0407Off_Pstr_Matterhorn 6/30/04 4:34 PM Page 1

ATLANTIA SEASTAR® TLP FOR MATTERHORN

ANOTHER SUCCESSFUL EPCI PROJECT BY ATLANTIA OFFSHORE LTD

Offshore

TOTAL

Matterhorn

Matterhorn Field Development Project

Mississippi Canyon 243

July 2004

Sponsored by: Jean-Pierre Hurel, Matterhorn Project Manager – TOTAL E&P USA, INC.
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For additional copies of the poster, please contact Betty Kight at PennWell (bettyk@pennwell.com)

POSTER 51 OTC 2004

DECK FABRICATION AT GULF MARINE FABRICATORS YARD – TEXAS

1. Deck pancake fabrication under cover in assembly bay. 2. Cellar deck fabrication/outfitting at erection site. 3. Production deck attached to lower deck supports. 4. Drilling deck fabrication near erection site. 5. Drilling deck being set onto lower deck supports. 6. Topsides fabrication completed and ready for transportation.

DECK TRANSPORTATION AND INSTALLATION

7. Transport of topsides to location on the MWB-403 barge. 8. Setting the deck at night. 9. Topsides installed by Heerema Hermod heavy lift vessel.

HULL FABRICATION AT KEPPEL FELS – SINGAPORE

10. Column sections on jigs for ring frame fit-up. 11. Base node assembly in dry dock. 12. Base node complete. Tier 1 set into place. 13. Tiers/HULS set in position by floating crane. 14. Setting of Tiers/HULS completed. 15. Mating of pontoon section white afloat.

HULL TRANSPORTATION AND INSTALLATION

16. Hull preparing for dry tow - Singapore to GOM. 17. Dry transport of the hull to the GOM on the Tai An Kou vessel. 18. Hull arrives at MC 243. 19. Hull installed by Hermod heavy lift vessel.

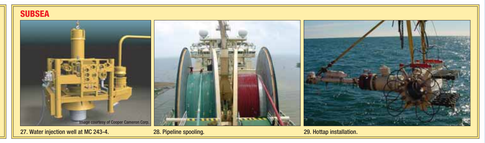
RISER FABRICATION

20. MTCP – Master Tensioner Control Panel. 21. Production riser bolstered and ready to ship from RTI Energy Systems. 22. Prod. riser tensioner test frame.

RISER INSTALLATION

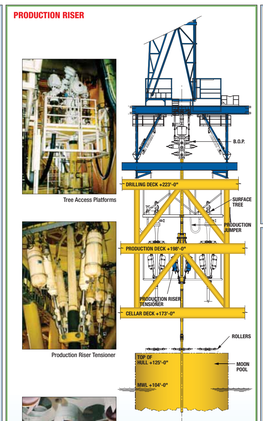
23. Complete riser string bolsters. 24. Fairing riser joint. 25. Tree access platforms. 26. Running production riser.

SUBSEA

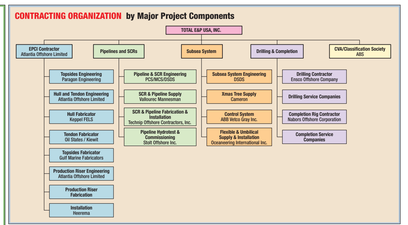


27. Water injection well at MC 243-4. 28. Pipeline spooling. 29. Hottap installation.

PRODUCTION RISER



CONTRACTING ORGANIZATION by Major Project Components



INNOVATION AWARD

Innovation Award given to Matterhorn

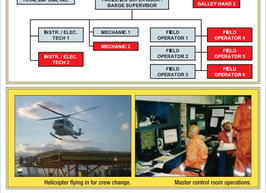
The Matterhorn project team won a Total Exploration & Production Innovation Award in 2003, a prestigious company honor awarded annually to employees who achieve major innovations within the industry. As the first tension leg platform of the worldwide Total group, Matterhorn was selected from more than 70 projects to receive this special recognition.

CREW ROTATION SCHEDULE

CREW ROTATION SCHEDULE

DAYS	7	7	7	7	7	7
CREW A & OIM 1						
CREW B						
CREW C & OIM 2						
CREW D						

TOTAL E&P USA, INC. MATTERHORN OPERATIONS ORGANIZATION CHART



Helicopter flying in for crew change. Master control room operations.

GENERAL INFORMATION

OWNERSHIP

TOTAL E&P USA, INC.	100%

LOCATION INFORMATION

Location:	Mississippi Canyon Block 243
Water Depth:	2,859 feet (858.3 m)
Distance from New Orleans:	100 miles (160 km)
Distance from Shore:	60 miles (96.5 km)
Seabottom Temperature:	40°F

FIELD DEVELOPMENT

Field Development Approach:	7 dry tree wells and one sub-sea water injector

OPERATIONS INFORMATION

Operations Center:	Houston
Shore Base:	Fourchon
Field Life:	15 years

HOST FACILITY

Type:	Single Column TLP
Design:	Atlantia's SeaStar™ TLP (2nd Generation)
Hull Diameter:	64 feet (25.6 m)
Moonpool Diameter:	34 feet (13.6 m)
Hull Height:	125 feet (38.1 m)
Pipe Deck:	11,000 tons
Dry Deck Levels:	
a. Drilling Deck:	140' x 140'
b. Production Deck:	140' x 140'
c. Cellar Deck:	140' x 140'
Quarters Building:	100 persons during completion/22 Persons during production with Heliport
Heliport:	Rated for Bell 412/Sikorsky-76
Design Life:	20 years

TENDONS

Number of Tendons:	6 tendons - 2 per pontoon
Total Tendon Length:	2,715 feet (827.5 m)
Tendon Jt. Length:	290 feet (88.4 m)
Tendon Diameter:	30" O.D. (812.8 mm)
Tendon Wall Thickness:	1.147" (29.02 mm)

FOUNDATION PILES

Quantity & Length:	6 piles, 400 feet (121.92 m)
Diameter:	36" (24.00 x 4 wall)
Penetration:	385 feet (117.35 m)

PROCESSING CAPABILITY

Oil System:	33,000 BOPD
Gas System:	55 MMSCFD (dehydration) - 100 MMSCFD)
a. Compression Capability:	55 MMSCFD
b. Export Recovery:	95% ethane
c. Separation:	three stages (HP, IP, LP)
Produced Water:	20,000 BWPD

UTILITY SYSTEM

Gas Generation:	2 x Solar Taurus 60 (4.6 MW each)
Emergency Generator:	1 x 1,200 KW

EXPORT SYSTEM

Export Oil Pipeline:	16 miles x 8" (Cheneron Pipeline to SP 50)
Export Gas Pipeline:	16 miles x 10" (to MC 20)

FLOWLINE INFORMATION

Flowline 1	4" Wellstream 3,500 psi - Dynamic Structure	Length 9,000 ft

UMBILICALS

Umbilical 1	4"- Direct Hydraulic - 7,500 psi HP 5,000 LP psi - Multiplex	10,200 ft

RISERS

Gas Export Steel Catenary Riser:	10" SCR
Oil Export Steel Catenary Riser:	8" SCR
Direct Vertical Access Risers:	3 x 10-3/4", 3 x 9-5/8" & 1 x 9-7/8"

WELL INFORMATION

Initial Wellhead Temperature:	98 to 160°F
Well Shut – In Tubing Pressure (SITP):	1,900 to 5,500 psi
Design Max Well Flowrate:	3,000 to 12,000 BOPD
Average GOR:	1,000 scf/bbl
API Gravity:	35 to 40°API

CLASSIFICATION

Classification Society & Guide:	ABS
Class:	+A1 Floating Installation (TLP)

FLOWLINE INTERVENTION

Work Over:	1000 HP WO unit
Coiled Tubing:	From Drilling Deck

ROYALTY RELIEF

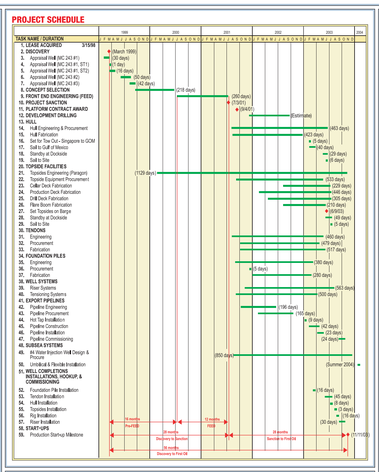
TOTAL E&P USA, INC.	100%

SUBSEA SYSTEM

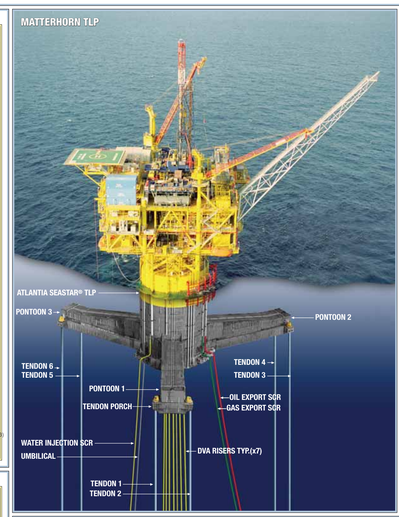
Number of Trees:	1 Tree (water injection)
Tree Type:	Cameron Spool Tree
Size and Rating:	5" x 2" API 10 K
Choke:	Cameron
Flowline Connection:	Cameron CVC

For additional information, see 2004 OTC Papers:
16607 Matterhorn Development Drilling-Innovation and Performing Equals Deepwater Directional Success
16608 Matterhorn TLP Dry-Tree Production Risers
16609 Integrated Global Performance Analysis of the Matterhorn SeaStar TLP
16610 Challenges, Design, and Experience on Oil, Gas, and Water-Injector Wells
16611 Matterhorn Project
16612 Matterhorn Steel Catenary Risers-Critical Issues and Lessons Learned for Reel-Layed SCRs to a TLP
16613 Matterhorn Export Pipeline and Steel Catenary Riser Design Fabrication, and Installation

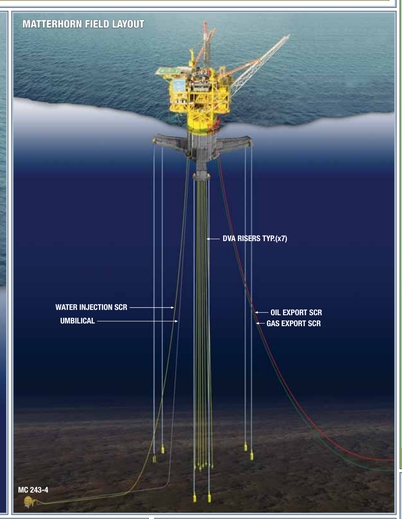
PROJECT SCHEDULE



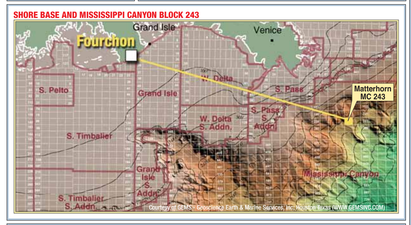
MATTERHORN TLP



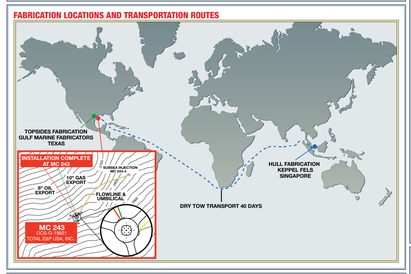
MATTERHORN FIELD LAYOUT



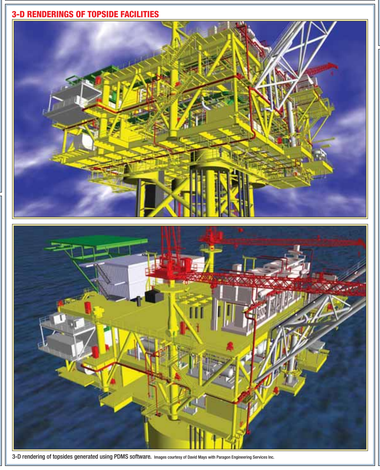
SHORE BASE AND MISSISSIPPI CANYON BLOCK 243



FABRICATION LOCATIONS AND TRANSPORTATION ROUTES

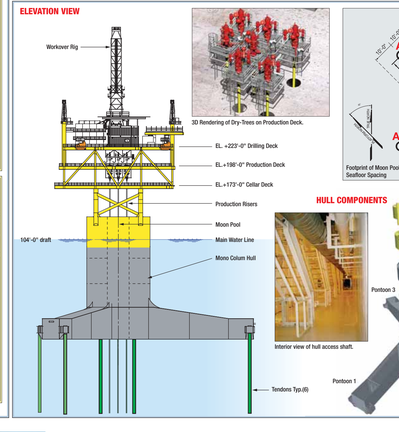


3-D RENDERINGS OF TOPSIDE FACILITIES

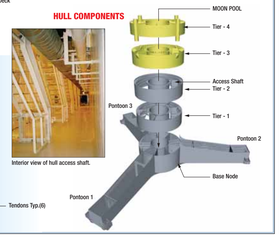


3-D rendering of topsides generated using PDMS software. Image courtesy of David Mayo with Paragon Engineering Services Inc.

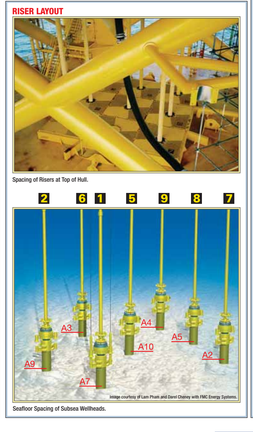
ELEVATION VIEW



HULL COMPONENTS



RISER LAYOUT

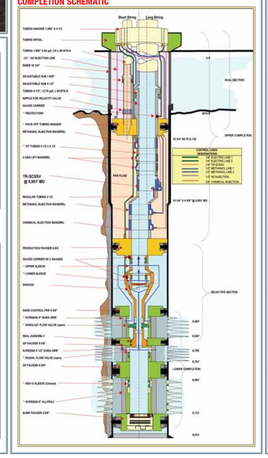


Spacing of Risers at Top of Hull.

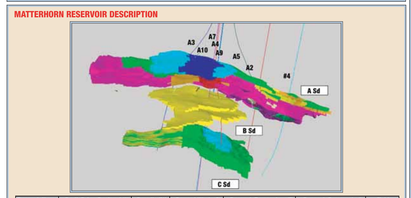
Seafloor Spacing of Subsea Wellheads.

Image courtesy of Lam Pham and Darrel Cheney with FMC Energy Systems.

COMPLETION SCHEMATIC

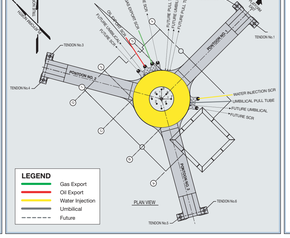


MATTERHORN RESERVOIR DESCRIPTION



Reservoir Name	Depth Below Sea Level (ft)	Porosity (%)	Permeability (nt D)	Reservoir Temperature (F)	Reservoir Pressure (psi)	Fluid
A 5d	6300	25-35	100-1000	113	3400	Oil/Gas
B 5d	7900	25-30	400	135	3600	Oil/Gas
C 5d	8000	25-30	500	140	4700	Oil/Gas
E 5d	9800	20-30	100	185	6700	Gas Cond.

RISER UMBILICAL ORIENTATION



LIST OF CONTRACTORS AND VENDORS

COMPANY	SERVICE OR PRODUCT	PHONE	WEBSITE
ENGINEERING & PROJECT MANAGEMENT			
Atlantia Offshore Limited	EPCI Contractor & Conceptual Engineering	281-899-4300	www.atlantia.com
Deep Sea Development Services	Pipeline and Subsea System Engineering and Supervision	281-858-8200	
Global Project Consultants, Inc.	Construction Supervision and Engineering	281-759-1650	www.globalproject.com
Paragon Engineering Services Inc.	Topsides Detail Engineering	713-379-1000	www.paraengr.com
Project Consulting Services	Pipeline Engineering	713-952-7380	www.projectconsulting.com
TOPSIDE FACILITIES DECK SECTION			
Abbeville Offshore Quarters, Inc.	Temporary Drilling Quarters	337-898-0644	www.abbevilleoffshore.com
AGI Industries	Closed Drain Sump Skid	318-235-0626	www.agiindustries.com
Allen Process Systems / Allen Tank	Glycol-Gas Dehydration Unit - Contactor Skid - Regen Skid	337-365-2492	www.allenprocess.com
Alliance Measurement Systems	Sales Gas Meter Skid	985-872-0005	www.alliancemeasurement.com
Continental Casing/Continental Valve & Fittings	Gaskets and Bolting	281-376-9600	www.cvrf-casing.com
Corrosion Companies	Corrosion Coupons & Monitors	504-436-0000	www.corrpro.com
Delta Engineering Corporation	Living Quarters-Helideck	713-466-8091	www.delta-eng.com
Dresser Masoneilan Controls, Inc.	Control Valves	281-445-3201	www.dresser-mc.com
Dupre Valve & Automation (DVA)	Pressure Gauges and Pressure Switches	713-849-3460	www.rubtel.com
Dynamic Industries	Hook-up & Commissioning Services		
Equipment Valve & Supply, Inc.	ICP Valves	281-498-6600	
Excellco International Corporation	Sewage Treatment	281-240-6770	www.nexsoft.com/~excellco
Gardner Denver, Inc.	Low Pressure Compressor	713-896-6210	www.gardnerdenver.com
GBA Corona, Inc.	Flare Tip & CO_2 Snuffing Unit	713-773-9933	www.gba-corona.com
GE Panametrics, Inc.	Ultrasonic Flare Meter	713-464-7041	www.ge.com
General Marine Leasing	Temporary HVAC Quarters	504-394-1155	www.generalmarineleasing.com
Global Industries	Quarters Building	281-578-7000	www.globalindustriesgroup.com
Gulf Marine Fabricators	Topsides Fabrication	361-776-7551	www.fechtelp.com
H_O, Inc.	Watermaker Skid	337-234-8017	www.watermaker.com
Hanover Companies	Methanol Storage Tank, Flare Scrubber Skid	281-447-6787	www.hanover-co.com
Integrated Flow Solutions (Formerly Flowtronex Int)	Firewater Pump Skid, Pipeline Pumps	713-956-9473	www.ifsolutions.com
Joyler	Level Indicator/Transmitter	281-489-6969	www.joyler.com
KMI (K Management Inc.)	Sales Gas and Oil Pig Launcher Skids	800-325-7841	www.kmitb.com
K-Tek Corporation	Level Transmitters	800-725-5855	www.ktekcorp.com
Lancon Co.	Deluge Valves	281-685-9797	www.lancon.com
Lilco-Glenmatic, Inc.	EACT Unit	713-464-1642	www.lenc.com
Micro-Blast International, Inc.	Sand Blaster	409-833-7878	www.microblastinternational.com
Moores Pump & Services	Seawater Injection Booster Pump Skid	800-457-7867	www.mooresservices.com
New Offshore, Inc.	Oil Tank Skid, Meltdrown Heater Skid	800-467-8670	www.newindustries.com
Omega Natchez	Heat Medium Skid	800-360-6020	www.omeganatchez.com
Petro-Flex	Open Drain Sump	409-760-1555	www.petroplix.com
Powell Industries Inc.	MCC Building and Equipment	281-452-6085	www.powellelectric.com
Rawson	Level Gauges	713-664-1400	www.rawson.net
Redfish Rental	Temporary Generator Rental	985-868-6758	www.redfishrental.com
Rosemount, Inc.	Pressure, Temperature & Level Transmitters	504-456-3051	www.rosemount.com
Seatrax, Inc.	Platform Cranes	713-896-6500	www.seatrax.com
Shell Engineering	Sea Water Cooler	713-241-6161	www.shell.com/sgp.com
Sola Communications	Portable Radios	713-641-5023	www.solacomm.com
Solar Turbines	Turbine Generators	713-895-2300	http://mysolar.cat.com
Specialty Equipment	Valves	800-525-5825	www.seviinc.biz
Sunbelt Supply Co.	ICP Valves	713-972-2222	www.hughessupply.com
Tech Oil Products (Enviro-Pak)	Trash Compactor	281-485-1655	www.enviro-pak.net
Tech Transfer	Topsides Compressor Vibration Engineering Analysis	713-463-3636	www.techtran-hou.com
Technical Control Systems	Production Manifold Skid	800-203-2674	tcsystems@cox-internet.com
Thermon Heat Tracing Services, Inc.	Heat Tracing Equipment	713-433-2600	www.thermon.com
Tidewater Signal	Navigational Aids	713-861-3181	www.tidelandsignal.com
Turtle & Hughes	Cable Support Grips & Switches	713-238-5247	www.turtle.com
Valmet Flow Control Controls	Control Valves	800-833-9450	www.valmet.com
Q. S. Filter	Injection Water Treating System	800-643-3101	www.qsfilter.com
Unicel Incorporated	Flotation Cell Skid	281-477-3100	www.unicelinc.com
Universal Compression	Flash Gas Compressors	713-335-7000	www.universalcompression.com
Vee Enterprise, Inc.	Deluge Nozzles, Fiberglass Piping	713-472-5071	
W Industries	PLC, Control Panels, I&E Hook-up	713-466-4463	www.w-industries.com
WPS, Inc.	Fuel Gas Skid, Production Separators, Oil Treater	888-820-2763	www.wpsinc.org
HULL/MARINE SYSTEMS			
Best Equipment/Pump Works	Deballast Pumps, Ballast Fill Pump	713-956-2002	www.bestinpump.com
DMP Sopco	Bilge Trim Pumps, Moonpool Skimmer	713-837-2800	www.dmp.com
Enardo Manufacturing Co.	8" x 10" Pressure Vacuum Relief Valve	918-622-6161	www.enardo.com
Fabrichem Industries	8" Cast Steel Basket Strainers	631-467-2040	www.fabrichem.com
Fisher Controls c/o Puffer Swinnen	Hull Valves with Actuators	281-274-6600	www.puffer.com
Gulf Coast Supply Co., Inc.	Hull Valves	713-674-5151	www.gulfcoastsupplyinc.com
Industrial Air Tool	Hull Equipment Hoist	713-477-3144	www.industrialairtool.com
Keppel FELS	Hull Fabrication	+6566837200	www.keppelfels.com
Kings Point Machinery	Inverted Vent Ball Check Valves	516-638-2712	www.kingspointmachinery.com
L. C. Eldridge	Hull Dehumidifier, Hull Ventilation Fan, and Hull Air Conditioner	713-780-7200	www.eldridgesales.com
Oil Patch Lubricants	Lubricants for Deballast Pump and Hull Hoist Housing	800-379-3835	
Point Eight Power, Inc	480 Volt Motor Control Center	504-394-6100	www.point8.com
Power Unlimited Inc.	Uninterruptible Power Supply System	281-458-6100	www.powerunlimited.com
Red Man Pipe & Supply	Pressure Gauges	281-872-4700	www.red-man.com
Texas Steam	Liquid Level Drain Trap	713-464-9955	www.steamautomatic.com
Valmatic Inc.	Hoist Hold-Numbers Motor	281-933-4500	www.valmatic.com
Wellstream & Controls	Hull Ventilation Ball Valves	281-240-6770	www.nexsoft.com
Westfield Engineering	Bronze Plaque for Hull	800-519-3344	www.westfieldengraving.com
W Industries	Valve Control and Panel, Junction Box & Distribution Panelboard	713-466-4463	www.w-industries.com
TENDONS & PILES			
Bayou Companies LLC	Tendon Pipe Coating	337-369-3761	www.bayoupipe.com
Europipe	Tubular Steel Tendon Supplier	+4921633621146	www.europipe.com
Fabricating Specialties, Inc.	Grillage and Sealfastening Tendon Fasteners	281-485-2010	www.fsihou.com
Gulf Marine Fabricators	Foundation Pile Fabrication	361-776-7551	www.fechtelp.com
Kiewit Offshore Services	Tendon Fabrication	361-775-1440	www.kiewit.com
Murray International Metals, Inc.	Tendon Pipe	713-339-2227	www.murray-metals.com
Oil States Industries (UK) Ltd.	Tendon System	+4412245960060	www.oilstates.com
Scientific Marine Services	Tendon Tension Load Monitoring System/Marine Monitoring Systems	281-858-8090	www.scimar.com
Stoles Service	Tendon End Step Assembly	361-776-7399	
UMBILICAL SYSTEMS			
ABB Offshore Systems, Inc.	Wellhead Control System	281-485-3000	www.abb.com
Cameron Subsea	Tree Valves	281-013-3000	www.benoist-inc.com
Cameron	Well #4 Subsea Tree	713-939-2311	www.coopercameron.com
FMC Energy Systems	Drilling Sub-Sea Wellheads	281-591-4000	www.fmctechnologies.com
Landmark	Tubing Studies	713-939-2000	www.lgc.com
MCS	Tubing Studies	281-646-1071	www.mcs.com
Sonar/Tract Inc.	Wall Tractors	713-952-3479	www.smartract.com
Subsea Video Systems	Subsea Camera, Frame & Winch	252-338-1001	www.subseavideosystems.com
Tetra Technologies	Well Flow Testing		www.tetratec.com
Tuboscope	Tubulars	281-893-2200	www.tuboscope.com
Weatherford	Tubing Tongs	281-756-0101	www.weatherford.com
Wellten	Well Tractors	+6282432121111	www.wellten.com
SCR & FLOWLINES & UMBILICALS			
Bredero Price	SCR Pipe Coating	281-488-2338	www.bredero-price.com
MCS International	10" and 8" SCR design verification	281-646-1071	www.mcs-international.com
Oceaneering International, Inc.	Umbilicals (free central)	713-329-4000	www.oceaneering.com
Oil States Industries, Inc.	SCR Supplier	713-510-2200	www.oilstates.com
Shell Global Solutions	VIV Analysis	281-544-8887	www.shellglobalsolutions.com
Stolt Offshore Inc.	10" and 8" pipelines hydrotesting and commissioning	713 439 1100	www.stoltoffshore.com
Technip Offshore Contractors, Inc.	10" and 8" pipeline Construction and Installation	281 248 8100	www.technip.com
Vallourec & Mannesmann	SCR & Pipe Supply	713-479-3200	www.vmtubes.com
PRODUCTION RISERS			
Bosch Rexroth	Production Riser Tensioner Cylinder	713-812-0000	www.boschrexroth.com
Century Corrosion Technologies, Inc.	Production Riser TSA Coatings	281-855-1000	www.centurycorrosion.com
CP Industries	Nitrogen Accumulator for Production Riser Tensioner System	412-664-6637	www.cp-industries.com
FMC Energy Systems	Tieback Connectors & Tapered Stress Joints for Production Risers	281-591-4000	www.fmcenergysystems.com
FMC Energy Systems	Surface Connectors	281-591-4000	www.fmctechnologies.com
Grant Prideco Inc.	Tieback Connector for Production Riser Tensioner Systems	713-308-2000	www.grantprideco.com
Industrial Air Tool	Guidance Winch System	713-477-3144	www.industrialairtool.com
MCS International	Multi-tubing Analysis for Completions	281-646-1071	www.mcs-international.com
Nitrogen Specialty Company, L.L.C.	Nitrogen Charging of Accumulators	888-466-4276	www.nitrogenspecialty.com
Polymer Sealing Solutions	Centralizer Arm Washers	713-461-3495	www.polymersealing.com
Precision Urethane Machine	Centralizer Arm Roller	979-835-3912	www.precisionurethane.com
RTI Energy Systems	Production Riser Fabrication	281-379-4289	www.rtienergy.com
Technip Offshore Contractors, Inc.	Jumpers	281-457-9300	www.technip.com
Tire-o-draulics (The TAD Group)	Hydraulic Cylinder & Clevis Rod	713-937-8111	www.tiraudraulics.com
Wire Rope Corporation of America	20 Ton Shackles	800-248-5808	www.alleycompanies.com
Xtreme Molding	Production Riser Tensioner Control Panel	713-466-9483	www.w-industries.com
Wemtech Machine Supply Company	Reel Fill Cart	713-956-6400	www.wemtech-machine.com
TRANSPORTATION & INSTALLATION			
COSCO	Transportation of Hull from Singapore to Gulf of Mexico	+6862037585333	www.cosco.com
Hatfield and Company	Installation Aid Vessels	281-893-8870	www.hatfieldandcompany.com
Heerema Marine Contractors	Hull and Topsides Installation	281-580-1600	www.heerema.com
Southwest Synthetic	Mooring Lines	713-799-1985	www.swsol.com
OPERATIONS, MAINTENANCE & LOGISTICS			
ASCO	Methanol Supply	504-396-2711	http://flolco.com
Baker Petrolite	Production Chemicals	281-276-5400	www.bakerhughes.com/bakerpetrolite
Canyon Offshore	Pipeline CP baseline survey	713-858-6010	www.canyonnv.com
Era Aviation	Helicopters	985-534-7810	www.era-aviation.com
Gaudet Oil Company	Tri-Ethylene Glycol	800-256-1250	www.gaudetoil.com
Kilgore Offshore	Supply Work Boats	281-364-6942	www.kilgoreoffshore.com
Offshore Logistics Corporation	Supply Crew Operations Personnel	281-878-6000	www.pacificbourbon.com
SEACOR Marine	Motherwell Maintenance Vessel	281-499-2000	www.seacormarine.com
Solar Turbines	Contract Maintenance	713-895-2300	http://mysolar.cat.com
Tidewater Inc.	Supply Work Boats	504-568-1010	www.tdw.com
Universal Sodexho	Catering	504-733-5761	www.universalsodexho.com
DRILLING & COMPLETIONS			
Baker Hughes	Completion Material	713-625-4200	www.bakerhughes.com
BJ Services	Lower Completion Material		www.bjservices.com
Cetco	Completion fluid clean up and disposal	847-392-5600	www.cetco.com
Drilling Supervisors, Inc.	Provided completion foreman and rig-site dispatchers	225-435-4882	DrillingSupEmsc.com
Enoss Offshore Company	Drilling Contractor	214-397-3000	www.enscointernational.com
Nabors Offshore Corporation	Supply of 1000hp Sundowner workover rig	281-874-0035	www.nabors.com
Schlumberger	Upper Completion Material	504-592-5275	www.schlumberger.com
Specialty Rental Tools and Supply	Tool Rentals	281-464-9855	www.strental.com
CERTIFICATION, INSPECTION & QUALITY CONTROL			
American Bureau of Shipping	Construction Inspection & Design Approval	281-877-6336	www.eagle.org
Noble Denton Associates Inc.	Marine Warranty Survey	281-558-7180	www.nobledenton.com
HSE (HEALTH, SAFETY & ENVIRONMENTAL)			
Alexander/Ryan	Lifeboats, Life Ring Buoys, Fire Extinguishers	713-823-1871	www.alexanderryan.com
Dräger	HSE Support / Explosion Overpressure Analysis of Topsides	281-723-8800	www.dra.com
Donley Tackaberry	Fire Extinguishers & Brackets, Fire Hoses, Emergency Tripod	281-479-9700	www.safetyfire.com/tt
Protechnics	Radioactive Tags	713-335-2673	www.corrtab.com/protechnics
Schut-Harding	Survival Capsules	337-365-1150	www.schut-harding.com
Wilson Fire Equipment & Service, Inc.	CO_2 & Nitrogen Fire Protection	713-896-4747	www.wilsonfire.com
W Industries	Emergency Shutdown and Process Control System	713-466-9