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The CSB Clears Its Investigations Backlog With a Flurry of Holiday Season Investigation Reports

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As we begin the new year, we wanted to look back and report out on a rather remarkable year at the US Chemical Safety and Hazard Investigation Board (the "CSB"). Most notably, the CSB set and met a goal of clearing out its investigations backlog before the end of CY 2023. By any measure, the CSB just closed its most productive year ever, issuing a record-setting eleven investigation reports. For context, the CSB issued only six reports in 2022, three in 2021, none in 2020, and four in 2019. Currently, the CSB has only two open investigations for incidents that just occurred within the last year and a half.

As we discussed in our December 13, 2022 Process Safety Update Webinar, on May 20, 2021, the Congressional Committee on Energy and Commerce sent the CSB a letter, calling on the CSB to clear out its "investigations backlog," which, at that time, included 20 open investigations, including at least one that was more than five years old. The letter specifically instructed the CSB to:

"Provide a copy of the CSB's most recent investigation plan, including the status of all open investigations, the expected timeframe for completing each investigation, and the number of investigators assigned to each investigation."

A day later, the CSB released one investigation report, so that, by the time the agency replied to Congress' letter on June 10, 2021, it reported that there were 19 open investigations, and provided a status for each one: five were noted as being in the early investigation report-writing phase, and 14 were in a mid- or advanced phase. However, the CSB did not at that time provide a specific timeframe for completing each report, stating only that:

"[t]he timeframe for completing investigations is a dynamic re-assessment based on numerous factors. The Agency plans to continue closing investigations with increased transparency through the public board meeting process . . . and to improving the timelines as the Agency rebuilds our staff and processes."

Three months later, on September 24, 2021, the CSB issued a couple more investigation reports, and a few days

after that, on September 29, 2021, then-CSB Chairperson Katherine Lemos testified before the Subcommittee on Oversight and Investigations of the Committee on Energy and Commerce, emphasizing the progress the CSB was making on the release of investigation reports. Specifically, Chairperson Lemos testified that the CSB had completed three investigations in 2021, compared to only one in 2020.

Then, on October 7, 2021, the CSB sent another letter to Congress, this time providing a specific timeline for all remaining open investigations. Per the (very ambitious) timeline, with older investigations prioritized, all open CSB investigations of incidents occurring prior to calendar year 2020 would be completed in fiscal year 2022. Although the CSB was not able to meet its initial timeline, it updated its investigations closure plan in October 2022, committing to another very ambitious timeline to complete all of its then-remaining fourteen open investigations by the end of calendar year 2023. With a new and nearly full slate of Board Members and renewed life at the agency under the Biden Administration, including the hiring of additional staff, the CSB met that timeline, barely.

The agency continued to work through its investigation reports at remarkable (for the CSB) speed, through 2022 and 2023, ultimately issuing its final backlog investigation reports during the holidays, and updated its investigations closure plan accordingly. Indeed, on December 27, 2023, the CSB declared that it has "completely eliminated its long-standing backlog of investigations."

Reflecting on this accomplishment, CSB Chairperson Steve Owens said:

"When I became the CSB's Interim Executive in late July 2022 … the CSB was faced with an unacceptable backlog of seventeen open investigations and uncompleted reports that had built up over many years, dating as far back as 2016. But the other CSB Board Members and I were determined to conclude these investigations and issue the reports as quickly as possible. Eliminating the backlog has taken an extraordinary effort by every single employee at the CSB, working together as a team. We are committed to continuing to move the CSB forward and making sure that such a serious backlog never happens again."

Board Members Sylvia Johnson added:

"Over the last two years the focus of CSB board members has been on eliminating the long-standing backlog. Now that these legacy reports are out, we are better positioned to deploy to chemical incidents across the country and complete future reports more efficiently. The entire CSB team is to be commended for the agency reaching this historic milestone."

Here is a complete list of the CSB investigation reports finalized in the last year and a half:

And here is a summary we have prepared of the highlights from the eleven investigation reports that the CSB issued in 2023:

Report	Incident Date	Report Date	Report Highlights
Wendland 1H Well Fatal Explosion **Burleson County, TX**	01/29/20	12/26/23	On January 29, 2020, the Daniel H. Wendland 1-H well operated by Chesapeake Operating, LLC (Chesapeake), experienced a loss of well control that resulted in a blowout of the well. Oil and gas escaped the well and found an ignition source, resulting in a flash fire in the vicinity of the well, which fatally burned three workers and seriously injured another. The injured personnel were contractors from Eagle PCO LLC and CC Forbes Energy Services. At the time of the incident, eleven contractors were working at the well site. The CSB's report identified safety issues related to well planning, well control for the Wendland 1-H well blowout and for completed wells in under-pressured reservoirs, ignition source management, and deficiencies in federal regulatory safety requirements. The CSB issued recommendations to OSHA, Chesapeake, and the American Petroleum Institute (API).
KMCO LLC Fatal Fire and Explosion **Crosby, TX**	04/02/19	12/21/23	On April 2, 2019, a flammable isobutylene vapor cloud exploded at the KMCO, LLC facility. The event fatally injured a KMCO employee and seriously injured two others. At least twenty-eight other workers were injured, including five KMCO employees and twenty-three contractors. The CSB determined that the cause of the isobutylene release was a brittle overload fracture of the cast iron y-strainer driven by internal pressure. The CSB's investigation also identified safety issues related to emergency response, remote isolation, and hazard evaluation. The CSB did not issue any recommendations. Following the incident, KMCO filed for bankruptcy and ceased all operations. Altivia Oxide Chemicals, LLC purchased the facility in 2020 and informed the CSB that the process involved in the incident would be dismantled and two new oxide reactors installed.

Foundation Food Group Fatal Chemical Release **Gainesville, GA**	01/28/21	12/11/23	On January 28, 2021, liquid nitrogen overflowed from an immersion freezer located inside the Plant 4 building at the Foundation Food Group (FFG). The release began while maintenance workers were troubleshooting operational issues with the freezer, which was designed and owned by Messer LLC and leased to FFG. Once released, the liquid nitrogen quickly vaporized, expanded, and accumulated inside a partially enclosed lower-level room that lacked mechanical ventilation. The two maintenance workers who were troubleshooting the freezer at the time of the release died by asphyxiation due to the vaporized liquid nitrogen. The uncontrolled liquid nitrogen release continued, and the two deceased maintenance workers went undetected for up to 60 minutes until another worker went looking for them and saw a four- to five-foot-high vapor cloud filling the room. This worker reported the incident to management, which initiated an evacuation. During the building-wide evacuation, at least fourteen other employees, responded to the incident by investigating the freezer room or attempting to rescue their coworkers, resulting in four more employees fatally injured by asphyxiation, and three other employees and a firefighter seriously injured. The CSB determined the cause of the liquid nitrogen release was the failure of the immersion freezer's liquid level control system to accurately measure and control the liquid nitrogen level inside the freezer, which resulted from deformation of the system's bubbler tube component. The CSB also identified safety issues related to single point of failure, atmospheric monitoring and alarm systems, emergency preparedness, process safety management, and product stewardship. The CSB issued recommendations to Gold Creek Foods (the current owner of FFG), Messer LLC, OSHA, the Compressed Gas Association, the National Fire Protection Association, and the International Code Council.

Didion Milling Co. Explosion and Fire **Cambria, WI**	05/31/17	12/06/23	On May 31, 2017, a combustible dust explosion occurred inside the milling system at a Didion Milling dry corn milling facility, fatally injuring five employees and injuring another fourteen employees. On the night of the incident, during normal mill facility operations, employees smelled smoke in parts of the mill. Employees investigated the source of the smoke and heard an explosion and subsequently saw fire emanate from piping on a rotary gap mill equipment discharge. The employees began to evacuate and attempted to notify other employees of the emergency using their radios. A fire, a type of deflagration, spread through the process equipment via interconnected dust collection systems resulting in explosions inside some of the dust collection equipment. As the deflagrations relieved from the process equipment, expelling dust into the mill, secondary explosions occurred throughout the facility. The CSB determined the cause of the dust explosions and collapsed buildings was the ignition of combustible corn dust inside process equipment. The CSB's investigation identified alleged safety issues related to process hazard recognition, dust hazard analysis, engineering controls for combustible dust hazards, structural design for combustible dust hazards, management of change, incident investigations, process safety information, management of audits and inspections, emergency preparedness, process safety leadership, and regulatory coverage of combustible dust. The CSB issued recommendations to OSHA, Didion Milling, and the National Fire Protection Association.

Yenkin-Majestic Resin Plant Vapor Cloud Explosion and Fire **Columbus, OH**	04/08/21	11/30/23	On April 8, 2021, a mixture of flammable naphtha solvent vapors and resin liquid became pressurized and released through the seal of a closed manway of an operating kettle at the Yenkin-Majestic Paint OPC Polymers resin plant. The naphtha vapor spread throughout the enclosed building and formed a flammable vapor cloud inside and outside the building. The flammable vapor cloud found an ignition source, and an explosion erupted, which ignited additional flammable material and resulted in a large fire that took approx. eleven hours to extinguish. More than 100 firefighters responded, including hazmat teams. The incident damaged the Yenkin-Majestic site and caused a fire in an adjacent commercial property. One employee was fatally injured from thermal injuries and inhalation of products of combustion and was found partially covered by rubble inside the second floor of the resin plant. Eight other employees were transported to area hospitals for injuries suffered during the explosion and building collapse, including 3rd degree burns and bone fractures, with one employee requiring a leg amputation after he was crushed under collapsed debris. The CSB determined that the cause of the fatal explosion and fire was the release of flammable solvent vapor through the seal of a closed reactor manway that was not designed, constructed, or pressure tested to a design pressure appropriate for the process. The release through the closed manway occurred after the reactor became pressurized by the rapid vaporization of solvent when the reactor's agitator was turned on. The CSB's report identified safety issues related to mechanical integrity of low-pressure vessels, safeguard selection and hierarchy of controls, and emergency preparedness. The CSB issued recommendations to Yenkin-Majestic, the American Petroleum Institute, and the American Society of Mechanical Engineers.

Intercontinental Terminals Company Tank Fire **Deer Park, TX**	03/17/19	07/06/23	On March 17, 2019, a large fire erupted at the Intercontinental Terminals Company, LLC (ITC) bulk liquid storage terminal. The fire originated in the vicinity of an 80,000- barrel aboveground atmospheric storage tank that held a blend of flammable liquids – naphtha and butane. The fire caused substantial property damage at the ITC terminal, including destruction of fifteen 80,000-barrel aboveground atmospheric storage tanks and their contents. CSB determined that the cause of the incident was the release of flammable butane-enriched naphtha vapor from the failed Tank 80-8 circulation pump, which accumulated in the area. The CSB's investigation also identified safety issues related to pump mechanical integrity, flammable gas detection systems, remotely operated emergency isolation valves, tank farm design, and PSM/RMP applicability. The CSB issued recommendations to ITC, American Petroleum Institute, OSHA, and EPA.

Optima Belle Explosion and Fire **Belle, WV**	12/08/20	07/06/23	On December 8, 2020, a pressure-rated rotary double cone dryer containing a chlorinated isocyanurate compound (sodium dichloroisocyanurate dihydrate, or NaDCC dihydrate) exploded, causing a subsequent fire and toxic chlorine release at Optima Belle LLC. The explosion prompted local authorities to issue a shelter-in-place order within two miles of the site for over four hours. The facility experienced significant property damage, and debris was found almost a half mile away. An Optima Belle employee was fatally injured, two others were evaluated for respiratory irritation, and one area resident reported an injury. The CSB determined that the cause of the over-pressurization and the explosion was a self-accelerating decomposition of heated sodium dichloroisocyanurate dihydrate inside the dryer. The CSB's report also identified safety issues related to process knowledge management, thermal hazard assessment, equipment selection and design, tolling of hazardous materials, and regulatory coverage of reactive hazards. The CSB issued recommendations to OSHA (including a repeat recommendation), EPA (repeat recommendation), Optima Belle, Clearon Corporation, Richman Chemical Inc., the National Center for Biotechnology Information, and the Center for Chemical Process Safety.

Watson Grinding Fatal Explosion and Fire **Houston, TX**	01/24/20	06/29/23	On January 24, 2020, an accidental release of propylene accumulated and exploded inside a building at the Watson Grinding and Manufacturing Co. facility. The explosion fatally injured two employees and injured two others. A nearby resident was also fatally injured. On February 6, 2020, Watson Grinding filed for bankruptcy and ceased operations. The CSB determined the cause of the accidental release of propylene was a combination of: (i) a degraded and poorly crimped rubber welding hose that disconnected from its fitting inside a coating booth; (ii) not closing the manual shutoff valve at the propylene storage tank at the end of production the prior workday; and (iii) an inoperative automated gas detection alarm, exhaust fan startup, and gas shutoff system. The CSB concluded that the propylene vapor likely ignited when an employee entered the coating building and turned on the lights. The CSB's report also identified safety issues related to process safety management and emergency preparedness. The CSB issued recommendations to Compressed Gas Association and Matheson Tri-Gas Inc.

Wacker Polysilicon Chemical Release **Charleston, TN**	11/13/20	06/15/23	On November 13, 2020, a graphite heat exchanger cracked during maintenance activities, releasing gaseous hydrogen chloride (HCl) at the Wacker Polysilicon facility. The incident occurred on the fifth floor of an equipment access structure when a contractor pipefitter applied excessive torque to flange bolts on a heat exchanger outlet pipe containing HCl, causing the pipe to crack and release HCl. One worker was fatally injured attempting to escape the release, and two others sustained serious injuries. The CSB determined the cause of the incident was the inadvertent over-torquing of bolts on an HCl piping flange connection to a heat exchanger that fractured the heat exchanger outlet piping and released gaseous HCl in the vicinity of seven contractors. The CSB report also identified safety issues related to a lack of written procedures, contract workers performing simultaneous operations at a single worksite without accounting for potential hazards, inadequate control of hazardous energy, and insufficient means of egress from open-air industrial structures. The CSB issued recommendations to Wacker, OSHA, Tennessee OSHA, the Center for Chemical Process Safety, the International Code Council, and the National Fire Protection Association.

LyondellBasell La Porte Fatal Chemical Release **La Porte, TX**	07/27/21	05/25/23	On July 27, 2021, three contract workers employed by Turn2 Specialty Companies at the LyondellBasell La Porte Complex were working to remove an actuator from a plug valve in the site's acetic acid unit. The workers inadvertently removed pressure-retaining components of the valve while attempting to remove the actuator, and the pressure ejected the plug from the valve body. Approx. 164,000 pounds of acetic acid mixture erupted from the open equipment, and all three contract workers were sprayed with the acetic acid mixture. Two were fatally injured by chemical burns and toxic inhalation from exposure to acetic acid and methyl iodide, and the third was seriously injured, as was a LyondellBasell emergency responder. Twenty-nine other personnel were transported to medical facilities for further evaluation and treatment. The CSB determined that the cause of the incident was the inadvertent removal of pressure-retaining components from a plug valve in pressurized service while workers were removing the valve's actuator. Contributing to the incident was a plug valve design that did not include sufficient design features to prevent inadvertent removal of pressure-retaining valve components, the lack of procedures to conduct the actuator removal work, and the lack of training for conducting the work. The CSB issued safety recommendations to LyondellBasell, Turn2, American Society of Mechanical Engineers, American Petroleum Institute, and Valve Manufacturers Association of America Technical Committee.

Bio-Lab Lake Charles Chemical Fire and Release **Lake Charles, LA**	08/27/20	04/24/23	On August 27, 2020, extreme winds from Category 4 Hurricane Laura caused severe damage to buildings storing trichloroisocyanuric acid (TCCA) at the Bio-Lab, Inc. Lake Charles facility. TCCA is intended for use in large bodies of water where it is soluble and breaks down slowly, releasing chlorine in the water to sanitize contaminants. When TCCA instead is moistened by a small amount of water and does not dissolve, it can experience a chemical reaction, generating heat and causing decomposition of the chemical, which produces toxic chlorine gas and produces explosive nitrogen trichloride. After the buildings at the Bio-Lab facility were damaged by Hurricane Laura winds, rainwater contacted the TCCA stored inside, initiating a chemical reaction and subsequent decomposition of the TCCA. The heat produced from the reaction and decomposition initiated a fire, and released a large plume of hazardous gases, including toxic chlorine. The plume of hazardous gases crossed the facility boundary and could be seen over a large portion of the nearby community. A portion of a nearby interstate was closed for over 28 hours, and an emergency shelter-in-place order was issued to the surrounding community. The CSB determined the cause of the release to be rainwater contacting stored TCCA, which initiated a chemical reaction, decomposition, and fire after Category 4 Hurricane winds damaged portions of the building roof that were not built to current wind design requirements. The CSB's report also identified safety issues related to extreme weather preparation, process hazard analysis implementation, emergency preparedness and response, adherence to applicable hazardous materials codes, and the lack of regulatory coverage of reactive chemical hazards. The CSB issued safety recommendations to Bio-Lab Lake Charles, OSHA, EPA, and the Louisiana Governor and Louisiana State Legislature/Secretary of the Louisiana Department of Environmental Quality.