

ANTICIPATING GREENER SUPPLY CHAIN DEMANDS

One Singapore company's journey to ISO 14001*

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A leading designer and manufacturer of moulded foam packaging in Southeast Asia, the Jebsen & Jessen Packaging group is one of the seven core businesses of the Singapore-based Jebsen & Jessen Group of Companies (South East Asia) (JJSEA). The Packaging group manufactures custom-designed packaging using expandable polystyrene, expandable polypropylene and expandable polyethylene. In addition, the Jebsen & Jessen Packaging group designs and produces moulded foam products for the building and construction industries for such applications as void forming, roofing and insulation, and is one of the largest stockists of insulation materials in Singapore and Malaysia.

The group's original and largest plant, Jebsen & Jessen Packaging Pte Ltd (JJPS), is located in Singapore and focuses on the nation-state's many multinational companies in the high-tech electronics industry. Situated in Tuas, an industrial zone consisting of factories and warehouses, JJPS is close to the causeway leading to peninsular Malaysia.

Along with two factories in Malaysia, JJPS operates round-the-clock production, synchronising computer-aided scheduling with customers to offer 'just-in-time' delivery. One of the first companies in Southeast Asia to receive ISO 9002 certification, its commitment to providing quality, reliability, value, and customer service have been instrumental to its success.

With three shifts operating six days a week, the company's 160 employees produce and sell 2,400 tonnes of packaging per year for over 100 customers, generating over S\$25 million in revenue.

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▲ Why implement ISO 14001?

Since the launch of ISO 14001 in Singapore in 1996, JJPS management has observed a growing trend toward certification by the local operations of multinationals. In addition, consistent with its active industrial policy to encourage competitiveness, the Singapore government had been encouraging local small and medium-sized enterprises (SMEs) to become certified to ISO 14001 by providing an incentive scheme that paid a large proportion of consulting and certification fees. By late 1999, over 80 companies in Singapore were certified to ISO 14001, with the large majority being American, Japanese, and European-based multinationals but very few local SMEs such as JJPS—despite the government incentive programme.

Several of JJPS's key customers within the electronics industry had begun implementing environmental management systems (EMSs) to meet the ISO 14001 standard. Some of these companies indicated that, in the future, those suppliers that also became certified to this standard would be favoured, as this issue would be included as a criterion in their quarterly business reviews. A few years earlier, customers had encouraged JJPS and other suppliers to adopt the ISO 9002 quality management standard, and this eventually became the norm.

Sensing that a similar situation with regard to the environment would emerge, management of JJPS began to believe that implementing ISO 14001 would become a customer expectation. The 1997 Asian economic crisis had significantly reduced local demand for consumer electronic products—a key customer base for foam packaging manufacturers. Thus, a surplus mounted in the packaging manufacturing capacity. JJPS management was therefore particularly keen to pursue opportunities to gain competitive advantages over other packaging suppliers. Implementing ISO 14001 was considered to have potential to offer such an advantage by improving the company's ability to meet customer demands.

Management also recognised the synergies between the managing of quality and environment, health and safety (EHS) issues, as both seek to ensure predictable and reliable operations. Indeed, since the inception of EHS management at JJPS in 1995, the company's quality manager had been assigned both areas of responsibility. Further encouragement to implement a formal EHS management system that met ISO 14001 standards was provided by JJSEA's corporate EHS department which was convinced that implementation would lead to improvements in EHS commitment, training and performance.

Due to these numerous factors, in late 1998, JJPS management decided to formalise its ongoing EHS programme into an EHS management system that would be certified to the ISO 14001 standard. Quality manager Loo Tiong Kok, already the management representative for the company's ISO 9002 programme and responsible for the company's informal EHS management system, was appointed to head the ISO 14001 initiative.

Assembling the team

Management assigned the EHS committee, which was already meeting monthly to implement the company's informal EHS management programme, to create a formal management system that would meet ISO 14001 standards. Both the corporate EHS department and JJPS management sought to continue the integrated management of environmental issues alongside occupational health and safety. Therefore, the EHS committee was challenged to incorporate occupational health and safety management into the new formal management system. The committee consisted of the following individuals:

- General manager: Han Hong Juan
- Factory manager: Lim Gim Boh
- Quality manager/EHS committee chair: Loo Tiong Kok
- Plant engineer: Lim Ban Aik
- Financial manager: Susan Leong Fong Leng
- Administration and human resources manager: Rolern Ng
- Confidential secretary: Chris Yip

While not a formal committee member, the corporate EHS Director for environment, health and safety, Mike Toffel, participated in many ISO 14001 meetings to monitor the committee's progress and provide support. In addition, Chui Tau Siong, the Regional Managing Director of the Jepsen & Jessen Packaging group, monitored the committee's progress and provided support as needed.

Similar to its approach to implementing ISO 9002, JJPS management sought outside support to guide its implementation of an EHS management system that met ISO 14001 requirements. Two service providers were approached: the local office of a large multinational consulting firm that specialised in helping companies achieve ISO 14001 standards, and a small quality management consultancy that had helped JJPS prepare for ISO 9002 certification. The latter was chosen due to the established positive working relationships and for its use of a highly structured approach similar to its ISO 9002 approach. Furthermore, due to the consultant's limited experience with ISO 14001, it was agreed that the work would be performed at a particularly competitive price.

Establishing a policy

When JJSEA launched a corporate-wide initiative in 1995 to strengthen EHS management within all of its companies, JJPS developed an EHS policy that assigned EHS management responsibilities and established the company's first EHS standards. Now, after learning that ISO 14001 required all employees to know and understand the EHS policy and that

the policy must be made available to outside stakeholders, the EHS committee sought to simplify the EHS policy and incorporate the company's experience in the years since the original policy was drafted. The committee also sought to ensure that the policy was broad enough to become the standard for all three companies within the Packaging group. Supported by the Packaging group's senior management and JJSEA's corporate EHS department, the committee reduced the EHS policy to eight core principles that were meant to provide the foundation for the Packaging group's entire EHS management system (see Box 16.1).

This policy was attached to all employees' identity badges, sent to customers, suppliers and neighbouring facilities, and has been made available to the general public. In addition, it has been posted throughout the facility in English, Bahasa Malaysia and Chinese.

Legal review

With the assistance of JJSEA's corporate EHS department, all Singapore EHS laws and regulations were gathered and organised into the following categories:

Box 16.1 EHS policy

JEBSEN & JESSEN PACKAGING IS COMMITTED TO ESTABLISHING EXCELLENCE IN the environmental and occupational health and safety aspects of its operations. The company will actively promote environmentally responsible behaviour at all levels of our organisation and among our customers, suppliers and principals. Our vision is to become a company that promotes environmentally superior products and services that are produced in an environmentally superior manner. We are therefore committed to the following principles:

- 1 To establish and operate an environment, health and safety management system that promotes continuous improvement
- 2 To maintain an organisational culture that fosters keen awareness of environmental and occupational health and safety aspects of our operations and that encourages broad participation in managing them
- 3 To comply with environmental, health and safety laws and regulations in the countries where we operate
- 4 To prioritise source reduction and pollution prevention over proper waste management, and to maximise the use of recycled and recyclable materials
- 5 To give significant consideration to environmental and occupational health and safety criteria in our procurement practices
- 6 To promote our environmental, health and safety management by educating, training and communicating to all employees in the organisation
- 7 To increase environmental awareness by making available this policy to all company stakeholders, including employees, customers, suppliers, principals, neighbours and the general public
- 8 To establish environmental objectives and targets in accordance with our policy and ensure effective implementation

- Air pollution
- Water pollution
- Solid waste management
- Hazardous substances
- Noise pollution
- Occupational health
- Safety
- Fire safety
- Land development
- Emerging issues

Regulations are managed online in a Lotus Notes database and are updated periodically by the corporate EHS department (see example in Table 16.1).

The management representative identifies the regulatory requirements relating to the company's operations, and learns of updates from the corporate EHS department, a newsletter published by Singapore's Productivity and Standards Board (PSB), and Singapore's packaging industry association. The management representative led discussions with the EHS committee to develop a common understanding of how each regulation applied to the company's operations. This information was documented in

Table 16.1 EHS laws and regulations database

▼ 01. Country overview
▼ Overview information
Overview of Singapore's Legal System (S01)
▼ 02. Air pollution control
▼ Emissions from motor vehicles
Road Traffic Act and Regulations and EPC (Vehicular Emissions) Regulations (S07)
▼ Emissions from premises
Clean Air (Standards) Regulations 1972 (S05)
Emissions from Industrial or Trade Premises (S02)
Environmental Pollution Control Act 1999 (S03)
Environmental Pollution Control (Prohibition on the Use of Open Fires) Order 1999 (S04)
Environmental Public Health (Burning of Joss Sticks and Candles) Regulations 1999 (S06)
National Emission Standards for Air Pollution (S10)
▼ Indoor air
Smoking (Prohibition in Certain Places) Act 1992 Smoking (Prohibition in Certain Places) Notification 1994 Guidelines to Good Indoor Air Quality in Office Premises (S09)

the company's legal register (see Table 16.2), which followed the same categorisation as the EHS laws and regulations database.

The management representative worked with the administration and human resources manager to ensure that legislative requirements were communicated to relevant personnel based on their job functions. In some cases, this was done through formal training. The management representative was given responsibility for ensuring that objectives, targets, management programmes, procedures, and instructions would be modified should they be affected by new or amended legislation. Finally, the management representative also became responsible for keeping records and documents illustrating the active tracking of legal requirements and changes.

Identifying aspects and impacts

The committee's next step was to learn the concepts of EHS aspects and impacts, and then to identify all aspects across the company's operations. JPS also consulted its legal registry to ensure that EHS aspects included all EHS-related issues that were subject to regulations. As required by the ISO 14001 standard, each aspect was categorised as to whether it would occur in normal, abnormal or emergency circumstances, and the company defined these

Table 16.2 Legal registry [excerpt]

Legislation	Implication for JPS
5. Water pollution 5.1 Pollution of inland waters	
Environmental Pollution Control Act 1999 (Part V)	
Section 15. Licence for the discharge of trade effluent, oil, chemical, sewage or other polluting matters	Licence required for the discharge of trade effluent
Environmental Pollution Control (Trade Effluent) Regulations 1999	
Section 5. Control mechanism for discharge of trade effluent	Requires sampling test points and recording periodically. (Refer to schematic diagram/floor plan.)
Section 8. Nature and type of trade effluent to be discharged	Temperature at point of entry into public sewer or watercourse shall not exceed 45°C. pH value shall not be less than 6 or more than 9 and caustic alkalinity shall not be more than 2,000 mg of calcium carbonate per litre.
Section 9. Trade effluent to be free of certain substances	JPS does not discharge any listed substance.
Section 10. Maximum concentrations of certain substances	Refer to Section 10 for the discharge limits

terms as part of its documentation. A 'normal' operating condition was defined as relating to daily or routine events, such as combusting fuel oil to produce steam. An 'abnormal' operating condition relates to events that are expected to occur once in a week or month, such as the maintenance of equipment or machinery, process start-up or shut-down. An 'emergency' operating condition relates to occurrences that are not expected to occur, but could happen nonetheless, such as accidents, injuries, or fire.

Once all aspects were identified, each was linked to the resulting EHS impact. Table 16.3 illustrates a few of the aspects and impacts that were identified.

Prioritising impacts

Once the committee identified all aspects and impacts, they developed a methodology to evaluate the significance of the impacts. The management representative worked with the corporate EHS department to develop a prioritisation matrix that incorporated the following concerns:

- Upstream issues, including the environmental impacts of raw materials and natural resources

Table 16.3 EHS aspect/impact inventory [excerpt]

Area	Activity, product, service	EHS aspect	EHS impact	Condition
Boiler room	Boiler operation	▶ Emission from fuel oil combustion	▶ Air pollution	Normal
		▶ Use of fresh-water to fill boiler	▶ Use of renewable resource	Normal
		▶ Boiler blowdown (water discharge from boiler)	▶ Water pollution	Normal
		▶ Use of fuel oil	▶ Use of non-renewable resource	Normal
		▶ Generation of noise	▶ Worker hearing loss ▶ Boundary noise pollution	Normal
		▶ Possibility of spillage while refilling fuel oil into underground storage tank	▶ Land and water pollution	Emergency
		▶ Possibility of oil leakage from underground storage tank	▶ Land and water pollution	Emergency
		▶ Possible worker injury from contact with hot boiler	▶ Worker injury	Emergency
Annual boiler cleaning		▶ Discharge of effluent	▶ Water pollution	Abnormal
		▶ Possibility of worker injury in handling chemical	▶ Worker injury	Emergency

- Downstream issues, including the environmental impacts of emissions, effluents and solid waste disposal
- The EHS impacts of emergency situations
- The seriousness of potential health and safety impairments

Natural resources and raw materials that contribute to serious upstream environmental damage were deemed to be 'highly significant'. Non-renewable natural resources and raw materials with no recycled content were considered to be 'moderately significant'. The only upstream issues that were considered to be of 'low significance' were renewable resources that were not associated with adverse environmental impacts and non-renewable resources with at least partial recycled content.

Next, the downstream impacts of the company's wastes were considered. To assess their significance, Singapore's regulations and standards were consulted. Should any of the company's emissions or effluents exceed 85% of the value of any regulatory limit or standard, the emission or effluent would be considered 'highly significant': for example, if the standard for a particular effluent parameter is 100 ppm, then its impact was deemed to be high if test results showed the effluent to contain 85 ppm or more of the parameter. On the other hand, if all tested parameters of an emission or effluent demonstrated that each was at most 50% of the standard, the emission or effluent would be of 'low significance'. Those emissions or effluents that were in between these two situations, whereby the closest parameter to the limit was above 50% but below 85% of the standard, were deemed to be of 'moderate significance'.

Most solid waste in Singapore is incinerated, increasingly so in electricity-generating waste-to-energy facilities, and the resulting ash is landfilled. With continuing pressure on its very limited land resources, Singapore recently opened Asia's first offshore landfill facility. To incorporate the scarcity of landfill space and air pollution generated by waste incinerators situated near Singapore's dense population, no wastes that require disposal were considered as 'low significance'. Wastes with low thermal potential, and thus limited capacity to promote the offsetting benefit of electricity generation, were deemed 'highly significant'. Those wastes with high thermal potential were deemed 'moderately significant' due to their potential to reduce some combustion of fossil fuels to produce the same amount of electricity at a power station. Furthermore, all hazardous wastes were classified as 'highly significant' because of their additional threats posed to the environment and public safety.

To assess the significance of boundary noise, ranges were established for the measurement of noise in decibels during daytime, evening and night periods based on local regulations. Any measurement in excess of the regulatory limit was considered to be 'highly significant'. Any noise within five decibels' below the limit was deemed 'moder-

1 Decibels and dBA are similar—dBA means decibels weighted on the A scale. This adjustment is made to measure impact of noise on human hearing. This is standard practice for regulatory limits, industrial noise assessment, and measuring hearing. Decibels are more typically used when discussing nuisance noise, such as noise levels at a site's boundary.

ately significant', and any noise levels measuring more than five decibels below the regulatory limits were considered of 'low significance'.

Emergency and other typical situations were considered next. It was decided that situations with the potential for lasting or serious EHS impairment were 'highly significant', while those with the potential for temporary or minimal EHS impact were 'moderately significant'.

Finally, health and safety issues were addressed by weighing the permanence and seriousness of potential injuries and health impairments. Those situations with the potential for permanent injury or health impairment were deemed 'highly significant'. Situations that would result in temporary injury or health impairment were considered 'moderately significant'. Because noise levels can be easily measured objectively, specific guidelines were provided: areas with average noise levels above 85 dBA over an eight-hour period—a generally accepted international standard—were classified 'highly significant', while areas with 80–85 dBA were considered 'moderately significant'. Areas with less noise were considered to be of 'low significance'.

If any issue was addressed by more than one of these areas, a precautionary principle was adopted: the category that took precedence was the one where the issue was considered to be more highly significant. This methodology to prioritise EHS impacts is summarised in Table 16.4.

Documenting procedures and work instructions

Once all aspects and impacts were identified and prioritised, the committee began the large task of ensuring that all highly significant—in addition to many moderately significant—aspects and impacts were managed according to documented procedures.

After studying the requirements of the standard in detail, committee members anticipated that implementing ISO 14001 would require substantial documentation of existing procedures and work instructions, as well as the creation of many new ones.

To begin, the committee reviewed the company's existing documentation and training materials and set an aggressive schedule to document procedures and work instructions to manage all environmental aspects that had been identified. A number of opportunities were recognised where the committee could rely on the existing ISO 9002 documentation, with minor or no modifications, to fulfil some ISO 14001 documentation requirements. The overlap areas included the following:

- Data control
- Document control
- Purchasing control
- Equipment calibration
- Record control

	Highly significant impact if . . .	Moderately significant impact if . . .	Low significant impact if . . .
Upstream (materials) Impact of raw materials and natural resources	Contributor to a serious environmental concern	Non-renewable resources with 100% virgin content	Renewable resources; also, non-renewable resources with some recycled content.
Downstream (wastes) Impact of effluent	If any parameter of an effluent exceeds 85% of the applicable legal standard (pH, total suspended solids, etc.)	If any parameter of an effluent is between 50% and 85% of the applicable legal standard	If all parameters of an effluent are below 50% of the applicable legal standard
Impact of emissions	If any parameter of an emission exceeds 85% of the applicable legal standard (opacity, solid particles, etc.) or permissible exposure limit	If any parameter of an emission is between 50% and 85% of the applicable legal standard or permissible exposure limit	If all parameters of an emission are below 50% of the applicable legal standard or permissible exposure limit
Impact of landfilled solid wastes	Hazardous materials	Non-hazardous materials	Not applicable
Impact of incinerated solid wastes	Low thermal potential	High thermal potential (this enables the waste to generate electricity in a waste-to-energy incinerator)	Not applicable
Boundary noise Impact of boundary noise	If boundary noise exceeds legal limit (75 decibels during day, 70 during evening, or 65 during night)	If boundary noise is within 5 decibels of legal limit (between 70 and 75 decibels during day, 65–70 decibels during evening and 60–65 decibels during night)	If boundary noise is more than 5 decibels below the legal limit (70 decibels during day, 65 decibels during evening and 60 decibels during night)
Emergencies Issue not part of typical everyday operations	Potential for lasting or serious EHS damage	Potential for temporary or minor EHS damage	Not applicable
Health and safety Seriousness and likelihood of injury or health impairment	If permanent injury or health impairment is possible OR the work environment noise levels are above legal limit ($L_{Aeq,8h} > 85$ dBA)	If injury or health impairment is possible, but not permanent OR the work environment noise levels are within 5 decibels of the legal limit (80 dBA $< L_{Aeq,8h} < 85$ dBA)	If injury or health impairment is possible but is very unlikely due to machine guarding or insulation OR the work environment noise levels are more than 5 decibels below the legal limit ($L_{Aeq,8h} < 80$ dBA)

Table 16.4 Methodology to prioritise EHS impacts

- EMS audit
- Corrective actions
- Preventative actions
- Training

As a result of many hours of work by managers and supervisors across the company, the following procedures and work instructions were developed (see Box 16.2).

Box 16.2 EHS procedures and work instructions

EHS PROCEDURES

- Aspects and impacts
- Legal requirements
- Environmental objectives, targets and management programme
- Communication
- Management of waste
- Management of atmospheric emissions
- Management of waste-water discharge
- Noise pollution control
- Supplier/contractor control
- Emergency preparedness and response
- Monitoring and measurement
- EMS audit
- Management review of environmental system

EHS WORK INSTRUCTIONS

- Handling and storage of materials
- Spillage containment instructions
- Handling and storage of liquid petroleum gas
- Workshop standing order
- Factory standing orders
- Canteen standing order
- Guardhouse standing order
- Product sample control
- General housekeeping instructions
- Handling and storage of fuel oil
- Moulding machine maintenance instructions
- Pre-expander maintenance instructions
- Cooling tower maintenance instructions
- Steam boiler maintenance instructions
- Air compressor maintenance instructions
- Maintenance instructions for equipment in die cut department
- Maintenance instructions for equipment in block and trade division
- Conveyor belt maintenance instructions
- Forklift maintenance instructions
- Delivery truck maintenance instructions
- Sprinkler and alarm system maintenance instructions
- Crushing operation control
- Re-use of foam products
- Water pool cleaning
- Changing and disposal of dust bag

▲ Training

The EHS committee realised that a great deal of formal training would be required for the 160 staff members. Since nearly all training was being done on the job in an ad hoc manner, significant time would be required both to develop training materials and to conduct formal training. Training would need to be provided for the EHS procedures and work instructions listed in Box 16.2, and refresher training was provided for those procedures from the company's ISO 9002 quality management system that were modified so they could be shared by the ISO 14001 EHS management system.

Developing the training material and conducting training would be particularly challenging as:

- Workers' education level ranged from elementary to technical college.
- Many staff members spoke only one of three languages (English, Mandarin or Bahasa Malaysia).
- The plant operated 24 hours a day.
- The staff was split among three shifts.

As a result, while training materials were developed in English, training sessions were conducted separately in English, Mandarin and Bahasa Malaysia. Because of tight production schedules, many training sessions were held outside normal working hours. In total, 32 hours of training were provided to the company's managers, supervisors and staff, which resulted in over 750 staff-hours of training. The training incurred over S\$7,000 in labour costs, largely comprised of paid overtime.

▲ Establishing objectives and targets

To establish its objectives, the EHS committee considered the company's EHS policy, the operation's EHS impacts deemed to be of high and moderate significance, and the legal review that was conducted. A performance indicator was developed to correspond with every target, and a manager was assigned responsibility to achieve each one. Table 16.5 illustrates a few of the objectives and targets that were established.

▲ Certification

While a number of ISO 14001 certification bodies compete in Singapore, the market is dominated by the government-linked PSB which has handled 47 certifications, representing nearly 60% of Singapore's ISO 14001 certifications. Multinational companies includ-

Policy/commitment	Objective	Target	Performance indicator	Responsibility
To prioritise source reduction and pollution prevention	To increase fuel oil efficiency	Improve fuel oil efficiency by at least 1% over the average 1999 level by 31 December 2000	Monthly fuel oil ratio expressed in litres per kilograms as: $\text{Fuel oil consumed per month} \div \text{Goods produced per month}$	Factory manager
To maximise the use of recycled and recyclable materials	To increase recycled content in expandable polystyrene products, wherever technically and commercially practical	Increase recycled content in expandable polystyrene products to 5% (by weight) by 31 December 2000	Monthly percentage calculated using kilograms of expandable polystyrene material (EPS) as: $\text{Recycled EPS used per month} \div \text{Total EPS used per month}$	Factory manager
To promote safety by educating, training and communicating	To ensure all relevant employees are trained to promote their safety	Establish proper operating procedure for cutting and slicing machines by 31 October 2000	Operating procedures	Engineering manager

Table 16.5 Objectives and targets [excerpt]

ing Bureau Veritas Quality International (BVQI), Lloyds Register Quality Assurance (LRQA), Société Générale de Surveillance (SGS) and TÜV Rheinland have a modest share, each having conducted six or seven ISO 14001 certifications in Singapore. Four additional companies compete, but together they account for only 10% of the market.

JJPS chose PSB for two main reasons. First, they were already familiar with their staff as PSB had certified JJPS's ISO 9002 quality management system and had subsequently conducted surveillance audits. Second, PSB was priced competitively. The initial two-day preliminary audit resulted in several findings, including the need to:

- Review the aspect/impact record to ensure its comprehensiveness
- Review the procedure to evaluate EHS impacts to ensure it could be used for assessing the significance of boundary noise
- Clarify the definitions for normal, abnormal and emergency operating conditions
- Clarify the procedures used by the EHS committee to determine which aspects and impacts to focus on when establishing objectives and targets

Within two weeks of the preliminary audit, the management representative wrote to PSB explaining how each audit finding had been addressed. He explained the immediate fixes made to the specific findings and, importantly, described the changes made to the management system to ensure these situations would not be repeated.

The subsequent two-day pre-award audit resulted in only one observation and two minor non-conformances. The observation related to a company document that reported the annual emerging evacuation drill, where the EHS committee noted the duration was too long. While the company conducted a second drill shortly thereafter, there were no

records indicating whether the performance had improved to the satisfaction of the EHS committee.

One minor non-conformance issue involved the company's need to re-test its boundary noise to ensure that it met with Singapore's legal standards. In fact, Singapore's Ministry of the Environment does not require companies to test their boundary noise; it simply requires compliance with prescribed limits. However, as part of the ISO 14001 process, JJPS was required to demonstrate compliance, which meant conducting the test to illustrate that the results are within the standards. While JJPS had already identified this issue in its legal review, the test had not yet been conducted.

The second minor non-conformance issue involved the need to clarify a procedure. At issue was the need for the EHS committee to demonstrate and document the rationale it used when establishing the company's objectives and targets.

The management representative replied to the certification team on all pre-award audit findings within two weeks. The company was certified in May 2000.

Costs

In building its management system, JJPS incurred several one-time costs, including S\$22,800 for the consultant and S\$6,900 for the initial certification. As mentioned earlier, the labour costs associated with training managers, supervisors and all staff totalled over S\$7,000.

Ongoing costs associated with implementing the EHS management system include periodic environmental testing, a strengthened employee health-monitoring programme, as well as S\$3,000 for two surveillance audits per year.

Over the course of implementing the EHS management system, JJPS has made additional investments in equipment and engineering projects that will both improve EHS performance and process efficiency.

Using Lotus Notes as a document management system

Just as JJPS was finalising the implementation of ISO 14001, a corporate-wide installation of Lotus Notes was launched. This provided the management representative with an opportunity to create a Lotus Notes database to maintain and disseminate all ISO 14001 documentation online, and eliminated the need to print hard copies (see Table 16.6). The system also provided much more effective and efficient document control. Initial concerns that users could print documents from their workstations were addressed by implementing a policy that only those hard copies that had been stamped by the management representative were to be considered official controlled documents.

▼ 01. Manual
▼ Final
JJPS-EHS-EM01 Introduction
JJPS-EHS-EM02 Environment, Health & Safety Policy
JJPS-EHS-EM03 Environmental System Elements
JJPS-EHS-EM04 Circulation
JJPS-EHS-EM05 Reference
▶ 02. Procedure
▶ 03. Work Instruction
▶ 04. Material Safety Data Sheet
▶ 05. Monitoring Test Report
▶ 06. Equipment Calibration
▶ 07. Minutes of Meeting
▶ 08. Environmental Audit
▶ 09. Training Material
▼ 10. Records
▶ 01. Impacts
▼ 02. Legal Requirements
Master List of Legal Requirements
Record of Legal Requirements
Schedule for Evaluation

Table 16.6 ISO 14001 'documentation' on a customised Lotus Notes database

Lessons learned

The ISO 14001 process resulted in several improvements that will be very useful to strengthen the EHS management in the other Jepsen & Jessen Packaging companies. For example, many procedures and work instructions that were largely passed on via word of mouth are now formally documented, and many improvements were made to these during the documentation process. Similarly, much of the pre-ISO 14001 training provided to operational staff had been conducted on the job, risking wide variability in the amount and quality of the training actually delivered. As part of the ISO 14001 process, all training needs were identified, documented training materials were produced and training records were formalised. All of this will be applied in the Packaging group's other companies.

JJPS management gained a great deal of insight on how best to implement an EHSMS, and these lessons will help the other Packaging companies implement their management systems. Explanations by various managers of the company's activities and ongoing programmes, procedures and work instructions dominated the first ten weekly meetings

with the consultant. In future implementations, the management representative should take more time—before the committee begins to meet weekly—to ensure that the consultant gains this understanding through thorough one-on-one discussions with the appropriate managers and supervisors. This will also serve to improve the accuracy of the implementation time-line developed by the management representative and consultant.

After every committee meeting, the consultant and management representative learned to work together more efficiently. They began to draft the agenda for the next meeting and determine which managers and supervisors needed to attend. Not only did this reduce the number of managers and supervisors attending meetings where the topics did not relate to their responsibilities, but it also enhanced their enthusiasm for the ISO 14001 process, as most meetings they did attend required their active participation.

The consultant's initial explanation of EHS aspects and impacts did not provide the committee with a clear understanding of the terms and their distinction. As the identification of EHS aspects lays the foundation for the entire EHS management system, it is one of the most important steps in the implementation process. Therefore, in future implementations, particular care should be taken to ensure that the committee is provided with a clear explanation and guidance. When identifying and prioritising impacts, the consultant should emphasise the important distinction between impacts that can be controlled (e.g. emissions), influenced (e.g. raw material composition in some cases) and not controlled (e.g. upstream impacts of water consumption if only one source is available). In addition, the consultant should assist the committee in developing a methodology to prioritise impacts by sharing methods of how other companies have done this—particularly methods used by companies that have already been certified to ISO 14001.

Given the context of many companies operating in Southeast Asia, the implementation timetable should provide a significant amount of time for the committee to become familiar with local EHS regulations. In many cases, there are regulations that have not been enforced, or have been enforced sporadically, that a company may not be aware of. Not only will this promote the respective department's legal compliance, but it will also help all the committee members understand why these impacts are rated as highly significant. In many of these countries, there are periodic training courses offered by regulators, industry associations and consultants that seek to educate company managers about ongoing legal requirements. Attending such a course could be an excellent first step for the management representative, even before the implementation process for ISO 14001 begins.

Conclusions

One major benefit of JJPS's implementation of ISO 14001 is that it acquired a third-party 'seal of approval' that will be used in its marketing efforts to meet the growing environmental concern of its customers within the electronics industry. However, earning the full value of this benefit may still be years away. According to JJPS General Manager

Han Hong Juan, thus far it has usually been American-based multinationals that have expressed interest in whether their suppliers are certified to ISO 14001, typically discussed in the quarterly business reviews they conduct with their suppliers. However, Han believes price, service and the relationship will remain the main factors in securing orders, and that the environmental performance of suppliers will remain a preference rather than a requirement. He observes:

We do not have any customers dictating that we must be ISO 14001-certified yet and I don't see it coming within the next three years or so. Like the ISO 9000 quality management standard, ISO 14001 will become the norm instead of the exception.

Chui Tau Siong, Regional Managing Director of the Jebsen & Jessen Packaging group, believes that certification to the ISO 14001 standard may bring value to other business relationships:

I see value when we are trying to obtain a new agency or partner. When we say we are ISO 14001-certified, it will certainly enhance our image and demonstrate our care for the environment.

Many other benefits were realised by implementing an ISO 14001-certified EHS management system. Every JJPS manager and supervisor has gained a thorough understanding of EHS laws and regulations, which has enabled the company to strengthen its regulatory compliance at the same time that Singapore's Ministry of Environment and Ministry of Manpower is increasing its enforcement stringency. This may yet provide advantages if competitors are less effective in compliance and, as a result, regulators take action.

Comprehensive staff training has increased participation in the company's ongoing recycling and energy conservation initiatives, and has focused attention on preventative actions to reduce risks. For example, machine guarding was installed in additional equipment where it could improve worker safety, well beyond just those machines where the manufacturer had already designed this feature. Across all departments, EHS procedures and work instructions were documented and clarified, and, recognising additional potential health impacts of machine noise and chemicals used in production, a more extensive health-monitoring programme was initiated.

Implementing ISO 14001 has therefore enabled the company to improve EHS management across all departments and has ensured that tasks are assigned and accomplished in a much more systematic manner. In particular, management's periodic review and establishment of EHS objectives and targets based on EHS impacts—a new feature of the company's management system—ensures continuous improvement in the most relevant areas.

▲ Future plans

JJPS plans to promote its ISO 14001 experience to its customers and suppliers to encourage their participation. In the coming months, the Jebsen & Jessen Packaging group plans to

implement EHS management systems that comply with ISO 14001 requirements in all of its other factories, which are currently implementing quality management systems to meet the ISO 9002 standard. Each company will begin implementing its EHS management system immediately following certification to ISO 9002—expected in late 2000 or early 2001.

In addition, as the Jebsen & Jessen Packaging group is planning to broaden its activity level by expanding its product platform and regional coverage, it will probably implement ISO 14001-certified EHS management systems in any new companies it begins operating.