SAFETY MANAGEMENT SYSTEM ASSESSMENT CRITERIA

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This paper describes the safety management system assessment criteria which will be used to assess the information in safety reports relating to Annex III of European Directive 96/82/EC. An operator's safety management system forms only one part of a wider set of management arrangements, reflecting the management philosophy and safety culture of the organisation. The HSE model is used as a template. The paper describes the model and explains how it underpins the assessment criteria.

Key words: Safety Reports, Major Hazards, MAPP, Safety Management Systems

INTRODUCTION

This paper describes how HSE developed the criteria to be used to assess the Major Accident Prevention Policy (MAPP) and the safety management systems (SMS) in safety reports submitted under the Control of Industrial Major Accident Hazards Regulations (COMAH). The criteria did not evolve from a blank sheet of paper but reflect previous HSE experience both in the major hazards sector and under other legislative regimes.

In COMAH the MAPP is the statement of management intent with respect to major accident prevention. This is equivalent to a major hazard version of the health and safety policy which is a *general* requirement under Section 2(3) of the 1974 Health and Safety at Work Act 1974. The Safety Management System (SMS) is the vehicle for delivery and therefore broadly equivalent to the requirement to make arrangements for securing health and safety under Regulation 4 of the Management of Health and Safety at Work Regulations 1992 (MHSWR). The 2 components are complementary: the MAPP provides the strategic thrust behind the requirement to prevent major accident hazards; the SMS provides the framework to implement it.

HISTORIC REQUIREMENTS

The duty to provide management information to describe or demonstrate the adequacy of controls is not novel. Under the 1984 Control of Industrial Major Accident Hazards Regulations (CIMAH), the 'entry level' requirement in Regulation 4 requires all sites subject to CIMAH, not just the top tier ones, to be able to provide evidence for 'Demonstration of safe operation'. CIMAH also required manufacturers to provide certain information in a safety report relating to the management system for controlling the industrial activity. The matters were set out in Schedule 6 to the Regulations and included:

The **staffing** arrangements for controlling the industrial activity;
The arrangements for the **safe operation** of the activity including design, construction, testing, operation, inspection and maintenance;
The arrangements for **training.**

HSE published guidance on what to include under each of the 3 headings, first in 1985 and then in revised form in 1990 (HSE, 1990). This predated the publication of HSE's own guidance entitled 'Successful Health and Safety Management' in 1991 (updated 1997) and usually known more familiarly by its Series number: *HS(G)65* (HSE, 1997).

HSE GUIDANCE ON SUCCESSFUL HEALTH AND SAFETY MANAGEMENT

HS(G)65 conveys a simple message: organisations need to manage health and safety with the same degree of expertise and to the same standards as other core business activities if they are to control risks effectively and prevent harm to people. The guidance is not mandatory and is conceived as a general model for all sectors of work activity, not just major hazards. It draws on the evidence which HSE has gathered about what 'works' in companies who demonstrate they can achieve high standards of health and safety performance.

In HS(G)65, the key elements of successful health and safety management can be broken down into 5 separate stages (see Fig 1) which can be summarised by the acronym POPMAR:

POLICY: Effective health and safety policies set a clear direction for the organisation to follow and contribute to business performance

ORGANISING: An effective management structure and arrangements are in place for delivering the policy. There are structures and systems to:

establish and maintain management **control**
promote **cooperation** between staff to make health and safety a collaborative effort
ensure **communication** of necessary information throughout the organisation
secure the **competence** of employees

PLANNING: There is a planned and systematic approach to implementing the health and safety policy through an effective health and safety management system which both controls risks and reacts to changing demands.

MEASURING PERFORMANCE: Performance is measured against agreed standards to reveal when and where improvement is needed in two ways: **active** systems which monitor the achievement of plans and the extent of compliance with standards and **reactive** systems which monitor accidents ill health and incidents

AUDITING AND REVIEWING PERFORMANCE: The organisation learns from all relevant experience and applies the lessons through both auditing and review of performance.

The approach bears obvious comparison with other models for planning and decision making. In particular, it incorporates feedback loops to improve performance and emphasises the

importance of quality assurance *within* a management process rather than quality control at the end. Many organisations only react to accidents and ill health ('defects') once they have occurred *(the quality control approach). But if the 'output' is risk control, then the process has* to be properly assured. This can be achieved by designing and implementing an effective proactive health and safety management system. HSE does not promote the POPMAR model as the only way to manage health and safety. *Organisations can manage safety in whatever ways they choose and the model provides only a guide.*

CIMAH did not deal explicitly with 2 elements in the POPMAR model: policy and auditing. MSHWR aligns more closely with the HS(G)65 headings and it is possible for manufacturers to read across from existing requirements under CIMAH to the elements of sound management and to provide a structure for setting out the management information in safety reports. Examples of some of the main links are shown in Table 1.

Table 1: Links between HS(G)65 and CIMAH

HSG65	CIMAH
Policy	Not specifically treated
Organising Control Competence Cooperation Communication	 staffing and reporting arrangements training systems securing contributions from all staff up to date information, communication of operating procedures
Planning and implementing	Hazard analysis and risk assessment safe operating procedures application of human factors control of contractors
Measuring	Arrangements for inspection, test and maintenance Quality assurance Checking working methods Investigating accidents and near misses
Audit	Not specifically mentioned, but requirement to ensure the adequacy of the management structure and to audit design
Review	Correcting deficiencies Keeping senior management informed

EXPERIENCE IN OTHER SECTORS

HSE inspectors assess management arrangements in all sectors of industry. Similar approaches exist elsewhere. In the nuclear industry, licensees have to produce and maintain adequate safety cases. In the railway, gas and offshore sectors, operators have to submit safety cases requiring formal acceptance by HSE. These require demonstrations of suitable management arrangements to control risks. In the relevant HSE guidance for offshore safety (HSE 1992), it states:

> *'The requirement is...to demonstrate the adequacy of the system, and not to show in detail how compliance with all relevant requirements is to be ensured"*

Use of the model by HSE inspectors has revealed what successful organisations can achieve. The 1997 edition of HS(G)65 contains a 3 component model illustrating three targets for management effort in controlling risks: These are shown in Fig 2.

Workplace precautions protect people at the point of risk: They include physical equipment such as guards on machines or relief valves on pressure systems and 'software' such as instructions or systems of work.

Risk Control Systems (RCS) produce the appropriate workplace precautions. Organisations need to have a range of RCS which are appropriate to the hazards arising from their activities and which are sufficient to cover all hazards. This means that each organisation has to build up a profile of the risks to which its employees and others may be exposed. The design, reliability and complexity of each RCS needs to be proportionate to the hazards and risks inherent in the operation. For major hazards, typical RCS include control of contractors, permits to work, maintenance, plant and process change and operating procedures.

Management arrangements are necessary to organise, plan, control and monitor the design and implementation of the RCS.

Together, these 3 components can be assembled into a single 'picture' of a health and safety management system to form a framework for planning and auditing.

LINKING THE MODEL WITH THE REQUIREMENTS UNDER COMAH

When the team looked at the requirements under Annex III of the Directive for the MAPP and the SMS, the primary objective was to avoid reinventing the wheel. This accumulated experience could be used to make explicit links between the new requirements in Annex III and the management model in HSG65 (Table 2).

Table 2: Links between Annex III and HS(G)65

ANNEX III (ref to para in brackets)	HS(G)65 ELEMENT
MAPP (a)	Policy
SMS (b)	*POPMAR*
Organisation and personnel (c)(i):	control
Roles and responsibilities (c)(i)	control
Training (c)(i)	competence
Involvement of employees (c)(i)	cooperation
Identification and evaluation of major hazards (c)(ii)	planning and implementing
Operational control (c)(iii)	risk control system for safe operation, including control and communication
Management of change (c)(iv)	risk control system
Planning for emergencies (c)(v)	risk control system

Monitoring performance (c)(vi)	active and reactive monitoring
Audit and review (c)(vii)	audit and review

The 'fit' between COMAH and HSG65 is not perfect but it is very close. The requirements for a MAPP and for auditing address the omissions from CIMAH. Communication is not mentioned specifically under 'Organising' but is implicit under the other headings as a means of establishing and maintaining control. There are 3 ***sets*** of risk control systems specified under COMAH for operational control, management of change and planning for emergencies. These are shown in Fig 3 in a modified 'COMAH version' of the 3 component model:

For each criterion included, an explanation was given about why it needed to be there by referring back to the Directive and explaining why individual criteria added value. Some examples of evidence which would satisfy the requirement were also given. 29 separate criteria were identified including the following example:

CONTROL

Criterion: The safety report should show that the responsibilities of everyone involved in the management of major hazards have been clearly defined.

Reason: Unless responsibilities have been clearly defined the operator will be unable to implement the MAPP. Employees and other people involved need to know who is responsible for each aspect of managing the major accident hazards.

Examples of evidence:

Reference to job descriptions or other documents in which responsibilities for the control of major accident hazards are explicitly allocated to line managers.

Descriptions of the responsibilities allocated to key managers and post holders at all levels depending on the management structure of the organisation.

Appropriate references to the way in which the operator has set out how particular jobs should be done eg by using performance standards.

A full list of the criteria is shown in the Annex.

CHALLENGES

The main challenge faced by the team was to agree that the model was appropriate for COMAH requirements and from there to develop a set of workable and robust criteria. It was important for the users to be able to recognise what is required, what evidence might satisfy the criteria and what constitutes an acceptable standard of performance.

The team interpreted 'demonstration' in the following way. Whereas CIMAH required a safety report to contain descriptions (and manufacturers could usually satisfy this requirement by describing a set of outcomes) COMAH requires an explanation of the *process* for

delivering specific outcomes. This is equivalent to the difference between 'proof' (which could be an outcome) and 'evidence leading to proof' (a process description which produces the desired outcome).

ASSESSMENT

The purpose of assessment of the MAPP and the SMS is to answer 5 questions:

1. Does the safety report contain a MAPP?
2. Does the information in the safety report demonstrate that there is a SMS for implementing the MAPP?
3. Does the information provided in the safety report as a whole demonstrate that the MAPP and the rest of the SMS have been out into effect?
4. Does the information demonstrate that all necessary measures have been taken to prevent major accidents and to limit their consequences for people and the environment?
5. Has the assessment revealed any serious deficiencies in the measures taken for the prevention and mitigation of major accidents?

The approach to the MAPP and the SMS will be the same as for all the other elements in the safety report. The safety report describes a series of outcomes which are themselves determined or influenced by the SMS. This includes the technical descriptions and predictive elements. The SMS will be assessed as a whole, not as a series of isolated parts.

'SERIOUSLY DEFICIENT'

The following circumstances might arise:

1. the MAPP is seriously deficient or absent
2. the management arrangements are seriously deficient or absent
3. a single element of the SMS or a RCS is seriously deficient or absent
4. there are a number of elements in the SMS or RCS which, taken in isolation, are not seriously deficient, but when viewed as a whole, render the whole SMS seriously deficient
5. there are a number of elements in the SMS or RCS which, in total, are not seriously deficient, but when evaluated together with technical and/or predictive shortcomings, render the report seriously deficient.

CONCLUSIONS

The safety management system assessment criteria closely parallel the elements of sound health and safety management practice set out in HSE's own guidance. However, operators are free to use other management models to suit their own particular situations.

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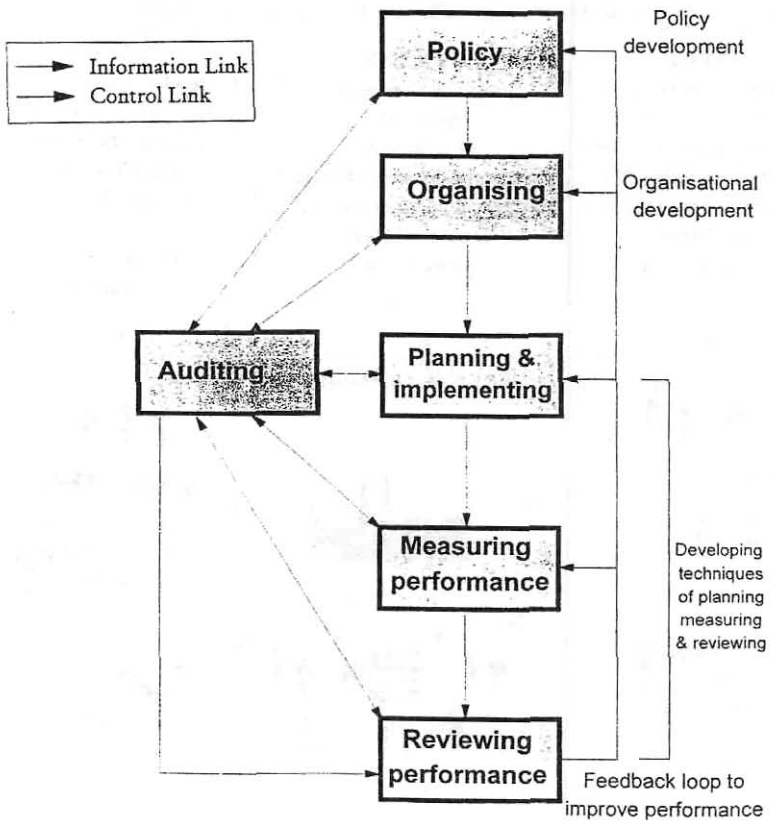
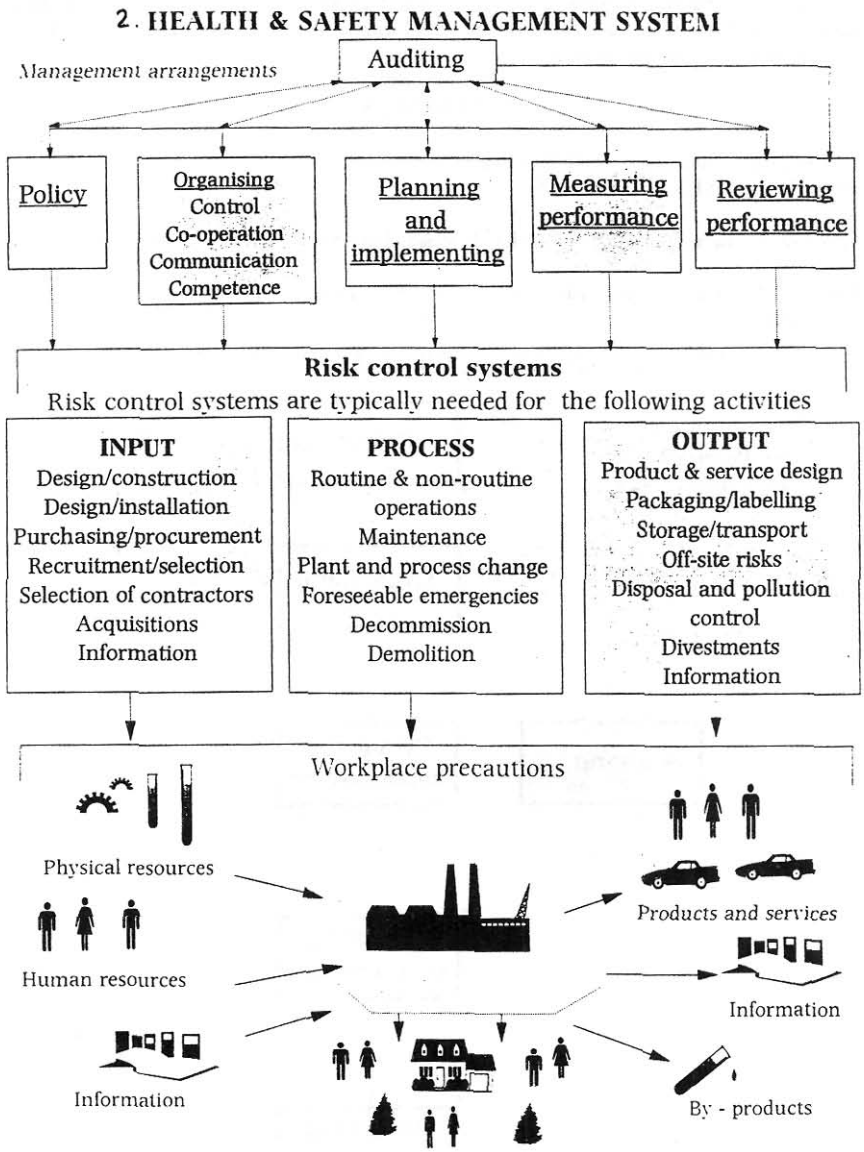
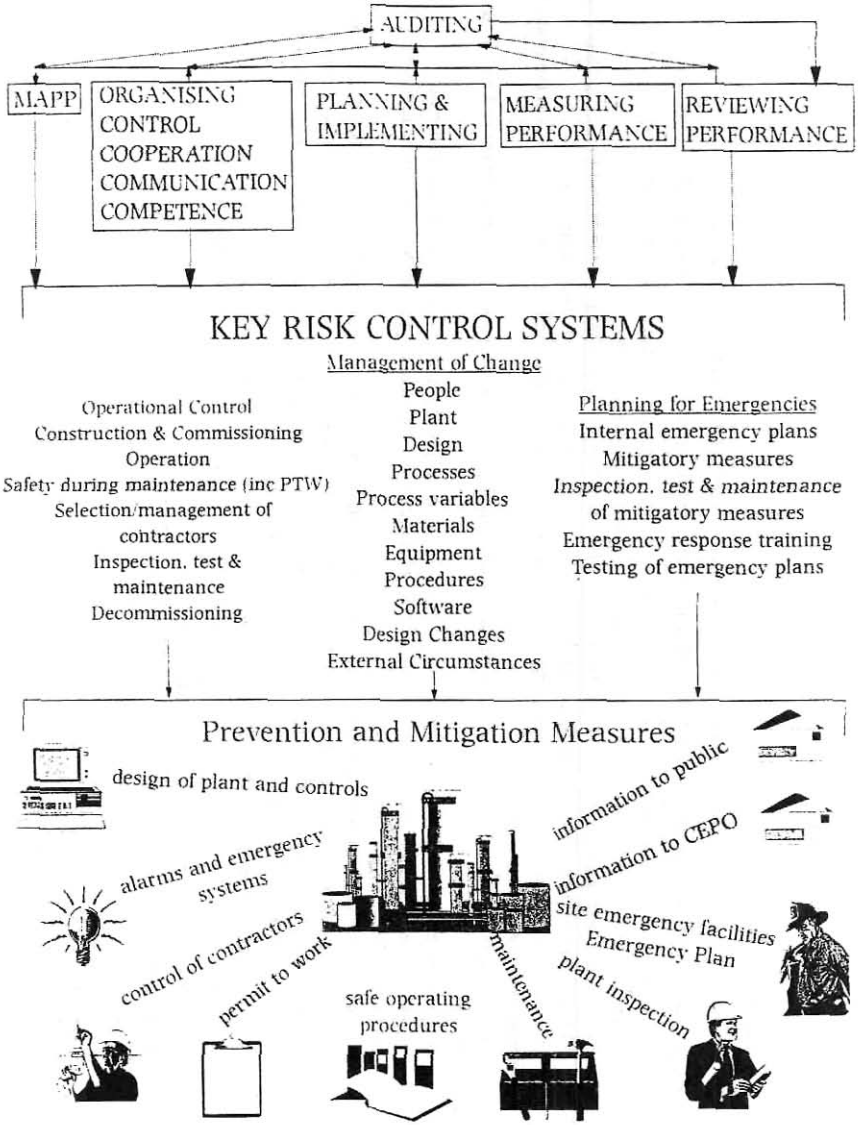
I. KEY ELEMENTS OF SUCCESSFUL HEALTH & SAFETY MANAGEMENT




2. HEALTH & SAFETY MANAGEMENT SYSTEM
Management arrangements
Auditing
Policy
Organising
Control
Co-operation
Communication
Competence
Planning and implementing
Measuring performance
Reviewing performance
Risk control systems
Risk control systems are typically needed for the following activities
INPUT
Design/construction
Design/installation
Purchasing/procurement
Recruitment/selection
Selection of contractors
Acquisitions
Information
PROCESS
Routine & non-routine operations
Maintenance
Plant and process change
Foreseeable emergencies
Decommission
Demolition
OUTPUT
Product & service design
Packaging/labelling
Storage/transport
Off-site risks
Disposal and pollution control
Divestments
Information
Workplace precautions
Physical resources
Human resources
Information
Products and services
Information
By - products

3. MANAGEMENT ARRANGEMENTS



MAPP		The MAPP should:
	1	include a commitment to achieve a high standard of protection for people and the environment
	2	set out the operator's overall aims and principles of action with respect to the control of major accident hazards
	3	include a commitment to achieving high standard of protection for people and the environment and demonstrate that an appropriate management system covering the following elements has been put into effect: the roles and responsibilities of personnel involved in the management of major hazards at all levels in the organisation, including contractors where appropriate, and the provision of training to meet identified training needs the procedures for systematically identifying major hazards arising from normal and abnormal operation and the assessment of their likelihood and severity the procedures and instructions for safe operation, including maintenance of plant, processes, equipment and temporary stoppages the procedures for planning modifications to, or the design of new installations, processes or storage facilities the procedures to identify foreseeable emergencies by systematic analysis and to prepare, test and review emergency plans to respond to such emergencies the procedures for the ongoing assessment of compliance with ht objectives set out in the MAPP and SMS and the mechanisms for investigation and taking corrective action in the event of failing to achieve the stated objectives. The procedures should cover the operator's system for reporting major accidents and near misses, particularly those involving failure of protective measures and their investigation and follow up on the basis of lessons learnt the procedures for periodic systematic assessment of the MAPP and the effectiveness and suitability of the SMS, the documented review of performance of the MAPP and SMS and their updating by senior management
	4	be set at a senior level in the operator's organisation
	5	be in writing
SMS		**The safety report should**
	6	include sufficient explanation of how the SMS fits into the overall organisational arrangements

	7	show that all necessary roles in the management of major hazards have been clearly allocated
	8	show that the responsibilities of everyone involved in the management of major hazards have been clearly defined
	9	show that the operator has allocated sufficient resources to implement the MAPP
	10	show that the performance of people having a role to play in the management of major accident hazards is measured and that they are held accountable for their performance
	11	show that the operator has in place a system for providing and maintaining appropriate levels of management and employee competence
	12	show that the operator has systems for ensuring that employees are actively involved in the management of major accident hazards
	13	show that the operator has in place arrangements for co-operating with and securing the cooperation of other organisations
	14	show that the operator has arrangements for gathering intelligence needed for the control of major accident hazards from external sources
	15	show that the operator has arrangements for communicating information important for the control of major accident hazards within the operator's organisation
	16	show that the operator has arrangements for communicating information relevant to the control of major accident hazards to external organisations
	17	show that the operator has arrangements for systematically identifying major hazards, assessing the risks from normal and abnormal operations and determining necessary control measures
	18	show that the operator has systems for identifying areas for necessary improvement in relation to the control of major accident hazards
	19	show that the operator has systems for determining priorities to achieve the objectives of the MAPP and scheduling necessary improvement work in relation to ht control of major accident hazards
	20	show that the operator has adopted and implemented procedures and instructions for safe operation, including maintenance, of plant, processes, equipment and temporary stoppages
	21	show that the operator has adopted and implemented procedures for planning modifications to, or the design of new installations, processes or storage facilities

	22	show that the operator has arrangements in place to identify foreseeable emergencies by systematic analysis and to prepare, test and review emergency plans
	23	show that the operator has adopted and implemented procedures for the ongoing assessment of compliance with the objectives set by the MAPP and SMS
	24	show that the operator has adopted and implemented a system for reporting major accidents and near misses particularly those involving failure of the protective measures for control of major accident hazards
	25	show that the operator has adopted and implemented mechanisms for investigation and taking corrective action in cases of non-compliance with the objectives set by the MAPP and in relation to major accidents and near misses
	26	show that the operator has adopted and implemented a procedure for systematic independent assessment of the MAPP and the effectiveness and suitability of the SMS
	27	show that the operator has adopted and implemented a review process which uses information from performance measurement and audit
	28	show that results of review are documented
	29	show that the operator has adopted and implemented a system under which the MAPP and SMS is updated by senior management