

**MINIMUM BLOWOUT PREVENTER EQUIPMENT REQUIREMENTS**  
**(ATTACHMENT O. \_\_\_\_\_ TO BID SHEET AND WELL SPECIFICATIONS)**

3000 PSI WORKING PRESSURE

TO BE INSTALLED AFTER SETTING 13 3/8 INCH CASING

Contractor or Pzl to furnish items checked (X). See attached drawing

No.	Item	Min. Size	Type	Press. Rating	Furnished By	
					Contr.	Pzl.
1.	Flow Line	8"	Weld	125	X	
2.	Fill Up Line	2"	Thd or Weld	125	X	
3.	Bell Nipple	12"	Weld	125	X	
4.	Rotating Head					
5.	Hydraulically Operated Gate Valve					
6.	Bleed Line					
7.	Bag Preventer	12"	Flanged	3000	X	
8.	Hydraulically Operated Ram Preventer					
9.	Drilling Spool with <u>2</u> in. and <u>2</u> in. Side Outlets	12"	Flanged	3000	X	
10.	Preventers Side Outlets <u>      </u> in. and <u>      </u> in. Use as alternate to No. 9 above.					
11.	Gate Valve	2"	Flanged	3000	X	
12.	Hydraulically Operated Gate Valve (HCR Valve)					
13.	Line to Choke Manifold	2"	Flanged	3000	X	
14.	Gate Valve	2"	Flanged	3000	X	
15.	Hydraulically Operated Gate Valve					
16.	Check Valve					
17.	Drilling Spool with <u>      </u> in. and <u>      </u> in. Side outlets					
18.	Preventer Side Outlets <u>      </u> in. and <u>      </u> in.					
19.	Gate Valve					
20.	Hydraulically Operated Gate Valve					
21.	Relief Line					
22.	Wear Flange or Bushing					
23.	Kill Line to accessible location approx. <u>      </u> ft. from rig. (MINIMUM DISTANCE)					
24.	Gate Valve					
25.	Kill Line to rig pump manifold	2"	Flanged	3000	X	
26.	<u>      </u> Way Cross, <u>      </u> in. x <u>      </u> in. x <u>      </u> in. x <u>      </u> in.					
27.	Tee, <u>      </u> in. x <u>      </u> in. x <u>      </u> in.					
28.	Bull Plug					
29.	Casing Spool					
30.	Gate Valve					
31.	Casing Spool					
32.	Gate Valve					
33.	Pressure Gauge					
34.	Casing Head					
35.	Gate Valve					
36.	Gate Valve					

Line sizes to be inside diameter.

Valves, spools and preventers sizes to be bore dimension.

**EXHIBIT F**

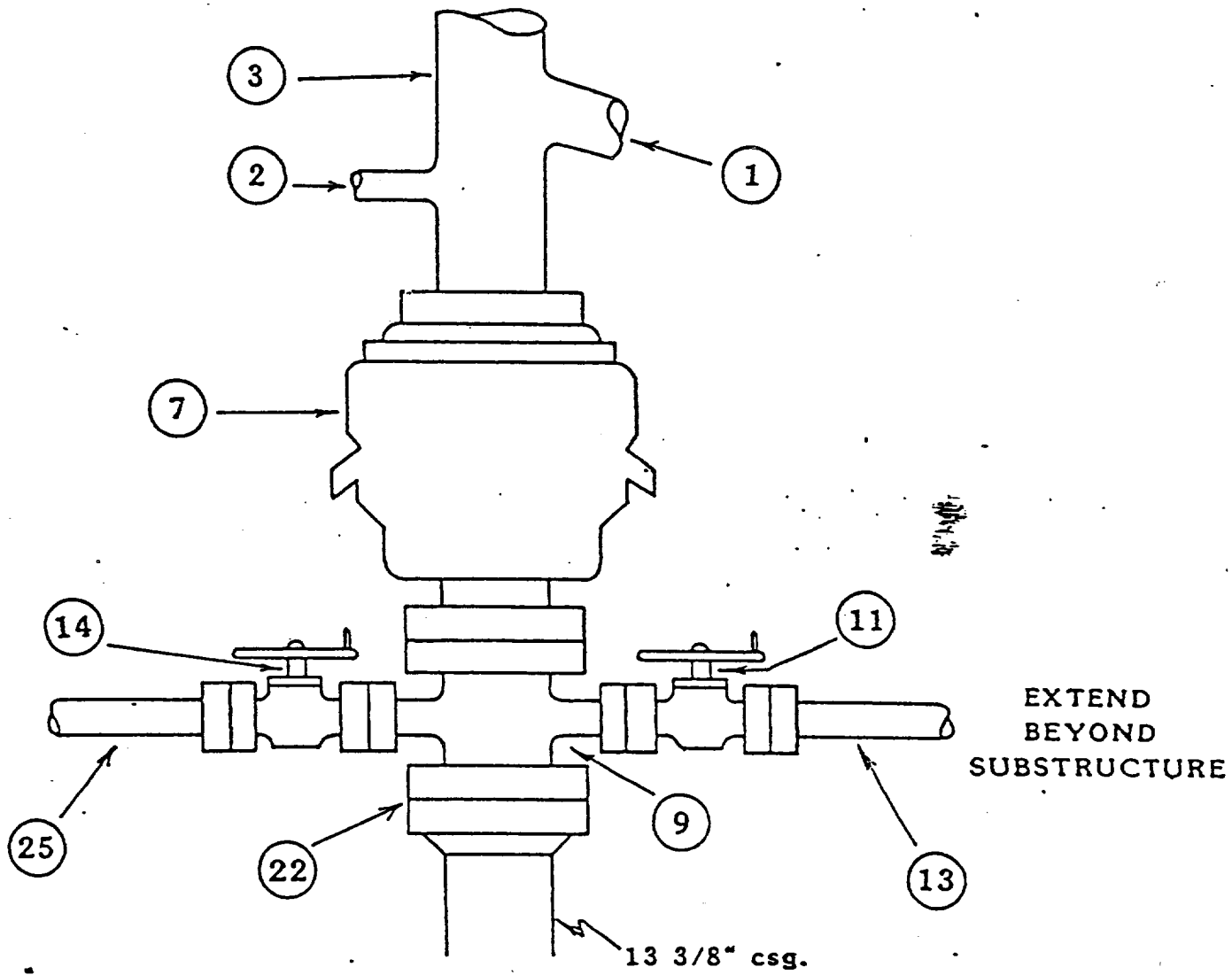
Item	Furnished By	
	Contr.	Pzl
Automatic Accumulator and Master Control. See below for details.	X	
Remote set of closing unit controls with <u>2</u> stations.	X	
Bag Preventer Pressure Regulating Control Valve on remote station	X	
Kelly Cocks: Upper - Make _____ Press. Rating <u>3000 Full Opening</u>	X	
Lower - Make _____ Press. Rating <u>3000 Full Opening</u>	X	
Inside Blowout Preventer: Gray/Shaffer _____ PSI WP		
Drop-In (Hydrill) _____ PSI WP		
Full Opening Ball Valve for each size drill pipe in use (Extra Lower Kelly Valves) <u>3000</u> PSI WP (Full Opening)	X	
Circulating Head for each type and size of tool joint in use		
_____ Ft. of 2 in. steel hose (Chickson) _____ PSI WP		
Blind/Shear Rams		

**ACCUMULATOR AND MASTER CONTROL  
SPECIFICATIONS**

REQUIREMENTS CHECKED (X) SHALL APPLY:

X	Item
X	Accumulator Volume <u>80</u> gal., <u>3000</u> PSI WP Unit
X	Power for Pumps: Air X Air and Electric
X	Sufficient Capacity to Recharge Complete Unit in 6 Minutes Pumps Capacity _____ Gal/Min. at _____ PSI
X	Number of Control Valves Required (at least <u>3</u> for rig floor and remote units)
X	Pressure Regulator Valve to control pressure on bag preventer
X	Control Valves on both Master and Remote Control properly labeled with name of respective function and open and closed clearly marked.
X	Blind Ram control on both Master and Remote Control protected to avoid accidental activation. These control handles are not to be locked in position, however, as this could prevent activation from the remote station.
X	Hydraulic Lines from Accumulator to Hydraulic Device to be <u>0.9</u> in. minimum ID and have <u>3000</u> PSI minimum working pressure.
X	Pressure Gauges showing accumulator pressure, manifold pressure, pressure on bag preventer and air supply pressure on both master and remote control stations.
	Bottled Nitrogen _____ Bottles _____ ft. each at _____ PSI manifold to bypass accumulator and operate BOP directly.

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**MINIMUM BLOWOUT PREVENTER EQUIPMENT REQUIREMENTS**  
**(ATTACHMENT \_\_\_\_\_ TO BID SHEET AND WELL SPECIFICATIONS)**  
**\_\_\_\_\_ 3000 PSI WORKING PRESSURE**

**TO BE INSTALLED AFTER SETTING 8 5/8 INCH CASING**  
**Contractor or Pzl to furnish items checked (X). See attached drawing**

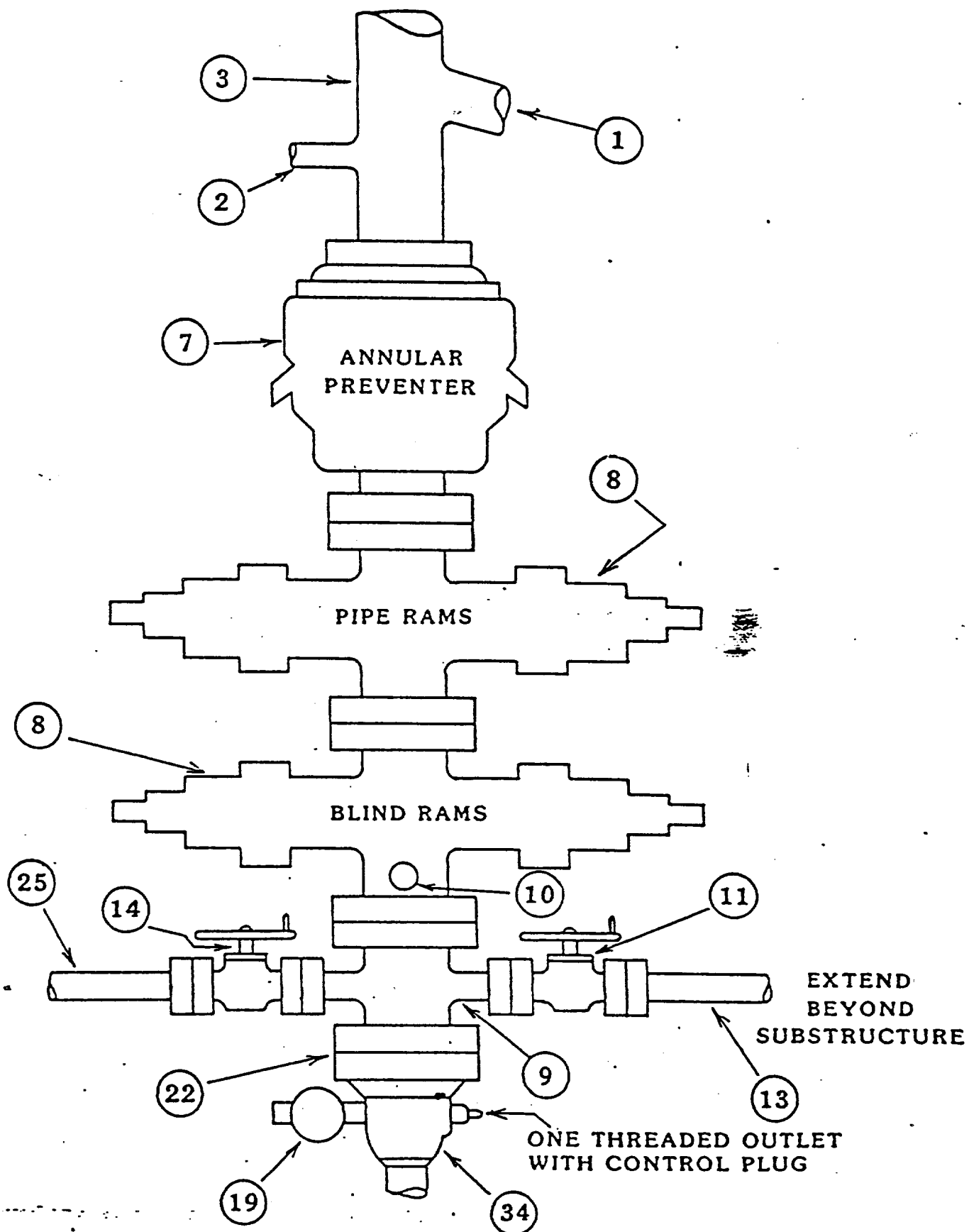
No.	Item	Min. Size	Type	Press. Rating	Furnished By	
					Contr.	Pzl.
1.	Flow Line	8"	Weld	125	X	
2.	Fill Up Line	2"	Thd or Weld	125	X	
3.	Ball Nipple	6"	Weld	125	X	
4.	Rotating Head					
5.	Hydraulically Operated Gate Valve					
6.	Bleed Line					
7.	Bag Preventer	8"	Flanged	3000	X	
8.	Hydraulically Operated Ram Preventer					
9.	Drilling Spool with _____ 2 in. and _____ 2 in. Side Outlets	8"	Flanged	3000	X	
10.	Preventers Side Outlets _____ 2 in. and _____ 2 in. Use as alternate to No. 9 above.	8"	Flanged	3000	X	
11.	Gate Valve	2"	Flanged	3000	X	
12.	Hydraulically Operated Gate Valve (HCR Valve)					
13.	Line to Choke Manifold	2"	Flanged	3000	X	
14.	Gate Valve	2"	Flanged	3000	X	
15.	Hydraulically Operated Gate Valve					
16.	Check Valve					
17.	Drilling Spool with _____ in. and _____ in. Side outlets					
18.	Preventer Side Outlets _____ in. and _____ in.					
19.	Gate Valve	2"	Flanged	3000 <del>psi</del>		X
20.	Hydraulically Operated Gate Valve					
21.	Relief Line					
22.	Wear Flange or Bushing					
23.	Kill Line to accessible location approx. _____ ft. from rig. (MINIMUM DISTANCE)					
24.	Gate Valve					
25.	Kill Line to rig pump manifold	2"	Flanged	3000	X	
26.	_____ Way Cross, _____ in. x _____ in. x _____ in. x _____ in.					
27.	Tee, _____ in. x _____ in. x _____ in.					
28.	Bull Plug					
29.	Casing Spool					
30.	Gate Valve					
31.	Casing Spool					
32.	Gate Valve					
33.	Pressure Gauge					
34.	Casing Head	8"	Flanged	3000		X
35.	Gate Valve					
36.	Gate Valve					

Line sizes to be inside diameter.

Valves, spools and preventers sizes to be bore dimension.

**EXHIBIT G**

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GENERAL EQUIPMENT SPECIFICATIONS & INSTALLATION INSTRUCTIONS

1. All connections on the BOP stack shall be flanged or bolted ring clamp of comparable rating.
2. Flanges to be API 6B or 6BX and ring gaskets shall be API RX or BX.
3. All drilling spools are to be forged steel construction. Spools constructed from pipe are not acceptable.
4. The fill-up line shall not be connected to any side outlet below the uppermost preventer.
5. Replacement parts for the BOP equipment shall be obtained from the original manufacturer.
6. BOP stack shall be properly braced to rig substructure by turnbuckled lines or rods.
7. Connections on the kill line, choke lines and choke manifold:
  - ☒ May be threaded, welded, flanged or bolted ring clamp.
  - ☐ Shall be either flanged or bolted ring clamp of comparable rating.
8. All gate valves must be equipped with hand wheels.
9. Choke and kill lines are to be seamless steel pipe having a minimum working pressure that is based on 80% of the API minimum internal yield pressure rating of that pipe.
10. The kill line shall not be used as a fill-up line.
11. All choke lines must be as straight as possible with no abrupt bends or turns.
12. All choke lines are to be securely anchored.
13. Steel hose (chicksons) are not to be used in any part of the choke manifold.
14. The accumulator unit and master set of controls shall be located at ground level, a minimum of 75 ft. from the wellbore. The remote set of controls is to be located near the drillers position on the rig floor.
15. All hydraulic lines between the accumulator and any hydraulically operated device shall be of seamless steel pipe and swing joints. Rubber hoses are not permitted. Short lengths of high pressure hose are permitted in lines connecting the remote station to the valve actuating cylinders on the master control unit.



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16. Housing and heating should be provided for accumulator, blowout preventers and choke manifold where conditions warrant.
17. All drill string blowout prevention equipment must be maintained in good operating condition and stored in an orderly condition on the rig floor.
18. Operating wrenches for the drill string BOP equipment are to be kept in full view near the driller's position.
19. Contractor to make no connection to casing head side outlets except by orders of PZL.
20. Keep on rig:
  - (a) One spare set of pipe rams, complete with packing rubbers for each size of drill pipe in use.
  - (b) Replacement parts for all manual adjustable chokes along with the necessary tools for changing parts.
21. When a rotating head is in use on the BOP stack, dresser sleeve connections in the flowline are not permitted.
22. Hand wheels and extensions (outside the substructure) shall be installed for operating the locking screws on all ram preventers and hydraulically operated gate valves on the choke and kill lines. If the installation of these extensions create a safety hazard or for some avoidable reason cannot be properly installed, a hand crank or wrench should be readily available to operate the locking screws.
23. When a wear bushing is required, only the lock-in type shall be used.
24. Waterlines and valves shall be connected and ready for use on all internal combustion engine exhausts.
25. The cellar is to be kept jettied and the preventer stack and choke manifold washed down at all times.
26. All valves are to be lubricated at regular intervals.
27. All valves are to be clearly identified as being open or closed.
28. Proper alignment of the rig with the center line or the BOP stack and casing shall be maintained at all times.
29. All flange bolts on the stack, kill line and choke manifold should be tightened at least once each week.

CHECKLIST AND DRAWING  
**MINIMUM CHOKER MANIFOLD EQUIPMENT REQUIREMENTS**  
 (ATTACHMENT NO.      TO BID SHEET AND WELL SPECIFICATIONS)  
3000 PSI WORKING PRESSURE  
 TO BE INSTALLED AFTER SETTING 8 5/8 INCH CASING  
 Contractor or Pzl to furnish items checked (X). See attached drawing.

No.	Item	Min. Size	Type	Press. Rating	Furnished By	
					Contr.	Pzl.
1.	Choke Line from BOP stock (same as Item No. 13 on Attachment 2)	2"	Weld or Flanged	3000	X	
2.	4 Way Cross, in. x in. x in. x in.	2"	Flanged	3000	X	
3.	Gate Valve	1 13/16"	Flanged	3000	X	
4.	Pressure Sensor					
5.	Pressure Gauge	1"	Threaded	3000	X	
6.	Gate Valve	2"	Flanged	3000	X	
7.	Gate Valve	2"	Flanged	3000	X	
8.	Gate Valve	2"	Flanged	3000	X	
9.	Tee x in. x in. x in.					
10.	Way Cross, in. x in. x in. x in.					
11.	Adjustable Choke	2"	Flanged	3000	X	
12.	Positive Choke	2"	Flanged	3000	X	
13.	Hydraulically Operated Choke					
14.	Forged Extension Spool					
15.	Hydraulically Operated Gate Valve					
16.	Hydraulically Operated Gate Valve					
17.	Line to Low Pressure Header	2"	Weld or Thread	1000	X	
18.	Line to Low Pressure Header	2"	Weld or Thread	1000	X	
19.	Line to Burn Pit	2"	Weld or Thread	1000	X	
20.	Line to Burn Pit	2"	Weld or Thread	1000	X	
21.	Line to Reserve Pit	2"	Weld or Thread	1000	X	
22.	Line to Mud Pit	2"	Weld or Thread	1000	X	
23.	Line to Mud/Gas Separator					
24.	Header					
25.	Header					
26.	Gate Valve	2"	Flanged	1000		X
27.	Gate Valve	2"	Flanged	1000		X
28.	Gate Valve	2"	Flanged	1000		X
29.	Gate Valve	2"	Flanged	1000		X
30.	Gate Valve					
31.	Gate Valve					
32.	Base for Choke Manifold					
33.	Block Tee, in. x in. x in. x					
34.	Tee 2 in. x 2 in. x 2 in. x	2"	Flanged	1000		X
35.	Tee 2 in. x 2 in. x 2 in. x	2"	Flanged	1000		X
36.	Operating Consoles for Hydraulic Choke					
37.	Line to Low Pressure Header					
38.	Line to Reserve Pit					
39.	Line to Mud/Gas Separator					
40.	Line to Mud/Gas Separator					
41.	Line to Burn Pit					
42.	Forged Extension Spool					
43.	Way Cross, in. x in. x in. x in.					
44.	Gate Valve					
45.	Gate Valve					
46.	Gate Valve					

Line size to be inside diameter.

Valve, Spools and preventers to be bore dimension.

Header size to be outside diameter.

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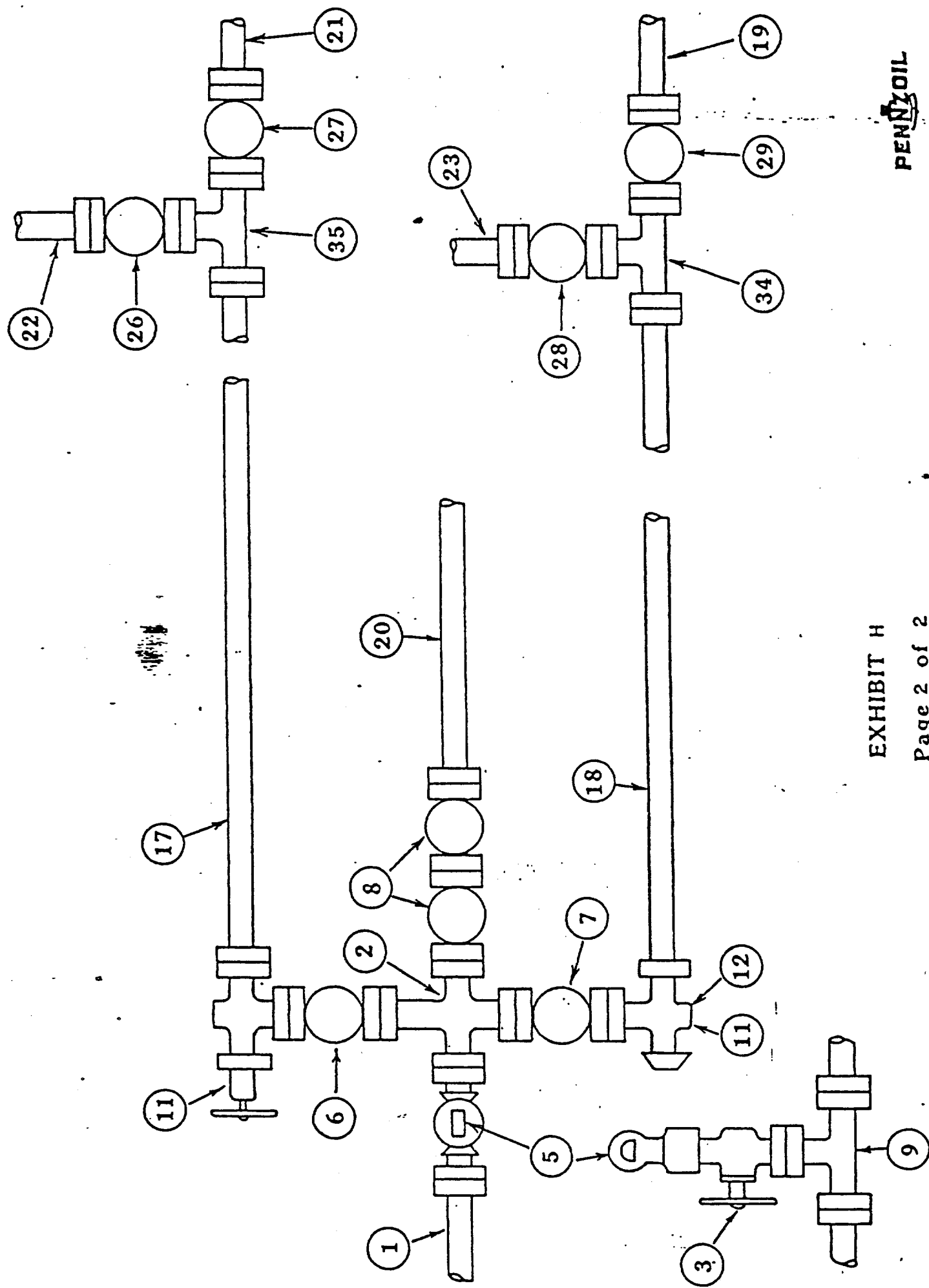


EXHIBIT J

INSTRUCTIONS FOR CONTRACTORS  
(ATTACHMENT TO BID SHEET AND WELL SPECIFICATIONS)  
TESTING AND OPERATION OF BLOWOUT PREVENTION EQUIPMENT

Minimum blowout preventer requirements have been established by Pennzoil. The applicable BOP and Manifold drawing shall be furnished to the contractor and will be included as part of the specifications and requirements of the Bid Sheet and Well Specifications.

The appropriate blowout preventer equipment shall be installed immediately after conductor, surface, intermediate, or production casing is cemented. At that time, the entire BOP stack with manifold is to be completely assembled, installed, pressure tested, and performance tested, and should be ready for immediate use, prior to drilling out.

TESTING BLOWOUT PREVENTERS AND CASING

Routine blowout preventer pressure tests, performance tests, and casing tests will be made following installation of the equipment and prior to drilling out. Pennzoil may specify additional tests prior to penetrating a known abnormally pressured zone, or any other time considered necessary. Details of inspection, test pressures, and test periods will be furnished by Pennzoil's foreman.

Careful alignment of rig must be maintained to prevent excessive wellhead and casing wear.

Preventers must be actuated with sufficient frequency to insure all equipment is in proper working condition at all times.

Operation and testing of preventer equipment and casing must be recorded on the daily drilling tour sheets, unless Pennzoil provides special forms for this purpose.

TRAINING RIG CREWS FOR OPERATION OF BLOWOUT EQUIPMENT

It is the Contractor's responsibility to assure that each crew is well trained, familiar with installation, maintenance, and operation of all blowout prevention equipment. It is also the Contractor's responsibility to see that adequate drills are conducted to assure that all crews are competent and capable of handling any potential blowout.

If Contractor has a standard drill procedure, this should be used. Otherwise, Contractor's and Pennzoil's foremen should agree on a procedure to be followed.

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## EXHIBIT J (Continued)

## INDICATION OF EMERGENCY

There are numerous signs which may indicate an approaching emergency. If these signs are detected in time and recognized as a warning, there is no valid reason for a well getting out of control. All crew members must always be alert and trained to recognize these signs.

Listed below are a number of indications which may be forerunners of trouble, and must be checked out when they occur:

1. Fluid rise in pits (which indicates well is unloading) may be caused by (1) hydrostatic mud weight being too light, (2) formation fluid or gas entering bore hole, (3) accumulation of air from past trip being circulated to surface, or (4) lost circulation zone flowing mud back into bore hole during trip.
2. Increase in pump speed or decrease in pump pressure while drilling may be caused by (1) formation fluid or gas entering the bore hole and lightening the mud column, (2) mud pump not functioning properly, or (3) washed out drill pipe or drill collars.
3. A drilling break in a known or suspected productive interval.
4. Mud continuing to flow from bore hole after pumps are stopped may be caused by (1) formation fluid or gas entering bore hole, or (2) from an unbalanced mud column (heavy mud having been pumped into drill pipe and lighter mud in the annulus).
5. Continued flow of mud from drill pipe when tripping, or drill pipe failing to dry up when pulling.
6. Decrease in mud weight because of gas cutting.
7. Hole not taking proper amount of mud when tripping out of the hole may be caused by (1) swabbing action of drill string and bit, or (2) an insufficient mud weight over-balance on formation when pump is taken off the hole.
8. Loss of circulation, causing a lowering of fluid in the hole, which decreases hydrostatic pressure and may allow formation fluid or gas to enter the bore hole.
9. While drilling, circulating, or tripping, any unusual condition occurring which cannot be quickly identified or explained.

## EMERGENCY PROCEDURE

When the driller has decided a blowout threatens from any of the above-mentioned items, he should follow procedures used in blowout prevention drills. In addition, he should contact his supervisor as soon as possible, who in turn should contact Pennzoil's supervisor.

Contractor's and Pennzoil's supervisors should agree in advance on procedures to be followed. If agreed upon, Pennzoil's "Emergency Procedure for Blowout Prevention" and "Kick Control Work Sheet" should be posted at the well.



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