



Health Hazards
Module 13
1 hour of instruction

1

VERSION: 2020



1

"This material is based upon work supported by the U.S. Department of Transportation under Cooperative Agreement No. 693JJ31750001. Any opinions, findings, and conclusions or recommendations expressed in this publication are those of the Author(s) and do not necessarily reflect the view of the U.S. Department of Transportation."



U.S. Department of Transportation
Federal Highway Administration

2

VERSION: 2020



2

Learning Objectives

- Explain the short-term and long-term effects of chemical and environmental hazard exposure
- Describe the physical symptoms of exposure to common health hazards
- Identify measures for preventing, controlling, and abating exposures
- Recognize processes for evaluating and controlling lead and silica



3

VERSION: 2020

3

Discussion: What Are Health Hazards?

Activity instructions

4

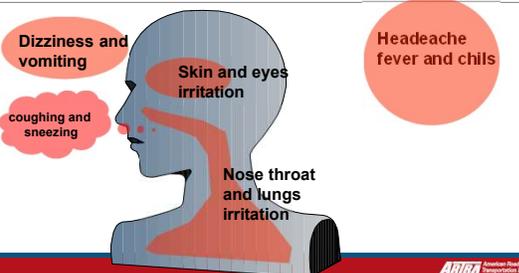


Short-Term Effects

- Develop soon after exposure
- Last a short amount of time
- Can be a warning sign of over exposure
- Symptoms vary depending on type of chemical

5

Short Term Effects



6

Long-Term Effects

- Takes time to appear
- Low level of exposure over extended time periods
- At times not easy to identify as chemically related



Photo: Radiopaedia.org

VERSION: 2019



7

Long Term Effects



Examples

- Damage to major organs such as the brain, liver, kidneys, heart, lungs
- Damage to the blood and nervous system
- Cancer
- Death

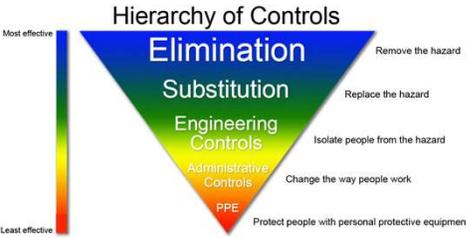
VERSION: 2019



8

Prevent, Control & Abate Chemical Hazards

Hierarchy of Controls



Most effective

Least effective

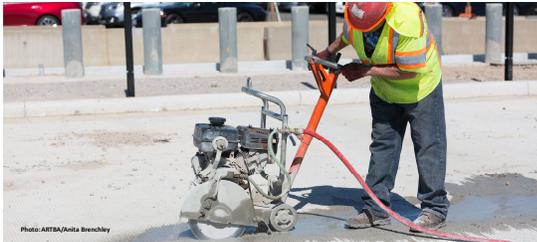
- Elimination** - Remove the hazard
- Substitution** - Replace the hazard
- Engineering Controls** - Isolate people from the hazard
- Administrative Controls** - Change the way people work
- PPE** - Protect people with personal protective equipment

VERSION: 2019



9

Engineering Controls



10 VERSION: 2020 ARIBA American Road & Transportation Builders Association

10

Administrative Controls



11 VERSION: 2020 ARIBA American Road & Transportation Builders Association

11

Personal Protective Equipment (PPE)



12 VERSION: 2020 ARIBA American Road & Transportation Builders Association

12

Hazard Communication



Source: OSHA

13

ARIBA American Road & Transportation Builders Association

13

Hazard Communication (Hazcom)

Hazard communication programs ensure employers and employees know about work hazards, and how to protect themselves

Elements include:

- Employer information to inform and train employees
- Employee information allowing participation in, and support of, protective job site measures



14

ARIBA American Road & Transportation Builders Association

14

HazCom Program Elements

- Labeling, safety data sheets (SDSs), and employee training
- List of hazardous chemicals, employee routine task information program, and unlabeled pipe hazards
- Multiple employers communication program
- Written HazCom for employees



15

ARIBA American Road & Transportation Builders Association

15



Required Training

- Inform workers of health effects from exposure
- Teach safe handling and safe work practices
- Comply with OSHA Hazard Communication requirements: CFR [1910.1200](#) / CFR [1926.59](#)

Photo: ARTGA

ARIBA American Road & Transportation Builders Association

VERSION: 2019

19

19

Maintenance & Housekeeping

Store chemicals in proper containers
Properly store & dispose of chemical wastes
Provide wash-up facilities for workers

Handle chemical spills properly

- mark the location
- leave the area
- prevent others from entering the area
- have a trained worker respond to the spill as soon as possible



ARIBA American Road & Transportation Builders Association

20

20

Common HazCom Hazards

Unmarked Containers



ARIBA American Road & Transportation Builders Association

21

21

Common HazCom Hazards

Mixed Chemicals



22

ARTBA American Road & Transportation Builders Association

22

Maintenance & Housekeeping



23

VERSION: 2020

ARTBA American Road & Transportation Builders Association

23

Unlabeled Tanks & Containers



24

VERSION: 2020

ARTBA American Road & Transportation Builders Association

24

Health Hazards in Roadway Construction

- Silica
- Lead
- Noise
- Concrete
- Asphalt



25

VERSION: 2019

ARIBA American Road & Transportation Builders Association

25

Silica

- What is Silica?
- How is it produced?
- How does it come into my body?
- Effects
- Protection



26

VERSION: 2019

ARIBA American Road & Transportation Builders Association

26

VIDEO: OSHA

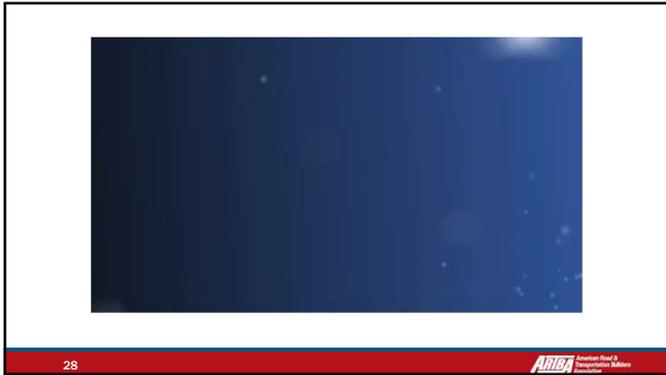
SILICA PROTECTION IN CONSTRUCTION

27

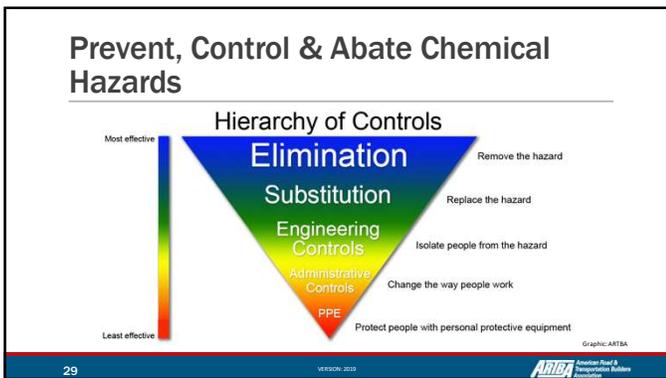
VERSION: NOVEMBER 2017

ARIBA American Road & Transportation Builders Association

27



28



29

Protective Measures - Silica

- Elimination
- Substitution
- Engineer Controls
- Administrative Controls
 - Rotation
 - Limited access
 - Training
- PPE

DANGER

SILICA DUST HAZARD

EXPOSURE TO CRYSTALLINE SILICA
DUST CAN CAUSE CANCER
OR SILICOSIS

AVOID BREATHING DUST

Graphic: ARIBA

30

Engineer Controls

29 CFR 1926.1153(c)(1)

Photo: ARTBA/Angel Branchley | Photo: Zichy Construction | Photo: ARTBA/Brad Smith

31

ARIBA American Road & Transportation Builders Association

31

32

VERSION: NOVEMBER 2017

ARIBA American Road & Transportation Builders Association

32

Lead Poisoning

- Why is lead so dangerous?
- What are the effects of lead poisoning?
- What damage does exposure cause?

33

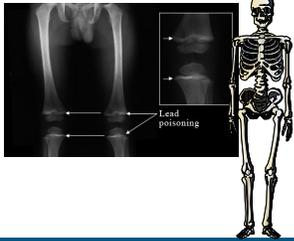
VERSION: 2010

ARIBA American Road & Transportation Builders Association

33

Why Is Lead Dangerous?

Lead is readily absorbed and distributed throughout the body
It accumulates in the body, especially in the bones



34



34

Lead Release

Lead may be released as dust or fumes by doing the following types of work where lead products are present:

- Soldering
- Grinding
- Welding
- Abrasive blasting
- Torch burning



35



35

VIDEO: OSHA

LEAD HAZARDS

36

VERSION: NOVEMBER 2017

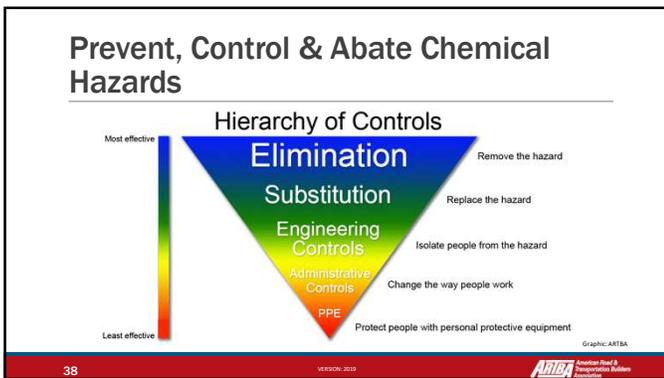


36



37

37



38

VERSION: 2010

38

Protective Measures - Lead

- Elimination
- Substitution
- Engineer Controls
- Administrative Controls
 - Rotation
 - Limited access
 - Training
 - Hygiene
- PPE

Photo: U.S. Federal Highway Administration

Graphic: ARIBA

39

VERSION: 2010

39

Key Elements of a Lead Program

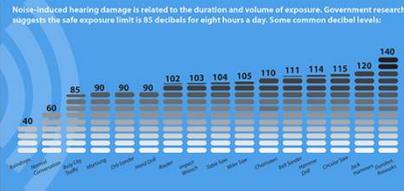
- Frequent & regular inspection of the job site, materials, & equipment by a "Competent Person"
- Housekeeping & hygiene
- Medical surveillance (& provisions for medical removal)
- Training

40

Noise

- How loud is too loud?
- What are the effects of exposure to loud noise?
- What damage does exposure cause?

How Loud is Too Loud?



Graphic: ARIBA

41

1926.52 Coverage

- Overexposures
- Feasible administrative & engineering controls
- PPE (ear protective devices)
- A Hearing Conservation Program

42

Roadway Construction Exposure - Noise



43

VERSION: 2010



43

OSHA Standard

- Time-weighted-average of 90 dBA over an 8-hour day
- Impact noise, which occurs over a much shorter time frame, (sometimes instantaneous - 15 minute dose) is also a serious problem



44



44

Common Noise Levels

Pneumatic Chipping Hammer	110 - 113 dBA
Jackhammer	102 - 111 dBA
Concrete Joint Cutter	99 - 102 dBA
Bulldozer	93 - 96 dBA
Crane	90 - 96 dBA
Gradeall	87 - 94 dBA
Front End Loader	86 - 94 dBA
Backhoe	84 - 93 dBA

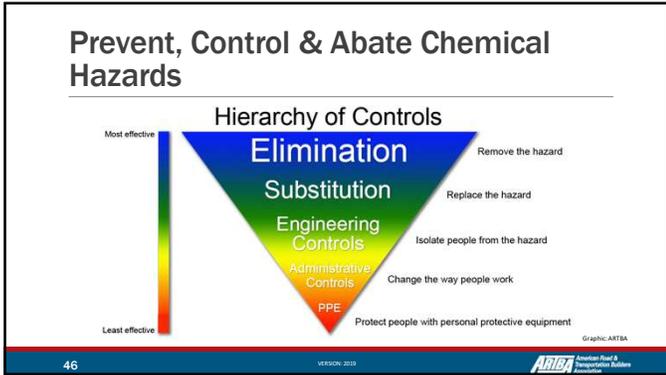


Source: Laborers Health & Safety Fund of North America

45



45



46

Solutions for Contractors

Retrofit Equipment

- Cost approx. \$2,000
- Noise reduction 11 - 12 dBA

Note noise ratings when purchasing new equipment

Sequence work to keep workers distant from loud equipment

Use spoil piles, parked machinery, etc. as a noise barrier

47 VERSION: 2010 **ARIBA** American Road & Transportation Builders Association

47



48

Asphalt, Cement & Concrete

- How is asphalt dangerous?
- How is cement dangerous?
- How is concrete dangerous?
- What are the effects of exposure?
- What damage does exposure cause?



Photo: ARIBA

VERSION: 2019

ARIBA American Road & Transportation Builders Association

49

Roadway Construction Exposure – Asphalt

Asphalt

- burns
- particles
- fumes



Photo: ARIBA

VERSION: 2019

ARIBA American Road & Transportation Builders Association

50

Protective Measures – Cement & Concrete

Concrete

- chemical burns
- wet concrete (in eyes, mouth, etc.)



Photo: ARIBA

VERSION: 2019

ARIBA American Road & Transportation Builders Association

51

Health Issues

Emergency Action Plan 

First Aid 

Sanitation and Hygiene 

52 

52

Emergency Response



53 

53

Protective Measures - Hygiene



54 

54

Protective Measures - Sanitation



55

VERSION 2020



55

Health Hazards Summary

- Explain the short term and long term effects of chemical and environmental hazard exposure
- Describe the physical symptoms of exposure to common health hazards
- Identify measures for preventing, controlling, and abating exposures
- Recognize processes for evaluating and controlling lead and silica



56

VERSION 2020



56

The End

Questions?
 Poll
 OSHA 10-Hour Card?



57

VERSION 2020



57

John Walker
789 Candle St.
Frederick MD 12345

58 

58

Activity:
Activity instructions

59 VERSION: 2020 

59

Break
Please return after a 10-minute break

60 VERSION: 2020 

60

LUNCH

We will resume class in 30 minutes

61 VERSION: 2019 **ARBA** American Road & Transportation Builders Association
