COMAH
Control of Major Accident Hazards

COMAH Competent Authority
Inspection of Competence Management Systems at COMAH Establishments

(Operational Delivery Guide)

the Competent Authority

HSE

Environment Agency

SEPA

COMAH   Control of Major Accident Hazards

CONTENTS

Introduction

1. Major hazard organisations require competent staff who have the necessary skills, knowledge and experience to undertake critical tasks in such a way as to prevent a major accident or minimise the consequences to people and the environment should one occur.

2. However, a review of major accidents across hazardous industries found that a lack of competence contributed to many of those incidents including:

    *   Southall Rail Crash;
    *   BP Texas City;
    *   Piper Alpha explosion and fire;
    *   the Esso Longford Gas plant explosion; and
    *   Buncefield.

3. The COMAH Competent Authority Intelligence Review Group (CAIRG) reviewed evidence from loss of containment incidents within the chemicals sector covering several years. The findings, set out in the HSL Annual Operational Intelligence Report 2010, showed human error was, by far, the most frequent cause for "loss-of-containment events". This was closely linked to inadequate procedures, poor plant design and unsuitable risk assessment.

Justification

4. The HSE Chemicals Sector Strategy, developed in early 2011, identified that maintaining competence was "a key challenge for industries within the sector". Accordingly, CAIRG recommended that, based upon the evidence, the next strategic inspection topic for the CA should be competence management.

> "Competence" means the ability to undertake responsibilities and perform activities to a relevant standard, as necessary to ensure process safety and prevent major accidents. Competence is a combination of knowledge, skills and experience and requires a willingness and reliability that work activities will be undertaken in accordance with agreed standards, rules and procedures.
>
> "Competence management" means arrangements to control, in a logical and integrated manner, a cycle of activities within the organisation that will assure, and develop, competent performance. The aim is to ensure that individuals are clear about the performance that is expected of them, that they have received appropriate training, development and assessment, and that they maintain, or develop, their competence over time.

Background

5. Competence is a very broad subject area that may span the breadth and depth of an organisation. To verify every aspect of a competence management system could require a disproportionate amount of resource. Consequently, this Delivery Guide details a targeted, proportionate and sampled competence intervention.

6. Most mature organisations will have a number of existing processes and procedures that can contribute to the overall competence picture. The following list, whilst not exhaustive, indicates some examples of those existing processes:

   • performance management and review processes;
   • incident investigation processes;
   • workplace observation processes;
   • recruitment processes;
   • change management processes;
   • sub standard performance / disciplinary processes; and
   • recruitment and control of contractors processes.

7. Very often, the main challenge for COMAH Operators is a recognition that the above processes can contribute to their overall competence management system. The subsequent challenge is then to ensure that there are effective arrangements in place, in order for these existing processes to inform the Operator's competence management system.

Purpose of the Programme

8. The Competent Authority's (CA) purpose[1] is to deliver a regulatory framework that seeks to protect people and the environment from, and limit the consequences of, major accidents occurring within establishments covered by the COMAH Regulations. The CA's strategic aim is to enforce the regulations for the control of major accident hazards, by delivering a safety regime that:

   • ensures that those responsible for creating risks meet their responsibilities to manage them, and that suitable emergency arrangements are in place;
   • assures surrounding populations that activities at the site take into account their safety and that of the surrounding environment; and
   • helps industry recognise that individual failures undermine the sector as a whole, and supports them in conducting their activities safely.

9. In June 2009 HSE published "The health and safety of Great Britain – Be part of the solution"[2]. One of the goals of the strategy is to reduce the likelihood of low-frequency, high-impact catastrophic incidents.
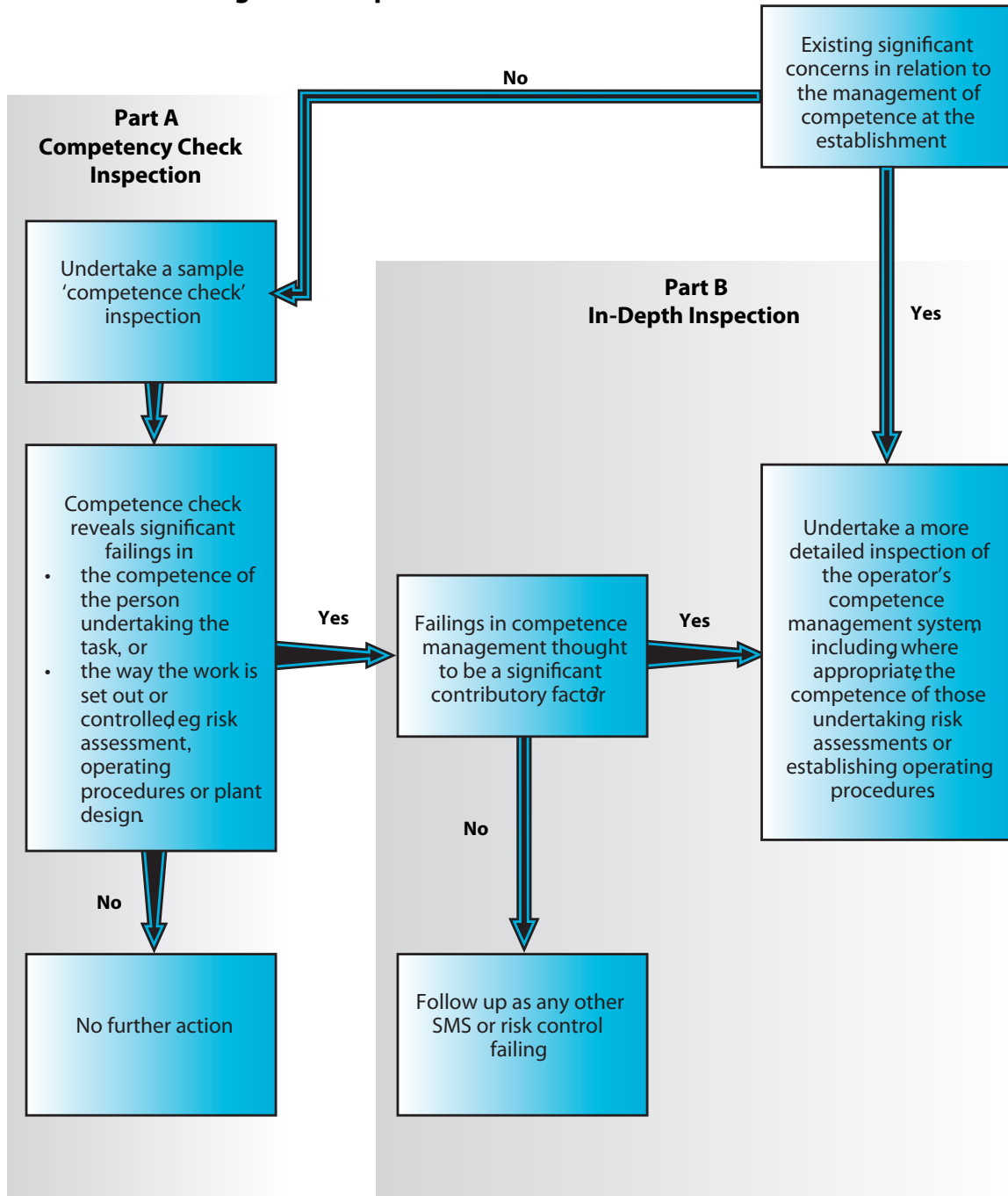
10. This Delivery Guide (DG) underpins the CA programme to prevent, control and mitigate major accidents at COMAH sites by ensuring Operators adequately discharge their duty under COMAH Regulation 4 with regard to the management and attainment of competence for key personnel.

11. This DG helps the CA to identify those sites where competence compliance is a priority, and to assess the extent to which a competence management system is being effectively managed / implemented. It should enable inspectors to:

- identify sites where competence, if not effectively managed, may have the potential to give rise to a major accident to both people and the environment;
- target inspections proportionate to the risk;
- assess how well an Operator is managing competence;
- record Operators' CMS performance in a consistent way;
- identify compliance issues;
- secure improvements through proportionate and targeted enforcement; and
- arrange further interventions as necessary.

Scope

12. The programme of inspections described within this DG is targeted at COMAH sites from 2012 to 2015. However, elements of the Competence Management System Toolkit (CMST), in Annex 2, may be useful:

- during investigations, where competence is identified as a relevant issue; and
- at other non-COMAH major hazard Operators and sites.

13. This inspection programme is relevant to both Top-Tier and Lower-Tier COMAH sites and further guidance on the selection of sites for inclusion in this programme is given in paragraphs 22 to 24.

14. There will be sites where competence is well-managed, where it would not be necessary to carry out a detailed competence management inspection.

15. The programme is divided into two parts as shown in Figure 1 on page 7.

16. In order to identify and target sites where a detailed inspection would be appropriate, a sample check inspection (known as a Part A Inspection) has been developed. The Part A Inspection will give a broad overview of how the Operator is managing competence and focuses on whether key personnel are achieving the desired outcomes when undertaking critical tasks.

17. The basis of the Part A Inspection is an assumption that if there is direct evidence of competent people undertaking critical tasks in a competent manner, then there is evidence to suggest that the Operator has an effective CMS, is managing and implementing it, and it is delivering desired outcomes.   As such, no further action is required in respect to this programme.

18. The Part A Inspection is based upon sampling how a task critical to the prevention of a major accident is actually undertaken. This check inspection will reveal whether there are any underlying concerns about the effectiveness of the Operator's CMS.

19. The Part B Inspection is a more in-depth inspection of the management of competence, and is normally only undertaken when the initial Part A Inspection gives rise to concern about the way in which competence is managed.

20. However, a Part B Inspection should also be considered at sites where, from previous regulatory activity, the CA already has significant concerns regarding the management of competence, such as during the assessment of a Safety Report. In such circumstances, it is unnecessary to undertake a Part A Inspection first.

21. The overall aim of this program of inspections is to test whether there is;

    • an effective Competence Management System (CMS) exists,
    • it is being effectively managed,
    • it is being effectively implemented, and
    • it is delivering the desired outcomes.

Figure 1: Inspection Selection Process

Part A
Competency Check
Inspection

Undertake a sample 'competence check' inspection

Competence check reveals significant failings in
- the competence of the person undertaking the task, or
- the way the work is set out or controlled, eg risk assessment, operating procedures or plant design.

No

No further action

Yes

Failings in competence management thought to be a significant contributory factor

No

Follow up as any other SMS or risk control failing

Part B
In-Depth Inspection

Existing significant concerns in relation to the management of competence at the establishment

No

Yes

Yes

Undertake a more detailed inspection of the operator's competence management system, including where appropriate, the competence of those undertaking risk assessments or establishing operating procedures

Control of Major Accident Hazards

Targeting sites

22. This programme of inspections is intended to take 3 years (2012-2015) to complete. The aim is to undertake Part A inspections at all COMAH Top-Tier sites, and at approximately one third of COMAH Lower-Tier sites. The work will be equally spread over the programme period.

23. The order of inspections at both Top-Tier and Lower-Tier sites will be undertaken according to risk, taking account of hazard ranking, performance, and the impact of competence on major hazard prevention.

24. In order to prioritize current key concerns, Part A inspections at Lower-Tier sites will focus on process safety risk assessments, as set out in the box on page 15. Process Safety Specialist Inspectors will take the lead for Part A inspections at Lower-Tier sites.

Legal Framework

25. Competence is an **implicit** element of:

- Control of Major Accident Hazard Regulations, Regulation 4;
- Health and Safety at Work etc Act 1974, Sections 2 and 3;
- Environmental Permitting Regulations (England and Wales) 2010; and
- Pollution Prevention and Control Regulations (Scotland) 2000, Regulations 3, 7 and 8.

26. Competence is an **explicit** element of:

- Control of Major Accident Hazard Regulations, Regulations 5 and 7
- Management of Health & Safety at Work Regulations 1999, Regulation 5
- Pollution Prevention and Control Regulations (Scotland) 2000, Regulations 7(3) and Schedule 4.

27. Annex 3 shows the relationship between

- the requirements of Regulation 5(1) of the Management of Health & Safety at Work Regulations 1999;
- its associated ACOP;
- HSG65 'Successful health and safety management' (and its proposed replacement); and
- the Competence Management System Cycle.

Enforcement Expectations

28. Where a shortfall in compliance is identified then enforcement action should be taken in accordance with HSE's Enforcement Policy Statement (and EA / SEPA equivalents) and enforcement decisions should be guided by the Enforcement Management Model (EMM or SEPA equivalent), taking account of the rating and enforcement expectation in Tables 1 and 2 (pages 16 and 20).

29. The performance rating guidance in Tables 1 and 2 aims to promote a consistent and transparent approach to performance rating, and allows for discretion and professional judgement.

30. The performance rating guidance in Tables 1 and 2 provide indicative guidance only and outlines suggested benchmark scenarios and appropriate actions to consider, taking account of the overall inspection findings.

31. It does not offer guidance on specific issues that may arise. The EMM process (in particular an assessment of duty holder performance and local factors) will ultimately determine the appropriate action.

COIN Recording

32. The performance rating will be entered against the "Competence Management" strategic topic column on the Intervention Plan inspection rating form following either a Part A or a Part B inspection. **Where relevant, Part B scores will update and overwrite Part A results.**

COMAH
Control of Major Accident Hazards

Part A: Competence Check Inspection

33. This section outlines the details of the initial sample competence check inspection (Part A Inspection). The process is set out in Figure 2.
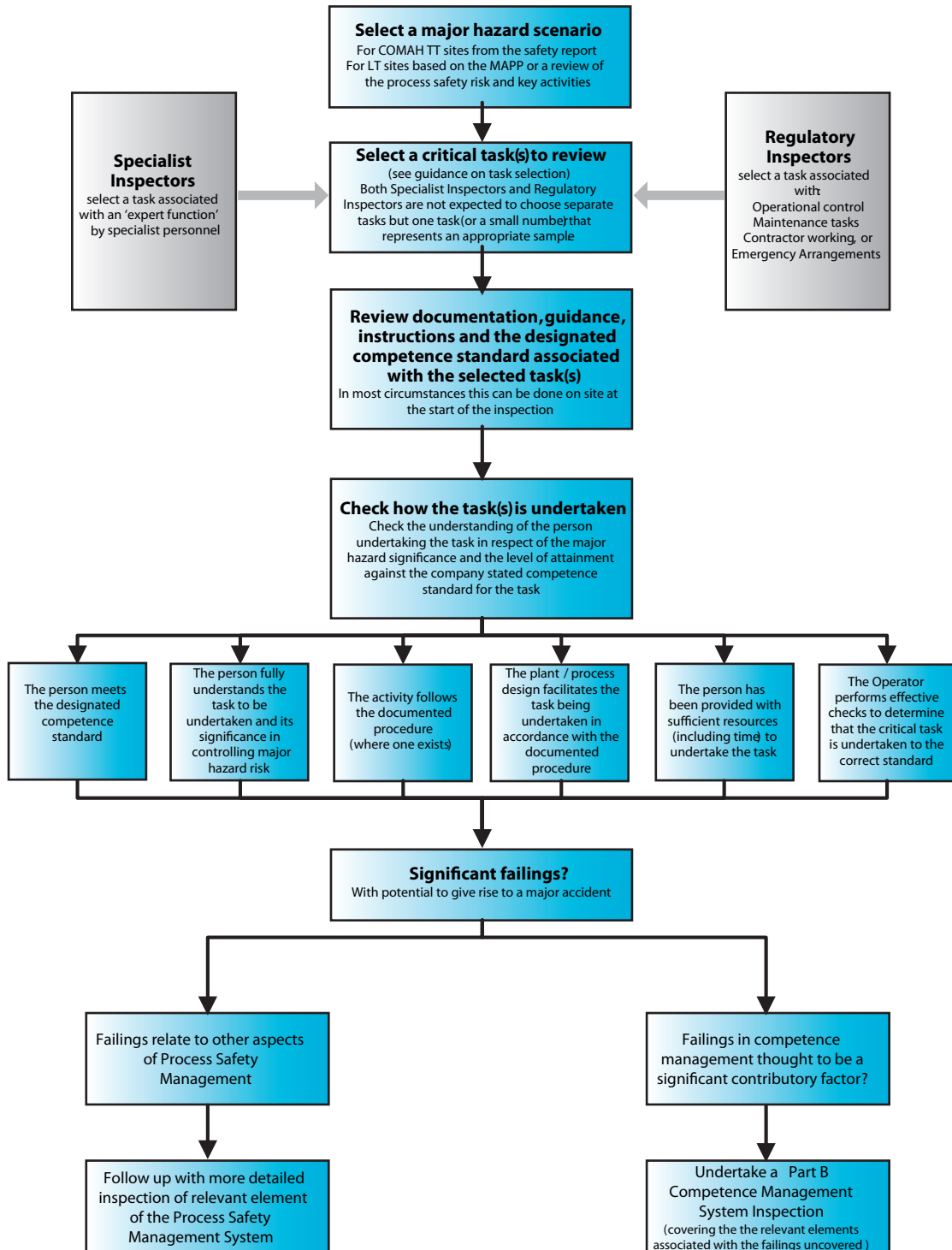
Select a major hazard scenario
For COMAH TT sites from the safety report
For LT sites based on the MAPP or a review of the process safety risk and key activities

Specialist Inspectors
select a task associated with an 'expert function' by specialist personnel

Select a critical task(s) to review
(see guidance on task selection)
Both Specialist Inspectors and Regulatory Inspectors are not expected to choose separate tasks but one task (or a small number) that represents an appropriate sample

Regulatory Inspectors
select a task associated with:
Operational control
Maintenance tasks
Contractor working, or
Emergency Arrangements

Review documentation, guidance, instructions and the designated competence standard associated with the selected task(s)
In most circumstances this can be done on site at the start of the inspection

Check how the task(s) is undertaken
Check the understanding of the person undertaking the task in respect of the major hazard significance and the level of attainment against the company stated competence standard for the task

- The person meets the designated competence standard
- The person fully understands the task to be undertaken and its significance in controlling major hazard risk
- The activity follows the documented procedure (where one exists)
- The plant / process design facilitates the task being undertaken in accordance with the documented procedure
- The person has been provided with sufficient resources (including time) to undertake the task
- The Operator performs effective checks to determine that the critical task is undertaken to the correct standard

Significant failings?
With potential to give rise to a major accident

Failings relate to other aspects of Process Safety Management

Failings in competence management thought to be a significant contributory factor?

Follow up with more detailed inspection of relevant element of the Process Safety Management System

Undertake a Part B Competence Management System Inspection
(covering the the relevant elements associated with the failings uncovered)

Figure 2: Competent check inspection

What a Competence Check Inspection Looks Like

34. A Part A inspection involves a walk and / or talk through a critical task, where:

- the actions (or sequencing) need to be undertaken to an agreed standard; and
- there is a dependence on competent staff to undertake the task; and
- where the task is critical to the prevention, or mitigation, of a major accident.

The task or activity may be, for instance:

- a routine process operational task;
- start-up or shut-down of operations;
- a task associated with commissioning plant, equipment, or new processes;
- abnormal or emergency events;
- bulk loading / unloading;
- maintenance and inspection of safety systems;
- a task associated with undertaking risk assessments, such as hazard identification, HAZOP study etc;
- an emergency exercise;
- an internal investigation; etc.

COIN Recording

35. It is important to remember that a Part A inspection is intended to act as a filter to identify where a more thorough Part B inspection is needed. **Part A inspections should therefore be kept simple, and, furthermore, in some instances, a Part A inspection may be undertaken as part of other planned inspections, where appropriate.**

"Walk Throughs and Talk Throughs"

36. "Walk-throughs" require the Inspector to observe critical tasks being performed onsite. The aim is for the person to undertake the task, or to closely emulate the way in which a task would be undertaken on the plant, if it is not possible to actually undertake the task during the inspection.

37. Walk-throughs can also look at how teams work. This can be useful for exploring the interactions and communications between individuals in multi-person tasks, and assessing how effectively the tasks are linked.

38. "Talk-throughs" are similar but can be undertaken remotely from the normal task location. They do not require the task to be carried out directly or in the normal location. A talk-through can also be used as a means of obtaining an understanding of the task prior to a walk-through.

39. Technical documentation, such as procedures, control / display drawings, or process flow diagrams can be used as the basis for discussion.

40. Success criteria for a Part A inspection are as follows:

- A designated competence standard exists for the task under review, and the person undertaking the task meets the designated competence standard;
- The person fully understands the task to be undertaken and its significance in controlling major hazard risk;
- The activity follows the documented procedure (where one exists);
- The plant / process design facilitates the task being undertaken in accordance with the documented procedure;
- The person has been provided with sufficient resources (including time) to undertake the task; and
- The Operator performs effective checks to determine that the critical task is undertaken to the correct standard.

Pre-visit Information Gathering

41. As most Part A inspections will be simple it is not envisaged that pre-visit documents are requested from the site. For Top-Tier sites the safety report should be sufficient in order to select critical tasks. The Safety Report will also give an overview on how competence is managed at the site. In order to ensure that the inspection examines the way the task is normally undertaken it is more appropriate to examine the supporting documentation once on site.

42. For inspections involving several tasks or more complex tasks, Inspectors may wish to ask for relevant documents for review ahead of the inspection, and this may include the following:

- Risk assessments to select key scenarios, processes, tasks and people;
- Job analysis methodology, e.g. techniques used to decompose safety and/or environmentally critical tasks into constituent skills and knowledge etc;
- Job description and competence requirements;
- Evidence of training needs analysis;
- Training profiles for a sample of the safety and/or environmentally critical posts under review;
- Selection of procedures for safety and/or environmentally critical tasks;
- Management of change procedures;
- Maintenance and testing requirements; and
- Records of maintenance and testing carried out.

Inspection Process

43. For Top-Tier sites a major hazard scenario outlined within the Safety Report should be selected where it is recognised that competence is critical in managing major hazard risks. Such scenarios are usually risk-ranked in order of potential consequence. The highest being those with off-site consequences and / or high fatality rates. For example, overfilling of an LPG sphere would probably be ranked high and competence related to this task could be with regard to:

- Process tasks and associated critical procedures;
- Mechanical / EC&I issues relating to assessment of overfill protection systems and it's physical integrity and related critical maintenance procedures;
- EC&I equipment issues in zoned hazardous atmospheres to assess management of ignition sources from electrical equipment; and
- Secondary / tertiary containment design, integrity assessment regimes, and related critical procedures.

Critical Tasks

44. Critical tasks are those that have the potential, if not undertaken correctly, to initiate, propagate or exacerbate a major accident. For the purposes of this guide, a critical task is one that requires a person to undertake an important action or function, rather than an activity or process that is automated. An integral part of identifying critical tasks is the identification of the essential roles and responsibilities of the people involved with respect to the control of major accidents.

Task Analysis

45. Task Analysis can be used by an Operator to help identify, define and understand critical tasks. The process of task analysis involves breaking down the task into separate component actions that make up the whole task. These can include operational or maintenance / inspection tasks etc. Where task analysis has been undertaken by Operators it is recommended that the Inspector utilises this when preparing for and undertaking walk / talk-throughs.

Procedures

46. Procedures are used to support people engaged on critical tasks, and the process of task analysis usually produces detailed task descriptions which can be readily converted into formal procedures.

47. An integral part of the Part A inspection is to judge the adequacy of the procedures, the person's understanding of them, and whether the procedures were / able to be complied with.

Who Should Undertake the Inspection?

48. A Part A inspection may be undertaken either by a single Inspector, or by a multi-discipline team of inspectors, depending upon the complexity of the task chosen for review. A multi-discipline team may need to undertake the inspection where it is felt necessary, for instance;

- in order to examine more than one task, involving different areas of expertise;
- where it makes sense to explore risk assessment, task design and execution as part of a single sequence; or
- where more than one competence is being assessed, for example, competence of a technician to test a safety instrumented system, and that of operative in taking action following an alarm.

49. **It is normally only necessary to undertake one Part A inspection for each site rather than separate inspections per discipline.**

50. Regulatory and Agency site Inspectors should always be involved in the selection of the task(s) but both do not always need to be directly involved in the inspection. Selection of the task(s) should normally involve consultation with relevant Specialist Inspectors so that the most relevant critical task(s) are selected. Process Safety Specialists should usually assist Regulatory and Agency Inspectors in the selection of relevant major hazard scenarios and Human Factors Specialist Inspectors may assist in the determination of the potential for human error and the criticality of the task.

51. Specialist inspector involvement may include:

- selection of the major hazard scenario;
- review of critical procedures; or
- review of the competence requirements of particular individuals fulfilling a specialist role/function.

Resources

52. Part A is a filtering process. Therefore it is estimated that simple single task Part A inspections should take no more than 1 to 2 days to prepare, undertake, record and conclude. However this estimate may be refined and agreed upon at a later intervention planning stage.

53. Multiple task inspections are estimated to require an additional 0.25 to 0.5 days per task, depending upon the complexity.

54. More time will be needed for particularly complex or multiple inspector Part A inspections but these will normally be within the range of 1 to 3 days.

Judging Success and Moving On

55. Operators subject to a Part A inspection should have their performance rated against the success criteria set out in paragraph 40 and using the scores set out in Table 1. The performance score will be recorded on the "Competence Management" topic line on the COIN IRF tab. The performance score should be linked, where necessary, to the relevant enforcement action, having taken into account the EMM (or SEPA equivalent).

> **Part A Inspections at Lower-Tier COMAH Sites**
>
> For Part A inspections at lower-tier sites the main objective is to gain assurance that persons who are involved in the following tasks have the required competencies to undertake them;
>
> - identifying major accident hazards,
> - assessing the risks and
> - specifying the necessary control measures, and
> - maintaining the effectiveness of the control measures
>
> The inspection will be led by Process Safety Specialists and will focus on process safety risk assessments. To gain an understanding of how the assessment was undertaken (and the competence of those involved) the Process Safety Specialist will identify topics for discussion with key people who were involved in risk assessment processes such as HAZOP, reaction hazard assessment, etc.
>
> As outlined in Figure 2, where failings are identified in other elements of the Operator's Process Safety Management System, such as management of change, compliance with standards etc, these can be dealt with by further intervention outside of this programme. Failings in respect of competence management should be followed up as a Part B inspection as set out in this guide.
>
> Part B Inspections should also be considered at Lower Tier sites where, from previous regulatory activity, the CA already has significant concerns regarding the management of competence. In such cases, there is no requirement to undertake a Part A inspection at a lower tier site.

COMAH Control of Major Accident Hazards

Table 1: Performance Rating following a Part A inspection Success criteria outlined in paragraph 40

Performance Rating	Description	CA action to consider	Score
Exemplary	Good practice or above in all respects. All success criteria outlined within paragraph 40 fully met. The person is fully aware that the task they are performing is critical to the prevention of a major accident, they understand the hazards and have a full appreciation of the tasks they are required to perform. The task was undertaken correctly, and in full alignment with instructions contained within the written procedures. The person attained all the competencies required by the Operator. The Operator was able to demonstrate effective monitoring arrangements to determine that the critical task is undertaken correctly.	No further action required on this occasion.	10
Good	Good practice in most respects. Most success criteria met. Some areas of potential weakness. The person is aware, only to some degree, that the task they are performing is critical to the prevention of a major accident, they understand the hazards and have an appreciation of the tasks they are required to perform. The task was undertaken, on the whole, correctly, and in alignment with the instructions contained within the written procedures. The person had attained the competencies required by the Operator. The Operator was able to demonstrate monitoring arrangements to determine that the critical task is undertaken correctly	Provision of advice only, with no further action required on this occasion.	20
Partially Compliant	Some success criteria not fully met. The person is only partially aware that the task they are performing is critical to the prevention of a major accident, they don't fully understand the hazards and don't have a full appreciation of the tasks they are required to perform. The task wasn't fully undertaken and/or wasn't in alignment with the instructions contained within the written procedures. The person had only attained some competencies required by the Operator. The Operator was only partially able to demonstrate monitoring arrangements to determine that the critical task is undertaken correctly.	Written confirmation of work required and agreed timetable for completion. Short term follow-up action required.	30

Performance Rating	Description	CA action to consider	Score
Poor	Many success criteria not fully met. The person is not aware that the task they are performing is critical to plant safety, they don't understand the hazards and don't have an appreciation of the tasks they are required to perform. The task undertaken wasn't in alignment with the instructions contained within the written procedures. The person hadn't attained many of the competencies required by the Operator. The COMAH Operator was not able to fully demonstrate monitoring arrangements to determine that the critical task is undertaken correctly. Failure to adequately manage competence may have potential to give rise to major accident if improvements not sustained.	Consider Improvement Notice. Refer to HSE Specialist(s) and/or Agency Inspectors. **Consider conducting a Part B inspection as a priority.**	40
Very Poor	Majority of success criteria not fully met. The person is not aware that the task they are performing is critical to the prevention of a major accident, they don't understand the hazards and don't have an appreciation of the tasks they are required to perform. The task undertaken wasn't in alignment with the instructions contained within the written procedures. The person hadn't attained the competencies required by the Operator. The Operator was not able to demonstrate monitoring arrangements to determine that the critical task is undertaken correctly. Matters of immediate evident concern. Failure to adequately control and manage competence has potential to give rise to major accident.	Consider: Improvement Notice; HSWA or COMAH Prohibition Notice; Prosecution. Refer to HSE Specialist(s) and/or Agency Inspectors. **Conduct a Part B Inspection as a priority.**	50
Unacceptable	No success criteria met. Matters of evident concern. Failure to adequately control and manage competence has potential to give rise to major accident.	Improvement Notice; HSWA or COMAH Prohibition Notice; Prosecution. Refer to HSE Specialist(s) and/or Agency Inspectors. Conduct a Part B inspection as a priority.	60

Part B: Competence Management Systems Inspection

56. A Part B Competence Management System (CMS) inspection should be undertaken if:

   • a Part A inspection has identified significant compliance issues with the potential to give rise to a major accident; or
   • the CA already has concerns about the management of competence onsite. (It is entirely appropriate to undertake a Part B inspection, without the need for a Part A inspection where, for instance, the safety report assessment concludes potential issues with the Operator's competence management arrangements).

57. The CMS inspection is based on the set of demonstration statements found within the Competence Management System Toolkit (CMST), Annex 2, and details all elements of a management system.

58. **Where a Part A inspection has been undertaken, the extent and depth of a Part B inspection should be determined by the failings identified during the Part A inspection. It is not necessary to look at every aspect of a CMS as set out in the CSMT (Annex 2).**

59. Once sufficient evidence of failings has been obtained then the Operator should be advised and directed towards existing guidance[3],[4] on the establishment of an effective CMS. A follow-up visit should be undertaken at a later date to check that a suitable CMS has been implemented. Once more, Annex 2 will be helpful at this stage.

Pre-visit Information Gathering

60. It is recommended that the site provide examples of the following documents to review ahead of the inspection:

   • job descriptions and competence matrices (if available);
   • evidence of training needs analysis;
   • records of audit/review of the competence assurance/management system;
   • examples of training material;
   • documents relating to validation and evaluation of training; and
   • evidence that incident findings and/or "near miss data" are embodied in training/improved procedures.

Interviewing Key People

61. Inspectors may find it helpful to gather information by interviewing a selection of:

- experienced frontline staff;
- trainees, new recruits and/or employees new to the role;
- Supervisors, Middle/Senior Managers;
- engineers responsible for design and/or changes to design;
- Managers/engineers responsible for developing procedures and systems of work;
- Training Managers, Trainers, Assessors; and
- Safety Representatives/Employee Representatives.

Resources

62. The Part B inspection will normally be led by the HSE Regulatory Inspector, and may include other Specialist or Agency Inspectors depending upon the range and complexity of the issues explored.

63. If a Part A inspection identifies unacceptable process safety management competence, the Part B inspection may have a very narrow focus, for example, on process safety management training, recruitment or contractor competence of one person, and it may be possible for the Process Safety Specialist to undertake this at the same time as the Part A inspection. In other cases, for example where the Part A inspection identifies high reliance on Operator competence or a broader concern over management competence, a separate Part B inspection, by others, may be more appropriate.

64. It is estimated that a Part B inspection will take between 3 to 5 days to prepare, undertake, record and conclude depending upon complexity.

Judging Success and Moving On

65. Operators subject to a Part B inspection should have their performance rated using the criteria in Table 2, and the result recorded on the COIN IRF tab. These judgments should be linked, where necessary, to the relevant enforcement action and the EMM. **Part B scores should update and overwrite Part A scores, where relevant.**

COMAH Control of Major Accident Hazards

Table 2: Performance Rating following a CMS inspection Success criteria outlined with the CMST in Annex 2

Performance Rating	Description	CA action to consider	Score
Exemplary	Good practice or above in all respects. Relevant parts of the success criteria outlined within the Competence Management System Toolkit (CMST found in Annex 2) fully met. Robust and effective CMS in place. The rationale for the system can be demonstrated. Relevant senior managers have attained suitable training in process safety management. Effective performance measures (leading and lagging indicators) for CMS are established, embedded and reviewed regularly by senior management.	No further action required on this occasion.	10
Good	Good practice in most respects. Relevant parts of the success criteria met. Effective CMS is in place, but some potential weaknesses. The rationale for the system can be demonstrated. Effective monitoring of competencies are planned and prioritised. Identification of critical tasks, competence matrices, requirements for refresher training, is all fully developed. Effective performance measures (leading and lagging indicators) for CMS are established, embedded and reviewed regularly by senior management. The Operator has clear roles and responsibilities. Some senior managers have attained suitable training in process safety management.	Provision of advice only with no further action required on this occasion.	20
Partially Compliant	Some relevant parts of the success criteria not fully met. A CMS is in place but has some gaps and weaknesses. Some monitoring of competencies is planned and prioritised. Key leading and lagging indicators are known but may not be effectively used to monitor performance. Not all site and third party personnel have clear roles and responsibilities. Not all critical tasks, competence matrices, requirements for refresher training, are fully developed.	Written confirmation of work required and agreed timetable for completion. Short term follow-up action required.	30

Performance Rating	Description	CA action to consider	Score
Poor	Most of the relevant parts of the success criteria not met / fully met. Critical tasks, competence matrices, requirements for refresher training only partially identified. Ineffective CMS in place. Monitoring of competencies is poorly planned and prioritised. Key leading and lagging indicators not fully under stood and not used to monitor performance. Little progress with improvement actions. Failure to ad equately manage competence may have potential to give rise to major accident if improvements not sustained.	Consider Improvement Notice. Refer to HSE Specialist(s) and/or Agency inspectors.	40
Very Poor	Majority of the relevant parts of the success criteria not met / fully met. Critical tasks, competence matrices, requirements for refresher training only partially identified. No monitoring of competencies in place. Largely reactive response to competence failures. Key leading and lagging indicators not identified. Site and third party staff have no distinct roles and responsibilities. No progress with improvement actions. Possible matters of evident concern. Failure to adequately control and manage competence has potential to give rise to major accident.	Consider: Improvement Notice; HSWA or COMAH Prohibition Notice; Prosecution. Refer to HSE Specialist(s) and/or Agency Inspectors	50
Unacceptable	No success criteria met. Critical tasks, competence matrices, requirements for refresher training not identified. No CMS in place. No monitoring of competencies. Possible matters of immediate evidence concern. Failure to adequately control and manage competence has potential to give rise to major accident.	Improvement Notice; HSWA or COMAH Prohibition Notice; Prosecution. Refer to HSE Specialist(s) and/or Agency Inspectors.	60

Annex 1: Introduction to CMS

1. Competence in this delivery guide means the ability to undertake responsibilities and perform activities to a relevant standard, as necessary to ensure process safety and prevent major accidents. Competence is a combination of knowledge, skills and experience and may include a willingness to undertake work activities in accordance with agreed standards, rules and procedures. Competence depends upon the context and the environment in which the activity is performed, the working culture of the organisation, and also upon the resources (including time) that the individual is provided with by the company/organisation in order to perform tasks.

2. In the work environment the standard of competence is the standard of work expected to satisfy a number of requirements, including business objectives as well as process safety, environmental protection, and health and safety requirements. The context, environment and culture are particularly relevant during an individual's development programme before their first competence assessment, and when seeking to address any subsequent sub-standard performance. Developing competence will not in itself guarantee safety, but it will improve the predictability of good performance.

3. Competence plays a very important role in controlling health and safety risks on COMAH establishments. Risk control systems rely on a complex mix of hardware, software, human factors and safety management systems. This includes the design of the process, the risk assessments of that design and how it is intended to be operated and maintained and the management of change systems used.

4. In this guide the terms 'normal operations', 'foreseeable process deviations' and 'emergencies' are used to describe the types of operation. The role of individuals in controlling risks is central. However, whilst the role of individuals is important during normal operations, it is vital during foreseeable process deviations and emergencies when it is the ability of that individual to return the system to normal operation that is critical. It is only the competent individual who will be able to undertake such recovery, and this is why competent operation is so important. Where competent performance is not maintained, accidents, incidents and injuries may occur as a consequence.

5. The purpose of a CMS is to control, in a logical and integrated manner, a cycle of activities within the company or organisation that will assure and further develop competent performance in work. The aim is to ensure that individuals are clear about the performance that is expected of them, that they have received appropriate training, development and assessment and that they maintain or improve their competence over time.

6. Training and development seeks to create a level of competence for the individual or team, sufficient to allow individuals or teams to undertake the operation at a basic level. Initially this will be under direct supervision, which will become less direct as the individual progresses. Over time, as knowledge and practical experience grows, operations can be carried out at a more complex level. Such an approach will also increase the confidence of the individual or team to deliver competent performance, whilst making them aware of their limitations. Assessment (and re-assessment) is how judgements are made that the inputs (i.e. training, development and experience) have been sufficiently understood so as to deliver outputs (i.e. in terms of competent performance and safe operation). Competence can be seen as a continuum, with people at various stages along it such as novice, not yet competent, competent, proficient and expert.

CMS Cycle

7. Competence management seeks to integrate in a logical process a number of related management activities. Like most management systems it involves designing, planning, implementing, monitoring and reviewing. In this delivery guide we show that competence management can be viewed as a cycle defined by 15 principles linked in five phases, as shown in Figure 3. This cyclic process should lead to continued improvement in competence.

8. Whilst individuals may be currently competent, they do not necessarily retain a satisfactory level of competence over time. This is true for the competence management activities as well as the activities carried out by individuals. The level and nature of the competence of staff will be continually changing. The purpose of the CMS outlined in this delivery guide is to provide checks and guidance to help COMAH Operators meet their duty to provide adequate resources with a sufficient level of competence to prevent major accident hazards. Good companies will also ensure that competence management activities focus on further development of staff as part of their continued professional development.

9. To compare an existing CMS with the principles outlined in this guidance it may be best to start using the guidance from Principle 15, 'Review and Feed Back'. Risk assessments relating to the competence standards and the process safety performance of the company or organisation should be reviewed along with whether recommendations for change from verification and audit have been implemented. This should be followed by checking the CMS against the requirements of Principle 1, 'Identify Activities and Assess Risks'. The assessment of the risks from all the activities undertaken by the company or organisation, including the competence management aspects, is vitally important.

10. When setting up a new CMS the starting point should be Phase 1, i.e. to establish the requirements for the system. Principle 1 requires the identification of the activities undertaken by the company or organisation and the assessment of the associated risks. This is the foundation for a CMS, i.e. to reduce risks to health and safety and continually improve. This will be followed by Principle 2, for the selection or development of standards to control risks. Moving around the cycle shown in Figure 3, the next action is to design the system, followed by implementation, and then to maintain and develop competence. The audit and review provides the results that can be used to update the requirements for the system. It should be noted that, as with all management systems, it is a continuous cycle to promote continuous improvement in the CMS.
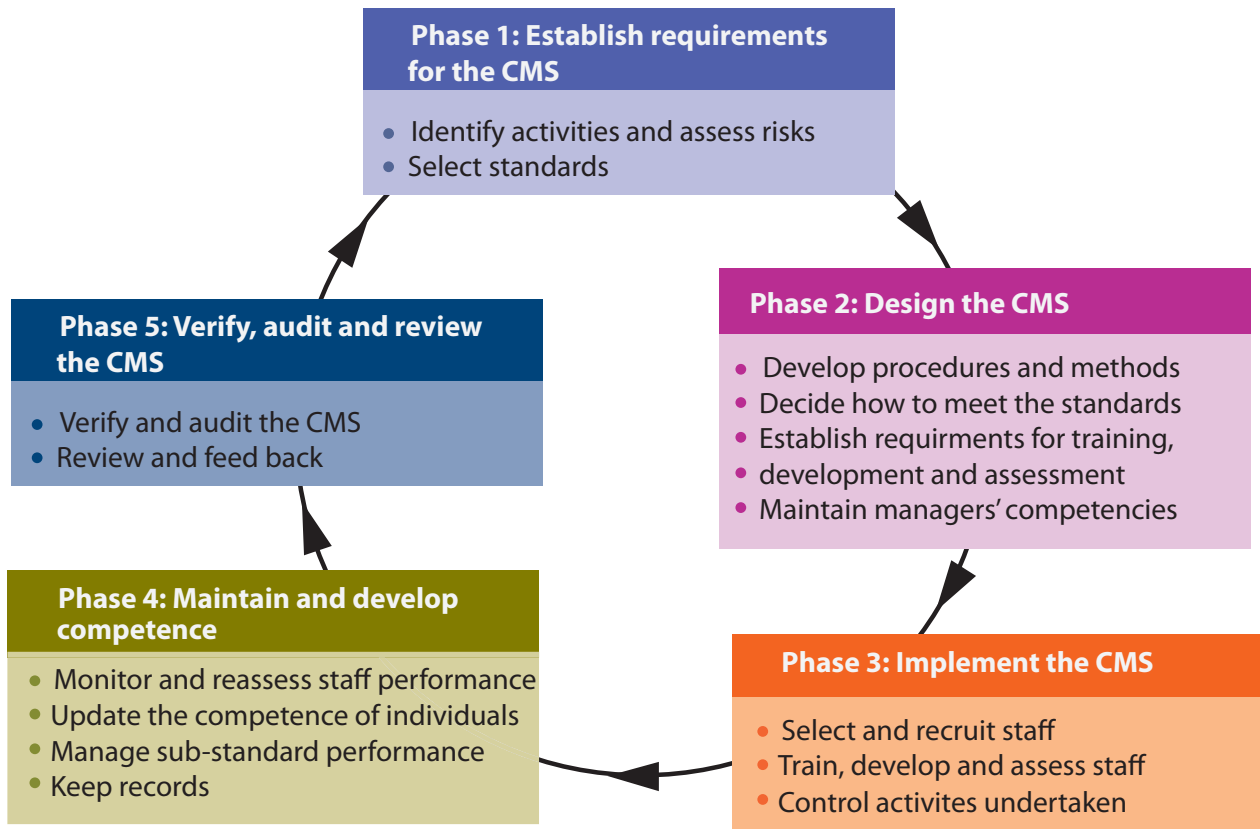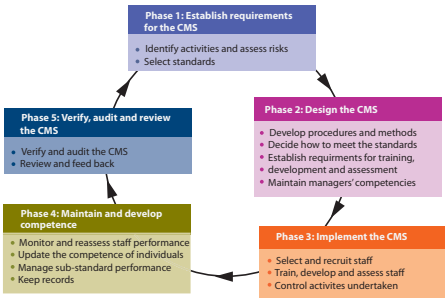
CMS Cycle

Phase 1: Establish requirements for the CMS
- Identify activities and assess risks
- Select standards

Phase 2: Design the CMS
- Develop procedures and methods
- Decide how to meet the standards
- Establish requirments for training,
- development and assessment
- Maintain managers' competencies

Phase 3: Implement the CMS
- Select and recruit staff
- Train, develop and assess staff
- Control activites undertaken

Phase 4: Maintain and develop competence
- Monitor and reassess staff performance
- Update the competence of individuals
- Manage sub-standard performance
- Keep records

Phase 5: Verify, audit and review the CMS
- Verify and audit the CMS
- Review and feed back

Figure 3: CMS cycle

COMAH Control of Major Accident Hazards

Annex 2: CMS Toolkit

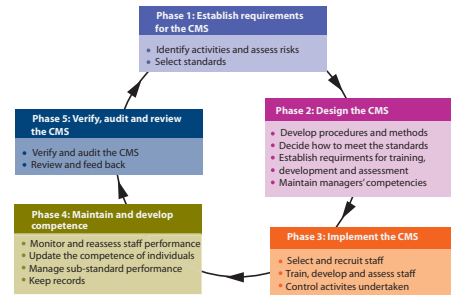| Phase 1: Establish requirements for the CMS |
|---|
| ■ Identify activities and assess risks
■ Select standards |

Principle 1	Identify activities and assess risks	The Operator has appropriate arrangements in place to be able to identify safety and/or environmentally critical activities that affect initiate, propagate or exacerbate major accident hazards, and the activities that are critical for controlling risks.
Principle 1	Identify activities and assess risks	The Operator has appropriate arrangements in place to be able to identify hazards associated with major hazards in normal and foreseeable process deviations and emergencies.
Principle 1	Identify activities and assess risks	The Operator has determined the risks that need to be controlled under all operating conditions and has implemented all measures necessary to control major hazard risks.
Principle 1	Identify activities and assess risks	The Operator has identified where and to what extent the risk controls rely on competence of people to control the risks.
Principle 1	Identify activities and assess risks	The Operator has appropriate arrangements in place in order to be able to consider the effects of significant changes of technology, procedures and working practices.
Principle 1	Identify activities and assess risks	The Operator has considered the effect of human factors / error on the prevention of major accidents.

Principle 2	Select standards	Standards have been selected for all elements of the CMS, including selection recruitment, training, development, monitoring, verification, audit and review.
Principle 2	Select standards	The existing competence standards are adequate to control identified risks, up to date, relevant for the applications, appropriate for the context in which they are used, and take into account the current working practices.
Principle 2	Select standards	Where contractors and subcontractors are used, the competence standards applied to and used by contractors are the same as, or equivalent to, the standards required for the Operator's employees.
Principle 2	Select standards	Current competence standards are available for the activities that the managers operating the CMS are being asked to undertake. Standards of competence for managers are crucial to effective operation of the CMS and it is thus vital that those who have a role in managing the system are kept up to date.
Principle 2	Select standards	Competence standards are made available to staff and the managers operating the CMS in a format that promotes understanding and encourages their use. Staff are able to refer to them and understand how they relate to their activities. Staff can then use the competence standards as working checklists to develop and maintain their own competence in conjunction with their managers
Principle 2	Select standards	The CMS is compatible with, and fully integrated within, the overall company policy for process safety management including integrating training, development, performance reviews, safety and environmental management and quality management.

COMAH Control of Major Accident Hazards

Phase 2: Design the CMS

- Develop procedures and methods
- Decide how to meet the standards
- Establish requirements for training, development and assessment
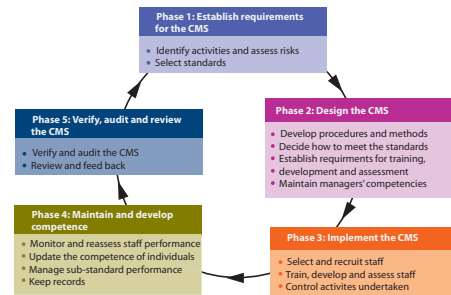- Maintain managers' competencies

Phase 1: Establish requirements for the CMS
- Identify activities and assess risks
- Select standards

Phase 5: Verify, audit and review the CMS
- Verify and audit the CMS
- Review and feed back

Phase 2: Design the CMS
- Develop procedures and methods
- Decide how to meet the standards
- Establish requirments for training, development and assessment
- Maintain managers' competencies

Phase 4: Maintain and develop competence
- Monitor and reassess staff performance
- Update the competence of individuals
- Manage sub-standard performance
- Keep records

Phase 3: Implement the CMS
- Select and recruit staff
- Train, develop and assess staff
- Control activites undertaken

Principle 3	Develop procedures and methods	The Operator has established what is to be achieved in terms of measurable results and objectives for the CMS and has determined the processes required to deliver them including the number of personnel to be recruited, trained, developed and assessed.
Principle 3	Develop procedures and methods	There are clear and unambiguous procedures (and more detailed work instructions, if required) describing how all the tasks needed to operate the CMS are managed, including how those assessing competence will be trained and updated to maintain their own competence, and how regular verification checks and audit will be carried out.
Principle 3	Develop procedures and methods	The roles and responsibilities of those operating the CMS are well defined and are understood by the job holders. There are adequate resources in place to ensure delivery of the CMS.
Principle 3	Develop procedures and methods	If contractors / consultants are to be used, their roles and responsibilities, in relation to the CMS, are well defined.
Principle 3	Develop procedures and methods	The methods and processes for producing records of assessment are clear, transparent, and provide a clear audit trail see Principle 13 for more details.
Principle 3	Develop procedures and methods	The Operator can demonstrate effective communication of key information between all those operating the system. Channels of communication are designed to ensure rapid flow of information between all those involved in the system, with clear standards for what and when defined information is to be communicated.
Principle 3	Develop procedures and methods	The COMAH Operator's procedures, work instructions and methods incorporate current good practice. This may be defined by national and professional standards.
Principle 4	Decide how to meet the standards	The COMAH Operator has developed appropriate methods for the initial assessment of each competence. Assessment methods are related to and relevant to the activity and competence being assessed, and are linked to the competence standards themselves. The assessment methods consider the nature, complexity and risk associated with the task, the extent of error detection or supervision and the immediacy and/or impact of non-competent performance.
Principle 4	Decide how to meet the standards	Competence assessment methods are suitable for foreseeable process deviations and emergencies. Competence in these situations is of great importance, yet these situations may be rarely encountered and the assessments may be difficult, if not impossible, to carry out in normal operations. Questioning the individual should only be used to supplement other assessment methods, as knowledge alone cannot be assumed to infer competence. Therefore alternative techniques may need to be used including group exercises in a classroom, training videos, simulations of incidents, use of simulators, computer-based training and variants, practical demonstrations and table top exercises.

Principle 4	Decide how to meet the standards	The Operator has established development arrangements which are tailored to individuals. A programme of supervised, structured development is in place to provide exposure to different conditions that will be experienced on a regular basis, but may not yet have been encountered e.g. overnight working or inclement weather. There may be arrangements in place to assign an individual to a skilled team in order to gain experience in carrying out certain activities. Alternatively, there may be arrangements in place to assign a mentor (i.e. someone who can discuss problems using one-to-one methods). In the latter stages, where on-the-job training may be appropriate, the trainer/supervisor will ensure that the work is being carried out correctly and without risk.
Principle 4	Decide how to meet the standards	There may be risks that arise from the assessment, development and training itself. These may have an impact on the safety of operations or increase risks to: the people providing or receiving the assessment, development and training; others at work; or the general public. These risks should have been assessed and methods changed where appropriate, or other actions taken, to minimise any additional risks.

Principle 5	Establish requirements for training, development and assessment	The Operator has established the training and development needs and the assessment requirements of personnel to meet existing, new or modified standards. For each competence standard proposed, training and development programmes have been determined including assessment methods and systems - see Principle 4. In structured training and development activities it is beneficial to develop skills and knowledge in normal operations before progressing to foreseeable process deviations, and then emergencies. In this way learning is built upon experience in a logical manner facilitating the assessment of competence at each stage without the assessment being end-loaded.
Principle 5	Establish requirements for training, development and assessment	A structured attempt has been made to analyse the job/task in terms of its component skills and knowledge. Recognised techniques have been used to identify the relevant competence criteria, e.g. job/task analysis etc. The analysis has considered the full range of operating conditions, i.e. normal, deviations and emergency situations.
Principle 5	Establish requirements for training, development and assessment	Training input is followed by assessment against the competence standards in stages to allow people to be judged as sufficiently competent to progress through to the next stage. This will apply equally to existing, new and modified standards. It cannot be assumed that existing personnel will be competent to carry out activities to a new or modified standard; all personnel will usually require some additional briefing, development and re-assessment when they are expected to take on new activities.
Principle 5	Establish requirements for training, development and assessment	Competence criteria are clearly linked to the major accident hazard (MAH) potential on site, and they reflect the on-site risks including those described in risk assessments. A walk-through of key safety and/or environmentally critical procedures has confirmed that the correct competencies have been identified.
Principle 5	Establish requirements for training, development and assessment	Where new activities are to be undertaken, a structured development process is in place and a person's prior experience and learning is accredited in a consistent and structured way.

COMAH Control of Major Accident Hazards

Principle 5	Establish requirements for training, development and assessment	The Operator has established training and development needs and assessment requirements of recruits to reach the required levels of competence in their initial assessment. The COMAH Operator has determined the core activities to be undertaken and the related competencies that all recruits need, and established the extent of any variations to suit individuals and set their training and development needs accordingly.
Principle 5	Establish requirements for training, development and assessment	The Operator has established the training and development needs and assessment requirements of the managers to operate the CMS.
Principle 5	Establish requirements for training, development and assessment	Competence criteria are relevant to the specific job/task, and are not based on generic 'job descriptions'. Competence matrices have been used to record competence criteria, and are sufficiently differentiated for different roles/jobs.
Principle 5	Establish requirements for training, development and assessment	Different levels of competence are identified for different parts of a job, and they are clearly defined. Sometimes different levels of competence will be allocated for different parts of a job e.g. Awareness; Basic; Intermediate; Advanced and Expert. Where this occurs, it is important that the minimum competence level is clearly defined.

Principle 6	Maintain managers' competencies	The Operator can demonstrate that those involved in the operation of the CMS have a combination of professional competences, related to their role as assessors, recruiters, etc. and occupational competences, related to their knowledge, skills, experience, etc. in the activity they are assessing, recruiting for, etc. These competences are clearly identified.
Principle 6	Maintain managers' competencies	The Operator can demonstrate that the managers who carry out competence assessment and verification are suitably trained and periodically re-assessed.
Principle 6	Maintain managers' competencies	Management responsibilities for those operating the CMS are clearly defined and allocated.

COMAH
Control of Major Accident Hazards

Phase 3: Implement the CMS
■ Select and recruit staff
■ Train, develop and assess staff
■ Control activities undertaken

Phase 1: Establish requirements for the CMS
- Identify activities and assess risks
- Select standards

Phase 5: Verify, audit and review the CMS
- Verify and audit the CMS
- Review and feed back

Phase 2: Design the CMS
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- Decide how to meet the standards
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Phase 3: Implement the CMS
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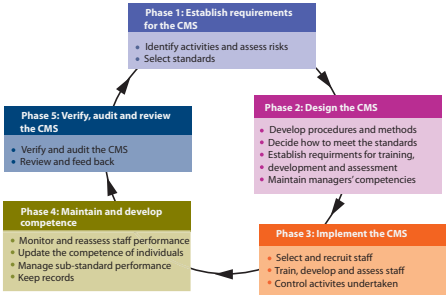| Principle 7	Select and recruit staff	A systematic approach has been made to match the individual to the job using a competence-based selection process. In terms of physical fitness to do the job safely, factors such as lung function, blood-pressure, urine (drug/alcohol screening) and audiometry have been considered. Where visual danger signals are frequently encountered, candidates have bee tested for visual acuity and colour perception.
Principle 7	Select and recruit staff	The Operator can demonstrate consistency and fairness in setting common standards for both new recruits to activities and existing personnel selected to undertake new activities.
Principle 7	Select and recruit staff	The Operator's selection and recruitment of new personnel includes suitable selection methods. Many skills are transferable to a new job, and often knowledge gained from one job can be used in another. The recruitment and selection process should identify the relevant experience, skills and knowledge required for candidates taking on new or similar work. Methods include questionnaires, application forms, worked test examples, and interviews. A structured interview, with a single set of questions, can be used to compare candidates. In some jobs, selection and recruitment can be assisted by the candidate working alongside a member of staff for a day or two. The candidate can experience the work and working environment, while the member of staff can observe the candidate.
Principle 7	Select and recruit staff	In the case of a person transferring from one company/organisation to another to perform the same or a similar job or activity, the recruiting Operator has applied appropriate standards for selection, which will highlight the recruit's ability to carry out all aspects of the new activity.
Principle 7	Select and recruit staff	The Operator can demonstrate the use of appropriate methods to test the candidate's aptitude and mental abilities. For some tasks, selection may include tests of a candidate's aptitude and mental abilities. This may be relevant where the ability to learn, follow rules or make decisions may be a crucial factor. There are many different methods for this, e.g. psychometric tests and in-tray exercises, but whatever assessment tools are chosen, they need to be reliable, validated and consistently applied.

Principle 8	Train, develop and assess staff	The Operator has defined the activities to be carried out by new recruits or members of staff and the training and development required to undertake those tasks, sometimes referred to as a Training Needs Analysis. With regard to this: ▪ Did the TNA identify whether or not knowledge can be assumed from previous job experience? ▪ Do expectations regarding transfer of training appear realistic? ▪ Did the TNA identify appropriate methods of training and instruction i.e. bearing in mind the level of control/performance required, e.g. knowledge-based (classroom), rule-based (procedural) and skill-based (simulation)? ▪ Has a training & development plan been prepared for staff undertaking safety and/or environmentally critical tasks? Did it involve the Trainee, Line Manager and, where appropriate, the Training Department? ▪ Is the training profile accurate, up-to-date and does it reflect the roles and responsibilities of the job holder? ▪ How are the key roles and responsibilities communicated to the post holder? ▪ Does the training plan cover major accident hazards, e.g. with reference to the safety and/or environmentally critical post, does it consider how MAH scenarios can be initiated, prevented and mitigated? Does it capture and explain the reasons for particular actions and controls etc? ▪ Is there evidence that incidents and near misses have in some way contributed to the content of the training programme? ▪ Does training cover 'team behaviour' and, where appropriate, responding as a team during emergencies? ▪ Is emergency response training conducted under realistic conditions for both team and individual?
Principle 8	Train, develop and assess staff	The Operator has arrangements in place to be able to train and develop each individual to attain the required standards of competence using the defined assessment methods based on the gap between current and intended performance.
Principle 8	Train, develop and assess staff	The Operator assesses competence using defined risk-based methods. The Operator assesses each individual using methods defined through the risk assessment process. The methods may involve any combination of direct observation, indirectly gained information, unannounced monitoring, incident simulation, use of a simulator, written and verbal tests using open and multi-choice questions. Information may be taken from a personal task or log book. The candidate should understand the methods of assessment before the assessment is made. The competence assessment should be proportional to the hazards and risks involved with the activity e.g. by the use of adequate testing, pass marks and performance checks, and the verification required.
Principle 8	Train, develop and assess staff	The Operator has arrangements in place to be able to effectively manage those 'not yet competent'. A person who is assessed as being 'not yet competent' may need further training and development to gain sufficient practical experience prior to another assessment. Feedback from the assessment should state which activities were not being competently carried out and indicate what further training and development is required. he individual should not undertake activities that they are not yet competent to undertake, other than where they are directly supervised or the work is checked by a competent person. A decision should be made on the suit ability of the person for further training and development. If agreed, the train ing and development should be carried out, followed by a further assessment.

Principle 8	Train, develop and assess staff	The Operator can apply the system to contractors and subcontractors. Contractors should operate to the same competence standards as permanent staff. The contracting company should ensure that the CMS they use is aligned to that of the Operator. It should be subjected to verification and audit. Alternatively, contract staff should be assessed within the client company's own assessment and re-assessment programmes. Contractor companies should themselves ensure that any subcontractors they employ also have a suitable CMS in place.
Principle 8	Train, develop and assess staff	The Operator can demonstrate that it has considered the impact of changed circumstances on the system or the use of different equipment. Re-assessment and additional training and development are likely to be required as part of the introduction of new processes, plant, etc. The changes may be in the working conditions, e.g. shift working, or the introduction of new plant, equipment or processes.
Principle 8	Train, develop and assess staff	The Operator retains records, or certificates, of competence. A record should be made that the person has been assessed as competent to carry out the activity, referencing the competence standard(s) against which the person was assessed. Best practice suggests that the name of the assessor(s) and the expiry date of the assessment should be recorded. This record should be kept and maintained by the Operator and be made available to others who may need to see it.
Principle 8	Train, develop and assess staff	The Operator can demonstrate that individuals are given sufficient opportunity to consolidate training. With regard to this: ■ Does the post holder have someone to go to, regardless of shift, if they are unsure about anything, i.e. a buddy or mentor? ■ Do they feel that they have enough time to consolidate training, i.e. practise and rehearse before doing the task/activity for real? ■ Are they comfortable with the level of supervision provided and amount of feedback given on task performance? ■ Are there generally sufficient resources available to release people for training? ■ Is line management supportive of training and development needs? ■ Is the individual regularly asked to do jobs that they are not competent to do? ■ Is there a tendency to assign particular tasks to the same people, thus depriving others of the opportunity to consolidate training? ■ Do arrangements exist to change the frequency for carrying out competence assessments in response to changes to process, incidents and other sources of information about business performance?.

Principle 9	Control activities undertaken	The Operator has arrangements in place to ensure that individuals only perform activities that they are competent to carry out. Personnel and their line managers should know which activities personnel have been assessed as being currently competent and authorised to undertake. Personnel should be made aware of the importance of only carrying out those activities for which they have been assessed as competent and for which their assessment is current.
Principle 9	Control activities undertaken	The Operator can demonstrate that contractors and subcontractors are competent to carry out the activities assigned to them. Contractor companies should know which activities their personnel are currently competent and authorised to undertake. Each contractor and the Operator should be clear which activities individuals are competent to undertake. The Operator should not allow personnel to work outside these boundaries. Subcontractors should be subject to the same controls.

Principle 9	Control activities undertaken	When planning and allocating resources for jobs, the Operator can demonstrate that he selects only competent people to undertake the work. When putting work teams together it is important to know which competencies are needed by all team members, and which, by only some team members.
Principle 9	Control activities undertaken	The Operator can demonstrate that line managers are aware of the range of activities that their personnel and contractors are currently competent to carry out, and the context and environment in which the work will take place. The line manager should not ask personnel or contractors to carry out work for which they have not been assessed as being currently competent. Control processes should be in place and managers should ensure that the controls are enforced, so that no individual is asked to carry out work they are not currently competent to perform.
Principle 9	Control activities undertaken	The Operator can demonstrate that personnel and contractors are not asked by management to carry out an activity for which they have not been assessed as being currently competent, and will not be adequately supervised. Equally, the Operator can demonstrate that if personnel or contractors are asked to perform such an activity, that they are able to refuse. Such a request may be made for a number of reasons, e.g. by mistake, no one else available, no supervisor available to check the work, or in an emergency. In each case the personnel or contractors should be able to refuse to do the work if they are not competent to do it, and the management should accept this as the correct decision, with no detriment to the personnel or contractors.
Principle 9	Control activities undertaken	The Operator can demonstrate that following training, personnel are supervised by a suitably competent person until such time as they have acquired the necessary experience etc. and are deemed competent. After training to undertake a new activity, most personnel require some practical experience to become sufficiently competent to undertake the task unsupervised. Where personnel are not yet competent they should be supervised by a currently competent person. The supervisor should control the activities undertaken, check that the activity has either been carried out correctly and/or ensure that any necessary corrective action is taken, and take overall responsibility for the work.
Principle 9	Control activities undertaken	The Operator can demonstrate that they have clearly defined procedures for those personnel changing jobs or employers, or standing in for others on jobs that involve additional activities. When personnel change jobs or employers, competence should be assessed/re-assessed before personnel start their new activities. When changing jobs or employers some assessment will be required and some development may be needed before people can work unsupervised. Until all the assessments have been completed a competent supervisor should check the work. When a member of personnel stands in for someone else, e.g. someone on leave, but does not have the necessary competencies to cover all the work, a currently competent supervisor should check the work and take overall responsibility for the work.
Principle 9	Control activities undertaken	The Operator can demonstrate that there is proper and effective communication both within and between teams working on site. Teams are frequently used to carry out a range of activities. The competence make-up of a team will depend upon the mix of competencies of each member, and how well they work together as a team. The nature of the competence mix of the team may place limitations on what the team may do. The competence of the team leader is vital for ensuring good relationships within the team and that each member of the team communicates effectively.

COMAH
Control of Major Accident Hazards

Phase 4: Maintain and develop competence

- Monitor and reassess staff performance
- Update the competence of individuals
- Manage sub-standard performance
- Keep records

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Principle 10	Monitor and re-assess personnel performance	Operating procedures are being used to train and assess people as being competent. Based on a walk-through of a sample of operating procedures, are they accurate, up-to-date, reflect how the work is actually done, and how the work needs to be done to ensure process safety?.
Principle 10	Monitor and re-assess personnel performance	The Operator can demonstrate that he checks competence through planned, informal, remote and unannounced monitoring. Monitoring of performance against agreed key assessment criteria lies at the heart of maintaining and developing standards of competence. Between planned re-assessments, competent and consistent performance can be checked via monitoring by a supervisor, line manager or mentor. The frequency should relate to the risk involved in carrying out the activity and the interval between planned re-assessments. The monitoring may include the following: ■ Planned monitoring, regularly and previously arranged, as part of a structured scheme; ■ Informal monitoring by observing operations as part of day-to-day supervision; ■ Remote monitoring; ■ Unannounced formal checks, which are undertaken at random intervals, and inspection of personal log books, where they exist.
Principle 10	Monitor and re-assess personnel performance	The Operator can demonstrate that he has additional measures in place to monitor newly qualified personnel. Newly qualified personnel will have been assessed as competent. However, because they are relatively inexperienced, a controlled development of their experience, together with post-qualification monitoring, will help to ensure their increasing competence as they experience more of the infrequent events. In this way the confidence of both the newly qualified personnel member and the line manager is increased. Monitoring should take account of situations of highest risk and, where possible, target infrequent events and emergencies.
Principle 10	Monitor and re-assess personnel performance	The Operator has established the appropriate nature and frequency of planned re-assessments to address identified risks. Monitoring and re-assessment ensures that competence can be checked in a wider range of situations, allowing for testing in simulated situations and to probe underpinning knowledge and understanding. Monitoring and re-assessment test that individuals maintain the necessary level of commitment, skill, experience and knowledge to perform at an acceptable level in the environment in which they are to operate. The frequency of monitoring and re-assessment should link with and take account of the risk assessment data. Operators should check that their re-assessment frequencies are consistent with other organisations having similar plant and processes.

Principle 10	Monitor and re-assess personnel performance	Re-assessments are carried out by personnel who are competent to undertake the assessment and whose own assessment is current. It is thus important to have a systematic and planned approach to monitoring and re-assessment.
Principle 10	Monitor and re-assess personnel performance	The Operator can demonstrate that personnel will not continue to carry out an activity after the expiry date of an assessment until they have been re-assessed as being competent. Personnel should be re-assessed after any significant lapse in performance has been identified that may question their competence, and when line managers request an assessment. For some work, where a person has not carried out a specific activity for an agreed period, a re-assessment is likely to be needed in the specific activity before it can be undertaken again.
Principle 10	Monitor and re-assess personnel performance	The Operator can demonstrate that personnel remain competent to deal with emergencies. (Emergencies occur relatively rarely so it can be difficult to monitor the performance of personnel under these circumstances. That said, some foreseeable process deviations could occur relatively frequently, some even daily.) Personnel should remain competent to deal with all these events and there should be systematic methods for monitoring and re-assessment, with refresher training and development as required. The outputs from Principles 1 to 4 will determine the most appropriate methods. Such methods may include: ■ Tabletop exercises, e.g. working through a planned scenario with one or more personnel responding to a particular situation; and ■ Simulation of procedures using real equipment.
Principle 10	Monitor and re-assess personnel performance	The Operator can demonstrate that when planning re-assessment programmes they take into account relevant information available from analysis of personnel records for accidents, injuries and incidents, as well as information from monitoring an individual's performance. Analysis of this data can highlight an individual's shortfall or a pattern of deteriorating performance against the agreed performance standards.
Principle 10	Monitor and re-assess personnel performance	The Operator can demonstrate that re-assessment is undertaken following incidents. If personnel or contractors are involved in an incident, they should be re-assessed in terms of their core and any more advanced competencies related to the incident and its control. The extent of this re-assessment should be proportionate, but this is a key element in maintaining levels of competence.
Principle 10	Monitor and re-assess personnel performance	Where NVQs are used to set the standards for training, they are relevant to the local context and followed-up by on-the-job assessment. Are the NVQs linked to MAH scenarios, e.g. do they consider how job/tasks might initiate, prevent or mitigate MAH?.

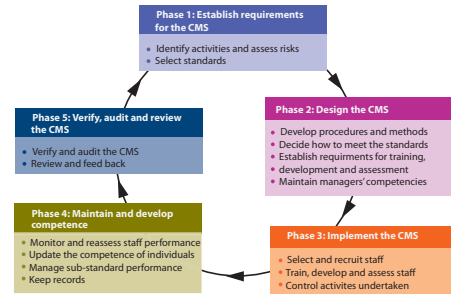| Principle 11	Update the competence of individuals	Arrangements are in place to actively monitor changes in legislation / guidance etc. and to develop and deliver relevant training regarding these changes. New legislation, changes in existing legislation, revised guidance on existing legislation, and expected changes, will produce new requirements. New mandatory industry standards and new rules, procedures and ways of working, e.g. lessons learned from accident inquiries, will also produce new requirements. Competence standards may need to be altered and the competence of personnel updated and assessed; this may require additional training and development.

Principle 11	Update the competence of individuals	Arrangements are in place for the delivery of appropriate training in the event of the introduction of new or modified plant, equipment and/or processes. Risk assessments will need to be revised, and the competence of personnel may need to be updated and re-assessed to more detailed competence standards as a result of such changes; this may require additional training and development.
Principle 11	Update the competence of individuals	Arrangements are in place for the delivery of appropriate training in the event of changes to the operating methods and/or maintenance procedures for plant and equipment. Manufacturers and/or Operators may change or give notice that they will be changing the operating methods and maintenance procedures and standards for plant and equipment, especially where defects become known. The maintenance work to be carried out and its frequency may change. Reducing the frequency may require additional work to be carried out each time it is maintained. The competence of personnel may need to be updated and assessed; this may require additional training and development.
Principle 11	Update the competence of individuals	Arrangements are in place for the delivery of appropriate training in the event of organisational changes. Changes in an organisation can affect the work carried out, the responsibilities of personnel and the reporting chain for communications and it is vital that personnel are clear about the roles and responsibilities they have. Changes in shift patterns and hours of work may cause fatigue. Changes in contracts and contractor companies can have effects on the work and on the standards worked to. It is important to analyse the effects of a change before it is allowed to take place and then to monitor the change after implementation. The competence of personnel may also need to be updated and assessed requiring additional training or development, preferably before the changes take place.
Principle 11	Update the competence of individuals	Arrangements are in place to identify the need for and be able to deliver refresher training. Many activities and events occur infrequently, they may or may not be foreseeable, for which refresher training or coaching will help to maintain competence, in conjunction with competence assessment. Refresher training should also be seen as an opportunity for repeating key messages. Such learning events may be enhanced by using alternative ways to make the presentation fresh and relevant.
Principle 11	Update the competence of individuals	Arrangements are in place to effectively deliver regular personnel briefings, obtain feedback from personnel, and have open discussions. These can assist in maintaining and updating competence, e.g. regular team meetings or experienced personnel giving feedback to newly qualified personnel. Briefings need to be planned, but additional briefings may be required after a major accident or incident. There may be instances when it would be best for line managers to brief personnel on a one-to-one basis, e.g. concerning an individual's competence, when a group briefing would be inappropriate. At all briefings management should ensure personnel understand the information given to them, and that personnel can obtain further clarification as required. The following subjects are likely to be most beneficial in these meetings: ■ New and revised operational requirements; ■ Temporary procedures that take into account foreseeable process deviations; ■ Lessons learned from accidents, incidents, statistical trends and management information systems; ■ Technical revisions; ■ Revised procedures; ■ Modified competence standards; and ■ Changes to recruitment standards.

Principle 12	Manage sub standard performance	There are arrangements in place to identify sub-standard performance and its causes. Performance below the required standard of competence may result in the health and safety of people and/or the environment being com promised. Such sub-standard performance can be identified through formal and informal monitoring, planned re-assessment and from appraisal and performance reviews. The system should establish the nature of any gap that exists between the performance observed and the required standard of performance, and the reasons for any gap. The causes for a gap may be associated with one or more of the following compliance issues: ■ Lack of confidence or experience; ■ Changes in ability, e.g. skill or knowledge of a situation that has been lost since the last re-assessment; ■ Lack of willingness, e.g. attitude, approach, motivation, commitment, rule violation; ■ Internal and external factors, e.g. changes in shift patterns, etc.; ■ Lack of concentration, e.g. multiple activities that may reduce the level of concentration, fatigue, etc.; ■ Poor team working, e.g. poor supervision of the team or poor communications within the team; ■ Personal reasons, e.g. stress, family problems; ■ Poor relationships at work, e.g. between personnel within the team; ■ Change in health and fitness, e.g. deteriorating eyesight; and ■ Omissions or deficiencies in a previous assessment.
Principle 12	Manage sub standard performance	The Operator is aware that the perceived company culture can contribute to sub-standard performance. An individual may feel pressurised to complete a job by 'cutting corners'. A supervisor may put pressure on an individual to deliver a result. Although the Operator would not support 'cutting corners' or taking unnecessary risks, personnel may react to a perceived pressure to perform and respond inappropriately. In a similar way, those working for contractor companies may perceive and respond to pressure from the Operator. Therefore care is needed to ensure that the expected standards are clearly understood and followed in practice.
Principle 12	Manage sub standard performance	There are arrangements in place to monitor both team and individual performance. In certain areas of work people increasingly work in teams. Where these are multi-skilled teams personnel may have similar competencies, or more likely a range of different but complementary competencies. It is important for the Operator to be able to identify core competencies that all team members need, such as communication skills, and those that can be held by only some personnel. It is also important for the Operator to monitor both team and individual performance and to detect when any member may be working below standard. This sub-standard performance may affect the overall standard of the team and will require an appropriate response that may be directed at the whole team or at an individual. The competencies that senior management teams require are also important and need to be considered. However, the measurement of such competencies may be over longer time scales.
Principle 12	Manage sub standard performance	There are arrangements in place for detecting where a person is working below standard, and for implementing a development programme to restore competence.

Principle 12	Manage sub standard performance	There are arrangements in place for the more frequent monitoring of an individual or team where a programme to restore competence has been put in place. Where relevant, the area of the specific activity where there has been sub-standard performance should be targeted and scrutinised more closely.
Principle 12	Manage sub standard performance	There are arrangements in place for the removal from the workplace, where necessary, of an individual who has been found to be working below standard. Alternatively, and where appropriate, there are arrangements in place to provide them with greater supervision. The decision to remove someone will depend upon the context and the level of seriousness. Any removal is likely to be only short term and lead to some form of development and re-assessment. Where the development programme and re-assessment shows that a person is not yet sufficiently competent, or where it was decided that the person is not suitable for a development programme, then that person should be regarded as being no longer suitable for carrying out the activity, and some form of re-deployment should be considered.

Principle 13	Keep records	There are arrangements in place for the maintenance of safety and/or environmentally critical records, including: ■ Competence assessment records; ■ Certificates of competence; and ■ Records of aptitude and significant events.

COMAH   Control of Major Accident Hazards

Phase 1: Establish requirements for the CMS
- Identify activities and assess risks
- Select standards

Phase 5: Verify, audit and review the CMS
- Verify and audit the CMS
- Review and feed back

Phase 2: Design the CMS
- Develop procedures and methods
- Decide how to meet the standards
- Establish requirments for training, development and assessment
- Maintain managers' competencies

Phase 4: Maintain and develop competence
- Monitor and reassess staff performance
- Update the competence of individuals
- Manage sub-standard performance
- Keep records

Phase 3: Implement the CMS
- Select and recruit staff
- Train, develop and assess staff
- Control activites undertaken

Phase 5: Verify, audit and review the CMS

- ■ Verify and audit the CMS
- ■ Review and feed back

Principle 14	Verify and audit the CMS	There are arrangements in place to verify that the CMS is operating as intended. Verification is concerned with operation and the assessment aspects of the CMS as well as the assessors. The focus is on the quality, effectiveness and degree of compliance to determine how well the assessments have been carried out, and how closely the assessment process has been followed. These checks should look at the use of appropriate competence standards, methods of assessment, and the consistent use of the procedures and work instructions developed for the CMS. Normally, internal independent verification is sufficient, but with high-risk activities it may be appropriate to supplement it with external verification.
Principle 14	Verify and audit the CMS	There are arrangements in place to audit the CMS. Audit of the CMS will look at the system as a whole, sampling and checking the performance and compliance over the entire scope of the CMS against the procedures and the latest regulatory requirements. It may also include sampling and other checks on the up-to-date competencies of the managers operating the system and maintaining auditable records. The audit of the procedures and work instructions should take into account relevant standards. Normally the audit will be carried out by an auditor external to the company, but familiar with systems for competence assessment. External auditors should be qualified as auditors or external verifiers. The audit should check the results and recommendations from the verification, from which further recommendations may result.

Principle 15	Review and feedback	There are arrangements in place to review the CMS to ensure that it remains effective. The review should assess performance of the overall system against agreed standards, key performance indicators, industry trends and recommendations resulting from verification and audit. A judgement should be made on whether the initial assessment of risks was satisfactory, if the objectives have been achieved and if recommendations made for improvements should be implemented. Analysis of company safety performance data can play an important part in the review. This may include an analysis of a range of key performance indicators which need to be linked to personnel competence, especially those indicating precursors to incidents. A root cause analysis of accidents and incidents may indicate inadequate levels of competence. Industry-wide accident, injury and incident, including 'near miss' reports, provide a valuable benchmark against which to assess any shortcomings in standards, competence of personnel, assessment methods and other internal competence-related factors. The opportunity should be taken to learn from accidents, injuries and incidents in order to develop the system to make it more effective in preventing similar occurrences within the company. When the review has been completed, the results and recommendations need to be fed back into the relevant phases of the process leading to a systematic and regular updating and improvement of the CMS. The managers involved in operating the CMS should consider any recommendations resulting from verification and audit, and implement those agreed.

Annex 3: How the CMS Cycle aligns with HSG65 and Reg 5(1) of the Management of Health and Safety at Work Regulations 1999.

Every employer shall make and give effect to such arrangements as are appropriate, having regard to the nature of his activities and the size of his undertaking, for the effective planning, organisation, control, monitoring and review of the preventive and protective measures.

MHSW 5(1)	MHSW ACOP (with paragraph number)	Successful health and safety management HSG65		CMS Cycle
planning	33 Employers should set up an effective health and safety management system to implement their health and safety policy which is proportionate to the hazards and risks. Adequate planning includes: a) adopting a systematic approach to the completion of a risk assessment. Risk assessment methods should be used to decide on priorities and to set objectives for eliminating hazards and reducing risks. This should include a programme, with deadlines for the completion of the risk assessment process, together with suitable deadlines for the design and implementation of the preventive and protective measures which are necessary; b) selecting appropriate methods of risk control to minimise risks; c) establishing priorities and developing performance standards both for the completion of the risk assessment(s) and the implementation of preventive and protective measures, which at each stage minimises the risk of harm to people. Wherever possible, risks are eliminated through selection and design of facilities, equipment and processes.	Policy Effective health and safety policies set a clear direction for the organisation to follow. They contribute to all aspects of business performance as part of a demonstrable commitment to continuous improvement. Responsibilities to people and the environment are met in ways which fulfil the spirit and letter of the law. Stakeholders' expectations in the activity (whether they are shareholders, employees, or their representatives, customers or society at large) are satisfied. There are cost-effective approaches to preserving and developing physical and human resources, which reduce financial losses and liabilities.	P	The requirements for the system are established in Phase 1, starting with the identification of activities that may affect (initiate, propagate or exacerbate) major accident hazards (Principle 1). The risk assessment, with control measures, identifies those activities where the competence of people to control risks is important. This leads to defining and selecting the competence standards for individuals to enable them to control risks adequately and consistently (Principle 2).
organisation,	34 This includes: a) involving employees and their representatives in carrying out risk assessments, deciding on preventive and protective measures and implementing those requirements in the workplace. This may be achieved by the use of formal health and safety committees where they exist, and by the use of team working, where employees are involved in deciding on the appropriate preventive and protective measures and written procedures etc; b) establishing effective means of communication and consultation in which a positive approach to health and safety is visible and clear. The employer should have adequate health and safety information and make sure it is communicated to	Organising for health and safety An effective management structure and arrangements are in place for delivering the policy. All personnel are motivated and empowered to work safely and to protect their long-term health, not simply to avoid accidents. The arrangements are: ■ underpinned by effective personnel involvement and participation; and ■ sustained by effective communication and the promotion of competence, which allows all employees and their representatives to make a responsible and informed contribution to the health and safety-effort.	O	The procedures, methods and work instructions for operating the system are developed to prevent MAH and achieve consistency (Principle 3). How each competence standard is met and assessed is then established (Principle 4). The extent of the training, development and assessment requirements is established (Principle 5). The competencies and responsibilities of those managing and operating the system are established (Principle 6).

MHSW 5(1)	MHSW ACOP (with paragraph number)	Successful health and safety management HSG65		CMS Cycle
	employees and their representatives, so informed decisions can be made about the choice of preventive and protective measures. Effective communication will ensure that employees are provided with sufficient information so that control measures can be implemented effectively; c) securing competence by the provision of adequate information, instruction and training and its evaluation, particularly for those who carry out risk assessments and make decisions about preventive and protective measures. Where necessary this will need to be supported by the provision of adequate health and safety assistance or advice.	There is a shared common understanding of the organisation's vision, values and beliefs. A positive health and safety culture is fostered by the visible and active leadership of senior managers.		
control	35 Establishing control includes: a) clarifying health and safety responsibilities and ensuring that the activities of everyone are well co-ordinated; b) ensuring everyone with responsibilities under stands clearly what they have to do to dis charge their responsibilities, and ensure they have the time and resources to discharge them effectively; c) setting standards to judge the performance of those with responsibilities and ensure they meet them. It is important to reward good performance as well as to take action to improve poor performance; and d) ensuring adequate and appropriate supervision, particularly for those who are learning and who are new to a job.	**Planning and Implementing** There is a planned and systematic approach to implementing the health and safety policy through an effective health and safety management system. The aim is to minimise risks. Risk assessment methods are used to decide on priorities and to set objectives for eliminating hazards and reducing risks. Wherever possible, risks are eliminated through selection and design of facilities, equipment and processes. If risks cannot be eliminated, they are minimised by the use of physical controls or, as a last resort, through systems of work and personal protective equipment. Performance standards are established and used for measuring achievement. Specific actions to promote a positive health and safety culture are identified.	P	Personnel are selected and recruited (Principle 7) against standards selected previously, and trained, developed and assessed (Principle 8) against the competence standards and methods already selected (Principles 2 and 4). Control processes should be established to ensure that personnel and contractors only undertake work for which they are competent (Principle 9).
monitoring	36 Employers should measure what they are doing to implement their health and safety policy, to assess how effectively they are controlling risks, and how well they are developing a positive health and safety culture. Monitoring includes: a) having a plan and making adequate routine inspections and checks to ensure that preventive and protective measures are in place and effective. Active monitoring reveals how effectively the health and safety management system is functioning; b) adequately investigating the immediate and underlying causes of incidents and accidents to ensure that remedial action is taken, lessons are learnt and longer term objectives are introduced. 37 In both cases it may be appropriate to record and analyse the results of monitoring activity, to identify any underlying themes or trends which may not be apparent from looking at events in isolation.	**Measuring Performance** Performance is measured against agreed standards to reveal when and where improvement is needed. Active self-monitoring reveals how effectively the health and safety management system is functioning. This looks at both hardware (premises, plant and substances) and software (people, procedures and systems) including individual behaviour and performance. If controls fail, reactive monitoring discovers why by investigating accidents, ill health or incidents which could cause harm or loss. The objectives of active and reactive monitoring are: ■ to determine the immediate causes of sub-standard performance; and	M	Monitoring and reassessment of the personnel ensures that performance is being maintained (Principle 10), and that the competence of individuals is updated (Principle 11) in response to relevant changes including changes in legislation, standards and equipment. In particular, systems are required to identify sub-standard performance and restore the competence of individuals (Principle 12). Records must be maintained and made available when requested (Principle 13).

MHSW 5(1)	MHSW ACOP (with paragraph number)	Successful health and safety management HSG65		CMS Cycle
		■ to identify the underlying causes and the implications for the design and operation of the health and safety management system. Longer-term objectives are also monitored.		
and review	38 Review involves: a) establishing priorities for necessary remedial action that were discovered as a result of monitoring to ensure that suitable action is taken in good time and is completed; b) periodically reviewing the whole of the health and safety management system including the elements of planning, organisation, control and monitoring to ensure that the whole system remains effective.	**Auditing and reviewing performance** The organisation learns from all relevant experience and applies the lessons. There is a systematic review of performance based on data from monitoring and from independent audits of the whole health and safety management system. These form the basis of self-regulation and of complying with sections 2 to 6 of the Health and Safety at Work etc Act 1974 (HSW Act) and other relevant statutory provisions. There is a strong commitment to continuous improvement involving the constant development of policies, systems and techniques of risk control. Performance is assessed by: ■ internal reference to key performance indicators; and ■ external comparison with the performance of business competitors and best practice, irrespective of employment sector. Performance is also often recorded in annual reports.	AR	The verification and audit of the system (Principle 14) checks on the competence assessments and the assessment process. The COMAH Operator should review the whole system and feed back, using the information from verification and audit (Principle 15), to update the requirements for the CMS which returns the system to phases 1 and 2, leading to changes or modifications to system design.

COMAH Control of Major Accident Hazards

Annex 4: Supplementary Information
Key Principles in the Design of Critical Procedures

1. An Operator's risk assessment should clearly establish if procedures are an appropriate control measure. The results should inform the development of the procedure, for example by considering the competencies required to undertake them. Procedures will still be required where fully automatic systems are provided and such procedures may also be critical, e.g. the testing of safety instrumented systems.

2. The Operator should have effective arrangements for managing procedures which includes: an overview of where and when written procedures are appropriate over other control measures; how to decide which tasks need procedures; how these are developed, complied with and reviewed / updated; and assurance that those responsible for the development of procedures and systems have the necessary knowledge, skills and experience.

3. Operators may use task analysis to inform the contents of procedures, for example by walking and talking through the task with those undertaking the work. The format, style and level of detail should be appropriate to the person, task and consequences of failure. Operators can further support compliance with procedures through user-involvement in development of the procedures, designing the task, job, environment, and equipment, etc.

4. Where written procedures are an essential element to ensure the task is completed correctly there are a number of important elements that should be considered during the inspection, including:

   - Who are they designed for?
   - What competencies and authorisations are required to undertake the tasks outlined within the procedure?
   - Are the job-aids designed with employee's needs in mind and with their involvement?
   - What are the critical steps? These should be properly specified within the document.
   - The critical tasks should contain the essential information. For example, the correct torque settings and required valve seal types should be specified, rather than reference to another document.
   - Diagrams and flow charts etc. can aid clarity.
   - When should tasks be undertaken, and in what order, and why does it matter?
   - How should the task be done, with what equipment, and what specifications should be followed?
   - What level of checking and supervision is needed (e.g. bench-testing a standby compressor before bringing it back into service).
   - What warnings and cautions are needed to help assure the procedure, e.g. inform people using the procedure of the important key steps, information, and of key hazards and risks both to themselves and to others, immediately or later.
   - Whether staff use the procedures and if not what reasons are given for not using the procedures provided.

Training
Standards for training

5. Performance on the job, after or between periods of training, should be closely monitored and measured. Many organisations use on-the-job training as part of the overall development programme for each individual. Again this approach is permissible providing it is structured, linked to MAH, and can be measured. Inspectors should look for evidence of a 'training log' in which performance attainments and reports by relevant training personnel are entered at prescribed intervals.

6. Guidance from high hazard industries suggests that it is good practice for two or more supervisory personnel, with close knowledge of the individual's performance, to score the person under assessment on carefully defined rating scales. The two or more assessments should be made independently of each other. Inspectors should look at the assessment rating scales to ensure that they provide measurement on all the general and specific attributes which are known to contribute to skilled performance. It is also important to check that the assessment/selection teams receive formal training in order to ensure consistency in the criteria which are applied (perhaps as part of a train-the-trainer programme).

7. There is a clear need for some method of measuring the success of personnel whilst actually on the job. Many organisations use National Vocational Qualification (NVQs) to set the standards for training. Inspectors should check that NVQs are relevant to the local context and that training is followed by on-the-job assessment to show that the training is being applied. If the NVQ lacks a MAH focus, inspection should look for evidence that additional training / instruction is being provided to ensure that candidates are given an underpinning knowledge of MAH/process safety risks.

Methods of training

8. Modern analysis of human reliability distinguishes three levels of control.

9. The highest of these is the 'knowledge-based' or symbolic level of performance, which relies on formal learnt principles (e.g. the principles of an exothermic reaction). This behaviour is evident when the situation is novel and unexpected. Under such circumstances Operators are required to know the fundamental principles and laws by which the system is governed. As such, knowledge-based performance depends upon training in formal principles (e.g. Joule-Thomson effect etc.) and classroom methods are a well-tried and widely used method of imparting such knowledge.

10. The intermediate 'rule-based' level of performance is characterised by the use of rules and procedures to select the correct course of action when faced with a familiar situation. It often happens at the planning stage of the decision-making process and can result in the application of a bad plan or the mis-application of a good one (i.e. rule-based mistakes). Correct performance at the rule-based level is difficult to teach by classroom methods, though some diagnostic rules of the 'check-list' type may be helpful.

11. The lowest level of control is the 'skill-based' level of performance, which is characterised by automatic / habitual behaviour when dealing with a familiar and non-problematic task. This level of performance is well adapted to being taken over by automatic devices. However, the skill-level is still needed to ensure that the person looks towards the correct display and presses the appropriate button on the DCS etc. Skill-based performance has to be learnt in real situations, or on a simulator sufficiently realistic to provide the same signals as would apply in an operating situation. Peoples' skills that are used in ordinary non-emergency situations can be practised on the job. Emergency tasks may not occur sufficiently often during normal operation and therefore must be simulated (including site-wide rehearsals, drills and exercises etc.).

12. The various levels of performance also interact since the effects of one action alter the effects of another. The key point to remember is that most 'safety and/or environmentally critical jobs' will require a combination of all three levels of performance. It thus follows that the Operator should be providing a balance of classroom, simulation and on-the-job or embedded training methods. The provision of simulation does not remove the need for real experience, but excessive reliance on experience may lead to bad or outdated practices and it is thus important that people are regularly tested (against independently derived criteria) in the way in which they carry out their tasks. Human Reliability Analysis is a complex subject area and further advice / help can be obtained from HID / HSL Human Factors teams.

Individual v team training (and training for stress)

13. Most experts agree that no one job and no one person can ever be seen in total isolation. For the initial stages of training where the candidate needs to be introduced to the subject and then brought up to basic standards, individual training will be more appropriate; in further stages team training will have an important part to play, especially for tasks that are rarely performed, such as emergency response.

14. The importance of this should not be underestimated as research indicates that context plays an important part during the recall of information. Therefore, inspectors should look for signs that emergency response training is conducted under realistic conditions, including both the level of demand, and as far as possible, the seriousness of error. This also includes any requirement to respond as a team, i.e. if the safety and/or environmentally critical post involves a team response then arrangements should exist for people to train, drill and rehearse as a team under realistic conditions.

15. It is regarded as good practice for all levels of personnel (from the Director to the newest recruit) to be periodically assessed in terms of training needs. Inspection should look for evidence that those in positions of management have received some training and instruction in their understanding and execution of the tasks of those who report to them, those alongside them, and those to whom they themselves report to, especially if they are required to 'deputise' for their Line Manager.

16. The training of instructors must be of such a standard that the instructor cannot be faulted by line management or by one of his/her trainees. Communication skills training will be necessary for both Line Manager and trainer (e.g. trained to communicate both by the written and spoken word). Inspectors should establish how recently (if at all) the trainer has attended a "Train-the trainer" course and what it actually entailed.

COMAH Control of Major Accident Hazards

Developing and Maintaining the Competence of Individuals

17. This Delivery Guide focuses on a COMAH Operator's CMS. Similarly, principles 7 to 12 can be used to assist in the process of developing and maintaining the competence of individuals. The flow chart below consists of a number of tasks (shown as rectangles) and decision boxes (shown as diamonds) with the corresponding principles alongside.
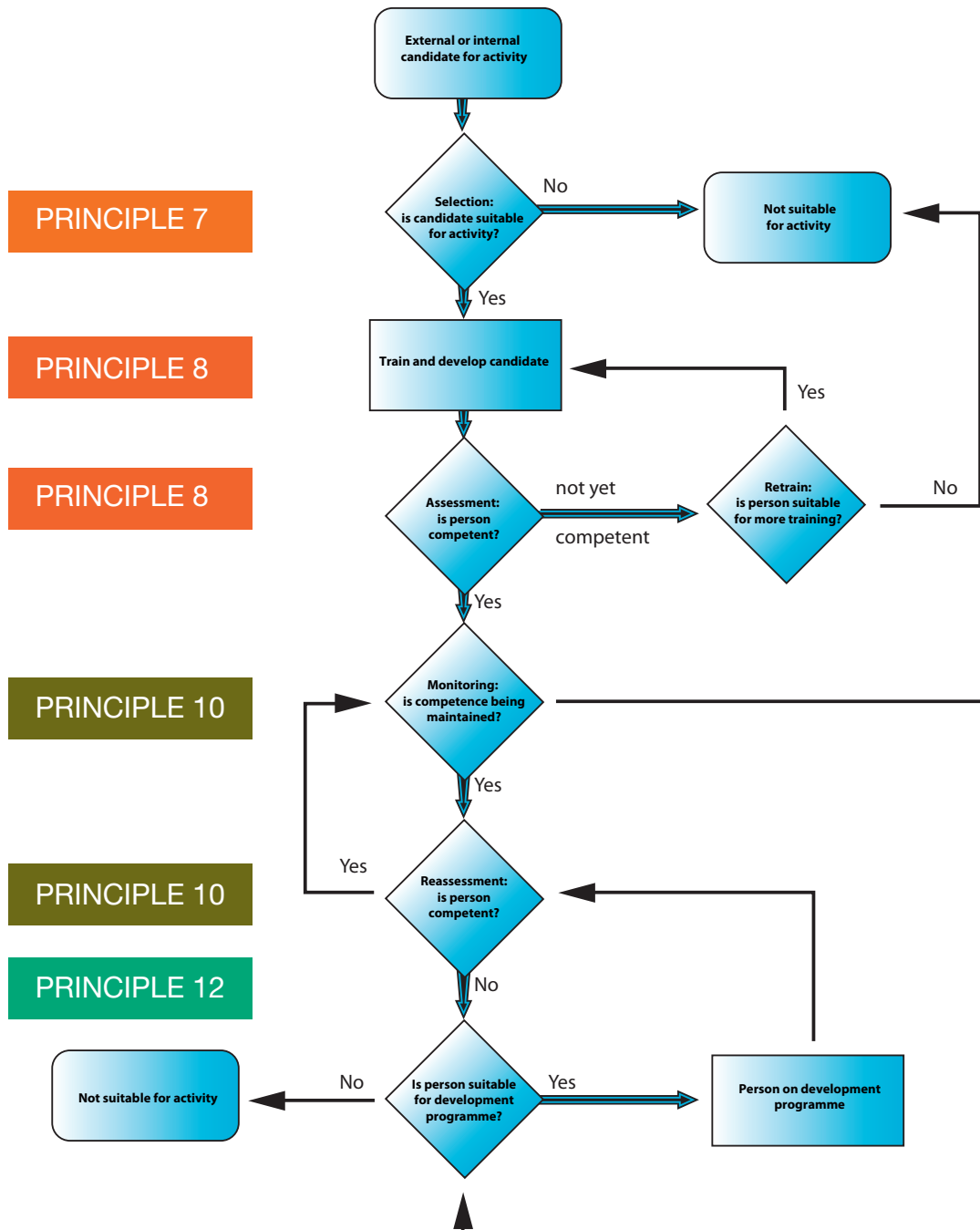
Figure 4: Developing and maintaining the competence of individuals

Recruitment and selection

18. The candidates for recruitment or for selection to carry out new activities are either selected as suitable for the activity, or rejected as not being suitable for the activity (Principle 7).

Training, development and assessment

19. The personnel and recruits are trained and developed and then submitted for assessment (Principle 8). Some will be assessed as competent. Others will not yet be competent; some of these will be suitable for more training and development, but others may not be suitable for the activity (Principle 8).

Training, development and assessment

20. Those who have been assessed as competent will be monitored to ensure that their competence is being maintained. It is also beneficial to aim assessment activities towards continuous improvement and further development of personnel skills and knowledge (Principle 10). Personnel continue working, with formal and informal monitoring, for most of the time that they are carrying out the activity. The monitoring may detect that a person's competence is not being maintained, as shown by sub-standard performance. If the person is suitable for a development programme to help restore competence (Principle 12), the programme can be implemented and the person re-assessed (Principle 10). In some cases the person may not be suitable for a development programme, and consequently is not suitable to continue to carry out the activity (Principle 12).

Re-assessment

21. The personnel who continue to be competent will be periodically re-assessed (Principle 10). Some personnel may be re-assessed, as required by their line manager. If the re-assessment is successful, they will continue carrying out the activity, and monitoring continues (Principle 10) until the next re-assessment. The re-assessment may identify that competence is not being maintained, as shown by sub-standard performance, in which case the decision needs to be made about whether the person is suitable for a development programme (Principle 12) to help restore competence, followed by re-assessment. In some cases the person may not be suitable for a development programme, and consequently is not suitable to continue to carry out the activity (Principle 12).

22. Figure 4 on page 46 is a simplified version of how the CMS can be applied to an individual.

COMAH
Control of Major Accident Hazards

Annex 5: References and Supporting Information

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    Supplementary material [1.1MB] http://www.hse.gov.uk/humanfactors/topics/mancomppt2.pdf