

Statement of Qualifications as Independent Third Party

Axon Pressure Products, Inc. and its subsidiaries, Church Energy Services Ltd. ("Church Energy"), Drilling Controls Inc. ("DCI") (collectively, "Axon"), is an established well control equipment manufacturers with multiple manufacturing facilities and over 150 employees that provide engineering design, manufacturing, and aftermarket service of oilfield equipment. Axon is a qualified independent third party under the guidelines of the Bureau of Ocean Energy Management Regulation and Enforcement (BOEMRE). Axon is an American Petroleum Institute (API) licensed manufacturer with state of the art software for computer modeling, stress calculations, material testing and recording. Through its subsidiaries, Axon has been operating as an American Petroleum Institute (API) licensed manufacturer for 8 years in the United States. Axon is licensed by the API for the design and manufacture of products from the following Specifications:

1. **API SPECIFICATION 16A/ISO 13533:** Petroleum and Natural Gas Industries: Drilling and Production Equipment: Drill-Through Equipment
2. **API SPECIFICATION 6A/ISO 10423:** Petroleum and Natural Gas Industries: Drilling and Production Equipment: Wellhead and Christmas Tree Equipment
3. **API SPECIFICATION 16C:** Specification for Choke and Kill Systems
4. **API SPECIFICATION 16D:** Specification for Control Systems for Drilling Well Control Equipment and Control Systems for Diverter Equipment

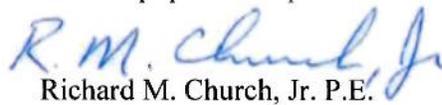
All designs are made by Registered Professional Engineers with extensive experience in the design of blowout preventers and all facets of well control equipment.

Axon specializes in the remanufacture, inspection and certification of well control equipment such as:

1. Ram and Annular Blowout Preventers
2. Ram blocks, packers, etc.
3. Choke and Kill Manifolds
4. Gate Valves, drilling chokes
5. Surface and subsea control systems

Axon will retain and provide the following to BOEMRE

1. Statement of Fact as to the condition of the equipment.
2. Actual field service report of the inspections and condition of the equipment.
3. List of the actual Blowout Preventer equipment inspected.



Richard M. Church, Jr. P.E.
Vice President of Engineering and Quality
June 1, 2011



2810 Washington Drive
Houston, TX 77038-3319
Telephone: (281) 931-1400
Facsimile: (281) 931-8700
e-mail: sales@church-energy.com

ENGINEERING REPORT

REPORT NO.: ER112B
DATE: 06.24.10

TITLE: Test Report on Shear Ram performance performed at Church Energy Services facilities for a 13-5/8" 10000 psi W.P. Type U (Cameron) blowout preventer (BOP) equipped with large bore shear bonnets and shear boosters (LBT) with type ISR shear rams installed

DATE OF TEST: 17 June 2010

BACKGROUND: Church Energy Services was requested by Seahawk Drilling, Inc., Hercules Offshore, Inc. and Diamond Offshore to perform shear ram testing on 5" S-135 and 5" G-105 drill pipe used by both companies in their offshore drilling operations. This was initiated by a request from the United States MMS for verification of the equipment to perform its required function.

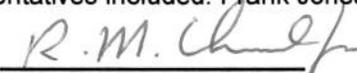
EQUIPMENT: A double ram Cameron Type U BOP was furnished by Seahawk Drilling in performing the shear tests. The BOP consisted of standard bonnets on the upper cavity and large bore shear bonnets on the lower cavity. Shear boosters were installed on the lower cavity. Shear rams and drill pipe were also furnished by Seahawk drilling. The rams were manufactured by Church Energy Services and the BOP had been recently remanufactured and re-certified by Church Energy Services. Hydrostatic test equipment and facilities were provided by Church Energy Services.

PROCEDURE: An 84" length of pipe was suspended into the BOP approximately midway across the shear rams. No attempt was made to center the pipe in the bore of the BOP. Strip chart recorders were used to monitor the closing pressure and bore pressures after shearing. No well bore pressure was used during the shearing operation. After shearing of the pipe, low pressure and the working pressure of the BOP were applied beneath the shear rams. A visual inspection of the shear rams was made between each shear test. After removal of the sheared pipe and shear rams, the rams were cleaned and surface NDE performed on the shearing blade surfaces.

SUMMARY: Church Energy Services supplied calculations for the predicted maximum operating shearing pressure of the 5" S-135 drill pipe to be approximately 2233 psi. The actual shearing operating pressure from the test was approximately 1000 psi (45% of calculated). The calculated maximum operating shearing pressure of the 5" G-105 drill pipe was to be approximately 2011 psi. The actual shearing operating pressure from the test was approximately 950 psi (47% of calculated). Visual inspection of the shear rams showed minor brinelling of the shear blade areas. Surface NDE showed no indications caused by the shear tests. The shear rams were dressed using emery paper by hand and were indistinguishable from a new set of shear rams.

ATTENDEES: The test was witnessed by numerous employees of Seahawk Drilling and Hercules Offshore along with other drilling contractor personnel and Church Energy employees.

Third Party representatives included: Frank Jones, Moduspec; I. M. Dobbie, ABS; Jarvis Outlaw, US MMS

PREPARED BY: 
Richard M. Church, Jr. P.E.

Attachments

TYPE CAMERON U RAM BLOWOUT PREVENTER
SHEAR TEST DATA

CUSTOMER: SEAHAWK / HERCULES

DATE: 06-17-2010

BOP size: 13-5/8"

Pressure: 10,000 psi

UPPER RAM SN 720007-000-1

BOP type: DOUBLE

LOWER RAM SN 720008-000-1

Bonnet type: LBT (Large Bore Shear with Boosters)

Ram type: ISR

Pipe / Tubular to shear: 5" 19.5 ppf S-135

Maximum allowable operating pressure of bonnet: 3000 psi

Is the pipe geometry acceptable per the requirements of PD220-01, Section 5.0? YES

Shear pressure, P_{Shear} calculated using the equation in PD220-01, Section 6.0: 2233 psi

PROCEDURE:

1. Lower the pipe into the BOP and suspend it approximately 3" above the blind flange.

2. Close the shear rams and monitor the pressure to shear.

Pressure to shear: 1000 psi

3. Apply pressure below the rams and hold for 10 mins.

a. Low Pressure: 200-300 psi Accept: YES

b. High Pressure: 10,000 psi Accept: YES

4. Open shear rams and remove from bonnets.

5. Inspect ram cavities and rams for damage.

Data recorded by:

R. Church
R. CHURCH /
Name / Signature

CHURCH ENERGY SERVICES
Company

06-17-2010
Date

Witness:

FRANK JONES
Name / Signature
I. H. DOBBIE
WITNESS
06/17/10

M. S. S. P. C.
Company

17/6/2010
Date

TYPE CAMERON U RAM BLOWOUT PREVENTER
SHEAR TEST DATA

CUSTOMER: SEAHAWK / HERCULES **DATE:** 06-17-2010

BOP size: 13-5/8"

Pressure: 10,000 psi UPPER RAM SN 720007-000-1

BOP type: DOUBLE LOWE RAM SN 720008-000-1

Bonnet type: LBT (Large Bore Shear with Boosters)

Ram type: ISR

Pipe / Tubular to shear: 5" 19.5 ppf G-105

Maximum allowable operating pressure of bonnet: 3000 psi

Is the pipe geometry acceptable per the requirements of PD220-01, Section 5.0? YES

Shear pressure, P_{Shear} calculated using the equation in PD220-01, Section 6.0: 2011 psi

PROCEDURE:

1. Lower the pipe into the BOP and suspend it approximately 3" above the blind flange.
2. Close the shear rams and monitor the pressure to shear.

Pressure to shear: 950 psi

3. Apply pressure below the rams and hold for 10 mins.

a. Low Pressure: 200-300 psi Accept: YES

b. High Pressure: 10,000 psi Accept: YES

4. Open shear rams and remove from bonnets.
5. Inspect ram cavities and rams for damage.

Data recorded by:

<u>R. Church</u> Name / Signature	<u>CHURCH ENERGY SERVICES</u> Company	<u>06-17-2010</u> Date
--------------------------------------	--	---------------------------

Witness:

<u>F. Jones / Frank Jones</u> Name / Signature	<u>Modularpac</u> Company	<u>17/6/2010</u> Date
<u>J.M. DOBBIE</u> A.B.S. WITNESS ONLY		

CAMERON TYPE U RAM BLOWOUT PREVENTER
REQUIRED SHEAR PRESSURE CALCULATION FORM

BY: R. M. Church, Jr.
Richard M. Church, Jr. P.E.

CUSTOMER: Seahawk / Hercules

RIG: N/A

LOCATION: N/A

DATE: 09-10-2010

OPERATOR: N/A

BOP Size: 13-5/8" Pressure: 10,000 psi

Bonnet Type: LBT (Large Bore Shear with Boosters) Booster size: 11"

Ram Type used: ISR

Pipe / Tubular to Shear: 5" 19.5 ppf S-135 (0.362" wall thickness)

Maximum Allowable Operating Pressure of Bonnet: 3000 psi

P_w (Wellbore Pressure at the time of the Shear): 0 psi

Is the pipe geometry acceptable per the requirements of PD220-01, Section 5.0? YES

INPUT VARIABLES:

C₁ = 224 BOP / Bonnet constant corresponding to the piston closing area

C₂ = 13 BOP / Bonnet constant corresponding to the piston rod opening area

C₃ = 0.19 Shear ram type / pipe grade constant

ppf = 19.5 lbf/ft

σ_{yield} = 135,000 Minimum Yield Strength of Pipe Material (psi)

Shear pressure, P_{Shear} is calculated using the following equation:

$$P_{\text{Shear}} = \left[\frac{(C_3)(ppf)(\sigma_{\text{yield}}) + (P_w)(C_2)}{C_1} \right]$$

P_{Shear} (Bonnet Shear Pressure) = 2233 psi

Therefore, since P_{Shear} is less than the maximum allowable operator pressure, the BOP is acceptable for the shearing operation.

CAMERON TYPE U RAM BLOWOUT PREVENTER
REQUIRED SHEAR PRESSURE CALCULATION FORM

BY: R. M. Church, Jr.
Richard M. Church, Jr. P.E.

CUSTOMER: Seahawk / Hercules

RIG: N/A

LOCATION: N/A

DATE: 09-10-2010

OPERATOR: N/A

BOP Size: 13-5/8" Pressure: 10,000 psi

Bonnet Type: LBT (Large Bore Shear with Boosters) Booster size: 11"

Ram Type used: ISR

Pipe / Tubular to Shear: 5" 19.5 ppf G-105 (0.362" wall thickness)

Maximum Allowable Operating Pressure of Bonnet: 3000 psi

P_w (Wellbore Pressure at the time of the Shear): 0 psi

Is the pipe geometry acceptable per the requirements of PD220-01, Section 5.0? YES

INPUT VARIABLES:

C₁ = 224 BOP / Bonnet constant corresponding to the piston closing area

C₂ = 13 BOP / Bonnet constant corresponding to the piston rod opening area

C₃ = 0.22 Shear ram type / pipe grade constant

ppf = 19.5 lbf/ft

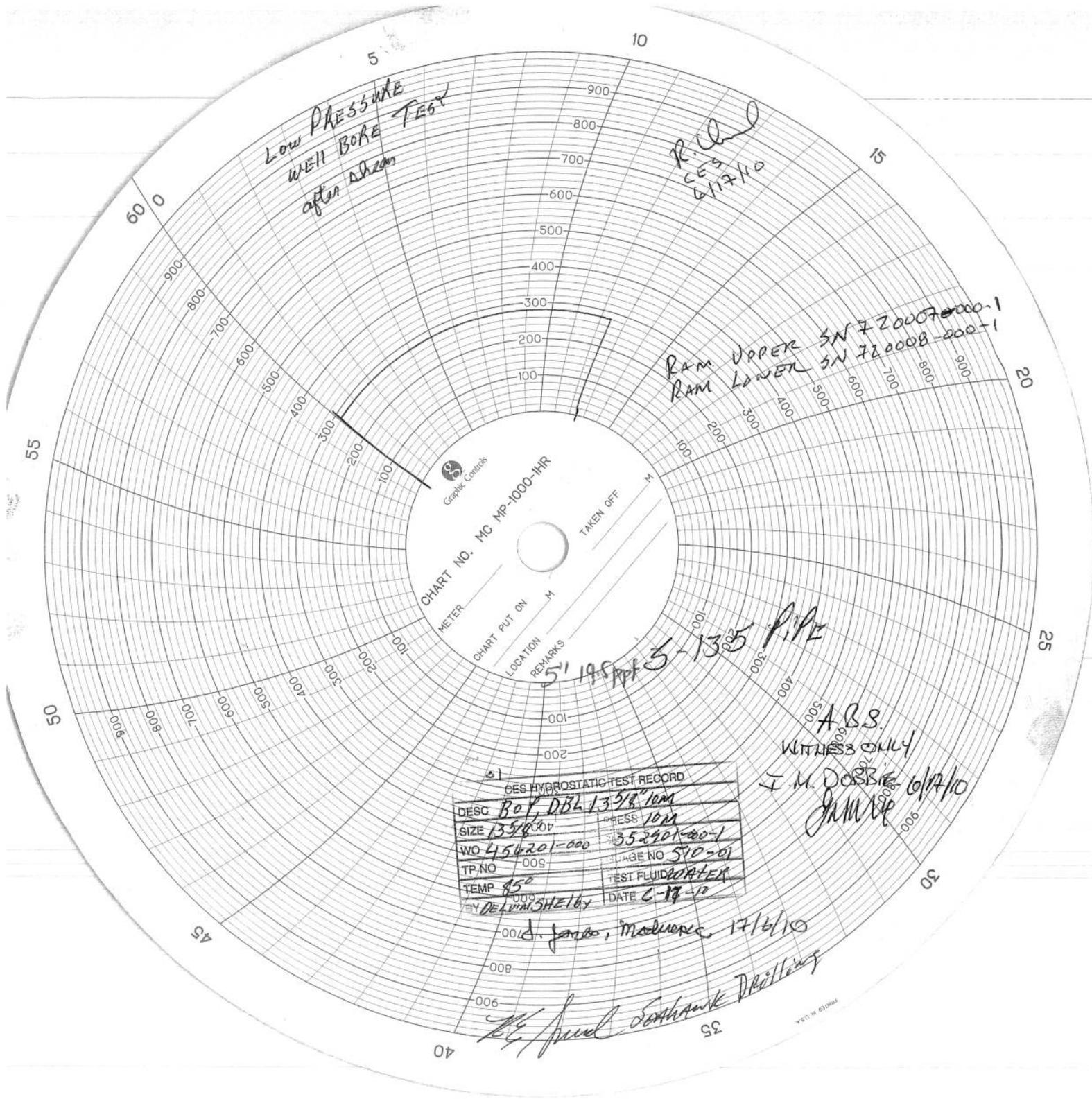
σ_{yield} = 105,000 Minimum Yield Strength of Pipe Material (psi)

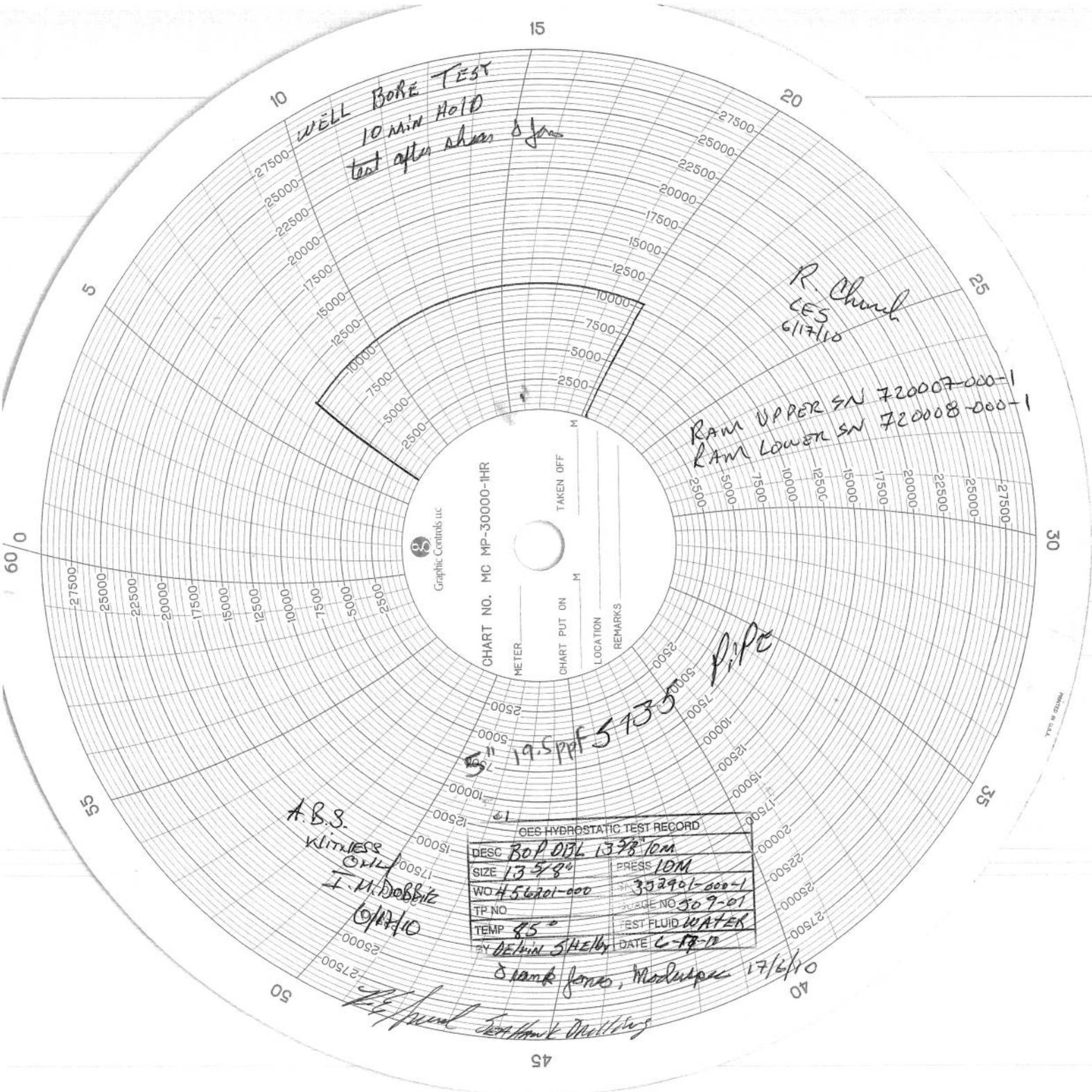
Shear pressure, P_{Shear} is calculated using the following equation:

$$P_{\text{Shear}} = \left[\frac{(C_3)(ppf)(\sigma_{\text{yield}}) + (P_w)(C_2)}{C_1} \right]$$

P_{Shear} (Bonnet Shear Pressure) = 2011 psi

Therefore, since P_{Shear} is less than the maximum allowable operator pressure, the BOP is acceptable for the shearing operation.





WELL BORE TEST
10 min Hold
test after show sign

R. Church
CES
6/17/10

RAM UPPER SN 720007-000-1
RAM LOWER SN 720008-000-1

CHART NO. MC MP-30000-IHR
METER _____ TAKEN OFF _____
CHART PUT ON _____ M _____
LOCATION _____
REMARKS _____

5" 19.5ppf 5735 PIPE

A.B.S.
WITNESS
O.M.L.
I.M. DOBBIE
6/17/10

CES HYDROSTATIC TEST RECORD	
DESC	BOP OBL 13 7/8" 10M
SIZE	13 7/8"
WO	456201-000
TP NO	
TEMP	85°
BY	DE/lin SHELBY
PRESS	10M
SN	352901-000-1
TEST FLUID	WATER
DATE	6-17-10

Frank Jones, Modesto 17/6/10

Signature: [Handwritten]

PRINTED IN U.S.A.

40

35

45

R. Church
CES 6/17/10

30

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Hydraulic Reservoir
with STEARBIT
cutting discs
from 450psi & 4500

RAM UPPER SW 720007-000-1
RAM LOWER SW 720008-000-1

CES HYDROSTATIC TEST RECORD

DESC	50P, UBL 13 5/8" 10M
SIZE	13 5/8" PRESS 10M
WO	456201-000 SW 720007-000-1
TP NO	GUAGE NO 510-01
TEMP	90° TEST FLUID WATER

A.S.S. WITNESS ONLY
I.M. DOBBIE
6/17/10

DELV. M. SHELBY
6-17-10
8 Jania Moduspec 12/6/10
56' prod
SEA Hook Drilling

10

15

5

60

50-105

5" 19.5 SPT GZ

CHART NO. MC MP-6000-IHR
METER
CHART PUT ON
LOCATION
REMARKS
TAKEN OFF



60/0

Low Press ure well Bore TEST #2
10 MIN Hold
after show

R. Chund
CES
6/17/10

RAM UPPER SN 720007-000-1
RAM LOWER SN 720008-000-157



CHART NO. MC MP-1000-IHR

METER _____
CHART PUT ON _____ M TAKEN OFF _____ M
LOCATION _____
REMARKS _____

CES HYDROSTATIC TEST RECORD

DESC	Bot DBL 1358 10M
SIZE	1358
WOL	56201-000
TP NO	
TEMP	90°
TEST FILL	
DATE	6/17-10

DELVIN SHELBY
& James Madhous 17/16/10

R. Chund
Seismic Drilling

WELL BORE TEST
 10 min Hold
 after draw

#2

R. Chund
 CES
 6/17/10

RAM UPPER SN 720007-000-1
 RAM LOWER SN 720008-000-1

19.5" SPFG 105 PIPE

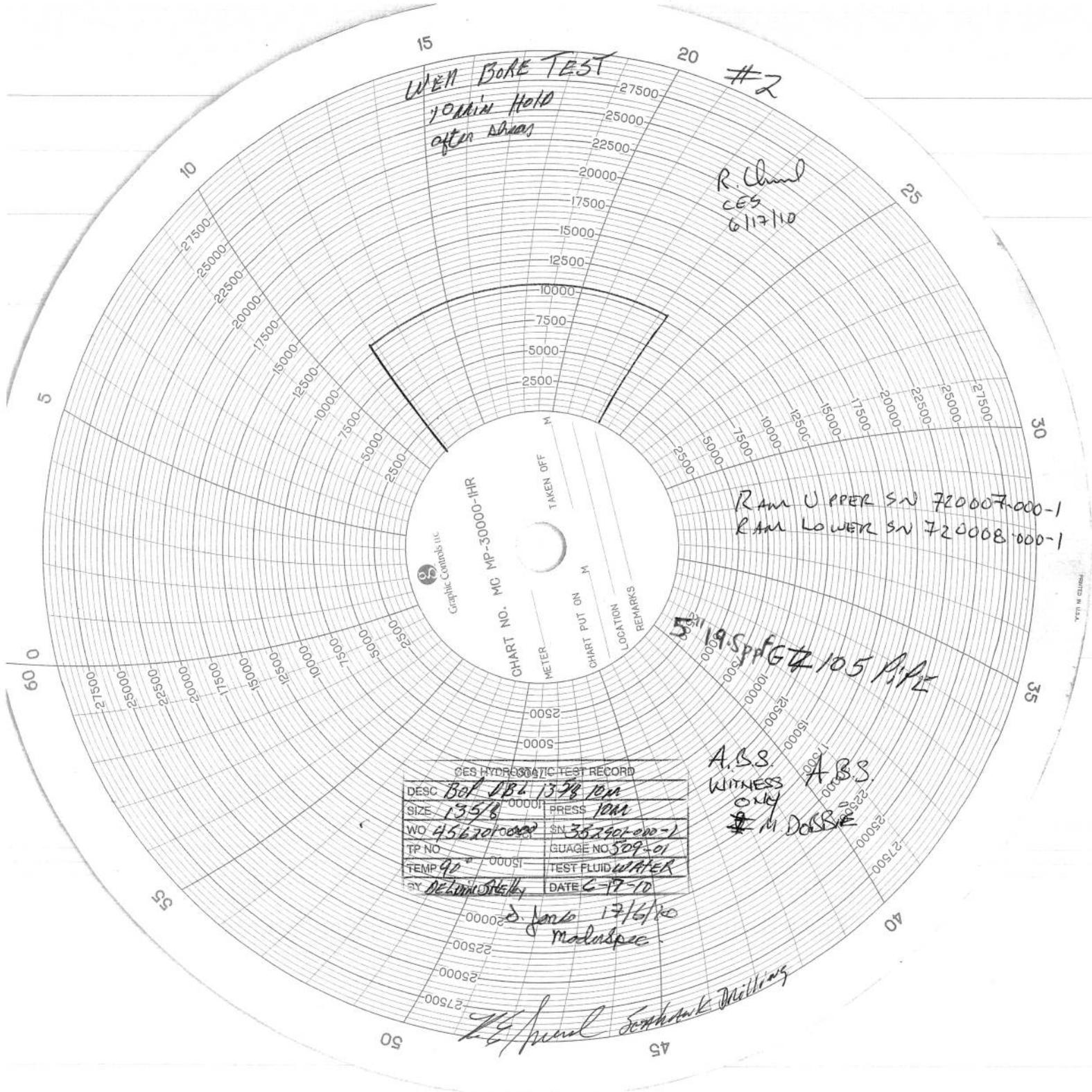
A.B.S.
 WITNESS
 ONLY
 M. Dossie

GES HYDROSTATIC TEST RECORD

DESC	Bot JB 13 7/8 10M
SIZE	1 3/8" PRESS 10M
WO	4567010000 SN 352901-000-1
TP NO	GUAGE NO 509-01
TEMP	92° TEST FLUID WATER
BY	DELOUIS STELLY DATE 6-19-10

D. Jones 17/6/10
 Madraspec

R. Chund Southbank Drilling





LLP P.O. Box 802404 ♦ Houston, TX 77280-2404 ♦ Telephone (713) 460-3655 ♦ FAX (713) 460-3695

Report Date: 06/21/10
Report No: 465984.0
Rev.: A
Cust Acct: CHU038

To: Church Energy Services, Ltd.
2810 Washington Drive
Houston, TX 77038-3319

Ordered By: Paul Burkhardt PO#: 1110662
Material: S135 5"OD x 4-1/4"ID x 8"LG Test PC
ID/Heat: WO:456201 000 997000
Job Info:

Tensile Test Results

No./Location	Size (in.)	Area (in^2)	Ult. Load (lbs.)	Yield (psi)	Tensile (psi)	Elong. (%)	R. of A. (%)	Hardness
1	.249			158,500	170,000	17.0	60.0	

Unless otherwise stated, yield stress is 0.2% offset, gage length is 2 in. for 1/2 in. bars or 1 in. for 1/4 in. bars.

Charpy Test Results

	Temp	Location	Foot-Pounds	% Shear	Mils Lat Exp
1	+72°F	LCVN	49-42-48	100-100-100	46-43-47

Unless otherwise stated, Charpy Impact specimens are V-notch 10 x 10 mm.

Notes:

Size: .295" X .394"

Chemical Analysis Results

1	C: 0.26 Mn: 1.35 P: 0.008 S: 0.009 Si: 0.28 Cr: 0.74 Mo: 0.19 Ni: 0.02 Cu: 0.01 Al: 0.024
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Chemical analysis results are reported in percent by weight.

Signed: Erica Budzisz
Erica Budzisz

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LLP P.O. Box 802404 ♦ Houston, TX 77280-2404 ♦ Telephone (713) 460-3655 ♦ FAX (713) 460-3695

Report Date: 06/21/10
Report No: 465983.0
Rev.: A
Cust Acct: CHU038

To: Church Energy Services, Ltd.
2810 Washington Drive
Houston, TX 77038-3319

Ordered By: Paul Burkhardt PO#: 1110662
Material: G105 5"OD x 4-1/4"ID x 8"LG Test PC
ID/Heat: WO:456201 000 997000
Job Info:

Tensile Test Results								
No./Location	Size (in.)	Area (in ²)	Ult. Load (lbs.)	Yield (psi)	Tensile (psi)	Elong. (%)	R. of A. (%)	Hardness
1	.248			128,000	141,100	20.0	69.0	

Unless otherwise stated, yield stress is 0.2% offset, gage length is 2 in. for 1/2 in. bars or 1 in. for 1/4 in. bars.

Charpy Test Results					
	Temp	Location	Foot-Pounds	% Shear	Mils Lat Exp
1	+72°F	LCVN	90-77-82	100-100-100	80-70-75

Unless otherwise stated, Charpy Impact specimens are V-notch 10 x 10 mm.

Notes:

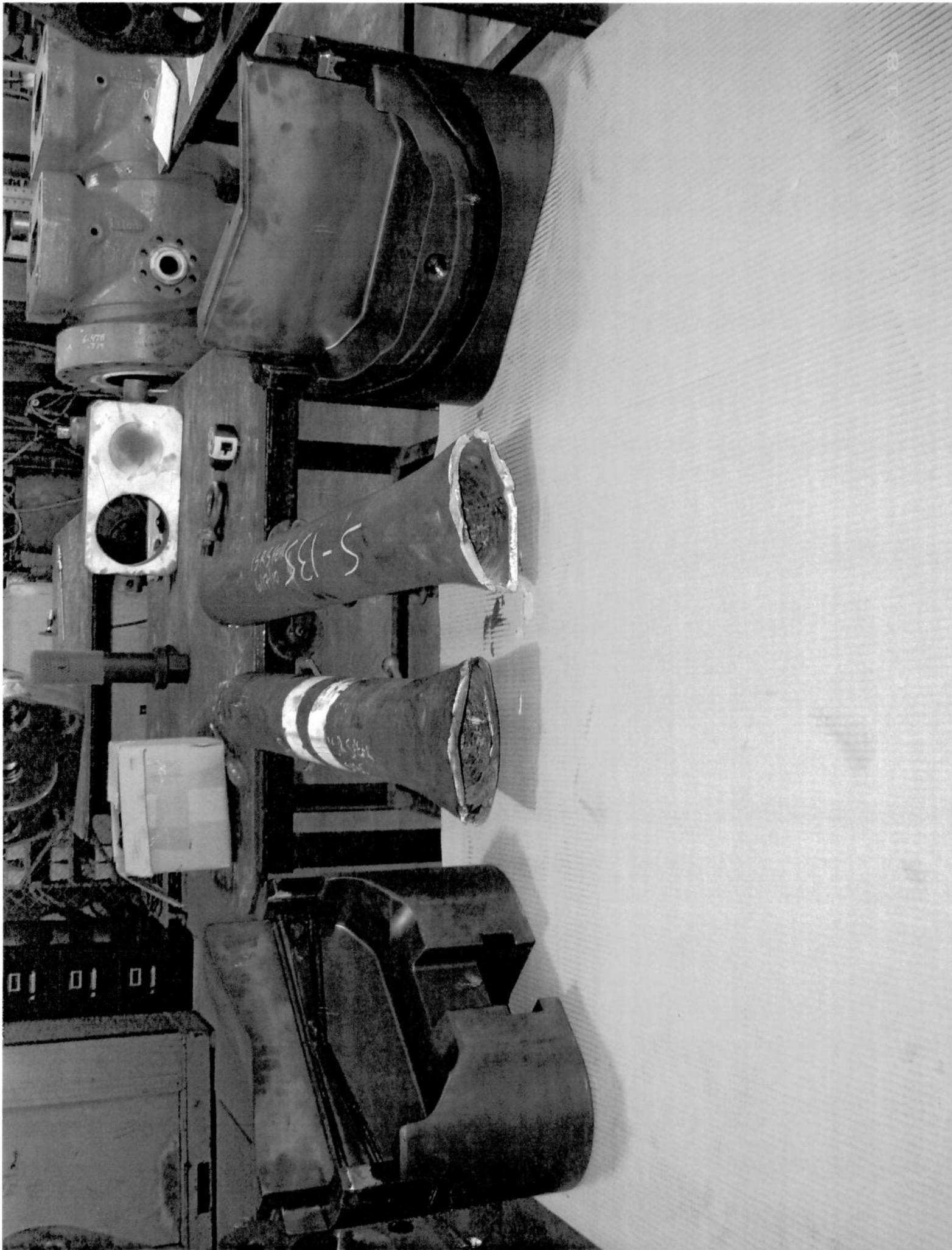
Size: .295" X .394"

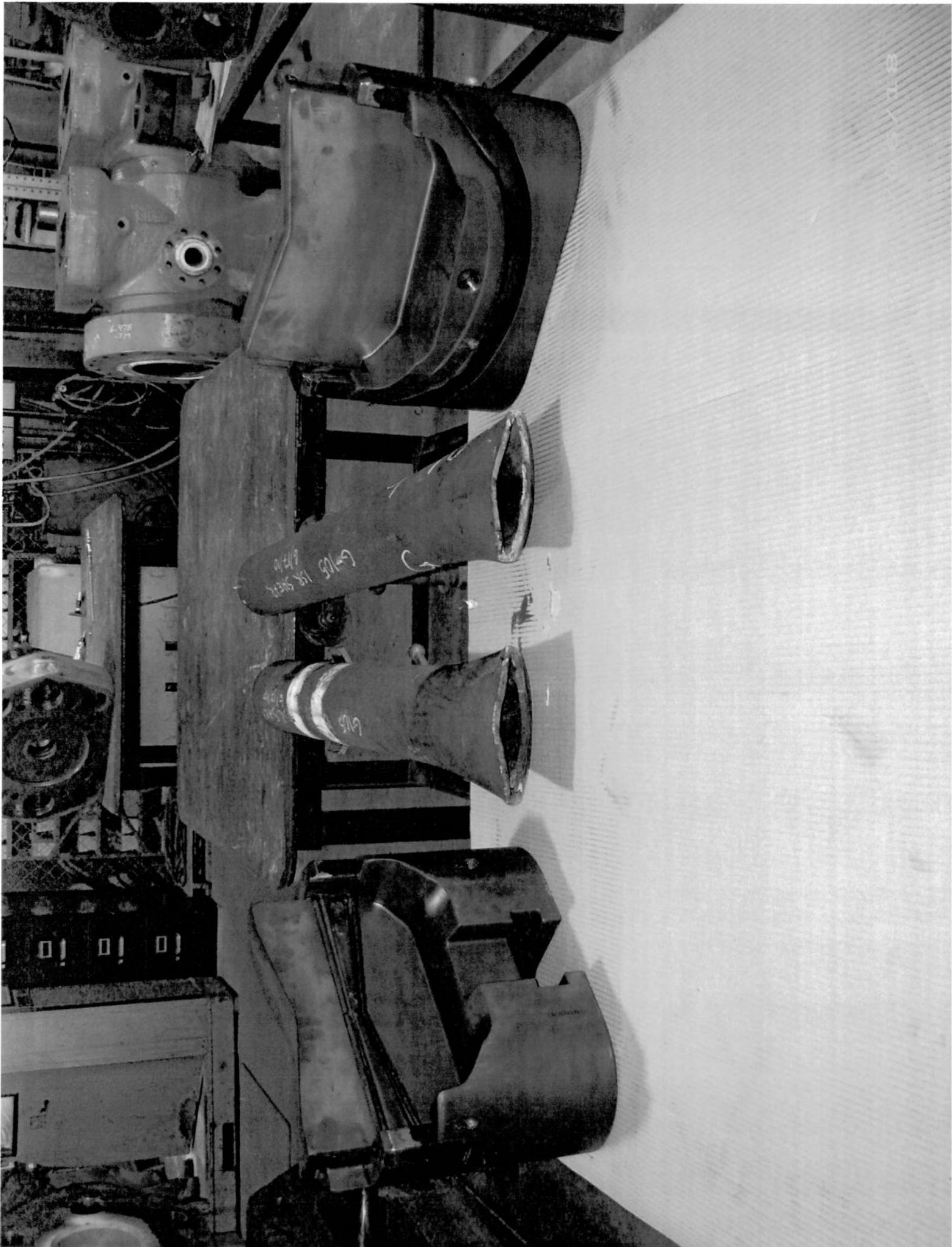
Chemical Analysis Results										
1	C: 0.26	Mn: 1.38	P: 0.009	S: 0.003	Si: 0.28	Cr: 0.79	Mo: 0.18	Ni: 0.04	Cu: 0.07	Al: 0.032

Chemical analysis results are reported in percent by weight.

Signed: Erica Budzisz
Erica Budzisz

Our reports are for the exclusive use of our customer and our name may be used only with prior written approval. Our reports apply only to the sample tested or inspected and do not necessarily represent the quality of other apparently similar or identical materials. All test specimens and testing conforms to ASTM A-370 requirements unless otherwise stated. This test report shall not be reproduced, except in full, without the written approval of Accu-Test Labs LLP.





6-105
100 SPEC

6-105

01 01 01

CAMERON TYPE U RAM BLOWOUT PREVENTER
REQUIRED SHEAR PRESSURE CALCULATION FORM

BY: R.M. Church
Richard M. Church, Jr. P.E.

CUSTOMER: Hercules Offshore, Inc.

RIG: Hercules 300

LOCATION: E.I. 305, Well 1

DATE: 10-05-2011

OPERATOR: Tarpon Energy

BOP Size: 13-5/8" Pressure: 10,000 psi

Bonnet Type: LBT (Large Bore Shear with Boosters) Booster size: 11" Ram Type used: ISR

Pipe / Tubular to Shear: 5" 19.5 ppf S-135 (.362" wall thickness)

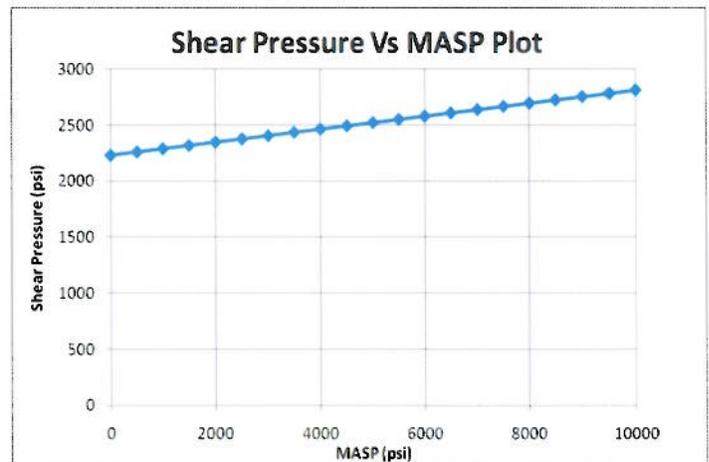
Maximum Allowable Operating Pressure of Bonnet: 3,000 psi

P_w (Wellbore Pressure at the time of the Shear): 6,520 psi

Is the pipe geometry acceptable per PD220-01, Section 5.0 and Cameron Engineering Bulletin EB 702 D? Yes

INPUT VARIABLES:

C₁= 224 BOP / Bonnet constant corresponding to the piston closing area
 C₂= 13 BOP / Bonnet constant corresponding to the piston rod opening area
 C₃= .19 Shear ram type/ pipe grade constant
 ppf= 19.5 lbf/ft
 σ_{yield} = 135,000 Minimum Yield Strength of Pipe Material (psi)



Shear pressure, P_{Shear} is calculated using the following equation:

$$P_{\text{Shear}} = \left[\frac{(C_3)(ppf)(\sigma_{\text{yield}}) + (P_w)(C_2)}{C_1} \right]$$

P_{Shear} (Bonnet Shear Pressure) = 2,611 psi

Therefore, since P_{Shear} is less than the maximum allowable operator pressure, the BOP is acceptable for the shearing operation.

Hercules Offshore, Inc.
9 Greenway Plaza, Suite 2200
Houston, TX 77046

October 05, 2011

ATTENTION: Karl Callegan

RE: BOP shear ram verification for Hercules Offshore, Inc.

Shear testing of a 13-5/8" 10,000 psi W.P. Cameron Type U BOP equipped with large bore shear bonnets and shear boosters was conducted by Church Energy Services on 17th June 2010 (ref. ER 112B). The shear rams used were type ISR. The drill pipe used to shear was 5" 19.5 ppf S-135, .362" wall thickness. No wellbore pressure was used during the shearing operation. The calculated operating shear pressure was 2233 psi and the actual pressure required to shear the pipe was approximately 1000 psi (45 % of the calculated pressure). The maximum operating pressure of the BOP actuator was 3000 psi.

Church Energy Services also provided calculations to predict the pressure required to shear 5" 19.5 ppf S-135, .362" wall thickness drill pipe with wellbore pressure. The following information was utilized during calculations.

- Operator Name: Tarpon Energy
- Well Name: E.I. 305, Well 1
- BOP Equipment: 13-5/8" 10,000 psi W.P. Type U BOP with large bore shear bonnets and shear boosters with ISR rams
- Drill Pipe: 5" 19.5 ppf S-135, .362" wall thickness
- MASP: 6520 psi

The calculated pressure required to shear the above drill pipe with the MASP shown is 2611 psi. After review of the test results and calculations, Church Energy Services hereby certifies that the BOP would shear the pipe based on the calculations and test results from actual pipe shear tests performed as stated above for Tarpon Energy's E.I. 305, Well 1. The shear rams as identified will shear the 5" 19.5 ppf S-135, .362" wall thickness drill pipe.

Factors affecting shear ram operating pressures:

Many factors contribute to a wide range of shearing forces required to shear drill pipe and wellbore tubular. These may include the pipe material strength, toughness and dimensional differences used in the pipe manufacture. Other factors that can affect shearing performance include the BOP's internal dimensions, which include wear, corrosion and drill bit/tool damage to the ram cavities.

If we can be of any other assistance, please let us know.



Richard M. Church, Jr. P.E.
Vice President of Engineering and Quality