



Risk Engineering Services: Oil & Petrochemical

## **Understanding new or aggravated exposures arising from the COVID-19 crisis for the Oil & Petrochemical industry**



**To provide “first aid” measures against the current COVID-19 crisis, Oil and Petrochemical (OPC) companies have the imperative to act immediately to protect their employees by addressing business challenges and helping to mitigate the outbreak.**

The decision for many Oil and Petrochemical (OPC) plants to stop operations requires companies that are still operating to manage their production volumes and inventories by adjusting to fluctuating demand with a high degree of flexibility. Simultaneously, new actions and unexpected deviations from standard operating procedures (SOPs) could increase risk exposure.

Currently, business continuity plans that are in place may not fully address today’s fast-moving variables, and extra actions should be considered as emergency responses to the following top risks today:

- Reduced workforce productivity
- Limitations in financial liquidity and capital resources
- Supply chain disruption
- Decreased consumer confidence and demands
- Global recession



## Loss control measures for aggravated exposures

At this stage, it is difficult to predict whether actions will be limited to short-term since the duration of the crisis remains unknown. Long-term solutions/new business models may need to be implemented if the crisis persists. With a specific focus on the oil and gas industry, inherent hazard conditions leading to aggravated exposures have been identified in conjunction with the most appropriate mitigation and protection measures intended to reduce the likelihood of incidents.

### Changes to process configurations

Due to supply chain disruption, during this period plant managers may be required to make operational changes that introduce unusual process configurations/raw materials and uncommon utilisation factors (outside of the 50–90% range).

This can result in “abnormal” operating conditions (e.g., temperature, pressure, flows, etc.) outside the safety envelope that may stress personnel and equipment. This could increase the likelihood of incident scenarios such as loss of containment resulting in fire or explosion.

### Mitigation measures

A structured safety review must be followed for all changes to hardware and software. This should include a multidisciplinary team and involve parties across Operations, Maintenance, Inspection, HR & HSEQ. It should have an increased focus on following aspects:

- Changes to process configurations
- Changes in feedstock

The management of change (MoC) procedure represents the most suitable practice to be applied from a process safety perspective.

Moreover, the application of Integrity Operating Windows (IoW as per API 584) is the most suitable standard for identifying atypical fluctuations and exceedances of main operating parameters that could impact mechanical integrity in the medium term. It does so by preventing damage mechanisms and reducing the deterioration of equipment and machinery.

---

### Plant managers should consider

- Have they applied the MoC procedure in the case of changes to the traditional process configuration?
  - Have they implemented the IoW concept?
- 

### Maintenance and inspection investment deferrals

The deferral of major capital expenditure (e.g., maintenance/inspection turnarounds) due to a reduced number of contractors and limited capital resources can impact the fitness-for-service of equipment and machinery approaching end-of-life. Operating equipment and machinery close to its end-of-life increases the likelihood of loss of containment, thereby increasing the likelihood of incidents resulting in fire and/or explosions. This exposure is much higher in countries where the frequency of testing and inspection activities is not regulated by statutory requirements.

### Mitigation measures

Proper risk assessments (via MoC or the deferral procedure) must be applied when a turnaround is postponed. Assessments must cover the deferral of inspection activities for all disciplines (mechanical, electrical, instrumentation, civil) and must not be limited to those with consequences on equipment under statutory regulation.

Special attention must be paid to the postponement of testing of any safety-critical systems. Outcomes from the deferral analysis must highlight fitness-for-service for the extended run length. This should be done by providing, where necessary, the remaining life calculation and the countermeasures to be adopted should a piece of equipment be considered unfit for continued service for the required period (e.g. shutting down or de-rating of equipment).

---

### Plant managers should consider

- Have they applied a formal deferral procedure for the postponement of major maintenance/inspection?
  - Have they extended the risk analysis to all disciplines to include operations, maintenance, inspections and corrosion specialists?
-

---

## Social distancing within organizations

Limited staffing levels within organisational structures and shifts reduced to the minimum (social distancing) over an extended period can lead to significant “fatigue” of personnel. Such conditions increase the likelihood of human error and therefore of incidents.

## Mitigation measures

A structured review (involving a multidisciplinary team) must be followed for all changes to organisational structures, particularly for the following aspects:

- Changes to safety-critical roles
- Organisational changes impacting emergency response

The MoC procedure is the most suitable practice to be applied from a process safety perspective. Minimum staffing levels must be defined, identifying critical roles and positions to be occupied and guaranteeing a balanced level of experience across all personnel working on shifts.

---

## Plant managers should consider

- Have they applied the MoC procedure in the case of changes to organisational structures?
  - Have they reviewed operating and emergency procedures to estimate the consequences of human downsizing?
- 

## Business Continuity Exposures

For plants with high exposure to critical equipment and/or with a level of high dependence on single suppliers, long lead times and delays in delivery times due to supply disruptions and travel restrictions can lead to aggravated machinery breakdown vulnerability and business continuity loss.

## Mitigation measures

Machinery breakdown exposure must be supported by the results of a formal criticality study. A proper spares philosophy must also be implemented, with major parts of un-spared critical equipment being stored in-house. Standby philosophy can be implemented for smaller equipment/machinery (pumps, heat exchangers, etc.). The availability and reliability of critical equipment might need to be reviewed under drastic reductions of predictive/preventative maintenance programmes.

The Business Continuity Plan (BCP) must identify and map all major product/service supply chains, with alternative suppliers being included in the process. Actions and plans resulting from the threat-scenario analysis might need to be reviewed given changing market conditions and margins.

---

## Plant managers should consider

- Have they implemented a formal spares philosophy? If yes, which is the level of in-house stock for critical parts?
  - Have they implemented a formal BCP?
  - If yes, have they identified alternatives for raw materials suppliers and customers?
- 



---

## Idling/Mothballing/Restart

Fluctuations in unit throughput due to the uncertainty of margins and reduced demand may ultimately result in the need for standby or idling mode, either fully or partially. The need for mothballing or preservation can increase the likelihood of human errors and incidents.

For stopped plants manned by personnel on shifts reduced to the minimum (completely vacant locations in some cases), the presence of flammable hold-up might not be monitored as per normal operations. Unmanned plants might also suffer from intrusions and theft. Ultimately, in the case of a loss of containment, this can lead to more severe fire incidents and/or incendiary attacks.

## Mitigation measures

When plants are idle/mothballed—either fully or partially—formal preservation procedures must be applied. Procedures might require the involvement of multidisciplinary teams (operations, maintenance and inspection, corrosion specialists, process engineering) to define the most suitable actions and strategies in view of equipment restart.

Special attention must be paid to:

- Purging and blanketing practices (proper medium and the effective removal of residues/contaminants)
- Isolation schemes with the identification of blinds/spades and/or Log Out/Tag Out (LOTO)
- Preservation conditions (proper medium and the setting of parameters such as temperature and pressures)
- Additional hazards such as freezing, dead legs corrosion, etc.
- Vendor recommendations (consider specific know-how in the case of preservation/idle equipment)
- Continuity of utilities and services (power, instrumentation etc.)
- Frequency of visual checks performed by personnel

Concerning the restarting of plants that were mothballed or idle after a prolonged period (typically a period exceeding the average length of a major turnaround (T/A)), a thorough start-up procedure must be applied. Similar to a new commissioning procedure, special attention should be paid to:

- Fitness-for-service examination of vessels, piping and machinery with analysis of historical inspection results and the status of overdue inspections.
- Equipment overhauling, especially for rotating equipment
- Safety-critical systems verification and testing
- Firefighting measures verification and testing
- Pre-start up safety review
- Requirements of the Lloyd's Market Association (LMA) 5197A clause

---

## Plant managers should consider

- Has an idling/mothballing procedure put in place?
  - Has the OEM been involved in the idling/mothballing of equipment?
- 

## Contact

### Massimo Giachino

Manager OPC

Massimo\_Giachino@swissre.com

Disclaimer: The guidance contained in this document, in the opinion of Swiss Re Corporate Solutions, is sound, reasonable and may help reduce the risk of property loss and business interruption. This guidance is used for low to medium hazard property occupancies and is not suitable for higher hazard facilities. Swiss Re Corporate Solutions does not warrant that all losses will be avoided or that all reasonable preventive measures have been taken if advice in this document is followed. By sharing its opinion as to certain sound and reasonable practices, Swiss Re Corporate Solutions does not relieve the insured of its own duties and obligations with respect to assessing and implementing loss prevention measures and Swiss Re Corporate Solutions disclaims any liability as respects loss prevention.