Information Request No. 3

Auroral Training Well G-04 Abandonment

ACW-2023-AC-G-04-WID1915

3.1 Type, Class, and Rating of Equipment

Request:

Submit an updated Abandonment Program that describes the type, class, and rating of well servicing and well control equipment to be used during the operation.

Response

Please see attached Aurora College Training WellG-04 Well Abandonment Program Revision2 May 31, 2023.

3.2 Cementing During Abandonment

Request:

Please submit an updated Abandonment Program that meets the requirements of section 6A of the *Well Suspension and Abandonment Guidelines and Interpretation Notes* for cementing during abandonment.

Response
Please see attached Aurora College Training WellG-04 Well Abandonment Program Revision2 May 31, 2023.

Aurora Training Well G-04 Abandonment Program
Revision 2, May 2023

Date: May 31, 2023	**AFE No: TBD**
	AFE Amount:
Type of Program:	Routine Abandonment
Location:	Unit G-04 Grid Area 68 30 – 133 30

Objective: Surface Abandonment - Cut and Cap

Aurora College drilled the Aurora Training Well G-04 to provide a training facility in the town site of Inuvik that would be used for. training of Northwest Territories residents in safe oilfield practices. Stakeholders from Inuvik, PITS, CAPP, Aurora College and Akita Drilling were in support of the test well. Aurora College approached stakeholders in the oil and gas industry and government and received wholehearted support from all groups.

The 400 meter well was spudded on July 30, 2001 and was completed on August 4, 2001
The drilling contractor was Akita Equtak based out of Inuvik. Akita Equtak was a· joint venture between the Inuvialuit Regional Corporation and Akita Drilling Ltd. The drilling rig used was Akita Rig # 15, the rig was rated to drill to 2000 meters.

The well was drilled on a site located within the town boundaries of Inuvik on Lot # 1001, Quad 107 Bn LTO 1227. The lot was leased to Aurora College for a ten (10) year period by the Municipal Corporation of the town of Inuvik for the training facility.

Akita Rig #15 was moved onto the location on 7129/01following the setting of a 406 mm refrigerated conductor to a depth of 16 meters. The conductor casing was cemented with good mud and cement returns throughout the job with cement to surface. The diverter was nippled up and pressure tested, as was the remainder of the well control equipment.
The refrigeration unit was run continuously until the 244 mm permafrost casing was set at 155 meters. No evidence of permafrost was seen, and the mud cooler was not run for the main section of the well.

The conductor shoe was drilled out with a 311 mm bit and the 311 mm surface hole was control drilled to 155 meters at a penetration rate of 15 m/hr. The permafrost protection string made up of 11 joints of Siderco 244 mm, 71.62 kg/m, DST 80 LT, BT&C casing was run to 155 meters and cemented with 13 tonnes of permafrost cement. The casing was rotated and reciprocated during cementing and good cement returns, approximately 0.5 m^3, were circulated out at surface. The plug was bumped with 3000 kPa and the pressure held. The plug was down at 0522 on 8/1/01.

The BOP's were installed and the annular preventor pressure tested to 1400 and 10,000 kPa. The pipe rams, HCR, Choke manifold, kelly cock, stabbing valve, and kill lines were all tested to 1400 kPa and 10,000 kPa high. All equipment tested with no bleed off seen.

The float collar and shoe were drilled out on 8/1/2001. A formation leak off test was not done due to the soft formation and 18 kPa/m was used for all well control calculations. The 216 mm hole was drilled from 155 meters to 340 meters without incident. At 340' meters, the penetration rate slowed from 10 meters/hr to approximately 5 to 6 meters /hr. Bit # 2 was tripped out at 349 meters and Bit # 3 run in. Bit # 3 drilled from 349 meters to 401 meters at 5.1 m/hr.

After total depth was reached at 401 meters, Schlumberger logged the open hole. One log run was made, and the following logs obtained from 401 m to 155 m: Temperature Log, Platform Express Array. Induction - SP, Platform Express Compensated Neutron- LithoDensity, and a caliper-cement volume log.

Following the log run, a wiper trip was made in preparation for· running casing. Thirty (30) Joints of Siderco 178 mm, 47.62 kg/m, DST - 80 LT, BT&C casing was run to 397.5 meters. The casing was rotated and reciprocated while cementing and was cemented with 9 tonnes of permafrost cement with good cement returns to surface. The plug was bumped with 5000 kPa at 0930 on 8/4/01.

The rig was released at 1200 hours on 8/4/01 *for* use as the training facility. Aurora College in conjunction with PITS conducted 4 introductory courses for floor hands and 76 personnel from the Northwest Territories successfully completed the course. Akita Rig #15 was released by Aurora College on 8/25/01 at the completion of the floor hand training courses. The well was suspended with a FMC wellhead installed on the 178 mm casing to facilitate a service rig training course. The service rig training course started 08/30/01 and was completed 09/8/01.

Scope of Proposed Surface Abandonment Program

In early August 2023, Contractor equipment will be moved onto the Aurora College Training Well G-04 location to conduct a routine surface abandonment of the well. The integrity of the existing casing will be confirmed by running a cement evaluation log on wireline and pressure testing the casing as per OROGO's Well Suspension and Abandonment Guidelines and Interpretation Notes.

A bulldozer and an excavator will be used to excavate around the casing to a depth of about two meters below ground level to provide access for cutting off the casing strings. The conductor casing, surface casing and production casing will be cut by a certified welder. Once the casing is cut, the wellhead and cut of casing will be removed using either the excavator or a picker truck. A vented cap will then be installed, and the cellar backfilled using the material on site that was previously excavated. After completing the cut and cap operation, the abandoned well will be marked with a durable post and signage that meets the requirements of the OROGO Well Suspension and Abandonment Guidelines and Interpretation Notes. The signage will be located one meter north of the abandoned well and cemented in the ground.

Location Co-ordinates:

Latitude	68 ^{0} 23’25.9 N	Longitude	133 ^{0} 045' 42.7' N		

Casing Design:

	Depth (m)	Size (mm)	Weight (kg/m)	Grade	Couplings
Surface	155	244.5	71.62	DST 80	BTC
Production	397.5	177.8	47.62	DST 80	BTC

Elevations:

TD	401.0 m KB	GL	20.21 m	PBTD	397.5 m KB

Tubular Data:

	Production Casing	Work string	Tubing
Size OD (mm)	177.8	N/A	N/A
Weight (kg/m)	47.62		
Grade	DST 80		
Drift ID (mm)	151.6		
Capacity (m^3/m)	0.0188		
Collapse (kPa)	59366		
Burst (kPa)	62469		
Joint Strength (daN)	35900		

Geological Horizons:

	Subsea Depth (m)	Measured Depth	TVD. (m) (Est.)
KB		25.3	
GL		20.2	
TD		401	
PBTD		397.5	
SURFACE CSG		155	
PRODUCTION		397.5	
PERFS (open)		N/A	
PERFS (abandoned)		N/A	

Note: MD & TVD are based on original KB elevation of 25.3 m.

PROGRAM

Cut and Cap Procedures

The abandonment and equipment removal procedure for Aurora College Training well G-04 is planned as follows:

1. Read and record SIP(s). Check and monitor LEL and H2S levels at wellhead and investigate for evidence of gas migration at surface. Examine surface casing vent for blow or suction. Record and report findings. If present, stop work and hold a safety meeting to review working procedures. If required, contact the Calgary office for further direction. Proceed with work only when conditions are able to be managed safely.

2. Move in pressure test truck and rig into wellhead. Pressure test casing string to 7000 kPa and record all pressures. Hold pressure for 10 minutes. A successful pressure test will require that pressure declines less than 10% over the 10 minutes.

3. Move in e-line logging truck and rig up lubricator on top of wellhead. Pressure test lubricator with N_2. Run cement evaluation tool and log from plugged back total depth to surface. Rig out loggers.

4. Review the cement evaluation log to confirm that all potable water zones penetrated and cased off by the 177.88 mm casing are isolated. Confirm cement exists between the 177.8 mm casing and surface casing that will be a pressure seal.

5. Move in and rig up swabbing unit and support equipment. Remove well cap on wellhead above master valve and rig in swabbing lubricator. Pressure test lubricator to 7000 kPa.

6. Run in hole to about 50 meters depth with swab mandrel and cups and pull test swab. Flow swabbed fluid back to storage tank. Adjust depth of swab pulled based on fluid flowback. Swab well down as far as possible. Record total volume removed. Total wellbore volume = 7.45 m^3

7. Fluid from well should be pumped from storage tank to an identified tank that can be transported to an approved wastewater disposal site as described in the waste management plan. Plastic totes with a 1m^3 capacity may be the simplest solution for storage and transport.

8. Refill well with fresh water from Inuvik water system.

9. Rig out swab equipment. Replace well cap on wellhead.

10. If cement evaluation is positive, move to Step 11 of Program. If cement evaluation indicates that hydraulic isolation does not exist, proceed with Contingency plan.

11. Proceed with cut and cap program.

12. Move in 'B'-ticket welder and backhoe. If required, depending on ground conditions, a dozer may be required to assist in the excavation.

13. Remove all plugs and function test all wellhead valves to confirm there is no pressure built up in the wellhead or casing. Disassemble the SCV piping assembly and visually inspect that the vent is not plugged with cement or other debris.

14. Review corporate ground disturbance package and policies with all on-site personnel prior to commencing excavation around the wellhead. Excavate a 6.0m x 2.5m bell hole around the wellhead ensuring that walls of the bell hole are properly sloped for safe entry and egress and to prevent sloughing in. Check and monitor LEL and H2S levels and investigate for evidence of gas migration.

15. While exercising caution, weld cut a small hole about 30 cm below the surface casing bowl and investigate for trapped gas and fluids. Check and monitor LEL and H_2S levels. **With closed hooks and shackles, connect backhoe bucket to wellhead and pull into tension slightly more than the weight of the wellhead**.

16. Cut the conductor casing and remove as long a section as possible to expose the surface casing string.

17. Cut off the casing strings so that the top of the cut and capped casings will be a minimum of 1.5 meters below the surveyed ground elevation.

18. Weld cut three (3) windows in the surface casing to access the innermost casing string ensuring that 50% of the circumferential metal remains to prevent possible collapse of the surface casing from the weight of the wellhead. While exercising caution, weld cut the innermost string.

    NOTE: Innermost string should not drop as it is cemented full length. Be aware that it could drop once completely cut. Do not place pry bars, hands or fingers in the windows.

19. Complete weld cut of the surface casing, lift and remove wellhead from bellhole with backhoe.

20. Fabricate the protective cap and slip-on collar (A wedding cake style cap is desired).

21 Dress the casing stubs. Install and seal weld a 12.7 mm steel plate "donut" and vent assembly over the surface casing and production casing annulus and install the previously fabricated steel plate and vent assembly over the inner most casing string.

22. Install and weld the Protective Cap to the surface casing.

23. Install and weld a steel rod extension 2.5 metres long on to a plate. Weld a plate to the top of the rod at a 45-degree angle. Install the rod/plate assembly at a depth of 1 metre below ground level. The rod /plate is to be located 1 metre due north of the well center.

24. The rod/plate assembly is to extend to 1.5 metres above surface and the well location is to be weld inscribed on the steel plate. Document the cut and cap details on the Daily Report and take a digital photograph of the assembly.

25. Backfill and compact the excavation. Ensure that fill is mounded over the excavation toa sufficient height to prevent excessive subsidence and pooling of water over the excavation

26. Clean up lease and rig out and release all services.

Aurora College Training Well G-04 Remedial Cementing

This operation will occur if the cement bond log indicates that hydraulic isolation des not exist over the 177.8 mm casing or if the casing will not pressure test.

1. Move in and rig up Service rig c/w pump tank, BOP's etc. Conduct a service rig inspection prior to conducting any further work n the location. Conduct a safety meeting with all personnel to review cement squeeze operations.

2. Remover upper section of wellhead at the upper 7 1/16" flange, Rig in pre pressure tested BOP's, pressure test the flange connection to 7000kPa.

3. Move in wireline equipment and rig up above BOP's. Pick up lubricator.

4. If a cement squeeze is required, proceed as follows:

5. Make up wireline conveyed perforating guns and RIH and perforate just above the last hydraulically isolated interval. Depth for perforating will be confirmed with CPE Calgary prior to perforating.

6. Set retainer on wireline about 5 meters above perforated interval.

7. Pick up and RIH to the retainer with tubing and establish feed rate or pressure test.

8. If the perforations pressure test to 7000 Kpa for 10 minutes. If the pressure test holds POH and circulate 15 or more vertical meters of cement on the retainer. Rig out wireline and service rig and release these services.

   If a feed rate can be established, then proceed as follows:

9. If circulation to surface is obtained cement must be pumped to surface. Following cementing the retainer must be capped with 15 m of cement.

10. If the perforations take fluid, and a feed rate can be established conduct a cement squeeze using the retainer. Adjust the volume and blend after discussions with Calgary and a Service Provider.

11. If circulation to surface is not successful, attempt must be made to establish a feed rate, if a feed rate can be established a cement squeeze must be conducted.

    Note: Formation fracture pressure is estimated using 18 kPa/m for gradient. Cement density is greater than overburden density. Pressure that can be exerted on formation is low before fracturing occurs so consult with Calgary office on maximum squeeze pressure that must not be exceeded.

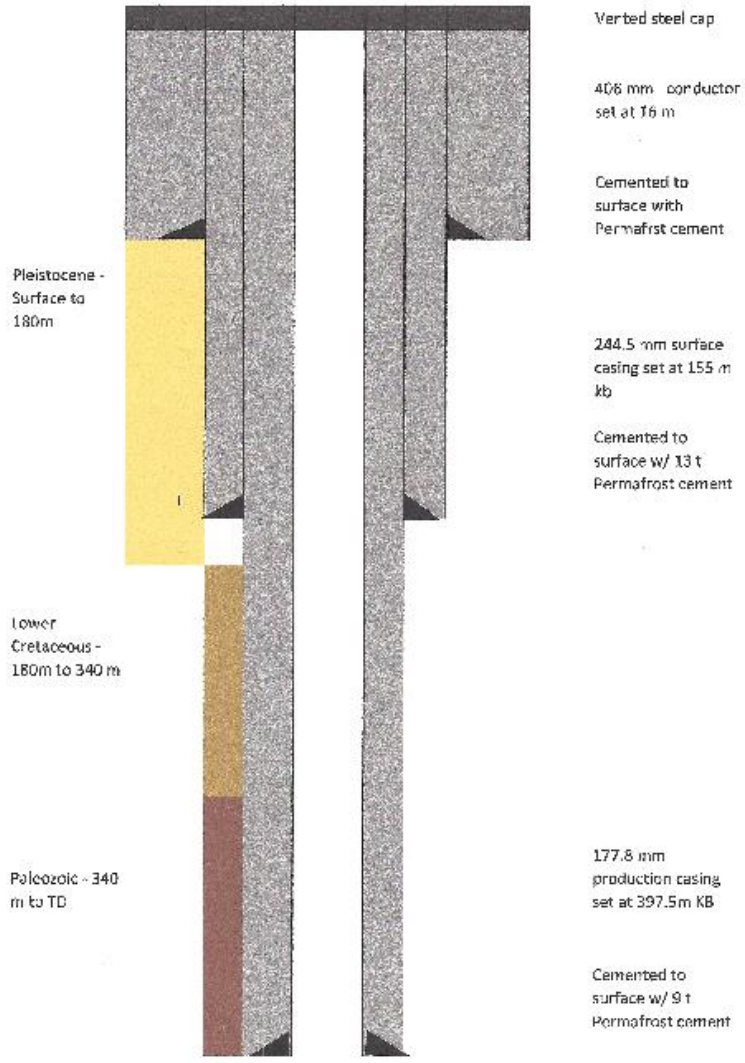
12. Post cementing the retainer must be pressure tested and capped with 15 linear meters of cement.

13. If a casing issue is indicated by a lack of pressure integrity, then RIH with a test packer and isolate the point of casing damage. Establish a feed rate and check for circulation to surface.

14. If circulation to surface is established, then the annulus from the point of damage to surface should be cemented.

15. Set a bridge plug and top the bridge plug with a cement plug in the casing that covers the damage with its top at least 10 meters above the bridge plug.

Wellbore After Cut and Cap Operation



Regulatory and Other

Well abandonment procedures and gas migration testing will comply with OROGO (NWT Office of the Oil and Gas Regulator Operations) Well Suspension and Abandonment Guidelines and Interpretation Notes and with Section 6 of the Oil and Gas Drilling and Production Regulations (OGDPR).

1. All safety practices followed by Canadian Petroleum Engineering must be adhered to while on the lease.
2. Ensure a copy of the CPE Emergency Response Plan is on lease at all times and has been reviewed by all personnel related to the supervision of the abandonment.
3. When recording shut in tubing and casing pressures at the wellhead, use either a recently calibrated test gauge or a deadweight measurement instrument.
4. Prior to moving equipment on location, take necessary steps to ensure the lease and access road are in acceptable condition.
5. Fax or email daily workover /completion reports to Lorne Hammer and Ron McCosh at (403) 233-0859, email lhammer@cpe.ab.ca

Safety

A safety meeting is to be held with all service company personnel prior to each job.

Wellsite supervisor must notify Contractors of known hazards of which Contractor(s) may be unaware. Wellsite supervisor must ensure that workers are aware of their responsibilities and duties under OH&S regulations and that the workers comply with regulations. All service companies supplying materials will review Material Safety Data Sheets at this meeting for all products supplied and maintain these Material Safety Data Sheets available for worker's examination on location in compliance with WHIMIS regulations. All safety meetings will be recorded on the CPE daily report and on the daily tour sheet.

ENGINEERING AND OPERATIONS CONTACTS

Position	Name	Telephone	Number	EMail
Project Manager	Lorne Hammer	Office	403-263-0752	lhammer@cpe.ab.ca
		Cellular		
Completions Superintendent	Ron McCosh	Office	403-263-0752	rmccosh@cpe.ab.ca
		Cellular		
Completions Supervisor	TBD	Cellular		
Aurora College	Jonathon Michel	Office	867-777-7878	Jmichel@auroracollege.nt.ca

EMERGENCY RESPONSE CONTACTS

Position	Name	Location	Telephone	Email
Orogo Executive Director	Ms. Pauline De Jong	Yellowknife	1(867) 767-9097	Pauline_DeJong@gov.nt.ca
Chief Safety Officer	Michael Martin	Yellowknife	1(867) 446-2235	Mike_Martin@gov.nt.ca
Inuvik Regional Hospital		Inuvik	1(867) 678-8000	
Inuvik RCMP		Inuvik	1(867)777-1111	GDIV_INUVIK_DETACHMENT@rcmp-grc.gc.ca
Inuvik Fire Department		Inuvik	1(867)777-2222	
OROGO Incident Report Line			1(867) 445-8551	
NWT Spill Reporting Line			1(867) 920-8130	
GNWT OH&S			1(867) 920-3888	

Gas Migration Testing

Gas migration testing has to be conducted to ensure the safety of workers conducting the abandonment and to ensure that downhole problems do not exist with the well. Gas Migration testing can only take place when ground is not frozen. Gas Migration testing for the Aurora College G-04 well will be conducted in early August 2023.

These procedures are based upon AER Directive 20 – Well Abandonment (Appendix 2 – Suggested Procedures for Gas migration Testing)

Testing is to be done only in frost-free months. Periods immediately after a rainfall must be avoided.

If less than full-scale readings are obtained, the soil horizon should be examined to ensure that readings are not the result of contaminated soils due to spills of diesel fuel, solvents, oil, etc. If contaminated soils are suspected, retesting is recommended.
Instrumentation should be calibrated regularly and checked daily when in use.
Sample testing points are to be selected to ensure that potential gas migration is detected.

Recommended Test Point Locations
• two within 30 cm of wellbore on opposite sides
• at 5 m intervals outward from the wellbore every 90° (a cross with the wellbore at centre) to a distance of 20 m

Recommended Equipment
• equipment capable of penetrating a minimum of 50 cm deep and a maximum of 64 millimetres (mm) in diameter
• calibrated explosion meter or other instrument capable of detecting hydrocarbon at 1 per cent lower explosive limit (LEL)
- Gas detector capable of reading to 2 ppm methane

• equipment or material to seal hole at surface while soil gases are being evacuated from the soil through the instrument

Testing Procedures
• Perform instrument check (calibration, voltage, zero, etc.).
• Make a hole a minimum of 50 cm deep.
• Isolate the hole from atmospheric contaminations.
• Insert hose, wand, or other equipment a minimum of 30 cm into hole, maintaining a seal at surface to prevent atmospheric gas and soil gas mixing.
• Withdraw soil gas sample. The volume, rate, etc., will depend on the instrumentation being used. Ensure that a sufficient sample is removed to purge lines and instrumentation.
• Record observations.
• Purge instrument and lines

Program Schedule

	2022	2023					
	December	January	Feb - May	June	July	August	September
Activity							
Submit OA Application	9						
Submit ACW Application	15						
IR responses		1 - 31	All	1 - 30			
Receive Approvals to proceed					1		
Well Abandonment Op'ns					31		
Gas Migration Testing					8		
Pressure test csg& whd					9		
Cement Evaluation log						11	
Replace wellbore fluid						13	
Excavate around wellhead						14	
Cut & Cap well						15	
Level well site						16	

Class 1 Service Rig Specifications

The Aurora College Training Well G-04 well abandonment may require that a service rig conduct down hole remediation operations. The well conditions are such that a Class 1 Service rig meets the requirements to conduct this work. The following equipment list provides an overview of a Class 1 Service Rig.

SERVICE RIGS Class 1 - Stiff Mast

- 2008 or newer CCM mobile free standing rig
- 500 HP 60 series Detroit Diesel power unit
- 72’ Derrick (21.9m) 140,000 lbs/62 300 DaN hook load
- RG 38” X 8” with disc brake & sand line drum
- 22 Gallon Class II BOP system
- 60.3 mm and 70 mm handling systems
- 24.4 mm rod handling equipment up to 25.1 mm rod handling equipment

Pump Truck

- Western Star 500 HP
- E-300 horizontal triplex 5” X 6” (5000psi)
- 5 valve manifold system
- 28m3 dual compartment tank
- Integrated degasser & trough
- Portable manlift system for tank entry

Equipment Truck

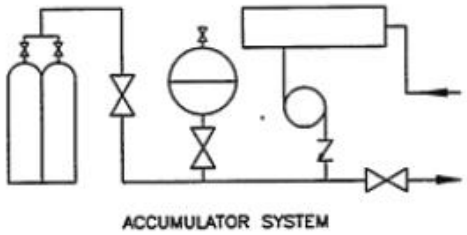
- Equipment truck is enclosed
- BOP slide system
- Testing stump

Doghouse

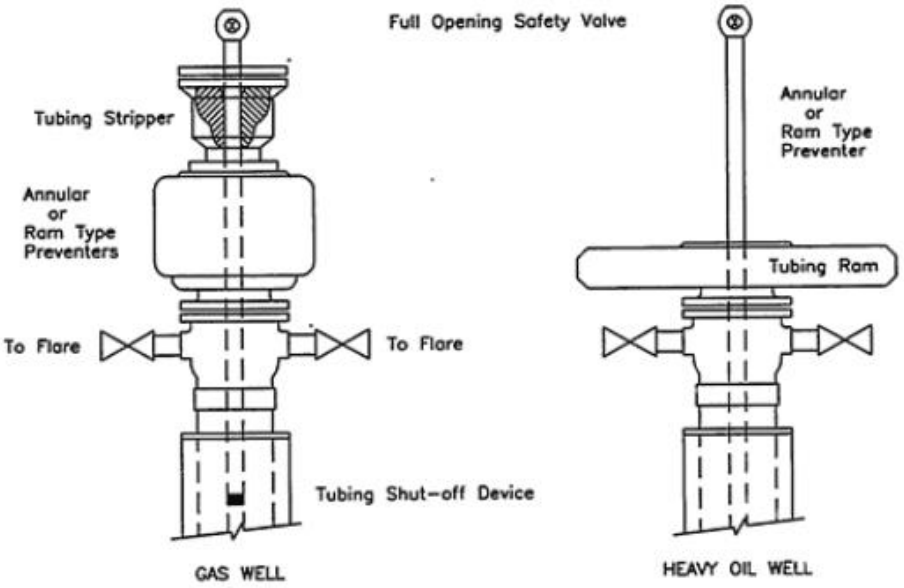
- 30’ doghouse with integrated 30 kW generator

Class 1 BOP Requirements

REFERRED TO IN SECTION 8.144 OF THE OIL AND GAS CONSERVATION REGULATIONS
SERVICING BLOWOUT PREVENTIONS SYSTEMS - CLASS I
RESERVOIR PRESSURE LESS THAN 5500 kPa AND NO H_2S PRESENT



ACCUMULATOR SYSTEM



NOTE:
1. Well is not killed.
2. A tubing and blind ram blowout preventer unit may be used in lieu of an annular preventer (position of rams may be interchanged).
3. The tubing stripper may be located below the blowout preventer(s) provided it is an integral part of the wellhead.
4. Two Flare Lines - minimum diameter 50mm, or
   One Flare Line - minimum diameter 75mm, extending 50m from well.