



U.S. Chemical Safety and
Hazard Investigation Board



Across Industries and Continents, Demand for CSB Safety Videos is Global

Normally it was a challenge for safety manager **Holly M. Little** to keep the full attention of the operators at a polymers plant in Sturtevant, Wisconsin, during training workshops. If she wasn't constantly on her toes, the operators would steal glances at the newspaper or drift into side conversations. "They're a pretty tough audience," says the veteran safety professional.

But it was different the morning she screened the U.S. Chemical Safety Board's video on the March 23, 2005, explosion inside a BP refinery in Texas City, Texas, that killed 15 contract workers—the deadliest U.S. industrial accident in more than a decade.

In an email to the Chemical Safety Board, Little wrote: "There was not a sound in the room during the video or my presentation. Several came up to me afterwards and commented on how the video really helped them to understand what happened."

The BP refinery explosion was a disaster of such magnitude that the Board looked for a new way to share the results of its investigation with the widest possible audience. More than a year prior to issuing its 341-page final investigation report, the Board released its first safety video, a six-minute, 14-second presentation that mixes sophisticated, 3-D animation of vapor cloud and explosion models with television news footage as a CSB investigator dispassionately explains how the disaster unfolded. The explosion occurred during the restart of a unit that boosted octane in gasoline. A distillation tower was flooded with flammable hydrocarbons that erupted through a blowdown stack. Backfire from an idling pickup truck quickly ignited the vapor cloud.

That video has been downloaded half a million times since it was posted on the CSB web site in December 2005, and the Board has distributed thousands of copies on DVD in response to requests from industry, fire departments, colleges, labor unions, and safety agencies around the world. Corporations and safety agencies have translated the BP video into Spanish, French, German, Mandarin, and Cantonese. Since then, the Board—whose mission is to investigate major chemical accidents and explain what caused them so that other disasters can be prevented—has produced 11 more videos on other big chemical accidents at U.S. work sites. Anyone with a computer and internet access can view these videos at safetyvideos.gov, and they are even posted on YouTube. Good videos begin with and depend on good investigations, and that is the CSB's stock in trade. In addition to dissecting what happened

valve design. The pressurized cylinders flew like rockets into the surrounding neighborhood on June 24, 2005.

- An August 19, 2004, explosion at a Sterigenics facility in Ontario, California, that sterilizes medical products. The open flame in a pollution control device set off the blast after a supervisor authorized a shortcut in removing ethylene oxide gas from a sterilization chamber.
- A vinyl chloride explosion and fire that killed five at a Formosa Plastics Corp. plant in Illiopolis, Illinois, on April 23, 2004.
- A fire that burned for five days at a Formosa plant in Point Comfort, Texas, after a forklift towing a small trailer snapped off an unprotected protruding valve causing propylene gas to escape on October 6, 2005.



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Holly M. Little, CSP, CHMM
Novartis Consumer Health, Inc.

at the BP refinery, CSB videos address these other accidents where routine operations went terribly awry:

- Three Acetylene Services Company workers killed on January 25, 2005, as they shoveled snow outside the Perth Amboy, New Jersey, plant in an acetylene gas explosion. The gas flushed through an open valve into an adjoining wooden shed, where it was ignited by a propane space heater.
- Two workers killed and a third injured at a municipal wastewater plant in Daytona Beach, Florida, on January 11, 2006, as they cut apart the steel roof of a hurricane-damaged shed. The corroded flame arrester atop a methanol tank—never cleaned nor inspected since its installation 13 years earlier—failed as cascading sparks from the welders’ torches triggered the fire.
- Two workers asphyxiated trying to retrieve a roll of duct tape that fell into the confined space atop a hydrocracker reactor at the Valero refinery in Delaware City, Delaware, on November 5, 2005. The vessel was undergoing a nitrogen purge to remove oxygen and other gases.
- Thousands of gas cylinders at a Praxair facility in St. Louis that exploded in the summer heat due to an inadequate relief

The Board has received thousands of emails from people like Holly Little who have found the CSB videos a valuable tool for their own safety work. Some commendations come from the executive suite, others from the plant floor. **Mike Long**, Maintenance Supervisor and Safety Coordinator for a Sterigenics plant in Charlotte, North Carolina, called the CSB video on the explosion at a sister facility “a tremendous training tool.”

“A lot of times you don’t get a second chance. We’re in a very dangerous business where our safety policy is do the job right the first time and every time. We really have to live by that because if you don’t, people could get hurt or, even worse, die,” said Long, a master electrician. The Ontario video “really helped me to hammer that point home: ‘Pay attention to the details, because things can happen.’”

Kevin D. Westwood, the Group Fire Advisor for BP International Ltd. at the company’s headquarters in London and secretary of the Joint Oil & Industry Fire Forum (www.joiff.com), wrote to say he personally planned to distribute “the excellent CSB video material inside and outside the shores of the U.S. to ensure the safety message is heard in other locations around the globe.” He regularly shares CSB safety materials across BP’s network of 570 facilities in more than 100 countries, and, through the JOIFF, with counterparts throughout the oil industry.

David E. Cummings, the Process Safety Competency Manager for E. I. du Pont de Nemours and Company in Wilmington, Delaware, found the videos especially helpful in DuPont's efforts to send the same safety messages to its 170 operating sites in four different regions of the world.

"It takes a lot of effort and a lot of organizational focus to do (process safety management) right," Cummings said in an interview. When the CSB deems an incident serious enough to warrant an investigation and subsequently releases a full report and safety video, "we want to learn from those incident reports and share those learnings with our people," says Cummings.

"Most people are not going to read an 800-page report," he said, but the videos "really get people's attention." DuPont has aired the BP Texas City video at numerous presentations for employees, line managers, and senior managers in concert with a summary of the full CSB investigation report. It also has made wide use the safety videos on the Formosa Plastics fire and explosion and the nitrogen asphyxiation incident at the Valero refinery. Cummings finds the videos especially valuable in helping train new process engineers, supervisors, and others about their roles in process safety management. "Many have never experienced a significant incident in their 'new' careers," said Cummings.

Ian Boyle, Director of Environmental Health and Safety at a facility of a major U.S. pharmaceutical company in Dublin, Ireland, calls the CSB videos "simply the most effective and high impact training tools I have come across."

In a telephone interview, Boyle said he was always on the lookout for training tools, and "was amazed to see the quality of the stuff the CSB had produced. It's just head and shoulders above anything else that I had come across." Nitrogen is commonly used in industrial plants for purging, and a tragedy like that at the Valero refinery could happen anywhere that safety controls are not rigorously observed, says Boyle. He has shown the CSB videos to technicians and managers at his plant. They are always the most interesting part of the meeting and the item that generates the most positive feedback.

Boyle, a former UK environmental regulator, said, "There's obviously some very clued-in people in the CSB because the material they produce really does have a resonance with the people who are actually carrying out the job on a day-to-day basis. Everybody can see how the same kind of thing might happen if similar circumstances were to occur in their own facility."

A situation like that at the Valero refinery "could easily arrive in our facility. We use nitrogen for everything because we use a lot of flammable materials," Boyle said. "Typically we use these videos at meetings of our site safety committee, made up people from the shop floors and managers. They are always the most interesting part of the meeting and always the thing that we get the most positive feedback about." Boyle agrees that it is the videos' realism that makes them so valuable.

The CSB video on the BP refinery was not **Daniel J. Buchanan's** first look at that conflagration. Buchanan, the Security and Emergency Preparedness Supervisor at the Marathon refinery across the street

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Recon Engineering



from the BP Texas City complex, went to the stricken refinery on a mutual aid call. "It was a real rough day for a lot of people. I remember it well," says Buchanan.

Buchanan sent the CSB an email encouraging the agency to keep the free safety videos coming. "The price is right," he said with a laugh, but quickly added, "I was so impressed with the quality of the production, namely, the graphics, the animation, and the duration is just right for a management meeting or an employee safety meeting."

"The CSB does an excellent job of summarizing lessons learned. The takeaways are very applicable to real world plant conditions or plant operations," said Buchanan, whose refinery processes 75,000 barrels of crude a day. "It's factual. It stays clear of the emotional element—and rightly so—yet it does present the reality of an event."

Catherine Corliss, then the Process Safety Code Mechanical Integrity Team Leader at the FMC Corp. Lithium Division, used the BP video for PSM training at her plant in Bessemer City, North Carolina.

The Bethune Point safety video hit close to home for **Lois Thomas**, Safety Officer for St. Johns County in St. Augustine, Florida, 50 miles north of Daytona Beach. "Our goal is that everyone goes home the same way we came in to work: happy, safe, healthy and whole. Thank you for your efforts with these investigations," wrote Thomas. "If this video changes just one heart to prevent injury or death, it was worth every dime it took to produce it."

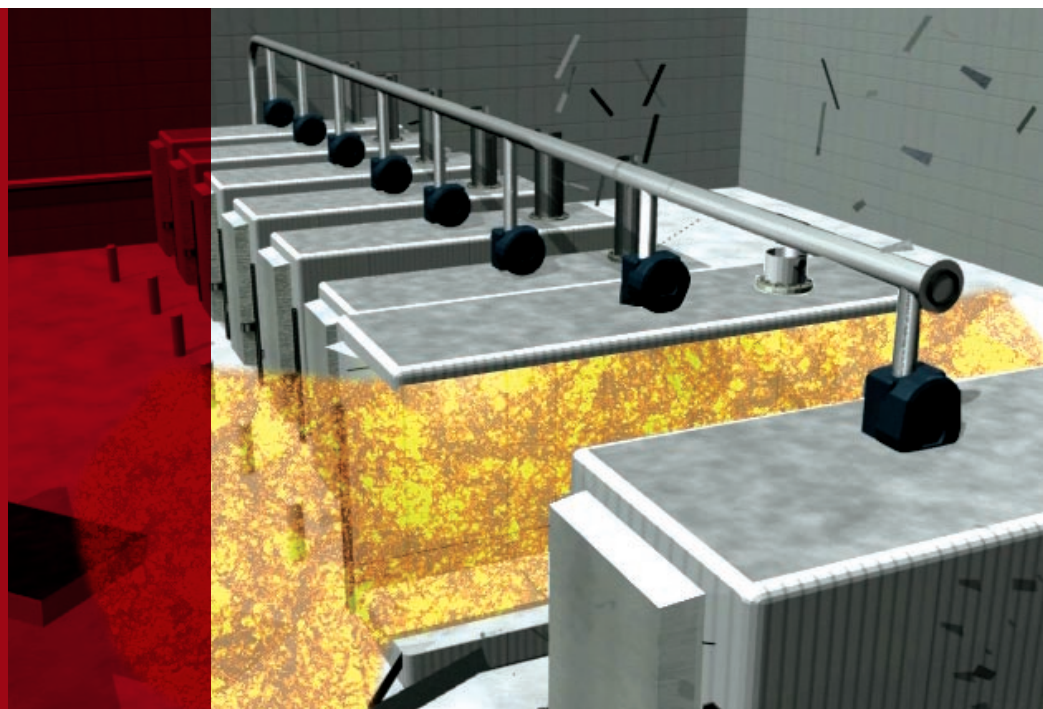
First responders—the firefighters and hazardous materials specialists who must extinguish the flames and deal with the vapor clouds when chemicals are spilled or ignited—form one of the most eager and appreciative audiences for CSB safety videos.

Captain David Ignecci, of the Elyria, Ohio, Fire Department, regularly uses the CSB safety videos to train not only Elyria and county firefighters, but in HazMat training sessions across the country conducted by the International Association of Fire Fighters (IAFF).

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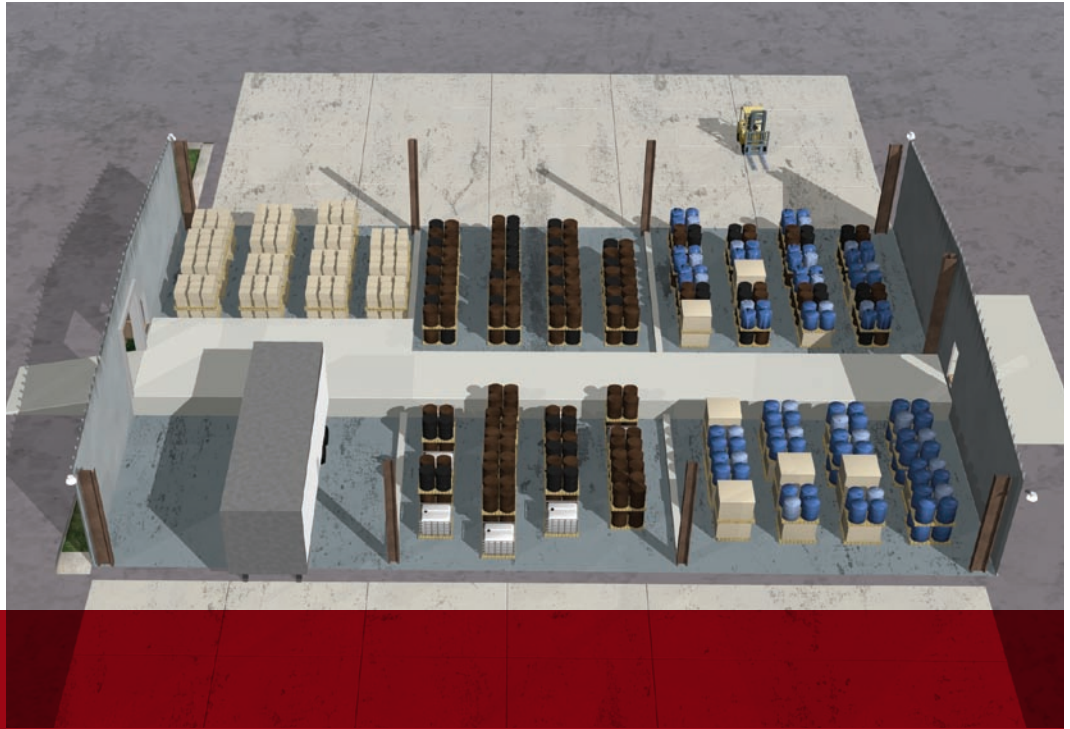
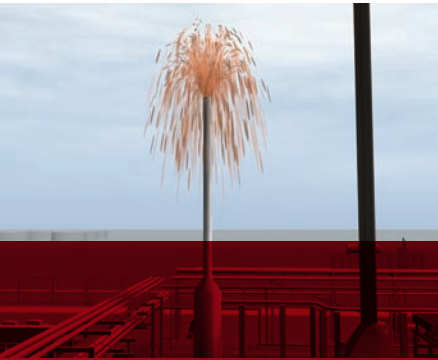
Corliss said the video of the Texas City incident "covered every element of process safety" that they wanted to highlight. She embedded the entire video into a PowerPoint presentation for engineers, operators, mechanics, team leaders, and managers at her plant.

"We showed the video in its entirety and then went through each of the 14 elements discussing what went wrong," recounted Corliss, a mechanical engineer who recently joined the CSB as an investigator. She praised the realistic animation that allows viewers "to watch as the process began to fail and where it overheated and where the flow stopped." She added, "It's easy for people to see and understand."

Jason Gibson, the Process Hazard Analysis Facilitator and PSM Incident Investigation Leader for Recon Engineering at a Firestone facility in Lake Charles, Louisiana, called the CSB video "one of the best produced safety videos I've ever seen. They are relevant, concise, attention getting and not full of fluff or B-movie actors. I've gotten nothing but good feedback from the people I've shown them to."

form of terrorist or criminal acts," said Ignecci. Elyria (pop. 56,000), a city near Cleveland, is crisscrossed by rail routes and interstate highways and is home to four chemical plants and other heavy industry. He calls the CSB safety videos "invaluable" and singles out those on the wastewater plant explosion in Daytona Beach and the Praxair fire in St. Louis, as well as the BP video. Firefighters must know how to deal with all sorts of chemical hazards that if not contained can cascade into catastrophe, said Ignecci, a firefighter for 29 years. He credits the recommendations of the Chemical Safety Board with making industry more safety conscious and sharply reducing the numbers of accidents in chemical facilities.

In bustling Fairfax County, Virginia—a Washington, DC, suburb with more than a million residents—**Battalion Chief Craig Buckley** supervises more than 200 hazardous materials specialists in a department with 1,400 firefighters. "We are always looking for more information to use for training. The CSB with its DVDs and the videos



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Acting Lieutenant Steve Crother, Fire Inspector, Special Hazards Unit, Seattle Fire Department

and the reports is very helpful,” said Buckley, who also does HazMat training for the IAFF. The department recently used the Praxair video on the exploding cylinders as a centerpiece in a continuing education program for its entire HazMat team.

“It’s excellent information to give out. Their simulations are really high end,” said Buckley, who has spent 25 of his 29 years on the force in HazMat work. “Most hazardous materials teams in the country are always looking at other people’s HazMat events as a way of learning and getting better.”

Michael McNeil, a Fire Prevention Battalion Chief with the U.S. Forest Service in Susanville in California’s northeast corner, said that chemicals come into play even in fighting forest fires. “We have a lot of dumps,” explained the 16-year veteran. When it comes to hazardous materials, “everybody’s got to learn from everybody else. We’ve all got to watch each other’s backs, especially on the public safety side of things, and we’ve got to know what we’re talking about when we meet with industry.”

Acting Lieutenant Steve Crothers, a Fire Inspector in the Special Hazards Unit of the Seattle Fire Department, was so struck by the Bethune Point wastewater plant video—where a flame arrester failed after a welder’s torch ignited methanol fumes—that he worked with colleagues on rewriting the flame arrester section of the International Fire Code (IFC). These and other changes will ensure that flame arresters nationwide undergo regular maintenance and inspection.

“In Seattle we heavily regulate cutting and welding and other hot

work operations, specifically on fuel tanks and in the shipping and marine industry,” said Crothers. Welders need fire permits to operate a torch inside the city limits of Seattle. “That [CSB] training video spoke directly to an activity we regulate. They did a good job of tying the sequence of tragic events together, and the animation really makes it come alive.”

The videos are popular, too, with professors teaching safety management courses at colleges in the U.S. and overseas, and with the training industry. **John Alden**, a Program Coordinator for the nonprofit Environmental Management Institute in Indianapolis, says, “I love what the CSB does.” With commercial videos, “you can tell all the way through that everything has been simulated. There is nothing realistic about it.”

Carl Steiner, a Maintenance Electrician and Chair of the United Steelworkers Health and Safety Committee at the ConocoPhillips refinery in Rodeo, California, first got his hands on CSB safety videos at the union’s 2006 HSE conference. He wrote the Board: “These are the most informative and pertinent videos our shop has seen. They beat our 1970s VHS tapes ten fold!” Steiner said 20 people at his shop—including electricians, instrument technicians and supervisors—eventually watched the CSB safety videos. “The CSB videos use high quality graphics simulations and excellent commentary that really help management, operators, and maintenance personnel think about how their specific decisions and work activities can cause or prevent these tragedies,” Steiner wrote.

The videos regularly generate mail from across the globe, from Brazil to Bahrain to Egypt to South Korea to Australia.

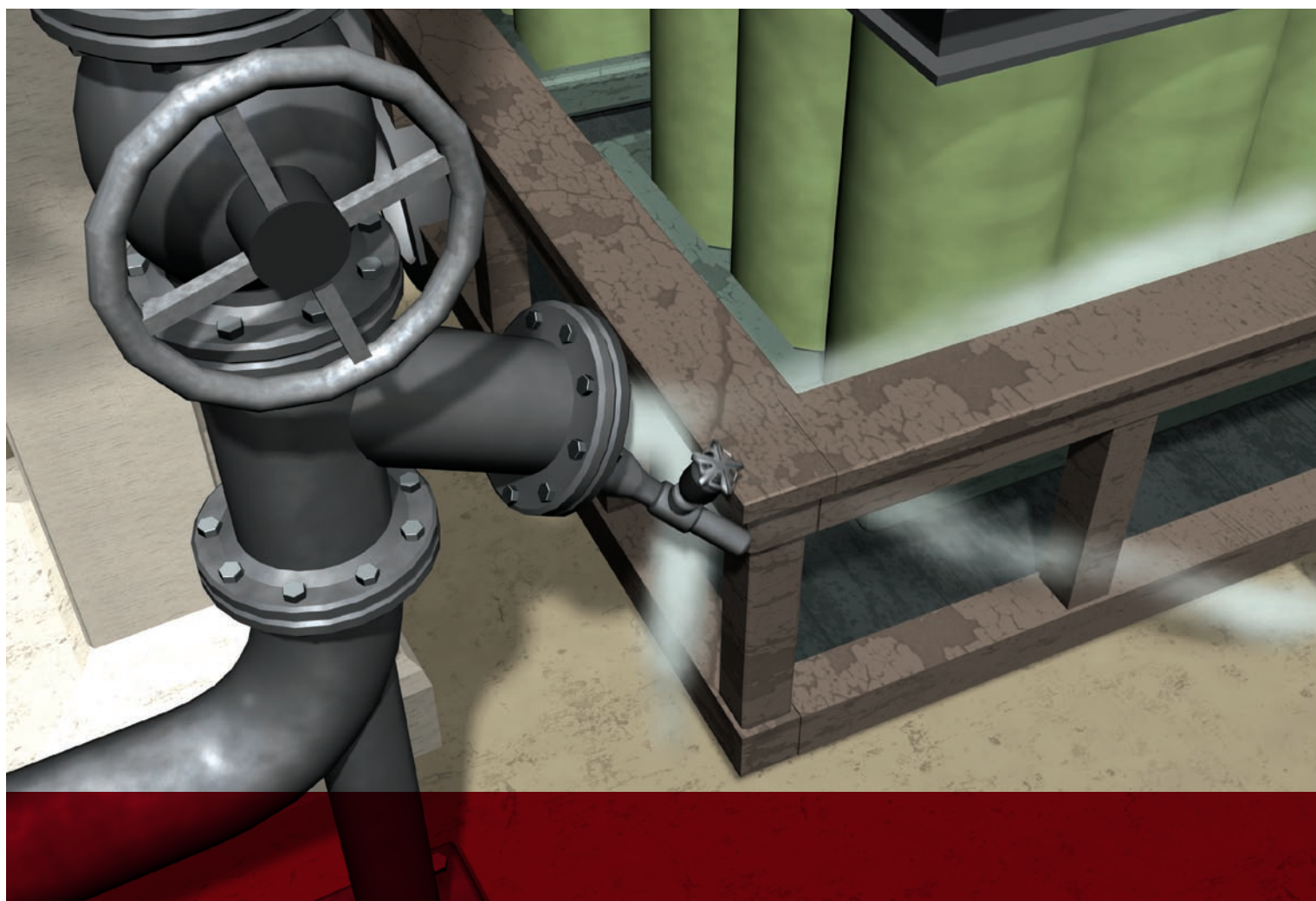
Hans J. Johansen, QHSE Manager for the oil exploration subsidiary of DONG Energy, a Danish utility, learned of the videos while at a safety seminar in Kuala Lumpur, where the BP Texas City refinery explosion was a topic of discussion. “I was surprised to learn that other participants—for example, from the Middle East—were well informed of the information which could be gathered from the CSB. I did not know about it—then. I do now,” he said.

Back home, Johansen aired the safety video and discussed the accident at several DONG safety seminars, and DONG’s Exploration

& Production Company, which employs 300 personnel at sites in Denmark, the United Kingdom, Norway, and Greenland, has increased emphasis on maintenance, asset integrity, and safety culture to avoid the problems that befell the BP refinery.

Johansen also sent a second copy of the video to those working at a DONG offshore production facility. For those on the front lines, he notes, “a picture often says more than a thousand words.”

Feedback like that explains why the Board intends to keep the videos coming as a regular outgrowth of its investigative work.



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