BUREAU OF LAND MANAGEMENT
43 FR PART 3160 **(updated as of 01/19/00)**

Federal Register / Vol. 53, No. 223
Friday, November 18, 1988
Effective date: December 19, 1988

Onshore Oil and Gas Operations; Federal and Indian Oil and Gas Leases; Onshore Oil and Gas Order No. 2, Drilling Operations

Onshore Oil and Gas Order No. 2
Drilling Operations on Federal and Indian Oil and Gas Leases

I. Introduction

A. Authority

This order is established pursuant to the authority granted to the Secretary of the Interior

pursuant to various Federal and Indian mineral leasing statutes and the Federal Oil and Gas Royalty Management Act of 1982. This authority has been delegated to the Bureau of Land Management and is implemented by the onshore oil and gas operating regulations contained in 43 CFR Part 3160. Section 3164.1 thereof specially authorizes the Director, Bureau of Land Management, to issue Onshore Oil and Gas Orders when necessary to implement and supplement the operating regulations and provides that all such Orders shall be binding on the lessees and operators of Federal and restricted Indian (except Osage tribe) oil and gas leases that have been, or may hereafter be issued.

Specific authority for the provisions contained in this Order is found at: §3162.3-1 *Drilling Applications and Plans*; §3162.3-4 *Well Abandonment*; §3162.4-1 *Well Records and Reports*; §3162.4-3 *Samples, Tests, and Surveys*; §3162.5-1 *Environmental Obligations;* §3162.5-2 *Control of Wells;* §3162.5-2(a) *Drilling Wells*; §3162.5-3 *Safety Precautions*; and Subpart 3163 *Noncompliance and Assessment.*

B. Purpose

This Order details the Bureau's uniform national standards for the minimum levels of performance expected from lessees and operators when conducting drilling operations on Federal and Indian lands (except Osage Tribe) and for abandonment immediately following drilling. The purpose also is to identify the enforcement actions that will result when violations of the minimum standards are found, and when those violations are not abated in a timely manner.

C. Scope

This Order is applicable to all onshore Federal and Indian (except Osage Tribe) oil and gas leases.

D. General

1. If an operator chooses to use higher rated equipment than that authorized in the *Application for Permit to Drill* (APD), testing procedures shall apply to the approved working pressures, not the upgraded higher working pressures.

2. Some situations may exist either on a well-by-well or field-wide basis whereby it is commonly accepted practice to vary a particular minimum standard(s) established in this Order. This situation may be resolved by requesting a variance (See section IV of this Order), by the inclusion of a stipulation to the APD, or by the issuance of Notice to Lessees and Operators (NTL) by the appropriate BLM office.

3. When a violation is discovered and if it does not cause or threaten immediate substantial and adverse impact on public health and safety, the environment, production accountability or royalty, it will be classified as minor. The violation may be reissued as a major violation if not corrected during the abatement period and continued drilling has changed the adverse impact of the violation so that it meets the specific definition of a major violation.

4. This Onshore Order is not intended to circumvent the reporting requirements or compliance aspects that may be stated elsewhere in Existing NTL's, Onshore Orders, etc. A lessee's compliance with the requirements of the regulations in this Part shall not relieve the lessee of the obligation to comply with other applicable laws and regulations in accordance with 43 CFR 3162.5-1(c). Lessee's should give special attention to the automatic assessment provisions in 43 CFR 3163.1(b).

5. This Order is based upon the assumption that operations have been approved in accordance with 43 CFR Part 3160 and Onshore Oil and Gas Order No.1. Failure to obtain approval prior to commencement of drilling or related operations shall subject the operator to immediate assessment under 43 CFR 3163.1(b)(2).

II. **Definitions.**

A. Abnormal Pressure Zone means a zone that has either pressure above or below the normal gradient for an area and/or depth.

B. Bleed Line means the vent line that bypasses the chokes in the choke manifold system; also referred to as Panic Line.

C. Blooie Line means a discharge line used in conjunction with a rotating head.

D. Drilling Spool means a connection component with both ends either flanged or hubbed with an internal diameter at least equal to the bore of the casing, and with smaller side outlets for connecting auxiliary lines.

E. Exploratory Well means any well drilled beyond the known producing limits of a pool.

F. Filled-up Line means the line used to fill the hole when the drill pipe is being removed from the well. It is usually connected to a 2-inch collar that is welded into a drilling nipple.

G. Flare Line means a line used to carry gas from the rig to be burned at a safer location. The gas comes from the degasser, gas buster, separator, or when drill stem testing, directly from the drill pipe.

H. Functionally Operated means activating equipment without subjecting it to well-bore pressure.

I. Isolating means using cement to protect, separate, or segregate usable water and mineral resources.

J. Lease means any contact, profit-share agreement, joint venture, or other agreement issued or approved by the United States under a mineral leasing law that authorizes exploration for, extraction of, or removal of oil or gas (See 43 CFR 3160.0-5).

K. Lessee means a person holding record title in a lease issued by the United States (See 43 CFR 3160.0-5).

L. Make-up Water means water that is used in mixing slurry for cement jobs and plugging operations, and is compatible with cement constituents being used.

M. Manual Locking Device means any manually activated device, such as a hand wheels, etc., that is used for the purpose of locking the preventer in the closed position.

N. Mud for Plugging Purposes means a slurry of bentonite of similar flocculent/viscosifier, water, and additive needed to achieve the desired weight and consistency to stabilize the hole.

O. Mudding Up means adding materials and chemicals to water to control the viscosity,

weight, and filtrate loss of the circulating system.

P. Operating Rights Owner (or Owner) means a person or entity holding operating rights in a lease issued by the United States. A lessee also may be an operating rights owner if the operating rights in a lease or portion thereof have not been severed from record title.

Q. Operational means capable of functioning as designed and installed without undue force or further modification.

R. Operator means any person or entity, including but not limited to the lessee or operating rights owner, who has stated in writing to the authorized officer his/her responsibility for the operations conducted in the leased lands or a portion thereof.

S. Precharge Pressure means the nitrogen pressure remaining in the accumulator after all the hydraulic fluid has been expelled from beneath the movable barrier.

T. Prompt Correction means immediate correction of violations, with drilling suspended if required in the discretion of the authorized officer.

U. Prospectively Valuable Deposit of Minerals means any deposit of minerals that the authorized officer determines to have characteristics of quantity and quality that warrant its protection.

V. Tagging the Plug means running in the hole with a string of tubing or drill pipe and placing sufficient weight on the plug to insure its integrity. Other methods of tagging the plug may be approved by the authorized officer.

W. Targeted Tee or Turn means a fitting used in pressure piping in which a bull plug or blind flange of the same pressure rating as the rest of the approved system is installed at the end of a tee or cross, opposite the fluid entry arm, to change the direction of flow and to reduce erosion.

X. 2M, 3M, 5M, 10M, and 15M mean the pressure ratings used for equipment with a working pressure rating of the equivalent thousand pounds per square inch (psi) (2M=2,000 psi, 3M=3,000 psi, etc.)

Y. Usable Water means generally those waters containing up to 10,000 ppm of total dissolved solids.

Z. Weep Hole means a small hole that allows pressure to bleed off through the metal plate, used in covering well bores after abandonment operations.

[57 FR 3025, Jan. 27, 1992]

III. **Requirements**

A. Well Control Requirements

1. Blowout preventer (BOP) and related equipment (BOPE) shall be installed, used, maintained, and tested in a manner necessary to assure well control and shall be in place and operational prior to drilling the surface casing shoe unless otherwise approved by the APD. Commencement of drilling without the approved BOPE installed, unless otherwise approved, shall subject the operator to immediate assessment under 43 CFR 3163.1(b)(1). The BOP and related control equipment shall be suitable for operations in those areas which are subject to sub-freezing conditions. The BOPE shall be based on known or anticipated sub-surface pressures, geologic conditions, accepted engineering practice, and surface environment. Item number 7 of the eight point plan in the APD specifically addresses expected pressures. The working pressure of all

BOPE shall exceed the anticipated surface pressure to which it may be subjected, assuming a partially evacuated hole with a pressure gradient of 0.22 psi/ft.

2. The gravity of the violations for many of the well control minimum standards listed below are shown as minor. However, very short abatement periods in this Order are often specified in recognition that by continuing to drill, the violation which was originally determined to be of a minor nature may cause or threaten immediate, substantial and adverse impact on public health and safety, the environment, production accountability, or royalty income, which would require its reclassification as a major violation.

a. *Minimum standards and enforcement provisions for well control equipment.*

i. A well control device shall be installed at the surface that is capable of complete closure of the well bore. This device shall be closed whenever the well is unattended.

Violation:	Major.
Corrective Action:	Install the equipment as specified.
Normal Abatement Period:	Prompt correction required.

ii. 2M system:

- Annular preventer, or double ram, or two rams with one being blind and one being a pipe ram *
- kill line (2 inch minimum)
- 1 kill line valve (2 inch minimum)
- 1 choke line valve
- 2 chokes (refer to diagram in Attachment 1)
- Upper kelly cock valve with handle available
- Safety valve and subs to fit all drill strings in use
- Pressure gauge on choke manifold
- 2 inch minimum choke line
- Fill-up line above the uppermost preventer.

Violation:	Minor (all items unless marked by asterisk).
Corrective Action:	Install the equipment as specified.
Normal Abatement Period:	24 hours.

*Violation:	Major.
Corrective Action:	Install the equipment as specified.
Normal Abatement Period:	Prompt correction required.

iii. 3M system:

- Annular preventers*
- Double ram with blind rams and pipe rams*
- Drilling spool, or blowout preventer with 2 side outlets (choke side shall be a 3-inch minimum diameter, kill side shall be at least 2-inch diameter)*
- Kill line (2 inch minimum)
- A minimum of 2 choke line valves (3 inch minimum)*
- 3 inch diameter choke line

- 2 kill line valves, one of which shall be a check valve (2 inch minimum)*
- 2 chokes (refer to diagram in Attachment 1)
- Pressure gauge on choke manifold
- Upper kelly cock valve with handle available
- Safety valve and subs to fit all drill string connections in use
- All BOPE connections subjected to well pressure shall be flanged, welded, or clamped*
- Fill-up line above the uppermost preventer.

Violation: Minor (all items unless marked by asterisk).
Corrective Action: Install the equipment as specified.
Normal Abatement Period: 24 hours.

*Violation: Major.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: Prompt correction required.

iv. 5M system:

- Annular preventer*
- Pipe ram, blind ram, and, if conditions warrant, as specified by the authorized officer, another pipe ram shall also be required*
- A second pipe ram preventer shall be used with a tapered drill string
- Drilling spool, or blowout preventer with 2 side outlets (choke side shall be a 3-inch minimum diameter, kill side shall be at least 2-inch diameter)*
- 3 inch diameter choke line
- 2 choke line valves (3 inch minimum)*
- Kill line (2 inch minimum)
- 2 chokes with 1 remotely controlled from rig floor (refer to diagram in Attachment 1)
- 2 kill line valves and a check valve (2 inch minimum)*
- Upper kelly cock valve with handle available
- When the expected pressures approach working pressure of the system, 1 remote kill line tested to stack pressure (which shall run to the outer edge of the substructure and be unobstructed)
- Lower kelly cock valve with handle available
- Safety valve(s) and subs to fit all drill string connections in use
- Inside BOP or float sub available
- Pressure gauge on choke manifold
- All BOPE connections subjected to well pressure shall be flanged, welded, or clamped*
- Fill-up line above the uppermost preventer.

Violation: Minor (all items unless marked by asterisk).
Corrective Action: Install the equipment as specified.
Normal Abatement Period: 24 hours

*Violation: Major.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: Prompt correction required.

v. 10M & 15M system:
- Annular preventer*
- 2 pipe rams*
- Blind rams*
- Drilling spool, or blowout preventer with 2 side outlets (choke side shall be a 3-inch minimum diameter, kill side shall be at least 2-inch diameter)*
- 3 inch choke line*
- 2 kill line valves (2 inch minimum) and check valve*
- Remote kill line (2 inch minimum) shall run to the outer edge of the substructure and be unobstructed
- Manual and hydraulic choke line valve (3 inch minimum)*
- 3 chokes, 1 being remotely controlled (refer to diagram in Attachment 1)
- Pressure gauge on choke manifold
- Upper kelly cock valve with handle available
- Lower kelly cock valve with handle available
- Safety valves and subs to fit all drill string connections in use
- Inside BOP or float sub available
- Wear ring in casing head
- All BOPE connections subjected to well pressure shall be flanged, welded, or clamped*
- Fill-up line installed above the uppermost preventer.

Violation: Minor (all items unless marked by asterisk).
Corrective Action: Install the equipment as specified.
Normal Abatement Period: 24 hours.

*Violation: Major.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: Prompt correction required.

vi. If repair or replacement of the BOPE is required after testing, this work shall be performed prior to drilling out the casing shoe.

Violation: Major.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: Prompt correction required.

vii. When the BOPE cannot function to secure the hole, the hole shall be secured using cement, retrievable packer or a bridge plug packer, bridgeplug, or other acceptable approved method to assure safe well conditions.

Violation: Major.
Corrective Action: Install the equipment as specified.

Normal Abatement Period: Prompt correction required.
[54 FR 39528, Sept. 27, 1989]

b. *Minimum standards and enforcement provisions for choke manifold equipment.*

i. All choke lines shall be straight lines unless turns use tee blocks or are targeted with running tees, and shall be anchored to prevent whip and reduce vibration.

Violation: Minor.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: 24 hours.

ii. Choke manifold equipment configuration shall be functionally equivalent to the appropriate example diagram shown in Attachment 1 of this Order. The configuration of the chokes may vary.

Violation: Minor.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: Prompt correction required.

iii. All valves (except chokes) in the kill line, choke manifold, and choke line shall be a type that does not restrict the flow (full opening) and that allows a straight through flow (same enforcement as item ii).

iv. Pressure gauges in the well control system shall be a type designed for drilling fluid service (same enforcement as above).
[57 FR 3025, Jan. 27, 1992]

c. *Minimum standards and enforcement provisions for pressure accumulator system.*

i. 2M system – accumulator shall have sufficient capacity to close all BOP's and retain 200 psi above precharge. Nitrogen bottles that meet manufacturer's specifications may be used as the backup to the required independent power source..

Violation: Minor.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: 24 hours.

ii. 3M system – accumulator shall have sufficient capacity to open the hydraulically-controlled choke line valve(if so equipped), close all rams plus the annual preventer, and retain a minimum of 200 psi above precharge on the closing manifold without the use of the closing unit pumps. This is a minimum requirement. The fluid reservoir capacity shall be double the usable fluid volume of the accumulator system capacity and the fluid level shall be maintained at the manufacturer's recommendations. The 3M system shall have 2 independent power sources to close the preventers. Nitrogen bottles (3 minimum) may be 1 of the independent power sources and, if so, shall maintain a charge equal to the manufacturer's specifications.

Violation: Minor
Corrective Action: Install the equipment as specified.

Normal Abatement Period: 24 hours.

iii. 5M and higher system – accumulator shall have sufficient capacity to open the hydraulically-controlled gate valve (if so equipped) and close all rams plus the annular preventer (for 3 ram systems add a 50 percent safety factor to compensate for any fluid loss in the control system or preventers) and retain a minimum pressure of 200 psi above precharge on the closing manifold without use of the closing unit pumps. The fluid reservoir capacity shall be double the usable fluid volume of the accumulator system capacity and the fluid level of the reservoir shall be maintained at the manufacturer's recommendations. Two independent sources of power shall be available for powering the closing unit pumps. Sufficient nitrogen bottles are suitable as a backup power source only, and shall be recharged when the pressure falls below manufacturer's specifications.

Violation: Minor.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: 24 hours.
[57 FR 3025, Jan. 27, 1992]

d. *Minimum standards and enforcement provisions for accumulator precharge pressure test.* This test shall be conducted prior to connecting the closing unit to the BOP stack and at least once every 6 months. The accumulator pressure shall be corrected if the measured precharge pressure is found to be above or below the maximum or minimum limit specified below (only nitrogen gas may be used to precharge):

Accumulator working pressure rating	Minimum acceptable operating pressure	Desired precharge pressure	Maximum acceptable precharge pressure	Minimum acceptable precharge pressure
1,500 psi	1,500 psi	750 psi	800 psi	700 psi
2,000 psi	2,000 psi	1,000 psi	1,100 psi	900 psi
3,000 psi	3,000 psi	1,000 psi	1,100 psi	900 psi

Violation: Minor.
Correction Action: Perform test.
Normal Abatement Period: 24 hours.

e. *Minimum standards and enforcement provisions for power availability.* Power for the closing unit pumps shall be available to the unit at all times so that the pumps shall automatically start when the closing valve manifold pressure has decreased to the pre-set level.

Violation: Major.
Corrective Action: Install the equipment as specified.
Normal Abatement Period: Prompt correction required.

f. *Minimum standards and enforcement provisions for accumulator pump capacity.* Each BOP closing unit shall be equipped with sufficient number and sizes of pumps so that, with the accumulator system isolated from service, the pumps shall be capable of opening the hydraulically-operated gate valve (if so equipped), plus closing the annular preventer on the

smallest size drill pipe to be used within 2 minutes, and obtain a minimum of 200 psi above specified accumulator precharge pressure.

Violation:	Minor.
Corrective Action:	Install the equipment as specified.
Normal Abatement Period:	24 hours.

g. *Minimum standards and enforcement provisions for locking devices.* A manual locking device (i.e., hand wheels) or automatic locking devices shall be installed on all systems of 2M or greater. A valve shall be installed in the closing line as close as possible to the annular preventer to act as a locking device. This valve shall be maintained in the open position and shall be closed only when the power source for the accumulator system is inoperative.

Violation:	Minor.
Corrective Action:	Install the equipment as specified.
Normal Abatement Period:	24 hours.

h. *Minimum standards and enforcement provisions for remote controls.* Remote controls shall be readily accessible to the driller. Remote controls for all 3M or greater systems shall be capable of closing all preventers. Remote controls for 5M or greater systems shall be capable of both opening and closing all preventers. Master controls shall be at the accumulator and shall be capable of opening and closing all preventers and the choke line valve (if so equipped). No remote control for a 2M system is required.

Violation:	Minor.
Correction Action:	Install the equipment as specified.
Normal Abatement Period:	24 hours.

i. *Minimum standards and enforcement provisions for well control equipment testing.*

i. Perform all tests described below using clear water or an appropriate clear liquid for subfreezing temperatures with a viscosity similar to water.

ii. Ram type preventers and associated equipment shall be tested to approved (see item I.D.1. of this order) stack working pressure if isolated by test plug or to 70 percent of internal yield pressure of casing if BOP stack is not isolated from casing. Pressure shall be maintained for at least 10 minutes or until requirements of test are met, whichever is longer. If a test plug is utilized, no bleed-off of pressure is acceptable. For a test not utilizing a test plug, if a decline in pressure of more than 10 percent in 30 minutes occurs, the test shall be considered to have failed. Valve on casing head below test plug shall be open during test of BOP stack.

iii. Annular type preventers shall be tested to 50 percent of rated working pressure. Pressure shall be maintained at least 10 minutes or until provisions of test are met, whichever is longer.

iv. As a minimum, the above test shall be performed:
A. when initially installed:
B. whenever any seal subject to test pressure is broken:
C. following related repairs: and

D. at 30-day intervals.

v. Valves shall be tested from working pressure side during BOPE tests with all down stream valves open.

vi. When testing the kill line valve(s), the check valve shall be held open or the ball removed.

vii. Annular preventers shall be functionally operated at least weekly.

viii. Pipe and blind rams shall be activated each trip, however, this function need not be performed more than once a day.

ix. A BOPE pit level drill shall be conducted weekly for each drilling crew.

x. Pressure tests shall apply to all related well control equipment.

xi. All of the above described tests and/or drills shall be recorded in the drilling log.

Violation:	Minor.
Corrective action:	Perform the necessary test or provide documentation.
Normal Abatement Period:	24 hours or next trip, as most appropriate.

[54 FR 39528, Sept. 27, 1989]

B Casing and Cementing Requirements

The proposed casing and cementing programs shall be conducted as approved to protect and/or isolate all usable water zones, potentially productive zones, lost circulation zones, abnormally pressured zones, and any prospectively valuable deposits of minerals. Any isolating medium other than cement shall receive approval prior to use. The casing setting depth shall be calculated to position the casing seat opposite a competent formation which will contain the maximum pressure to which it will be exposed during normal drilling operations. Determination of casing setting depth shall be based on all relevant factors, including: presence/absence of hydrocarbons; fracture gradients; usable water zones; formation pressures; lost circulation zones; other minerals; or other unusual characteristics. All indications of usable water shall be reported.

– Minimum design factors for tensions, collapse, and burst that are incorporated into the casing design by an operator/lessee shall be submitted to the authorized operator for his review and approval along with the APD for all exploratory wells or as otherwise specified by the authorized officer.

– Casing design shall assume formation pressure gradients of 0.44 to 0.50 psi per foot for exploratory wells (lacking better data).

– Casing design shall assume fracture gradients from 0.70 to 1.00 psi per foot for exploratory wells (lacking better data).

– Casing collars shall have a minimum clearance of 0.422 inches on all sides in the hole/casing annulus, with recognition that variances can be granted for justified exceptions.

– All waiting on cement times shall be adequate to achieve a minimum of 500 psi compressive strength at the casing shoe prior to drilling out.

1. Minimum Standards and Enforcement Provisions for Casing and Cementing.

a. All casing, except the conductor casing, shall be new or reconditioned and tested casing.

All casing shall meet or exceed API standards for new casing. The use of reconditioned and tested used casing shall be subject to approval by the authorized officer; approval will be contingent upon the wall thickness of any such casing being verified to be at least 87 ½ percent of the nominal wall thickness of new casing.

Violation:	Major.
Corrective Action:	Perform remedial action as specified by the authorized officer.
Normal Abatement Period:	Prompt correction required.

[57 FR 3025, Jan. 27, 1992]

b. For liners, a minimum of 100 feet of overlap between a string of casing and the next larger casing is required. The interval of overlap shall be sealed and tested. The liner shall be tested by a fluid entry or pressure test to determine whether a seal between the liner top and next larger string has been achieved. The test pressure shall be the maximum anticipated pressure to which the seal will be exposed. No test shall be required for liners that do not incorporate or need a seal mechanism.

Violation:	Minor.
Corrective Action:	Perform remedial action as specified by the authorized officer.
Normal Abatement Period:	Upon determination of corrective action.

c. The surface casing shall be cemented back to surface either during the primary cement job or by remedial cementing.

Violation:	Major.
Corrective Action:	Perform remedial cementing.
Normal Abatement Period:	Prompt correction required.

d. All of the above described tests shall be recorded in the drilling log.

Violation:	Minor.
Corrective Action:	Perform the necessary test or provide documentation.
Normal Abatement Period:	24 hours.

e. All indications of usable water shall be reported to the authorized officer prior to running the next string of casing or before plugging orders are requested, whichever occurs first.

Violation:	Major.
Corrective Action:	Report information as required.
Normal Abatement Period:	Prompt correction required.

f. Surface casing shall have centralizers on the bottom 3 joints of the casing (a minimum of 1 centralizer per joint, starting with the shoe joint).

Violations:	Major.
Corrective Action:	Logging/testing may be required to determine the quality of the job. Recementing may then be specified.
Normal Abatement Period:	Prompt correction upon determination of corrective action.

[57 FR 3025, Jan. 27, 1992]

g. Top plugs shall be used to reduce contamination of cement by displacement fluid. A bottom plug or other acceptable technique, such as a preflush fluid, inner string cement method, etc., shall be utilized to help isolate the cement from contamination by the mud fluid being displaced ahead of the cement slurry.

Violation:	Major.
Correction Action:	Logging may be required to determine the quality of the cement job. Recementing or further recementing may then be specified.
Normal Abatement Period:	Based upon determination of corrective action.

h. All casing strings below the conductor shall be pressure tested to 0.22 psi per foot of casing string length or 1500 psi, whichever is greater, but not to exceed 70 percent of the minimum internal yield. If pressure declines more than 10 percent in 30 minutes, corrective action shall be taken.

Violation:	Minor.
Corrective Action:	Perform the test and/or remedial action as specified by the authorized officer.
Normal Abatement Period:	24 hours.

i. On all exploratory wells, and on that portion of any well approved for a 5M BOPE system or greater, a pressure integrity test of each casing shoe shall be performed. Formation at the shoe shall be tested to a minimum of the mud weight equivalent anticipated to control the formation pressure to the next casing depth or at total depth of the well. This test shall be performed before drilling more than 20 feet of new hole.

Violation:	Minor.
Corrective Action:	Perform the specified test.
Normal Abatement Period:	24 hours.

C. Mud Program Requirements

The characteristics, use, and testing of drilling mud and the implementation of related drilling procedures shall be designed to prevent the loss of well control. Sufficient quantities of mud materials shall be maintained or readily accessible for the purpose of assuring well control.

Minimum Standards and Enforcement Provisions for Mud Program and Equipment

1. Record slow pump speed on daily drilling report after mudding up.

Violation:	Minor.
Corrective Action:	Record required information.
Normal Abatement Period:	24 hours.

2. Visual mud monitoring equipment shall be in place to detect volume changes indicating loss or gain of circulating fluid volume.

Violation:	Minor.

Corrective Action: Install necessary equipment.
Normal Abatement Period: 24 hours.

3. When abnormal pressures are anticipated, electronic/mechanical mud monitoring equipment shall be required, which shall include as a minimum; pit volume totalizer (PVT); stroke counter; and flow sensor.

Violation: Minor.
Corrective Action: Install necessary instrumentation.
Normal Abatement Period: 24 hours.

4. A mud test shall be performed every 24 hours after mudding up to determine, as applicable: density, viscosity, gel strength, filtration, and pH.

Violation: Minor.
Correction Action: Perform necessary tests.
Normal Abatement Period: 24 hours.

5. A trip tank shall be used on 10M and 15M systems and on upgraded 5M systems as determined by the authorized officer.

Violation: Minor.
Corrective Action: Install necessary equipment.
Normal Abatement Period: 24 hours.

6. a. Gas detecting equipment shall be installed in the mud return system for exploratory wells or wells where abnormal pressure is anticipated, and hydrocarbon gas shall be monitored for pore pressure changes.

b. Hydrogen sulfide safety and monitoring equipment requirements may be found in Onshore Oil and Gas Order No. 6 – Hydrogen Sulfide Operations.

Violation: Minor.
Corrective Action: Install necessary equipment.
Normal Abatement Period: 24 hours.

7. All flare systems shall be designed to gather and burn all gas. The flare line(s) discharge shall be located not less than 100 feet from the well head, having straight lines unless turns are targeted with running tees, and shall be positioned downwind of the prevailing wind direction and shall be anchored. The flare system shall have an effective method for ignition. Where noncombustible gas is likely or expected to be vented, the system shall be provided supplemental fuel for ignition and to maintain a continuous flare.

Violation: Major.
Corrective Action: Install equipment as specified.
Normal Abatement Period: 24 Hours.

8. A mud-gas separator (gas buster) shall be installed and operable for all systems of 10M or greater and for any system where abnormal pressure is anticipated beginning at a point at

least 500 feet above any anticipated hydrocarbon zone of interest.

Violation:	Minor.
Corrective Action:	Install required equipment.
Normal Abatement Period:	Prompt correction required.

[54 FR 39528, Sept. 27, 1989, further amended at 57 FR 3026, Jan.27, 1992]

D. Drill Stem Testing Requirements

Initial opening of drill stem test tools shall be restricted to daylight hours unless specific approval to start during other hours is obtained from the authorized officer. However, DSTs may be allowed to continue at night if the test was initiated during daylight hours and the rate of flow is stabilized and if adequate lighting is available (i.e., lighting which is adequate for visibility and vapor-proof for safe operations). Packers can be released, but tripping shall not begin before daylight, unless prior approval is obtained from the authorized officer. Closed chamber DSTs may be accomplished day or night.

Minimum Standards for Drill Stem Testing.

1. A DST that flows to the surface with evidence of hydrocarbons shall be either reversed out of the testing string under controlled surface conditions or displaced into the formation prior to pulling the test tool. This would involve providing some means for reserve circulation.

Violation:	Major.
Corrective Action:	Contingent on circumstances and as specified by the authorized officer.
Normal Abatement Period:	Prompt correction required.

2. Separation equipment required for the anticipated recovery shall be properly installed before a test starts.

Violation:	Major.
Corrective Action:	Install required equipment.
Normal Abatement Period:	Prompt correction required.

3. All engines within 100 feet of the wellbore that are required to "run" during the test shall have spark arresters or water cooled exhausts.

Violation:	Major.
Corrective Action:	Contingent on circumstances and as specified by the authorized officer.
Normal Abatement Period:	Prompt correction required.

E. Special Drilling Operations

1. In addition to the equipment already specified elsewhere in this onshore order, the following equipment shall be in place and operational during air/gas drilling:

- Properly lubricated and maintained rotating head*

- Spark arresters on engines or water cooled exhaust*
- Blooie line discharge 100 feet from well bore and securely anchored
- Straight run on blooie line unless otherwise approved
- Deduster equipment*
- All cuttings and circulating medium shall be directed into a reserve or blooie pit*
- Float valve above bit*
- Automatic igniter or continuous pilot light on the blooie line*
- Compressors located in the opposite direction from the blooie line a minimum of 100 feet from the well bore
- Mud circulating equipment, water, and mud materials (does not have to be premixed) sufficient to maintain the capacity of the hole and circulating tanks or pits

Violation:	Minor (unless marked by an asterisk).
Corrective Action:	Install the equipment as specified.
Normal Abatement Period:	24 hours.

*Violation:	Major.
Corrective Action:	Install the equipment as specified.
Normal Abatement Period:	Prompt correction required.

2. Hydrogen sulphide operation is specifically addressed under Onshore Oil and Gas Order No. 6.

F. Surface Use

Onshore Oil and Gas Order No. 1 specifically addresses surface use. That Order provides for safe operations, adequate protection of surface resources and uses, and other environmental components. The operator/lessee is responsible for, and liable for, all building, construction, and operating activities and subcontracting activities conducted in association with the APD. Requirements and special stipulations for surface use are contained in or attached to the approved APD.

Minimum Standards and Enforcement Provisions for Surface Use.

The requirements and stipulations of approval shall be strictly adhered to by the operator/lessee and any contractors.

Violation: If a violation is identified by the authorized officer he shall determine whether it is major or minor, considering the definitions in 43 CFR 3160.0-5, and shall specify the appropriate corrective action and abatement period.

G. Drilling Abandonment Requirements

The following standards apply to the abandonment of newly drilled dry or non-productive wells in accordance with 43 CFR 3162.3-4 and section V of Onshore Oil and Gas Order No. 1. Approval shall be obtained prior to the commencement of abandonment. All formations bearing

usable-quality water, oil, gas, or geothermal resources, and/or a prospectively valuable deposit of minerals shall be protected. Approval may be given orally by the authorized officer before abandonment operations are initiated. This oral request and approval shall be followed by a written notice of intent to abandon filed not later than the fifth business day following oral approval. Failure to obtain approval prior to commencement of abandonment operations shall result in immediate assessment of under 43 CFR 3163.1(b)(3). The hole shall be in static condition at the time any plugs are placed (this does not pertain to plugging lost circulation zones). Within 30 days of completion of abandonment, a subsequent report of abandonment shall be filed. Plugging design for an abandonment hole shall include the following:

1. Open Hole.
   i. A cement plug shall be placed to extend at least 50 feet below the bottom (except as limited by total depth (TD) or plugged back total depth (PBTD)), to 50 feet above the top of:
      a. Any zone encountered during which contains fluid or gas with a potential to migrate;
      b. Any prospectively valuable deposit of minerals.

   ii. All cement plugs, except the surface plug, shall have sufficient slurry volume to fill 100 feet of the hole, plus an additional 10 percent of slurry for each 1,000 feet of depth.

   iii. No plug, except the surface plug, shall be less than 25 sacks without receiving specific approval from the authorized officer.

   iv. Extremely thick sections of single formation may be secured by placing 100-foot plugs across the top and bottom of the formation, and in accordance with item ii hereof.

   v. In the absence of productive zones or prospectively valuable deposits of minerals which otherwise require placement of cement plugs, long sections of open hole shall be plugged at least every 3,000 feet. Such plugs shall be placed across in-gauge sections of the hole, unless otherwise approved by the authorized officer.

2. Cased Hole. A cement plug shall be placed opposite all open perforation and extend to a minimum of 50 feet below (except as limited by TD or PBTD) to 50 feet above the perforated interval. All cement plugs, except the surface plug, shall have sufficient slurry volume to fill 100 feet of hole, plus an additional 10 percent of slurry for each 1,000 feet of depth. In lieu of the cement plug, a bridge plug is acceptable, provided:
   i. The bridge plug is set within 50 feet to 100 feet above the open perforations;
   ii. The perforations are isolated from any open hole below; and
   iii. The bridge plug is capped with 50 feet of cement. If a bailer is used to cap this plug, 35 feet of cement shall be sufficient.

3. Casing Removed from Hole. If any casing is cut and recovered, a cement plug shall be placed to extend at least 50 feet above and below the stub. The exposed hole resulting from the

casing removal shall be secured as required in items 1i and 1ii hereof.

4. An additional cement plug placed to extend a minimum of 50 feet above and below the shoe of the surface casing for intermediate string, as appropriate).

5. Annular Space. No annular space that extends to the surface shall be left open to the drilled hole below. If this condition exists, a minimum of the top 50 feet of annulus shall be plugged with cement.

6. Isolating Medium. Any cement plug which is the only isolating medium for a usable water interval or a zone containing a prospectively valuable deposit of minerals shall be tested by tagging with the drill string. Any plugs placed where the fluid level will not remain static also shall be tested by either tagging the plug with the working pipe string, or pressuring to a minimum pump (surface) pressure of 1,000 psi, with no more than a 10 percent drop during a 15-minute period (cased hole only). If the integrity of any other plug is questionable, or if the authorized officer has specific concerns for which he/she orders a plug to be tested, it shall be tested in the same manner.

7. Silica Sand or Silica Flour. Silica sand or silica flour shall be added to cement exposed to bottom hole static temperatures above 230 °F to prevent heat degradation of the cement.

8. Surface Plug. A cement plug of at least 50 feet shall be placed across all annuluses. The top of this plug shall be placed as near the eventual casing cutoff point as possible.

9. Mud. Each of the intervals between plugs shall be filled with mud of sufficient density to exert hydrostatic pressure exceeding the greatest formation pressure encountered while drilling such interval. In the absense of other information at the time plugging is approved, a minimum mud weight of 9 pounds per gallon shall be specified.

10. Surface Cap. All casing shall be cut-off at the base of the cellar or 3 feet below final restored ground level (whichever is deeper). The well bore shall then be covered with a metal plate at least 1/4 inch thick and welded in place, or a 4-inch pipe, 10-feet in length, 4 feet above ground and embedded in cement as specified by the authorized officer. The well location and identity shall be permanently inscribed. A weep hole shall be left if a metal plate is welded in place.

11. The cellar shall be filled with suitable material as specified by the authorized officer and the surface restored in accordance with the instructions of the authorized officer.

Minimum Standard

All plugging orders shall be strictly adhered to.

Violation: Major.

Corrective Action:	Contingent upon circumstances.
Normal Abatement Period:	Prompt correction required.

[54 FR 39528, Sept. 27, 1989]

IV. Variances From Minimum Standard

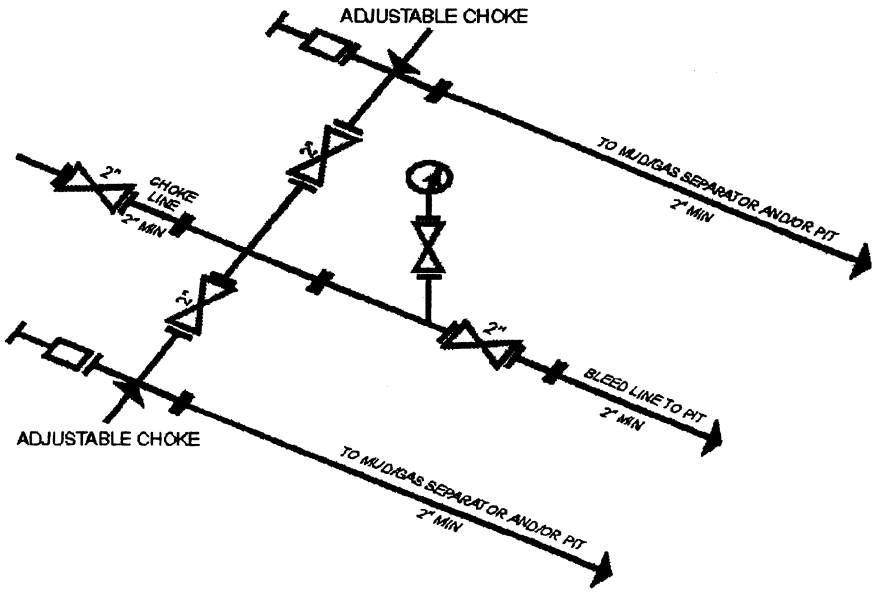
An operator may request the authorized officer to approve a variance from any of the minimum standards prescribed in section III hereof. All such request shall be submitted in writing to the appropriate authorized officer and provide information as to the circumstances which warrant approval of the variance(s) requested and the proposed alternative methods by which the related minimum standard(s) are to be satisfied. The authorized officer, after considering all relevant factors, if appropriate, may approve the requested variance(s) if it is determined that the proposed alternative(s) meet or exceed the objectives of the applicable minimum standard(s).

Emergency or other situations of an immediate nature that could not be reasonably foreseen at the time of APD approval may receive oral approval. However, such requests shall be followed up by a written notice filed not later than the fifth business day following oral approval.

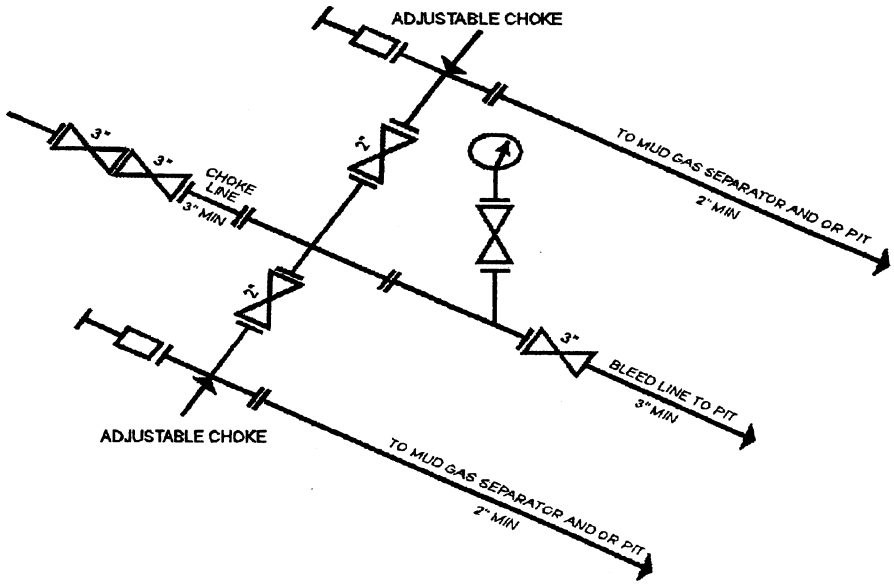
ATTACHMENTS

I. Diagrams of Choke Manifold Equipment
II. Sections From 43 CFR Subparts 3163 and 3165 (Not included With Federal Register Publication)

Attachment I. Diagrams of Choke Manifold Equipment

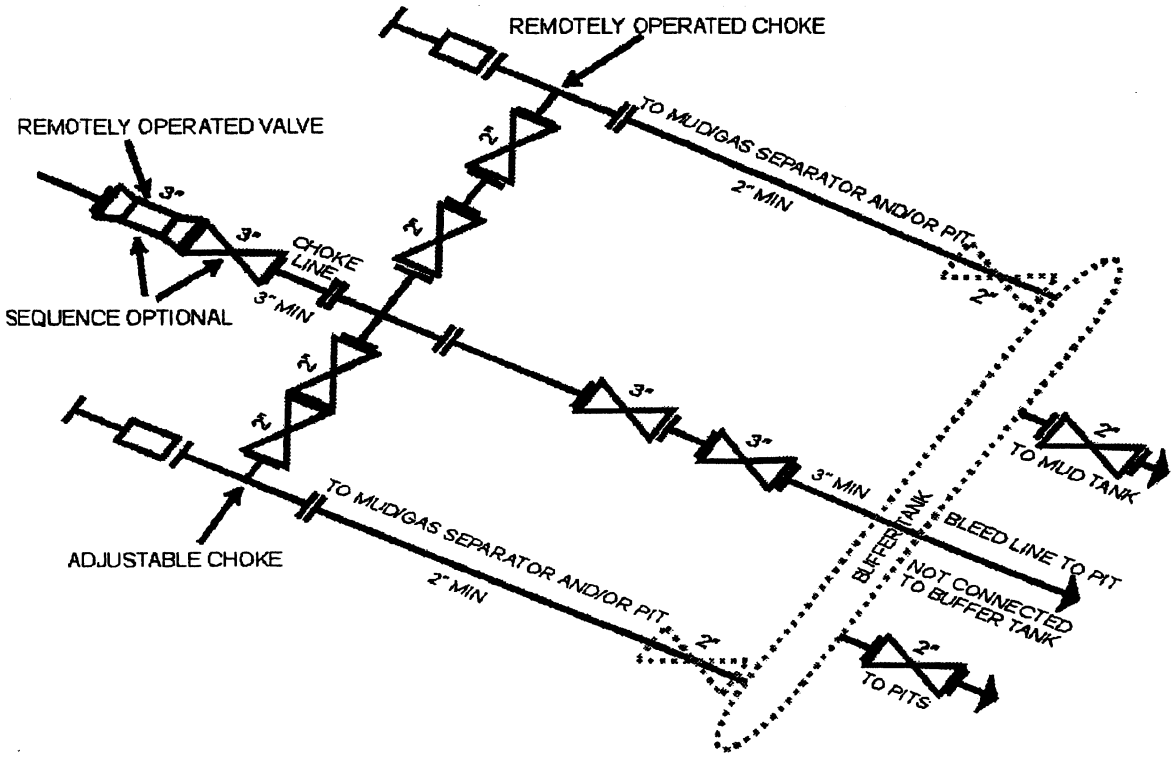


2M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY



3M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY

[54 FR 39528, Sept. 27, 1989]

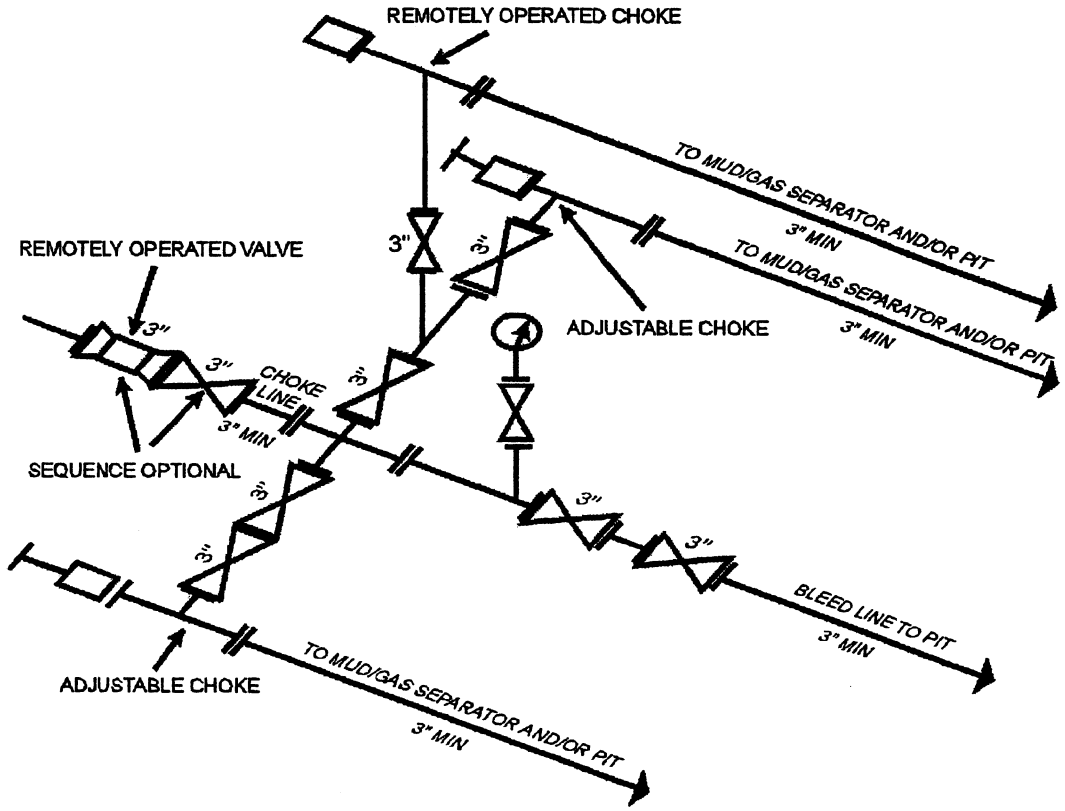


5M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY

Although not required for any of the choke manifold systems, buffer tanks are sometimes installed downstream of the choke assemblies for the purpose of manifolding the bleed lines together. When buffer tanks are employed, valves shall be installed upstream to isolate a failure or malfunction without interrupting flow control. Though not shown on 2M, 3M, 10M, OR 15M drawings, it would also be applicable to those situations.

[54 FR 39528, Sept. 27, 1989]

Attachment I - 2



10M AND 15M CHOKE MANIFOLD EQUIPMENT - CONFIGURATION OF CHOKES MAY VARY
[53 FR 49661, Dec. 9, 1988 and 54 FR 39528, Sept. 27, 1989]

Attachment I - 3