WEST ENGINEERING SERVICES

# Shear Certificate Packet

# For

# *Rowan EXL I*

## OCS-G 21640 No. 1 BP 01

**Job Number: 4980**

**18 November 2011**

P.O. Box 577
Brookshire, TX 77423
U.S.A

WEST ENGINEERING SERVICES
ISO 9001 Certified

Tel: (281) 375-5515
Fax: (281) 934-1600
west@westengineer.com

Mr. Greg Sibley
Senior Drilling Engineer
AGR FJ Brown

18 November 2011

**Subject: *Rowan EXL I*, OCS-G 21640 No. 1 BP 01**
**Reference: Shear Verification per 30 CFR §250.416(e)**

Dear Mr. Sibley:

Please find attached the Blind-Shear Ram Certificate and related documents for the *Rowan EXL I*. The calculations were carried out according to Cameron EB702 D Rev B10 and utilize both the Dimensional and PPF methods. Background equations used for the calculations are shown on each shear calculation spreadsheet near the required shear pressure output cells. Additionally, relevant shear test documentation is included. Should you have any questions or concerns, please feel free to contact us.

Based on the client supplied input data, actual shear test report values and WEST shear calculations, the certified pipe is the hardest pipe to shear in this well program; therefore, the certified pipe also qualifies the other pipe sizes. WEST has used the submitted MASP for calculations and also considers this certification valid for any MASP of lower value.

Sincerely,

*Originally sent via email*

Raleigh S. Williamson,
for WEST Engineering Services, Texas Registration No. F-4672

WEST Job Number: 4980

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10. Letter Attesting No Violation of Law
11. Insurance Certificate

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# Blind-Shear Ram Certificate

In accordance with 30 CFR §250.416(e), **Verification that Blind-shear Rams will Shear Pipe in the Hole,** this certificate verifies that, based on cited calculation method, data provided to WEST Engineering, and actual testing, the equipment listed below is capable of shearing the specified pipe.

NOTE – Certification is only valid for fully functional equipment maintained according to manufacturers and API requirements and operated within design and testing standards as specified within API Specification 16A. This certification assumes the same BOP equipment (i.e., blind-shear rams of the same make, model, and size as proposed for the operation) is utilized in all cases. Calculations are based on client Input Data Sheet found as Section 5.

| | |
|---|---|
| **Client:** | AGR FJ Brown |
| **West Job Number:** | 4980 |
| **Rig:** | Rowan EXL I |
| **Operator:** | McMoRan Oil & Gas |
| **Contractor:** | Rowan |
| **Well Name:** | OCS-G 21640 No. 1 BP 01 |
| **Water Depth (ft):** | 138 |
| EQUIPMENT / CALCULATION INFORMATION | |
| **BOP:** | Cameron 18-3/4" – 15K TL BOP |
| **Type of Shear Operator:** | SBT (Standard Shear Bonnet equipped with Booster Assembly) |
| **Type of Shear Ram:** | DVS (Double V Shear Ram) |
| **Hydraulic Pressure Supplied to Operator:** | 3,400 psi |
| **Maximum Wellbore Pressure at BOP (MASP):** | 12,410 psi |
| **Tested Pipe: See Section 4** | 6.625" OD, 0.522" wall, Z-140 |
| **Certified Pipe: See Section 3** | 6.625" OD, 0.522" wall, Z-140 |
| **Certified Pipe Nominal Yield Strength:** | 140,000 psi |
| **Certified Pipe Theoretical Shear Pressure Corrected for Wellbore Pressure:** | 3,024 psi |
| **Calculation Method:** | Cameron EB 702 D, Rev B10 Dimensional & PPF Methods |

Calculations Performed by: Abhijit Mohod AM Date: 18 Nov 2011

Calculations Approved by: Covey Hall Date: 18 Nov 2011

Certificate Approval: Date: 18 Nov 2011

Raleigh S. Williamson,
for WEST Engineering Services,
Texas Registration No. F-4672

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## Section 3

Theoretical Results obtained by stated calculation method,
corrected for MASP
*Source: Client Input Data Sheet; Section 5*

Summary Table of Calculated Theoretical Results:

| Pipe | MASP [psi] | Shear Pressure [psi] | Comment |
|---|---|---|---|
| 6.625” OD, 0.522” wall, Z-140 | 12,410 | 3,024 | Tested and certified |
| 5” OD, 0.5” wall, S-135 | 12,410 | 2,561 | Qualified by certified pipe |
| 5” OD, 0.362” wall, S-135 | 12,410 | 1,999 | Qualified by certified pipe |

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## Section 4

Tested Pipe Results obtained from Shear Test Report,
corrected for MASP
*Source: Shear Test Report; Section 7*

Summary of Table of Tested Pipe Results:

| | |
|---|---|
| Tested Pipe: | 6.625” OD, 0.522” wall, Z-140 |
| Tested Pipe Nominal Yield Strength: | 140,000 psi |
| Tested Pipe Actual Shear Pressure: | 1,900 psi |
| Tested Pipe Actual Shear Pressure Corrected for Wellbore Pressure and Hydrostatic Effects: | 2,841 psi |
| Tested Pipe Theoretical Shear Pressure Corrected for Wellbore Pressure and Hydrostatic Effects: | 3,024 psi |

WEST ENGINEERING SERVICES

# Shear Calculation Input Data

WEST is preparing to perform shear verification as required by 30 CFR §250.416(e).
Please input information where indicated in the template below and return to WEST Engineering Services via email to **ntl@westengineer.com. Please enter data carefully, as any subsequent changes may have cost & schedule impact.**

- If the requested data is not relevant, please enter "N/A" for Not Applicable.
- Please enter data for each situation (e.g. pipe size & MASP) to be calculated.

| **Equipment** | |
|---|---|
| BOP Original Equipment Manufacturer (Shaffer, Cameron, etc.) | Cameron |
| Ram BOP Model Designation (U, TL, SL, etc.) | TL |
| BOP Size and Pressure Rating (18 3/4" - 15K, etc.) | 18 3/4" |
| Shear Operator Configuration or Bonnet Size (SBT, LBT, etc.) | SBT |
| Shear Ram Type (Ram Design) | DVS |
| Shear Operator Closing Area (if non-Cameron) [sq. inches] | n/a |
| Shear Operator Closing Ratio (if non-Cameron) | n/a |
| Control Fluid Pressure Gradient [psi/ft]* | 0.442 |
| Seawater Pressure Gradient [psi/ft]* | 0.445 |
| Elevation of HPU above Sea Level [ft]** | 129 |
| Hydraulic Pressure Supplied to Operator on Closing Side [psi] | 3400 |

**Tubular Information Required**

| No. | Pipe OD [in] | Pipe ID [in] | Wall Thickness [in] | Pipe Weight per Foot [ppf] | Pipe Grade (e.g. S-135) | Yield Strength (Nominal) [psi] | Comments |
|---|---|---|---|---|---|---|---|
| 1 | 6 5/8 | 5.581 | 0.522 | 34 | Z-140 | 140,000 | actual shear test attached |
| 2 | 5 | 4 | 0.5 | 30 | S-135 | 135,000 | |
| 3 | 5 | 4.276 | 0.362 | 19.5 | S-135 | 135,000 | |
| 4 | | | | | | | |
| 5 | | | | | | | |
| 6 | | | | | | | |
| 7 | | | | | | | |

| **Well Information** | |
|---|---|
| Existing West Job # or New Purchase Order No. (if new job) *** | |
| Rig Name | Rowan EXL I |
| Drilling Contractor (rig owner) | Rowan |
| Operator (oil company) | McMoRan Oil & Gas |
| Well Name | OCS-G 21640 No. 1 BP 01 |
| Water Depth [ft]* | 138 |
| MASP (Maximum Anticipated Surface Pressure) [psi] | 12410 |

* This is necessary to accurately calculate the hydrostatic head.
*** - FR# if PO# is unavailable
** The marine or barge dept. should be able to provide this information

Gregory M. Sibley
Information provided by (please print name above)

11/18/2011
Date

Requested Delivery Date for Shear Certification: 10*-28-2011
Date

*Your service request will be picked up as soon as team member availability allows. However, you should not expect turn around for shear verification requests within less than 7 days.*
*Also, please note that subsequent changes to input data are likely to delay certification.*

*Rev - 20101201ejd*

## Section 6.a
## Test Pressure Compensated for Wellbore Pressure
## Cameron 18 3/4" - 15K TL BOP, SBT, DVS
## 6.625" OD, 0.522" wall, Z-140

### Change in Shear Pressure due to MASP & Hydrostatic Effects

WEST Engineering Services

$P_a$ - Actual Shear Pressure from Test

MASP - Maximum Anticipated Surface Pressure (in BOP)

$C_r$ - BOP Closing Ratio (from table)

$P_i$ - Increased Shear Pressure due to Pressure in the Wellbore

$= MASP / C_r$

$\Delta P_{hyd}$ - Change in Shear Pressure due to Hydrostatic Effects*

$P_t$ - Total Shear Pressure $= P_r + P_i + \Delta P_{hyd}$

| | | |
|---|---|---|
| $P_a$ [psi] | 1,900 | |
| MASP [psi] | 12,410 | |
| $C_r$ | 13.194 | |
| Increase in Shear Press., $P_i$ | 941 | psi |
| Hydrostatic Effect, $\Delta P_{hyd}$ | 0 | psi |
| Total Shear Pressure, $P_t$ | 2,841 | psi |

Input

Output

# EB 702 D, Rev B10
# SHEARING CAPABILITIES OF CAMERON SHEAR RAMS

| EQUIPMENT AND TUBULAR DATA | |
|---|---|
| BOP Type: | 18-15M T/TL (ST LOCK/MA |
| Ram Type: | DVS |
| Operator Type: | SBT |
| Wellbore Pressure [psi]: | 12,410 |
| Tubular Yield [ksi]: | 140 |
| Tubular PPF: | 34 |
| Calculated Highest Shear Pressure [psi] | |
| **3024** | |

$P_{shear}$ = Calculated required operator shear pressure (psi)
$P_w$ = Wellbore pressure at time of shear (psi)
$\sigma_{yield}$ = Minimum yield strength of the tubular material
ppf = Nominal weight of the tubular (pounds per foot)
$C_1$ = Operator constant corresponding to the piston closing area
$C_2$ = Operator constant corresponding to the piston rod opening area
$C_3$ = Constant corresponding to shear ram type / pipe grade

**DIMENSIONAL METHOD - To be used if the shear pressure calculations require the pipe outside and inside diameter.**

| | OD | Wall | ID | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tubular Shear Data** | 6.625 | 0.522 | 5.581 | 475 | 36 | 0.19 | 34 | 140000 | 2084 | 3024 |

**PPF METHOD - Calculates using the nominal weight of the tubular (pounds per foot).**

| | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
|---|---|---|---|---|---|---|---|
| **Tubular Shear Data** | 475 | 36 | 0.19 | 34 | 140000 | 1904 | 2845 |

| Equations | PPF Method | Dimensional Method |
|---|---|---|
| No Wellbore Pressure (psi) | Pshear=[C3*ppf x $\sigma_{yield}$]/C1 | Pshear=[(C3 x $\sigma_{yield}$) x (pipeOD^2-pipeID^2) x 2.92]/C1 |
| Including Wellbore Pressure (psi) | Pshear=[(C3 x ppf x $\sigma_{yield}$)+(Pw x C2)]/C1 | Pshear=[((C3 x $\sigma_{yield}$) x (pipeOD^2-pipeID^2) x 2.92)+(Pw x C2)]/C1 |

# EB 702 D, Rev B10
# SHEARING CAPABILITIES OF CAMERON SHEAR RAMS

| EQUIPMENT AND TUBULAR DATA | |
|---|---|
| BOP Type: | 18-15M T/TL (ST LOCK/M |
| Ram Type: | DVS |
| Operator Type: | SBT |
| Wellbore Pressure [psi]: | 12,410 |
| Tubular Yield [ksi]: | 135 |
| Tubular PPF: | 30 |
| Calculated Highest Shear Pressure [psi] | 2561 |

$P_{shear}$ = Calculated required operator shear pressure (psi)
$P_w$ = Wellbore pressure at time of shear (psi)
$\sigma_{yield}$ = Minimum yield strength of the tubular material
ppf = Nominal weight of the tubular (pounds per foot)
$C_1$ = Operator constant corresponding to the piston closing area
$C_2$ = Operator constant corresponding to the piston rod opening area
$C_3$ = Constant corresponding to shear ram type / pipe grade

**DIMENSIONAL METHOD - To be used if the shear pressure calculations require the pipe outside and inside diameter.**

| | OD | Wall | ID | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tubular Shear Data** | 5 | 0.5 | 4 | 475 | 36 | 0.19 | 30 | 135000 | 1419 | 2360 |

**PPF METHOD - Calculates using the nominal weight of the tubular (pounds per foot).**

| | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
|---|---|---|---|---|---|---|---|
| **Tubular Shear Data** | 475 | 36 | 0.19 | 30 | 135000 | 1620 | 2561 |

| Equations | PPF Method | Dimensional Method |
|---|---|---|
| No Wellbore Pressure (psi) | Pshear=[C3*ppf x $\sigma_{yield}$]/C1 | Pshear=[(C3 x $\sigma_{yield}$) x (pipeOD^2-pipeID^2) x 2.92]/C1 |
| Including Wellbore Pressure (psi) | Pshear=[(C3 x ppf x $\sigma_{yield}$)+(Pw x C2)]/C1 | Pshear=[((C3 x $\sigma_{yield}$) x (pipeOD^2-pipeID^2) x 2.92)+(Pw x C2)]/C1 |

# EB 702 D, Rev B10
# SHEARING CAPABILITIES OF CAMERON SHEAR RAMS

| EQUIPMENT AND TUBULAR DATA | |
|---|---|
| BOP Type: | 18-15M T/TL (ST LOCK/M |
| Ram Type: | DVS |
| Operator Type: | SBT |
| Wellbore Pressure [psi]: | 12,410 |
| Tubular Yield [ksi]: | 135 |
| Tubular PPF: | 19.5 |
| Calculated Highest Shear Pressure [psi] | |
| **1999** | |

$P_{shear}$ = Calculated required operator shear pressure (psi)
$P_w$ = Wellbore pressure at time of shear (psi)
$\sigma_{yield}$ = Minimum yield strength of the tubular material
ppf = Nominal weight of the tubular (pounds per foot)
$C_1$ = Operator constant corresponding to the piston closing area
$C_2$ = Operator constant corresponding to the piston rod opening area
$C_3$ = Constant corresponding to shear ram type / pipe grade

**DIMENSIONAL METHOD - To be used if the shear pressure calculations require the pipe outside and inside diameter.**

| | OD | Wall | ID | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
|---|---|---|---|---|---|---|---|---|---|---|
| **Tubular Shear Data** | 5 | 0.362 | 4.276 | 475 | 36 | 0.19 | 19.5 | 135000 | 1059 | 1999 |

**PPF METHOD - Calculates using the nominal weight of the tubular (pounds per foot).**

| | C1 | C2 | C3 | PPF | Yield | Req. shear pressure with no wellbore pressure (psi) | Req. shear pressure for wellbore pressure (psi) |
|---|---|---|---|---|---|---|---|
| **Tubular Shear Data** | 475 | 36 | 0.19 | 19.5 | 135000 | 1053 | 1994 |

| Equations | PPF Method | Dimensional Method |
|---|---|---|
| No Wellbore Pressure (psi) | Pshear=[C3*ppf x $\sigma_{yield}$]/C1 | Pshear=[(C3 x $\sigma_{yield}$) x (pipeOD^2-pipeID^2) x 2.92]/C1 |
| Including Wellbore Pressure (psi) | Pshear=[(C3 x ppf x $\sigma_{yield}$)+(Pw x C2)]/C1 | Pshear=[((C3 x $\sigma_{yield}$) x (pipeOD^2-pipeID^2) x 2.92)+(Pw x C2)]/C1 |

| PROPERTY OF CAMERON | DRAWN BY | DATE | REVISION | |
|---|---|---|---|---|
| | John Corkhill | 06-23-2010 | | TP-***D |
| | APPROVED | DATE | | |
| | Raul Araujo | 06-23-2010 | 01 | Page 1 of 2 |

**SUBJECT:** 18-15TL Shear Test

**OBJECT:** To Investigate the Shearability of Customer Supplied Tubulars

**TEST EQUIPMENT:**

1. BOP Assembly
2. BOP control unit
3. Shear test specimen
4. Chart recorder to measure a low and high pressure test pressure transducers as required for the wellbore pressure test (use a chart that has a maximum range of 25% to 75% of the maximum working pressure of the bonnet assembly)
5. Pressure transducers as required for high wellbore pressure test (as applicable)
6. Operating pressure hoses for the BOP
7. High pressures hoses as needed
8. Shear specimen 6 5/8" .522" Z-140 – minimum 10 ft length

**TEST PROCEDURE:**

1. Install blind test fixture to lower part of the BOP.
2. Prepare the BOP for wellbore pressure testing. Hot line to the close function
3. Attach a chart recorder and guage to the vent/drain port on one bonnet. The chart recorder line requires to be no longer than 10ft.
4. Visually inspect packers and top seals.
5. Measure the OD and wall thickness of the pipe and record the values at the end of this procedure. Calculate the plain end weight (ppf) (contact Engineering for assistance if required)
6. Visually inspect ram blocks and note any abnormality found. The blocks must have been LP inspected and the location of the cracks to be noted and photographed. Install the ram packers and top seals in the ram blocks. Note any abnormalities found. Take photos of the ram assemblies before greasing them for installation.
7. Install the ram assemblies in the BOP.
8. Isolate the supply pressure and apply the maximum allowable bonnet working pressure to ensure there are no leaks in the supply equipment.
9. Fill the BOP's wellbore with water; past the ram's cavity by 10 inches. Open and close the rams, with 1500 PSI, three times to bleed out any trapped air in the ram cavity.
10. Close the rams and conduct a low wellbore pressure test, 200-300 psi for 10 minutes. No visual ram leak allowed during testing. This can be confirmed by no visual external leaks, and a pressure drop of less than 20 psi within the 10 minute hold period.
11. Conduct a high wellbore pressure, 15,000–15,700 psi test for 10 minutes. No visual ram leak allowed during testing. This can be confirmed by no visual external leaks, and a pressure drop of less than 250 psi within the 10 minute hold period.
12. Bleed down the BOP's wellbore to ambient pressure and open the rams.
13. Prepare the shear specimens for the shear operation.

| PROPERTY OF CAMERON | DRAWN BY | DATE | REVISION | |
|---|---|---|---|---|
| | John Corkhill | 06-23-2010 | | TP-***D |
| | APPROVED | DATE | | |
| | Raul Araujo | 06-23-2010 | 01 | Page2of 2 |

14. Suspend the shear sample test piece on top of the BOP's well bore with a crane. Lower the test piece until the bottom of the test piece is approximately 12" below the BOP cavity. This is to be done by measuring the height between the cavity lower surface and the test flange, and the overall height of the BOP. The shear pipe specimen can then be lowered until it touches the test flange and then marked. The pipe can then be lifted by the appropriate height to ensure approximately 12" is located beneath the cavity.
15. Using accumulators apply ???? PSI closing pressure. If the shear sample does not shear with the fully stroked closing pressure, allow the pumps to build up to complete the shearing process. Record the actual closing pressure required to shear the shear joint.

***DO NOT EXCEED THE MAXIMUM ALLOWABLE WORKING PRESSURE OF BONNET ASSEMBLY***

16. Reduce closing pressure to 1500 PSI.
17. While maintaining 1500 PSI closing pressure conduct a low wellbore pressure test, 200-300 psi for 10 minutes. No visible leak allowed on top of the ram during testing. No visual ram leak allowed during testing. This can be confirmed by no visual external leaks, and a pressure drop of less than 20 psi within the 10 minute hold period.
18. Conduct a high wellbore pressure, 15,000–15,700 psi test for 10 minutes. No visual ram leak allowed during testing. This can be confirmed by no visual external leaks, and a pressure drop of less than 250 psi within the 10 minute hold period.
19. Bleed down the BOP's wellbore to ambient pressure and open the rams.
20. Remove the sheared fish and visually inspect the rams from the BOP bore
21. Repeat steps 13 thru 120 for a total of ~~3~~ shear test. (ONE)
22. Perform an LP on rams after shearing and photograph the condition of the rams
23. Take photographs of the sheared specimens and shear rams.
24. Fill out the information below for each sheared pipe.

**SHEAR PRESSURE (PSI):** 1900

**PIPE OD (INCH) :** 6 5/8"

**PIPE WALL THICKNESS (INCH) :** .567

**PLAIN END PIPE WEIGHT (PPF) :** 37

- Cameron assembler performing tests: Scott Jutten
- Customer witness: William R Richey - McMoRan Oil & Gas
- Third party witness if applicable: Jack Marie THOMAS Rowan Raymond Sandlin Rowan
- Date: 6/24/10

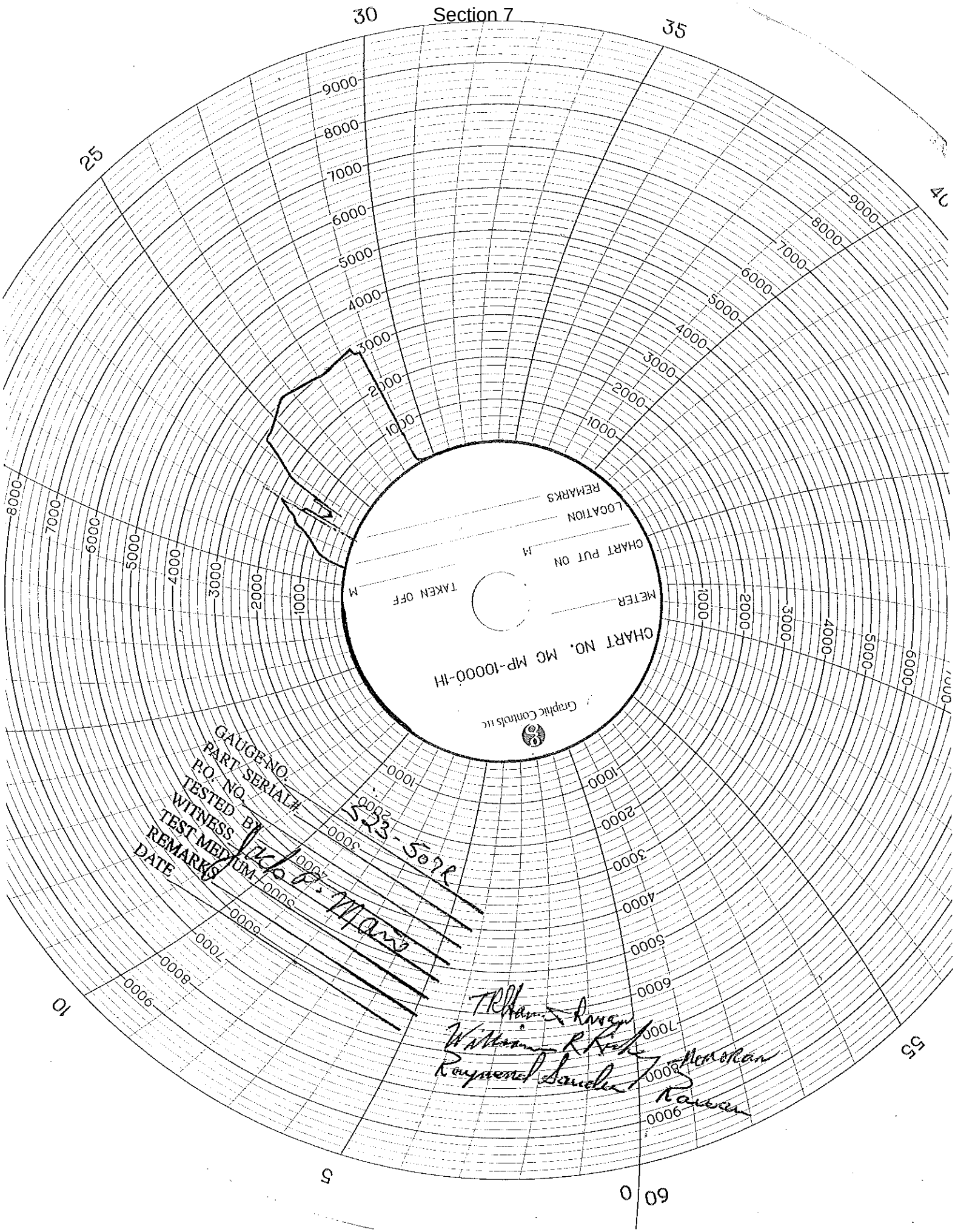
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CHART NO. MC MP-10000-1H
METER
CHART PUT ON
M
LOCATION
REMARKS
TAKEN OFF
M
GAUGE NO.
PART SERIAL #
P.O. NO.
TESTED BY
WITNESS
TEST MEDIUM
REMARKS
DATE

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# STATEMENT OF QUALIFICATIONS

## Introduction

The Department of the Interior, Bureau of Ocean Energy Management, Regulation and Enforcement (BOEMRE) issued revisions to 30 CFR Part 250 to implement certain safety measures for Lessees regarding energy development on the OCS. Some include having an independent third party verify and/or certify specific capabilities of BOP and well control systems.

## Qualifications

Per 30 CFR 250.416(g1); "*The independent third party must be a… licensed professional engineering firm capable of providing the verification required with this part.*" (See Items 1 - 13).

WEST:

1. is a registered Engineering firm in the state of Texas. A copy of our license is included. (See Section 9)
2. is a Well Control Equipment verification company, established in 1984, that places emphasis on technical excellence.
3. has conducted over 3700 surveys on WCE over the last 27 years for Operators and Contractors.
4. has 13 degreed engineers and 6 licensed professional engineers on staff.
5. draws upon the collective experience of a team of approximately 70 drilling equipment and BOP surveyors, each with an average field experience level of 19 years.
6. performs Failure Modes, Effects, and Criticality Analyses on a wide variety of drilling equipment ranging from Top Drives to Blow-Out Preventers and their control systems.
7. has created a database of Inspection and Test Procedures (ITPs) and Acceptance Test Procedures (ATPs) that detail procedures to ensure fitness-for-purpose.
8. maintains a database of Original Equipment Manufacturer product/engineering bulletins called RigLore, which serves as a single resource for manufacturer engineering history and record of design changes.
9. maintains continuously updated databases for drilling equipment anomalies and lessons learned. WEST also has a searchable failure database.
10. conducted 7 major technical studies over the past 15 years concerning WCE on topics including shear ram capabilities, secondary intervention methods in well control, high pressure high temperature BOP elastomer performance, BOP reliability, BOP multiplex control systems, and applicability of API recommended practices in US regulations. These studies help position WEST on the forefront of best available and safest technology (BAST).
11. provides specialized training and seminars on Well Control Equipment.
12. engineers participate in API standards committees. In this capacity, WEST is involved in revising API standards to meet the latest technological developments in drilling equipment.
13. engineers author and present SPE papers in peer reviewed events on a wide range of topics involving advanced drilling technology, the vast majority of which have been on BOP topics.

Per 30 CFR 250.416 (g2); …"*the firm you are using is reputable, the firm and its employees hold appropriate licenses to perform the verification in the appropriate jurisdiction, the firm carries industry standard levels of professional liability insurance, and the firm has no record of violations of applicable law.*" (See Items 14 – 15).

WEST:

14. is a sufficiently capitalized, insured (limited to a maximum of $1 million per incident), licensed professional engineering firm with no record of violations of applicable law (or ethical guidelines) and is willing to sign a certification under penalty of perjury. (See Sections 9, 10 & 11)
15. is an ISO 9001 certified company.

Jeffry P. Sattler, P.E.
Sr. Vice President, Engineering

# Texas Board of Professional Engineers
# CERTIFICATE OF REGISTRATION

This acknowledges that

## *WEST HOU, INC.*
## *DBA: WEST ENGINEERING SERVICES*

has fulfilled the requirements of the Texas Board of Professional Engineers to offer and perform engineering services in the state of Texas.

| Registration Number | Expiration Date |
|---|---|
| F-4672 | 3/31/2012 |

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U.S.A

WEST ENGINEERING SERVICES

Tel: (281) 375-5515
Fax: (281) 934-1600
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ISO 9001 Certified

02 August 2011

To Whom It May Concern:

As regards to the use of WEST's engineering professional status in commercial transactions, WEST states that no prior or present violation of applicable law has been charged by others.

Please contact us if you require any additional information.

Sincerely,

Jeffry P. Sattler,

For WEST Engineering Services, Texas Registration No. F-4672

P.O. Box 577
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U.S.A

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4. has 13 degreed engineers and 6 licensed professional engineers on staff.
5. draws upon the collective experience of a team of approximately 70 drilling equipment and BOP surveyors, each with an average field experience level of 19 years.
6. performs Failure Modes, Effects, and Criticality Analyses on a wide variety of drilling equipment ranging from Top Drives to Blow-Out Preventers and their control systems.
7. has created a database of Inspection and Test Procedures (ITPs) and Acceptance Test Procedures (ATPs) that detail procedures to ensure fitness-for-purpose.
8. maintains a database of Original Equipment Manufacturer product/engineering bulletins called RigLore, which serves as a single resource for manufacturer engineering history and record of design changes.
9. maintains continuously updated databases for drilling equipment anomalies and lessons learned. WEST also has a searchable failure database.
10. conducted 7 major technical studies over the past 15 years concerning WCE on topics including shear ram capabilities, secondary intervention methods in well control, high pressure high temperature BOP elastomer performance, BOP reliability, BOP multiplex control systems, and applicability of API recommended practices in US regulations. These studies help position WEST on the forefront of best available and safest technology (BAST).
11. provides specialized training and seminars on Well Control Equipment.
12. engineers participate in API standards committees. In this capacity, WEST is involved in revising API standards to meet the latest technological developments in drilling equipment.
13. engineers author and present SPE papers in peer reviewed events on a wide range of topics involving advanced drilling technology, the vast majority of which have been on BOP topics.

Per 30 CFR 250.416 (g2); …"*the firm you are using is reputable, the firm and its employees hold appropriate licenses to perform the verification in the appropriate jurisdiction, the firm carries industry standard levels of professional liability insurance, and the firm has no record of violations of applicable law.*" (See Items 14 – 15).

WEST:

14. is a sufficiently capitalized, insured (limited to a maximum of $1 million per incident), licensed professional engineering firm with no record of violations of applicable law (or ethical guidelines) and is willing to sign a certification under penalty of perjury. (See Sections 9, 10 & 11)
15. is an ISO 9001 certified company.

Jeffry P. Sattler, P.E.
Sr. Vice President, Engineering

ACORD®

# CERTIFICATE OF LIABILITY INSURANCE

DATE (MM/DD/YYYY) 11/14/2011

**THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AFFIRMATIVELY OR NEGATIVELY AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW. THIS CERTIFICATE OF INSURANCE DOES NOT CONSTITUTE A CONTRACT BETWEEN THE ISSUING INSURER(S), AUTHORIZED REPRESENTATIVE OR PRODUCER, AND THE CERTIFICATE HOLDER.**

**IMPORTANT: If the certificate holder is an ADDITIONAL INSURED, the policy(ies) must be endorsed. If SUBROGATION IS WAIVED, subject to the terms and conditions of the policy, certain policies may require an endorsement. A statement on this certificate does not confer rights to the certificate holder in lieu of such endorsement(s).**

**PRODUCER**

Frank Crystal & Co of TX, Inc.
2000 West Loop S., Suite 1800
P.O. Box 27723
Houston TX 77227-7723

CONTACT NAME: Amy Skinn
PHONE (A/C, No, Ext): 713-627-2250
FAX (A/C, No): 713-621-5425
E-MAIL ADDRESS: skinna@fcrystal.com

| INSURER(S) AFFORDING COVERAGE | NAIC # |
|---|---|
| INSURER A : Axis Insurance Company | |
| INSURER B : | |
| INSURER C : | |
| INSURER D : | |
| INSURER E : | |
| INSURER F : | |

**INSURED** WESTEN1

West Hou, Inc.
DBA WEST Engineering Services
P. O. Box 577
Brookshire TX 77423

**COVERAGES** **CERTIFICATE NUMBER:** 1987623807 **REVISION NUMBER:**

THIS IS TO CERTIFY THAT THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

| INSR LTR | TYPE OF INSURANCE | ADDL INSR | SUBR WVD | POLICY NUMBER | POLICY EFF (MM/DD/YYYY) | POLICY EXP (MM/DD/YYYY) | LIMITS | |
|---|---|---|---|---|---|---|---|---|
| | **GENERAL LIABILITY** | | | | | | EACH OCCURRENCE | $ |
| | COMMERCIAL GENERAL LIABILITY | | | | | | DAMAGE TO RENTED PREMISES (Ea occurrence) | $ |
| | CLAIMS-MADE / OCCUR | | | | | | MED EXP (Any one person) | $ |
| | | | | | | | PERSONAL & ADV INJURY | $ |
| | | | | | | | GENERAL AGGREGATE | $ |
| | GEN'L AGGREGATE LIMIT APPLIES PER: | | | | | | PRODUCTS - COMP/OP AGG | $ |
| | POLICY / PRO-JECT / LOC | | | | | | | $ |
| | **AUTOMOBILE LIABILITY** | | | | | | COMBINED SINGLE LIMIT (Ea accident) | $ |
| | ANY AUTO | | | | | | BODILY INJURY (Per person) | $ |
| | ALL OWNED AUTOS / SCHEDULED AUTOS | | | | | | BODILY INJURY (Per accident) | $ |
| | HIRED AUTOS / NON-OWNED AUTOS | | | | | | PROPERTY DAMAGE (Per accident) | $ |
| | | | | | | | | $ |
| | **UMBRELLA LIAB** / OCCUR | | | | | | EACH OCCURRENCE | $ |
| | **EXCESS LIAB** / CLAIMS-MADE | | | | | | AGGREGATE | $ |
| | DED / RETENTION $ | | | | | | | $ |
| | **WORKERS COMPENSATION AND EMPLOYERS' LIABILITY** Y / N | | | | | | WC STATU-TORY LIMITS / OTH-ER | |
| | ANY PROPRIETOR/PARTNER/EXECUTIVE OFFICER/MEMBER EXCLUDED? **(Mandatory in NH)** If yes, describe under DESCRIPTION OF OPERATIONS below | N / A | | | | | E.L. EACH ACCIDENT | $ |
| | | | | | | | E.L. DISEASE - EA EMPLOYEE | $ |
| | | | | | | | E.L. DISEASE - POLICY LIMIT | $ |
| A | Professional Liability (Claims Made) | | | ECN000069801101 | 8/5/2011 | 8/5/2012 | Limit of Liability<br>Retention | $1,000,000<br>$100,000 |

**DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES (Attach ACORD 101, Additional Remarks Schedule, if more space is required)**

**CERTIFICATE HOLDER**

To whom It May Concern
.
. . .

**CANCELLATION**

**SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, NOTICE WILL BE DELIVERED IN ACCORDANCE WITH THE POLICY PROVISIONS.**

**AUTHORIZED REPRESENTATIVE**

Frank Crystal & Co. of Texas, Inc.

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