Revitalising procedures

Introduction

This document provides guidance for employers responsible for major hazards on how to develop procedures that are appropriate, fit-for-purpose, accurate, 'owned' by the workforce and, most of all, *useful.* It covers offshore and onshore oil, gas and chemical installations; will also apply to railway operators and nuclear installations, and is also relevant to non-major hazards industries.

This guidance is intended to provide practical help for managers, supervisors and others in the chemical and petrochemical industries who are involved in designing, using, checking and reviewing safe working procedures for safety-critical tasks or safety-related activities or processes. It will also help operators and safety representatives who are involved - as they should be - in helping draw up or review procedures.

> Following a recent major incident, several inadequacies were identified with the procedures. Critical information was distributed between various documents, with incorrect cross-referencing. Insufficient detail was provided, with no identification of safety critical tasks or roles. There was evidence that procedures were not used as working documents.

Why address procedures?

Problems with procedures are frequently cited as the cause of major accidents. The main causes are too much reliance placed on procedures to control risk, a failure to follow safe working procedures or the use of inadequate procedures. A study of refinery incidents in the United States concluded that procedures were the most common human factors root cause (accounting for 22% of all refinery incidents). Procedures problems have contributed to some of the world's worst incidents, such as Bhopal, Piper Alpha and Clapham Junction.

> One major oil company reviewed its operating procedures and benefited from significant efficiency gains, for example, reduced start-up times. The full involvement of employees was a crucial feature of this process.

What are procedures … and why do we need them?

Procedures are agreed **safe ways of doing things**. Written procedures usually consist of step-by-step instructions and related information needed to help carry out tasks safely. They may include checklists, decision aids, diagrams, flow-charts and other types of **job aids** – more on these later. Remember that procedures are not always paper documents – they may appear as 'on screen' help in control system displays. In the major hazard industries, procedures are essential for a number of reasons:

- To minimise errors/failures;

- To protect against loss of operating knowledge (for example, when experienced personnel leave);

- To standardise working practice;

- To provide a basis for training;

- To meet statutory requirements.

Procedural violations

Many major hazard companies stress compliance with procedures as a control against major accidents. During site inspections and through reading safety reports, we are often informed that operators adhere to written procedures. Two important questions to ask here are: (i) Do they? and (ii) How do you know that they do? People do not always follow procedures outside of work activities (such as the Highway Code) and so is it reasonable to assume 100% compliance at work?

Determining whether a procedure is likely to be followed or not is as important as considering the technical merits of the procedure. The consequences of inadequate procedures, or operators not following procedures, can be disastrous.

Why do people not always follow procedures?

Procedures may not be complied with for a variety of reasons and some of the more common are:

- Procedures are not correct or out-of-date;

- Procedures are difficult to use or follow;

- Procedures are not readily available/portable;

- There are easier ways of performing the task;

- Pressure from peers;

- A failure to understand the risks;

- Perceived pressure from management to 'get the job done'.

How can you encourage compliance with procedures?

- Design the job or task so that the correct procedure is hard to avoid (e.g. by engineering-out short cuts through equipment design or programmable logic controllers);

- Base the procedure on how the task is actually performed. The operators may have devised an informal procedure that is quicker/easier and these methods should be incorporated into the formal procedure (as long as safety/quality issues are not compromised).

- Identify incentives to take short cuts (such as work pressures) and address these directly;

- Adopt a control and review process to keep procedures relevant and up-to-date.

Different types of procedures

Procedures may range from detailed guidance, through step-by-step instructions, to short checklists. You may require several types of procedures for some tasks: those used for training new users will differ from those used in the field by 'old hands'. It is important that the procedure provided be **fit for purpose**.

Deciding between different types of procedures
In order to decide on the level of detail needed in the procedure, there are several factors that you must consider, including the significance of error, the complexity of the task, how often the task is performed and the competence of the user.

Using job aids
Job aids support the successful performance of a task, for example *checklists* may be used for complex isolations or *decision aids* used to help control room operators problem-solving when responding to alarms. They often take the form of diagrams and flow charts.

Job aids reduce the amount of decision-making and decrease the need to memorise key points. Above all, they should be practical – some companies produce key information on small laminated cards that can withstand everyday use in an industrial environment. You may find that operators have devised their own job aids and you should not ignore or prohibit these, as long as they are safe ways of working. These informal job aids and other useful notes are contained in 'black books' and are often based on years of operating experience.

The flowchart in Figure 2 can help you to decide between different levels of procedural support.

Figure 2: Deciding between different types of procedures

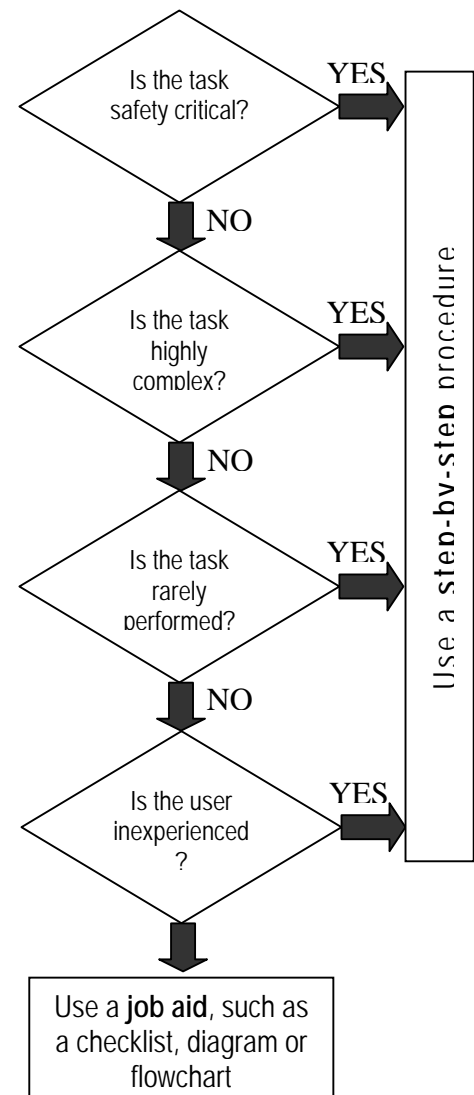# A widespread approach to procedures

Frequently, when an accident or near miss occurs, a company takes one or more of the following actions:

- Writes a new procedure to cover the specific problem identified;

- Re-writes existing procedures to make them more 'user-friendly'; or

- Re-trains operators in the procedures.

Neither of these actions will address the underlying causes of the incident, but simply focus on **preventing the incident that has already occurred.**

Encouraging involvement
Procedure users should always be involved in writing procedures in order to encourage ownership and compliance. This is not simply assigning procedure writing to one individual, but obtaining the active input of as many users as possible (e.g. different teams/shifts).

Involve procedure users

Procedure users should be involved in two aspects:

(i) identifying issues with current procedures, and
(ii) revising or writing new procedures.

Questions to ask procedure users
- Do they always use the procedures? - Why not?

- Are procedures up-to-date?

- Do they reflect how tasks are performed?

- Are they of the right level of detail?

- Do they include safety critical tasks?

- Do they identify all the necessary warnings?

- Are they easy to use?

- Do operators use 'black books'? - Why?

- Ask them to explain how to do a specific task - Do they always do it that way? - How do they remember how to do it?

- Were they involved in developing procedures?

Where do procedures fit into risk control?

The decision to rely on a procedure to control a risk must always come after all reasonable attempts to remove or reduce hazards. Wherever procedures are chosen as part of a defence against major hazards or risks this can only be justified if compliance can be assured.

Procedures, by their very nature, depend upon operators following them and having a suitable procedure in the first place. Clearly, manual operations (and hence operating procedures) may not be appropriate when controlling major hazards or risks, at least not as the sole defence.

If you do rely on operators following procedures for major hazard control, you need to be able to **justify** this reliance. This may involve the use of human reliability assessment. You may wish to consider alternative controls for the performance of safety critical tasks.

Procedures are not to be confused with....

.....manuals, reference sets of full procedures, site and corporate standards. These are clearly not intended for day-to-day practical use. Such larger documents provide a record, can be referred to when necessary, and provide the basis for training. But they will normally be too long or bulky to take to, or to use on, the job. In other words they wouldn't help in the immediate performance of a task. In some cases you may want to keep procedures in a manual to be used for training and provide job aids to be used when the task is actually performed.

Links between training, competency and procedures

You can't write a procedure for every eventuality that employees may face - ultimately you will have to rely on correct identification and assessment of key hazards and risks, and on a competent work force operating in a good safety culture. However, good procedures, along with job aids where appropriate, will help.

Where reliance on people has been properly justified for safety-critical tasks, then check to see they are matched by suitable:

- Training and competence arrangements; and
- Procedures and other job aids.

The skills and competencies needed for tasks have to be identified (by job or skills analysis) and then fed into the training and competence programmes and (by e.g. risk assessment/task analysis) into the procedures and other job aids.

Equally, developing training and experience programmes won't be fruitful if they are not based firmly on site procedures - there's not much point in spending money and effort on procedure-based classroom or on-the-job training if trainees subsequently find the procedures don't match real work practices on the site.

Finally, checking and reviewing training and competence, and procedures, provides invaluable feedback on how well you are managing the assurance of safety-critical tasks - and, again, this feeds into improving competency and procedures. This is the continuous improvement cycle.

3 steps to improving your procedures:

Step 1: Consider your system of managing procedures
In order to review your 'procedure for developing procedures' you should consider whether you have the following processes:

- a formal process in place to determine which safety critical operations/tasks need procedures (e.g. by HAZOP/risk assessment);

- a process in place to consider how the work activities of non-company personnel (e.g. contractors) are managed;

- an approvals process for operating procedures;

- involving operators in writing of procedures;

- ensuring consistency in the procedures used across site for identical tasks or operations;

- a process in place to ensure that procedures remain valid and up-to-date;

- a formal mechanism in place for removal of all out-of-date procedures;

- a formal mechanism in place to ensure that staff are trained in new/updated procedures;

- an ongoing monitoring system to ensure compliance with procedures;

- a process to ensure that relevant procedural controls are reviewed following an incident or audit non-compliance.

Step 2: Identify safety critical tasks
Put simply: why spend energy, time and money on developing procedures for areas that aren't priorities? So start with the identified safety-critical tasks. Check your risk assessments - and for major hazard sites, review your major accident hazard analysis in your COMAH safety report. You should review procedures for such safety critical operations as:

- Start-up and shut down;

- Commissioning;

- Abnormal/emergency events

- Bulk loading/unloading;

- Maintenance of safety systems;

- Plant/process change.

Step 3: Review key procedures
Where you identify that a procedure is required you should review it against the following criteria:

Reviewing procedures

Regardless of their format, there are a number of important elements to procedures, including:

- *Who are they for?* What competencies and authorisation is needed? And are the job aids designed with operators' needs in mind, and with their involvement?

- *What are the key steps?* Specify these - don't refer to a table in a manual kept elsewhere for torque settings, valve seal types etc. - and don't just say 'suitable' tools. Consider diagrams and flow charts etc to add clarity.

- *Why is a procedure (or a key step) necessary or critical?* Make sure the procedure or job aid includes this information.

- *Where exactly is the task - or individual step - to be carried out?* Is it feasible to do it there? - e.g. Consider accessibility for maintenance tasks.

- *When should things be done?* And in what order - and why does it matter?

- *How should the task be done?* Again this is partly a competency question but consider also how much time is allowed or needed for the work to be done properly; how many people are needed; specify tools, materials, instruments, torque/calibration values, gasket specifications; what level of checking and supervision is needed (e.g. bench-testing a standby compressor before bringing it back into service; checking valve positions etc before a start-up). And finally:

- *What warnings and cautions* are needed to help assure the procedure, for example to let employees using the procedure know the importance of key steps, information etc., and of key hazards and risks both to themselves and to others, immediately or later.

There are several activities that you can undertake to identify shortfalls in current procedures:

- Talk to those who either use or are involved in supervising/monitoring procedures;

- Identify informal procedures and other job aids e.g. the personal 'black books' of key information often carried by staff;

- Review a sample of existing procedures with a team representative of those involved – talk through the written procedure at the place of work;

- Analyse accidents, incidents, near misses and instances of non-compliance.

In order to review your procedures, you will need a detailed understanding of how people interact with each other and the system. This can be achieved by describing the actions that people are required to perform and the decisions that they have to make.

The information required for this process can be gathered from the above four activities (i.e. talking to users, identifying informal procedures, evaluating key procedures and reviewing incidents etc). This process of understanding how people perform their activities is called **task analysis**.

In addition to procedure development, information from task analyses can be used for a variety of other purposes including determining what people you need, how many people, what controls and displays are necessary and training requirements.

Presenting procedures – formatting and layout

Even the best-written procedures may not be followed where the safety culture (local or site/ company-wide) predisposes employees to violate them. However, when you have considered your management arrangements (Step 1 above) the box below provides some guidance that can help ensure that procedures are as clear as possible. Further guidance is available in the HSE publication 'Reducing error and influencing behaviour' HSG48.

Formatting and presenting procedures

- Only use UPPER CASE for emphasis

- State who does what and when

- Number all steps (e.g. 1.1, 1.2, 1.2.1)

- Use the present tense and the active voice (Starting sentences with a verb often helps)

- Include only one action for each procedural step

- Do not use more than one negative

- Use short, simple sentences

- Give quantitative values/limits

- Rather than referring to other procedures, try to include the steps in full

- Ensure that quantities and dimensions correspond to those on controls and displays

- Highlight *warnings* (e.g. bold, italics, in a box) and place them before the relevant step – warnings should be explanatory (i.e. what happens if…), not actions

Improvements in usability will not increase the use of procedures without workforce buy-in and you should therefore ensure their active involvement and participation at all stages.

Summary

This document has outlined a three-step approach to developing procedures in the major hazards industries. In order to prioritise resources, there should be a focus on safety critical tasks. Sites should develop formal processes to:

- Determine where procedures are required;

- Determine the nature of support required;

- Ensure that procedures are relevant and up-to-date;

- Involve procedure users at all stages;

- Ensure compliance with procedures.

Further advice

For site-specific advice on particular changes, or concerning legal compliance, advice should be sought from the HSE, EA or SEPA inspector for your site.

For general advice on the matters set out in this guidance, contact Martin Anderson in HSE's HID Human Factors Team, Tel: 0151 951 3495 e-mail: martin.anderson@hse.gsi.gov.uk

References

- Reducing error and influencing behaviour HSG48 (Second edition) HSE Books 1999 ISBN 0 7176 2452 8

- Improving maintenance: A guide to reducing human error HSE Books 2000 ISBN 0 7176 1818 8