

WHITE PAPER

Incident Investigation (Part 3): Improving Process Safety Maturity in Your Organization and Throughout Your Supply Chain

Authors: Pieter de Kort, General Manager Process Safety, The Netherlands & Flanders and
Dr. Arturo Trujillo, Global Director Process Safety Consulting

In previous papers we discussed why incident investigation is a powerful prevention tool. This time we focus on: a) the need to align your incident investigations with a process safety management maturity model and b) how to use your supply chain to improve process safety performance in your own organization and throughout each link in the chain.

Managing a multitude of recommendations

In a previous [white paper](#), we explained how organizations can learn from **Incidents and Near Hits** (I&NH), which we at DEKRA support clients around the globe in investigating and learning from. However, our work sometimes reveals that recommendations from previous investigations have not been implemented, leading to recurrent I&NH.

We do not conclude that these omissions are the result of a lazy or negligent approach to Process Safety by our clients—far from it. We know that process plant operators face a nearly overwhelming amount of input aimed at improving process safety maturity. For instance, Hazard Identification and Risk Assessment (HIRA)

methodologies such as **HAZOP**, What-if, **LOPA**, etc., generate long lists of recommendations. Additional suggestions arise from other Process Safety Management (PSM) elements such as Management of Change or emergency response. And then external entities such as regulatory bodies and insurers provide operators with even more advice. Eventually, plant operators end up with literally hundreds of recommendations for improvement, unstructured and difficult to prioritize.

On top of this, as we described in the abovementioned white paper, there is the multiplicative effect of sharing lessons learned from incidents and near hit investigations with other companies, easily multiplying your “learning power” by 1,000. In fact, there are a number of organizations (the most famous of which is probably the

U.S. Chemical Safety Board) whose mission is to investigate incidents and publish lessons learned for everybody to profit from, and indeed one can learn from reading these publicly available incident reports.

This leads to a central dilemma: on the one hand, we benefit from having more incident investigations and leveraging their multiplicative power; on the other, we need to simplify how we manage the resulting recommendations in order to implement necessary change. Is there a way out? At DEKRA we are convinced there is.

First of all, recommendations generated by incident investigation are, of course, focused on preventing a recurrence of the incident in question, independent of other aspects of overall PSM performance. They must, therefore, be linked intentionally to a global PSM framework. The fundamental principles for prioritizing and optimizing recommendations are:

- > Always do root cause analysis in your incident investigations.
- > Align root causes with the key elements of your Process Safety Management (PSM) system and your maturity assessment metric.

Recommendations arising from other sources will also need to be aligned with your PSM system so that you can map recommendations onto a common framework.

In line with these principles, in 2019, DEKRA introduced **Organizational Process Safety** (OPS), a PSM system based on the almost universally accepted model from the Center for Chemical Process Safety (CCPS). OPS includes a maturity measurement tool and a digitized solution to produce an optimized roadmap for excellence in process safety. DEKRA has also introduced its own methodology for incident investigation, fully aligned with OPS.

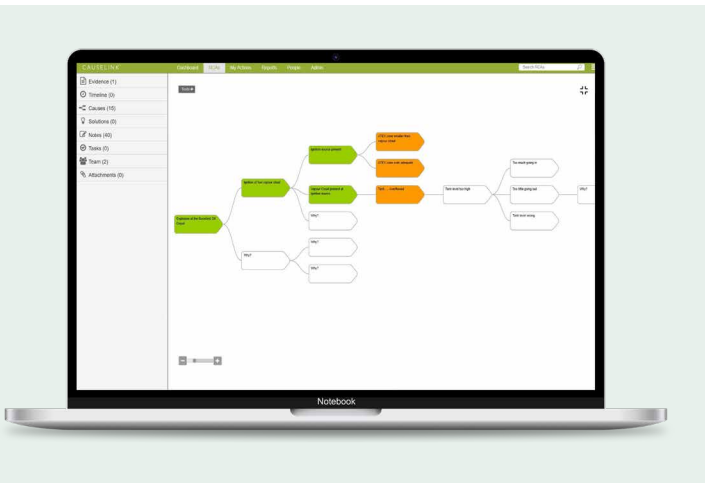


Figure 1. Screenshot of DEKRA's digital solution for incident investigation

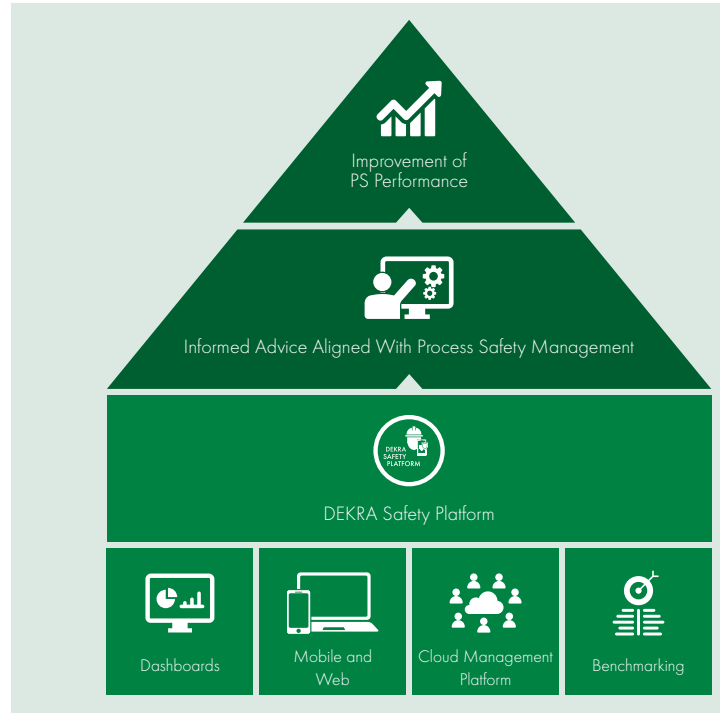


Figure 2. General scheme of the DEKRA Safety Platform

Any recommendations from an incident investigation will, therefore, be entirely consistent with the OPS elements and correlate with the roadmap for improvement.

DEKRA plans to continue developing process safety solutions compatible with OPS and grouped under the umbrella of the DEKRA Safety Platform.

Learning from your supply chain

Richard Stallman, one of the main advocates of free software and the free exchange of knowledge, understood how sharing ideas multiplies their benefits. In the realm of industry and process safety, learning from others is certainly preferable to acquiring knowledge by dealing first-hand with frequent I&NHs. One source of information, as we've said, are non-profit organizations that investigate process safety incidents and share lessons learned. However, the number of such investigations each year may not be sufficient for a company to reach its PS maturity level goals.

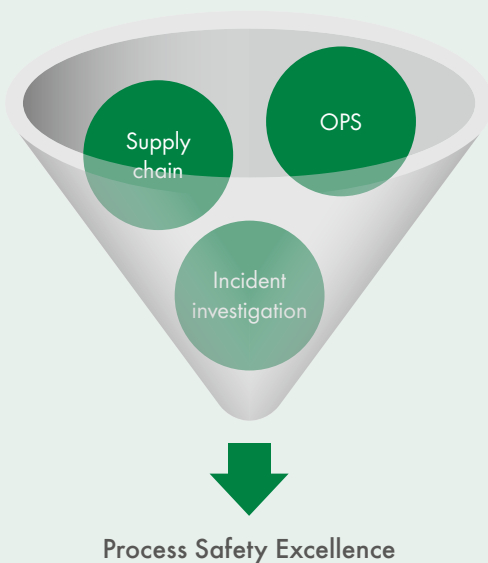
“If you and I have one apple each and swap them, we still have one apple each. If you and I have one idea each and swap them, we have two ideas each; we have doubled our capital” – Richard Stallman

Your supply chain provides another handy resource. **Elsewhere**, we have emphasized the need to attend not only to your own process safety performance, but also to that of your supply chain. Unfortunately, recent events have reinforced the urgency of this advice. For instance, in Resilinc’s annual report,¹ factory fires were reported as the main cause of supply chain disruption in 2020. It is noteworthy that, even during a global pandemic, there were more than twice as many disruptions caused by factory fires than by human health issues.

Investigating I&NHs in your supply chain can serve two purposes:

- > Improving the process safety performance of your supply chain.
- > Learning lessons to improve your own process safety performance.

Moreover, by sharing what you’ve learned from your supply chain, you ultimately reduce the likelihood of significant disruptions in your production process.



A net positive for business

Supply chain disruptions negatively impact a company’s profit and loss statement, sometimes severely. Moreover, the financial harm incurred can never be fully compensated by fining or penalizing the

culprits. That’s why a culture of “punitive damages” is best replaced by one that emphasizes “preventing together”— that is, treating your supply chain as a valuable resource that is also responsive to and intertwined with your organization’s process safety efforts.

The experts concur. In their widely distributed booklet “The Business Case for Process Safety,”² the CCPS explicitly acknowledges the financial benefits of establishing a sound Process Safety Management (PSM) program:

“When properly implemented, [PSM] helps ensure reliable processes that can produce high quality products, on time, and at lower cost. These improvements allow the enterprises that make them to sustain value creation over time.”

Conclusions

In short, a highly effective way to prevent major process safety events is to assimilate lessons learned from incidents and near hits, whether those collected and published by non-profits or those experienced by suppliers and organizations themselves. In fact, tapping into the supply chain is a fantastic opportunity to leverage lessons learned and improve process safety performance throughout the entire pyramid of suppliers as well as the organization at the top.

This requires more than an information exchange, however. Recommendations arising from incident investigations must be properly implemented, and they can number in the hundreds. In order to absorb and prioritize them appropriately, organizations also need a plan for managing them. By integrating recommendations into the framework of a process safety management system, companies can maintain a global overview and optimize their interventions. This means ensuring that incident investigations include a root cause analysis, and that root causes are fully aligned with the key elements of an established PSM system. Furthermore, process companies reap benefits from robust PSM beyond their safety performance, experiencing positive financial consequences from more reliable, efficient production.

¹ Carpe Diem. Resilinc annual report 2020.

² Center for Chemical Process Safety, 2006.

PIETER DE KORT

Pieter de Kort has accumulated 25+ years of experience in the process industry gained through various positions in process safety for large chemical companies. His experience has given him a broad know-how for tackling process safety issues. His main areas of expertise are process safety management, incident investigation, due diligence studies, chemical reaction hazards, HSE auditing / process safety auditing, process hazard analysis (PHR, HAZOP, What-If) facilitation and he is an experienced facilitator and trainer.



DR. ARTURO TRUJILLO

Dr. Arturo Trujillo is Global Director of Process Safety Consulting. His main areas of expertise are diverse types of process hazard analysis (HAZOP, What-if, HAZID), consequence analysis and quantitative risk analysis. He has been involved in many projects over the last 25 years, especially in the oil & gas, energy, chemicals and pharmaceutical industries.



DEKRA Process Safety and Chemical Safety

The breadth and depth of expertise in process safety makes us globally recognised specialists and trusted advisors. We help our clients to understand and evaluate their risks, and work together to develop pragmatic solutions. Our value-adding and practical approach integrates specialist process safety management, engineering and testing. We seek to educate and grow client competence to provide sustainable performance improvement. Partnering with our clients we combine technical expertise with a passion for life preservation, harm reduction and asset protection. As a part of the world's leading expert organisation DEKRA, we are the global partner for a safe world.

Process Safety Management (PSM) Programmes

- > Design and creation of relevant PSM Programmes
- > Support the implementation, monitoring, and sustainability of PSM Programmes
- > Audit existing PSM Programmes, comparing with best practices around the world
- > Correct and improve deficient Programmes

Process Safety Information/Data (Laboratory Testing)

- > Flammability/combustibility properties of dusts, gases, vapours, mists, and hybrid atmospheres
- > Chemical reaction hazards and chemical process optimisation (reaction and adiabatic calorimetry RC1, ARC, VSP, Dewar)
- > Thermal instability (DSC, DTA, and powder specific tests)
- > Energetic materials, explosives, propellants, pyrotechnics to DOT, UN, etc. protocols
- > Regulatory testing: REACH, UN, CLP, ADR, OSHA, DOT
- > Electrostatic testing for powders, liquids, process equipment, liners, shoes, FIBCs

Specialist Consulting (Technical/Engineering)

- > Dust, gas, and vapour flash fire and explosion hazards
- > Electrostatic hazards, problems, and applications
- > Reactive chemical, self-heating, and thermal instability hazards
- > Hazardous area classification
- > Mechanical equipment ignition risk assessment
- > Transport & classification of dangerous goods

We have offices throughout North America, Europe, and Asia.

For more information, visit www.dekra.com/process-safety

To contact us: process-safety@dekra.com

Would you like more information?

Contact Us