FPST 2343
INDUSTRIAL HYGIENE

VIDEO LECTURE
WEEK 1 LECTURE 2
HISTORY OF
INDUSTRIAL HYGIENE

Learning Objectives

- Understand the historical context of the development of industrial hygiene
- Know significant persons in the development of industrial hygiene
- Know important dates in the development of industrial hygiene regulation
- Know the major events that shaped the practice of industrial hygiene

History of Occupational Hygiene

1,000,000 BC	Australopithecus used stones as tools and weapons. Flint knappers suffered cuts and eye injuries; bison hunters contracted anthrax.
10,000 BC	Neolithic man began food-producing economy and the urban revolution in Mesopotamia. At end of Stone Age, grinding of stone, horn, bone, and ivory tools with sandstone; pottery making, linen weaving. Beginning of the history of occupations.
5000 BC	Copper and Bronze Age—metal workers released from food production. Metallurgy—the first specialized craft.
370 BC	Hippocrates dealt with the health of citizens, not workers, but did identify lead poisoning in miners and metallurgists.
50 AD	Plinius Secundus (Pliny the Elder) identified use of animal bladders intended to prevent inhalation of dust and lead fume.
200 AD	Galen visited a copper mine, but his discussions on public health did not include workers' disease.
Middle Ages	No documented contributions to the study of occupational diseases.

DiNardi, Salvatore R., ed. 1998. *The Occupational Environment - Its Evaluation and Control.* Fairfax, VA: American Industrial Hygiene Association.

History of Occupational Hygiene

1473	Ellenbog recognized that the vapors of some metals were dangerous and described the symptoms of industrial poisoning from lead and mercury with suggested preventive measures.
1500	In *De Re Metallica* (1556), Georgius Agricola described every facet of mining, smelting and refining, noting prevalent diseases and accidents, and means of prevention including the need for ventilation. Paracelsus (1567) described respiratory diseases among miners with an excellent description of mercury poisoning. Remembered as the father of toxicology. "All substances are poisons . . . the right dose differentiates a poison and a remedy."
1665	Workday for mercury miners at Idria shortened.
1700	Bernardino Ramazzini, "father of occupational medicine," published *De Morbis Artificum Diatriba*, (Diseases of Workers) and examined occupational diseases and "cautions." He introduced the question, "Of what trade are you?"

Figure 1.3 — A portrait of Paracelsus (1567) who is remembered as the father of toxicology.

DiNardi, Salvatore R., ed. 1998. *The Occupational Environment - Its Evaluation and Control.* Fairfax, VA: American Industrial Hygiene Association.

History of Occupational Hygiene

1775	Percival Pott described occupational cancer among English chimney sweeps, identifying soot and the lack of hygiene measures as a cause of scrotal cancer. The result was the Chimney-Sweeps Act of 1788.
1830	Charles Thackrah authored the first book on occupational diseases to be published in England. His views on disease and prevention helped stimulate factory and health legislation. Medical inspection and compensation were established in 1897.
1900s	Dr. Alice Hamilton investigated many dangerous occupations and had tremendous influence on early regulation of occupational hazards in the United States. In 1919 she became the first woman faculty member at Harvard University and wrote *Exploring the Dangerous Trades.*

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IH in the USA

1902–1911	Federal and then state (Washington) legislation covering workers' compensation. By 1948 all states covered occupational diseases. First survey in the United States of the extent of occupational disease conducted by the Illinois Occupational Disease Commission. Massachusetts appointed health inspectors to evaluate dangers of occupations.
1910	First national conference on industrial diseases in the United States.
1912	U.S. Congress levied prohibitive tax on the use of white phosphorus in making matches.
1913	National Safety Council organized. New York and Ohio established first state industrial hygiene agencies.
1914	USPHS organized a Division of Industrial Hygiene and Sanitation. American Public Health Association organized section on industrial hygiene.
1916	American Association of Industrial Physicians and Surgeons formed. American Medical Association held first symposium on industrial hygiene and medicine.

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IH in the USA

1922	Harvard established industrial hygiene degree program.
1928–1932	Bureau of Mines conducted toxicological research on solvents, vapors, and gases.
1936	Walsh-Healy Act required companies supplying goods to government to maintain safe and healthful workplaces.
1938	National (later American) Conference of Governmental Industrial Hygienists formed.
1939	American Industrial Hygiene Association organized. American Standards Association and ACGIH prepared first list (maximum allowable concentrations) of standards for chemical exposures in industry.
1941–1945	Expanded industrial hygiene programs in states.
1941	Bureau of Mines authorized to inspect mines.

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IH in the USA

1960	American Board of Industrial Hygiene organized by AIHA and ACGIH.
1966	Metal and Nonmetallic Mine Safety Act.
1968	Professional Code of Ethics drafted by AAIH. Code adopted by all four industrial hygiene associations by 1981.
1969	Coal Mine Health and Safety Act.
1970	Occupational Safety and Health Act.
1977	Federal Mine Safety and Health Act.
1992–present	Efforts to significantly amend OSHAct.
1995	Revised Professional Code of Ethics adopted by all four industrial hygiene associations.

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Prior to OSHA

1911 – Triangle Shirtwaist Fire

1913 – Bureau of Labor

1918 – Federal Compensation Act/Office of Worker's Compensations

1934 – Bureau of Labor Standards

1935 – National Labor Relations Act

1936 – Walsh-Healy Act

Contributory Negligence

Relieved employers of responsibility if the actions of their employees contributed to their own injuries

The Fellow Servant Rule

Stated that employers were not liable for workplace injuries that resulted from the negligence of other workers.

Assumption of Risk

The notion that workers who accept payment for work should assume that there will be risks involved in doing that work.

1917-1926 "Radium Girls"

Female workers at the U.S. Radium Corporation

- Watches
- Aircraft instruments

Daily Herald Archive / Getty Images

Wired.com

1917-1926 "Radium Girls"

Workers were instructed to "point" their brushes on their lips or hands

Workers were told the paint was harmless

Workers painted their nails and teeth with the paint for fun

Workers literally "glowed in the dark" when returning home

Chicago Daily Times/Sun-Times Media

1917-1926 "Radium Girls"

~4,000 women worked for the U.S. Radium Corporation

Unknown how many died from radiation poisoning

The women suffered from anemia, bone fractures, necrosis of the jaw, and carcinomas

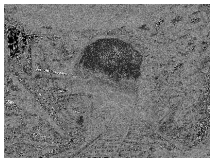
Collection of Ross Mullner

1917-1926 "Radium Girls"

- U.S. Radium Corporation knew of the hazards of radium paint and protected their executives and scientists
- The inventor of the paint dies from radium poisoning
- The company blamed the workers' ailments on syphilis
- Litigation settlement gave each worker the equivalent of $150k lump sum payout, an annuity of $9k/yr, a $200 weekly stipend, and all medical and legal fees paid.

1927-1935 Hawk's Nest Tragedy

- Construction of a 3-mile (4.8 km) tunnel carrying the New River under Gauley Mountain, West Virginia
- Undertaking of the Union Carbide Company
- Workforce of ~3,000 men, largely black migrants

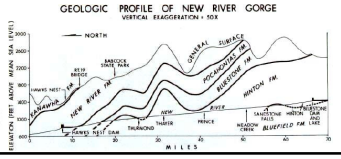


Elkem Metals Collection, West Virginia State Archives

1927-1935 Hawk's Nest Tragedy

			Alluvium consists of unconsolidated boulders, gravel, sand and silt that make up the floodplain.
PALEOZOIC ERA	PENNSYLVANIAN PERIOD	POTTSVILLE GROUP	KANAWHA FORMATION Kanawha Formation consists of 900 feet of shale and siltstone with lesser amounts of sandstone. Contains Gilbert and Eagle coal seams. NEW RIVER FORMATION New River Formation consists of coal-bearing sandstones, siltstones, and shale. Contains Fire Creek, Beckley, and Sewell coal seams and Nuttall sandstone at top. Maximum thickness is 900 feet in Gorge.
			POCAHONTAS FORMATION Pocahontas Formation consists of coal-bearing sandstone with lesser amounts of siltstone and shale. Maximum thickness of 400 feet. Contains famous Pocahontas coal seams.
	MISSISSIPPIAN PERIOD	MAUCH CHUNK GROUP	BLUESTONE FORMATION Bluestone Formation consists of shale and siltstone with lesser sandstone and limestone. Includes Pride shale and Grady Park sandstone. Maximum thickness is 850 feet. PRINCETON CONGLOMERATE Princeton Formation is a distinctive 50-foot thick coarse conglomerate that grades into a sandstone. HINTON FORMATION Hinton Formation consists of marine and freshwater shales and siltstones with lesser amounts of sandstone and limestone. Includes Stony Gap sandstone and Avis limestone. Maximum thickness is 1,100 feet in Gorge. BLUEFIELD FORMATION Bluefield Formation consists mostly of marine calcareous shales with minor limestone, siltstone, and sandstone. Maximum thickness is 25 feet in Gorge.

Sandstone/Siltstone = Quartz = Silica (Silicon Dioxide)

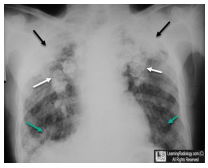


1927-1935 Hawk's Nest Tragedy

Deposits of silica were found and the workers were told to mine it for use in electroprocessing steel.

The workers were not provided masks or breathing equipment (Management used equipment during inspections)

Workers developed silicosis (including the rare form of acute silicosis)



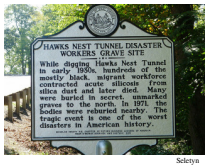
1927-1935 Hawk's Nest Tragedy

No definitive number of deaths

Union Carbide admits to 109 deaths

Congressional hearing places the total at 476

Some sources estimate the total to be 700-1,000



Seletyn

9/11/2001-Present World Trade Center Attack

Boeing 767 aircraft were flown into Towers 1 and 2 of the World Trade Center

Both planes erupted into flame and ignited the interior contents of the buildings

The sustained fire caused the already weakened superstructure to fail resulting in the collapse of both buildings

2,977 people died in the collapse including:

- 343 firefighters FDNY + 1 NYFP
- 60 police officers from PAPD & NYPD
- 8 EMT's and Paramedics

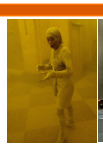
Reuters/Sean Adair

9/11/2001-Present World Trade Center Attack

The collapse led to the generation of a dust cloud that covered lower Manhattan Island

Resulted in "WTC Lung"

A collection of lung diseases including asthma, asthmatic bronchitis, terminal airways disease, sarcoidosis, and acute eosinophilic pneumonia.



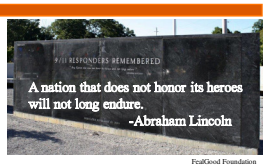
"9/11 Dust Lady" – Marcy Borders
Stan Honda/AFP/Getty Images

Jose Jimenez/Primera Hora/Getty Images

9/11/2001-Present World Trade Center Attack

Since 9/11:

- 10,000 first responders and others who were at Ground Zero and have developed cancer
  - 2,000 have died
  - Including 170 deaths of firefighters
  - 1 in 8 firefighters who were at Ground Zero have developed cancer
  - 221 policemen have died in the years since 2001



FealGood Foundation

Never forget.