Case Study: Laser-based gas detection technology and dispersion modeling used to eliminate false alarms and improve safety performance on Terra Nova FPSO

Edward Sharpe  
Suncor Energy, Inc  
esharpe@suncor.com

Rajat Barua  
Senscient, Inc.  
rbarua@senscient.com

Are Bratteteig  
GexCon US  
are@gexcon.com

Zona Bath  
Suncor Energy, Inc.  
zbath@suncor.com

Abstract
Suncor Energy is the operator of the Terra Nova FPSO, which is located in the Grand Banks, off the East Coast of Canada. In 2010, a multi-disciplinary team was assembled to assess and upgrade the overall gas detection system on the FPSO. The team involved personnel from safety, risk analysis, operations, instrumentation and controls engineering. A detailed analysis of the facility, based on computational fluid dynamics (CFD) modeling, was performed. In aggregate, more than 1,400 gas leak scenarios were simulated and used in the evaluation, detector selection process, optimization and overall design of the upgrade to the gas detection system. Laser-based technology was selected to replace infrared gas detection technology after extensive testing in both onshore and offshore environments. By combining a quantitative gas dispersion study with the implementation of new technology, Terra Nova was able to achieve:

1. An elimination of false alarms
2. An increase in gas leak detection coverage
3. Earlier warning for preventative and remedial action
4. A reduction in maintenance requirement
5. A reduction in the exposure of operations personnel to hazardous locations and gases
6. An improvement in the reliability and robustness of the FPSO’s overall gas detection system.

The Terra Nova FPSO is a remote facility with limited egress. Therefore, any hazardous gas release in the facility requires complete production shutdown, blow down of available inventory and isolation of electrical equipment that is not Zone 1 rated. Prior to the upgrade, false alarms from gas detectors were resulting in prolonged outages, damage to process equipment and production deferments of approximately 50,000-100,000 barrels per year. The upgrade was able to address all of these problems. This paper describes the methodology that was applied and presents an overview of the results. Implementation of this retrofit and upgrade approach is expected to benefit numerous industrial facilities where the threat of a toxic or flammable gas leak exists.