

Enterprise Landfill Gas Management

Overview

Organizations worldwide go to great lengths to create procedures and workflows to standardize how information is collected, stored, maintained, and delivered. These efforts are intended to create a consistent and efficient method for an entire organization to conduct day to day operations. In the landfill gas (LFG) industry, these same principles apply. Companies look to confidently collect consistent and accurate data easily regardless of the field technician executing the procedures. Additionally, this data needs to be recorded, stored, analyzed, and delivered to a number of people. To accomplish this data integrity must be maintained at the highest levels. In this paper we will review how to get started, field procedures, security components, and data management systems involved to implement and maintain successful Enterprise Landfill Gas Management environment.

Getting Started

Assessment

To improve upon any ongoing activity, the first step that must be taken is to assess the process that's currently in place. An assessment should be a very objective record of each step in the process while taking note of what works well, what can be improved upon, and what should be removed all together. Process and workflow assessment is a common practice when viewing systems in the enterprise environment. This also applies for the landfill gas industry. Time and money can be significantly saved if the proper controls are put into place. Whether you have tens, hundreds, or thousands of users involved, a standard process to executing tasks and handling exceptions will help any organization reach its goals.

Workflow Evaluation

Once you've conducted your assessment of your existing landfill gas monitoring workflows, it's time to collectively make decisions on how to move forward. Three categories of identification were mentioned in the previous section: What works well/What can be improved/What should be removed. If something is noted as working well it should stay in the process. For a step that can be improved upon, identify whether the improvement is in the execution, equipment used, or qualifications of the person performing the step in question. If a step should be removed, verify with all parties affected by the step and remove it if possible. The simpler the process, the more likely it will be performed successfully. Some examples of each category are:

What Works Well?

- Field calibrating the gas analyzer at the start of each monitoring session
- Visual inspection of wellhead connections (i.e. hose clamps, connection ports, quick connect seals, etc.) for aging and standard wear and tear
- Scheduling factory maintenance of equipment several weeks prior to the date you will need to send it to the manufacturer allowing you to get a temporary replacement or schedule activities around this time frame.

What Can Be Improved?

- Wells are monitored in random order according to the first location I need to be that day.

- Create a standard walking route. This will help with consistency of readings and save time. To further improve this, well device IDs should be loaded in the instrument in the order that they will be read
- Keeping data stored in my portable gas monitor for long periods of time before downloading to the computer for reporting and secure storage.
 - While memory technology has definitely improved over the years, keeping large amounts of data in the storage of a portable gas monitor definitely has downsides:
 - Data is not available for reporting and decision making
 - Potential corruption and/or loss of data
- Compliance or other reporting and action requirements aren't always performed on time.
 - Look to implement a system that takes a proactive approach to alerting and initiating workflows such as time sensitive compliance actions or automatically emails reports on a scheduled basis. Technology is put in place to help performance, this is the purpose of the enterprise environment.

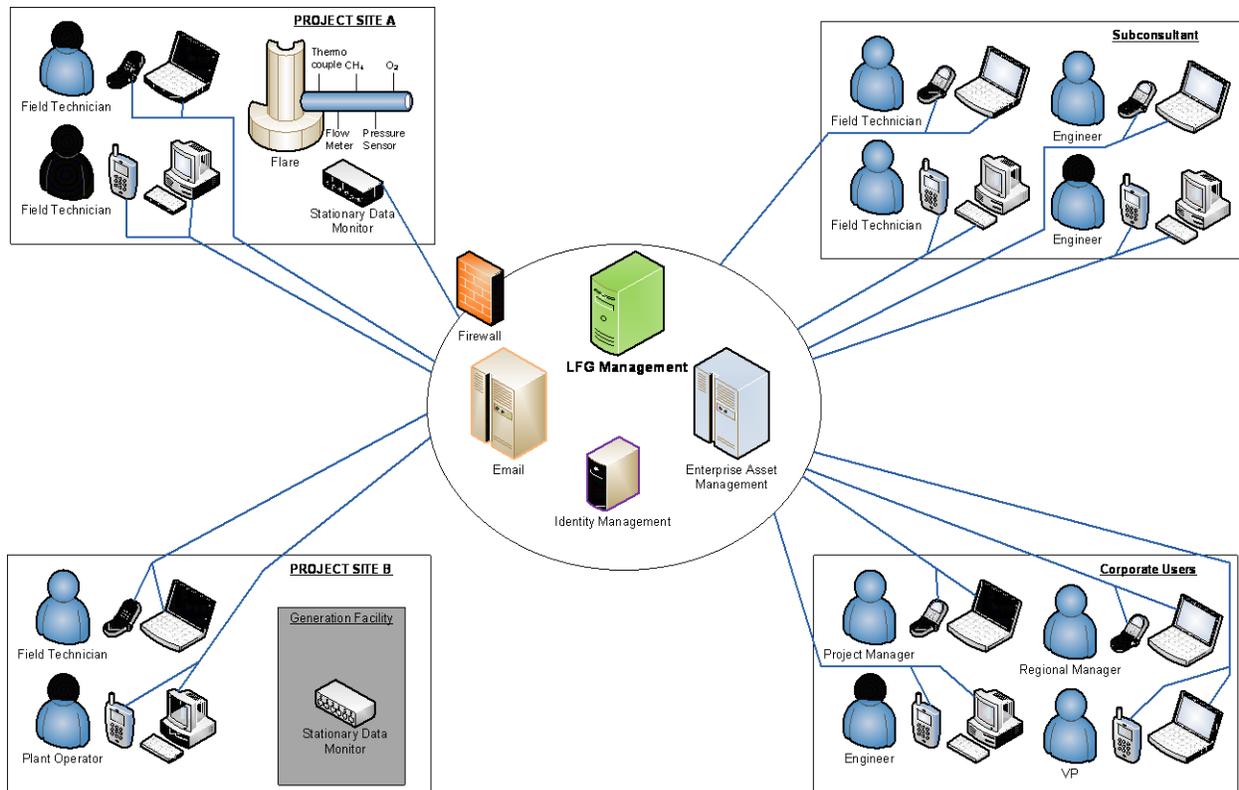
What Should Be Removed?

- Sending untrained personnel into the field to perform monitoring.
 - It is critical to obtain accurate and consistent readings from the field. An untrained technician can, and will most likely, get "bad" data which will need to be disregarded.
- Writing readings down on a paper log
 - Unless this is required for compliance to a rule, trust technology. While paper reports are produced as a deliverable, the data should be recorded in the portable analyzer and downloaded to the enterprise system when the session is completed. Paper logging is tedious, prone to errors, and take a large amount of time and effort. Supplemental information may need to be recorded but look to see if there are user defined fields that can be used in the portable unit.

Systems

The Enterprise Environment

There are many solutions on the market for each part of the landfill gas management process. This is true for gas extraction equipment, portable/stationary monitors, and web based reporting systems. To many professionals, the enterprise only consists of the centrally managed server based computing systems. When describing the enterprise for the landfill gas industry, you must include all systems that will affect the quality of data collection, delivery of information to decision makers, and systems that affect how the actions are implemented. For the LFG industry this includes not only the centrally managed computer systems but also portable and stationary monitors and the equipment from which the information is being gathered.



As you can see, all these systems are interlinked and are critical to the collection and delivery of accurate information.

A Solid Foundation

All enterprise environments rely on implementing the best solution to act as the foundation for warehousing consistent and accurate information. An enterprise landfill gas management system provides mechanisms for user access security (Identity Management), project site configuration, secure data transfer to and from field monitoring equipment, reporting, and information delivery to project participants and stakeholders.

Enterprise Technology

The enterprise environment consists of various pieces of enterprise application software (EAS). EAS is application software that performs specific business functions. Examples are systems designed for customer information management, accounting, project scheduling, procurement, and landfill gas management. All systems reside in the enterprise and are designed with overall enterprise architecture in mind. Standard server and database platforms are considered such as Windows Server, Unix, Linux, Microsoft SQL Server, or Oracle to name a few. These constraints should be considered and the IT department should be consulted. Other considerations are an internally managed solution or a web based, externally hosted solution such as SaaS (Software as a Service).

Security

User security, while a simple concept from a high level, provides many benefits. An obvious benefit is controlling who has access to confidential data belonging to your organization. In addition to simple access, your LFG data management system should also include role definition. Role definition is establishing a grouping of functions that will be made available to certain types of users. The following are two examples:

- Field Technician

- Read-only access to well devices IDs
- Read-only access to project information
- Read-only access to process system configuration (i.e. flare or engine systems)
- Access to transfer data to and from field monitoring equipment
- Edit access to field tasks
- Add/Edit access to field maintenance and service records
- Access Historical data reports reports
- Preconfigured to receive emailed monitoring summary reports and task assignments
- No access to edit project configuration, well device IDs, and user access configuration
- Project Engineer
 - Add/Edit/Delete access to well device IDs
 - Read-only access to project information
 - Add/Edit/Delete access to process system configuration (i.e. flare or engine systems)
 - No access to transfer data to and from field monitoring equipment
 - Add/Edit/Delete access to field tasks
 - Add/Edit/Delete access to field maintenance and service records
 - Access Historical data, production, and compliance reports
 - Preconfigured to receive emailed monitoring summary reports and task updates
 - No access to edit project configuration and user access configuration

In the large corporate enterprise environment, landfill gas management security may be integrated with the organization's Identity Management initiative. This scenario entails merging the privileges and roles of LFG management with those of the corporate structure. While this may be a more involved process, the benefits can be found in standardization, clear role definition, and ease of user maintenance for the IT Department.

Project Configuration

The landfill gas management starts with defining the project site. Project sites represent assets to the business and are managed as such. A wealth of information about each project site typically originates in other enterprise systems. This information can be replicated into the LFG management solution manually or in an integrated fashion automating the process and preventing scenarios of human error.

Once the identity of the project site is create in the LFG management system, the specific landfill gas system information can be configured. An enterprise LFG management system should allow configuration of all devices that contribute to the information that needs to be reported. Examples include gas extraction wells and their properties such as identifier, pipe size, flow measurement device, location, gas probes, and gas line sample ports. Other items to configure might be those from which data is collected surrounding any gas destruction facilities such as gas flares and cogeneration plants.

Data Integrity

In today's generation of enterprise environments, data integrity is a large factor in the success of a system. The vast amounts of data that exist combined with the available computing power allow for more scrutinized auditing for compliance to a number of regulations. These regulations may be internal to your organization, for gas production and payment such as Carbon Credits or gas sales for pipeline supply. Another set of regulations heavily apparent in the United States are environmental regulations such as the Environmental Protection Agency's (EPA) New Source Performance Standards/Environmental Guidelines (NSPS/EG). To ensure the highest data integrity, your enterprise environment must encompass the data recorders that collect the information and demonstrate secure data collection, transfer, validation, and storage.

Data should be collected via analyzer and data recorder without a user writing down or entering the value if at all possible. This demonstrates that a piece of equipment, operating to manufacture specification, has directly analyzed and logged the value of a parameter such as methane, oxygen, pressure, flow rate, and/or temperature. To further the integrity of the data recorded, you should select equipment that was designed to work in conjunction with each other. This adds an additional layer of confidence to the entire system. Once data is collected, a data validation process should occur. This process typically consists of a series of rules and conditions that data values must pass to be considered “good” data for final reporting and information delivery. Validation processes should be consistent for each piece of data that is compared to the given rules. To provide consistency, the enterprise LFG management solution should conduct the majority of the validation. The validation steps will be set up to verify the incoming information falls within historical trends, meets compliance limits, and should be stored permanently for reporting. The validation process may also kickoff steps in a workflow. An example of another workflow step is to assign another monitoring task on a specific gas well or require comments from management to explain a specific instance or series of readings.

Information Delivery

One of the major components and reasons for creating and maintaining an enterprise environment is information delivery to all personnel involved in any specific business function. “Delivery” can be viewed a number of ways. For instance, information can be delivered in reports with user defined parameters (i.e. date range), emails, attachments in email, text messages, etc. One or more of these methods, including others not listed may work best in any given organization. Whatever method(s) minimize the delay in which decision making or task based information is delivered should be considered when selecting an enterprise LFG management solution.

How do I evaluate an Enterprise LFG Management Solution?

Talk to the leading professionals in the industry. See what they are using, what equipment they rely on. Compare that information to your own internal assessment. Do others utilize solutions that help resolve items that fall into the “What Can Be Improved” category? Are others doing things that you should implement? These are all important questions to answer and factors to weigh when deciding on an enterprise solution. What meets the IT requirements of your enterprise environment? Is your organization a Microsoft shop or do they lean towards Oracle or other technologies? Implementing an enterprise solution is a sizable task and LFG professionals can easily be overwhelmed by the scale of the initiative. Approaching this with a planned approach can break the process into phases that are manageable. Value of each portion of the implementation can be shown. Workflows will be discovered that reveal how your projects, equipment, and infrastructure should be configured. Additionally, determining what types of information delivery methods are optimal for your organization will become apparent thus improving the efficiency of the operation, reduce cost of ownership, and increase your return on investment.

Author

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He has been involved in office and field operations, research and development, engineering, software, and business development.

Mr. Vidal’s other experiences include civil engineering and project management in private development and the public sector as well as enterprise systems integration and consulting.