Health and Safety Executive

The Importance of Safe Isolation of Plant and Equipment

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Background to HS(G) 253

- Issue of guidance in January 2006.
- Widening out scope of the Oil Industry Advisory Committee 1997 document to include all industries.
- So it is not new.
- Safe isolation should include environmental protection.
- This is not an ACOP but sets a standard that all COMAH sites should seek to attain. It represents ‘Good Practice’ and can be enforced.

Legal basis

- HSWA – keeping people safe
- Management Regs – assessing the risk
- PUWER – safety of work equipment Reg 19.
- PSSR – unintentional release of stored energy
- COSHH – exposure to dangerous substances
- Confined spaces Regs – exposure to hazardous atmosphere
- COMAH – all measures necessary

PUWER Regulation 19

- *Every employer shall ensure that where appropriate work equipment is provided with suitable means to isolate it from all its sources of energy.*
- *Clearly identifiable and readily accessible.*
- *Risks during reconnection.*
- These are all covered by HS(G) 253.

Who has duty?

- COMAH sites - the duty is with the COMAH operator and cannot be passed on to a contractor.
- The COMAH operator needs to ensure that the recommendations in HS(G) 253 are followed as far as is reasonably practical.
- The COMAH operator needs to be able to demonstrate risk is ALARP for each isolation on site that could lead to a MAH.

Reducing the risk

- Avoid risk wherever possible.
- Engineering not PPE (6 step risk assessment model - ERIC PD)
- If risk is intolerable the work should not go ahead.
- Opening up any system involves a risk, isolation is required for a 1/4” pipe as well as for a 6’ gas main.
- Use CBA to assure ALARP position.

So are all isolations the same?

- A leak from a ¼” gas line may be far more hazardous than an open end on (say) water main.
- HS(G) 253 recognises this and allows each isolation to be assessed differently.
- This ensures that the risks are controlled and gives a good indication on where the ALARP solution might lay.

Examples

So why the interest now?

- Recent incidents where poor containment was a contributory factor.
- Water main.
- Process gas
- Steam
- Refinery Plant

Water Main

- Two men working in a pit with open ended 2m water main supply line.
- Single valve isolation failed.
- Double fatality as water swirled around the pit.
- We will see later if the single valve isolation met HS(G)253 expectations.

Process gas

- Two contractors injured after blast from burning hydrocarbons in a large open topped vessel opened for maintenance.
- Isolation by single valve on live inlet and blank on live outlet. Valve not locked shut.
- Valve opened allowing flammable toxic gas into vessel.
- Routine operation - so major maintenance isolation standards were not followed.

Steam

- Fatality from high pressure steam where complex isolation failed.
- More than twenty lines fed into the isolated vessel.
- Isolations were by a number of types of valve, including control valves.
- Some were locked off, others could not be.
- Control valve operated and released superheated steam into work area. HSG 253 recommends **not** to use control valves for isolations

Toxic & Flammable

- Isolation required for work on process pipework.
- Complex refinery with miles of piping.
- Isolation identified and fitted to standard.
- Did not check effectiveness of isolation fully before breaking into pipe.
- Isolation was on the adjacent line.
- Release of toxic and flammable gases, workers hospitalised.

Mechanical Isolation

Determination of baseline isolation standard – HSG 253		Outcome Factor		
		A	B	C
Substance Category	1	R	I	I
	2	R	I	II
	3	I	II	II
	4	II	II	II
	5	II	III	III

Mechanical isolation

- Other isolations are often required – for example electrical. These are not dealt with today, where the emphasis is on the safe mechanical isolation of plant and machinery.
- Mechanical isolation can be achieved in a variety of ways and today looks at the most appropriate methods for some generic scenarios using the tools provided in HS(G) 253.

So why isolate?

- To prevent the loss of containment of what is in the piping system or the vessel.
- This may be a gas, a liquid or a powder.
- Sometimes you may isolate to stop something getting in rather than to stop something getting out.
- Sometimes you may isolate to prevent mixing of two substances that could react.

So why isolate?

- To allow maintenance or inspection.
- To take a piece of plant out of use for a short or a longer period.
- To change process streams.
- To ensure that, even on dead plant, a mistake elsewhere cannot lead to danger.
- Because there is always a potential for human error or mechanical failure.
- Defence in depth

Basic principles

- Set a policy and standards for isolation – HSG 253 Appendix 3 gives examples using the POPMAR Model.
- Set procedures with workers help.
- Train all staff – Make contractors aware and ensure compliance with company standards and expectations.
- Assess any deviation from standard.

Basic principles

- Set a plan to remedy any deviations.
- Monitor, review and audit isolations – HSG 253 Appendix 3 gives checklists for monitoring & review.
- Revise policy, standards and procedures as required.
- Set KPIs and ensure corporate overview.

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Thank you

Any questions?