U.S. Chemical Safety and Hazard Investigation Board

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Chairperson

Mark Griffon
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Frank Reiner, President
The Chlorine Institute
1300 Wilson Blvd., Suite 525
Arlington, VA 22209

JUL 09 2013

Dear Mr. Reiner:

As you may know, the U.S. Chemical Safety and Hazard Investigation Board (CSB) issued the following recommendation to the Chlorine Institute pursuant to our investigation of a chlorine gas release from the DPC Enterprises chlorine repackaging facility in Glendale, Arizona on November 17, 2003:

CSB Recommendation No: 2004-2-I-AZ-R14:
Clarify the chemistry involved in over-chlorination incidents so that "Chlorine Scrubbing Systems, Pamphlet 89," and other pertinent publications:

- *Ensure that the recommended practices and safeguards prevent, mitigate, and control hazardous releases due to bleach decomposition.*
- *Provide sufficient detail on the safety and environmental consequences of over-chlorination to enable companies to provide emergency responders with information on the potential characteristics of over-chlorination events, and on the best means of mitigating the bleach decomposition reaction following a release.*

I am writing to notify you that the Board voted on June 17, 2013 to designate this recommendation with the status: "**Closed- Acceptable Action.**" This status designation reflects the Board's determination that the information submitted by the Chlorine Institute indicates completed actions that satisfied the objectives of the CSB's recommendation; no further actions are needed. Please see the attached "Recommendation Status Change Summary" for further detail. Please note that this document has also been posted on our web site, www.csb.gov. Thank you for your efforts to safeguard the health and safety of workers and the general public.

Sincerely,

Rafael Moure-Eraso, PhD, CIH
Chairperson

Enclosure

cc: Manuel Gomez, Director, Office of Recommendations, CSB
Mark Kaszniak, Senior Chemical Safety Recommendations Specialist, CSB

U. S. Chemical Safety and Hazard Investigation Board
RECOMMENDATIONS STATUS CHANGE SUMMARY

Report:	DPC Enterprises Chlorine Release
Recommendation Number:	2004-2-I-AZ-R14
Date Issued:	February 28, 2007
Recipient:	Chlorine Institute (CI)
New Status:	R14: Closed – Acceptable Action
Date of Status Change:	June 17, 2013

Recommendation Text:

Clarify the chemistry involved in over-chlorination incidents so that "Chlorine Scrubbing Systems, Pamphlet 89," and other pertinent publications:

- *Ensure that the recommended practices and safeguards prevent, mitigate, and control hazardous releases due to bleach decomposition.*
- *Provide sufficient detail on the safety and environmental consequences of over-chlorination to enable companies to provide emergency responders with information on the potential characteristics of over-chlorination events, and on the best means of mitigating the bleach decomposition reaction following a release.*

Board Status Change Decision:

A. Rationale for Recommendation

On November 17, 2003, chlorine gas was released from the DPC Enterprises chlorine repackaging facility in Glendale, Arizona, near Phoenix. Fourteen people, including ten police officers, required treatment for chlorine exposure. The release occurred when chlorine vapors from a rail car unloading operation escaped from a scrubbing system designed to capture the material and also produce bleach (sodium hypochlorite). Owing to the exhaustion of absorbent chemicals in the scrubber, and a back-reaction, chlorine gas was released in large quantities.

The Chlorine Institute (CI) publishes guidance documents relevant to the design and operation of chlorine scrubbers used for bleach production, including: Chlorine Institute Pamphlet 89 - "Chlorine Scrubbing Systems," and Chlorine Institute Pamphlet 96 - "Sodium Hypochlorite Manual." These documents advise that over-chlorinating scrubbers is dangerous and can lead to the release of hazardous materials, including chlorine; however, the versions available at the time of the incident did not recommend specific safeguards to prevent, control, or mitigate the consequences of scrubber over-chlorination. As public safety would benefit from additional guidance quantifying the consequences of scrubber over-chlorination and providing more comprehensive recommendations for best practices to prevent these dangerous events, the Board issued a recommendation to the Chlorine Institute to update its documents to address issues pertaining to over-chlorination.

B. Response to the Recommendation

The Chlorine Institute (CI) reviewed existing technical guidance found in its pamphlets and made modifications in the following three to address the CSB's recommendation:

- Pamphlet 64 – *Emergency Response Plans for Chlor-Alkali Sodium Hypochlorite and Hydrogen Chloride Facilities*, 6th edition, dated February 2006
- Pamphlet 89 – *Chlorine Scrubbing Systems*, 3rd edition, dated August 2006
- Pamphlet 96 – *Sodium Hypochlorite Manual*, 3rd edition, dated April 2006

The substance of the changes made in these pamphlets centered on the following:

- Ensuring that process over-chlorination is included as a possible hazard to be considered in the facility's emergency response planning, including how to deal with an accidental over-chlorination of a process (e.g., over-chlorination of a bleach reactor);
- Informing users that the over-chlorination of a scrubber can release significant amounts of chlorine and that an over-chlorinated scrubber could continue to release chlorine until mitigation measures modify certain reactor conditions or the pH increases (e.g., through the addition of caustic). The sequences of chemical reactions that typically occur during an over-chlorination event are also explained;
- Ensuring proper operation of emergency scrubbing units; and,
- Analyzing the risks associated with the production of sodium hypochlorite and implementing the proper type and number of layers of protection to prevent a release.

C. Board Analysis and Decision

Because the changes made to the three Chlorine Institute pamphlets to address all the elements listed in CSB Recommendation No. 2004-2-I-AZ-R14, the status of this recommendation was changed to: "Closed – Acceptable Action."