



### **NUFLO CONE Success Story**

Much like the SAGD operations in the Canadian Oil Sands, operators in Bakersfield, Calif., inject wet steam into heavy oil-bearing formations to reduce viscosity and push the oil to recovery wells.

Wet steam is very tough to measure because it is multiphase, which means only a percentage of the media is steam – in this case, approximately 70% – and the rest is water. This creates havoc with traditional differential pressure (DP) measurement devices like the orifice plate or flow nozzle because water tends to gather in front of and behind the restrictions, which can create a faulty DP.

### **The Customer Challenge**

The end user required an accurate steam measurement device that fit into tight piping because of facility design space restrictions. The customer also needed to ensure a specific steam flow rate and pressure for reservoir management and for economic and regulatory reasons.

California has stringent regulations controlling the amount of steam that can be pumped into a formation. Through proper measurement and flow control, the cone meter can prevent fissures from occurring as a result of injecting too much steam at once.



### **The Cameron Solution**

Cameron proposed a packaged solution to satisfy the customer requirement for accurate steam measurement and control, which was comprised of a NUFLO cone meter and a Scanner 2000 in conjunction with a choke. The cone meter measures the steam flow while the scanner totalizes the data and sends a signal back to the programmable logic controller, which, in turn, regulates the choke valve.

In this way, the customer could manage his investment by maintaining the optimal flow rate for the operation to: save on energy costs, project future results, increase the return on investment, provide information for project valuation and report results to the regulatory body.

### **The NUFLO Cone Meter Advantage**

The hydrodynamic cone-shape design guarantees a unique and economic solution outside the scope of traditional technologies. It not only operates over large turndowns (10 to 1) and achieves high accuracies of up to  $\pm 0.5\%$  (Reynolds Number), the meter's ability to "condition the flow" allows for the use of a shorter meter run, which, in turn, reduces installation and setup costs. Further, because the NUFLO cone meter has no moving parts, it is maintenance-free and parts do not need to be replaced for the operational life of the unit.

### **Project Results**

First, Cameron installed a beta test, which proved to be very successful. After seeing test results, the operator installed nine NUFLO cone meters, which also have performed exceedingly well. Since then, the end user hard-specified the cone meter for future project expansions and sees a need for 20 more units for one project and even more for another project.

Matthew Norris, Cameron's Account Manager who secured the sizable project, said, "I used to work with these guys in an engineering/technical capacity, so I know them well. They told me they were very impressed with results of the cone meter, scanner and choke combination. Now, it's the preferred system. They also said they were very happy with the long service life of the product. With no moving parts, the cone meter has lasted two to three years without maintenance."

**Accurate steam flow measurement. Rugged, compact design. High, stable turndown.** Cameron's NUFLO cone meter is an ideal choice for accuracy in steam measurement and low total cost of ownership. Cameron's engineering expertise and manufacturing excellence goes into every product we make. Cameron is your first choice for measuring or controlling flow, even in tough-to-measure applications.



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