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Case Study: Benefits of Utilizing a Closed-Loop, Evaporative Cooler for Supercritical CO₂ Cooling for Well Injection

By Chuck Marchetta

Those of us in the industry know that high pressure CO₂ can be used for enhanced oil recovery, however, some many not be aware that cooling the supercritical CO₂ stream can have a dramatic affect on the overall efficiency of the supply system.

This case study will discuss the outcome of an independent oil/natural gas producer which needed to cool a high pressure CO₂ stream after extraction from a gas well and before pumping for distribution. Due to the relatively high pressure, cooling equipment options are limited, but the results will show specific advantages include reduction in pumping horsepower, lower capital equipment cost, and an increase in operating capacity efficiency.

A solutions provider designed, manufactured, and installed three closed-loop, evaporative coolers to meet the strict process requirements. This presentation will discuss how the technology offers:

- Lower capital cost than an air cooler
- Smaller plot space requirement
- Lower outlet temperature with efficient process cooling
- Direct process heat rejection
- Low water consumption

These units were designed using 304 stainless steel per ASME VIII Division I with serpentine tube bundles and an access package including a fan deck, ladders, and railing. Design details such as heavy duty 10 & 12 ga panel construction, 900# ANSI flanges, nut & bolt construction, no self tapping screws, and modular assembly will also be discussed.