



Total Safety CCSMSM Provided an Innovative Safety Solution for a Major West Coast Refinery



During a recent major maintenance turnaround at a 150,000 bbl/d West Coast refinery, Total Safety's Centralized Confined Space MonitoringSM succeeded in detecting carbon monoxide when traditional methods failed, and in the process, also helped save the owner approximately 12% on overall confined space project cost.

Opportunity

In Q1 of 2014, Total Safety set up the CCSM system at this refinery to monitor confined spaces in an F-1 Heater project using 18 single point monitors (SPM) for the entire duration of the turnaround or approximately 35 days.

Total Safety's patented CCSM system was the ideal solution for the client. This system has been used successfully in more than 180 turnaround projects in Europe. CCSM utilizes five types of technology to ensure the safety of workers including access control badge readers, constant atmospheric monitoring, closed-circuit video monitoring, audio/visual alarms and push-to-talk 2-way communications.

Using real-time technology, the Centralized Control Center (CCR), under the supervision of Total Safety's highly trained safety professionals, identifies workers entering the confined space, maintains visual and audio communications with confined space entrants, monitors atmospheric conditions for toxic or dangerous gases, and activates appropriate alarms when an accident occurs, helping to ensure evacuation of confined space entrants.

The CCR is continuously monitored by experienced and trained Total Safety personnel, and —

- Utilizes highly intelligent software to centralize, analyze and report all incoming data through one video system and two system servers.
- Provides continuous atmospheric (gas detection and air velocity) monitoring of the confined space(s) by trained personnel.
- Provides ongoing safety observations of employees working inside the confined space using video technology, and if an unsafe act or condition is detected, provides instant intervention using an intercom system.
- Completes checklists to verify authorized work permits, required personal protective equipment (PPE), and atmospheric hazards.
- Provides reliable reporting and trending of all gas measurements.
- Provides access control reports by vessel, worker or contractor.
- Activates clear and visible alarm conditions and status both inside the CCR and the confined space.
- Enables direct communication with the rescue team and workers inside the vessel in the event of an emergency.
- Receives visual and audible alerts via "pop-ups" in case of incoming calls.
- Records and backs up all video with data logs including headcount and gas detection to provide work history and case management.

Project Scope

Total Safety issued entry access badges to 300 workers who, during the course of the 35-day installation, required access and egress from the monitored confined spaces. During the project, Total Safety logged more than 4,000 confined space entries.

Eighteen SPMs were deployed to monitor 28 confined spaces during the project. Total Safety effectively managed the entire project with just nine operators and technicians on site for each shift.

Situation

The client's confined space policy requires direct line of site on all confined space entrants at all times. Typically on a project of this scope, the client would have used 36 attendants per shift – 18 working the day shift and 18 working the night shift.

Utilizing CCSM technology in conjunction with traditional safety attendants, the client recognized significant savings and was able to eliminate 16 attendants per day. With CCSM only 5,460 man-hours were worked on the project. Had a standard safety attendant approach been used, 16,800 man-hours would have been worked on the project. Total Safety CCSM contributed to an overall reduction of 11,340 MH.

At one point during the 35-day project, CCSM more than proved its value when the system detected carbon monoxide in a remote part of the F-1 heater. While workers were in this area, none of the workers' four-gas monitors registered an alarm. Total Safety personnel in the CCR were able to evacuate the space quickly until atmospheric conditions returned to normal. At the end of each shift, Total Safety could verify that all workers had vacated the confined space and were safely account for.

STANDARD CONFIGURATION PER CONFINED SPACE	
Access control	Active badging system: 1 reader confined space, 1 reader at man-way outside confined space
Gas detection	4 sensors + 1 optional input + air velocity meter – includes 150' of sampling tube to follow workers within confined space O2, LEL, H2S, CO
Camera monitoring	1 internal day/night video camera that can be moved to follow the workers in confined space 1 external day/night video camera at the man-way that is stationary
Antennas	Standard wireless communications from the confined space(s) to the centralized control center
Communications and alarming	1 full duplex intercom inside 1 full duplex intercom outside 2 automatic alarm sirens with flashing warning lights

Objective

In addition to the improved level of confined space safety and accountability that Total Safety's CCSM provides, the system performance was closely scrutinized during this project by the client's safety team. These "audit teams" were comprised of experienced turnaround and safety personnel from other refineries throughout the U.S. Members of the audit team were eager to see CCSM in action and consider its value for future turnarounds.

During the audit, a client site representative was impressed with the system capabilities and performance. As a result, CCSM is being considered as an option to traditional confined space attendants for their fall 2014 turnaround.

Total Safety has since been invited (and confirmed) to present at the clients Annual Turnaround Managers Meeting in the summer of 2014.

Project Cost Savings

Utilizing CCSM in conjunction with fewer Confined Space Attendants provided significant cost savings to the client. Some of these savings included:

- Enhanced technology combined with professional safety supervision provided a reduction of 32 confined space attendants for 35 days.
- Improved overall safety on the project by having 32 fewer workers on the turnaround.
- Eliminated recruiting, training and on-boarding costs for 32 confined space attendants.
- Because of the continuous atmospheric monitoring, confined space permits remain active once issued and bottlenecks at shift change around the permit shack are eliminated.
- Eliminated travel and per diem costs for 32 confined space attendants
- Improved worker productivity in confined spaces with continuous video surveillance inside the confined space.
- Provided valuable real time video feed during heater rod removal that allowed project planners to deploy most efficient and cost effect removal and remediation.
- Immediate response to unsafe acts and changing atmospheric conditions.
- Live video feed and two-way communications with rescue personnel.
- Increased safety observations by taking screen shots of unsafe behavior.
- Full video record with recorded gas readings for future case management.

About Total Safety

Houston-based Total Safety, a Warburg Pincus portfolio company, is the world's premier provider of integrated safety and compliance services and the products necessary to support them, including gas detection, respiratory protection, safety training, fire protection, compliance and inspection, comprehensive flare services, industrial hygiene, onsite emergency medical treatment/paramedics, communications systems, engineered systems design, and materials management. It operates from 137 locations in 20 countries to ensure the safe Wellbeing of Workers Worldwide (W3). For more information about Total Safety and its unwavering commitment to safety, visit www.totalsafety.com.