

Developing Environmental Management Systems Based on ISO 14000 Principles for Companies in the Metals Industries: Why and How

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ABSTRACT

This paper is directed to those in the metals industries concerned with improving their management processes and systems for complying with their company's environmental policy including compliance with environmental regulations.

The purposes of this paper are to examine why companies in the metals industries may wish to develop an environmental management system (EMS) based on ISO 14000 principles, to discuss our approach to developing such an EMS including specific examples, and to offer practical guidance about the development and implementation of such systems.

Traditional approaches to complying with a company's environmental policies including its environmental regulations do not adequately meet the needs of companies in the metals industries in today's environment of increasing compliance requirements, increasing monitoring, increasing record keeping and reporting, increasing certification of compliance status, and increasing consequences of being out of compliance-- both personally and for the company.

We urge companies in the metals industries to adopt a new approach to complying with the company's environmental policies through development and implementation of an environmental management system that incorporates many of the principles in the ISO 14001 Standard.

INTRODUCTION

An environmental management system (EMS) is that part of the overall management system of a company that includes organizational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy of the company. The International Organization for Standardization (ISO) adopted a standard for environmental management systems in 1996.⁽¹⁾ The major elements of this standard, ISO 14001, are given in Table 1.

The purposes of this paper are to discuss why companies in the metals industries may wish to develop an EMS based on ISO 14000 principles, discuss our approach to developing such an EMS including specific examples, and offer practical guidance about the development and implementation of such systems.

WHY DEVELOP AN ENVIRONMENTAL MANAGEMENT SYSTEM

Many environmental requirements affect companies in the metals industries. These translate into a large number of recurring compliance tasks. Table 2 lists some of the environmental requirements for an integrated steel mill that includes coking facilities.

At the same time, government is increasing its requirements for monitoring, record keeping, reporting and certification of compliance status with all environmental regulations.

For air pollution sources, many of these requirements were recently promulgated by U.S. EPA through the Compliance Assurance Monitoring (CAM) Rule.⁽²⁾ A periodic monitoring rule for emission units not covered by the CAM Rule is currently under development.⁽³⁾

Both of these rules will be implemented when Title V permits and state operating permits are issued under Title V of the Clean Air Act Amendments of 1990 (40 CFR Part 70). Similar monitoring, record keeping, reporting and certification requirements are being implemented with each new air pollution emission standard promulgated since 1991 including ones for hazardous air pollutants (e.g. coke oven National Emission Standard for Hazardous Air Pollutants at 40 CFR Part 63 Subpart L) and New Source Performance Standards at 40 CFR Part 60.

Many other environmental regulations for management of solid and hazardous waste, for discharges to water bodies and for other environmental activities already require monitoring, record keeping, reporting and certification of compliance status.

These growing environmental requirements and growing government emphasis on documenting compliance status are increasing the number of required compliance activities, the amount of record keeping and reporting, the number of required compliance certifications, the personal and company liabilities associated with those certifications, the awareness of compliance status by senior management, and the awareness of compliance status by the general public including environmental groups.

The consequences of being out of compliance are continuing to grow for companies and for the individuals at those companies responsible for compliance.

For example, between January 1994 and June 1996, U.S. EPA assessed \$113,376,000 of judicial penalties for noncompliance with environmental regulations at 315 facilities for an average penalty of \$315,924 per facility.⁽⁴⁾ In 1996, U.S. EPA assessed a \$75,000,000 penalty against an oil shipping

company for oil spills and noncompliance with the Oil Pollution Act of 1990.⁽⁵⁾ Also in 1996, U.S. EPA assessed a \$23,000,000 penalty against Iroquois Pipeline Company for Clean Water Act violations.⁽⁶⁾ There have also been many monetary penalties assessed against companies in the metals industries for noncompliance with environmental regulations.

These increasing compliance requirements and consequences of noncompliance are taking place in an atmosphere of continued downsizing and reengineering that is reducing the staff and time available to make sure companies are in compliance.

Improving internal management systems may be the only way for a company to deal with the increasing environmental requirements, increasing consequences of noncompliance and less available resources for assuring compliance.

THE ENVIRONMENTAL MANAGEMENT SYSTEM

The traditional approach for managing compliance with a company's environmental policy including compliance with all environmental regulations involves four elements:

- 1) Develop and maintain an environmental procedures manual that implements the environmental policy of the company
- 2) Select a person responsible for the company's environmental policy and individuals responsible for each area of compliance
- 3) Train these personnel in the environmental procedures
- 4) Conduct periodic environmental audits to assess how well the company is complying with its environmental policy including all regulatory compliance requirements

Not all companies use all four of these elements to manage environmental compliance, e.g. frequently, environmental auditing does not take place or there is not a complete environmental procedures manual.

The problem with this approach to managing compliance is that there is no way of determining whether each compliance task has been properly carried out until a problem occurs (e.g. notice of inspection by a government agency) or until there is an environmental audit, which may take place typically every one to three years.

In today's environment of increasing compliance requirements, increasing monitoring, increasing record keeping and reporting, increasing certification of compliance status, and increasing consequences of being out of compliance--both personally and for the company, this traditional approach, we believe, does not adequately meet the needs of companies in the metals industries.

We urge companies in the metals industries to adopt a new approach to complying with their company's environmental policies similar to the approach our staff have used at over 20 facilities -- development and implementation of an environmental management system. This system incorporates many of the principles in the ISO 14001 Standard but does not necessarily need to be a system that fully conforms with this standard.

The major elements of such an environmental management system are:⁽⁷⁾

- 1) Establishing a company commitment and environmental policy
- 2) Planning how to implement this policy
- 3) Implementing the policy
- 4) Measuring and evaluating compliance with the policy including checking compliance status and taking corrective actions
- 5) Management review of the system
- 6) Continual improvement of the system

Our approach to developing an EMS involves ten steps.

First, the company must formulate a strategy for successfully implementing the EMS. The critical starting point for this is getting top management commitment for the policy, followed by such commitment from other levels of management and the personnel directly responsible for implementing the policy and conducting the routine compliance tasks. Without such commitment, it is probably not worthwhile to develop an EMS since it is unlikely it will continue to be used over time as other management priorities for which there is commitment take precedence.

Second, the company must establish its environmental policy-- the statement of its intentions and principles in relation to its overall environmental performance which provides a framework for action and for the setting of its environmental objectives and targets. At one end of the spectrum a company's environmental policy is to seek to be in compliance with all applicable environmental regulations and do so in the most cost effective manner. At the other end of the spectrum, a company's environmental policy may state affirmatively that it will always be in compliance combined with a commitment of continual improvement and prevention of pollution whether or not there is a regulatory requirement to do so.

Third, the company must establish procedures for determining the environmental aspects of all of its activities so it can assess which may have a significant impact on the environment.

Fourth, a company must identify all environmental regulatory requirements and associated compliance tasks it is subject to as well as other requirements and tasks that are part of the company environmental policy even if not required by law and regulation. These will be compiled into a list of the detailed environmental objectives and environmental targets representing the detailed performance requirements (e.g. periodic storage tank, dike and hazardous waste drum inspection). These detailed performance requirements are hereafter referred to as compliance tasks. Some of these compliance tasks may include periodic training and retraining.

Fifth, a company must determine the person responsible for actually carrying out each compliance task.

Sixth, a company must determine the frequency and schedule for completing each compliance task and the steps involved (procedure) for conducting the compliance task. This information should be documented on a Work Task Form as illustrated in Table 3. All forms have the same basic format consisting of compliance task description, person responsible, date due, operation it applies to, reason

why this task must be conducted, listing of each work step to complete the compliance task with a box to check when completed, and signature and date attesting to the person addressing the compliance task and reporting any problems and corrective actions to resolve them.

This sixth step is one of the most crucial in the development of the EMS. It should involve both the personnel responsible for the EMS and the personnel who actually conduct the compliance task. In our own work EMS', the starting point for this is to ask how the task is currently carried out (if at all) and then ask the person responsible for the task whether he/she has any suggestions on how to carry out this task more effectively and at less time and cost.

It is not common for personnel who typically carry out a company's daily environmental compliance tasks to be asked these questions. But the results of this "brainstorming" can be both more effective compliance and less costly compliance.

For example, at one facility we asked the person responsible for hazardous waste drum inspection how frequently he inspects the drums to satisfy Resource Conservation and Recovery Act requirements (e.g. labeling, location and segregation, drum condition). He said he did this daily. We then asked how many drums he typically has to inspect. His response was two or three! He said he conducted daily inspections because he was told to do it -- perhaps at a time when more drums were stored. Here is a case where less frequent inspection will save labor time and money without compromising the effectiveness of the inspection compliance task.

Seventh, a company must compile all the compliance tasks into a Management Checklist that includes a listing of each task, the person responsible for conducting the task, the schedule for conducting the task and a mechanism for recording that the task has been successfully completed. One person must be in charge of the Management Checklist. That person must be informed when each compliance task is completed and, if not completed on schedule, will be responsible for contacting the person responsible for the task to determine why it was not done on time and when it will be completed. The person responsible for the Management Checklist should report preferably directly to the facility manager. An example of a Management Checklist is given in Table 4.

Eighth, a company must establish a corrective actions program. A person who does not successfully carry out a compliance task will prepare a Problem/Corrective Action Form as illustrated in Table 5. This form describes the problem, the planned corrective action, and the person responsible for the corrective action with its planned start and completion date.

Periodically, a designated person will have the responsibility of reporting on the status of each outstanding corrective action. His report may have the same format as a Work Task Form as illustrated in Table 6.

Ninth, a company should explore whether and how performance appraisal systems should be modified to assure compliance with the company's environmental policy.

Finally, the company must decide if and how to integrate its EMS into its other management systems.

PRACTICAL GUIDANCE ABOUT THE DEVELOPMENT AND IMPLEMENTATION OF ENVIRONMENTAL MANAGEMENT SYSTEMS

A company will only develop, implement and use an EMS on a continuing basis if its benefits exceed its costs.

One major benefit of an EMS is more effective compliance with the company's environmental policies including applicable environmental regulations thereby avoiding the consequences and costs of noncompliance. A second major potential benefit is reengineering the company's environmental compliance processes to develop less costly ways of complying, e.g. the above illustration about the hazardous waste drum inspection procedure.

These savings can be significant. For example, one company reported that its expected pay back on its investment in an EMS (that included integrating safety and health compliance requirements into the EMS) was one year, i.e. a 100% per year return on its investment.⁽⁸⁾ However, few EMS' based on ISO 14000 or equivalent principles have been implemented to date and even fewer may be collecting the information needed to quantify savings. Also, if a company is not carrying out all of its required compliance tasks before implementing the EMS, it may be more difficult to identify tangible savings from the EMS.

Counterbalancing these benefits are the costs of developing and using the EMS. To reduce these costs, we offer the following suggestions.

First, do not necessarily include every environmental compliance task in the EMS. Limit the EMS to those compliance tasks that have a meaningful impact on compliance with the company's environmental policies. Some tasks may also be eliminated because they are covered adequately by other company management systems.

Second, limit the detailed steps in the Work Task Form. You only want a sufficient level of detail so that the prime person responsible or a replacement person in his absence can complete the compliance task. The time to document task completion is only a few seconds per compliance task since it involves checking a few boxes, signing and dating.

Third, limit the frequency with which each compliance task is conducted. Here is a major opportunity for cost savings, e.g. the hazardous waste drum inspection procedure.

Fourth, limit the frequency with which work task completion is transmitted to the person responsible for the EMS and the Management Checklist. Once per month should normally be sufficiently frequent.

Fifth, automate the EMS including the confirmation of Work Task completion either by incorporating it into an existing automated management system (e.g. for operation and maintenance) or implementing it initially as a simple independent system.

Finally, design the EMS so it is easily adaptable to changes such as revising or adding/deleting Work Task Forms and revising Management Checklists.

CONCLUSIONS

Traditional approaches to complying with a company's environmental policies including its environmental regulations do not adequately meet the needs of companies in the metals industries in today's environment of increasing compliance requirements, increasing monitoring, increasing record keeping and reporting, increasing certification of compliance status, and increasing consequences of being out of compliance-- both personally and for the company.

We urge companies in the metals industries to adopt a new approach to complying with the company's environmental policies through development and implementation of an environmental management system that incorporates many of the principles in the ISO 14001 Standard.

This paper discusses why companies in the metals industries may wish to develop environmental management systems based on ISO 14000 principles, describes our approach to developing these systems and offers practical guidance about the development and implementation of such systems.

REFERENCES

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Table 1. Major elements of the ISO 14001 standard for environmental management systems.

1. Environmental policy
2. Planning
 - 2.1 Environmental aspects
 - 2.2 Legal and other requirements
 - 2.3 Objectives and targets
 - 2.4 Environmental management program
3. Implementation and operation
 - 3.1 Structure and responsibility
 - 3.2 Training, awareness and competence
 - 3.3 Communication
 - 3.4 Environmental management system documentation
 - 3.5 Document control
 - 3.6 Operational control
 - 3.7 Emergency preparedness and response
4. Checking and corrective action
 - 4.1 Monitoring and measurement
 - 4.2 Nonconformance and corrective and preventive action
 - 4.3 Records
 - 4.4 Environmental management system audit
5. Management review

Table 2. Some of the environmental requirements of an integrated steel mill that includes coking facilities.

National Emission Standards for By-Product Coke Oven Batteries under 40 CFR Part 63.302
Work Practice Plans under 40 CFR Part 63.306 upon designated exceedances of visible emission limits
Standards for collecting mains under 40 CFR Part 63.308
Daily performance tests to determine compliance with the visible emission limits for coke oven doors, topside port lids, offtake systems and charging operations under 40 CFR Part 63.309
Reporting and record keeping requirements under 40 CFR Part 63.311 including the semiannual compliance certifications
Emission standards, emission monitoring, operations monitoring, testing, record keeping, and reporting requirements of applicable New Source Performance Standards (e.g. Subparts D, Dd, Dc, K, Ka, Kb, Na, Y, AA and Aa)
Emission standards, monitoring, work practice, record keeping, and reporting requirements of National Emission Standards for Benzene Emissions from Coke By-Product Recovery Plants (40 CFR Part 61 Subpart L) and Benzene Waste Operations (40 CFR Part 61 Subpart FF)
NPDES permit sampling, analysis and reporting
Update of SPCC Plans and other environmental response plans and assuring compliance with these plans
Inspection of above ground and underground storage tanks
Inspection and draining of dikes
Inspection of drum storage facilities
Compliance with RCRA requirements for the generation, storage and transport of hazardous waste
Compliance with storage pile and roadway fugitive emission control requirements
Compliance with other air pollution regulations including testing requirements
Preparation of annual air pollution emission statements
Chemical storage and use tracking and toxic chemical release reporting under SARA Title III Sections 312 and 313

Table 3. Example of work task forms.

LB.B.1

COMPLIANCE MANAGEMENT SYSTEM

STATION:

WORK TASK FORM:LB.B.1

PREPARE WASTE GENERATION/STORAGE INSPECTION REPORTS AND CONFIRM COMPLIANCE WITH GENERATION AND STORAGE LIMITS

PERSON RESPONSIBLE: Waste Water Treatment Plant Operator

DATE DUE:Last day of month

OPERATION:Hazardous waste generation and storage

REASON:Confirm facility regulatory status and provide information for Environmental Services to prepare reports to government

Task #	Description	Completion
1	Confirm that hazardous waste generation report (Form LB.B.1-1) has been updated within one day of receipt of hazardous waste, has been reviewed and is complete	
2	Confirm that weekly hazardous waste storage report (Form LB.B.1-2)has been prepared by Friday of each week, has been reviewed and is complete	
3	Submit above reports monthly to Environmental Services, Supervisor Environmental Compliance and Remediation	
4	Confirm that facility has not exceeded generation limits for month (5 drums).	
5	Confirm that facility has not exceeded storage limits at any time in month (30 drums).	
6	Confirm that facility has not exceeded 180 days storage limit for any container with hazardous waste.	

Note: Mark Completion with if completed satisfactorily or X if problem.

I have addressed the above tasks and reported any problems and corrective actions to resolve them on the enclosed Problem/Corrective Action Form:

Name _____

Date _____

Distribute completed form to: Operations Supervisor

Table 4. Example of portion of management checklist.

MANAGEMENT CHECKLIST
SUMMARY OF COMPLIANCE TASKS FOR COMPLIANCE MANAGEMENT SYSTEM BY COMPLIANCE AREA

Task No.	Description	Person Responsible	Schedule for Completing
A.	GENERAL WASTE MANAGEMENT PRACTICES		
A.2	Report when incompatible wastes mixed	B	When incompatible wastes mixed
B.	HAZARDOUS WASTE		
B.1	Prepare waste generation/storage inspection reports and confirm compliance with generation and storage limits	B	Last day of month.
B.4	Prepare hazardous waste drum storage condition report	B	Weekly on Mondays
B.9.1	Update Local Emergency Response Agencies Notification List, Emergency Coordinators List and Chain of Command List in Environmental Emergency Plan	C	Annually by 12/31
B.9.2	Check emergency equipment availability	B	Annually by 1/31 and whenever transfer/receipt of emergency equipment
B.9.3	Update Environmental Emergency Plan	C	12/31/97 and every three years thereafter
B.10	Prepare environmental spill report	A	Within one business day of the spill
C.	NONHAZARDOUS WASTE		
C.3.1	Affix and maintain sign on each nonhazardous waste (NIHW) dumpster and confirm log is maintained of NIHW received	B	Semiannually by 3/31 and 9/30

Table 5. Example of problem\corrective action form.

PCAF.1

PROBLEM/CORRECTIVE ACTION FORM

STATION:

WORK TASK FORM:

Note: This form is only to be completed if corrective action to resolve problem is not taken immediately and does not successfully resolve the problem.

Task No.	Problem	Corrective Actions
	Description:	Description: Person Responsible: Planned Start Date:

I have addressed the above tasks and reported any problems and corrective actions to resolve them on this Problem/Corrective Action Form:

Name Date

Distribute completed form to: Station Operations Supervisor

KEY WORDS

ISO 14000

ISO 14001

Management

System

Environmental

Compliance