

SCAN UPDATE
SEGMENT 18176
ROW OCS-G29041

In Reply Refer To: GE 1035A

April 13, 2012

Ms. Vanessa Villagran
Noble Energy, Inc.
100 Glenborough Dr., Suite 100
Houston, Texas 77067-3299

Dear Ms. Villagran:

This office has reviewed your completion report for the following pipeline(s):

Application Type: New Right-of-Way Pipeline
Letter Date: November 10, 2011

Segment Number	ROW Number	Size (inches)	Length (feet)	Service	From	To
18176	G29041	04-05	144970	Bulk Oil	East PLET Mississippi Canyon Block 292	Platform A Viosca Knoll Block 900

The total length of the "as-built" right-of-way is 27.46 miles.

The report is submitted in accordance with 30 CFR 250.1008 (b).

The data provided in the report establishes the assigned maximum allowable operating pressure (MAOP) for the pipeline:

MAOP (psig)	MAOP Determination
8399	Hydrostatic Test Pressure

The high and low-pressure sensors shall be set no higher than 15 percent above and below the normal operating range, respectively. The high pilot, however, shall not be set higher than the MAOP of the pipeline. The pressure range shall be established by the use of pressure recorders.

The right-of-way No. OCS-G29041 is described as follows:

A 200-foot wide right-of-way to operate and maintain a 4-1/2-inch bi-directional pipeline, 27.46 miles in length, to transport bulk oil from an East Pipeline End Terminal (East PLET) in Block 292 through Blocks 248, 204, 203, 159, 115, 71, 27, and 26, all in Mississippi Canyon Area, and through Blocks 988 and 944 to Platform A in Block 900, all in Viosca Knoll Area.

Sincerely,

BIMAL SHRESTHA

Nick Wetzell
Regional Supervisor
Field Operations

bcc:1502-01 Segment No. 18176, ROW OCS-G G29041 (MS5232)
1502-01 ROW OCS-G G29041 (Scanning) (MS 5033)
BShrestha:02/01/2012:Noble Energy, Inc.:18176

100 Glenborough Drive
Suite 100
Houston, TX 77067-3299
Tel: 281 872-3100
Fax: 281 872-3111



Scan

BS

November 10, 2011

Bureau of Ocean Energy Management
1201 Elmwood Park Blvd - MS5210
New Orleans, LA 70123-2394

Attn: Alex Alvarado

Re: Pipeline As-Built Drawings
Raton South Field Development Project
Mississippi Canyon 292
OCS Federal Waters, Gulf of Mexico, Offshore, Louisiana

Dear Mr. Alvarado:

Per the approved letters for segments 18176, 18177, 18178, 18179, 18182, Noble Energy Inc. is submitting the as-built pipeline plats for the Mississippi Canyon 292, OCS Federal Waters, Gulf of Mexico, Offshore Louisiana. Also enclosed are the pipelines hydrostatic test forms, charts and calibrations certificates.

If you should need anything further, please advise.

Sincerely,

Noble Energy Inc.

A handwritten signature in black ink, appearing to read 'V Villagran'.

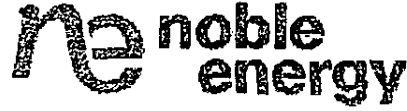
Vanessa Villagran
Regulatory Analyst

Enclosures
Mailed Via: UPS

Minerals Management Service
RECEIVED

NOV 14 2011

Office of Field Operations
Pipeline Section



DOCUMENT TITLE:		WEATHERFORD FLOODING OF DUAL 4.5" FLOWLINES OPERATIONAL PROCEDURE	
DOCUMENT NO.:		11268-HT-PR-N7001	
CUSTOMER:	NOBLE ENERGY	PROJECT:	RATON SOUTH
CLIENT JOB NO.:	N/A	HELIX JOB NO:	11268

THIRD PARTY:	WEATHERFORD	REFERENCE NO.:	WPSS-014550- WP-01	REV NO.:	03
		NUMBER OF PAGES TO FOLLOW:			69

SIGNATURE LEGEND:

ID:	NAME:	TITLE:
HB	Harry Barker	Project Manager
NO	Nicholas Okubo	Field Engineer
BS	Bill Schmidt	Weatherford

HELIX SUBSEA CONSTRUCTION						NOBLE ENERGY INC	
0	Issued for Construction	BS	HB	HB	09/08/11	APPROVAL STATUS DESCRIPTION	
C	Issued for Client Review	BS	HB	HB	08/03/11	APPROVED, WORK MAY PROCEED.	<input checked="" type="checkbox"/>
B	Issued for Client Review	BS	HB	HB	07/22/11	REVISE AS NOTED AND RE-SUBMIT FINAL. WORK MAY PROCEED.	
						REVISE AS NOTED AND RE-SUBMIT. WORK MAY NOT PROCEED.	
						FOR INFORMATION ONLY. RE-SUBMISSION NOT REQUIRED.	
REV	DESCRIPTION	ORIGIN	CHECK	APPROVAL	DATE	NAME	DATE
						<i>[Signature]</i>	9/8/11

CLIENT



Weatherford®

LOCATION

VK 900

PIPELINE AND SPECIALTY SERVICES

RATON SOUTH FIELD DEVELOPMENT OPERATIONAL PROCEDURE FLOODING OF DUAL 4.5" FLOWLINES

DOCUMENT TYPE: WORK PROCEDURE

DOCUMENT TITLE: OPERATIONAL PROCEDURES
4.5" Dual Flowline Flooding

WPSS DOCUMENT NUMBER: WPSS-014550-WP-01

CLIENT DOCUMENT NUMBER:

REV	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	REVIEWED BY	HESG
03	3 JUNE 2011	Approved for Construction	T. Williams	T. Strahl		
02	22 JUNE 2011	Re-issued for Review	T. Williams	T. Strahl		
01	7 JUNE 2011	Re-issued for Review	B. Schmidt	T. Strahl	R. White	
00	31 May 2011	Issued for Review	B. Schmidt	T. Strahl		H. Barker
0A	16 MAY 2011	Internal Review	B. Schmidt	T. Strahl		
REVISIONS			SIGNATURES			



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1.0 GENERAL

Weatherford Pipeline and Specialty Services, hereinafter referred to as "WPSS", has been requested by Helix Energy Solutions Group, hereinafter referred to as "Helix", to perform pre-commissioning flooding of the crude oil field tieback to the existing Chevron production facility. The tie back consists of twin 4.5-inch O.D, 27.5 mile long flowlines terminating by means of Pipeline End Termination structures (PLETs) near the Raton South wellhead. The tie-in at the Raton South well will be achieved by installing a diverless vertically installed connection jumper. WPSS will flood each flowline individually prior to welding on the PLETs and overboarding. This scope of work will take place on the deck of the Helix Express Vessel.

WPSS will flood from a port on the pull in head. The flooding medium will be filtered seawater, treated with 600ppm of XC102 and 110ppm of OSW490. The Helix Express will supply the seawater from their saltwater lift pumps on board the Helix Express. Following the Flooding the WPSS equipment will be demobilized and the WPSS personnel will transfer to the Chevron platform VK-900 for the Hydrotect Operations.

SYSTEM	LENGTH [FT]	OD [IN]	WT [IN]	ID [IN]	WD (MAX.) [FT]	VOLUME [GALS]
EAST FLOWLINE	145,309	4.500"	0.531	3.438	3,400	70,075
WEST FLOWLINE	145,378	4.500"	0.531	3.438	3,400	70,108
NOTE:	Flowline Pipe Specification		API 5L x70 SMLS Line Pipe. w/ 14 – 16 MILS FBE Coating			

1.1 OBJECTIVE

The objective of this document is to provide all personnel a clear understanding of the work scope to ensure the work is completed in a safe, efficient and timely manner. Furthermore it is designed to be an inclusive source of information regarding the activities associated with the flooding operation to be performed on Noble Raton South Development Project, from the Helix Express.



1.2 ABBREVIATIONS

ASME	American Society of Mechanical Engineers
ANSI	American National Standards Institute
API	American Petroleum Institute
ID	Inside Diameter
ITP	Inspection Test Plan
JSA	Job Safety Analysis
MAOP	Maximum Allowable Operating Pressure
MSL	Mean Sea Level
OD	Outside Diameter
PPE	Personal Protective Equipment
PTW	Permit to Work
SOW	Scope of Work
SDV	Shut Down Valve
WFT	Weatherford
WPSS	Weatherford Pipeline & Specialty Services
WT	Wall Thickness
cfm	Cubic Feet per minute
ft	Feet
ft ³	Cubic Feet
gal	Gallons
gpm	Gallons Per Minute
hrs	Hours
in	Inches
mm	Millimeters
psi	Pounds Per Square Inch
psia	Pounds Per Square Inch (Absolute Pressure)
psig	Pounds Per Square Inch (Gauge Pressure)
scf	Standard Cubic Feet
scfm	Standard Cubic Feet Per Minute



Each Operational Procedure has an ITP. In the ITP involvement codes and definitions are used as follows:

"P" - Performance

The Organization involved is responsible for the physical performance of the Inspection Check or Task and for issuing the relevant Quality Record (definition of Record as per ISO 9000:2000 Quality Management Systems – Fundamentals and Vocabulary, para 3.7.6).

"W" - Witness

The Organization involved elects to attend to the Inspection or Check performed by the Performing Organization. The Performing Organization shall notify the Witnessing Organization of the Inspection or Check performance within 24 hours of activity being performed. Non-attendance of the Witnessing Organization at the notified time shall under no circumstances delay the Inspection or Check being carried out by the Performing Organization.

"H" - Validation (Hold Point)

The Organization involved attends the Inspection or Check performed by the Performing Organization to record the Inspection or Check results. The Performing Organization shall notify the Validation Organization of the Inspection or Check performance within 24 hours of activity being performed and shall carry out the Inspection or Check only if the Validation Organization is attending. A written waiver from the Validation Organization is required before execution of the Inspection or Check can take place in their absence.

"R" - Review

The Organization involved is responsible for the performance of a review of relevant documentation and/or Quality Records.

"M" - Monitor

The Organization indicated may monitor the works during routine surveillance.



1.3 REFERENCES

1.3.1 CODE REFERENCES

NUMBER	TITLE
30 CFR 250(J)	Pipeline and Pipeline Rights of Way
API Spec 5L	Specifications for Line Pipe
API RP 1110	Pressure Testing of Liquid Petroleum Pipelines
API RP 1111	Design, Construction, Operation and Maintenance of Offshore Hydrocarbon Pipelines
ASME B31.4.2002	Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids
ASME B31.8.2003	Gas Transmissions and Distribution Piping Systems
DNVS-OS-F101	Submarine Pipeline Systems

1.3.2 WPSS REFERENCES

NUMBER	TITLE
WPSS-Q-014550-01	Weatherford Commercial Proposal

1.3.3 HELIX ISSUED REFERENCES

NUMBER	TITLE
16172A100 REV01	RATON SOUTH SCOPE OF SUPPLY SCHEMATIC

1.3.4 Baker Hughes References

NUMBER	TITLE
	Raton South Hydrotest Recommendation



1.4 RESOURCES

Helix shall provide the following services to support the activities as outlined herein:

- Marine transportation for WPSS equipment and personnel
- Helicopter Transportation (if applicable)
- Meals and lodging for four (4) WPSS personnel onboard the Helix Express
- Crane services at dock and offshore facilities to transfer WPSS equipment and personnel
- Utility air supply for WPSS equipment onboard the Helix Express (185cfm @ 100psi)
- Water supply for WPSS equipment onboard the Helix Express (min 120gpm @ 30psi)
- Electrical supply for WPSS equipment onboard the Helix Express (110v, 15amp)
- Offshore Rigging support as needed



2.0 SAFETY

2.1 SUMMARY

WPSS is fully committed to providing a quality H.S.E. performance in all facets of its operations, at all locations and on all projects in which WPSS is involved. It is a requirement for all work procedures that pre-job safety analysis or JSAs be performed and that all pertinent information be distributed and discussed with all personnel involved prior to start of work. Furthermore, safety meetings shall be held prior to every shift to distribute current information and discuss hazards and safe procedures of the job at hand. WPSS personnel must wear proper PPE on the job; hard hat, safety shoes and safety glasses and other PPE as stipulated by the offshore vessel/platform.

2.2 SAFETY MEETINGS & JOB SAFETY ANALYSIS

Upon arrival at the work location, a site specific safety meeting will be held to review all aspects of safety relating to the work and location. All relevant personnel will be required to attend. This meeting will be recorded by WPSS.

A Job Safety Analysis (JSA) will be conducted before commencing each new operation and at the beginning of each work shift. The JSAs shall outline tasks to be performed and identify the associated risks for each task along with mitigating procedures to minimize the anticipated risk exposure. All work crewmembers shall participate in the JSA process to ensure everyone understands the risk and mitigating procedures. The JSAs shall also review the means of egress at the specific location.

The JSAs shall include all hazards, control measures, emergency response, fire prevention, safe areas, escape routes, muster points, use of signs and barriers, PPE, handling of hazardous material, awareness of high pressure, noise, First Aid facilities and accident and incident reporting.

Any accidents or incidents, including near misses, will require a total "ALL STOP" with a post review of the situation before any activity can resume. With regards to an unsafe act or situation, any personnel involved in operations can give an "ALL STOP" but only the WPSS Superintendent in conjunction with the Company Representative and Operations can give an "ALL START".

NOTE:

At any point in time during the WPSS operations, an individual has the right to "STOP THE JOB" if there are "unsafe" activities or situations occurring.

2.3 PERMIT TO WORK

WPSS personnel are to ensure that a permit to work is issued by Offshore Vessel / Client on all offshore facilities / vessels thus ensuring that all parties under WPSS control are in full compliance with the facilities operating practices.

2.4 HIGH PRESSURE SYSTEMS PRECAUTIONS (AIR, CHEMICAL OR WATER)

When operating in the vicinity of hoses, equipment, or piping under pressure, all personnel must adhere to the following precautions:

- During pressurization and hold period, a **minimum 15 foot** stand-off distance shall be maintained from test flange/head and a **minimum 10 foot** stand-off distance from pressurized piping. In the case of limited space due to SIMOPS, the client will assist WPSS crew in allocating stand-off distances during the Flooding operations.
- Placement of the test flange/head should take into consideration the ballistic flight path if failures were to occur on the autoclave port fitting and separation from the blind flanges was to occur.
- No work is to be conducted on the pressurized system. In the event that a leak is found, the system must be de-pressurized to ambient pressure or "double-block" isolation must be used before any work can be conducted on the system.
- A suitable area around test spread shall be taped off (red danger tape) to prevent unauthorized entry to area's near the test head.
- Prior to pressurization, the location and test activity shall be announced over the intercom/loud-speaker system.
- A suitable means shall be put in place to provide visual leak detection without having to approach the test flange/head during pressurization or hold period to accomplish the visual verification.
- Whip checks will be utilized to secure all hoses no matter the level of pressure; this will include all "standard" whip checks and/or rope for larger hoses when no "standard" whip checks exist.
- Before beginning work on any operation, the WPSS Crew on site will conduct a walk-through to check each piece of equipment and ensure it is correctly installed and secured with whip checks.

2.5 EQUIPMENT TRANSFER

Prior to mobilization the following will be confirmed for each item of WPSS equipment to be lifted:

- All equipment will be designed to adhere to standards for offshore transit/transfer and operations.
- All equipment will be clearly marked on the lifting frame with its weight.
- Equipment slings, shackles, stingers, etc. will be certified within the last 6 months and certification shall accompany the equipment.

WPSS personnel will adhere to the following precautions when operating in the vicinity of items being lifted overhead:

- Proper PPE will be worn by all individuals.
- Only one individual will provide hand-signals to the crane/forklift operator.
- WPSS personnel will clearly define a plan prior to beginning the lift, and will execute the plan as it was designed.



2.6 ENVIRONMENTAL SAFETY

The following project specific precautions will be put in place to avoid any undue damage to the environment:

- To prevent spillage of fuel during pump to tank transfers, these operations will be performed over drip-pans or pads at all times.
- Water Disposal methods will be in place to remove the water brought onto the facilities and will be disposed of in a manner in accordance with regulations

2.7 EQUIPMENT CERTIFICATION

All WPSS stand alone equipment (containers, pumps, compressors, tanks and hose baskets) shall be supplied with suitable rigging for offshore lifting and designed in accordance with Weatherford installation basis of design and shall include valid certification (certified lifting points and lifting gear). All mechanical instrumentation and electrical gear shall be calibrated by authorized Third party no sooner than 1 month of mobilization of the spread with 6 months validity certificates from time of delivery or testing.



3.0 EQUIPMENT, PERSONNEL & MATERIALS REQUIRED

3.1 WPSS FLOODING EQUIPMENT

ITEM	DESCRIPTION	QTY	DIMENSIONS (L x W x H) (FT)	WEIGHT (LBS)
1.	Diesel driven positive displacement pump	2	4 x 4 x 5	2,200
2.	Chemical Injection pump	2	3 x 5 x 4	1,200
3.	50 micron Filter Skid	1	2 x 2 x 4	200
4.	Job Box	1	5 x 4 x 4	1,500
5.	50 bbl Tank	3	4 x 4 x 6	1,500
6.	Storage Container	1	10 x 8 x 8	9,800
7.	1" Diaphragm Pump	1	Stored Inside: Hose Basket Job Box Storage Container	
8.	2" Fill Hose	Set		
9.	1" Air Hose	250'		
10.	¼" Injection Hose	Set		
11.	2" Flow Meter	2		
12.	Pressure Relief Valve set to 1500psi	2		
13.	Keller Digital Gauge (pressure & temperature) 300bar	2		
14.	Hand Tools / Valves / Fittings	1 set each		
15.	Handheld Radio	1 set		
16.	Computer and printer package	1		

3.2 WPSS PERSONNEL

ITEM	DESCRIPTION	Qty
1.	Supervisor	1
2.	Foreman	1
3.	Technician	2

3.3 WPSS CHEMICAL REQUIREMENTS

ITEM	DESCRIPTION	Qty
1.	Baker Hughes Biocide XC102 (600ppm) + 20% contingency	100 gallons total
2.	Baker Hughes Oxygen Scavenger (110ppm) + 20% contingency	19 gallons total



3.4 WPSS OFFSHORE REQUIREMENTS

ITEM	DESCRIPTION	QTY
1.	Seawater Supply	140,590 gals
2.	Utility Air	185cfm / 100psi
3.	Diesel Fuel	As needed
4.	Crane Access	As needed

3.5 HELIX PROVISIONS

ITEM	DESCRIPTION	QTY
1.	Tie in port on pull in head for flooding spread	1



4.0 OPERATIONAL PROCEDURES

4.1 EQUIPMENT AND PERSONNEL MOBILIZATION

Once confirmation to mobilize has been received from Helix, WPSS equipment and personnel will be transferred to the Client Specified Dockyard Location from transit to the offshore location. Lift transfers for equipment and personnel will be conducted by the Helix personnel. Staging of the equipment will be carried out by Helix personnel with the assistance of WPSS personnel. All personnel working under WPSS will undergo the vessel orientation before any work can commence.

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE
1.	<p>Prior to mobilization of equipment and personnel, the WPSS crew will stage equipment and review the following:</p> <ul style="list-style-type: none"> • Pre-Test of manifolds/hoses per workshop procedure • Start-up and run of pumps • Check certification of hoses, lifting slings, shackles, lifting point, etc. • Check Keller Gauge for operating pressure: 300bar (4350psi) 	WPSS-14550-MAN-01	P	W
2.	<p>Prior to performing any work, WPSS Supervisor will conduct JSA</p> <p>Ensure all relevant parties have read and signed JSA</p>	3-4-GL-GL-PSS-00004	P	W
3.	<p>Load out equipment for Helix Noble Raton South Flooding operations on board the Helix Express.</p>		P	W
4.	<p>Mobilize equipment and personnel to:</p> <p>COMPANY DOCKYARD ADDRESS (TBD)</p>	5-4-GL-GL-PSS-00006	P	W



NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE
5.	Upon arrival at the COMPANY DOCKYARD ADDRESS, WPSS personnel to supervise the offloading of WPSS equipment from transportation	5-4-GL-GL-PSS-00006	P	P
6.	Confirm all items are properly secured for transit to site		P	P
7.	Upon arrival WPSS employees will immediately check-in with Vessel Safety Officer and receive safety orientation prior to commencing any work activities	5-4-GL-GL-PSS-00006	P	W
8.	The WPSS Supervisor shall conduct a Site Safety Meeting, JSA and job brief with crew and all relevant personnel before any operation has commenced to review all aspects of safety relating to the location with relevant personnel. Helix, Company, and/or vessel representatives shall attend and provide site safety information. The meeting will be recorded by WPSS on a Site Safety Form.	3-4-GL-GL-PSS-00004 7-4-GL-GL-PSS-00003	P	W
9.	Vessel personnel to lift equipment to Vessel and spot into the planned position according to predetermined lifting plan. WPSS to review and oversee placement of equipment.	5-4-GL-GL-PSS-00006	W	P
10.	Await Helix representative's instructions to proceed with rig-up activities. Changes to be authorized by WPSS Supervisor and reviewed by Helix representative.	5-4-GL-GL-PSS-00006	P	W



4.2 FLOODING EQUIPMENT RIG-UP

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
1.	Confirm all equipment is functional and complete daily maintenance and fuel checks.	5-4-GL-GL-PSS-00006	P	W	W
2.	Obtain Permit to Work for rig up and function testing and commence positioning of the equipment as per General Arrangement drawings. Conduct JSA/Tool Box Talk.	3-4-GL-GL-PSS-00004	P	P	W
3.	Lift the Flooding pumps and equipment to stage in the planned position if not already done during mobilization of equipment.	5-4-GL-GL-PSS-00006	P	P	W
4.	Connect the supply hose from the water source to the inlet of the 50 micron filter and tank manifold. Note: The Express confirm Fire water system can supply minimum 120gpm.	5-4-GL-GL-PSS-00006	P	W	W
5.	Connect the 2" flooding hose from the flooding pump to the flow meter / double block and bleed assembly. Install the heavy-duty whip checks to all connections and fully tighten.	5-4-GL-GL-PSS-00006	P	W	W
6.	Connect Supply hose from Chemical Storage tanks to Chemical Injection Pumps. Install the heavy-duty whip checks to all connections and fully tighten.	5-4-GL-GL-PSS-00006	P	W	W
7.	Prior to proceeding it will be necessary calibrate the chemical injection pumps to determine volume per stroke for chemical injection purposes.	5-4-GL-GL-PSS-00006	P	W	W



NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
8.	<p>To perform confirmation on the output per stroke on each pump, conduct the following calibration test:</p> <ol style="list-style-type: none"> 1. Ensure stroke counter on pump is "zeroed" 2. Flow water through system until a steady stream of water is flowing from the discharge hose 3. Place discharge hose in 5gal bucket and engage pump 4. Record the number of strokes required to fill 5gal bucket 5. Repeat 3 times to ensure accuracy <p style="text-align: center;">$Volume\ per\ stroke = \frac{5gal}{Number\ of\ strokes}$</p> <p>Average volume per stroke <input type="text"/></p>				
9.	<p>Calculate strokes per minute using volume per stroke above.</p> $Strokes/Min = \frac{Flowrate\ x\ ppm}{1,000,000\ x\ volume\ per\ stroke}$ <p>Strokes / Minute <input type="text"/></p>	5-4-GL-GL-PSS-00006	P	W	W
10.	<p>After calibration connect the Chemical injection hose from the Chemical injection pump to the double block and bleed assembly. Install the heavy-duty whip checks to all connections and fully tighten.</p>	5-4-GL-GL-PSS-00006	P	W	W
11.	<p>Upon completion of previous steps WPSS will wait until first pipeline end is recovered to surface for PLET installation and given instruction to proceed.</p>	5-4-GL-GL-PSS-00006	M	M	M
12.	<p>Upon confirmation to proceed; The Helix representative shall review and sign the Commencement Report prior to the start of any operations associated with the tying in to pull in head and flooding operations.</p> <p>Note: Helix will provide a 2" Female NPT tap for tie in</p>	5-4-GL-GL-PSS-00006 5-4-GL-GL-PSS-00011	P	P	W



NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
13.	WPSS will then Install tie in manifold to pull in head. Note: Helix may need to provide rigger support and/or scaffolding to support tie in manifold on PLET porch.	5-4-GL-GL-PSS-00006	P	W	W
14.	Install 1" "bleed" hose from the tie in manifold and route to the 50 bbl Tanks for discharge. Note: Bleed water may contain chemical for disposal by Helix.	5-4-GL-GL-PSS-00006	P	W	W
15.	Connect the 2" flooding hose from the double block and bleed assembly to the tie in manifold on pull in head. Install the heavy-duty whip checks to all connections and fully tighten.	5-4-GL-GL-PSS-00006	P	W	W
16.	With all equipment in place the Subcontractor Project Engineer, and relevant personnel and walk through the flooding spread and will carry out a Safety walk-through of rig-up.	5-4-GL-GL-PSS-00006	P	H	H
17.	Upon confirmation of safety walk-through, WSPP will erect safety barriers and place safety warning signs and check functionality of WPSS flooding spread	5-4-GL-GL-PSS-00006	P	W	W
18.	Platform personnel will ensure that top of riser flange is properly vented to allow displaced air to escape. Note: If delays are expected, the top of riser blind flange will be secured and tightened to prevent any entry of foreign debris.	5-4-GL-GL-PSS-00006	P	P	W
19.	Personnel on VK-900 platform will ensure immediate area around risers is barricaded, and all relevant personnel are aware of the commencement of Flooding operations.	5-4-GL-GL-PSS-00006	P	P	W



4.3 FLOODING OPERATIONS

NOTE: The following procedure will be done for each flowline prior to over boarding of the PLET(s).

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
1.	<p>The WPSS Supervisor shall conduct a JSA/Toolbox Talk at the beginning of the operation with all personnel who will be operating, observing or witnessing for the duration of the operation.</p> <p>This JSA/Toolbox Talk will be reviewed at shift handovers for the duration of the operation. Any new or changing hazards identified and updated as required.</p>	3-4-GL-GL-PSS-00004	P	W	W
2.	<p>During the flooding operation, the following parameters will be recorded and logged every 10 minutes:</p> <ul style="list-style-type: none"> • Pipeline Pressure.....psig • Flooding Rate.....gpm • Volume of water injected.....gallons • Volume of chemical injected.....strokes <p>NOTE: Chemical Concentration is 600ppm XC102 and 110ppm OSW490</p>	5-4-GL-GL-PSS-00012 Appendix E			
3.	Confirm water supply to flooding pump.	5-4-GL-GL-PSS-00006	P	W	W
4.	Begin filling 50 bbl tanks with filtered seawater.	5-4-GL-GL-PSS-00006			
5.	By regulating Chemical injection pump ensure that each 50 bbl tank is dosed with approximately 0.231 gallons of OSW 490 to achieve 110 ppm.	5-4-GL-GL-PSS-00006 Appendix E			
6.	Confirm good communication with personnel on VK-900 platform. Confirm top of riser flange is open to allow air to escape.	5-4-GL-GL-PSS-00006			



NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE		
7.	Walk the line and verify WPSS valves aligned to flood	5-4-GL-GL-PSS-00006	P	W	W		
8.	Once tanks have settled for at least 4 minutes. Start flooding pump and begin filling pipeline with chemically treated seawater Total Volume to be pumped per flowline is: 70,295 gallons + 1% = 71,000gals	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W		
9.	Upon starting flooding pump, commence chemical injection XC 102 at rate noted below (from Item 4.2.10) to achieve 600ppm. <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 30%;">Strokes per Minute</td> <td style="width: 70%;"></td> </tr> </table>	Strokes per Minute		5-4-GL-GL-PSS-00012 Appendix E	P	W	W
Strokes per Minute							
10.	During flooding operations the tanks will be rotated out to allow filling with chemically treated seawater, settling for at least 4 minutes per tank, and injection into the pipeline. Note: Each tank will be allowed at least 4 minutes settling time prior to injection into pipeline.	Appendix E					
11.	During flooding operations WPSS will monitor the flooding pressure on the line. It is expected that once flooding has begun the bottom "U" shape of the line will fill with water and air pressure trapped between the "U" and the injection point will increase throughout the Flooding process. As the pressure increases and as the pipeline becomes full, WPSS will stop pumping and "bleed" the air in the line through the 1" bleed valve on the tie in manifold. The bleed hose will be diverted to a 50bbl tank to capture the chemically treated water.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W		
12.	Upon reaching a steady state of flow adjust the rate to no less than 120 GPM, as not to exceed 1500 psig on the pump discharge.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W		
13.	Continue the pumping of water followed by the "bleeding" of air	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W		



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NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
	until the total volume is achieved.				
14.	Upon reaching 71,000gals, Stop the flooding pump and chemical injection pump.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
15.	Disconnect tie in manifold from pull in head and secure WPSS equipment until the second line is ready. Helix will now install the PLET to the pipe and recover next flowline section.	5-4-GL-GL-PSS-00006	P	W	W
16.	Once second line is recovered and placed in PLET porch WPSS will repeat the previous steps to complete flooding operations.	5-4-GL-GL-PSS-00006	P	W	W
17.	Upon completion of flooding both flowlines the Helix representative shall review and sign the Completion Report at the conclusion of all operations associated with flooding operations.	5-4-GL-GL-PSS-00013 5-4-GL-GL-PSS-00006	P	H	H
18.	Remaining chemically treated seawater will be neutralized by mixing at a 1:1 ration of XC102 and OSW490 with a contact time of at least 30 seconds. The neutralized seawater will then be overboarded	Appendix E	P	W	H



4.4 EQUIPMENT DEMOBILIZATION

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/DATE	HELIX INITIAL/DATE	CLIENT INITIAL/DATE
1.	Await Helix representative's approval to begin demobilization of equipment. Personnel will then be transferred to the Chevron Platform for Hydrotest operations.	5-4-GL-GL-PSS-00006	P	P	W
2.	<p>Ensure all paperwork has been signed by Helix representative and / or relevant parties.</p> <ul style="list-style-type: none"> • Commencement Reports • Daily Site Reports • Shift Handover Forms • Field Tickets • Pumping Reports • Job Safety Analysis (JSA's) • Post Job Evaluation • All Related Pressure Charts • All Related Temperature Charts • Completion Reports 	<p>5-4-GL-GL-PSS-00011 5-4-GL-GL-PSS-00006 5-4-GL-GL-PSS-00007 5-4-GL-GL-PSS-00012 3-4-GL-GL-PSS-00004 6-4-US-GL-PSS-00001 5-4-GL-GL-PSS-00013 5-4-GL-GL-PSS-00008</p>	P	W	W
3.	The WPSS Supervisor shall conduct a JSA/Toolbox Talk at the beginning of the operation with all personnel who will be operating, observing or witnessing for the duration of the operation.	3-4-GL-GL-PSS-00004	P	W	W
4.	Break-down equipment spreads and prepare/secure delicate items prior to load-out.	5-4-GL-GL-PSS-00006	P	W	W
5.	Load-out equipment spread on WPSS supplied transportation. Ensure equipment is properly secured.	5-4-GL-GL-PSS-00006	P	W	W
6.	<p>Demobilize equipment and personnel to the WPSS facilities at the following addresses:</p> <p>Attn: Taylor Williams Phone: (713) 580-9700 7721 Pinemont Road Houston, TX 77040-6203 USA</p>	5-4-GL-GL-PSS-00006	P	W	W



NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS







ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
7.	Contact Project Manager or Asset Coordinator to coordinate trucks for equipment and crew to shop. Maintain shipping manifests or other records for Project Manager.	5-4-GL-GL-PSS-00006	P	W	W
8.	Deliver Project Completion Book to Helix at time of final invoice.	WPSS-014550-CB	P	W	W

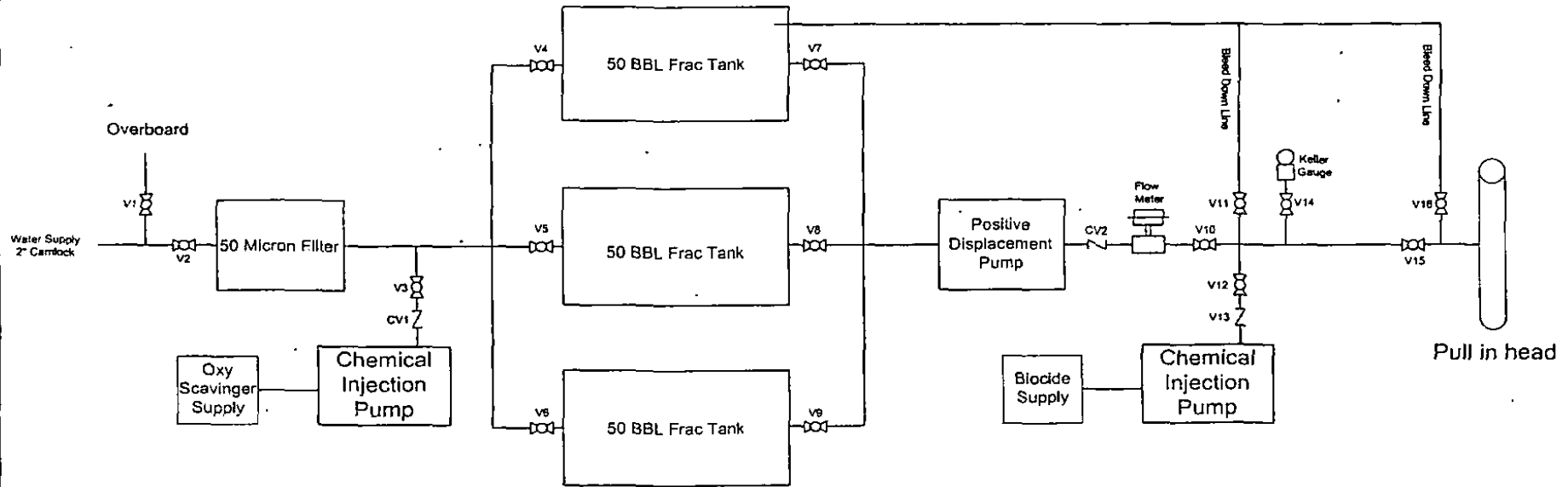


APPENDIX A: WPSS DIAGRAMS

NUMBER	TITLE
WPSS-014550-DW-02	Flooding Rig-Up Schematic

LEGEND:

-  Flowmeter
-  Check-valve
-  Valve
-  Keller Gauge Data Logger



NOTES:
 Additional Weatherford equipment not identified in this drawing
 This drawing assumes the Express can supply air and water

DESCRIPTION	DATE OF ISSUE	DRAWN BY	CHECKED BY	APPROVED BY
ISSUED FOR INTERNAL USE	19 MAY 11	BS	TS	
ISSUED FOR USE	2 JUNE 11	BS	TS	
ISSUED FOR USE	11 JUNE 11	DL	TW	WB


Weatherford
 PIPELINE & SPECIALTY SERVICES
 7721 PINEMONT DR
 HOUSTON, TEXAS 77042

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 FOR ANY OTHER PURPOSE WITHOUT
 THE EXPRESS PERMISSION OF
 WEATHERFORD.

CLIENT: Helix Energy Services
 UNITS: N/A
 SCALE: NOT TO SCALE

DRAWING NUMBER: WPSS-014550-DW-02
 DRAWING TITLE: FLOODING RIG-UP SCHEMATIC
 PROJECT: NOBLE RATON SOUTH
 REVISION: 2



NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS



APPENDIX B: ENGINEERING CALCULATIONS

1. Flooding Calculations (Per line)

Pipeline Basic Data: Fill and Test Data

Comments: Noble Raton South

Pipe OD:	4.5	in (actual)		114.30	mm	
Pipe WT:	0.531	in		13.49	mm	
Pipe Length:	145765	ft	27.61	44429.17	m	44.43
Fill Pump Rate:	120	gpm		454.24	L/min	
Estimated By-Pass:	3.0%	%				
Test_Press_Max:		psig		0.00	barg	0
Pack_Press:	0	psig		0.00	barg	0
Press Pump Rate:		gpm		0.00	L/min	
Inhibitor PPM	0	ppm		0.00	ppm	
O2 Scavenger PPM	110	ppm		110.00	ppm	
Biocide PPM	600	ppm		600.00	ppm	
Dye PPM	0	ppm		0.00	ppm	
Actual Volume to Test Pressure:	0	gal		0.00	L	
Pipe ID:	3.44	in		87.33	mm	
Gal / Foot:	0.4822	gal/ft		5.9891	L/m	
Ft^3 / Foot:	0.06	ft^3/ft		0.01	m^3/m	
Pipeline Total Vol:	70,295.12	gal		266090.24	L	
Pipeline Total Vol:	9,397.09	ft^3		266.10	m^3	
Pipeline Total Vol:	1,673.69	bbl		1673.69	bbl	days
Pipe Fill Time:	10.06	hr	0.42	10.06	hr	0.42
Fill Fg Speed:	4.15	ft/sec	2.83	1.26	m/s	4.55
Gal / psi	0.229370	gal/psi		12.59	L/bar	12.35
Gal to Test Press:	0.00	gal (at 70 degF)		0.00	L	days
Time to Test Press:	NA	hr	NA	NA	hr	NA
Pressurization Rate:	0.00	psi/min	0.00	0.00	bar/min	0.00
Est Mill Scale:	1475.80	lb	0.74	669.41	kg	0.67
Inhibitor Vol:	10.00	gal	0.00	0.00	L	0.00
O2 Scavenger Vol:	7.73	gal	0.18	29.27	L	0.18
Biocide Vol:	42.18	gal	1.00	159.65	L	1.00
Dye Vol:	0.00	gal	0.00	0.00	L	0.00
%Trapped Air:	NA			NA		
Max Vol to Press:	140.59	gal		532.18	L	


Trapped Air Acceptance Criterial is 0.2% Maximum

Revision Date: 2-Aug-11



APPENDIX C: WPSS FIELD FORMS

TITLE
Commencement Report (1pg)
Daily Site Reports (DSR) (1pg)
Job Safety Analysis (JSA's) (5pgs)
Field Tickets (6pgs)
Site Safety Meeting (1pg)
Work Safe Plan "Tool Box Talk" (1pg)
Shift Handover Forms (2pgs)
Completion Reports (1pg)
Pumping Report General Purpose (1pg)

		PIPELINE & SPECIALTY SERVICES FORM		
FORM NUMBER: 5-4-GL-GL-PSS-00006	REV: 05	PAGE: 1 of 1	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007
PREPARED BY: BIRGIT THIELE	REVIEWED BY: MURDO MORRISON	APPROVED BY: MALCOLM DUNCAN	APPROVED BY:	
TITLE:	DAILY SITE REPORT			

Project Name:			
Project No.:		Operation:	

Date & Time	Operational Details & Remarks

	Name	Signature	Date
Weatherford P&SS Representative			
Client Representative			



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PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER: 3-4-GL-GL-PSS-00004	REV: 04	PAGE: 1 of 5	ORIGINAL ISSUE DATE: 06/14/2004	REVISION DATE: 09/17/2007
PREPARED BY: BIRGIT THIELE	REVIEWED BY: CRAIG MORRIS	APPROVED BY: ADRIAN HOULBROOK	APPROVED BY:	
TITLE:	JOB SAFETY ANALYSIS			

Pre-Job Risk Assessment

Standard Hazards	Hazards Requiring Permits to Work	Hand Protection
Exposure to Cold/ Heat Extremes <input type="checkbox"/>	Will a Lock-Out/Tag-Out of Equipment Occur? <input type="checkbox"/>	Leather Gloves <input type="checkbox"/>
Presence of or Traveling on Ice, Snow, Water <input type="checkbox"/>	Will a Confined Space Entry Occur? <input type="checkbox"/>	Cotton Gloves <input type="checkbox"/>
Slip/Trip/Fall Hazards <input type="checkbox"/>	Will Welding, Cutting, or Brazing Occur? <input type="checkbox"/>	Chemical Resistant Gloves <input type="checkbox"/>
Pinch Points Present <input type="checkbox"/>	Ergonomic Hazards	Welding Gloves <input type="checkbox"/>
Poor Lighting <input type="checkbox"/>	Awkward Position or Balance Will Be Necessary <input type="checkbox"/>	Vibration Reduction Gloves <input type="checkbox"/>
Presence of Insects or Wildlife <input type="checkbox"/>	Poor Posture Will Be Necessary <input type="checkbox"/>	Insulated Gloves <input type="checkbox"/>
Wind Conditions <input type="checkbox"/>	Straining, Lifting, Pushing or Pulling Will Be Necessary <input type="checkbox"/>	Other <input type="checkbox"/>
Inclement Weather <input type="checkbox"/>	Reaching or Climbing Will Be Necessary <input type="checkbox"/>	Hearing Protection
Physical Hazards	Bending or Twisting Will Be Necessary <input type="checkbox"/>	Ear Plugs <input type="checkbox"/>
Pressurized Equipment Hazard <input type="checkbox"/>	Repetitive Motion Will Be Necessary <input type="checkbox"/>	Canal Caps <input type="checkbox"/>
Fire or Explosion Hazard <input type="checkbox"/>	Chemical and Material Hazards	Ear Muffs <input type="checkbox"/>
Electrical Hazard <input type="checkbox"/>	Oxygen Content Hazards <input type="checkbox"/>	Respiratory Protection
Use of Hand Tools or Power Tools <input type="checkbox"/>	Asbestos Hazards <input type="checkbox"/>	Air Purifying Respirator <input type="checkbox"/>
Radiant Energy Hazard (i.e. Welding, Lasers, X-Ray) <input type="checkbox"/>	Airborne Dust Hazards <input type="checkbox"/>	SCBA or Airline Respirator <input type="checkbox"/>
Flying Debris (Blown or Thrown Particles) <input type="checkbox"/>	Airborne Toxic Vapour, Fumes or Gas Hazard <input type="checkbox"/>	Escape Pack <input type="checkbox"/>
Working at Heights <input type="checkbox"/>	Absorption of a Chemical Possible <input type="checkbox"/>	Special Items
High Noise Levels (85dba or greater) <input type="checkbox"/>	Caustic or Acidic Chemicals <input type="checkbox"/>	Deluge Station <input type="checkbox"/>
Lifting Equipment (i.e. Crane, Forklift, Man-lift) <input type="checkbox"/>	Reactive Chemical Hazard <input type="checkbox"/>	Active Fall Arrest System <input type="checkbox"/>
Lifting Equip. (Work on Uneven/Unstable Surfaces) <input type="checkbox"/>	H2S, CO2 or Natural Gas Hazard <input type="checkbox"/>	Retrieval System <input type="checkbox"/>
Access/Egress Hazards or Limitations <input type="checkbox"/>	Over Head Protection	Atmospheric Monitors <input type="checkbox"/>
Work Practice Hazards	Hard Hat <input type="checkbox"/>	Cotton or Fire Retardant Clothing <input type="checkbox"/>
Training Deficiency (Technical and/or HSE) <input type="checkbox"/>	Safe Zone <input type="checkbox"/>	Chemical Resistant Clothing (Apron, Cloves, Boots, Etc.) <input type="checkbox"/>
SSE/SPE Present <input type="checkbox"/>	Foot Protection (ANSI Approved)	Fire Extinguisher <input type="checkbox"/>
Culture and/or Communication Deficiency <input type="checkbox"/>	Steel Toe Shoes or Boots <input type="checkbox"/>	First Aid Kit <input type="checkbox"/>
Testing and Inspection Hazards <input type="checkbox"/>	Chemical Resistant Boots <input type="checkbox"/>	
Performance of a Non-Routine Task Will Occur <input type="checkbox"/>	Slip, Heat or Puncture Resistant Soles <input type="checkbox"/>	
Shift Changes Will Occur During Operations <input type="checkbox"/>	Other <input type="checkbox"/>	
Policy Variance Will Occur <input type="checkbox"/>		

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PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER:
3-4-GL-GL-PSS-00004

REV:
04

PAGE:
2 of 5

ORIGINAL ISSUE DATE:
06/14/2004

REVISION DATE:
09/14/2007

TITLE:

JOB SAFETY ANALYSIS

Comments

States

Critical Errors

Analysis

Job:	Page: of (Use Additional Pages if Necessary)
Location:	Supervisor:
Date: <input type="checkbox"/> New <input type="checkbox"/> Revised	Reviewed By:

Correctly Sequenced Job Steps	Potential Hazards (Be Specific)	Actions to Eliminate or Reduce Hazards	Assigned Person
1.			
Specific Job Site Hazard			
2.			
Specific Job Site Hazard			

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ORIGINAL ISSUE DATE:
06/14/2004

REVISION DATE:
09/14/2007

TITLE:

JOB SAFETY ANALYSIS

3.			
Specific Job Site Hazard			
4.			
Specific Job Site Hazard			
5.			
Specific Job Site Hazard			
6.			
Specific Job Site Hazard			



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PIPELINE & SPECIALTY SERVICES FORM

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3-4-GL-GL-PSS-00004

REV:
04

PAGE:
4 of 5

ORIGINAL ISSUE DATE:
06/14/2004

REVISION DATE:
09/14/2007

TITLE:

JOB SAFETY ANALYSIS

7.			
Specific Job Site Hazard			
8.			
Specific Job Site Hazard			
9.			
Specific Job Site Hazard			
10.			
Specific Job Site Hazard			



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PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER:
3-4-GL-GL-PSS-00004

REV:
04

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ORIGINAL ISSUE DATE:
06/14/2004

REVISION DATE:
09/14/2007

TITLE: **JOB SAFETY ANALYSIS**

Verification of Job Safety Analysis

I have participated in the analysis of this job. I understand the hazards involved in this job. I understand I have an obligation to stop the job if I observe any unsafe acts or conditions to myself or any other person.

Name (Print)	Signature	Company	SSE? (✓)	Mentor? (✓)

Post Review of JSA Completed

JSA Requires Update because of: New Hazard Near-miss Injury Incident Environmental Incident

- Distribution:
- Send completed JSA to local Management and Local QHSE
 - If Revision is required send this document to Local QHSE, Corporate QHSE, Area Management and Product Line Management



PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER:
5-4-GL-GL-PSS-00008

REV:
07

PAGE:
3 of 6

ORIGINAL ISSUE DATE:
02/24/2004

REVISION DATE:
05/10/2011

TITLE:

FIELD TICKET

PERSONNEL REGISTER

Offshore

Onshore

Project Name:

Project Number:

Month:

S= Standby

W= Working

T= Transit

	Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
Title & Name	WT																																
	hr																																
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	WT																																
	hr																																
	WT																																
	hr																																
Client Initials:																																	

Weatherford P&SS Representative Name:

Client Representative Name:

Company Representative Name:

Weatherford P&SS Representative Sign:

Client Representative Sign:

Company Representative Sign:

Date:

Date:

Date:

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PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER:
5-4-GL-GL-PSS-00008

REV:
07

PAGE:
4 of 6

ORIGINAL ISSUE DATE:
02/24/2004

REVISION DATE:
05/10/2011

TITLE:

FIELD TICKET

PERSONNEL REGISTER

Offshore

Onshore

Project Name:

Project Number:

Month:

S= Standby

W= Working

T= Transit

Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
-----	---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

Title & Name

WT

hr

WT

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WT

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WT

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WT

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WT

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WT

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WT

hr

Client Initials:

Weatherford.P&SS Representative Name:

Client Representative Name:

Company Representative Name:

Weatherford P&SS Representative Sign:

Client Representative Sign:

Company Representative Sign:

Date:

Date:

Date:

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PIPELINE & SPECIALTY SERVICES FORM

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5-4-GL-GL-PSS-00008

REV: 07

PAGE:
5 of 6

ORIGINAL ISSUE DATE:
02/24/2004

REVISION DATE:
05/10/2011

TITLE:

FIELD TICKET

CONSUMABLE REGISTER

Project Name:

Project Number:

Month:

S= Standby

W= Working

T= Transit

		Day	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
UOM	Description																																

Weatherford P&SS Representative Name:	Client Representative Name:	Company Representative Name:
Weatherford P&SS Representative Sign:	Client Representative Sign:	Company Representative Sign:
Date:	Date:	Date:

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PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER:
7-4-GL-GL-PSS-00003

REV:
05

PAGE:
1 of 1

ORIGINAL ISSUE DATE:
02/24/2004

REVISION DATE:
04/02/2007

PREPARED BY:
BIRGIT THIELE

REVIEWED BY:
MURDO MORRISON

APPROVED BY:
MALCOLM DUNCAN

APPROVED BY:

TITLE:

SITE SAFETY MEETING

Project Name:		Date:	
Project No.		Place:	

Meeting Agenda:

- 1.
- 2.
- 3.
- 4.
- 5.
- 6.
- 7.
- 8.
- 9.
- 10.
- 11.
- 12.

Safety Meeting Attendees

Name:

Signature:



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PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER: 7-4-GL-GL-PSS-00001	REV: 05	PAGE: 1 of 1	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007
PREPARED BY: BIRGIT THIELE	REVIEWED BY: MURDO MORRISON	APPROVED BY: MALCOLM DUNCAN	APPROVED BY:	
TITLE:	WORK SAFE PLAN "TOOL BOX TALK"			


- | | | |
|---|----------------|--|
| 1. Write the name of the job task in the space provided. | Project Name | |
| 2. In the first column, list all possible hazards involved in the task or job. | Project Number | |
| 3. In the second column provide the corrective actions that will be taken to prevent hazards. | Date | |
| 4. In the third column list the resources that are needed to achieve the "safe work plan". | Authorised By | |
| 5. Have team members that helped develop this safe work plan sign their name in the space provided at the bottom. | | |

JOB / TASK	Hazard	Safe Work Plan	Resources	Prompts (not exhaustive)
				General Hazards: Fall protection, guard rails, edge protection, tie off points for safety harnesses, heavy lifts, chemicals, materials and tools, fire risk, access / egress, housekeeping.
				Permit to Work: Excavation, hot work, electrical, confined space, lift, and shaft.
				PPE: Helmet, boots, vests, glasses, goggles, dust mask, gloves, earmuff, ear plugs, safety harness, respirator
				Personnel: Enough personnel on site. Lookout / warning men, banks men

Team members signature:		

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 Weatherford		PIPELINE & SPECIALTY SERVICES FORM		
FORM NUMBER: 5-4-GL-GL-PSS-00007	REV: 05 .	PAGE: 1 of 2	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007
PREPARED BY: BIRGIT THIELE	REVIEWED BY: MURDO MORRISON	APPROVED BY: MALCOLM DUNCAN	APPROVED BY:	
TITLE:	SHIFT HANDOVER FORM			

Project:		Project Number:	
Job Location/System		Date:	
		Time:	

Work Completed (Previous shift):

Work In Progress:

Work to be done in next shift:

System / Pipeline status:



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PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER:
5-4-GL-GL-PSS-00007

REV:
05

PAGE:
2 of 2

ORIGINAL ISSUE DATE:
02/24/2004

REVISION DATE:
04/02/2007

TITLE:

SHIFT HANDOVER FORM

Permit status:

Barriers / Signs status:

Procedural / system status:

Operational Equipment / safety equipment status / hookup status/ consumable status:

Handover:		Accepted:	
Name:		Name:	
Signed:		Signed:	
Date:		Date:	
Time:		Time:	



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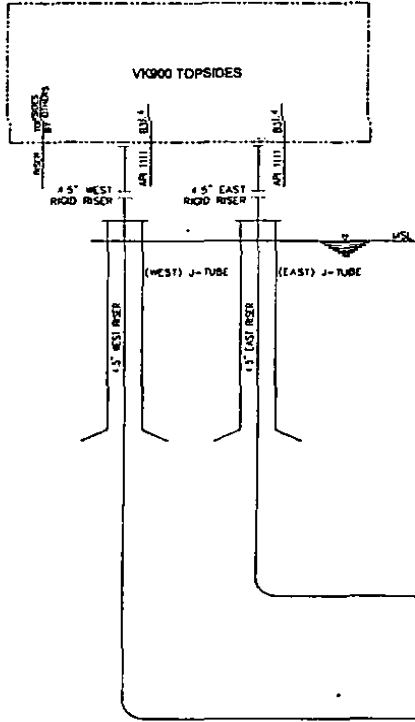
NOBLE RATON SOUTH FIELD DEVELOPMENT

FLOODING OPERATIONS

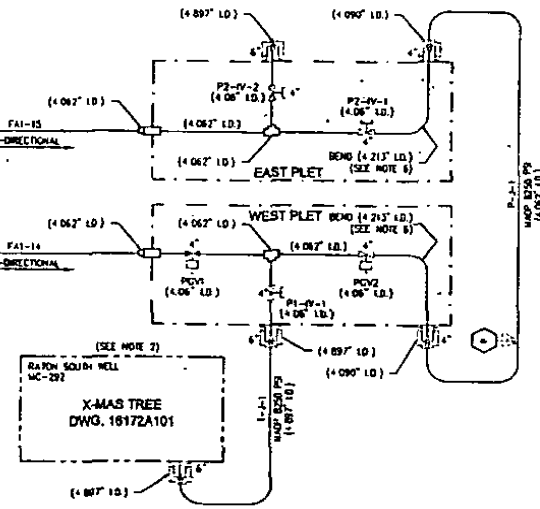


APPENDIX D: HELIX SUPPLIED DRAWINGS

NUMBER	TITLE
16172-A100 Rev 01	Raton South Scope of Supply Schematic



SCOPE OF SUPPLY BILL OF MATERIALS					
ITEM	DESCRIPTION	QTY.	UNIT	ANTICIPATED ISSUE DATE	PROVIDED BY
J-TUBE BUNDLE (EAST & WEST J-TUBES) MATERIALS					
1	8.625" O.D. x 0.300" W.T. API 5L X52 SMLS LINE PIPE (SEE NOTE 5)	1048	FT	1-Mar-11	COMPANY
2	10.75" O.D. x 0.300" W.T. API 5L X52 SMLS LINE PIPE (SEE NOTE 5)	440	FT	1-Mar-11	COMPANY
3	24" O.D. x 0.375" W.T. API 5L X52 DSAM LINE PIPE (SEE NOTE 3)	80	FT	1-Mar-11	COMPANY
4	18.00" O.D. x 0.300" W.T. API 5L X52 ERW LINE PIPE (SEE NOTE 5)	80	FT	1-Mar-11	COMPANY
5	J-TUBE BUNDLE CLAMPS & STAND-OFFS, CONNECTORS & MISCELLANEOUS	780	-	-	CONTRACTOR
EAST & WEST RISER MATERIALS					
6	4.50" O.D. x 0.331" W.T. API 5L X70 SMLS LINE PIPE W/ 14-18 MILS FBE COATING & 2.0mm 14-2.0mm OF ZN/P COATING	1,400	FT	13-May-11	COMPANY
7	4-1/16" API 10K HUB WELD NECK FLANGE	2	EA	11-Feb-11	COMPANY
8	1/2" x 6" L.G. SCH 80 NPT PIPE, (10E)	3	EA	11-Feb-11	COMPANY
9	1/2" FNPT BALL VALVE, 3000PSI, STAINLESS STEEL	3	EA	11-Feb-11	COMPANY
10	A-194-2H NUT COATED FOR 1-1/8" A-193-B7 STUD	40	EA	11-Feb-11	COMPANY
11	1-1/8" x 10" L.G. A-193-B7 STUD	20	EA	11-Feb-11	COMPANY
12	API 10K B7-120 RING GASKET	4	EA	11-Feb-11	COMPANY
13	4-1/16" API 10K HUB FLANGE NPT CENTER DRILLED & TAPPED 1/2"	2	EA	11-Feb-11	COMPANY
14	8.831" I.D. ALUMINUM BRACKET TAPERED ANODE, CALVOTEC CW W/ DR SIMILAR, 90 LB (NET WEIGHT)	36	EA	-	CONTRACTOR
15	18.00" O.D. ALUMINUM BRACKET TAPERED ANODE, CALVOTEC CW W/ DR SIMILAR, 97 LB (NET WEIGHT)	15	EA	-	CONTRACTOR
PYL EAST MATERIALS					
16	4.50" O.D. x 0.331" W.T. API 5L X70 SMLS LINE PIPE W/ 14-18 MILS FBE COATING	147,814	FT	FIRST 1233 JTS 15-Mar-11 REMAINING 1233 JTS 15-Apr-11	COMPANY
17	4.5" ED ALUMINUM BRACKET TAPERED ANODE, CALVOTEC CW W/ DR SIMILAR, 48 LB (NET WEIGHT)	87	EA	-	CONTRACTOR
PYL WEST MATERIALS					
18	4.50" O.D. x 0.331" W.T. API 5L X70 SMLS LINE PIPE W/ 14-18 MILS FBE COATING	147,814	FT	FIRST 1233 JTS 15-Mar-11 REMAINING 1233 JTS 15-Apr-11	COMPANY
19	4.5" ED ALUMINUM BRACKET TAPERED ANODE, CALVOTEC CW W/ DR SIMILAR, 48 LB (NET WEIGHT)	87	EA	-	CONTRACTOR



- NOTE:**
- UNDER NORMAL OPERATION ONE FLOWLINE WILL OPERATE AT A TIME.
 - REFERENCE CAMERON DRAWING SD-030566-02 FOR FLOW DIAGRAM
 - PRESSURE CAPS ON SPOOL HUBS FOR HYDROTEST ONLY, TO BE REMOVED AT TIME OF INSTALLATION
 - CONTROLS MATERIALS ARE NOT INCLUDED IN THE SCOPE OF SUPPLYDRAWING. REFER TO USDS RAYON SOUTH CONTROLS SCOPE OF SUPPLY DRAWING 16172-02-001-1 & CONTROLS SCOPE OF SUPPLY EQUIPMENT LIST 16172-02-002-01.
 - J-TUBE PIPE MAY BE ORDERED WITH 14-18 MILS OF FBE COATING OR COATED USING AN APPROVED PAINT SPECIFICATION FROM SPLASH ZONE REGION TO TOP OF J-TUBE FLANGE
 - LD 15%RED INCLUDES 10% WALL BENDING ALLOWANCE. PIPE LD MUST TO BENDING IS 4.062"

LINES AND SYMBOLOLOGY LEGEND

PIPELINE CONNECTION AIR	PIPELINE CONNECTION HUB W/ INHIBITED RELEASE	FLANGE 1E1	NO BYPASS	VALVE	CONTROL VALVE	CHECK VALVE	FLANGE 1E2	ALARM	NO BYPASS	VALVE	CONTROL VALVE	CHECK VALVE

NO	DR	REVISION DESCRIPTION	DATE	CHK	APP	FORWARDED SHEET
1	03	UPDATED BEND MATERIAL SIZE FOR P-1 & J-TUBES	04/20/11	SP	AP	SP
2	03	APPROVED FOR CONSTRUCTION	04/21/11	EA	SP	SP

SCOPE OF SUPPLY BILL OF MATERIALS					
ITEM	DESCRIPTION	QTY.	UNIT	ANTICIPATED ISSUE DATE	PROVIDED BY
P-J-T MATERIALS					
20	5.563" O.D. x 0.375" W.T. API 5L DR 480 SMLS LINE PIPE, W/ 14-18 MILS FBE COATING	160	FT	1-May-11	COMPANY
21	5.563" O.D. x 0.375" W.T. API 5L X52 SMLS LINE PIPE, 90 DEG. 50 (25") BEND PER DRAWING 16172-0002	4	EA	1-May-11	CONTRACTOR
22	4-1/16" 10K REMOTE ARTICULATED CONNECTOR W/ 2" PULPS	2	EA	1-May-11	COMPANY
23	RAC COMPACT RUNNING TOOLS	2	EA	14-Aug-11	COMPANY
24	MEASUREMENT INTERFACE CAP & FABRICATION JO FOR DL STATES 4-1/16" 10K	2	-	1-May-11	COMPANY
25	CLAMPON PIDDING DETECTOR 5.63" PIPE	1	EA	20-Jul-11	COMPANY
T-J-T MATERIALS					
26	4.531" O.D. x 0.300" W.T. API 5L X52 SMLS LINE PIPE, W/ 14-18 MILS FBE COATING & 1.5" CSPU PER ALUMINUM	60	FT	1-May-11	COMPANY
27	8.831" O.D. x 0.384" W.T. API 5L X52 SMLS LINE PIPE, 90 DEG. 50 (30") BEND PER DRAWING 16172-0003	6	EA	1-May-11	CONTRACTOR
28	MEASUREMENT INTERFACE CAP & FABRICATION JO FOR CAMERON 8" 10K	2	-	1-May-11	COMPANY
29	8" 10K COLLET VERTICAL CONNECTORS W/ 2" PULPS	3	-	15-Dec-10	COMPANY
30	CVC HYDRAULIC RUNNING TOOL	2	-	14-Aug-11	COMPANY
EAST PLET MATERIALS					
31	5.563" O.D. x 0.375" W.T. API 5L X52 SMLS LINE PIPE, W/ 14-18 MILS FBE COATING	140	FT	1-May-11	COMPANY
32	4-1/16" 10K SHORT TERM PRESSURE CAPS FOR HUBS	1	EA	1-May-11	COMPANY
33	8" 10K CAMERON LONG TERM PRESSURE CAPS FOR HUBS	1	EA	1-May-11	COMPANY
34	API 8" 10K VERTICAL HUB, CAMERON	1	EA	15-Dec-10	COMPANY
35	API 4-1/16" 10K VERTICAL HUB, DL STATES	1	EA	1-May-11	COMPANY
36	8" HUB GASKETS	3	EA	1-May-11	COMPANY
37	4-1/16" HUB GASKETS	2	EA	1-May-11	COMPANY
38	4-1/16" 10K ROV MANUAL GATE VALVES	2	EA	3-May-11	COMPANY
39	5.563" O.D. x 0.375" W.T. API 5L X52 SMLS LINE PIPE, 90 DEG. 50 (25") BEND PER HELIX DNG 11268-EN-DC-43903	1	EA	-	CONTRACTOR
40	FORGED ANCHOR FLANGE, PER HELIX DNG 11268-EN-DC-43902	1	-	-	CONTRACTOR
41	HUB CLEANING TOOL	1	TBC	-	CONTRACTOR
42	HUB CLEANING TOOL	1	TBC	-	CONTRACTOR
43	FORGED BAR TEE, PER HELIX DNG 11268-EN-DC-43901	1	-	-	CONTRACTOR
WEST PLET MATERIALS					
44	5.563" O.D. x 0.375" W.T. API 5L X52 SMLS LINE PIPE, W/ 14-18 MILS FBE COATING	140	FT	1-May-11	COMPANY
45	4-1/16" 10K SHORT TERM PRESSURE CAPS FOR HUBS	1	EA	1-May-11	COMPANY
46	8" 10K CAMERON SHORT TERM PRESSURE CAPS FOR HUBS	1	EA	1-May-11	COMPANY
47	API 8" 10K VERTICAL HUBS	1	EA	1-May-11	COMPANY
48	API 8" 10K VERTICAL HUB	1	EA	1-May-11	COMPANY
49	8" HUB GASKETS	3	EA	1-May-11	COMPANY
50	4-1/16" HUB GASKETS	2	EA	1-May-11	COMPANY
51	4-1/16" 10K ROV MANUAL GATE VALVES	1	EA	3-May-11	COMPANY
52	4-1/16" 10K SUBSEA HYDRAULIC OPERATED FAL-SAFE VALVES	2	EA	5-May-11	COMPANY
53	5.563" O.D. x 0.375" W.T. API 5L X52 SMLS LINE PIPE, 90 DEG. 50 (25") BEND, PER HELIX DNG 11268-EN-DC-43903	1	EA	-	CONTRACTOR
54	FORGED ANCHOR FLANGE, PER HELIX DNG 11268-EN-DC-43902	1	-	-	CONTRACTOR
55	HUB CLEANING TOOL	1	TBC	-	CONTRACTOR
56	HUB CLEANING TOOL	1	TBC	-	CONTRACTOR
57	FORGED BAR TEE, PER HELIX DNG 11268-EN-DC-43901	1	-	-	CONTRACTOR

* INCLUDES QUANTITY FOR FREE HUB CONNECTION

UniversalPegasus
Pegasus International, Inc.

RATON SOUTH TO VK900

RATON SOUTH SCOPE OF SUPPLY SCHEMATIC

16172 16172A100



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Raton South Hydrotest Recommendation

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Introduction:

Before a new or rehabilitated pipeline is placed into service, it must be tested for integrity at a pressure above its designed working pressure. This is usually done with water, which may remain in the system for an extended period of time.

Water used in hydrostatic testing usually comes from one of several sources: aquifers, rivers, ponds, seas, etc. The use of water from any of these sources can cause corrosion and introduce bacteria into the pipeline. The severity of the problem is dependent upon the type and quality of water used, the length of time the water remains in the line, and the ambient temperature,

While the line is filled with water it is subjected to three types of corrosion:

1. Direct reaction of dissolved oxygen with the steel pipe to form ferric oxide/hydroxide. Pitting may be initiated. This mechanism is not generally serious because the concentration of dissolved oxygen in the water is rapidly depleted due to the reaction with the pipe wall, Our tests indicate that corrosion due to oxygen content, even with air-saturated waters, is usually minimal in a closed steel pipeline and problems rarely result from this mechanism,
2. Localized pitting and corrosion resulting from the growth of sulfate reducing bacteria (SRB) and acid producing bacteria (APB).
3. Attack by hydrogen sulfide produced as a result of SRB growth.

Mechanisms 2 and 3, which involve bacterial growth, are the most serious concerns in hydrotest waters. Sea water and high TDS brines have a greater potential for corrosion than fresh water due to their higher conductivity and sulfate levels,

Conventional wisdom has it that to protect against corrosion during hydrostatic testing, you must add three types of chemicals to the water: an oxygen scavenger, a biocide and a corrosion inhibitor. For large or long pipelines, this can be exceedingly expensive.

BHI research data indicates that much of this expense is not necessary, In a closed system, oxygen is exhausted long before pitting due to oxygen becomes a problem. Controlling bacterial growth is generally sufficient to protect a pipeline from hydrotest damage. This can be accomplished by adding a biocide to the water prior to introducing it into the pipeline.

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Recommendation:

Recommendations were based upon the following information:

Water Source: Sea water
Water Quality: Sea water
Expected min. Temp: 40 F
Expected max. Temp: 72 F
Expected ph of water: Sea Water
West Flowline Length: approx. 145402 ft (includes riser length)
East Flowline Length: approx 145335 ft (includes riser length)
Flowline diameter (ID): 3.438 inches
PLET Piping diameter (ID): 4.063 inches
Pigging Jumper diameter (ID): 4.063 inches
Well Jumper diameter (ID): 4.987 inches
Expected shut in duration: 30 to 60 days (recommendation based on 90 day max)
Volume of Water: approx. 3343 bbls
Expected min. pressure: 10,313 psi
Expected max. pressure: not to exceed 10, 413 psi
Disposal method: Overboard

Biocide: 600 ppm (88.2 gallons) of XC102 is recommended for these hydrostatic test waters. This assumes a shut-in period not to exceed 90 days and a pH not to exceed 8. The recommended minimum and allowable concentration of active glutaraldehyde at disposal will be 50 ppm (see EPA Discharge Attachment).

Oxygen Scavenger: 11 ppm OSW490 for each ppm of oxygen is recommended for removal of the dissolved oxygen. Sea water typically contains between 8-10 ppm of dissolved oxygen.

Product Application:

Before pumping the hydrostatic test water into the pipeline, a specific treatment regime should be followed to avoid interactions between the products, The oxygen scavenger will deactivate the biocide, so they should not be mixed. The following is a recommended procedure for treating and mixing the water,

1. Measure the amount of dissolved oxygen in the water to be treated.
Determine the amount of oxygen scavenger needed (11ppm OSW490 per

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- ppm oxygen in the water).
2. To remove oxygen, continuously inject the required amount of OSW490 into the seawater upstream of the seawater tank. Allow approximately 3 to 4 minutes for complete scavenging (see table A below). Best results are achieved in a closed system to avoid oxygen re-contamination. Because XC102 will interact with the oxygen scavenger, it is important to allow the recommended scavenging time to avoid biocide deactivation. However since the neutralization rate is 1:1 ratio the small OSW490 residual will not have much impact on the biocide treatment in this case.
 3. Add the required amount of XC102 to the tank and mix gently or pump in on the fly.

Table A

Temp	pH	O ₂ Concentration in ppm after time in minutes									
		0	0.5	1	1.5	2	3	4	5	6	7
20°C	pH 5	8.2	3.8	1.6	1.3	0.9	0.7	0.4	0.2	0.1	0
	pH 6	9	4.3	1.2	0.9	0.6	0.4	0.2	0.1	0	
	pH 7	7.5	6	1.9	0.6	0.3	0.1	0			
30°C	pH 5	7.1	2.9	2.1	1.4	0.6	0.4	0.2	0.1	0	
	pH 6	6.8	1.7	0.6	0.4	0.2	0.1	0			
	pH 7	6.8	1.2	0.6	0.2	0.1	0				

Fluid Disposal:

HYDROSTATIC TEST FLUIDS CONTAINING RESIDUAL LEVELS OF BIOCIDES SHOULD BE DISPOSED OF IN ACCORDANCE WITH PERTINENT STATE AND FEDERAL REGULATIONS.

Hydrostatic test fluids containing XC102 bactericide may be detoxified prior to their release to surface waters, dependent upon the residual level of biocide. A 1:1 ratio of OSW490 should be used if neutralization is necessary. An in-line mixer or surge tank should be used to promote mixing of the detoxifying agent with the hydrostatic test water. A 30-second contact time is sufficient for detoxification to take place. Dilution of the hydro test water with additional seawater can also help to achieve detoxification therefore minimizing risks. If the discharge from a hydrostatic test

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displaces a substantial percentage of the receiving water (such as a stream or a small bay), then the discharge should be re-aerated to avoid a fish kill due to the lack of oxygen. Discussions should be held with Cetco to inform them of the relatively small amount of production chemicals that will be returning to VK900 in the dewatering operation. These products are listed below:

PAO3045 – Paraffin Inhibitor

PAO3042 – Asphaltene Inhibitor

PFR14UC – Flushing Solvent

Transaqua – Storage Fluid

Methanol –

Cetco can design their system to capture most of these fluids using their weir tanks, etc. Small residuals can be filtered. Baker representatives can be available to participate in the discussion.



Material Safety Data Sheet

1. Product and company identification

Product name : OSW490 OXYGEN SCAVENGER
Supplier : Baker Petrolite
A Baker Hughes Company
12645 W. Airport Blvd.
Sugar Land, TX 77478
For Product Information/MSDSs Call: 800-231-3606
(8:00 a.m. - 5:00 p.m. cst, Monday - Friday) 281-276-5400

Material Uses : Special: Oxygen scavenger.
Code : OSW490
Validation date : 3/9/2010.
Print date : 3/9/2010.
Version : 3
Responsible name : Global Regulatory Affairs - Telephone 281-276-5400 or 800-231-3606
In case of emergency : CHEMTREC: 800-424-9300 (U.S. 24 hour)
Baker Petrolite: 800-231-3606
(001)281-276-5400
CANUTEC: 613-996-6666 (Canada 24 hours)
CHEMTREC Int'l 01-703-527-3887 (International 24 hour)

2. Hazards identification

Physical state : Liquid. [Clear.]
Odor : Pungent.
Color : Greenish-yellow.
OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview : WARNING!
CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
Do not get in eyes. Avoid breathing vapor or mist. Avoid contact with skin and clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation.

Potential acute health effects

Inhalation : Irritating to respiratory system.
Ingestion : Ingestion may cause gastrointestinal irritation and diarrhea.
Skin : Irritating to skin.
Eyes : Severely irritating to eyes. Risk of serious damage to eyes.

Potential chronic health effects

Over-exposure signs/symptoms

Inhalation : respiratory tract irritation, coughing
Ingestion : None known.
Skin : irritation, redness
Eyes : pain or irritation, watering, redness

See toxicological information (section 11)

Additional information

Corrosive to metal.

3. Composition/information on ingredients

Name	CAS number	%
Ammonium bisulfite	10192-30-0	30 - 60

4. First aid measures

- Eye contact** : Get medical attention immediately. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

5. Fire-fighting measures

Flammability of the product : In a fire or if heated, a pressure increase will occur and the container may burst.

Extinguishing media

- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : None known.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- Hazardous thermal decomposition products** : nitrogen oxides, sulfur oxides
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up**
- Small spill** : Stop leak if without risk. Move containers from spill area. Absorb with an inert material. Dispose of via a licensed waste disposal contractor.

6. Accidental release measures

- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.) Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			
Ingredients:	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	Notations
No exposure limit value known.											

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Engineering measures** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location. Take off contaminated clothing and wash before re-use.

Personal protection

- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant gloves: Butyl rubber gloves.
- Eyes** : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.
- Skin** : Wear long sleeves and other protective clothing to prevent repeated or prolonged skin contact.

9 . Physical and chemical properties

Physical state	: Liquid. [Clear.]
Flash point	: Not available.
Auto-ignition temperature	: Not available.
Flammable limits	: Not available.
Color	: Greenish-yellow.
Odor	: Pungent.
pH	: 5 to 5.5
	: Neat - without dilution.
Boiling/condensation point	: Not available.
Initial Boiling Point	: Not available.
Melting/freezing point	: Not available.
Relative density	: 1.298 (16°C)
Density	: 10.81 (lbs/gal)
Vapor density	: >1 [Air = 1]
Odor threshold	: Not available.
Evaporation rate	: Not available.
VOC	: Not available.
Viscosity	: Not available.
Solubility (Water)	: Soluble
Vapor pressure	: Not available.
Pour Point	: Not available.
Partition coefficient (LogKow)	: Not available.

10 . Stability and Reactivity

Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions to avoid	: No specific data.
Materials to avoid	: Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Conditions of reactivity	: Non-flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.

11 . Toxicological information

No additional information.

Chronic toxicity Remarks

1) Ammonium bisulfite

Ammonium bisulfite is a component of this product. Prolonged contact can produce corrosion of the skin and permanent damage to the eye. Under acidic conditions, sulfur dioxide may be formed. Inhalation of sulfur dioxide can cause stricture of the esophagus, acute pulmonary edema, and respiratory failure. Sulfur dioxide has been linked to miscarriages, gynecological disease, and abnormal pregnancies (Reprotext).

The ACGIH exposure limits for sulfur dioxide are TWA of 2 ppm and STEL of 5 ppm. The OSHA exposure limit for sulfur dioxide is a TWA of 5 ppm.

11 . Toxicological information**12 . Ecological information**Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
OSW490 OXYGEN SCAVENGER	Acute LC50 103 mg/l	Fish - Bluegill sunfish	96 hours
	Acute LC50 100 mg/l	Fish - Threespine stickleback	96 hours

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

Additional information

An EcoTox™ Report, and/or the material's environmental fate is available upon request at the following number: 1-800-235-4249, then press 4.




13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN2693	BISULFITES, AQUEOUS SOLUTION, N.O.S. (Contains: Ammonium bisulfite)	8	III		-
TDG Classification	UN2963	BISULFITES, AQUEOUS SOLUTION, N.O.S. (Contains: Ammonium bisulfite)	8	III		-
IMDG Class	UN2693	BISULPHITES, AQUEOUS SOLUTION, N.O.S. (Contains: Ammonium bisulfite)	8	III		<u>Emergency schedules (EmS)</u> F-A S-B

PG* : Packing group

DOT Reportable quantity : Ammonium bisulfite, 916 gal of this product.

14 . Transport information

Marine pollutant : Not applicable.

North-America NAERG : 154

15 . Regulatory information

HCS Classification : Irritating material

U.S. Federal regulations : United States inventory (TSCA 8b): All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.

SARA 302/304 emergency planning and notification: No products were found.

SARA 302/304/311/312 hazardous chemicals: ammonium hydrogensulphite

SARA 311/312 MSDS distribution - chemical inventory - hazard identification:

OSW490 OXYGEN SCAVENGER: Immediate (acute) health hazard

CERCLA: Hazardous substances.: ammonium hydrogensulphite: 5000 lbs. (2270 kg);

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: ammonium hydrogensulphite

Clean Air Act (CAA) 112 accidental release prevention: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Not listed

SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Supplier notification	: Ammonium bisulfite	10192-30-0	30 - 60
United States inventory (TSCA 8b)	: All components are listed or exempted.		

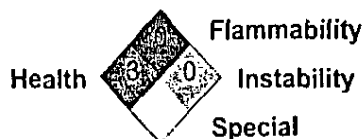
CanadaWHMIS (Canada) : Class D-2B: Material causing other toxic effects (Toxic).
Class E: Corrosive material

Canada (CEPA DSL): : All components are listed or exempted.

16 . Other information

Label requirements : CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.

National Fire Protection Association (U.S.A.) :



Date of printing : 3/9/2010.

☑ Indicates information that has changed from previously issued version.

Notice to reader

16 . Other information

NOTE: The information on this MSDS is based on data which is considered to be accurate. Baker Hughes, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.



Material Safety Data Sheet

1. Product and company identification

Product name : X-CIDE™ 102 INDUSTRIAL BACTERICIDE
™ a trademark of Baker Hughes, Inc.

Supplier : Baker Petrolite
A Baker Hughes Company
12645 W. Airport Blvd.
Sugar Land, TX 77478
For Product Information/MSDSs Call: 800-231-3606
(8:00 a.m. - 5:00 p.m. cst, Monday - Friday) 281-276-5400

Material Uses : Special: Industrial Bactericide.

Code : XC102

Validation date : 11/2/2009.

Print date : 11/2/2009..

Version : 3

Responsible name : Global Regulatory Affairs - Telephone 281-276-5400 or 800-231-3606

In case of emergency : CHEMTREC: 800-424-9300 (U.S. 24 hour)
Baker Petrolite: 800-231-3606
(001)281-276-5400
CANUTEC: 613-996-6666 (Canada 24 hours)
CHEMTREC Int'l 01-703-527-3887 (International 24 hour)

2. Hazards identification

Physical state : Liquid.

Odor : Fruity. Medicinal. [Strong]

Color : Colorless.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : DANGER!
CAUSES EYE BURNS. CAUSES RESPIRATORY TRACT AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
Do not breathe vapor or mist. Do not ingest. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation.

Potential acute health effects

Inhalation : Severely irritating to the respiratory system.

Ingestion : Harmful if swallowed. May cause burns to mouth, throat and stomach.

Skin : Severely irritating to the skin. May cause sensitization by skin contact.

Eyes : Corrosive to eyes. Causes burns.

Potential chronic health effects

Chronic effects : Contains material that may cause target organ damage, based on animal data. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Target organs : Contains material which may cause damage to the following organs: upper respiratory tract, skin, eye, lens or cornea.

Over-exposure signs/symptoms

Inhalation : respiratory tract irritation, coughing

Ingestion : None known.

2. Hazards identification

- Skin : irritation, redness
- Eyes : pain, watering, redness
- Medical conditions aggravated by over-exposure : Pre-existing skin disorders and disorders involving any other target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Additional information

Glutaraldehyde may stain skin and nails to brown or golden brown color. Glutaraldehyde can cause allergic contact dermatitis, asthma and rhinitis and may aggravate existing asthmatic conditions.

3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Glutaraldehyde	111-30-8	10 - 30

4. First aid measures

- Eye contact** : Get medical attention immediately. Immediately flush the eye(s) continuously with lukewarm, gently flowing water for at least 20-60 minutes while holding the eyelid(s) open.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wear suitable protective clothing and gloves. Remove contaminated clothing and shoes.

5. Fire-fighting measures

Flammability of the product : In a fire or if heated, a pressure increase will occur and the container may burst.

Extinguishing media

- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : None known.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- Hazardous thermal decomposition products** : carbon dioxide, carbon monoxide
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Absorb with an inert material. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.) Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			
Ingredient	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	Notations
Glutaraldehyde	US ACGIH	-	-	-	-	-	-	0.05	-	-	
	OSHA PEL 1989	-	-	-	-	-	-	0.2	0.8	-	

Consult local authorities for acceptable exposure limits.

Only components of this product with established exposure limits appear in the box above.

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Engineering measures** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

8 . Exposure controls/personal protection

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location. Take off contaminated clothing and wash before re-use.

Personal protection

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant gloves: Nitrile or Neoprene gloves. PVC gloves. 4H gloves. Butyl rubber gloves.

Eyes : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.

Skin : Wear long sleeves and other protective clothing to prevent repeated or prolonged skin contact.

9 . Physical and chemical properties

Physical state : Liquid.

Flash point : Closed cup: >93.4°C (>200.1°F) [SFCC]

Auto-ignition temperature : Not available.

Flammable limits : Not available.

Color : Colorless.

Odor : Fruity. Medicinal. [Strong]

pH : 3 to 4.5

Boiling/condensation point : Not available.

Initial Boiling Point : Not available.

Melting/freezing point : Not available.

Relative density : 1.056 (15.6°C)

Density : 8.8 (lbs/gal)

Vapor density : >1 [Air = 1]

Odor threshold : Not available.

Evaporation rate : Not available.

VOC : Not available.

Viscosity : Dynamic (15.6°C): 4 cP

Solubility (Water) : Soluble

Vapor pressure : 4.1 kPa (31 mm Hg) at 37.8°C

Pour Point : -6.7°C (19.9°F)

Partition coefficient (LogKow) : Not available.

10 . Stability and Reactivity

Chemical stability : The product is stable.

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

Conditions to avoid : No specific data.

Materials to avoid : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.

Hazardous decomposition products : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

10 . Stability and Reactivity

Conditions of reactivity : Slightly flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.

11 . Toxicological information**Acute toxicity**

Product/ingredient name	Result	Species	Dose	Exposure
Glutaraldehyde	LD50 Dermal	Rabbit	560 uL/kg	-
	LD50 Oral	Rat	134 mg/kg	-
	LC50 Inhalation Vapor	Rat	480 mg/m ³	4 hours
	LD50 Dermal	Rabbit	13600 mg/kg	-
X-CIDE™ 102 INDUSTRIAL BACTERICIDE	LD50 Oral	Rat	1990 mg/kg	-

Carcinogenicity**Classification**

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Glutaraldehyde	A4	-	-	-	-	-

Chronic toxicity Remarks

1) Glutaraldehyde

Glutaraldehyde is a component of this product. In long-term experimental animal studies, glutaraldehyde caused liver damage in mice (ACGIH, 1992), but it was not neurotoxic in rats (Spencer et al, 1978).

Female rats had increased large granular lymphocytic leukemias after receiving glutaraldehyde in the drinking water at levels up to 1,000 ppm for 2 years (Andersen, 1996).

The results of genetic studies have been mixed with no conclusive evidence of positive effects.

In 2-year inhalation studies, there was no evidence of carcinogenic activity in male or female rats exposed to 250, 500 or 750 ppb, or in male or female mice exposed to 62.5, 125, or 250 ppb glutaraldehyde. Incidences of nasal and respiratory lesions were increased in both male/female rats and mice. Reduction in body weight, as compared to the controls was also noted.

Additional information

Draize Test Eye (Rabbit): Extreme Irritant/Corrosive. Draize Test Skin (Rabbit): Extreme Irritant.

12 . Ecological information**Aquatic ecotoxicity**

Product/ingredient name	Result	Species	Exposure
X-CIDE™ 102 INDUSTRIAL BACTERICIDE	EC50 16 mg/l	Algae - Selenastrum capricornutum	96 hours
	EC50 8 mg/l	Algae - Chlorella vulgaris	96 hours
	EC50 1.8 mg/l	Algae - Skeletonema costatum	96 hours
	LC50 75 mg/l	Fish - Threespine stickleback	96 hours
	LC50 43 mg/l	Daphnia - Daphnia magna	48 hours
	LC50 42 mg/l	Fish - Bluegill sunfish	96 hours
	LC50 33 mg/l	Fish - Rainbow trout	96 hours
	LC50 28.4 ppm	Daphnia - Mysid	96 hours

12 . Ecological information

shrimp

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

Additional information

An EcoTox™ Report, and/or the material's environmental fate is available upon request at the following number: 1-800-235-4249, then press 4.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
OT Classification	Not regulated.	-	-	-		-
TDG Classification	Not regulated.	-	-	-		-
IMDG Class	Not applicable.	-	-	-		-

PG* : Packing group

DOT Reportable : Not applicable.
Quantity

Marine pollutant : Not applicable.

North-America NAERG : Not available.

15 . Regulatory information

HCS Classification : Corrosive material
Sensitizing material
Target organ effects

U.S. Federal regulations : **United States inventory (TSCA 8b):** All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.

SARA 302/304 emergency planning and notification: No products were found.

SARA 302/304/311/312 hazardous chemicals: glutaral

SARA 311/312 MSDS distribution - chemical inventory - hazard identification: X-CIDE™ 102 INDUSTRIAL BACTERICIDE: Immediate (acute) health hazard

CERCLA: Hazardous substances.: methanol: 5000 lbs. (2270 kg);

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: No products were found.

15 . Regulatory information

Clean Air Act (CAA) 112 accidental release prevention: No products were found.
 Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
 Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Not listed

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada

WHMIS (Canada) : Class D-1B: Material causing immediate and serious toxic effects (Toxic).
 Class D-2A: Material causing other toxic effects (Very toxic).
 Class D-2B: Material causing other toxic effects (Toxic).
 Class E: Corrosive material

Canada (CEPA DSL): : All components are listed or exempted.

Additional information

This product is subject to regulation under the US Federal Insecticide, Fungicide and Rodenticide ACT (FIFRA) and is therefore exempt from US Toxic Substance Control Act (TSCA) Inventory listing requirements. EPA Registration No. 10707-40

16 . Other information

Label requirements : CAUSES EYE BURNS. CAUSES RESPIRATORY TRACT AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

National Fire Protection Association (U.S.A.) :



Date of printing : 11/2/2009.

☑ Indicates information that has changed from previously issued version.

Notice to reader

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This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.



APPENDIX G: WPSS CONTACTS

WEATHERFORD P&SS				
NAME	POSITION	PHONE: OFFICE	PHONE: CELL	EMAIL
Wayne Berrey	Area Manager (Houston)	713-580-9780	713-449-4680	wayne.berrey@weatherford.com
Taylor Williams	Product Line Specialist (Houston)	713-580-9720	832-492-5739	taylor.williams@weatherford.com
Brock Hennigh	Offshore Product Line Specialist, Western Hemisphere	713-580-9706	832-418-0256	Brock.hennigh@weatherford.com
Hugo Ybarra	Asset Coordinator / Logistics	713-580-9743	832-418-0258	Hugo.ybarra@weatherford.com
Ronnie Singleton	District Manager / Logistics	713-580-9721	832-492-6703	Ronnie.singleton@weatherford.com

**Weatherford****PIPELINE & SPECIALTY SERVICES FORM**

FORM NUMBER: 5-4-GL-GL-PSS-00012	REV: 07	PAGE: 1 of 3	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007
PREPARED BY: BIRGIT THIELE	REVIEWED BY: MURDO MORRISON	APPROVED BY: MALCOLM DUNCAN	APPROVED BY:	
TITLE:	PUMPING REPORT GENERAL PURPOSE			

Project:	Helix Noble Raton	Project Number:	WPSS-014550
Client:	Helix ESG	Contract Number:	WPSS-Q-014550-03
Operation:	Pipeline Flooding / Chemical Injection		
Location:	Helix Express	Medium:	Filtered/Treated Seawater
System / Pipeline Description: Raton East Flowline. 145,000 ft of 4.5" OD 0.531" Wall Thickness vessel to VK-900 platform			

Time	Flow Rate (GPM)	Pipeline Pressure (PSI)	Volume Pumped (Gallons)	X-Cide 102 (Gallons)	X-Cide 102 (PPM)	OSW-490 (Gallons)	OSW-490 (PPM)	Remarks
7:15	0	54	0	0.00	0	0.00	0	Begin Flooding
7:20	210	53	888	0.33	366	0.10	110	
7:30	200	54	2515	1.59	632	0.28	110	
7:40	209	56	5055	3.02	597	0.56	110	
7:50	211	57	7203	4.52	627	0.79	110	
8:00	206	54	9515	5.70	599	1.05	110	
8:10	208	61	11420	6.68	585	1.26	110	
8:20	210	55	13432	7.95	592	1.48	110	
8:30	209	60	15488	9.33	602	1.70	110	
8:40	207	59	17712	10.84	612	1.95	110	
8:50	209	61	20032	12.49	624	2.20	110	
9:00	200	61	22413	13.99	624	2.47	110	
9:10	200	51	23647	14.62	618	2.60	110	
9:20	198	52	24881	15.83	636	2.74	110	
9:30	187	46	27539	17.15	623	3.03	110	
9:40	178	132	29301	18.33	626	3.22	110	
9:50	172	270	31170	19.43	623	3.43	110	
10:00	168	339	32900	20.46	622	3.62	110	

Weatherford P&SS Representative:	
Name:	Taylor Williams
Sign:	
Date:	7 August 2011

**Weatherford****PIPELINE & SPECIALTY SERVICES FORM**


FORM NUMBER: 5-4-GL-GL-PSS-00012	REV: 07	PAGE: 2 of 3	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007
TITLE:	PUMPING REPORT			

Project:	Helix Noble Raton	Project Number:	WPSS-014550
Client:	Helix ESG	Contract Number:	WPSS-Q-014550-03
Operation:	Pipeline Flooding / Chemical Injection		
Location:	Helix Express	Medium:	Filtered/Treated Seawater
System / Pipeline Description: Raton East Flowline. 145,000 ft of 4.5" OD 0.531" Wall Thickness vessel to VK-900 platform			

Time	Flow Rate (GPM)	Pipeline Pressure (PSI)	Volume Pumped (Gallons)	X-Cide 102 (Gallons)	XCide 102 (PPM)	OSW-490 (Gallons)	OSW-490 (PPM)	Remarks
10:10	162	369	34752	21.55	620	3.82	110	
10:20	165	554	36524	22.63	620	4.02	110	
10:30	164	610	38296	23.72	619	4.21	110	
10:40	163	817	39419	24.10	611	4.34	110	
10:50	170	1049	41224	24.96	606	4.53	110	
11:00	169	1213	42600	25.67	603	4.69	110	
11:10	169	1220	43976	26.49	602	4.84	110	
11:20	168	1256	45988	27.97	608	5.06	110	
11:30	168	1282	47873	30.06	628	5.27	110	
11:40	167	1256	49846	30.72	579	5.48	110	
11:50	167	1294	50729	31.48	577	5.58	110	
12:00	166	1259	53098	33.06	590	5.84	110	
12:10	165	1398	54583	34.32	592	6.00	110	
12:20	164	1434	56086	35.74	605	6.17	110	
12:30	162	1511	57983	37.35	614	6.38	110	
12:40	160	1507	59036	38.52	620	6.49	110	
12:50	157	1462	60856	39.70	652	6.69	110	
13:00	155	1416	62147	40.81	657	6.84	110	
13:10	152	1492	63964	41.62	651	7.04	110	
13:20	147	1430	65512	42.55	649	7.21	110	

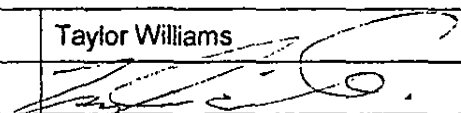
Weatherford P&SS Representative:

Name:	Taylor Williams
Sign:	
Date:	7 August 2011

 Weatherford		PIPELINE & SPECIALTY SERVICES FORM			
FORM NUMBER: 5-4-GL-GL-PSS-00012	REV: 07	PAGE: 1 of 2	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007	
PREPARED BY: BIRGIT THIELE	REVIEWED BY: MURDO MORRISON	APPROVED BY: MALCOLM DUNCAN		APPROVED BY:	
TITLE:	PUMPING REPORT GENERAL PURPOSE				

Project:	Helix Noble Raton	Project Number:	WPSS-014550
Client:	Helix ESG	Contract Number:	337346
Operation:	Pipeline Flooding / Chemical Injection		
Location:	Helix Express	Medium:	Filtered/Treated Seawater
System / Pipeline Description: Raton West Flowline. 145,000 ft of 4.5" OD 0.531" Wall Thickness vessel to VK-900 platform			

Time	Flow Rate (GPM)	Pipeline Pressure (PSI)	Volume Pumped (Gallons)	X-Cide 102 (Gallons)	XCide 102 (PPM)	OSW-490 (Gallons)	OSW-490 (PPM)	Remarks
2:50	0	0	0	0	0	0	0	Begin Flooding
3:00	203	57	2266	1.45	639	0.25	110	
3:10	203	57	4751	2.59	546	0.52	110	
3:20	202	57	6328	3.93	621	0.70	110	
3:30	203	57	8956	5.28	589	0.99	110	
3:40	199	70	11369	7.14	628	1.25	110	
3:50	213	70	12567	7.85	625	1.38	110	
4:00	106	67	14825	9.21	621	1.63	110	
4:10	206	65	16956	10.73	633	1.87	110	
4:20	213	68	18886	11.74	621	2.08	110	
4:30	204	64	21209	13.17	621	2.33	110	
4:40	205	64	23380	14.52	621	2.57	110	
4:50	210	173	25355	15.76	622	2.79	110	
5:00	203	216	27346	16.85	616	3.01	110	
5:10	199	428	29955	18.38	614	3.30	110	
5:20	203	748	31593	19.81	627	3.48	110	
5:30	202	870	33231	21.31	641	3.66	110	
5:40	196	1091	35785	22.20	620	3.94	110	
5:50	196	1218	37222	23.55	633	4.09	110	

Weatherford P&SS Representative:	
Name:	Taylor Williams
Sign:	
Date:	8 August 2011

**Weatherford****PIPELINE & SPECIALTY SERVICES FORM**FORM NUMBER:
5-4-GL-GL-PSS-00012REV:
07PAGE:
2 of 2ORIGINAL ISSUE DATE:
02/24/2004REVISION DATE:
04/02/2007

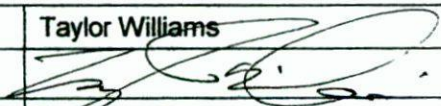
TITLE:

PUMPING REPORT

Project:	Helix Noble Raton	Project Number:	WPSS-014550
Client:	Helix ESG	Contract Number:	WPSS-Q-014550-03
Operation:	Pipeline Flooding / Chemical Injection		
Location:	Helix Express	Medium:	Filtered/Treated Seawater
System / Pipeline Description: Raton West Flowline. 145,000 ft of 4.5" OD 0.531" Wall Thickness vessel to VK-900 platform			

Time	Flow Rate (GPM)	Pipeline Pressure (PSI)	Volume Pumped (Gallons)	X-Cide 102 (Gallons)	XCide 102 (PPM)	OSW-490 (Gallons)	OSW-490 (PPM)	Remarks
6:00	192	1347	39533	25.10	635	4.35	110	
6:10	191	1284	41261	26.51	643	4.54	110	
6:20	190	1456	42183	27.15	644	4.64	110	
6:30	186	1470	44546	28.83	647	4.90	110	
6:40	189	1777	46909	30.50	650	5.16	110	
6:50	191	1356	46985	31.39	668	5.17	110	
7:00	172	1471	48985	33.09	675	5.39	110	
7:10	170	1469	50357	34.18	679	5.54	110	
7:20	168	1480	52710	36.00	683	5.80	110	
7:30	167	1533	55063	37.83	687	6.06	110	
7:40	165	1594	55500	38.26	689	6.11	110	
7:50	154	1548	56937	39.24	689	6.26	110	
8:00	157	1594	58905	40.60	689	6.48	110	
8:10	154	1548	60385	41.61	689	6.64	110	
8:20	144	1579	61522	42.47	690	6.77	110	
8:30	147	1505	62561	43.42	694	6.88	110	Flow estimated
8:40	144	1233	64260	44.36	690	7.07	110	
8:50	141	1254	65960	45.29	687	7.26	110	
9:00	138	1298	67660	46.22	683	7.44	110	
9:10	135	1353	69360	47.15	680	7.63	110	Flooding Complete

Weatherford P&SS Representative:

Name: Taylor Williams
 Sign: 
 Date: 8 August 2011



RATON SOUTH CHARTS

OPERATION: FILLING OF THE RATON SOUTH EAST FLOWLINE.

DATE: 07 AUGUST, 2011

START TIME: 07:15AM

END TIME: 14:00PM

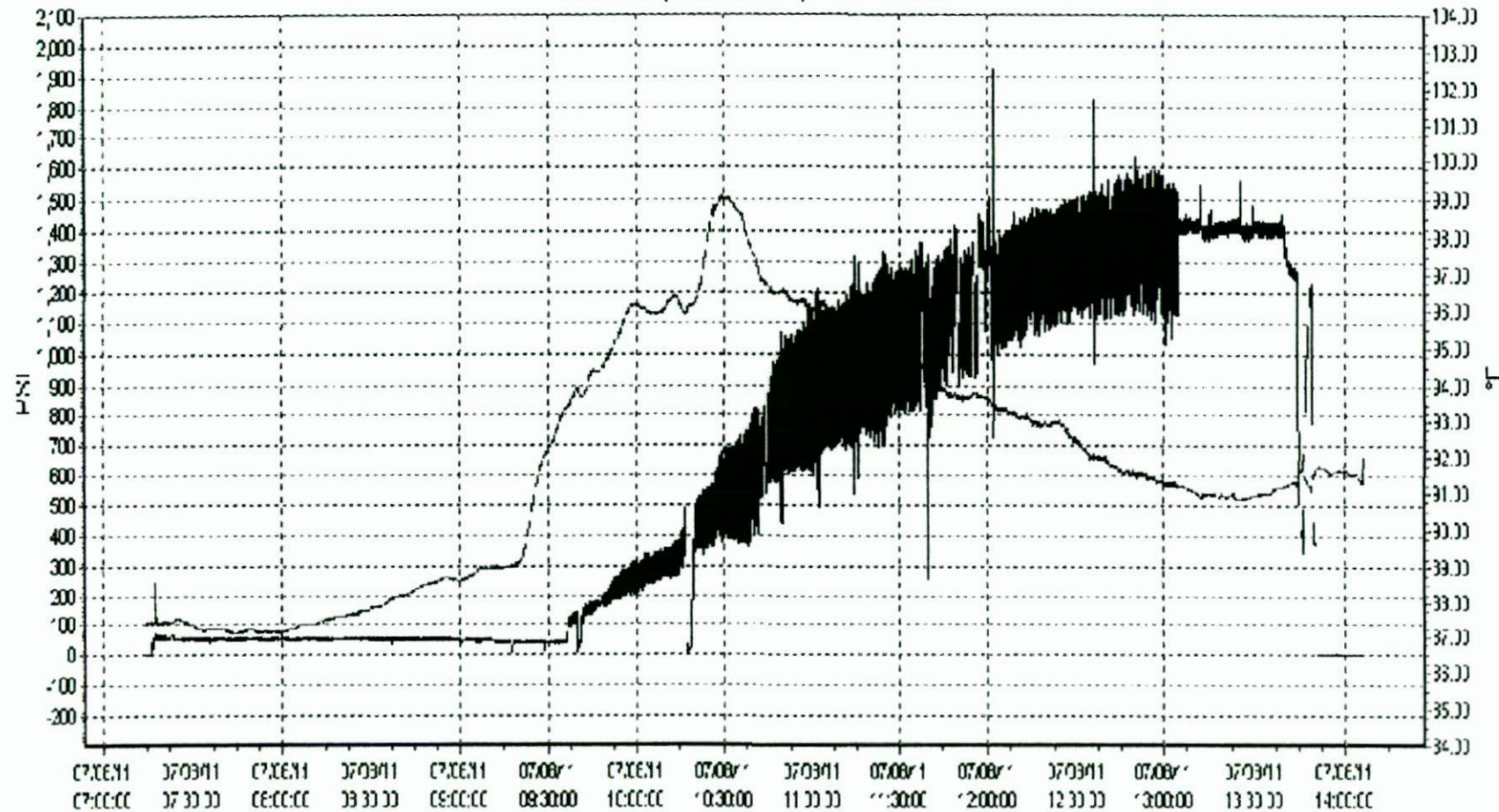
LOCATION: MC-292

INSTRUMENT SSN: KELLER GAUGE 3819

FILL ACCEPTED: YES



Seve-rieva (33 - hrmss AMPY) 00 - 2000' AM



WEATHERFORD REPRESENTATIVE:

Taylor Williams

SIGNATURE/DATE:

CLIENT REPRESENTATIVE:

SIGNATURE/DATE:

CLIENT REPRESENTATIVE:

SIGNATURE/DATE:



RATON SOUTH CHARTS



OPERATION: FILLING OF THE NOBLE RATON WEST FLOWLINE.

DATE: 08 AUGUST, 2011

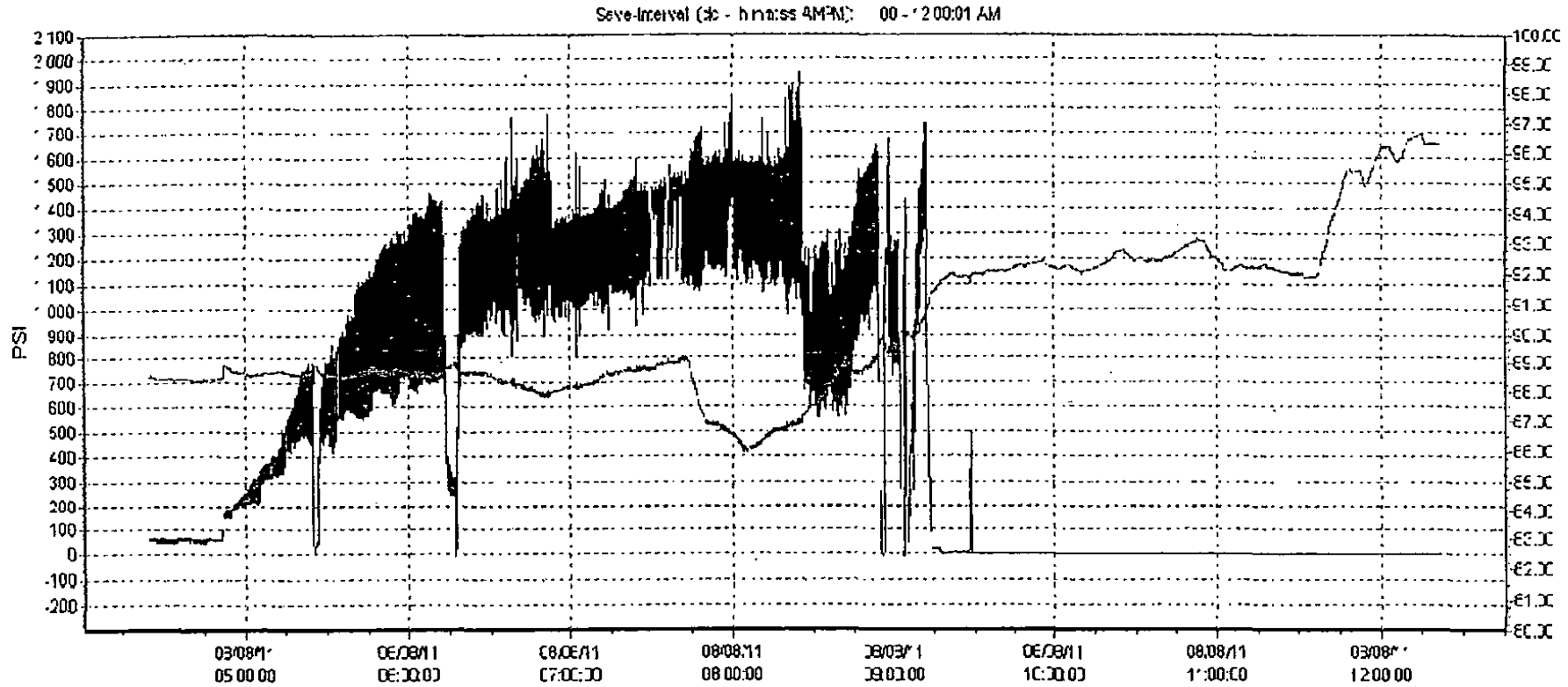
START TIME: 02:50 AM

END TIME: 09:10 AM

LOCATION: HELIX EXPRESS MC-292

INSTRUMENT SSN: KELLER GAUGE 3819

FILL ACCEPTED: YES



WEATHERFORD REPRESENTATIVE:

Taylor Williams

SIGNATURE/DATE:

CLIENT REPRESENTATIVE:

SIGNATURE/DATE:

CLIENT REPRESENTATIVE:

SIGNATURE/DATE:



Weatherford

PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER: 5-4-GL-GL-PSS-00013	REV: 05	PAGE: 1 of 1	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007
PREPARED BY: BIRGIT THIELE	REVIEWED BY: MURDO MORRISON	APPROVED BY: MALCOLM DUNCAN	APPROVED BY:	
TITLE:	COMPLETION REPORT			

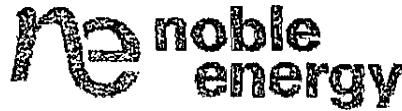
Project:	Helix Noble Raton South	Project No.:	WPSS-014550
Client:	Helix ESG	Client Contract No.:	337346
Operational End:	Date: August 8 th 2011	Time:	14:00
Location:	Helix Express		

Description:

WPSS has completed filling the West and East Raton South Flowlines from the deck of the MV Helix Express. The flooding was completed with no pig and injecting OSW490 Oxygen Scavenger at 110 ppm and XC-102 Biocide at 600 ppm.

The operation described above has been completed in full conformity with the client.

Weatherford P&SS Representative:	Helix Representative:
Name: Taylor Williams	Name: Nicholas Okubo
Sign:	Sign:
Date: 9 August 2011	Date: 9 August 2011



DOCUMENT TITLE:	WEATHERFORD HYDROTEST OF DUAL 4.5" FLOWLINES OPERATIONAL PROCEDURE		
DOCUMENT NO.:	11268-HT-PR-N7002		
CUSTOMER:	NOBLE ENERGY	PROJECT:	RATON SOUTH
CLIENT JOB NO.:	N/A	HELIX JOB NO:	11268

THIRD PARTY:	WEATHERFORD	REFERENCE No.:	WPSS-014550- WP-02	REV NO:	03
		NUMBER OF PAGES TO FOLLOW:			58

SIGNATURE LEGEND:

ID:	NAME:	TITLE:
HB	Harry Barker	Project Manager
AG	Alex Gomez	Assistant Project Manager
NO	Nicholas Okubo	Field Engineer
BS	Bill Schmidt	Weatherford

HELIX SUBSEA CONSTRUCTION						NOBLE ENERGY INC	
0	Issued for Construction	BS	AG	AG	08/12/11	APPROVAL STATUS DESCRIPTION <input checked="" type="checkbox"/>	
B	Issued for Client Review	BS	HB	HB	07/19/11	APPROVED. WORK MAY PROCEED. <input checked="" type="checkbox"/>	
A	Issued for Client Review	BS	HB	HB	06/08/11	REVISE AS NOTED AND RE-SUBMIT FINAL. WORK MAY PROCEED.	
						REVISE AS NOTED AND RE-SUBMIT. WORK MAY NOT PROCEED.	
						FOR INFORMATION ONLY. RE-SUBMISSION NOT REQUIRED.	
REV	DESCRIPTION	ORIGIN	CHECK	APPROVAL	DATE	NAME	DATE
						<i>[Signature]</i>	3/12/11

CLIENT



Weatherford®

LOCATION

VK 900

PIPELINE AND SPECIALTY SERVICES

RATON SOUTH FIELD DEVELOPMENT

OPERATIONAL PROCEDURE

HYDROTEST OF DUAL 4.5" FLOWLINES

DOCUMENT TYPE: WORK PROCEDURE

DOCUMENT TITLE: OPERATIONAL PROCEDURES
4.5" Dual Flowline Hydrotest

WPSS DOCUMENT NUMBER: WPSS-014550-WP-02

CLIENT DOCUMENT NUMBER:

REV	DATE	DESCRIPTION	PREPARED BY	CHECKED BY	REVIEWED BY	HESG
03	11 August 2011	Issued for Approval	T. Williams			
02	12 July 2011	Re-issued for Review	T. Williams	T. Strahl		
01	7 June 2011	Re-Issued for Review	B. Schmidt	T. Strahl	R. White	
00	31 May 2011	Issued for Review	B. Schmidt	T. Strahl		H. Barker
0A	16 MAY 2011	Internal Review	B. Schmidt	T. Strahl		
REVISIONS			SIGNATURES			



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1.0 GENERAL

Weatherford Pipeline and Specialty Services, hereinafter referred to as "WPSS", has been requested by Helix Energy Solutions Group, hereinafter referred to as "Helix", to perform pre-commissioning hydrotest the crude oil field tieback to the existing Chevron production facility. The tie back consists of twin 4.5-inch O.D, 27.5 mile long flowlines terminating by means of Pipeline End Termination structures (PLETs) near the Raton South wellhead. The tie-in at the Raton South well will be achieved by installing a diverless vertically installed connection jumper. WPSS will have flooded the flowlines beginning Hydrotest operations. This scope of work will take place on the Chevron platform located in Viosca Knoll (VK) 900.

WPSS will Hydrotest from a tapped flange on one riser against a tapped flange on top of the second riser. The test medium will be filtered untreated seawater. Following the Hydrotest WPSS will bleed down the hydrotest water overboard and disconnect their spread from the risers.

SYSTEM	LENGTH [FT]	OD [IN]	WT [IN]	ID [IN]	WD (MAX.) [FT]	TEST PRESSURE [PSIG]	HOLD PERIOD [HR]
EAST FLOWLINE *	145,309	4.500"	0.531	3.438	3,400	10,313	8
WEST FLOWLINE *	145,378	4.500"	0.531	3.438	3,400	10,313	8
JUMPER	93	5.563	0.750	4.063	3,400	10,313	8
NOTE:	Flowline Pipe Specifications		API 5L x70 SMLS Line Pipe. w/ 14 – 16 MILS FBE Coating				

*Including Riser

1.1 OBJECTIVE

The objective of this document is to provide all personnel a clear understanding of the work scope to ensure the work is completed in a safe, efficient and timely manner. Furthermore it is designed to be an inclusive source of information regarding the activities associated with the Hydrostatic testing operation to be performed on Noble Raton South Development Project, from the Chevron platform, VK900.



1.2 ABBREVIATIONS

ASME	American Society of Mechanical Engineers
ANSI	American National Standards Institute
API	American Petroleum Institute.
ID	Inside Diameter
ITP	Inspection Test Plan
JSA	Job Safety Analysis
MAOP	Maximum Allowable Operating Pressure
MSL	Mean Sea Level
OD	Outside Diameter
PPE	Personal Protective Equipment
PTW	Permit to Work
SOW	Scope of Work
SDV	Shut Down Valve
WFT	Weatherford
WPSS	Weatherford Pipeline & Specialty Services
WT	Wall Thickness
cfm	Cubic Feet per minute
ft	Feet
ft ³	Cubic Feet
gal	Gallons
gpm	Gallons Per Minute
hrs	Hours
in	Inches
mm	Millimeters
psi	Pounds Per Square Inch
psia	Pounds Per Square Inch (Absolute Pressure)
psig	Pounds Per Square Inch (Gauge Pressure)
scf	Standard Cubic Feet
scfm	Standard Cubic Feet Per Minute



Each Operational Procedure has an ITP. In the ITP involvement codes and definitions are used as follows:

“P” - Performance

The Organization involved is responsible for the physical performance of the Inspection Check or Task and for issuing the relevant Quality Record (definition of Record as per ISO 9000:2000 Quality Management Systems – Fundamentals and Vocabulary, para 3.7.6).

“W” - Witness

The Organization involved elects to attend to the Inspection or Check performed by the Performing Organization. The Performing Organization shall notify the Witnessing Organization of the Inspection or Check performance within 24 hours of activity being performed. Non-attendance of the Witnessing Organization at the notified time shall under no circumstances delay the Inspection or Check being carried out by the Performing Organization.

“H” - Validation (Hold Point)

The Organization involved attends the Inspection or Check performed by the Performing Organization to record the Inspection or Check results. The Performing Organization shall notify the Validation Organization of the Inspection or Check performance within 24 hours of activity being performed and shall carry out the Inspection or Check only if the Validation Organization is attending. A written waiver from the Validation Organization is required before execution of the Inspection or Check can take place in their absence.

“R” - Review

The Organization involved is responsible for the performance of a review of relevant documentation and/or Quality Records.

“M” - Monitor

The Organization indicated may monitor the works during routine surveillance.



1.3 REFERENCES

1.3.1 CODE REFERENCES

NUMBER	TITLE
30 CFR 250(J)	Pipeline and Pipeline Rights of Way
API Spec SL	Specifications for Line Pipe
API RP 1110	Pressure Testing of Liquid Petroleum Pipelines
API RP 1111	Design, Construction, Operation and Maintenance of Offshore Hydrocarbon Pipelines
ASME B31.4.2002	Pipeline Transportation Systems for Liquid Hydrocarbons and other Liquids
ASME B31.8.2003	Gas Transmissions and Distribution Piping Systems
DNVS-OS-F101	Submarine Pipeline Systems

1.3.2 WPSS REFERENCES

NUMBER	TITLE
WPSS-Q-014550-01	Weatherford Commercial Proposal

1.3.3 HELIX ISSUED REFERENCES

NUMBER	TITLE
16172-N002 Rev2	Pigging (PLET to PLET) Jumper
16172-A100 Rev 1	Raton South Scope of Supply Schematic
11268-EN-DG-A3100 Rev C	East PLET Assembly Sheets (1-3)
11268-EN-DG-A3200 Rev C	West PLET Assembly Sheets (1-3)



1.4 RESOURCES

Helix shall provide the following services to support the activities as outlined herein:

- Marine transportation for WPSS equipment and personnel
- Helicopter Transportation (if applicable)
- Meals and lodging for four (4) WPSS personnel onboard the Chevron platform
- Crane services at dock and offshore facilities to transfer WPSS equipment and personnel
- Utility air supply for WPSS equipment onboard the Chevron platform (185cfm @ 100psi)
- Water supply for WPSS equipment onboard the Chevron platform (min 10gpm @ 100psi)
- Electrical supply for WPSS equipment onboard the Chevron platform (110v, 15amp)
- Offshore Rigging / scaffold support as needed



2.0 SAFETY

2.1 SUMMARY

WPSS is fully committed to providing a quality H.S.E. performance in all facets of its operations, at all locations and on all projects in which WPSS is involved. It is a requirement for all work procedures that pre-job safety analysis or JSAs be performed and that all pertinent information be distributed and discussed with all personnel involved prior to start of work. Furthermore, safety meetings shall be held prior to every shift to distribute current information and discuss hazards and safe procedures of the job at hand. WPSS personnel must wear proper PPE on the job; hard hat, safety shoes and safety glasses and other PPE as stipulated by the offshore vessel/platform. There is a possibility diluted chemical present in hydrotest water. All personnel will take precautions to not come in contact with hydrotest discharge water or wear the correct PPE if contact is likely. MSDS for X-cide102 and OSW490 in appendix D.

2.2 SAFETY MEETINGS & JOB SAFETY ANALYSIS

Upon arrival at the work location, a site specific safety meeting will be held to review all aspects of safety relating to the work and location. All relevant personnel will be required to attend. This meeting will be recorded by WPSS.

A Job Safety Analysis (JSA) will be conducted before commencing each new operation and at the beginning of each work shift. The JSAs shall outline tasks to be performed and identify the associated risks for each task along with mitigating procedures to minimize the anticipated risk exposure. All work crewmembers shall participate in the JSA process to ensure everyone understands the risk and mitigating procedures. The JSAs shall also review the means of egress at the specific location.

The JSAs shall include all hazards, control measures, emergency response, fire prevention, safe areas, escape routes, muster points, use of signs and barriers, PPE, handling of hazardous material, awareness of high pressure, noise, First Aid facilities and accident and incident reporting.

Any accidents or incidents, including near misses, will require a total "ALL STOP" with a post review of the situation before any activity can resume. With regards to an unsafe act or situation, any personnel involved in operations can give an "ALL STOP" but only the WPSS Superintendent in conjunction with the Company Representative and Operations can give an "ALL START".

NOTE:

At any point in time during the WPSS operations, an individual has the right to "STOP THE JOB" if there are "unsafe" activities or situations occurring.

2.3 PERMIT TO WORK

WPSS personnel are to ensure that a permit to work is issued by Offshore Vessel / Client on all offshore facilities / vessels thus ensuring that all parties under WPSS control are in full compliance with the facilities operating practices.

2.4 HIGH PRESSURE SYSTEMS PRECAUTIONS (AIR, CHEMICAL OR WATER)

When operating in the vicinity of hoses, equipment, or piping under pressure, all personnel must adhere to the following precautions:

- During pressurization and hold period, a **minimum 15 foot** stand-off distance shall be maintained from test flange/head and a **minimum 10 foot** stand-off distance from pressurized piping. In the case of limited space due to SIMOPS, the client will assist WPSS crew in allocating stand-off distances during the Hydrotesting operations.
- Placement of the test flange/head should take into consideration the ballistic flight path if failures were to occur on the autoclave port fitting and separation from the blind flanges was to occur.
- No work is to be conducted on the pressurized system. In the event that a leak is found, the system must be depressurized to ambient pressure or "double-block" isolation must be used before any work can be conducted on the system.
- A suitable area around test spread shall be taped off (red danger tape) to prevent unauthorized entry to area's near the test head.
- Prior to pressurization, the location and test activity shall be announced over the intercom/loud-speaker system.
- A suitable means shall be put in place to provide visual leak detection without having to approach the test flange/head during pressurization or hold period to accomplish the visual verification.
- Whip checks will be utilized to secure all hoses no matter the level of pressure; this will include all "standard" whip checks and/or rope for larger hoses when no "standard" whip checks exist.
- Before beginning work on any operation, the WPSS Crew on site will conduct a walk-through to check each piece of equipment and ensure it is correctly installed and secured with whip checks.

2.5 EQUIPMENT TRANSFER

Prior to mobilization the following will be confirmed for each item of WPSS equipment to be lifted:

- All equipment will be designed to adhere to standards for offshore transit/transfer and operations.
- All equipment will be clearly marked on the lifting frame with its weight.
- Equipment slings, shackles, stingers, etc. will be certified within the last 6 months and certification shall accompany the equipment.

WPSS personnel will adhere to the following precautions when operating in the vicinity of items being lifted overhead:

- Proper PPE will be worn by all individuals.
- Only one individual will provide hand-signals to the crane/forklift operator.
- WPSS personnel will clearly define a plan prior to beginning the lift, and will execute the plan as it was designed.



2.6 ENVIRONMENTAL SAFETY

The following project specific precautions will be put in place to avoid any undue damage to the environment:

- To prevent spillage of fuel during pump to tank transfers, these operations will be performed over drip-pans or pads at all times.
- Water Disposal methods will be in place to remove the water brought onto the facilities and will be disposed of in a manner in accordance with regulations

2.7 EQUIPMENT CERTIFICATION

All WPSS stand alone equipment (containers, pumps, compressors, tanks and hose baskets) shall be supplied with suitable rigging for offshore lifting and designed in accordance with Weatherford installation basis of design and shall include valid certification (certified lifting points and lifting gear). All mechanical instrumentation and electrical gear shall be calibrated by authorized Third party no sooner than 1 month of mobilization of the spread with 6 months validity certificates from time of delivery or testing.



3.0 EQUIPMENT, PERSONNEL & MATERIALS REQUIRED

3.1 WPSS HYDROTEST EQUIPMENT

ITEM #	DESCRIPTION	QTY	DIMENSIONS (L x W x H) [FT]	WEIGHT [LBS]
1.	Diesel Driven Test Pump	2	14 x 7 x 6	12,500
2.	Job Box	1	5 x 4 x 4	1,500
3.	50 Micron filter skid	1	2 x 2 x 2	300
4.	Hose Basket	1	4 x 6 x 4	5,000
5.	Storage Container	1	10 x 8 x 8	9,800
6.	MP Test manifold	1	Stored Inside: Hose Basket Job Box Storage Container	
7.	MP Test Hose	Set		
8.	MP Instrumentation Hose	Set		
9.	1" Fill Hose	Set		
10.	1" Air Hose	250'		
11.	4 1/16" 10K API test flange with taps	2		
12.	Pressure Relief Valve (set @ 12,000psi)	2		
13.	Keller Digital Gauge (pressure & temperature) 1,000bar	2		
14.	Pressure Chart Recorders 15K (w/charts)	2		
15.	Temperature Chart Recorder 0-150°F (w/charts)	2		
16.	Hand Tools / Valves / Fittings	1 set each		
17.	Handheld Radio	1 set		
18.	Computer and printer package	1		

3.2 WPSS PERSONNEL

ITEM	DESCRIPTION	QTY
1.	Supervisor	1
2.	Foreman	1
3.	Technician	2



3.3 WPSS OFFSHORE REQUIREMENTS

ITEM	DESCRIPTION	QTY
1.	Seawater Supply	As needed
2.	Utility Air	185cfm / 100psi
3.	Diesel Fuel	As needed
4.	Crane Access	As needed

3.4 HELIX PROVISIONS

ITEM	DESCRIPTION	QTY
1.	Studs, Nuts and Gasket for Tie -in Flange	2 sets



4.0 OPERATIONAL PROCEDURES

4.1 EQUIPMENT AND PERSONNEL MOBILIZATION

Once confirmation to mobilize has been received from Helix, WPSS equipment and personnel will be transferred to the Client Specified Dockyard Location for transit to the offshore location. Lift transfers for equipment and personnel will be conducted by the Helix personnel. Staging of the equipment will be carried out by Helix personnel with the assistance of WPSS personnel. All personnel working under WPSS will undergo the vessel orientation before any work can commence.

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE
1.	<p>Prior to mobilization of equipment and personnel, the WPSS crew will stage equipment and review the following:</p> <ul style="list-style-type: none"> • Pre-Test of manifolds/hoses per workshop procedure • Start-up and run of pumps • Check certification of hoses, lifting slings, shackles, lifting point, etc. • Check instrumentation for operating pressure: 0-15,000psig, 0.1% FS accuracy. • Operating Temperature of 0 °F to 150 °F • Check Keller Gauge for Hydrotest operating pressure: 1000bar (14,500psi) • PRV set at 12,000 psig for Hydrotest 	WPSS-14550-MAN-01	P	W
2.	<p>Prior to performing any work, WPSS Supervisor will conduct JSA</p> <p>Ensure all relevant parties have read and signed JSA</p>	3-4-GL-GL-PSS-00004	P	W
3.	Load out equipment for Helix Noble Raton South Hydrotest operations	5-4-GL-GL-PSS-00006	P	W



NOBLE RATON SOUTH FIELD DEVELOPMENT

HYDROTEST OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE
4.	Mobilize equipment and personnel to: COMPANY DOCKYARD ADDRESS (INTER MOOR, FOURCHON LA)	5-4-GL-GL-PSS-00006	P	W
5.	Upon arrival at the COMPANY DOCKYARD ADDRESS, WPSS personnel to supervise the offloading of WPSS equipment from transportation	5-4-GL-GL-PSS-00006	P	P
6.	Confirm all items are properly secured for transit to site	5-4-GL-GL-PSS-00006	P	P
7.	Mobilize equipment and personnel onboard CLIENT SPECIFIED VESSEL	5-4-GL-GL-PSS-00006	P	P
8.	Upon arrival WPSS employees will immediately check-in with Platform Safety Officer and receive the platform safety orientation prior to commencing any work activities.	5-4-GL-GL-PSS-00006	P	W
9.	The WPSS Supervisor shall conduct a Site Safety Meeting, JSA and job brief with crew and all relevant personnel before any operation has commenced to review all aspects of safety relating to the location with relevant personnel. Helix, Company, and/or platform representatives shall attend and provide site safety information. The meeting will be recorded by WPSS on a Site Safety Form.	3-4-GL-GL-PSS-00004 7-4-GL-GL-PSS-00003	P	W
10.	Platform personnel to lift equipment to platform and spot into the planned position according to predetermined lifting plan. WPSS to review and oversee placement of equipment.	5-4-GL-GL-PSS-00006	W	P



NOBLE RATON SOUTH FIELD DEVELOPMENT

HYDROTEST OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE
11.	Await Helix representative's instructions to proceed with pre-commissioning activity. Changes to be authorized by WPSS Supervisor and reviewed by Helix representative.	S-4-GL-GL-PSS-00006	P	W



4.2 PREPARATION OF HYDROTEST EQUIPMENT

The WPSS site representative shall agree with the Site Safety Officer the positions of a safe boundary to prevent unauthorized entry to WPSS temporary work zone. Danger tape will be erected at agreed points to warn all personnel in the vicinity of the intended operation. WPSS instrumentation is ideally to be positioned outside or at the limits of the agreed test area. No work other than that controlled by the WPSS and Helix site representative shall be allowed within the defined boundary during operation for which WPSS is responsible and entry by un-authorized personnel shall be prohibited.

The WPSS site representative shall be responsible for ensuring that the equipment and instrumentation that is delivered to the site is in accordance with the equipment and instrument lists. He shall also check that all relevant items are equipped with valid Calibration Certification from a recognized and independent certifying agency/lab. This will include, but may not be limited to Calibration Certificates, Hose Test Certificates and Lifting Gear Certificates.

- Keller Gauge instrumentation shall have a range of minimum 1.25 times the specified test pressure and shall have accuracy better than ± 0.1 bar and a sensitivity better than 0.05 bar.
- The volume of water added or subtracted during the pressure test shall be measured with equipment having accuracy better than $\pm 1.0\%$ and a sensitivity better than 0.1%.
- Temperature measuring instruments and recorders shall have accuracy better than $\pm 1.0^{\circ}\text{C}$ and sensitivity of 0.1°C .
- Pressure and temperature recorders shall be used to provide a graphical record of the pressure test for the total duration of the test with the main graphical output being supplied by the Keller Gauge.

All Calibration and Lifting Gear Certificates shall be available for inspection prior to equipment mobilization and be available for inspection by the Helix site representatives if requested. All calibration & test certificate to be submitted by WPSS shall be included in the Mobilization Manual. All original documents shall have a relevant QC stamp & certified as a true copy by WPSS. All certificates shall also be stamped and signed by the inspection company.

Original copies of all certificates shall remain in the possession of the WPSS site representative at all times. Copies can be produced and submitted to the Helix site representative if requested.



4.3 HYDROTEST EQUIPMENT RIG-UP

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
1.	Obtain Permit to Work for rig up and function testing and commence positioning of the equipment as per General Arrangement drawings. Conduct JSA/Tool Box Talk.	3-4-GL-GL-PSS-00004	P	P	W
2.	Lift the Hydrotest pumps and equipment to stage in the planned position if not already done during mobilization of equipment.	5-4-GL-GL-PSS-00006	P	P	W
3.	Confirm all equipment is functional and complete daily maintenance and fuel checks.	5-4-GL-GL-PSS-00006	P	W	W
4.	Install Hydrotest test flange(s) on top of East and West riser(s)	5-4-GL-GL-PSS-00006	P	P	W
5.	Connect the supply hose from platform fire water supply to the inlet of the pressurizing pump.	5-4-GL-GL-PSS-00006	P	W	W
6.	Connect the MP injection hose from the pressurization pump to the double block and bleed assembly. Install the heavy-duty whip checks to all connections and fully tighten.	5-4-GL-GL-PSS-00006	P	W	W
7.	Connect the MP Injection hose from the double block and bleed assembly to the isolation valve assembly on the hydrotest test flange on East Riser. Install the heavy-duty whip checks to all connections and fully tighten.	5-4-GL-GL-PSS-00006	P	W	W
8.	Connect the instrumentation hose to the valve assembly on the hydrotest flange on West Riser and route the hose in the direction of the test pump. Install the heavy-duty whip checks and fully tighten connections.	5-4-GL-GL-PSS-00006	P	W	W



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
9.	<p>Connect the MP depressurization hose from the double block and bleed assembly and route the hose in a safe manner to be discharged over board.</p> <p>NOTE: Install the heavy-duty whip checks to all connections and fully tighten. Securely tie depressurization line off.</p>	5-4-GL-GL-PSS-00006	P	W	W
10.	<p>Prior to testing all temperature monitoring instrumentation will be positioned to allow for thermal equilibrium to be achieved.</p> <p>Spot the pipe wall temperature "Circular Chart" recorder adjacent to the pipeline and attach probe to the pipe wall out of direct sunlight. Ensure that adequate lagging has been installed to the probe to prevent interference from direct sunlight. Ensure that the temperature "Circular Chart" recorder is in the working position and that a new chart and battery have been installed.</p> <p>Check the orientation of the chart and ensure that the time on the chart is correct.</p>	5-4-GL-GL-PSS-00006	P	W	W
11.	<p>Install the Keller gauge and 15,000psi pressure recorder to the instrument line from the test flange and fit the PRV.</p> <p>Note the elevation of the instrumentation in reference to the deck. Ensure that the pressure chart recorder is in the working position and that a new chart and battery have been installed.</p> <p>Check the orientation of the chart and ensure that the time on the chart is correct.</p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p>Instrument Deck Elevation</p> </div>	5-4-GL-GL-PSS-00006	P	W	W



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ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
12.	With all equipment in place the Subcontractor Project Engineer, and relevant platform personnel and walk through the testing spread and will carry out a Safety walk-through of rig-up.	5-4-GL-GL-PSS-00006	P	H	H
13.	Upon confirmation of safety walk-through, WPSS will erect safety barriers and place safety warning signs and check functionality of WPSS hydrotest spread	5-4-GL-GL-PSS-00006	P	W	W



4.4 FINAL PLATFORM PREPARATIONS

Safety barriers and warning signs shall be erected around the work area.

Upon completion of all hose and pipework connections to the temporary pumping station, the hoses and manifolds will be subjected to a leak test to 1.05 times the hydrotest pressure of the system (11,000psi). Back pressure on the injection hoses will be achieved by means of pressurizing against the isolation valves on the test flange. The tie-in point shall be the bleed connection located on the double block and bleed assembly fitted to the flange. All required instrumentation hoses shall be connected to the bleed point and pressurized during the injection hose test. The holding time will be no less than 10 minutes. *Any leaks found shall be rectified to ensure that the system is leak free. All supply lines will be checked for leaks by utilizing the supply pressure from the platform water supply. Contractor representative witnesses all leak checks.*

All instrumentation is to be checked and inspected prior to start-up. These checks are to determine the reliability of the required instruments during the entire phase of operations. All instruments are to be at the zero point prior to start-up. As part of function testing the Pressure Recorder is to be tested against the main pressure measurement Keller Gauge and spot readings taken and officially recorded to verify accuracy of all instruments.

All mechanical devices shall be function tested prior to the commencement of operations. These checks shall include, but not be limited to the start-up of all diesel driven units, function of speed controllers to allow for variable speed operations, the necessary pre-start maintenance checks on all units (oil, water, fuel, etc) A pre-start check sheet is to be completed and filed in the site office.



4.5 PRESSURE CORRECTION

Elevation of instrumentation above sea level is to be confirmed following final installation of instrumentation to determine test pressure with reference to MSL. For example, if the instrumentation is placed on the 100' deck level this shall be a pressure compensation of $100' \times 0.445 = 44.5\text{psig}$. A test pressure of 10,313psig at the 100' level would mean the pipeline would be pressurized to $10,268.5 + 44.5 = 10,313\text{psig}$ at mean sea level.

Top Deck	-	100 feet above sea level
Gauge tied-off 5 feet above deck floor	-	5 feet
Total above sea level	-	105 feet

Pressure Compensation - $105 \text{ feet} \times .445 = 47 \text{ psig}$

In order to have test pressure at sea level to be 10,313 psi, the reading on the Gauge will be;

$$10,313 \text{ psi} - 47 \text{ psi} = 10,266 \text{ psig.}$$

This is from:

$$\text{Pressure Correction} = (\rho \times g \times h) \div 100000$$

Where:

ρ = Density of the test medium in kg/m^3 (sea water is 1024kg/m^3)

g = Acceleration due to gravity (9.81m/s)

h = Height above test medium (-32m)

$$(1024 \times 9.81 \times 32) \div 100000 = -3.21\text{barg} = -46.41\text{psig}$$

All non return valves are to be inspected to check that orientation is correct. All pressure relief valves are to be inspected to determine that the valves are set at the correct pressure.



4.6 VALVE AND SYSTEM STATUS CHECKLIST

Ref: WPSS-014550-DW-01

SYSTEM IDENTIFICATION	VALVE NO.	POSITION REQUIRED	CHECKED	WPS CLIENT	REMARKS
MANIFOLD ON TEST PUMP					WPSS-014550-DW-02
Autoclave Ball Valve	ABV-1	OPEN			In-line off pump
Autoclave Ball Valve	ABV-2	OPEN			In-line off pump
Autoclave Ball Valve	ABV-3	Closed			Bleed valve off pump
VALVE MANIFOLD TABLE					WPSS-014550-DW-02
Autoclave Ball Valve	ABV-4	OPEN			In-line to test head
Autoclave Ball Valve	ABV-5	OPEN			In-line to test head
Autoclave Ball Valve	ABV-6	Closed			Bleed Valve for depressurization
Autoclave Needle Valve	ANV-1	Closed			Valve to control depressurization
Check Valve	CV-1	FITTED			Check Proper Orientation
Pressure Relief Valve	PRV-1	FITTED			Installed and set @ 12,000psi
TEST HEAD INJECTION MANIFOLD					WPSS-014550-DW-02
Autoclave Ball Valve	ABV-7	OPEN			In-line to test head
Autoclave Ball Valve	ABV-8	OPEN			In-line to test head
Autoclave Ball Valve	ABV-9	Closed			Bleed Valve
TEST HEAD INSTRUMENT MANIFOLD					WPSS-014550-DW-02
Autoclave Ball Valve	ABV-10	OPEN			In-line to instrumentation
Autoclave Ball Valve	ABV-11	OPEN			In-line to instrumentation
Autoclave Ball Valve	ABV-12	Closed			Bleed Valve
SUBSEA VALVES					
EAST PLET					
4 1/16" 10k ROV Manual Gate Valve	P2-IV-1	OPEN			In-line valve
4 1/16" 10k ROV Manual Gate Valve	P2-IV-2	Closed			To pressure cap
WEST PLET					
4 1/16" 10k Subsea Hydraulic Operated Fail-safe Valve	PGV2	OPEN			In-line valve
4 1/16" 10k Subsea Hydraulic Operated Fail-safe Valve	PGV1	OPEN			In-line valve
4 1/16" 10k ROV Manual Gate Valve	P1-IV-1	Closed			To pressure cap



SYSTEM IDENTIFICATION	REQUIREMENTS	WPS CHECKED		REMARKS
Barrier /Caution notification	In place & good condition			
Leak Test	Verified no leaks			
Instrumentation	In place and functioning			
Subsea systems ready	Check List Verified			
Water & Air Supply	Verified ready			



4.7 HYDROTEST OPERATIONS

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/DATE	HELIX INITIAL/DATE	CLIENT INITIAL/DATE
1.	The Helix representative shall review and sign the Commencement Report prior to the start of any operations associated with the Hydrotesting operation.	S-4-GL-GL-PSS-00011	P	P	W
2.	The WPSS Supervisor shall conduct a JSA/Toolbox Talk at the beginning of the operation with all personnel who will be operating, observing or witnessing for the duration of the operation. This JSA/Toolbox Talk will be reviewed at shift handovers for the duration of the operation. Any new or changing hazards identified and updated as required.	3-4-GL-GL-PSS-00004	P	W	W
3.	Install pressure charts to the pressure and temperature recorder. Charts will be clearly indicate: <ul style="list-style-type: none"> • Pipeline Section • Date • Time • Phase of Operation • Recorder Serial Number • Range • Location <p>Ensure that the clock is in the 24hr operating position, new pen, and new batteries are in place. The system is now ready for operation. Upon removal of any chart during the operation ensure that all charts have been signed-on by the Company, Contractor, Subcontractor and relevant third parties.</p>		P	W	W



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
4.	<p>During the hydrotesting operation, the following parameters will be recorded and logged according to procedure:</p> <ul style="list-style-type: none"> • Pipeline Pressure.....psig • Volume of water injected.....gallons • Ambient Air Temperature.....°F • Pipeline Wall Temperature.....°F <p>Note: Temperature will be read from the Charts</p>	5-4-GL-GL-PSS-00012			
5.	The flowline will have been previously free flooded and should be topped up to the test flange(s). Air will be bled off at the highest instrumentation point. Topping off of the topside piping will be done prior to pressurization if required.	5-4-GL-GL-PSS-00006	P	W	W
6.	Danger Tape off hydrotesting area and equipment and make a platform announcement of hydrotest operations.	5-4-GL-GL-PSS-00006	P	W	W
7.	Request Helix representative confirms topsides and subsea valves are properly aligned for hydrostatic testing as per valve and system status checklist (sec. 4.6)	5-4-GL-GL-PSS-00006	H	H	H
8.	Confirm water supply to pressure pump.	5-4-GL-GL-PSS-00006	P	W	W
9.	Walk the pressurization line and verify WPSS valves are per valve and system status checklist (sec. 4.6)	5-4-GL-GL-PSS-00006	P	W	W
10.	<p>Start Hydrotest pump and adjust the pressurizing pump speed and commence the pressurization sequence.</p> <p>Pressurization to be done in a safe and controlled manner at approximately 15psig/min .</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W



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ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
11.	Ensure that the pressurization rate does not exceed 15psig/min. Record the injected volumes in 15psig increments and add to the air inclusion report form.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
12.	Once the pipeline system has reached 525psig at the instruments, stop pressurization pump. Close Valve: ABV-4	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	H	H
13.	Carry out a visual leak check on all connections. WPSS representative to complete the air inclusion calculations. Hold the pressure for a minimum of 15 minutes logging pressure every 5 minutes.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	H	H
14.	For the Air Inclusion calculation, the pipeline pressure versus injected volume will be calculated and presented graphically. With the air inclusion calculation completed verify that the air content is within the specification of less than 0.5% for a non-pigged pipeline. Present the results to Company and Contractor representatives and if the air content is less than 0.5%, obtain permission from the Company representative to continue with the hydrotest. If the air content is greater than 0.5%, obtain written confirmation from Helix to continue or to bleed down.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	H	H
15.	OPEN Valve: ABV-4 Start the pressurizing pump, adjust the pressurizing pump speed and re-commence the pressurization sequence.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
16.	Adjust the speed on the pressurizing pump, ensuring that the pressurization rate does not exceed 15psig/min. Record the injected volumes in 100psig increments. WPSS representative shall continuously analyze data during pressurization, should data indicate any abnormalities pressurization is be halted and only restarted following instruction from Contractor representative	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
17.	Once the pipeline system has reached 35% of test pressure at the instruments (3,610psig) Shutdown the pressurizing pump; Close Valve: ABV-4	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
18.	Carry out a visual leak check on all connections and hold the pressure for a minimum of 15 minutes logging pressure every 5 minutes	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	H	H
19.	If a leak occurs during the pressurization of the riser and flowline, the pressure pump will be shut down and isolated. All hoses and equipment shall be checked for visual leaks on the topside of the platform prior to the Helix representative's inspection for leaks within the risers, flowline, and subsea structures.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	H	H



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ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
20.	<p>If there are no visible leaks or pressure drops, continue pressuring the flowlines.</p> <p>OPEN Valve: ABV-4</p> <p>Start the pressurizing pump, adjust the pressurizing pump speed and re-commence the pressurization sequence. Adjust the speed on the pressurizing pump, ensuring that the pressurization rate does not exceed 15 psig/min. Record the injected volumes in 100psig increments.</p> <p>WPSS Representative shall continuously analyze data during pressurization, should data indicate any abnormalities pressurization is be halted and only restarted following instruction from Contractor representative</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
21.	<p>Once the pipeline system has reached 50% of test pressure at the instruments (5,166psig)</p> <p>Shutdown the pressurizing pump; Close Valve: ABV-4</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
22.	<p>Carry out a visual leak check on all connections and hold the pressure for a minimum of 15 minutes logging pressure every 5 minutes</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	H	H



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
23.	<p>If there are no visible leaks or pressure drops, continue pressuring the flowlines.</p> <p>OPEN Valve: ABV-4</p> <p>Start the pressurizing pump, adjust the pressurizing pump speed and re-commence the pressurization sequence. Adjust the speed on the pressurizing pump, ensuring that the pressurization rate does not exceed 15psig/min. Record the injected volumes in 100psig increments.</p> <p>WPSS Representative shall continuously analyze data during pressurization, should data indicate any abnormalities pressurization is be halted and only restarted following instruction from Contractor representative</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
24.	<p>Once the pipeline system has reached 80% of test pressure at the instruments (8,250psig)</p> <p>Shutdown the pressurizing pump; Close Valve: ABV-4</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
25.	<p>Carry out a visual leak check on all connections and hold the pressure for a minimum of 15 minutes logging pressure every 5 minutes</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	H	H



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/DATE	HELIX INITIAL/DATE	CLIENT INITIAL/DATE
26.	<p>If there are no visible leaks or pressure drops, continue pressuring the flowlines.</p> <p>OPEN Valve: ABV-4</p> <p>Start the pressurizing pump, adjust the pressurizing pump speed and re-commence the pressurization sequence. Adjust the speed on the pressurizing pump, ensuring that the pressurization rate does not exceed 15psig/min. Record the injected volumes in 100psig increments.</p> <p>WPSS Representative shall continuously analyze data during pressurization, should data indicate any abnormalities pressurization is be halted and only restarted following instruction from Contractor representative</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
27.	<p>Once the pipeline system has reached 95% of test pressure at the instruments (9,797psig)</p> <p>Shutdown the pressurizing pump; Close Valve: ABV-4</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
28.	<p>Carry out a visual leak check on all connections and hold the pressure for a minimum of 15 minutes logging pressure every 5 minutes</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	H	H
29.	<p>If there are no visible leaks or pressure drops, continue pressuring the flowlines.</p> <p>OPEN Valve: ABV-4</p> <p>With the system pressure at 95% of test pressure at the instruments (9,797psig)</p> <p>Reduce the speed of the pressurizing pump. Adjust the speed on the pressurizing pump, ensuring that the pressurization rate does not exceed 10psig/min.</p> <p>Record the injected volumes in 50psig increments.</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W



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ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
30.	<p>With the system pressure at Test pressure(10, 313psig) Plus 200psi at the instruments (10,513psig) -</p> <p>Shutdown the pressurizing pump.</p> <p>Close Valve: ABV-4</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
31.	<p>The stabilization period will now commence. A minimum of one hour stabilization will be observed with the logging of parameters carried out at 5 minute intervals for the first two hours then at 15 minute intervals thereafter.</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	H	H
32.	<p>With pipeline temperature equalizing with seawater temperature, thermal equilibrium will be achieved and pipeline pressure will stabilize. When pressure and thermal stabilization has been confirmed all data will be presented to Company and Contractor representatives and permission gained to commence the 8 hour Hold Period.</p> <p>Examples of stabilization include when previous 4 reading are the same or decay rate is constant over some period of time and can be explained.</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	H	H
33.	<p>Should it be required, the pressure shall be increased to test pressure Plus 200psi (10,513psig) following commencement of the stabilization period by opening ABV-4 on the valve manifold table and starting the pressurizing pump until test pressure is achieved. The pump will be isolated by valve ABV-4 on valve manifold table with the pressurizing hoses between the pump and the valve manifold depressurized through ABV-3 to isolate pump from system.</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	W	W
34.	<p>Once the 8 hour Hold Period commences, no visible topside or observable sub-sea leaks shall be allowed. If leaks are observed during the 8 hour Hold Period, the pipeline system will be depressurized, the leak(s) fixed and the Hydrotest restarted.</p>	<p>5-4-GL-GL-PSS-00012</p> <p>5-4-GL-GL-PSS-00006</p>	P	H	H



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ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
35.	<p>The pressure test Hold period shall be held for a minimum period of 8 hours. Readings of pressure and temperature shall be logged by the Keller Gauge every 15 seconds and at least every 15 minutes by the Technician.</p> <p>The pressure test is acceptable if:</p> <ol style="list-style-type: none"> 1. The pressure does not drop below the designated test pressure; 2. There are no observable leaks in the pipeline system during the 8-hour hold period; and 3. There are no unexplainable pressure drops 	<p>5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006</p>	P	H	H
36.	<p>Upon acceptance of Hydrotest, Helix Representative will sign the WPSS Hydrotest Acceptance Certificate (5-4-GL-GL-PSS-00033) prior to commencing depressurization.</p>	<p>5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006</p>	R	R	R



4.8 SYSTEM DEPRESSURIZATION

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
1.	Upon the acceptance of the Hold period and charts and test acceptance certificates signed off by Helix, the pipeline system shall be depressurized.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
2.	Prior to depressurization the platform control room will be notified and all non-essential personnel will be cleared prior to commencing depressurizing operation.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
3.	The depressurization dump line from valves ABV-6 & ANV-1 will have been installed prior to start of operation keeping the hose as short as possible yet routing the discharge safely over board. Hose will have been securely fastened.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
4.	OPEN valve ANV-1 completely OPEN Valve: ABV-6 Adjust ANV-1 to control depressurization rate Commence de-pressurizing the pipeline system.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
5.	A sample of the discharge water will then be taken.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
6.	Depressurize in a safe and controlled manner control the depressurization rate by regulating the bleed valve ANV-1. Monitored pressure every 15minutes and every 15 seconds by the Keller Gauge.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	P	W	W
7.	Once the pipeline is at atmospheric static pressure (0psig), sign off on all charts and Operational Paperwork and complete a Completion Report Form.	5-4-GL-GL-PSS-00012 5-4-GL-GL-PSS-00006	R	R	R



4.9 EQUIPMENT DEMOBILIZATION

ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
1.	Await Helix representative's approval to begin demobilization of equipment and personnel.	5-4-GL-GL-PSS-00006	P	P	W
2.	<p>Ensure all paperwork has been signed by Helix representative and / or relevant parties.</p> <ul style="list-style-type: none"> • Commencement Reports • Daily Site Reports • Shift Handover Forms • Field Tickets • Pumping Reports • Job Safety Analysis (JSA's) • Post Job Evaluation • All Related Pressure Charts • All Related Temperature Charts • Completion Reports 	<p>5-4-GL-GL-PSS-00011</p> <p>5-4-GL-GL-PSS-00006</p> <p>5-4-GL-GL-PSS-00007</p> <p>5-4-GL-GL-PSS-00012</p> <p>3-4-GL-GL-PSS-00004</p> <p>6-4-US-GL-PSS-00001</p> <p>5-4-GL-GL-PSS-00013</p> <p>5-4-GL-GL-PSS-00008</p>	P	W	W
3.	The WPSS Supervisor shall conduct a JSA/Toolbox Talk at the beginning of the operation with all personnel who will be operating, observing or witnessing for the duration of the operation.	3-4-GL-GL-PSS-00004	P	W	W
4.	Break-down equipment spreads and prepare/secure delicate items prior to load-out.	5-4-GL-GL-PSS-00006	P	W	W
5.	Load-out equipment spread on WPSS supplied transportation. Ensure equipment is properly secured.	5-4-GL-GL-PSS-00006	P	W	W
6.	<p>Demobilize equipment and personnel to the WPSS facilities at the following addresses:</p> <p>Attn: Taylor Williams Phone: (713) 580-9700 7721 Pinemont Road Houston, TX 77040-6203 USA</p>	5-4-GL-GL-PSS-00006	P	W	W











NOBLE RATON SOUTH FIELD DEVELOPMENT

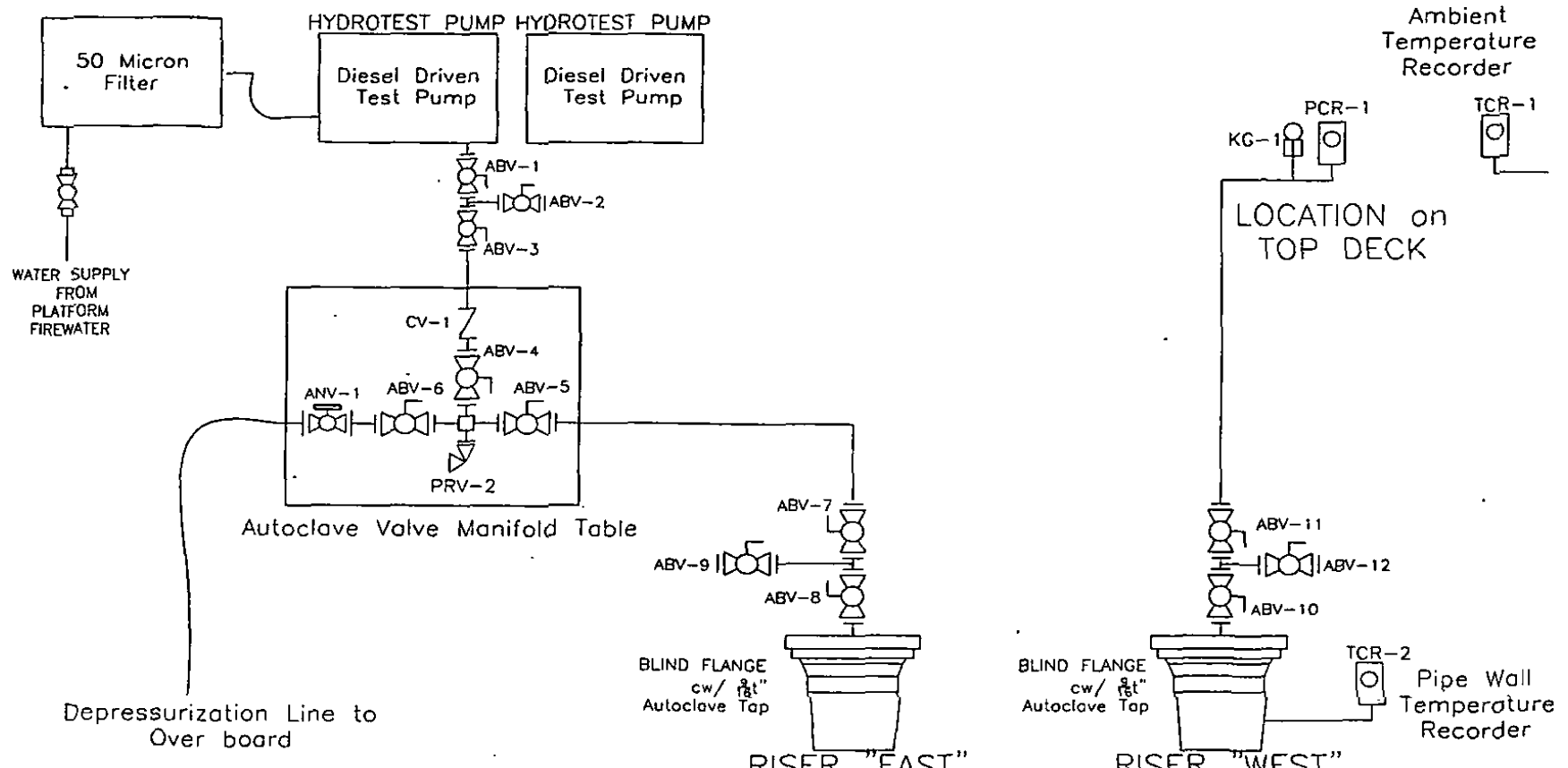
HYDROTEST OPERATIONS



ITEM	DESCRIPTION	REFERENCE	WPSS INITIAL/ DATE	HELIX INITIAL/ DATE	CLIENT INITIAL/ DATE
7.	Contact Project Manager or Asset Coordinator to coordinate trucks for equipment and crew to shop. Maintain shipping manifests or other records for Project Manager.	5-4-GL-GL-PSS-00006	P	W	W
8.	Deliver Project Completion Book to Helix at time of final invoice.	WPSS-014550-CB	P	W	W

LEGEND:

-  Flowmeter
-  Pressure Relief Valve
-  Check-valve
-  1/8" HP Autoclave Needle valves
-  1/8" HP Autoclave Ball valves
-  Keller Gauge Data Logger
-  Pressure or Temperature Chart Recorder
-  Ball Valve



NOTES:

DESCRIPTION	DATE OF ISSUE	DRAWN BY	CHECKED BY	APPROVED BY
ISSUED FOR INTERNAL USE	18 MAY 11	BS	TS	
ISSUED FOR REVIEW	3 JUNE 11	BS	TS	
ISSUED FOR REVIEW	11 JUNE 11	DL	TW	WB

Weatherford
 PIPELINE & SPECIALTY SERVICES
 7721 FRENCH CTR
 HOUSTON, TEXAS 77040

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CLIENT:	Helix Energy Services
UNITS:	N/A
SCALE:	NOT TO SCALE

DRAWING NUMBER:	WPSS-014550-DW-01	REVISION:	2
DRAWING TITLE:	HYDROTEST RIG-UP SCHEMATIC		
PROJECT:	NOBLE RATON SOUTH		



APPENDIX B: ENGINEERING CALCULATIONS

1. Hydrotest Calculations

Pipe ID:	3.44	in	
Gal / Foot:	0.4822	gal/ft	
Ft ³ / Foot:	0.06	ft ³ /ft	
Pipeline Total Vol:	140,228.56	gal	
Pipeline Total Vol:	18,745.83	ft ³	
Pipeline Total Vol:	3,338.78	bbl	
Gal / psi	0.457559	gal/psi	
Gal to Test Press:	4718.81	gal (at 70 degF)	
Time to Test Press:	11.24	hr	0.47 days
Pressurization Rate:	15.30	psi/min	917.91 psi/hr
Est Mill Scale:	2944.00	lb	1.47 tons

Trapped Air Acceptance Criterial is 0.4% Maximum



APPENDIX C: WPSS FIELD FORMS

TITLE
Commencement Report (1pg)
Daily Site Reports (DSR) (1pg)
Job Safety Analysis (JSA's) (5pgs)
Field Tickets (6pgs)
Site Safety Meeting (1pg)
Work Safe Plan "Tool Box Talk" (1pg)
Shift Handover Forms (2pgs)
Completion Reports (1pg)
Pumping Report General Purpose (1pg)



Material Safety Data Sheet

1. Product and company identification

Product name : OSW490 OXYGEN SCAVENGER
Supplier : Baker Petrolite
A Baker Hughes Company
12645 W. Airport Blvd.
Sugar Land, TX 77478
For Product Information/MSDSs Call: 800-231-3606
(8:00 a.m. - 5:00 p.m. cst, Monday - Friday) 281-276-5400

Material Uses : Special: Oxygen scavenger.
Code : OSW490
Validation date : 3/9/2010.
Print date : 3/9/2010.
Version : 3
Responsible name : Global Regulatory Affairs - Telephone 281-276-5400 or 800-231-3606
In case of emergency : CHEMTREC: 800-424-9300 (U.S. 24 hour)
Baker Petrolite: 800-231-3606
(001)281-276-5400
CANUTEC: 613-996-6666 (Canada 24 hours)
CHEMTREC Int'l 01-703-527-3887 (International 24 hour)

2. Hazards identification

Physical state : Liquid. [Clear.]
Odor : Pungent.
Color : Greenish-yellow.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : **WARNING!**
CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
Do not get in eyes. Avoid breathing vapor or mist. Avoid contact with skin and clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation.

Potential acute health effects

Inhalation : Irritating to respiratory system.
Ingestion : Ingestion may cause gastrointestinal irritation and diarrhea.
Skin : Irritating to skin.
Eyes : Severely irritating to eyes. Risk of serious damage to eyes.

Potential chronic health effects

Over-exposure signs/symptoms

Inhalation : respiratory tract irritation, coughing
Ingestion : None known.
Skin : irritation, redness
Eyes : pain or irritation, watering, redness

See toxicological information (section 11)

Additional information
Corrosive to metal.

3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Ammonium bisulfite	10192-30-0	30 - 60

4. First aid measures

- Eye contact** : Get medical attention immediately. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Protection of first-aiders** : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation.

5. Fire-fighting measures

Flammability of the product : In a fire or if heated, a pressure increase will occur and the container may burst.

Extinguishing media

- Suitable** : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable** : None known.
- Special exposure hazards** : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- Hazardous thermal decomposition products** : nitrogen oxides, sulfur oxides
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up**
- Small spill** : Stop leak if without risk. Move containers from spill area. Absorb with an inert material. Dispose of via a licensed waste disposal contractor.

6. Accidental release measures

- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.) Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not ingest. Avoid contact with eyes, skin and clothing. Avoid breathing vapor or mist. Use only with adequate ventilation. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			
Ingredients:	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	Notations
No exposure limit value known.											

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Engineering measures** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.
- Hygiene measures** : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location. Take off contaminated clothing and wash before re-use.
- Personal protection**
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant gloves: Butyl rubber gloves.
- Eyes** : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.
- Skin** : Wear long sleeves and other protective clothing to prevent repeated or prolonged skin contact.

9 . Physical and chemical properties

Physical state	: Liquid. [Clear.]
Flash point	: Not available.
Auto-ignition temperature	: Not available.
Flammable limits	: Not available.
Color	: Greenish-yellow.
Odor	: Pungent.
pH	: 5 to 5.5
	: Neat - without dilution.
Boiling/condensation point	: Not available.
Initial Boiling Point	: Not available.
Melting/freezing point	: Not available.
Relative density	: 1.298 (16°C)
Density	: 10.81 (lbs/gal)
Vapor density	: >1 [Air = 1]
Odor threshold	: Not available.
Evaporation rate	: Not available.
VOC	: Not available.
Viscosity	: Not available.
Solubility (Water)	: Soluble
Vapor pressure	: Not available.
Pour Point	: Not available.
Partition coefficient (LogKow)	: Not available.

10 . Stability and Reactivity

Chemical stability	: The product is stable.
Possibility of hazardous reactions	: Under normal conditions of storage and use, hazardous reactions will not occur.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions to avoid	: No specific data.
Materials to avoid	: Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Conditions of reactivity	: Non-flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.

11 . Toxicological information

No additional information.

Chronic toxicity Remarks

1) Ammonium bisulfite

Ammonium bisulfite is a component of this product. Prolonged contact can produce corrosion of the skin and permanent damage to the eye. Under acidic conditions, sulfur dioxide may be formed. Inhalation of sulfur dioxide can cause stricture of the esophagus, acute pulmonary edema, and respiratory failure. Sulfur dioxide has been linked to miscarriages, gynecological disease, and abnormal pregnancies (Reprotext).

The ACGIH exposure limits for sulfur dioxide are TWA of 2 ppm and STEL of 5 ppm. The OSHA exposure limit for sulfur dioxide is a TWA of 5 ppm.

11 . Toxicological information**12 . Ecological information**Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
OSW490 OXYGEN SCAVENGER	Acute LC50 103 mg/l	Fish - Bluegill sunfish	96 hours
	Acute LC50 100 mg/l	Fish - Threespine stickleback	96 hours

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

Additional information

An EcoTox™ Report, and/or the material's environmental fate is available upon request at the following number: 1-800-235-4249, then press 4.




13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN2693	BISULFITES, AQUEOUS SOLUTION, N.O.S. (Contains: Ammonium bisulfite)	8	III		-
TDG Classification	UN2963	BISULFITES, AQUEOUS SOLUTION, N.O.S. (Contains: Ammonium bisulfite)	8	III		-
IMDG Class	UN2693	BISULPHITES, AQUEOUS SOLUTION, N.O.S. (Contains: Ammonium bisulfite)	8	III		Emergency schedules (EmS) F-A S-B

PG* : Packing group

DOT Reportable quantity : Ammonium bisulfite, 916 gal of this product.

14 . Transport information

Marine pollutant : Not applicable.

North-America NAERG : 154

15 . Regulatory information

HCS Classification : Irritating material

U.S. Federal regulations : United States inventory (TSCA 8b): All components are listed or exempted.

SARA 302/304/311/312 extremely hazardous substances: No products were found.

SARA 302/304 emergency planning and notification: No products were found.

SARA 302/304/311/312 hazardous chemicals: ammonium hydrogensulphite

SARA 311/312 MSDS distribution - chemical inventory - hazard identification:

OSW490 OXYGEN SCAVENGER: Immediate (acute) health hazard

CERCLA: Hazardous substances.: ammonium hydrogensulphite: 5000 lbs. (2270 kg);

Clean Water Act (CWA) 307: No products were found.

Clean Water Act (CWA) 311: ammonium hydrogensulphite

Clean Air Act (CAA) 112 accidental release prevention: No products were found.

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Clean Air Act Section
112(b) Hazardous Air
Pollutants (HAPs) : Not listed**SARA 313**

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
Supplier notification	: Ammonium bisulfite	10192-30-0	30 - 60

United States inventory (TSCA 8b) : All components are listed or exempted.

CanadaWHMIS (Canada) : Class D-2B: Material causing other toxic effects (Toxic).
Class E: Corrosive material

Canada (CEPA DSL): : All components are listed or exempted.

16 . Other information

Label requirements : CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.

National Fire Protection
Association (U.S.A.) :

Date of printing : 3/9/2010.

☑ Indicates information that has changed from previously issued version.

Notice to reader

16 . Other information

NOTE: The information on this MSDS is based on data which is considered to be accurate. Baker Hughes, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.



Material Safety Data Sheet

1. Product and company identification

Product name : X-CIDE™ 102 INDUSTRIAL BACTERICIDE
™ a trademark of Baker Hughes, Inc.

Supplier : Baker Petrolite
A Baker Hughes Company
12645 W. Airport Blvd.
Sugar Land, TX 77478
For Product Information/MSDSs Call: 800-231-3606
(8:00 a.m. - 5:00 p.m. cst, Monday - Friday) 281-276-5400

Material Uses : Special: Industrial Bactericide.

Code : XC102

Validation date : 11/2/2009.

Print date : 11/2/2009.

Version : 3

Responsible name : Global Regulatory Affairs - Telephone 281-276-5400 or 800-231-3606

In case of emergency : CHEMTREC: 800-424-9300 (U.S. 24 hour)
Baker Petrolite: 800-231-3606
(001)281-276-5400
CANUTEC: 613-996-6666 (Canada 24 hours)
CHEMTREC Int'l 01-703-527-3887 (International 24 hour)

2. Hazards identification

Physical state : Liquid.

Odor : Fruity. Medicinal. [Strong]

Color : Colorless.

OSHA/HCS status : This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).

Emergency overview : DANGER!
CAUSES EYE BURNS. CAUSES RESPIRATORY TRACT AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.
Do not breathe vapor or mist. Do not ingest. Do not get in eyes or on skin or clothing. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Routes of entry : Dermal contact. Eye contact. Inhalation.

Potential acute health effects

Inhalation : Severely irritating to the respiratory system.

Ingestion : Harmful if swallowed. May cause burns to mouth, throat and stomach.

Skin : Severely irritating to the skin. May cause sensitization by skin contact.

Eyes : Corrosive to eyes. Causes burns.

Potential chronic health effects

Chronic effects : Contains material that may cause target organ damage, based on animal data. Once sensitized, a severe allergic reaction may occur when subsequently exposed to very low levels.

Target organs : Contains material which may cause damage to the following organs: upper respiratory tract, skin, eye, lens or cornea.

Over-exposure signs/symptoms

Inhalation : respiratory tract irritation, coughing

Ingestion : None known.

2. Hazards identification

- Skin : irritation, redness
- Eyes : pain, watering, redness
- Medical conditions aggravated by over-exposure : Pre-existing skin disorders and disorders involving any other target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

Additional information

Glutaraldehyde may stain skin and nails to brown or golden brown color. Glutaraldehyde can cause allergic contact dermatitis, asthma and rhinitis and may aggravate existing asthmatic conditions.

3. Composition/information on ingredients

<u>Name</u>	<u>CAS number</u>	<u>%</u>
Glutaraldehyde	111-30-8	10 - 30

4. First aid measures

- Eye contact : Get medical attention immediately. Immediately flush the eye(s) continuously with lukewarm, gently flowing water for at least 20-60 minutes while holding the eyelid(s) open.
- Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- gestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.
- Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wear suitable protective clothing and gloves. Remove contaminated clothing and shoes.

5. Fire-fighting measures

- Flammability of the product : In a fire or if heated, a pressure increase will occur and the container may burst.

Extinguishing media

- Suitable : Use an extinguishing agent suitable for the surrounding fire.
- Not suitable : None known.
- Special exposure hazards : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training.
- Hazardous thermal decomposition products : carbon dioxide, carbon monoxide
- Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

- Personal precautions** : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Do not breathe vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Methods for cleaning up

- Small spill** : Stop leak if without risk. Move containers from spill area. Absorb with an inert material. Dispose of via a licensed waste disposal contractor.
- Large spill** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Dike spill area and do not allow product to reach sewage system or surface or ground water. Notify any reportable spill to authorities. (See section 12 for environmental risks and 13 for disposal information.) Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

If RQ (Reportable Quantity) is exceeded, report to National Spill Response Office at 1-800-424-8802.

7. Handling and storage

- Handling** : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Persons with a history of skin sensitization problems should not be employed in any process in which this product is used. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Empty containers retain product residue and can be hazardous. Do not reuse container.
- Storage** : Store in accordance with local regulations. Store in a dry, cool and well-ventilated area, away from incompatible materials (see section 10). Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Occupational exposure limits		TWA (8 hours)			STEL (15 mins)			Ceiling			
Ingredient	List name	ppm	mg/m ³	Other	ppm	mg/m ³	Other	ppm	mg/m ³	Other	Notations
Glutaraldehyde	US ACGIH	-	-	-	-	-	-	0.05	-	-	
	OSHA PEL 1989	-	-	-	-	-	-	0.2	0.8	-	

Consult local authorities for acceptable exposure limits.

Only components of this product with established exposure limits appear in the box above.

If OSHA permissible exposure levels are shown above they are the OSHA 1989 levels or are from subsequent OSHA regulatory actions. Although the 1989 levels have been vacated the 11th Circuit Court of Appeals, Baker Hughes recommends that these lower exposure levels be observed as reasonable worker protection.

- Recommended monitoring procedures** : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment.
- Engineering measures** : Use only with adequate ventilation. If user operations generate dust, fumes, gas, vapor or mist, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits.

8 . Exposure controls/personal protection

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Ensure that eyewash stations and safety showers are close to the workstation location. Take off contaminated clothing and wash before re-use.

Personal protection

- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- Hands** : Chemical-resistant gloves: Nitrile or Neoprene gloves. PVC gloves. 4H gloves. Butyl rubber gloves.
- Eyes** : Wear chemical safety goggles. When transferring material wear face-shield in addition to chemical safety goggles.
- Skin** : Wear long sleeves and other protective clothing to prevent repeated or prolonged skin contact.

9 . Physical and chemical properties

- Physical state** : Liquid.
- Flash point** : Closed cup: >93.4°C (>200.1°F) [SFCC]
- Auto-ignition temperature** : Not available.
- Flammable limits** : Not available.
- Color** : Colorless.
- Odor** : Fruity. Medicinal. [Strong]
- pH** : 3 to 4.5
- Boiling/condensation point** : Neat - without dilution.
- Initial Boiling Point** : Not available.
- Melting/freezing point** : Not available.
- Relative density** : 1.056 (15.6°C)
- Density** : 8.8 (lbs/gal)
- Vapor density** : >1 [Air = 1]
- Odor threshold** : Not available.
- Evaporation rate** : Not available.
- VOC** : Not available.
- Viscosity** : Dynamic (15.6°C): 4 cP
- Solubility (Water)** : Soluble
- Vapor pressure** : 4.1 kPa (31 mm Hg) at 37.8°C
- Pour Point** : -6.7°C (19.9°F)
- Partition coefficient (LogKow)** : Not available.

10 . Stability and Reactivity

- Chemical stability** : The product is stable.
- Possibility of hazardous reactions** : Under normal conditions of storage and use, hazardous reactions will not occur.
- Hazardous polymerization** : Under normal conditions of storage and use, hazardous polymerization will not occur.
- Conditions to avoid** : No specific data.
- Materials to avoid** : Reactive or incompatible with the following materials: oxidizing materials, acids and alkalis.
- Hazardous decomposition products** : Under normal conditions of storage and use, hazardous decomposition products should not be produced.

X-CIDE™ 102 INDUSTRIAL BACTERICIDE

10 . Stability and Reactivity

Conditions of reactivity : Slightly flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and heat.

11 . Toxicological information

Acute toxicity

Product/ingredient name	Result	Species	Dose	Exposure
Glutaraldehyde	LD50 Dermal	Rabbit	560 uL/kg	-
	LD50 Oral	Rat	134 mg/kg	-
	LC50 Inhalation Vapor	Rat	480 mg/m3	4 hours
X-CIDE™ 102 INDUSTRIAL BACTERICIDE	LD50 Dermal	Rabbit	13600 mg/kg	-
	LD50 Oral	Rat	1990 mg/kg	-

Carcinogenicity

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
Glutaraldehyde	A4	-	-	-	-	-

Chronic toxicity Remarks

1) Glutaraldehyde

Glutaraldehyde is a component of this product. In long-term experimental animal studies, glutaraldehyde caused liver damage in mice (ACGIH, 1992), but it was not neurotoxic in rats (Spencer et al, 1978).

Female rats had increased large granular lymphocytic leukemias after receiving glutaraldehyde in the drinking water at levels up to 1,000 ppm for 2 years (Andersen, 1996).

The results of genetic studies have been mixed with no conclusive evidence of positive effects.

In 2-year inhalation studies, there was no evidence of carcinogenic activity in male or female rats exposed to 250, 500 or 750 ppb, or in male or female mice exposed to 62.5, 125, or 250 ppb glutaraldehyde. Incidences of nasal and respiratory lesions were increased in both male/female rats and mice. Reduction in body weight, as compared to the controls was also noted.

Additional information

Draize Test Eye (Rabbit): Extreme Irritant/Corrosive. Draize Test Skin (Rabbit): Extreme Irritant.

12 . Ecological information

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
X-CIDE™ 102 INDUSTRIAL BACTERICIDE	EC50 16 mg/l	Algae - Selenastrum capricornutum	96 hours
	EC50 8 mg/l	Algae - Chlorella vulgaris	96 hours
	EC50 1.8 mg/l	Algae - Skeletonema costatum	96 hours
	LC50 75 mg/l	Fish - Threespine stickleback	96 hours
	LC50 43 mg/l	Daphnia - Daphnia magna	48 hours
	LC50 42 mg/l	Fish - Bluegill sunfish	96 hours
	LC50 33 mg/l	Fish - Rainbow trout	96 hours
	LC50 28.4 ppm	Daphnia - Mysid	96 hours

12. Ecological information

shrimp

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

Additional information

An EcoTox™ Report, and/or the material's environmental fate is available upon request at the following number: 1-800-235-4249, then press 4.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	Not regulated.	-	-	-	-	-
TDG Classification	Not regulated.	-	-	-	-	-
IMDG Class	Not applicable.	-	-	-	-	-

PG* : Packing group

DOT Reportable Quantity : Not applicable.

Marine pollutant : Not applicable.

North-America NAERG : Not available.

15. Regulatory information

HCS Classification : Corrosive material
Sensitizing material
Target organ effects

U.S. Federal regulations : **United States inventory (TSCA 8b)**: All components are listed or exempted.
SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: glutaral
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: X-CIDE™ 102 INDUSTRIAL BACTERICIDE: Immediate (acute) health hazard
CERCLA: Hazardous substances.: methanol: 5000 lbs. (2270 kg);
Clean Water Act (CWA) 307: No products were found.
Clean Water Act (CWA) 311: No products were found.

15. Regulatory information

Clean Air Act (CAA) 112 accidental release prevention: No products were found.
Clean Air Act (CAA) 112 regulated flammable substances: No products were found.
Clean Air Act (CAA) 112 regulated toxic substances: No products were found.

Clean Air Act Section 112(b) Hazardous Air Pollutants (HAPs) : Not listed

United States inventory (TSCA 8b) : All components are listed or exempted.

Canada

WHMIS (Canada) : Class D-1B: Material causing immediate and serious toxic effects (Toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).
Class E: Corrosive material

Canada (CEPA DSL): : All components are listed or exempted.

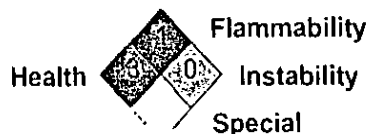
Additional information

This product is subject to regulation under the US Federal Insecticide, Fungicide and Rodenticide ACT (FIFRA) and is therefore exempt from US Toxic Substance Control Act (TSCA) Inventory listing requirements. EPA Registration No. 10707-40

16. Other information

Label requirements : CAUSES EYE BURNS. CAUSES RESPIRATORY TRACT AND SKIN IRRITATION. MAY CAUSE ALLERGIC SKIN REACTION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

National Fire Protection Association (U.S.A.) :



Date of printing : 11/2/2009.

☑ Indicates information that has changed from previously issued version.

Notice to reader

NOTE: The information on this MSDS is based on data which is considered to be accurate. Baker Hughes, however, makes no guarantees or warranty, either expressed or implied of the accuracy or completeness of this information.

The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of this product.

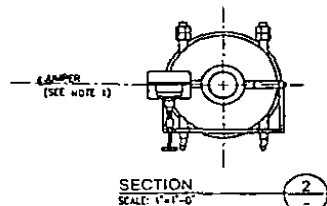
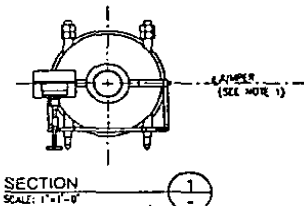
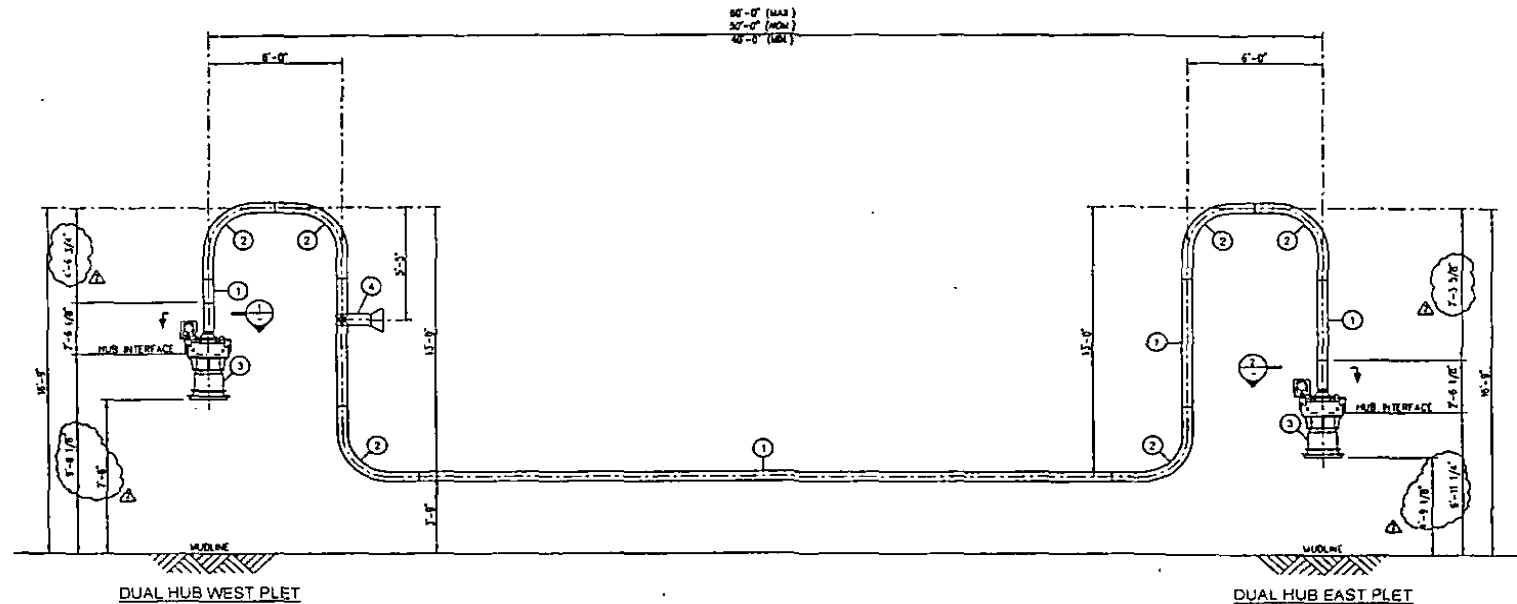
This MSDS was prepared and is to be used for this product. If the product is used as a component in another product, this MSDS information may not be applicable.



APPENDIX E: HELIX SUPPLIED DRAWINGS

NUMBER	TITLE
16172-N002 Rev 2	Pigging (PLET to PLET) Jumper
16172-A100 Rev 1	Raton South Scope of Supply Schematic

BILL OF MATERIALS (MAX.)		DESCRIPTION
1	50	5.563" O.D. x 0.750" W.T. API 5L X65 SMLS LINE PIPE
2	4	5.563" O.D. x 0.750" W.T. API 5L X65 SMLS INDUCTION BEND, 90 DEG. SO (25") RAD. 16" TANGENTS
3	2	FEMALE 4" RAC CONNECTOR w/ REDUCER, API 5L X65 w/ 30" PUP PIECE
4	1	CLAMPING PIG DETECTOR, 5.63" O.D. PIPE



SUPERSEDES DRAWING 18172-F011

- NOTES
- CONNECTOR DETAILS SUPPLIED BY NOBLE, REFERENCE TO DRAWING RA-080674, RA-080673, RA-080782, & RA-080783.
 - ALL DIMENSIONS TO BE CONFIRMED BY PRE-INSTALLATION METROLOGY.

NO.	BY	REVISION DESCRIPTION	DATE	CHK	ENG	APP	DATE
1	CLS	ADDED TO MATCH PLET DESIGN	02/26/13	RB	BP	BP	
2	CLS	ADDED TO ADD PUP PIECE	02/26/13	RA	BP	BP	
3	CLS	ADDED FOR CONNECTION	02/26/13	SB	BP	BP	

DESIGNED BY: S. P. HOD	DATE: 02/20/13
DESIGNED BY: C. SPANGLER	DATE: 02/20/13
DESIGNED BY: S. P. HOD	DATE: 02/20/13
APP'D BY: S. P. HOD	DATE: 02/20/13
SCALE: 1/4" = 1'-0"	
SCALE: 1/4" = 1'-0"	
SCALE: 1/4" = 1'-0"	
SCALE: 1/4" = 1'-0"	

noble energy

UniversalPegasus INTERNATIONAL

Pegasus International, Inc.

RATON SOUTH TO VK-900 PROJECT	
PIGGING (PLET TO PLET) JUMPER	
NO. 18172	REV. 2



Weatherford

NOBLE RATON SOUTH FIELD DEVELOPMENT

HYDROTEST OPERATIONS



APPENDIX F: WPSS CONTACTS

WEATHERFORD P&SS				
NAME	POSITION	PHONE: OFFICE	PHONE: CELL	EMAIL
Wayne Berrey	Area Manager (Houston)	713-580-9780	713-449-4680	wayne.berrey@weatherford.com
Taylor Williams	Product Line Specialist (Houston)	713-580-9720	832-492-5739	taylor.williams@weatherford.com
Brock Hennigh	Offshore Product Line Specialist, Western Hemisphere	713-580-9706	832-418-0256	Brock.hennigh@weatherford.com
Hugo Ybarra	Asset Coordinator / Logistics	713-580-9743	832-418-0258	Hugo.ybarra@weatherford.com
Ronnie Singleton	District Manager / Logistics	713-580-9721	832-492-6703	Ronnie.singleton@weatherford.com



Weatherford®

Project:	Helix Noble Raton South
Job No.:	WPSS-014550
Contractor:	Helix ESG
Location:	VK-900
Section:	Raton South Looped Flowlines
Length:	290,000 feet
Diameter:	4.5"
Volume gal:	140228.00
Date:	Saturday, August 13, 2011

**Pressurisation Report
(Air Inclusion)**

Time	Press (psi)	Volume Diff.	Total Volume	Time	Press (psi)	Volume Diff.	Total Volume
2:56	0	0.0	0.0	3:26	270	8.0	174.0
3:00	15	0.0	0.0	3:28	285	10.0	184.0
3:01	30	42.0	42.0	3:30	300	8.0	192.0
3:02	45	3.0	45.0	3:32	315	8.0	200.0
3:03	60	7.0	52.0	3:34	330	9.0	209.0
3:04	75	9.0	61.0	3:36	345	10.0	219.0
3:05	90	9.0	70.0	3:38	360	8.0	227.0
3:06	105	10.0	80.0	3:39	375	8.0	235.0
3:07	120	7.0	87.0	3:41	390	9.0	244.0
3:08	135	10.0	97.0	3:42	405	8.0	252.0
3:12	150	9.0	106.0	3:42	420	9.0	261.0
3:13	165	8.0	114.0	3:45	435	9.0	270.0
3:15	180	8.0	122.0	3:46	450	7.0	277.0
3:17	195	9.0	131.0	3:48	465	8.0	285.0
3:19	210	9.0	140.0	3:49	480	9.0	294.0
3:20	225	9.0	149.0	3:51	495	9.0	303.0
3:22	240	8.0	157.0	3:53	510	9.0	312.0
3:24	255	9.0	166.0	3:56	525	8.0	320.0

AIR INCLUSION CALCULATIONS:

(A) Actual Volume (gal) 320.0
 (B) Theoretical Volume (gal) 297.5
 (C) Difference in Volume (gal) 22.5
 (D) Total Fill Volume (gal) 140228.0

AIR INCLUSION =

$$A - B = \frac{C}{D} \times 100$$

0.0160 % AIR CONTENT

Weatherford Representative

Name: Taylor Williams Signature: [Signature] Date: 19 Aug 2011

Contractor Representative:

Name: Ken Summers Signature: [Signature] Date: 8-14-11

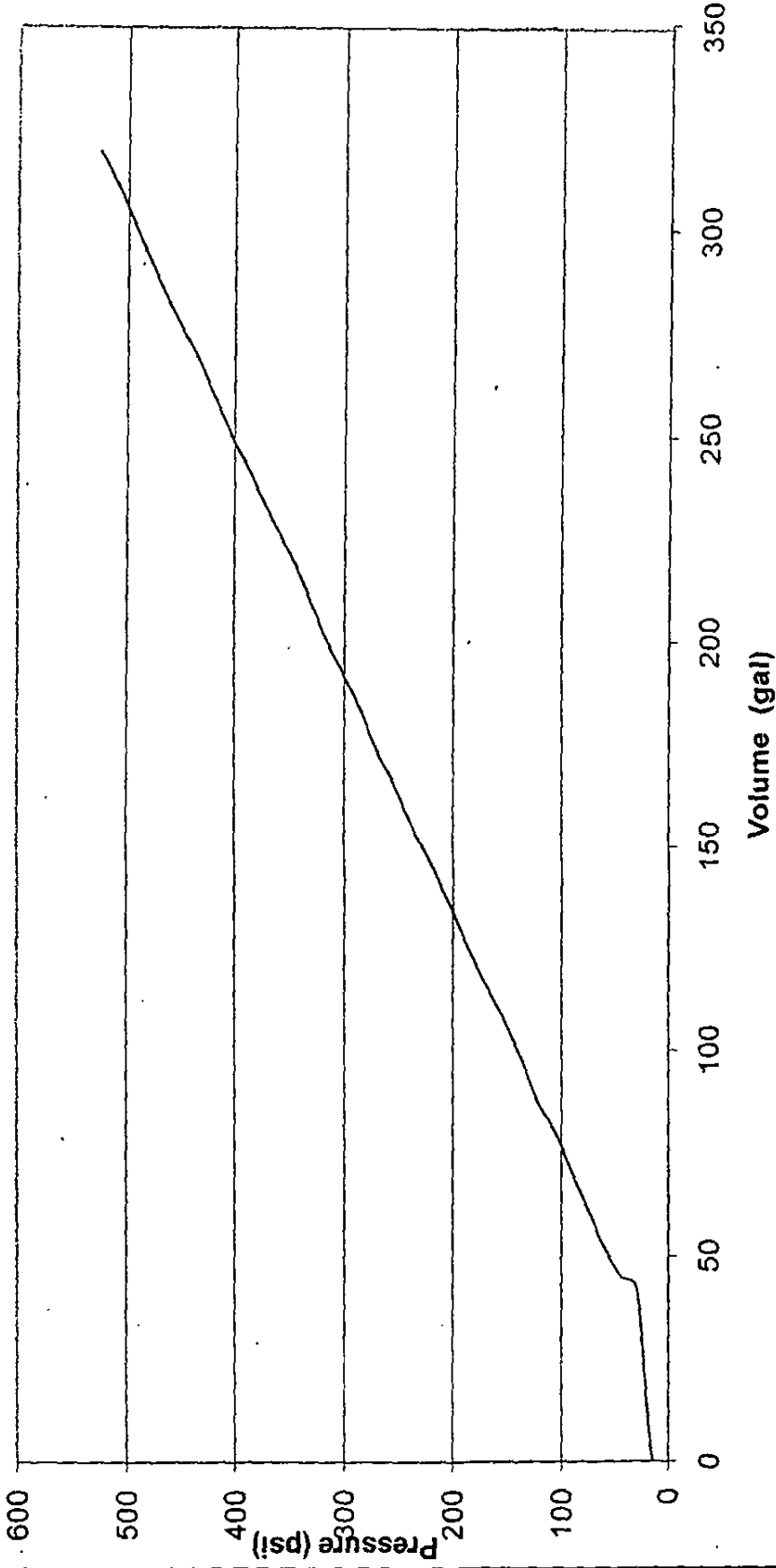
Company Representative:

Name: M. P. Pava Signature: [Signature] Date: 8-14-11

Pressure Volume

0	0.00
15	0.00
30	42.00
45	45.00
60	52.00
75	61.00
90	70.00
105	80.00
120	87.00
135	97.00
150	106.00
165	114.00
180	122.00
195	131.00
210	140.00
225	149.00
240	157.00
255	166.00
270	174.00
285	184.00
300	192.00
315	200.00
330	209.00
345	219.00
360	227.00
375	235.00
390	244.00
405	252.00
420	261.00
435	270.00
450	277.00
465	285.00
480	294.00
495	303.00
510	312.00
525	320.00

Pressure/Volume Plot for Raton South Flow lines



Name	Signature	Date
Taylor Williams	<i>Taylor Williams</i>	18 Aug 2011
Ben Simmons	<i>Ben Simmons</i>	8-14-11
Mike Peña	<i>Mike Peña</i>	8-14-11

Weatherford Representative:
 Contractor Representative:
 Company Representative:





Weatherford[®]

Project:	Helix Noble Raton
Job No.:	WPSS-014550
Customer:	Helix ESG
Location:	VK-900
Section:	Raton South Looped flowlines
Length:	290,000 feet
Date:	13-Aug-11

Hydrotest Stabilisation/Hold Report

Date	Time	Pressure psiG		Ambient Temp. °F	Pipewall Temp. °F	Remarks
13-Aug-11	15:45 pm	10502.0		85.0	96.0	
13-Aug-11	16:00 pm	10501.0		86.0	95.0	
13-Aug-11	16:15 pm	10501.0		86.0	94.0	
13-Aug-11	16:30 pm	10499.0		86.0	93.0	Begin 8 hour hold
13-Aug-11	16:45 pm	10499.0		86.0	92.0	
13-Aug-11	17:00 pm	10499.0		86.0	92.0	
13-Aug-11	17:15 pm	10499.0		86.0	92.0	
13-Aug-11	17:30 pm	10499.0		86.0	92.0	
13-Aug-11	17:45 pm	10499.0		86.0	92.0	
13-Aug-11	18:00 pm	10499.0		87.0	92.0	
13-Aug-11	18:15 pm	10499.0		87.0	92.0	
13-Aug-11	18:30 pm	10499.0		87.0	92.0	
13-Aug-11	18:45 pm	10499.0		87.0	91.0	
13-Aug-11	19:00 pm	10499.0		87.0	91.0	
13-Aug-11	19:15 pm	10499.0		87.0	91.0	
13-Aug-11	19:30 pm	10499.0		87.0	90.0	
13-Aug-11	19:45 pm	10499.0		87.0	90.0	
13-Aug-11	20:00 pm	10499.0		87.0	90.0	
13-Aug-11	20:15 pm	10499.0		87.0	90.0	
13-Aug-11	20:30 pm	10499.0		87.0	89.0	
13-Aug-11	20:45 pm	10499.0		87.0	89.0	
13-Aug-11	21:00 pm	10499.0		87.0	89.0	
13-Aug-11	21:15 pm	10499.0		87.0	89.0	
13-Aug-11	21:30 pm	10499.0		87.0	89.0	
13-Aug-11	21:45 pm	10499.0		87.0	88.0	
13-Aug-11	22:00 pm	10499.0		87.0	88.0	
13-Aug-11	22:15 pm	10499.0		87.0	88.0	
13-Aug-11	22:30 pm	10499.0		87.0	88.0	
13-Aug-11	22:45 pm	10499.0		87.0	88.0	
13-Aug-11	23:00 pm	10499.0		87.0	88.0	
13-Aug-11	23:15 pm	10499.0		86.0	87.0	
13-Aug-11	23:30 pm	10499.0		86.0	87.00	
13-Aug-11	23:45 pm	10499.0		86.0	87.00	

Weatherford Representative:

Name: Michael Templeman Signature: [Signature] Date: 14 August, 2011

Contractor Representative:

Name: [Signature] Signature: [Signature] Date: 14 August, 2011

Company Representative:

Name: [Signature] Signature: [Signature] Date: 14 August, 2011



Weatherford

Project:	Helix Noble Raton
Job No.:	WPSS-014550
Contractor:	Helix ESG
Location:	Viosca Knoll - 900
Section:	Noble Raton South Looped Flow lines
Length:	290,000 feet
Diameter:	4.5"

Pressurization Report

Time	Pressure (psi)	Differential Volume (gal)	Flowmeter (gal)	Time	Pressure (psi)	Differential Volume (gal)	Flowmeter (gal)
2:56	0		0.00	9:35	5500	52.00	2996.0
3:06	100	79.0	79.0	9:41	5600	52.00	3048.0
3:18	200	52.0	131.0	9:47	5700	52.00	3100.0
3:30	300	61.0	192.0	9:53	5800	50.00	3150.0
3:42	400	58.0	250.0	9:58	5900	51.00	3201.0
3:52	500	54.0	304.0	10:04	6000	50.00	3251.0
4:27	600	60.0	364.0	10:10	6100	52.00	3303.0
4:32	700	54.0	418.0	10:16	6200	52.00	3355.0
4:38	800	56.0	474.0	10:22	6300	51.00	3406.0
4:44	900	56.0	530.0	10:27	6400	51.00	3457.0
4:49	1000	55.0	585.0	10:35	6500	51.00	3508.0
4:54	1100	56.0	641.0	10:40	6600	51.00	3559.0
5:00	1200	57.0	698.0	10:45	6700	51.00	3610.0
5:06	1300	51.0	749.0	10:51	6800	53.00	3663.0
5:12	1400	56.0	805.0	10:56	6900	52.00	3715.0
5:18	1500	55.0	860.0	11:03	7000	39.00	3754.0
5:23	1600	56.0	916.0	11:09	7100	60.00	3814.0
5:29	1700	54.0	970.0	11:36	7200	50.00	3864.0
5:34	1800	55.0	1025.0	11:42	7300	51.00	3915.0
5:40	1900	55.0	1080.0	11:49	7400	39.00	3954.0
5:46	2000	53.0	1133.0	11:55	7500	65.00	4019.0
5:51	2100	55.0	1188.0	12:01	7600	47.00	4086.0
5:57	2200	56.0	1244.0	12:07	7700	49.00	4115.0
6:03	2300	54.0	1298.0	12:14	7800	55.00	4170.0
6:08	2400	54.0	1352.0	12:20	7900	47.00	4217.0
6:14	2500	55.0	1407.0	12:26	8000	50.00	4267.0
6:20	2600	60.0	1467.0	12:32	8100	50.00	4317.0
6:25	2700	48.0	1515.0	12:38	8200	50.00	4367.0
6:31	2800	58.0	1573.0	13:01	8300	52.00	4419.0
6:37	2900	69.0	1642.0	13:07	8400	48.00	4467.0
6:43	3000	32.0	1674.0	13:13	8500	48.00	4515.0
6:49	3100	60.0	1734.0	13:19	8600	50.00	4565.0
6:54	3200	50.0	1784.0	13:25	8700	48.00	4613.0
7:00	3300	55.0	1839.0	13:31	8800	50.00	4663.0
7:05	3400	52.0	1891.0	13:37	8900	37.00	4700.0
7:11	3500	53.0	1944.0	13:43	9000	64.00	4764.0
7:14	3600	54.0	1998.0	13:49	9100	47.00	4811.0
7:39	3700	57.0	2055.0	13:55	9200	49.00	4860.0
7:44	3800	51.0	2106.0	14:01	9300	48.00	4908.0
7:50	3900	53.0	2159.0	14:07	9400	49.00	4957.0
7:55	4000	54.0	2213.0	14:13	9500	50.00	5007.0
8:00	4100	50.0	2263.0	14:19	9600	48.00	5055.0
8:06	4200	53.0	2316.0	14:25	9700	51.00	5106.0
8:12	4300	52.0	2368.0	14:31	9800	46.00	5152.0
8:17	4400	53.0	2421.0	15:00	9900	49.00	5201.0
8:23	4500	54.0	2475.0	15:07	10000	50.00	5251.0
8:28	4600	52.0	2527.0	15:14	10100	49.00	5300.0
8:34	4700	50.0	2577.0	15:21	10200	49.00	5349.0
8:40	4800	55.0	2632.0	15:28	10300	47.00	5396.0
8:45	4900	50.0	2682.0	15:35	10400	48.00	5444.0
8:51	5000	53.0	2735.0	15:43	10500	49.00	5493.0
8:56	5100	52.0	2787.0				
9:18	5200	65.0	2852.0				
9:24	5300	39.0	2891.0				
9:30	5400	53.0	2944.0				

Total Volume Pumped = 5493 gallons

Weatherford Representative:

Name: [Signature]

Signature: [Signature]

Date: 2/19/11

Helix Representative:

Name: [Signature]

Signature: _____

Date: _____

[Signature]



Weatherford

RATON SOUTH HYDROTEST CHART

OPERATION: HYDROTEST OF THE NOBLE RATON SOUTH LOOPED FLOWLINE

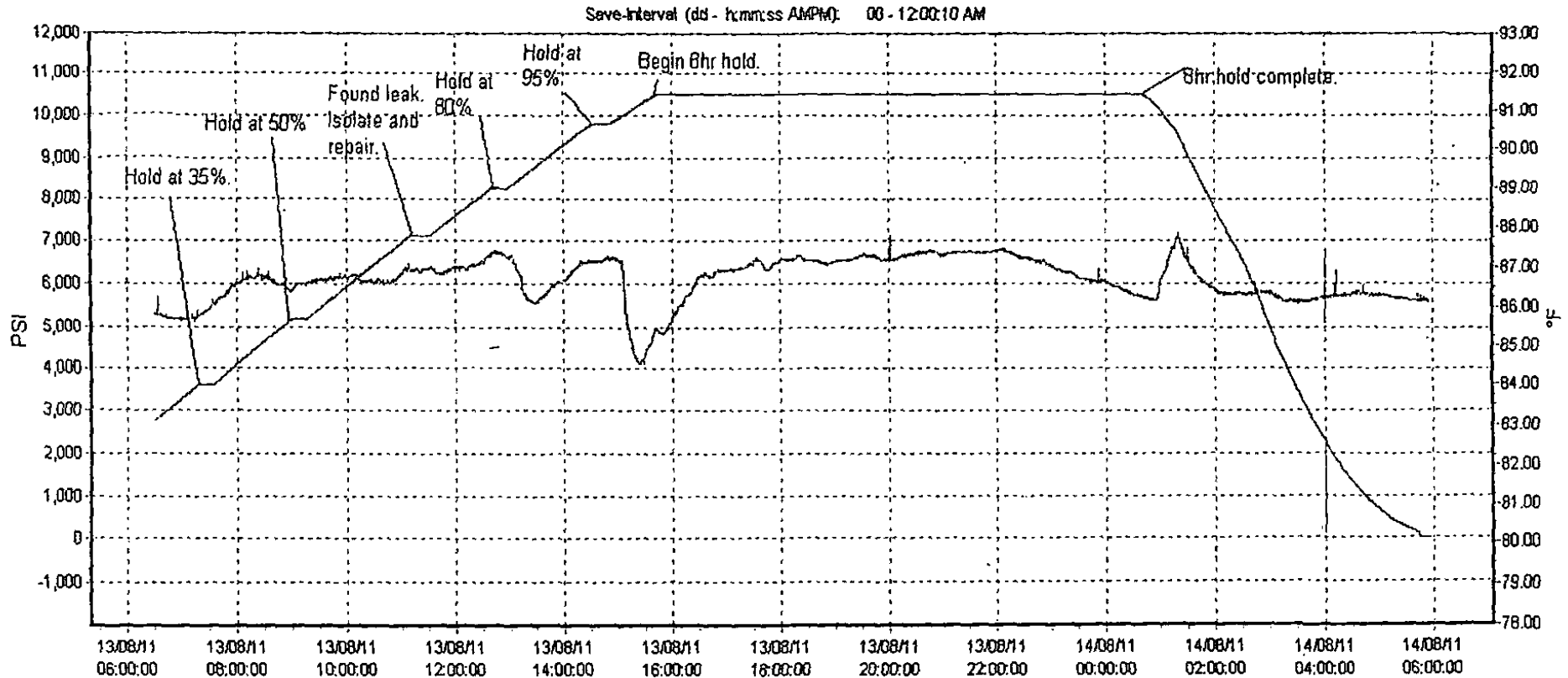
DATE: 13 AUGUST, 2011 TO 14 AUGUST, 2011 LOCATION: CHEVRON VK 900A PLATFORM

START TIME: 16:30 PM/ 13 AUGUST, 2011 INSTRUMENT SSN: 2994

END TIME: 00:30 AM/ 14 AUGUST, 2011 TEST ACCEPTED: YES



HELIX
ENERGY SOLUTIONS



WEATHERFORD REPRESENTATIVE:

Taylor Williams

SIGNATURE/DATE:

[Signature]
8/14/11

COMPANY REPRESENTATIVE:

MIKE PENA

SIGNATURE/DATE:

[Signature] 8/14/11

CLIENT REPRESENTATIVE:

KEN SIMMONS

SIGNATURE/DATE:



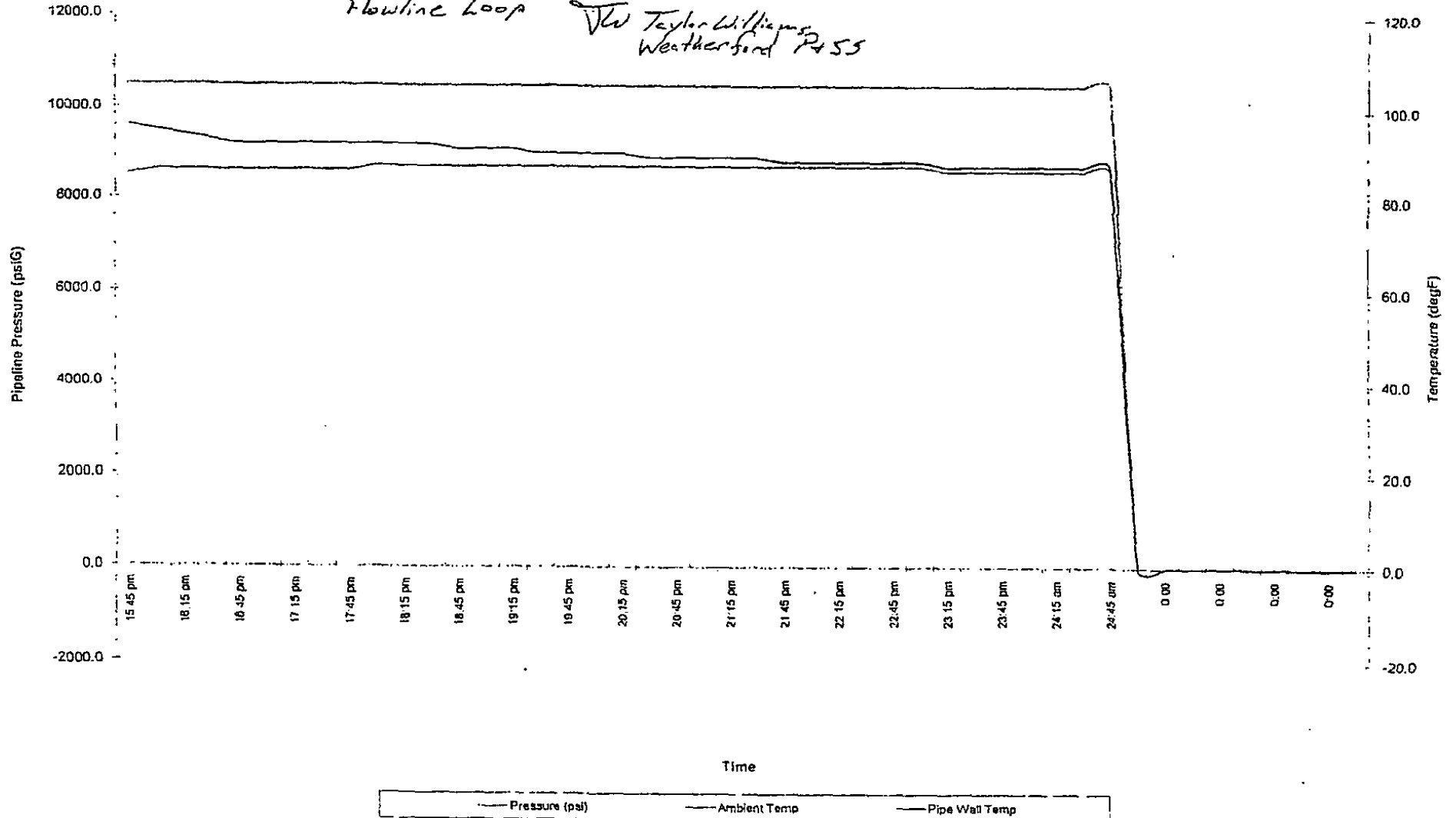
Weatherford

Pipeline & Specialty Services

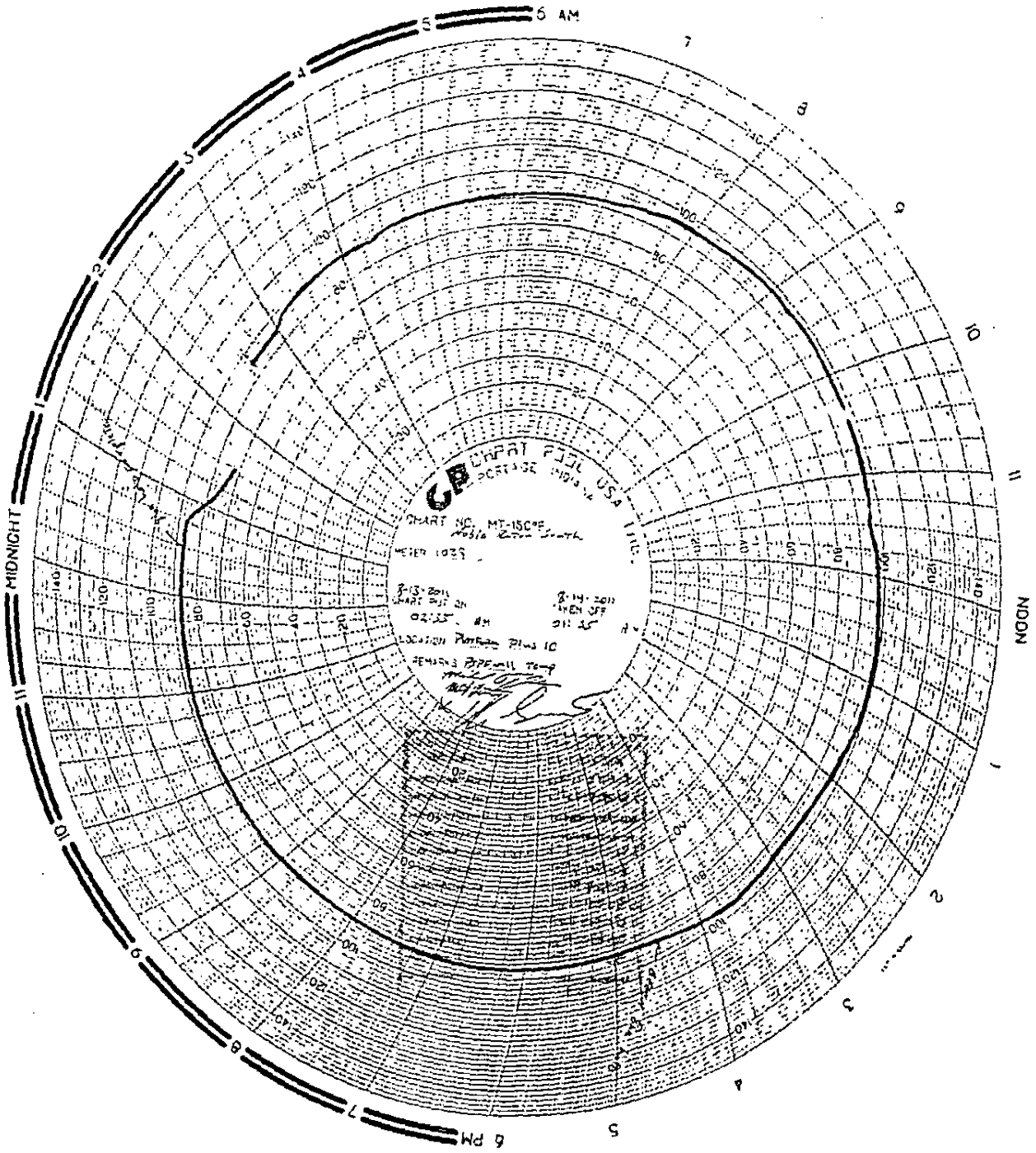
-5" Galboa Pipeline Hydrotest Hold Period Chart

4.5" Raton South
Flowline Loop

JW Taylor Williams
Weatherford P455



	Name	Signature	Date
Weatherford Representative:	<u>Michael Tompkins</u>	<u>[Signature]</u>	<u>14 August 2011</u>
Contractor Representative:	<u>Kevin [unclear]</u>	<u>[Signature]</u>	<u>14-8-11</u>
Compl. representative:	<u>Mike Pava</u>	<u>[Signature]</u>	<u>8-14-11</u>



**Weatherford****PIPELINE & SPECIALTY SERVICES FORM**

FORM NUMBER: 5-4-GL-GL-PSS-00033	REV: 05	PAGE: 1 of 1	ORIGINAL ISSUE DATE: 05/27/2004	REVISION DATE: 11/17/2009
PREPARED BY: BIRGIT THIELE	REVIEWED BY: TRENT STRAHL	DOCUMENT APPROVED BY: PEGGY CUELLAR	ISSUANCE APPROVED BY: Peggy Cuellar	
TITLE:	HYDROSTATIC TESTING ACCEPTANCE CERTIFICATE			

PROJECT:	Helix Noble Raton South	COMPANY:	Noble Energy
CONTRACTOR:	Helix ESG	CONTRACT NO.:	337346
PRESSURE TEST NO.:	1	DATE:	14 August, 2011

This is to certify that the pipeline or pipeline section described below was hydrostatically tested in accordance with the Terms of the Specification.

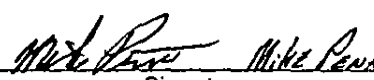
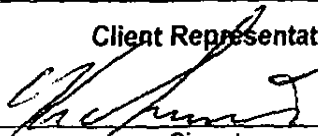

PIPELINE:	Raton South	FROM:	Chevron VK900	TO:	Loop flowline VK 900 to MC292		
LENGTH:	290,000ft	PIPE O.D.:	4.500in	WALL THK:	0.531in	GRADE:	5L
LENGTH:		PIPE O.D.:		WALL THK:		GRADE:	
LENGTH:		PIPE O.D.:		WALL THK:		GRADE:	

Pressure Recorder S/N	242A040401R	Pipewall Recorder S/N	1029
Ambient Recorder S/N	928	Dead Weight Gauge S/N	N/A
Digital Test Gauge S/N	2994	Test Gauge S/N	N/A
Ground Temp. Recorder S/N	N/A		

LOCATION OF TEST EQUIPMENT:	Chevron VK900A platform cellar deck.
Nominal Test Pressure:	10,313 psig
Initial Test Pressure at Testing Location:	10,499 psig
Final Test Pressure at Testing Location:	10,499 psig
Initial Temperature of Test Medium:	93 degrees F
Final Temperature of Test Medium:	87 degrees F
Duration of Test Holding Period:	8 (eight) hours
Description and Cause of Leak (if any):	N/A

Total Water added to reach Final Test Pressure:	5,493 Gallons
Pressure remaining in Pipeline upon Completion of all Test Operations:	0 psig

REMARKS:	
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Company Representative  Signature	Client Representative  Signature	Weatherford P&SS Representative Michael Templeman  Signature
--	---	--



Weatherford

PIPELINE & SPECIALTY SERVICES FORM

FORM NUMBER:
5-4-GL-GL-PSS-00006

REV:
05

PAGE:
5

ORIGINAL ISSUE DATE:
02/24/2004

REVISION DATE:
04/02/2007

TITLE:

DAILY SITE REPORT

Project Name: Helix Noble Raton South


Project No.: PS-14550

Operation:

Flooding/Hydrostatic Testing

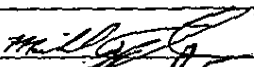

Date & Time	Operational Details & Remarks
08 Aug, 2011	
01:00	Informed of imminent start up of flooding operation
01:20	Speak with the platform and inform them of start up on the West flowline.
01:45	Filling tanks with filtered seawater and OSW490 chemical at 110ppm. Rig up hose to the flowline.
02:00	Conduct JSA with the affected personnel.
02:50	Begin flooding the West flow line with filtered chemically treated seawater.
06:15	Shut down to repair a leak on the hose.
06:16	Continue pumping.
7:40	Note extreme fluxes in flow rate according to flow meter.
7:55	Install diaphragm pump in line with tanks to boost flow.
08:40	Informed that platform is receiving water. Shut down pumps. Final flow meter reading 64,740 total gallons. Mechanical failure on the meter caused last part of flood to register incorrectly. Tanks indicate approximately 69,500 gallons injected into the flowline.
09:10	Restart pumps to ensure line is topped off.
9:11	Shut down pumps and depressurize to tanks.
09:45	Discharge hose is disconnected from the flowline.
09:52	Begin circulating the tanks with XC102 to neutralize any remaining OSW490.
09:56	All stop on number 1 tank.
09:58	Begin circulating on tank number 2.
10:05	All stop on number 2 tank.
10:08	Begin circulating on the number 3 tank.
10:15	All stop on number 3.
10:40	Begin rigging down the equipment spread.
12:40	All Weatherford crew off deck. Helix crew will let us know when the crane is available for use to complete rig down.
continued	

	Name	Signature	Date
Weatherford P&SS Representative	Taylor Williams		9 August 2011
Helix ESG Representative	Nicholas Okubo		9 August 2011

 Weatherford		PIPELINE & SPECIALTY SERVICES FORM			
FORM NUMBER: 5-4-GL-GL-PSS-00006	REV: 05	PAGE: 1 of 1	ORIGINAL ISSUE DATE: 02/24/2004	REVISION DATE: 04/02/2007	
TITLE:	DAILY SITE REPORT				

Project Name:	Helix Noble Raton South		
Project No.:	PS-14550	Operation:	Hydrotesting.

Date & Time	Operational Details & Remarks
13 August, 2011	
00:30 am	The Helix Express calls and informs us that the jumper is installed and that they will be performing the back seal tests very shortly. They should be ready for us to begin in about an hour.
02:30 am	The Helix Express calls and they are ready for us to begin pressuring up the flowline.
03:00 am	Begin pressurizing the flowline.
03:56 am	All stop on the pumping. We have reached 525 psig, thus completing the air inclusion of the flowline.
04:21 am	Resume pumping.
07:17 am	All stop on the pumping. We have reached 3,610 psig, which is our 35% hold point.
07:33 am	Resume pumping.
09:00 am	All stop on the pumping. We have reached 5,171 psig, which is our 50% hold period.
09:17 am	Resume pumping.
11:11 am	All stop. Found a small leak on the test manifold. Isolate to fix and replace the check valve.
11:32 am	Resume pumping.
12:41 pm	All stop on the pumping. We have reached 8,256 psig, which is our 80% hold point.
12:58 pm	Resume pumping.
14:31 pm	All stop on pumping. We are at 9,800 psig, which is our 95% hold period.
14:52 pm	Resume pumping.
15:43 pm	All stop on the pumping. We have reached test pressure, 10,502 psig. Total gallons that were pumped in were 5,493 gallons.
15:47 pm	Bleed down the top side hose from the pump to zero psig.
16:00 pm	Begin the hold for the test. Shortly after the beginning of the test hold period, it was noticed that the pressure recorder circular chart was approximately 250 psig higher than the Keller Gauge. It was determined by Mike Pena to make a notation of the deviation, on the chart after the test is complete.
21:00 pm	Pressure is still holding good.

	Name	Signature	Date
Weatherford P&SS Representative	Michael Templeman		13-Aug-2011
Client Representative	Ken Simmons		13-Aug-2011

For Flooding

O.G.M.E.	Oil & Gas Measurement Equipment	O.G.M.E.
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5227 DOW ROAD - 77040 * P.O. BOX 55641 * HOUSTON, TX 77256 * PH. (713) 263-9740 * FAX (713) 263-0741 * E-MAIL: sales@ogme.net

INSTRUMENT CERTIFICATION

DATE OF CALIBRATION: 07/13/11

CERTIFICATION DUE DATE: 01/13/12

CUSTOMER: WEATHERFORD PIPELINE SERVICES

OGME JOB NUMBER: 10981

TYPE OF INSTRUMENT: LEO KELLER GAUGE

PRESSURE RANGE: 0-300 BAR (CALIBRATED TO 0-4,000 PSI)

ACCURACY ±: 0.1%

SERIAL NUMBER: 3819


THE ABOVE INSTRUMENT HAS BEEN CERTIFIED IN ACCORDANCE WITH OGME QC MANUAL LATEST REVISION. ALL STANDARDS TRACABLE TO U.K.A.S. (UNITED KINGDOM NATIONAL STANDARDS LAB) OR N.I.S.T. (UNITED STATES NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY) IN ACCORDANCE WITH A.N.S.I. Z540.3 (2000)

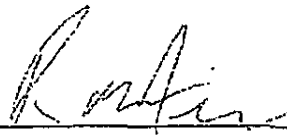
DEAD WEIGHT	INSTRUMENT	% Accuracy
0#	0#	
1000	997	0.075
2000	1993	0.175
3000	2988	0.3
4000	3984	0.4
2500	2495	0.125
1500	1496	0.1
0#	0#	

N.I.S.T AND UKAS TRACABLE STANDARDS

MANUFACTURER	SERIAL NUMBER	RANGE	ACCURACY	RECERTIFICATION
				DUE DATE
*D.H. BUDENBERG (MOD. 283)	25509	1000-30,000 PSI	0.05%	03/08/12
D.H. BUDENBERG (MOD. 558)	26490	10-2000 PSI	0.03%	05/18/12
AMETEK RK (RK1600WC)	85345	4"WC-1600" WC	0.05%	02/22/15
KESSLER 24" SPEC PREC	441806	30/220°F.	.1°F.	02/01/15

* INDICATES MASTER STANDARD USED FOR THIS INSTRUMENT

CALIBRATION TECH: 

QUALITY CONTROL INSPECTOR: 



SPARE NOT USED

O.G.M.E.	Oil & Gas Measurement Equipment	O.G.M.E.
----------	---------------------------------	----------

5227 DOW ROAD - 77040 * P.O. BOX 55641 * HOUSTON, TX 77255 * PH. (713) 263-9740 * FAX (713) 263-9741 * E-MAIL: sales@ogme.net

INSTRUMENT CERTIFICATION

DATE OF CALIBRATION: 07/13/11

CERTIFICATION DUE DATE: 01/13/12

CUSTOMER: WEATHERFORD PIPELINE SERVICES

OGME JOB NUMBER: 10981

TYPE OF INSTRUMENT: LEO KELLER GAUGE

PRESSURE RANGE: 0-300 BAR (CALIBRATED TO 0-4,000 PSI)

ACCURACY ±: 0.1%

SERIAL NUMBER: 5603


THE ABOVE INSTRUMENT HAS BEEN CERTIFIED IN ACCORDANCE WITH OGME QC MANUAL LATEST REVISION. ALL STANDARDS TRACABLE TO U.K.A.S. (UNITED KINGDOM NATIONAL STANDARDS LAB) OR N.I.S.T. (UNITED STATES NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY) IN ACCORDANCE WITH A.N.S.I. Z540.3 (2008)

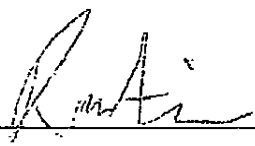
DEAD WEIGHT	INSTRUMENT	Accuracy
0#	0#	
1000	996	0.1
2000	1995	0.125
3000	2993	0.175
4000	3989	0.275
2500	2498	0.05
1500	1498	0.05
0#	0#	

N.I.S.T AND UKAS TRACABLE STANDARDS

MANUFACTURER	SERIAL NUMBER	RANGE	ACCURACY	RECALIBRATION
				DUE DATE
*D.H. BUDENBERG (MOD. 283)	25509	1000-30,000 PSI	0.05%	03/08/12
D.H. BUDENBERG (MOD. 558)	26490	10-2000 PSI	0.03%	05/18/12
AMETEK RK (RK1600WC)	85345	4"WC-1600" WC	0.05%	02/22/15
KESSLER 24" SPEC PREC	441806	30/220°F.	.1°F.	02/01/15

* INDICATES MASTER STANDARD USED FOR THIS INSTRUMENT

CALIBRATION TECH: 

QUALITY CONTROL INSPECTOR: 



For Hydro

O.G.M.E.	Oil & Gas Measurement Equipment	O.G.M.E.
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5277 DOW ROAD - 77040 * P.O. BOX 55641 * HOUSTON, TX 77255 * PH. (713) 263-9740 * FAX (713) 263-9741 * E-MAIL: sales@ogme.net

INSTRUMENT CERTIFICATION

DATE OF CALIBRATION: 07/28/11

CERTIFICATION DUE DATE: 01/28/12

CUSTOMER: WEATHERFORD PIPELINE SERVICES

OGME JOB NUMBER: 11055

TYPE OF INSTRUMENT: LEO KELLER GAUGE

PRESSURE RANGE: 0-1,000 BAR (CALIBRATED 0-14,000 PSI)

ACCURACY ±: 0.1%

SERIAL NUMBER: 2994

THE ABOVE INSTRUMENT HAS BEEN CERTIFIED IN ACCORDANCE WITH OGME QC MANUAL LATEST REVISION. ALL STANDARDS TRACABLE TO U.K.A.S. (UNITED KINGDOM NATIONAL STANDARDS LAB) OR N.I.S.T. (UNITED STATES NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY) IN ACCORDANCE WITH A.N.S.I. Z540.3 (2008)

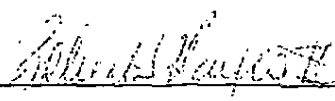
DEAD WEIGHT	INSTRUMENT	% Accuracy
0#	0#	
3000	2996	0.02857143
7000	6988	0.08571429
11000	10978	0.15714286
14000	13964	0.25714286
8000	7983	0.12142857
6000	5989	0.07857143
0#	0#	

N.I.S.T AND UKAS TRACABLE STANDARDS

MANUFACTURER	SERIAL NUMBER	RANGE	ACCURACY	RECERTIFICATION
				DUE DATE
* D.H. BUDENBERG (MOD. 283)	25509	1000-30,000 PSI	0.05%	03/08/12
D.H. BUDENBERG (MOD. 558)	26490	10-2000 PSI	0.03%	05/18/12
AMETEK RK (RK1600WC)	85345	4"WC-1600" WC	0.05%	02/22/15
KESSLER 24" SPEC PREC	441806	30/220°F.	.1°F.	02/01/15

* INDICATES MASTER STANDARD USED FOR THIS INSTRUMENT

CALIBRATION TECH: 

QUALITY CONTROL INSPECTOR: 



For SPARE NOT USED

O.G.M.E. Oil & Gas Measurement Equipment O.G.M.E.

5227 DOW ROAD - 77040 * P.O. BOX 55641 * HOUSTON, TX 77255 * PH. (713) 263-9740 * FAX (713) 263-9741 * E-MAIL:sales@ogme.net

INSTRUMENT CERTIFICATION

DATE OF CALIBRATION: 07/28/11 CERTIFICATION DUE DATE: 01/28/12

CUSTOMER: WEATHERFORD PIPELINE SERVICES

OGME JOB NUMBER: 11055

TYPE OF INSTRUMENT: LEO KELLER GAUGE

PRESSURE RANGE: 0-1,000 BAR (CALIBRATED 0-14,000 PSI)

ACCURACY ±: 0.1%

SERIAL NUMBER: 1184

THE ABOVE INSTRUMENT HAS BEEN CERTIFIED IN ACCORDANCE WITH OGME QC MANUAL LATEST REVISION. ALL STANDARDS TRACABLE TO U.K.A.S. (UNITED KINGDOM NATIONAL STANDARDS LAB) OR N.I.S.T. (UNITED STATES NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY) IN ACCORDANCE WITH A.N.S.I. 2540.3 (2008)

Table with 3 columns: DEAD WEIGHT, INSTRUMENT, Accuracy. Rows include 0#, 3000, 7000, 11000, 14000, 8000, 6000, 0#.

N.I.S.T AND UKAS TRACABLE STANDARDS

Table with 5 columns: MANUFACTURER, SERIAL NUMBER, RANGE, ACCURACY, RECERTIFICATION DUE DATE. Rows include D.H. BUDENBERG, AMETEK RK, KESSLER.

* INDICATES MASTER STANDARD USED FOR THIS INSTRUMENT

CALIBRATION TECH: [Signature]

QUALITY CONTROL INSPECTOR: [Signature]



O.G.M.E.

Oil & Gas Measurement Equipment

O.G.M.E.

5227 DOW ROAD - 77040 * P.O. BOX 55641 * HOUSTON, TX 77255 * PH. (713) 263-9740 * FAX (713) 263-9741 * E-MAIL:sales@ogme.net

INSTRUMENT CERTIFICATION

DATE OF CALIBRATION: 07/20/11

CERTIFICATION DUE DATE: 01/20/12

CUSTOMER: WEATHERFORD PIPELINE SERVICES

OGME JOB NUMBER: 10999

TYPE OF INSTRUMENT: SINGLE PEN CHART RECORDER

PRESSURE RANGE: 0-15,000 PSI

ACCURACY ±: 0.1%

SERIAL NUMBER: 242A-040401R

THE ABOVE INSTRUMENT HAS BEEN CERTIFIED IN ACCORDANCE WITH OGME QC MANUAL LATEST REVISION.
ALL STANDARDS TRACABLE TO U.K.A.S. (UNITED KINGDOM NATIONAL STANDARDS LAB) OR N.I.S.T.
(UNITED STATES NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY) IN ACCORDANCE WITH A.N.S.I. Z540.3 (2008)

DEAD WEIGHT	INSTRUMENT	% Accuracy
0#	0#	
3000	3000	0
7500	7500	0
12000	12000	0
15000	15000	0
9000	9150	-1
6000	6150	-1
0#	0#	

N.I.S.T AND UKAS TRACABLE STANDARDS

MANUFACTURER	SERIAL NUMBER	RANGE	ACCURACY	RECERTIFICATION
				DUE DATE
*D.H. BUDENBERG (MOD. 283)	25509	1000-30,000 PSI	0.05%	03/08/12
D.H. BUDENBERG (MOD. 558)	26490	10-2000 PSI	0.03%	05/18/12
AMETEK RK (RK1600WC)	85345	4"WC-1600" WC	0.05%	02/22/15
KESSLER 24" SPEC PREC	441806	30/220°F.	.1°F.	02/01/15

* INDICATES MASTER STANDARD USED FOR THIS INSTRUMENT

CALIBRATION TECH: *[Signature]*

QUALITY CONTROL INSPECTOR: *[Signature]*



O.G.M.E.

Oil & Gas Measurement Equipment

O.G.M.E.

5227 DOW ROAD - 77040 • P.O. BOX 55641 • HOUSTON, TX 77255 • PH. (713) 263-9740 • FAX (713) 263-9741 • E-MAIL: sales@ogme.net

INSTRUMENT CERTIFICATION

DATE OF CALIBRATION: 07/20/11

CERTIFICATION DUE DATE: 01/20/12

CUSTOMER: WEATHERFORD PIPELINE SERVICES

OGME JOB NUMBER: 10999

TYPE OF INSTRUMENT: SINGLE PEN CHART RECORDER

PRESSURE RANGE: 0-15,000 PSI

ACCURACY ±: 0.1%

SERIAL NUMBER: 11827

THE ABOVE INSTRUMENT HAS BEEN CERTIFIED IN ACCORDANCE WITH OGME QC MANUAL LATEST REVISION. ALL STANDARDS TRACABLE TO U.K.A.S. (UNITED KINGDOM NATIONAL STANDARDS LAB) OR N.I.S.T. (UNITED STATES NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY) IN ACCORDANCE WITH A.N.S.I. Z540.3 (2008)

DEAD WEIGHT	INSTRUMENT	% Accuracy
0#	0#	
3000	3000	0
7500	7500	0
12000	12000	0
15000	15000	0
9000	9150	-1
6000	6150	-1
0#	0#	

N.I.S.T AND UKAS TRACABLE STANDARDS

MANUFACTURER	SERIAL NUMBER	RANGE	ACCURACY	RECERTIFICATION
				DUE DATE
*D.H. BUDENBERG (MOD. 283)	25509	1000-30,000 PSI	0.05%	03/08/12
D.H. BUDENBERG (MOD. 558)	26490	10-2000 PSI	0.03%	05/18/12
AMETER RK (RKL600WC)	85345	4"WC-1600" WC	0.05%	02/22/15
KRSSLER 24" SPEC PREC	441806	30/220°F.	.1°F.	02/01/15

* INDICATES MASTER STANDARD USED FOR THIS INSTRUMENT

CALIBRATION TECH:

QUALITY CONTROL INSPECTOR:



O.G.M.E.

Oil & Gas Measurement Equipment

O.G.M.E.

5227 DOW ROAD - 77040 * P.O. BOX 55841 * HOUSTON, TX 77255 * PH. (713) 263-9740 * FAX (713) 263-9741 * E-MAIL: sales@ogme.net

INSTRUMENT CERTIFICATION

DATE OF CALIBRATION: 07/20/11

CERTIFICATION DUE DATE: 01/20/12

CUSTOMER: WEATHERFORD PIPELINE SERVICES

OGME JOB NUMBER: 10999

TYPE OF INSTRUMENT: TEMPERATURE RECORDER

TEMPERATURE RANGE: 0-150° F.

SERIAL NUMBER: 1029

THE ABOVE INSTRUMENT HAS BEEN CERTIFIED IN ACCORDANCE WITH OGME QC MANUAL LATEST REVISION.
 ALL STANDARDS TRACABLE TO U.K.A.S. (UNITED KINGDOM NATIONAL STANDARDS LAB) OR N.I.S.T.
 (UNITED STATES NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY) IN ACCORDANCE WITH A.N.S.I. 2540.3 (2008)

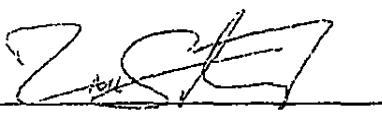
TEMP. CALIBRATED TO MASTER KESSLER THERMOMETER SN# 441806 TRACEABLE TO NATIONAL INSTITUTE OF STANDARDS & TECHNOLOGY
 TEMPERATURE: 32.00°F. REFERENCE: ICE BATH TRANSFER STANDARDS: N/A, ICE POINT PER NIST SPEC PUB 819;
 TEMPERATURE: 120.00°F. REFERENCE: NIST THERMOMETER STANDARDS: 229150 & 9C8073 TEMPERATURE: 212.00°F. REFERENCE:
 NIST THERMOMETER 40350, TRANSFER STANDARDS: 3B2847 & 2Y6628

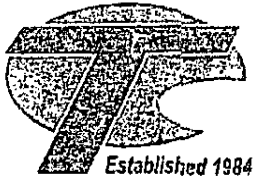
STANDARD	TEMP READING
33°F.	33°F.
75°F.	75°F.
150°F.	150°F.
75°F.	75°F.
33°F.	33°F.

N.I.S.T AND UKAS TRACABLE STANDARDS

MANUFACTURER	SERIAL NUMBER	RANGE	ACCURACY	RECERTIFICATION
				DUE DATE
D. H. BUDENBERG (MOD. 283)	25509	1000-30,000 PSI	0.05%	03/08/12
D. H. BUDENBERG (MOD. 558)	26490	10-2000 PSI	0.03%	05/18/12
AMETEK RK (RK1600WC)	85345	4"WC-1600" WC	0.05%	02/22/15
*KESSLER 24" SPEC PREC	441806	30/220°F.	.1°F.	02/01/15

* INDICATES MASTER STANDARD USED FOR THIS INSTRUMENT

CALIBRATION TECH: QUALITY CONTROL INSPECTOR: 



Technology & Calibration, Inc.
 "When Quality Counts"

Temperature Recorder Calibration Report CR-8.19 Rev.B

Report Number: 66754

CERTIFICATE OF CALIBRATION

Tech Cal Temp Recorder , S/N#: 00928

150.00 °F Capacity

Issued To:

**Weatherford
Houston, Texas**

This instrument has been tested and calibrated in accordance with Technology & Calibration's procedure, WI-8.19, Latest Revision with temperature measuring instruments certified to N.I.S.T. traceable standards. This calibration is in conformance with Technology & Calibration's Quality Assurance Program, ANSI/NCSL Z540.1 and ISO 10012-1. Environmental conditions during calibration are 72 degrees F +/- 4 degrees F and less than 65% relative humidity. The collective uncertainty of the measurement standard does not exceed 25% of the acceptable tolerance for each characteristic of the measuring and test equipment being certified.

PO Number: _____ **Work Location:** Tech Cal, Houston
Temp. Range: 150.00 **Units:** °F **Rated Accuracy :** 0.50 % of Span

As Found				As Left			
Applied Temp.	Actual Reading	% of Span Error		Applied Temp	Actual Reading	% of Span Error	
0.00	0.00	0.00 %	Downscale	0.00	0.00	0.00 %	Downscale
30.00	30.00	0.00 %	Rdg @ 40%	30.00	29.00	-20.00 %	Rdg @ 40%
60.00	60.25	0.17 %	60.25	60.00	59.00	-40.00 %	60.00
90.00	90.00	0.00 %		90.00	84.00	-60.00 %	
120.00	120.00	0.00 %		120.00	112.00	-80.00 %	
150.00	150.00	0.00 %		150.00	130.00	-100.00 %	

As Found / As Left

Calibration Date January 17, 2011 **Recall Date** July 17, 2011

NIST Tracable Standard(s)				
Manufacture	Serial Number	Range	Accuracy	Recall Date
Instrulab	3506 / 61578	-32 - 725 Deg. F	+/- .1% OR	10/13/2011

Comments: None.

Calibrated By:
C. Swailes

(Signature)
 Approved By

 N. Green, QA Mgr.

**This certificate shall not be reproduced except in full, without the written approval of Tech Cal.*

Head # 293878

SOUTHERN FLOW COMPANIES

METER PROVING REPORT

107 ROW 3, CANEBRAKE-LAFAYETTE, LA-70508		PHONE: (337) 234-7017 FAX (337)-232-0136	
PROVE-DATE	15-Jul-2011	PROVE FOR	WEATHERFORD PIPELINE
MET SER. NO.	75SAE29203	FIELD LOC	BROUSSARD
SF-CUST NO	645901	STA/MET ID	N/A
MET MAKE	NUFLO .75 SAE	OTHER ID	ATTN: BROUSSARD
* MIN. RATE	1.97 GPM	* PRV TYPE	LOOP-PIPE 4 IN - 1 BBL CERT #748
* MAX RATE	15.09 GPM	* GR-OBS @ Deg-F	43.1@71
* REG UNITS	PULSES	* MET ATG --- :	NO
		* GRAV - API @ 60-F	42.1
		* PRV RATES:	1

5 RUN AVG/RATE-LOOP	10 GPM
*PROVER DATA	RATE #1
GROSS TOTAL PROVER VOLUME	0.905333
TEMP-DEG F	79.92
PRESSURE-PSIG	39.0
CTLP FACTOR	0.99005
CTSP FACTOR	1.00037
CPSF FACTOR	1.00002
CPLP FACTOR	1.00023
COMB FACTOR	0.99066
NET TOTAL GSPV	0.896877
*METER DATA	RATE #1
TOTAL PULSES	94638
K-FACTOR	104549
TEMP-DEG F	78.76
PRESSURE-PSIG	26.0
GROSS TOTAL IVMM	0.905199
CPLM FACTOR	1.00016
CTLM FACTOR	0.99063
COMB FACTOR	0.99079
NET TOTAL ISVMM	0.896862
MECH MET FACTOR	1.0000
CORRECTED PULSES	93766
K-FACTOR-CORR	104549

15-Jul-2011	PROVE-MET/FCT/bbl	Met-Fct-var R/R	PROVE-K-FCT/BBL	Coir-K-FCT/bbl	Corr-MET/FCT/bbl
10 GPM	1.0000	0.0000	104549.000	104549	1.0000
	Prev MET-FCT	MET-FCT CHANGE	Prev K-FCT/BBL	K-FCT CHANGE	%-F-FCT CHG
10 GPM	0.0000		0.000		0.00%

NEW KIT INSTALLED -PROVE TO ESTABLISH NEW FACTOR

PAUL ARDENEUX
 TESTER: SOUTHERN FLOW COMPANIES
Paul Ardeneux

WITNESS: _____



LOOP PROVING RUN DATA INPUT

15-Jul-2011

75SAE29203

WEATHERFORD PIPELINE N/A

BROUSSARD

COPIES ROW-9 to ROWS 10..13 >

T-5 P-5 T P

INP>

RATE		DATA RATE #1				
10 GPM		METER DATA		PROVER		
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES	
1	94624		78.30	26.00	79.70	39.00
2	94625	0.0000	78.60	26.00	79.80	39.00
3	94634	0.0001	78.80	26.00	79.90	39.00
4	94645	0.0001	78.90	26.00	80.00	39.00
5	94660	0.0002	79.20	26.00	80.20	39.00
AVG-PULSES		TEMP	PRES	TEMP	PRES	
94638		78.76	26.0	79.92	39.0	
RUNS		TEMP	PRES	TEMP	PRES	
5		5	5	5	5	

COPIES ROW-9 to ROWS 10..13 >

T-5 P-5 T P

RATE		DATA RATE #2			
		METER DATA		PROVER	
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES		TEMP	PRES	TEMP	PRES
RUNS		TEMP	PRES	TEMP	PRES

COPIES ROW-22 to ROWS 23..26 >

T-5 P-5 T P

1

RATE		DATA RATE #3			
0		METER DATA		PROVER	
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES
1					
2					
3					
4					
5					
AVG-PULSES		TEMP	PRES	TEMP	PRES
RUNS		TEMP	PRES	TEMP	PRES

COPIES ROW-22 to ROWS 23..26 >

T-5 P-5 T P

RATE		DATA RATE #4			
		METER DATA		PROVER	
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES		TEMP	PRES	TEMP	PRES
RUNS		TEMP	PRES	TEMP	PRES

Head # 306563

SOUTHERN FLOW COMPANIES

METER PROVING REPORT

107 ROW 3, CANEBRAKE-LAFAYETTE, LA-70508		PHONE- (337) - 234-7017 FAX (337)-232-0136	
PROVE-DATE	15-Jul-2011	PROVE FOR	WEATHERFORD PIPELINE
MET SER. NO.:	5SAE18540	FIELD LOC	BROUSSARD
SF-CUST. NO.	645901	STA/MET ID	N/A
MET MAKE	NUFLO .5 SAE	OTHER ID	ATTN: BROUSSARD

* MIN. RATE	.73 GPM	* PRV TYPE	LOOP-PIPE 4 IN - 1 BBL CERT #748
* MAX RATE	7.52 GPM	* GR-OBS @ Deg-F	43.1@71
* REG UNITS	PULSES	* MET ATG --	NO
		* GRAV - API @ 60-F	42.1
		* PRV RATES:	1

5 RUN AVG RATE-LOOP	4 GPM
*PROVER DATA	RATE #1
GROSS TOTAL PROVER VOLUME	0.905333
TEMP-DEG F	81.40
PRESSURE-PSIG	39.0
CTLP FACTOR	0.98931
CTSP FACTOR	1.00040
CPSP FACTOR	1.00002
CPLP FACTOR	1.00024
COMB FACTOR	0.98996
NET TOTAL GSVF	0.896243
*METER DATA	RATE #1
TOTAL PULSES	561851
K-FACTOR	620912
TEMP-DEG F	79.52
PRESSURE-PSIG	29.0
GROSS TOTAL IVMM	0.904880
CPLM FACTOR	1.00017
CTLM FACTOR	0.99025
COMB FACTOR	0.99042
NET TOTAL ISVMM	0.896211
MECH MET FACTOR	1.0000
CORRECTED PULSES	556468
K-FACTOR-CORR	620912

15-Jul-2011	PROVE-MET/FCT/bbl	Met-Fct-var.R/R	PROVE-K-FCT/BBL	Corr-K-FCT/bbl	Corr-MET/FCT/bbl
4 GPM	1.0178	-0.0356	631964.000	620912	1.0000
	Prev MET-FCT	MET-FCT CHANGE	Prev K-FCT/BBL	K-FCT CHANGE	%-F-FCT CHG
4 GPM	0.0000		0.000		0.00%

NEW KIT INSTALLED -PROVE TO ESTABLISH NEW FACTOR

PAUL ARDENEUX
 TESTER: SOUTHERN FLOW COMPANIES
Paul Ardeneux

WITNESS: _____

LOOP PROVING RUN DATA INPUT

15-Jul-2011

5SAE18540

WEATHERFORD PIPELINE N/A

BROUSSARD

COPIES ROW-9 to ROWS 10..13 > T-5 P-5 T P

COPIES ROW-9 to ROWS 10..13 > T5 P5 T P

RATE		DATA RATE #1			
4 GPM		METER DATA		PROVER	
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES
1	562033	78.50	29.00	80.70	39.00
2	561870	-0.0003	79.30	29.00	81.10
3	561700	-0.0003	79.60	29.00	81.40
4	561885	0.0003	80.00	29.00	81.80
5	561765	-0.0002	80.20	29.00	82.00
AVG-PULSES		TEMP	PRES	TEMP	PRES
561851		79.52	29.0	81.40	39.0
RUNS		5	5	5	5

RATE		DATA RATE #2			
		METER DATA		PROVER	
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES		TEMP	PRES	TEMP	PRES
RUNS					

COPIES ROW-22 to ROWS 23..26 > T-5 P-5 T P

COPIES ROW-22 to ROWS 23..26 > T5 P5 T P

RATE		DATA RATE #3			
0		METER DATA		PROVER	
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES
1					
2					
3					
4					
5					
AVG-PULSES		TEMP	PRES	TEMP	PRES
RUNS					

RATE		DATA RATE #4			
		METER DATA		PROVER	
PULSES	RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES		TEMP	PRES	TEMP	PRES
RUNS					

SOUTHERN FLOW COMPANIES

METER PROVING REPORT

107 ROW 3, CANEBRAKE-LAFAYETTE, LA-70508

PHONE- (337) - 234-7017 FAX (337)-232-0136

PROVE-DATE	29-Jul-2011	PROVE FOR	WEATHERFORD PIPELINE
MET SER. NO.	2-ST-53613	FIELD LOC	BROUSSARD
SF-CUST NO.	645901	STA/MET ID	N/A
MET MAKE	NUFLO 2" ST	OTHER ID	ATTN: BROUSSARD

* MIN. RATE	40 GPM	* PRV TYPE	LOOP-PIPE 4 IN - 1 BBL CERT #748
* MAX RATE	400 GPM	* GR-OBS @ Deg-F	43.1@71
* REG UNITS	PULSES	* MET ATG ---	NO
		* GRAV - API @ 60-F	42.1
		* PRV RATES:	1

5 RUN AVGRATE-LOOP	200 GPM
*PROVER DATA	RATE #1
GROSS TOTAL PROVER VOLUME	0.905333
TEMP-DEG F	71.40
PRESSURE-PSIG	33.0
CTLP FACTOR	0.99431
CTSP FACTOR	1.00021
CPSP FACTOR	1.00002
CPLP FACTOR	1.00019
COMB FACTOR	0.99473
NET TOTAL GSVF	0.900562
*METER DATA	RATE #1
TOTAL PULSES	2139
K-FACTOR	2363
TEMP-DEG F	70.96
PRESSURE-PSIG	23.0
GROSS TOTAL IVMM	0.905375
CPLM FACTOR	1.00013
CTLM FACTOR	0.99453
COMB FACTOR	0.99466
NET TOTAL ISVMM	0.900540
MECH MET FACTOR	1.0000
CORRECTED PULSES	2128
K-FACTOR-CORR	2363

29-Jul-2011	PROVE-MET/FCT/bbl	Met-Fct-var R/R	PROVE-K-FCT/BBL	Corr-K-FCT/bbl	Corr-MET/FCT/bbl
200 GPM	1.0000	0.0000	2363.000	2363	1.0000
13-Apr-2010	Prev MET-FCT	MET-FCT CHANGE	Prev K-FCT/BBL	K-FCT CHANGE	%-F-FCT CHG
200 GPM	1.0001	-0.0001	2330.000	33	1.40%

METER INSPECTED & CLEANED - NEW FACTOR ESTABLISHED

PAUL ARDENEUX

TESTER: SOUTHERN FLOW COMPANIES

WITNESS: _____

LOOP PROVING RUN DATA INPUT

29-Jul-2011

2-ST-53613 WEATHERFORD PIPELINE N/A

BROUSSARD

COPIES ROW-9 to ROWS 10..13 >		T-5	P-5	T	P	
RATE		DATA RATE #1				
200 GPM		METER DATA		PROVER		
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
1	2139		70.90	23.00	71.40	33.00
2	2140	0.0005	70.90	23.00	71.40	33.00
3	2139	-0.0005	71.00	23.00	71.40	33.00
4	2140	0.0005	71.00	23.00	71.40	33.00
5	2139	-0.0005	71.00	23.00	71.40	33.00
AVG-PULSES			TEMP	PRES	TEMP	PRES
AVG>	2139		70.96	23.0	71.40	33.0
RUNS	5		5	5	5	5

COPIES ROW-9 to ROWS 10..13 >		T-5	P-5	T	P	
RATE		DATA RATE #2				
		METER DATA		PROVER		
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES			TEMP	PRES	TEMP	PRES

COPIES ROW-22 to ROWS 23..26 >		T-5	P-5	T	P	
RATE		DATA RATE #3				
		METER DATA		PROVER		
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
1						
2						
3						
4						
5						
AVG-PULSES			TEMP	PRES	TEMP	PRES
AVG>						
RUNS						

COPIES ROW-22 to ROWS 23..26 >		T-5	P-5	T	P	
RATE		DATA RATE #4				
		METER DATA		PROVER		
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES			TEMP	PRES	TEMP	PRES

SOUTHERN FLOW COMPANIES

METER PROVING REPORT

107 ROW 3, CANEBRAKE-LAFAYETTE, LA-70508		PHONE- (337) - 234-7017 FAX (337)-232-0136	
PROVE-DATE	29-Jul-2011	PROVE FOR	WEATHERFORD PIPELINE
MET SER. NO.	2-ST-41035	FIELD LOC	BROUSSARD
SF-CUST NO	645901	STA/MET ID	N/A
MET MAKE	NUFLO 2" ST	OTHER ID	ATTN: BROUSSARD
* MIN. RATE	40 GPM	* PRV TYPE	LOOP-PIPE 4 IN - 1 BBL CERT #748
* MAX RATE	400 GPM	* GR-OBS @ Deg-F	43.1@71.
* REG UNITS	PULSES	* MET ATG -- :	NO
		* PRV RATES:	1

5 RUN AVG RATE-LOOP	200 GPM
* PROVER DATA	RATE #1
GROSS TOTAL PROVER VOLUME	0.905333
TEMP-DEG F	71.60
PRESSURE-PSIG	33.0
CTLP FACTOR	0.99421
CTSP FACTOR	1.00022
CPSP FACTOR	1.00002
CPLP FACTOR	1.00019
COMB FACTOR	0.99464
NET TOTAL GSVP	0.900480
* METER DATA	RATE #1
TOTAL PULSES	2149
K-FACTOR	2373
TEMP-DEG F	71.32
PRESSURE-PSIG	23.0
GROSS TOTAL IVMM	0.905436
CPLM FACTOR	1.00013
CTLM FACTOR	0.99435
COMB FACTOR	0.99448
NET TOTAL ISVMM	0.900438
MECH MET FACTOR	1.0000
CORRECTED PULSES	2137
K-FACTOR-CORR	2373

29-Jul-2011	PROVE-MET/FCT/bbl	Met-Fct-var R/R	PROVE-K-FCT/BBL	Corr-K-FCT/bbl	Corr-MET/FCT/bbl
200 GPM	1.0000	0.0000	2373.000	2373	1.0000
13-Apr-2010	Prev MET-FCT	MET-FCT CHANGE	Prev K-FCT/BBL	K-FCT CHANGE	%-F-FCT CHG.
200 GPM	0.9999	0.0001	2339.000	34	1.43%

METER INSPECTED & CLEANED - NEW FACTOR ESTABLISHED

PAUL ARDENEUX

TESTER: SOUTHERN FLOW COMPANIES

WITNESS: _____

LOOP PROVING RUN DATA INPUT

29-Jul-2011

2-ST-41035

WEATHERFORD PIPELINE N/A

BROUSSARD

COPIES ROW-9 to ROWS 10..13 > T-5 P-5 T P

COPIES ROW-9 to ROWS 10..13 > T5 P5 T P

RATE		DATA RATE #1				
200 GPM		METER DATA			PROVER	
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
1	2149		71.30	23.00	71.60	33.00
2	2148	-0.0005	71.30	23.00	71.60	33.00
3	2148	0.0000	71.30	23.00	71.60	33.00
4	2149	-0.0005	71.30	23.00	71.60	33.00
5	2149	0.0000	71.40	23.00	71.60	33.00
AVG-PULSES		TEMP	PRES	TEMP	PRES	
AVG>	2149		71.32	23.0	71.60	33.0
RUNS	5		5	5	5	5

RATE		DATA RATE #2				
		METER DATA			PROVER	
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES		TEMP	PRES	TEMP	PRES	

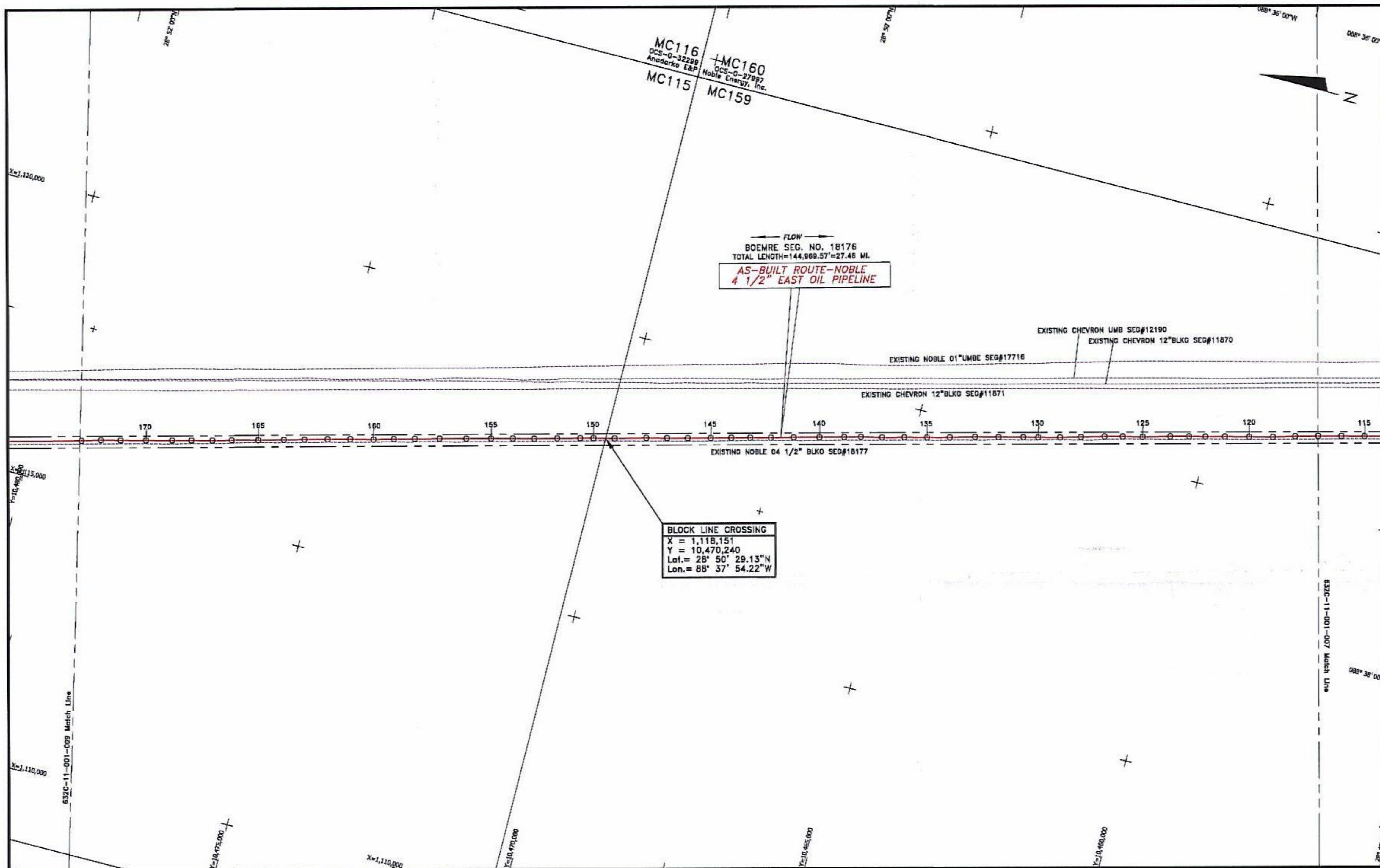
COPIES ROW-22 to ROWS 23..26 > T-5 P-5 T P

COPIES ROW-22 to ROWS 23..26 > T5 P5 T P

RATE		DATA RATE #3				
		METER DATA			PROVER	
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
1						
2						
3						
4						
5						
AVG-PULSES		TEMP	PRES	TEMP	PRES	
AVG>						
RUNS						

RATE		DATA RATE #4				
		METER DATA			PROVER	
PULSES		RUN/RUN	TEMP	PRES	TEMP	PRES
AVG-PULSES		TEMP	PRES	TEMP	PRES	

PLAN VIEW



BOEMRE SEG. NO. 18176
TOTAL LENGTH=144,969.57'=27.46 MI.
AS-BUILT ROUTE-NOBLE
4 1/2" EAST OIL PIPELINE

BLOCK LINE CROSSING
X = 1,118,151
Y = 10,470,240
Lat. = 28° 50' 29.13"N
Lon. = 88° 37' 54.22"W

NOTES

- 1) PIPELINE COORDINATES ARE THE POSITIONS OF THE R.O.V. (REMOTELY OPERATED VEHICLE) LOCATED AT THE POINTS USING BOTH VERIPOS LD2 ULTRA DGPS RECEIVING SPOTBEAM CORRECTIONS, VERIPOS ULTRA DGPS RECEIVING INMARSAT CORRECTIONS, SONARDYNE FUSION LBL (LONG BASELINE) ACOUSTIC POSITIONING, KONGSBERG HIPAP USBL(ULTRA SHORT BASELINE) ACOUSTIC POSITIONING AND RDI WORKHORSE DVL POSITIONING.
- 2) SURVEYED COORDINATES TRANSFORMED FROM NAD83 (GPS DATUM) NADCON VERSION 2.1.
- 3) THIS DRAWING IS NOT FOR NAVIGATION. PIPELINES AND FEATURES IN THE IMMEDIATE VICINITY ARE OBTAINED FROM BOEMRE (BUREAU OF OCEAN ENERGY MANAGEMENT, REGULATION AND ENFORCEMENT) DATABASE AND CLIENT PROVIDED DATA.
- 4) AS-BUILT SURVEY DATE: JULY 28TH, JULY 31ST AND AUGUST 9TH, 2011.
- 5) CLIENT DRAWING REFERENCE: 16172-BASEMAP.DWG AND 24105013ENG.DWG.

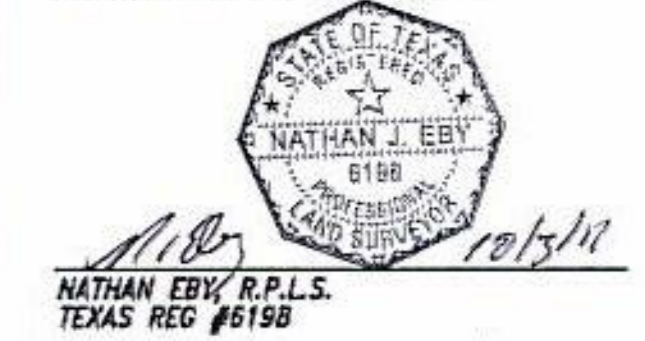
LEGEND

- AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176
- AS-FOUND PIPELINE OR UMBILICAL
- RIGHT-OF-WAY (PROVIDED BY CLIENT)
- BOEMRE EXISTING PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- AS-INSTALLED HFL
- AS-INSTALLED EFL
- BOEMRE PROPOSED PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- BOEMRE LEASE BLOCK BOUNDARIES
- MATCHLINE WITH ADJOINING CHART
- PROPOSED STRUCTURES
- EXISTING STRUCTURES
- GEOGRAPHICAL TICKS
- UTM TICKS
- BOEMRE WELLS

GEODESY

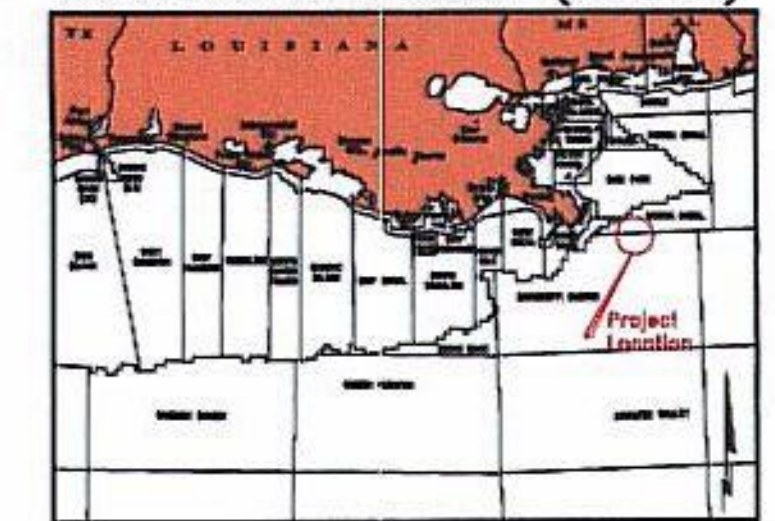
Survey Datum: NAD 27
Ellipsoid: Clarke 1866
Projection: Universal Transverse Mercator ZONE 16N
Longitude of Central Meridian: 87°W
False Easting (m): 500 000
False Northing (m): 0
Scale Factor at Central Meridian: 0.99960
Units: US Survey Feet

CERTIFIED CORRECT AS TO THE HORIZONTAL POSITION OF THE AS-BUILT PIPELINE BASED ON THE SURVEY METHODS NOTED.



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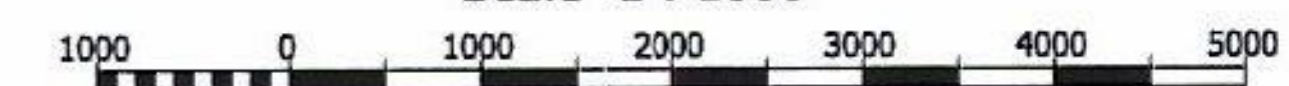
LOCATION PLAN (N.T.S)



7240 BRITTMOORE RD. SUITE 110
HOUSTON, TEXAS 77041
Tel 713-984-8688
Fax 713-984-8683
Website www.utecsurvey.com

RATON SOUTH FIELD DEVELOPMENT PROJECT
AS-BUILT 04 1/2" BLKO EAST PIPELINE
FROM MISSISSIPPI CANYON AREA BLOCK 292
TO VIOSCA KNOLL AREA BLOCK 900
SEGMENT #18176 GULF OF MEXICO

Scale 1 : 1000



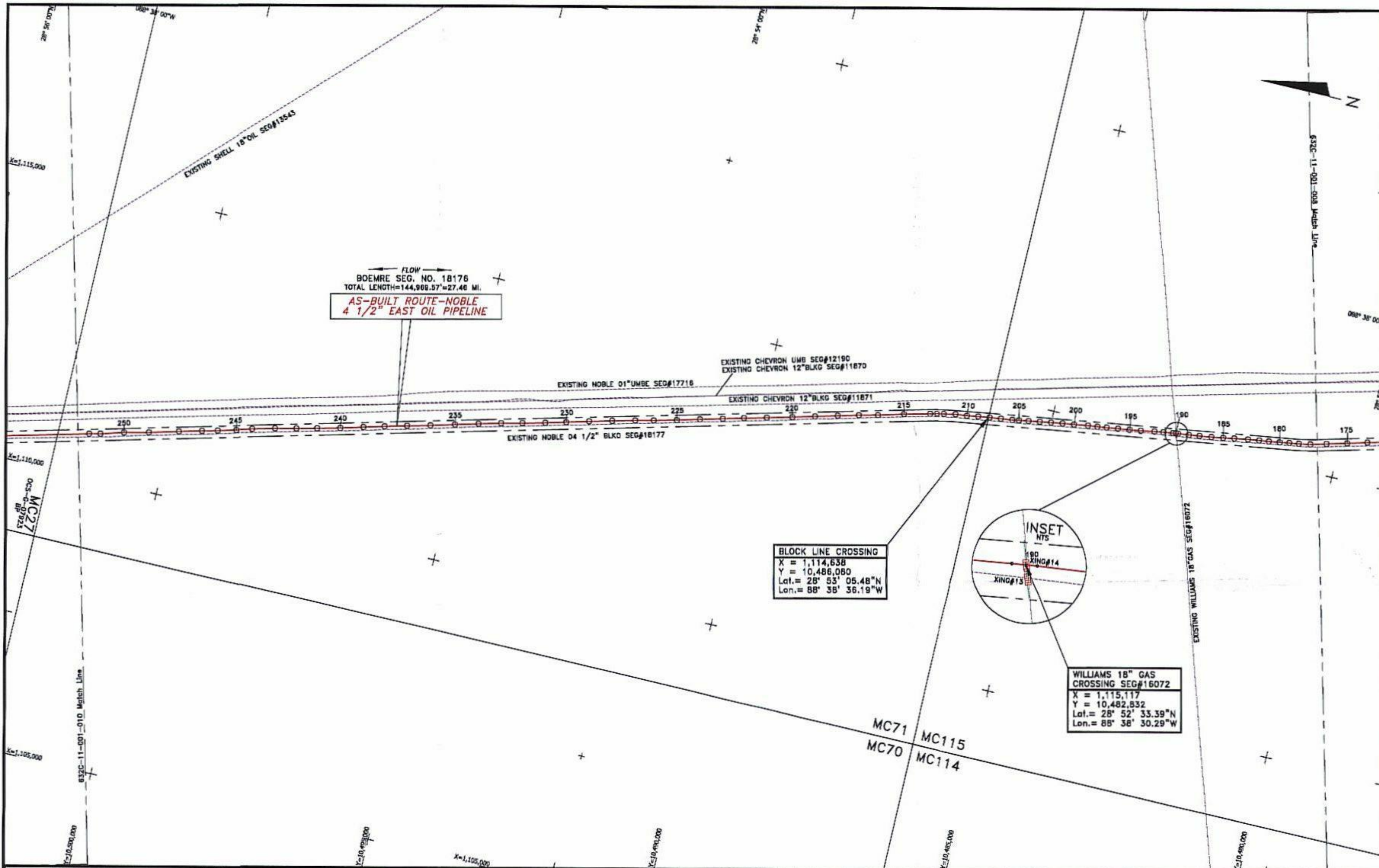
Rev. No.	Date	Comment	Drawn	Checked	Appr.
0	09/29/11	ISSUED AS FINAL	VR	SW	RG
A2	09/20/11	ISSUED FOR CLIENT COMMENTS	VR	SW	RG
A1	08/24/11	ISSUED FOR CLIENT COMMENTS	VR	SW	SF

Survey Dates: JULY 28th, 31st & AUG 9th, 2011		Survey Vessel: HELIX EXPRESS	
UTEC Ref. No. 632C-11-001	UTEC Drawing No. 632C-11-001-008	Sheet	Of
Plot Size ANSI D		003	007

AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176

POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION
114	1,121,610	10,456,968	FIELD JOINT	139	1,119,214	10,466,191	FIELD JOINT	164	1,116,724	10,475,702	ROV FIX
115	1,121,512	10,457,355	FIELD JOINT	140	1,119,102	10,466,610	FIELD JOINT	165	1,116,807	10,476,135	ROV FIX
116	1,121,411	10,457,749	FIELD JOINT	141	1,118,988	10,467,047	FIELD JOINT	166	1,116,496	10,476,590	ANODE
117	1,121,309	10,458,143	FIELD JOINT	142	1,118,882	10,467,431	FIELD JOINT	167	1,116,408	10,476,917	FIELD JOINT
118	1,121,204	10,458,532	FIELD JOINT	143	1,118,791	10,467,784	FIELD JOINT	168	1,116,316	10,477,272	FIELD JOINT
119	1,121,096	10,458,907	ANODE	144	1,118,707	10,468,105	ROV FIX	169	1,116,235	10,477,601	ROV FIX
120	1,120,996	10,459,314	FIELD JOINT	145	1,118,614	10,468,453	FIELD JOINT	170	1,116,119	10,478,048	ROV FIX
121	1,120,893	10,459,726	ROV FIX	146	1,118,512	10,468,845	FIELD JOINT	171	1,116,009	10,478,480	ROV FIX
122	1,120,807	10,460,056	FIELD JOINT	147	1,118,422	10,469,197	FIELD JOINT	172	1,115,927	10,478,817	ANODE
123	1,120,739	10,460,335	FIELD JOINT	148	1,118,336	10,469,551	ROV FIX	173	1,115,832	10,479,145	FIELD JOINT
124	1,120,656	10,460,654	ROV FIX	149	1,118,189	10,470,086	FIELD JOINT				
125	1,120,526	10,461,120	ANODE	150	1,118,100	10,470,448	ROV FIX				
126	1,120,446	10,461,460	FIELD JOINT	151	1,118,042	10,470,872	ROV FIX				
127	1,120,366	10,461,768	FIELD JOINT	152	1,117,937	10,471,061	FIELD JOINT				
128	1,120,255	10,462,166	FIELD JOINT	153	1,117,832	10,471,450	FIELD JOINT				
129	1,120,158	10,462,515	FIELD JOINT	154	1,117,742	10,471,814	ROV FIX				
130	1,120,064	10,462,887	ROV FIX	155	1,117,647	10,472,186	ANODE				
131	1,120,001	10,463,141	FIELD JOINT	156	1,117,536	10,472,607	ROV FIX				
132	1,119,893	10,463,563	FIELD JOINT	157	1,117,421	10,473,080	ROV FIX				
133	1,119,793	10,463,962	FIELD JOINT	158	1,117,307	10,473,484	ROV FIX				
134	1,119,676	10,464,387	FIELD JOINT	159	1,117,213	10,473,837	FIELD JOINT				
135	1,119,570	10,464,777	FIELD JOINT	160	1,117,116	10,474,185	FIELD JOINT				
136	1,119,472	10,465,168	FIELD JOINT	161	1,117,021	10,474,579	FIELD JOINT				
137	1,119,371	10,465,545	ANODE	162	1,116,921	10,474,963	FIELD JOINT				
138	1,119,288	10,465,906	ROV FIX	163	1,116,817	10,475,354	FIELD JOINT				

PLAN VIEW



AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176

POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION
174	1,115,731	10,479,528	FIELD JOINT	199	1,114,894	10,484,561	ROV FIX	224	1,113,437	10,491,009	FIELD JOINT	249	1,111,013	10,500,366	ROV FIX
175	1,115,637	10,479,869	FIELD JOINT	200	1,114,859	10,484,802	ROV FIX	225	1,113,331	10,491,400	FIELD JOINT	250	1,110,913	10,500,793	ROV FIX
176	1,115,542	10,480,222	ROV FIX	201	1,114,831	10,484,801	ROV FIX	226	1,113,233	10,491,793	FIELD JOINT	251	1,110,796	10,501,192	ROV FIX
177	1,115,470	10,480,493	FIELD JOINT	202	1,114,798	10,485,001	FIELD JOINT	227	1,113,159	10,492,110	FIELD JOINT	252	1,110,751	10,501,384	FIELD JOINT
178	1,115,435	10,480,694	ROV FIX	203	1,114,766	10,485,198	FIELD JOINT	228	1,113,059	10,492,500	FIELD JOINT				
179	1,115,411	10,480,859	FIELD JOINT	204	1,114,735	10,485,390	FIELD JOINT	229	1,112,957	10,492,892	FIELD JOINT				
180	1,115,384	10,481,026	ANODE	205	1,114,707	10,485,557	FIELD JOINT	230	1,112,851	10,493,279	FIELD JOINT				
181	1,115,354	10,481,213	FIELD JOINT	206	1,114,687	10,485,668	FIELD JOINT	231	1,112,757	10,493,634	FIELD JOINT				
182	1,115,332	10,481,383	FIELD JOINT	207	1,114,666	10,485,868	FIELD JOINT	232	1,112,658	10,494,022	FIELD JOINT				
183	1,115,305	10,481,578	FIELD JOINT	208	1,114,640	10,486,063	ROV FIX	233	1,112,573	10,494,366	FIELD JOINT				
184	1,115,266	10,481,816	ROV FIX	209	1,114,611	10,486,263	FIELD JOINT	234	1,112,471	10,494,770	FIELD JOINT				
185	1,115,232	10,482,008	FIELD JOINT	210	1,114,578	10,486,460	FIELD JOINT	235	1,112,367	10,495,169	FIELD JOINT				
186	1,115,198	10,482,213	FIELD JOINT	211	1,114,557	10,486,661	FIELD JOINT	236	1,112,254	10,495,589	FIELD JOINT				
187	1,115,168	10,482,419	FIELD JOINT	212	1,114,515	10,486,859	FIELD JOINT	237	1,112,152	10,495,984	FIELD JOINT				
188	1,115,143	10,482,606	FIELD JOINT	213	1,114,490	10,486,981	FIELD JOINT	238	1,112,054	10,496,368	FIELD JOINT				
189	1,115,123	10,482,792	TOUCHDOWN	214	1,114,458	10,487,087	FIELD JOINT	239	1,111,957	10,496,725	ANODE				
190	1,115,110	10,482,832	WILLIAMS 18" GAS CROSSING	215	1,114,346	10,487,547	ANODE	240	1,111,849	10,497,115	FIELD JOINT				
191	1,115,110	10,482,861	TOUCHDOWN	216	1,114,223	10,487,990	ROV FIX	241	1,111,751	10,497,506	FIELD JOINT				
192	1,115,086	10,483,048	FIELD JOINT	217	1,114,144	10,488,314	FIELD JOINT	242	1,111,665	10,497,861	FIELD JOINT				
193	1,115,064	10,483,202	FIELD JOINT	218	1,114,050	10,488,672	FIELD JOINT	243	1,111,581	10,498,224	FIELD JOINT				
194	1,115,020	10,483,440	FIELD JOINT	219	1,113,948	10,489,054	FIELD JOINT	244	1,111,480	10,498,613	FIELD JOINT				
195	1,114,992	10,483,634	FIELD JOINT	220	1,113,845	10,489,441	FIELD JOINT	245	1,111,404	10,498,982	FIELD JOINT				
196	1,114,963	10,483,836	FIELD JOINT	221	1,113,733	10,489,874	FIELD JOINT	246	1,111,319	10,499,197	FIELD JOINT				
197	1,114,936	10,484,035	FIELD JOINT	222	1,113,633	10,490,263	FIELD JOINT	247	1,111,253	10,499,465	ROV FIX				
198	1,114,915	10,484,194	FIELD JOINT	223	1,113,537	10,490,622	FIELD JOINT	248	1,111,150	10,499,858	ROV FIX				

NOTES

- 1) PIPELINE COORDINATES ARE THE POSITIONS OF THE R.O.V. (REMOTELY OPERATED VEHICLE) LOCATED AT THE POINTS USING BOTH VERIPOS L22 ULTRA DGPS RECEIVING SPOTBEAM CORRECTIONS, VERIPOS ULTRA DGPS RECEIVING INMARSAT CORRECTIONS, SONARDYNE FUSION LBL (LONG BASELINE) ACOUSTIC POSITIONING, KONGSBERG HPAP USB (ULTRA SHORT BASELINE) ACOUSTIC POSITIONING AND RDI WORKHORSE DVL POSITIONING.
- 2) SURVEYED COORDINATES TRANSFORMED FROM NAD83 (GPS DATUM) NADCON VERSION 2.1.
- 3) THIS DRAWING IS NOT FOR NAVIGATION. PIPELINES AND FEATURES IN THE IMMEDIATE VICINITY ARE OBTAINED FROM BOEMRE (BUREAU OF OCEAN ENERGY MANAGEMENT, REGULATION AND ENFORCEMENT) DATABASE AND CLIENT PROVIDED DATA.
- 4) AS-BUILT SURVEY DATE: JULY 28TH, JULY 31ST AND AUGUST 9TH, 2011.
- 5) CLIENT DRAWING REFERENCE: 16172-BASEMAP.DWG AND 24105013EN0.DWG.

LEGEND

- AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176
- AS-FOUND PIPELINE OR UMBILICAL
- RIGHT-OF-WAY (PROVIDED BY CLIENT)
- BOEMRE EXISTING PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- AS-INSTALLED HFL
- AS-INSTALLED CFL
- BOEMRE PROPOSED PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- BOEMRE LEASE BLOCK BOUNDARIES
- MATCHLINE WITH ADJOINING CHART
- PROPOSED STRUCTURES
- EXISTING STRUCTURES
- GEOGRAPHICAL TICKS
- UTM TICKS
- BOEMRE WELLS

GEODESY

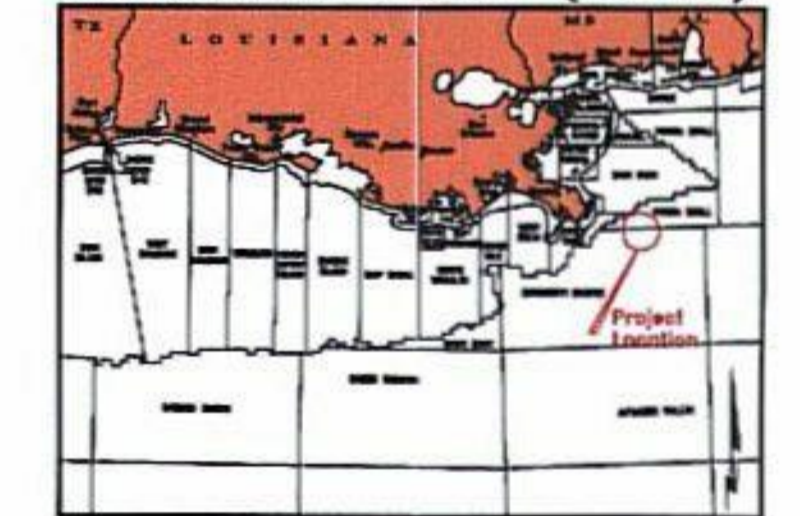
Survey Datum: NAD 27
 Ellipsoid: Clarke 1886
 Projection: Universal Transverse Mercator ZONE 18N
 Longitude of Central Meridian: 87°W
 False Easting (m): 500 000
 False Northing (m): 0
 Scale Factor of Central Meridian: 0.99960
 Units: US Survey Feet

CERTIFIED CORRECT AS TO THE HORIZONTAL POSITION OF THE AS-BUILT PIPELINE BASED ON THE SURVEY METHODS NOTED.



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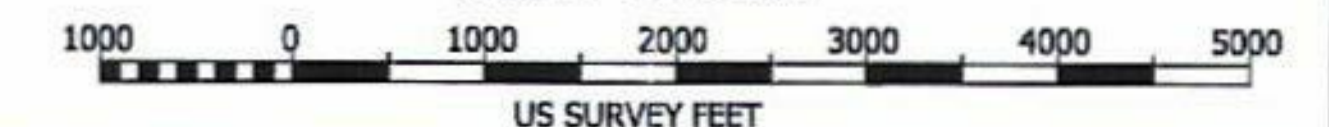
LOCATION PLAN (N.T.S)



2740 BRITTMOORE RD. SUITE 110
 HOUSTON, TEXAS 77041
 Tel 713-984-8688
 Fax 713-984-8683
 Website www.utecsurvey.com

RATON SOUTH FIELD DEVELOPMENT PROJECT
 AS-BUILT 04 1/2" BLKO EAST PIPELINE
 FROM MISSISSIPPI CANYON AREA BLOCK 292
 TO VIOSCA KNOLL AREA BLOCK 900
 SEGMENT#18176 GULF OF MEXICO

Scale 1 : 1000

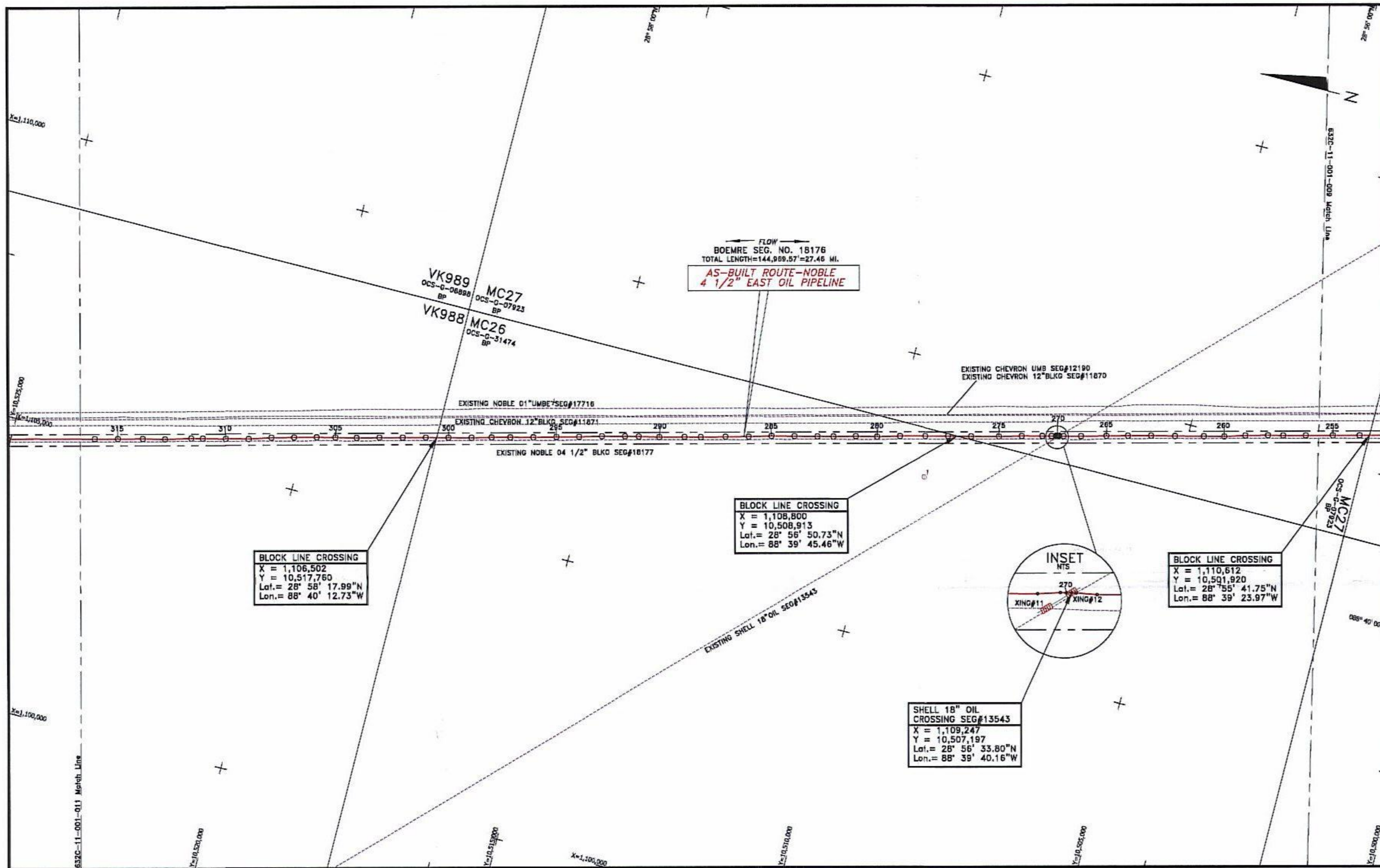


Rev. No.	Date	Comment	Drawn	Checked	Appr.
0	09/29/11	ISSUED AS FINAL	VR	SW	RG
A2	09/20/11	ISSUED FOR CLIENT COMMENTS	VR	SW	RG
A1	08/24/11	ISSUED FOR CLIENT COMMENTS	VR	SW	SF

Survey Dates: JULY 28th, 31st & AUG 9th, 2011 Survey Vessel: HELIX EXPRESS

UTEC Ref. No. 632C-11-001	UTEC Drawing No. 632C-11-001-009	Sheet 004	Of 007
Plot Size ANSI D			

PLAN VIEW



BLOCK LINE CROSSING
 X = 1,106,502
 Y = 10,517,760
 Lat. = 28° 58' 17.99"N
 Lon. = 88° 40' 12.73"W

AS-BUILT ROUTE-NOBLE 4 1/2" EAST OIL PIPELINE
 BOEMRE SEG. NO. 18176
 TOTAL LENGTH=144,989.57'=27.46 MI.

BLOCK LINE CROSSING
 X = 1,108,800
 Y = 10,508,913
 Lat. = 28° 56' 50.73"N
 Lon. = 88° 39' 45.46"W



BLOCK LINE CROSSING
 X = 1,110,612
 Y = 10,501,920
 Lat. = 28° 55' 41.75"N
 Lon. = 88° 39' 23.97"W

SHELL 18" OIL CROSSING SEG#13543
 X = 1,109,247
 Y = 10,507,197
 Lat. = 28° 56' 33.80"N
 Lon. = 88° 39' 40.16"W

AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176

POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION
253	1,110,685	10,501,639	ROV FIX	278	1,108,661	10,509,456	FIELD JOINT	303	1,106,253	10,518,733	FIELD JOINT
254	1,110,569	10,502,086	ROV FIX	279	1,108,548	10,509,890	FIELD JOINT	304	1,106,150	10,519,119	FIELD JOINT
255	1,110,450	10,502,543	ROV FIX	280	1,108,437	10,510,278	FIELD JOINT	305	1,106,065	10,519,481	ANODE
256	1,110,333	10,503,001	ANODE	281	1,108,351	10,510,640	ANODE	306	1,105,988	10,519,799	ROV FIX
257	1,110,233	10,503,384	ROV FIX	282	1,108,248	10,511,022	FIELD JOINT	307	1,105,885	10,520,181	ROV FIX
258	1,110,170	10,503,645	FIELD JOINT	283	1,108,180	10,511,294	ROV FIX	308	1,105,783	10,520,565	FIELD JOINT
259	1,110,067	10,504,028	FIELD JOINT	284	1,108,084	10,511,684	FIELD JOINT	309	1,105,664	10,520,947	FIELD JOINT
260	1,109,960	10,504,381	FIELD JOINT	285	1,107,989	10,512,074	FIELD JOINT	310	1,105,569	10,521,338	ROV FIX
261	1,109,875	10,504,729	ROV FIX	286	1,107,878	10,512,460	FIELD JOINT	311	1,105,476	10,521,729	FIELD JOINT
262	1,109,752	10,505,221	ANODE	287	1,107,774	10,512,853	ANODE	312	1,105,427	10,521,927	FIELD JOINT
263	1,109,654	10,505,627	FIELD JOINT	288	1,107,661	10,513,271	FIELD JOINT	313	1,105,298	10,522,369	FIELD JOINT
264	1,109,552	10,506,020	FIELD JOINT	289	1,107,594	10,513,550	FIELD JOINT	314	1,105,209	10,522,752	FIELD JOINT
265	1,109,455	10,506,386	ROV FIX	290	1,107,482	10,513,977	FIELD JOINT	315	1,105,098	10,523,175	FIELD JOINT
266	1,109,340	10,506,813	ROV FIX	291	1,107,401	10,514,329	FIELD JOINT	316	1,104,995	10,523,569	FIELD JOINT
267	1,109,263	10,507,109	FIELD JOINT	292	1,107,344	10,514,563	FIELD JOINT				
268	1,109,251	10,507,182	START OF MATRESS	293	1,107,244	10,514,955	FIELD JOINT				
269	1,109,247	10,507,197	SHELL 18" OIL CROSSING	294	1,107,136	10,515,341	FIELD JOINT				
270	1,109,242	10,507,215	END OF MATRESS	295	1,107,034	10,515,726	FIELD JOINT				
271	1,109,238	10,507,236	TOUCHDOWN	296	1,106,927	10,516,117	FIELD JOINT				
272	1,109,214	10,507,312	FIELD JOINT	297	1,106,828	10,516,509	FIELD JOINT				
273	1,109,174	10,507,469	FIELD JOINT	298	1,106,745	10,516,825	ROV FIX				
274	1,109,084	10,507,821	ROV FIX	299	1,106,652	10,517,165	FIELD JOINT				
275	1,108,976	10,508,207	FIELD JOINT	300	1,106,552	10,517,559	FIELD JOINT				
276	1,108,857	10,508,676	FIELD JOINT	301	1,106,454	10,517,948	FIELD JOINT				
277	1,108,763	10,509,069	FIELD JOINT	302	1,106,353	10,518,340	FIELD JOINT				

NOTES

- 1) PIPELINE COORDINATES ARE THE POSITIONS OF THE R.O.V. (REMOTELY OPERATED VEHICLE) LOCATED AT THE POINTS USING BOTH VERIPPOS L22 ULTRA DOPS RECEIVING SPOTBEAM CORRECTIONS, VERIPPOS ULTRA DOPS RECEIVING INHAASAT CORRECTIONS, SONAR/DYNE FUSION LBL (LONG BASELINE) ACOUSTIC POSITIONING, KONGSBERG HPAP USBL(ULTRA SHORT BASELINE) ACOUSTIC POSITIONING AND RDI WORKHORSE DVL POSITIONING.
- 2) SURVEYED COORDINATES TRANSFORMED FROM NAD83 (GPS DATUM) NADCON VERSION 2.1.
- 3) THIS DRAWING IS NOT FOR NAVIGATION. PIPELINES AND FEATURES IN THE IMMEDIATE VICINITY ARE OBTAINED FROM BOEMRE (BUREAU OF OCEAN ENERGY MANAGEMENT, REGULATION AND ENFORCEMENT) DATABASE AND CLIENT PROVIDED DATA.
- 4) AS-BUILT SURVEY DATE: JULY 28TH, JULY 31ST AND AUGUST 9TH, 2011.
- 5) CLIENT DRAWING REFERENCE: 18172-BASEMAP.DWG AND 24105013ENG.DWG.

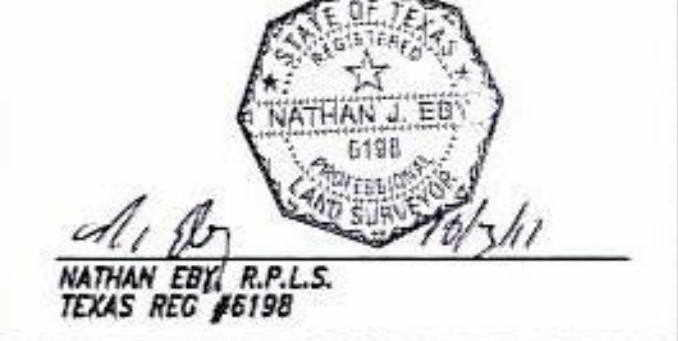
LEGEND

- AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176
- AS-FOUND PIPELINE OR UMBILICAL
- RIGHT-OF-WAY (PROVIDED BY CLIENT)
- BOEMRE EXISTING PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- AS-INSTALLED HFL
- AS-INSTALLED CFL
- BOEMRE PROPOSED PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- BOEMRE LEASE BLOCK BOUNDARIES
- MATCHLINE WITH ADJOINING CHART
- PROPOSED STRUCTURES
- EXISTING STRUCTURES
- GEOGRAPHICAL TICKS
- UTM TICKS
- BOEMRE WELLS

GEODESY

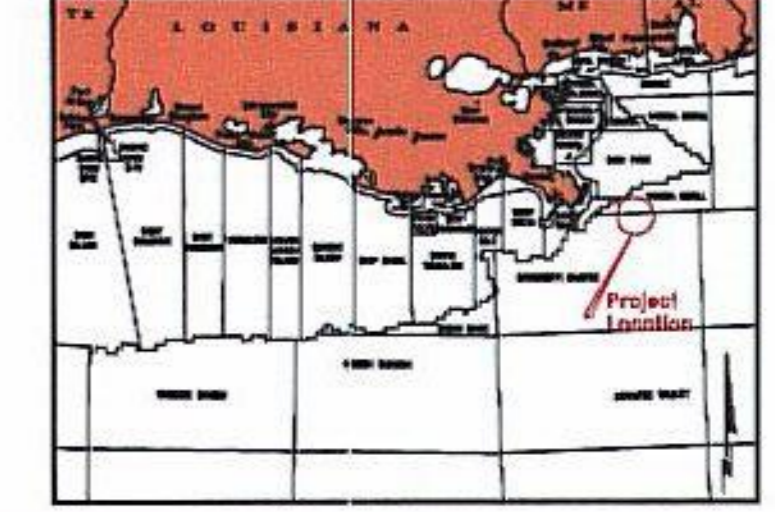
Survey Datum: NAD 27
 Ellipsoid: Clarke 1866
 Projection: Universal Transverse Mercator ZONE 16N
 Longitude of Central Meridian: 87°W
 False Easting (m): 500 000
 False Northing (m): 0
 Scale Factor at Central Meridian: 0.99980
 Units: US Survey Feet

CERTIFIED CORRECT AS TO THE HORIZONTAL POSITION OF THE AS-BUILT PIPELINE BASED ON THE SURVEY METHODS NOTED.



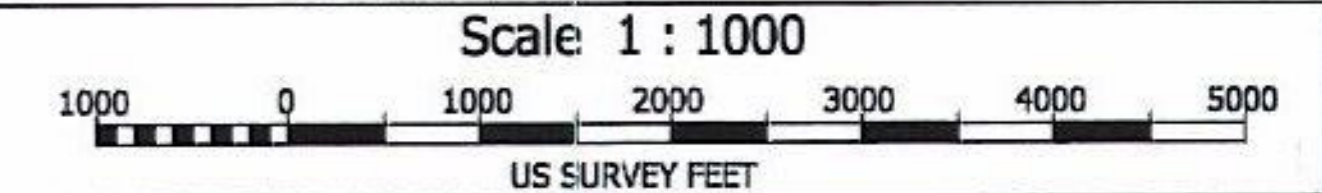
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LOCATION PLAN (N.T.S)



UTEC
 7240 BRITTMOORE RD. SUITE 110
 HOUSTON, TEXAS 77041
 Tel 713-984-8688
 Fax 713-984-8653
 Website www.utecsurvey.com

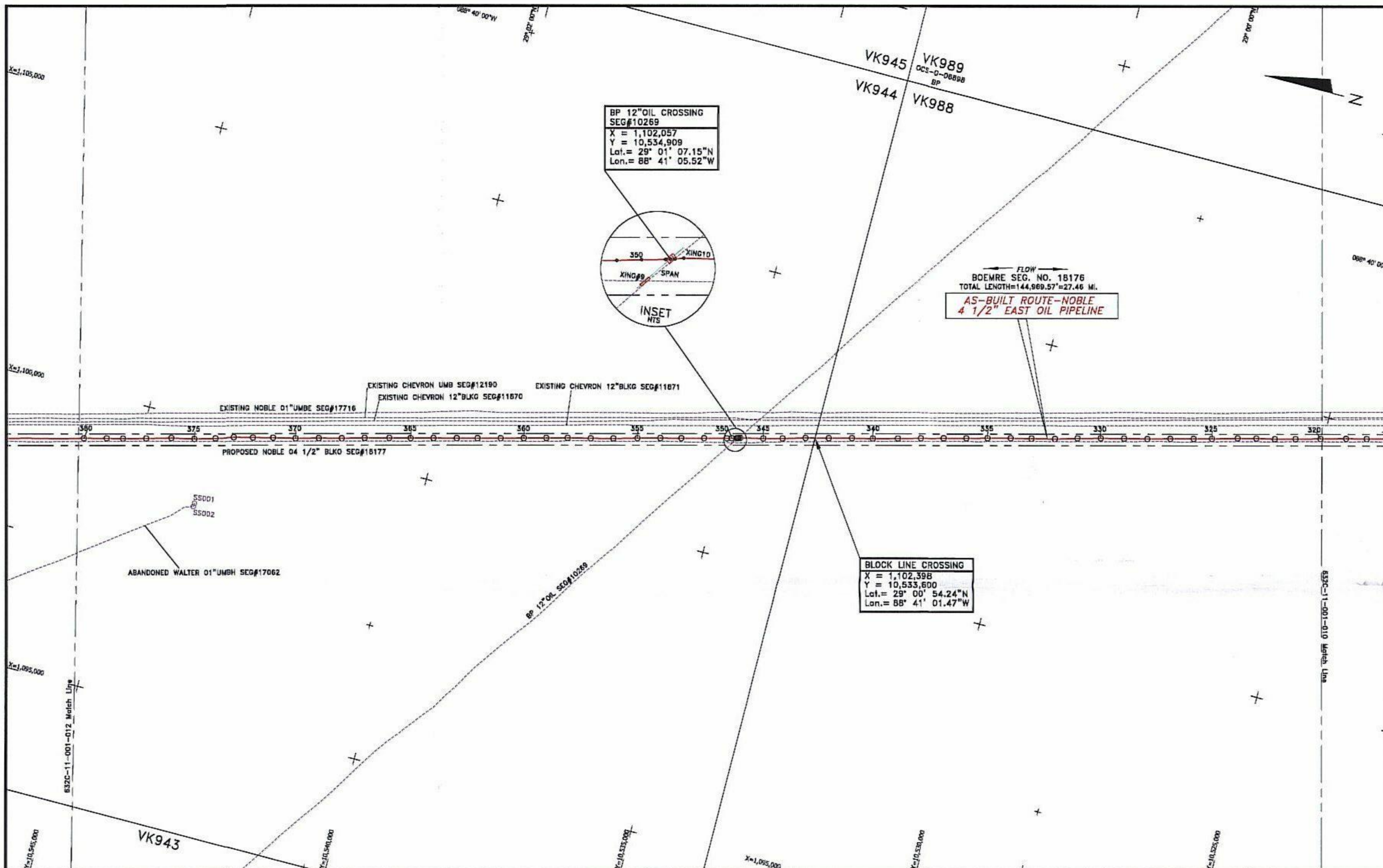
RATON SOUTH FIELD DEVELOPMENT PROJECT
 AS-BUILT 04 1/2" BLKO EAST PIPELINE
 FROM MISSISSIPPI CANYON AREA BLOCK 292
 TO VIOSCA KNOLL AREA BLOCK 900
 SEGMENT#18176 GULF OF MEXICO



Rev. No.	Date	Comment	Drawn	Checked	Appr.
0	09/29/11	ISSUED AS FINAL	VR	SW	RG
A2	09/20/11	ISSUED FOR CLIENT COMMENTS	VR	SW	RG
A1	08/24/11	ISSUED FOR CLIENT COMMENTS	VR	SW	SF

Survey Dates: JULY 28th, 31st & AUG 9th, 2011 Survey Vessel: HELIX EXPRESS
 UTEC Ref. No. 632C-11-001 UTEC Drawing No. 632C-11-001-010 Sheet 005 Of 007
 Plot Size ANSI D

PLAN VIEW



- ### NOTES
- 1) PIPELINE COORDINATES ARE THE POSITIONS OF THE R.O.V. (REMOTELY OPERATED VEHICLE) LOCATED AT THE POINTS USING BOTH VERIPPOS LD2 ULTRA DGPS RECEIVING SPOTBEAM CORRECTIONS, VERIPPOS ULTRA DGPS RECEIVING INMARSAT CORRECTIONS, SONARDYNE FUSION LB. (LONG BASELINE) ACOUSTIC POSITIONING, KONGSBERG HFAP USBL (ULTRA SHORT BASELINE) ACOUSTIC POSITIONING AND RDI WORKHORSE DVL POSITIONING.
 - 2) SURVEYED COORDINATES TRANSFORMED FROM NAD83 (GPS DATUM) NADCON VERSION 2.1.
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 - 4) AS-BUILT SURVEY DATE: JULY 28TH, JULY 31ST AND AUGUST 9TH, 2011.
 - 5) CLIENT DRAWING REFERENCE: 16172-BASEMAP.IWG AND 2410501SENG.DWG.

- ### LEGEND
- AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176
 - AS-FOUND PIPELINE OR UMBILICAL
 - RIGHT-OF-WAY (PROVIDED BY CLIENT)
 - BOEMRE EXISTING PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
 - AS-INSTALLED HFL
 - AS-INSTALLED EFL
 - BOEMRE PROPOSED PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
 - BOEMRE LEASE BLOCK BOUNDARIES
 - MATCHLINE WITH ADJOINING CHART
 - PROPOSED STRUCTURES
 - EXISTING STRUCTURES
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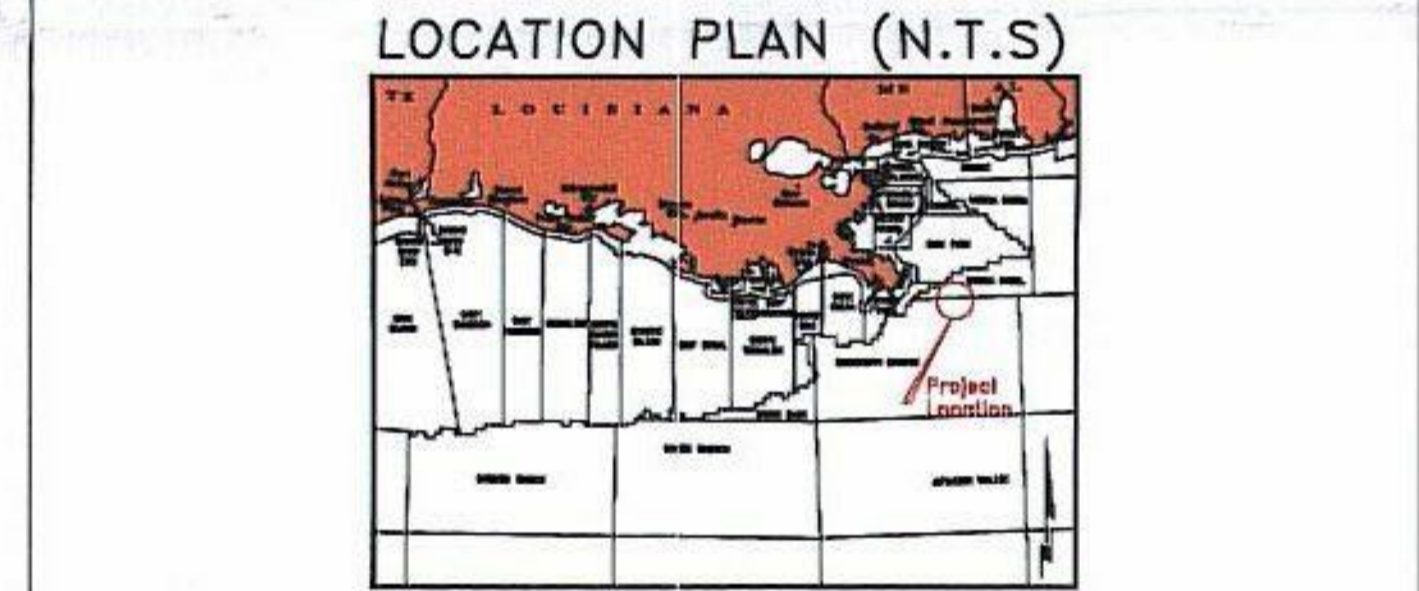
GEODESY

Survey Datum: NAD 27
 Ellipsoid: Clarke 1866
 Projection: Universal Transverse Mercator ZONE 16N
 Longitude of Central Meridian: 87°W
 False Easting (m): 500 000
 False Northing (m): 0
 Scale Factor at Central Meridian: 0.99960
 Units: US Survey Feet

CERTIFIED CORRECT AS TO THE HORIZONTAL POSITION OF THE AS-BUILT PIPELINE BASED ON THE SURVEY METHODS NOTED.

NATHAN J. EBY
 6198
 TEXAS REG #6198

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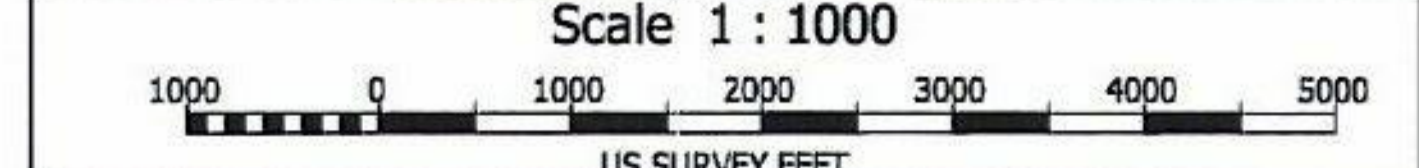
7240 BRITTMORE RD. SUITE 110
 HOUSTON, TEXAS 77041
 Tel 713-984-6688
 Fax 713-984-6683
 Website www.utecsurvey.com

HELIX
 SUBSEA CONSTRUCTION
 A HELIX ENERGY SERVICES COMPANY

AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176

POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION
317	1,104,913	10,523,900	ANODE	342	1,102,457	10,533,367	FIELD JOINT	367	1,100,423	10,541,221	FIELD JOINT
318	1,104,816	10,524,269	FIELD JOINT	343	1,102,357	10,533,760	FIELD JOINT	368	1,100,317	10,541,606	FIELD JOINT
319	1,104,728	10,524,618	FIELD JOINT	344	1,102,250	10,534,146	FIELD JOINT	369	1,100,220	10,541,994	FIELD JOINT
320	1,104,613	10,525,050	FIELD JOINT	345	1,102,164	10,534,472	ROV FIX	370	1,100,115	10,542,388	FIELD JOINT
321	1,104,500	10,525,472	FIELD JOINT	346	1,102,072	10,534,865	TOUCHDOWN	371	1,100,026	10,542,769	ANODE
322	1,104,409	10,525,823	FIELD JOINT	347	1,102,062	10,534,893	START OF MATTRESS	372	1,099,940	10,543,110	ROV FIX
323	1,104,338	10,526,138	FIELD JOINT	348	1,102,057	10,534,909	BP 12" OIL CROSSING	373	1,099,862	10,543,434	ROV FIX
324	1,104,258	10,526,453	FIELD JOINT	349	1,102,052	10,534,925	TOUCHDOWN	374	1,099,768	10,543,743	FIELD JOINT
325	1,104,139	10,526,887	FIELD JOINT	350	1,102,031	10,535,006	FIELD JOINT	375	1,099,667	10,544,098	FIELD JOINT
326	1,104,059	10,527,196	FIELD JOINT	351	1,102,008	10,535,089	ROV FIX	376	1,099,581	10,544,490	FIELD JOINT
327	1,103,955	10,527,589	FIELD JOINT	352	1,101,909	10,535,475	FIELD JOINT	377	1,099,483	10,544,916	FIELD JOINT
328	1,103,851	10,527,976	FIELD JOINT	353	1,101,809	10,535,859	FIELD JOINT	378	1,099,357	10,545,309	FIELD JOINT
329	1,103,756	10,528,369	FIELD JOINT	354	1,101,720	10,536,216	FIELD JOINT	379	1,099,290	10,545,587	FIELD JOINT
330	1,103,658	10,528,766	FIELD JOINT	355	1,101,617	10,536,603	FIELD JOINT	380	1,099,191	10,545,974	FIELD JOINT
331	1,103,554	10,529,157	ROV FIX	356	1,101,507	10,537,009	ROV FIX				
332	1,103,446	10,529,535	FIELD JOINT	357	1,101,409	10,537,392	FIELD JOINT				
333	1,103,348	10,529,931	FIELD JOINT	358	1,101,314	10,537,784	FIELD JOINT				
334	1,103,264	10,530,284	FIELD JOINT	359	1,101,220	10,538,144	ROV FIX				
335	1,103,151	10,530,677	FIELD JOINT	360	1,101,120	10,538,526	FIELD JOINT				
336	1,103,067	10,531,033	FIELD JOINT	361	1,101,015	10,538,915	FIELD JOINT				
337	1,102,968	10,531,415	FIELD JOINT	362	1,100,915	10,539,305	FIELD JOINT				
338	1,102,862	10,531,808	FIELD JOINT	363	1,100,824	10,539,658	FIELD JOINT				
339	1,102,756	10,532,197	FIELD JOINT	364	1,100,723	10,540,056	ROV FIX				
340	1,102,645	10,532,619	FIELD JOINT	365	1,100,621	10,540,444	ROV FIX				
341	1,102,561	10,532,973	FIELD JOINT	366	1,100,531	10,540,803	ROV FIX				

RATON SOUTH FIELD DEVELOPMENT PROJECT
 AS-BUILT 04 1/2" BLKO EAST PIPELINE
 FROM MISSISSIPPI CANYON AREA BLOCK 292
 TO VIOSCA KNOLL AREA BLOCK 900
 SEGMENT #18176 GULF OF MEXICO

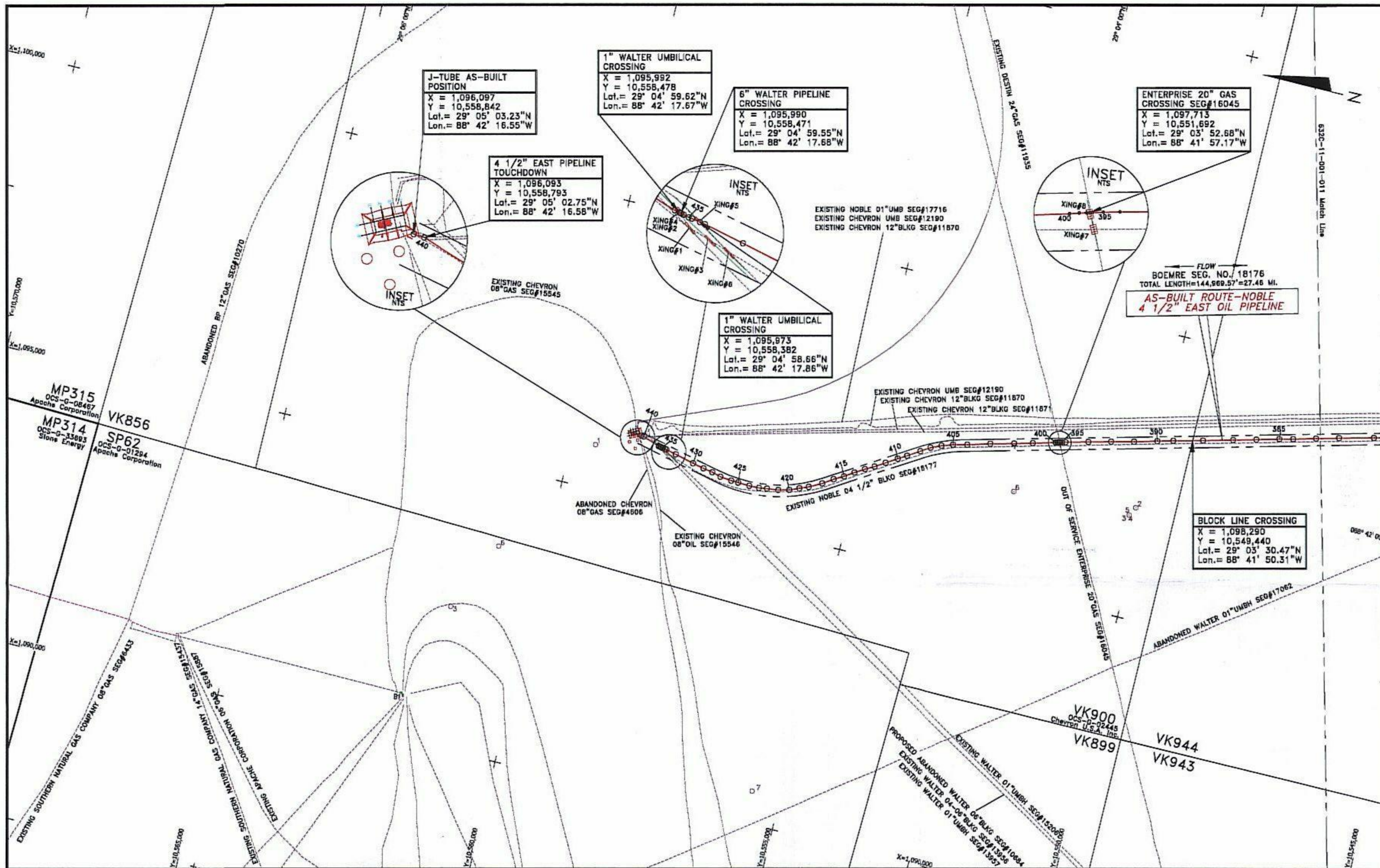


Rev. No.	Date	Comment	Drawn	Checked	Appr.
0	09/29/11	ISSUED AS FINAL	VR	SW	RG
A2	09/20/11	ISSUED FOR CLIENT COMMENTS	VR	SW	RG
A1	08/24/11	ISSUED FOR CLIENT COMMENTS	VR	SW	SF

Survey Dates: JULY 28th, 31st & AUG 9th, 2011 | Survey Vessel: HELIX EXPRESS

UTEC Ref. No. 632C-11-001	UTEC Drawing No. 632C-11-001-011	Sheet 006	Of 007
Plot Size ANSI D			

PLAN VIEW



AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176

POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION
381	1,099,065	10,546,366	FIELD JOINT	406	1,097,170	10,553,686	FIELD JOINT	431	1,095,927	10,558,177	ROV FIX
382	1,098,937	10,546,957	ROV FIX	407	1,097,092	10,553,863	FIELD JOINT	432	1,095,969	10,558,359	TOUCHDOWN
383	1,098,833	10,547,347	FIELD JOINT	408	1,096,988	10,554,029	FIELD JOINT	433	1,095,973	10,558,382	1" WALTER UMBILICAL CROSSING
384	1,098,730	10,547,735	FIELD JOINT	409	1,096,857	10,554,231	FIELD JOINT	434	1,095,980	10,558,419	TOUCHDOWN
385	1,098,674	10,547,971	FIELD JOINT	410	1,096,770	10,554,379	FIELD JOINT	435	1,095,982	10,558,435	TOUCHDOWN
386	1,098,571	10,548,360	FIELD JOINT	411	1,096,652	10,554,568	FIELD JOINT	436	1,095,988	10,558,459	START OF MATTRESS
387	1,098,466	10,548,754	FIELD JOINT	412	1,096,543	10,554,741	FIELD JOINT	437	1,095,990	10,558,471	6" WALTER PIPELINE CROSSING
388	1,098,335	10,549,262	FIELD JOINT	413	1,096,459	10,554,894	FIELD JOINT	438	1,095,992	10,558,478	1" WALTER UMBILICAL CROSSING
389	1,098,207	10,549,769	FIELD JOINT	414	1,096,357	10,555,059	FIELD JOINT	439	1,095,997	10,558,501	END OF MATTRESS
390	1,098,135	10,550,038	FIELD JOINT	415	1,096,249	10,555,222	FIELD JOINT	440	1,096,093	10,558,793	PIPELINE TOUCHDOWN
391	1,098,029	10,550,431	FIELD JOINT	416	1,096,158	10,555,387	ROV FIX	441	1,096,097	10,558,842	J-TUBE AS-BUILT POSITION
392	1,097,935	10,550,821	FIELD JOINT	417	1,096,041	10,555,566	FIELD JOINT	LENGTH OF SURVEY POINTS 1 THROUGH 441: 144,970' = 27.46 MILES			
393	1,097,857	10,551,205	FIELD JOINT	418	1,095,928	10,555,781	FIELD JOINT				
394	1,097,740	10,551,590	ROV FIX	419	1,095,866	10,555,934	FIELD JOINT				
395	1,097,725	10,551,647	TOUCHDOWN	420	1,095,797	10,556,099	FIELD JOINT				
396	1,097,715	10,551,683	START OF MATTRESS	421	1,095,750	10,556,287	FIELD JOINT				
397	1,097,713	10,551,692	ENTERPRISE 20" GAS CROSSING	422	1,095,729	10,556,485	FIELD JOINT				
398	1,097,710	10,551,703	END OF MATTRESS	423	1,095,707	10,556,624	FIELD JOINT				
399	1,097,703	10,551,727	TOUCHDOWN	424	1,095,701	10,556,799	FIELD JOINT				
400	1,097,692	10,551,759	FIELD JOINT	425	1,095,709	10,557,001	ANODE				
401	1,097,586	10,552,145	FIELD JOINT	426	1,095,712	10,557,127	ROV FIX				
402	1,097,503	10,552,461	FIELD JOINT	427	1,095,732	10,557,328	FIELD JOINT				
403	1,097,401	10,552,865	FIELD JOINT	428	1,095,776	10,557,482	FIELD JOINT				
404	1,097,291	10,553,252	FIELD JOINT	429	1,095,807	10,557,649	FIELD JOINT				
405	1,097,232	10,553,494	FIELD JOINT	430	1,095,851	10,557,847	FIELD JOINT				

NOTES

- 1) PIPELINE COORDINATES ARE THE POSITIONS OF THE R.O.V. (REMOTELY OPERATED VEHICLE) LOCATED AT THE POINTS USING BOTH VERIPOS LD2 ULTRA DGPS RECEIVING SPOTBEAM CORRECTIONS, VERIPOS ULTRA DGPS RECEIVING INMARSAT CORRECTIONS, SONARDYNE FUSION LBL (LONG BASELINE) ACOUSTIC POSITIONING, KONGSBERG HIPAP USBL (ULTRA SHORT BASELINE) ACOUSTIC POSITIONING AND ROV WORKHORSE DVL POSITIONING.
- 2) SURVEYED COORDINATES TRANSFORMED FROM NAD83 (GPS DATUM) NADCOON VERSION 2.1.
- 3) THIS DRAWING IS NOT FOR NAVIGATION. PIPELINES AND FEATURES IN THE IMMEDIATE VICINITY ARE OBTAINED FROM BOEMRE (BUREAU OF OCEAN ENERGY MANAGEMENT, REGULATION AND ENFORCEMENT) DATABASE AND CLIENT PROVIDED DATA.
- 4) AS-BUILT SURVEY DATE: JULY 28TH, JULY 31ST AND AUGUST 9TH, 2011.
- 5) CLIENT DRAWING REFERENCE: 16172-BASEMAP.DWG AND 24105013END.DWG.

LEGEND

- AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176
- AS-FOUND PIPELINE OR UMBILICAL
- RIGHT-OF-WAY (PROVIDED BY CLIENT)
- BOEMRE EXISTING PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- AS-INSTALLED HFL
- AS-INSTALLED EFL
- BOEMRE PROPOSED PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
- BOEMRE LEASE BLOCK BOUNDARIES
- MATCHLINE WITH ADJOINING CHART
- PROPOSED STRUCTURES
- EXISTING STRUCTURES
- GEOGRAPHICAL TICKS
- UTM TICKS
- BOEMRE WELLS

GEODESY

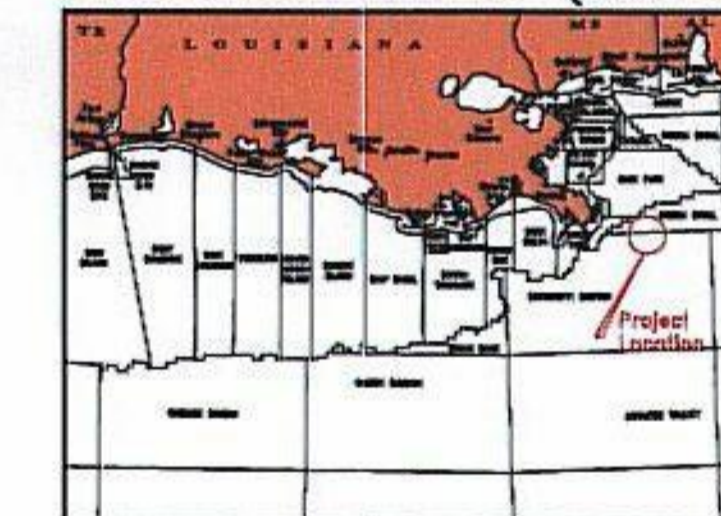
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 Projection: Universal Transverse Mercator ZONE 16N
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 False Northing (m): 0
 Scale Factor at Central Meridian: 0.99960
 Units: US Survey Feet

CERTIFIED CORRECT AS TO THE HORIZONTAL POSITION OF THE AS-BUILT PIPELINE BASED ON THE SURVEY METHODS NOTED.



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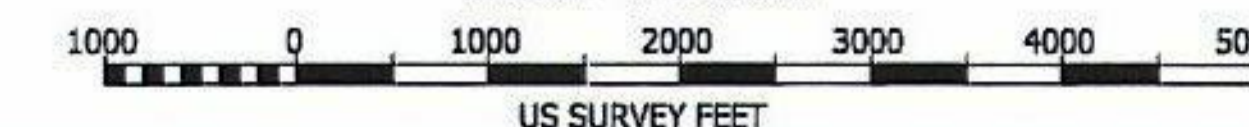
LOCATION PLAN (N.T.S)



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RATON SOUTH FIELD DEVELOPMENT PROJECT
 AS-BUILT 04 1/2" BLKO EAST PIPELINE
 FROM MISSISSIPPI CANYON AREA BLOCK 292
 TO VIOSCA KNOLL AREA BLOCK 900
 SEGMENT#18176 GULF OF MEXICO

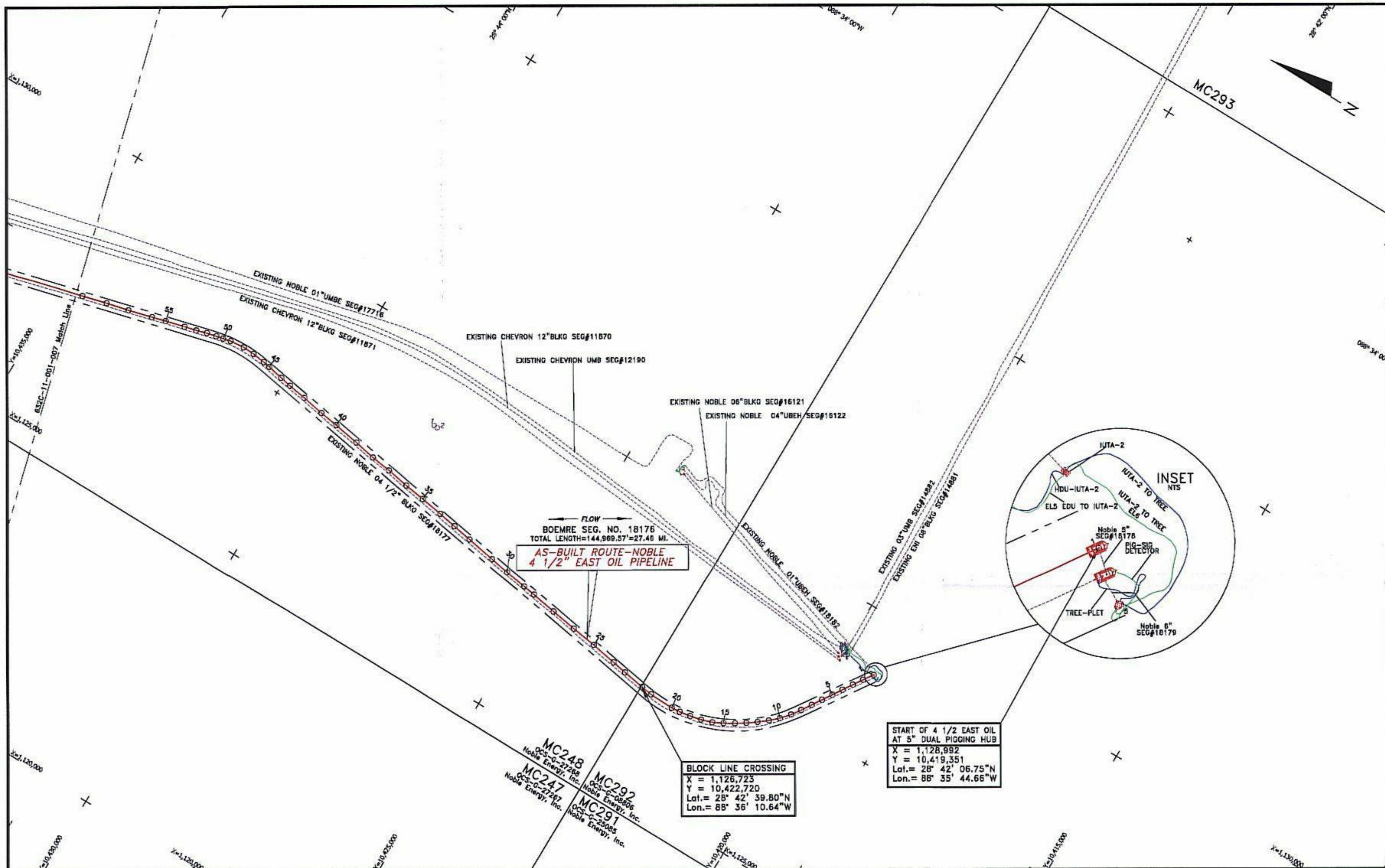
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Rev. No.	Date	Comment	Drawn	Checked	Appr.
0	09/29/11	ISSUED AS FINAL	VR	SW	RG
A2	09/20/11	ISSUED FOR CLIENT COMMENTS	VR	SW	RG
A1	08/24/11	ISSUED FOR CLIENT COMMENTS	VR	SW	SF

Survey Dates: JULY 28th, 31st & AUG 9th, 2011 Survey Vessel: HELIX EXPRESS
 UTEC Ref. No. 632C-11-001 UTEC Drawing No. 632C-11-001-012 Sheet 007 Of 007
 Plot Size ANSI D

PLAN VIEW



- ### NOTES
- 1) PIPELINE COORDINATES ARE THE POSITIONS OF THE R.O.V. (REMOTELY OPERATED VEHICLE) LOCATED AT THE POINTS USING BOTH VERIPOS LD2 ULTRA DOPS RECEIVING SPOTBEAM CORRECTIONS, VERIPOS ULTRA DOPS RECEIVING INMARSAT CORRECTIONS, SONAR/DYNE FUSION LBL (LONG BASELINE) ACOUSTIC POSITIONING, KONGSBERG HIPAP USBL(ULTRA SHORT BASELINE) ACOUSTIC POSITIONING AND RO1 WORKHORSE DVL POSITIONING.
 - 2) SURVEYED COORDINATES TRANSFORMED FROM NAD83 (GCS DATUM) NADCON VERSION 2.1.
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 - 4) AS-BUILT SURVEY DATE: JULY 28TH, JULY 31ST AND AUGUST 9TH, 2011.
 - 5) CLIENT DRAWING REFERENCE: 16172-BASEMAP.DWG AND 2410501SENO.DWG.

LEGEND

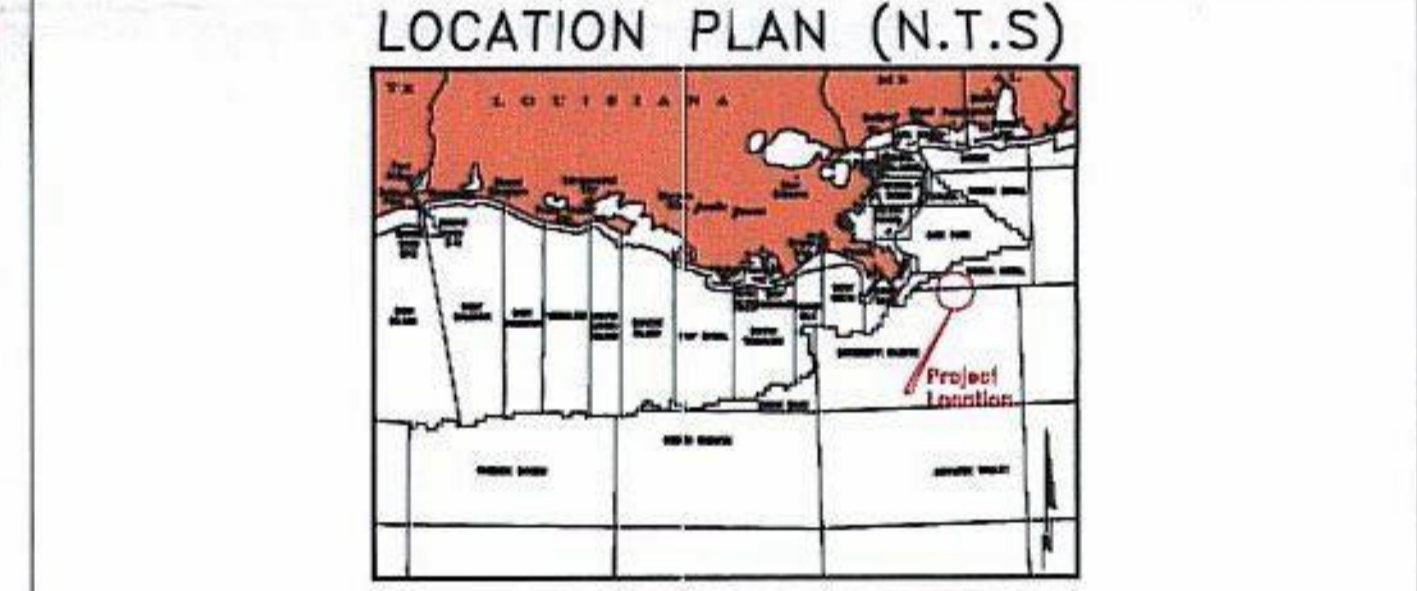
	AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176
	AS-FOUND PIPELINE OR UMBILICAL
	RIGHT-OF-WAY (PROVIDED BY CLIENT)
	BOEMRE EXISTING PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
	AS-INSTALLED HFL
	AS-INSTALLED EFL
	BOEMRE PROPOSED PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
	BOEMRE LEASE BLOCK BOUNDARIES
	MATCHLINE WITH ADJOINING CHART
	PROPOSED STRUCTURES
	EXISTING STRUCTURES
	GEOGRAPHICAL TICKS
	UTM TICKS
	BOEMRE WELLS

GEODESY

Survey Datum: NAD 27
 Ellipsoid: Clarke 1886
 Projection: Universal Transverse Mercator ZONE 16N
 Longitude of Central Meridian: 87°W
 False Easting (m): 500 000
 False Northing (m): 0
 Scale Factor at Central Meridian: 0.99960
 Units: US Survey Feet

CERTIFIED CORRECT AS TO THE HORIZONTAL POSITION OF THE AS-BUILT PIPELINE BASED ON THE SURVEY METHODS NOTED.

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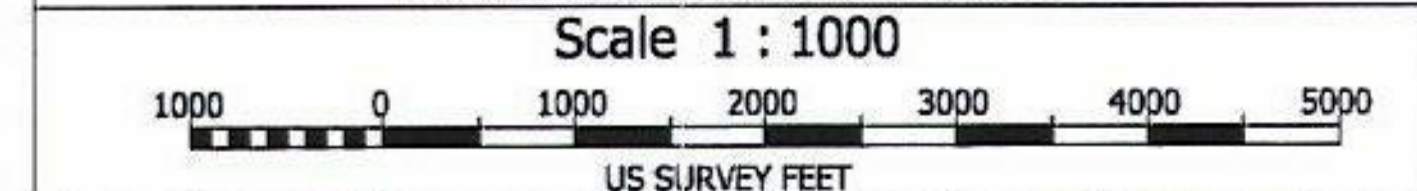


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AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176

POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION
1	1,128,992	10,419,351	EAST 5" DUAL PIGGING HUB	26	1,126,964	10,424,248	ROV FIX	51	1,128,073	10,432,225	ROV FIX
2	1,128,822	10,419,466	ROV FIX	27	1,127,033	10,424,705	ROV FIX	52	1,128,034	10,432,393	ANODE
3	1,128,660	10,419,574	ROV FIX	28	1,127,111	10,425,148	ROV FIX	53	1,127,977	10,432,575	FIELD JOINT
4	1,128,492	10,419,684	ROV FIX	29	1,127,145	10,425,372	ROV FIX	54	1,127,926	10,432,784	ROV FIX
5	1,128,327	10,419,793	ROV FIX	30	1,127,207	10,425,757	ROV FIX	55	1,127,837	10,433,118	FIELD JOINT
6	1,128,162	10,419,903	ROV FIX	31	1,127,264	10,426,087	ROV FIX	56	1,127,770	10,433,357	FIELD JOINT
7	1,127,994	10,420,013	ROV FIX	32	1,127,352	10,426,615	FIELD JOINT	57	1,127,658	10,433,770	FIELD JOINT
8	1,127,824	10,420,122	ROV FIX	33	1,127,413	10,426,959	ROV FIX	58	1,127,567	10,434,163	ROV FIX
9	1,127,668	10,420,233	ROV FIX	34	1,127,467	10,427,283	FIELD JOINT	59	1,127,452	10,434,589	ANODE
10	1,127,514	10,420,368	ROV FIX	35	1,127,525	10,427,678	FIELD JOINT				
11	1,127,375	10,420,513	ROV FIX	36	1,127,575	10,428,045	FIELD JOINT				
12	1,127,252	10,420,667	ROV FIX	37	1,127,638	10,428,438	FIELD JOINT				
13	1,127,136	10,420,826	ROV FIX	38	1,127,686	10,428,796	FIELD JOINT				
14	1,127,027	10,420,993	ROV FIX	39	1,127,758	10,429,173	ROV FIX				
15	1,126,925	10,421,166	ROV FIX	40	1,127,835	10,429,629	ROV FIX				
16	1,126,837	10,421,341	ROV FIX	41	1,127,881	10,429,961	ROV FIX				
17	1,126,776	10,421,532	ROV FIX	42	1,127,949	10,430,353	ROV FIX				
18	1,126,732	10,421,729	ROV FIX	43	1,128,000	10,430,675	ROV FIX				
19	1,126,701	10,421,923	ROV FIX	44	1,128,038	10,430,876	FIELD JOINT				
20	1,126,687	10,422,078	ROV FIX	45	1,128,091	10,431,152	ROV FIX				
21	1,126,694	10,422,303	ROV FIX	46	1,128,111	10,431,275	FIELD JOINT				
22	1,126,720	10,422,700	FIELD JOINT	47	1,128,142	10,431,505	FIELD JOINT				
23	1,126,781	10,423,088	FIELD JOINT	48	1,128,150	10,431,710	ROV FIX				
24	1,126,824	10,423,549	ANODE	49	1,128,127	10,431,963	ROV FIX				
25	1,126,902	10,423,802	ROV FIX	50	1,128,099	10,432,103	FIELD JOINT				

RATON SOUTH FIELD DEVELOPMENT PROJECT AS-BUILT 04 1/2" BLKO EAST PIPELINE FROM MISSISSIPPI CANYON AREA BLOCK 292 TO VIOSCA KNOLL AREA BLOCK 900 SEGMENT#18176 GULF OF MEXICO



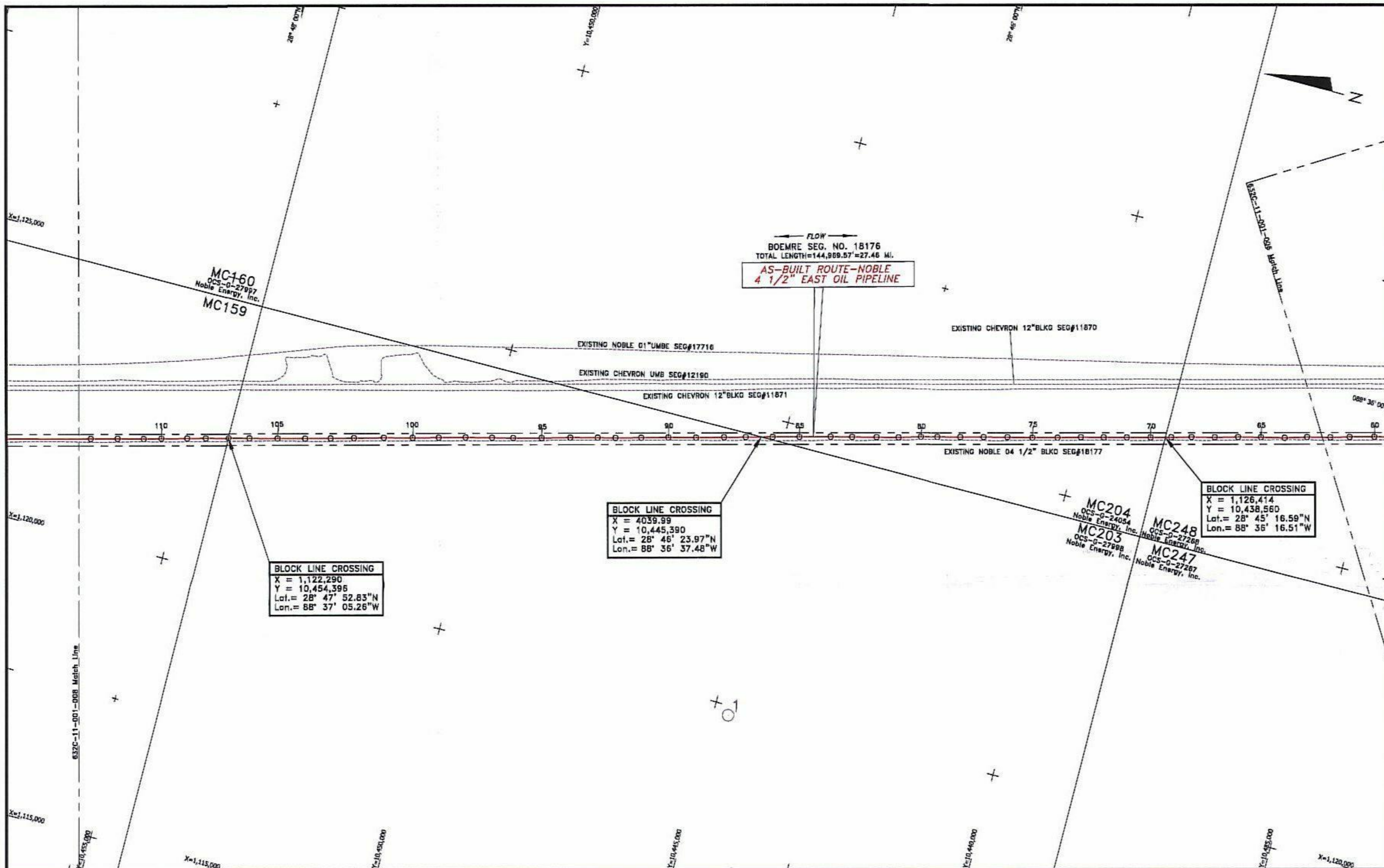
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A2	09/20/11	ISSUED FOR CLIENT COMMENTS	VR	SW	RG
A1	08/24/11	ISSUED FOR CLIENT COMMENTS	VR	SW	SF

Survey Dates: JULY 28th, 31st & AUG 9th, 2011 Survey Vessel: HELIX EXPRESS

UTEC Ref. No. 632C-11-001	UTEC Drawing No. 632C-11-001-006	Sheet 001	Of 007
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Plot Size ANSI D

PLAN VIEW



- NOTES**
- 1) PIPELINE COORDINATES ARE THE POSITIONS OF THE R.O.V. (REMOTELY OPERATED VEHICLE) LOCATED AT THE POINTS USING BOTH VERIPDS LD2 ULTRA DGPS RECEIVING SPOTBEAM CORRECTIONS, VERIPDS ULTRA DGPS RECEIVING INMARSAT CORRECTIONS, SONARDYNE FUSION LBL (LONG BASELINE) ACOUSTIC POSITIONING, KONGSBERG HIFAP USBL (ULTRA SHORT BASELINE) ACOUSTIC POSITIONING AND RDI WORKHORSE DVL POSITIONING.
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 - 4) AS-BUILT SURVEY DATE: JULY 28TH, JULY 31ST AND AUGUST 9TH, 2011.
 - 5) CLIENT DRAWING REFERENCE: 16172-BASEMAP.DWG AND 24105013ENG.DWG.

LEGEND

	AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176
	AS-FOUND PIPELINE OR UMBILICAL
	RIGHT-OF-WAY (PROVIDED BY CLIENT)
	BOEMRE EXISTING PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
	AS-INSTALLED HFL
	AS-INSTALLED EFL
	BOEMRE PROPOSED PIPELINES/UMBILICALS/FLYING LEADS/JUMPERS
	BOEMRE LEASE BLOCK BOUNDARIES
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	UTM TICKS
	BOEMRE WELLS

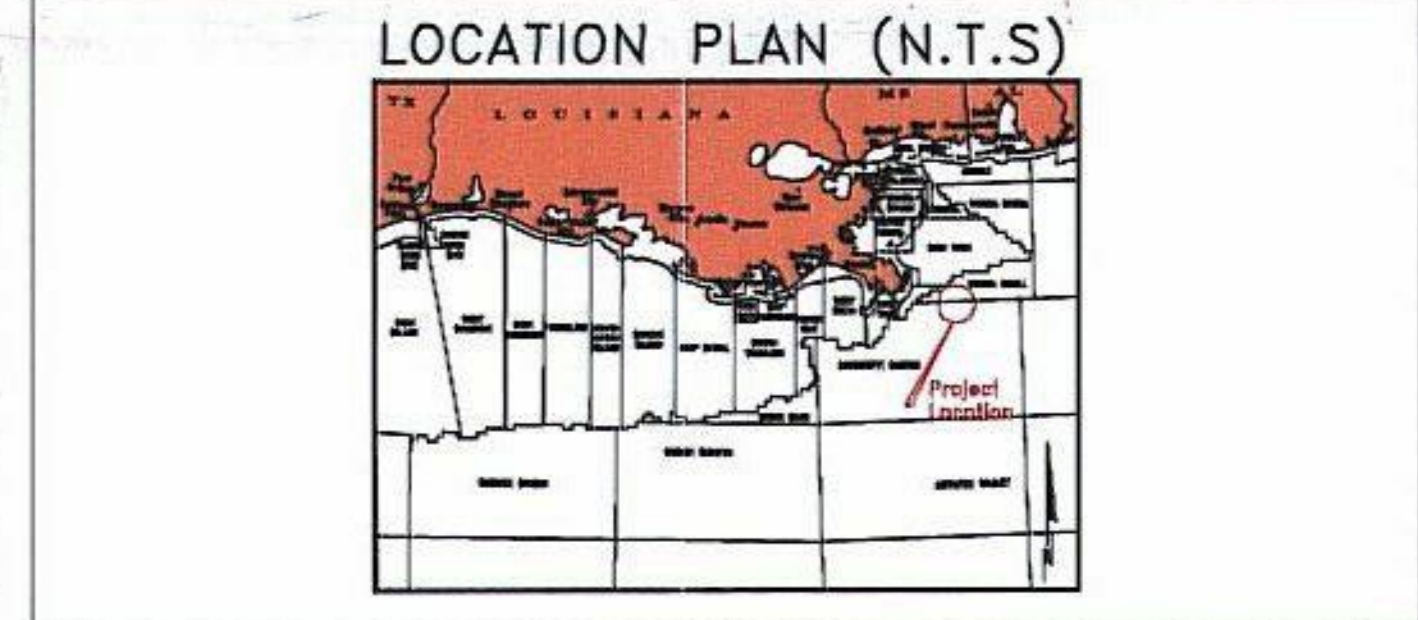
GEODESY

Survey Datum: NAD 27
 Ellipsoid: Clarke 1866
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 Longitude of Central Meridian: 87°W
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CERTIFIED CORRECT AS TO THE HORIZONTAL POSITION OF THE AS-BUILT PIPELINE BASED ON THE SURVEY METHODS NOTED.

NATHAN EBY, R.P.L.S.
 TEXAS REG #6198

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AS-BUILT NOBLE 4 1/2" EAST OIL PIPELINE SEG#18176

POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION	POINT	X-COORDINATE	Y-COORDINATE	DESCRIPTION
60	1,127,342	10,435,029	ROV FIX	85	1,124,809	10,444,747	ROV FIX	110	1,121,990	10,455,532	FIELD JOINT
61	1,127,232	10,435,448	ROV FIX	86	1,124,691	10,445,200	ROV FIX	111	1,121,907	10,455,831	ROV FIX
62	1,127,138	10,435,770	FIELD JOINT	87	1,124,569	10,445,654	ANODE	112	1,121,795	10,456,276	ROV FIX
63	1,127,041	10,436,165	FIELD JOINT	88	1,124,471	10,446,020	ROV FIX	113	1,121,676	10,456,731	FIELD JOINT/ANODE
64	1,126,930	10,436,540	FIELD JOINT	89	1,124,343	10,446,494	ROV FIX				
65	1,126,836	10,436,946	FIELD JOINT	90	1,124,224	10,446,962	ROV FIX				
66	1,126,740	10,437,333	FIELD JOINT	91	1,124,101	10,447,419	ROV FIX				
67	1,126,633	10,437,724	FIELD JOINT	92	1,123,985	10,447,854	ANODE				
68	1,126,535	10,438,118	ROV FIX	93	1,123,912	10,448,155	ROV FIX				
69	1,126,440	10,438,460	FIELD JOINT	94	1,123,792	10,448,619	ROV FIX				
70	1,126,348	10,438,809	FIELD JOINT	95	1,123,660	10,449,102	ROV FIX				
71	1,126,243	10,439,209	FIELD JOINT	96	1,123,535	10,449,582	ROV FIX				
72	1,126,143	10,439,597	FIELD JOINT	97	1,123,448	10,449,942	ROV FIX				
73	1,126,045	10,439,984	FIELD JOINT	98	1,123,336	10,450,391	ROV FIX				
74	1,125,935	10,440,377	ROV FIX	99	1,123,216	10,450,845	ROV FIX				
75	1,125,824	10,440,803	ROV FIX	100	1,123,096	10,451,289	ROV FIX				
76	1,125,723	10,441,225	ANODE	101	1,122,972	10,451,775	ROV FIX				
77	1,125,619	10,441,627	FIELD JOINT	102	1,122,835	10,452,277	ANODE				
78	1,125,519	10,442,020	FIELD JOINT	103	1,122,729	10,452,672	ROV FIX				
79	1,125,420	10,442,408	ROV FIX	104	1,122,615	10,453,103	ROV FIX				
80	1,125,346	10,442,893	FIELD JOINT	105	1,122,496	10,453,568	ROV FIX				
81	1,125,236	10,443,069	FIELD JOINT	106	1,122,376	10,454,041	ROV FIX				
82	1,125,145	10,443,442	ANODE	107	1,122,290	10,454,396	ROV FIX				
83	1,125,040	10,443,856	FIELD JOINT	108	1,122,190	10,454,784	FIELD JOINT				
84	1,124,948	10,444,220	ROV FIX	109	1,122,107	10,455,096	FIELD JOINT				

RATON SOUTH FIELD DEVELOPMENT PROJECT
AS-BUILT 04 1/2" BLKO EAST PIPELINE
FROM MISSISSIPPI CANYON AREA BLOCK 292
TO VIOSCA KNOLL AREA BLOCK 900
SEGMENT#18176 GULF OF MEXICO

Scale 1 : 1000

Rev. No.	Date	Comment	Drawn	Checked	Appr.
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UTEC Ref. No. 632C-11-001	UTEC Drawing No. 632C-11-001-007	Sheet 002	Of 007
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Plot Size ANSI D