

SIRRI ISLAND

GAS GATHERING & NGL RECOVERY PLANT

Oil Industries' Engineering & Construction, Persian Gulf, Iran



PROJECT SUMMARY

TDE's contract was to develop the Basic Engineering Design for a sour gas processing and liquids recovery plant for installation on Sirri Island in the desert marine environment of the Persian Gulf. The contract was awarded to TDE in July 2004 and the engineering project was completed in June 2005.

Plant nominal inlet gas flow is 4 MMm³/day (142 MMSCFD) of wet sour gas and 106 m³/day (665 BBL/day) of hydrocarbon liquids.

The plant is designed to yield the following final production:

| | |
|-----------------------|--|
| Residue Gas | 3.1 MMm ³ /day (108.4 MMSCFD) |
| Propane | 22,580 Kg/h |
| Butane | 13,700 Kg/h |
| Pentane | 5,680 Kg/h |
| Hexane+ | 3,750 Kg/h |
| Stabilized Condensate | 2,100 Kg/h |

The contract included submission of over 1,400 engineering documents in Process, Safety, Civil, Structural, Building, Piping, Rotary Equipment, Fixed Equipment, Electrical, Telecommunication, Instrumentation & Control disciplines.

PROJECT DELIVERABLES

Thermo Design generated engineering documents as a result of design, optimization & modification of conceptual information. A summary of generated documents by Thermo Design follows:

Process

- Basis of Design, Conceptual Study Report
- Process Simulations
- Heat and Mass Balances
- Flow Diagrams (BFD, PFD, UFD)
- P&I Diagram (Process, Utility, Offsite)
- Philosophies (Vent, Relief, Blow down, Drainage)
- Process Data Sheet for Equipment, Systems, Packages, Control/Safety Valves
- Flare Load Summary
- Process/Utility Line Sizing
- Line Lists
- Material Selection Report
- Equipment List / Utility Summary

Safety / Environment

- HAZOP / HAZID Study
- Consequence Analysis Study
- Safety Layout
- Area Classification
- Fire Zones & Fire Partitioning
- Passive Fire Protection
- Active Fire Fighting
- Fire & Gas Detection
- Emergency Shut-Down
- Emergency Escape Routing
- Environment Protection

Piping / Layout

- Piping Material Specifications
- General/Unit Plot Plans
- Equipment Layout (3D PDMS)
- Critical Line Study (3D PDMS)
- Piping Stress Calculation
- Single Line Pipe Rack Drawings
- Preliminary Material Take Off
- Line List
- Test Procedures

Fixed Equipment

- Specification / Mechanical Data Sheet / Test Procedures for Double Wall Tanks, Fixed/Floating Roof Storage Tanks, Air Coolers, Shell & Tube Heat Exchangers, Cold Heat Exchangers, Pressure Vessels

Rotary Equipment

- Mechanical Data Sheet, Specification for extensive variety of Compressors, Expander, Pumps, Utility packages, Loading Arms, Gas Turbine Generators

Civil & Structural

- Design Specification & Design Drawing for Underground, Roads & Paving, Trench, Earthwork, Drainage, Foundations, Concrete Works, Flood Control, Seawater Intake, Fire Proofing, Landscaping
- Loading of Critical Line for Pipe Rack and Supports
- Preliminary Load of Equipment & Critical Line for foundation design
- 3-D Model for Steel Structure
- Preliminary Material Take Off for Civil Material, Steel Structure & Concrete Works

Building & Architectural

- Building Functional Specification for Industrial & Non-Industrial Buildings
- Building Material Specification
- Schematic Architectural Drawings & Dimensions
- Preliminary Material Take Off for Building Material

HVAC

- Design Criteria, Specification, Data Sheet for HVAC & Plumbing in optimized condition
- Duct, Pipe & Instrument Diagrams
- Preliminary Material Take Off for HVAC & Plumbing

Electrical

- Electrical Design Philosophy
- Electrical Load List
- Hazardous Area Classification
- Data Sheet & Specification for Electrical Equipment
- Load Flow/Shedding Study
- LV, MV Single Line Diagram
- Main Cable Route Layout
- Substation / Control Room Equipment Arrangement

Instrument & Control

- Instrumentation Data Sheet & Specification
- PCS, ESD, F&G Specification
- Control Systems Diagram / Logic Diagrams / Cause & Effect Matrix
- Instrument Index
- I/O List & Summary
- SIL Dossier, Test & Calibration Procedure

- Control Building / Technical Equipment Room / Main Cable Route Layout
- Electrical Power & Air Consumption List

Telecommunication

- Telecommunication System Philosophy & Specification
- Telecommunication Equipment Data Sheet & Lists
- Telecommunication Block Diagram
- Link Budget & Design Report for Fiber Optic Ring
- Radio Propagation & Coverage Study for radio systems
- Power Consumption List
- Equipment Layout Drawing for Telecommunication
- Radio Aerial Layout
- Main Cable Route Layout

PROJECT EQUIPMENT SCOPE

The engineering documentation was prepared for the process & utility equipment summarized below.

Nasr Reception Facilities

Sirri-E Slug Catcher Facilities

NASR & ESFAND Production Stations

LP Compression Facilities

NGL Plant

- Feed gas compression station.
- Acid gas removal unit.
- Acid gas incinerator.
- Gas dehydration unit.
- Mercury Removal
- NGL recovery unit to extract C3+ from the gas.
- NGL fractionation to Propane, Butane, Pentane and C6+.
- NGL refrigeration.
- Cryogenic Propane and Butane storage.
- Propane and Butane boil-off gas recovery.
- Loading facilities for Propane and Butane export by fully refrigerated gas carriers.
- Pentane storage and export ship loading facilities.
- Condensate stabilization, storage and export to ship loading facilities.

Onshore LP Compression Station Utilities

- Instrument and plant air systems (from existing facilities)
- Nitrogen (if required) from new NGL plant facilities
- Fire Water (from existing facilities)
- Utility Water (from road tanker)
- Flare System (tied into existing facilities)



- Power Supply (imported from new NGL plant facilities)
- Closed & Open Drain systems (tied into existing facilities)

NGL Plant Utilities

- Fuel gas system.
- Instrument and plant air systems
- Nitrogen System
- Raw Water / Fire Water / Potable Water system
- Steam generation
- Power Generation/Distribution
- Fire Fighting System
- HP, LP, and Loading Flare Systems
- Closed & Open Drain systems
- Burn Pit
- Amine Drain system
- Effluent Treatment/Disposal system