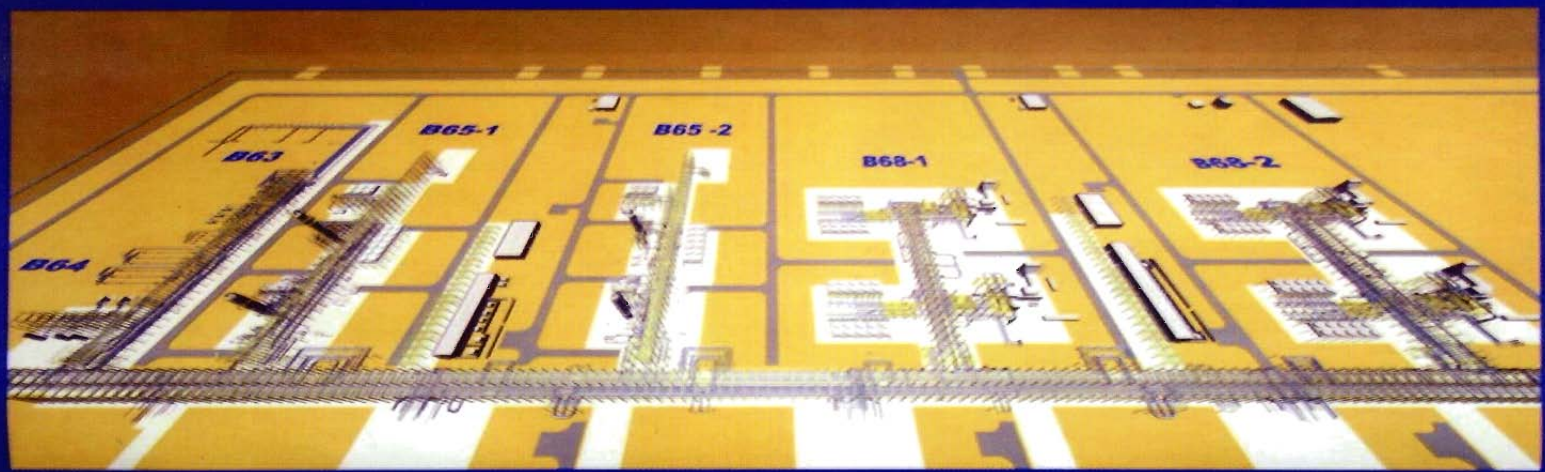


GAS TREAT & COMPRESSION FACILITIES HAWIYAH NGL RECOVERY PLANT



Snamprogetti

Gas Treatment & Compression Facilities at Hawiyah NGL Recovery Plant
GENERAL VIEW

2007
Saudi Arabia

PROJECT NAME	GAS TREAT & COMPRESSION FACILITIES (HAWIYAH NGL RECOVERY PLANT)
LOCATION	HAWIYAH, SAUDI ARABIA
CLIENT	SNAMPROGETTI / SAUDI ARAMCO
CONSTRUCTION PERIOD	34 MONTHS

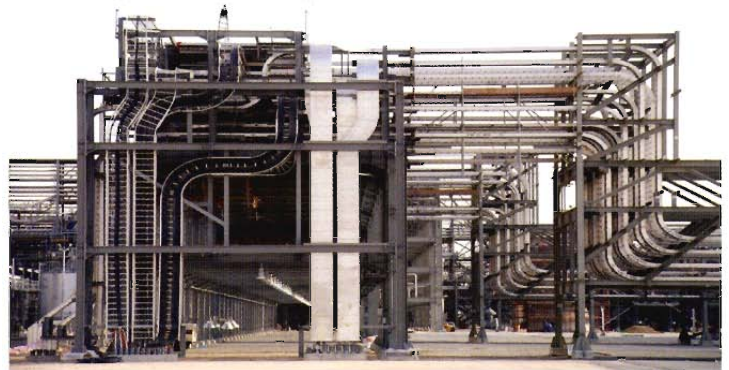
MAC was commissioned by Snamprogetti of Milan, Italy to carry out the multi-discipline construction for the Saudi Aramco Gas Treat & Compression Facilities Project thus increasing Saudi Arabia's ethane and natural gas liquids (NGL) capacity at existing and new gas processing plants.

The PROJECT, executed in joint venture with Kettaneh Construction Saudi Arabia Ltd., involved underground piping systems, civil works including channels and swales, micro-tunneling, buildings and cathodic protection was subdivided into two parts:

- A 52.4 HECTARES PAD-10 AREA
- A 106.21 HECTARES FLARE AREA

consisting of the following:

- FOUR COMPRESSOR TRAINS AREAS
- TWO GAS TREATMENT FACILITY AREAS
- A GAS INLET AREA
- A 1185m x 18m Main Pipe Rack
- A Switchyard Area
- A 106.21-Ha. Flare Area where a DGA Sludge Pond, Sump, three Burn Pits, Anchor Blocks, and 1721 sleepers foundation were constructed by cast-in-place and pre-cast methods



- 14 new buildings on EPC basis including Architectural, Mechanical, HVAC, Electrical, Communications, Plant Paging and Instrumentation, as follows:

- MS1 300 - Electrical Substation
- MS2 301 - Electrical Substation
- GT1 100 - Electrical Substation
- SG1 104 - Electrical Substation
- PIB 101 - Process Interface Building
- PIB 105 - Process Interface Building
- TMB 102 - Team Maintenance Building
- TMB 106 - Team Maintenance Building
- PDM 302 - Power Distribution
- BCS 121 - Bulk Chemical Storage
- RSF 122 - Radiation Storage Facilities
- HWT 123 - Hazard Waste Transfer
- SS 103 - Smoking Shelter
- SS 107 - Smoking Shelter



The four substations were built with precast walls and roof panels.

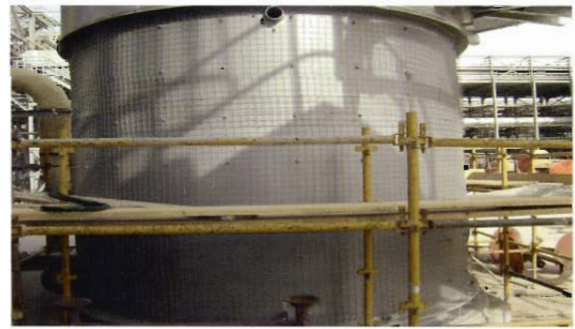
- Manpower reached a peak of 1,090 Direct and 107 Indirect men. All personnel was accommodated and catered for in the project owned camp constructed near the project site, with full life support facilities
- A Safety Record of 4,750,000 worked man-hours was achieved without a Lost-Time Incident



The scope of work consisted of:

- Underground Piping Systems (Fire Water, Drinking Water, Utility Water, Irrigation Water, Oily Water Sewer, and Sanitary Sewer Systems)
- Fire Water and Oily Water Sewer Systems used RTR Pipes ranging from 4" to 36" diameter with a total estimated length of 7,600m and 11,800m respectively
- UPVC was used for a combined length of 3,000m
- Five Lift Stations with a 7m deep foundation works were built
- CIVIL WORKS :
 - A total quantity of 562,000m³ of earthworks including 24,000m³ of rock excavation
 - 70,000m³ of structural concrete poured which included structures such as Pipe Racks and Compressors Foundations, Sleepers, Electrical Pits, Instrument Pits, Oily Water Sewers/ Sanitary/Acid Neutralizing Manholes, 2,430 High Capacity Catch Basins excluding 400 small pipe supports in various locations of the plant
 - An estimated 6,000m of security fences with various types of Gates were constructed
 - 4,350m² of fireproofing works with wire mesh by machine and by trowelling, during the last stages of structural steel structures erection including small structural pipe supports.





- 410,000m² Asphalt Paving area (two layers 6cm each) which includes the 7 to 10m wide x 12,600m Road network around PAD-10 and the Flare Areas. Concrete Paving reached 147,000m² in PAD-10. Swales with an area of 21,200m² (approximately 4,500m long) terminating in High Capacity Catch Basins on the West side of the plant area which in turn provides overflows to the 3 to 5m wide x 1,133m long West Channel that flows to the 800m long Swale to desert.
- Electrical Works involved installation of 64,000m of Electrical Grounding System with 6,200 earthing rods which were installed at PAD-10 and Flare areas.



