

Safety & Environmental Management System Assessment

A tool for evaluating & improving SH&E performance

By David E. Downs

MANY ORGANIZATIONS ARE SEEKING ways to improve their performance. As part of this movement, SH&E professionals are being tasked with improving performance of their management processes—obtain better results, reduce operational costs, become more efficient and demonstrate value to the organization.

They are not alone in facing such challenges. Managers of all types are being asked to do more with fewer resources. Often, these managers have implemented various types of “management systems” to help drive improvement. This has been seen most dramatically in the area of quality management, as many companies have developed and registered their quality management systems to international standards such as ISO 9001; more than 500,000 ISO 9000 certificates have been awarded. Some firms have also elected to certify their environmental programs to ISO 14001, although at a somewhat slower rate; nearly 40,000 companies have followed this route [ISO(a)].

Organizations have adopted other management systems standards over the years as well, including OSHA’s Voluntary Protection Programs—in which more than 930 companies now participate (OSHA)—and the British Standards Institute’s Occupational Health and Safety Management System (BSI 8800) and Occupational Health and Safety Assessment Series (OHSAS 18001). While certification to such standards is an indicator of interest in these

approaches to improvement, many organizations wish to improve their SH&E performance, yet do not wish to pursue actual certification, often due to the costs involved (both fiscal and human resources). For such firms, what is the best way to use the principles of management systems to improve performance without becoming officially certified?

The common thread that connects most management systems developed over the last 20 years is a disarmingly simple principle: “plan, do, check, act.” Adapted and used by W. Edwards Deming in his work with developing Japanese industries in the early 1950s, this principle is the basis for standards such as ISO 9000, ISO 14001 and OHSAS 18001. It can be applied to almost any activity that requires management:

1) **Plan.** Conduct an analysis to determine what aspects of the activity require improvement, identify the most significant aspects and prioritize actions needed to create improvement.

2) **Do.** Develop programs and procedures needed to implement the required actions, including establishment of responsibilities, resources, training and documentation.

3) **Check.** Establish procedures to measure progress toward goals.

4) **Act.** If sufficient progress is not being

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made according to plan, take action to determine the causes and make necessary changes to drive improvement.

As Figure 1 illustrates, the process is a never-ending cycle of continuous improvement. This article describes a process based on this principle that has been used to assess and develop management systems for safety and environmental performance.

Process Development & Design

The safety and environmental management system assessment (SEMSA) tool uses a set of questions that address performance details in five management categories. Each question has five possible levels of implementation, allowing each question to be assessed in terms of current management practices. Questions are assessed during a site visit, when a series of interviews are conducted with personnel at all levels.

SEMSA was initiated in 1995 to help an upper Midwest medical device manufacturing company drive continuous improvement in its safety and environmental programs. While potential future certification to a management system standard was one objective, it was not the primary initial goal. Several key design considerations were defined at the beginning of the project:

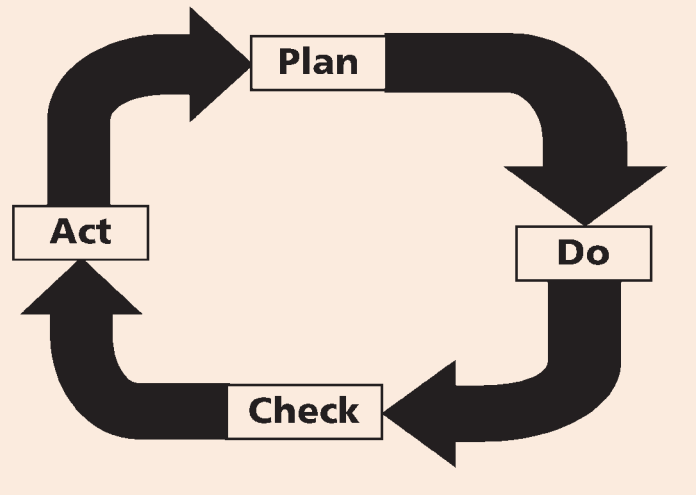
1) The process would be based on the original Deming Plan/Do/Check/Act principle and would include components of more recent management systems models, including the then-draft version of ISO 14001.

2) The process would address both safety and environmental performance within the same tool. Since safety and environmental issues were managed together by this company, it made sense to assess them together.

3) The design of the assessment questions provided for five levels of implementation to assess where the organiza-

Figure 1

Plan/Do/Check/Act Cycle



tion was on the path to an effective management system. This has proved to be a key feature of the process, as it provides a plan for future development. The sidebar at left provides a generic description of the implementation levels.

4) Questions were developed to assess performance within five key management categories:

- management expectations and communication;
- risk assessment and action plans;
- process implementation;
- checking and corrective action;
- review and renewal.

Table 1 provides descriptions of these categories. The guidance provided in ISO 14004, "Environmental Management Systems: General Guidelines on Principles, Systems and Supporting Techniques," was used to formulate the contents of the assessment questions for each management category (ISO 14004).

5) The assessment tool was designed as a database application, containing the questions, implementation levels, question guidance, and the ability to document and report results. The action plan resulting from the assessment was documented and tracked as well. This tool allowed for rapid documentation and report generation, with the assessment team able to leave a draft report with the site at the assessment's conclusion.

Two additional features were ultimately not retained as the process was implemented. The original assessment was designed with sets of questions addressing specific regulatory drivers, such as hazardous waste, safety and health, wastewater and transportation. Questions were developed for each of the five management categories to specifically address each of nine regulatory areas, resulting in a database of more than 350 questions. The original concept was to assess management of each regulatory area over time, resulting in action plans for each, in an attempt to combine aspects of both a regulatory audit and a management system assessment. It

Implementation Level Descriptions

Level 1: No management attention to area. No evidence of activity or recognition of the management area addressed by the question.

Level 2: Serious lack of management attention to the area. Some evidence of recognition, but implementation has been minimal; may have "just started." Most requirements have not been addressed and/or there is little documentation of activity.

Level 3: Management has addressed the area, but not in a consistent, complete and continuous manner. Most requirements have been completed and documented, but some specific areas must still be addressed, communicated or documented.

Level 4: Management has addressed this area in a well-developed and effective manner. Procedures/policies for implementation are documented and communicated within the organization. There is evidence of a good understanding of the requirement throughout the organization.

Level 5: Management has addressed this area in an outstanding manner, representing a sustained "best-of-class" approach that is fully documented; or particularly effective and innovative approaches.

quickly became apparent that this approach was unwieldy, confusing and complex. Consequently, it was decided that the “regulatory” type assessment would be conducted using a separate tool of similar design. Usually the two activities are scheduled as separate assessments, but a few sites have evaluated both functions at the same time.

In addition, the original process was conceived and designed as a “self-assessment.” In this scenario, a representative team of management, supervisory, technical and operations personnel from a site would be assembled, and a facilitator would present the assessment questions and explain the five possible levels of implementation. Through a process of discussion and consensus, the group would assign an implementation level to each question. This part of the activity would usually take two to three hours, scheduled as a morning session. After a break, during which assessment results were summarized, the team would return to develop an action plan to address key areas for improvement.

This process was modeled after one used successfully by a major manufacturing company in its European manufacturing sites. While a self-assessment has several distinct advantages (e.g., fosters communication between levels of management, builds consensus, facilitates action plan buy-in), it can be a logistical challenge to gather the right combination of people at one time. Underlying cultural or other disruptive issues at a site can prevent consensus as well.

As a result of these potential problems, the final model calls for a facilitator to conduct the assessment via a series of individual interviews. This resolves most logistical issues, since the interviews can be conducted at the interviewee’s convenience. In many cases, it has been found that interviewees are more open and willing to discuss difficult issues in this setting. Both methods can be used successfully, however, depending on the factors noted.

SEMSA Process Steps

The general steps in conducting a SEMSA are not unlike those of a typical compliance audit:

1) **Scheduling.** Site visits are scheduled several weeks in advance. Depending on the number of employees and site complexity, interviews take one to three days to complete.

2) **Pre-SEMSA activity.** The assessment team provides the site with information about the SEMSA process and how interviews will be conducted, including a list of potential interviewee types. A list of potential interviewees of each type (e.g., supervisors, managers, line employees) is solicited, from which the assessment team randomly selects candidates. The site is encouraged to specifically schedule

Table 1

SH&E Management Category Descriptions

Management Category	Descriptions
Management Expectations & Communication	<ul style="list-style-type: none"> •The management team (at all levels) has established expectations for SH&E performance in the organization. •Expectations are communicated effectively and routinely. •The management team reports the status of SH&E performance and takes action when performance goals are not met.
Risk Assessment & Action Plans	<ul style="list-style-type: none"> •A process is in place for identifying SH&E risks in the organization (regulatory and other). •A process is in place for assessing the risks and identifying the top risk issues facing the organization. •Achievable goals and objectives are established to reduce identified risks. •Action plans are developed to achieve goals/objectives.
Process Implementation	<ul style="list-style-type: none"> •Responsibility for action plan steps has been established. •Necessary resources to execute action plans have been allocated. •Those responsible for action plan execution (at all levels) are competent in their responsibilities. •There are means to communicate SH&E issues within and outside the organization. •Procedures are in place to address SH&E issues with new and existing processes and equipment. •Outside contractors are managed in order to achieve SH&E objectives. •Effective plans are in place to prevent, respond to and mitigate SH&E emergencies. •Effective documentation of SH&E management procedures is maintained.
Checking & Corrective Action	<ul style="list-style-type: none"> •SH&E performance to established goals and objectives is tracked and communicated routinely. •The management team assesses the results of measurements and takes actions where needed to achieve goals and objectives. •Processes are in place to routinely check compliance status. •A process is in place for routine assessment of the effectiveness of the SH&E management system.
Review & Renewal	<ul style="list-style-type: none"> •A process is in place for routine management review of the status of the SH&E management system. •A process is in place for reassessment of SH&E risks and development of new goals and objectives based on current conditions.

personnel if possible; however, at busy sites, flexibility is a necessity. During this stage, the team also gathers information regarding the site's management structure, as well as details such as type of operation, staffing, number of employees and past history of regulatory performance.

3) **Opening conference.** The assessment team leader conducts an opening conference attended by top site management and other personnel such as supervisors, staff members and employee representatives. During this conference, the SEMSA process is described, the interview procedure is defined, last-minute scheduling concerns are addressed and a closing conference is scheduled.

4) **Site walkthrough.** If the assessment team is not familiar with site operations, a brief walkthrough can help team members gain an understanding of the operations and typical SH&E issues.

5) **Conduct interviews.** Interviews need not be conducted in any particular order. In about half of the SEMSAs in which the author has participated, the interview with the site manager has occurred at the beginning of the process; however, no particular advantage is realized by forcing the timing of interviews. The key is to ensure representative coverage of all levels of staff and employees. Generally, interviews last 30 to 45 minutes, although interviews with SH&E staff can last up to four hours. Interviews with front-line employees are often conducted on the factory floor or in an office near their work area, and usually take less than 15 minutes.

6) **Data analysis and summary.** Analysis of interview results progresses through three distinct phases. At the beginning, findings tend to vary widely, seemingly irresolvable conflicts of information are evident and issues are ill-defined. Near the halfway point, issues begin to consolidate and conflicts become more understandable. Finally, the interviews start to become repetitive, with no new insights offered. At this point, data gathered are analyzed.

The database structure allows for each interviewee's responses to each question to be entered so a report of all comments can be generated for team review. Each question is analyzed by reviewing the comments and comparing results to the defined implementation levels for the question. Finally, the question is assigned an implementation level based on team consensus, and observations that support the assessment are documented. A draft report is then printed, which includes a summary chart of implementation levels by management category.

7) **Pre-Closing meeting.** As an optional step, the assessment team may meet with SH&E staff prior to the closing conference to review preliminary results and develop a draft action plan. Another approach is to leave the draft report with the site for its independent action plan development. Providing up-front guidance on the first management system development steps can help prevent confusion and overly aggressive action plans that could overwhelm site management.

8) **Closing conference.** This meeting is an oppor-

tunity to review the overall SEMSA process, present a summary of the site implementation status, recognize areas of outstanding performance and focus the management team on areas that need attention. Questions are answered, areas of confusion are clarified and any differences of opinion in assessed implementation levels can be resolved. Site management receives a draft report for review, comment and action plan development. This group is encouraged to complete its review and return the report to the lead assessor within four weeks.

9) **Final report.** Based on comments received from the site, a final report is generated and submitted to the plant manager or another designee.

While in many ways these steps mirror the steps of a compliance audit, a SEMSA is different in at least two key ways:

1) It is generally not conducted under attorney/client privilege procedures. The findings are reflective of management practices—not compliance status—and do not represent the potential liability that may result from compliance audit findings. This encourages the free and open distribution and discussion of SEMSA results. In some cases, however, management practices may be a focal point in terms of compliance performance. Two SEMSAs have been conducted at the direction of an attorney for a site based on a state regulatory authority consent degree requirement for an assessment of management systems.

2) Most compliance audits are conducted with the expectation that the status of findings will be aggressively tracked and reported until closed, usually with some type of corporate oversight. Various approaches to SEMSA follow-up have been used. Some organizations emphasize that the findings are owned by the site and the action plan is their action plan. While follow-up may include offers of implementation assistance and encouragement for plan implementation, no overt pressure is placed on a site. In most cases, sites see the clear advantages of taking action. Other organizations, particularly those seeking registration to ISO 14001 or OHSAS 18001, follow up findings more aggressively.

SEMSA Interview Process & Techniques

The interview is a key assessment process in a SEMSA. The following discussion details the interview process and techniques.

Use of a "Scribe"

Having an assistant take notes during the interview process frees the interviewer to focus attention on the interviewee and respond to his/her input. While it is possible to conduct an interview with just one person, it has been more effective (and the results better documented) when a scribe is used. The scribe should not actively participate in the interview in order to avoid the perception of "ganging up" on the interviewee; however, s/he may ask follow-up questions at the end of the interview. Since the scribe should be an "unbiased" entity, a site employee is generally not a good choice; corporate staff personnel have been used with good success.

Table 2

Sample SEMSA Questions

Management Category	Typical SEMSA Questions
Management Expectations & Communication	<ul style="list-style-type: none"> •Is there evidence of commitment from the site management team (at all levels) to improve SH&E performance? •How well developed is the facility’s policy with regard to safety and environmental management?
Risk Assessment & Action Plans	<ul style="list-style-type: none"> •To what extent has the site conducted an assessment of SH&E risks associated with its activities, services or products? •Does evidence exist that specific action plans have been developed which define required steps to achieve stated objectives and targets for SH&E performance?
Process Implementation	<ul style="list-style-type: none"> •How is accountability and responsibility for SH&E performance established for site personnel at relevant levels in the organization? •How effectively does the site determine SH&E training needed to achieve stated objectives and targets? •What is the process for receiving and responding to employee concerns relative to safety and environmental objectives and other issues? •Is there a procedure in which the organization reviews the SH&E aspects of new processes or equipment that may be brought on site?
Checking & Corrective Action	<ul style="list-style-type: none"> •How effectively does the site track progress toward goals and objectives? •How effectively does the site communicate the status of stated goals and objectives? •What is the process to periodically evaluate compliance with relevant legal and other requirements?
Review & Renewal	<ul style="list-style-type: none"> •What are the procedures for routinely reviewing the status of the SH&E management system?

After each interview, the scribe and the interviewer should review the notes to ensure that they have a common understanding of the responses and to prevent misinterpretations.

Representative Interviewees Are Key

Interviewees must represent a good cross-section of the management chain and the site organization. A SEMSA that does not include interviews with the site manager and key SH&E staff is not complete. Beyond that, however, candidate selection can be based on schedules and availability. As noted, in most SEMSAs, a list of potential interviewees is obtained during the pre-assessment activity. Interviews are scheduled with:

- Top manager direct reports (four to six people).** Include operations, human resources, financial, engineering, maintenance, research and development (as applicable).

- Line supervisors.** Target at least 25 percent of the total number and try to include supervisors from at least two shifts, if possible. Practices on the second and third shift often differ greatly.

- SH&E staff.** These employees are responsible for developing and managing SH&E programs. Include interviews with employees who have key SH&E functions, such as waste management or the safety committee chair.

- Line employees.** Interview employees from representative departments and shifts. The number of employees interviewed may increase or decrease based on the variation in responses gathered; high variability may require additional interviews to resolve issues. In the author’s experience, interviews with randomly selected line employees continue until the team is comfortable that a consensus has been determined. This can require interviews with as few as five or six employees at small sites with general agreement on issues or as many as 20 or more at larger sites.

- Contractors.** If contractors are a major part of site operations (such as at many pulp/paper mills and chemical plants), they should be included in the interview process.

- Interview location.** This helps to set the tone and level of comfort for the interviewee. Conducting the session on the interviewee’s “turf” is recommended, even when this is not the ideal interview environment. Some sites have set up a special room in a central location for the team’s convenience and comfort; interviewees are then brought in individu-

ally. In the author’s experience, this approach has been less successful in getting open, honest input. For line employees, it can be effective to simply tour production areas and speak with employees at random. This technique also avoids the risk of the site selecting “ringers” who have been prepped for the interview (although that is rarely effective).

- Interviewee comfort.** Since an interviewee may be nervous, it is best to begin with a brief discussion of the SEMSA process and why the employee’s input is important. Next, instead of diving into the questions, ask the person to describe his/her job. This gives the person the opportunity to discuss something familiar and increases his/her confidence. After such interaction, the first formal interview question is often a natural follow-up.

- Questions.** The most important skill for the interviewer is how questions are asked. By design, SEMSA questions are “open-ended,” which allows interviewees to provide a descriptive narrative and explicitly avoids a “yes/no” answer. Table 2 provides examples of SEMSA questions.

During the interview, one should expand on this approach. The actual SEMSA question is rarely asked verbatim; rather, it is constructed differently depending on the interviewee. The purpose is to obtain different perceptions of the same issue. Table 3 offers examples of interview questions generated by a question from the “Management Expectations and Communication” category.

Typical SEMSA Interview Question: How does facility management communicate its values, goals and objectives regarding the SH&E management system?

Interviewee	Question
Plant manager	<ul style="list-style-type: none"> •Describe how you communicate your commitment to SH&E performance to your staff and the rest of the plant.
Operations manager	<ul style="list-style-type: none"> •How does the plant manager communicate expectations for SH&E performance to you? •Describe how you communicate SH&E performance requirements to your direct reports (supervisors, leads, etc).
Shift supervisor	<ul style="list-style-type: none"> •Describe how you report the status of SH&E objectives and goals to your manager. •Describe how you communicate SH&E performance requirements to your team.
Safety manager	<ul style="list-style-type: none"> •Describe how the plant manager communicates expectations for SH&E performance to the plant staff.
Line employee	<ul style="list-style-type: none"> •Describe the last time you heard or saw a communication from the plant manager about expectations for SH&E performance. •In what ways does your supervisor communicate the status of SH&E performance in your department?

•**Listen actively.** The interviewer must actively listen to the interviewee, providing encouragement and maintaining positive body language. S/he must respond to interviewee questions and seek more details: For example, "Why do you think that happens?" "Can you explain that in more detail?" "Can you give more examples?" "What do you think we could do to improve?"

•**Uncooperative employees.** On occasion, an interviewee will be uncooperative. Some may believe the SEMSA is interfering with his/her job. Or, the employee may see this as an opportunity to vent frustration that may or not be relevant to the assessment. In these cases, it is best to thank the interviewee for his/her time and move on. If the issue raised merits further investigation, additional interviews should be conducted to determine whether it is a system issue or an isolated concern.

•**"Ringers."** Some sites hope to "show well" on the assessment, even though it has been communicated that the assessment is their tool and they will own the results. In these cases, selected interviewees may be reflective of the site's best—a safety committee member, a recent safety award winner, the supervisor with the best safety record. In general, it is easy to detect when employees have been coached—and the preparation typically does not achieve the expected results. To answer open-ended questions, the interviewee must construct a response, not simply answer "yes," "it's great" or "no." When asked about details of practices, the "ringer" often provides much more information than s/he realizes.

Resolving Conflicts in Interview Results

Inevitably, conflicts will arise between interviews, reflecting differing perceptions of performance on a given SEMSA question. These conflicts can typically be resolved by delving into the issue, either through additional interviews or by reviewing documentation. Following are two typical scenarios.

Scenario 1

The plant manager reports quarterly communication meetings with all employees, which include status of SH&E goals and issues. Various employees can remember only one meeting within the last year during which safety was discussed. Meeting minutes reveal the plant manager was out of town for two of the last four meetings. No evidence of safety discussions at any meetings is available.

Result: Implementation Level 2.

Recommendation. Establish a formal agenda for quarterly meetings, including status of SH&E goals. Ensure that SH&E items are covered by another

member of the management team when the plant manager is absent.

Scenario 2

The environmental manager is concerned about new processes that are installed without prior environmental review and describes two examples. The engineering manager states that there is good communication about new projects, that the environmental manager is involved when necessary and describes two examples where she was consulted. Interviews with two staff engineers reveal that environmental issues are generally not addressed specifically unless the environmental manager contacts an engineer.

Result: Implementation Level 2.

Recommendation. Include the environmental manager as approval sign-off on all new equipment/process changes.

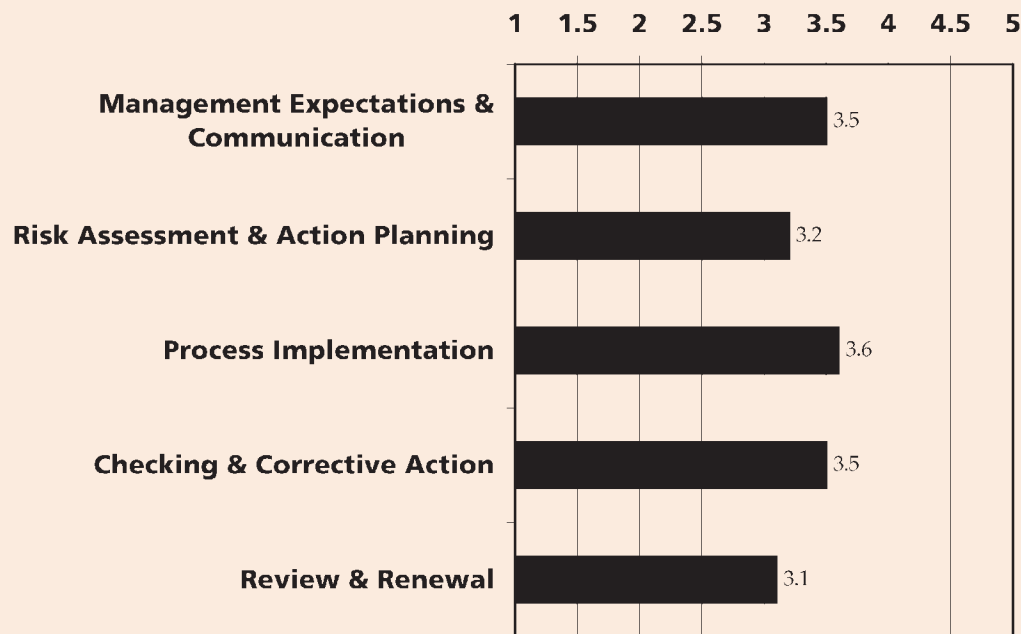
SEMSA Results

To date, more than 50 sites operated by six companies have been assessed using the SEMSA tool. The companies are manufacturing firms representing a relatively diverse group that ranges from food to medical devices and electronic equipment. Figure 2 shows an average of the implementation levels for the questions grouped by management category. For the sites assessed to date, results show that SH&E management systems have been partially implemented but are not yet fully effective. Comments for each management category follow.

•**Management Expectations/Communication.** Generally, assessments found good management commitment and communication regarding SH&E performance, with an average score of 3.5 out of 5 (Figure 2). In several cases, a lack of management communication regarding environmental performance was identified. These sites often had good communication regarding safety issues, but had not considered a need to broadly communicate the sta-

Figure 2

SEMSA Implementation Level Results Chart



tus of environmental issues. Another common issue was a disconnect between levels of management. For example, plant management was communicating a vision that was not being implemented at the operational level. Only one site achieved a Level 5 in this category; in this case, the plant manager had taken direct responsibility for SH&E management and had fully integrated it into the plant operations.

•**Risk Assessment and Action Planning.** Almost all sites assessed had opportunities to improve in this category. Perhaps because enforcement actions and legal liabilities are a primary driver for development of SH&E programs in the U.S., most sites were still establishing priorities and actions based directly on those issues. While these activities may be needed, little had been done in the way of formalized risk assessment or setting action priorities.

Another common issue was lack of communication about established SH&E priorities. Interviewees are typically asked, "What do you consider to be the most significant safety/environmental issue in this plant?" When collective responses were a laundry list of issues, it was clear that priorities were not well-defined, communicated or understood.

Finally, specific, measurable goals and objectives were rarely established, other than for lagging indicators such as incident rates or waste generation. Sites that scored well in this area showed evidence of an effective risk assessment process, a means to establish action priorities and specific action plans for identified initiatives. In addition, leading indicators were established for activities that were expected to have a positive impact on downstream metrics. For example, one site used percent observed safe behaviors as a leading indicator of improved safety performance in terms of recordable injuries.

•**Process Implementation.** Sites assessed were generally effectively implementing SH&E programs and procedures, with the highest average score in this category. This category contains questions that assess issues such as assignment of responsibility, allocation of resources, training and competency, management of change, emergency procedures, management of contractors and SH&E documentation. Common opportunities for improvement included:

• Few sites were assessing the competency of employees and actual effectiveness of their training programs.

• Involvement of SH&E staff in process/equipment changes was lacking in many cases.

• Establishment of broad responsibilities for

environmental activities was often an issue. Typically, environmental management was assigned to one or more employees, with little recognition of a need for broader assumption of responsibilities (as compared to safety, which tended to be more broadly assigned). For example, at one site, a significant wastewater discharge issue had emerged as a result of washing cooking oil down drains rather than diking and cleanup. Production area employees were not aware that these actions were problematic.

•**Checking and Corrective Action.** Performance in this category is clearly linked to risk assessment and action planning. If no measurable goals and objectives are established, it is difficult to implement effective measurement systems. Most sites had systems in place to check regulatory compliance and were performing inspections and other compliance-related activities. However, because the most objective goals tended to be lagging indicators, little opportunity was recognized for implementation of corrective actions.

•**Review and Renewal.** The assessment looks at only one issue in this category: Is there a process for routine review of the status of objectives and targets that results in a new assessment of risks based on current operations? This component drives the site to continual improvement. While most sites had some level of SH&E program review, it was typically associated with budgeting and/or setting goals for site SH&E staff. Most assessed sites were encouraged to initiate a more formal review process with re-establishment of site-level goals based on current risk assessment results.

SEMSA in Practice

Does SEMSA result in real improvement in management systems and SH&E performance? Not enough evidence is yet available to definitively

answer this question. However, one site that has been assessed twice has shown dramatic improvement. During the first assessment, the site scored poorly in almost all management categories. The root cause was determined to be the fact that the top management team was undergoing considerable changeover, resulting in lack of leadership and direction (a factor that affected all aspects of the site operations, not just SH&E).

The action plan included specific recommendations for top management leadership and communication activities. A new manager was placed at the site within six months. He used SEMSA recommendations as a roadmap to re-establish the SH&E management process. Working with the SH&E manager, a specific set of goals and objectives for plant performance was developed and widely communicated. New procedures were developed to achieve these goals, which were aggressively tracked and routinely reported. Management incentive compensation was linked in part to achievement of the goals. Not only did these factors result in a significantly higher SEMSA score, they also generated better SH&E performance, as indicated by achievement of defined objectives.

As this case illustrates, it can be easier to initiate change as a new manager. It is more difficult to change course midstream. This was the result from a SEMSA at a large R&D facility. The site was complex organizationally, with a matrix management structure involving facilities, R&D and engineering organizations. The facility was responsible for new product development as well as new production processes to be implemented at the manufacturing plant level. A large pilot plant within the site was used by both R&D and engineering for testing purposes. From an SH&E performance standpoint, the site was in compliance with environmental requirements, mostly due to the direct efforts of the environmental engineer (with little involvement by other staff). However, the pilot plant had the highest injury incidence rate of any facility within the company (of more than 25 sites).

One major issue in the pilot plant was mixed messages to technicians about the chain of command: Did they report to pilot plant management or to their R&D/engineering "customers"? Although a safety council made up of volunteers from most departments was in place, its direction and mission were not well-established. Key SEMSA findings included:

- lack of consistency and communication of top management expectations for SH&E performance;
- ineffective communication between key safety and environmental staff resources and top management;
- ill-defined responsibility (neither tracked nor considered in performance assessment) for SH&E performance;
- inconsistent SH&E competency throughout the organization.

Presented with these findings, the senior vice president for R&D took the lead in re-establishing direction for the site's SH&E performance. A key recognition was that as the R&D and engineering innovator for the company, what this group did affected SH&E performance throughout the entire corporation. Specific actions included:

- An executive EHS guidance council was established with a vice president chair to implement a newly developed SH&E policy statement.
- Reporting relationships for SH&E staff were changed to improve visibility and communication.
- Recognizing that many issues hindering improved performance were caused by internal cultural issues between technicians, engineers and managers, a firm specializing in culture change was engaged to assess and improve these issues.
- The safety council was reorganized with new, more senior members; it now receives better direction and more communication from the executive EHS guidance council.
- An SH&E training matrix was created to ensure a consistent level of competency throughout the organization, including engineers and developers.
- Management provides quarterly updates on the status of SH&E performance and activities to the entire site.

Conclusion

Implementation and improvement in SH&E management systems is one way to drive improvements in SH&E performance. Based on key management systems concepts and standards, SEMSA was developed as a tool to help organizations assess and improve SH&E management systems.

It may be that the simple recognition that SH&E can be managed proactively—as opposed to reacting to regulatory requirements—can be a victory. During the closing conference of a SEMSA conducted at a California manufacturing plant, results were being reviewed and recommendations for future actions discussed. At the conclusion, the plant manager summarized, "What you are asking us to do is manage EHS the same way we do the rest of our business, right?" After a brief silence, the assessment team responded, "Yes, that is exactly what we are asking you to do." ■

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