

Gas Liquids Engineering has designed over 300 dehydration facilities including:

Client	Location	Total Volume (MMSCFD)	Units	Pressure (kPa)	Dewpoint (Deg C)	Notes
Bahrain National Oil Company	Bahrain	250	3	3180	-42	
Devon Canada Corporation	Cabin Creek	50	1	11500	-10	Sour TEG
Devon Canada Corporation	Coleman	60	1	4500	-10	Sweet Sorbead™
Enco Gas	Sierra West	25	1	8720	-20	
Gas Authority of India	Pata, India	400	1	8720	-60	
Industrie Meccaniche Scardelatto	Romania	1100	25	2100	-15	

**Altana Exploration - Sunchild**

- 500 hp compressor station c/w dehydration and associated pipelines.

**Amerada Hess Canada Ltd. - Bearberry**

- Design and installation management of seven pipelines.
- Design, procurement and construction management of dehydration facility and pipeline for 5 MMSCFD.

## **Anadarko Canada**

### **Buckinghorse**

- Responsible for the design of a 5.0 MMSCFD gas plant and pipeline including inlet separation, compression piping layout, dehydration, flare system, MCC buildings, utility buildings, gen-sets, tank farm, FKOs, I.A. metering facilities, line heating, storage containment and gas tie-ins to plant.

### **Gundy**

- Responsible for the design of a 5.0 MMSCFD gas plant and pipeline including inlet separation, compression piping layout, dehydration, flare system, MCC buildings, utility buildings, gen-sets, tank farm, FKOs, I.A. metering facilities, line heating, storage containment and gas tie-ins to plant.

### **Junior, NEBC**

- Design, material and equipment specifications, as well as procurement and project management, for the construction of a new separation/dehydration station with capabilities for future compressor installation. Design capacity: 28 MMSCFD, sour gas.

### **Townsend**

- Responsible for the designing of a 20.0 MMSCFD gas plant and pipeline including inlet separation, compression piping layout, dehydration, flare system, MCC buildings, utility buildings, gen-sets, tank farm, FKOs, I.A. 5000 HP compressors, metering facilities, line heating, storage containment and gas tie-ins to plant. Large O.D. Mountain pipeline Bores.

## **Anderson Exploration Ltd.**

### **Blue Range – Big Bear – South Clear Hills**

- Design and procure materials for a 1,000 HP sour compression and dehydration facility with state-of-the-art emissions incineration.
- Managed HAZOP study process.

### **Sextet**

- Project management for the installation of a line heater, dehydrator and a 2.5 km, 6 MMSCFD pipeline associated with one well.

### **Valhalla**

- 3,000 BOPD (42° API, high paraffin content) oil battery c/w treating, water source, treatment and re-injection, gas boot, gas blanket flare system, field test satellites (2) and pigging system, custody transfer metering, provision for future VRU. The solution gas plant (c/w dehydration) was designed for 6 MMSCFD. Provided permitting, engineering and project management of oil and gas production facilities including mechanical design, equipment specification, purchasing, expediting, critical path scheduling, reporting, cost control, instrumentation, controls system design. The scope of the installation also included an inlet skid, a separator package, storage tanks, a recycle building, a process heater and a PLC control system.

### **Antrim Energy International - Czech Republic**

- Dehydrator fabrication inspection and installation supervision.
- Operator training.

### **Apache Canada Ltd. - Zama Lake**

- Responsible for managing the upgrade additions to the gas plant including inlet separation, 250 HP compression piping layout, dehydration, VRU units, additional flare system, amine contractor, MCC buildings, utility buildings, gen-sets, tank farm and gas tie-ins to plant.

### **APF Energy – Two Rivers**

- Research and supervision of a dehydration still vent vapour incinerator study and modifications.

### **Bahrain National Oil Company**

- As part of a project worth in excess of \$2 Billion U.S., GLE designed and managed the construction of 3 dehydrator units for JGC Corporation of Yokohama, Japan and LeGrand Inc. of Calgary, Alberta.
- Two field dehydrators, 65 MMSCF capacity, 447 psig at 130°F, required outlet water dewpoint +40°F.
- Central Plant Dehydrater, 120 MMSCFD capacity, 388 psig @ 55°F, required outlet water dewpoint - 45°F.

### **Bonavista Petroleum**

#### **Beaton**

- Project management of the installation of compression (400 HP and 800 HP), inlet separator and dehydration facilities.

#### **Branch**

- Project management of the installation of inlet separator, dehydrator and compressor (400 HP).

### **BP Canada Energy Company – Ojay**

- Evaluated existing process design based on operating data at the sour gas dehydration facility including process simulation with HYSIS of the dehydration system (solid desiccant) for 0.57 MMSCFD.

### **Burlington Resources Canada Ltd - Dahl**

- 10 MMSCFD compressor station c/w inlet separation, dehydration, metering, NGL storage, fuel gas sweetening, electrical generation and scada system.

### **Canada Northwest Energy Limited - Meyer Lake**

- Design and project management of a 1072 HP compressor station with dehydration facilities.

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## **Canadian Natural Resources Ltd. - Wolf Lake**

### **Desand pit**

## **Confidential - Alberta**

- This also involved the design of a novel dehydration unit for the acid gas using low-temperature methanol injection.

## **ConocoPhillips Canada Corporation**

### **Cessford**

- Project engineering to assess and optimize a 50 MMSCFD TEG dehydration unit.

### **Minehead**

- Design and project management for the installation of a new group/test separator and piping associated at an existing compressor/dehydration station.

## **DeKalb Energy Canada Ltd - Leafland**

- Dehydration and field heater modules.

## **Denimex (Canada) Ltd. - Cherhill**

- Troubleshooting of dehydration system.

## **Devon Canada Corp (formerly Anderson)**

### **Cabin Creek**

- Design review and process engineering for sour conversion of a 50 MMSCFD TEG glycol dehydration facility.
- Plant SO<sub>2</sub> modeling.
- Design and project management for the addition of 1480 HP sour gas compressor.
- Design and installation for upgrading an existing dehydration facility to sour service modifications to the fuel gas system and tie-in of one new sour well into existing production. Responsibilities included drawings management, regulatory audit packages and submissions, equipment procurement and construction inspection.

### **Coleman**

- Engineering review of 1690 e<sup>3</sup>m<sup>3</sup>/day (60 MMSCFD) sour dehydration facility (27% H<sub>2</sub>S).
- Installation of molesieve regeneration cooler.

### **East Eagle**

- A sour 6 MMSCFD, 1050 HP compression facility comprised of group separator, compressor, dehydrator, flare system, pipelines and modifications to existing oil battery to recover solution gas. Provided permitting, engineering and project management including mechanical design, equipment specification, procurement, expediting, instrumentation and controls system design.

### **Edam, Saskatchewan**

- Design and project management of a facility including 500 HP compression, inlet separation, dehydration, produced water, gas gathering system and sales line with an alternate fuel gas system for the nearby sand disposal facility.

### **Leland**

- Engineering review of a 1690 e<sup>3</sup>m<sup>3</sup>/day (60 MMSCFD) sour dehydration facility (31% H<sub>2</sub>S). The recommendations led to operations support, installation of replacement salt bath heater, a sulphur meltout system, numerous other plant and capacity studies.

### **North Nig Creek, BC**

- Permitting, process design, and project management for the installation of a second compression train at an existing 40 MMSCFD compressor station.
- Modifications included the addition of inlet separator, compression (2215 HP), dehydration with dual sales line flowcontrol, a sales pipeline and power generation.

### **Omega**

- EPCM execution for a gas battery, 112.7 e<sup>3</sup>m<sup>3</sup>/day (4 MMSCFD), 296 kW (400 HP) compression, dehydration. The equipment included the piping, instrumentation and controls, compressors, towers, heat exchangers, pumps and vessels. Responsible for operating manuals, commissioning and start-up.

### **Palliser**

- preliminary conceptual design, cost estimating and project scoping for the construction of a sour molecular sieve dehydration facility.

### **Placid**

- Design of a produced water boil-off tank 3 MMSCFD gas dehydration unit re-design.
- Addition of a produced water tank.

### **Wolverine**

- Design and construction support for a 3 MMSCFD sour gas dehydration facility. The equipment included a line heater, hot oil circulation string pump skid, dehydrator unit, meter skid, utility skid c/w air compressor, flare stack and incinerator.

### **Enar Petroleum Services Pvt. - Karachi, Pakistan**

- Design review of a 9 MMSCFD dehydration facility.

### **Encal Oil and Gas Ltd - North Oak, BC**

- 1,500 B/D (32° API) oil battery including gathering system and treatment, water handling, 2 MMSCFD sweet solution gas plant (compression, dehydration, provision for future VRU). Provided permitting, engineering and project management for oil and gas production facilities including mechanical design, equipment specification, purchasing, expediting, critical path scheduling, reporting, cost control, instrumentation, and controls system design.
- Design and project management of a 400 HP compressor installation.

### **Enco Gas Ltd.**

#### **North Helmet, BC**

- Design and project management for EPCM of gathering pipelines and two dehydration facilities.

#### **Shekilie**

- Project engineering and detailed engineering design and procurement of equipment for an 8.0 MMSCFD sour gas dehydration facility complete with water injection.

#### **Sierra West**

- Design and project management of a 25 MMSCFD sour gas dehydration facility including aerial cooler and power generation.
- Design and installation management of a 6" diameter, 5 km sour pipeline.

#### **Windflower**

- Field Inspection for a 600 hp compressor station including dehydration and associated pipelines.

### **Enerplus Resources Corporation - Pouce Coupe**

- Amine unit, dehydration unit, dew point control unit optimization
- Capacity review, equipment's performance evaluation, process simulations, debottlenecking study, cost estimation

### **Enterprise Training**

#### **Doha, Qatar**

- Three-day course on Natural Gas Dehydration, refrigeration and fractionation.

#### **London, UK**

- Two-day course on Natural Gas Dehydration and Natural Gas Sweetening presented in London.

### **Gas Authority of India - Pata, India**

- Evaluation of problems at a 400 MMSCFD dehydration facility.

### **Gas Liquids Engineering Ltd. - Various**

- Simulation studies with the Bryan Research and Development Company's software including: Improving the C<sub>3+</sub> and C<sub>2+</sub> recovery performance of existing natural gas processing plants based on turbo expander refrigeration and/or absorption. Nitrogen removal from natural gas by cryogenics or absorption. Helium separation by cryogenics. Modeling and simulation of natural gas dehydration with molecular sieves. Modeling and simulation of hydrocarbon separation on activated carbon.

### **Grad & Walker Resources Ltd. - Bonnyville**

- Design and project management of a 1200 HP compression/dehydration facility including 10 km 4" / 6" gathering system.

### **Grand Banks Energy – Tower Creek**

- Conducted process simulation (25 MMSCFD) of mole sieve dehydration system, sour water stripping, pipeline gathering system.; responsible for the subsequent EPCM execution.

### **Gulf Canada Resources Limited - Jenner**

- Jenner Shallow Gas program with 100 well site tie-ins.
- Rebuilt and modified Jenner 15-23 51" separator.
- Project manager for the installation of 7840 HP Ariel JGH4 compressor and 5 MMSCFD dehydrator.

### **HTC Pureenergy – Saskatchewan, Canada**

- Project Management of a total installed cost estimate at  $\pm 25\%$  for an onshore facility entailing 4355 tonne/day CO<sub>2</sub> capture from flue gas with amines, 73 MMSCFD (0.68 x 10<sup>6</sup>m<sup>3</sup>/day) dehydration and 24,500 hp (18.3 MW) of compression for offshore EOR. This facility was an add-on to an existing 420 MW gas fired combined cycle power plant in Norway.
- Provided the total installed cost lump sum estimate for the dehydration and compression sections.

### **IMS Scardellato – Romgaz (Romania)**

- Equipment sizing for 25 dehydration skids to be installed at different locations in Romania, including flash tanks, contactors, surge drums, filters, gas scrubbers, etc.
- Process design and data sheets for multiple dehydration units.
- Dehydration unit fabrication inspection.
- Flowrates ranging from 5 to 25 MMSCFD at low pressure with contactors up to 10 ft. in diameter.

### **J.M. Huber Canada Limited - Kaybob**

- Permitting, process design and commissioning for the installation of a glycol dehydration system for a 2 MMSCFD sweet gas stream.

### **K2 Energy - Cutbank, Montana**

- Design, engineering and project management for the tie-in of 7 low pressure gas wells and gathering system including booster compressor (325 HP), dehydration, sales compressor (250 HP) and sales pipeline.
- Permitting including Montana Flood Plain & Floodway Management, Glacier County Planning, Glacier County Sanitation, Glacier County Roads, FAA, Dept. of Environmental Quality, Montana Land Use License, Montana Department of Transportation, ASACoE, Federal Rivers & Harbours, Federal Clean Water.

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## **Kinder Morgan CO<sub>2</sub> Company L.P. – USA**

### **Capacity Increase Project**

- The scope involved inlet separation, dehydration, filtration, chilling/separation, booster compression, gas and liquid amine treating, NGL recovery and condensate stabilization.

### **Expansion Project**

- The primary scope involves design basis memorandum, engineering process design, capital cost estimation and data sheet package generation involving inlet separation, dehydration, filtration, refrigeration, liquids separation, heating and water cooling.

### **Snyder, Teas**

- New 240 MMSCFD processing train, which included CO<sub>2</sub> rich gas pretreatment units for membrane separation, such as gas dehydration and hydrocarbon dew point control.
- Conducted process calculations/simulation (Promax and VMG Sim) for desiccant dehydration, pre-cooling, separation, refrigeration and membrane pre-treating systems to evaluate the capacity of existing systems. Recommended modifications to increase capacity from 610 MMSCFD to 710 MMSCFD.

## **Ministry of Energy and Mines, BC**

- Completed a project for BC Government to assist the Ministry in evaluating producers cost of service. Assembled 4Q06, 4Q07, 4Q08 data and summarized the capital cost of equipment and total installation cost for pipeline, line heaters, compressors, amine plants, molecular sieve plant for sweetening and TEG dehydration.

## **Murphy Oil – East of Red Deer**

- A large 2-Phase sour gas gathering system utilizing heaters and a central dehydration station for gas rates up to 35 MMSCFD.

## **Newport Petroleum Corporation - Willesden Green**

- Upgrade of a 700 HP compressor and the installation of an additional 500 HP compressor c/w attending inlet separation and dehydration. Facility downtime was only five days.

## **North Canadian Oils Ltd. - Delia**

- 20 MMSCFD gas plant, 250 HP compression, dehydration.

## **Northridge Exploration Ltd. – Petrorep (Canada) Ltd. - Provost**

- EPCM execution for a 704.4 e<sup>3</sup>m<sup>3</sup>/day (25 MMSCFD) gas plant including 1780 kW (2400 HP) compression, refrigeration, desiccant dehydration, 78 m<sup>3</sup>/day (105 B/D) LPG mix. The equipment included the piping, instrumentation and controls, compressors, towers, heat exchangers, pumps and NGL storage vessels. Responsible for operating manuals, commissioning and start-up.

### **Numac Energy Inc. (now Devon Canada Corporation)**

#### **Clarke Lake**

- DBM, budget, detailed engineering, material specs, bid documentation, BC government permits, material procurement and construction, contract award, as well as project management through to completion, for a 9 km 4" diameter pipeline, well site installations and tie-in to existing dehydration plant (b-89-K, 94-J-10).

#### **Birley / Martin Creek. BC**

- Detailed design, procurement and installation of two 1600 HP Weatherford Enterra compression packages with glycol dehydration, heat medium, power generation and accommodations. This 30 MMSCFD gas grassroots mobile facility was available for production on schedule.

#### **Red Creek**

- Project Engineer from DBM through detailed design, to construction and commissioning for a 20 MMSCFD gas, sour station c/w dehydration and pipeline.

#### **Tommy Lakes**

- Design, procurement and project management for the addition of a 1478 HP sour compressor, 20" OD dehydrator and sales metering to existing facilities.

### **Pacific Cassiar Limited**

#### **McIntyre**

- Design and project management for the installation of a two compressor stations, choke plant and gatehiring system.

#### **Bow Island**

- 5 compressor stations varying in size from 3 MMSCFD to 5 MMSCFD c/w dehydration and choke plant for hydrocarbon removal.

#### **Welling South**

- Coordination and field inspection for a compressor station, including dehydration and associated pipelines.

### **Pakistan Petroleum Limited - Pakistan, 2002**

- Worked as a Process Engineer on SUI gas plant expansion Phase II project, with a project budgeted cost of \$US 1 billion, to increase the capacity of gas sweetening and dehydration process to 140 MMSCFD. Supervised and involved actively in all project phases including detailed engineering, commissioning & start up.

### **PanCanadian Petroleum Ltd. - Dimsdale**

- 30 MMSCFD, 1200 HP compression c/w dehydration and hydrocarbon dew point control.

### **Penn West Petroleum Ltd.**

#### **Esther**

- Gathering system design and installation management for the connection of 17 oil wells.
- Project management of the installation of inlet separation, compression (500 HP) and dehydration for solution gas.
- Project management of the twinning of existing water injection facility.

#### **Firebird**

- Install water disposal / condensate re-injection pump package, gas driven.
- Design and project management of 7 km of 6" pipeline and three wellsite meter facilities.
- Design and installation management of a grassroots gas plant. The scope included a five well tie-in, wellsite facilities, 18 km of pipeline (4" and 6"), inlet separation, 750 HP compression, dehydration and water disposal.
- Installed incremental 500 HP inlet compression.
- Satellite plant communications.

### **Pipestone Petroleums Inc. - Big Jedney / Highway**

- Process design and project management for the installation of 16" Ø to 24" Ø glycol dehydration facilities at three (3) wellsites.
- Pipeline permitting for the tie-in of all three (3) wells.

### **Pointwest Energy Inc. – Boundary Lake**

- New 30 mmscfd, 2400 hp compressor station including dehydration.

### **Quasar Petroleum Ltd. (Now Canadian Natural Resources Ltd.) – Grizzly Valley**

- Gas wells complete with three phase separation, dehydration units and line heaters.

### **Rigel Energy Corporation - Gilby**

- Project management of compressor (305 HP) and dehydration facility (2 MMSCFD) installation.

### **Solex Gas Processing Corp. (now Altagas) - Harmattan**

- Design, equipment specification as well as procurement for adding a new CO<sub>2</sub> recovery facility to the existing gas plant. The CO<sub>2</sub> production capacity is 19800 lb/h. The project includes CO<sub>2</sub> filtration, sweetening, dehydration, refrigeration, storage and truck loading facility.

### **Spectra Energy Transmission - McMahon**

- Simulated 275 MMSCFD Drizo dehydration unit using ProMax Software.

### **Suncor Inc. - Lagarde, BC**

- Oil battery expansion to accommodate additional 485 BOPD, 398 BPD water and 2.45 MMSCFD of associated gas. The new facilities comprised of a treater skid c/w inlet group separator, four oil storage tanks, two water storage tanks, a pop tank, gas compression and dehydration, a flare stack and K.O. drum, office/warehouse/ MCC trailer, pipeline and meter skid.

### **Tetreau & Associates Ltd. – Patricia & Princess**

- Detailed engineering design of two (2) sweet natural gas compressor stations, each complete with inlet separator and dehydration and designed for 4.0 MMSCFD of sweet natural gas.

### **Total Austral S. A. - Ara, Canadon Alfa, Brazil**

- Layout of a multi-skid plant extension including the inlet FWKO, exchanger, low temp, economizer, compressor (700 HP, screw type) refrigeration accumulator, glycol dehydration, fuel gas, condensate flash drum, condensate pump, ESD, and quadruple level pipe rack skids.

### **Transwest Gas Systems Ltd.**

#### **Chandler**

- 15 MMSCFD sweet gas compression (1478 HP) and dehydration c/w a mix of 3", 4" and 6" dia. pipe in a 56 km (21.6 miles) gathering system.

#### **Ethel Lake**

- 5 MMSCFD, 5 well tie-in with dehydration facilities.

#### **Kehiwin**

- Design and project management of a sweet gas compression (1478 HP) and dehydration facility including a mix of 4" and 6" diameter pipe in a 10 km gathering system.

#### **Winnefred North**

- Design and installation management of a 1478 HP screw compressor.
- Addition of two (2) 1478 HP compressors to the existing plant, upgraded the dehydration facilities, and installed 35 km of gathering system complete with two (2) satellites.

### **Triton Canada Resources - Fort McMurray**

- 20 MMSCFD, 1500 HP gas plant c/w dehydration and gathering system.

### **Universiti Teknologi Malaysia - Malaysia**

- Training – Dehydration Process Design