



GREY OWL
ENGINEERING

Grey Owl Engineering Ltd. is a Calgary-based firm providing a comprehensive range of engineering and support services to the upstream oil and gas industry in Canada and internationally.

- ◆ **Project Management**
- ◆ **Project Engineering**
- ◆ **Process Engineering**
- ◆ **Mechanical Engineering**
- ◆ **Pipeline Engineering**
- ◆ **Electrical / Instrumentation**
- ◆ **Civil / Structural Engineering**
- ◆ **2D / 3D Design Drafting**
- ◆ **Procurement**
- ◆ **Construction Management**
- ◆ **Regulatory Affairs**
- ◆ **Health, Safety & Environment**
- ◆ **Training & Development**



PROJECT MANAGEMENT



Grey Owl Engineering recognizes the importance of project controls and how they form the foundation of a successful project. We set standards for each project according to project size and scope, client requirements and Grey Owl principles.

Our management and execution standards are applied to all projects, big or small. Project controls are adapted to the complexity of the project, assuring a competent and justifiable expense to guarantee the project scope, cost, schedule and quality are managed optimally.

- Design Basis Memorandum
- Scope Management / Change Management
- Cost Estimating, Control, and Forecasting
- Scheduling and Schedule Management
- Quality Control / Quality Assurance
- Professional Practice Management Plan



PROJECT ENGINEERING



Grey Owl Engineering provides engineering for upstream oil and gas projects from wellsites through pipelines, gas plants, oil batteries, metering stations and all points in between. We design pipelines and process facilities for gas, oil and water treatment.

- **Conceptual design**
- **Feasibility studies**
- **Preliminary and detailed design**
- **FEED studies**
- **Facility turnaround and maintenance support**
- **Fast track projects**
- **AFE preparation**
- **Scheduling**
- **Cost estimating**
- **Specifications and operating procedures**
- **Procurement**

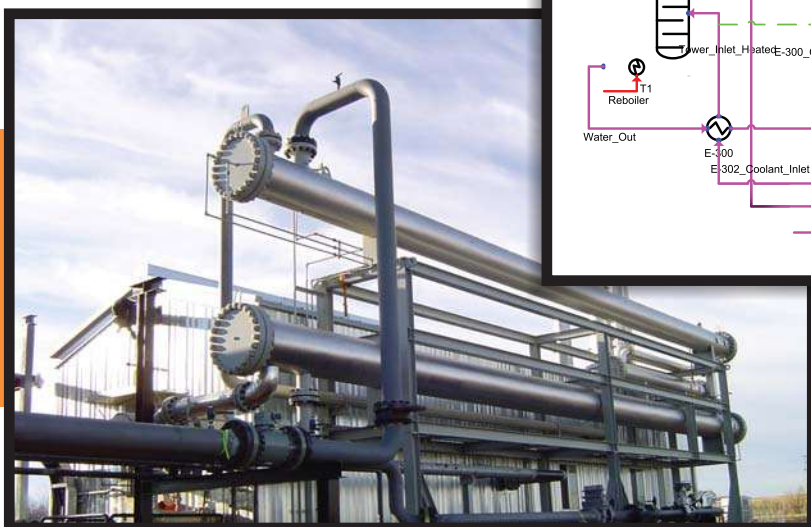
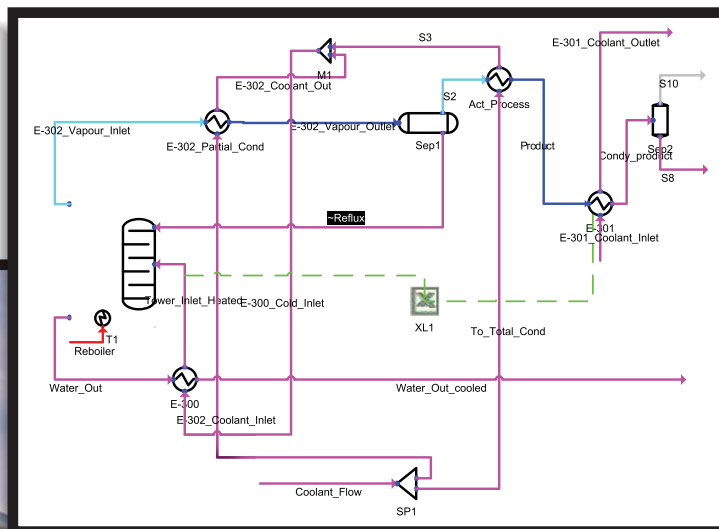


PROCESS ENGINEERING



Grey Owl Engineering has extensive experience and capabilities in all aspects of process engineering for upstream oil and gas projects. We utilize a number of engineering simulation and sizing programs, including HYSYS, VMGSim, our proprietary Oil & Gas Applications Suite and many other software tools.

- Well tie-ins and gathering systems
- Oil and gas processing facilities
- Sour gas processing
- Dehydration
- Pumping and compression stations
- Storage and transportation systems
- Process optimization and de-bottlenecking
- Plant expansion planning and design
- Produced water treatment
- Water injection systems
- Acid gas injection systems
- Sulfur recovery and management systems
- Safety systems
- Flare system design



MECHANICAL ENGINEERING



Grey Owl Engineering is experienced in every aspect of mechanical engineering for upstream oil and gas facilities to all applicable codes (ASME, CSA, API, NACE):

- Mechanical design
- Pressure vessel design
- Pressure piping design
- Piping stress analysis (CAESAR II)
- Pumping system analysis and design
- Equipment specification
- Material evaluations



PIPELINE ENGINEERING



Grey Owl Engineering provides services including the design and project management of pipeline systems and related facilities for oil, gas, water and batched products including transmission, storage, tankage and distribution.

- Pipeline design, construction management and operation
- Material selection
- Pipeline stress analysis (CAESAR II)
- Hydraulics analysis (Neotec - PIPEFLO, Fekete – F.A.S.T. Piper)
- Regulatory assistance and liaison
- Audit and system performance assessment
- Pipeline emergency response planning
- Pipeline system reliability and risk analysis
- Pipeline pumping & compression
- Pipeline protection



ELECTRICAL/ INSTRUMENTATION



Grey Owl Engineering provides comprehensive electrical and instrumentation engineering:

- Electrical design
- Process control
- Power system design
- Field Instrumentation
- E&I system integration
- Supervisory Control And Data Acquisition (SCADA) design
- Distributed Control Systems (DCS) design
- Shutdown key development
- Programmable Logic Controller (PLC) programming
- Human Machine Interface (HMI) configuration
- Commissioning and testing of equipment

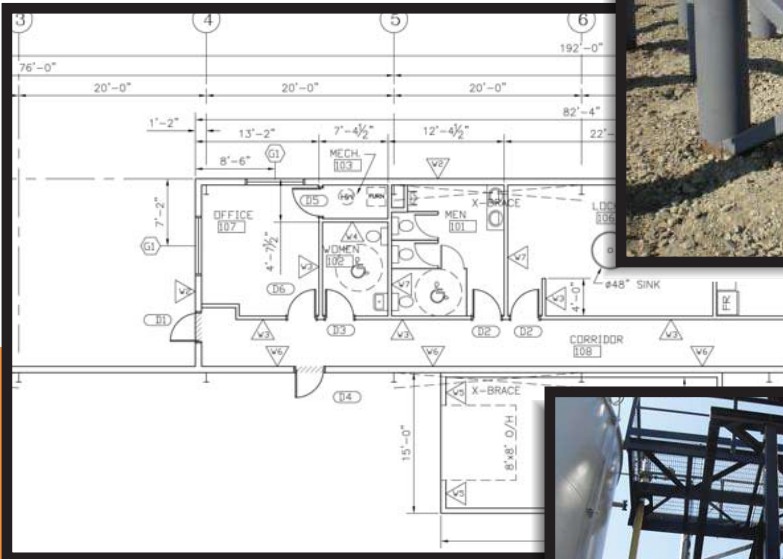


CIVIL/STRUCTURAL ENGINEERING



Grey Owl Engineering is proficient in all aspects of civil and structural engineering related to upstream oil and gas projects and industrial buildings:

- Foundation design
- Facility structural engineering
- Piping system structural design
- Buildings, equipment and skid structural design
- Plant and facility civil engineering
- Site grading, drainage, retention ponds and berms
- Geotechnical and foundation engineering
- Building and foundation design, permits and inspections

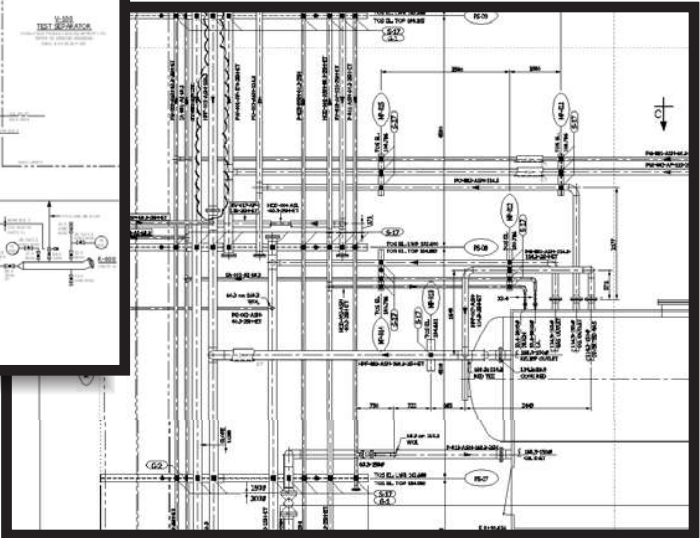
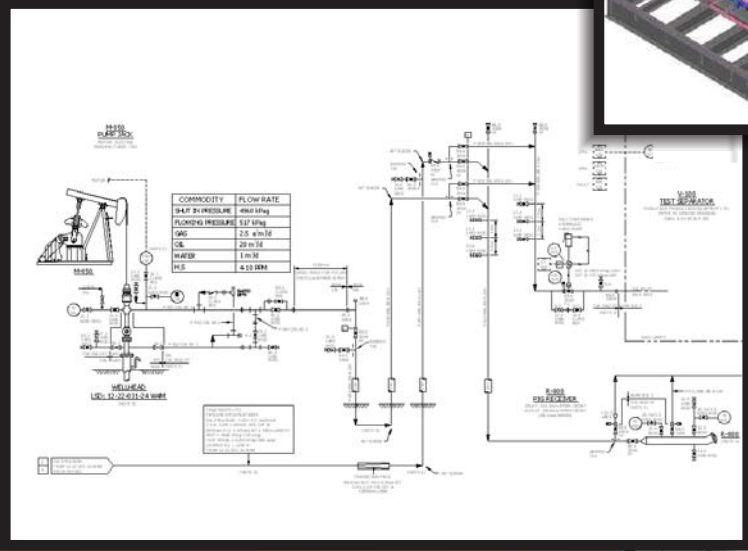
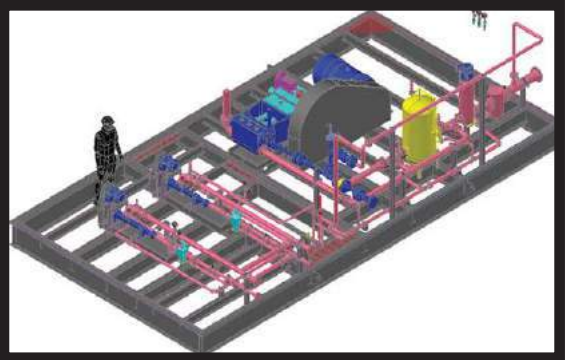


2D/3D DESIGN DRAFTING



Grey Owl Engineering provides 2D/3D design drafting services for oil and gas engineering using state-of-the-art software tools:

- Process Flow Diagrams (PFDs)
- Piping & Instrumentation Diagrams (P&IDs)
- Site plans
- Civil engineering drawings
- Mechanical design drawings
- Bill of Materials
- Piping design drawings
- Geotechnical and foundation engineering drawings
- Structural engineering drawings
- Electrical & instrumentation drawings
- Spool drawings
- Pipeline Alignment Sheets
- Detailed pipeline crossing drawings
- Installation drawings

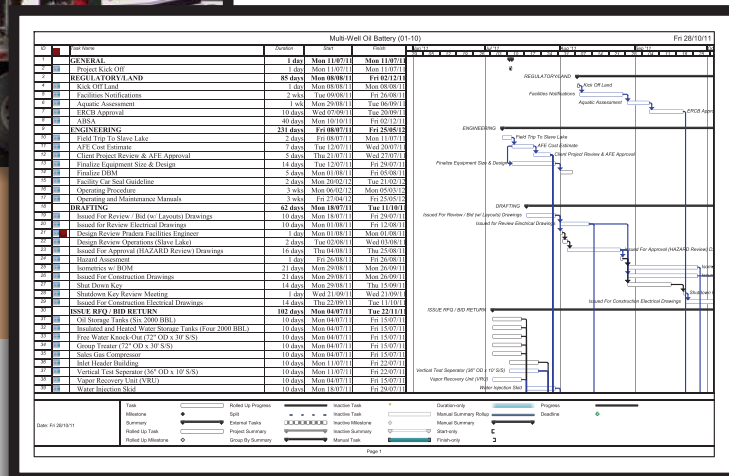


PROCUREMENT



Grey Owl Engineering has comprehensive procurement experience and capabilities:

- Procurement and vendor liaison
- Vendor/Contractor selection
- Expediting
- Purchase order and invoice management
- Cost tracking and reporting
- RFQ management
- Contract management



CONSTRUCTION MANAGEMENT



Grey Owl Engineering provides complete construction management services for oil and gas EPCM projects:

- Facility & pipeline construction management
- Project cost estimating and scheduling
- Engineering and construction audit and review
- Project field engineering
- Field supervision
- Contract administration
- Health, safety and environmental management
- Startup & commissioning
- Quality planning, assurance and control
- Turnaround planning and supervision



REGULATORY AFFAIRS

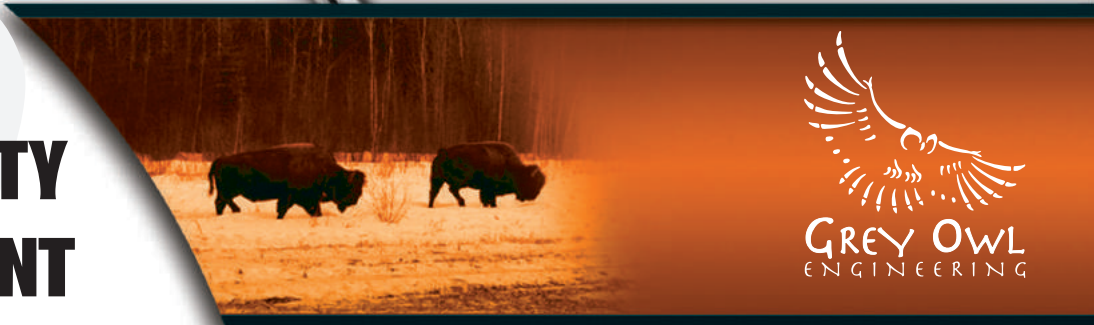


Grey Owl Engineering has extensive experience in all aspects of regulatory affairs for oil and gas projects in Alberta, British Columbia, Saskatchewan, Manitoba, Montana, North Dakota, and other jurisdictions.

- Facility, pipeline and well applications
- Environmental regulatory requirements
- Stakeholder notification and consultation
- Sour gas permitting
- Environmental Impact Assessment
- Risk Assessment
- Compliance Audits
- Air emissions modeling



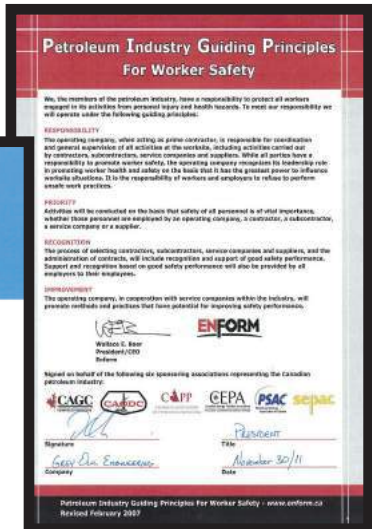
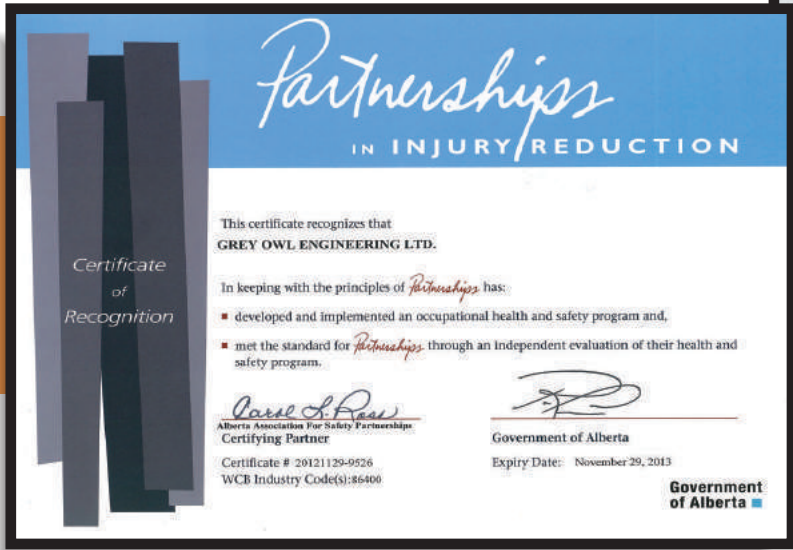
HEALTH, SAFETY & ENVIRONMENT



Grey Owl Engineering has thorough health, safety and environmental management programs that are applied to all aspects of our work.

Grey Owl's commitment to HSE includes:

- Providing leadership, resources, equipment and training that enhance personnel awareness of, and participation in, the creation of a safe, controlled and environmentally healthy workplace
- Maintaining an active hazard recognition, assessment and control program
- Encouraging self-monitoring activities by identifying, evaluating and minimizing the risk of exposure to people and the environment
- Maintaining a documented emergency response plan that enables personnel to respond promptly and effectively
- Ensuring measures are in place for reporting and investigating accidents and ensure compliance with established occupational health and safety regulations and environmental laws
- Improving the effectiveness of our HSE program by setting and reviewing standards, policies, and objectives



TRAINING & DEVELOPMENT



Grey Owl Engineering can provide training on a wide range of oil and gas engineering topics at our offices or at company facilities. Courses can be arranged from part day to 5 day duration.

Course subjects include:

- Pipeline design, construction & operation
- Pipeline stress analysis
- Piping design (ASME B31, CSA Z662)
- Compressor design, selection, maintenance and operation
- Applied process control
- Design of gas surface operations
- Design of oil surface operations
- Gas processing
- CALPUFF modeling
- Air quality modeling



Kaybob Liquids Rich Sour Gas Plant



Project: Kaybob Liquids Rich Sour Gas Plant – 150 MMSCFD, 2300 BBL/day
Sweet NGL, 4500 BBL/day Sweet Condensate

Client: Celtic Exploration Ltd. / XTO Energy Inc.

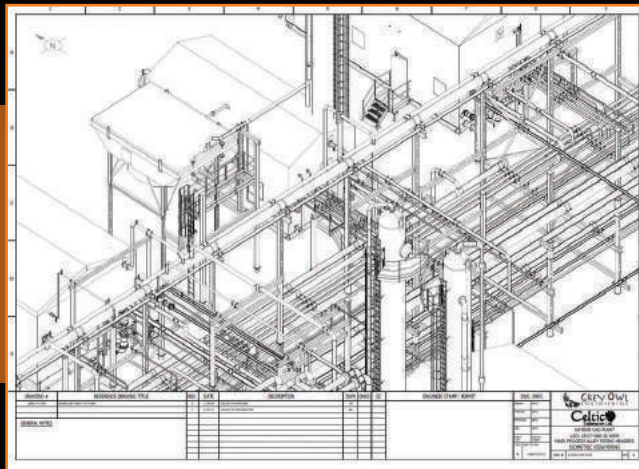
Location: Fox Creek, Alberta

Description: The processing plant consists of high (22% H₂S) and low sour (2000ppm H₂S) inlets. Inlet condensate is sweetened and stabilized. Gas is processed through the amine and refrigeration units and sent to sales. Liquid products include a propane/butane mixture and stabilized condensate.

- Installation of high pressure and low pressure inlet headers and separators
- condensate stabilizer unit (96" dia)
- amine sweetening
- propane refrigeration (2 x 1600hp refig compressors)
- de-butanizer (42" dia)
- acid gas compression
- low pressure and recycle gas compression
- high pressure, low pressure and acid gas flare systems
- 4 x 2000 BBL condensate and water storage tanks
- 80,400 gal NGL bullet
- Vapour Recovery Unit
- pump building
- loading stations
- hot oil (2 x 30 MMBtu/hr) and glycol (6 MMBtu/hr) heat medium skids
- fuel gas system
- instrument air skid
- sales coalescer and metering skid
- pipe racks and associated / auxiliary equipment

Materials & Construction: \$85,000,000

Engineering Design & Drafting: \$4,000,000 (excludes Electrical, Instrumentation and Programming)



Saturn Deep Cut Facility Phase 1



Project: Saturn Deep Cut Facility Phase 1 – All associated Inlet, Sales and Fuel Gas Pipelines

Client: Pembina Pipeline Corporation

Location: Saturn, AB (120 km North of Hinton)

Description

- Installation and construction of nine pipelines: 4" Fuel Gas, 6" NGL, two 8" Residue Gas, two 12" Residue Gas, 12" Raw Gas, 16" Residue Gas and 20" Sales Gas pipelines
- All pipelines and associated risers designed to CSA Z662
- Includes two on-lease Horizontal Direction Drills (HDD)
- All pipelines inspected incorporating High Resolution MFL Inspection with High Resolution Caliper Inspection

Total Installed Cost: \$15,000,000

Engineering Cost: \$795,000



Cecilia 12" Residue Gas Pipeline



Project: Cecilia 12" Residue Gas Pipeline
Client: Pembina Pipeline Corporation
Location: Cecilia /Saturn, AB (120 km North of Hinton)

Description

- Installation and construction of a 5 km 12" residue gas pipeline
- Pipeline and risers designed to CSA Z662, piggable complete with 16" launcher and receiver
- Included 2 Horizontal Direction Drills (HDD) – 465m river bore and 60m road bore
- Pipeline inspected incorporating High Resolution MFL Inspection with High Resolution Caliper Inspection

Total Installed Cost: \$6,000,000
Engineering Cost: \$175,000



Multi-Well Oil Battery



Project: Multi-Well Oil Battery – 15.0 MMSCFD Gas, 2500 BBL/day Oil & 250 BBL/day Water

Client: Tournament Exploration Ltd.

Location: Willesden Green, Alberta

Description: Multi-well oil battery installation including: mechanical, electrical, civil, structural & regulatory components. Multiple pipelines to and from this facility were done by Grey Owl separately. Battery is comprised of:

- 60" OD x 18' S/S Inlet Separator
- 8' OD x 30' S/S Treater
- Pump building – recycle, skim, oil transfer
- MCC Building
- Treater Gas Compressor -75 HP
- Vapour Recovery Unit (VRU) - 30 HP
- 100 BBL High Pressure Flare Knock-out
- 25 BBL Low Pressure Flare Knock-out
- Dual HP/LP Flare Stack
- 3 x 750 BBL Tanks
- Instrument Air Compressor
- Sales Gas Compressor (rental unit) - 1,500 HP
- 30" OD x 28' S/S Gas Dehydrator

Total Installed Cost: \$8,000,000.00

Engineering Cost: \$ 851,000.00



Pipeline With AltaGas



Project: Pipelines and Fiber Optics
Client: AltaGas
Location: Townsend (90km NW Fort St. John, BC)

Description: The design, engineering, procurement and construction management of various pipelines to and from the Townsend Gas Plant. These pipelines included first nations, regulatory and environmental planning while steep terrain, heavy rock, side slopes, creeks and HDD's were considered and designed during engineering.

- 1) **Inlet / Gathering Pipeline:** 25 km of 406mm O.D. with < 1km HDD and midpoint camelback riser
- 2) **Sales Gas Pipeline:** 8.5km of 324mm O.D. with two (2) < 1km HDD's and two (2) tie-in's to Spectra transmission lines
- 3) **Liquid Pipelines:** 30km of twin 219mm O.D. HVP and LVP pipelines and Fiber Optic cable with 1km HDD and seven (7) camelback risers

Total Install Cost: \$100,000,000.00
Engineering Cost: \$5,500,000.00



Taqa North Ltd. Lone Pine Creek



Project: Two (2) Grass roots Multi-Well Gas Batteries and 100 Well Tie-in Program
- 10 MMSCFD & 5 MMSCFD

Client: Taqa North Ltd.

Location: Lone Pine Creek, Alberta

Description: Two (2) Multi-Well Gas Battery installations including: mechanical, electrical, civil, structural and regulatory components. The program also included 100 well tie-in and eight (8) field meter stations. The 87.5 Km gathering system was constructed of 5" and 8" high density polyethylene pipe (HDPE) and two (2) 6" steel sales gas pipelines (3Km and 6Km respectively). Both locations were designed for future expansion and the batteries are comprised of the following equipment:



Taqa North Ltd. Lone Pine Creek



12-19 MWB

- One (1) 60" ID x 18' S/S horizontal inlet separator
- Two (2) sales gas compressors - 1680 HP per unit
- One (1) lube oil scrubber
- One (1) 30" OD Dehydrator with still column vent tank
- One (1) 42" OD x 8' S/S H.P. vent knock-out drum c/w 6" OD x 40' vent stack
- One (1) 400 BBL heated water storage tank c/w secondary containment
- A low mounted above ground pipe rack, pipeline pigging facilities, instrument air compressor and MCC building.

08-21 MWB

- One (1) 60" ID x 18' S/S horizontal inlet separator
- Two (2) sales gas compressors - 1680 HP per unit
- One (1) lube oil scrubber
- One (1) 24" OD Dehydrator with still column vent tank
- One (1) 42" OD x 8' S/S H.P. vent knock-out drum c/w 6" OD x 40' vent stack
- One (1) 400 BBL heated water storage tank c/w secondary containment
- A low mounted above ground pipe rack, pipeline pigging facilities, instrument air compressor and MCC building.

Total Install Cost: \$21,700,000.00
Engineering Cost: \$1,500,000.00



Pembina Pipeline Musreau



Project: Musreau 1-26 Interconnect Pipelines
Client: Pembina Pipeline Corporation
Location: Musreau, Alberta

Description: Design, Procurement and Construction Management of six new pipelines designed to CSA Z662.

- Five Pipelines installed in the same ditch, including two Horizontal Direction Drills (HDD)
 - 16" Sales Gas, 12" Raw Gas, 8" Raw Gas, 6" Raw Gas and 3" Condensate Pipelines
- One On-Lease interconnect Pipeline
 - 12" Bi-directional Pipeline
- All pipelines inspected incorporating In-line MFL Inspection with High Resolution

Design of Above Ground Piping/Facility Work at Four Locations, including associated E&I, Instrument and Controls designed both to CSA Z662 and ASME B31.3

- Two New Field Riser Stations
- Two Existing Brownfield Facilities

Total Install Cost: \$10,000,000.00
Engineering Cost: \$790,000.00



Methanol Recovery Technologies



Project: Methanol Recovery and Water Pre-treatment
Client: Methanol Recovery Technologies

Description: Grey Owl Engineering, has been successfully working with Methanol Recovery Technologies (MRT) since 2006 on methanol recovery technology at various oil & gas facilities in Alberta. Methanol recovery from produced water can be attained to an almost pure condition if adequate attention is paid to water pre-treatment where required to remove scaling salts and hydrocarbons upstream of the unit.





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