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**MAKING YOUR EMS WORK FOR YOU: THE WHY AND HOW OF  
MAKING SURE YOUR EMS IS EFFECTIVE**

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**ABSTRACT**

*The recent changes in the environmental regulatory climate in Western Australia, which have seen the introduction of the Environmental Enforcement Unit, more stringent licence conditions and increased personal liability, have highlighted the importance of an organization being able to demonstrate due diligence in environmental management. A robust systematic framework such as that provided by an Environmental Management System (EMS) can provide the structure to assist an organization in the identification and appropriate management of legal and environmental risks, data collection and management of records, all of which are core to being able to demonstrate due diligence.*

*As a recent opinion survey of ISO14001 certified organizations in the UK showed however, just having an EMS is not always enough to be able to demonstrate systematic and sustained environmental performance - the system must be effective. This paper will discuss, through practical examples, what makes a system effective, where organizations are commonly and unknowingly left exposed, and give practical tips on successful system implementation.*

**INTRODUCTION**

In addition to internal motivation to want to improve environmental performance, two of the drivers commonly cited by organisations for implementing an EMS include reduced risk of legal liability and improved public image. In the current regulatory environment in WA, the need for a robust compliance management system is becoming even more important. This system should be able to demonstrate that an organisation has taken all reasonable precautions to prevent foreseeable environmental harm. A properly designed and implemented EMS can be used to achieve this outcome. However, many such systems miss the mark. Certification

to a recognised EMS standard often results in the assumption that an organisation has a superior level of environmental control and a robust compliance management system that can demonstrate that all reasonable precautions have been taken to prevent reasonably foreseeable environmental harm. A recent opinion survey of ISO 14001 certified organizations in the UK (Environmental Data Services Ltd, 2003) showed that there is a significant level of scepticism among organizations, certifiers and consultants regarding the degree to which ISO 14001 and EMAS (European Union Eco-Management and Auditing Scheme) certification reflects an organisation's commitment to environmental protection. A study of USA organisations in 2003, by The Auditing Roundtable, reported similar findings (MacLean, 2004). The scepticism has been attributed in large part, to a series of certified organisations being prosecuted for pollution offences in both Europe and the USA.

If certification does not necessarily produce the outcomes required in relation to compliance management, what then, is required? This paper discusses the key issues that need to be addressed in order to attain a robust and effective compliance management system and provides examples of common mistakes that organisations make in attempting to develop and implement such systems.

### **WHAT MAKES AN EMS EFFECTIVE?**

There are two key issues that impact on the success of an EMS. These are:

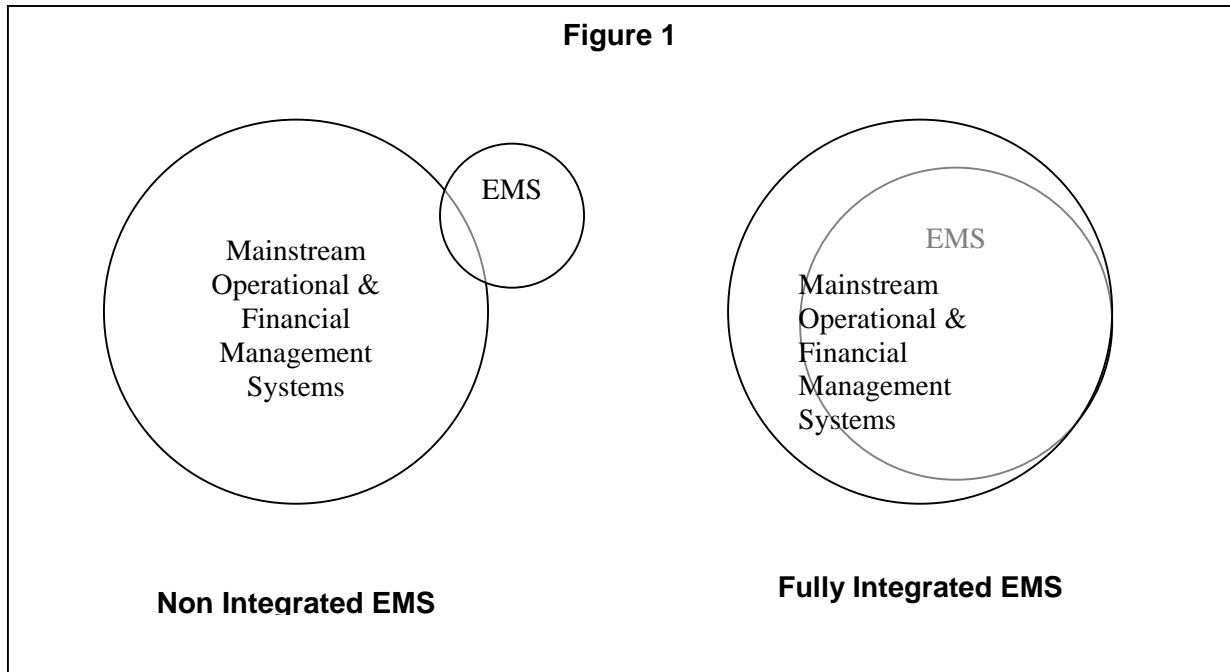
- the degree to which an EMS is embedded in the normal operational practices of an organisation; and
- the culture of that organisation.

### **Integration of the EMS with operational practices**

Many EMSs sit outside of the business practices that relate to the mainstream financial and operational management of the organisation (refer to Figure 1). For example, often the human resources or mining department trainer will be responsible for keeping records on training needs and ensuring that employees who are in a position that requires certain training, receive that training. Rather than integrate environmental training needs into this system, the EMS is often designed with its own training needs analysis and programme, which is administered by the environmental department. Sometimes there are even special environmental operating procedures held electronically in a separate location from the operating procedures for mining or milling tasks, rather than an integration of environmental issues into operating procedures for a specific task. The problem with these systems is that they generally rely on the energy and enthusiasm of the environmental officer responsible for implementing the system and on the personal relationships that the officer has built up at the site.

The fate of non-integrated systems is usually for the implementation of certain elements of the system to be interrupted during busy periods in the environmental department, and potentially for the system to fail in the event that key environmental personnel leave. An example of the failure of such a system relates to an organisation where the key environmental management system officer left the organisation. When this officer left, the running of the environmental management system became the responsibility of another environmental officer who had

other responsibilities and whose interests lay elsewhere. As a result, there was nobody to drive the updating of the environmental risk registers and consequently no updates occurred. The improvement plans had previously been developed by the environmental department and had been 'issued' to the operating departments. None of the actions in the plans had progressed as the plans were not part of the mainstream business planning cycle and they had



not been 'signed off' at an appropriate level. The preventative action system failed as the environmental management system officer was the only person that filled in the preventative action request forms.

Those systems that are fully integrated with operational business practices (refer to Figure 1) are more effective as they do not rely on one person for their continued implementation. More people are driving various elements of the system and the fact that environment is integrated into day to day business practices connected with financial or operational management means that consideration of environment becomes a habit as it is always considered in any decision making process. It becomes just one of the other business factors that we have to weigh up during decision-making. In effect, you have a whole team of environmental managers rather than just one person with some focus on the environment. This is happening in some organisations but even in the best-integrated systems, environment will never be fully considered during decision making until the organisational culture is right.

### **Management commitment and culture**

The lack of an appropriate level of management commitment is commonly cited as a cause of implementation difficulties, including respondents to the ENDS survey (Environmental Data Services Ltd, 2003), who attributed varying results across their multi-site organizations to the management commitment at the site level.

A strong leader can help foster a culture of environmental responsibility, and the leader's actions will either support or destroy any influence that words have had. A leader who 'walks

the talk' sends a clear message to the workforce that environmental responsibility is a high priority. Management commitment is often discussed but what does this mean, in a practical sense, when implementing an environmental management system that can provide robust evidence of appropriate compliance management?

In sites where there is a good culture of environmental management and compliance with environmental requirements, the most senior manager on site tends to be well informed regarding the main environmental compliance issues/risks on site and understands the importance and implications of these issues and risks. In these sites, the senior manager consistently communicates the message that environment is an important component of the business that must be managed, and this message is underpinned by decision-making practices that reflect due consideration of environment as well as financial and operational matters. The senior managers also encourage their staff to report environmental issues and these issues are acted on.

Where senior managers do not demonstrate appropriate commitment to environment and compliance issues, it is often necessary to communicate a business case for the environment and compliance. This business case should be delivered to that manager by a person that has credibility in that manager's eyes.

The culture of the organisation plays a big part in the effectiveness of the system used for communicating environmental issues to senior management. In some organisations, people have cause to fear reprimand, or fear being perceived to be under-performing, if they were to report an environmental incident in an area of their responsibility. In organisations with such a culture, the information reported up the management reporting line tends to become sanitised as it moves progressively to more senior managers. Such a culture interferes with the effectiveness of a system in managing compliance, as it means that those personnel that make decisions about resourcing are not in possession of all the facts, and resources needed for compliance or environmental projects may be withheld.

A change from a culture of sanitising, or downplaying the significance of, environmental incidents, to a constructive continual improvement culture, where open and honest communication is accepted and encouraged, needs to be brought about by senior management. It will involve a combination of education, ongoing communication and performance management measures.

The culture of the environment department itself can also influence whether an organisation-wide environmentally responsible/compliance culture is achieved. Traditionally, environmental departments have had low visibility on site, involving themselves mainly with environmental monitoring, reporting and specific environmental projects such as rehabilitation trials. Greater involvement with operational personnel assists in promoting an environmentally responsible culture.

A case study that illustrates the importance of organisational culture relates to a mining organisation that has not yet completed the development and implementation of its environmental management system, but which has been attempting to integrate environmental management into its mainstream activities for the last four years. Environmental improvements had always occurred at this location, but they were often centred on projects run by the environmental department or were incidental to a new project to increase the efficiency of the process. The general perception within the organisation at a departmental level was that environmental management was the responsibility of the environment department. The first moves to integrate environmental management into the mainstream business activities centred around the inclusion of environment into the business planning process. It has taken some time and some personnel and cultural changes to get to the point

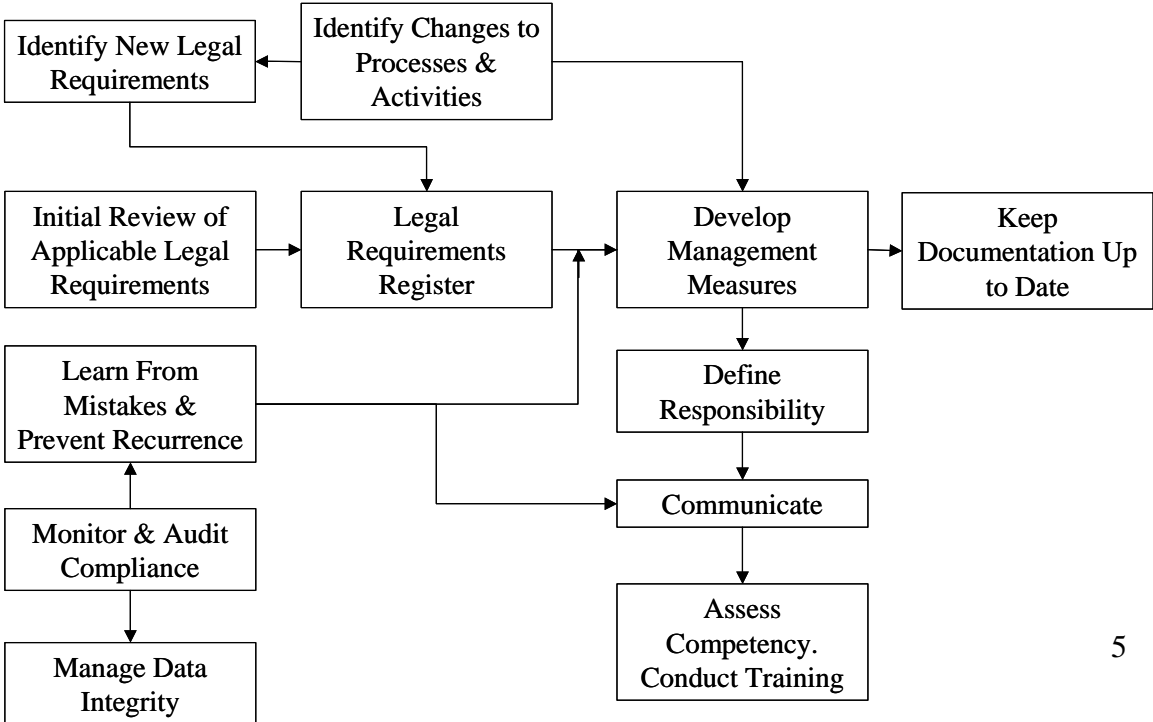
where the departmental managers recognise environment as an issue to be considered along side production and safety matters. However, after four years these managers are now taking responsibility for the environmental issues in their areas and recent plans show that significantly more improvements are planned in the next year than in previous years. Objectives and targets are becoming more measurable and people are becoming more accountable for their completion.

Factors that have contributed to this shift in local management commitment include the development of a business risk register and implementation of an issue reporting system. All business risks, including production, health and safety, financial and environment, were assessed for each area. Workshops were undertaken with departmental staff to facilitate the identification of these risks. The involvement of personnel in the identification of environmental risks along with other business risks served to highlight the potential business consequences associated with environmental impacts, in relation to the consequences of other business risks, and to change departmental managers’ attitudes in relation to the need for consideration of environmental issues. The risk registers have been used as the basis for identifying areas for business improvement, further emphasising the need to improve environmental issues as well as other areas of business performance. The issue reporting system also integrates consideration of environmental incidents and hazards along with other business issues such as quality, production loss, health and safety etc. Again, this integration has served to highlight the importance of environmental issues in relation to other business issues.

**COMMON MISTAKES**

In discussing the common mistakes that organisations make in relation to developing and implementing an EMS that forms a robust compliance management system, it is worth discussing those things that a compliance management system must do to achieve the outcome of good compliance. Figure 2 provides a summary of the key elements of a compliance management system. Further explanation is provided below.

**Figure 2**  
**Elements of a Compliance Management System**



A compliance management system must:

- Ensure that the legal requirements applicable to the organisation are identified and kept up to date;
- Identify any changes in activities or processes that could affect the compliance of the organisation; either by changing the legal requirements that are applicable to the organisation (e.g. introducing a new process that means that controlled waste will now be produced), or by altering the organisation's compliance status with existing regulations (e.g. by increasing the amount of wastewater produced over the licensed limits).
- The measures that will be taken by the organisation to achieve compliance must then be identified and appropriate roles, responsibilities and authorities defined. These should then be communicated to relevant personnel.
- Any documented procedures must be updated within a reasonable timeframe to reflect changes in management measures.
- In the communication of management measures and their relevant roles and responsibilities to appropriate personnel, it is important to assess the competency of that individual to perform that role.
- A programme for monitoring compliance with legal requirements should be developed and implemented. This programme can include emissions monitoring, environmental monitoring and compliance auditing. The monitoring programmes should be designed to enable early detection of potential non-compliance and allow action to be taken prior to a non-compliance situation occurring.
- Data from compliance monitoring programmes should be subject to appropriate peer review and checking procedures to ensure the validity of the data. The data should be stored in a manner that prevents loss or damage and facilitates easy retrieval.
- A robust incident and near miss reporting system should be implemented which identifies root causes and ensures that actions to address the issue are incorporated into the management system so that such incidents do not recur. It is important that near misses and incidents are communicated so that the whole organisation can learn from the mistake made and prevent a recurrence.

Some of the areas where organisations often leave themselves exposed from a compliance management perspective in the development and implementations of EMSs are described below.

### **Change management**

Good change management tends to be one of the things that organisations do least well. In general, this is because it is one of the hardest things to manage properly. There needs to be a balance between unnecessary, time-consuming bureaucracy and identifying the issues associated with a seemingly minor change. An example of how minor changes can lead to major events comes from health and safety incident experienced by an organisation that decided to change the type of valve that it used in a process liquor line in its plant. This

change affected the way that the valve behaved when it was opened for maintenance purposes. Instead of the valve cracking open gradually and the liquor draining into a receptacle, the new valve opened suddenly and sprayed the operator with a hazardous liquor, causing significant injuries.

In the event that such a process change leads to an environmental incident for which an organisation is prosecuted, the question will be asked as to how foreseeable that incident was, and whether appropriate controls had been put in place to prevent the incident from occurring. Without a good change management system, it is difficult to demonstrate that the potential environmental risks associated with a particular change were even reviewed, without even starting to consider whether the incident was foreseeable or not. Successful change management systems are generally based on some clear risk-based rules about what changes should and should not be assessed, and the degree of assessment that is required for each type of change. Changes include both physical changes to plant and the way that activities are performed. For example, a decision to extend the operational hours of a facility based close to a residential area may result in non-compliance with noise requirements (as different standards apply for night time noise), even though the equipment used at the site has not changed.

For those organisations that do have a change management system, two of the common issues that arise are:

- Failing to update the relevant procedural documentation in a timely manner; and
- Failing to properly communicate the change such that:
  - Some assessment is made of the understanding and competency of existing staff in relation to that change; and
  - The new procedures are consistently communicated to new personnel starting work at the site in the future.

Document control and communication issues are discussed in further detail below.

## **Document control**

Keeping procedures up to date and controlling the distribution of procedures may not seem to be a big issue when communication processes are good, and all the most up to date ways of doing things appear to be followed by the relevant staff. In the event of a prosecution however, the documented procedures are likely to be reviewed and questions will be asked as to why the documented procedures were not being followed. Operators may be interviewed at length regarding the way that they undertake a task. At this time, it may be found that while people are generally following the new procedure that has been handed down verbally, there are differences (which could be significant) in the way that people do things as a result of them not remembering the procedure correctly, or in misinterpreting what has been discussed. In addition, in large organisations, the training department may be removed from the operations personnel. If training is based on the written procedures and there is a significant lag in the time between changing the way that something is done and updating the procedure, it is possible that new personnel will be trained and assessed as competent in the old procedure rather than the new one. Lastly, if the distribution of procedures is not controlled,

personnel may unknowingly refer to an old procedure and follow this rather than the most current one.

The key to maximising the speed at which procedures are updated is to find an appropriate balance between the need to keep proper control over changes to the procedures and the need to minimise bureaucracy.

## **Communication and training**

The communication and training elements of a system are vital in contributing to the effectiveness of an EMS. Often organisations focus on documenting operational and system procedures without giving adequate attention to information flow and learning. Those organisations that have good communication structures that discuss environmental issues across all departments and at all levels in the organisation, have much greater success in the implementation of their systems than those with limited communication.

It is important to ensure that people have access to the appropriate information. In the case of one organisation, personnel from the environment department of that organisation were monitoring the quality of the surface water runoff from mining waste dumps. The environment department observed the gradual increase in the level of contaminant present in the water over time, however this information was not communicated to the production supervisor prior to the level of contamination becoming critical in relation to the organisation's licence. Had the production supervisor been made aware of the upward trend of these levels in a timely manner, action could have been taken prior to the issue becoming critical.

Tools that are commonly used for achieving good communication across the organisation include the following:

- Development of communication plans that identify the information needed by specific parties (e.g. monitoring results) and the way in which it is most effective to communicate that information.
- Specific environmental meetings at a managerial level.
- Incorporation of environment onto the agenda at general management and production meetings.
- Site environmental management committees incorporating representatives from all departments and levels across site.
- Discussion of environmental issues at regular shift meetings, toolbox or safety meetings. Some organisations have chosen to make their safety meetings safety health and environment meetings. Often this is nothing more than a change in name, however, as there is insufficient awareness of environmental issues to enable meaningful discussions to be held. To combat this problem, some organisations elect to provide a short presentation on a specific environmental topic to managers for incorporation into each month's safety meeting. Attendance of an environmental officer at safety or production meetings can also be invaluable.

As discussed previously, good upward communication of environmental issues is essential for compliance management, as it is important for senior management to be in possession of all

the facts when making decisions about resourcing. Similarly, clear and consistent communication regarding the importance of environmental issues and compliance is required from senior managers to the rest of the organisation, to attain a culture where environmental issues are considered as a matter of course during decision making processes at all levels.

One of the common mistakes that organisations make with respect to environmental training is that they utilise only general awareness training without building in a discussion of related environmental issues into operational training. The general environmental awareness training rarely incorporates any competency assessment. Operational training tends to be competency based and when environment is incorporated into such training modules, this is generally the most effective way of making sure that personnel are competent in relation to the control of the environmental issues associated with the tasks that they perform.

One key issue that is often overlooked, with respect to training and competency assessment, is when a procedure is revised following an incident or process/activity change. In this case, often the new procedure is documented and e-mailed to personnel for review, or discussed in toolbox meetings. E-mail is the least effective way of communicating an update to a procedure, as there is no control over whether the update has been read and understood or not. Toolbox discussions also have their failings as:

- Often the attendees at the meeting are not tracked and personnel absent on the day that a particular procedure was discussed may not hear about the update.
- There is no assessment of whether the change has been fully understood and personnel are now competent in the new procedure. Some form of individual two-way feedback is required for this assessment to be made, as people are often embarrassed to ask questions in front of their peers. In addition, they may not think that they have any questions if they are not asked to apply their knowledge.

For the purposes of compliance management, it is important that an organisation can demonstrate that it has not only communicated the way that a task should be undertaken but it has also checked that the individual has understood this communication and that they are competent to perform the task. A management system will never prevent human error from occurring, but an organisation would be expected to take steps to ensure that all personnel are competent to undertake the tasks that they perform and to periodically check that those tasks are being performed properly.

## **Incident management and reporting**

Incident and near miss reporting is one of the key tools that organisations can use to prevent the occurrence of a significant incident or non-compliance, providing that it is appropriately implemented. This is because minor incidents and near misses can serve to highlight the potential for a significant incident to occur in different circumstances, and can enable corrective actions to be implemented to prevent such an incident occurring.

One of the key failings in organisations' incident reporting systems is the identification of corrective actions to prevent recurrence of that incident. Many of the corrective actions address the immediate cause but do not do anything to modify the management system to help ensure that the incident will not recur. For example, an organisation identified that it was having an issue with the quality of its wastewater discharge. As a result, a new discharge

procedure was developed and training in the new procedure for all personnel was mandated. All the existing personnel in the organisation were trained in the new procedure. The procedure was never formally documented, except in a memo that was issued but not kept for future reference by operators. No thought had been given as to how this procedure would be communicated to a person new to the site. Consequently, the original incident recurred when a new person started at the site who had not been made aware of the new procedure. All changes to procedures should be captured in the operating procedure documentation, which can be used as a basis for training material for new personnel, so that this information is passed on consistently for the life of the system.

One of the other areas where corrective action systems often fail is in the action and close out of corrective actions. Sometimes it is not confirmed that actions have been undertaken and more often, whether those actions have been effective or not. For high-risk events, such an assessment should be undertaken to reduce the potential for this incident to recur.

It is not unusual to see recurrent incidents in an organisation's incident records with the same corrective action stated for each incident. Often these recurrences are not tracked and consequently a re-evaluation of the effectiveness of the corrective action is not undertaken. From a compliance management perspective, it is difficult to prove that a particular event was not reasonably foreseeable and has been appropriately managed if there have been recurrent minor incidents or near misses arising from the same cause, and corrective actions have not been re-evaluated for effectiveness.

In the event that an incident does occur, it is important to have plans in place to mitigate the environmental effects of that incident. Emergency response plans often have a safety focus, in that they identify what actions are required to render the site safe following an incident. While ensuring the safety of the site is a necessity, emergency response plans should also identify what environmental issues are likely to arise in various scenarios, and what actions need to be taken to minimise environmental harm in the case of that scenario eventuating. These plans should be developed with the involvement of a combination of personnel with the appropriate knowledge and skills to be able to identify likely emergency scenarios and any associated primary and secondary environmental impacts. For example, a fire occurred at the Bellevue waste facility in Perth. Primary impacts were associated with release of smoke and fumes and damage to the facility from fire. Secondary impacts as a result of this fire included exploding drums igniting fires on adjacent land, soil and groundwater contamination from released wastes and contamination of adjacent waterways with water used for fire suppression.

Management aspects of emergency response plans are often not well established and tested. It is necessary to ensure that individuals nominated for roles such as media, community and relation liaison have the appropriate training and skills and that rehearsal of these roles is included in simulated emergency scenarios.

It is also important to ensure that appropriate records are kept of any emergencies to assist in the subsequent investigation of the incident to facilitate learning and demonstration of appropriate management. Details of the incident including times of critical events, results of environmental monitoring taken during the incident and details of any technical responses that have been instigated, such as changes to plant or production, are examples of such records.

## **Monitoring and data management**

The implementation of appropriate monitoring and data management procedures is particularly important in a compliance management system. Mistakes often made in this regard by organisations are as follows:

- Failure to take environmental samples in accordance with appropriate sampling procedures during an incident. Often the information from such monitoring will be used in an assessment of the degree of environmental harm that occurred during the incident. This could have some bearing on whether an organisation is prosecuted or not. If the sampling methodologies are not defensible, doubts may be raised regarding the reliability of the monitoring data, which may not be favourable for the organisation. It is therefore, prudent to make an assessment of the types of samples that might need to be taken during an incident to assess the environmental impact of that incident and have appropriate sampling equipment and procedures available in the event that such an incident occurs.
- Failure to undertake routine monitoring in a consistent manner in accordance with specified procedures. One organisation was conducting routine monitoring of a process discharge into a dam. The people undertaking the monitoring were all taking the samples at a different locations. This meant that the results were not consistent, as the effects of dilution and degradation of the substance that they were monitoring were different at each location. Physical signposting of monitoring locations and development of written procedures for monitoring activities can help improve consistency and comparability of results.
- Failure to conduct monitoring that offers prior warning of an incident rather than alerting the organisation to the occurrence of an incident. For example, monitoring effluent at the point at which it is discharged to the environment will provide a good indication of the quality of the effluent just prior to discharge but will not enable an organisation to take action in the event that that discharge is out of licence requirements. Further monitoring should be undertaken of the process that produces the effluent, at a point that enables action to be taken in the event that something happens to make the effluent quality move out of accepted parameters.
- Failure to note weather or production conditions during environmental or emissions sampling. The weather can affect the monitoring results significantly, e.g. heavy rain can dilute concentrations of contaminants in surface water. Similarly, production conditions can impact the quality of emissions significantly. Often emissions samples are undertaken at the same time every day/week. If this time coincides with a regular plant occurrence that affects the quality of emissions, representative samples may not be obtained.
- Failure to understand the limitations associated with the sampling methodologies being used. For example, taking periodic grab samples from a highly variable effluent stream may mean that the samples do not reflect very well the organisation's actual compliance with its licence requirement. One organisation with a highly variable effluent stream moved from a grab sampling to continuous monitoring and found that while the grab samples had shown generally good compliance with licence conditions, the continuous monitoring showed regular peaks which breached licence conditions.
- Failure to conduct compliance auditing. Environmental monitoring specified in licence conditions is generally undertaken and compliance with the operating licence checked on

a regular basis. What is not so often done is an audit of compliance with all legal requirements including operating licence, Ministerial Conditions & Commitments and requirements of Acts and Regulations. It is difficult to show that an organisation has exercised appropriate compliance management if they have not bothered to check whether they are actually in compliance with the requirements that they have identified in their legal compliance registers.

- Failure to maintain the integrity of monitoring data. During the course of our report verification work, we commonly find issues with data integrity within organisations. Issues that we regularly identify include:
  - Failure to check that data have been transposed from one location to another (e.g. laboratory results into on-site monitoring record database). This is a common source of error and can lead to significant issues.
  - Unidentified alterations to spreadsheet formulas resulting in inaccurate data. Spreadsheets can generally be accessed by a wide variety of personnel within an organisation without any 'write' protection. Sometimes changes can be made to the spreadsheet without the originator being aware that these changes have been made. Some form of control on the access to modify the spreadsheet may assist in preventing these issues from arising.
  - Failure to cross check calculations. We have identified errors in data arising from a systematic error in the spreadsheet calculating the data. Often these errors arise because there is no cross checking process to determine whether the calculated data are correct. For compliance related data, it is prudent for comprehensive cross checking procedures to be implemented.

## **SUMMARY**

In summary, in order to implement an EMS that can demonstrate that compliance issues are being appropriately managed:

- Senior site management must be aware of the main legal requirements applicable to the site and any current compliance issues. They must understand the implications of these issues and the business case for managing the environment and legal compliance.
- Senior site managers must demonstrate commitment to environmental and compliance management through actions as well as words. Due consideration of the environment and compliance during decision-making processes should be evident and transparent to the rest of the site personnel.
- There must be a robust change management procedure that identifies any potential compliance issues associated with change.
- Any new or revised procedures should be communicated to existing and new personnel into the future. When communicating new procedures, some assessment of personnel understanding and competency to implement the new procedure should be undertaken.
- Procedural documentation should be kept up to date and obsolete versions should be removed from circulation.
- Incident reporting systems should ensure that root causes are addressed and that actions are taken prevent recurrence of the incident. This often requires that some form of action

be integrated into the management system to ensure prevention of the incident into the future. The implementation of corrective actions should be tracked, and the effectiveness of the actions assessed. In particular, corrective actions associated with recurrent incidents should be re-evaluated.

- Emergency response plans should incorporate instructions on dealing with both the primary and secondary environmental impacts of an incident. Management aspects of emergency response plans should be established and tested. Appropriate environmental sampling equipment and procedures should be held where environmental monitoring is likely to be required to determine the extent of impact during the incident.
- Care should be given to the development of a monitoring programme that allows compliance to be managed and produces consistent and comparable results.
- Compliance monitoring should include audits of compliance with all relevant legal requirements (e.g. operating licence, Ministerial Conditions & Commitments, acts and regulations).
- Data checking procedures should be instigated for compliance data.

## **REFERENCES**

Environmental Data Services Ltd, 2003. *EMS survey reveals widespread concerns over certification*. [Online]. Available from: [www.endsreport.com/emssurvey](http://www.endsreport.com/emssurvey). [11 May, 2004].

MacLean, R, 2004. *Environmental Management Systems: Do they provide real business value?* [Online]. Available from: [www.eponline.com](http://www.eponline.com). [11 May, 2004].