



Using EMIS and Other Tools to Enhance Environmental Management Systems

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ABSTRACT

Environmental management has evolved to be an integral part of business operations, rather than an adjunct function. Many types and sizes of organizations wish to achieve and demonstrate environmental performance. In some industries, market pressures drive companies to implement the voluntary ISO 14000 Environmental Management Systems (EMS) standards. In addition, many proactive companies are evaluating how implementing the ISO 14000 standards can enhance their business.

This paper outlines the areas within ISO 14001 and ISO 14004 where organizations can best leverage technology to achieve environmental management objectives and targets. It also discusses the use of Environmental Management Information Systems (EMIS) and other technology-based tools to enhance EMS. While EMIS and other tools cannot guarantee compliance, these systems can be used to assess EMS and to improve performance tracking, data consistency, communication and compliance management. Finally, the paper addresses the business benefits of using EMIS other tools.

INTRODUCTION

There is an increasing worldwide trend to focus on better environmental management, raising environmental management from an add-on function to an integral part of business operations. Environmental management is making the transition from compliance-driven to becoming strategy-driven in many proactive companies.¹

Many types and sizes of organizations wish to achieve and demonstrate environmental performance. In some industries, market pressures drive companies to implement the voluntary ISO 14000 Environmental Management Systems (EMS) standards. In addition, many proactive companies are evaluating how implementing the ISO 14000 standards can enhance their business. Approximately 6000 companies are expected to be ISO 14001 certified by the end of 2001.

While ISO 14001 and 14004 do not include health & safety, this paper addresses the use of tools that manage health & safety, as well as environmental, data.

EMS and EMIS

What is an EMS?

The International Organization for Standardization (ISO) standards define an *Environmental Management System* as a group of elements that interact and function together as a whole

(system) to direct or control the use of (manage) the surroundings (environment). There are several standards within the ISO 14000 series. ISO 14001 and ISO 14004 are companion standards that share common principles and definitions. ISO 14001 is the specification standard, and its primary use is for registration (though some organizations self-certify). ISO 14004 is a guidance standard for the development and implementation of environmental management systems. For purposes of simplicity in this paper, the term “ISO 14001” is used as a catchall for both standards. The 14000 series also contains guidelines for environmental auditing (14010), audit procedures (14011) and qualification criteria for auditors (14012).

What is an Environmental Management Information System?

An EMIS is a *tool* that can enhance an organization’s EMS. There are many different definitions of an EMIS. Definitions range from pencil-and-paper methods to small-scale database systems like spreadsheets and word processors, to integrated multimedia client/server software systems to enterprise-wide software solutions. Many companies currently use or are integrated multimedia client/server systems that can be integrated with other systems such as process historians and business enterprise databases.

EMIS AND OTHER TOOLS TO ENHANCE EMS

EMS ≠ EMIS

An Environmental Management System is not equivalent to an Environmental Management Information System. However, EMIS and other technology-based tools can help organizations to assess EMS and to improve performance tracking, data consistency, communication and compliance management.

How Do Companies Use an EMIS?

Companies use EMIS in many ways, ranging from pure data repositories to powerful reporting and engineering calculation tools. Companies can use an EMIS to automate various business processes:

- Collect and manage the current and anticipated future data load.
- Automate effluent reporting and other routine environmental data management processes.
- Replace Material Safety Data Sheet (MSDS) functionality in a mainframe computer system.
- Support Annual Compliance Certification under the Clean Air Act.
- Manage and track day-to-day compliance requirements and provide notification to environmental and other staff when deviations occur.
- Gain productivity improvements while maintaining environmental staff at its current level.

In addition, an EMIS can serve the following technical functions:

- Provide a repository for data used to demonstrate environmental compliance.
- Consolidate data resources between departments and reduce data collection redundancy.

- Integrate with business and/or process management systems to directly acquire data where possible.
- Ensure consistency of collected and archived data.
- Provide distributed rapid access to all data used to support regulatory compliance and provide documentation of compliance.
- Adapt to future business and/or technology requirements.

Because of the nature of EH&S regulations and the propensity for documentation a key area where an EMIS can help is document management and control. Document control is often cited as one of the key reasons organizations don't want to consider ISO 14000... One way to minimize the potential burden is to consider carefully what documentation is truly necessary and to not overburden the system with unneeded data.² Likewise, an EMIS solution used in concert with EMS should fit the needs of the organization. Keep superfluous data out of the EMIS to make the EMIS perform in its intended manner. Integrate other systems such as process data historians, real-time monitoring systems, maintenance and purchasing systems rather than trying to force-fit all this data into the EMIS. Consider integrating with document management systems and chemical databases to get the full benefits of the EMIS.

Table 1. How EMS and EMIS Compare

Characteristic	EMS	EMIS
Business Drivers	Global markets and supplier requirements first, "competitive edge" later	Regulatory compliance first, and "beyond compliance" or "competitive edge" later
Focus	Focus on process	Focus on output or results
What it Tracks	Track nonconformance to EMS, not to requirements	Track noncompliance with requirements, policies and procedures
Audits	Systems audit	Compliance audit

EMS and EMIS have expected outcomes in common, shown in Table 2.

Table 2. Expected Outcomes of an EMIS

- | |
|---|
| <ul style="list-style-type: none"> • Help to demonstrate senior management leadership in EH&S issues • Help to attain goals and objectives • Clearly define roles, responsibilities, accountability, authority |
|---|

- Achieve individual leadership in EH&S issues at operations level
- Identify and manage risks
- Identify resources to manage EH&S issues
- Improve performance
- Improve stakeholder relations

Opportunities to Automate EMS

The foundation of ISO 14000 is the Plan-Do-Check-Act cycle. To parallel this cycle, ISO 14000 organizes seventeen elements into four categories: 1) Planning, 2) Implementation and Operation, 3) Checking and Corrective Action, and 4) Action. Many of the ISO elements are amenable to automation using technology-based tools. Table 3 summarizes the types of automation that organizations may use to enhance EMS, including but not limited to:

- Integrated, multimedia EMIS
- Document Management Systems
- Process Historian Systems
- MSDS Management Systems
- EH&S Training Delivery and Management Systems

Table 3. Elements of 14001 Amenable to Automation

Activity Category	ISO 14001 Element	Type of System, Tool or Technology
<i>Planning</i>	Environmental Policy	Intranet/Internet
	Environmental Aspects	ISO Package
	Legal and Other Requirements	EMIS, Document Management Systems
	Objectives and Targets	ISO Package
	Environmental Management Program(s)	Intranet/Internet
<i>Implementation and Operation</i>	Structure and Responsibility	EH&S Training Delivery and Management System
	Training, Awareness and Competence	EMIS, EH&S Training Software, Web-based Training Systems

<p><i>Checking and Corrective Action</i></p>	<p>Communication</p>	<p>Intranet/internet e-mail</p>
	<p>Environmental Management System Documentation</p>	<p>Document Management System, EMIS</p>
	<p>Document Control</p>	<p>EMIS, MSDS Package, Document Management Systems</p>
	<p>Operational Control</p>	<p>Process Historians, Document Management Systems</p>
	<p>Emergency Preparedness and Response</p>	<p>Modeling Software, MSDS Packages</p>
	<p>Monitoring and Measurement</p>	<p>Process Historians, Handheld Data Collection Devices, EMIS</p>
	<p>Nonconformance and Corrective and Preventive Action</p>	<p>EMIS (Compliance Management Features)</p>
<p><i>Action</i></p>	<p>Records</p>	<p>EMIS, Document Management Systems</p>
	<p>Environmental Management System Audit</p>	<p>Audit Software</p>
	<p>Management Review</p>	<p>Decision Support Systems, EMIS (Roll-up Reporting Features)</p>

ADVANTAGES OF EMIS AND OTHER TECHNOLOGY-BASED TOOLS

There are multiple advantages of using EMIS and other technology-based tools to enhance EMS.

Enhanced Ability to Manage Environmental Processes. While a software package cannot guarantee compliance with the multitude of regulatory requirements, automating environmental data systems will allow the Mill to view trends, perform *ad hoc* data searches, and have data readily available during agency inspections. In addition to archiving data into a repository, a fully integrated EMIS will allow The Company to greatly streamline the process of performing annual compliance certifications for the Title V operating permit.

Enhanced Productivity. The enhanced ability to manage EH&S processes leads to improved performance and thus can increase the “bottom line.”

Standardization and Consistency. One of the greatest advantages of a highly integrated EMIS is the consistency that the system provides between calculations, analytical methods, compliance reports and compliance practices. This consistency facilitates communication with the regulatory agencies, facilitates internal auditing of procedures/compliance and facilitates unit-to-unit and site-to-site performance tracking. In addition, a highly integrated EMIS can improve the consistency of process and accounting or purchasing data related to environmental processes.

Distributed Data Entry. A client/server or web-enabled system allows distributed access to all

of the information in the system. The data owner can enter the data at the point of generation, promoting greater accuracy and reducing redundant data entry. It also provides access to information with a minimum effort, enhancing the ability to respond quickly to potential compliance problems.

Increased Accuracy of Information. A highly integrated system can utilize information that already exists in other systems, which reduces the need for manual data entry or manipulation. This reduces the potential for error and increases overall accuracy.

Software Support. By purchasing a third-party software product, the Company will not have to rely exclusively on in-house development resources for maintaining environmental compliance systems. The software vendor provides software maintenance and periodic enhancements and upgrades.

Improved Knowledge Management Systems. An EMIS must be designed to provide the right EH&S data (knowledge content) to the worker at the right time in the appropriate level of detail to do the job. The EH&S content to be included in an EMIS is typically in many forms, including paper, electronic, and in people's heads.³ EMIS can help to centralize the "knowledge content" of the organization, which can lead to improved process management, decision-making, and forecasting.

Enhanced Compliance and Risk Reduction. While an EMIS cannot *guarantee* compliance, it can be a powerful tool to aid in managing compliance. With the ever-increasing burden of regulations, it is nearly impossible to track all the requirements that apply to a facility without some sort of electronic assistance. All of the benefits stated above can lead not only to enhanced compliance, but help to reduce EH&S and business risks.

CONCLUSIONS

An Environmental Management System (EMS) is not the same as an Environmental Management Information System (EMIS). EMIS and other technology-based tools can be valuable in helping organizations to plan, implement, and audit EMS under the ISO 14001 standard. While EMIS and other tools cannot guarantee compliance, these systems can be used to assess EMS and to improve performance tracking, data consistency, communication and compliance management.

Since there are tools available to automate almost every aspect of the ISO EMS, organizations need to assess where they will gain the most value for their time and efforts and set priorities for automation. A well-designed implementation of EMIS and other tools that follows an overall strategy is virtually imperative, rather than a piecemeal approach.

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KEY WORDS

Computer, EMS, EMIS, Environmental Management Information System, Environmental Management System, Hardware, Information Systems, Information Technology, ISO 14000, ISO 14001, Software, Standards