Managing Process Safety during the COVID-19 Pandemic
May 2020
Background

This paper outlines a collection of various good practices and pitfalls to avoid and to help organisations manage during the COVID-19 pandemic. It has been drafted following feedback from a number of different ISC member organisations. It is not extensive but provides some useful information across a range of aspects.

Introduction

The world has seen massive upheaval at this time as we experience a global pandemic. This has seen significant numbers of COVID-19 infections across the world, over quarter of a million deaths (as at 3 May 2020) (Global Change Data Lab, 2020) and health care systems stretched beyond capacity. There is a shortage of medical personal protective equipment, as well as some treatment devices such as ventilators. While research is continuing, there is no known vaccine for a Severe Acute Respiratory Syndrome virus, such as COVID-19. The cases of infection are creating absenteeism issues for some businesses. From a societal perspective, we are seeing lockdown orders and restriction of movement. Travel has largely ceased around the world. There is significant growth in unemployment in some sectors, while urgent recruiting in others. Production has been ramped up of PPE and hand sanitizers, and some manufacturers have converted their manufacturing process to service the demand. We are seeing working from home as the new standard for desk-based employees across the world. In addition to this occurring what we are seeing concurrently is a decrease in demand for refined products due to reduced movement and an oversupply of crude oil, resulting in the crude price dropping to record lows, even entering negative territory. The oil industry is also being significantly impacted by the fly in fly out nature of operations due to the restricted movement of people.

All these factors have necessitated an adaption to the current new normal if we are to continue to operate with a focus on process safety. This paper outlines some of the good practices being exercised around the world at this time by IChemE Safety Centre members. This is not an exhaustive list, just some examples that you may be able to apply in your workplace.

We have seen reports of incidents occurring with fire and explosions in production of hand sanitisers, as well as incidents like gas leaks during start up activities as people return to work. The most recent incident occurred at a chemical plant during lockdown and killed at least 11 people and hospitalized hundreds (The Guardian, 2020).

As operators of industrial sites, the major goal is to prevent any accidents and as such, a robust management system should be in place. The ISC Process Safety Framework shown in Figure 1 can be applied to the overall management of process safety at this time. This framework focuses on leadership across 6 elements, being knowledge & competence, engineering & design, systems & procedures, assurance, human factors, and culture.

Figure 1 – ISC Process Safety Framework

Aspects

As stated in the introduction there are many different aspects of life currently being impacted. This paper will explore tips and practices in the following areas, referring to the ISC Process Safety Framework element:

- Mental Health
- Working from home
- Virtual meetings
- Distraction/stress
- Board implications
- Training delivery
- Risk assessments and assurance
- Transportation
- Managing teamwork
- Shift management and handover
- Safe ethanol handling
- Supply chains
- Reliability and maintenance
- Emergency response
- Returning to work

It may be useful to consider a barrier model with managing COVID-19 in the workplace. This starts with prevention, detection, control and then mitigation.

Mental Health

There is potential for significant mental health impacts resulting from the current situation. Whether it is triggered by isolation and loneliness or by stress, the mental health of personnel still needs to be considered by the organisation. A number of organisations have adopted various programs to assist personnel with their mental health. A useful wellbeing framework developed by APPEA and Safer Together in Australia (APPEA. Safer Together, 2020) that outlines strategies for different levels in an organisation across the following areas:

- Wellbeing Culture and Leadership

- Promote Wellbeing
- Promote Mental Health
- Support People

Working from home

There are many examples of good guidance on working from home and your home workspace set up. As much as possible try to replicate your office workspace – for example use of multiple monitors if that is what you are used to. You should also ensure you have an ergonomic set up with respect to your devices, seating and lighting. A Harvard Business Review article has detailed a number of tips to avoid burn out (Harvard Business Review, 2020). It is important to remember to differentiate your home and work, both with physical, social boundaries and temporal boundaries, as well as focusing on the most important tasks. There is a need to differentiate between the "home" you and the "work" you. This can be assisted with maintaining a morning preparation ritual, such as dressing for work, and even taking a morning walk in place of your usual commute. Where possible, have your home workspace set in a different room, that you can physically enter and leave. Maintaining usual work start times is also important to establish the boundaries, though we may all need some flexibility as well. It is important to ensure you turn off from work, so set a finish time. You may find that different hours work better for you in this situation, for example children's nap times, so establish a routine where you can. Lastly try and focus on the most important tasks, as you may not get everything done due to interruptions, or the need to have more meetings than you would if you could have a quick chat in the office. It is also important to remain connected to others while isolated at home. This may mean you need to have virtual coffee chats with colleagues, or just check in on your teams, and ask if they are ok.

Virtual meetings

It was noted that the mental activity in participating in virtual meetings is quite significant, and this is resulting in a form of meeting fatigue. The reliability of technology and telecommunications has been an issue in some areas, with frequent dropouts during high demand times. Some general tactics being used during meetings is to request people have web camera on so they can be seen as well as establishing a "no emails" rule while on meetings. The ISC has a current code of conduct for virtual meetings to help encourage participation and ensure all attendees have the opportunity to speak. This is detailed Figure 2. Time limits should also be established and adhered to, as well as providing regular comfort breaks for people.

Figure 2 – ISC Code of Conduct for Virtual Meetings

This guideline assists ISC members, and others in the proper conduct of ISC virtual meetings.

Virtual meetings shall be conducted in the following manner:

- all meeting papers shall be shared with the participants prior to the meeting
- all participants should introduce themselves prior to speaking each time
- the chair should seek input from each person in turn by name, to ensure all attendees have a say in discussions and decisions
- endeavours should be made to stick to the time allocated for each topic
- meetings should not extend beyond scheduled time

All efforts should be made to ensure the technology service is suitable for hosting the meeting.

Distraction/stress

Distraction and stress at this time has been heightened. Whether it is the need to work from home while home schooling children, caring for loved ones or the uncertainty of ongoing employment, these all add a level of stress and distraction on top of the normal day to day work stresses. Some ways to help this may be the establishment of virtual networks where people can share their concerns or discuss challenges. This is a way for people to remain connected and take care of their mental health. It needs to be a voluntary activity, though there needs to be a high degree of trust for it to work. It is also useful to have people training in mental health first aid, to be able to spot areas of concern and encourage people to seek help. Other social networks can also be established, for example if a work group regularly does a newspaper quiz each day, this can be continued virtually over a coffee break, providing the interaction, and a chance to laugh.

Board implications

At this time there is still a need for board or executive meetings to take place, especially as decisions may need to be taken. While it is always important to have good quality papers, it is more important than ever to ensure that the correct information is provided to inform the decision. This does not mean more information, but papers should have applicable data with insight. Meetings need pre-planning, suitable agendas and to be run to agendas. It is also important that the technology is available to conduct the meetings with all necessary parties present and able to contribute.

Training delivery

Training has switched to virtual platforms, from self-paced e-learning modules, webinars to integrated pre-recorded content followed by live interaction. There has been a need to adapt current face to face training offerings to be suitable for virtual delivery, this is because you cannot just deliver the same slides in the same way over such a different platform and expect similar results. There is some more use of virtual and augmented reality being used in training scenarios. Given the duration people have regarding attention span when online, day long training sessions need to be broken up, with regular breaks given. This has slowed the progress of some programs. There seems to be significant interest in one to two hours online events at this time.

Risk assessments and assurance

The need to do risk assessments has not gone away at this time. There are many management of change (MoC) activities being undertaken to adapt to the current situation as well as ongoing investment in projects and the need to still submit legislatively required assessments. This means that while some assessments can be postponed for some time, others need to be performed which means new ways to perform risk assessments need to be developed. Some examples of what has worked when performing risk assessments are listed below:

- pre-assessment preparation is more important than ever – including, for example, clearly defining the roles required for the review, how they will interact with each other and how they will access drawings and documentation
- it may be useful to develop a generic MoC to address the changed circumstances of project groups, and then have each project reviewed and update it for their specific needs
- facilitators need to be highly experienced in this instance and very active in the facilitation; this is not the time for a more passive facilitator, they need to be drawing out participation

from all attendees – this may be more tiring for them because they are not receiving all the usual body language cues they normally would in a face to face meeting

- if at all possible it is good to have the facilitator and scribe in the same room, socially distanced – where this cannot be done, the scribe should be a very experienced participant, perhaps even a qualified facilitator – ground rules need to be set if this is the case to ensure they play the role of the scribe and do not drift into facilitator mode
- the technology needs to be robust and reliable to ensure everyone remains connected in the discussion. It should be assumed people only have one screen when working from home, so they may not be able to view multiple sources of information at once.
- use of cloud computing and access means to everyone can see the work in real time
- if providing the drawings in card copy, this needs to be arranged early, with nodes pre marked and distributed to the team, allowing them time to review – this may have some privacy concerns regarding sharing home addresses for delivery, and some health concerns regarding where the printing has originated and if there is a contamination risk
- people may be used to seeing all drawings posted up around the room, so there needs to be ample time for everyone to catch up with the current discussion before moving on as they may be sorting through drawings
- some organisations have mandated "web cameras on" and banning distractions such as emails, others believe people can remain engaged without video connection – it will be a preference for each facilitator – the key is to make sure all participants agree on the terms and participate
- be prepared for the assessment to take at least 20% longer overall to complete – it needs to be slowed down for the virtual environment, including limiting duration each day (half days are quite long) and providing amply comfort breaks for participants – fatigue needs to be closely managed in this environment
- various means can be provided for visual access to brown fields sites, such as site photos or video (noting that hot work permits be required to produce this information), access to CCTV feed may provide some ability to "see" the facilities, 3-dimensional models, or even some virtual or augmented reality files may be useful where they exist
- when considering who needs to be involved in the assessment, do not assume more is better – focus on the core personnel required and keep the team as small as possible to make facilitation easier
- establish a communications protocol, how and when people will speak up – a useful reference may be the virtual meeting code of conduct referenced in this document – at the end of each node everyone must be given another chance to speak up
- the virtual environment may not lend itself to using the typical risk assessment tracking software, you may need to go back to excel sheets to capture and manage data and transfer into system later
- temporary procedures may be needed if company procedures prevent assessments being done in this manner – these could include a review period following the resumption of normal operations to check the quality
- the fact the assessment was done virtually must be noted in the report for future reference
- feedback from participants following a virtual risk assessment should be sought to improve future sessions
- assurance activities, such as audits still need to be planned and conducted – the desktop components can be easily achieved remotely, however onsite activities could be achieved via operators using helmet mounted cameras for inspections (while following all hot work requirements)
- camera or augmented reality technologies could also be employed for site safety interactions and discussions

Transportation

Transporting people to and from facilities needs to be arranged as well. There may be a duty of care to ensure that your personnel can safely commute from home to work and back. This might include not using public transport and ensuring another means of transport, for example shuttle bus or private cars. If you have a remote workforce such as an offshore platform, you will also need protocols for transport like helicopters. This will require established Fly – No-Fly decision matrices depending on the situation and potential medical need. These decision matrices may also require input from self-declarations as well as onsite temperature monitoring. For example, some organisations require self-declarations made 7 days in advance and 48 hours in advance of travel to a facility.

Where social distancing cannot be achieved during transport, for example in a helicopter, additional precautions such face masks may be necessary.

In some instances, letters of authority to travel, where these needs to be cross-boarded may be required from government authorities.

Managing teamwork

The management of teams, whether they be onsite or office based requires additional planning. Teams should be divided up to protect each subgroup should there be an outbreak within another subgroup. This in effect means smaller teams but more of them. This applies at site and in offices, especially for critical roles.

Where critical roles exist, there should be back up plans which assume a critical role incumbent may be unable to work, ensuring sufficient backup in the organisation. This may mean segregating workers so that the backup personnel are not in any contact with the primary workforce.

Where work has increased at this time due to ramping up production, the impacts on teams should be assessed via a management of change to ensure the necessary skills and resources are available. It should also be understood that progress may slow at this time on a range of projects and activities. Prioritisation may be necessary to manage this impact.

Shift management and handover

For facility-based roles, the entire shift should segregate together, for example the bus driver with the shift team becomes part of the team, so as not to cross spread any contagion. Shift handover needs to be done in a socially distanced manner, and it may be useful to designate specific teams where handover occurs and even physically segregate those from other team members.

Infectious disease management plans are useful to help managing situations where people may be living offshore or in remote locations. This could include the following factor for consideration: Cabin arrangements – only one person per cabin for the entire 24 hours, that is, not allowing night and day shift to share the same cabin. This is especially important for critical roles to ensure you maintain coverage. Other elements of a plan would include the following:
- Clinical aspects, including diagnosis and treatment options
- Risk management, including communication, medical supplies and PPE, infection control, accommodation, and cleaning

Safe ethanol handling

Facilities all over the world have been undertaking modifications to either increase or start production of alcohol-based hand sanitizer. This has led to situations where facilities are now handling greater volumes of alcohol, or handling alcohol for the first time. The alcohol is usually in the form of ethanol. Given the increased or new handling of ethanol requires implementation of additional controls to manage the flammability hazard. Even though changes may be temporary, the hazards still need to be controlled. This could mean higher storage quantity, either in bulk or in packages. If you are sourcing ethanol from a supplier, you still need to conduct due diligence on that supplier and the supply chain to ensure the hazards are managed. There is a range of good resources on safe handling of ethanol, these cover many aspects, such as safe storage and quantities, fire protection systems, bonding and earthing to manage static discharge, management of ignition sources such as ensuing the use of intrinsically safe equipment. There are a number of guidance documents available for the safe handling of flammable liquids. Such as *Safe use and handling of flammable liquids* (HSE, 2015), which references a number of both British and European standards.

WorkSafe Victoria (WorkSafe Victoria, 2020) have some useful guidance, as do Safe Work Australia (SWA, 2020) and the Health and Safety Executive (HSE, 2020) in the UK. It is also important to seek credible standards on fire protection, such as the National Fire Protection Association 30 Flammable and Combustible Liquids Code (NFPA, 2018) or the European equivalent fire protection standards.

This situation has also seen an increase in the use of alcohol-based hand sanitizers in the workplace which introduced additional hazards that need to be managed. Continuous use of such products can also dry out the skin, requiring the use of moisturisers. Hand sanitizers can also pose a fire risk on the skin until they are fully dry, and the product has evaporated. The International Association Oil and Gas Producers (IOGP, 2020) recently issued a safety alert for a case when a worker's hands caught fire after the sanitizer had not fully dried and the worker came into contact with an ignition source. Correct use of sanitizer is vital to protect the skin. Alternatively, the use of soap and warm water is a preferred way to maintain clean hands. Correct labelling is also necessary for safe transport and use. While each jurisdiction may have their own legislative requirements a good place to start is the United Nations Globally Harmonized System (United Nations, 2019).

Supply chains

Management of supply chains is challenging at this time, as standard supply may not be available due to border closures. It makes forward planning critical as well as understanding new sources. When considering new sources, due diligence should be undertaken to ensure that there is not an unknown increased risk being added to the supply chain.

There may also be shortages of personal protective equipment. It is important to ensure that any PPE obtained is suitable for use and to an acceptable standard. There are now reports of counterfeit face masks and other medical and personal protective equipment being supplied (SafeWork NSW, 2020) (World Customs Organizantion, 2020) in some countries.

Reliability and maintenance

Social distancing requirements may have impacted the ability to perform certain tasks if they require close contact. In this instance it may be useful to conduct a task risk assessment looking at the critical steps and interactions to see if they can be achieved via another means. It may mean asking

questions like 'what could fail?' 'what would be the outcome?' and 'how could we manage it at this time?'

With many sites impacted by government movement restrictions it may be difficult for contractors to attend site for troubleshooting and necessary maintenance. Alternative means may be needed to achieve this, such as video calling with onsite personnel and walking them through the troubleshooting.

Decisions may need to be made to delay maintenance or other activities. This should be risk assessed to ensure the delay can be implemented safely. It may require the reprioritisation of activities as well. Any delays on maintenance must consider the ongoing integrity of the equipment to ensure the site can safely operate in the meantime. These decisions need to be made at suitable (Safework Australia, 2020) levels in the organisation, to ensure the full safety and business implications of delays are understood. Having established decision matrices assists with these decisions.

Reliability and maintenance also need to be considered regarding preparing to end isolation and restart equipment. There needs to be adequate checking on equipment to ensure it is safe to operate again. Start-up checklists should be developed to assist that, in addition to the prestart up safety reviews. The European Commission Joint Research Centre's Major Accident Hazards Bureau have released a Lessons Learned Bulletin on pandemic measures and chemical process safety (JRC MAHB, 2020) which details important considerations for safe start up.

Emergency response

The emergency response requirements must be reviewed considering reduced number of personnel, to ensure that a suitable response can be mustered if necessary. This may mean that certain tasks or activities need to be delayed if an emergency cannot be responded to adequately. It could mean additional response personnel must be trained in the short term and exercised to ensure they can perform the necessary response. It may also be necessary to review the scope of response activities, as a wider response is needed because so many parts of an organisation are impacted.

Returning to work

The process of returning to work, where people have been absent from the workplace needs to be considered to manage the potential of cluster outbreaks. Additional cleaning protocols, access and social distancing need to be considered. Where social distancing cannot be maintained, controls to manage transmission risk may be needed, such as screens or barriers for example. Staggered start times may be a useful way to reduce the number of people moving at facilities at any given time. The starting point is to complete a risk assessment covering possible transmission paths and determine what control can be implemented to address these. There are a number of resources to provide guidance on doing these reviews, such as the UK Government (UK Government, 2020) or SafeWork Australia (Safework Australia, 2020).

Conclusions

There are many competing challenges for our attention during this period. Clear decision making is required and may be aided by defined decision matrices, so everyone knows who has what accountability. Overall, we need to remember that humans by their nature are social creatures and

need human interaction. This means keeping an eye on the interaction that occurs, so people do not become isolated is critical to allow the other processes to function. It is important to try to show a little less judgement about how others are acting and a bit more compassion for their circumstances, some of which we may not understand.

Resources

A number of excellent resources have been released to support companies to adapt in this challenging time. These include:

- Institution of Chemical Engineers Coronavirus Hub (Institute of Cheimcal Engineers, 2020)
- IChemE Safety Centre YouTube Channel (YouTube, 2020)
- Bow Tie diagram (Manton, 2020) developed by the Energy Institute and the Center for Chemical Process Safety, based on the methodology from their recent book (CCPS and Energy Institute, 2018).
- CCPS have referenced how to apply their Risk Based Process Safety Guidelines to a pandemic or similar event (CCPS, 2020).
- FM Global have produced a number of fact sheets and checklists to assist with facility management (FM Global, 2020).

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