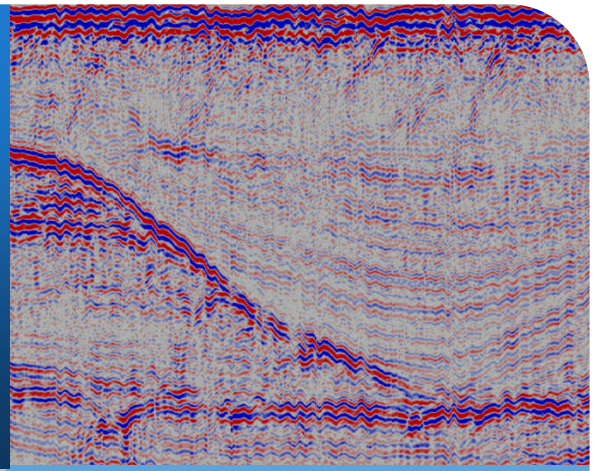
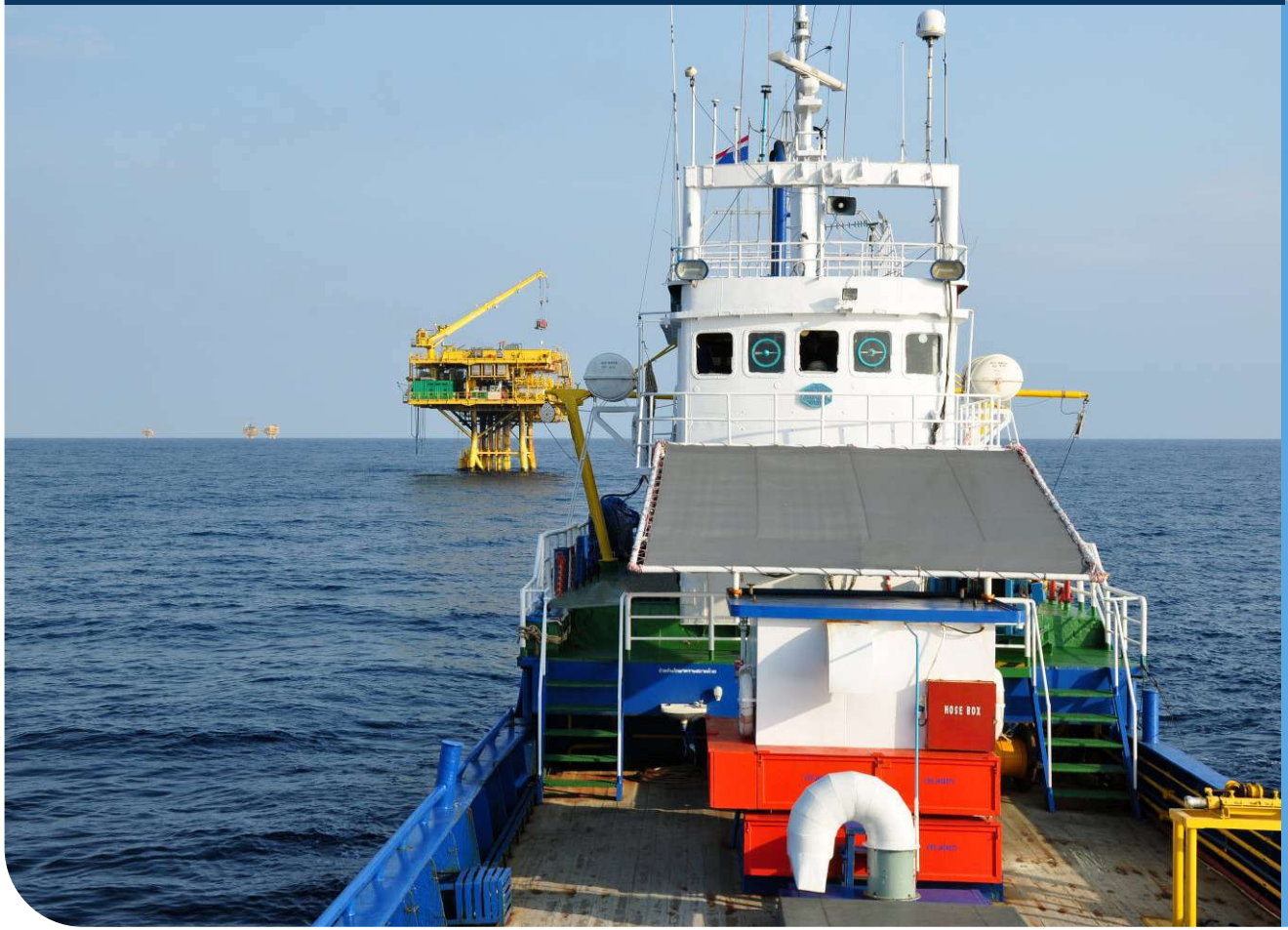
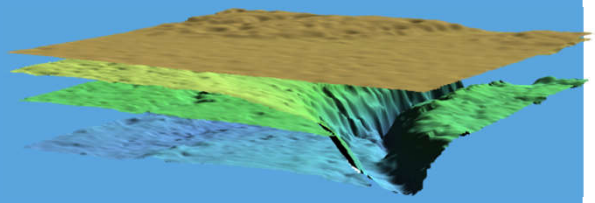
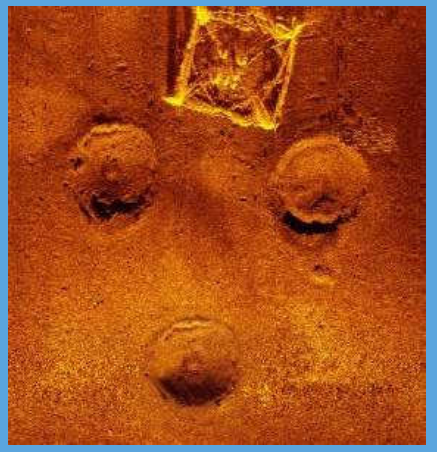
M.V.M. SURVEYS (THAILAND)





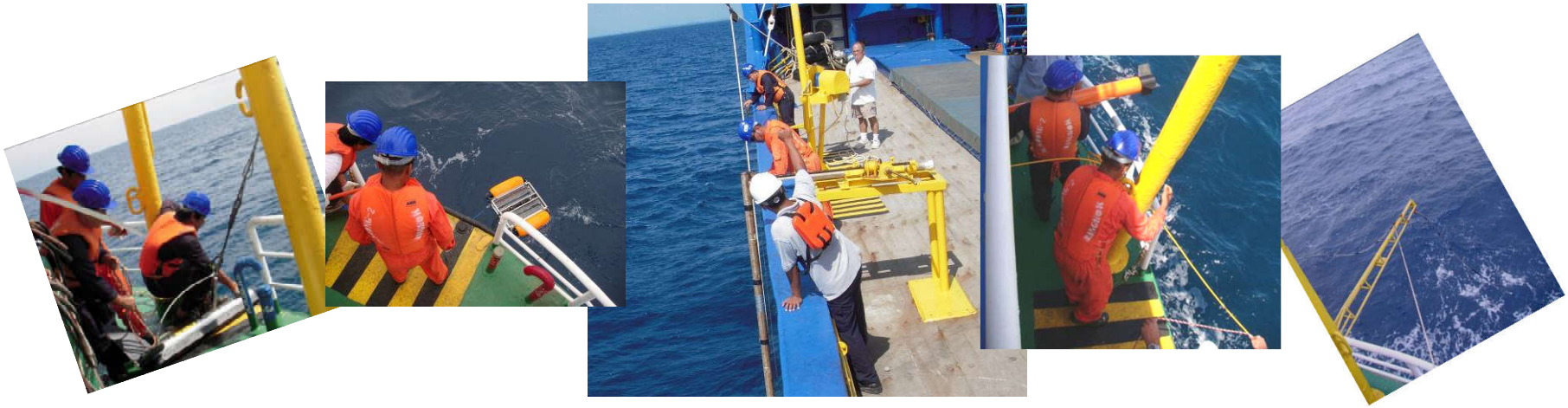




Company Profile

M.V.M. SURVEYS (THAILAND) CO. LTD.

- Founded and registered in Thailand in 1999.
- Providing professional marine geoscience, hydrographic, and positioning surveys primarily to the offshore Oil & Gas industry.



Company Profile

M.V.M. SURVEYS (THAILAND) CO.,LTD.

- Professional services
  1. High Resolution Offshore Surveys
  2. QA/QC Services
  3. Vessel Tracking and Monitoring
  4. Barge Management Navigation and Positioning Systems for rig moves, barge setups, and anchor handling
  5. Cartographic and spatial data management services
- Areas of Operation
  - Gulf of Thailand
  - Malaysia
  - Myanmar

Services

1. High Resolution Offshore Surveys

- Specialized equipment to map the seafloor in 3D using acoustic techniques
  - Bathymetry
  - Seabed features / obstructions (pipelines, wellheads, debris)
  - Detection of buried pipelines and cables
  - Seabed stratigraphy
    - Seabed foundation surveys to support design & installation of offshore structures and jack-up rig emplacement
    - Interpreted data is integrated with Geotechnical Boreholes to extrapolate soil properties over a wider area

Services

2. Barge Management Systems

- Specialized navigation and positioning systems to support anchor deployment and retrieval for barges and drilling rigs
  - Portable system is easily mobbed and de-mobbed on rigs, barges, anchor handlers, and other support vessels
    - GPS receiver unit
    - Wireless data communication
    - Computer software and graphical displays for viewing data from various vessels to allow safe, accurate, and efficient management of anchoring operations
- Currently developing next-generation capabilities
  - Remote administration and management of positioning and anchoring operations via extended telemetry and sat comms
  - Shore-based monitoring of positioning and anchoring operations

Services

3. QA/QC Services

- Rig moves
  - Planning of Tow route and anchor patterns
  - QA/QC navigation and positioning to ensure rig is setup at correct location
- High resolution surveys
  - Survey Planning. QA/QC data acquisition to ensure data is of suitable quality to meet interpretation and reporting requirements
- Engineering Construction surveys
  - QA/QC positioning during installation of pipelines and platforms
- Geodetic
  - Datums, transformations, and projections
  - Data coordinate transformations and/or conversion

Project Experiences

CLIENTS / PROJECT HISTORY for GEOPHYSICAL SURVEY From 2008 - Present

PEARL ENERGY a Mubadala company Mubadala Petroleum	SALAMANDER ENERGY ophir energy plc MEDCOENERGI Oil & Gas	COASTAL ENERGY CEPSA	KRISENERGY
157 Projects	85 Projects	82 Projects	23 Projects

Project Experiences

CLIENTS / PROJECT HISTORY for GEOPHYSICAL SURVEY From 2008 - Present

Seadrill

ITALIAN-THAI DEVELOPMENT PCL.

FUGRO

PEA

Borr Drilling

twinza

OWA GROUP

EGAT
Power for Thai Happiness

SHELF DRILLING

SIAM GAS GROUP

MM GROUP

Boskalis
Dredging & Marine Experts

CS
OFFSHORE CONSTRUCTION SPECIALISTS

TOTAL 24 Projects

DEBRIS SURVEY

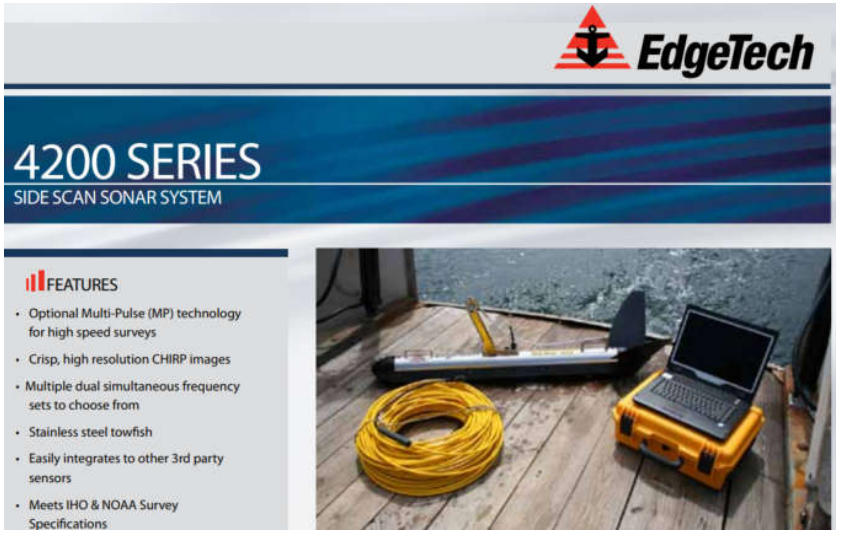
SURVEY EQUIPMENT

SIDE SCAN SONAR SYSTEM

EDGETECH 4200 Series is a versatile side scan sonar system that can be configured for almost any survey application from shallow to deep water operations.

One of the unique features of the 4200 is the optional Multi-Pulse technology, which places two sound pulses in the water rather than one pulse like conventional side scan sonar systems.

SONAR SPECIFICATIONS	STANDARD	WITH OPTIONAL MP TECHNOLOGY	
Frequency	Choice of either 100/400, 300/600 or 300/900 kHz dual simultaneous		
Operating Range (meters/side)	100 kHz: 500m, 300 kHz: 230m, 400 kHz: 150m, 600 kHz: 120m, 900 kHz: 75m		
Horizontal Beam Width:	100 kHz: 1.5°, 300 kHz: 0.5°, 400 kHz: 0.4°, 600 kHz: 0.26°, 900 kHz: 0.2°	In High Speed Mode: 100 kHz: 1.26°, 300 kHz: 0.54°, 400 kHz: 0.4°, 600 kHz: 0.34°, 900 kHz: 0.3° In High Definition Mode: 100 kHz: 0.64°, 300 kHz: 0.28°, 400 kHz: 0.3°, 600 kHz: 0.26°, 900 kHz: 0.2°	
Resolution Along Track	100 kHz: 5 m @ 200 m 300 kHz: 1.3 m @ 150 m 400 kHz: 0.6 m @ 100 m 600 kHz: 0.45 m @ 100 m 900 kHz: 18 cm @ 50 m	High Definition Mode: 100 kHz: 2.5m @ 200m 300 kHz: 1.0m @ 200m 400 kHz: 0.5m @ 100m 600 kHz: 0.45m @ 100m 900 kHz: 18 cm @ 50m	HIgh Speed Mode: 100 kHz: 4.4m @ 200m 300 kHz: 1.9m @ 200m 400 kHz: 0.7m @ 100m 600 kHz: 0.6m @ 100m 900 kHz: 26 cm @ 50m
Resolution Across Track	100 kHz: 8 cm, 300 kHz: 3 cm, 400 kHz: 2 cm, 600 kHz: 1.5 cm, 900 kHz: 1 cm		
Vertical Beam Width	50°		



DEBRIS SURVEY

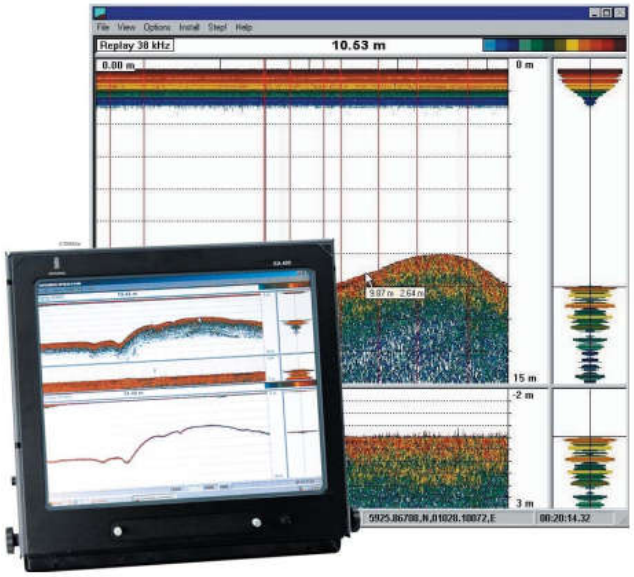
SURVEY EQUIPMENT

SINGLE BEAM ECHO SOUNDER

EA 400

KONGSBERG

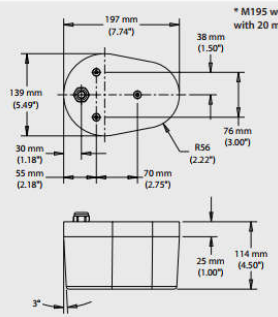
Precision hydrographic echo sounding at your fingertips...



EchoRange™ Smart™ Sensors

M195
Dual Frequency

M195 HOUSING DIMENSIONS

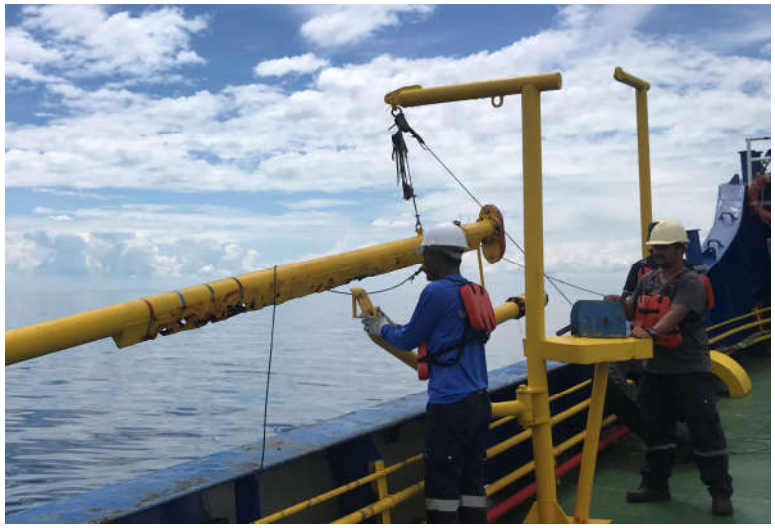


SPECIFICATIONS	
NMEA 0183* Standard Output Sentences	
Power output from transmitter:	100 W
Reverse polarity protection:	Yes
Power supply voltage:	9 – 40 VDC, Regulated
Average current draw:	300 mA @ 12 V for 30/200 kHz 150 mA @ 12 V for 200 kHz
NMEA 0183 Baud Rate:	4800 (Default)
Full Auto mode data output rate:	From 0.1 to 25 sec/interval
Manual mode:	Output rate equal to ping rate
Flash reprogrammability:	Using boot loader with encryption
Operating temperature range:	-5C to +60C
Storage temperature range:	-30C to +70C
CE certification:	Marine standard IEC60945
Minimum depth reading:	0.4 m, limited in manual mode
Maximum depth reading:	200 m, limited in manual mode
Depth display resolution:	1 cm
Depth accuracy:	99.46% at full range (see accuracy table for more info)

DEBRIS SURVEY

SURVEY EQUIPMENT

SONARDYNE SCOUT PLUS USBL & AAE Acoustic Beacon



The transceiver interrogates subsea transponders attached to targets being tracked (towfish), receives their replies and calculates the range, bearing and declination to determine the relative x,y,z position from the vessel.

Feature		Type 8024
Operating Frequency		Sonardyne HF (35-55 kHz)
Operating Range		500 Metres
Acoustic Coverage		±90° below transceiver
Accuracy		±2.75% of Slant Range (With integrated heading/pitch/roll sensor) ±0.5% of Slant Range (With external heading/pitch/roll sensors)
Tracking		Simultaneous tracking of multiple subsea targets
Integrated Sensors		Magnetic heading (0.5deg) and Pitch/Roll (0.25deg)
Power		48 V DC
Communications		RS485
Deployment Method		Through-hull or Over-the-side
Mechanical Construction	Standard	Aluminium Bronze, Powder Coated
	Lightweight Option	Aluminium Alloy, Anodised
Dimensions (LxDia)	Standard	489 mm (19.25") x 160 mm (6.3")
	Lightweight Option	500 mm (19.7") x 145 mm (5.7")
Weight in Air	Standard	18.9 kg
	Lightweight Option	10 kg
Weight in Water	Standard	8.9 kg
	Lightweight Option	2.2 kg

DEBRIS SURVEY

SURVEY EQUIPMENT

SOUND VELOCITY PROFILER

AML Minos-X

Minos•X
The New Standard in Vertical Profiling

The smallest combined CTD/SVP on the market is known for its rugged performance and ease of use. Minos•X is designed for vertical profiling in tight spaces like launches or boats. The instrument includes a shackle and sensor cage, as well as an LED status indicator to simplify deployment preparation. High-speed 25Hz sampling ensures excellent data resolution.

DEBRIS SURVEY

SURVEY EQUIPMENT

Positioning Equipment

Octopus F180*series*

Precise, reliable
motion and positioning data
in a compact package

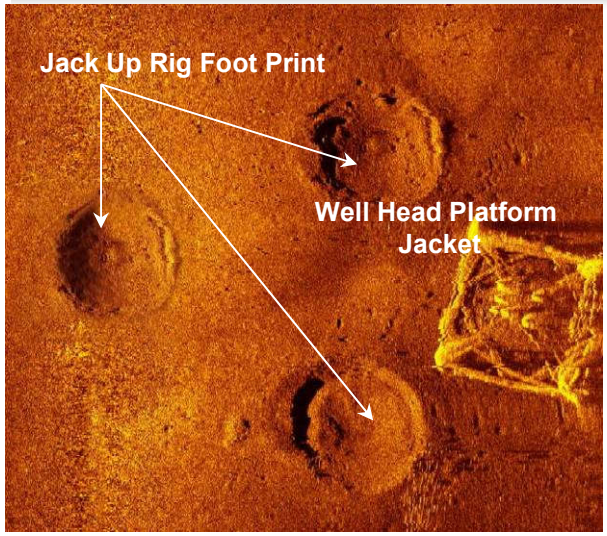
V101 and V111 GPS Compass

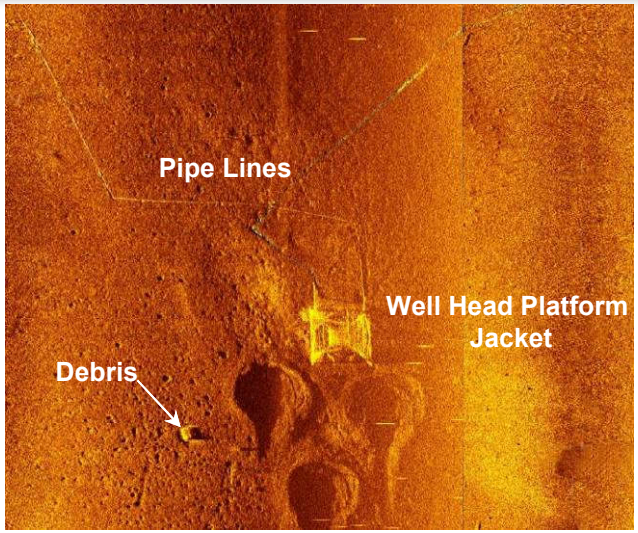
Professional Heading and Positioning Smart Antenna

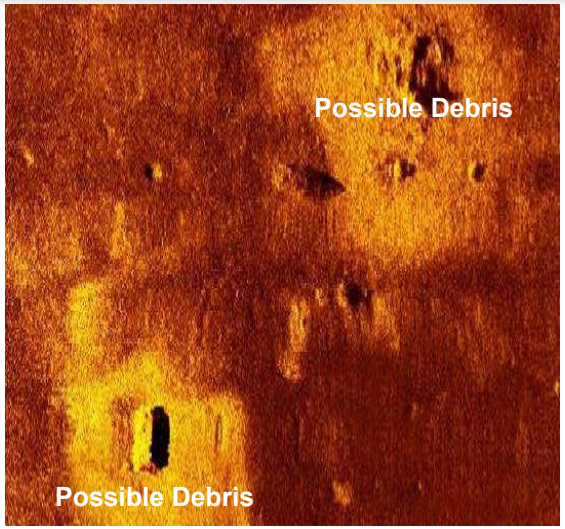
VS100 Series GPS Compass

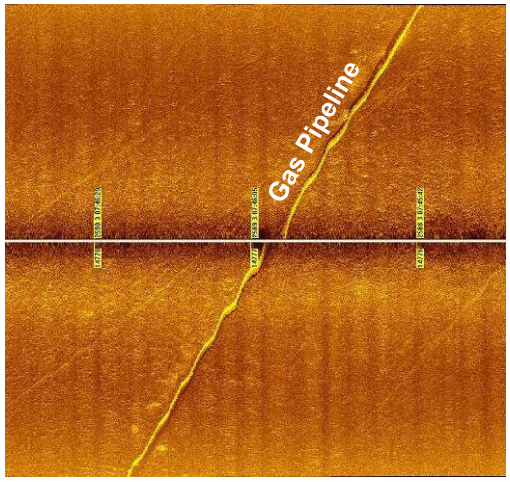
Professional Heading and Positioning Receiver

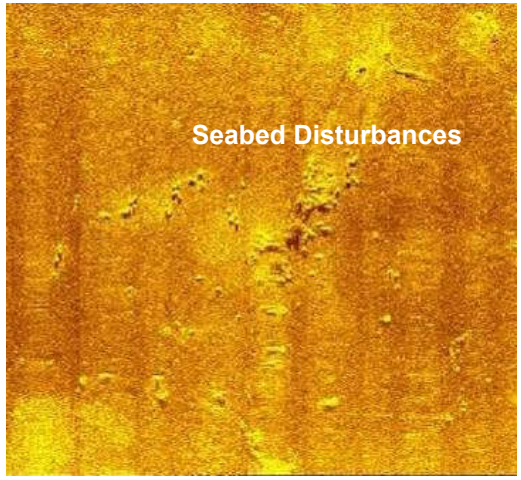
Sample Data


Jack Up Rig Foot Print
Well Head Platform
Jacket


Pipe Lines
Well Head Platform
Jacket
Debris


Possible Debris
Possible Debris


Gas Pipeline


Seabed Disturbances

Report & Charting

Client.....
Debris and Seafloor Inspection
Platform..... Location
Block.....

CLIENT LOGO

SIDE SCAN SONAR

SEAFLOOR FEATURES			
SOIL BORING CORRELATION:	N/A	EXTRAPOLATION DISTANCE:	N/A
INFERRED SEAFLOOR SEDIMENT TYPE(S):	The seabed sediment is interpreted to consist of soft mud throughout.		
NATURAL FEATURES:	Isolated pockmarks are present throughout the site attesting to the soft nature of the seabed.		
SEAFLOOR TEXTURE WITHIN THE SURVEY AREA:	Anchor and trawl scars are abundant throughout the survey area.		
REMARKS: The seabed appears relatively smooth throughout the survey area. The above mentioned features will not constrain rig emplacement. There are no natural features that would impede rig emplacement within the Platform..... survey area.			

OBSTRUCTIONS				
DEBRIS ID	OFFSET From Well	SIZE L x W x H (Metres)	COORDINATES OF DEBRIS	
			UTM	GEOGS
NA	NA	NA	NA	NA
REMARKS: No features that would constrain jack-up rig emplacement have been identified within the Platform..... survey area.				

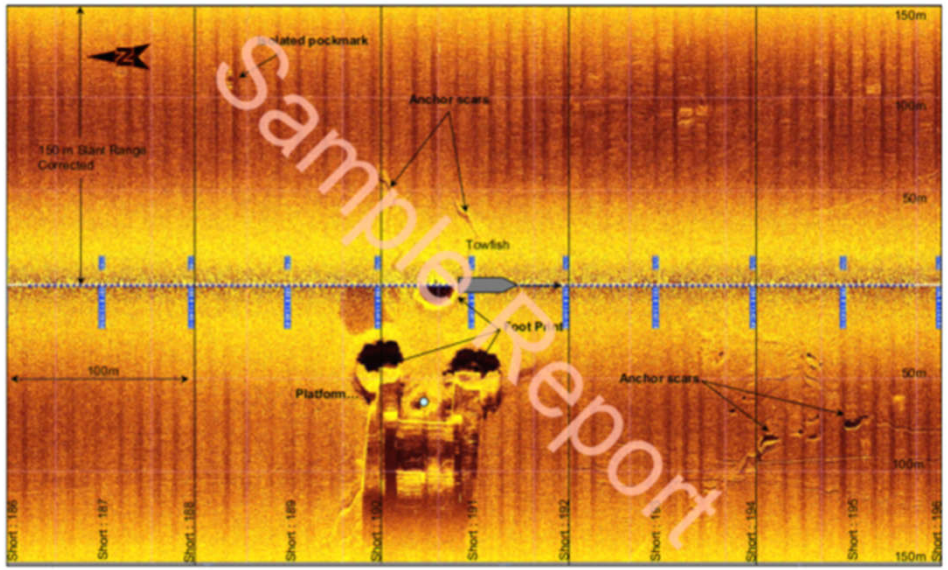
PIPELINE(S)
PIPE: CLOSEST APPROACH TO LOCATION: None

WELLHEAD POSITIONS
WELLHEADS WITHIN SURVEY AREA: None

CABLES
CLOSEST APPROACH TO LOCATION: None

SIDE SCAN RECORD
CLIENT :
PROJECT :
EQUIPMENT : Edgetech 4200FS Side Scan Sonar Tow Fish
DATE :

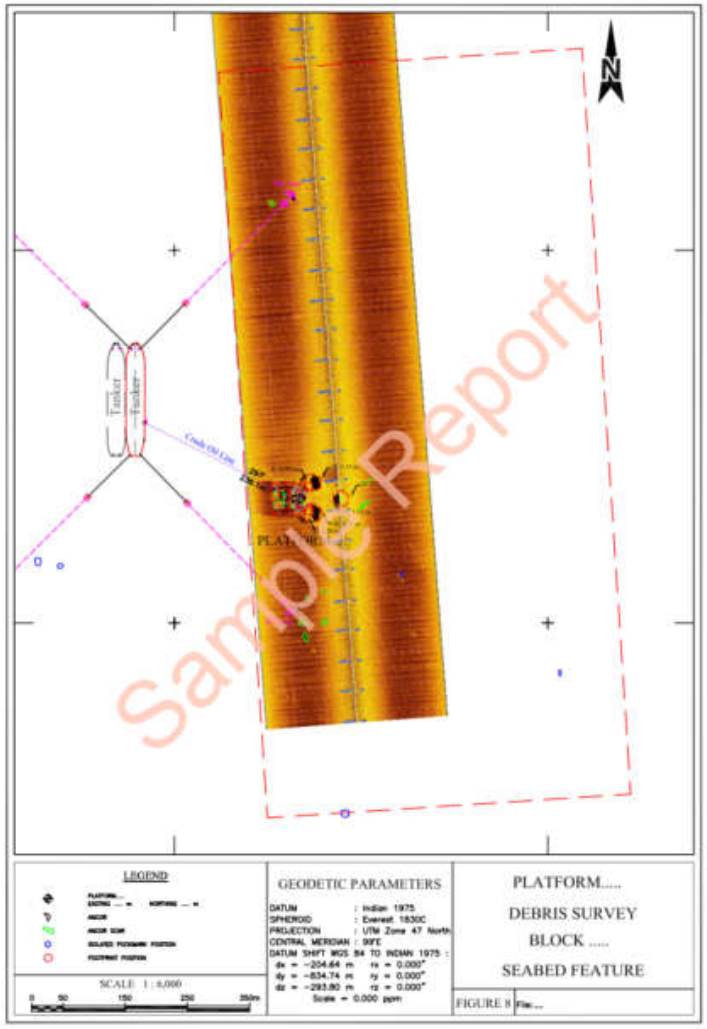
CLIENT LOGO



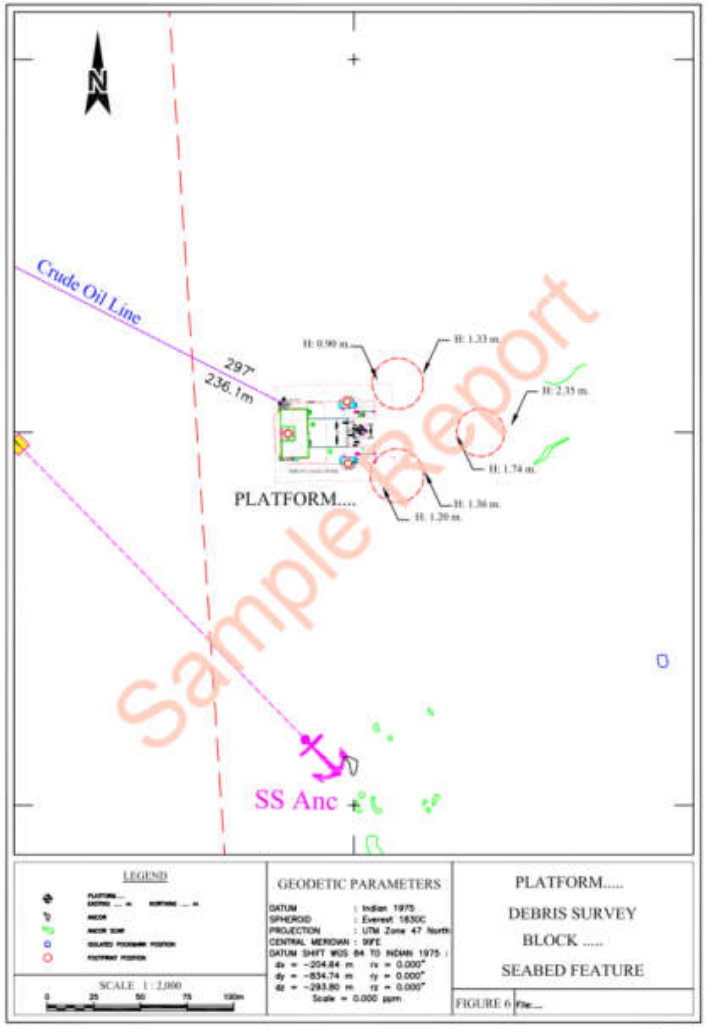
Example of Side Scan Sonar data, Line 08_P Line Az 180°, Showing the seabed at and around the Platform..... location

FIGURE 4

Report & Charting



Page 14



Page 12

SITE SURVEY

SBP SURVEY EQUIPMENT

Geo-Source 200 - 400

Marine Multi-Tip Sparker System

Ideal seismic profiling system for small and large vessels

Operational Features

- Powerful hi-resolution seismic source
- Primary pulse < 1ms, no ringing
- Proven operation in 1000 m water depth
- Penetration to 400 ms below seabed, depending on geology and survey conditions
- Vertical resolution < 30 cm

Geo-Spark 1000 Plus

Solid State Pulsed Power Supplies

Operational Features

- from 100 J to 1000J real power
- Unique negative discharge technology
- User-friendly & 100 % safe
- Very reliable, 3 rd generation model

Cutting-Edge Pulsed Power Technology

The Geo-Spark 1000 is a revolutionary high voltage (HV) power supply based on cutting-edge 'pulsed power' technology. The system uses an extremely reliable, state-of-the-art thyristor switch that can generate very short (60 - 200 µs) HV pulses of up to 15 kA at - 5.6 kV at high repetion rates.

Geo-Sense Mini-Streamers

Single Channel Arrays of 8 to 24+ Elements

- Specifically designed to capture the high frequency spectrum emitted by our VHR sources (sparkers, boomers, pingers)
- The short 8-element array was used successfully in 4500 m water depths
- The active length and number of elements can be configured to your requirements

Mini-Trace II

24-bit Very Hi-res Seismic Acquisition Module

Mini-Trace II dual acquisition module

The new Mini-Trace II acquisition module is a very high resolution, 24-bit sigma-delta, seismic recorder, which can be interfaced to any suitable laptop or desktop computer, using a plug-and-play USB connection.

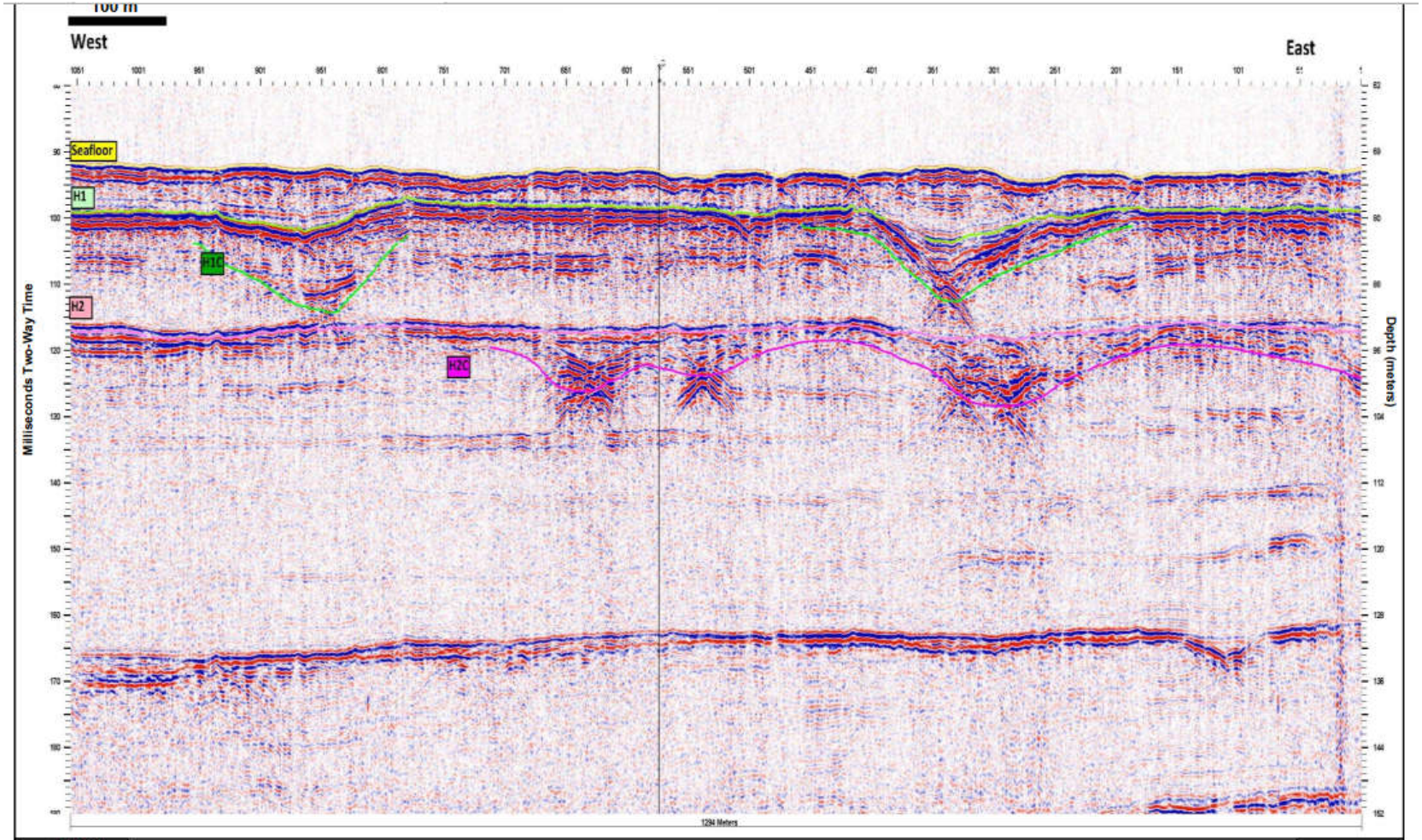
Navigation data is acquired via the LAN of the control PC or via a serial port on the acquisition module (for old systems)

Timeless and reliable hardware

The Mini-Trace II is timeless and will serve you a long time. It features extremely reliable hardware with fully integrated electronics, which will outlast by many years the typical life time of the control computer.

SITE SURVEY

REPORT AND CHARTING



Example of Sparker data, **Line I** **_22A,** Line heading 270° Showing the Proposed location.

FIGURE 12

SITE SURVEY
REPORT AND CHARTING

FOUNDATION PROPERTIES

All depths derived from the seismic data are based on an assumed speed of sound through the sediments of 1600M/Sec.
Depth of investigation for this report is 30 meters sub-seabed.

PREDICTED SOIL PROFILE AT) PROPOSED LOCATION	
UNIT AND SOIL TYPE	**DEPTH BELOW SEABED IN METERS (FEET)**
Seabed	0 m. (0 ft.)
Unit A: Probable firm to stiff clay	
H1 Reflector	0.0 – 4.3 m. (0.00 – 14.11 ft.)
Unit B: Probable firm silty clay	
H1C Reflector	NA
Unit C: Probable firm to stiff clay	
H2 Reflector	4.3 – 19.2 m. (14.11 – 62.99 ft.)
Unit D: Probable firm to stiff silty clay	
H2C Reflector	19.2 – 22.3m (62.99 – 73.16 ft.)
REMARKS: 1. The identified horizons represent Erosion Surfaces that separate the soil units.	

FOUNDATION CONSTRAINTS / HAZARDS	
SANDY INTERVALS :	None identified
IMPLICATION OF SANDY INTERVALS TO JACK-UP RIG PLACEMENT:	NA
REMARKS :	None
CRUSTAL LAYERS :	Mapped reflectors likely indicate the presence of shallow crusts throughout the survey area. Such crustal layers are not observable from seismic data.
IMPLICATION OF CRUSTAL LAYERS TO JACK-UP RIG PLACEMENT:	Rapid and uncontrolled penetration of the rig's legs.
REMARKS :	Confirmation on the presence of crustal layers should be confirmed or dismissed based on data obtained from the borehole report.
PALEO CHANNELS :	There are two (2) channels (H1C and H2C) in the survey area. (See Figure 10 for Channel Structures) The H1C channel is located 130m east of the proposed location with a depth of 6.0m -17.5m sub-seabed. The H2C channel is at the location with depths of 19.2m – 22.3m sub-seabed.
IMPLICATION OF PALEOCHANNELS TO JACK-UP RIG PLACEMENT:	Possible uneven final penetration and possible uneven rate of penetration of the rig legs.
REMARKS :	These channels should not have any impact on the rig placement.
SHALLOW GAS :	None
IMPLICATION OF SHALLOW GAS TO JACKUP RIG PLACEMENT:	NA
REMARKS :	None
FAULTS :	None
IMPLICATION OF FAULTS TO JACKUP RIG PLACEMENT:	NA
REMARKS :	None

GEOTECHNICAL SURVEY

VIBRO CORE OPERATION

Geo-Vibro Corer 3000 + 6000

High Frequency Vibro Coring System

Operational Features

- Proven performance & high quality cores
- 30 kN impulse at 30 Hz for fast penetration
- Reliable, lightweight & cost effective
- Modular construction (cores of 3 m or 6 m)
- Pivoting core barrel for horizontal retrieval
- Water injection for deep cores of 12 m and applications onshore & in transition zone
- Optional pre-pressured or compensated model for deep water operation

Applications

- Geotechnical surveys
- Stratigraphic studies
- Geological mapping
- Mineral exploration
- Environmental surveys
- Pollution investigations

High Frequency Vibration

The Geo-Corer 3000 + 6000 is a high frequency (28 Hz), electrically driven vibrocoring system. It can penetrate fast (thereby enhancing the quality of the core) into all common unconsolidated sediments, including compact sands and stiff clays, and even unconsolidated chalk.

Variable Coring Parameters

The two standard configurations are designed to take high quality cores of 6 m or 3 m length, in ordinary PVC liners with an internal diameter of 106 mm.
The penetration force can be adjusted by varying the deadweights on the vibrator head.

Proven Performance

The Geo-Corer 3000 + 6000 has a proven performance over many years, even in extreme conditions. The very fast penetration rate results in high quality cores with a minimum of sediment disturbance.

Lightweight Structure & Small Vessel Operation

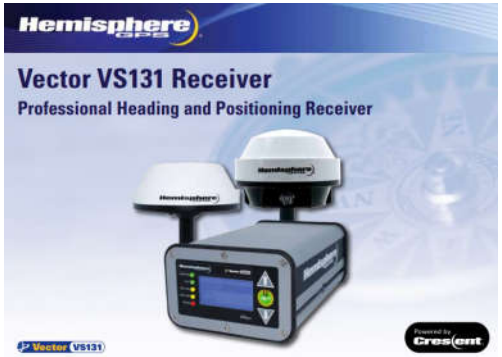
This modular system can be assembled manually in two hours (a crane is required to bring it upright) and can be deployed from a relatively small vessel. Because of its lightweight construction and smart pull-out system, it requires a limited hoisting power of five tonnes maximum. Also, its low overall weight minimizes transportation costs.

BARGE MANAGEMENT

Positioning Equipment

Seastar® 9205 GNSS Receiver

Seastar® 9205 GNSS Receiver



BARGE MANAGEMENT

TELEMETRY SYSTEMS

EDL II

Rugged & Reliable Radio Modem

RF Data Pipe for Outdoor Telemetry Applications

Environmentally Secure

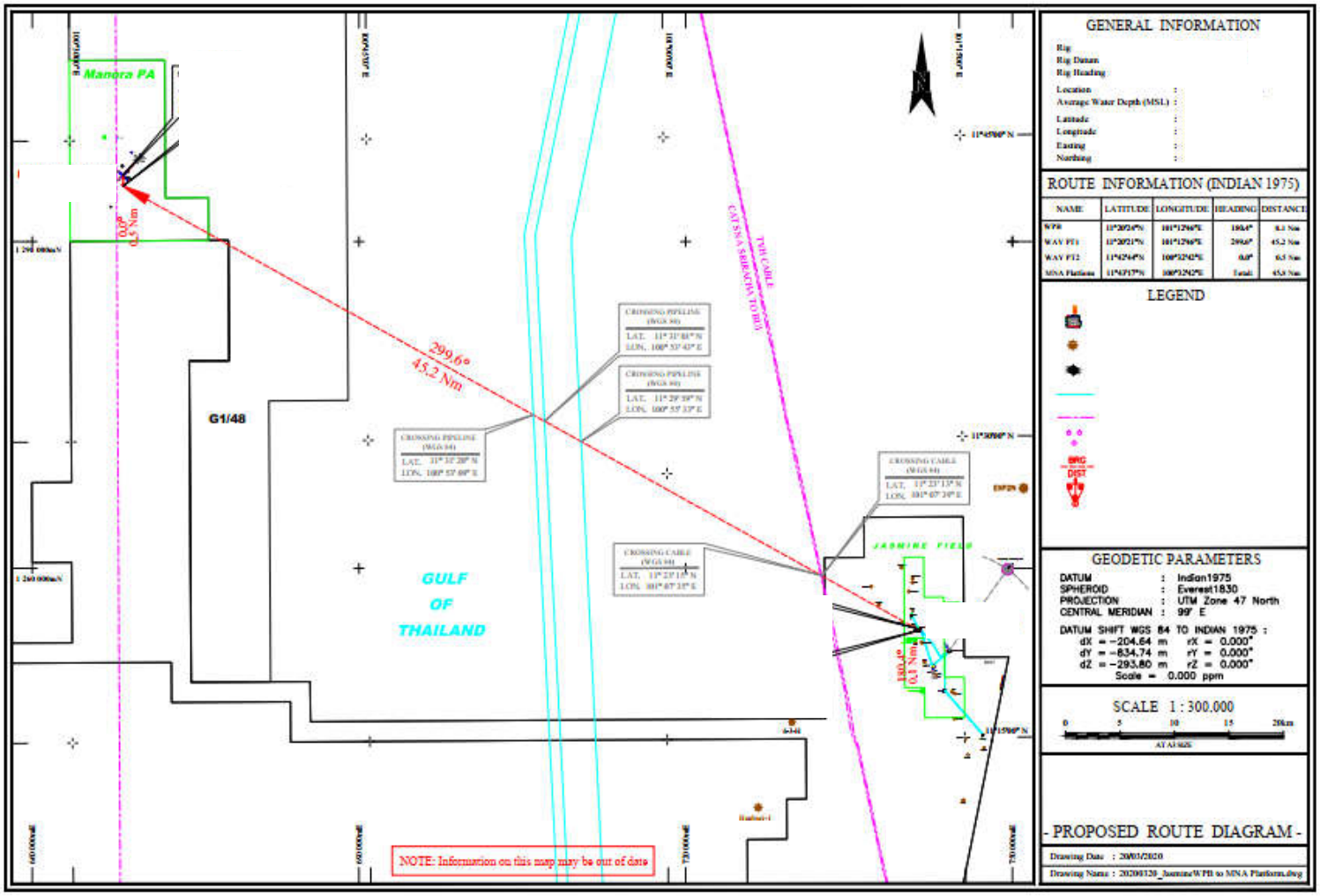
Completely Sealed Construction

Waterproof and Corrosion Resistant

Designed to Operate in All Outdoor Environments

BARGE MANGEMENT

NAVIGATION PACK / REPORT



BARGE MANGEMENT

NAVIGATION PACK / REPORT

Rig Move Information for

Easting

Northing

Latitude

Longitude

Water Depth

Proposed Rig Heading *180.0*

Straight line distance from *is 84.2 km (45.5 Nm) @ 300°*

Tow distance is 84.8 km (45.8 Nm)

Anchor Details for

Rig datum point (Center Stern) is 4.6m @ 180° from the Proposed Location

Anchor	*Length (m)*	*Length (ft)*	*Relative Brg*	*True Brg*	*Easting*	*Northing*
SB	497	1631	52.4	232.4		
SS	605	1985	136.8	316.8		
PS	605	1985	225.2	45.2		
PB	497	1631	309.4	129.4		

Distances to Structures

		Range (m)	*Range (nm)*	*Bearing*	*Easting*	*Northing*
Closest Wellhead		782	0.42	356.9		
		807	0.44	356.9		
		849	0.46	355.7		
		2242	1.21	21.6		
		3459	1.87	352.3		
Closest Wellhead Platform	WPP	0	0.00	180.0		
Closest Pipeline	AAG Cable	607	0.33	270.0		

Final Surface Position

(Local Datum: Indian 1975; Reference Spheroid: Everest 1830C; Map Projection: UTM Zone 47 North)

Proposed Location			Center Stem Position		
Latitude	:		**Latitude**	:	
Longitude	:		**Longitude**	:	
Easting	:		**Easting**	:	
Northing	:		**Northing**	:	
Rig Heading	:	180.0° True	**Rig Heading**	:	**180.5° True**

The convergence at this location is given as *+0° 26' 12" (+ 0.4366°)*

The rig center stem position : 3.19 m. (10.45 ft.) @ 159.5°True from sed location.
The rig center stem position : 566.23 m. (1857.71 ft.) @ 217.2°True from WPC Platform Center.
The final air gap : 15.24 m. (50.0 ft.) (L.A.T.) as per information from rig Barge Engineer
Water depth : 59.20 m. (194.2 ft.) (L.A.T.) as per information from rig Barge Engineer

Legs Location and Final Penetrations

Bow Leg		Port Leg		Starboard Leg	
Easting	:	Easting	:	Easting	:
Northing	:	Northing	:	Northing	:
Penetration	: 8.2m(26.9ft)	Penetration	: 8.0m(26.2ft)	Penetration	: 7.8m(25.6ft)

Note : Legs penetration as per information from Rig Barge Engineer.