Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

Section 2 - Blowout Prevention

Pressure Rating (PSI): 3M **Rating Depth:** 9665

Equipment: 3M rotating head, mud-gas seperator, panic line, and flare will be rigged up prior to drilling out surface casing.

Requesting Variance? YES

Variance request: A variance is requested for the use of a flexible choke line from the BOP stack to the choke manifold. See attached for specs for hydrostatic test chart.
Testing Procedure: A multibowl wellhead may be used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

Choke Diagram Attachment:

Thistle Unit 153H_Choke_BOP Equipment_3M_09-06-2016.pdf

BOP Diagram Attachment:

Thistle Unit 153H_Choke_BOP Equipment_3M_09-06-2016.pdf

Pressure Rating (PSI): 3M **Rating Depth:** 5100

Equipment: 3M rotating head, mud-gas seperator, panic line, and flare will be rigged up prior to drilling out surface casing.

Requesting Variance? YES

Variance request: A variance is requested for the use of a flexible choke line from the BOP stack to the choke manifold. See attached for specs for hydrostatic test chart.
Testing Procedure: A multibowl wellhead may be used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

Choke Diagram Attachment:

Thistle Unit 153H_Choke_BOP Equipment_3M_09-06-2016.pdf

BOP Diagram Attachment:

Thistle Unit 153H_Choke_BOP Equipment_3M_09-06-2016.pdf

Section 3 - Casing

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

String Type: INTERMEDIATE **Other String Type:** * See COA: Casing must be kept 1/3 fluid filled

Hole Size: 12.25

Top setting depth MD: 0 **Top setting depth TVD:** 0

Top setting depth MSL: 3661

Bottom setting depth MD: ~~5100~~ 4300 **Bottom setting depth TVD:** ~~5100~~ 4300

Bottom setting depth MSL: -1439

Calculated casing length MD: ~~5100~~ 4300

Casing Size: 9.625 **Other Size**

Grade: J-55 **Other Grade:**

Weight: 40

Joint Type: OTHER **Other Joint Type:** btc

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 1.15 **Burst Design Safety Factor:** 1.77

Joint Tensile Design Safety Factor type: BUOYANT **Joint Tensile Design Safety Factor:** 3.98

Body Tensile Design Safety Factor type: BUOYANT **Body Tensile Design Safety Factor:** 3.98

Casing Design Assumptions and Worksheet(s):

Thistle Unit 153H_Intermediate Casing Assumptions_09-06-2016.docx

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

String Type: SURFACE **Other String Type:**

Hole Size: 17.5

Top setting depth MD: 0 **Top setting depth TVD:** 0

[redacted]:

Bottom setting depth MD: 1400 **Bottom setting depth TVD:** 1400

[redacted]

Calculated casing length MD: 1400

Casing Size: 13.375 **Other Size**

Grade: H-40 **Other Grade:**

Weight: 48

Joint Type: STC **Other Joint Type:**

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 1.18 **Burst Design Safety Factor:** 2.64

Joint Tensile Design Safety Factor type: BUOYANT **Joint Tensile Design Safety Factor:** 8.05

Body Tensile Design Safety Factor type: BUOYANT **Body Tensile Design Safety Factor:** 8.05

Casing Design Assumptions and Worksheet(s):

Thistle Unit 153H_Surface Casing Assumptions_09-06-2016.docx

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

String Type: INTERMEDIATE **Other String Type:**

Hole Size: 12.25

Top setting depth MD: 4300 **Top setting depth TVD:** 4300

[redacted]

Bottom setting depth MD: 5100 **Bottom setting depth TVD:** 5100

[redacted]

Calculated casing length MD: 800

Casing Size: 9.625 **Other Size**

Grade: HCK-55 **Other Grade:**

Weight: 40

Joint Type: OTHER **Other Joint Type:** btc

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 1.58 **Burst Design Safety Factor:** 1.47

Joint Tensile Design Safety Factor type: BUOYANT **Joint Tensile Design Safety Factor:** 4.5

Body Tensile Design Safety Factor type: BUOYANT **Body Tensile Design Safety Factor:** 4.5

Casing Design Assumptions and Worksheet(s):

Thistle Unit 153H_Intermediate Casing Assumptions_09-06-2016.docx

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

String Type: PRODUCTION **Other String Type:**

Hole Size: 8.75

Top setting depth MD: 0 **Top setting depth TVD:** 0

Top setting depth MSL: 3661

Bottom setting depth MD: 19326 **Bottom setting depth TVD:** 9665

Bottom setting depth MSL: -6004

Calculated casing length MD: 19326

Casing Size: 5.5 **Other Size**

Grade: P-110 **Other Grade:**

Weight: 17

Joint Type: OTHER **Other Joint Type:** btc

Condition: NEW

Inspection Document:

Standard: API

Spec Document:

Tapered String?: N

Tapered String Spec:

Safety Factors

Collapse Design Safety Factor: 1.56 **Burst Design Safety Factor:** 1.93

Joint Tensile Design Safety Factor type: BUOYANT **Joint Tensile Design Safety Factor:** 2.09

Body Tensile Design Safety Factor type: BUOYANT **Body Tensile Design Safety Factor:** 2.09

Casing Design Assumptions and Worksheet(s):

Thistle Unit 153H_Production Casing Assumptions_09-06-2016.docx

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Section 4 - Cement

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

Casing String Type: SURFACE

Stage Tool Depth: 300

Lead

Top MD of Segment: 0	**Bottom MD Segment:** 300	**Cement Type:** C
Additives: N/A	**Quantity (sks):** 185	**Yield (cu.ff./sk):** 1.72
Density: 13.5	**Volume (cu.ft.):** 312	**Percent Excess:** 50

Tail

Top MD of Segment: 300	**Bottom MD Segment:** 1400	**Cement Type:** C
Additives: N/A	**Quantity (sks):** 865	**Yield (cu.ff./sk):** 1.33
Density: 14.8	**Volume (cu.ft.):** 1146	**Percent Excess:** 50

Stage Tool Depth: 300

Lead

Top MD of Segment: 0	**Bottom MD Segment:** 300	**Cement Type:** C
Additives: N/A	**Quantity (sks):** 235	**Yield (cu.ff./sk):** 1.33
Density: 14.8	**Volume (cu.ft.):** 312	**Percent Excess:** 50

Stage Tool Depth:

Lead

Top MD of Segment: 0	**Bottom MD Segment:** 1400	**Cement Type:** C
Additives: 1% Calcium Chloride	**Quantity (sks):** 1090	**Yield (cu.ff./sk):** 1.34
Density: 14.8	**Volume (cu.ft.):** 1458	**Percent Excess:** 50

Casing String Type: INTERMEDIATE * See COA Additional cement maybe Required

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

Stage Tool Depth:

Lead

Top MD of Segment: 0	**Bottom MD Segment:** 4100	**Cement Type:** C
Additives: Poz (Fly Ash): 6% BWOC Bentonite + 5% BWOW Sodium Chloride + 0.125 lbs/sks Poly-E-Flake	**Quantity (sks):** 905	**Yield (cu.ff./sk):** 1.85
	Volume (cu.ft.): 1669	**Percent Excess:** 30
Density: 12.9		

Tail

	Bottom MD Segment: 5100	**Cement Type:** H
Top MD of Segment: 4100	**Quantity (sks):** 320	**Yield (cu.ff./sk):** 1.33
Additives: 0.125 lbs/sks Poly-R-Flake	**Volume (cu.ft.):** 426	**Percent Excess:** 30
Density: 14.8		

Casing String Type: PRODUCTION

Stage Tool Depth: 5500

Lead

Top MD of Segment: 4800	**Bottom MD Segment:** 4900	**Cement Type:** C
Additives: Enhancer 923 + 10% BWOC Bentonite + 0.05% BWOC SA-1015 + 0.3% BWOC HR-800 + 0.2% BWOC FE-2 + 0.125 lb/sk Pol-E-Flake + 0.5 lb/sk D-Air 5000	**Quantity (sks):** 20	**Yield (cu.ff./sk):** 3.31
	Volume (cu.ft.): 66	**Percent Excess:** 25
Density: 10.9		

Tail

	Bottom MD Segment: 5000	**Cement Type:** H
Top MD of Segment: 4900	**Quantity (sks):** 30	**Yield (cu.ff./sk):** 1.33
Additives: 0.125 lbs/sack Poly-E-Flake	**Volume (cu.ft.):** 39	**Percent Excess:** 25
Density: 14.8		

2ND Stage DV Tool

Stage Tool Depth:

Lead

Top MD of Segment: 4900	**Bottom MD Segment:** 9500	**Cement Type:** H
Additives: Poz (Fly Ash) + 0.3% BWOC HR-601 + 10% bwoc Bentonite	**Quantity (sks):** 580	**Yield (cu.ff./sk):** 2.31
	Volume (cu.ft.): 1336	**Percent Excess:** 25
Density: 11.9		

Tail

Top MD of Segment: 9500	**Bottom MD Segment:** 19326	**Cement Type:** H
Additives: Poz (Fly Ash) + 0.5% bwoc HALAD-344 + 0.4% bwoc CFR-3 + 0.2% BWOC HR-601 + 2% bwoc Bentonite	**Quantity (sks):** 2380	**Yield (cu.ff./sk):** 1.2
	Volume (cu.ft.): 2854	**Percent Excess:** 25
Density: 14.5		

Single Stage Cement Program

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

Stage Tool Depth: 5500

Lead

Top MD of Segment: 5000 **Bottom MD Segment:** 9500 **Cement Type:** C

Additives: Enhancer 923 + 10% BWOC Bentonite + 0.05% BWOC SA-1015 + 0.3% BWOC HR-800 + 0.2% BWOC FE-2 + 0.125 lb/sk Pol-E-Flake + 0.5 lb/sk D-Air 5000 **Quantity (sks):** 405 **Yield (cu.ff./sk):** 3.31

Volume (cu.ft.): 1336 **Percent Excess:** 25

1st Stage DV Tool

Tail

Density: 10.9 **Bottom MD Segment:** 19326 **Cement Type:** H

Quantity (sks): 2380 **Yield (cu.ff./sk):** 1.2

Top MD of Segment: 9500 **Volume (cu.ft.):** 2854 **Percent Excess:** 25

Additives: Poz (Fly Ash) + 0.5% bwoc HALAD-344 + 0.4% bwoc CFR-3 + 0.2% BWOC HR-601 + 2% bwoc Bentonite

Density: 14.5

Section 5 - Circulating Medium

Mud System Type: Closed

Will an air or gas system be Used? NO

Description of the equipment for the circulating system in accordance with Onshore Order #2:

Diagram of the equipment for the circulating system in accordance with Onshore Order #2:

Describe what will be on location to control well or mitigate other conditions: Sufficient mud materials to maintain mud properties and meet minimum lost circulation and weight increase requirements will be kept on location at all times.

Describe the mud monitoring system utilized: PVT/Pason/Visual Monitoring

Circulating Medium Table

Top Depth: 0 **Bottom Depth:** 1400

Mud Type: WATER-BASED MUD

Min Weight (lbs./gal.): 8.5 **Max Weight (lbs./gal.):** 9

Density (lbs/cu.ft.): **Gel Strength (lbs/100 sq.ft.):**

PH: **Viscosity (CP):** 2

Filtration (cc): **Salinity (ppm):**

Additional Characteristics:

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

Top Depth: 0 **Bottom Depth:** 5100

Mud Type: SALT SATURATED

Min Weight (lbs./gal.): 10 **Max Weight (lbs./gal.):** 11

Density (lbs/cu.ft.): **Gel Strength (lbs/100 sq.ft.):**

PH: **Viscosity (CP):** 2

Filtration (cc): **Salinity (ppm):**

Additional Characteristics:

Top Depth: 5100 **Bottom Depth:** 17109

Mud Type: WATER-BASED MUD

Min Weight (lbs./gal.): 8.5 **Max Weight (lbs./gal.):** 9.3

Density (lbs/cu.ft.): **Gel Strength (lbs/100 sq.ft.):**

PH: **Viscosity (CP):** 12

Filtration (cc): **Salinity (ppm):**

Additional Characteristics:

Section 6 - Test, Logging, Coring

List of production tests including testing procedures, equipment and safety measures:

Will run GR/CNL fromTD to surface (horizontal well – vertical portion of hole). Stated logs run will be in the Completion Report and submitted to the BLM.

List of open and cased hole logs run in the well:

GR

Coring operation description for the well:

N/A

Section 7 - Pressure

Anticipated Bottom Hole Pressure: 4223 **Anticipated Surface Pressure:** 2096.69

Anticipated Bottom Hole Temperature(F): 150

Anticipated abnormal proessures, temperatures, or potential geologic hazards? NO

Describe:

Contingency Plans geoharzards description:

Contingency Plans geohazards attachment:

Operator Name: DEVON ENERGY PRODUCTION COMPANY LP

Well Name: THISTLE UNIT **Well Number:** 153H

Hydrogen Sulfide drilling operations plan required? YES

Hydrogen sulfide drilling operations plan:

Thistle Unit 153H_H2S Plan_09-07-2016.pdf

Section 8 - Other Information

Proposed horizontal/directional/multi-lateral plan submission:

Thistle Unit 153H_Directional Plan_09-07-2016.pdf

Other proposed operations facets description:

Multi-Bowl Verbiage
Multi-Bowl Wellhead
Closed-Loop Design Plan
Anti-Collision Plan

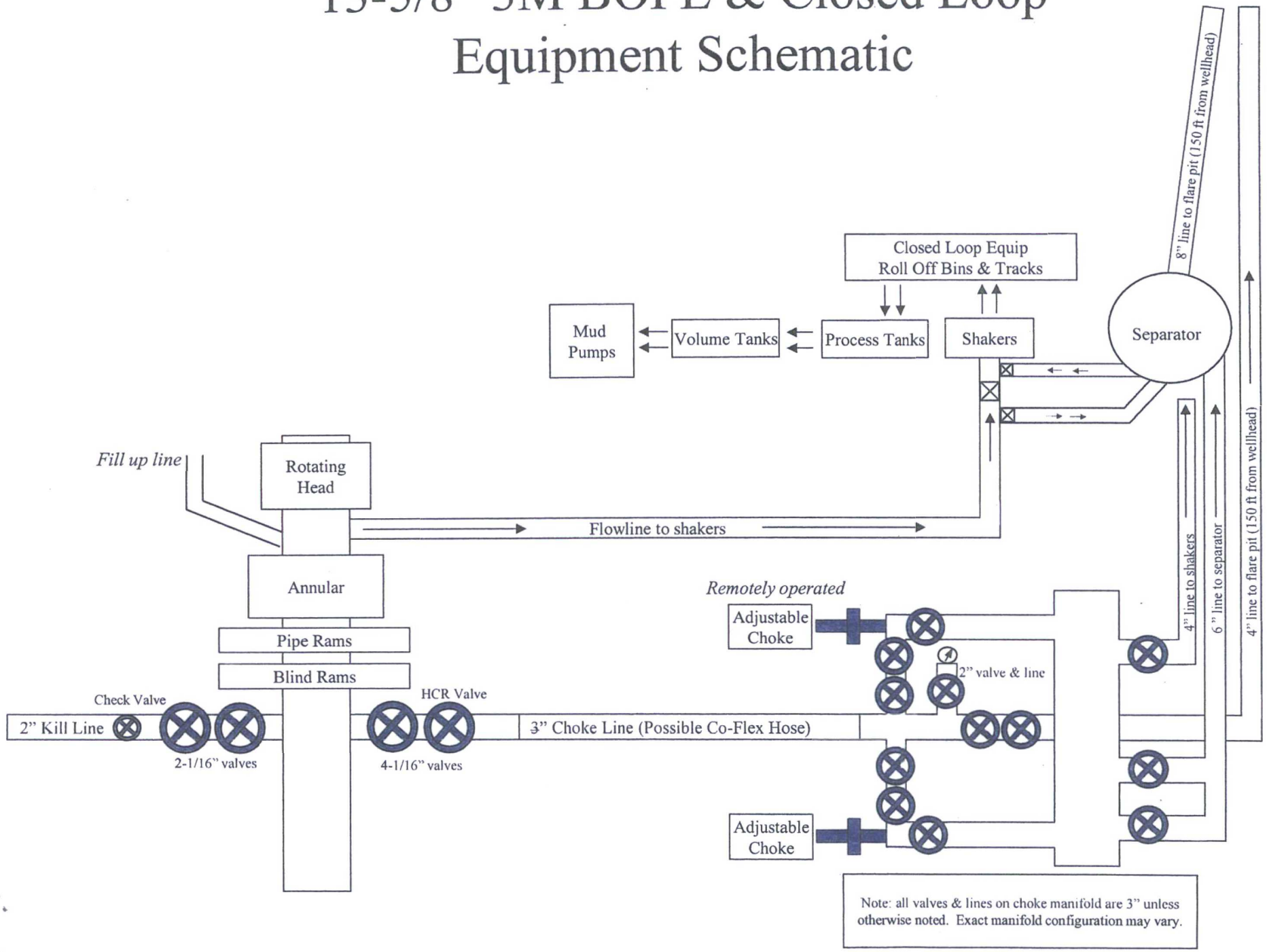
Other proposed operations facets attachment:

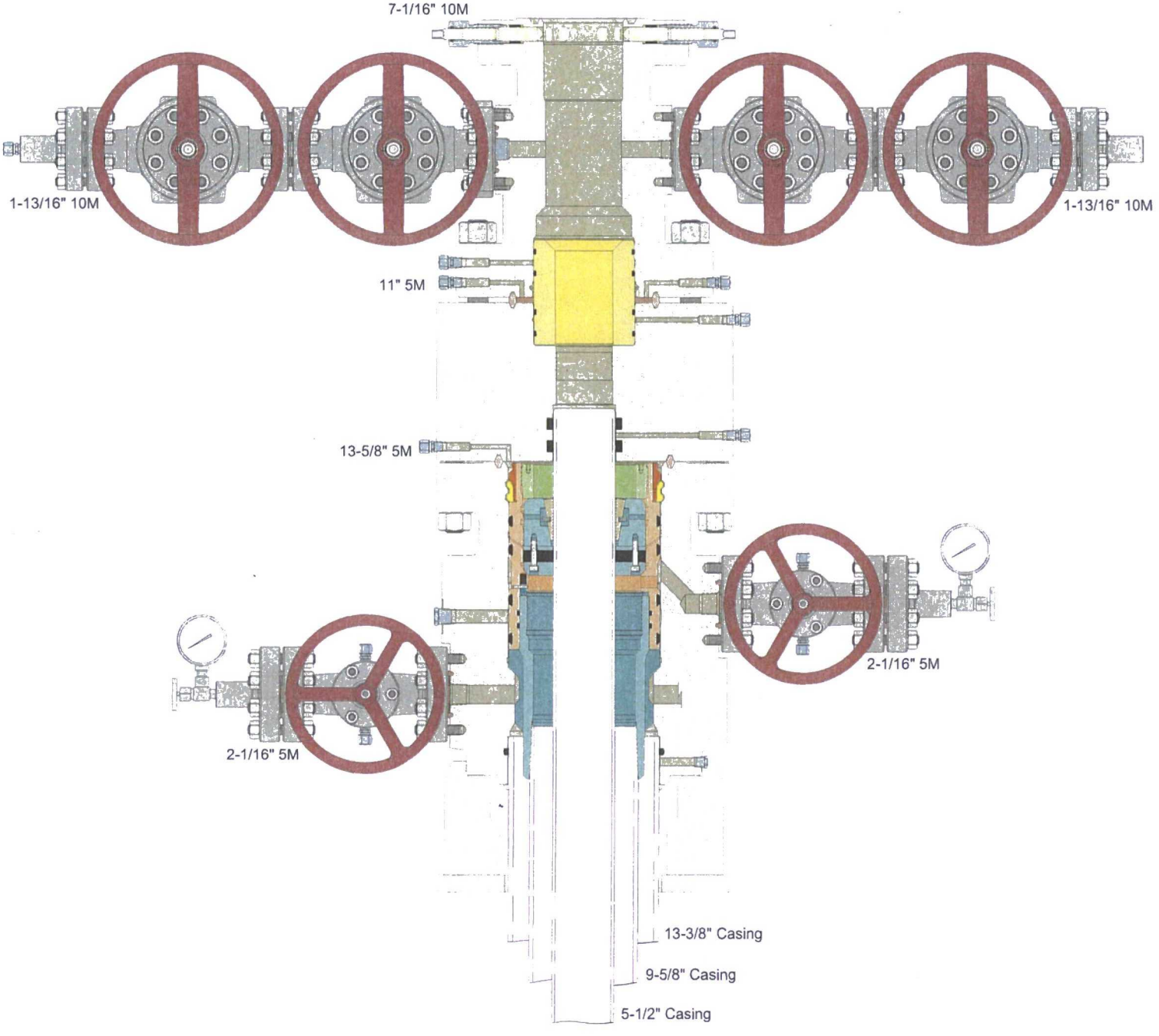
Thistle Unit 153H_Multi-Bowl Verbiage_3M_09-07-2016.pdf
Thistle Unit 153H_Multi-Bowl Wellhead_09-07-2016.pdf
Thistle Unit 153H_Closed Loop Design Plan_09-07-2016.pdf
Thistle Unit 153H_AC Report_09-15-2016.pdf

Other Variance attachment:

Thistle Unit 153H_H_P Co-flex hose_09-07-2016.pdf

13-5/8" 3M BOPE & Closed Loop Equipment Schematic




7-1/16" 10M
1-13/16" 10M
1-13/16" 10M
11" 5M
13-5/8" 5M
2-1/16" 5M
2-1/16" 5M
13-3/8" Casing
9-5/8" Casing
5-1/2" Casing

A multibowl wellhead may be used. The BOP will be tested per Onshore Order #2 after installation on the surface casing which will cover testing requirements for a maximum of 30 days. If any seal subject to test pressure is broken the system must be tested.

Devon proposes using a multi-bowl wellhead assembly. This assembly will only be tested when installed on the surface casing. Minimum working pressure of the blowout preventer (BOP) and related equipment (BOPE) required for drilling below the surface casing shoe shall be 3000 (3M) psi.

- Wellhead will be installed by wellhead representatives.
- If the welding is performed by a third party, the wellhead representative will monitor the temperature to verify that it does not exceed the maximum temperature of the seal.
- Wellhead representative will install the test plug for the initial BOP test.
- Wellhead company will install a solid steel body pack-off to completely isolate the lower head after cementing intermediate casing. After installation of the pack-off, the pack-off and the lower flange will be tested to 3M, as shown on the attached schematic. Everything above the pack-off will not have been altered whatsoever from the initial nipple up. Therefore the BOP components will not be retested at that time.
- If the cement does not circulate and one inch operations would have been possible with a standard wellhead, the well head will be cut and top out operations will be conducted.
- Devon will pressure test all seals above and below the mandrel (but still above the casing) to full working pressure rating.
- Devon will test the casing to 0.22 psi/ft or 1500 psi, whichever is greater, as per Onshore Order #2.

After running the 13-3/8" surface casing, a 13-5/8" BOP/BOPE system with a minimum rating of 3M will be installed on the wellhead system and will undergo a 250 psi low pressure test followed by a 3,000 psi high pressure test. The 3,000 psi high and 250 psi low test will cover testing requirements a maximum of 30 days, as per Onshore Order #2. If the well is not complete within 30 days of this BOP test, another full BOP test will be conducted, as per Onshore Order #2.
After running the 9-5/8' intermediate casing with a mandrel hanger, the 13-5/8" BOP/BOPE system with a minimum rating of 3M will already be installed on the wellhead.

The pipe rams will be operated and checked each 24 hour period and each time the drill pipe is out of the hole. These tests will be logged in the daily driller's log. A 2" kill line and 3" choke line will be incorporated into the drilling spool below the ram BOP. In addition to the rams and annular preventer, additional BOP accessories include a kelly cock, floor safety valve, choke lines, and choke manifold rated at 3,000 psi WP.

Devon's proposed wellhead manufactures will be FMC Technologies, Cactus Wellhead, or Cameron.

Continental CONTITECH

Fluid Technology

ContiTech Beattie Corp.
Website: www.contitechbeattie.com

Monday, June 14, 2010

RE: Drilling & Production Hoses
Lifting & Safety Equipment

To Helmerich & Payne,

A Continental ContiTech hose assembly can perform as intended and suitable for the application regardless of whether the hose is secured or unsecured in its configuration. As a manufacturer of High Pressure Hose Assemblies for use in Drilling & Production, we do offer the corresponding lifting and safety equipment, this has the added benefit of easing the lifting and handling of each hose assembly whilst affording hose longevity by ensuring correct handling methods and procedures as well as securing the hose in the unlikely event of a failure; but in no way does the lifting and safety equipment affect the performance of the hoses providing the hoses have been handled and installed correctly It is good practice to use lifting & safety equipment but not mandatory

Should you have any questions or require any additional information/clarifications then please do not hesitate to contact us.

ContiTech Beattie is part of the Continental AG Corporation and can offer the full support resources associated with a global organization.

Best regards,

Robin Hodgson
Sales Manager
ContiTech Beattie Corp

ContiTech Beattie Corp,
11535 Brittmoore Park Drive,
Houston, TX 77041
Phone: +1 (832) 327-0141
Fax: +1 (832) 327-0148
www.contitechbeattie.com

Thistle Unit 153H

Casing Assumptions and Load Cases

Surface

All casing design assumptions were ran in Stress Check to determine safety factor which meet or exceed both Devon Energy and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the pipe.

Surface Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Formation Pore Pressure	Max mud weight of next hole-section plus Test psi
Drill Ahead	Formation Pore Pressure	Max mud weight of next hole section
Displace to Gas	Formation Pore Pressure	Dry gas from next casing point

Surface Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Water gradient in cement, mud above TOC	None
Cementing	Wet cement weight	Water (8.33ppg)

Surface Casing Tension Design	
Load Case	**Assumptions**
Overpull	100kips
Runing in hole	3 ft/s
Service Loads	N/A

Thistle Unit 153H

Casing Assumptions and Load Cases

Intermediate

All casing design assumptions were ran in Stress Check to determine safety factor which meet or exceed both Devon Energy and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the pipe.

Intermediate Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Formation Pore Pressure	Max mud weight of next hole-section plus Test psi
Drill Ahead	Formation Pore Pressure	Max mud weight of next hole section
Fracture @ Shoe	Formation Pore Pressure	Dry gas

Intermediate Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Water gradient in cement, mud above TOC	None
Cementing	Wet cement weight	Water (8.33ppg)

Intermediate Casing Tension Design	
Load Case	**Assumptions**
Overpull	100kips
Runing in hole	2 ft/s
Service Loads	N/A

Thistle Unit 153H

Casing Assumptions and Load Cases

Production

All casing design assumptions were ran in Stress Check to determine safety factor which meet or exceed both Devon Energy and BLM minimum requirements. All casing strings will be filled while running in hole in order to not exceed collapse rating of the pipe.

Production Casing Burst Design		
Load Case	**External Pressure**	**Internal Pressure**
Pressure Test	Formation Pore Pressure	Fluid in hole (water or produced water) + test psi
Tubing Leak	Formation Pore Pressure	Packer @ KOP, leak below surface 8.6 ppg packer fluid
Stimulation	Formation Pore Pressure	Max frac pressure with heaviest frac fluid

Production Casing Collapse Design		
Load Case	**External Pressure**	**Internal Pressure**
Full Evacuation	Water gradient in cement, mud above TOC.	None
Cementing	Wet cement weight	Water (8.33ppg)

Production Casing Tension Design	
Load Case	**Assumptions**
Overpull	100kips
Runing in hole	2 ft/s
Service Loads	N/A

RIG 212

PHOENIX

QUALITY DOCUMENT

PHOENIX RUBBER INDUSTRIAL LTD.

6728 Szeged, Budapesti út 10. Hungary • H-6701 Szeged, P. O. Box 152
Phone: (3662) 566-737 • Fax: (3662) 566-738

SALES & MARKETING: H-1092 Budapest, Ráday u. 42-44. Hungary • H-1440 Budapest, P. O. Box 26
Phone: (361) 456-4200 · Fax: (361) 217-2972, 456-4273 · www.taurusemerge.hu

QUALITY CONTROL INSPECTION AND TEST CERTIFICATE					CERT. N°: 552
PURCHASER: Phoenix Beattie Co.					P.O. N°: 1519FA-871
PHOENIX RUBBER order N°: 170466		HOSE TYPE: 3" ID		Choke and Kill Hose	
HOSE SERIAL N°: 34128		NOMINAL / ACTUAL LENGTH:		11,43 m	
W.P. 68,96 MPa	10000 psi	T.P. 103,4 MPa	15000 psi	Duration: 60	min.

Pressure test with water at ambient temperature

See attachment. (1 page)

↑ 10 mm = 10 Min.

→ 10 mm = 25 MPa

COUPLINGS

Type	Serial N°	Quality	Heat N°
3" coupling with	720 719	AISI 4130	C7626
4 1/16" Flange end		AISI 4130	47357

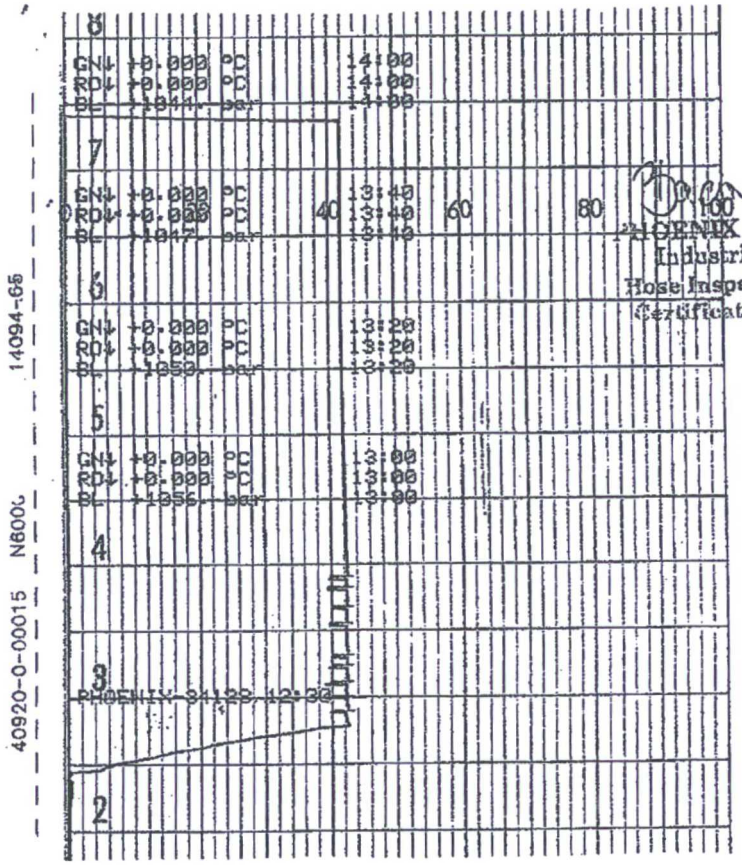
API Spec 16 C
Temperature rate:"B"

All metal parts are flawless

WE CERTIFY THAT THE ABOVE HOSE HAS BEEN MANUFACTURED IN ACCORDANCE WITH THE TERMS OF THE ORDER AND PRESSURE TESTED AS ABOVE WITH SATISFACTORY RESULT.

Date:	Inspector	Quality Control
29. April. 2002.		PHOENIX RUBBER Industrial Ltd. Hose Inspection and Verification Dept.

CERTIFIED TRUE COPY
PHOENIX RUBBER Q.C.



VERIFIED TRUE COPY
PHOENIX RUBBER Q.C.