Title: Remote emission monitoring for enhanced Operations Safety Management

Abstract:

Production activity has increased dramatically over the past 10 years as oil/gas operations have expanded the utilization of efficient extraction and production methods. Legacy operations have extended production lifetimes and new drilling operations utilize enhanced production methods to accelerate time to production. The scale of operations drive the compelling requirement of Safety Management to mitigate the risk to personnel and communities. Regulatory agencies have strong roles in setting requirements and enforcing the implementation of compliance requirements for safety and emissions performance.

Remote monitoring products and services provide additional resource to scale Safety Management to meet the expectations of enterprise, regulatory, and community requirements. The solutions are a key component to addressment of those requirements and expectations. Present risk assessment and mitigation method already employed by the oil and gas industry in operations management are directly leveraged by emission products with economy of cost scale. Additional efficiencies with remote monitoring are gained with work process, situational assessment, and emission incident avoidance.

Remote Emission Monitoring

Alert Plus's Aegis 400 was designed by Field Engineering personnel to proactively provide emission status data to enhance operational integrity and mitigate emission incidents. A site based instrument provides continuous monitor of volatile emissions activity; Modbus 4–20 mA compatibility insures integral tag location on SCADA or Intermediate Operation Center (IOC) control systems/rooms. Site based mobile access provides situation assessment for field and operations stake holders to determine present emission threat status. Intelligence provided by remote emission monitoring is able to be included with operations knowledge base to establish SOP and threat addressment – all response activities able to be linked with the original emission alarm alerts for later review and assessment. Remote monitoring capability is aligned with Operations Integrity Management driven by existing DOT/PHMSA CRM initiatives. The concept is to integrate remote emissions management into a comprehensive life-cycle management process as present deployed in DOT/PHMSA connected operations. Illustrated in Figure 1 below is the life cycle management process as defined by ANSI/ASI 18.2 Alarm Management standard, a requirement for CRM compliance by DOT/PHMSA.

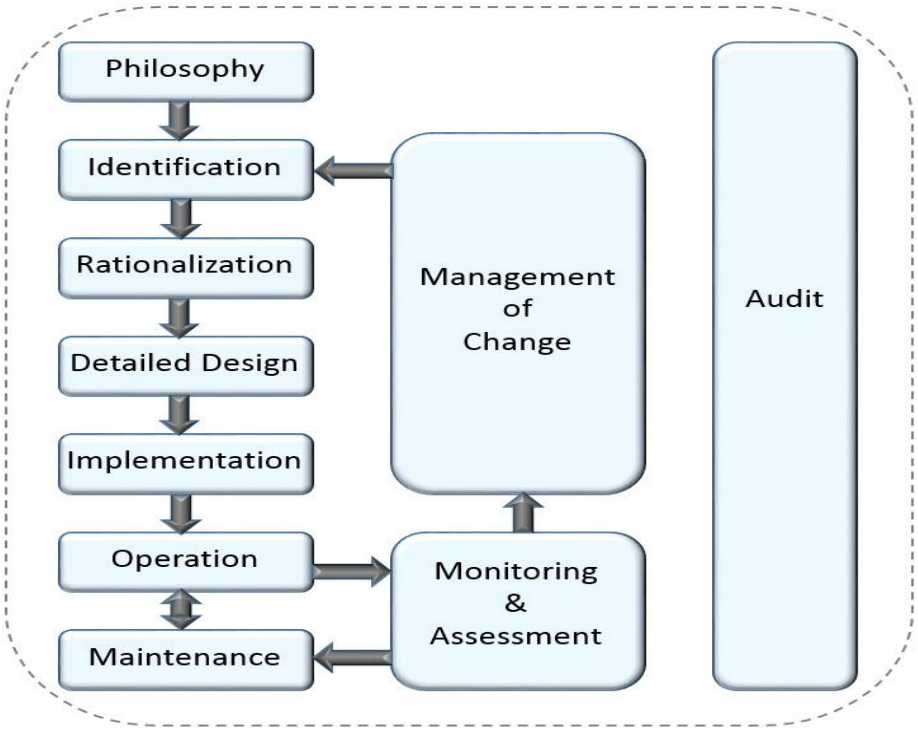


Figure 1. Alarm Management Lifecycle

Technology Adoption.

Another benefit of remote emission monitoring is the adoption of technology of a remote emission monitoring method process by Field and Operations team members. For example, SOP changes to remotely pre-assess emission levels before entering the site mitigates the emission threat that personnel will be exposed to. Comprehensive pre-assessment can set a draft work flow schedule for the work day, alerting ancillary support resources for that day's task list. The long term benefit is work flow efficiency improvement and process repeatability as a return on investment (ROI) for remote emission monitoring.

Knowledge based retention.

Knowledge base retention is a continuing challenge for Field operations management. Personnel turnover and industry retirements challenge the integrity of operations with operations knowledge loss. Introduction of new technology sets opportunity to establish more efficient practices and capture the improved knowledge base with remote monitoring solutions such as the Aegis 400. Operations can extract the best practices from existing methods and processes, and integrate the efficiencies gained from remote monitoring resources into a continuous improvement best practice operation strategy. All is captured into a linked activities database that is reviewed, improved, and set to life cycle management process.

Imagine the capabilities provided with remote monitoring resources. An emission event is alerted to the IOC or SCADA control room. Remote data assessment provides for assessment of the threat and the immediacy of the response to protect field personnel or local communities. Mobile access from Field provides instantaneous glimpse as to emission levels before entry to the site. All are captured in an alarm and event database to connect a response process to mitigate the impact of the emission threat. Monthly threat review meetings allow a team review of that incident, the response, and the event completion SOP to determine if efficiencies can be

applied to future incidents or threats. Figure 2 is a repeatable work process to manage remote monitoring emission alerts at field site locations.

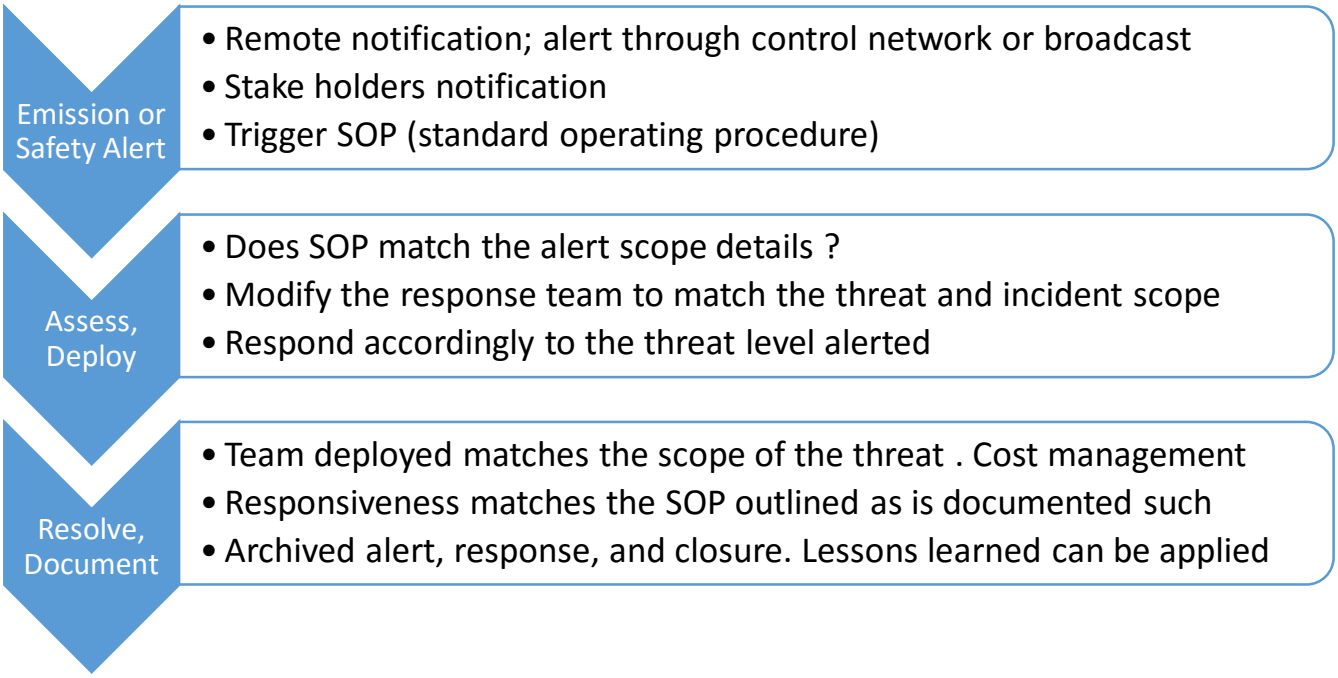


Figure 2. Repeatable Work Process

Site Implementation Flexibility.

Streamline connectivity for remote emissions monitoring to existing operations assets is a primary goal of implementation. Aegis 400 provides that flexibility for power and communication; sensor type selection for that site equipment or production type; and low temperature operation for cold climates. A proprietary pneumatic valve design provides capability to shut down remote equipment pending a critical emission event or explosion to protect equipment, personnel, and communities, and thus production value.

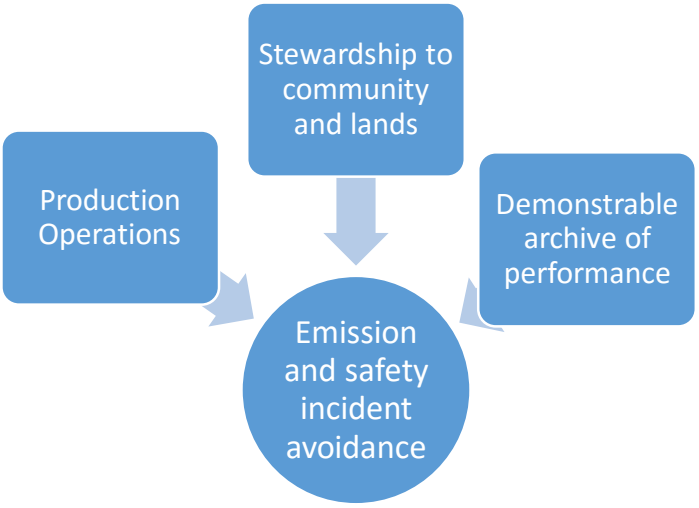
Regulatory Management Value

The primary benefit of Remote Emission monitoring is Safety Management. With a multitude of operations based regulatory compliance challenges, remote emission monitoring is a key asset to manage activities and metric alignment performance as demonstrable data for compliance efforts. Colorado is an excellent baseline for Emission and Safety driven initiatives and looks to be a model that gains adoption with the EPA and states. Highlights of Colorado efforts include LDAR (leak detection and repair) at compressor assets and production facilities, methods to identify high emitters and develop program to mitigate it, storage tank emission management (STEM) with remote emission monitoring among other methods. The Colorado requirements harmonize well with Remote Emission Monitoring methods and the best practices. Emerging methane emission regulations such as EPA NSPS emission guidelines justify the utilization of remote monitoring resources beyond just Safety Management programs.

Summary/Conclusion:

Remote emission monitoring enhances the Safety Management methods of operation strategy. An emission alert based process proactively triggers emission events to drive remote assessment process on the threat level to production assets, personnel, and communities. Implementation is iterative to present asset infrastructure and links a technology driven methodology to present operations management. It supports Integrity Management and Risk assessment/plan mitigation that harmonizes well with life cycle methods advocated by Regulatory driven best practices. The implementation has economy of scale and is able to be categorized as enhancement investment to existing IOC or SCADA based control systems. There is return-on-investment (ROI) for emission incident avoidance, work process improvement, inclusion to present service and maintenance procedures, regulatory issue avoidance, and safety system enhancement.

There continue to be community challenges to accept existing production operations and new drilling efforts. Aside the present oil and gas market economics, remote monitoring offers opportunity to illustrate production investments that demonstrate the stewardship message production companies wish to convey. Consider the public relations benefit of leveraging a remote emissions monitoring system for monthly community reports on emission performance to community stake holders as one example. The yield of such efforts provide multiple levels of



benefit to all stake holders.

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