point and Sulphur Point formations.

D. S. T.'s

Three possible in Slave Point and Sulphur Point on penetration and Keg River after logs.

LOGS

Phasor DISFL-GR	T. D. to surface casing
CNL-LDT-GR-XYCal	T. D. to surface casing
Array Sonic-GR-Cal	T. D. to surface casing
Microlog	T. D. to 100 m above Slave Point

A.3 WELL INFORMATION SUMMARYS

Name : PARAMOUNT et al CAMERON
 Location : F - 61 60° 10' N 117° 15' W
 Province : North West Territories
 K. B. Elevation : 753.0 m (estimated)
 G. L. Elevation : 749.22 m (surveyed)
 Projected T. D. : 1628 mKB.
 Primary Objective : Sulphur Point - gas
 Secondary Objective : Keg River and Slave Point
 Spud : Approximately - March 5, 1991
 Drilling Authority : #
 Classification : Exploratory
 Permit or Lease : Federal - Exploration Licence #312
 UWI : 300F616010117150

AFE No. :	16590	Paramount W. I. :	77.0%
AFE Amount :	\$	Camerco W. I. :	2.0%
AFE Days :		Lite W. I. :	5.0%
		Quinterra W. I. :	4.0%
		Trilogy W. I. :	8.0%
		Oilco W. I. :	4.0%

HOLE AND CASING PROFILE

Surface : 311.2 mm hole to 390 m with 244.5 mm casing cemented back to surface with 30 t Class "G" + 2% CaCl₂.

Main : 222.2 mm hole to 1628 m with 139.7 mm casing cemented back to approx. 1200 m with T-E-L Master and 1200 to 390 m with LITE Master.

DRILLING FLUID

Surface : Spud with water, mud up to a Gel-Lime slurry as hole conditions dictate.

Main : Drill out and ahead with air as far as possible. At +/- 1300 m, mud up to a Gel-chemical system with filtrate control.

CORES

None.

D. S. T.'s

Three possible in Slave Point and Sulphur Point on penetration and Keg River after logs.

LOGS

Phasor DISFL-GR	T. D. to surface casing
CNL-LDT-GR-XYCal	T. D. to surface casing
Array Sonic-GR-Cal	T. D. to surface casing
Microlog	T. D. to 100 m above Slave Point

A.4 WELL INFORMATION SUMMARYS

Name : PARAMOUNT et al CAMERON
 Location : F - 19 60° 10' N 117° 30' W
 Province : North West Territories
 K. B. Elevation : 788.0 m (estimated)
 G. L. Elevation : 784.39 m (surveyed)
 Projected T. D. : 1628 mKB.
 Primary Objective : Sulphur Point - gas
 Secondary Objective : Keg River and Slave Point
 Spud : Approximately - February 26, 1991
 Drilling Authority : #
 Classification : Exploratory
 Permit or Lease : Federal - Exploration Licence #312
 UWI : 300F196010117300

AFE No. :	16570	Paramount W. I. :	74.0%
AFE Amount :	\$	Tarragon W. I. :	25.0%
AFE Days :		Camerco W. I. :	1.0%

HOLE AND CASING PROFILE

Surface : 311.2 mm hole to 390 m with 244.5 mm casing cemented back to surface with 30 t Class "G" + 2% CaCl₂.

Main : 222.2 mm hole to 1628 m with 139.7 mm casing cemented back to approx. 1200 m with T-E-L Master and 1200 to 390 m with LITE Master.

DRILLING FLUID

Surface : Spud with water, mud up to a Gel-Lime slurry as hole conditions dictate.

Main : Drill out and ahead with air as far as possible. At +/- 1350 m, mud up to a Gel-chemical system with filtrate control.

CORES

None.

D. S. T.'s

Three possible in Slave Point and Sulphur Point on penetration and Keg River after logs.

LOGS

Phasor DISFL-GR	T. D. to surface casing
CNL-LDT-GR-XYCal	T. D. to surface casing
Array Sonic-GR-Cal	T. D. to surface casing
Microlog	T. D. to 100 m above Slave Point

A.5 WELL INFORMATION SUMMARYS

Name : PARAMOUNT et al SWEDE
 Location : A - 52 60° 20' N 117° 30' W
 Province : North West Territories
 K. B. Elevation : 697.0 m (estimated)
 G. L. Elevation : 692.63 m (surveyed)
 Projected T. D. : 1597 mKB.
 Primary Objective : Sulphur Point - gas
 Secondary Objective : Keg River and Slave Point
 Spud : Approximately - January 5, 1991
 Drilling Authority : #
 Classification : Exploratory
 Permit or Lease : Federal - Exploration Licence #327
 UWI : 300A526020117300

AFE No. :	16550	Paramount W. I. :	96.0%
AFE Amount :	\$1,070,700	Camerco W. I. :	4.0%
AFE Days :			

HOLE AND CASING PROFILE

Surface : 311.2 mm hole to 390 m with 244.5 mm casing cemented back to surface with 30 t Class "G" + 2% CaCl₂.

Main : 222.2 mm hole to 1597 m with 139.7 mm casing cemented back to approx. 1200 m with T-E-L Master and 1200 to 390 m with LITE Master.

DRILLING FLUID

Surface : Spud with water, mud up to a Gel-Lime slurry as hole conditions dictate.

Main : Drill out and ahead with air as far as possible. At +/- 1300 m, mud up to a Gel-chemical system with filtrate control.

CORES

One 9 m possible in Keg River.

D. S. T.'s

Three possible in Slave Point and Sulphur Point on penetration and Keg River after logs.

LOGS

Phasor DISFL-GR	T. D. to surface casing
CNL-LDT-GR-XYCal	T. D. to surface casing
Array Sonic-GR-Cal	T. D. to surface casing
Microlog	T. D. to 100 m above Slave Point

A.6 WELL INFORMATION SUMMARYS

Name : PARAMOUNT et al SWEDE
 Location : G - 21 60° 20' N 117° 30' W
 Province : North West Territories
 K. B. Elevation : 761.0 m (estimated)
 G. L. Elevation : 757.15 m (surveyed)
 Projected T. D. : 1631 mKB.
 Primary Objective : Sulphur Point - gas
 Secondary Objective : Keg River and Slave Point
 Spud : Approximately - February 3, 1991
 Drilling Authority : #
 Classification : Exploratory
 Permit or Lease : Federal - Exploration Licence #327
 UWI : 300G216020117300

AFE No. :	16560	Paramount W. I. :	47.4%
AFE Amount :	\$	Petro Canada W. I. :	40.0%
AFE Days :		Tarragon W. I. :	12.0%
		Cameroco W. I. :	0.6%

HOLE AND CASING PROFILE

Surface : 311.2 mm hole to 390 m with 244.5 mm casing cemented back to surface with 30 t Class "G" + 2% CaCl₂.

Main : 222.2 mm hole to 1631 m with 139.7 mm casing cemented back to approx. 1200 m with T-E-L Master and 1200 to 390 m with LITE Master.

DRILLING FLUID

Surface : Spud with water, mud up to a Gel-Lime slurry as hole conditions dictate.

Main : Drill out and ahead with air as far as possible. At +/- 1300 m, mud up to a Gel-chemical system with filtrate control.

CORES

None.

D. S. T.'s

Three possible in Slave Point and Sulphur Point on penetration and Keg River after logs.

LOGS

Phasor DISFL-GR	T. D. to surface casing
CNL-LDT-GR-XYCal	T. D. to surface casing
Amay Sonic-GR-Cal	T. D. to surface casing
Microlog	T. D. to 100 m above Slave Point

B.1 GEOLOGICAL WELL PROGNOSIS

PARAMOUNT et al CAMERON		B - 25	
Surveyed Grd. Elev. :	704.24 m	Est. KB Elev. :	708 m
<u>Formation</u>	<u>Depth (m)</u>	<u>Subsea (m)</u>	<u>Important Isopachs</u>
Wabamun	484	+224	Wabamun - Twin Falls
Fort Simpson	670	+38	299 m
Twin Falls	783	-75	Twin Falls - Slave Point
Hay River Shale	943	-235	512 m
Beaver Hill Lake	1241	-533	Slave Point - Watt Mountain
Muskwa	1271	-563	47 m
Slave Point	1295	-587	Watt Mountain - Muskeg
Fort Vermilion	1326	-618	53 m
Watt Mountain	1342	-634	Muskeg - Keg River
Sulphur Point	1353	-645	53 m
Muskeg	1395	-687	Keg River - PreCambrian
Keg River	1448	-740	35 m
Chinchaga			
PreCambrian	1483	-775	
Total Depth	1513	-805	

B.2 GEOLOGICAL WELL PROGNOSIS

PARAMOUNT et al CAMERON		M - 73	
Surveyed Grd. Elev. :	771.45 m	Est. KB Elev. :	775.0 m
<u>Formation</u>	<u>Depth (m)</u>	<u>Subsea (m)</u>	<u>Important Isopachs</u>
Wabamun	558	+217	Wabamun - Twin Falls
Fort Simpson	717	+58	269 m
Twin Falls	827	-52	Twin Falls - Slave Point
Hay River Shale	985	-210	504 m
Beaver Hill Lake	1277	-502	Slave Point - Watt Mountain
Muskwa	1308	-533	49 m
Slave Point	1331	-556	Watt Mountain - Muskeg
Fort Vermilion	1365	-590	38 m
Watt Mountain	1380	-605	Muskeg - Keg River
Sulphur Point	1393	-618	96 m
Muskeg	1418	-643	Keg River - PreCambrian
Keg River	1514	-739	72 m
Chinchaga			
PreCambrian	1586	-811	
Total Depth	1625	-850	

B.3 GEOLOGICAL WELL PROGNOSIS

PARAMOUNT et al CAMERON

F - 61

Surveyed Grd. Elev. : 749.22 m

Est. KB Elev. : 753.0 m

<u>Formation</u>	<u>Depth (m)</u>	<u>Subsea (m)</u>	<u>Important Isopachs</u>
Wabamun	547	+206	Wabamun - Twin Falls
Fort Simpson	693	+60	256 m
Twin Falls	803	-50	Twin Falls - Slave Point
Hay River Shale	964	-211	525 m
Beaver Hill Lake	1268	-515	Slave Point - Watt Mountain
Muskwa	1305	-552	50 m
Slave Point	1328	-575	Watt Mountain - Muskeg
Fort Vermilion	1361	-608	34 m
Watt Mountain	1378	-625	Muskeg - Keg River
Sulphur Point	1383	-630	89 m
Muskeg	1412	-659	Keg River - PreCambrian
Keg River	1501	-748	96 m
Chinchaga	1572	-819	
PreCambrian	1597	-844	
Total Depth	1628	-875	

B.4 GEOLOGICAL WELL PROGNOSIS

PARAMOUNT et al CAMERON

F - 19

Surveyed Grd. Elev. : 784.39 m

Est. KB Elev. : 788.0 m

<u>Formation</u>	<u>Depth (m)</u>	<u>Subsea (m)</u>	<u>Important Isopachs</u>
Wabamun	556	+232	Wabamun - Twin Falls
Fort Simpson			297 m
Twin Falls	853	-65	Twin Falls - Slave Point
Hay River Shale	1008	-220	521 m
Beaver Hill Lake	1319	-531	Slave Point - Watt Mountain
Muskwa	1350	-562	45 m
Slave Point	1374	-586	Watt Mountain - Muskeg
Fort Vermilion	1401	-613	25 m
Watt Mountain	1419	-631	Muskeg - Keg River
Sulphur Point	1422	-634	85 m
Muskeg	1444	-656	Keg River - PreCambrian
Keg River	1529	-741	65 m
Chinchaga			
PreCambrian	1594	-806	
Total Depth	1628	-840	

B.5 GEOLOGICAL WELL PROGNOSIS

PARAMOUNT et al SWEDE A - 52

Surveyed Grd. Elev. :	692.63 m	Est. KB Elev. :	697.0 m
<u>Formation</u>	<u>Depth (m)</u>	<u>Subsea (m)</u>	<u>Important Isopachs</u>
Wabamun	463	+234	Wabamun - Twin Falls
Fort Simpson	692	+5	343 m
Twin Falls	806	-109	Twin Falls - Slave Point
Hay River Shale	957	-260	515 m
Beaver Hill Lake	1276	-579	Slave Point - Watt Mountain
Muskwa	1299	-602	49 m
Slave Point	1321	-624	Watt Mountain - Muskeg
Fort Vermilion	1353	-656	24 m
Watt Mountain	1370	-673	Muskeg - Keg River
Sulphur Point	1373	-676	85 m
Muskeg	1394	-697	Keg River - PreCambrian
Keg River	1479	-782	87 m
Chinchaga	1553	-856	
PreCambrian	1566	-869	
Total Depth	1597	-900	

B.6 GEOLOGICAL WELL PROGNOSIS

PARAMOUNT et al SWEDE G - 21

Surveyed Grd. Elev. :	757.15 m	Est. KB Elev. :	761.0 m
<u>Formation</u>	<u>Depth (m)</u>	<u>Subsea (m)</u>	<u>Important Isopachs</u>
Wabamun	527	+234	Wabamun - Twin Falls
Fort Simpson	729	+32	314 m
Twin Falls	841	-80	Twin Falls - Slave Point
Hay River Shale	995	-234	515 m
Beaver Hill Lake	1306	-545	Slave Point - Watt Mountain
Muskwa	1333	-572	47 m
Slave Point	1356	-595	Watt Mountain - Muskeg
Fort Vermilion	1387	-626	27 m
Watt Mountain	1403	-642	Muskeg - Keg River
Sulphur Point	1408	-647	84 m
Muskeg	1430	-669	Keg River - PreCambrian
Keg River	1514	-753	87 m
Chinchaga	1589	-828	
PreCambrian	1601	-840	
Total Depth	1631	-870	

C. DRILLING PROCEDURE

SURFACE HOLE

1. Conductor pipe (406 mm) to be set as deep as possible to cover any surface water zones, gravels and rocks. Give COGLA 24 hour advance notice of spud.

Move in and rig up drilling rig and auxiliary equipment. Drill collars are to be inspected prior to spud. Ensure rig is properly levelled and centered on survey pin or conductor. Check lease construction, confirm and report any cut or fill at the survey pin. Establish and report distance from ground to KB and KB elevation. Also establish and report casing flange to KB or distance "H" and casing flange elevation. Report spud date and time to COGLA as soon as possible after spud, during office hours.

2. Spud well with 311.2 mm bit and drill ahead using water. Ensure largest drill collars available are used. Mud up to a gel-lime slurry if required for hole cleaning. If lost circulation encountered, use high viscosity pills loaded with sawdust and kwik seal. If major problems are encountered at less than 100 m, a cemented 339.7 mm conductor casing may be required. Specific comments for individual wells are as follows:

- B - 25 : - surface already set
 - piloted 222 mm hole to 232 m and reamed 311 mm to 394 m
 - deviation max. @ 344 m = 1-3/4°, no lost circulation
- M - 73 : - surface hole is not expected to encounter major problems
 - nearest offsets did not report lost circulation or deviation
 - J-62 drilled 311 mm hole without pilot hole
- F - 61 : - same as M-73
 - localized boulders and gravels could be present
- F - 19 : - nearest offset, N-28 had major problems with gravel and boulders to 250 m
 - N-28 had to pilot hole, ran 298 mm surface casing to isolate gravels but could only get to 203 m and became stuck. Ran 219 mm to 834 m.
 - J-37 had no reported problems
- A - 52 : - A-73 had major problems on surface hole. Loose rocks and gravels necessitated setting and cementing 508 mm conductor. Cement returns were not possible with several attempts and cement was dropped from surface. Gravel and rocks were drilled to 47 m and the hole reamed to 406 mm. A 339 mm conductor was run and cemented to 47 m. A 311 mm hole was drilled to 402 m and encountered considerable rocks and sandstone stringers. A 222 mm pilot hole was drilled from 76 to 361 m due to minor deviation. The surface casing hung up on running and dropped the guide shoe which resulted in a fishing operation. After cleaning up hole, 244 mm casing was run and cemented at 416 m.
 - the next nearest offset, C-50, had minimal problems as previously shown
- G - 21 : - nearest offset is C-50
 - would expect few problems.

3. Drill to approximately 390 m, surveying every 30 m. A 222.2 mm pilot hole may be required if deviation occurs. (This is probably due to the running of small drill collars.) Maximum deviation allowed is 2° with 1/30 m change. Tally casing and have finish drilling depth allow for easy installation of cement plug loading head. Dummy trip and condition hole to run casing.
4. Run 244.5 mm OD surface casing as per Section Q and cement to surface as per Section R. Have 25.4 mm pipe on location to recement from surface if required. Ensure casing is true to vertical.
5. Wait on cement four (4) hours prior to slackening off weight. Cut off casing and install 244.5 mm Slip Weld x 279.4 mm 20.7 MPa casing head with 2 - 52.4 mm 20.7 MPa sour trim valves. Casing vent to be positioned S 45° W or S 45° E. Pressure test weld with grease to 7000 kPa and ensure pressure is bled off after test.
6. Install a Class IV BOP stack and bleed off manifold as per Section E and COGLA regulations. Wait on cement eight (8) hours after plug down prior to testing BOP equipment.

7. Pressure test BOP equipment as per Section E. Do not drill out without a successful pressure test. Wait on cement twelve (12) hours after plug down prior to drilling out.

MAIN HOLE

1. Run in hole with a 222.2 mm HP43A type bit or equivalent (See Bit Program in Section U). Drill out casing shoe with water using 2-3000 daN and 40 rpm. A formation leak off test is required prior to drilling more than 10 m past casing shoe. Blow hole dry and drill ahead with air as deep as possible or to +/- 50 m above top of Slave Point formation, typically 1250 to 1350 m. Ensure geograph is operational at all times.
2. Survey wellbore every 100 m or less if deviation is noted. Maximum hole angle allowed is 2° with a 1° / 30 m change.
3. Drill samples are to be caught at 5 m intervals starting from surface casing. It may be only possible to catch samples at 10 m intervals while air drilling. Two sets of unwashed and one set of washed cuttings are to be collected and sent to the Calgary office for further handling. Canned unwashed samples for geochemical analysis are required at 10 m intervals.
4. Mud up to a gel-chemical system at +/- 50 m above Slave Point or earlier if hole conditions dictate. Fill hole with mud in 150-200 m intervals while pulling out of hole. Ream back to bottom and condition hole before drilling ahead. Maintain filtrate loss at less than 10 cc's / 30 min to total depth. The pH should be controlled at a value equal to or greater than 10.5. Pretreat system with Pel ThinzCF and soda ash for anhydrite.

No major hole problems are expected while air drilling. After mudding up, some lost circulation could occur. This is generally due to the Twin Falls formation. If severe losses were to occur and could not be controlled, consideration would be given to running an intermediate casing prior to penetrating the Slave Point. Some anhydrite will be encountered and should be treated out with soda ash.

Note : Conventional cores are to be cut in wells M - 73 and A - 52. See Section I for details. After coring hole size will be reduced to 215.9 mm to avoid reaming out cored section.

5. Drill ahead to Slave Point and Sulphur Point formations. Depending on drilling rate and samples, drill stem tests may be called on penetration. Tally out of hole to test or core.
6. Drill ahead to total depth as indicated in well prognosis of Section B. Total depth should provide sufficient over hole to clearly identify the Precambrian top on logs, typically 30 m. Dummy trip 10-15 stands and condition hole for logging. Pull out of hole to log and tally.
7. Run logs as outlined in Section J. Have Cement Volume log integrated and sent to Calgary office.
8. Run in hole with bit for clean out trip. Circulate and condition hole.
9. Depending on log results, a drill stem test in the Keg River may be called.
10. After tests, run in hole with bit for clean out. Circulate and condition hole. Pull out of hole laying down drill string. If well is to be plugged, run in open ended and set abandonment plugs as per instructions from Calgary and COGLA.
11. If well is to be cased, prepare to and run 139.7 mm casing to total depth as per Section S and cement as per Section T.
12. Set casing slips and ensure they are properly seated. Cut off casing and weld on cap.

D. DRILLING FLUIDS PROGRAM

SURFACE HOLE

0 to 390 m : Spud and drill ahead with water. Mud up to a gel-lime slurry if required to ensure proper hole cleaning. Hole conditions can vary a considerable amount from well to well and be quite localized. Rocks and gravel are usually present and may cause deviation or sticking. Lost circulation could be encountered. Treat with slugs of sawdust and kwik seal in high viscosity pills. Condition hole and mud prior to running surface casing.

MAIN HOLE

390 to +/-1300 m Drill out and ahead with air as far as possible. Use only sufficient air for hole cleaning as excessive flow will erode wellbore. No major problems are anticipated but waterizing out could occur at any depth. A standby mud volume of at least 55 m³ (1.5 x hole volume) must be on site and ready for pumping into well. Mud density of standby system to be no more 1100 kg/m³. Higher densities may contribute to the possibility of lost circulation.

+/-1300 to TD Mud up to a gel-chemical system. The pH should be raised and maintained above 10.5. This is all that should be required to offset the effect of drilling up any H₂S. Maintain a filtrate loss of less than 10 cc's/30 min from 1300 m to total depth. Peltex and soda ash should be added to pretreat for anhydrite contamination when penetrating the Watt Mountain. Try to maintain as low a mud density as possible to reduce the possibility of lost circulation. This is also required to minimize the amount of invasion in the productive formations which are underpressured.

No major hole problems are anticipated. The Twin Falls formation can be a loss zone with water or mud in the hole. If severe losses were to occur and could not be controlled, consideration would be given to running an intermediate casing prior to penetrating the Slave Point. Hydrogen sulphide gas is present in formations from the Slave Point and deeper in concentrations up to 2%. Maintaining high mud pH and proper hole filling should ensure no influx of gas. No H₂S problems have been encountered in previously drilled wells.

Refer to the drilling fluids company program for details of mud systems and mixing instructions. The drilling fluid is on a full service basis with daily mud checks and as required. When casing is run, the mud properties while circulating prior to cementing, should be reduced to the minimums required while drilling.

E. BOP EQUIPMENT REQUIREMENTS AND SAFETY

SURFACE HOLE

1. Ensure all mud lines, standpipe, kelly hose, swivel, kelly and kelly cocks are pressure tested to the working pressure of the rig pumps prior to drilling out.

MAIN HOLE

1. Install a 244.5 mm 20700 kPa Class IV BOP stack and manifold system as per COGLA regulations. A rotating head and 50 m bleed off line are required while air drilling as well as a standby mud system equal to 1.5 times the hole volume, approximately 55 m³.
2. WOC at least twelve (12) hours prior to pressure testing.
3. Pressure test as follows with the aid of a pressure test unit :
 - a) Conduct a 10 minute pressure test to 1500 and 11000 kPa on blind rams and casing through fill line.

Run in hole with bottom hole assembly and drill string :

- a) Conduct a 10 minute pressure test to 1500 and 11000 kPa on stabbing valve, kelly cock, inside BOP, pipe rams and all bleed off manifold chokes and valves.
- b) Conduct a 10 minute pressure test to 1500 and 10500 kPa on annular preventer.
- 4. Conduct a complete BOP drill. Record results on Tour Sheets and Daily Reports.
- 5. A formation leak off test is required before drilling more than 10 m below casing shoe.
- 6. The BOP system is to be pressure tested every fifteen drilling days. The surface casing is to be pressure tested every 1000 rotating hours or less if wear is suspected.
- 7. Blowout prevention drills are to be conducted with all crews prior to drill out and drill stem tests, a minimum of once per seven (7) days following drill out. A fire drill is to be held at least once every two weeks.
- 8. BOP stack and well control equipment shall be kept clean and free of ice, heated and checked daily for operating efficiency. Rams are to be actuated daily if possible and closing times noted in tour sheets and daily reports.
- 9. The Wellsite Supervisor and Rig Manager will have a valid PITS "Well Control" Certification and "H2S Alert". All Drillers will have a valid PITS "First Line Supervisors" Certificate and "H2S Alert".
- 10. A safety trailer air supply with supervisor are required on site whenever drill stem tests are be conducted. Equipment is to be deployed and crews instructed in its use.
- 11. Monitoring of drilling fluids require use of PVT system. A hydrogen sulphide gas detection system with four sensors is required. Sensors are to be located on the rig floor, in cellar beside BOP stack, at shale shaker and in mud mixing building or at end of bleed off line when air drilling. A continuous combustible gas detector is to be placed at the shale shaker to monitor fluid returns.

F. RIG INSPECTIONS

The Wellsite Supervisor is to personally fill out the Paramount Rig Inspection form prior to drilling out casing. Rig inspections are to be carried out once per week after drilling out. The Rig Manager should participate in and co-sign all inspections. Completed forms are to be forwarded to the Calgary Office along with other field paperwork. Any serious violations must be reported to the Calgary Office immediately.

G. DRILLING TIME RECORD

The Geograph is to be functional at all times to record every 0.2 m from drillout to total depth.

H. DRILL PIPE MEASUREMENT

Drill pipe is to be tallied at all casing, coring, logging and testing points on trip out of the hole or as otherwise directed by the wellsit supervisor or Calgary Office. Strap and board measures are to be reported on daily reports with any difference and correction noted.

I. CORING PROGRAM AND PROCEDURES

Conventional cores are called for as follows:

M - 73 :	in Slave Point, 9 m at approx. 1335 mKB
	in Sulphur Point, 9 m at approx. 1400 mKB
A - 52 :	in Keg River, 9 or 18 m at approximately 1475 mKB

Actual core point to be picked by wellsit geologist.

The specific procedures to follow for coring operations are :

- a) Prior to tripping out to core, dummy trip 10-15 stands and circulate bottoms up.
Strap out of hole.
- b) Run in hole with 215 x 102 mm core bit and 171 mm x 102 mm x 18 m barrel to cut a 9 m core.
- c) Wash to bottom and cut core as required or until jamming occurs.
- d) Slowly raise core off bottom 3 - 5 m, then tag bottom again to ensure core is retrieved. Pull barrel out of cored interval.
- e) Circulate a bottoms up before tripping out with core. Conduct a flowcheck and BOP drill.
- f) Conduct flow checks after pulling 300 m of pipe and prior to pulling any pipe size changes through the BOP stack.
- g) Recover core and laydown core barrel.
- h) Run in hole with 215 mm bit to resume drilling. Carefully ream to bottom through cored interval.

J. LOGGING PROGRAM

Log as follows :

1. Phasor DISFL-GR

1:600	T. D. to surface casing. SP -120 to 15 mV, GR 0 - 150 Resistivity ILD 0 - 50 ohms & SFLA 0 - 50 ohms linear scale Conductivity 1000 - 0 mhos/m
1: 240	T. D. to surface casing SP -120 to 15 mV, GR 0 - 150 Resistivity 0.2 - 2000 ohm-m logarithmic scale
2. BHC Sonic- GR - Cal

1:600	T. D. to surface casing
1:240	T. D. to surface casing GR 0 - 150 T. D. to top of Slave Point - 300 - 100 μ s/m Top of Slave Point to surface casing - 500 - 100 μ s/m
SDT Sonic - GR	
1:240	T. D. to surface GR 0 - 150 T. D. to top of Slave Point - 300 - 100 μ s/m Top of Slave Point to surface casing - 500 - 100 μ s/m
3. CNL - LDT - Pef - GR - XYCal

1:600	T. D. to surface casing GR 0 - 150 Bulk Density 2000 - 3000 kg/m ³
1:240	T. D. to surface casing GR 0 - 150 Limestone matrix 45 to -15 Dolomite matrix 45 to -15, TD to top of Slave Point Display and integrate X-Y Calipers for cement volume log
1:120	High Resolution - Limestone scale - TD to top of Slave Point - Dolomite scale - TD to top of Sulphur Point
4. Microlog - GR

1:240	T. D. to top of Slave Point Resistivity 0 - 40 ohm-m linear scale
1:120	T. D. to top of Slave Point Resistivity 0 - 40 ohm-m linear scale
5. Cement Volume Log - compute on 1:600 scale, phone fax to Paramount office

6. LOGNET Phasor, Sonic, Microlog - T.D. to 50 m above Slave Point on 1:240
Neutron/Density - T.D. to 50 m above Slave Point on 1:240,
Limestone presentation

Check shot or VSP surveys may be required. Paramount would prefer to utilise the full wave or array sonic logs.

K. DRILL STEM TESTING

Tests of the Slave Point and Sulphur Point formations may be called for on penetration. Bottom hole conventional tools would be run. If log results are unsatisfactory, additional tests may be called for the Keg River formation using inflate straddle tools. Tests would be run utilizing the following equipment :

- floor manifold and flow line
- fail safe control head (c/w drop bar)
- reverse circulation valve
- hydraulic jars
- safety joint
- by-pass assembly on straddle tests

A minimum of four (4) pressure recorders are to be run as follows :

- one inside above shut-in tool
- one inside above top packer and safety joint, electronic with temperature
- one inside within the interval
- one outside within the interval

The preflow should be 10 minutes. Initial shut-in 60 minutes and valve open will be 60 - 90 minutes. Depending on flow indications, open time may be extended. Final shut-in time should be two (2) times the flow period. Catch gas and fluid samples for analysis. Obtain top, middle and bottom samples of any recovered fluids. Use Drager tubes and report any H₂S content.

Safety service with air supply trailer and supervisor is required due to the presence of H₂S gas in prospective formations. Inhibitor should be used inside drill pipe. Reverse circulate out liquid recoveries.

L. GENERAL INFORMATION

1. All operations must be duly and accurately recorded in the tour sheets. Tour sheets are to be checked and signed daily.
2. All required Paramount drilling forms are to be completely filled out as they pertain to each operation. Field copies and unused forms are to be returned to the Calgary office at the end of each well. A complete and detailed bit record using proper coding for insert bits is to be kept and submitted at end of well.
3. All field tickets from contract services must be signed by Paramount's wellsite supervisor. All tickets must clearly indicate quantities of materials brought to or leaving wellsite as well as service performed. On completion of well, report movement of any surplus materials. Give detailed descriptions serial numbers and threads-on tallies for tubulars. If possible, tag equipment with well name and number.
4. Service companies will be instructed to provide one (1) field copy and three (3) final copies of all service reports. Open hole loggers are to supply six (6) field prints of logs; two (2) for transmittal to COGLA in Yellowknife, three (3) to Calgary Office and one (1) for drilling supervisor at rig. Additional copies may be requested.
5. Purchase orders are not used by Paramount Resources Ltd. However, all field tickets should be encoded with the AFE Number and AFE Sub Item Number (ie. : 16650-224 for drilling fluid

materials and service). A copy of the AFE and coding guide are included with the Field Copy of the Drilling Program.

All invoices will be sent to the following address :

Paramount Resources Ltd.
4000, 350 - 7th Avenue S.W.
CALGARY, Alberta T2P 3W5

6. Close communication and co-operation is to be maintained by field personnel with COGLA. All COGLA regulations are to be followed at all times.
7. Only authorized personnel directly involved with drilling operations are to be allowed on the rig floor. Access to the lease is to be restricted to authorized personnel only.
8. All drilling and geological information is to be treated CONFIDENTIAL at all times.
9. All crew members shall be informed of any potential dangers and informed of their duties should well control become a problem. Full safety meetings shall be held a minimum of once per week and prior to any key operations (ie : DST). Ensure that a CAODC "Yellow Board" is displayed conspicuously in doghouse.
10. Under no circumstances will the use or possession of alcoholic beverages or illegal drugs be permitted in the camp or wellsite area. Anyone ignoring these directions shall be dismissed immediately.
11. Wellsite representative is responsible for ensuring that all operations are being carried out safely and in accordance with all government regulations (COGLA, O.H.& S., WCB) and recognized safety procedures.

M. PERSONNEL CONTACTS

		<u>Office</u>	<u>Home</u>	<u>Mobile</u>
Phil Besler	Drilling	266-2047	948-5367	
Lloyd Jeffries	Drilling Alt.	266-2047 734-3175	269-2475 XJ4-4283	560-0631
Susan Rose	Geology	266-2047	281-9678	
COGLA	M. Thomas	Yellowknife	920-8175	
R.C.M.P.		High Level Hay River	926-3013 / 926-2226 (24 hrs) 874-6555	
Emergency Support		Canadian Helicopters Ambulance Air Ambulance Hospital	High Level High Level High Level High Level	926-2686 926-2545 926-3890 926-3791
Land Occupant		Federal Crown		

N. CONTRACT SERVICES

<u>SERVICE</u>	<u>COMPANY</u>	<u>CONTACT</u>	<u>LOCATION</u>	<u>PHONE</u>
Drilling Rig	Sierra #2/#5	L. Fikowski G. Carrier	Medicine Hat "	526-0489 "
Lease Work	Dechant	B. Hinson	High Level	926-4411

Log. Supv.

Conductor, Etc.

Drig. Fluids	Mission (Warehouse)	R. Beebe E. Schacher Edwards ?	Calgary on site Edmonton	263-0160 468-5032
Logging	Schlumberger	S. Wtorek	Calgary High Level	231-9600 926-2551
D. S. T.	Baker	J. Ottenbreit	Calgary Gr. Prairie	234-0911 539-6700
Casing	Wilson (IPSCO)	D. Butler J. Palazeti	Calgary Calgary	253-8881 279-8000)
Casing Acc.	Wilson (Baker)	D. Butler Wilson Supply	Calgary Edmonton	253-8881 437-0930)
Casing Trucking	Mother	T. Jeffries	Calgary	236-3440
Wellsite Shack			Calgary	
Wellhead	WKM	M. Urich	Calgary Edmonton	281-2800 434-3476
Core & Fluid Analysis	Core Lab	P. Maurice	Calgary Gr. Prairie	250-4000 532-4047
Cementing	Fracmaster	C. Schesnuik	Calgary Gr. Prairie	262-2222 539-6060
Medical	Knutson's	D. Olson	Ft. St. John	787-7215
Shock Sub	Lee Mason			
Safety & Gas detect	Standard	L. Kreutz	Calgary High Level	266-8677 926-2178
PVT, Flosko,	Chimo	D. Braun	Calgary Gr. Prairie	264-2245 539-6280
Power Tongs	not req'd			

ATTACHMENTS

- Q. SURFACE CASING
- R. SURFACE CASING CEMENTING
- S. PRODUCTION / INTERMEDIATE CASING
- T. PRODUCTION / INTERMEDIATE CASING CEMENTING
- U. BIT PROGRAM
- V. SURVEY AND DIRECTIONS
- W. REFERENCE WELL MAP AND OFFSET INFORMATION

SECTION. Q

SURFACE CASING - Design Specifications

Setting Depth :	390 m	Hole Size :	311.2 mm
Tubular Specs :	Size : 244.5 mm O.D. Nom. Weight : 53.6 kg/m Grade : J - 55 Connection : 8rd, LT&C Type - Manu. : ERW - IPSCO Connection O. D. : 269.9 mm Inside Dia. : 226.6 mm Drift Dia. : 222.6 mm	Collapse Rating : 13930 kPa Burst Rating : 24270 kPa Body Yield : 250900 daN Tensile Rating : 201500 daN Conn. Torque : Opt. : 6150 N·M Min. : 4620 N·M Max. : 7690 N·M	
Design Criteria :	Drilling fluid density = 1150 kg/m ³ (11.28 kPa/m), Gas Gradient = 2.25 kPa/m COGLA Burst = 22 kPa/m of depth run		
	Collapse Pressure = 4400 kPa Burst Pressure = 6142 kPa (8580 kPa) Tension Load in Air = 20506 daN Tension Load in Fluid = 17494 daN Maximum Allowable Pull : = 137506 daN (SF = 1.3)		
Design Factors :		(COGLA)	
	Collapse : 3.16 (3.16) Burst : 3.95 (2.82) Tension : 11.5 (9.83)		
Well Control Data :	Assume leak off gradient of 22.0 kPa/m		
MACP	- with casing full of gas (2.25 kPa/m) = 7702 kPa - with casing full of fluid (1150 kg/m ³) = 4180 kPa		
Casing Accessories & Placement :			
a) Accessories :	1 - 244.5 mm Guide Shoe, 8rd ST&C or SO 1 - 244.5 mm Float Collar, 8rd ST&C 2 - 244.5 mm Stop Rings 6 - 244.5 mm x 311.2 mm Latch On Bow Spring Centralizers 2 - "Thread-lok" Kit		
b) Placement :	Shoe joint to be assembled with guide shoe on bottom and float collar on top. Secure all threaded connections with "Thread-lok" compound. Centralizers to be placed as follows : - in middle of first joint above float collar over stop ring. - over casing collars of joints #3, 5, & 7. - over casing collar of second last joint in hole to centralize casing in conductor pipe.		
c) Wellhead :	244.5 mm Slip Weld x 279.4 mm 20.7 MPa w/52.4 mm EFSO's (9 - 5/8" x 11" 3000#) 2 - 52.4 mm 20.7 MPa (2-1/16" 3000#) valves with T-37 sour trim. 2 - 52.4 mm 20.7 MPa companion flanges		

SECTION. R**SURFACE CASING - Cementing (FRACMASTER)****Cement Specifications :**

Drilled Hole Size :	311.2 mm
Casing Size & Interval :	244.5 mm, 390 m to surface
Cement Interval :	390 m to surface
Cement Blend :	0 : 1 : 0 Class 'G'
Proposed Additives :	2% CaCl ₂
Mix Water Ratio :	0.440 m ³ /t
Slurry Yield :	0.762 m ³ /t
Slurry Density :	1916 kg/m ³
Thickening Time :	3:50 hr:mins @ 21° BHCT
Comp. Strength ::	2.6 MPa in 8 hrs 4.9 MPa in 12 hrs
Slurry Volume Req'd :	22.69 m ³ (Gauge + 100%)
Cement Volume Req'd :	29.8 tonnes
Mix Water Vol. Req'd.:	13.10 m ³

NOTE: Increased cement volume may be required if severe lost circulation encountered.

Cementing Procedure :

1. Establish free circulation before touching bottom with casing. Circulate a minimum of two bottoms up. Reciprocate casing throughout cement job.
2. Use at least 2.0 m³ preflush of water.
3. Follow wash with cement. Maintain slurry temperature of 15°C (60°F) while mixing. Release closing plug. Do not pump cement from lines.
4. Displace cement with water and volume into place (approx. 15.20 m³ to float collar). Calculate displacement volume on site to actual tally. Casing capacity = 0.040326 m³/m. **DO NOT OVERDISPLACE**
5. Check float for flowback.
6. Ensure casing is true to vertical and maintained so while waiting on cement.
7. Monitor fluid returns throughout mixing and displacement. Report amount of cement returns. If poor or no cement returns are noted at surface, re-cement from top with 25 mm pipe.
8. Send 4 litres of rig water with cementing company so that production cement design can be tested prior to job.

SECTION. S

PRODUCTION CASING - Design Specifications

Setting Depth : 1650 m typical Hole Size : 222.2 mm

Section : 0 - 1650 m
 Tubular Specs. : Size, O.D. : 139.7 mm
 Nom. Wt. : 23.1 kg/m
 Grade : IK-55
 Connection : 8rd, LT&C
 Type - Manu. : ERW - IPSCO
 Connection O. D. : 153.7 mm
 Inside Dia. : 125.7 mm
 Drift Dia. : 122.6 mm
 Conn. Torque : Opt. : 3250 N·M
 Min. : 2430 N·M
 Max. : 4050 N·M
 Collapse Rating : 27860 kPa
 Burst Rating : 33160 kPa
 Body Yield : 110300 daN
 Tensile Rating : 106300 daN

Design Criteria : Drilling fluid density = 1150 kg/m³, 11.28 kPa/m
 Gas Gradient = 2.26 kPa/m
 (ERCB - Collapse Grad. = 12 kPa/m, Burst Grad. = 11 kPa/m)

Collapse Pressure : 18612 kPa
 (19800 kPa)
 CRTRF 0
 (0)
 Reduced Coll. Rating : 27860 kPa
 (27860 kPa)
 Burst Pressure : 14833 kPa
 (18150 kPa)
 Tension Load in Air : 37391 daN
 Tension Load in Fluid : 31782 daN

Allowable Pull (DF = 1.3) 49987 daN

Design Factors : (COGLA values)

Collapse	1.49	(1.40)
Burst	2.23	(1.82)
Tension	3.34	(2.84)

SECTION. S, cont'd

Casing Accessories & Placement :

a) Accessories :

1	-	139.7 mm Float Shoe, 8rd ST&C or slip weld
1	-	139.7 mm Float Collar, 8rd ST&C
2	-	139.7 mm Stop Rings
approx. 6	-	139.7 mm x 222.2 mm Latch on Bow Spring Centralizers.
approx. 10	-	139.7 mm x 222.2 mm Latch on Bow Spring Turbolizers.
approx. 20	-	139.7 mm Scratches, Cable type with integral stop.
2	-	"Thread-lok" Kits

b) Placement :

- (i) Shoe joint to be assembled with float shoe on bottom and float collar on top. Secure threaded connections with "Thread-lok" type compound. Place one centralizer in middle of shoe joint over stop ring.
- (ii) Centralizers to be placed as follows :
 - in middle of first joint above float collar over stop ring.
 - over casing collars of joints #3, 4, 5, 7, & 9.
 - _____ over casing collars spaced evenly and centered over prospective producing intervals with at least 2 above, 3 to 5 turbolizers across, and 2 below the interval :
 - Slave Point to m
 - Sulphur Point to m
 - Keg River to m
- (iii) Scratches to be placed starting 5 m below and at 2 m intervals to 5 m above any prospective producing intervals :
 - Slave Point to m
 - Sulphur Point to m
 - Keg River to m
- (iv) A very short joint should be set aside and run in the casing string about 20 m above each prospective producing zone.

c) Wellhead Equipment :

- (i) Casing Hanger - 279.4 mm x 139.7 mm, with automatic primary seal.

SECTION. T

PRODUCTION CASING - Cementing (FRACMASTER)

Drilled Hole Size :	222.2 mm
Casing Size and Interval :	139.7 mm, ~1650 to 0 m
Minimum Cement Top Required :	to surface casing

Cement Specifications :

Lead Stage Interval :	1200 m to 390 m for 810 m
Cement Blend :	LITE Master + 0.10% Defoamer-3

BHST : 47 °C est	BHCT : 30 °C est
Optimum Density :	1300 kg/m ³ (12.75 kPa/m)
Mix Water Req'd :	0.826 m ³ /t
Slurry Yield :	1.690 m ³ /t
Fluid Loss :	108 ml/30 min.
Thickening Time :	7 hrs : 38 mins @ 30 °C BHCT
Compressive Strength :	3.45 MPa @ 47°C BHST in 20 hrs 3.92 MPa @ 47°C BHST in 24 hrs

Minimum pump rate for turbulent flow is 2.30 m³/min based on 139.7 mm x 222.2 mm annulus. Rate determined from tail-in stage.

Tail-in Stage Interval :	~1650 m to 1200 m for 450 m
Cement Blend :	T-E-L Master + 1.0% CA-2 + 0.15% Defoamer-3

BHST : 47 °C est	BHCT : 30 °C est
Optimum Density :	1741 kg/m ³ (17.07 kPa/m)
Mix Water Req'd :	0.646 m ³ /t
Slurry Yield :	1.003 m ³ /t
Fluid Loss :	24 ml/30 min.
Thickening Time :	4 hrs : 54 mins @ 30 °C BHCT
Compressive Strength :	3.45 MPa @ 47°C BHST in 16 hrs 5.30 MPa @ 47°C BHST in 24 hrs

Minimum pump rate for plug flow is 0.77 m³/min and turbulent flow is 6.87 m³/min based on 139.7 mm x 222.2 mm annulus.

Cement volumes should be calculated using "XY" caliper integration plus 20% excess. Confirm cement program and volumes with Calgary Office.

CEMENTING PROCEDURE

1. Slurry temperature to be approximately 15 °C. Warm mixing water to about 23 °C, if necessary.
2. Tally, drift and visually inspect all casing and accessories. Ensure casing accessories are installed as previously specified in Section S. Run casing in the hole no faster than 45 seconds per joint, and fill casing at regular intervals.
3. Break circulation while running if deemed necessary.

SECTION. T, cont'd

4. After casing is on bottom, circulate a minimum of 2 hole volumes at the same annular velocity as during drilling. Before cementing, decrease mud viscosity and gel strengths to those present while drilling at total depth prior to logging. Have mud man check properties.
5. Use a plug loading head. Run both top and bottom rubber wiper plugs.
6. Reciprocate casing in 3 m strokes prior to and while circulating cement.
7. Manifold cement lines and kelly hose using a "Y" with valves on each arm so that rig pump can take over displacement, if necessary. A standby cementing unit should be on the lease and piped in. Pressure test all cementing lines to 21 MPa prior to cementing.
8. Drop bottom wiper plug and preflush with 1.60 m³ water. Run 3.0 m³ (150 m of annular volume) of 1200 Kg/m³ scavenger slurry (approximately 1.8 t) with the same cement blend as the lead slurry.
9. Run lead and tail in cement as per specifications above.
10. Drop top wiper plug and pump out lines. Displace cement with fresh water at a maximum rate of 0.77 m³/min for plug flow. Approximate displacement volume is 20.48 m³. Recalculate based on casing capacity of 0.012416 m³/m and actual casing tally.
11. Reduce displacement rate to 0.5 m³/min. prior to bumping plug. Bump plug with 3500 kPa over displacement pressure.
12. Hold pressure for 3 minutes after plug has been landed, then bleed off pressure and check to ensure floats are holding.
If float equipment does not hold, re-pressure to 1000 kPa over displacement pressure and close valve on head. Install pressure gauge. Monitor and maintain this pressure as required while waiting on cement for 8 hours.
13. Set casing slips and ensure they are properly seated. Cut off casing as high as possible above casing head flange. Cover casing stub with temporary cap.