

## Gas Production Wellhead Fire & Gas Detector Layout Design

### PROJECT BACKGROUND AND CHALLENGES:

A leading natural gas producer planned to drill a new production well and install wellhead facilities, requiring an effective fire and gas detection system to mitigate high-pressure gas leaks. Due to business constraints, they needed a cost-effective design that complied with the latest international standards while maintaining the required performance. The proposed standard design was deemed over-engineered and costly, but the client lacked the expertise and tools to determine the minimum design requirements necessary to meet performance standards. Initially, the request was for flammable gas detection only.

Equinox Automation was engaged in designing fire and gas detector layouts that met project constraints while maintaining high performance standards.

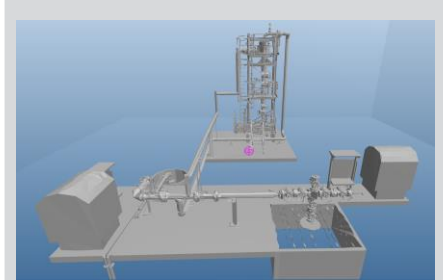
### SOLUTION:

Our engineers reviewed the project and facilities, working closely with the client team developing two solutions: one for start-up with a large sand-catcher cyclone installed and another without it. Our approach accounted for both design options, ensuring that neither was dependent on the other if the sand catcher was removed after the initial run-in period once optimal sand production rates were confirmed.

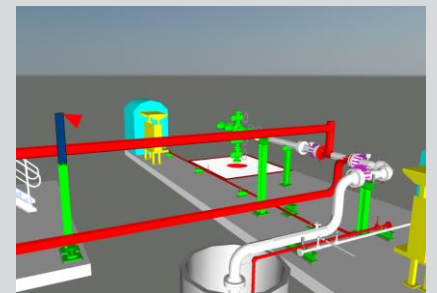
Using specialised 3D fire and gas detector mapping software, we optimised the gas detector layout to meet project requirements. A performance-based design methodology was applied to determine detector coverage targets for both operational modes, utilising both open path and point gas detection technologies.

The design options were verified using software tools to ensure the performance targets were met. This analysis confirmed that if the sand catcher cyclone were removed, one point gas detector could be decommissioned without affecting the effectiveness of the remaining layout.

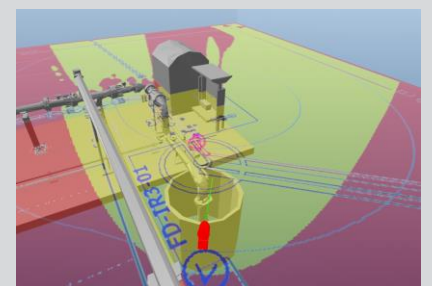
During our work, we identified an unaddressed fire hazard associated with a flammable chemical stored in bulk for injection into the production stream to improve operability. We highlighted the hazard and gaps in fire protection measures. As a result, we incorporated an IR flame detector into the design to enhance fire hazard mitigation. Software tools were used to confirm coverage targets and verify the design.



**Figure 1: Our engineers use specialist 3D Fire and Gas Mapping software tools to design compliant and effective detector layouts.**



**Figure 2: Working from the project 3D model to select detector location's optimised for construction efficiency.**



**Figure 3: Verifying flame detector coverage and field of view**

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### RESULTS:

Our optimised, compliant, and verified fire and gas detector layout design resulted in an estimated project cost saving of \$80,000 by reducing the number of detectors from the original design and utilising lower-cost point detectors where possible.

Detection effectiveness was enhanced by strategically positioning detectors close to potential leak points, reducing hazard detection and mitigation times. Safety was further improved by proactively identifying and addressing fire hazards in collaboration with the client.

To simplify construction, we pre-selected detector locations for mounting on existing facility structures. Where new detector poles were required, we ensured minimal cable trenching was needed.

By leveraging advanced 3D fire and gas detector mapping and a performance-based design approach, Equinox Automation delivered a fit-for-purpose, cost-effective, compliant, and optimised detection layout design to the project and client needs. Our solution not only reduced project costs by an estimated \$80,000 but also enhanced detection effectiveness, improved safety, and simplified installation. Through proactive hazard identification and collaborative problem-solving, we ensured an effective fire and gas detection system that meets both current and future operational requirements.

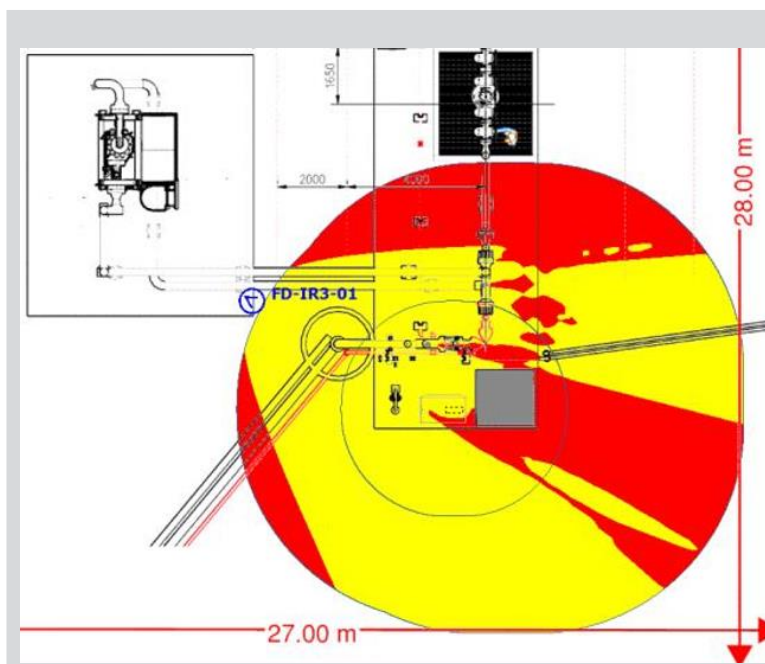


Figure 4: IR3 Flame detector coverage map visualizes the detector coverage and verifies the design achieves required performance standard.