District I
1625 N. French Dr., Hobbs, NM 88240
Phone: (575) 393-6161 Fax: (575) 393-0720
District II
811 S. First St., Artesia, NM 88210
Phone: (575) 748-1283 Fax: (575) 748-9720
District III
1000 Rio Brazos Road, Aztec, NM 87410
Phone: (505) 334-6178 Fax: (505) 334-6170
District IV
1220 S. St. Francis Dr., Santa Fe, NM 87505
Phone: (505) 476-3460 Fax: (505) 476-3462

State of New Mexico
Energy Minerals and Natural Resources
Oil Conservation Division
1220 South St. Francis Dr.
Santa Fe, NM 87505

OCD Received 11/26/2020

Form C-101
Revised July 18, 2013

☐ AMENDED REPORT

SWD-2004

APPLICATION FOR PERMIT TO DRILL, RE-ENTER, DEEPEN, PLUGBACK, OR ADD A ZONE

1. Operator Name and Address	2. OGRID Number
SOLARIS WATER MIDSTREAM, LLC 701 TRADEWINDS BLVD., SUITE C MIDLAND, TX 79706	371643
	3. API Number 30-015-TBD 47702

4. Property Code	5. Property Name	6. Well No.
329803	McCrae SWD	1

7. Surface Location

UL - Lot	Section	Township	Range	Lot Idn	Feet from	N/S Line	Feet From	E/W Line	County
A	33	19S	28E		275	N	1000	E	EDDY

8. Proposed Bottom Hole Location

UL - Lot	Section	Township	Range	Lot Idn	Feet from	N/S Line	Feet From	E/W Line	County

9. Pool Information

Pool Name	Pool Code
SWD; Devonian-Silurian	97869

Additional Well Information

11. Work Type	12. Well Type	13. Cable/Rotary	14. Lease Type	15. Ground Level Elevation
N	SWD	R	P	3359'
16. Multiple	**17. Proposed Depth**	**18. Formation**	**19. Contractor**	**20. Spud Date**
N	12848'	Silurian-Devonian	TBD	11/15/2020

Depth to Ground water	Distance from nearest fresh water well	Distance to nearest surface water
62.5'	1.25 miles	>1 mile

☒ **We will be using a closed-loop system in lieu of lined pits**

21. Proposed Casing and Cement Program

Type	Hole Size	Casing Size	Casing Weight/ft	Setting Depth	Sacks of Cement	Estimated TOC
Surface	26"	20"	94#	656'	1266 sks	Surface
Intermediate	17.5"	13.375"	54.5#	2660'	1821 sks	Surface
Intermediate	12.25"	9.625"	40#	8814'	2088 sks	Surface
Liner	8.75"	7.625"	39#	12158'-8614'	342 sks	8614'
Tubing		5.5" & 5"	17# & 15#	12123'	N/A	N/A

Casing/Cement Program: Additional Comments

See attached schematic.

22. Proposed Blowout Prevention Program

Type	Working Pressure	Test Pressure	Manufacturer
Double Hydraulic/Blinds, Pipe, Annular	10000 psi blinds/pipe, 5000 psi annular	5000 psi blinds/pipe, 5000 psi annular	TBD - Cameron

23. I hereby certify that the information given above is true and complete to the best of my knowledge and belief.
I further certify that I have complied with 19.15.14.9 (A) NMAC ☐ and/or 19.15.14.9 (B) NMAC ☒, if applicable.
Signature: Gary E Fisher

Printed name: Gary E Fisher

Title: Consulting Engineer

E-mail Address: gfisher@popmidstream.com

Date: 10-23-2020 Phone: 817-606-7630

OIL CONSERVATION DIVISION

Approved By:

Title: District III Geologist

Approved Date: 11/3/2020 Expiration Date:

Conditions of Approval Attached

DISTRICT I
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State of New Mexico
Energy, Minerals and Natural Resources Department

OIL CONSERVATION DIVISION

1220 South St. Francis Dr.
Santa Fe, New Mexico 87505

Form C-102
Revised August 1, 2011

Submit one copy to appropriate District Office

WELL LOCATION AND ACREAGE DEDICATION PLAT

☐ AMENDED REPORT

API Number	Pool Code	Pool Name
	97869	SWD; DEVONIAN-SILURIAN

Property Code	Property Name	Well Number
	McCRAE SWD	1

OGRID No.	Operator Name	Elevation
371643	SOLARIS WATER MIDSTREAM	3359'

Surface Location

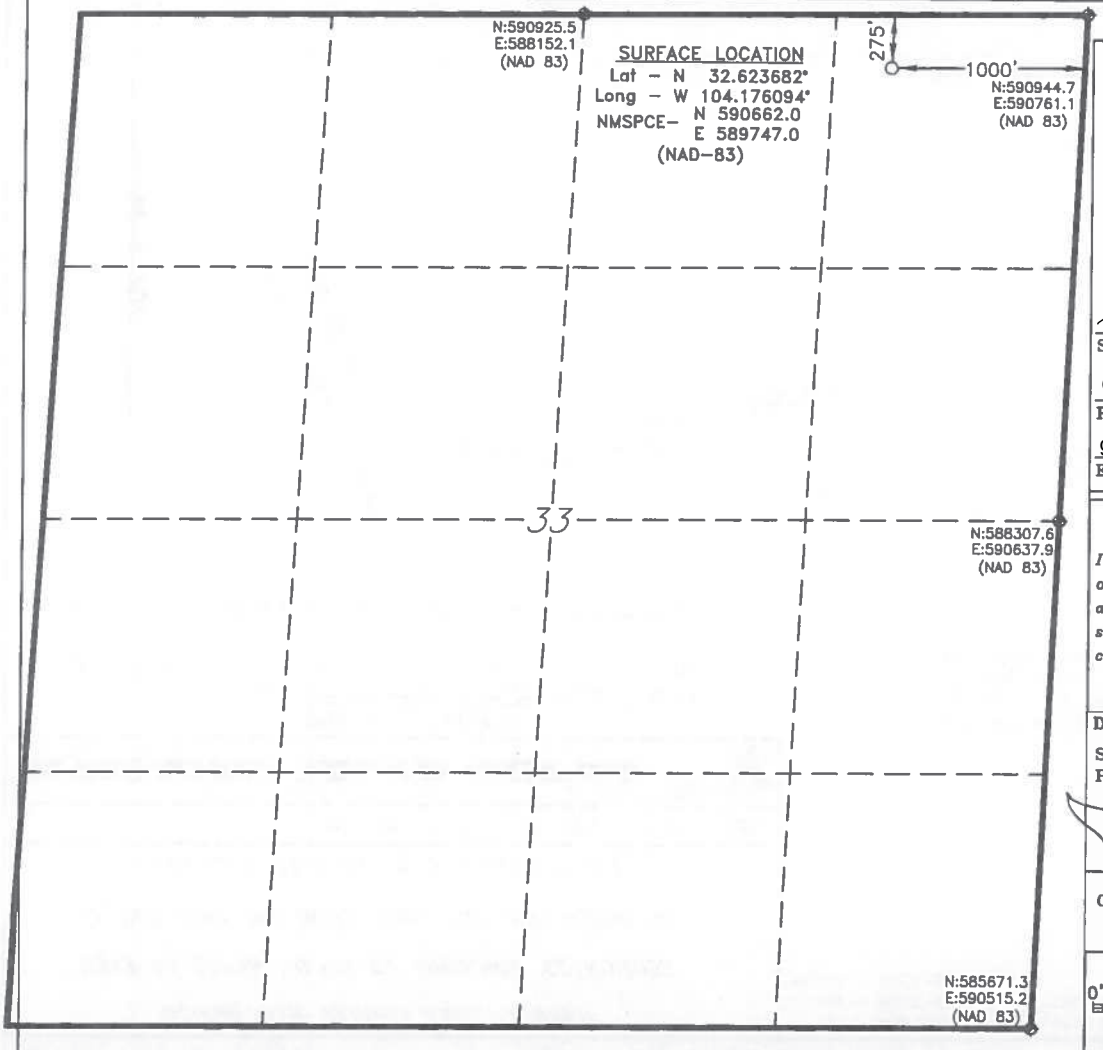
UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County
A	33	19 S	28 E		275	NORTH	1000	EAST	EDDY

Bottom Hole Location If Different From Surface

UL or lot No.	Section	Township	Range	Lot Idn	Feet from the	North/South line	Feet from the	East/West line	County

Dedicated Acres	Joint or Infill	Consolidation Code	Order No.
			SWD-2004

NO ALLOWABLE WILL BE ASSIGNED TO THIS COMPLETION UNTIL ALL INTERESTS HAVE BEEN CONSOLIDATED OR A NON-STANDARD UNIT HAS BEEN APPROVED BY THE DIVISION



OPERATOR CERTIFICATION

I hereby certify that the information contained herein is true and complete to the best of my knowledge and belief, and that this organization either owns a working interest or unLEAsed mineral interest in the land including the proposed bottom hole location or has a right to drill this well at this location pursuant to a contract with an owner of such a mineral or working interest, or to a voluntary pooling agreement or a compulsory pooling order heretofore entered by the division.

Gary E Fisher 10-21-2020
Signature Date

Gary E Fisher , Consulting Engineer
Printed Name

gfisher@popmidstream.com
Email Address

SURVEYOR CERTIFICATION

I hereby certify that the well location shown on this plat was plotted from field notes of actual surveys made by me or under my supervison, and that the same is true and correct to the best of my belief.

MAY 24, 2019
Date Surveyed

Signature & Seal of Professional Surveyor

GARY L. JONES
NEW MEXICO
7977
REGISTERED PROFESSIONAL LAND SURVEYOR

Certificate No. Gary L. Jones 7977

0' 500' 1000' 1500' 2000'
SCALE: 1" = 1000'
WO Num.: 34594

WELLBORE SCHEMATIC

Solaris Water Midstream LLC
McCrae SWD #1
275' FNL, 1000' FEL
Sec. 33, T19S, R28E, Eddy Co. NM
Lat 32.623682° N, Lon 104.176094° W
GL 3359', RKB 3389'

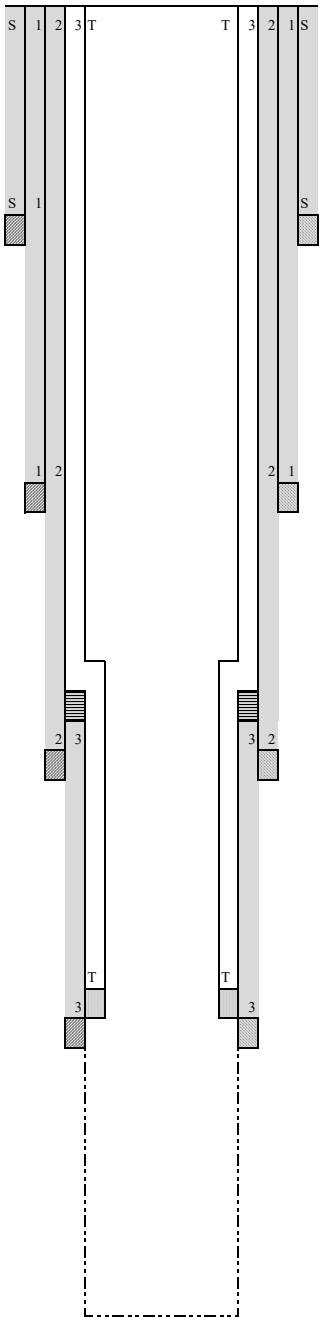
Surface - (Conventional)
Hole Size: 26"
Casing: 20" - 94# J-55 BTC Casing
Depth Top: Surface
Depth Btm: 656'
Cement: 1266 sks - Class C + Additives (100% excess)
Cement Top: Surface - (Circulate)

Intermediate #1 - (Conventional)
Hole Size: 17.5"
Casing: 13.375" - 54.5# J-55 BTC Casing
Depth Top: Surface
Depth Btm: 2660'
Cement: 1821 sks - Class C + Additives (50% excess)
Cement Top: Surface - (Circulate)

Intermediate #2 - (Conventional)
Hole Size: 12.25"
Casing: 9.625" - 40# HCL-80 BTC Casing
Depth Top: Surface
Depth Btm: 8814'
Cement: 2088 sks - Class C + Additives (50% excess)
Cement Top: Surface - (Circulate)
ECP/DV Tool: 2760'

Intermediate #3 - (Liner)
Hole Size: 8.75"
Casing: 7.625" - 39# HCL-80 FJ Casing
Depth Top: 8614'
Depth Btm: 12158'
Cement: 342 sks - Class H + Additives (50% excess)
Cement Top: 8614' - (Volumetric)

Intermediate #4 - (Open Hole)
Hole Size: 6.5"
Depth: 12848'
Inj. Interval: 12158' - 12848' (Open-Hole Completion)



Tubing - (Tapered)
Tubing Depth: 12113'
Tubing: 5.5" - 17# HCL-80 BTC Casing & 5" 15# HCL-80 BTC Casing (Fiberglass Lined)
X/O Depth: 8614'
X/O: 5.5" 17# HCL-80 BTC Casing - X - 5" 15# HCL-80 BTC Casing (Fiberglass Lined)
Packer Depth: 12123'
Packer: 5" - Perma-Pak or Equivalent (Inconel)

Drilling Program

Solaris Water Midstream
McCrae SWD #1
SL: 275' FNL & 1000' FEL
Sec 33, T19S, R28E
Eddy County, New Mexico

Surface Hole

Hole size: **26"**

Depth: **656'**

Mud: Fresh water "spud" mud/ "native". Need 28 to 36 visc. (mud weight not to exceed 8.8 ppg).

Drilling Parameters: Weld 30" drilling conductor with flow nipple onto the 30" conductor pipe at surface. **Notify NMOCD prior to spudding well *and* in sufficient time to witness cementing of surface casing.** Run 26" bit, BHA and 5" DP to casing point. Seepage should be controllable with LCM sweeps. After drilling to 656', pump heavy LCM sweep and circulate hole clean. TOOH to run csg.

Casing: From 0' to 656' – (20" 94# J55 BTC CSG)

Fill casing with drilling fluid as needed. Run 20" casing with Texas pattern guide shoe. Weld guide shoe and thread-lock bottom 2 joints. Centralizers to go in the middle of the first joint, on the second coupling and the fourth coupling.

Cement: Lead: 1066 sks Class "C" + Additives
Yield – 1.77 cu ft/sk @ 13.5 ppg

Tail: 200 sks Class "C" + Additives
Yield – 1.34 cu ft/sk @ 14.8 ppg

Notify NMOCD in sufficient time to witness cementing of casing. After getting casing to TD, displace casing volume with the rig pump. RU cementers and cement as prescribed**.** If cement ***does not*** circulate, notify NMOCD. If cement ***does*** circulate, shut in head and WOC 8 hours before cutting off casing and **welding on a 20" diverter head**.

Wellhead: **20" casing w/diverter head**

Solaris Water Midstream – McCrae SWD #1

First Intermediate Hole

Hole size: **17 ½"**

Depth: **2660' *Adjust depth to "fit" hole for Cameron Speed Head***

Mud: Saturated Brine with 29 to 31 visc. (Mud weight not to exceed 10.3 ppg).

Drilling Parameters: **Ensure 20" diverter head is installed prior to TIH**. WOC 8 hours total or until all cement has reached 500 psi compressive strength as required by NMOCD before drilling cement or the plug. Run 17 ½" bit, BHA and 5" DP to casing point. Saturated brine water will be used to minimize washout in salt sections. Seepage should be controllable with LCM sweeps. After drilling to 2660', pump heavy LCM sweep and circulate hole clean. TOOH to run csg.

Casing: From 0' to 2660' – (13 ⅜" 54.5# J55 BTC CSG)

Fill casing with drilling fluid every 20 jts or less as needed. Run float shoe, 1 jt 13 ⅜" 54.5# J55 BTC casing, float collar, & remainder jts 13 ⅜" 54.5# J55 BTC casing to surface. **Thread - lock guide shoe and first 2 joints.** Centralizers will go in the middle of the first joint, on the second coupling and the fourth coupling. Float equipment should be PDC drillable.

Make up Cameron Speed Head on final jt of 13 3/8" Casing and land on depth with landing joint.

Cement: Lead: 1621 sks Class "C" + Additives
Yield – 1.77 cu ft/sk @ 13.5 ppg

Tail: 200 sks Class "C" + Additives
Yield – 1.33 cu ft/sk @ 14.8 ppg

Notify NMOCD in sufficient time to witness cementing of casing. After getting casing to TD, displace casing volume with the rig pump. RU cementers and cement as per cement recommendation. If cement ***does not*** circulate, notify NMOCD. If cement ***does*** circulate, **WOC 8 hours** total or until all cement has reached 500 psi compressive strength as required by NMOCD before testing BOPE.

Wellhead: **13 ⅝" 5K rated Cameron Speed Head**

BOPE: **13 ⅝" 10K rated triple ram BOP stack, 5K rated annular & rotating head.**

BOPE Testing:	**WOC 8 hours or 500 psi compressive strength as required by NMOCD prior to testing BOPE. Test BOP Rams to 5000 psi & Annular to 5000 psi with third party.**

Solaris Water Midstream – McCrae SWD #1

Second Intermediate Hole

Hole size: **12 ¼"**

Depth: **8814' *Adjust depth to "fit" hole for Cameron Speed Head***

Mud: Cut Brine 9.0 to 9.4 ppg, 29 to 34 visc. Mud weight not to exceed 10 ppg.

Drilling Parameters: **Ensure 13 ⅝" triple ram BOP stack, 5K rated annular & rotating head are NU & Tested to 5000 psi. WOC 8 hours total** or until all cement has reached 500 psi compressive strength as required by NMOCD before drilling cement or the plug. H_2S monitors and related safety equipment will be operational before drilling out 13 ⅜" casing shoe. Run 12 ¼" bit, & BHA, with 5" DP back to surface. **Prior to drilling any cement, test casing to 2150# for 30 mins with rig pump**. **Before drilling 20' into formation, perform a FIT to 10.0 ppg mud equivalent.** Drill out with viscous cut brine and circulate through steel pits. Utilize mud cleaning equipment to keep fluid as clean as possible. Seepage should be controllable with LCM sweeps. After drilling to 8814', pump heavy LCM sweep and circulate hole clean. TOOH to run csg.

Casing: From 0' to 8814' – (9 ⅝" 40# HCL80 BTC CSG)
(ECP/DV tool @ 2760' – Ensure 50' min below previous csg shoe)

Fill casing with drilling fluid every 20 jts or less as needed. Run float shoe, 1 jt 9 ⅝" 40# HCL80 BTC casing, float collar, 4574' - 9 ⅝" 40# HCL80 BTC casing, 1440' – **BOND COATED** 9 ⅝" 40# HCL80 BTC casing, **ECP/DV TOOL** & remainder of 9 ⅝" 40# HCL80 BTC casing to surface. **Thread - lock guide shoe and first 2 joints.** Run centralizers in the middle of 1st joint, top of 2nd joint, then, alternating every other collar for a total of 8 centralizers. Float equipment should be PDC drillable. **Land 9 5/8" casing hanger in Cameron Speed Head using landing joint.**

Cement:

Stage 1: Lead: 1172 sks Class "C" + Additives
Yield – 2.41 cu ft/sk @ 11.5 ppg

Tail: 200 sks Class "C" + Additives
Yield – 1.18 cu ft/sk @ 15.6 ppg

ECP/DV TOOL @ 2760'

Stage 2: Lead: 516 sks Class "C" + Additives
Yield – 2.41 cu ft/sk @ 11.5 ppg

Tail: 200 sks Class "C" + Additives
Yield – 1.33 cu ft/sk @ 14.8 ppg

Notify NMOCD in sufficient time to witness cementing of casing. After getting casing to TD, displace casing volume with the rig pump. RU cementers and cement as prescribed in attached recommendation**. Cement volume to be adjusted after running fluid caliper**. If cement ***does not*** circulate, notify NMOCD. If cement ***does*** circulate, WOC 8 hours or 500 psi compressive strength as required by NMOCD before drilling cement & plug. **While WOC, displace pits with OBM & condition to spec.**

Wellhead: **13 ⅜" 5K rated Cameron Speed Head**

BOPE: **13 ⅝" 10K psi rated triple ram BOP stack, 5K psi rated annular & rotating head.**

BOPE Testing: **NU BOPE Testing required due to using Cameron Speed Head**

Solaris Water Midstream – McCrae SWD #1

Third Intermediate Hole

Hole size: **8 ¾"**

Depth: **12158'**

Mud: Mud up to 11.8 to 12 ppg WBM as per mud recommendation. Mud properties may have to be adjusted as needed for hole conditions.

Drilling Parameters: **Ensure 13 ⅝" 10K rated triple ram BOP stack, 5K rated annular & rotating head are NU & Tested. Ensure super choke installed on choke manifold. WOC 8 hours total** or until all cement has reached 500 psi compressive strength as required by NMOCD before drilling cement or the plug. Ensure H_2S monitors and related safety equipment are operational before drilling out shoe. PU 8 ¾" bit and BHA, with 5" drill pipe back to surface. **NOTE: (ECP/DV Tool @ 2760').** Use caution when drilling DV tool & float equipment to avoid damaging bit. **Test casing to 4100# for 30 mins with rig pump**. Drill out with WBM and circulate through steel pits. **Before drilling 20' into formation, perform a FIT to 12.0 ppg mud equivalent.** Utilize mud cleaning equipment to keep fluid as clean as possible. When nearing the top of the Devonian formation, circulate samples up every 5'. After drilling to 12158', pump heavy LCM sweep and circulate hole clean. TOOH to run csg.

Casing: 7 ⅝" 39# HCL80 FJ CSG
TOL @ 8614'
Halliburton Versaflex Liner Hanger

Fill casing with drilling fluid every 20 jts or less as needed. Run float shoe, 10' jt 7 ⅝" 39# HCL80 LFJM, Float Collar, 10' jt 7 ⅝" 39# HCL80 LFJM, Halliburton Landing Collar & 3479' 7 ⅝" 39# HCL80 LFJM, 7 ⅝" x 9 ⅝" liner hanger & DP to surface. **Set liner hanger to tie back minimum 100' inside 9 ⅝" casing.** Float equipment should be PDC drillable.

Cement: Lead: 342 sks Class "H" + Additives
Yield – 1.57 cu ft/sk @ 15.6 ppg

Notify NMOCD in sufficient time to witness cementing of casing. After getting casing to TD, displace casing volume with the rig pump. RU cementers and cement as prescribed in attached recommendation**.** If cement ***does not*** circulate, notify NMOCD. If cement ***does*** circulate, TOH w/liner hanger setting tool.

Wellhead: **No Change in wellhead required**

BOPE:	**13 ⅝" 10K psi rated triple ram BOP stack, 5K psi rated annular & rotating head.**
BOPE Testing:	**No BOPE testing required as the stack was not broken**

Solaris Water Midstream – McCrae SWD #1

Production Hole

Hole size:	6 ½"
Depth:	**12848'**
Mud:	Cut Brine 8.4 to 8.6 ppg, 29 to 32 visc. Mud weight not to exceed 9.0 ppg. Mud properties may have to be adjusted as needed for hole conditions.
Drilling Parameters:	**Ensure 13 ⅝" 10K rated triple ram BOP stack, 5K rated annular & rotating head are NU & Tested. WOC 8 hours total** or until all cement has reached 500 psi compressive strength as required by NMOCD before drilling cement or the plug. Ensure H_2S monitors and related safety equipment are operational before drilling out 7 ⅝" liner shoe. PU 6 ½" bit and BHA, with DP back to surface. **Prior to drilling any cement, test casing to 4100# for 30 mins with rig pump**. Use caution when drilling DV tool & float equipment to avoid damaging bit. **Before drilling 20' into formation, perform a FIT to 9.0 ppg mud equivalent.** Utilize mud cleaning equipment to keep fluid as clean as possible. After drilling to 12848' +/-, pump heavy LCM sweep and circulate hole clean. **DO NOT DRILL INTO MONTOYA FORMATION (CHERT RETURNS).** TOOH to 7 ⅝" casing shoe & LDDP.

Solaris Water Midstream – McCrae SWD #1

Completion

Logging: MIRU wireline truck & RIH w/open hole CNL/GR/ and cased hole CBL w/CCL. Verify formation markers with drilled depth.

Packer Setting: PU Setting Tool, CCL & 5" x 7 5/8" Perma-Pak Packer with short jt 4 ½" 13.5# casing tail pipe & pump out plug. RIH on wireline to packer setting depth **(< 100' to 7 5/8" csg shoe req'd)** & set packer. POH & RDMO wireline truck.

Tubing: 5 ½" x 5" CLS tubing string

If drilled depths correspond to formation tops, RU casers. Strap, tally & clean 5 ½" x 5" tubing. RIH with 5 ½" x 5" tubing and Packer Top Sub. PU landing joint and space out packer to correspond with proper landing depth. Lightly tag packer to confirm space out. Reverse circulate packer fluid down backside & up tubing. Pump 25% excess. Once backside is displaced, Sting into packer & set 50-100k on packer. ND BOP & set well head slips with remaining string weight. LD BOP & NU injection head. RDMO drilling rig.

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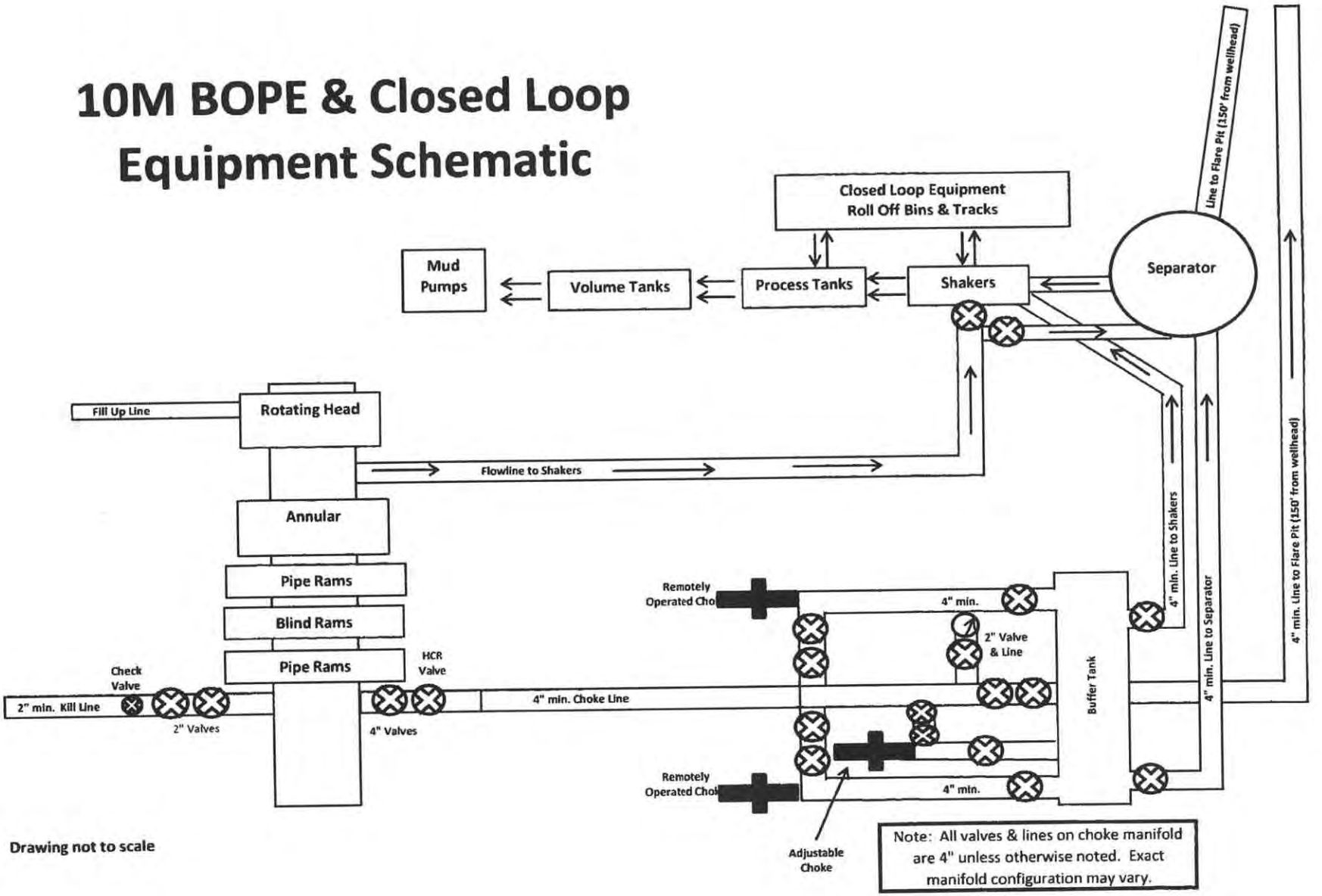
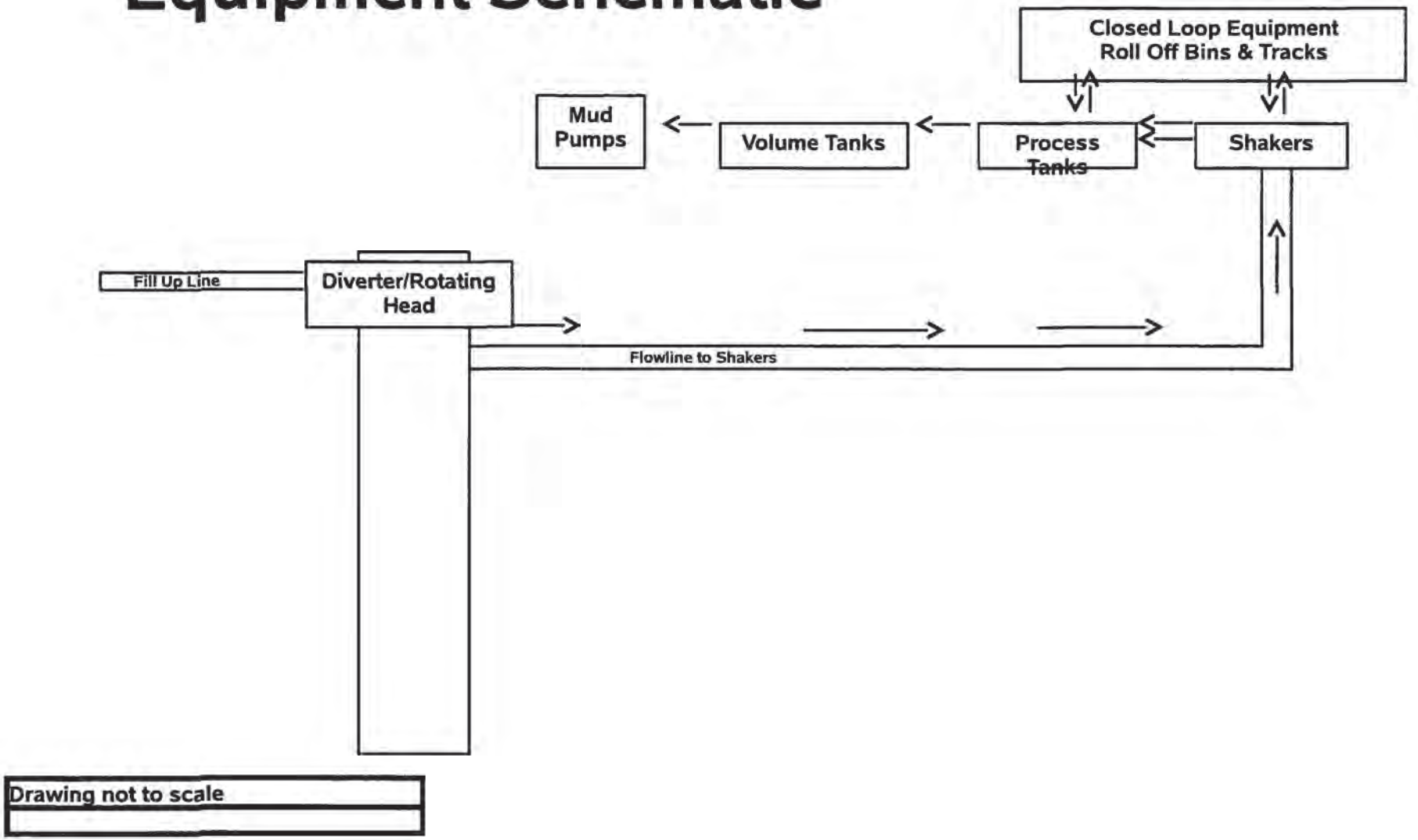
10M BOPE & Closed Loop Equipment Schematic



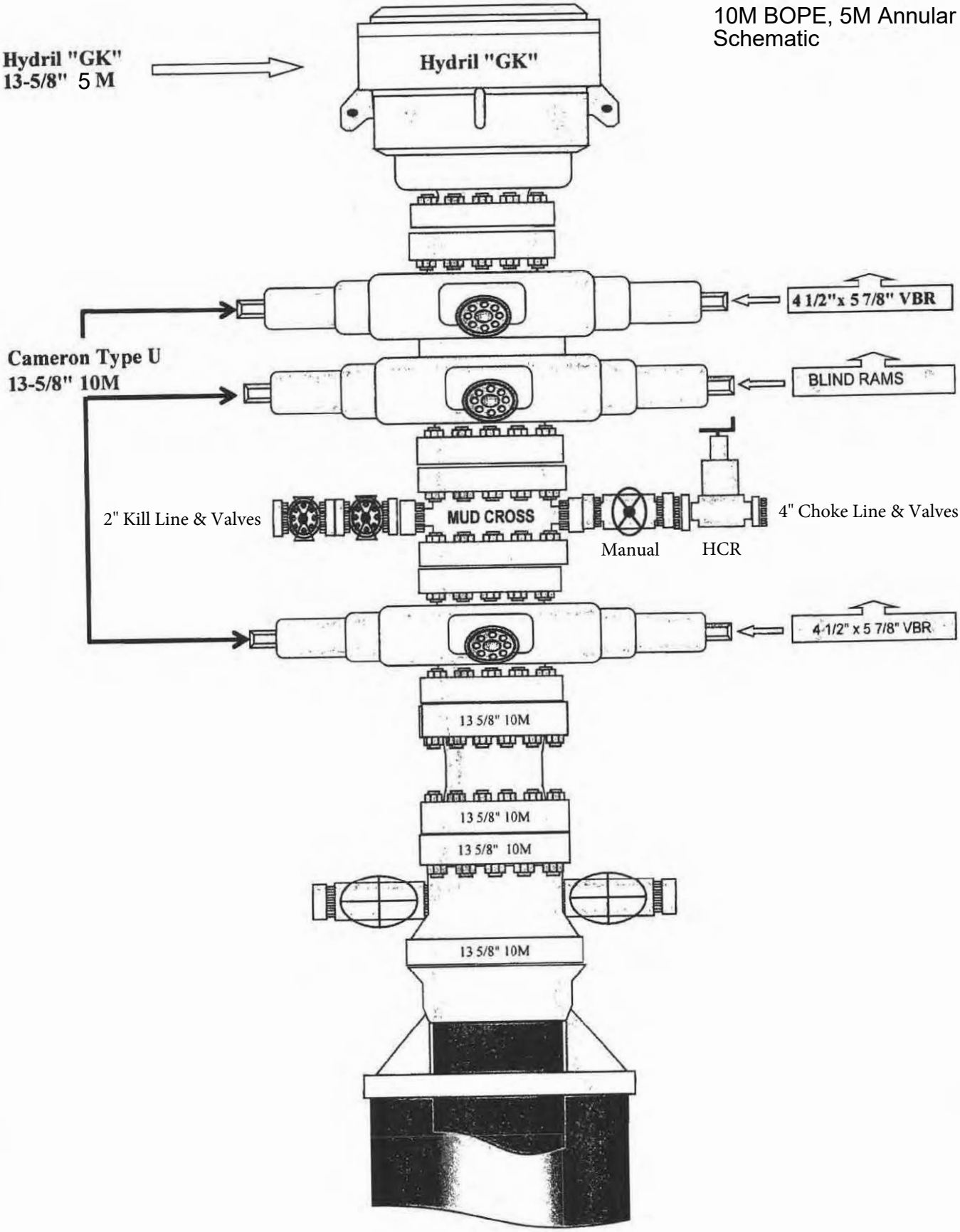
20" Diverter & Closed Loop Equipment Schematic



Drawing not to scale

Received by OCD: 10/26/2020 7:36:33 AM

10M BOPE, 5M Annular Schematic



Well Control Procedures

Below are the minimal high-level tasks prescribed to assure a proper shut-in while drilling, tripping, running casing, while pipe is not in the hole and moving the BHA through the BOP's. At least one well control drill will be performed weekly per crew to demonstrate compliance with the procedure and well control plan. The well control drill will be recorded in the daily drilling log. The type of drill will be determined by the ongoing operations, but reasonable attempts will be made to vary the type of drill conducted (pit, trip, open hole, choke, etc.). This well control plan will be available for review by rig personnel in the drilling supervisor's office on location and on the rig floor. All BOP equipment will be tested as per BLM Onshore Oil & Gas Order No. 2 with the exception of the **5M annular which will be tested to 100% of its RWP.** *Note: HCR valve and choke manifold will remain closed during all normal operations. Manipulation of such equipment will occur as part of the general well control proceedures.

General Well Control Procedure While Drilling

1. Sound alarm (alert crew)
2. Space out drill string
3. Shut down pumps (stop pumps and rotary)
4. Shut-in well (uppermost applicable BOP, typically annular preventer, first. HCR & choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP&SICP
    b. Pit gain
    c. Time

8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach 70% or greater of the RWP of the annular preventer, confirm spacing and close the upper variable bore rams.

General Procedure While Tripping

1. Sound alarm (alert crew)
2. Stab full-opening safety valve & close
3. Space out drill string
4. Shut-in well (uppermost applicable BOP, typically annular preventer, first. HCR & choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:

a. SIDPP&SICP
b. Pit gain
c. Time

8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach 70% of the RWP of the annular preventer, confirm spacing and close the upper variable bore rams.

General Procedure While Running Production Casing

1. Sound alarm (alert crew)
2. Stab crossover and full-opening safety valve and close
3. Space out string
4. Shut-in well (uppermost applicable BOP, typically annular preventer, first. HCR & choke will already be in the closed position.)
5. Confirm shut-in
6. Notify toolpusher/company representative
7. Read and record the following:
    a. SIDPP&SICP
    b. Pit gain
    c. Time

8. Regroup and identify forward plan
9. If pressure has built or is anticipated during the kill to reach 70% or greater of the RWP of the annular preventer, confirm spacing and close the upper variable bore rams.

General Procedure With No Pipe In Hole (Open Hole)

1. Sound alarm (alert crew)
2. Shut-in with blind rams (HCR & choke will already be in the closed position)
3. Confirm shut-in
4. Notify toolpusher/company representative
5. Read and record the following:
    a. SICP
    b. Pit gain
    c. Time

6. Regroup and identify forward plan

General Procedures While Pulling BHA Through Stack

1. PRIOR to pulling last joint of drillpipe through stack:

    a. Perform flow check. If flowing, continue to (b).

b. Sound alarm (alert crew)
c. Stab full-opening safety valve and close
d. Space out drill string with tool joint just beneath the upper variable bore rams
e. Shut-in using upper variable bore rams (HCR & choke will already be in the closed position)
f. Confirm shut-in
g. Notify toolpusher/company representative
h. Read and record the following:
    i. SIDPP & SICP
    ii. Pit gain
    iii. Time
i. Regroup and identify forward plan

2. With BHA in the stack and compatible ram preventer and pipe combination immediately available:

a. Sound alarm (alert crew)
b. Stab crossover and full-opening safety valve and close
c. Space out drill string with upset just beneath the upper variable bore rams
d. Shut-in using upper variable bore rams (HCR & choke will already be in the closed position)
e. Confirm shut-in
f. Notify toolpusher/company representative
g. Read and record the following:
    i. SIDPP & SICP
    ii. Pit gain
    iii. Time
h. Regroup and identify forward plan

3. With BHA in the stack and NO compatible ram preventer and pipe combination immediately available:

a. Sound alarm (alert crew)
b. If possible, pull string clear of the stack and follow "Open Hole" procedure.
c. If impossible to pull string clear of the stack:
d. Stab crossover, make up one joint/stand of drillpipe and full-opening safety valve and close
e. Space out drill string with tooljoint just beneath the upper variable bore ram
f. Shut-in using upper variable bore ram (HCR & choke will already be in the closed position)
g. Confirm shut-in
h. Notify toolpusher/company representative
i. Read and record the following:
    i. SIDPP & SICP

ii. Pit gain
iii. Time

j. Regroup and identify forward plan

Hydrogen Sulfide Drilling Operations Plan

McCrae SWD #1
Eddy County, NM

1. General Requirements

No high concentrations of H2S are expected during drilling of this well. Working H2S safety equipment will be installed on location before the Delaware formation for purposes of safety and insurance requirements.

2. Hydrogen Sulfide Training

All personnel, whether regularly assigned, contracted, or employed on an unscheduled basis, will have received training from a qualified instructor in the following areas prior to entering the drilling pad area of the well:

1. **The hazards and characteristics of hydrogen sulfide gas.**
2. **The proper use of personal protective equipment and life support systems.**
3. **The proper use of hydrogen sulfide detectors, alarms, warning systems, briefing areas, evacuation procedures.**
4. **The proper techniques for first aid and rescue operations. Additionally, supervisory personnel will be trained in the following areas:**

    - The effects of hydrogen sulfide on metal components. If high tensile tubular systems are utilized, supervisory personnel will be trained in their special maintenance requirements.
    - Corrective action and shut in procedures, blowout prevention, and well control procedures while drilling a well.
    - The contents of the Hydrogen Sulfide Drilling Operations Plan.

There will be an initial training session prior to encountering a known hydrogen sulfide source. The initial training session shall include a review of the site-specific Hydrogen Sulfide Drilling Operations Plan.

3. Hydrogen Sulfide Safety Equipment and Systems

All hydrogen sulfide safety equipment and systems will be installed, tested, and operational prior to drilling below the 13 3/8" intermediate #1 casing.

1. **Well Control Equipment**

    - Choke manifold with minimum of one adjustable choke.
    - Blowout preventers equipped with blind rams and pipe rams to accommodate all pipe sizes with properly sized closing unit

- Auxiliary equipment including annular type blowout preventer.

2. **Protective Equipment for Essential Personnel**

- A Thirty-minute self-contained work unit located in the dog house and at briefing areas.
- If H2S is encountered in concentrations less than 10 ppm, fans will be placed in work areas to prevent the accumulation of hazardous amounts of poisonous gas.
- If higher concentrations of H2S are detected the well will be shut in and POP will follow Onshore Order 6 and install a rotating head, mud/gas separator, remote choke and flare line with igniter.

3. **Hydrogen Sulfide Protection and Monitoring Equipment**

- Two portable hydrogen sulfide monitors positioned on location for optimum coverage and detection. The units shall have audible sirens to notify personnel when hydrogen sulfide levels exceed 20 PPM.

4. **Visual Warning Systems**

- Wind direction indicators as indicated on the wellsite diagram.
- Caution signs shall be posted on roads providing access to location. Signs shall be painted a high visibility color with lettering of sufficient size to be readable at reasonable distances from potentially contaminated areas.

4. Mud Program

The mud program has been designed to minimize the amount of hydrogen sulfide entrained in the mud system. Proper mud weight, safe drilling practices, and the use of hydrogen sulfide scavengers will minimize hazards while drilling the well.

5. Metallurgy

All tubular systems, wellheads, blowout preventers, drilling spools, kill lines, choke manifolds, and valves shall be suitable for service in a hydrogen sulfide environment when chemically treated.

6. Communications

State & County Officials phone numbers are posted on rig floor and supervisor's trailer. Communications in company vehicles and tool pushers are either two-way radios or cellular phones.

7. Well Testing

Drill stem testing is not an anticipated requirement for evaluation of this well. If a drill stem test is required, it will be conducted with a minimum number of personnel in the immediate vicinity. The test will be conducted during daylight hours only.

8. Emergency Phone Numbers

Eddy County Sheriff's Office 911 or (575) 887-7551

Ambulance Service 911 or (575) 885-2111

Carlsbad Fire Dept 911 or (575) 885-2111

Closest Medical Facility - Columbia Medical Center of Carlsbad (575) 492-5000

McCRAE SWD #1
H_2S DIAGRAM