



U.S. Chemical Safety and
Hazard Investigation Board

Fire During Hot Work at Evergreen Packaging Paper Mill

Canton, NC | Incident Date: September 21, 2020 | No. 2020-07-I-NC

Executive Summary From Final Report

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SAFETY ISSUES:

- Hot Work Safety
- Pre-Job Planning
- Confined Space Safety
- Combustible Materials of Vessel Construction



Executive Summary

Incident Overview

On September 21, 2020, a paper mill operated by Evergreen Packaging (Evergreen) in Canton, North Carolina, was undergoing a planned shutdown, and associated maintenance and capital project work was ongoing throughout the facility. In one of Evergreen's pulp bleaching units, two contract companies (Universal Blastco, or "Blastco," and Rimcor) were performing simultaneous maintenance work inside two connected process vessels, called an "upflow tower" and a "downflow tower."

The pulp bleaching process is corrosive by design, and the upflow and downflow towers were constructed of corrosion-resistant materials. However, due to the corrosive nature of the process, the upflow and downflow towers required periodic maintenance to their inside surfaces. The upflow tower was constructed of fiber-reinforced plastic (FRP), and Blastco's repair work in the upflow tower required the application of flammable epoxy vinyl ester resin and sheets of fiberglass to the inside walls of the vessel. However, cool ambient temperatures in the area on the night of the incident caused the resin to harden slower than the Blastco workers anticipated, resulting in the newly applied resin and fiberglass sliding down the walls of the vessel. The Blastco workers attempted several means of addressing the issue but were ultimately unsuccessful. Two Blastco workers resorted to using a portable, electric heat gun to warm the resin, enabling it to harden faster. The Blastco crew did not warn of or otherwise communicate to Evergreen or Rimcor its use of the heat gun, which was an ignition source in the presence of the flammable resin.

At approximately 5:15 a.m., a fire started inside the upflow tower when the heat gun fell into a five-gallon bucket containing flammable resin. The Blastco workers inside the upflow tower successfully escaped the fire and evacuated the vessel. However, smoke and flames quickly spread to the connected downflow tower, fatally injuring two Rimcor workers there [Brett Burgueno, Curtis Butler].

The Canton Fire Department and mutual aid from surrounding areas responded to the incident. In addition to the U.S. Chemical Safety and Hazard Investigation Board (CSB), the North Carolina Department of Labor, Occupational Safety and Health Division (OSHNC) investigated the incident.

The CSB's investigation identified the safety issues below.

Safety Issues

- **Hot Work Safety.** The electric heat gun used to warm the flammable resin could achieve temperatures in excess of the resin's flash point and auto-ignition temperatures. The electric heat gun came into direct physical contact with the flammable resin when it fell into the resin bucket. Blastco did not recognize the ignition hazard presented by the use of the heat gun, did not inform Evergreen or Rimcor of the heat gun's use, and did not take adequate action to prevent the introduction of ignition sources into a confined space containing flammable liquids. In addition, while Evergreen's internal policies defined hot work as "any activity that could serve as a source of ignition," Evergreen's contractor orientation materials limited the hot work definition to only "burning, cutting, brazing or welding." ([Section 3.1](#)).

- **Pre-Job Planning.** Cool ambient temperatures on the night of the incident caused poor performance of the resin Blastco was using to repair the inside surface of the upflow tower. Blastco workers unsuccessfully attempted several means of addressing the problem prior to resorting to warming the resin with a heat gun. Drum heaters, which might have prevented this incident by warming the resin in a drum outside the upflow tower, were not identified in pre-job planning efforts, and Blastco workers were unable to locate them on Blastco's job trailer. The work also was not performed during the day when temperatures were warmer, which may have eliminated the need to warm the resin ([Section 3.2](#)).
- **Confined Space Safety.** Evergreen, Blastco and Rimcor treated the upflow and downflow towers as separate and independent confined spaces, even though the towers were connected by a crossover pipe. Blastco failed to terminate the confined space entry when a new hazard, the heat gun, was introduced into the space. There was no coordination between the two contract crews, and no evaluation was made as to whether the simultaneous operations posed a hazard to each other. In addition, Blastco did not effectively evaluate the flammable material hazards presented by its work in the upflow tower, and Evergreen did not ensure its emergency response team was on standby outside the upflow tower while flammable materials were used inside the confined space ([Section 3.3](#)).
- **Combustible Materials of Vessel Construction.** The five-gallon bucket in which the fire initiated in the upflow tower did not contain enough fuel to sustain the size and duration that the fire achieved during the incident. Evidence shows that the upflow tower itself, constructed of combustible FRP, caught fire. This contributed to the spread of smoke and flames to the downflow tower, where the two Rimcor employees were fatally injured ([Section 3.4](#)).

Cause

The CSB determined the cause of the incident was the failure by Blastco to effectively evaluate the flammable material hazards presented by its work in the upflow tower and implement controls to prevent the introduction of ignition sources to the work area. Contributing to the incident was Blastco's failure to recognize heat guns as a form of hot work that could ignite flammable materials, gaps in Evergreen's training to contractors on forms of hot work, and poor pre-job planning that allowed Blastco's work to occur during cold temperatures which were known to make the fiber-reinforced plastic application process difficult, in addition to a lack of Blastco troubleshooting guidance for safely addressing cold-weather resin performance. Contributing to the severity of the incident were poor confined space safety practices, including Blastco's and Rimcor's lack of recognition and control of the hazards of the simultaneous operations, Evergreen's failure to ensure coordination and the integrity of pre-planning between the two contract companies, inadequate communication between Blastco and Rimcor, and the lack of immediately available emergency services during the hazardous operation involving flammable materials in a confined space. The material of construction of the upflow tower and crossover line also contributed to the severity of the incident, as it was a combustible material that enabled the fire to quickly spread.

Recommendations

Previously Issued Recommendation Reiterated in This Report

To the U.S. Occupational Safety and Health Administration (OSHA)

2008-01-I-CO-R2

Publish a “Safety and Health Information Bulletin” addressing the hazards and controls when using flammable materials in confined spaces that includes actionable guidance regarding:

- a. The importance of implementing a hierarchy of controls to address hazards in a confined space that first seeks to eliminate hazards or substitute with a less hazardous material(s) or method(s). Examples include performing work outside of a confined space where reasonably practicable or substituting a flammable material with a non-flammable one.
- b. The necessity of establishing a maximum permissible percentage substantially below the lower explosive limit (LEL) for safe entry and occupancy of permit required confined spaces.
- c. The need to comprehensively control all potential ignition sources and continuously monitor the confined space at appropriate locations and elevations when work activities involve the use of flammable materials or where flammable atmospheres may be created.
- d. The importance of treating confined spaces with the potential for flammable atmospheres above 10 percent of the LEL as a hazard immediately dangerous to life or health (IDLH) that requires rescuers to be stationed directly outside the permit space and available for immediate rescue with appropriate fire-extinguishing and rescue equipment.
- e. The requirement that confined spaces such as penstocks be managed as permit-required that are so large or part of a continuous system that they cannot be fully characterized from the entry point. Such spaces need to be monitored for hazardous atmospheres both prior to entry and continuously in areas where entrants are working.

New Recommendations

To OSHA

Issue a safety information product (such as a letter of interpretation) addressing the analysis and control of hazards that are not pre-existing but which result from work activities inside permit-required confined spaces.

Require Owner/Operators to ensure the coordination of simultaneous operations involving multiple work groups, including contractors. Include in the requirement for Owner/Operators to ensure the following activities occur:

- Identification of potential simultaneous operations
- Identification of potential hazardous interactions

- Evaluation and implementation of necessary safeguards to allow for safe simultaneous operations
- Coordination, including shared communication methods, between the simultaneous operations
- Inclusion of emergency response personnel or services in the planning and coordination of the simultaneous operations

As necessary, seek the regulatory authority to promulgate this requirement.

To Evergreen Packaging

Update all documentation, training, and orientation materials provided to contractors pertaining to hot work to reflect Evergreen Packaging's internal definition of hot work. The materials should make clear that hot work encompasses any method of work that can serve as a source of ignition.

Develop and implement a formalized and comprehensive Simultaneous Operations (SIMOPs) program addressing planned work occurring close together in time and place to include policies, procedures, hazards reviews, hazards abatement, training, and shared communication methods, to protect employees and contract workers from the hazards posed by simultaneous operations at its facilities. At a minimum, the program should:

- Identify potential simultaneous operations
- Identify potential hazardous interactions
- Evaluate and implement necessary safeguards to allow for safe simultaneous operations
- Ensure coordination, including shared communication methods, between the simultaneous operations
- Include emergency response personnel or services in the planning and coordination of the simultaneous operations

Develop and implement a policy that requires the involvement of emergency response personnel in planning and coordination of activities involving the use of flammable materials in confined spaces. In the policy, require that emergency response personnel be stationed directly outside the confined space in which flammable materials are used. Ensure that the emergency response personnel are appropriately trained and equipped for confined space entry, confined space rescue and fire response.

To Universal Blastco

Update the Universal Blastco hot work policy and employee training program to specifically identify the use of heat guns as hot work. The policy and programs should make clear that hot work encompasses any method of work that can ignite a fire and not just spark- or flame-producing work methods.

Develop a formalized troubleshooting guide and/or standard operating procedure for the usage of resin and fiberglass matting in FRP operations. The procedure should direct employees on acceptable means of addressing cold-weather resin performance.

Develop a policy and standard operating procedures for the proper use of heat guns in FRP operations.