



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

Report:	DPC Enterprises (Glendale) Chlorine Release
Recommendation Number:	2004-02-I-AZ-R1 through R6
Date Issued:	February 28, 2007
Recipient:	DPC Enterprises, L.P.
New Status:	R1 through R6: Closed-Acceptable Action
Date of Status Change:	September 20, 2012

Recommendation Text:

2004-2-I-AZ-R1: Establish and implement DPC corporate engineering standards that include adequate layers of protection on chlorine scrubbers at DPC facilities, including:

- additional interlocks and shutdowns, such as automatically stopping chlorine flow to the scrubber upon oxidation-reduction potential alarm;
- mitigation measures, such as systems to automatically add caustic to over-chlorinated scrubbers, or back-up scrubbing capability to treat emissions from over-chlorinated scrubbers;
- increases in the final caustic concentration in the scrubbers to eight percent or higher to provide a substantial safety margin against over-chlorination; and
- use of the site's continuous bleach manufacturing system to convert scrubber solution to saleable bleach.

2004-2-I-AZ-R2: Revise scrubber SOPs to include:

- clearly described operating limits and warnings about the consequences of exceeding those limits, and
- the safety and environmental hazards associated with scrubber over-chlorination.

2004-2-I-AZ-R3: Train employees on the revised SOPs and include a test to verify understanding. Periodically review operator understanding of and conformance to the scrubber SOPs.

2004-2-I-AZ-R4: Include scrubber operation in facility PHAs. Ensure that they:

- include lessons learned from this incident and other DPC scrubber incidents, as well as industry experience with over-chlorination, and
- consider off-site consequences when evaluating the adequacy of existing safeguards.

2004-2-I-AZ-R5: Use a qualified, independent auditor to evaluate DPCs PSM and RMP programs against best practices. Implement audit recommendations in a timely manner at all DPC chlorine repackaging sites.

2004-2-I-AZ-R6: Implement a recognized safety management system, including third party verification and certification, to achieve documented continuous improvement in safety performance at Glendale and the other DPC chlorine repackaging sites.

Board Status Change Decision:

A. Rationale for Recommendation

On November 17, 2003, a chlorine gas release of up to 1,920 pounds at DPC Enterprises in Glendale, Arizona led to the evacuation of 1.5 square miles of Glendale and Phoenix. Five residents and 11 police officers sought medical attention for symptoms of chlorine exposure and were treated and released.

DPC Enterprises, L.P. owns and operates a number of chlorine repackaging facilities around the United States. The Glendale facility operations received liquid chlorine from railcars and repackaged it into smaller containers to distribute to local customers. The facility also manufactured sodium hypochlorite (or bleach) in scrubbers, although these devices are typically used as pollution control devices to capture chlorine emissions. The CSB investigation concluded that an over-chlorination reaction occurred in the scrubber, leading to decomposition reaction and resulted in the chlorine release.

Among numerous other findings, the CSB concluded that insufficient safety margins, lack of engineering safeguards and unclear procedures and training contributed to the incident. The CSB issued fourteen recommendations, six of which went to the company to revise corporate procedures, training, and to undergo independent, external audits of their operations.

B. Response to the Recommendation

DPC reported to the CSB that it has added more layers of protection to prevent an over-chlorination event from occurring in its scrubber, and that these additional controls would also be employed in all 13 of its facilities that similarly manufacture bleach. They reported raising the minimum caustic soda concentration in the scrubbers, automating their systems to ensure better control over chlorine flows, installing chlorine detection devices with alarms around the facilities, as well as adding a caustic quench dump mechanism to add caustic soda if it is necessary to prevent an over-chlorination event.

DPC provided an example of a process hazard analysis that included scrubber operations and examined the hazards of potential over-chlorination events that could lead to worker exposure and/or off-site consequences. DPC also provided documentation that an independent third party conducted an audit, and reported that the audit's recommendations have been implemented. Finally, DPC also reported and provided evidence that it has implemented the National Association of Chemical Distributors, Responsible Distribution Verification Process, a recognized safety management system that includes independent third-party verification audits.

C. Board Analysis and Decision

The Board reviewed DPC's responses and documentation and concluded that DPC's addition of several additional layers of protection to their systems for manufacturing chlorine is consistent with the intent of the CSB's recommendations. Therefore, the Board voted to designate all six recommendations with the status of "Closed- Acceptable Action" on September 20, 2012.