BLUEWAVES

GLOBAL ENERGY SERVICES LIMITED

• Process Plant Services • Total Asset Integrity Management • Consultancy Services

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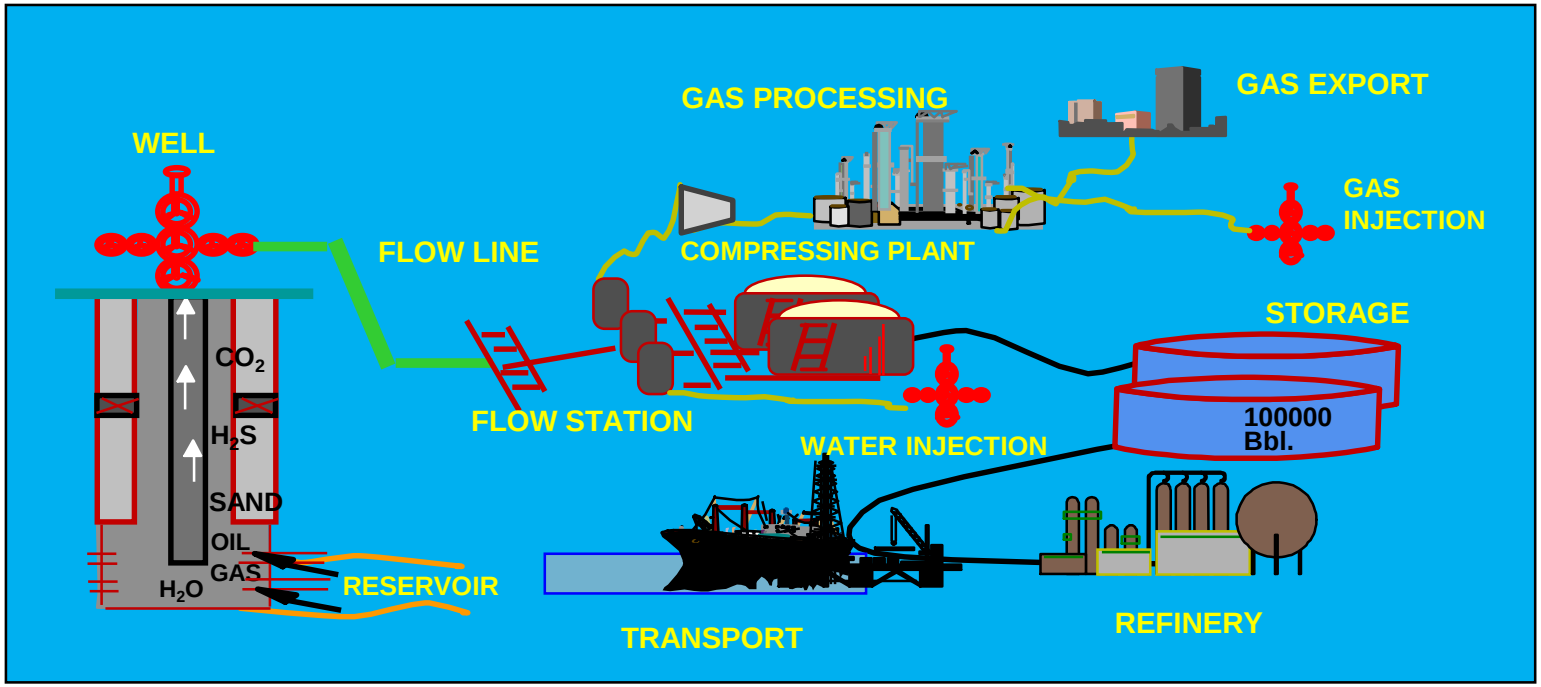
Technical Capabilities

TOTAL INTEGRITY MANAGEMENT

INSPECTION

ENGINEERING

ASSET INTEGRITY MANAGEMENT - VERIFICATION & INSPECTION



Asset Integrity

A. Pressure Vessels Integrity Management System
B. Piping Integrity Management System
C. Pipeline Integrity Management System
D. Storage Tank Integrity Management System
E. Structure Integrity Management System
F. Corrosion Management System

Asset Integrity

A. Pressure Vessels Integrity Management System

Inspection procedure to include:

- Damage mechanism
- Suitable NDT technique
- Inspection interval
- Inspection Person Qualification API 510

Sour Service – Lamination, Blistering, HIC Etc.

Techniques – AUT, Phased Array, TOFD

Asset Integrity

B. Piping Integrity Management System

Inspection procedure to include:

- Damage mechanism
- Suitable NDT technique
- Inspection interval
- Inspection Person Qualification API 570

Conventional Approach – General Corrosion

Techniques - UT, RT, Visual, Replica etc.

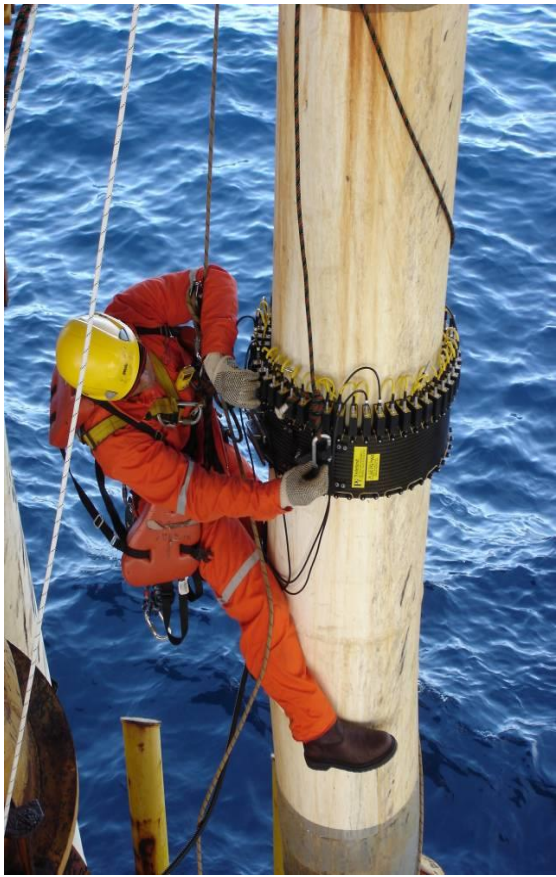
Piping Integrity Management System Cont'd

- Corrosion Under Insulation (CUI)
  - Stainless steel (SCC)
  - Carbon Steel (General/Pitting Corrosion)
  - Corrosion Under Support (Crevice)

- ADVANCED Techniques

  LRUT, SLOFEC, PEC, Digital Radiography

  AUT, ACFM, SRUT Etc.



Asset Integrity

C. Pipeline Integrity Management System

- Offshore Pipeline

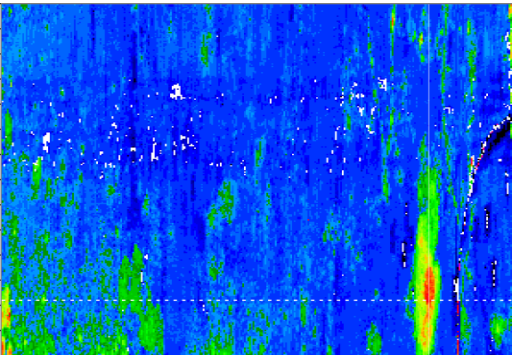
- External (ROV every 5 years)
  - Concrete Condition
  - CP measurements
  - Free Span

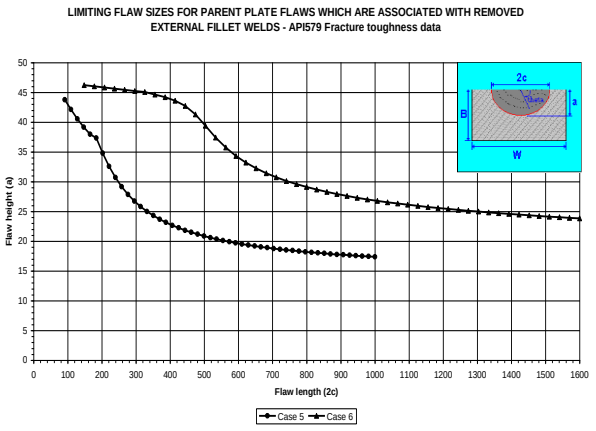
- Internal (IP every 5 years)
  - UT for liquids (Oil, water),
  - MFL for gases
  - ICDA Assessment

Asset Integrity

Pipeline Integrity Management System Cont'd

- Onshore Pipeline
  - External and Internal (every 5 years)
    - LRUT Screening
    - UT or Digital RT Defect Characterisation
    - FFS and RLA





Asset Integrity

D. Storage Tank Integrity Management System

Inspection procedure to include:

- Damage mechanism
- Suitable NDT technique
- Inspection interval
- Inspection Person Qualification API 653

Conventional Approach – API 653

Internal and External.

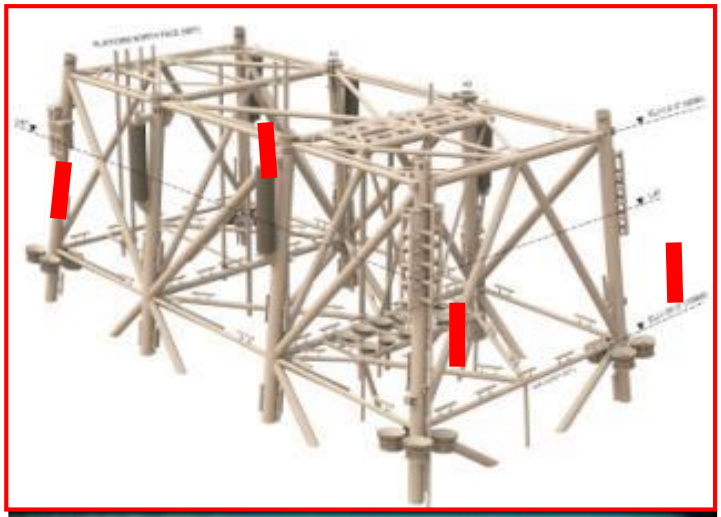
Asset Integrity

Storage Tank Integrity Management System Cont'd

- External
  - Visual, UT/AUT/SRUT
- Internal Inspection
  - SLOFEC thickness > 15 mm
  - MFL thickness > 15 mm
- On – stream Inspection
  - Robotic Inspection

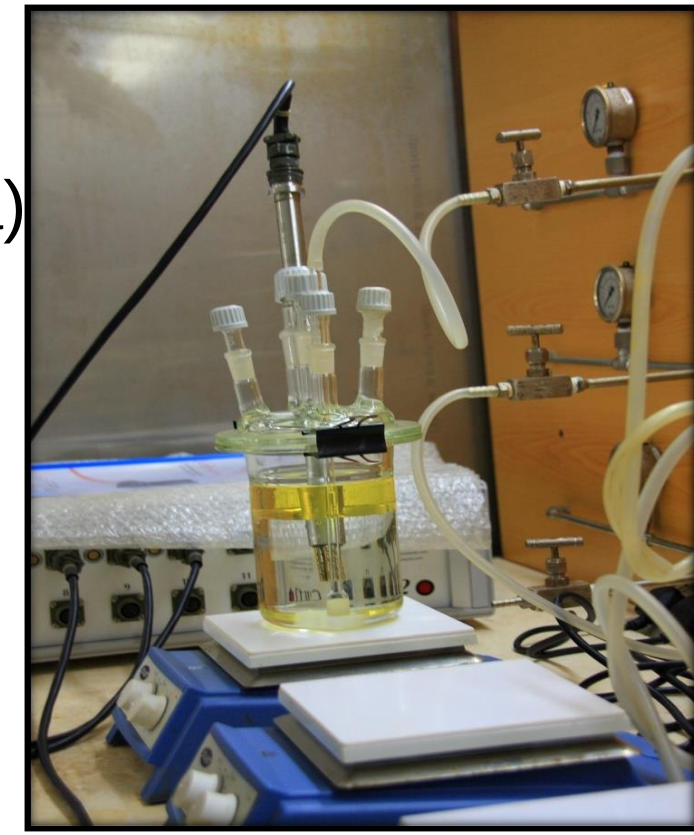
E. Structural Integrity Management System

- Topside
  - Visual
  - Thickness Survey
  - CP measurements
- Sub sea
  - ROV
  - Visual
  - Flooded member detection



F. Corrosion Management System

- Inhibit
  - SRB (Sulphide Reducing Bacteria)
- Monitoring
  - Coupons, Chemical Analysis
  - Thickness Survey
- Assessment
  - Fitness-for-Service Assessment
  - Run / Repair / Re-rate / Replace Decision

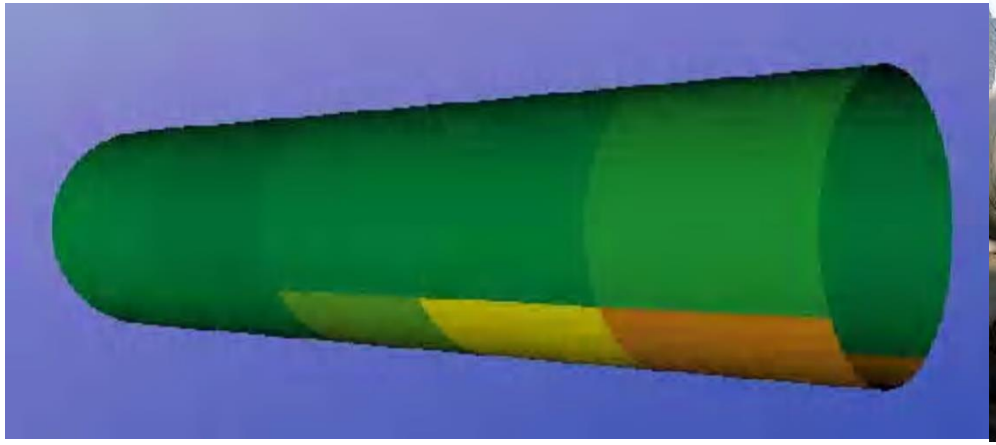


Asset Integrity

Topside:

Insulated objects:

- Piping Vessels
- Heat exchanger shells
- Separators
- De-sanding

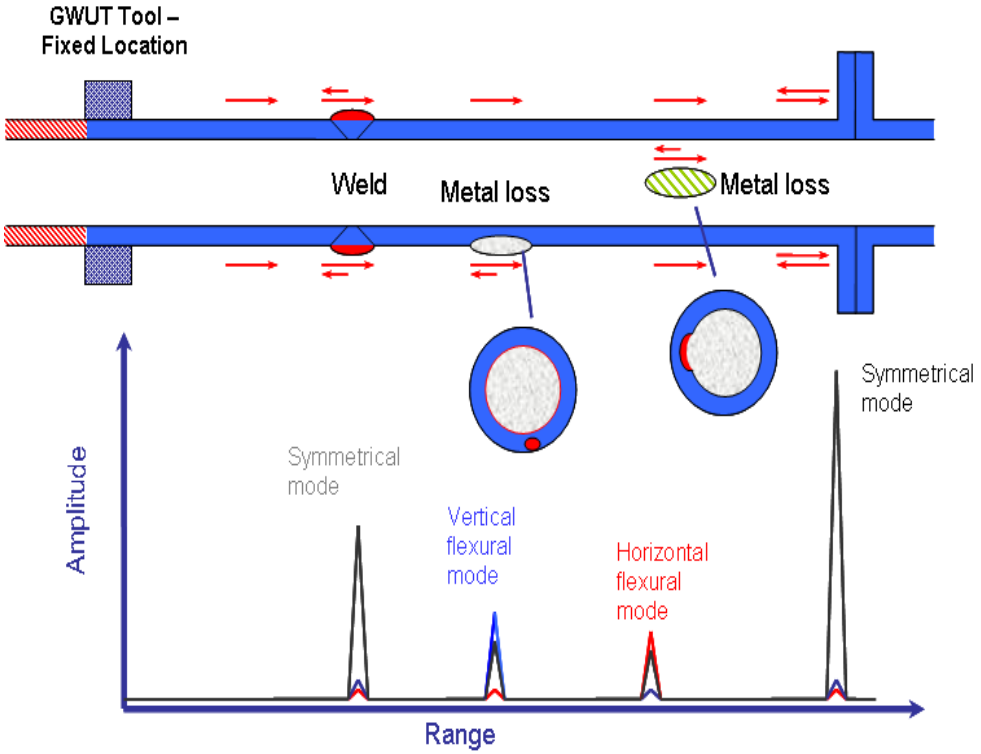


Asset Integrity

CUI - Guided Wave Ultrasonic Testing (LRUT)

The Long Range Guided Wave Ultrasonic Technique was designed to inspect long section of piping from a single location.

How It Works – torsional or longitudinal guided waves are induced into the pipe body and propagated along the pipe segment being inspected. When these guided waves identify an anomaly of pipe feature they mode convert into laminar waves and reflect back to the tools original location. Using a laptop these signals are digitally captured and processed. The time-of-flight for each signature is calculated to determine the distance from the tool and the significance of the anomaly. The octants determine the position around the pipe.



Parameters and Limitations

- Diameters – 1.5" to 54"
- 100% Coverage
- Test Range
  - Typical ±30m
  - Ideal conditions ±180m
- Productivity
  - Typical 600m per day
  - Under ideal conditions 3km has been achieved
- Service Temperature up to +125°C

Asset Integrity

LRUT - Examples of Application

Road Crossings

Risers & Topside

Pipe-Work

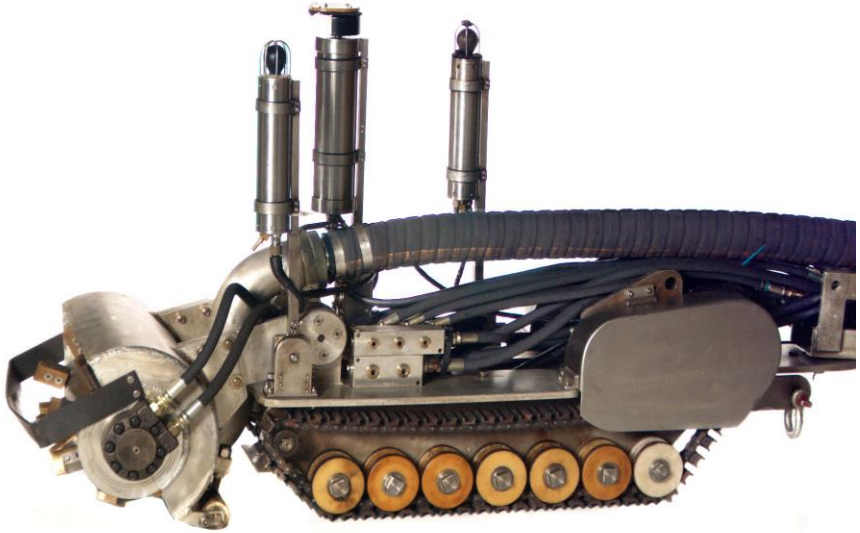
Buried Pipe

CUI

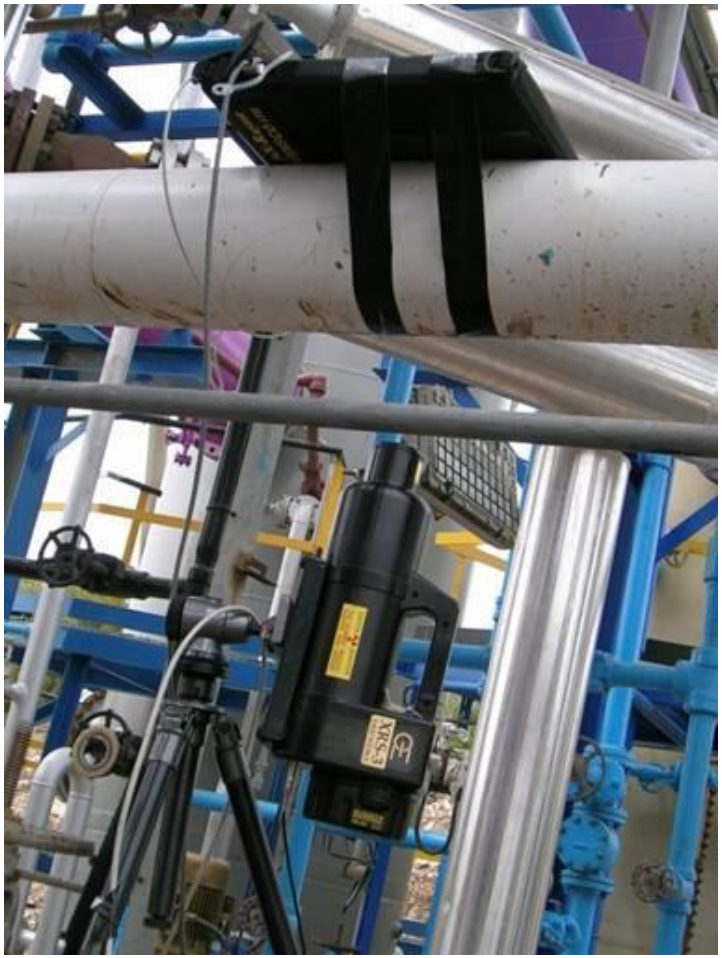
In-lieu of Pigging

Asset Integrity

In-Service Tank Cleaning, Inspection and Management



Asset Integrity



NDT/DRT

- **On-site plant maintenance inspections** of insulated pipes, joints, welds etc.
- No need to dismantle pipe segments, remove insulation to trace leaks or halt production for long periods of time.

Process Plant Services

Process Plant Services

- MULTIPHASE FLOW METERING SYSTEM;

  WET GAS METERING SYSTEM; CUSTODY METERING

  METERING CALIBRATION; WELHEAD MONITOR

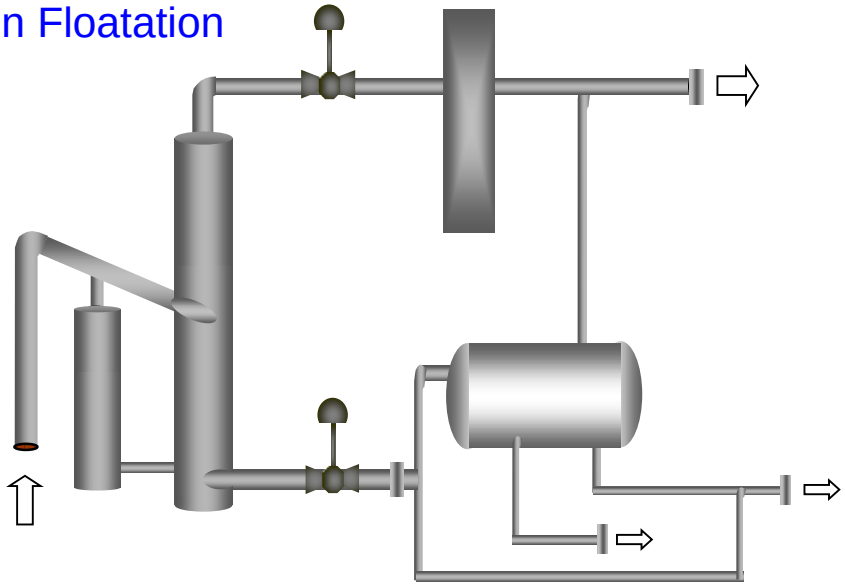
- WET GAS TREATMENT
- MAINTENANCE – MECHANICAL EQUIPMENT, E&I, CATHODIC PROTECTION SYSTEM, CORROSION CONTROL, ETC.
- SAND REMOVAL & MONITORING
- PRODUCED WATER TREATMENT:

  MICRO-BUBBLE FLOTATION SYSTEM; HYPER-HYDRO CYCLONE

Process Plant Services

Operating Principles: Micro-bubble Rotation Floatation

- Generates Micro-bubbles
- Micro-bubble catches dispersed oil
- Oily water flows to the top of the mixing barrel
- Oil droplets are separated from the water with the micro-bubble
- Thus separation of oil & water is achieved



Features:

- **High Separation efficiency**
- **No moving parts**
- **No chemical addition**
- **Simple Maintenance**

Process Plant Services

Offshore Installation

Process Plant Services

Advantages:

- High efficiency in oil-water separation, yielding large processing volume. With low concentration of oil in water （<100ppm) , oil removal rate is 85+%; with high concentration of oil in water （<3000ppm）, oil removal rate is 95+%.
- No moving parts, with high reliability.
- Significantly simplified process, greatly reducing the maintenance cost.
- Saving space, and can be scaled up for large volume

Process Plant Services

Used to solve the problems of:

1 Due to increased produced water, existing oil pipeline is insufficient for transportation. By installing this system at wellhead or at manifold of multiple wells, the free water can be knocked out and discharged locally, increasing the oil transportation ability.

2 Without upgrading the water processing facility, it can accommodate the increase in water treatment capability.

3 On offshore production, allowing a direct discharge of the water at sea.

4 Can be used for upgrading of the processing facility, avoiding the difficulty caused by limited space.

CONSULTANCY SERVICES

Consultancy Services

Procurement.

Project Management.

Training – Technical &
Non-Technical.

Manpower Supply.

TECHNICAL SUPPORTS:

1. Flow Technology International(FTI), UAE

2. Veritas - MSI, USA

For further information please contact:

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