



U. S. Chemical Safety and Hazard Investigation Board

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February 4, 2004

John Henshaw
Assistant Secretary of Labor
Occupational Safety and Health Administration
200 Constitution Ave N.W.
Washington D.C. 20210

Dear Assistant Secretary Henshaw:

On behalf of the Board, I am responding to your letter of November 13, 2003, that addressed the recommendations of the Chemical Safety Board (CSB) resulting from the Board's *Hazard Investigation on Improving Reactive Chemical Management*. Based on the findings of that report, and consistent with our mission, the Board proposed recommendations to protect the health and safety of workers and the public.

Specifically, the CSB recommended that the Occupational Safety and Health Administration:

1. Amend the Process Safety Management Standard (PSM), 29 CFR 1910.119, to achieve more comprehensive control of reactive hazards that could have catastrophic consequences. (2001-01-H-R1)
 - Broaden the application to cover reactive hazards resulting from process-specific conditions and combinations of chemicals. Additionally, broaden coverage of hazards from self-reactive chemicals. In expanding PSM coverage, use objective criteria. Consider criteria such as the North American Industry Classification System (NAICS), a reactive hazard classification system (e.g., based on heat of reaction or toxic gas evolution), incident history, or catastrophic potential.
 - In the compilation of process safety information, require that multiple sources of information be sufficiently consulted to understand and control potential reactive hazards. Useful sources include:

- Literature surveys (e.g., *Bretherick's Handbook of Reactive Chemical Hazards*, *Sax's Dangerous Properties of Industrial Materials*).
 - Information developed from computerized tools (e.g., ASTM's CHETAH, NOAA's The Chemical Reactivity Worksheet).
 - Chemical reactivity test data produced by employers or obtained from other sources (e.g., differential scanning calorimetry, thermogravimetric analysis, accelerating rate calorimetry).
 - Relevant incident reports from the plant, the corporation, industry, and government.
 - Chemical Abstracts Service.
- Augment the process hazard analysis (PHA) element to explicitly require an evaluation of reactive hazards. In revising this element, evaluate the need to consider relevant factors, such as:
 - Rate and quantity of heat or gas generated.
 - Maximum operating temperature to avoid decomposition.
 - Thermal stability of reactants, reaction mixtures, byproducts, waste streams, and products.
 - Effect of variables such as charging rates, catalyst addition, and possible contaminants.
 - Understanding the consequences of runaway reactions or toxic gas evolution.
2. Implement a program to define and record information on reactive incidents that OSHA investigates or requires to be investigated under OSHA regulations. Structure the collected information so that it can be used to measure progress in the prevention of reactive incidents that give rise to catastrophic releases. (2001-01-H-R2)

In accordance with our recommendation follow-up process, the Board considers the reply from recipients along with any evidence presented and then votes on the status of recommendations.

Recommendation 2001-01-H-R1

On February 2, 2004, the Board voted unanimously to designate the status of recommendation 2001-01-H-R1, referenced above, as **Open - Unacceptable Response**. I will address each part of our recommendation, your response and the Board's answer to that response:

Broaden Application of PSM Standard

With reference to the CSB recommendation that OSHA revise the PSM standard to broaden the application to cover reactive hazards resulting from process-specific conditions and combinations of chemicals and to broaden coverage of hazards from self-reactive chemicals, your letter states that "OSHA has not yet decided whether to revise

the PSM standard.” The main reason that OSHA offers for not coming to a decision is lack of “consensus on the part of experts” on the best approach to take with regard to chemical reactivity hazards. As an alternative, OSHA has decided to revise the PSM Compliance Directive and to expand its outreach efforts.

While the Board commends OSHA on increased outreach efforts designed “to heighten awareness of hazards associated with reactivity,” Board members continue to believe that the evidence compiled by the CSB’s investigation strongly indicates that a revision of the standard is necessary. Board members do not feel that a consensus on the best approach should be a condition for deciding the baseline question of whether a revision of the PSM standard is necessary. There is certainly no lack of ideas or opinions concerning how the problem can be solved. OSHA has under its authority ample means to gather the information and advice needed to determine how best to approach revision of this standard. These include an Advance Notice of Proposed Rulemaking, development of a proposed rule, as well as comments, public hearings and post hearing comments on that proposal.

While the Board understands that making a decision to move forward on a new standard or a major revision of an existing standard is difficult, we were disappointed that your letter provided no indication of when a decision may be made, nor did it indicate what criteria OSHA will use to arrive at that decision.

Consult Multiple Sources of Information when Compiling Process Safety Information

With reference to the CSB recommendation that the PSM standard be revised to “require that multiple sources of information be sufficiently consulted,” your letter states that the PSM standard already requires employers to consult additional sources of information and requires a thorough evaluation of reactive hazards.

The Board notes that these requirements are restricted to the current *application* of the standard (§1910.119(a)(1)(i)) and refer exclusively to a list of “extremely hazardous chemicals” as defined in Appendix A to §1910.119. The CSB report concluded, however, that the list in Appendix A provides inadequate coverage of reactive hazards.

Furthermore, while OSHA may “expect facilities to use as many sources as necessary” to understand reactive hazards, there is no *requirement* that they do so. In fact, the standard states that an MSDS is adequate to meet this requirement. The CSB found, however, that MSDSs are not adequate for this purpose because they do not contain detailed reactive chemical test data (such as thermal stability data) which can be valuable in assessing reactive hazards.

The CSB determined that only by changing the *application* of the standard and explicitly *requiring* employers to consult multiple sources of information can the problem of compiling adequate process safety information be adequately addressed. In addition, Appendix C, to which your letter refers for further guidance, is a *non-mandatory*

appendix. Neither of these limitations in the PSM standard can be adequately addressed solely through a revised compliance directive.

Process Hazard Analysis Should Evaluate Reactive Hazards

With reference to the CSB recommendation that the process hazard analysis (PHA) element of the PSM standard be amended to explicitly require an evaluation of reactive hazards, your letter states that the PSM standard already requires a process hazard analysis that includes a thorough evaluation of reactive hazards.

The Board points out, however, that such an analysis is currently limited to those reactive hazards covered in the list contained in Appendix A of the standard. Again, a revised compliance directive cannot address the limitations in application contained in the standard.

We are encouraged that OSHA is participating in the Reactivity Management Roundtable and that OSHA will continue to develop and make available educational materials, such as the new Center for Chemical Process Safety publication, *Essential Practices for Managing Chemical Reactivity Hazards*. The Board would like to continue working together with OSHA on this issue and would like to discuss with OSHA a timetable for reaching a decision on revising the standard, as well as an indication of what criteria OSHA will use to reach that decision.

Recommendation 2001-01-H-R2

On February 2, 2004, the Board voted unanimously to designate the status of recommendation 2001-01-H-R2 referenced above as **Open - Unacceptable Response**.

Your letter states that OSHA declines to implement this recommendation because the CSB has authority to develop and implement the program and that Congress envisioned that the CSB would undertake such activities.

The Board would like to clarify that the recommendation only asks OSHA to track data from incidents that OSHA investigates or requires to be investigated under current OSHA regulations. The PSM standard, paragraph 29 CFR 1910.119(m)(1), requires that companies investigate incidents and prepare a report on the factors that contributed to that incident. The Board's recommendation is that OSHA require companies to submit those existing reports to OSHA, rather than simply maintaining them at individual facilities. The Board feels that OSHA can then develop a database of reactive incidents to evaluate incidents, analyze trends, assess the effectiveness of the PSM program, and inform future decision-making about revision of the standard.

Before closing this recommendation, the Board would welcome an opportunity to meet with you to discuss our expectations regarding this recommendation. We will be contacting you to set up such a meeting.

The Board's goal is that all of our recommendations be acceptably implemented. We would like to work with you in moving toward an acceptable outcome and we will reconsider the status of these recommendations upon timely follow-up responses.

If you have any questions or need further information on the recommendations process, please contact Jordan Barab at (202) 261-7673.

Very truly yours,

A handwritten signature in cursive script that reads "Carolyn W. Merritt". The signature is written in dark ink and is positioned above the printed name and title.

Carolyn W. Merritt
Chairman



NOV 13 2003

Ms. Carolyn W. Merritt, Chairman
U.S. Chemical Safety
and Hazard Investigation Board
2175 K Street NW, 4th Floor
Washington, D.C. 20037-1809

Dear Ms. Merritt:

This is in response to your letter of September 25, 2002, containing the Chemical Safety Board's (CSB) recommendations based on its report, "HAZARD INVESTIGATION, Improving Reactive Hazard Management." On April 4, 2003, OSHA advised CSB that its response would be delayed since CSB, the Occupational Safety and Health Administration (OSHA), and the Environmental Protection Agency (EPA), were planning to jointly solicit additional public input from stakeholders on reactive chemical safety in a roundtable session hoped to be helpful in determining the best approach to take to address reactive chemical process safety. OSHA indicated it would send a formal response after the information obtained during the roundtable was fully evaluated.

OSHA has reviewed the CSB Hazard Investigation Report and its recommendations, the written comments CSB received in response to its Public Hearing and Request for Comments on Reactive Chemical Hazards (67 FR 18584) held in May 2002, and information resulting from the Reactive Chemical Roundtable discussion held on June 10, 2003. The following responds to the two recommendations in the Hazard Investigation Report.

In the Hazard Investigation Report, CSB recommends that OSHA:

1. Amend the Process Safety Management (PSM) Standard to achieve more comprehensive control of reactive hazards that could have catastrophic consequences by broadening the application to cover reactive hazards resulting from process-specific conditions and combinations of chemicals using objective criteria; require that multiple sources of information be sufficiently consulted to understand and control potential reactive hazards; and augment the process hazard analysis (PHA) element to explicitly require an evaluation of reactive hazards.

2. Implement a program to define and record information on reactive incidents that OSHA investigates or requires to be investigated by employers under OSHA regulations. Structure collected information so that it can be used to measure progress in prevention of reactive incidents that give rise to catastrophic releases.

In the first recommendation of the Report (pages 23 and 24) concerning amending the PSM standard to more comprehensively control reactive hazards, CSB states that OSHA should:

(1) Broaden the PSM standard's application to cover reactive hazards resulting from process-specific conditions and combinations, and not by adding individual chemicals to a list (OSHA's PSM Appendix A, List of Highly Hazardous Chemicals, Toxics and Reactives);

(2) Compile process safety information but require that sufficient multiple sources of information be consulted to better understand and control potential reactive hazards, and;

(3) Augment the process hazard analysis to explicitly require an evaluation of reactive hazards by considering the rate and quantity of heat or gas generated, maximum operating temperature to avoid decomposition, thermal stability of reactants, reaction mixtures, byproducts, waste streams and products, effect of variables such as charging rates, catalyst addition, possible contaminants, and the consequences of runaway reactions or toxic gas evolution.

OSHA has not yet decided whether to amend the PSM standard. However, OSHA has decided to pursue other avenues, as described below, to enhance the awareness of the hazards associated with reactive chemicals.

With regards to amending the PSM standard and the three specific recommendations listed above, OSHA notes that the Clean Air Act Amendments (CAAA) of 1990 were specific with respect to the responsibilities of OSHA in preventing and minimizing highly hazardous chemical releases. OSHA was to promulgate a chemical process safety management standard and would include, as part of the standard, a list of highly hazardous chemicals including toxic, flammable, highly reactive and explosive substances. The CAAA also stated that additions to such a chemical list could be made when a substance is found to pose a threat of serious injury or fatality in the event of an accidental release in the workplace.

When OSHA promulgated the PSM standard, it complied with the CAAA by including highly reactive chemicals in its Appendix A list (identified by groups such as NFPA). The question now concerns the potentially very large numbers of others chemicals that might be classified as "reactive."

While OSHA considered evaluating a list-based approach by publication of an Advance Notice of Proposed Rulemaking developed in the late 1990's, OSHA eventually removed the PSM action entry from the Department of Labor's Regulatory Agenda. OSHA realized at that time and continues to believe that there is no consensus on the part of experts on the best approach that should be taken with regard to reactivity hazards.

Further, information resulting from the recent Roundtable discussion still did not offer a uniform approach or consistent agreement on CSB's first point in its recommendation, i.e., to cover reactive chemicals resulting from process specific conditions and combinations. OSHA's representatives at the Roundtable concluded that although reactive chemical hazards are an important issue, there is a lack of agreement among stakeholders on how to approach reactivity hazards.

The CSB's second recommended change to the PSM standard states that in compiling process safety information on chemicals, OSHA should require that multiple sources of information be consulted to understand and control potential reactive hazards. Paragraph 29 CFR 1910.119(d) of the PSM standard requires that the employer compile process safety information to enable the employer and the employees involved in operating the process to identify and understand the hazards posed by those processes. The process safety information must include information pertaining to the hazards of the highly hazardous chemicals used or produced by the process, information pertaining to the technology of the process, and information pertaining to the equipment in the process. In Appendix C to the standard, *Compliance Guidelines and Recommendations for Process Safety Management*, OSHA indicated that the information to be compiled about the chemicals, including process intermediates, must be comprehensive enough for an accurate assessment of the fire and explosion characteristics, reactivity hazards, the safety and health hazards to workers, and the corrosion and erosion effects on the process equipment and monitoring. Even though 1910.119(d) is a performance requirement, OSHA expects facilities to use as many sources as necessary to understand the hazards, including reactive hazards, of the chemicals in the process.

As described below, OSHA intends to update the Process Safety Management Compliance Directive to reflect that other, more detailed sources of information may be necessary (e.g., literature surveys, information developed from

computerized tools, chemical reactivity test data, etc.). OSHA believes that it is important to reemphasize the need for employers to fully evaluate the hazards of reactivity in the process safety information requirements of the standard.

The CSB's third recommended change to the PSM standard is that OSHA should also augment the *process hazard analysis* (PHA) requirements of the standard to explicitly require an evaluation of reactive hazards including such relevant factors:

- Rate and quantity of heat or gas generated.
- Maximum operating temperature to avoid decomposition.
- Thermal stability of reactants, reaction mixtures, byproducts, waste streams, and products.
- Effect of variables such as charging rates, catalyst addition, and possible contaminants.
- Understanding the consequences of runaway reactions or toxic gas evolution.

The OSHA PSM standard is a comprehensive management program i.e., a holistic approach that integrates technologies, procedures, and management practices. A process hazard analysis is a key component of a process management system. A process hazard analysis is a thorough, orderly, systematic approach for identifying, evaluating and controlling processes involving highly hazardous chemicals. Like the *process safety information* element, the standard's requirement to conduct a process hazard analysis is a performance requirement. It requires employers to identify, evaluate and control the hazards of a process including the hazards of reactivity.

However, again OSHA believes that it is important to reemphasize that employers must fully evaluate the hazards of reactivity when conducting their process hazards analyses, and OSHA will more fully discuss this issue when it revises its Process Safety Management Compliance Directive. The Compliance Directive is available on OSHA's web page, www.osha.gov, and may be consulted by employers and employees.

Although OSHA has not, at this point, decided whether to amend the PSM standard, OSHA is taking the following action to address and to heighten awareness of hazards associated with reactivity. First, as noted above, OSHA has decided to revise its Process Safety Management Compliance Directive to reemphasize and elaborate on the need for employers to compile, using multiple sources as appropriate, information on the reactivity of *highly hazardous chemicals* used in a process. In addition, OSHA will reemphasize the need to thoroughly examine all aspects of reactivity in the process hazard analysis.

Second, as announced at the Roundtable discussion in June, OSHA is arranging to subscribe to the rights to the American Institute of Chemical Engineers' Center for Chemical Process Safety's (CCPS) new book on chemical reactivity, *Essential Practices for Managing Chemical Reactivity Hazards*. OSHA has looked to CCPS for its expertise in the past during the development of the PSM standard and included references to other CCPS chemical process safety publications in Appendix D to 29 CFR 1910.119, *Sources of Further Information*. The chemical reactivity book will be available to employers and employees and other interested persons without charge for three years through OSHA's web page.

Third, OSHA has committed resources to pursue other approaches to take with respect to the hazards of reactivity. Currently, OSHA is developing guidance for employers who have limited resources and less complex processes, so that they may better examine the hazards of chemical reactivity in their covered processes.

Fourth, OSHA believes that increasing the information and data coming available (e.g., CCPS), and engaging in a broad-based examination of the issue (e.g., Reactive Chemical Roundtable) will lead to positive results. The end result may well be in the form of guidance to the industry and might involve additional outreach activities. To assist in achieving this goal, OSHA plans to participate in a chemical safety stakeholder initiative called the Reactivity Management Roundtable. This initiative is being formed to cooperatively assimilate, implement, maintain, and update best practices for managing chemical reactivity. The group's goal is to reduce the frequency and consequences of runaway reactions producing accidents, particularly those occurring within companies with limited technical and financial resources.

Fifth, OSHA continues to enforce existing standards related to reactive chemical safety. These standards include the PSM standard for those highly reactive chemicals already covered the standard, other General Industry standards, and, where appropriate, the General Duty Clause of the OSH Act where serious recognized hazards exist that are not covered by specific OSHA regulations.

Sixth, OSHA is fostering collaborative efforts through its "Alliance Program" with organizations such as trade or professional organizations, businesses, labor organizations, educational institutions, and government agencies that are committed to workplace safety and health. One alliance under development is related to reactive chemical process safety. Currently, OSHA is collaborating with EPA, the American Chemistry Council (ACC) and the Synthetic Organic Chemical Manufacturers' Association (SOCMA) as participants to develop this alliance. We anticipate that this effort will broaden to include other interested organizations.

Finally, outreach for the PSM standard and EPA's Risk Management Plan were highly successful. OSHA, industry, unions, trade associations, and others recognized the need to conduct extensive outreach, and an educational effort was launched across the country to assist employers and employees in meeting the challenges of complying with the process safety management standard and the risk management plan. Educational opportunities continue to this day (e.g., Mary Kay O'Connor Center for Chemical Process Safety at Texas A and M).

The CSB's second recommendation (2001-01-H-R2) is for OSHA to implement a program to define and record information on reactive incidents that OSHA investigates or requires to be investigated by employers under OSHA regulations and to structure this information so that it can be used to measure progress in the prevention of reactive incidents that give rise to catastrophic releases.

We respectfully decline to implement this recommendation. We understand the CSB has authority to develop and implement the recommended program itself; in fact, this appears to be one of the activities Congress envisioned that the CSB would undertake when the authority was specifically granted to the CSB under the Clean Air Act Amendments of 1990 (CAAA). Title I, Part A, Section 112(r)(6)(C)(iii) of the CAAA states, "*The Board shall...establish by regulation requirements binding on persons for reporting accidental releases into the ambient air subject to the Board's investigatory jurisdiction. Reporting releases to the National Response Center, in lieu of the Board directly, shall satisfy such regulations. The National Response Center shall promptly notify the Board of any releases which are within the Board's jurisdiction*".

As we continue to build on our initiatives on reactive chemical process safety, we will look to expertise from the CSB to assist us in developing the various aspects we've described above. Our collaboration on chemical safety matters such as reactive chemical safety will result in safer and healthier places of employment across the United States.

Sincerely,



John L. Henshaw