HUMAN FACTORS

BRIEFING NOTE No. 7

Training and competence

Training: Training helps people acquire the skills, knowledge and attitudes to make them competent in the health and safety aspects of their work. It includes formal off the job training, instruction to individuals and groups, and on the job coaching and counselling. Source: Reference 1.

'SQEP': The term 'SQEP' is used in industry to mean 'suitably qualified and experienced person'. SQEP may be considered as a criterion for competence. Also, 'competence' and 'competency' are both used to mean a measure of an employee's knowledge, skill and experience.

Why training and competence?

Having competent staff is critical to running a safe operation. They should be competent in their day to day work but also in health and safety matters – for example, recognising hazards and risks at work. Training of personnel is a key factor in establishing a good safety culture.

There are many methods that can be applied to the key stages of establishing competence. Some will be more suitable than others to your particular needs. Training should not be used to try to overcome poor design elsewhere, for example, poor design of workplace, tools, equipment or procedures.

Are training and competence being handled effectively?

If the answer to any of the following questions is 'No', then you should take action!	Yes	No
1. Does the company assess employees' training needs when they are first recruited or redeployed, and does it continually assess these needs?		
2. Is it easy to apply for and get any training that is needed?		
3. Is training based on defined needs, for example, to control toxic or flammable releases that could lead to a major incident?		
4. Are training facilities good?		
5. Is enough time allowed for training and to apply what was learned in training afterwards?		
6. Does the company keep training records showing what training everyone has had and their current level of competence?		
7. Are trainees tested after training to see if it has been successful (met its objectives, and provided practical results, not just theoretical knowledge)?		
8. Are methods of assessing training effectiveness thorough and valid (do assessors ask the right questions; is on-job performance observed or measured, are practical tests administered)?		
9. Is training in health and safety provided?		
10. Are contractors, temporary workers and part timers given the training they need?		
11. Does training cover rare, unusual and emergency events?		
12. Do members of the workforce feel generally that the people they work with are fully competent?		
13. Are training courses regularly updated and improved?		
14. Is it always clear what the training is trying to achieve? Do the trainers set clear targets?		

What should my company do about it?

All industrial organisations should have a competence management system. This should have four main sections:

- Selection of personnel – identifying people who have the right aptitudes, experience and skills to do the work.
- Training – deciding the best type of training to pass on any further knowledge and skills required. This may be classroom training, using simulators, practice rigs or models, on the job training etc.
- Assessment – covering two aspects of competence:
    a) Selection, described above, is an initial assessment: looking at formal qualifications, asking questions and perhaps applying tests to find out the candidate's strengths and weaknesses.
    b) After training – testing, observing etc. to find out if the training has had the desired effect.
- Evaluation – assessing the training system itself to make sure it delivers the desired results, and changing it if it doesn't.

Management responsibility

Management should make adequate arrangements to implement, resource and monitor the four parts of the system described in more detail below.

Selection of personnel

- Develop a clear understanding of the type of person required using, for example, job task analysis.
- Review applications against a list of ideal characteristics.
- Estimate numbers and type of staff required from information available (e.g. risk assessments, staffing assessment tools, the safety case, company policies, and best practice).

Training

- Develop individual training plans for all workforce.
- Identify training needs (task analysis techniques are useful here).
    - What does the trainee need to learn (e.g. to control major accident hazards, to understand processes and hazards and thus consequences of their actions)?
    - What skills are needed?
- Consider whether this training is:
    - Initial training/familiarisation.
    - 'Refresher' training to maintain skill levels.
    - Required because of new plant or equipment.
    - Related to a change of job.
    - Health and safety training rather than skills training.
    - To develop non-technical skills (e.g. management/supervision, deputising, team building, communications, decision-making, or stress management).

CASE STUDY 1

On 25 September 1998, a heat exchanger at Esso's Longford gas plant (GP1) in Victoria, Australia, fractured releasing highly flammable liquid and vapour. The resulting fire killed two people and injured eight others. The coroner's inquest report noted that those "who were operating GP1…did not have the knowledge of the dangers…and did not take the necessary steps to avert those dangers. Nor did those charged with the supervision of the operations have the necessary knowledge and the steps taken by them were inappropriate. The lack of knowledge on the part of both operators and supervisors was directly attributable to a deficiency in their initial and subsequent training. Not only was their training inadequate, but there were no current operating procedures to guide them in dealing with the problem."

Source: Report of State Coroner Victoria case nos. 2907/98 and 2906/98 November 2002.

- For contractors or temporary staff.
- To teach infrequently used skills and knowledge (e.g. emergency, plant start-up, or error recovery).
- Focused on safety critical tasks.
- For maintenance tasks (including diagnosis/troubleshooting and problem-solving).

- Identify the best method of delivering the above training:
  - Are exercises or drills appropriate?
  - Consider simulators – are they needed; how realistic do they need to be?
  - Provide sufficient resources: training rooms/areas; trainers – who are themselves competent to train, knowledgeable and credible; give people time to attend courses. Note that mentoring and shadowing are also part of training.
  - Use actual job procedures for training (take the opportunity to check them first to ensure the procedures trained with are accurate).
  - Train teams together if they need to work closely together: stimulate team-building during training.

Assessment

- Give regular feedback and encouragement during training.
- Apply tests or observations afterwards – you should assess more than just skills: e.g. hazard awareness, safety attitude and behaviour; identify any shortfalls in everyday performance that suggest lack of competence.
- Have standards to measure against to ensure that training achieves its aims (including standards for assessor competence).
- Discuss the results/next steps.
- Provide extra supervision and support to recent trainees.
- Continually assess employees' competence.
- Keep records of training received and due ('passports' may be useful for this).

Evaluation

- Continually review the competence system.
- Use incident analyses to provide information on gaps in competence (ensure that the system exists to report incidents and that the workforce feel comfortable using it).
- Beware that enjoyment of a training course is not a measure of effectiveness!
- Get independent assessments.
- Keep abreast of new developments and practices in training.

CASE STUDY 2

"From 15 October 2002, to present, MMS [Minerals Management Service] has issued 42 training-related incidents of noncompliance (INCs) to 27 different operators. The majority of these INCs have centered around the operators' evaluations of their contractors, either in their failure to conduct an evaluation of the contractors' training plans or their failure to verify that the contractor personnel were trained."

MMS also noted in the same alert that the highly experienced personnel were moving into deepwater operations leading to "voids that are being filled with inexperienced personnel (less than 10 years' total experience), such as toolpushers, drillers, production foremen, and senior production operators, in key positions."

Source: Safety Alert No. 249, http://www.gomr.mms.gov..

CASE STUDY 3

"There are companies that are prepared to invest in training, there are those that make a token gesture and regrettably there are a significant number that make no investment, seeking to poach personnel from other companies and operate below manning levels that are demonstrably unsafe. Increasing numbers of quality personnel are required not only to meet technological change and increased demand but also to ensure the survivability and profitability of an organisation."

Source: Allan Graveson, 2nd International Scientific Maritime Conference: Frederick University, Limassol, 2008.

Measuring performance

Below is a sample of performance indicators that could potentially be used to monitor how effectively training and competence is being managed, divided into leading indicators (showing that a problem may occur in future) and lagging indicators (showing that there is currently a problem). See Briefing note 17 *Performance indicators* for more information on using performance indicators.

Leading indicators	Lagging indicators
Presence of a formal competence management system. Number or percentage of employees trained per period as compared with schedule. Percentage of training records complete/up-to-date. Number or percentage of safety critical staff assessed to be competent in their roles (based on competency assessment programme/use of simulator re-assessment). Number or percentage of staff satisfactorily completing refresher training as compared with schedule (this is not the same as competence; also, the number of non-attendees may indicate staffing pressures).	Percentage of candidates failed after training and assessment. Shortage of required skills and experience for specific tasks. Workmanship problems in maintenance. 'Mission failures' during operations. Feedback on staff competence from third-party body (based on annual audits).

CASE STUDY 4

"Competence plays a very important role in ensuring functional safety. Safety-related systems rely on a complex mix of hardware (e.g. automatic guards and trips), software (e.g. traffic monitoring on road networks), human factors (e.g. safety culture) and safety management systems. Competence is also vital in abnormal and emergency situations."

Source: HSE (2007) Managing competence for safety-related systems. http://www.hse.gov.uk/.

References

1. HSE (2000), *Successful health and safety management*, HSG 65, HSE Books.

Further reading

- HSE (2003), *Competence assessment for the hazardous industries*, RR086, HSE Books.
- HSE, Human factors: *Competence* http://www.hse.gov.uk/humanfactors/comah/competence.htm.
- Cogent, *Sector skills council for the chemicals and pharmaceuticals, oil and gas, nuclear, petroleum and polymer industries* http://www.cogent-ssc.com/ (has a competence assurance sub-site).
- HSE, Human factors Briefing note No.2 *Training and competence* http://www.hse.gov.uk/humanfactors/comah.
- IAEA (1996), *Nuclear power plant personnel training and its evaluation*.
- Office of Rail Regulation (2007), *Maintaining staff competence,* ORR/09/07.

For background information on this resource pack, please see Briefing note 1 *Introduction*.