PETROLEUM TECHNOLOGY ALLIANCE OF CANADA STUDY ON COLD WEATHER PUMP ALTERNATIVES: BEST PRACTICES RECOMMENDATIONS

Prepared for the Petroleum Technology Alliance of Canada by GreenPath Energy

www.greenpathenergy.com
(403) 200 1553

GREENPATH ENERGY LTD

This document is designed to provide field staff and facilities designers with a "quick start" guide to help determine the viability of pneumatic pump alternatives in Canadian operations.

The most important variable in determining pneumatic alternatives that are viable at a given site is good quality data about site configuration. The most important question in assessing pump alternatives is injection requirements: after these have been determined, site-specific factors will help determine the optimal pneumatic pump alternative.

This document provides a list of questions to be asked during facility design or if a pneumatic pump alternative is being assessed, in order to determine the best fit based on available technologies. Based on site information, better-informed decisions can be made on the best possible chemical injection pump alternative.

INJECTION INFORMATION

- ☐ Target litres per day
- ☐ More than one chemical injected at site?
- ☐ Chemicals at different rates? (Yes/No)
- ☐ Chemicals Injected:
  - ☐ Methanol – Litres per day
  - ☐ Corrosion Inhibitor - Litres per day
  - ☐ Other – Litres per day
- ☐ Injection is seasonal (e.g. October to April)
- ☐ Injection is 365 days per year (Yes/No)
- ☐ Has production delineated? (Yes/No)

SITE INFORMATION

- ☐ How many pumps on site?
- ☐ How many gas driven controllers on site?
- ☐ Is power available on site?
  - ☐ Grid-ied
  - ☐ Self-generation
  - ☐ Other
  - ☐ None
- ☐ What is the distance from the pump to the tree line? (metres)
- ☐ Site latitude and longitude
- ☐ Wet fuel gas?
- ☐ Sour site?
- ☐ Cata-Dyne heaters in proximity to methanol pumps?
- ☐ How many valves are at site?

PRODUCTION TYPES AND PREFERRED PNEUMATIC PUMP ALTERNATIVES

PRODUCTION TYPE	PREFERRED ALTERNATIVE TECHNOLOGY
Low-pressure, low rate well	Methanol sphere
Multi-well pad (>8 wells)	Self-generation + instrument air or electric pumps
Methanol Injection (seasonal)	Vent gas capture system
Wet fuel gas	Solar chemical
Sour site	Solar chemical
Non-remote site	Grid-tied electric pumps

ELECTRIC OPTIONS

If electricity is available on site, from an interconnection to a grid or self-generation, the preferred option is for electrically-actuated pumps. Power requirements for most single- and multi-well pads are for chemical injection pumping, and controls are relatively low and do not require the transmission infrastructure required for a large scale gas plant or compressor station.

When the total projected load (pumps and controllers) are known, the economics of interconnection or self-generation can be evaluated. Electric chemical injection pumps have been shown to handle most expected pressure present at site and deliver chemicals at more accurate rates than pneumatic pumps. If a site is sufficiently large that an instrument air system has been installed, running pneumatic pumps on instrument air is a viable option.

REMOTE POWER

In assessing a case of remote power, the most important element to identify is the chemical injection requirements in terms of both volume and number of chemicals to be injected. Generally, the greater the volume of chemical injected, the higher the cost in terms of panels and batteries. A number of solar chemical systems have the ability to pump more than one chemical at a time, which may reduce capital costs (one pump instead of two or three) and operating expenditures related to multiple gas-driven pumps on site.

The next step in the sequence would be to evaluate the particulars of the site:

- What is the quality of fuel gas on site? If the fuel gas is wet, a solar chemical pump may be more cost effective than maintenance related to dirty fuel gas. If a site is sour, running propane or a clean fuel gas line may be more expensive than solar.
- What is the injection pressure in the process that the chemical injection is targeting? New high pressure wells may exceed the pressure capabilities of solar systems, but if the injection target is the flowline, solar may still be an option. If initial pressures are too high for a solar system, pneumatic chemical injection could be used for startup and then switched to solar when the well delineates and pressure become more manageable.

In terms of site layout, a key issue is the latitude and longitude of the site. The more northern the latitude, the more panels and batteries are required for the system. A free tool for determining solar intensity is available at http://pv.nrcan.gc.ca/index.php?n=720&m=u&lang=e, which factors in average cloud cover that reduces available solar energy.

At sites with tree cover or other obstruction, examine where the panel(s) would be obscured. Generally, if over 200 metres to the obstruction, there should not be an issue with a solar system, even at northern latitudes.

Finally, examine if there are Cata-Dyne heaters on site and proximate to gas-driven chemical injection. If these injection systems involved injected methanol (which is generally injected seasonally), the exhaust from the injection process could be used as fuel or make-up fuel for the Cata-Dyne heaters in winter, reducing total operational costs as well as reducing emissions.

LOW PRESSURE – LOW VOLUME

In Alberta, for low pressure and low volume chemical injection cases, methanol spheres should be examined as an alternative; they appear to be a cost effective method for reducing emissions relative to a gas-driven pump.