Human Safety Factors Information

EIGA

Prepared by the Safety Advisory Group

Safety Info HF - 04/09

Task

Design and Effectiveness of Procedures

Procedure: a written description of the steps, identified through proper analysis of a task, which you need to follow to safely perform a task or to carry out a job of work. A procedure may be on paper or be presented on a computer screen, including diagrams, flowcharts, checklists etc. to make the text easier to understand.

Safety Critical Procedure: describes a procedure for a task which, if carried out incorrectly or not at all could lead to injury, fatality, serious damage to plant or environment or loss of containment.

Learning more about design and effectiveness of procedures.

If the answer to any of the questions below is 'no', then you need to take action

1. Is there a formal process in place to determine which safety critical operations/tasks need procedures (e.g. HAZOP's or risk assessments; incident/accident root cause analysis)?
2. Do the procedures in existence cover the range of areas/operations expected? e.g.
    - Maintenance tasks.
    - Plant Start up and Shutdown.
    - Plant Operation.
    - Abnormal or Emergency tasks.
    - Troubleshooting.
    - Training and Competence arrangements.
3. Is there a process in place to consider how the work of contractors or temporary staff is managed?
4. Is there an approval process for operating procedures?
5. Are the formats of the procedures (checklists, instructions, flow sheets etc) appropriate for their application? e.g.
    - Routine operation.
    - Safety critical operation.
    - Emergency and upset conditions.
6. Is there a consistency in the procedures used across sites or plants where the task or operation is identical?
7. Are operators involved in the identification and writing of procedures?
8. Do the procedures clearly identify responsibilities for tasks?
9. Is there a change management (Management of Change) process in place to manage revisions and updates to procedures?

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10. Are operators trained in new or changed procedures?
11. Is there an ongoing monitoring system to ensure compliance to procedures?
12. Are your procedures easily accessible?
13. Are they written so that they can be understood and followed easily?
14. Do they reflect the tasks as they are actually carried out?
15. Do the procedures include key safety information?
16. Are they kept up to date and reviewed occasionally?
17. Are procedures set out in logical steps and do they describe all items of special equipment you need for each job e.g. tools, clothing, PPE?
18. Is there any observation system in place to check the right implementation of the procedures?

What can we do about it?

Management Responsibility

Management should make sure they are familiar with modern standards for designing procedures and should actively encourage any initiatives to improve existing procedures

- Get feedback from operators on any problems and deal with them as quickly as possible.

They should also regularly check that procedures are being used properly and be prepared to make changes if the procedures are at fault.
If people are not using procedures, find out why. They may have discovered a better method of doing the work; on the other hand, their new method may be risky.

- Make sure there is a system for considering new methods.

Have Effective Procedures

Procedures, especially operating and maintenance procedures are important for the prevention of incidents and ill health. Written procedures are vital in maintaining consistency and in ensuring that everyone has the same basic level of information. They are a key element of a safety management system and an important training tool. However, poor procedures can be a reason for people not following recommended actions.
As well as being technically accurate, procedures need to be well-written, usable and up to date. Remember that even if your procedures are not formally written down they exist through the working practices of staff.

Procedures ideally need to:

- be accurate and complete;
- be clear and concise with an appropriate level of detail;
- be current and up to date;
- be supported by training;
- be accessible,
- identify any hazards;
- state necessary precautions for hazards;
- use familiar language;
- use consistent terminology;
- explicitly and accurately reference equipment names and tag numbers;
- reflect how tasks are actually carried out;
- promote ownership by users; and
- be in a suitable format.

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Writing and maintaining well designed procedures

First Steps.

Start by collecting information about the task and the users. To do this you could carry out an activity analysis. You will also need to have the results of any relevant risk assessments to hand so that the procedure can reflect arrangements to maintain adequate control of identified risks.
Here are some issues to think about:

- consider both the difficulty and importance of the task(s) to be documented;
- find out how often the task is carried out and the potential hazards;
- think about who will use the procedure and the level of information they need (providing too much information may lead to less use of the procedure if users find it too detailed and hard to follow, too little information may mean that an inexperienced person will not be able to carry out the task);
- establish the skills, experience level, past training and needs of the users of the procedure; and look at whether the procedure needs to be supported by training in order to promote understanding and effective use.

Write procedures

Promote ownership by encouraging users to participate in the preparation and maintenance of the procedure. E.g.

- Experienced staff could write the procedure and users could review it.
- Ask users about the ease of use of a procedure and whether it is easy to understand.
- Encourage users to suggest improvements to existing procedures.

Procedures can appear in many different forms, e.g. as printed text documents, electronically, as quick reference cards, or as posted notices.

- It is important that users know where the procedures can be found and that this is convenient for them.
- If it takes too long to find a procedure users will be more reluctant to use it.
- Procedures which are duplicated, e.g. as posted notices as well as printed text documents should not contain conflicting instructions.

Think about the issue of style.

- As general guidance keep sentences short and avoid use of complex sentence structure. This will make the procedure easier to read and understand.
- Try to write the required actions that users need to do in positive active sentences e.g. 'Open valve A then valve B'. This is easier to follow than the more complicated - 'After opening valve B open valve A' or 'Do not open valve B until valve A has been opened'.
- Put items in the order in which they need to be carried out. It is easier to follow a procedure which states 'Do A then do B' rather than 'Before doing B do A'. For procedures which are complex, rarely carried out, or performed in adverse conditions it is helpful to document the steps of the procedure one at a time.

Effective use can be made of:

- flow charts;
- decision tables (often in the form of 'if condition X, then go to step Y');
- questions
    - e.g. is the temperature greater than 1000^{o}C?
        - Yes, go to step 1; No, go to step 2.
- diagrams.

Divide longer procedures into shorter parts. This helps users to go back to a particular step if they are interrupted or if the task takes some time to carry out.

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AVOID USING ALL CAPITAL LETTERS FOR THE TEXT. Research shows that this is slower and more difficult for us to read than the lower case text we are more used to.

Decide how features such as capitals, bold, italics, and underlining will be used. Overuse of these features is very distracting for users.

Avoid using very small fonts e.g. 8 poInt or smaller) as this is very difficult for users to read

Make good use of open space in the printed text. If the page appears too cluttered, users will be discouraged from reading it. Although the procedure may have more pages, providing spaces between steps on the page will make it more usable.

Try to use the same format for all procedures. This will help users find their way around the text. An inconsistent format could confuse the user. A typical format would include:

- purpose of the procedure;
- precautions which must be observed to avoid potential hazards;
- special tools or equipment needed;
- initial conditions which must be satisfied before starting;
- references to other relevant documents, e.g. data sheets or manuals; and
- procedural steps to perform the task safely and efficiently.

Users may be very familiar with some frequently carried out procedures. Here it may be more effective if the procedure is in the form of a quick reference card containing the key precautions and action steps.

Warning information about potential hazards is usually given in a precautions section at the start of the procedure and in the form of 'cautions' adjacent to the relevant procedural steps.

- The precautions section needs to give the user information on what can happen, why, the consequences of ignoring the precaution and the appropriate intervention steps to take (if applicable).
- It is best to restrict the precautions section to important health and safety issues.
- Too much information about self-evident issues will reduce the impact of the key messages

Cautions in the procedural steps reiterate the precautions and intervention steps if applicable.

- Make sure that a caution appears immediately before the relevant step in the procedure and on the same page as the step.
- Ensure that the caution is clear, concise and contains only the relevant information for the user.
- Consider use of caution or warning signs or symbols with the text.
- Usually a caution or warning contains only information to alert or explain something to the user. Information about actions to carry out is contained in the procedural steps.

Use procedures

- Train people in procedures: use the training to make them familiar with the content of the procedure but also to test the procedure itself – it may contain errors or may not be practical
- Make sure procedures are suitable for contractors who, for example, may not be familiar with local terminology or work practices and may have come from a different working culture
- Make sure that when someone needs a procedure, they can find it quickly and easily
- Inexperienced people may need a different type of procedure compared with 'experts', but, for hazardous and rare tasks, even experts should be required to use a procedure

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Manage procedures

- Plan for any changes in the task (changes in equipment or materials used or changes in methods)
  - Start to change the procedures well before they are needed and issue them for training or familiarisation before they are first used.
- You may need temporary arrangements if it is not possible to update a procedure quickly e.g. extra supervision or temporary working instructions
- Control your procedures:
  - Put a date on them
  - Keep a log of who holds a copy and retrieve and dispose of out of date copies
  - Discourage the making and use of unofficial copies
  - Review procedures periodically to see if they need to be updated.
- If the system for managing procedures is not working, be prepared to change it.

Useful Reference Information

1. Institute of Petroleum, Safety Critical Procedures, Human Factors Briefing Notes No 6, 2003.
2. Health and Safety Executive, Procedures, HSE Human Factors Briefing Note No 4.
3. Health and Safety Executive, HSE Human Factors Toolkit, June 2004.
4. Health and Safety Executive, Reducing Error and Influencing Behaviour, HSG48, 2007, HSE Books ISBN 978-0-7176-2452-2

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