Port Safety, Health and Environmental Management System (PSHEMS) Development and Implementation Guideline

Partnerships in Environmental Management
for the Seas of East Asia (PEMSEA)

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1. Introduction to the PSHEMS

The purpose of the Port Safety, Health and Environmental Management System (PSHEMS) is to provide a mechanism for implementing the PSHEM Code. It provides Port Authorities and Operators, who have decided to voluntarily apply the PSHEM Code, with a tool that enables them to assess and improve their operational procedures consistent with relevant and applicable international and national regulations, guidelines and standards.

Development and implementation of the PSHEMS should also result in the achievement of the objectives of the PSHEM Code, including continual improvement of port operations with respect to safety, health and environment protection, over time.

The essential components of the PSHEMS covers the International Standards Organization's (ISO) 9001 standard on Quality Management Systems (QMS) and the ISO 14001 standard on Environmental Management Systems (EMS), as well as the Occupational Health and Safety Assessment Series (OHSAS) 18001 standard on Occupational Health and Safety Management Systems.

Reasons to implement a PSHEMS

Increasing public environmental awareness is exerting greater pressure on Port Authorities and Operators to demonstrate that their operations are safe and environment-friendly.

In addition, port customers, including shipping companies, manufacturers, exporters, importers and freight-forwarders, who may suffer a negative reputation and impact if their ships and/or cargoes are involved in a major accident, require that their transport partners provide evidence that they have taken all appropriate measures to ensure safe transport and handling of their cargoes.

In response, more and more Port Authorities and Operators have obtained certification under the ISO 9001 standard on QMS. However, an ISO 9001 certification covers only the "quality" of the services provided, in relation to customer product or service requirements, but does not take into account public requirements or expectations with regard to safety, health or environmental aspects of the port operation.

To provide management systems for environmental and safety issues, ISO has introduced the ISO 14001 standard on EMS, and OHSAS has developed the OHSAS 18001 standard on Occupational Health and Safety (OHS). However, like the 1SO 9001 standard on QMS, these standards are also sector-specific. Therefore, a Port Authority or Operator would have to introduce all three systems in order to ensure compliance with the PSHEM Code, but it would be cumbersome to implement and maintain.

The PSHEMS was developed to avoid having to implement three different systems in a port. The PSHEM Code incorporates the requirements of the three international standards into one integrated package especially designed for usage in ports. and to cater to the implementation of the requirements of the PSHEM Code in a combined, integrated system. Therefore, the PSHEMS provides the following distinct advantages:

- Integration of all the requirements of the aforementioned standards into one management system instead of three separate systems;
- Simplification and streamlining of documentation;
- More efficient use of human, physical and financial resources;
- Enhancement of communications within and between the Operator and the departments; and
- Allows continuous review and improvement of the management system to ensure quality, safety, health and environmental protection in the port area.

Benefits of a PSHEMS

With the introduction of a PSHEMS, the Port Authority or Operator can expect the following benefits:

- Through the implementation of a Port Safety, Health and Environmental Policy, the management demonstrates its commitment to improvement in the safety and environmental consciousness within the port and to the establishment of a safety, health and environment protection culture.
- Recognition by the staff that management cares about their personal safety and health. Their active participation in the development of the system will result in higher motivation of personnel and will lead to a corporate identity and ownership with personnel performing their jobs better.
- The training of personnel, their higher motivation, the improved corporate identity and the constant monitoring and improvement of operational processes by both management and staff will, in turn, lead to a more efficient utilization of human resources and a reduction of operating costs.
- On the financial side, there are potentially significant savings in insurance costs and claims, through the reduction of accidents, medical costs and sick leave, cargo loss and damage and environmental fines.

Further benefits include:

- Reductions in complaints from port customers;
- A better understanding of the issues at hand in the various areas of the port operations covered by the system by both management and staff; and
- Cost-effective and efficient review of the quality, safety, health and environmental protection management system in the port or company in a coordinated and integrated fashion.

In addition, the full implementation of the PSHEMS will will greatly improve the port's image locally, nationally and internationally, and open up new potential commercial opportunities for the port, the Port Authority and/or the Port Operator.

2. Concept of the PSHEMS and the Continual Improvement Process

The development and implementation of the PSHEMS follows the continual improvement cycle (Plan-Do-Check-Act PDCA cycle) to address the elements of the Port Authority's or Operator's activities, products and services that are having a significant risk to safety, health and environment (**Figure 1**).

Figure 1. PSHEMS Continual Improvement Process.

The major steps in the PSHEMS ongoing process include the following:

Plan:

- Conduct of baseline assessment or initial status review;
- Establish the port safety, health and environmental management policy statement;
- Determine the needs of its employees and stakeholders with regard to safety, health and environment;
- Identify the safety, health and environmental hazards aspects and assess the significance of the risk;
- Identify legal requirements applicable to the PSHEMS;
- Determine compliance to applicable international regulations;
- Set objectives and targets for the significant risk
- Formulate programs to address significant risk and achieve objectives and targets; and
- Develop the program implementation plan, including performance indicators for monitoring and assessing progress and achievements.

Do:

- Assign roles and responsibilities to facilitate the implementation of programs and processes to address the significant risk;
- Provide adequate resources including trained and competent personnel;
- Establish and maintain necessary operational control and documentation to support the implementation of the programs and processes;
- Disseminate the port safety, health and environmental management policy statement; and
- Communicate the programs to concerned employees and stakeholders.

Check:

- Monitor the objectives, targets, outputs and outcomes of the PSHEMS and the programs, and evaluate progress against the performance indicators;
- Evaluate the status of compliance to legal and regulatory requirements; and
- Identify non-conformities and take corrective, preventive and improvement actions.

Act:

- Conduct a management review of the PSHEMS;
- Identify areas for improvement; and
- Take actions to improve performance.

Implementing the PSHEMS

The PSHEMS implementation follows the PDCA cycle, using a Six Phase approach:

PLAN

Phase 1: Initial Status Review
Phase 2: Strategic Planning

DO

Phase 3: System Development and Documentation

DO and CHECK

Phase 4: Implementation and Monitoring

CHECK

Phase 5: PSHEMS Auditing

ACT

Phase 6: Continual Improvement

Phase 1: Initial Status Review (ISR)

The ISR establishes the baseline on current performance of the Port Authority or Operator, including present operational and structural procedures, and how they comply with the PSHEM Code requirements.

The ISR stage also covers the review of current system practices and evaluates the deficiency against the requirements of the PSHEM Code. Safety, health and environmental risks emanating from the facilities situated within the port area and from activities carried out in the port are identified. A review of all applicable legal requirements and their compliance status are undertaken during the ISR.

The Port Safety Audit Manual developed by PEMSEA can be used in identifying strengths, weaknesses and gaps in port regulations/policies and practices vis-à-vis their compliance to national and international requirements and recommendations (PEMSEA, 2001). Requirements of international conventions/ recommendations in the form of a checklist are provided in the Port Safety Audit Manual.

It must be stressed that Port Authorities and port operators need to ensure that in conducting the review of applicable regulations, they have the latest version of relevant international instruments.

With the results of the ISR, the Port Authority or Operator can plan its next course of action with regard to the establishment of the PSHEMS, including resource requirements, systems development and documentation, internal audit and management review, among others.

Phase 2: Strategic Planning

The development of the "working" PSHEMS starts with the identification of different (relevant) processes covered by the system based on the identified scope of the PSHEMS. This phase facilitates the development of the PSHEM policy ...top management has the primary responsibility for developing the PSHEM policy. This phase also involves conducting a detailed risk assessment based on the results of the ISR; identifying significant hazards and intolerable risks; setting of process objectives; establishing programs to address the objectives; allocating resources to facilitate the implementation of the programs; and developing an action plan for implementing the PSHEMS.

Phase 3: System Development

To enable the port to comply with the requirements of the PSHEM Code, process descriptions and system and operational procedures are developed. The procedures describe how the system has to be implemented and managed and "who has to do what, where, when, why and how" to ensure that the system is working properly. Operational procedures are also developed for relevant activities that are needed to ensure effective implementation and control of the processes and address safety, health and environmental concerns.

These resulting process descriptions and procedures can be documented and compiled through a series of manuals: the PSHEMS Manual contains the overview of the port and its PSHEMS (business process and brief process description); the Procedures Manual defines the flow of system and the operational activities (covering the process and the safety, health and environmental concerns) within the scope of the PSHEMS; and the Work Instructions (if needed) define the detailed how-to.

Phase 4: PSHEMS Implementation and Monitoring

One of the most important steps in the PSHEMS is the implementation of procedures and improvement programs. This phase includes defining the responsibilities and authorities of personnel affecting the PSHEMS. The objective of defining responsibilities and authorities in the PSHEMS is to ensure that everyone concerned with the implementation of the system knows what is expected of them. Responsibilities and authorities are defined including their interrelation at the organizational level and between personnel who manage, perform and verify work related to and affecting safety, health and environment.

Orientation of all personnel on their responsibilities, the procedures, their purpose and requirements, along with training to meet these requirements, has to be conducted. To provide the necessary knowledge and skills for implementation of the PSHEMS, procedures for identifying training needs and development of training plans should be put in place.

Developing a measurement and reporting system for the established PSHEMS enables the Port Authority or Operator to follow the progress of system implementation and assess its performance. Monitoring includes the progress on the implementation of the programs; the critical process parameters; the assessment of compliance to regulatory requirements; the system compliance with applicable codes and standards; and the performance with regard to achieving the defined objectives.

Phase 5: PSHEMS Internal Auditing

As part of this process, training may be needed in order to develop a core team of internal auditors who are capable of conducting an internal assessment of their PSHEMS. The internal audit team conducts an audit to verify that the developed PSHEMS is being properly implemented and is achieving the objectives defined by the organization. The result of the audit enables the ports to make adjustments and improvements on the system and to facilitate continual improvement of the PSHEMS.

Phase 6: Management Review and Continual Improvement

Management review is one of the key elements in implementing a PSHEMS. A management review is an activity conducted by top management to evaluate the continuing suitability, effectiveness and sustainability of the PSHEMS. The review includes evaluating the results of the internal audit, assessing opportunities for improvement and the need for changes to the PSHEMS, including policy, objectives and targets, based on continual improvement.

Key Factors in PSHEMS Development and Implementation

1. Top management commitment – this will play an important role in ensuring that the required support and resources to establish the system are provided, and this will motivate port personnel in developing and implementing the PSHEMS;

2. Leadership and membership on the project team is critical to the successful development and implementation of the integrated management system;

3. A thorough review of regulatory requirements, both international and national regulations, provides the ports with a clear indication of their level of compliance and results in knowledgeable updating of programs, procedures and practices; and

4. A participatory approach involving supervisory and technical personnel in identifying safety, health and environmental objectives, targets, and improvement programs, improves SHE consciousness among port personnel.

A detailed explanation on the Six Phases and the steps in the development of PSHEMS is discussed in Section 4 of this Guideline.

2.1 Terms and Definitions

Continual Improvement

A recurring process of enhancing the safety, health and environmental management system in order to achieve improvements in overall SHE performance consistent with the organization's port SHE policy. Note that the process need not take place in all areas of the port simultaneously.

This Code is based on the methodology of Plan-Do-Check-Act (PDCA), which entails continually improving the performance of the PSHEMS. PDCA can be briefly described as follows:

Plan: Establish the objectives and processes necessary to deliver results in accordance with the organization's safety, health and environmental policy;

Do: Implement the process;

Check: Monitor and measure processes against safety, health and environmental policy, objectives, targets, legal and other requirements, and report the results;

Act: Take actions to continually improve performance of the port safety, health and the environmental management system.

Documented System

A formal management system that is established and written to define the organizations goals and objectives, the processes and procedures; to ensure that processes are under control to achieve the desired result and meet agreed requirements. An undocumented system is a management system that exists by word of mouth and depends largely on supervision to ensure that practices are performed consistently.

Environment

Surroundings in which an organization operates, including air, water, land, natural resources, flora, fauna and humans, and their interrelations.

Hazard

A source or situation with a potential for harm, in terms of human injury or ill health, damage to property, damage to the workplace, and/or damage to the environment.

Health and Safety

Conditions and factors that affect the well-being of employees, temporary workers, contractor's personnel, visitors and any other person in the workplace.

Industrial Hygiene

The science of anticipating, recognizing, evaluating, and controlling workplace conditions that may cause workers' injury or illness.

Organization

The port authority or any company operating in a port, whose operation may have an effect on health and safety of the people, the environment, port installations, and cargoes, and which has agreed to implement the duties and responsibilities stipulated in the Code.

Process Approach

The systematic identification and management of the processes employed within an organization and particularly the interactions between such processes (**Figure 3**).

Port Area

The port area established by national legislation under the responsibility of a Port Authority.

Port Authority/Administration

The statutory organization legally responsible for ensuring safety, health and environment protection in the port.

Port Operator

A port operator is either the designated port authority or a company that contracts with the port authority to move, handle and store cargo passing through the port. They may be state-owned (particularly for port authorities) or privately-run.

Port Safety Health and Environmental Management (PSHEM) Code

A PEMSEA-certified document, which specifies the requirements for an effective port safety, health and environmental management system (PSHEMS).

Port Safety Health and Environmental Management System (PSHEMS)

A documented management system developed, implemented and maintained by the organization to achieve the objectives of the PSHEM Code.

Risk

The combination of the likelihood and consequence(s) of a specified hazardous event occurring.

Safety, Health and Environmental Objectives

Overall safety, health and environmental goals, consistent with the safety, health and environmental policy that the port authority or operator sets to achieve.

Safety, Health and Environmental Targets

Detailed performance requirements, applicable to the port, that arises from the safety, health and environmental objectives and that needs to be set and met in order to achieve those objectives.

3. Pre-PSHEMS Activities

3.1 Pre-planning

Management Commitment

As a first step, senior management needs to decide if it wants to establish a port safety, health and environmental management system. Continuation of the pre-planning process should only proceed if management is fully convinced that this is what the Port Authority or Operator needs, because "Without the full commitment of the top management, the system will not work."

Deciding the Scope

Once the decision has been taken to proceed with a PSHEMS, senior management determines the scope that the system will cover, in particular, which departments will be included. Examples of the scope include:

- Handling of dangerous cargoes
- Terminal operation and lease administration
- Port Governance

Generally, the scope depends on the type of operation the department is responsible for. Given the purpose of a PSHEMS, it is logical that every operation having the potential to cause harm to people, to the environment or to an installation is included.

If Quality Management is to be integrated in the system, there may be other departments or support processes such as marketing and administration that are included as well.

3.2 Pre-planning Team

Having identified the scope, a pre-planning team needs to be appointed. This team comprises a limited number of members. It is headed by a member of senior management and includes operational, financial and human resource management experience.

If another Management System is already in place, the "designated person" of that system should also be included.

At first, the Pre-planning Team establishes the following facts, based on the defined scope:

- Which of the steps in PSHEMS development and implementation can be undertaken by internal staff and which ones would require outside assistance?
- If outside assistance is required, what expertise is available and at what cost?
- Is a sufficient number of adequately trained staff available for setting up the PSHEMS Project Team and for carrying out the ISR?
- If not, what training is required and where can it be obtained and at what cost?

- How long will the training take?
- Based on the scope of the PSHEMS and the type of operation, how much time will be needed for conducting the ISR?

Based on the answers to these questions, the Pre-planning Team prepares a proposal to senior management, which should contain the required human and financial resources for the preparatory phase (separating internal and external resources), and the time schedule for the preparatory phase.

3.3 Management Decision to Establish a PSHEMS

The senior management of the port evaluates the proposal of the Pre-planning Team and performs the following steps:

- Define the objectives to be achieved by the PSHEMS;
- Establish the Port Safety, Health and Environmental Committee;
- Identify Required Resources;
- Establish the PSHEMS Project Team;
- Announce the Project Team;
- Provide resources and assistance to the Project Team; and
- Delineate actions to be taken by the Project Team.

Definition of the objectives to be achieved by the PSHEMS

Senior management defines the objectives to be achieved. These should include compliance with the PSHEM Code requirements, to prevent accidents and a better preparedness for and capability to respond to accidents.

PSHEM objectives should also include the provision of quality, safe and environmentally responsible services with reduced damages to cargo, and reduced operating costs through streamlined operations, better trained personnel, and reduction of equipment down-time through improved maintenance.

Identify Required Resources

Once the required actions are defined, it is necessary to:

- Identify the human resources (number and qualifications) that are required for each action and decide if these are sufficient or if external assistance is required, and available,
- Identify and budget for the financial resources required; and
- Set realistic target dates for each activity to be undertaken, taking into account that normal operations will have to continue without too much disturbance and disruption.

Establish the PSHEMS Project Team

The development and implementation of a PSHEMS is not a simple task and requires considerable time and resources, especially human resources. It is therefore necessary to appoint a Project Team with a Project Manager (could be the Management Representative or MR), who will have the overall authority and will be directly responsible to senior management for the success of the project. The team and the project manager should be officially appointed by senior management, should be provided with the necessary authority and resources, and should report directly to the Chief Executive of the Port Authority or Operator.

The tasks of the Project Team are to:

- Develop a detailed action plan, including a time schedule for the development and implementation of the PSHEMS, in accordance with the policy and guidance given by management;
- Initiate or directly undertake the actions required, in particular the development of the required procedures;
- Monitor the process of development and implementation; and
- Solve any problems that may have adverse consequences on the success of the project.

In appointing the members of the Project Team, management ensures that the right people with the right skills and experience are selected — as the success of the PSHEMS development and implementation process will depend on this.

The members of the Project Team should cover all relevant departments or sections and should have received appropriate training on the requirements of the PSHEM Code and of the structural and functional requirements of Management Systems, in particular of the PSHEMS.

It is important that the MR be part of the Project Team to ensure that he/she is fully familiar with the system upon completion of the project, as he/she will later be responsible for the maintenance and improvement of the PSHEMS.

It is also important that the members of the team are provided with clear guidelines as to the tasks they are expected to perform, the results expected and their responsibilities and authorities.

Management Representative (MR)

In appointing the Management Representative, senior management selects a person who has the appropriate knowledge of the requirements of the PSHEM Code and the PSHEMS, and who will provide a link between management and the departments and/or between the Port Authority and Operator.

The MR should always have direct access to senior management, and the responsibilities and authorities of the MR must be clearly defined, documented and made known to all parties concerned.

To be designated as the PSHEMS Project Manager, the MR should have experience in project management, good leadership and communication skills, knowledge about the requirements of the PSHEM Code and of the structural and functional requirements of Management Systems in general and of the PSHEMS in particular.

Announce the Project Team

In order for the Project Team to undertake its tasks effectively, it is necessary to advise all parties concerned (including all internal and external stakeholders) about the appointment of the MR and Project Team, including their tasks, responsibilities and authorities.

This should be done during an official meeting with all staff (several meetings, if necessary), during which the management should explain the decision to establish the PSHEMS, its aims and objectives, and the necessity for all staff to actively support and participate in the process.

This should be followed by an official circular letter to all staff, in which the appointment of the MR and Project Team and their tasks, responsibilities and authorities are clearly defined to avoid any possible unnecessary frictions.

Provide resources and assistance to the Project Team

In developing the PSHEMS, it is important that the Project Team is provided with expertise on all aspects of all operations and activities performed by a department, section or working unit. This can only be achieved through the active participation in PSHEMS development of personnel with the appropriate knowledge and experience of the operation or activity in question.

4. Implementing the PSHEMS

4.1 PLAN: Phase 1 - Initial Status Review (ISR)

Once the final decision has been taken to commence with establishing a PSHEMS, an ISR is carried out.

The ISR provides senior management with an analysis of how their operational procedures comply with relevant national and international rules, regulations, standards and practices, along with the requirements of the PSHEM Code and the sectors requiring improvements. This, in turn, allows senior management to define the objectives to be achieved by the PSHEMS.

The ISR is an initial gathering of information, which provides the baseline against which subsequent audits can measure improvements over time in relation to performance criteria. The ISR is therefore an important first step in the development and implementation of the PSHEMS.

ISR Objective

Assess safety, health and environmental risks in the port or company and define performances required to comply with the PSHEMS Code.

Minimum requirements of the ISR

During the ISR, the following facts should be established:

- Current administrative and operational practices in the port or operator, and their compliance with applicable national rules, regulations and standards and the PSHEM Code;
- Safety, health and environmental concerns emanating from the facilities situated within the port area or port operator's premises, and from operations and activities carried out in the port;
- Rules, regulations, standards, and administrative and operational procedures available nationally and internationally to reduce the risks to an acceptable level; and
- Consistency of applicable national rules, regulations and standards with applicable international rules, regulations and standards.

At the end of the ISR, the following should be available:

- ISR report that provides baseline data on current performance of the organization;
- Identification of hazard (hazards register); and
- Evaluation of present status on legal compliance (legal register).

Steps in conducting the ISR

There are four steps in conducting an ISR, as follows:

Step 1: ISR Planning
Step 2: Undertaking the review
Step 3: Reporting review results
Step 4: Follow-up action

Each of these steps comprises a number of tasks, explained in detail in the next section.

4.1.1 ISR Step 1: ISR Planning

Before the ISR is undertaken, it is essential to:

- Agree the scope of the review, in terms of the site areas and activities it will cover;
- Assemble the personnel who will be conducting the assessment, and appoint a team leader with overall responsibility;

- Plan a schedule and timetable for the review; and
- Allocate adequate resources for the review.

Setting up the ISR team

The ISR is usually coordinated by the appointed team leader, supported by a multi-disciplinary team of port personnel that is familiar with the site, processes, operations and activities under review. If in-house expertise to conduct a complete ISR is not adequate, it may be helpful to use consultants, particularly if the organization is seeking to implement a fully integrated PSHEMS. However, it is still important for an in-house team to do some preliminary work to gain an idea of the type of issues the organization is facing. This will give those responsible for hiring consultants a better idea of the kind of external assistance required. It is always important for an organization to set the goals to be achieved from a project, rather than allowing consultants to set the scope for their consultancy services, as this may be both costly and out of line with the objectives set by top management.

Personnel assigned to conduct the ISR should have some experience in relevant matters, including legislative requirements and hazard identification and risk assessment, and can provide qualified guidance and recommendations related to the outcome of the assessment. This will help provide a solid foundation for the implementation of the system, and in the long term may prove to be more cost-effective than using less-experienced personnel.

Before undertaking the review, it is necessary to develop a schedule or timetable of when designated areas/sites will be visited and assessed and when interviews with personnel will be undertaken. The schedule should seek to minimize disruption to the normal activities of the business. It is also important that subjects and sites are covered in a logical sequence, which should reduce the need to revisit areas for further information. A planned schedule will mean the assessment is conducted in the most efficient way and therefore will reduce costs.

Planning and Timetable of the ISR:

The time required for an ISR will depend on the size and complexity of the operations under review. An indicative estimate is four to six weeks from the start of the project to the production of the assessment report.

In conducting the ISR, preparatory activities ensure that the activity is conducted efficiently. Information, such as operational procedures, site plans, waste types, utility/commodity/resource use and permits, can be requested weeks before the actual ISR activity. These data serve as input to the development of a timetable and checklist for the ISR.

ISR uses the audit methodology, hence, the following information needs to be established:

- Schedule/timetable of activities;
- Locations/areas to be visited;
- When, where and with whom meetings are scheduled;
- Which team member will be involved; and
- Which activity, product or services are covered?

A sample preliminary checklist may include:

- Company policy
- Legal and regulatory requirements
- Existing management systems
- Operational information
  - Sites and buildings
  - Materials
  - Products and processes
  - Fuel , energy, water use
  - Waste and discharges
  - Transport and distribution
- Accidents, emergencies and past incidents and complaints

In summary, the following are the key steps in Planning ISR:

- Select the Team
- Define the Scope
- Define the Objectives
- Gather pre-review data
- Prepare the review time table
- Prepare the checklist

4.1.2 ISR Step 2: Conducting the Review

In conducting the review, there are six sub-steps, as follows:

- Data gathering
- Site assessment and interviews
- Systems assessment
- Legal compliance
- Process performance, accidents and incidents
- Identification of organizational hazards

Data gathering

Gathering relevant information is the key to the conduct of the ISR and this can be achieved by applying a variety of methods, including:

- Questionnaires to be completed by relevant personnel within the organization who have knowledge of the site and the activities.
- Checklist of the details that will need to be covered.
- Interviews with relevant personnel.
- Observations of the site and activities taking place.

Site assessment and interviews

After collating the information gathered from the questionnaires, the individual or team undertaking the ISR proceeds to the site to interview the personnel in each area being assessed. Interviews should not only be held with senior management but also with operational managers and personnel who carry out the activities being assessed, and who will have a good knowledge of the issues within their area of responsibility.

The time required for interviews will vary depending on the level of knowledge of the person being interviewed and their availability.

The site assessment should cover the following issues:

- Systems assessment against the PSHEM Code requirements;
- Status of the Port Operator's legal compliance;
- Present system/process performance, accidents and incidents; and
- Identification of hazards.

Systems assessment

In conducting the systems assessment, the ISR Team should follow the following steps:

- Divide the organization into different departments and operations (e.g., container yard, container freight station (CFS), maintenance area);
- Determine the applicable elements of the PSHEM Code per department/operation, e.g., for CFS – requirements relating to conduct of operation (handling of cargoes) and emergency preparedness and response;
- Conduct an assessment of requirements vs. existing system and procedures, e.g., for CFS assess cargo handling requirement vs. actual cargo handling system; and
- Prepare an assessment report for each department/operation specifying if applicable requirements are complied with or not.

Compliance to Legal and International Conventions

Identify the legal and other requirements applicable to the Port Authority's or Operator's processes and operations, determine the level of compliance and prepare a report specifying compliance.

Port Safety Audit Manual

To facilitate the assessment of the level of compliance of the port to international conventions/ recommendations, PEMSEA developed a two-volume Port Safety Audit Manual (2001). The team conducting the ISR can use Volume 2 of the Port Safety Audit Manual as the tool to assess the port's level of compliance to relevant international conventions and recommendations.

There are a number of international conventions and recommendations relating to safety, health and environment that the port should consider during the ISR. These may include:

- Awareness and Preparedness for Emergencies at Local Level (UNEP/IMO APELL);
- Code of Practice for the Safe Loading and Unloading of Bulk Carriers (BLU Code including BLU Manual);
- Guidance Concerning Chemical Safety in Port Areas;
- ILO Code of Practice: Safety and Health in Ports;
- International Management Code for the Safe Operation of Ships and for Pollution Prevention;
- International Convention for the Prevention of Pollution From Ships (MARPOL 73/78);
- International Convention on Oil Pollution Preparedness, Response and Cooperation (OPRC); 1990
- International Convention for the Safety of Life at Sea (SOLAS), consolidated edition, 2009;
- International Safety Management Code (ISM Code), Guidelines on Implementation of the ISM Code [2010 edition];
- International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004 (BWM 2004);
- Protocol on Preparedness, Response and Co-operation to Pollution Incidents by Hazardous and Noxious Substances, 2000 (OPRC-HNS 2000);
- Recommendation on the Safe Transport of Dangerous Goods; and
- The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes.

Other regulatory requirements may include:

- Site planning permits and restrictions;
- Permits to store and handle hazardous chemicals and substances;
- Trade effluent discharge permits; and
- Hazardous waste disposal permits.

There will also be other legal restrictions applying to port operation. All these need to be identified and listed as basis for preparing the Regulatory or Legal Register.

Any regulatory non-compliance should be noted and brought to the attention of top management for priority corrective action.

Process performance, accidents and incidents

As with the systems assessment, the assessment of process performance, accidents and incidents involves dividing the organization into different departments/operations (e.g.,management, maintenance, purchasing).

The desired performance targets for each department/operation should be established and agreed with the concerned department (e.g., for maintenance, 85% handling equipment machine availability and percentage of personnel with oil spill prevention training).

The rate of achievement of each department/operation should then be assessed against its performance targets (e.g., 79% handling equipment "machine availability" and 100% of personnel trained in oil spill prevention).

Evidence of past incidents or complaints can be a sign of underlying problems. They should be checked and records to be verified.

What to look for:

- Evidence of enquiries/complaints about breeches of relevant laws;
- Evidence of staff or community complaints;
- Evidence of whether they were investigated; and
- Indications of linkages to major problems.

Identification of organizational hazards

In identifying organizational hazards, the ISR Team lists the different operational activities per department or process (e.g., for CFS – receiving, stripping/unstuffing, releasing, stuffing).

Then, for each operational activity, the Team determines hazards (safety, health, environmental and quality) and prepares the ISR Hazards Register (**Figure 2**) (e.g., for stripping, possible hazards are contact with hazardous substances, damage to goods during stripping) and conducts an initial risk assessment for each hazard (to determine which of the identified concerns causes a significant safety, health and environmental problem). During the ISR, the risk assessment should only be a general evaluation and not a detailed assessment as defined in Section 4.2 of this Guide.

What to Look for:

- Pollution on land – Look for oil stains;
- Noise and nuisance – Look for noise monitoring records and sources of noise;
- Materials waste – Schedule of waste, disposal procedures;
- Air, Fuel, energy, waste water – Records of monitoring;
- Hazardous substance – Inventory of scheduled waste; and
- Chemical Spills – Procurement records, accident reports.

Figure 2. ISR Hazard Register.

Activity	Hazard	Hazardous Event	Consequences	Risk Level	Remarks

4.1.3 ISR Step 3: Reporting the Review Results

The main output of the ISR is a report that provides baseline data on the current performance of the organization. This report is compiled by the team leader with reference and checking by others who have taken part in the assessment. The report should consist of the following:

- An Executive Summary;
- Outline of the scope and objective of the ISR;
- Detailed ISR findings; and
- Collated materials (in appendices).

The Executive Summary should be designed to inform senior management on the overall status of the PSHEMS of the organization. It should summarize any major concerns identified (e.g., legal non-compliance, major complaints, performance problems), provide recommendations and specify the required commitment from the management, such as allocation of resources.

The detailed ISR findings should be designed to inform department managers of the status of the safety, health and environmental control of their department. This section should provide a detailed report per department on the status of compliance or non-compliance against the requirements of the PSHEM Code and other applicable standards, and recommend any proposed improvement programs for the department.

The appendices should contain a compilation of materials gathered during the ISR, including:

- Organizational charts;
- Management plans;
- Process flows;
- Process data;
- Performance records;
- Maintenance histories; and
- Feedback from interested parties.

4.1.4 ISR Step 4: Followup Action

Once the ISR is completed and reported, any areas of inadequacy identified can be improved through the followup PSHEMS strategic planning activities. However, any areas of serious concern identified by the ISR, such as legal non-compliance, require urgent action. Objectives should be set for immediate action on legal non-compliance issues and training given where necessary.

4.2 PLAN: Phase 2 - Strategic Planning

The objective of the strategic planning process is to establish an action plan for implementing the PSHEMS and the actions required to achieve the defined objectives on time and at a reasonable cost. The strategic planning is undertaken by senior management iassisted by the Management Representative and Project Team.

The foundation for the strategic planning process is the ISR results and the final objectives to be achieved.

Strategic Planning Objective

Achieve on time and at reasonable cost the implementation of the required performances in the port or company.

Minimum requirements for PSHEMS strategic planning

At the end of the Strategic Planning phase, the following should be available:

- Business Process;
- Hazard register and risk assessment;
- Existing controls assessment;
- Regulatory register; and
- Objectives, targets and improvement programs.

Steps in conducting strategic planning

There are six steps in undertaking the PSHEMS strategic planning, as follows:

Step 1: Develop the Business Process
Step 2: Conduct risk assessment
Step 3: Identify and establish regulations
Step 4: Set PSHEMS objectives
Step 5: Establish integrated management programs
Step 6: Allocate resources

Each of these steps comprises a number of tasks detailed below.

4.2.1 Business Process Development

Developing the PSHEM Business Process for inclusion in the PSHEMS is one of the most important activities in PSHEMS development, as it indicates the actual processes that will be considered in the different phases of PSHEMS development.

Steps in PSHEMS Business Process development

There are three steps in developing PSHEMS Business Processes, as follows:

Step 1: Process Identification
Step 2: Process Mapping
Step 3: Process Diagram

Each of these steps comprises a number of tasks, as follows:

Step 1: Process Identification

The development of the working PSHEMS starts with identifying the different processes that will be addressed by the PSHEMS. Examples of processes in a port context are:

- Vessel Berthing
- Dangerous goods handling
- Container yard operation
- CFS operation
- Administration
- Maintenance
- Purchasing
- Training
- Other processes conducted by the port

Step 2: Process Mapping

Process mapping involves arranging the identified processes in logical sequence and positions to define the flow of activities and the interrelations between the processes. In organizing the process map, the continual improvement cycle of Plan-Do-Check-Act (PDCA) should be used as the main process flow (**Figure 3**). For example:

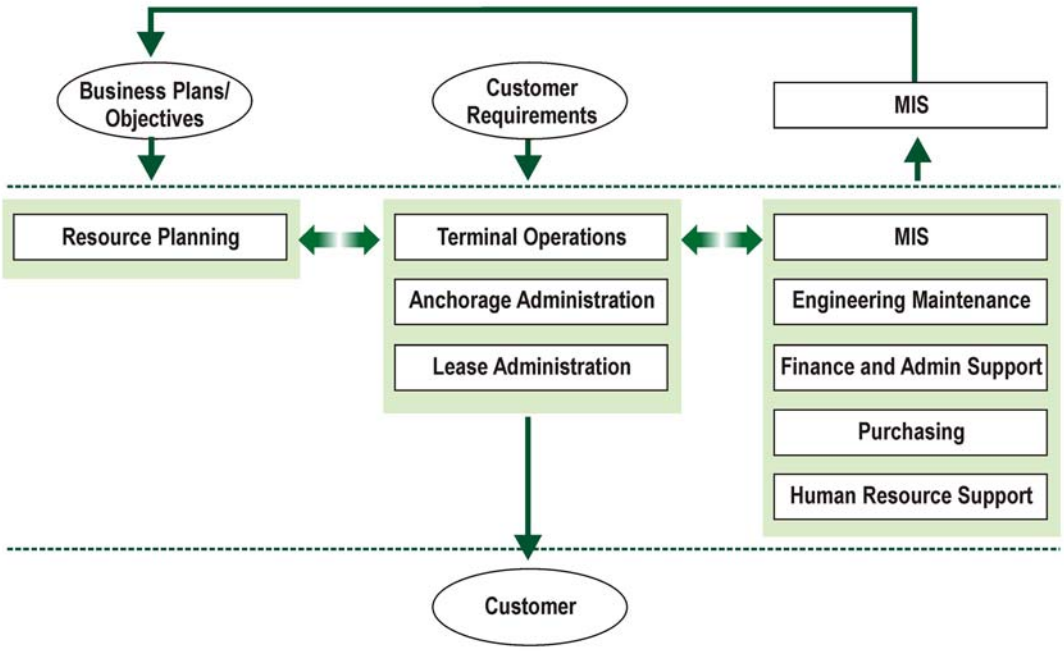
Plan: Business planning and budgeting (processes driven by organization's objectives)

Do: Container Yard operation, CFS operation, marine services, administration, maintenance, purchasing (processes driven by customer/stakeholder requirements with an ultimate output of product or service delivery to the customer/stakeholder)

Check: Performance and process monitoring, customer satisfaction assessment, internal audit

Act: Management review, corrective, preventive and improvement action

Figure 3. Typical port operation Business Process.



An overview of the Business Process should be presented in a Flow Diagram Model with a complete cycle, starting from receiving the customer/stakeholder's requirements to the delivery of products/ services to customers/stakeholders and handling of feedback to ensure achievement of the customer/ stakeholder's satisfaction.

Step 3: Process Diagram

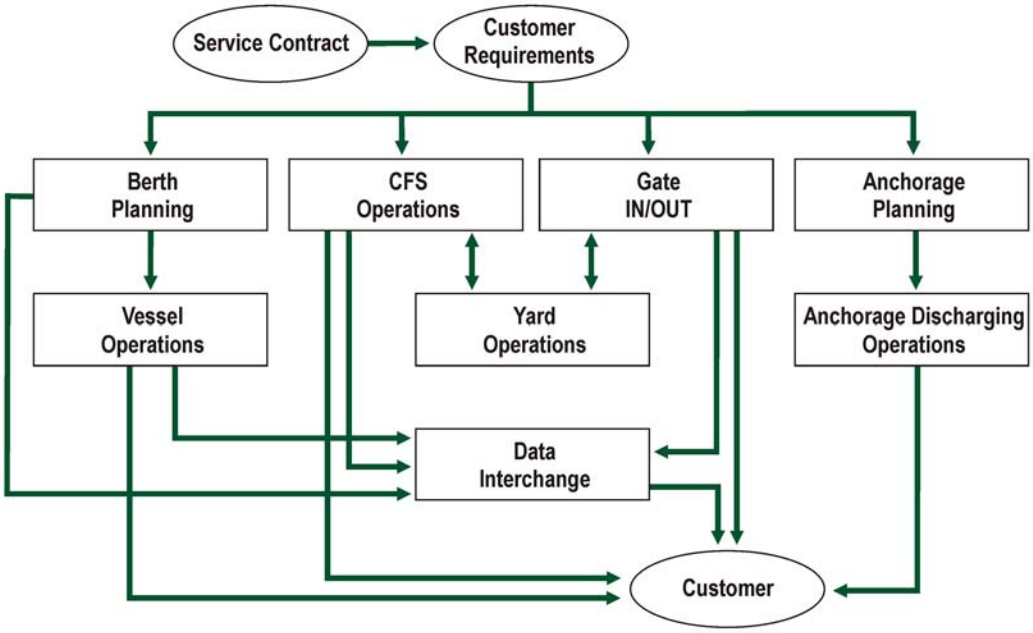
Once the block diagrams of the Business Process are ready, the Process Diagram needs to be prepared. The Process Diagram for each block identifies the specific sub-processes in the block and shows the inter-relation of the processes by converting the input to output (**Figure 4**).

For each process group or block in the Business Process, Process Diagram is developed in the same way as the Business Process. Each block consists of processes that need to be identified. The next step is to connect the processes and indicate the flow. There can be more than one input or more than one output.

4.2.2 Risk and Controls Assessment

Every activity carried out by a Port Authority or Operator has associated hazards and potential effects on employees, other people, the environment, property and to the port's business. Such hazards range from the office environment, where effects might relate to production of waste paper or energy use, to warehouse operations, where large quantities of hazardous goods are stored and handled.

Figure 4. Sample process diagram for Terminal and Anchorage Operations.



One of the fundamental aims of this step is to identify the range of possible effects of these hazards relative to the organizational activities. In addition, there needs to be a mechanism to identify and prioritize those which are most important. This will give a list of activities with significant hazards that basically tells the organization what it should be managing.

The first stage in risk assessment is to compile the register of activities and related hazards and collate available data relating to the potential consequences of these hazards (the Hazard Register produced during Phase 1 ISR should be used for this purpose).

The collection of data in the ISR phase provides baseline information from which the rest of the PSHEMS can be developed. However, the organization needs additional information to be able to facilitate a more detailed approach to risk assessment. Such information should be used to give a more comprehensive coverage of the possible effects and to demonstrate techniques to allow the determination of relative risk levels.

Concept of Risk and Controls Assessment

A risk-based approach to the evaluation of the health, safety and environmental effects considers:

- What is the probability of an adverse event?
- What are the consequences should the event occur?
- Are controls adequate to prevent the hazardous event from happening?
- Are controls adequate to lessen the impact or consequence of the hazardous event?

This approach has been very successfully applied in the field of health, safety and environment, not only to the major accident-type situation (fire or explosion), but also to minor events such as small leaks or spills. Hazard and Operability Studies (HAZOPs) and Failure Mode Effect Analysis (FMEA) are some of the several methodologies the Port Authority or Operator may consider in assessing the risk level.

Hazard Identification

The initial step in the risk assessment is to identify the hazards that may arise out of a material itself (e.g., because of toxicity) or as a result of a process (e.g., noise or equipment failure giving rise to an emission). The previously completed ISR should have identified these hazards and a register comprising of the organizational activities, related hazards and potential consequences should be available at this stage (see Section 4.1).

Risk Evaluation

In undertaking the risk assessment, the Project Team develops a risk matrix similar to the template in **Figure 5** in order to estimate the severity of harm and the probability of occurrence.

Each hazardous event per activity should be assessed using the template, or similar risk matrices (**Figure 6**). Per hazardous event, the Team estimates the severity of the consequence (per criteria, e.g., People, Asset, Environment, Image) and projects the result to the right side of the table to plot the probability. This will indicate the risk level. Note that during this assessment, existing controls are not considered.

Example:

Activity:	Handling of dangerous goods	
Hazard:	Hazardous goods (chemicals)	
Hazardous Event:	Direct contact with hazardous good (e.g. chemical splash)	
Consequence:	Recordable Injury	
Risk Level:	Worker:	C3
	Assets:	A1
	Environnent:	A1
	Image:	C2

The highest risk level among the criteria will be the overall risk level; in the above example: C3 for Worker. This means that this activity is considered medium risk.

Existing Controls Evaluation

If the risk level falls in the medium and high risk, existing controls should be assessed for adequacy to prevent the hazardous event from happening and/or reducing the level of consequence should the hazardous event happen (**Figure 7**).

Figure 5. Example of Criteria for Risk Assessment.

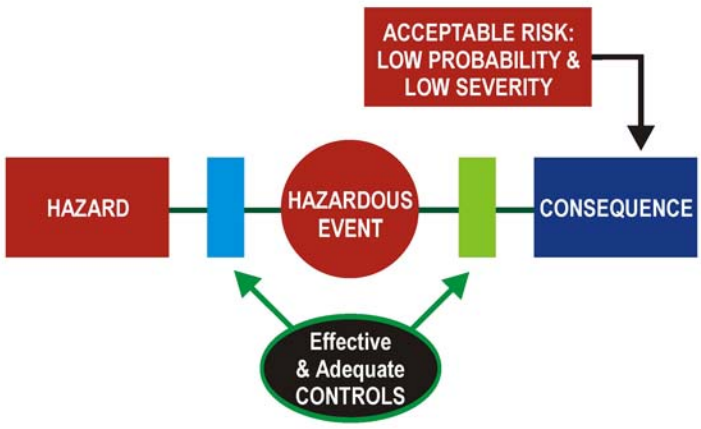
SEVERITY	WORKER	COMMUNITY	ASSET	ENVIRONMENT	PUBLIC IMAGE	PROBABILITY				
						HIGH 5	MOD. 4	MED. 3	LOW 2	VERY LOW 1
						SEVERAL OCCURRENCE AT SITE > ONCE IN 10 YRS.	ONE OCCURRENCE AT SITE ONCE IN 10 YRS.	INDUSTRY OCCURRENCE ONCE PER 10–100 YRS.	NEVER HEARD IN INDUSTRY ONCE PER 100–1000 YRS.	NEVER HEARD <100–1000 YRS.
E Catastrophic	Fatality, Permanent Disability	Fatality	Extensive Damage	Irreversible damage	International Coverage					
D High	Lost Work Day Injury	Med. Treatment	Major Damage	Reversible with human intervention 15 year recovery time	Nationwide Coverage					
C Medium	Recordable Case	First Aid	Local Damage	Reversible with human intervention 10 year recovery time	Local media attention					
B Low	First Aid	Nuisance	Minor Damage	Reversible with human intervention	Phoned-in Individual Complaints Community Level					
A None	No Injury	None	Slight Damage	Self-healing	None					

High Risk/Significance | Medium Risk/Significance | Low Risk

Figure 6. Hazard and Risk Register.

Activity	Hazard	Hazardous Event	Consequences	Risk Worker	Risk Assets	Risk Environment	Risk Image	Overall Rating	Remarks

Figure 7. Controls Assessment.



If existing controls are adequate, no further action is required. The information will only be included in the hazards register. If controls are not adequate, improvement programs should be established to lower the risk to acceptable levels (**Figure 8**).

Figure 8. Controls Evaluation Register.

Integrated Vision Statement for the Province	
Activity:	**Operation of Generator**
Hazard/Aspect:	**Emission of Noise**
Hazardous Event:	**Noise Pollution/Increase in Noise Level**
Risk Level:	**Medium**

Existing Controls Analysis	
Conditions that causes the situation	**Existing Prevention**
Generator is installed outdoor so noise dispersion is wide	**Administrative Controls:** • Use of signage to prevent work in the area
Possible Consequence	**Existing Response to lower the consequence**
Potential hearing loss	• Use of ear muff/ear plugs • Audiometric Examination is part of the Physical Examination

Existing Controls Assessment

Existing Prevention:
Present controls are not adequate to lower the noise level in the area.

Existing Response to lower the consequence:
Existing controls are adequate to lower the consequence to acceptable levels.

Recommendations:
1. Improving the muffler system of the generator to lower the noise being emitted.
2. Provision of enclosure to further reduce the noise level.

4.2.3 Establishment of Regulatory Register

Identifying and establishing regulations

The Port Authority or Operator should establish a procedure to identify legal and other requirements applicable to the Port Authority's or Operator's activities and services. Identification of these requirements can be done through regular consultation with international organizations and national and local regulatory agencies, checking government official gazettes for new or amended regulations and acquiring copies of regulations. The applicable legal and other requirements may include local and national regulations, international agreements, industry standards, codes of practice, organizational standards and agreement with public authorities.

A regulatory register data sheet should be prepared using the hazard register and copies of regulations as reference.

The Regulatory Register may contain the following:

- Legislative Issue – Regulated process/activities/product/service/aspect;
- List of applicable regulations and other requirements;
- Summary of regulatory requirements and organizational responsibility;
- Prohibitions and imposable sanctions;
- Permit and license requirements;
- Permit holder;
- Regulatory Authority; and
- Person responsible for compliance.

In addition to the recommended actions specified above, the Port Authority should formulate and adopt regulations to govern the ports under their control.

4.2.4 Policy Statement Development

Many Port Authority and Operators are committed to improving their performance through the introduction of new initiatives. These organizations should recognize that there is also a need to establish a culture through the formulation and implementation of a policy on the issue.

A policy acts as a guiding principle by which an organization determines its aims and objectives. A policy formally endorsed and adopted by the organization is a public declaration of its commitment to improve performance.

Communication Objective

Make all aware of the policy selected and the commitment of the Port Authority/ Company to ensure the success of the project.

Steps in the Development of the PSHEM Policy

There are eight steps in developing and implementing a PSHEM Policy, namely:

Step 1: Gaining commitment
Step 2: Consultation
Step 3: Inputs from Initial Status Review
Step 4: Formulating the policy
Step 5: Applying the policy principles in practice
Step 6: Communicating the policy
Step 7: Policy implementation
Step 8: Policy review

Each of these steps comprises a number of tasks, detailed below.

Step 1: Gaining commitment

To be effective, the policy requires the full support of the Port Authority's or Operator's chair, board of directors and senior management. It is only through the involvement of the most senior officers that an organization can demonstrate its commitment to improving performance.

The senior executive should take overall responsibility for allocating adequate resources and personnel to review the organization's activity and prepare the policy.

Step 2: Consultation

A primary task of the management is to communicate the organization's intentions to the staff and to gain their confidence and support. The organization's management representative or other suitable lead officer is responsible for ensuring that representatives from all levels of the organization are given an opportunity to contribute to the formulation of the policy. An organization will only be successful in the implementation of the policy if each department and staff member is involved in the process from the beginning.

As a way of demonstrating commitment to protect the local environment, the organization should also consider discussing the issues and concerns with the local community and other stakeholders who have an interest in the organization's activities.

Step 3: Inputs from the Initial Status Review

An important input to the development of the Policy is consideration of the findings of the ISR described in Section 4.1. The ISR report together with the consultation exercise will help to establish the principles, aims and objectives of the policy.

Step 4: Formulating the Policy

Port Governance Policy and Strategic Vision and Mission

The Port Authority develops and adopts a port governance policy as an expression of its overall intentions and direction with regard to port safety, health and environmental management. The port governance policy contains the rationale and reasons why the port should embark on a PSHEMS.

The port governance policy should also include the mandate to establish the PSHEMS as well as the roles and responsibilities and obligations of the Port Authorities and other stakeholders including Port Operators.

The policy should also define the supporting and monitoring processes in the implementation of the PSHEMS, including the need for the allocation of resources.

The Port Authority also develops a strategic vision and mission statement. The vision contains the long-term outcomes expected for the PSHEM implementation. It provides an indicator of how well the PSHEM is performing.

The Port Authority is responsible for implementing the actions to achieve the vision and implement the mission, as well as providing input to the formulation and modification of related policy and regulation. The mission contains the means by which the vision will be achieved, who will be involved, and their roles/responsibilities. The vision and mission is used to guide the Port Authority in the development, implementation, monitoring and continual improvement of the PSHEM.

Safety, Health and Environmental Management Policy Statement

A Port Operator's Safety, Health and Environmental Management policy statement reflects the nature of the organization's activities, and thus may vary from that adopted by other organizations. However, there are a number of general principles that the Port Operator should consider, as outlined below.

The policy should include:

- A statement of commitment towards satisfying the requirements of the PSHEM Code and other relevant regulations, standards and codes to which the organization subscribes;
- A statement geared towards addressing the main concerns identified during the ISR;
- A statement of commitment towards continually improving the performance of the PSHEMS; and
- A statement confirming the commitment of all personnel to adhere to the policy.

The policy statement should be seen as an integral part of the organization's business directives. In general terms, it should be organization-wide and strategic. The policy statement is often expressed in two parts:

- A general declaration of the organization's commitment; and
- A list of policy aims and objectives describing how improvements will be achieved.

The policy is normally a written statement outlining the overall policy, the reasons why it has been adopted, and what the expected results are.

A sample of an overall policy statement is given below.

Safety, Health and Environmental Management Policy Statement:

"The success of our port/company over time is seen as a continuous progress and depends essentially on the skills of our staff and the provision of a safe, environment-friendly, secure and efficient service to our clients.

In a growing competitive market, we must make every effort to prevent accidents, to protect the environment, and to provide a service to our clients that is reliable and of the highest quality.

As a member of XYZ Company, I make a personal commitment to this policy, which is vital for our future, and I count on your active participation and support."

Signed
Chief Executive Officer

However, writing such a statement alone is not enough. In matters of accident and pollution prevention, it is the commitment, competence, attitude and motivation of all individuals at all levels in the organization that determines the end result.

Therefore, it has to be stressed once again that in order to ensure that the PSHEMS will be successful, senior management must be fully convinced that a PSHEM Policy and PSHEMS is essential for the development and success of the organization, and their commitment and seriousness about the issue needs to be clearly communicated to all staff, as well as to clients and other external stakeholders.

Stated commitment by senior management must also be backed up with full material support for PSHEMS development, including provision of the necessary resources for its implementation. Accordingly, the following actions need to be taken by the management:

- Draft the Port Authority's or Operator's PSHEM Policy;
- Publicize and explain the policy to everyone involved, so that they understand the reasons behind it;
- Inform all employees of the importance of the PSHEMS, its contents, and the planned process of implementation (in the case of a Port Authority, all Port Operators also need to be informed);
- Explain to the employees (including in port operating companies) what effects the PSHEMS will likely have on their jobs and operations; and
- Solicit their support and understanding.

Step 5: Applying the policy principles in practice

After formulating the general policy, the organization defines the policy objectives to enable it to address its identified concerns.

Examples of policy objectives are listed below:

- *We will meet and, where possible, exceed the requirements of all applicable legislation and regulations.*

- *We will monitor air and water emissions and control them within statutory limits, or better, where this is technically and economically feasible.*

- *We will seek to minimize the use of hazardous substances and seek more environmentally sound alternatives/substitutes.*

- *We will minimize the disposal of waste to landfill sites and seek alternative methods which are less polluting and prevention-based.*

- *We will establish links with the regulatory authorities, local communities and industries to identify and implement the process and best practices.*

- *We will seek to conserve natural resources, including raw materials, water, fuel and energy, and introduce recycling schemes wherever practicable.*

- *We will identify and implement continuous improvement projects based on identified actual or potentially significant environmental impacts.*

- *We will provide training programs for all personnel to promote environmental awareness, specialist skills and regulatory compliance.*

- *We will maintain and update our environmental policies, objectives and targets to reflect any changes in our activities, products or services which may be reflected in changes of those aspects of our activities, which can change our environmental impacts or their significance.*

Such policy objectives should be fully considered in conducting the strategic planning activity of PSHEMS.

Step 6: Communicating the policy

The policy belongs to everyone in the organization, and represents a significant step in the development of the "continuous improvement culture" of the organization. It is important that the PSHEM Policy be made available to all members of the organization, as well as interested external parties (clients, regulators and other stakeholders). Senior management should inform all staff of the policy and how it relates to the implementation of the PSHEMS.

The policy can be communicated through newsletters and internal mail and should be prominently displayed in all work areas. Publicizing the policy can be done through direct communication with clients, regulators and other stakeholders, and in the annual report. This will help to ensure that interested external parties are aware of the commitment of the Port Authority or Operator.

Step 7: Policy implementation

Once the policy has been formulated and objectives established, the organization then decides how it intends to proceed towards implementation. This will necessitate a mechanism to ensure that organizational performance matches the aims and objectives in the policy — in other words the development and implementation of the PSHEMS. This includes:

- Developing the organizational structure;
- Identifying responsibilities; and
- Allocating resources.

The organization should prioritize policy implementation actions by initially concentrating on policy objectives relating to statutory legal compliance and key performance targets. Once policy objectives have been established to deal with these priorities, other policy objectives should then be implemented when time and resources permit.

Step 8: Policy review

The policy should be reviewed periodically to ensure that safety, security, health and environmental issues arising from new developments within the organization are incorporated in the policy. Changes to legislation may also trigger review of the policy. Review of the policy may be included during the conduct of the Management Review or as deemed necessary by top management.

4.2.5 Setting Objectives and Targets

Objective and targets play a key role in directing and assessing the PSHEMS and help to maintain a high standard of performance.

In setting objectives and targets, the organization refers to the policy. Objectives and targets should be realistic and not be over-ambitious. Whenever possible, the organization should quantify the level of improvement and specify a timescale for the improvement to be achieved.

The organization's objectives include safety, health, environment (especially those found to have medium and intolerable risk) and quality (desired output per process).

Objectives

An objective defines what is to be achieved in a particular area, for example, the organization may set an objective to reduce fuel consumption. Objectives should illustrate a commitment to improve the organization's performance. The improvement should also be continual and new objectives should be established as original objectives are met.

Targets

A target quantifies an objective. Setting it in terms of specific figures, for example, to reduce fuel consumption by 20% per container movement by the end of one year.

4.2.6 Establish Integrated Management Programs

Programs needed to achieve the defined objectives and targets should be established (**Figure 9**). Examples of programs are energy conservation, facilities improvement, waste minimization and provision of additional controls. In establishing programs the organization can consider the BATNEEC principle — *Best Available Technology Not Entailing Excessive Cost*.

An example of an integrated objective, target and program can be found in **Figure 9**.

Figure 9. Controls Evaluation Register.

Activity:	Container movements	
Hazardous event:	Use of fuel	
Consequences:	Potential depletion of resources	
Objective:	Reduce fuel consumption	
Target:	20% reduction in fuel consumption in one year	
Target date:	30 December 2012	
Program:	Computerization of container movements	
Actions:	**Time Line**	**Responsibility**
Design software	30 Oct 2012	J. Castro
Purchase hardware	15 Nov 2012	P. Caballero
Install hardware	6 Dec 2012	A. Calderon
Project complete	30 Dec 2012	

4.3 DO: Phase 3 - System Development

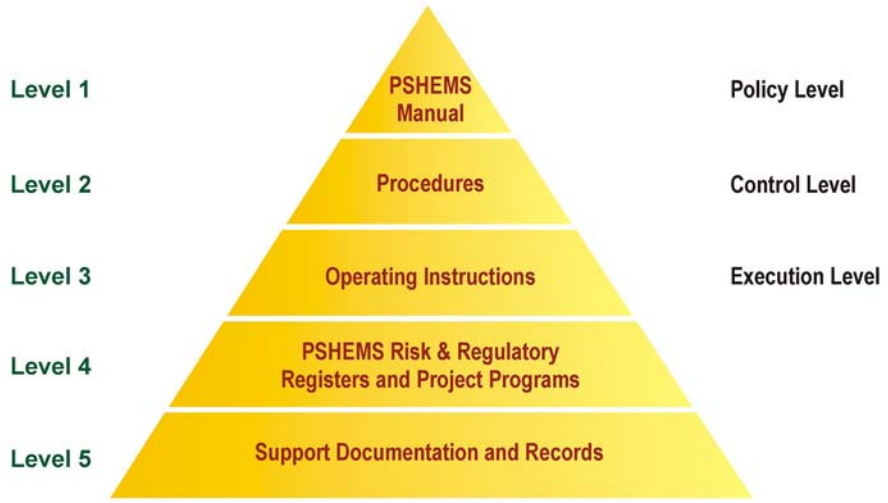
For organizations that already have established management systems in one form or another, PSHEMS can be integrated into the existing management system, such as ISO 9001 Quality Systems, or other systems that are in operation.

If an organization operates an ISO 9001, many of the procedures can be adopted to incorporate PSHEMS requirements. The document structure will most likely be compatible.

PSHEMS Documentation Structure

There is no set method for structuring PSHEMS documentation. Since there are many documents, the documentation should be structured in a way that is easy to use. Likewise, there is no specific manner on how documents are named in the structure. However, a common practice is to structure documents according to levels.

Figure 10. PSHEMS Documentation Structure.



Level 1 – PSHEMS Manual

The PSHEMS Manual represents the highest level in the hierarchy of documentation. The organization's policy and how the business components interact with each other to achieve the desired results of the management system are explained in this level.

The linkages to other documents within its document structure are identified here, and further details are explained in other levels. It also provides an overview of the organizational structure through mapping of the Business Process — describing how the PSHEMS is governed. Hence, it is similar to a directory for reference to other related PSHEMS information.

The PSHEMS Manual will describe how the management system is being implemented using the PDCA (Plan-Do-Check-Act) cycle. It will describe the necessary information for each part of the cycle.

The PSHEMS Manual should not be too lengthy or full of detailed information. It should serve as an easy reference for understanding the entire PSHEMS of an organization. Any detailed information required shall be linked to Level 2 documents.

Level 2 – Procedures

"Level 2 documentation" provides information on how PSHEMS is being executed. It provides a clear description on each process in the PSHEMS.

Level 2 documents describe the steps necessary to achieve the requirement being set by the PSHEMS Manual. Each procedure has its objective to be fulfilled and the personnel/group responsible to execute each step of the process. Each step shall be described to provide direction on how to link to other related procedures, instructions and documentation.

Level 3 – Work Instructions

Work instructions are documents that illustrate in detail how an activity or task is accomplished. They provide a clear step-by-step information on how a task needs to be executed and the personnel/ group responsible for the task. Basically, this is the level where port operation's specific activities will be described in detail.

Level 4 – PSHEMS Risk, Regulatory Registers and Project Programs

Documents that are active and need to be updated from time to time are placed in this level. They are the output of the PSHEMS process and need to be utilized for the implementation of the system.

These documents are:

- Hazard and Risk Assessment Registers – Current description of the hazards/aspects of activities, legal linkages, risk assessment, existing control measures, risk rating and risk category;
- Regulatory Register – Current description of the legal and other requirements applicable to port activities; and
- Management Programs – Current improvement programs resulting from the Risk Assessment and Policy.

Level 5 – Support Documentation and Records

Support documentation may be referred to as documents used to support the PSHEMS. These documents are generally referenced and categorized into internal and external documents.

Internal documents are the documents generated by the organization. These documents can be detailed guidelines or checklists.

External documents are the documents that are external to the port organization that are being used as reference (e.g., Industry Standards, Codes and reference books).

Records are generated as a result of implementation of PSHEMS. They serve as evidence to demonstrate conformance with PSHEMS and planned arrangements. They are used for analysis or future reference to ensure continual improvement of the PSHEMS.

4.3.1 PSHEMS Manual preparation

After identifying the quality, safety, health and environmental concerns and establishing the objectives, target and programs, the system can be developed and implemented as a single system. This requires starting the development of the integrated system by confirming the PSHEMS Business Process, and using the Business Process as the basis for developing the PSHEMS Manual.

The PSHEMS Manual provides the 'backbone' of the system, as it clearly describes the system and activities to ensure compliance of the organization's processes and operations with the PSHEM Code. Documentation in the Manual will also be the first point of reference in implementing and assessing the PSHEMS. The Manual is also a source of reference with respect to the implementation and maintenance of the system.

The PSHEMS Manual is a key document that describes the PSHEMS and provides direction to related documents.

The PSHEMS manual should consist of:

- Front cover – Mentioning the title of the manual;
- Control pages – indexing for all the contents and *"Document Control"* of the manual;
- Introduction to the Port/Port Authority or Operator;
- PSHEM Policy Statement;
- Organization for PSHEMS;
- Business Process (overall flowchart of the organization's process included in the scope of the PSHEMS);
- Process Diagrams (flowchart indicating subprocess/activities within a process in the Business Process, e.g., process diagram of Marine Services Process);
- Process Description (description of the Business Process and SHE management process);
- Responsibilities and authorities;
- Appendices – Documents to further enhance the PSHEMS;
- List or reference process/departmental Procedures Manuals; and
- List or reference process/departmental Working Instructions.

The appendices will serve as a database. They provide summary information on interaction of PSHEMS core elements and directions to related documents. The suggested contents include:

- Schedule of internally controlled documents;
- Schedule of externally controlled documents;

- Summary of Hazard and Risk register;
- Summary of Regulatory Register;
- Summary of Current PSHEMS program;
- Internal PSHEMS communication directory; and
- External PSHEMS communications directory.

Process Description

The Process Description consists of the Process Diagram (detailed flowchart of each one of the processes in the Business Process; see Section 4.2.1) and a narrative discussion of the activities of the process (see **Figure 4** example).

The Process Description (**Figure 11**) should describe the activities in each of the port's processes and discuss briefly the activities and the controls for the implementation of the PSHEMS in the said process. It should also discuss how the process is able to fulfill the relevant elements of the PSHEM Code, and ISO 9001, ISO 14001 and OHSAS 18001 (as necessary).

Figure 11. Process Description Terminal Operation.

The ABC-Corporate through the Business Development Office handles and maintains the service agreement entered with the shipping lines and other customers prior to it's regular transaction.

Terminal operations activities seek to ensure that all cargo handling requirements specified by the customer, safety, security, health, environmental, legal and other requirements are met. In order to achieve this, the organization shall:

- Plan and carry out its services under controlled conditions. These conditions shall include, as applicable:
  - The availability of information that describes the characteristics of the service;
  - The availability of work instructions, to ensure effective implementation of the PSHEMS;
  - The use of suitable equipment;
  - The availability and use of monitoring and measurement devices;
  - The implementation of monitoring and measurement; and
  - The implementation of release, delivery and post-release activities.
- Validate any service provision process where the resulting output cannot be verified by subsequent monitoring or measurement. This includes any process where deficiencies may only become apparent after the service has been delivered.
  - Validation activities must demonstrate the ability of these processes to achieve planned results. These validation activities will include, as applicable:
    - Defined criteria for the review and approval of the process
    - Approval of equipment and qualification of personnel

- Use of specific methods and procedures
- Requirements for records
- Revalidation

- *Note: the term cargo will apply to both cargo and/or containers, as applicable.*

- Determine the monitoring and measurement to be undertaken and the monitoring and measurement devices needed to provide the evidence of conformity of the service to determined requirements.

- Ensure that operational processes have been set up to ensure that these monitoring and measurement requirements can be carried out and are carried out in a manner that is consistent with the monitoring and measurement requirements.

- Ensure that where appropriate, cargo is properly identified by suitable means throughout the cargo handling process. Cargo status will only be identified with respect to monitoring and measurement requirements.

- Ensure that where traceability of services is a specified requirement, the organization controls and records the unique identification of the service rendered.

- Considering the fact that all cargo is customer supplied, ensure the implementation of control systems for handling all cargo (as well as other customer property). These control systems shall ensure that:

  - Due care is given to all customer property while it is under organization's control or being used by organization;
  - All customer property is properly identified, verified, protected and safeguarded;

- If any customer property is lost, damaged or otherwise found unsuitable for use, ensure that this is reported to the customer

- Ensure that all cargo is properly preserved (as defined by customer requirements and agreements) during internal handling and processing, as well as delivery to the customer. Preservation activities include identification, handling, packaging, storage and protection of the cargo and its constituent parts.

- Hold regular meetings among the Terminal Manager/Operations Managers, Shipping Line representatives, and concerned operations Section Heads to review perception of the quality of services rendered. In some cases, feedbacks and other concerms are discussed with the end view of improving operational quality to satisfy client requirements.

Berth Planning and Visit Creation

Berthing planning activities seek to ensure that the organization has the capability to meet the specified requirements stated by the shipping lines (or their specified representative). This activity includes the evaluation of berth upon receipt of application or notice of arrival for berth allocation. Operations should be informed of any change in information or schedule for berth planning update.

Based on the received berth application, vessel visit will be created in the Berth Control system. Vessel visit is essential in acceptance of export cargoes.

Vessel Operations

Vessel operations include all activities needed to ensure the proper docking, unloading, loading and undocking of vessels entering the port.

Vessel operations seek to ensure the appropriate control of all cargo entering and leaving the yard through the port.

All relevant vessel operations, such as discharge and loading planning are explained in more detail in the referred procedure.

During vessel operations, all delays and problems encountered are documented.

Gate In and Out

Gate In and Out activities seek to ensure the appropriate control of all cargo entering and leaving the yard through the gates.

Yard Operations

Yard operations seek to ensure that all cargo is properly identified and stored within the container yard. All cargo loading, movement and unloading activities within the yard also fall under this process.

CFS Operations

CFS operations seek to ensure that all required cargo receipt, stripping, storage, stuffing and delivery activities are properly conducted.

Data Interchange

Data interchange activities are conducted to ensure that all electronic data required by the customers are submitted according to previous arrangements.

Anchorage Berth Planning

This activity includes the evaluation of berth upon receipt of application or notice of arrival for berth allocation at the anchorage area.

Anchorage Discharging Operations

Anchorage discharging operations seeks to ensure that customer requirement regarding discharging of bulk or break-bulk cargo are met. This includes proper docking, undocking and unloading of cargo.

Responsibility

The Terminal Manager through the Operations Manager is responsible for ensuring that the policies and procedures stated in this section are properly implemented, executed and monitored.

Note on Process Description:

In describing the process, the organization should also ensure that statements pertaining to "how the Port Authority or Operator fulfils the requirements of relevant standards (e.g., PSHEM Code, ISO 9001, ISO 14001, OHSAS 18001) are included.

4.3.2 Procedures Development

To enable the organization's personnel to comply with the requirements of the PSHEM Code, system procedures are developed by the Project Team, for inclusion in the PSHEMS. These procedures explain in detail how the system should be managed and "who has to do what, where, when, why and how" to ensure that the system is working properly.

In addition to system procedures, operational procedures also need to be developed for all operations and activities of the organization, which may have safety, health or environment implications or which may contribute to the maintenance of the organization's PSHEM Policy. Operational procedures cover all levels, from senior management to operational staff that are involved in the activity to which the procedure relates.

Procedures Objective

Describe as clearly as possible all of the activities which contribute to the maintenance of the safety, health and environmental management policy of the port.

Steps in PSHEMS Procedures Development

The Project Team, with the assistance of each department, section or unit responsible for the activities requiring improvement, undertakes the following steps:

Step 1: Identify required PSHEMS procedures

The Phase 1 ISR and Phase 2 Strategic Planning should have identified the areas and aspects of the port operations and activities that require improvement to ensure compliance with relevant laws, standards and international conventions, the PSHEM Code and the organization's PSHEM Policy. These requirements should be addressed by developing "Systems" and "Operational" procedures.

"System procedures" define the continual improvement cycle (PDCA) that the organization should perform for the proper implementation of the PSHEMS. Examples are procedures for:

- Identifying the needs of customers and interested parties;
- Identifying safety and health hazard and environmental aspects;
- Health and safety risk assessment and risk minimization;
- Environmental aspects and impact assessment and impact minimization;
- Ensuring availability of up-to-date, applicable international and national rules, regulations, standards, documentation, plans, drawings and instruction manuals;
- Establishing PSHEMS responsibilities;

- Selecting and qualifying personnel;
- Establishing training needs, curricula and intervals;
- Internal and external communication;
- Document and data control;
- Preparing departmental procedures manuals/establishing operational controls (general procedures only);
- Emergency preparedness and response;
- Monitoring of compliance with the PSHEMS;
- Ensuring compliance with applicable international and national rules, regulations and standards;
- Measuring customer/stakeholder satisfaction;
- Inspecting and testing of equipment;
- Reporting non-compliance, accidents and near-misses;
- Investigating accidents;
- Treating customer/interested party complaints;
- Conducting PSHEMS audits;
- Taking corrective and preventive action;
- Record keeping;
- Annual management review; and
- Continual improvement of the PSHEMS.

"Operational procedures" should address and control the process activity and encompass controls for quality, safety, health and environmental concerns. Examples of operational procedures are as follows:

- Container stripping (unstuffing);
- Container stuffing procedure;
- Equipment maintenance procedure;
- Vessel berthing procedure; and
- Other procedures per specific department/section of the organization.

Step 2: Evaluate existing procedures and identify improvements needed

All existing systems and operational procedures and documents related to them are analyzed by the Project Team for relevance to and conformity with the intended PSHEMS and its aims and objectives.

For "System procedures," this is done by comparing the existing system procedures of the Port Authority or Operator with the system procedures required by the PSHEMS.

For "Operational procedures," this is done by comparing the actual performance of the operation and related available procedures with the requirements, guidance, recommendations and standards contained in national and international instruments for the execution of the task to be covered by the procedure. Operational procedures are geared towards controlling the process activities of the port, for example, the handling of dangerous goods.

Operational procedures should address and control the process activity and encompass controls for quality, safety, health and environmental concerns.

The PSHEMS Project Team, responsible for the specific operation to which the procedure will apply, should assess how the procedure can be applied to the operation to ensure that the requirements of the PSHEM Code are complied with, at the same time, try to optimize the operation.

Step 3: Draft additional procedures or revise existing procedures

Having identified what can be done to improve the operation, the Project Team either develops a new procedure, including instructions and forms and checklists to be used, or amends an existing one.

In preparing the procedures, the answer to the following questions should be evident:

Who?	–	The person responsible for the activity
What?	–	The activity or task to be performed
When?	–	The time when the procedure is applicable
Where?	–	The location of the activities
Why?	–	The purpose of the procedure
How?	–	The (method) steps in performing the task

It is a good practice to develop procedures in a process approach. In a procedure, there is the objective of the process. The process is basically explaining what is done. It shows the methods for performing defined activities using the PDCA cycle to achieve the objective of the process.

A sequential step-by-step approach is preferable and a flowchart should be used in preparing the procedures.

The procedure outline flowchart describes the main steps of the procedure and will serve as good reference for developing the procedure detail.

The procedure outline flowchart (**Figure 12**) is the procedure summary. It describes the sequential activities to be accomplished to achieve the overall procedure objective. It also defines responsibilities for achieving each step and provides reference to documentation and interfaces associated with each step.

The procedure is described in detail by expanding the procedure outline flow diagram. An explanation should be provided for steps in the flowchart (termed “Procedure details” and can be in text format). It clarifies the steps of the procedure flowchart in a more illustrative manner. By expanding the information content of the procedure summary, the user will have a clearer understanding of the procedure.

The level of detail should be sufficient for managers to control the overall process and carry out their own specific tasks, while achieving the objective consistently.

Figure 12. Procedure Outline.

Procedure details should be sufficient for staff involved in the process to understand their role and the roles of others, how they should interface with one another, what key tasks they are to perform and what documents they should refer to for detailed activities requiring work instructions.

Where additional details are required, additional work instructions or guidelines can be included as part of the departmental manual.

Every procedure should be developed using a standard format, which may consist of:

- Objective
- Scope
- Definitions
- Procedure Outline (Flow Diagram)
- Procedure Detail (Text)
- References
- Records

It is better for the Port Authority or Operator to identify the same headings for all procedures to ensure consistency.

It is a good practice to provide cross-references to related procedures, work instructions or other documents necessary to accomplish the procedure objective. This is to prevent overloading of the procedure, which may become too complicated for comprehension.

As each process will have records, the records generated should be listed to enable the user to note what type of records need to be produced. At the records headings, a list of the records necessary to demonstrate accomplishment of the objective and PSHEMS compliance can be included.

Step 4: Circulate improved procedure and remove obsolete procedures

If the Project Team evaluation reveals that an existing procedure, instruction, form or checklist is obsolete and has to be amended or replaced, the old documentation should be removed and destroyed.

Step 5: Implement the developed procedures

Once the procedures have been finalized, the Project Team submits them to the MR and Chief Executive of the Port Authority or Operator for approval. Upon receipt of the approval, the MR includes the procedure in the respective manual (Main Manual for common procedures and the appropriate Departmental Manual for operational procedures).

All persons affected by the procedures should be informed and instructed to apply the procedures. Where necessary, the appropriate training should be provided. What has been said above with regard to procedures and documentation for a Port Authority applies as well to every Port Operator, when setting up their own PSHEMS. However, in addition to looking into their own activities, Port Operators also should analyze the interfaces of their activities with those of the Port Authority to ensure that their procedures comply with the guidelines introduced by the Port Authority. Proper maintenance of the PSHEMS of the Port Authority and the Port Operator should be maintained..

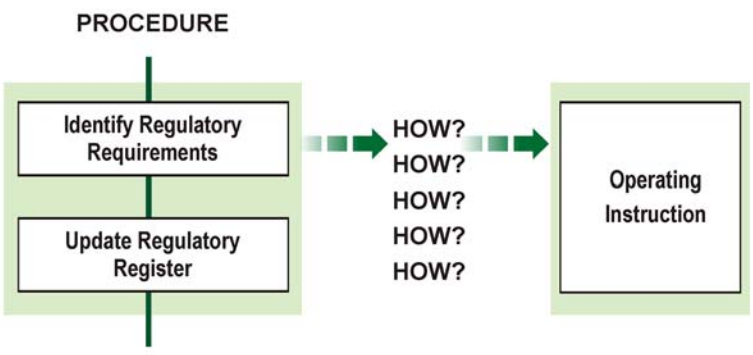
4.3.3 Work Instructions Development

Under the procedures development, the steps on how the process will flow are prepared. However, to avoid too much details, supporting documents, such as the work instructions, are referenced. A work instruction describes who does what in the steps, when the task will be done and how it will be done (**Figure 13**).

To establish the need for a work instruction, one way is to look at one or a small group of steps of a procedure and ask yourself “HOW do I accomplish this step?” If the answer is not clear, a work instruction to clarify the procedure may be needed.

Work instructions are not required where the Operator can demonstrate competence through training and/or experience. However, the need for the instruction may be determined by the need to use it as a basis for training.

Figure 13. Identifying Work Instruction.



A work instruction format needs to be descriptive and includes graphics for easy understanding.

In standardizing work instructions at all levels of the organization, it is advisable to use a format and approach that is understandable and can be communicated through all levels of users. Graphics can be very useful in the port industry wherein multi-nationalities are involved at times.

Generally, the content is similar to procedure, but is usually simplified.

4.3.4 Managing the Documented System

When documents start to be generated, there will be a need to start managing them. Documents include support documents and records. As mentioned earlier, there are different levels of documents. Thus, managing them in a structured way will ease documentation control.

The Internal documents that need to be managed are:

- PSHEMS Manual;
- Procedures;
- Supporting documents;
- Objectives and Programs;
- Legal registers; and
- Risk Assessment registers.

The External documents that need to be managed are:

- International Conventions and Protocols – e.g., SOLAS, MARPOL;
- National Laws and Regulations – e.g., Occupational Safety and Health Act, Fire Services Act, Port Authorities Act;
- The standards – e.g., PSHEM Code, ISO 9001, ISO 14001, OHSAS 18001;
- Code of practices – e.g., Code of Practices for Safe Entry of Confined Space; and
- Reference books.

Document Master List

To manage the documents, a Document Master List can be used. It provides all the necessary information on all the documents generated for the implementation of PSHEMS.

A document master list may contain:

- Document description;
- Document code/number;
- Issue/Revision date;
- Prepared/Checked/Approved by; and
- Distribution.

Document Control

As required by PSHEMS, relevant documents need to be controlled. Procedures should be established and maintained for controlling relevant PSHEMS documents.

In controlling the documents, they need to be:

- Retrievable – The documents can be readily retrievable anytime when needed;
- Reviewed, revised and approved for adequacy prior to use;
- Available with current revisions;
- Identified and labeled, especially obsolete documents for legal and/or knowledge preservation. Obsolete (when not in use) or outdated documents must be promptly removed to prevent from use;
- Legible;
- Dated to show the when they were prepared, checked and approved; and
- Clear on the changes that been made to the documents.

The following are considered as basic rules of document control to serve as a general guide.

Document title – All documents need to have a title for easy retrieval.

Document identification number – To ease the tracking of documents, all documents need to be coded in a way that anyone can basically know how many types of documents are there and how many there are within a classification (e.g., "IMS-P-CA-001" for Corrective Action Procedure).

Author – This is to indicate that the author is the originator of the document and authorized by him/her. It is also an indication of ownership.

Approval of person authorized to review and approve for adequacy – All documents need to be reviewed and approved for adequacy prior to use. This allows the document to be vetted and approved by higher or competent personnel in the department or function.

Date of approval and implementation – This requires all documents to indicate the effectivity date for the process.

Current revision – Since there will be updating by the author, it is important to allow users to know which revision is being applied. As a guide, obsolete documents are to be identified to prevent from inadvertent use. The current revision will be reflected in the Document Master List to indicate the latest revision being used for the PSHEMS, e.g., Revision 0 should be the starting number, followed by 1, 2, when updated.

Page number and number of pages – As it implies, all documents need to be identified through pagination. Since documents may be numerous, by numbering the document's pages, it will be easy to access the content inside the documents and one can identify if there are missing pages.

4.4 DO and CHECK: Phase 4 - Implementation and Monitoring

4.4.1 Responsibilities and Authorities and Resources

To implement and maintain a successful PSHEMS, it is important that everyone knows what is expected of them and the organization, with respect to ensuring port safety, health and environment protection. The roles, responsibilities and authorities of all staff under the PSHEMS should be clearly defined.

Roles, Responsibilities and Authorities Objective

Describe as clearly as possible all of the activities which contribute to the maintenance of the safety, health and environmental management policy of the port.

The respective responsibilities and authorities of the Port Authority and the Port Operator, and the interrelation between them in this respect, should be clearly defined.

The Port Authority should ensure that the functional links between the Port Authority and the Port Operator are clear. This can be done delineating respective regulations in the port by-laws, incorporating clear stipulations in the Port Operator's operating contracts or operating permits and providing policy and technical guidance to the companies.

Steps in defining responsibility and authority

There are five steps in defining staff PSHEMS responsibilities and authorities, as follows:

Step 1: Define responsibilities and authorities at organizational level
Step 2: Define responsibilities and authorities at staff level
Step 3: Document the defined responsibilities and authorities
Step 4: Allocate and provide adequate resources

Each of these steps comprises a number of tasks, as follows:

Step 1: Define responsibilities and authorities at the organizational level

The PSHEMS Project Team undertakes the following actions in order to define responsibilities and authorities at the organizational level:

- Establish the organizational structure of the Port Authority or Operator, including the number and names of departments and sections;
- Define the functions and activities in each department and section; and

- Define the responsibilities and authorities of the management, department heads and section heads, taking into account the legal setup of the Port Authority or Operator and the legal requirements.

This is normally done by preparing an organizational chart and written description of the organizational structure.

Step 2: Define responsibilities and authorities at the staff level

The PSHEMS Project Team undertakes the following actions in order to define responsibilities and authorities at the staff level:

- Establish who manages, performs and verifies work related to and affecting safety, health and environment protection;
- Decide how far responsibilities and authorities shall be delegated down the line; and
- Assign PSHEMS responsibilities and authorities to each staff member.

An example for the first case is that if a Port Operator is responsible for ensuring that only containers with a valid Container Safety Convention (CSC) plate are being loaded on board a ship, they should have the authority to reject the handling of a container without a valid plate. This should be supported by a regulation in the port by-laws.

An example for the second case is that if a stevedore foreman is responsible for ensuring the safety of personnel during loading and unloading, he should have the authority to stop the loading or unloading of the cargo if the cargo gear appears to be inadequate.

Delegation of responsibilities and authorities is normally effected through the individual job descriptions of staff, by stating what the responsibilities are, to whom the individual reports to, who reports to him/her, and what authorities have been vested in him/her.

Step 3: Document the responsibilities and authorities

The PSHEM Code requires that all organizational and staff responsibilities and authorities and the interrelation between them are documented in the PSHEMS Manual, with separate sections for the organizational- and staff-levels.

At the organizational level, the responsibilities and authorities of a department also should be included in the departmental PSHEMS Manual, again in a separate section.

For staff-level responsibilities and authorities, in addition to being stipulated in individual staff job descriptions, they should also be covered by the procedures and instructions to be developed for each of the organization's processes and operations.

The roles, responsibilities and authorities of personnel necessary to ensure effective implementation of the PSHEMS are defined in **Table 1**, and should be communicated to the individuals concerned through their job descriptions.

Table 1. PSHEMS Responsibilities.

Responsibility	Person Responsible
Establish overall direction	Board, President, Chief Executive Officer (CEO), Port Authority General Manager
Develop the PSHEM policy	President, CEO, Management Representative (MR), Port Authority General Manager
Develop PSHEMS objectives, targets and programs	Relevant managers
Monitor overall PSHEMS performance	Management Representative
Ensure regulatory compliance	Senior operating manager
Ensure continual improvement	All managers
Identify customer's expectations	Sales and marketing staff
Identify supplier's expectations	Sales and marketing staff
Develop and maintain accounting procedures	Purchasers, buyers
Comply with defined procedures	All staff
Response to safety/environmental incidents/accidents	MR/designated response team

Step 4: Allocate and provide adequate resources

The success of the PSHEMS depends on the implementation of the improvement program. Such programs can only be implemented when there are adequate resources allocated. Human resources, specialized skills, technology and financial resources are essential for the implementation and control of the management system.

Top management should establish a permanent unit for safety, health and environment for the port. A director or manager should be nominated as the head of the unit and be responsible for environment, safety and health at the management level.

4.4.2 Training

The employment of skilled personnel and providing recurrent training for personnel is a prerequisite for the efficient and safe execution of all activities carried out in a port. To develop and implement a well-functioning PSHEMS, additional training of all personnel involved is essential.

Training Objective

Develop and improve the skills of personnel with regard to the application of the port safety, health and environmental management policy and implementation of the PSHEMS.

The minimum requirements for any training effort are:

- Procedure for identification of training needs;
- Procedure for provision of training;
- Procedure for training records and evaluation of training effectiveness; and
- Training plan.

There are six steps in developing and providing PSHEMS training, as follows:

Step 1: Train the MR and Project Team
Step 2: Provide mechanisms and means for disseminating knowledge about the system
Step 3: Provide training for PSHEMS development and implementation
Step 4: Conduct training needs assessment
Step 5: Provision of training: General Awareness and Specific Skills Training
Step 6: Assess training effectiveness

Each of these steps comprises a number of tasks, as follows:

Step 1: Train the MR and Project Team

The training of the MR and Project Team members should be started before the commencement of PSHEMS development.

Step 2: Provide mechanisms and means for disseminating knowledge about the system

The understanding of staff — through thorough information dissemination about the requirements the PSHEM Code and the PSHEMS, the effects that the implementation of the PSHEMS will have on their daily work and the progress that has been made during the implementation phase — is of utmost importance for the success of the project, and in itself forms part of the overall training effort.

Regular staff meetings, circular letters, meetings of the MR with department and section heads and work units are the best ways of communicating. The PSHEMS Project Team should also be used for disseminating information on the actual situation and the progress achieved.

Step 3: Provide training for PSHEMS development and implementation

The training to be provided should be divided into system training and operational training.

System training

This is the familiarization of personnel with the system requirements of the PSHEMS. This training should be provided to all personnel that will manage the documented PSHEMS. These personnel are normally the department and section heads, unit foremen and the members of the PSHEMS Project Team. This depends entirely on the organizational setup of the Port Authority or Operator.

Operational training

During the initial and also the subsequent assessment of the PSHEMS procedures to be developed or amended, the Project Team should establish if the personnel involved in a particular procedure are adequately qualified and trained for the task to be performed, or if there is a need for further training to ensure that the new or amended procedures can be performed properly.

In providing the training, the organization should have a training strategy. When developing a training strategy, the organization needs to consider:

- What should be taught?;
- To whom the training should be given?; and
- What level of competence is needed.

Step 4: Conduct training needs assessment

One of the most important steps in developing a training strategy is to identify the training needs of the workforce. This should be done by assessing the existing knowledge and level of competence and determining the areas for further development (**Table 2**). Staff whose work involves minimal impacts may only need basic awareness training and understanding the organization's PSHEM policy, objectives, improvement programs and management system.

For those involved in the operational activities, the assessment should be able to determine the skills required to perform relevant tasks in a competent manner.

The output of the training needs assessment is a comprehensive training plan defining the required training modules that employees should attend in order to attain the general understanding of the PSHEMS, as well as the specific skills needed to perform their particular responsibilities relevant to the PSHEMS.

Table 2. PSHEMS Training Requirements.

Type of training	Audience	Purpose
Raising awareness of the strategic importance of safety, health and environmental management	Senior management	To gain commitment and alignment to the organization's PSHEM policy
Raising general safety, health and environmental awareness	All employees and stakeholders (e.g. the community, companies and people working for or on-behalf of the port)	To gain commitment to the PSHEM policy, objectives and targets of the organization; and instill a sense of individual responsibility
Skills enhancement	Employees with safety, health and environmental responsibilities	To improve performance in specific areas of the organization, e.g. operations, research an development, and engineering
Compliance	Employees whose actions can affect compliance	To ensure regulatory and internal requirements for training are met

Step 5: Provision of training

The training methods should ensure that staff attain the required levels of competence for their particular responsibilities. There are a number of training methods that an organization can use (**Table 3**).

Table 3. Training Methods.

Type of training	Audience
Induction courses	Familiarization with the PSHEMS, policy, and Improvement programs (for new staff)
In-house training	Introduce staff to policies, programs and new working methods
Workshop and discussion	Can be used to establish a forum for discussion or to provide teams with detailed information on a particular topic. Trainees are encouraged to participate by providing feedback on the subjects.
Lectures and seminars	Formal training methods relating to specific responsibilities and technical skills. Used to ensure high level of competence in a specialised area.
Demonstration and case studies	Useful for illustrating operational procedure and assessing consequences of incorrect practices.
External training	Used for certification courses such as Lead Auditor Certification

Step 6: Assessment of training

Training is a very important part in the implementation of the PSHEMS. The purpose of training assessment is to ensure that appropriate levels of competence have been achieved. Methods of assessment can include written tests, appraisal, interviews and group discussion. There is also a need to assess the effectiveness of training by looking at the improvement in the organization's performance. The overall training strategy should also be periodically reviewed to ensure that new issues related to the implementation of the PSHEMS are considered and addressed.

4.4.3 Communication

Procedures should be established, implemented and maintained for:

- Communicating information on the PSHEMS to achieve improved safety, health and environmental awareness and understanding;
- Disseminating the vision, mission, objective and targets;
- Communicating the potential benefits of implementation of, and/or consequences of non-implementation of the PSHEMS;
- Facilitating the continual improvement of the PSHEMS;

- Enhancing Port Operators' and stakeholders' willingness to share resources for program implementation;
- Assessing feedback and satisfaction level of stakeholders, including complaints and suggestions; and
- Verifying corrective and preventive actions are being implemented to address problems encountered in the implementation of the PSHEMS.

Internal communications are communications between and among the different sections of the Port Authority. Methods of internal communication can include meetings, bulletin board postings, internal newsletters, suggestion boxes, websites and email.

Communication with external parties is an important and effective tool for PSHEMS implementation. External parties include: the Port Operators, the companies, organizations located in the port and visitors to the port.

The Port Authority should encourage feedback and communication from stakeholders as a means of involving them. The Port Authority should establish, implement and maintain procedures for receiving, documenting and responding to relevant communication from external parties.

The participation of Port Operators and stakeholders is a key contribution to the successful implementation of the PSHEMS.

The Port Authority should establish a process and mechanisms to improve:

- Port Operator and stakeholder commitments to safety, health and environment;
- Coordination and cooperation;
- Partnerships; and
- Port Operators' and stakeholders' ownership of established policies and programs.

Advocacy and communication activities should also be implemented at various levels to gain commitment, support and involvement of Port Operator and stakeholders. Advocacy and communication activities can include:

- Consultations, briefings, workshops and other meetings;
- Notice boards;
- Use of mass media, e.g., newspapers, journals, magazine, audiovisual and electronic media (email/websites);
- Survey and suggestion schemes;
- Training; and
- Tecognition, awarding and incentives;

In order to determine the effectiveness of its Port Operator and stakeholder awareness and participation program, the Port Authority needs to identify the measurement requirements for

assessing the perception and behavioral changes among stakeholders. This information can be acquired through:

- A survey of opinion of Port Operator and stakeholders towards the PSHEMS and safety, health and environmental program activities, outputs and outcomes; or
- An assessment of individual and collective performances and their contribution to the safety, health and environmental programs.

The Port Authority should also establish procedures for evaluating and reporting the benefits and impacts of PSHEMS implementation. In evaluating the benefits of the PSHEMS, the Port Authority should consider the compliance/performance indicators, the conduct of external audits and the measurement of progress of the PSHEMS and the safety, health and environmental programs.

4.4.4 Implementation of PSHEMS Procedures and Improvement Programs

One of the most important steps in the PSHEMS is the actual implementation of the PSHEMS procedures and improvement program. In implementing the procedures and improvement program, it is important that all personnel that it applies to:

- Are aware of its existence;
- Understand its purpose;
- Are familiar with its requirements; and
- Have received adequate training to allow them to meet its requirements.

It is important that the personnel who have to implement the procedures have a strong commitment and feeling of ownership, achieved by consultation and use of their input. Encouraging them to participate in the preparation of procedures will greatly increase the success of implementation.

Another way towards successful implementation is the piloting of procedures. Piloting a procedure seeks a peer review, allowing any problems or difficulties to be remedied, resulting in a more tightly-defined and more workable procedure. Piloting can also be used to test interfacing procedures to ensure compatibility.

The underlying basis of implementation is process operational control; this is fundamental to the success of the PSHEMS. Process operational control can be achieved through the implementation of defined procedures. The main concern of the implementation of procedures and programs is the management of risk and resources.

The success of implementation also depends on the effectiveness of actions carried out prior to the implementation phase, especially the defining responsibility, training and documentation phases.

4.4.5 PSHEMS Monitoring, Measuring and Reporting

Monitoring, Measuring and Reporting Objective

Enable the Port Authority or Company to follow the project and to act when the situation requires this.

Minimum Requirement for PSHEMS Measuring and Reporting

As a minimum, the following elements should be measured and reported under the PSHEMS measuring and reporting system.

- Progress of the implementation of improvement programs;
- Critical process parameters;
- Performance indices;
- Compliance with legal and statutory requirements; and
- System compliance to applicable codes and standards.

Monitoring Items Under PSHEMS Monitoring, Measuring and Reporting System

Monitoring 1: Progress of the implementation of improvement programs

To enable management and the Project Team to monitor the progress made in the development and implementation of the PSHEMS, and to be able to react when difficulties, that may delay the project are encountered, a proper monitoring and reporting system should be introduced. This is normally done by setting up regular meetings, a project plan and a timetable with milestones and deadlines.

The Project Team should periodically submit a progress report to management regarding the status of the PSHEM improvement programs.

The progress report should compare the planned schedule against the actual status of the programs and define the necessary actions and resources required when schedules are not met.

Summary of actions:

- Prepare a detailed project plan including milestones, deliverables and deadlines.
- Advise the Project Team members what deliverables (e.g., assessments, procedures) are expected of them and when.
- Establish a timetable of project meetings to monitor progress.
- Establish a project monitoring and reporting system, for which the team leader is directly responsible.

- Identify deviations and their causes.
- Take appropriate corrective action as required, in order to meet the deadlines, or as a last resort, amend the timetable, advising management well in advance and the reasons why this was done.

Monitoring 2: Critical process parameters

Critical process parameters should be monitored to ensure that each operation is performed in a controlled manner. These can include operational parameters, such as machine pressure, temperature and oil level, and process discharges such as effluents, emissions to air and noise.

The main concept of monitoring is check and balance, achieved through the following:

- **Specification**: A means by which the input to an operation may be predetermined or set, e.g., concentration of emission.
- **Calibration**: A means by which the operational environment may be set or controlled with respect to a reference standard, e.g., standard weights, gas analyzers, effluent analyzers.
- **Checking**: A means by which simple evaluation may be made of any given function, e.g., visually observing work practices for handling of cargoes.
- **Monitoring**: Determining the status of a specific activity at any given point in time, e.g., noise levels.
- **Sampling**: Taking a representative sample of any product, by-product, effluent, emission or media into which such may be discharged, e.g., air quality, groundwater or contaminated land.
- **Inspection**: A means by which a representative sample may be examined to determine conformance to a set standard.
- **Verification**: Final inspection and testing at the end of the activity.

Monitoring 3: Performance Objectives and Targets

Process outputs are normally expressed as Objectives and Targets. Examples are:

- Container movements per year/month;
- Accident/incident occurrence rate;
- Fuel/energy saved per month/year; and
- Amount of waste generated.

Objectives and targets are the means to measure the effectiveness of the implementation of the improvement programs towards achievement of the organization's objectives and policy.

Monitoring 4: Compliance with legal and statutory requirements

One of the main objectives of implementing the PSHEMS is to ensure compliance with applicable legislation. Legal compliance is a minimum performance requirement not only for certification but also for organizational existence.

Monitoring for legal compliance requires assessing organizational performance against all relevant legislation, government permits and other regulatory requirements, and relies to a large extent on all of the other monitoring programs, including critical process parameters, such as effluents, emissions to air and noise .

Monitoring 5: System compliance to applicable codes and standards

System compliance to applicable codes and standards can be measured by conducting internal and external audits to assess and compare the organizational practices and activities against the requirements of the applicable standards. The audit is also used to assess the effectiveness of the management system in achieving the policy and objectives.

The audit team should prepare an audit program detailing the objective and scope of the audit, the schedule, area to be audited, identity of auditors and their designation in the audit team.

The actual audit can be conducted through a series of interviews, visual observation of operations and activities, and document checking and comparing the result of the audit to the applicable standard and established procedure.

The results of the audit should be documented in an audit report that includes the auditors' assessment of the degree of compliance with the applicable standards and any areas in need of improvement.

Monitoring 6: Improvement actions

When improvement actions are implemented to address non-compliance, it is also necessary to implement monitoring of the effectiveness of the improvement actions.

Control of Measuring and Monitoring Devices

Measuring and monitoring devices used to demonstrate compliance of the operation with the PSHEM Code and/or legal or regulatory requirements need to be controlled, calibrated and maintained and properly handled and stored. The methods used by the Port Authority or Operator to achieve the above have to cover:

- Calibration and adjustment of measuring and monitoring devices at specific intervals or prior to use;
- Identification of measuring and monitoring devices with suitable indicators or approved identification record to show the status of the calibration;
- Determination of the method for calibration;
- Recording the results of calibration;
- Ensuring that environmental conditions are suitable for calibrations, measurements, inspections and tests;
- Safeguarding the devices from adjustments that would invalidate the calibration; and
- Assessment of the validity of previous inspections and test results when a device is found to be out of calibration and taking the appropriate actions.

4.5 CHECK: Phase 5 - PSHEMS Audit

To verify that the developed PSHEMS has been properly implemented and is achieving the defined objectives, an implementation audit, covering all departments/sections/work places and procedures, has to be conducted.

The basis for this audit will be the PSHEMS, including the procedures developed by the Project Team and approved by the Chief Executive of the Port Authority or Operator. This can be done by either using internal auditors trained in auditing Management Systems or external auditors.

The audits may reveal certain areas that require further adjustments to be made before the system is fully operational.

Audit Objective

Prove that the system implemented by the Port Authority or Company will satisfy the requirements of the PSHEMS Code, ISO 9001, ISO 14001 and OHSAS 18001.

PSHEMS Audit Process

A PSHEMS audit has four stages:

Initiation phase	–	the scope and objectives are determined.
Audit Planning Phase	–	the audit plan is prepared.
Audit Data Collection and Review	–	audit evidence is collected.
Audit Report Phase	–	the findings of the audit are documented.

Initiation Stage

In initiating the audit, the audit team should:

- Define the audit objectives;
- Define the audit scope;
- Identify resources to be committed to meet the scope;
- Review documentation for adequacy.

Defining Audit Objectives:

The audit should be based on clearly defined and documented objectives. The objectives of the audit should define what is to be achieved as the output of the audit.

Audit Objectives should include: “to determine conformance of the PSHEMS with the PSHEMS audit criteria.”

Defining Audit Scope and Criteria:

The scope should be defined and documented. The Scope defines the extent of the physical, organizational or process boundaries of the audit.

For example:

"The audit will concentrate on handling of dangerous goods activities and the operational control requirements of PSHEMS."

The audit criteria used for the PSHEMS Audit are the PSHEM Code, the regulatory and other requirements, the procedures and work instructions. Other standards like ISO 9001, ISO 14001, and OHSAS 18001 can also be included to the audit criteria.

The auditor should audit the PSHEMS against the PSHEM Code, and the planned arrangements laid down in the procedures.

Identifying Resources to be committed to cover the scope:

There are two components that determine the resources required. A common methodology is the use of 'man-days'. The man-days requirement is normally dependant on the physical scope and the extent of processes within this scope.

For example:

The audit that covers all process in Terminal Operations, "Freezone" Area and Marine Services requires six man days for audit. If two auditors are deployed, the entire audit will take three days to complete.

Review of Documents for Adequacy:

The purpose of the document review is to:

- Check the adequacy of the documentation to meet the requirements of the PSHEM Code and any other requirement the organization subscribes to, e.g., ISO 9001, ISO 14001, OHSAS 18001 and any other audit criteria;
- Familiarize the auditor with the system or any changes; and
- Form a basis for preparing the audit plan.

Further, the following should be taken into consideration:

- The audit must be based on clearly defined and documented objectives;
- The objectives define what is to be achieved as the output of the audit; and
- For a PSHEMS audit for example, objectives will include: "to determine conformance of the auditee's PSHEMS with the PSHEMS audit criteria."

Planning Stage

Having established the audit scope and objectives, an appropriate audit team needs to be selected, the audit plan produced and distributed and the working documents needed during the audit assembled.

The audit plan should contain:

- Audit objectives and scope;
- Audit criteria;
- Identification of organization and functions to be audited;
- Elements of the PSHEMS of high priority;
- Reference to audit procedures;
- Identification of reference documents;
- Time and duration of audit activities;
- Dates and locations of audit;
- Identification of audit team members;
- Schedule of meetings to be held with auditee management; and
- Confidentiality requirements.

Data Collection and Review

In collecting audit evidence, the following should be observed:

- Collect sufficient audit evidence to verify if the PSHEMS conforms to PSHEMS audit criteria;
- Collect evidence through interview, examination of documents and records, observation of activities and conditions; and
- Record indications of non-conformity to criteria.

Audit Reporting

The audit report should consist of:

- A summary of findings, including the number of NCR's raised, their significance in terms of the overall performance of the PSHEMS and any major issues requiring urgent corrective action or preventive action to avoid potential problems;
- Copies of the NCR forms raised; and
- For internal audits, the report may include observations and suggested approaches to improving the PSHEMS. These should be on attached sheets if required.

4.6 ACT: Phase 6 - Management Review and Improvement

The overall responsibility for reviewing and improving the PSHEMS rests with senior management, with the day-to-day responsibility delegated to the designated MR.

It is also the obligation of every employee of the Port Authority or Operator to do his/her utmost to fulfill the requirements of the PSHEM Code through implementing the PSHEMS, by complying with the procedures established and also monitoring the effectiveness of the procedures, as well as providing feedback for improvements.

An important element of review and improvement is to recognize good performance and achievement of PSHEMS objectives and standards.

Minimum Requirements of PSHEMS Management Review and Improvement

At the review and improvement phase:

- Senior management should conduct a Management Review; and
- Records of Management Review should be maintained.

Elements of PSHEMS Management Review

Schedule of Management Review

Senior management should prepare a Management Review schedule. The frequency of the review should be at least once a year and should be attended by all senior management. Preferably, a management review should be conducted after performing an internal audit.

Agenda of Management Review

The management review should cover (but is not limited to) the following:

- Result of Internal Audit;
- Evaluation of compliance with legal and other requirements;
- Communication from interested parties including complaints;
- Environmental performance of the organization;
- Review of objective and targets;
- Status of corrective and preventive actions;
- Improvements to PSHEM Policy;
- Changing circumstances; and
- Recommendations for improvement.

Record of Management Review

The result of the Management Review should be documented, preferably in a Minutes of Meeting. These records should be properly maintained by the MR.

Maintenance and Improvement

The agreed decisions and recommendations for improvement should be initiated and implemented by relevant department or sections of the organization to ensure that the PSHEMS is continually improved. The progress of the implementation of decisions and recommended improvements should be monitored by the MR and regularly reported to the top management.

5. Considerations in PSHEMS Development

Timeframe for developing and implementing a PSHEMS

The time required to develop a PSHEMS will vary considerably between Port Authority and Operator and is influenced by many factors including:

- Commitment of the management;
- Size and type of the organization;
- Type and variety of operations and their current compliance with the requirements of the PSHEM Code;
- Number of people employed;
- Availability of other management systems and corresponding procedures;
- Familiarity of personnel with management systems and procedures;
- Availability of trained personnel;
- Resources (personnel, funds and equipment) available for development and implementation; and
- Use of outside expertise.

When starting from zero (i.e., with no existing systems) with reasonable resources available internally and limited assistance from outside, a period of 18 to 24 months may be realistic until the system is up and running, and ready for recognition.

This period may be reduced to about 9 to 12 months, if the management is fully committed, more resources are made available, if other management systems and procedures are already in place, and the personnel are familiar with these systems and procedures. The use of outside expertise may also reduce the time required to develop the system, but the implementation process requires at least a period of six months.

Implementation costs

The costs for implementing a PSHEMS will vary considerably, depending on the number of personnel involved in the development of the PSHEMS, the cost structure in the country, and the tasks given to outside consultants.

When budgeting, time spent by the Project Team on assessment and development, office space and equipment needed, such as computers, printers, and consumables (e.g., paper for the documentation) as well as eventual changes required in the existing Information Technology (IT) systems, need to be considered.

If the Port Authority or Operator intends to get the system recognized, this should be budgeted for as well. The costs will depend on the contract negotiations between the Port Authority or Operator and the recognition body, and will include a larger amount for the initial audit and a lesser amount for periodic, surveillance audits and verification of compliance.

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