HUMAN FACTORS

BRIEFING NOTE No. 22

Willingness to act

Willingness to act describes the willingness of employees to make decisions to shut down operations, stop production, release product overboard, etc. in order to prevent a potential emergency situation. A key example is whether an operator would press the emergency shutdown (ESD) button in a plant when required. From the management viewpoint, ESD operation is encouraged if there is a danger to life or to the whole plant, but frequent ESD operation could cause significant operational problems, safety issues and lost revenue through business interruption.

Why willingness to act?

Failure or hesitation to act has contributed to high profile incidents such as that at Chevron's Richmond refinery (See Case Study 1). However, operators face a dilemma when deciding whether to act. Will the operator be punished? Is it the right decision to take? Will it result in extra work etc.?

> 'We don't call it the ESD button, we call it the 'P45' button.'
>
> Source: Offshore platform banter

Does your company encourage its workforce to take action in possibly hazardous situations?

If the answer to any of the following questions is 'No' then you should take action!	Yes	No
1. Does the organisation's safety policy or mission statement (implicitly or explicitly) support operator safety interventions?		
2. Do managers clearly and regularly (in safety briefing/toolbox talks, for example) reinforce the company's message regarding safety interventions?		
3. Is 'willingness to act' covered in training for all staff and contractors?		
4. Does training include drills, exercises or rehearsals of these actions?		
5. Are ESD and similar 'abort' or purge controls easy to access and operate?		
6. Does your organisation have the correct approach to risk (versus productivity)?		

If the answer to any of the following questions is 'Yes' then you should take action!	Yes	No
7. Are there any 'unwritten' rules or mixed messages about emergency shutdowns (e.g. management state it is okay to shut down production but make it clear in other ways it is not)?		
8. Do you know of any instances in your organisation where an operator who took a safety action, that turned out to be the wrong decision, was punished by management or taunted by colleagues about it?		
9. Do you believe the industry's economic climate affects willingness of people to act in your organisation?		
10. Do operators routinely ignore possibly hazardous situations or faults?		
11. Do operators recognise the danger signs but fail to appreciate how serious they are?		
12. Is there any evidence that operators would discourage other operators from initiating an ESD?		

What is the problem?

There is a clear dilemma for the operator on a plant when considering whether to shut down an operation or not: such shutdowns are typically costly in terms of lost production, clean-up operations and possible regulatory action. It is a particular dilemma if the situation is not clear, for example: fumes from a pump could be steam or smoke; a fire is more obvious; an unusual sound, vibration or odour could be normal, or could be a malfunctioning piece of equipment – but the cause and likely consequence is unknown. Furthermore, operators in the field may not immediately recognise a situation as hazardous, for example: a pool of unknown liquid on deck; minor but visible damage or corrosion on equipment, etc. Lastly, they may not appreciate the extent of the hazard. For example, a 'weeping' flange may not be seen as a problem, even though it could be a precursor to a larger leak.

Management decision making can be a key influence. Some organisations are cautious and will investigate all plant anomalies thoroughly, and will take early action to bring the plant into a safe state (short of shutting down). Others are more willing to tolerate defects.

Even where organisations have access to information on process or other problems that require action, management may rationalise those problems and judge – incorrectly – that these are tolerable for a while longer. Again, taking action could be costly in terms of renewing plant and generally fixing the problems found.

What should my company do about it?

Management should:

- Provide clear guidance through, for example, inductions, face-to-face daily briefings and using written signs or labels, stating that it is acceptable, if in doubt, to shut down operations.
- Ensure that everyone on site is clear on actions they may need to take. Give them clear and unambiguous authority to take such action, and give visible support to this authority.
- Support operators by providing direct feedback on their shut down actions – with no 'hidden messages'.
- Give clear examples of situations that need action and what to do if indications are unclear: it may be acceptable to delay action and to consult others in certain cases.
- Specify the action options available if a potentially hazardous situation is observed, and how to carry out those actions.
- Consider establishing crew resource management (CRM) training which has multiple benefits in ensuring teams work together and operators maintain good situational awareness (See Reference 1).
- Accept that errors in judgement – even costly errors – will occur when operators err on the side of safety.
- Remain vigilant about plant state and known issues that might give rise to the need for an ESD or, worse, will lead to tolerance and complacency towards plant defects.

CASE STUDY 1

On August 6 2012, an operator at the Richmond refinery in California noticed a puddle caused by a leak from a distillation tower pipe. The pipe contained hot (338 °C) hydrocarbon similar to diesel. The Head Operator was called to the scene but considered that the situation did not require shutting down the unit. Others – including firefighters – attended and discussed another operator's suggestion to shut down. This was rejected and, on stripping insulation from the pipe in an attempt to repair the pipe, vapour was released and ignited. A large fire broke out. There were no fatalities but 15 000 people were affected by smoke inhalation.

Sulphidation corrosion of carbon steel pipes was a known problem but the company, despite inspections confirming thinning in 2002 and some replacement work in 2011, was unwilling to act fully on the information and judged that the pipework was good for another five years.

Source: Chemical Safety Board (CSB) website, http://www.csb.gov/chevron-refinery-fire/

- Be prepared to spend money, time and resources to fix problems rather than risk a major incident.
- Be aware of the problem of 'denial' – that is, being unwilling to accept there is a serious problem – either a short-term problem (requiring immediate action) or longer-term problem.
- Be aware of, and develop strategies to counter, the factors affecting willingness to act (see below).

Factors affecting willingness to act:

- Managers' level of risk tolerance vs. risk aversion.
- Past experience (self/others) – for example, where a colleague has been reprimanded or ridiculed for taking a wrong (though erring on the side of safety) action.
- Personality of the individual required to act (e.g. risk averse/risk tolerant).
- Commercial pressure – 'can do' attitude to keep the plant running and to satisfy customers.
- Company or national culture that discourages 'speaking up' or taking initiative to act.
- Fear of management reprimands or sanctions, or derision/criticism by colleagues.
- Copying – following another person's (or group's) lead in ignoring problems.
- Lack of training – failure by the company to educate operators and contractors in the rules and expectations for safety.
- Lack of communication or sending unclear messages – supervisors or managers stating their commitment to supporting operator actions but indicating (by body language or in other subtle ways) that they would prefer no shutdowns.
- Uncertainty – being unsure that the 'problem' is really a problem; vapour released could be steam or smoke; a leak could be water, or flammable or toxic material.
- Concern as to the personal consequence of action, for example, increased workload.
- Complacency – believing that automated systems or someone else will have detected the problem and will deal with it.
- Power gradient – failing to challenge a senior- or apparently more knowledgeable- person's judgement about whether to act or not.
- Disbelief/rationalisation – fear of thinking the worst or treating an abnormal situation as normal or acceptable.

Clearly, the factors above cannot be controlled with a set of easy or universally applicable solutions. This briefing note can only provide the means for an organisation to develop insights into the problem of willingness to act. Management should consider how to act on those insights. Reference 2 offers guidance on how decisions from leaders in a company have a significant effect on safety outcomes.

CASE STUDY 2

'In an air crash in Japan in 1982 [9th February] a co-pilot tried to jerk the controls away from a malfunctioning captain, but this is unusual. Generally, pilots and co-pilots tend to be in agreement, even when both are wrong. [. . .] But it is not unusual for a deck officer to remain aghast and silent while his captain grounds a ship or collides with another'.

Source: Reference 3

CASE STUDY 3

A shift manager running a batch process, with some intermediate storage between units, shut down the entire plant on two occasions when equipment failed in one area. He could have used the interim storage which would maintain production but would have had some safety implications as the operators would not only be running in an unusual state but also trying to resolve the initial failure.

Managers taking such decisions see this as being their role to apply judgement in order to determine the appropriate action. They do not simply apply formal rules and procedures or blindly comply with regulations.

Source: Reference 4

Measuring performance

The performance indicators below can be used to monitor how the balance between safety and production is being managed at a site. Leading indicators are early warning signs that there may be a problem with 'willingness to act'; lagging indicators demonstrate that there is a problem and it has led to a visible untoward outcome. See Briefing note 17 *Performance indicators* for further information on using performance indicators.

Leading indicators	Lagging indicators
Absence of 'willingness to act' covered in training or toolbox talks/ briefings. Poorly-positioned or poorly-labelled shutdown controls. Anecdotal evidence of poor operator/management attitude prioritising production over shutdowns. Reported plant faults, damage, worn items or similar that have not been attended to (and could lead to hazards requiring shutdown).	Actual failures to shut down leading to accidents or near misses. Incidents in which uncontrolled breaches of containment occurred but the plant was kept running. Penalties – however minor – against personnel who took action to shut down the plant. Failed attempts to shut down due to poor access to controls or controls failing.

CASE STUDY 4

Two operators on an offshore facility noticed a leaking valve whilst inspecting pipework and found condensation around a plug on a pressure gauge assembly. They decided to stop the planned work of bringing on a high pressure compressor and isolated the system so that the leaking plug could be fixed. The repair delayed start-up by 12 hours. The vice president of the business unit praised the crew and visibly supported their actions.

References

1. Energy Institute, *Guidance on crew resource management (CRM) and non-technical skills training programmes*, http://publishing.energyinst.org/publication/free-to-download/guidance-on-crew-resource-management-crm-and-non-technical-skills-training-programmes2
2. Energy Institute, *Supporting safety decision making in companies: briefing notes for Board members, managers and other leaders*
3. Perrow, C. (1999) *Normal accidents: Living with high risk technologies*, Princeton University Press.
4. Hayes, J. (2013) *Operational decision-making in high-hazard organizations*, Routledge, Burlington, VT, USA.

Further reading

- Reason, J. (2008), *The human contribution*, Ashgate, Burlington, VT, USA.