



**CCI Thermal**  
Technologies Inc.  
Heating and Filtration Solutions

CANADA'S  
**BEST  
MANAGED  
COMPANIES**  
Platinum member



# Dual Product Line Heating System

## Application Solution 14-01

### The Challenge

Supplying a zero emissions line heater capable of heating compressed natural gas or liquid butane during separate operating cycles.

A Canadian oilsands producer needed to heat large flows of high pressure natural gas during the start-up phase of a downhole steam injection operation lasting several months. Once the initial injection of natural gas was completed the injected flow then switched to butane for ongoing oil

viscosity enhancement during process operation. Butane liquid was supplied at low temperatures requiring heating to prevent thermal degradation of the steam injection flows. In addition to the dual product heating requirements, the site's operating permit dictated a zero emissions installation, negating the applicability of natural gas combustion as an energy source. Finally the installation location was outdoors requiring weather resistance.

## Design Conditions

Natural gas was supplied from a nearby gas pipeline at pressure of 1087 psig (7490 kPag), with a low end design temperature of -49°F (-45°C) and a flow rate of 750 scfm. The natural gas flow had to be heated to 90°F (32°C).

Butane liquid was supplied at -40°F (-40°C), requiring heating to 50°F (10°C), at a flow rate of 250m<sup>3</sup>/day liquid flow and 725 psig (5000 kPag).

Power was supplied at 480 volt 3 phase. CSA approval for Class I, Division 2, Groups C & D, T3C and Canadian CRN registration were required.

## Engineered Solution

CCI Thermal provided a custom engineered 72 kW, 480 volt, 3 phase electric fuel gas line heater complete with a 10" low temperature carbon steel pressure vessel designed to ASME Section VIII, Division 1. The operating conditions dictated a 900 ANSI design at 194°F (90°C) and 1700 psig (11,720 kPag). The 10" carbon steel immersion heater featured 42 incoloy® elements, a 72" immersed length with a watt density of 10 w/in<sup>2</sup>. The unit incorporated a stilted terminal box explosion-proof rated to Class I, Division 2, Groups C & D.

The unit included a skid mounted local control panel containing a single 120 Amp rated, 3 phase, zero-fired 2-leg control SCR. Safety related items included RC and MOV protection, semiconductor I<sup>2</sup>t fusing, diagnostic indicators for control power, command signal and blown fuse plus thermostatic over-temperature control. The panel was also supplied with a vortex cooler and explosion-proof electric panel heater for temperature control in all outdoor conditions.



## CCI Thermal Expertise and Innovation

The dual product heating requirements for both high pressure natural gas and butane liquid required careful engineering of the system operating envelope. The outdoor installation together with hazardous location requirements required CCI Thermal's expertise to engineer a system with the power, controls and safety features needed to meet rigorous site specifications while withstanding the harsh year round climatic conditions of a Northern Canada outdoor location.

CCI Thermal's ability to engineer the high pressure system and controls, obtain local pressure vessel approvals and design registrations and manufacture a high quality, emission free robust solution were key factors in the success of this application.

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