

Covid-19 pandemic measures and chemical accident risk – MAHB contributions

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MAHB Covid-19-related initiatives

- The Lessons Learned Bulletin on Covid-19 Pandemic measures and chemical process safety (LLB Covid #1)
- The survey of EU/OECD/UNECE competent authorities on practices and experiences chemical accident risk management and enforcement during the Covid-19 pandemic
- The Lessons Learned Bulletin on oxygen-related fires in hospitals treating Covid-19 patients (LLB Covid #2)

Lessons Learned Bulletin on pandemic measures and chemical process safety

Why this bulletin ...

- The OECD Working Group on Chemical Accidents (WGCA) was approached following the fatal accident in India in May 2020 and asked if a response could be provided.
- The Bureau of the WGCA agreed to write a note addressing this accident and issues related to start-up following lock-down.
- The EU JRC Major Accident Hazards Bureau agreed to publish the content, as this was the fastest way to bring attention to the issue.

Two cases

Visakhapatnam India, 7-8 May 2020

Leak of hazardous gas from a polymer plant, Visakhapatnam, Andhra Pradesh India 7th-8th May 2020

A leak of hazardous gas led to the death of at least 11 people and injuries to hundreds more. The authorities have reported that a release of gas from styrene tanks occurred in the early hours of the morning (around 3 a.m.) on 7th May 2020.

The polymer plant was restarting following shutdown due to the Covid-19 pandemic. Media reports and the official investigation report suggested that the styrene had been stored for a long time

Ottaviano, Italy, 5th May 2020

An explosion at a plastics factory killed one person and injured two others and also resulted in shelter-in-place of local residents. The factory reopened on 4th May after the government eased the lockdown following the coronavirus pandemic.

Start-up following a pandemic shut-down

Issues to consider

Was shutdown carried out in an organised and systematic manner?

Has everything remained in the same state?

Were processes identified which required continuous operation (power, cooling, stirring, inhibitor, nitrogen, etc.)?

Was this maintained?

Are all staff available for start-up?

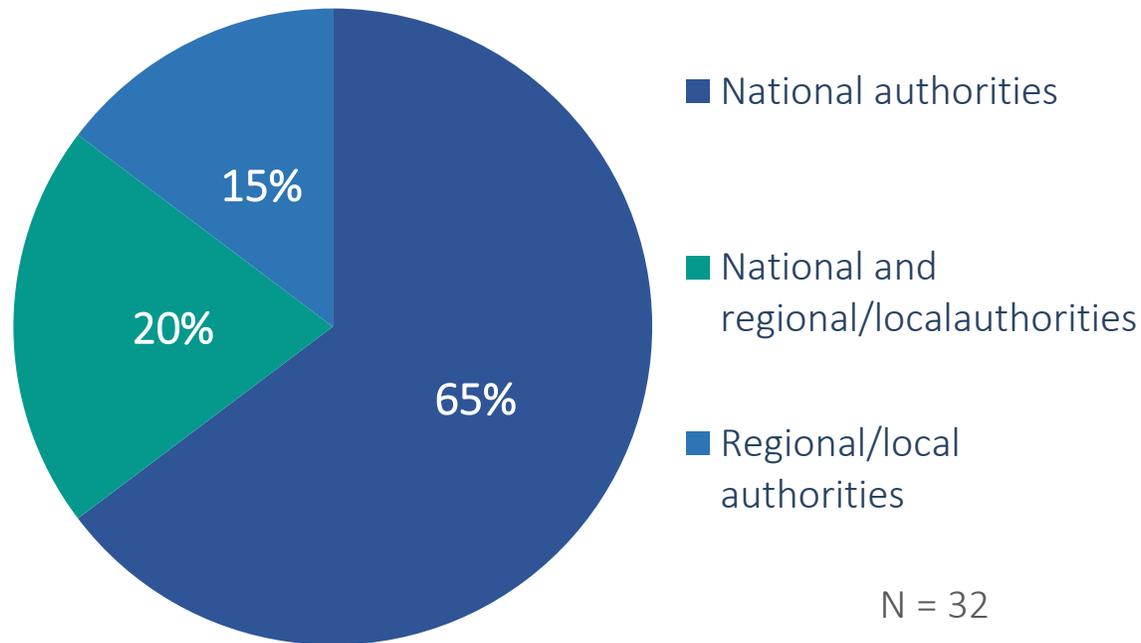
What has changed in working conditions?

How have changes been assessed with regard to safety?

Survey of EU/OECD/UNECE competent authorities on chemical accident risk management and enforcement during the Covid-19 pandemic

Who participated in the survey?

Affiliations of survey respondents
Survey on pandemic measures and hazardous site risk management



The figure represents survey responses on 5/10/2020

The survey was **developed by the EC Joint Research Centre** with the Technical Working Group on Seveso Inspections (TWG 2).

The survey was distributed by the **European Commission to EU and EEA countries and by OECD and UNECE to their Member States**

The survey was **targeted mainly to chemical hazard inspectorates** and was open to any level of government (national, regional, local).

29 countries participated in the survey. In total there were **32 respondents** (26 EU/EEA, 25 OECD, and 31 UNECE Member States).

All but two participants were from the European continent.

Typical process safety advice given by authorities during the Covid-19 pandemic

Representing 14 respondents

Staffing issues

- **Operators must assure minimum workers are present to keep the site running safely**
- **Operations should be stopped if not enough staff**
- **Maintenance activities (e.g., continuity, staffing)**
- **Availability of professional competences for specialised tasks**
- **Managing fatigue should be monitored and managed**
- **Companies should plan for shut down and startup**
- **Specific guidance on planning turnarounds**
- **Batch process recommended** to reduce disruption

Compliance and enforcement

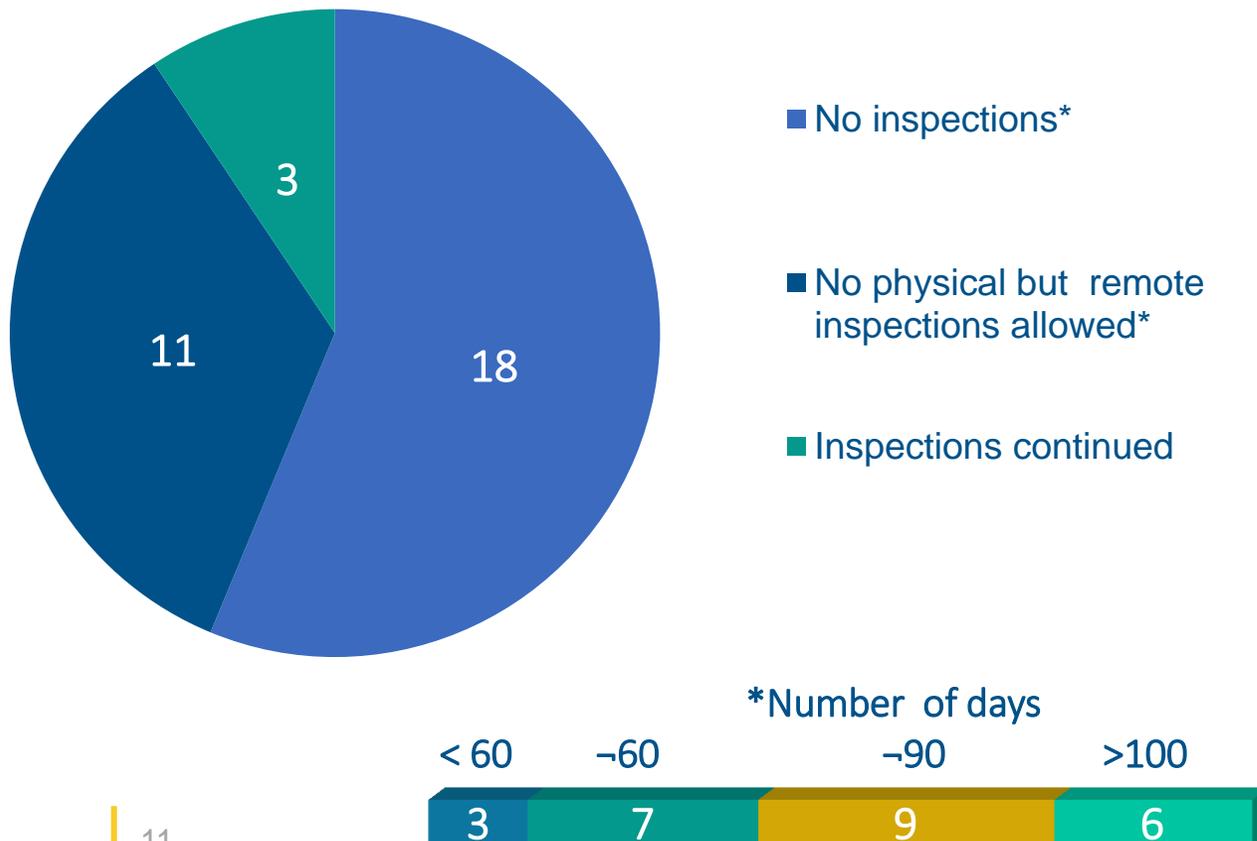
- **Legislative requirements still should be respected**
- **Discretionary enforcement. And compliance guidelines** (e.g., administrative requirement delays, equipment certification)
- **Operators must notify the authorities when restarting**

Safety management system issues

- **Change management processes** for reduced staff were followed
- **SMS** was adapted to reflect new arrangements
- Measures in place for also **resuming normal operations** post-Covid-19
- Sites should **plan for possible delays in obtaining safety critical components** and spare parts
- Several respondents noted that **reduced staffing levels** should already have been part of the SMS (e.g., in case of worker strike)
- **Template for evaluating the site's pandemic response** and lessons learned
- Site must confirm that **“all necessary measures”** have been taken to prevent incidents

Inspection protocols during the pandemic lockdown

Were inspections of high hazard sites conducted during the pandemic lockdown?



In most jurisdictions, an exception was made to allow physical inspections following an accident, a serious complaint, or other critical condition

When physical inspections restarted, they often included an inspection of pandemic measures

Remote inspection techniques continue to be used in combination with physical inspections in many jurisdictions even after the lockdown.

Inspectorates have invested considerable efforts to adapt their tools and strategies for remote inspections and some times the legislation.

A few jurisdictions had still not restarted physical inspections at the time of the survey (late September 2020)

How have inspection approaches changed due to the pandemic?

The bullets below represent a collection of responses from various jurisdictions

Approaches

- **Limited number of inspections.** Some inspection cycles have been postponed to the next year.
- **Close cooperation between operators and authorities** since changes/cancelation are possible even on short notice.
- **Strict implementation of hygiene measures** to avoid health or infection risks to the persons involved. These measures can also differ between different operators,
- **Reduction in the number of participants** to a minimum.
- **Discussions are kept short** as possible
- **Risk prioritization is extra important**, and **establishments with bad performance** , **recent accidents are prioritised**, e.g., for monitoring of staff impacts, for onsite inspection when onsite inspections are limited, etc.
- **No more exercises, no emergency plans tests and trainings** were carried out with a large number of staff
- **Adaptation of strategy, schedule, materials, etc. for conducting remote**, or partially remote **inspections.**

and in a few jurisdictions

- **No significant change to inspection approaches** once on-site inspections were re-started

How have inspection of high hazard sites changed thematically due to the pandemic?

The bullets below represent a collection of responses from various jurisdictions

Inspection themes adapted to address specific pandemic safety issues, such as:

- **Questions about Covid-19 measures included**, e.g., what measures were implemented, whether there were enough staff, whether maintenance was postponed
- **Inspections included review of safety management, during the pandemic**, e.g., emergency planning, maintenance, operating procedures with reduced staff, and subsequent re-commissioning or starting-up post lockdown.
- **Locations that had to shut down during the lockdown are asked about controls implemented to ensure site safety** ((installations, warehouses, substances) during its non-functioning state.
- **Special attention to storage and handling conditions** for specific types of substances
- **Interviews include questions on staff resilience** in regard to performance of safety critical tasks, resilience of emergency plans, response arrangements etc. „whether the operational state is altered, if there is enough personnel present to run the plants, etc.
- **Some topics postponed** because they require longer contact times (LOPA assessments for example)

Challenges and priorities for high hazard site inspections due to the Covid-19 pandemic

The bullets below represent a collection of responses from various jurisdictions

Everyone's top priority

- **Maintain high levels of protection on site while reducing exposure of personnel and inspectors to the risk of contracting the virus**

Challenges

- **Re-organizing and adapting inspections**
- **Maintaining morale of the inspection staff** when they could not do their jobs
- **Supporting sites that were critical to the normal functioning of society** and ensuring that their critical staff could keep working (childcare, etc.)
- **Testing the internal and external contingency plans** in a pandemic context
- **Limited inspection of the physical site**
- **Varying ability of some sites to correspond effectively in digital mode**

Challenges and priorities for operators due to the Covid-19 pandemic

The bullets below represent a collection of responses from various jurisdictions

Managing safety

- Ensuring **adequate supervision** on site
- **How to handle maintenance** activities, risk-based decisions (postpone or go ahead?)
- **Shutdown and startup**, having backup plans for critical infrastructures
- **Adapting the SMS**, management of change, e.g., to changes in staff , emergency planning, maintenance, IT security, etc.

Managing staff

- **Protecting staff** from exposure to the virus f, Ensuring that sick employees stay at home.
- **Managing labour** shortages and surpluses, and employees working from home
- **Having access to specialised competences** and certifications

Survival

- **Keeping the sites open**, especially sites important to society, despite reduced staff
- Maintaining the installations e with respect to **input and output of raw material, energy, products and waste, spare parts.**
- **Financial and economic survival**

Good practices during Covid-19 pandemic

The bullets below represent a collection of responses from various jurisdictions

Main message

Almost all operators have made enormous efforts to adapt quickly to the new situation and to take the necessary measures. Postponement of maintenance activities. No incidents so far caused by the pandemic measures

Some examples of good practices

- **Good communication** with authorities, sites in similar situations, etc.
- **Agreements between neighbouring Seveso sites** on exchanging experience and support during similar incidents.
- **Development of quality guidelines and procedures** for the Covid Situation and the Post Covid Strategy in one establishment.
- **Creation of safe operating programmes** due to deferred maintenance turnaround., some examples of successful turnarounds.
- **Execution of high level management of change** evaluations, stopping of production lines to review risks, etc.
- **Systematic approach to maintenance** including d expert consultation to determine which to postpone, continue
- **Strict enforcement of pandemic measures**, rapid adaptation of work spaces and schedules

Some examples of bad practices

- **Few bad practices**, mostly associated with poor adherence to pandemic measures

What does the future hold? (1)

Increased pandemic readiness

- **New./greater attention on site pandemic measures on sites** during inspections, safety report reviews, etc, including after this pandemic subsides

“The SEVESO documentation should be expanded with a risk analysis related to the effects of introducing restrictions on the functioning of all state standards (social restrictions, e.g. in the movement of employees / quarantine)”

- **New protocols for inspections implemented for the pandemic** will allow us to react more quickly to pandemic situations in future.

According to one respondent, inspector training on CBRN was already sufficient to adapt to pandemic risks

- Emergency plans will have to be reviewed to address reduced availability of personnel.
- Need to change the strategy for testing internal and external emergency plans.

Increased attention to site staffing

- **Ensuring minimum staff presence for site safety.** *How is the minimum-staff defined for a given installation? How is it assured that this minimum-staff is present? What are possible measures and proceedings if the minimum-staff is not present?*

- **Impact on high hazard establishments of key operating persons** when working remotely will have to be assessed to optimize the control activities, making the inspections even more functional.

What does the future hold?

- Influence of remote inspection methods
- Remote inspections without site visits is not recommended.
- Remote inspection methods may become routine tools, but used strategically with the onsite inspection
 - “We will pay more attention to the checklists submitted to the operator and their written replies.”
 - “Operators that are suitable for remote inspections are, for example, oil ports and oil terminals.”
- New awareness of the importance of cybersecurity, because of the increased reliance on information systems for inspections

Challenges for the short and medium term

- Routine onsite inspections may not return for some time and predominantly remote inspections will continue for a while in many jurisdictions
- It continues to be difficult to conduct inspections when sites refuse entry
- Planning inspections under pandemic uncertainty is challenging if the law requires advance notification
- Economic crisis may reduce resources for process safety

Lessons Learned Bulletin on oxygen-related fires in hospitals treating Covid-19 patients

Why this bulletin ...

Since the outbreak of the pandemic in March 2020, there have been at least 20 incidents of oxygen-related hospital fires in various countries around the world reported in the media.

Thirteen have been fatal, causing the deaths of nearly 70 people, the majority of whom were patients extremely ill with the novel Coronavirus.

The majority have started in the intensive care unit where oxygen therapy was being delivered to several Covid-19 patients.

Other accidents started in part of the hospital where oxygen is stored or distributed centrally.

What do we know about hospital fires involving oxygen

- An increased use of oxygen can create elevated risk in the oxygen delivery system and storage locations if conditions and practices are not well-suited to meet the higher demand.
- Fires involving medical oxygen are not a new phenomenon but are more common in the operating theatre where oxygen is routinely administered.
- In these settings, strict safety protocols are normally enforced and surgical staff are well trained in dealing with oxygen hazards.
- Prior to 2020, there have been serious oxygen-related fires reported in hospitals but at much lower frequencies. (In the media, one can find reports of 9 major accidents that have occurred in various parts of the world since 2010.)

Why are they happening more now

The Covid-19 pandemic has necessitated increasing oxygen ventilators available in intensive care units.

This has led to an increased electrical demand in the ICU, which in some cases may have overloaded the electrical supply systems.

It has also meant that, due to the increased number of oxygen ventilators, that the oxygen concentration is more readily elevated.

Given that infectious units have a low air exchange rate with the outside environment by design, the potential for a dangerous oxygen rich environment is increased.

Preliminary recommendations for reducing risks oxygen-related risks in Covid-19 hospitals

- Hospitals need to consider employing strategies developed for chemical process safety to manage flammable and explosive atmospheres (ATEX environments), so that there is no possibility of ignition when such hazards are present.
- Management procedures need to involve the whole of the management chain including not only medical and nursing staff, but also housekeeping, cleaning, electrical maintenance and other technical departments.
- Furthermore, emergency preparedness should take into account potential intensive care unit fires, incorporating necessary measures for reducing impacts including response equipment, training of staff, and planning for the practical and psychological needs of recovery.

Thank you

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