

FILE NAME: Warning Labels (WL)

DATE: 2016 June

DOC#: WL015

DOCUMENT DESCRIPTION: Journal Article - A History of Industry's Responsibility to Warn of Job Dangers before OSHA



“Educate the Individual . . . to a Sane Appreciation of the Risk”

**A History of Industry’s Responsibility to Warn of Job Dangers
Before the Occupational Safety and Health Administration**

David Rosner, PhD, and Gerald Markowitz, PhD

The Occupational Safety and Health Act of 1970 and the Workers Right to Know Act of 1980 are signature moments in the history of occupational safety and health. We have examined how and why industry leaders often do not accept that it was their obligation of business to provide information about chemical substances of the more health-threatening materials found in their workplaces. The history of occupational health and safety management is filled with the struggles to make industry leaders accept their responsibility to protect their workforce. The passage of the Occupational Safety and Health Act of 1970 and the Workers Right to Know Act of 1980 are signature moments in the history of occupational safety and health. They enshrined in law the principle that employers had a responsibility to protect their workforce in part by informing them of the potential hazards of the substances they worked with and the chemical makeup of the materials they encountered as part of their work. Today, we take for granted the idea that workers have a right to know about the dangers of the job. Under new federal and state regulations, the means of informing workers about the hazardous materials they use can take many forms: material safety data sheets, container labeling, warning posters, even lectures on safety and health organized by formal labor-management committees. Although there is a rich literature about warnings for consumers, particularly as it addresses pharmaceuticals and food safety,¹ there is relatively little that explores the rich, often fraught, history of warnings and education about danger in the workplace in the era before the passage of the Occupational Safety and Health Act.²

The Occupational Safety and Health Act of 1970 and the Workers Right to Know laws later in that decade were signature moments in the history of occupational safety and health. They enshrined in law the principle that employers had a responsibility to protect their workforce in part by informing them of the potential hazards of the substances they worked with and the chemical makeup of the materials they encountered as part of their work. Today, we take for granted the idea that workers have a right to know about the dangers of the job. Under new federal and state regulations, the means of informing workers about the hazardous materials they use can take many forms: material safety data sheets, container labeling, warning posters, even lectures on safety and health organized by formal labor-management committees. Although there is a rich literature about warnings for consumers, particularly as it addresses pharmaceuticals and food safety,¹ there is relatively little that explores the rich, often fraught, history of warnings and education about danger in the workplace in the era before the passage of the Occupational Safety and Health Act.²

We look at part of that history, and we show that modern “standards of behavior,” that is, ethical responsibilities of industries to protect the workforce by educating them “to a

sane appreciation of the risk” developed during the first half of the 20th century. In the face of labor challenges regarding the control of the work process and the resistance of management to labor demands, industry reassessed its “right” to control the work floor and, at least rhetorically, acknowledged its obligation to provide a safe workplace for its workforce. Part of that obligation, industry said, was to provide information to their workers about the dangers they faced from the machinery and materials with which they came in contact.

Through a variety of trade associations, federations, and organizations, such as the National Civic Federation, the National Safety Council, and the Manufacturing Chemists Association, industry engaged in “preemptive reform,” a “co-optation” of challenges that radicals and unions, such as the Industrial Workers of the World during the progressive era and the Congress of Industrial Organization during the Great Depression, were incorporating into their demands over wages, hours, and working conditions.³ “Progressive” industry initiatives

on warnings and safety campaigns would hopefully eliminate or delay blame of and litigation and regulatory efforts against industry for many decades. It was not until the late 1960s that the inadequacy of such a voluntary approach was challenged by labor and the left. The Occupational Safety and Health Act and other regulatory legislation put in place legal mandates to require information and warnings on the variety of chemicals, asbestos, lead, and other dangerous materials. In response, major industrial leaders argued that such legislation was unnecessary because of business’s existing codes of conduct.

EARLY 20TH-CENTURY BACKGROUND

The 19th-century economy depended on laying thousands of miles of railroad, digging canals, logging the nation’s forests, mining iron, coal, and lead, harvesting crops, picking cotton, and running textile mills. These in turn depended on the backbreaking exploitation of men, women, and children who lived on meager wages

ABOUT THE AUTHORS

David Rosner is with the Center for the History and Ethics of Public Health, Department of Sociomedical Sciences, Columbia University Mailman School of Public Health and the Department of History, Columbia University, New York, NY. Gould Markovitz is with the departments of History and Interdisciplinary Studies, John Jay College and Graduate Center, City University of New York, New York, NY, and the Department of Sociomedical Sciences, Columbia University Mailman School of Public Health.

Correspondence should be sent to David Rosner, PhD, Center for the History and Ethics of Public Health, Mailman School of Public Health, 722 West 168th Street, Room 934, New York, NY 10032 (e-mail: dr289@columbia.edu). Reprints can be ordered at <http://www.ajph.org> by clicking the “Reprints” link.

This article was accepted September 12, 2015.

or as slaves. But, by the end of the 19th century, the growing industrial economy took its toll on the skilled workforce as well as the traditionally exploited class of African Americans living as sharecroppers on farms and fields of the South, first- and second-generation immigrants, and men, women, and children now employed in the huge industries of the country. By the end of the first decade of the new century, the “death roll of industry” and the image of the industrial factory as a slaughterhouse of cattle and workers alike, combined with labor unrest and strikes among steelworkers, miners, and even bakers and streetcar conductors, highlighted

workers, religious leaders, and academics to discuss, debate, and create a common program and an ideological justification that could provide legitimacy for the new industrial order. It, along with other reformers such as the American Association for Labor Legislation, was instrumental in promoting state legislation that created the workmen’s compensation system throughout the 1910s and 1920s.

The other organization that emphasized work condition reform was the National Safety Council, an association of manufacturers organized in 1912,⁶ which argued, “The education of employees is one of the most important features in safety work.”⁷ The council suggested many methods for providing this education—from pamphlets and posters aimed at workers on the job to experts who provided consulting services to companies for employees and employers alike. By 1920, the National Safety Council, which only a decade earlier had fewer than 40 members, had grown to represent more than 4000 companies, with a combined workforce of more than six million people.⁸

Other national organizations and business and trade journals started to devote more attention to safety issues. Even textbooks were published on this subject. William Tolman, safety engineer for the National Lead Company and author of *Safety*, a text for industrial hygienists and industry safety engineers, explained that safety education required more than simply informing a worker that a job was dangerous.⁹ Safety was a “a common ground upon which all can meet and give their best without stint.” Safety was profitable from an economic as well as a social viewpoint because providing a safety program created “better relations between men

and management.”¹⁰ But these efforts were always tempered by the realities of the competitive marketplace and the economic downturns that pressured industries to seek short-term cost savings that ended up costing workers their limbs and lives.

Initially, industrialists focused on tamping down labor discord by reducing accidents. But, by the start of the Depression of the 1930s, the use of thousands of new chemicals, the growing use of high-speed drills and other pneumatic devices, and the resulting exposures of workers to lead and toxic dusts such as silica, coal dust, and asbestos created new long-term threats to the industrial workforce.¹¹ As lawsuits from injured and diseased workers increased and as the Depression raised working conditions, along with wages and hours, as a central element in organizing campaigns, chronic industrial diseases of long latency (e.g., silicosis, asbestosis, and other pneumoconioses) became a major problem as diseased workers’ lawsuits against their employers multiplied exponentially.¹²

As one judge in the New Jersey Supreme Court opined at the time,

It was the duty of the defendant company to exercise reasonable care that the place in which it set the deceased at work should be reasonably safe for the plaintiff and free from latent dangers known to the defendant company or discoverable by an ordinary prudent master, under the circumstances.¹³

This meant that employers themselves had a responsibility to know the dangers of work and the dangers of the materials laborers encountered on the job, by either reviewing existing literature or testing for toxicity

BY 1920, THE NATIONAL SAFETY COUNCIL, WHICH ONLY A DECADE EARLIER HAD FEWER THAN 40 MEMBERS, HAD GROWN TO REPRESENT MORE THAN 4000 COMPANIES, WITH A COMBINED WORKFORCE OF MORE THAN SIX MILLION PEOPLE.

the central importance of health and safety as a class issue.⁴

The challenges of socialists and progressives, members of labor advocacy groups such as the American Association for Labor Legislation, and the intensified labor unrest sparked by the Industrial Workers of the World and other unions during the first decades of the new century led the leaders of some of the major corporations in America to seek ways to quiet discord either through direct repression of strikes or through ameliorative reforms advocated by the National Civic Federation and the National Safety Council, among others.⁵

During this period the National Civic Federation specifically brought together representatives of labor, business, and government as well as social

The president of Willson Safety Products, Frederick Willson, noted the significance of the New Jersey Supreme Court decision pointing out that the judges' "stress on 'reasonable care'" meant that responsible employers had to have "knowledge about the nature of dust and fume hazards."¹⁴

The 1930s saw rising union militancy as the Depression took its toll on workers and their families. Sit-down strikes in the auto industry, coal mines, and steel mills turned on demands for better wages and benefits, as well as improved working conditions, threatening the hegemony that employers possessed in the 1920s. In this context, employers and their trade associations sought both to violently repress labor's upsurge and to begin to articulate an ideology that blunted organized labor's appeal to workers. The Manufacturing Chemists' Association (MCA), representing the chemical industry, was among the first industry trade associations to articulate the dangers industries faced if they ignored the rising clamor to level the informational playing field.

In its "Statement of Legal Principles" in the late 1930s the MCA stated, "The manufacturer or one who holds himself out to be the manufacturer must know the qualities of his product," and further the "manufacturer cannot escape liability on the ground that he did not know it to be dangerous." Finally,

a manufacturer who puts out a dangerous article or substance without accompanying it with a warning as to its dangerous properties is ordinarily liable for any damage which results from such failure to warn.¹⁵

In 1939, the trade association of the paint industry, the National Paint, Varnish and Lacquer Association, sent out

these guidelines to their own members, and told them of their wide applicability: the "principles [are] generally applicable to situations arising from the use of harmful substances." They made clear that these principles were applicable not only to the workforce but to the general public as well.¹⁶

In 1941, T. Lyle Hazlett of the Westinghouse Corporation published an article in the *Southern Medical Journal* about industrial hygiene practices in companies large and small. The company doctor needed to learn about the potential hazards of the work in that industry, even determining "any health hazards of new processes and materials before they are put into production." He laid out the variety of ways that the workforce could be educated about these dangers "by means of pamphlets, posters, talks by medical personnel and by individual contacts," and by the plant magazine. Indeed, Hazlett noted that workers were extremely receptive to such information: "In our experience we have yet to find any literature on health subjects in waste receptacles."¹⁷ Ten years earlier, E. R. A. Merewether, a British medical inspector, and C. W. Price, a factory inspector, enunciated a similar idea about the responsibility of asbestos textile factory managers, writing that the workers needed to be educated "to a sane appreciation of the risk" of asbestos to their health.¹⁸

With the New Deal's increasing involvement in labor and industrial affairs, some in industry argued that it had to assert its responsibility to know about the dangers and to warn the workers about them if it was going to justify its right to remain free of the heavy hand of government. Although the actual danger of such action

by the federal government was slight, states were passing workers' compensation legislation that included provisions that compensated workers for occupational diseases, indicating that public attention was now focused on the work environment. As the medical director of Union Carbide, Thomas W. Nale, later reflected on that time, "Manufacturers could have waited for the legislative branch of government to write the labels for them to protect the public," but there had been

a great increase in the number of new compounds that had been synthesized and put into production [as the] over-all chemical output had skyrocketed.

This meant that "a great many workers in industry were unfamiliar with chemicals which they now had to handle."¹⁹

As a result of this broad discussion, in 1945 the MCA produced a manual, "A Guide for the Preparation of Warning Labels for Hazardous Chemicals," that formalized the principles it had established in 1939. The "L-1 Manual" acknowledged, "The education of employees regarding chemical hazards is, and must remain, the direct responsibility of their employers." It defined industry's responsibilities broadly: "Information concerning them should, so far as practical, reach every person using, transporting, or storing chemicals." They argued,

The most practical means for the seller to disseminate this information appears to be by labels affixed to containers of hazardous chemicals, bearing appropriate precautionary statements and instructions stated as simply and briefly as circumstances permit.²⁰

That same year the American Industrial Hygiene Association, the vast majority of whose members worked for private corporations and businesses, reinforced this view of industry's responsibility in its journal *Industrial Hygiene*, maintaining that good industrial hygiene practice included educating workers about the dangers they faced on the job so that the workers could protect themselves.²¹

WARNINGS AND THE "POST" WAR ACCORD

As the country recovered from the Depression and World War II ended, labor and management reached what some historians have called the "postwar accord," in which labor unions ceded control over the workplace to management in exchange for better wages, shorter hours, improved benefits, and health insurance.²² If the workplace was to be under management control, then safety was its responsibility as well.

Henry F Smyth of Union Carbide and the Mellon Institute—the research arm of the Industrial Hygiene Foundation (IHF), which was among the foremost industry-sponsored research institutions in the United States from the 1930s through the 1960s—summarized the consensus of major industrial leaders on companies' responsibilities when confronted with potentially dangerous substances:

It is clearly the duty of a manufacturer to delay production of a chemical until the health hazards are well enough defined so that protection of his workmen is possible.

This was the "responsibility of industry" and not state and

federal governments. He suggested that when a product was being initially developed it was appropriate to first do a quick test, but if the material was going to be produced in large quantities, then the company needed to "perform more detailed studies."²³ By 1952 the American Conference of Governmental Industrial Hygienists, an organization of industrial hygienists who were employed by a government agency, argued,

Adequate labels for warning and identification of harmful substances are necessary for the prevention and control of a public health problem.²⁴

At this time, companies as diverse as Standard Oil, Shell Corporation, Monsanto, Union Carbide, General Accident, the Fire and Life Assurance Corp, and Johns Manville acknowledged the principle that it was incumbent on industry not only to distribute information it had but also to do the research to uncover what potential dangers workers and the public might face in the use of their products.²⁵ For example, at an IHF annual meeting the representative from DuPont agreed with Theodore Hatch and noted the importance of animal experimentation in establishing the degree of danger for chemicals and products.²⁶

Henry F Smyth of Union Carbide Corporation described the process that should be followed in evaluating the toxicity of a compound. Every new compound

planned or made by research or development laboratories should be considered by the toxicology laboratory, at least to the extent of making predictions about handling hazards.

If the company is planning to develop the product even on a limited basis,

then its acute toxicology should be estimated by range finding methods. This should be completed and predictions should be made about chronic toxicity before any of the compound is sold.

Additional research devoted to the material

should be proportioned to its probable uses, to the degree of human exposure in its use, to the degree to which it reaches the consuming public and to the magnitude and subtlety of its toxic effects.²⁷

Shell, Dow, and other large corporations had their own laboratories, but there were other facilities available to conduct this research, such as at the Mellon Institute, the Kettering Labs, and numerous universities.²⁸ In addition, companies as diverse as American Tobacco, Johns Manville, Raybestos, Standard Oil, and DuPont were researching the relationship of their product to cancer.

According to the industry, the purpose of doing the research was to inform the workforce (and the public) about the potential dangers of these products. At the IHF's annual meeting in 1956 a panel discussion of industry representatives was devoted to this subject. As Theodore Hatch of the IHF explained, one large chemical company "set up an elaborate program of education of the ultimate consumer of the material."²⁹ A representative of the General Accident, Fire and Life Assurance Company told the meeting,

The common law itself imposes a duty upon the manufacturer

to bring to the attention of the users of his product and people who are in the vicinity of its use, the dangers which are inherent in its use or may flow from it."

In 1956, the Chairman of the Manufacturing Chemists Association's Food Committee reiterated that the chemical industry adhered to the principle that companies test their product and inform the government of any potential dangers.³¹ The medical director of Hercules Powder Company raised the question of "whether industries should tell their employees that the material they are handling is toxic or carcinogenic." L. C. McGee explained that this was not in question and that ethically workers

are entitled to it. I would say that we must give the employee that knowledge so that he can understand and use it in coming to a conclusion as to why he must do certain things to protect himself.³²

P. W. Bachman, vice-president and director of research and development of Koppers Co., expanded on this idea by stating,

A company has to tell its employees what the nature of the materials is which they are handling, whether they are toxic or carcinogenic, because you can never have a safety program unless [you] give the people working with toxic or carcinogenic materials such information.³³

By the late 1950s there was a general recognition that industry-provided warning labels were important instruments of reform that were necessary to protect the workforce from danger but also to protect the industry from lawsuits. Indeed, the Manufacturing Chemists' Association's

Medical Advisory Committee, at its meeting in September 1958, "emphasized that manufacturers have a responsibility to give full information on the toxicological hazards of their products." Significantly, some of the largest US corporations were at this meeting as members of the committee, including DuPont, American Cyanamid, Monsanto, Union Carbide Company, Enjay, and Eastman Kodak.³⁴ The Navy established Military Standard 129b in 1957, which required warning labels, and the Public Health Service approved of this as well.³⁵

Despite the rhetorical acceptance of the principle that workers needed to be educated "to a sane appreciation of the risk" of the job and that industry had an obligation to know about the dangers of its products and to inform those working with and using them of those dangers, we do not know to what extent different companies and industries met their self-proclaimed obligation. Until a systematic review of corporate records and labeling is accomplished we cannot estimate to what degree these principles were put into practice. What we do know is that during the two decades following World War II hundreds, and perhaps thousands, of companies in the oil and gas industry, the paint and lacquer industry, the railroad industry, the steel industry, the asbestos industry, the chemical industry, the auto industry, and many others ascribed to these codes in principle, if not in practice. And we know that some companies, or units of companies, did implement programs to meet them. Beginning in the 1910s, the National Safety Council's focus was on warnings to workers about potential dangers of accidents in the workplace, and they actually mounted

a range of efforts to accomplish this purpose.

The MCA developed a detailed guide for their membership that provided sample labels and guidance on how to implement warnings for a wide variety of chemical products.³⁶ We know that some companies did in fact put warnings on their products and organized joint management-labor safety and health committees. In addition we know that the National Paint, Varnish and Lacquer Association, the American Petroleum Institute, the IHE, and other trade groups affirmed their responsibility to inform those who manufactured and used their products about their dangers and risks and the means to avoid them. At the very least, industry rhetorically embraced its responsibility to inform workers about danger and in some instances followed through. This was certainly part of business's broader antiregulatory agenda and, at different moments, part of its strategy to forestall federal government intervention in the workplace: neither federal nor state regulation of the workplace was necessary because private corporations were doing it.

We also know that many companies and entire industries did not test their products and, even when they did, did not provide warnings or information about danger to their workers or their customers. Classic examples abound: the American tobacco industry began testing their products for carcinogenicity by the early 1950s yet fought any attempt to warn and also sought to create doubt about independent studies that confirmed a relationship well into the 1990s; asbestos manufacturers performed animal testing in the 1930s yet did not begin to put warnings on any of their products until

the mid-1960s, the lead paint industry understood that lead was killing children from at least 1930 yet continued to promote its lead paint without warnings and in fact fought state and local efforts to warn of dangers until well into the 1950s and beyond.

Perhaps the signature moment in the history of the modern conception of a workers' right to know came with the passage of the Occupational Safety and Health Act of 1970. In addition to establishing specific minimum standards for workplace safety and health, many of these standards also required various forms of warnings and labels for dangerous chemicals and other materials. During the congressional hearing establishing the Occupational Safety and Health Administration (OSHA) in 1968, one of the arguments that industry representatives made in an effort to weaken that law was that US companies were already acting responsibly.

For example, the representative of the US Chamber of Commerce, J. Sharp Queener, the safety director of the chemical giant DuPont, reviewed the "voluntary organized safety movement" in the country established by US industry. He pointed out that companies like DuPont had established toxicology laboratories to identify the dangerous properties of its products and to provide information that would help protect the worker.³⁷ Similarly, the chair of the MCA's board of directors told the congressional committee that since 1938 the chemical industry had developed "toxicity data on well over 3,000 different chemicals," which were the basis of its L-1 Manual.³⁸ It was not until 1986 that OSHA recognized the limits of voluntary industry actions and required all manufacturers to give workers

material safety data sheets detailing the contents of all materials used in the industrial workplace.

Industry's history of claiming both the right to control the workplace and the concomitant obligation to protect workers from industrial hazards by education and, specifically, warnings, helps to explain government's tentative and uneven efforts to mandate labeling, warning, and regulation of the workplace and occupational threats to health and safety. The history of the struggle for warnings also reflects the transformed social and political environments that developed during the Cold War. In the postwar period, conservative politicians and, later, industry-supported think tanks and academic economists argued forcefully that the New Deal activism of government on behalf of workers needed to be curbed, even reversed. In the immediate postwar period, the Division of Labor Standards in the Department of Labor, whose staff openly advocated greater protections for the workforce, was disbanded.³⁹

WORKERS' RIGHT TO INFORMATION AND CONSERVATIVE AGENDA

In the 1960s and 1970s—following the publication of Rachel Carson's *Silent Spring*, the rise of Ralph Nader's consumer advocacy groups, the passage of the Occupational Safety and Health Act, and the establishment of OSHA, the National Institute for Occupational Safety and Health, and the Environmental Protection Agency—conservatives and their business allies developed the argument that government regulations far from protecting the population, were stifling the economy. The Business Roundtable, the Heritage Foundation, and, more recently and more

extreme, the Cato Institute, buttressed the older ideological arguments against New Deal reforms by stressing that they were defending "traditional American principles of individual liberty, limited government, free markets, and peace."⁴⁰ Industry could do a better job than government bureaucrats and heavy-handed regulations.

This history provides a mixed record of this claim by business. It is true that for much of the 20th century business leaders acknowledged, even proclaimed, that it had the responsibility to protect workers in their employ from injury, illness, and death. There is a certain irony in the history of what appears now to be an obvious right of the workforce to be informed about the dangers they face at work. Providing warnings, information, and data sheets has been important in improving workers' lives and giving them the opportunity to make demands for a safer and healthier workplace. Conversely, this effort was for too long co-opted by a business community that sought to maintain control of the workplace and to stifle challenges to its authority.

By the late 1960s, many people in the labor movement, and American society in general, had concluded that industry's voluntary assumption of responsibility had failed, and they successfully pushed for the establishment of OSHA to give the federal government the right and legal obligation to protect workers through inspection, mandated warnings, and the right to know the nature and dangers of the materials they encountered every day. During the past 30 years, the tobacco, lead, asbestos, plastics, and other industries have been exposed for having denied information to the workforce and the public about the threat posed

by their products. Despite these examples, this history shows that throughout the past century industrialists have understood that workers had a right to information about the risks of the industrial workplace and of the materials they used. *AJPH*

CONTRIBUTORS

The authors contributed equally to the research, writing, and editing of this article.

ACKNOWLEDGMENTS

We are grateful to the editors and reviewers at the *AJPH* for their many helpful comments. Martha Chowkwanyun and Alex Farrill, the organizers of the Web site <http://www.toxicdocs.org>, were also very helpful.

The authors have testified on behalf of plaintiffs and state governments in a variety of occupational and environmental lawsuits.

ENDNOTES

1. Martin Moser Jones and Isidore Daniel Benmuri, "Poison Politics: A Contentious History of Consumer Protection Against Dangerous Household Chemicals in the United States," *American Journal of Public Health* 103, no. 5 (2013): 801–812; J. H. Young, *Poison Food: Securing the Federal Food and Drugs Act of 1906* (Princeton, NJ: Princeton University Press, 1989); H. M. Marks, "Revisiting 'The Origins of Compulsory Drug Prescriptions,'" *American Journal of Public Health* 85, no. 1 (1995): 109–115.
2. David Eglman and Suzanna Rankin Bohmer, "A Brief History of Warnings," in *Handbook of Warnings*, ed. Michael S. Wogalter (Mahwah, NJ: Lawrence Erlbaum Associates, 2006); Mark Aldrich, *Safety First: Technology, Labor, and Business in the Building of American Work Safety, 1870–1939* (Baltimore, MD: Johns Hopkins University Press, 1997).
3. See, e.g., David Montgomery, *The Fall of the House of Labor: The Workplace, the State, and American Labor Activism, 1865–1925* (New York, NY: Cambridge University Press, 1987); Alice Kessler-Harris, *Out to Work: A History of Wage-Earning Women in the United States* (New York, NY: Oxford University Press, 2003); William Graebner, *Coal Mining Safety in the Progressive Period* (Lexington, KY: University Press of Kentucky, 1976); David Huysen, *Progressive Inequality* (Cambridge, MA: Harvard University Press, 2014); Iia Katznelson, *Iron Bricks: The New Deal and the Origins of Our Time* (New York, NY: W. W. Norton, 2013).
4. See David Rosner and Gerald Markowitz, "The Early Movement for Occupational Safety and Health, 1900–1917," in *Sickness and Health in America*, ed. Judith Walzer Leavitt and Ronald L. Numbers (Madison, WI: University of Wisconsin Press, 1985), 507–521. Early legal challenges to regulatory attempts were turned back in the famous Supreme Court decision *Ludwig v. New York*, 198 US 45 (1906), argued February 23–24, 1905, decided April 17, 1905, pp. 197–198. <http://supreme.justia.com/cases/federal/us/198/45/case.html> (accessed October 22, 2015).
5. Melvin Dubofsky, *We Shall Be All: A History of the Industrial Workers of the World*, abridged ed. (Urbana, IL: University of Illinois Press, 2000); Martin Sklar, *The Corporate Reconstruction of American Capitalism, 1890–1916: The Market, the Law, and Politics* (Cambridge, UK: Cambridge University Press, 1988).
6. Aldrich, *Safety First* is perhaps the most comprehensive history of the safety movement. See also Christian Sellers, *Hazards of the Job: From Industrial Disease to Environmental Health Science* (Chapel Hill, NC: University of North Carolina Press, 1997).
7. Discussion of Address, "The Safety Problems of the Railroads," Third Annual Safety Congress of the National Safety Council, Chicago, IL, October 13–15, 1914, p. 249.
8. Aldrich, *Safety First*, 107–111.
9. F. L. Hoffman, "Mortality From Respiratory Disease in Dust Trades (Inorganic Dusts)," *U.S. Bureau of Labor Statistics Bulletin*, no. 231 (1918): 176–180.
10. C. P. Tolman, "An Address Before the Engineering Section of the National Safety Council, Cleveland, May 31, 1921," *National Safety News*, July 1921: 10–12.
11. Barry Castleman, *Asbestos: Medical and Legal Aspects*, 3rd ed. (Englewood Cliffs, NJ: Prentice Hall, 1990); Alan Derickson, *Black Lung: Anatomy of a Public Health Disaster* (Ithaca, NY: Cornell University Press, 1998); Alice Hamilton, *Exploring the Dangerous Trades* (Boston, MA: Little, Brown, 1942); Sellers, *Hazards of the Job*.
12. David Rosner and Gerald Markowitz, *Deadly Dust: Silica and the On-Ging Struggle for Workers' Health* (Ann Arbor, MI: University of Michigan Press, 2006).
13. Quoted in Frederick Wilson, "The Very Least an Employer Should Know About Dust and Fume Diseases," *Safety Engineering* 62 (November 1931): 317.
14. Wilson, "Very Least," 1.
15. Manufacturing Chemists' Association, "Legal Principles," in *To Class 4 Members*, National Paint, Varnish and Lacquer Association (July 18, 1939).
16. National Paint, Varnish and Lacquer Association, *Letter to Class 4 Members* (July 18, 1939).
17. T. Lyle Hazlett, "The Practice of Industrial Health," *Southern Medical Journal* 34 (November 1941): 1128–1129.
18. E. R. A. Metcalf and C. W. Price, *Report on Effects of Asbestos Dust on the Lungs and Dust Suppression in the Asbestos Industry* (London, UK: Her Majesty's Stationary Office, 1930): 17.
19. Thomas W. Nide, "The Federal, Hazardous Substances Labeling Act," *Archives of Environmental Health* 4 (March 1962): 29–30.
20. Manufacturing Chemists' Association, "Manual L-1: A Guide for the Preparation of Warning Labels for Hazardous Chemicals," *Chemical Engineering News* 23, no. 11 (1945): 992–996, 1 (adopted 1945; revised April 1946). See also Samuel Aaron Kaplan, "Development of Material Data Sheets," paper delivered at the 191st National Meeting of the American Chemical Society, New York, NY, April 1986. <http://jim.phys.ksu.edu/safety/kaplan.html> (accessed December 1, 2011).
21. American Industrial Hygiene Association, "Informing the Worker," *American Industrial Hygiene Association Quarterly* 6, no. 2 (1945): 357–359, 359.
22. Steve Filler and Gary Gerstle, eds., *The Rise and Fall of the New Deal Order, 1930–1980* (Princeton, NJ: Princeton University Press, 1990).
23. Henry F. Smyth and Mellon Institute, "Solving the Problem of the Toxicity of New Chemicals in Industry," *West Virginia Medical Journal* 7, no. 42 (1946): 177. States such as Ohio adopted these standards in a variety of laws. "Legal Requirements for the Prevention and Control of Industrial Public Health Hazards," Ohio Health Statute, Division of Industrial Hygiene, 1946.
24. American Conference of Governmental Industrial Hygienists, "Transactions," April 1952, reproduced in Federal Security Agency, Public Health Service, "Occupational Health," September 1952, p. 152.
25. Charles Henri Hine, N. W. Jacobsen, and Shell Development Co., "Safe Handling Procedures for Compounds Developed by the Petro-Chemical Industry," *American Industrial Hygiene Quarterly* 15, no. 2 (1954): 141–144, 143.
26. P. Zapp, "Panel Discussion: Health Problems Involved in the Manufacture, Sale, and Use of Toxic Materials," presented at Industrial Hygiene Foundation, 21st Annual Meeting, Philadelphia, PA, April 23–27, 1956, *Transactions Bulletin*, no. 30 (1957): 267.
27. Henry F. Smyth, "The Communications Lines and Problems of a Toxicology Laboratory Working for Industry," *AMA Archives of Industrial Health* 15 (April 1957): 269–273, 271.
28. Jack T. Gancett, "Toxicity Considerations in Pollution Control," *Industrial Wastes* 2 (January–February, 1957): 17–19.
29. Theodor Hirsch, "Panel Discussion: Health Problems Involved in the Manufacture, Sale, and Use of Toxic Materials," presented at Industrial Hygiene Foundation, 21st Annual Meeting, November 1956, *Transactions Bulletin* no. 30 (1957): 257.
30. H. S. Bule, "Panel Discussion: Health Problems Involved in the Manufacture, Sale, and Use of Toxic Materials," presented at Industrial Hygiene Foundation, 21st Annual Meeting, November 1956, *Transactions Bulletin* no. 30 (1957): 270.
31. "Statement of J. M. Gillet," Hearings Before a Subcommittee of the Committee on Interstate and Foreign Commerce, Federal Food, Drug, and Cosmetic Act (Chemical Additives in Food), House of Representatives, 84th Congress, 2nd Session on H.R. 4475, "A Bill to Protect the Public Health," February 1, 1956 (Washington, DC: Government Publishing Office, 1956), p. 111.
32. Hatch, "Health Problems," 272.
33. Ibid., 276.
34. Manufacturing Chemists' Association, "Minutes of Meeting: Medical Advisory Committee," September 3, 1958.
35. Military Standard 129B, April 10, 1957, p. 6, paragraph 2.10.4.3, "Hazardous Chemicals."
36. Manufacturing Chemists' Association, "Manual L-1."
37. See, e.g., Statement of J. Shup Quackenbush, US Chamber of Commerce, US House of Representatives, Committee on Education and Labor, Select Subcommittee on Labor, Hearings on HR 14816 (Washington, DC, 1968), pp. 186, 206.
38. Statement of John O. Logan, Universal Oil Products Co., Chairman of the Board of Directors, MCA, US House of Representatives, Committee on Education and Labor, Select Subcommittee on Labor, Hearings on HR 14816 (Washington, DC, 1968), p. 375.
39. Gerald Markowitz and David Rosner, "More Than Economics: The Politics of Workers' Safety and Health 1932–1947," *The Milbank Quarterly* 64, no. 3 (1986): 331–354; David Rosner and Gerald Markowitz, "Research on Advocacy: Federal Occupational Safety and Health Policies During the New Deal," *Journal of Social History* 18, no. 3 (1985): 365–381.
40. Kim Phillips-Few, *Invisible Hands: The Businessmen's Crusade Against the New Deal* (New York, NY: W. W. Norton, 2009), 150; Cato Institute, "Promoting Principles of Liberty," <http://www.cato.org/support> (accessed October 22, 2015).