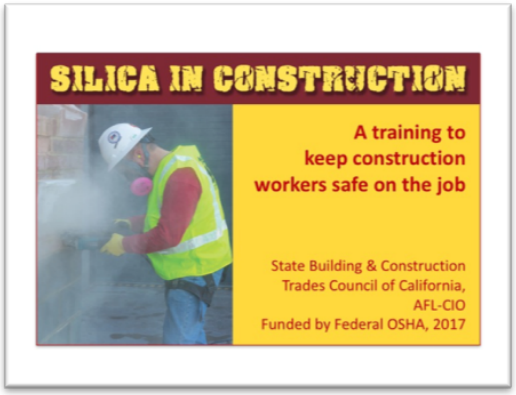
Introduction

(6 minutes)

Key points in this section:

- Acknowledge source and funding of training material
- How material may be used
- Introduce training topic
- Course objectives

Handouts: N/A

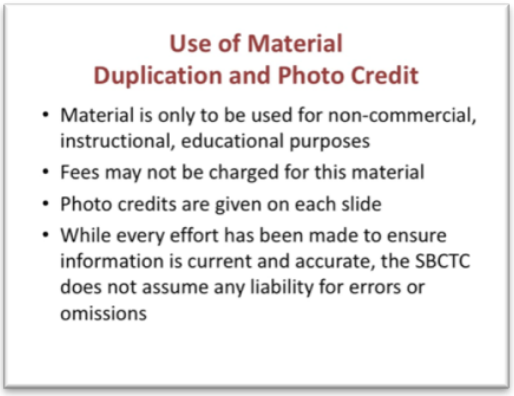
	**Slide 1**—Title page
	**Slide 2**—State Building and Construction Trades Council of CA, AFL-CIO Identify that this training program was developed 2016-17 by the State Building and Construction Trades Council of California, AFL-CIO (SBCTC). Explain that the SBCTC is a statewide non-profit council of building trades unions representing un construction workers throughout California. In existence for more than a hundred years, the SBC has been a strong advocate for worker health and safety. For more information about the SBCTC, visit our website at www.sbctc.org.

Slide 3—Funded by OSHA

Explain that funding for this program was provide through a grant from federal OSHA.
Through the grant program process, material is reviewed and approved by federal OSHA prior to distribution.

The Susan Harwood Training Grant Program awa grants to nonprofit organizations on a competitiv basis. The focus of the program is to provide trai and education for workers and employers on the recognition, avoidance, and prevention of safety health hazards in their workplaces, and to inform workers of their rights and employers of their responsibilities under the OSH Act. Target audier include underserved, low-literacy, and workers in high-hazard industries. Since 1978, over 2.1 millio workers have been trained through this federal O program.

Since 2000 the SBCTC has developed training thro OSHA grants on these topics: effective tailgate training; Focus Four hazards; preventing sprains strains; fall prevention and rescue planning; toxic construction; noise and hearing loss prevention.



Slide 4—Use of Material/Duplication and Photo Credit

Emphasize that this training was specifically desig to educate workers about the hazards of working with silica. It cannot be used for commercial purposes.

We have made every effort to give proper credit photo sources used in the PowerPoint presentati

Slide 5—Acknowledgements

Whenever possible, we use existing sources of information to compile our training.

The SBCTC expresses thanks to the organizations listed on this slide for their cooperation in sharing their resources and expertise for the benefit of our training.

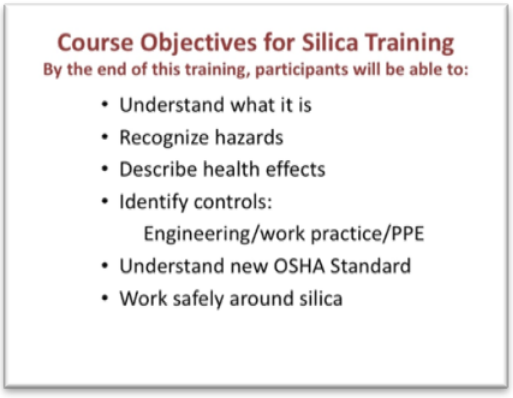
Slide 6—Silica—A High Priority for Construction

On construction sites there are many sources of dust that can contain a variety of contaminants. Some of these contaminants are of greater concern than others because they are known to cause serious health effects in workers. Silica is one of these.

The photo shows workers scarifying concrete without using dust controls.

You may have already seen or heard the slogan "Silica, it's not just Dust" which were the watchwords of a national public education campaign launched in the late 1990's by OSHA and other partners. Silica remains a high priority for construction health and safety and is the topic of this training program.

OSHA estimates that 2.3 million U.S. workers are exposed to this hazard every year, and close to 90% (2 million) of those work in construction. Out of an estimated 676,000 establishments affected, 600,000 are construction.



Slide 7—Course Objectives for Silica Training

The purpose of this training is to help you unders silica hazards, risk factors and how to work safely with construction materials containing silica. It is designed to make you an expert, but, by complet this training, you should accomplish these 6 objectives.

ASK: Do you have any questions about this traini before we move on?

Section 1: Introduction to Silica

(15 minutes)

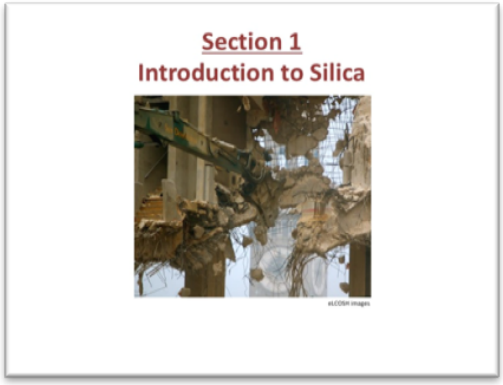
Key points in this section:

- Understand what silica is and where it naturally occurs
- Discuss different forms and types of silica
- Identify construction materials that may contain silica
- How to find out if material contains silica

Activity: Brainstorm list of construction materials that contain silica

Handouts: What is Crystalline Silica?

Props: Samples to pass around the class: Natural sources of silica: pieces of quartz, granite sandstone, a jar of sand. Construction material: pieces of cement fiber-board, cement, cor brick, block, tile.



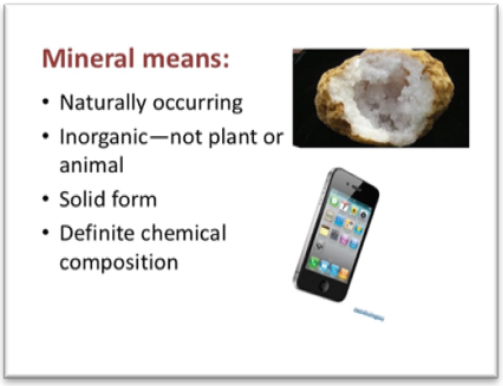
Slide 8—Section title page

Photo: Demolition of Morris Mechanic theater Baltimore, MD, January 2015

Slide 9—What is silica?

We may not realize it, but silica is all around us ev day.

ASK: Does anyone know what we mean by "mine Answer on next slide.



Slide 10—"Mineral" means:

The four points covered on the slide generally def what identifies a substance as a mineral.

ASK: What's the first thing that comes to mind wh you think of a mineral?

Possible answers are: rock, soil, something that comes from the Earth's crust.

ASK: Why would a cell phone appear on this slide

Most things we use in daily life are made from minerals or produced using mineral products. For example it takes dozens of minerals from different countries to make a cell phone.

The construction industry is the largest consumer mineral commodities.
Crushed stone is used for foundations, road base, concrete, and drainage.
Sand and gravel are used in concrete and foundat
Clays are used to make cement, bricks, and tile.
Iron ore is used to make reinforcing rods, steel be nails, and wire.
Gypsum is used to make drywall.
Dimension stone is used for facing, curbing, floori stair treads, and other architectural work.

These are just a few of the many uses of mineral commodities in construction.

ASK: Where do you think the mineral silica is four naturally?
Go to next slide for answer

Slide 11—Silica is found in rock, soil and sand

Silica is just one type of mineral. It is a chemical compound (silicon dioxide) formed from silicon ar oxygen atoms.

Because these two elements are so abundant, formation of silica is very common in nature and i occurs all over the planet.

For millennia, humans have used natural building materials that contain silica.

ASK: Can you think of 3 ancient structures that m be made from raw material that contains silica?

Possible answers include: Stonehenge 3100 BC (sandstone and bluestone), Egyptian pyramids 26(BC (limestone and limestone concrete), Greek ten 6th century BC (marble), Roman temples 2000 ye old (brick, concrete, marble, stucco). Many buildi in our own capitol Washington DC are built from granite, sandstone, and limestone.

Slide 12—Silica naturally occurs as:

The mineral compound silica occurs in two differe states called "amorphous" and "crystalline." The share the same chemical formula SiO_2 but have different properties. This is important to us becau one of these types presents a hazard to construct workers and is the focus of this training.

Amorphous describes a type that has no regular f If you were to look at a piece of amorphous silica, would be hard to find a defined, repeating patterr

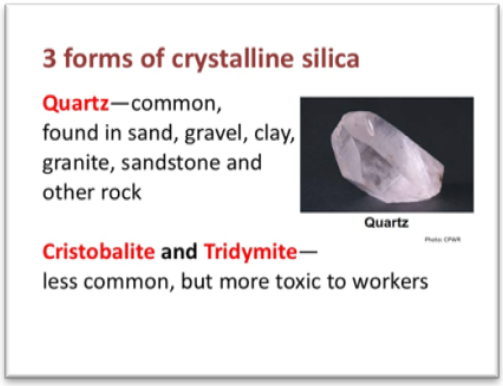
Crystalline silica has a three-dimensional repeatin pattern with a well-defined arrangement, a regula crystal form like what's shown in the photo on thi slide.

ASK: If we were to compare two solids that we al know well, butter and ice, which one would be crystalline? It's easy to find regular, repeating pat of form in the ice. The butter appears non-crystal

Of these two types of silica, it is exposure to the crystalline state that is of greatest concern becaus is very common and is proven to cause serious lur diseases.

Crystalline silica is found in rocks from every geolo era and from every location around the globe, ma it very likely to show up in construction materials you may work with.

There is a type of amorphous silica called "diatomaceous earth" that is produced by tiny organisms that extract silica from water. It is an effective filtering agent, and is used as a filler and mild abrasive. You may use it in construction and to follow appropriate protections, but it is not considered crystalline silica.



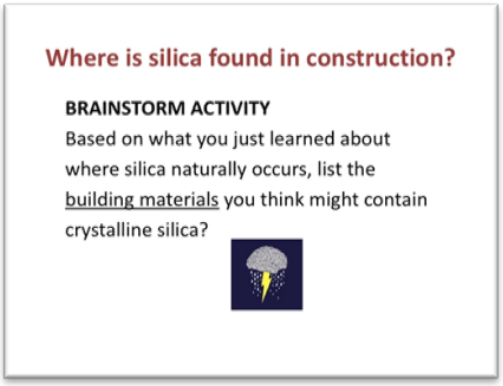
Slide 13—3 forms of crystalline silica

There are three forms of crystalline silica that are known to cause occupational disease and even de

Quartz is the most common form of the three. **Al** soils contain at least trace amounts of crystalline s in the form of quartz. It is found in sand, gravel, c granite, sandstone, and other forms of rock. Beca quartz is very abundant, workers have a high char of exposure.

Teaching Tip: Having samples of quartz, granite, sandstone, and beach sand to pass around the cla a good way to help workers retain this informatio

Cristobalite and Tridymite—are less common form found in volcanic rocks and soil. Because these ar very stable at high temperatures, they are also produced in some industrial operations that heat quartz or amorphous silica to extremely high temperatures, such as foundry processes, calcinin diatomaceous earth, brick and ceramics manufacturing. While more rare, these forms are believed to be more toxic.



Slide 14—Where is silica found in construction?

Activity: the purpose of this activity is to get the
to apply the information they just learned in a practical way by connecting it to the materials the commonly use on the job.
Preparation: familiarize yourself with the list on S 15 that follows.
Materials: flip chart or white board, multicolor pe tape

- Ask the group to brainstorm a list of buildi materials they think might contain crystall silica.
- Record the group's answers where everyo can see.
- Give everyone a chance to give an answer. to engage the whole class.
- If any items are listed that may be incorrec discuss this with the class and clarify why don't fit with the correct examples. Review previous information if necessary.
- When finished, go on to the next slide.

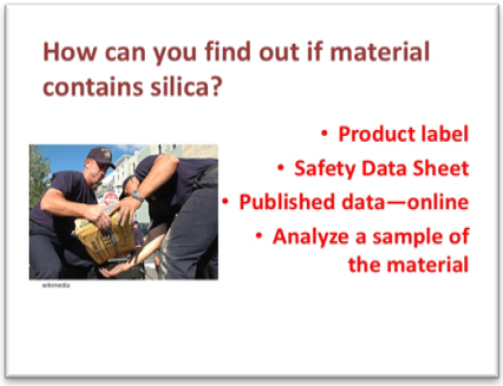
Slide 15—These materials may contain silica

Have the class compare their list to the one on thi slide which came from CPWR (Center for Construc Research and Training).

ASK: Do any surprise you? Discuss the list with th class.

It is important to know how much and what kind crystalline silica is contained in the construction materials you are using.

Make the point that, while working with any of th materials, workers need to be aware that they ma at risk for crystalline silica exposure.



Slide 16—How can you find out if material contai silica?

Explain to the class that there are ways they can c to see the form and concentration of crystalline si material contains.

- Check the product label for immediate information.
- Read the product Safety Data Sheet (SDS) which is required by law under Hazard Communication standards. Discuss where might be found at job sites. A worker may need to ask their employer where their company keeps this information. Also SDS often be found online through the manufacturer's website. Note: naturally occurring materials will not have an SDS.
- Review published data about the product doing a search online.
- The definitive way to know exactly how m and what form of crystalline silica is prese to perform monitoring and take a bulk sam of airborne contaminants for analysis by a testing lab. There is more information abo air monitoring later in this training.

Slide 17—Websites that can help you

Provide resources that workers can rely upon for I You may have your own specific to your craft.

Slide 18—Section 1 Review and Questions

This ends Section 1 "Introduction to Silica"

ASK: Name three important things you learned in section.

Make certain everyone understands these key poi before moving to the next section:

- ✓ Silica is a common, naturally occurring mir found in rock, soil, sand in all parts of the world.
- ✓ Crystalline silica is the type that is of most concern to worker health, and the most common form is quartz.
- ✓ Many common construction materials are known to contain crystalline silica and wor need to be aware there is potential risk fo exposure when working with these materi

Resolve any questions before proceeding to the n section.

Section 2: Silica as a Hazard

(20 minutes)

Key points in this section:

- Crystalline silica becomes a dangerous construction hazard when it takes the form o respirable dust.
- Multiple factors determine the potential for a substance to cause harm.
- Dose and duration of exposure is a critical factor for silica dust.
- Crystalline silica is known to cause serious lung disease, cancer and death.

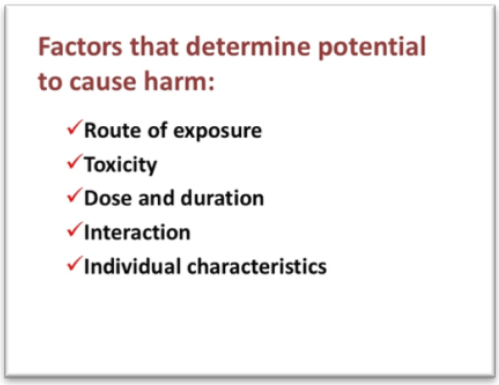
Activity: Guess what weighs 1 gram.

Handouts: CPWR Hazard Alert

Props: 1 gram packet of sweetener; meter stick or constructed cubic meter: several objects weights close to 1 gram.

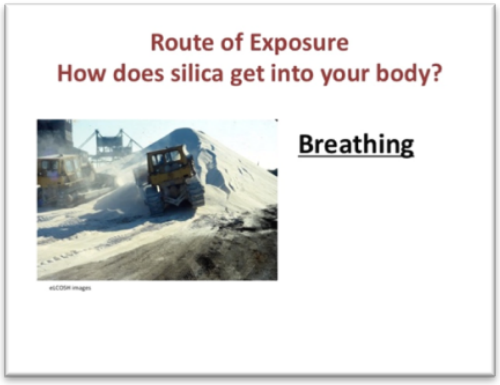
Slide 19—Silica as a Hazard

ASK: If silica is all around us, why aren't more peo sick from it?
To better understand the danger of silica exposure need to consider the factors that determine if a substance will cause harm to our health. In this se of the training, you will learn 5 factors that apply t silica.



Slide 20—Factors that determine potential to caus harm:

Introduce the five factors which will be discussed individually over the next 13 slides.



Slide 21—Route of Exposure

ASK: How do you think silica gets into your body? on the slide to reveal the answer:
Breathing

ASK: If this is how it enters your body, what form silica is hazardous?
A: Dust--- "Dust" is a generic term for minute solid particles in the air.

Larger, solid pieces of material containing crystalli silica, like rock, brick, block, quartz crystals, and ev beach sand are not hazardous for us to be around because they are too large to breathe.

But when these larger pieces are broken down int dust, very tiny solid particles of the crystalline silic become airborne, and now we are at risk for breat it into our body. Sometimes these particles may n even be visible in the air.

In construction and demolition projects, dust part are created in a wide range of sizes. Larger, heavie particles tend to settle out of the air, while smalle lighter solids may hang indefinitely.

ASK: What are some other particulates that come mind when you think of construction dust?
A: Lead
Wood
Asbestos
Fiberglass

Slide 22—Size matters!

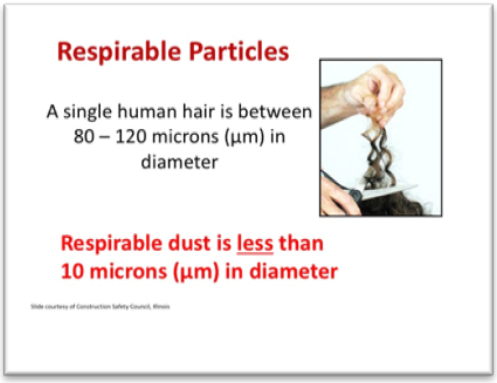
When dealing with contaminants that we breathe from the air, particle size really matters.

Crystalline silica dust is considered "respirable" meaning that it is small enough to get past human body defenses in the respiratory system that woul normally catch other contaminants with larger par sizes and different structures.

The larger particles in the inhalable dust classificat are typically trapped in the nose, throat or upper respiratory tract. You may be able to expel these b coughing, sneezing or blowing your nose.

But **respirable** crystalline silica dust penetrates de into your lungs beyond the body's natural cleaning mechanisms where it becomes permanently retai

Particles of respirable crystalline silica are at least times smaller than ordinary beach sand.



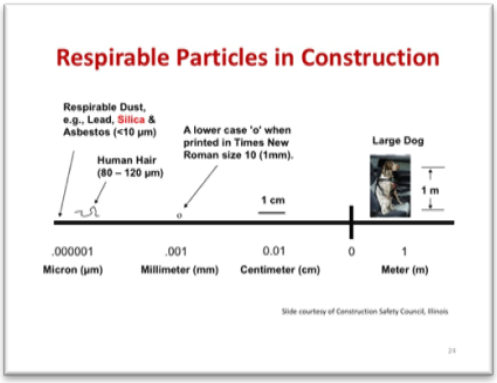
Slide 23—Respirable Particles

Respirable dust generally is identified as particles l than 10 microns in size. That's a fraction of the thickness of a single human hair.

Note: Students may not be familiar with the metr system so you may want to briefly explain some te and symbols that are used when referring to respi dust and silica exposure levels.

A "micrometer" also commonly called "micron" is unit of **length** on the metric scale equal to one millionth of a meter. For comparison, a meter is e to 39.37 inches.

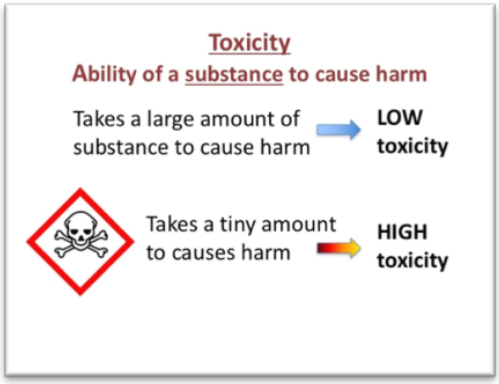
The symbol for "micro" is µ and looks something li the letter "u" with a line down the side. When thi symbol is used before a unit of measurement like meter "m" it is shorthand for 1/1,000,000 of a me and looks like this "µm" in print.
Later we will be seeing the symbol µ used in a me unit of **weight** called a "microgram" which is a ter often used in OSHA standards and looks like this " print.



Slide 24—Respirable Particles in Construction

This slide gives more comparisons to help workers understand the relative size of dust particles.

The takeaway message here is that these dust par are very very small and not visible to the naked ey



Slide 25—Toxicity

This refers to the ability of a substance to cause ha when it gets into the body. If a substance has low toxicity it would require exposure to a very large amount of that substance to cause harm. Convers exposure to a tiny amount of a substance causes h it's considered highly toxic.

ASK: Who can remember which type of silica is considered more toxic, amorphous or crystalline? A: Respirable crystalline silica is more toxic becau overexposure to it causes a serious lung disease ca silicosis. It has also been classified as a known hu carcinogen (cancer causing substance). Health eff of exposure to silica will be covered in more detail Section 4 of this training.

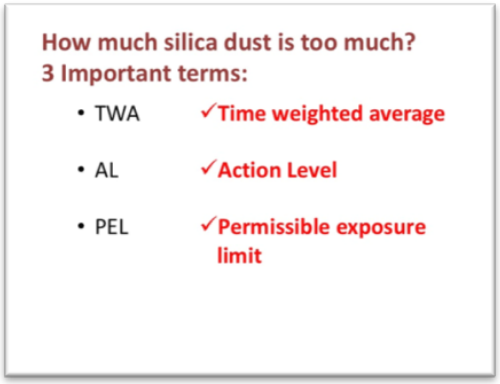
Slide 26—Dose and Duration

Dose refers to the amount of a substance that ent your body. The photo shows the amount of sugar different quantities of a soft drink.

Duration refers to the amount of time you are exp to the substance. The amount of time you are act exposed to respirable crystalline silica averaged ov the entire workday is a very important factor in assessing your risk.

The combination of dose and duration is called the "rate of exposure."

This is important for respirable crystalline silica be both smaller doses over a long period of time as w large doses over a short period of time can cause serious harm to your body.



Slide 27—How much silica dust is too much?

The new standard includes terms that may be unfamiliar to workers.

ASK: Does anyone know what these terms mean?

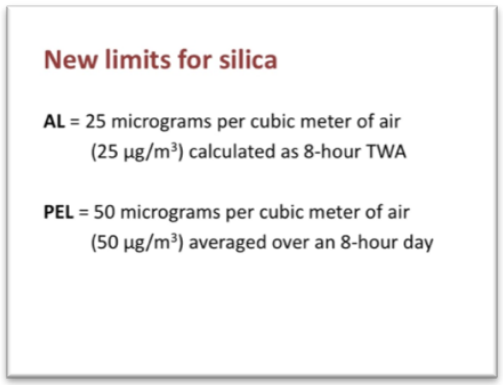
Click on slide to reveal answers
"8-hour time weighted average"
This is the average employee exposure to a specifi substance over an 8-hour period, based on industr hygiene monitoring.

ASK: Can you solve this example: An employee is exposed to 0.1 milligrams per cubic meter (mg/m³ respirable crystalline silica for 4 hours and then is exposed to silica at all for the rest of the day. Wha the employee's 8-hour TWA?
A: [(0.1mg/m³ *4 hours) + 0]/ 8 hours = 0.05 mg/
Multiply the dose (0.1 mg/m³) by the duration of exposure (4 hours). Divide that number by 8 to ge 8-hour TWA. 0.05 mg = 50 micrograms

ASK: Here's a tougher problem: An employee is exposed to 0.1 mg/m³ of respirable crystalline silic 2 hours, exposed to 0.05 mg/m³ for 4 hours, and t exposed to 0.2 mg/m³ for 2 hours. What is the employee's 8-hour TWA?
A: [(0.1 mg/m³ *2 hours) + (0.05 mg/m³ * 4hours) mg/m³ * 2 hours)] / 8 hours = 0.1 mg/m³ TWA.
0.1 mg = 100 micrograms

"Action Level"
OSHA uses this term to express the concentration specific substance, calculated as an eight (8)-hour weighted average (TWA), at or above which emplo must perform certain activities such as exposure monitoring and medical surveillance.

"Permissible exposure limit"
This represents the maximum amount (concentrat of a substance that can be present in the air; the allowable exposure limit set forth by OSHA regula

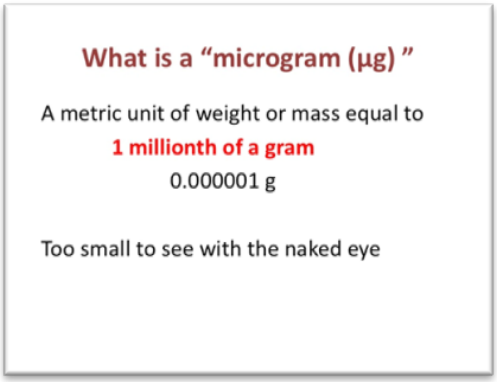


Slide 28—New limits for silica

The new Action Level (AL) for airborne respirable crystalline silica is now a concentration of 25 micrograms per cubic meter of air (25 µg/m³), calculated as an 8-hour TWA. This is what triggers standard. If employers can prove through air monitoring or objective data that workers are not exposed to silica above the AL, they are not subjec the silica standard.

The permissible exposure limit (PEL) is 50 microgr of respirable crystalline silica per cubic meter of ai µg/m³), averaged over an 8-hour day. This means be in compliance with the new standard, employe must implement silica dust controls to limit worke exposure to less than this amount of respirable crystalline silica each work day.

These measurements may be difficult to apply in practical terms. The next 3 slides explain what the mean in comparison to more familiar terms.



Slide 29—What is a "microgram (µg)"

In metric units a microgram (µg) is a unit of weigh
mass equal to 1 millionth of a gram.

The metric term milligram (mg) may be more fami
to you. It's commonly used in reference to medica
and vitamin supplements. For comparison, a millig
(mg) is 1/1000 of a gram and a microgram is 1/10
a milligram.

Earlier we talked about respirable dust as being 1
microns or less.

ASK: Does anyone remember what that measures
how it is different from micrograms?
A: Micrograms is a measurement of weight/mass,
microns (or micrometer) is length.

A microgram is too small to see with the naked ey
For perspective we will look at something we can
Activity: Guess what weighs closest to a gram.

- Gather several common small objects inclu
  those shown on the next slide. Choose son
  that weigh more than a gram.
- Hold each one up in front of the class and
  people vote on whether they weigh
  approximately a gram or not.

Go to the next slide to reveal which ones weigh cl
to 1 gram.

Slide 30—(no title)

These objects weigh approximately 1 gram each. T
contents of one packet of sweetener is 1 gram.

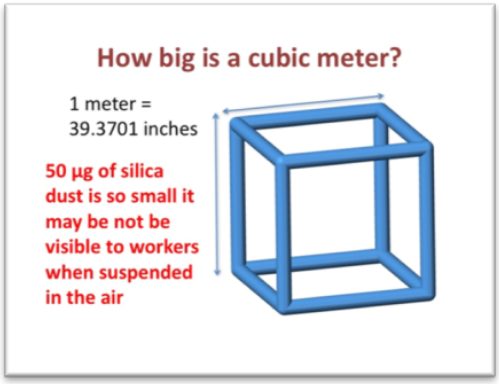
Teaching Tip: Have some packets of sweeteners available to open up and pour out or pass around class.

50 micrograms of silica dust, the PEL, would be 50 millionths of that mass.

Even when the air appears clear to you, respirable crystalline silica may be present in concentrations can cause harm.

Ask: True or False: Respirable crystalline silica has been determined to be toxic enough that even ver small doses can put workers' health at risk.
A: True

To establish an effective PEL there needs to be a defined way to measure the dose and duration of exposure. The dose is determined by the amount respirable crystalline silica present in the air and tl duration is averaged over an 8-hour workday. But need one more measurement to make this work.



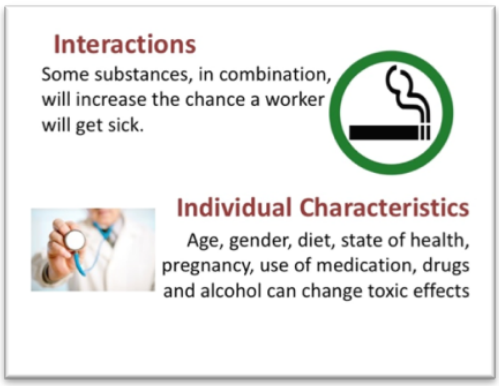
Slide 31—How big is a cubic meter?

The other metric unit referenced in the PEL is a cu meter which defines a space containing a certain volume of air.

Teaching Tip: Construct a prop to illustrate the vo of a cubic meter. If this is not possible, find spaces the room (e.g. space under a table) that may help students visualize the space.

The average worker breathes about 16.8 cubic me of air per day. At the PEL, an average worker woul breathe-in 840 micrograms of silica into their lung one day. In a year at the PEL, a worker would brea in 218,000 micrograms (0.2184 grams) of silica int their lungs. Compare this fraction (just over 20%) the gram of sweetener. That's the legal limit for si dust a worker can breathe in a year!

Remember, hazardous levels of silica are not alway visible. The only way to positively identify and qua airborne contaminants is to monitor the air worke breathing at the job site.



Slide 32—Interactions/Individual Characteristics

Two different substances may interact with one another and, in combination, create more harm.

A person's individual state of health overall can aff how they will respond to exposures.
ASK: Can anyone think of some examples of each?

A: An example is occupational exposure to respira crystalline silica coupled with cigarette smoking. T combination puts you at much greater risk for gett lung cancer. Also, smokers exposed to the same le of silica as non-smokers will suffer from silicosis at greater frequency than non-smokers. Smokers wi suffer from silicosis at lower silica exposures than smokers.

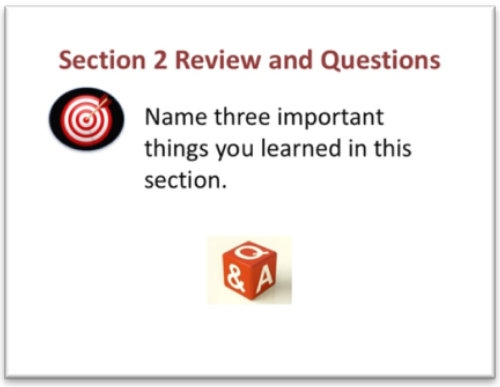
If you have an existing health condition that alread affects your respiratory system, or a compromised immune system, breathing silica dust may have a greater effect on you.

Slide 33—Putting it all together

Review each item highlighted on the slide.

Considering all of these factors, construction work are at high risk.

OSHA estimates that of all U.S. workers exposed to crystalline silica each year, close to 90% work in construction.



Slide 34—Section 2 Review and Questions

ASK: Name three important things you learned in section.

Resolve any questions before proceeding to the ne section.

Section 3: Tasks and Tools that Create Silica Dust

(35 minutes)

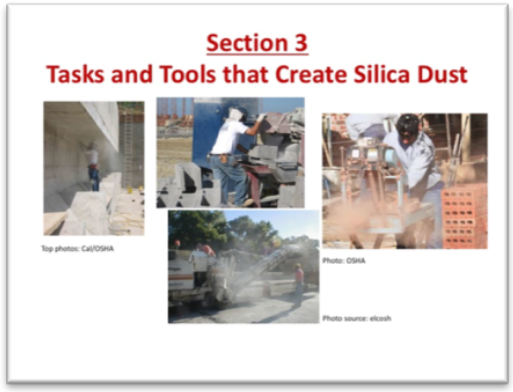
Key points in this section:

- Connect what kind of work tasks are commonly involved when working with materi contain silica.
- Identify the tools that workers use when performing these tasks.
- Show that these tools create overexposure to dust if controls are not used.
- Even if you are not the one creating the dust, you may still be exposed.

Activity: Small groups think of tasks/tools that may create silica dust exposure.

Handouts: CPWR Silica-safe.org "Who's At Risk?" list of tasks and materials

Props: Samples of tools or materials



Slide 35—Section 3 title slide

These photos show workers engaged in different activities that seem to be creating dust.

Slide 36—It's dusty work…but somebody has to d

TEACHING ACTIVITY: the purpose of this activity
get participants to think of construction tasks and
tools that may expose them to silica dust.

Preparation: Have the class list of materials gene
in the first activity posted where everyone can re
Make enough copies of Slide 15 to give one to ea
group. Decide how you will divide the class into s
groups. Make sure groups have paper/ pen/penc

Materials: flip chart or white board, multicolor p
tape, handout, paper/pens for groups

Activity:

- Divide the class into small buzz groups of
people.
- Post the class brainstorm list of materials
Section 1 and give each group a copy of Sl
15 (list of construction materials).
- Ask the groups to review the list together
write down the tasks they perform and to
equipment they utilize when working with
those materials and note if these generate
dust. What type of work is being done? H
them select one person from the group to
report back to the class.
- Allow no less than 10 minutes for the grou
to work together.
- Reconvene the class and ask each group t
share one or two of their results with the
Write their findings on a new flip chart pa
There will be repetition of tasks, so it is go
give every group a chance to list one task/
- Discuss the results of the group exercise.
- Save the lists of tasks/tools for later.
- Have everyone return to their seats.

Slide 37—Operations that create silica dust

Compare the task/tool list just created by the clas with these general categories of tasks shown on t slide. These categories came from the Cal/OSHA eTOOL for construction.

Discuss the following information from Cal/OSHA each category:
Cutting, drilling, coring: concrete; roof tile; tile backer; brick; block; granite.
Grinding, sanding, sandblasting: Sack and patch point grinding; scabbling/scarifying; drywall mud sanding; hand-held surface grinding.
Pulverizing: jack and chipping hammers; cement truck cleaning; concrete recycling; road milling; backhoes; excavators; demolition.
Mixing: Cement; plaster; grout.
Cleaning up: Dry sweeping; compressed air; haul On their Silica-Safe website, CPWR provides a sim list of work activities that expose workers to silica dust:

Abrasive blasting
Bushhammering
Cutting/sawing
Demolishing/disturbing
Drilling
Earthmoving
Grinding
Jackhammering
Milling
Mixing
Polishing
Roofing
Sacking/patching
Sanding
Scabbling
Scarifying
Scraping
Sweeping/cleaning up

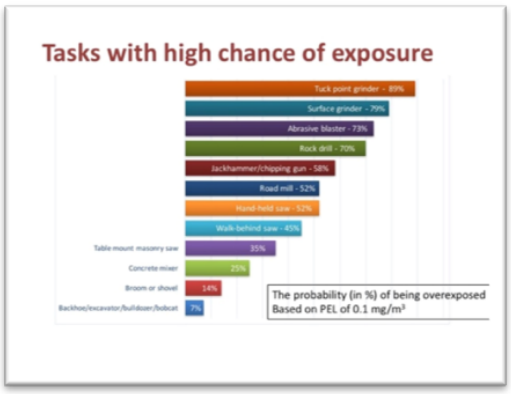
The key point is that there are many activities tha

Slide 38—Group Discussion

Have the class discuss the questions on the slide.

Key points to make here:

- Exposure can happen in all phases of construction.
- All crafts have the potential for exposure a different levels.
- Workers need to be aware that if they will using certain tools to work with materials contain silica, they may be exposed to leve respirable crystalline silica that can cause harm.



Slide 39—Tasks with high chance of exposure

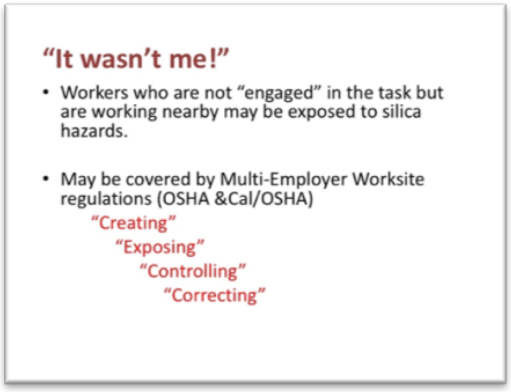
ASK: What do you notice about this chart?

This chart reflects the results of a study complete the University of Washington Department of Environmental and Occupational Health Sciences 2006.

It shows the likelihood of being overexposed to si dust when using certain tools. The percentages indicate how often samples for that tool exceede Washington State allowable limit (or PEL) which v the same as that for California at the time of the 11 years ago.

Researchers collected data for 12 common construction tools, using over 1,300 samples for a wide range of activities for both commercial and construction. Average silica exposures for 7 (read down from top of the list) of the 12 tools were ov recommended exposure limits for workers at that time. The highest exposures were surprisingly hig

It is important to note that the permissible expos limit has just been lowered to half the level it was when this study came out, meaning even more of tools on this list would expose workers to danger levels of silica dust if appropriate controls are not used. There is still a significant risk to workers ev the new PEL for long term exposures.



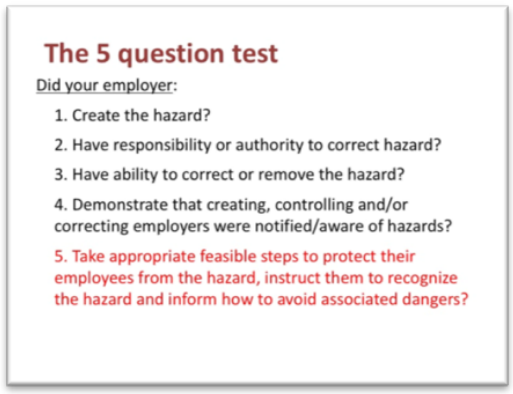
Slide 40—"It wasn't me!"

What if you are not using any of the tools or performing tasks that create silica dust but you ar working nearby? Do you still need to be protecte

The answer is yes. Even if you are not creating th dust, there are multi-employer regulations in plac protect you. Your employer is one of the followir

Creating—employer who actually created the haz
Exposing—employer whose employees were exp to the hazard
Controlling—employer responsible for safety and health conditions at worksite and authority for ensuring hazardous condition is corrected
Correcting—employer responsible for actually correcting the hazard

In California, Cal/OSHA regulations outline 5 ques that inspectors can use to determine if an employ citable for exposing their workers.



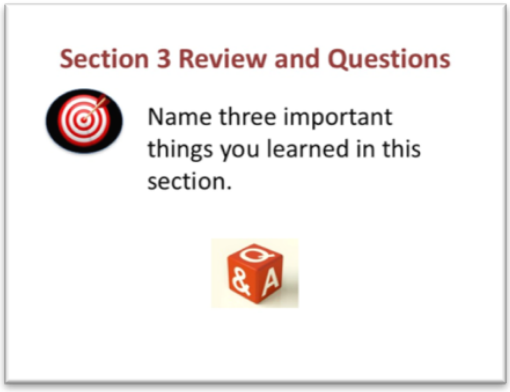
Slide 41—The 5 question test

If the answers to these 5 questions are as follows
1. No
2. No (refers to authority to have the hazard corrected)
3. No
4. Yes
5. Yes

Then the employer is not citable. Any other combination of answers means they are not in compliance with multi-employer regulations.

It is assumed feasible to provide employees with appropriate respiratory protection to protect the from respirable crystalline silica hazards at a minimum.

Key point: Standards and regulations are the minimum that employers need to do to comply w the law. If you believe that you are being expose harmful levels of contaminants, including silica du tell your crew leader, foreman or job site safety manager immediately. When you attend weekly Tailgate Training/Toolbox Talks on-the-job, ask questions about the work you will be performing the tools and materials you will be using. Prepari advance for how you will be minimizing your exp to silica dust is the best way to protect your healt



Slide 42—Section 3 Review and Questions

ASK: Name three important things you learned ir section.

At this point in the training workers should be abl identify:

- What silica is and where it comes from
- That crystalline silica, especially quartz, is form we are covering
- Which construction materials may contair crystalline silica
- That crystalline silica becomes a hazard w it is worked into respirable dust
- The tasks and tools common to constructi that create silica dust
- That it's not just the workers engaged in t task that are at risk

Resolve any questions before proceeding to the r section.

Section 4: Health Effects of Silica Exposure

(45 minutes)

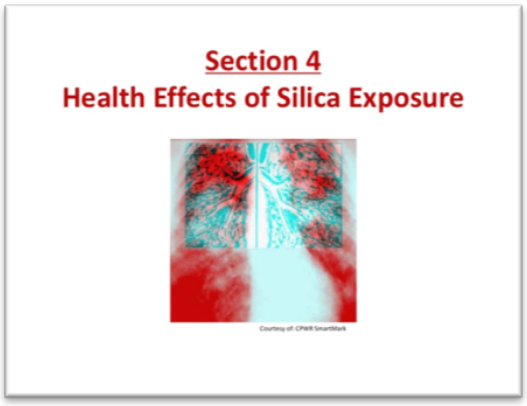
Key points in this section:

- Breathing respirable crystalline silica can lead to significant health effects, even deat
- The body part most affected is our lungs however, other organs can also be affected
- Learn what silica actually does to the lungs and the signs and symptoms of disease.
- Silicosis is the disease most closely associated with silica exposure.
- Silicosis is permanent, irreversible but preventable.
- There are 3 types of silicosis.
- Silica dust has great historical significance in U.S. worker occupational health.

Activity: Group discussion; "Silica Exposure" video; Bricklayer testimony audio; "Silica in Construction: From danger to safety" video.

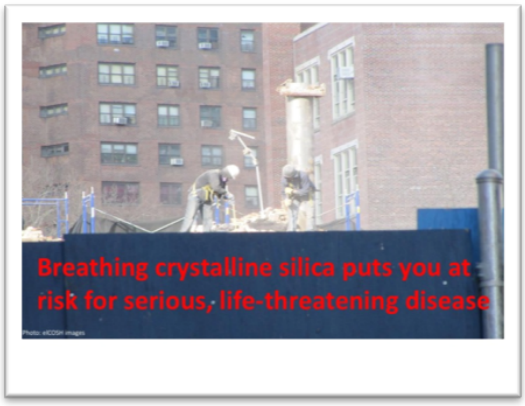
Handouts: OSHA Fact Sheet "Crystalline Silica Exposure Health Hazard Information"

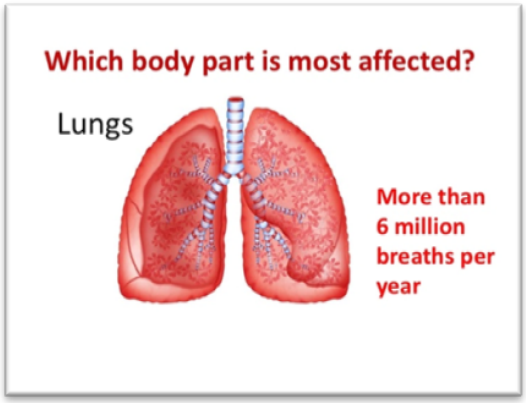
Props:



Slide 43—Section 4 title slide

This segment of the training teaches the potenti
health effects resulting from silica dust exposure

	**Slide 44**—Group Discussion Begin this section by determining if anyone in th class has personal experience with breathing sili dust and have them describe what happened ar how it felt. Alternatively, participants may know someone, perhaps a family member or co-worke who has been affected. Teaching Tip: Real-life, personal stories are very useful for engaging everybody, but as an instruc you need to keep control of the time and assure the point of the story stays on the topic of healt effects.
	**Slide 45**—(no title) Silica dust needs to be taken seriously. As we learned in the last section, the risk for overexpo is high for construction workers. This photo shows workers wearing respiratory protection to reduce exposure to silica dust.



Slide 46—Which body part is most affected?

Click the slide to reveal the answer: Lungs

Every cell in your body needs oxygen in order to

Your lungs play a vital role in the process of getti oxygen into the bloodstream so it can be carried through your body and in removing the waste ga carbon dioxide from the bloodstream and exhali from your body.

This process, essential to life, is automatically performed by your lungs and respiratory system

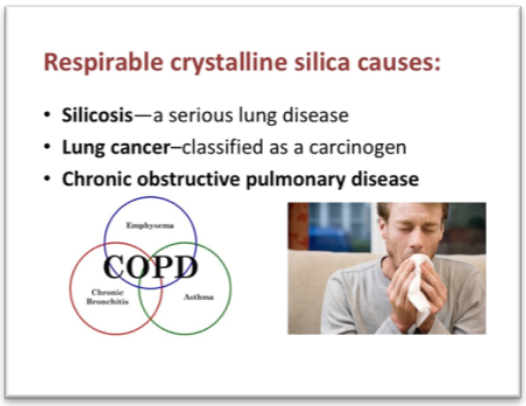
Chances are you don't think much about your lu They work hard all the time and you may only pa attention to your breathing when something is wrong.
ASK: How many breaths do you think we take ea year on average?
Click slide again to reveal the answer: On averag we breathe 12-15 times per minute at rest. Tha more than 6 million breaths per year!

If your lungs are not able to function properly, y whole body is affected and your quality of life is diminished.

ASK: What would happen to your lifestyle if you lungs did not work properly?
Simple activities like…

- Walking
- Talking/communicating
- Cheering for your team
- Laughing
- Blowing out candles
- Holding your breath for swimming or div
- Vigorous physical activity and exercise—hiking, sports,
- Playing with your kids and family
- Doing your job

…would become difficult.



Slide 47—Respirable crystalline silica causes:

Breathing-in crystalline silica can cause multiple diseases that can lead to disability and death.

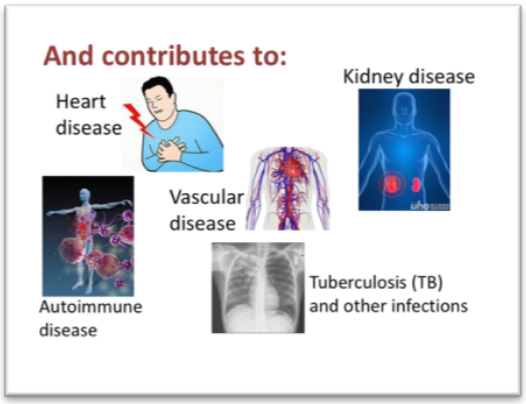
OSHA estimates that 2 million construction worl are exposed to silica each year and each year, hundreds of workers die from illnesses caused b breathing in silica and thousands more become

The primary disease associated with occupation exposure to crystalline silica is the incurable lun disease called silicosis.

Other diseases related to silica exposures and silicosis are:

Lung cancer: In 1997 the International Agency f Research on Cancer (IARC) published studies concluding that crystalline silica (quartz, cristoba is a human carcinogen (cancer causing). Data supports that silicosis increases risk for lung can It is less clear whether silica exposure causes lur cancer without silicosis.

COPD (Chronic obstructive pulmonary disease): is a chronic airflow limitation that is usually irreversible. It includes 4 interrelated disease processes: chronic bronchitis; emphysema; asth peripheral airways disease.

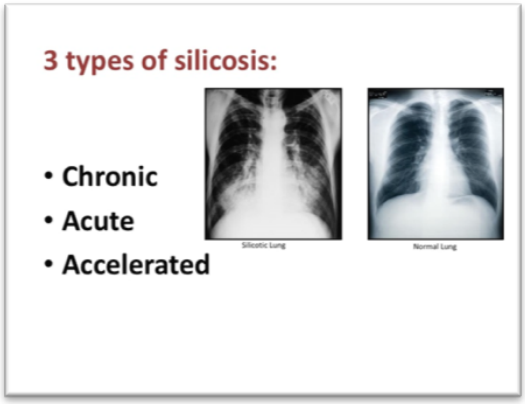


Slide 48—And contributes to:

These other diseases on the slide.

When your lungs are compromised and overwhelmed by silica dust, they cannot kill infectious organisms and infections like TB (tuberculosis) can make you very sick.

	**Slide 49**—Watch video: This short 2-minute video from Worksafe BC Can demonstrates very well how silica gets deep into lungs and how our body responds.
	**Slide 50**—Silicosis facts Review these important facts that were covered in the video.



Slide 51—3 types of silicosis:

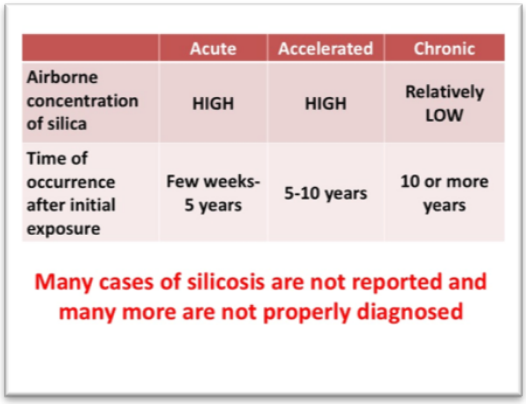
ASK: Does anybody know what the terms "chro
and "acute" mean?

A:

Chronic effects:
-Health effects develop slowly over time, usu
months and years.
-Often involve low exposures, small doses ov
time.
-Can be difficult to relate the disease to the
exposure because of the long time delay.
-Effects are usually not reversible.

Acute effects:
-Health effects occur immediately or soon af
exposure.
-Often involve high exposure, large dose ove
short period.
-Can be minor or severe.
-The relationship between the exposure to t
substance and symptoms is generally obviou

Chronic and acute silicosis may result in death.



	Acute	Accelerated	Chronic
Airborne concentration of silica	HIGH	HIGH	Relatively LOW
Time of occurrence after initial exposure	Few weeks-5 years	5-10 years	10 or more years

Many cases of silicosis are not reported and many more are not properly diagnosed

Slide 52—(no title)

This slide shows silica concentrations and the tir takes for health effects to develop for each of th three types of silicosis. The most important fact the development of silicosis is the dose.

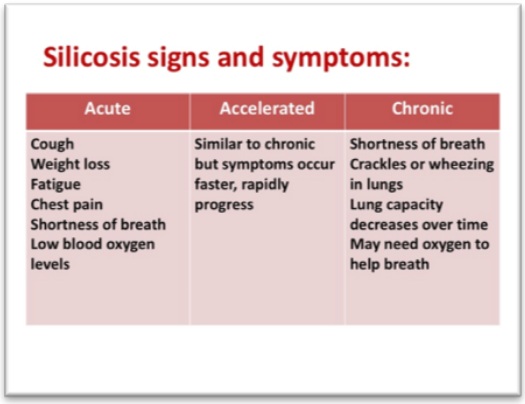
The delay between the exposure and appearanc disease caused by that exposure is called: latenc period

ASK: What other exposures to construction haz can you think of that cause health effects that o gradually over time?
A: Noise and hearing loss, asbestos, lead.

The latency period for chronic silicosis can make difficult to establish the cause-and-effect relationship between the exposure and the illne Since chronic diseases develop gradually, you m have the disease for some time before it is dete It is important for your physician to know if you exposed to crystalline silica at work.

Many cases of silicosis are not reported and mar more are not properly diagnosed.

Silicosis can worsen even after exposure ends!



Slide 53—Silicosis signs and symptoms:

Most of us have at some time had a cold or flu t compromises our respiratory system. Imagine w it would be like to live with the symptoms show here all the time.

Workers who have silicosis or other silica-relate diseases have described it as feeling like you are able to take a deep breath, wheezing, breathing someone sitting on your chest or a plastic bag ti over your head. They also talk about fatigue an loss of stamina, being physically no longer able t their normal activity which leads to depression.

Eventually, for some of these trades workers, symptoms reach the point where they are no lo able to work in their craft and must find other ty of employment to make a living.

Resource: A good reference for more detailed information about health effects is the NIOSH Hazard Review "Health Effects of Occupational Exposure to Respirable Crystalline Silica" (2002) DHHS (NIOSH) Publication No. 2002-129

Slide 54—Workers speak up

The union members you're about to hear in the audio clip were testifying at federal OSHA hearir describing how their lives were changed by silica related diseases.

Play 3:40 minute audio file
The audio file can be accessed on your flash driv on the Safety HUB website at http://safety.sbctc

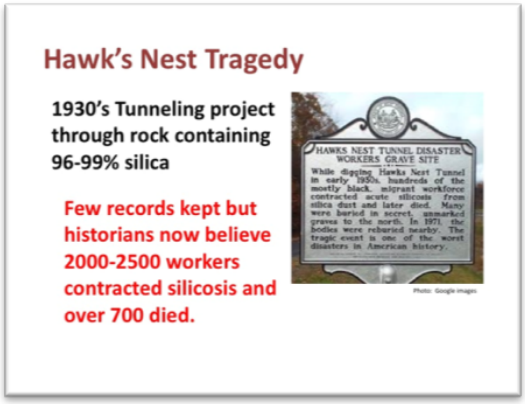
Slide 55—Silicosis: One of the oldest occupatio diseases

Silica dust has been linked to health effects for thousands of years. In the 1700's chronic silicosi was documented by physicians who noted in autopsies of stone cutters that their lungs were hardened and filled with sand-like substances.

ASK: Why would newer tools increase silicosis cases?
A: They were more powerful and had greater potential to create dust. As the United States became more industrialized, hand tools gave wa powered tools. Introduction of the pneumatic hammer drill in 1897 and sandblasting in 1904 dramatically increased the number of silicosis ca

The photo, from a 1911 U.S. Bureau of Mines technical paper, shows a worker wearing a self-contained oxygen breathing apparatus. The cap on the original photo read: "Salvus light apparat supplies oxygen for half an hour and weighs abo 15 pounds."

ASK: Does anybody know of a silica disaster in t U.S.? Ask them to explain, then go to the next s



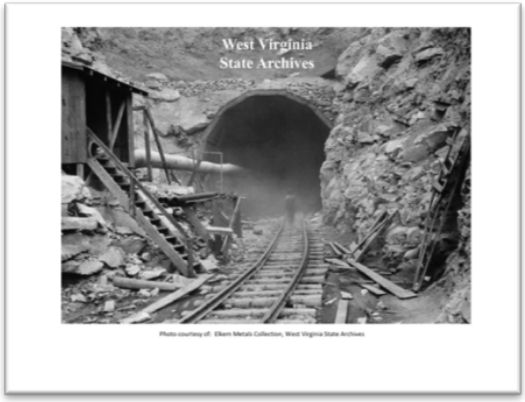
Slide 56—Hawk's Nest Tragedy

In the 1930's, silica dust was the focal point of th worst industrial disaster in US history.

Background information: During the "Great Depression" a project in West Virginia, known as Hawk's Nest Gauley Bridge project, offered payi work to thousands, many African-American, desperate unemployed who were willing to trav get a job to support their families. The job was tunnel through a mountain of rock containing 96-99% silica.

The silica dust exposure was so intense that wor quickly got sick and many died from silicosis. Mo of these victims only worked 6 months or less o project. Actual numbers of the dead are hard to know because few records were kept. Hawk's N became an infamous tragedy, leading to lawsuit and Congressional hearings that would forever change attitudes toward worker health and safe

In 2017, 87 years later, we still face challenges ir obtaining accurate data for work-related silicosis resulting in possible underreporting.

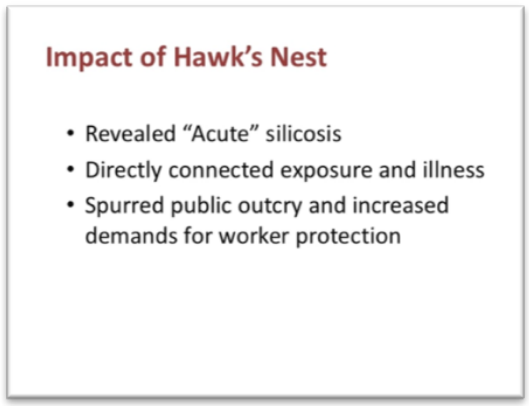


Slide 57—(Hawk's Nest tunnel photo)

In this photo, we see a worker walking into the tunnel through a cloud of visible dust.

The worker death rate on the job was so high th the company hired an undertaker to dispose of bodies in unmarked graves in nearby fields.

The employer's blatant disregard for workers' liv would be revealed later. Respiratory protection not provided even though the employer knew o danger. While acute silicosis was not yet describ the latency period of chronic silicosis was well known; the employer counted on workers completing the project and moving on before ill was tied to the job.



Slide 58—Impact of Hawk's Nest

The new "acute" form of silicosis presented an undeniable connection between job tasks and health effects. In the late 1930's silicosis became first chronic disease incorporated into workers' compensation legislation in several states.

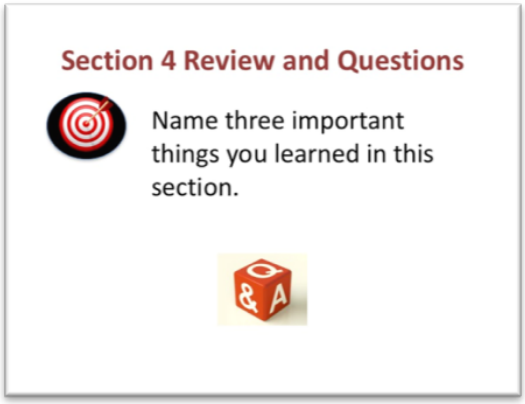
There was even a blues song written in 1936 cal "Silicosis is Killin' Me" by Pinewood Tom (Josh White). You can search YouTube and listen to th song.
https://www.youtube.com/watch?v=gd4H1rAoH

Government involvement in worker protection v growing. With people living longer, chronic dise became more concerning as "retirement" becan new possibility. Perceptions were shifting about compensation, responsibility and the role of fed government in helping individuals. The Social Security program was created in 1935.
As an industrial disease, silicosis brought attenti to society's obligation to the workforce and ensu decent quality of life after retirement.

Resource: For information about the history of silicosis and the Hawk's Nest tragedy read these books:
The Hawk's Nest Incident by Martin Cherniack (1986)
Deadly Dust by David Rosner and Gerald Markov (2006)

Slide 59—Watch Video

Show 8 minute SBCTC video "Silica in Constructi From danger to safety" This is a good review an transition to the next section on controlling haza The video file can be accessed on your flash driv on the Safety HUB website at http://safety.sbctc



Slide 60—Review and Questions

ASK: Prompting questions:

- Which body part is affected? A: Lungs
- What disease is most associated with breathing silica dust? A: Silicosis
- What other diseases are related to silica dust? A: Lung cancer; COPD; heart disea kidney disease; vascular disease; autoimmune disease; tuberculosis
- Name 3 types of silicosis. A: Chronic; ac accelerated
- Name symptoms of silicosis. A: shortnes breath; crackles/wheezing in lungs; decreased lung capacity; cough; weight l fatigue; chest pain; low blood oxygen lev
- True or False: Silicosis is curable. A: FALS is permanent and incurable, but prevent

Resolve any questions before moving to next section.

Section 5: Controlling Silica Hazards

(45 minutes)

Key points in this section:

- How to use the Hierarchy of Controls
- What factors should be considered in assessing risk for silica exposure
- Workers learn engineering and administrative controls, best practices for working sa silica and common PPE used for silica
- Examples of each type of control
- How to know if controls are working
- How air monitoring works
- Why PPE is less effective than engineering controls

Activity: Brainstorm ways dust is controlled on-the-job.

Materials: Flip chart/white board; multi-color markers; post-it notes 3 colors; flip chart pag Hierarchy of Controls pyramid drawn on it.

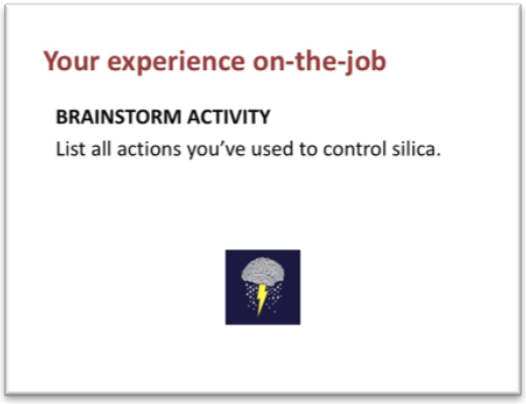
Handouts: CPWR Table of Best Practices; NJ Dept. of Health and Senior Services: What Phy Need to Know About Occupational Silicosis and Silica Exposure Sources

Props: Samples of respirators; tools with integrated water or vacuum systems; air monitori equipment

Slide 61—Section 5 title slide

The photo shows an unsafe work practice, scarif concrete without using appropriate controls.

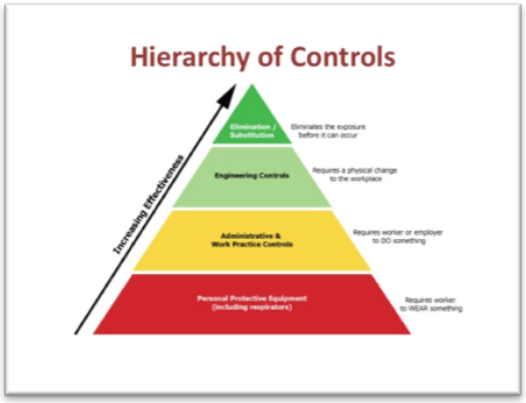
In this segment of the training we are going to le ways to prevent exposure to silica dust. The bes way to protect workers is to eliminate the hazar



Slide 62—Your experience on-the-job

Brainstorm Activity: Ask the class to think of all ways they've seen dust being controlled at their sites. What have they been told to do by their employers?

Write down the responses on a flip chart/white board and save for the next slide.



Slide 63—Hierarchy of Controls

ASK: Raise your hand if you have heard of this before?

Click slide to reveal pyramid and ask someone in class to explain.

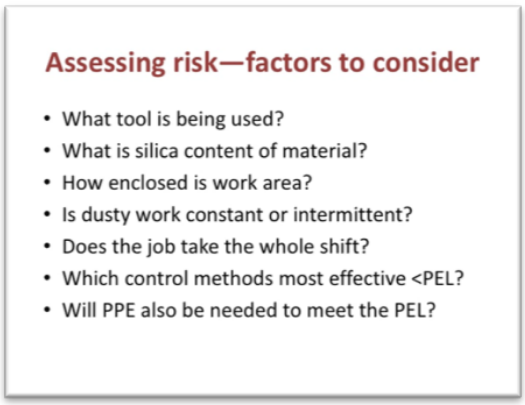
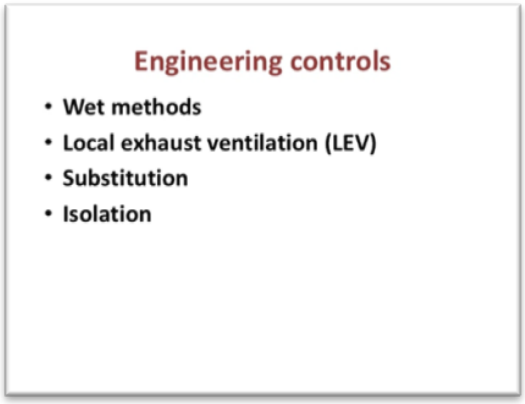
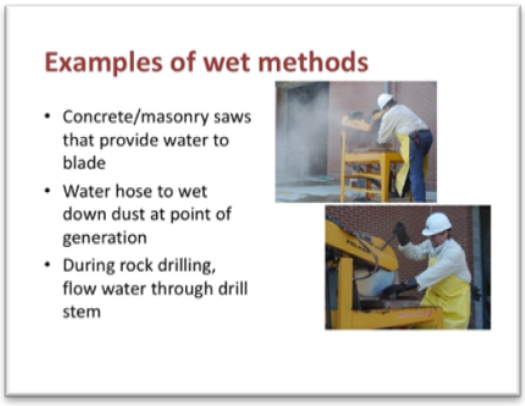
Occupational health professionals use a system called the "Hierarchy of Controls" to categorize hazard control methods into three groups in ord effectiveness:
Engineering Controls
Administrative Controls
Personal Protective Equipment (PPE)

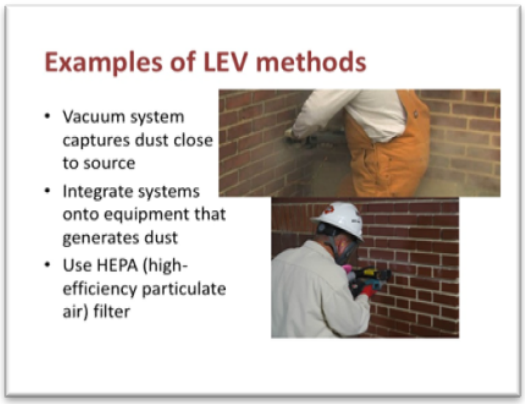
Engineering controls are designed to remove the hazard at the source, before it comes in contact the worker. This could include design changes ar modifications, equipment, systems and processe that reduce the source of exposure. Well-design engineering controls can be highly effective in protecting workers and will typically be indepen of worker interactions to provide this high level protection.

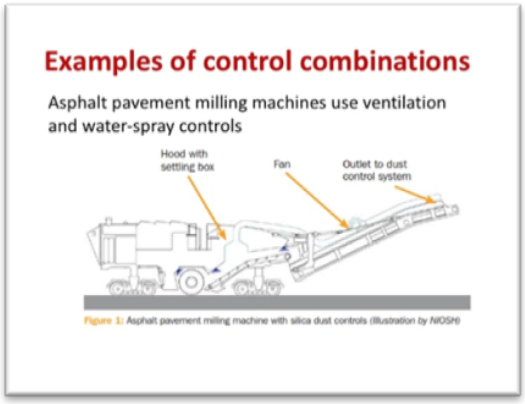
Administrative controls alter the way the work is done, including timing of work, policies and othe rules, and **work practices** such as standards and operating procedures (including training, housekeeping, and equipment maintenance, an personal hygiene practices). These controls don' actually remove or reduce the hazard and can b more difficult to implement.

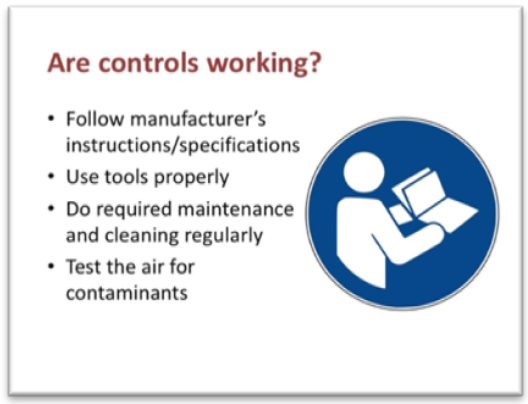
ASK: What does "PPE" stand for? A: Personal protective equipment

PPE is worn by individual workers to reduce exposure such as contact with hazardous substa or exposure to noise.
PPE includes items such as respirators, protectiv clothing such as gloves, face shields, eye protect and footwear.

	**Slide 64**—Assessing risk—factors to consider These are some of the things to consider when assessing risk for silica dust exposures and determining the most effective controls. ASK: Would you add anything else to this list? Discuss
	**Slide 65**—Engineering controls These are the controls commonly used for silica. ASK: How do these eliminate the hazard? Wha the hazard? A: silica dust A: All of these methods either suppress the dus its source before it can become respirable or the eliminate the hazard by using a non-silica mater confining the dust to an enclosed area away fro workers.
	**Slide 66**—Examples of wet methods Water has been used as an effective dust suppressant for decades. It is important to be s that water is applied at flow rates sufficient to minimize release of visible dust. Photo shows a stationary saw with no control ar with water control.

	**Slide 67**—(Water control photos) Top photos: Handheld grinder with no control a with water control. Bottom photos: Handheld saw with no control a with water control.
	**Slide 68**—(Water control photos) Top photos: Walk-behind concrete saw with no control and with water control. Bottom photos: Jackhammer with no control ar with water control.
	**Slide 69**—Examples of LEV methods Photos: Handheld grinder for tuckpointing with control and vacuum control. Vacuum systems capture dust at the source befc becomes respirable. Often these systems are equipped with high-efficiency particulate air (HE filters. OSHA defines HEPA filter as a filter that is at leas 99.97% efficient in removing mono-dispersed particles of 0.3 micrometers in diameter. Systems must be maintained according to manufacturers specifications to assure they are functioning at full efficiency.

	**Slide 70**—(Vacuum control photos) Top photos: Right-angle grinder with no control vacuum control. Bottom photos: Handheld drill with no control a vacuum control.
	**Slide 71**—Examples of control combinations Some equipment utilizes both wet and LEV cont in combination as in this example.
	**Slide 72**—(Control combo photo) Photos: Vehicle-mounted drilling rig with no controls and with water and vacuum controls.



Slide 73—Are controls working?

If there is any visible dust while using water or vacuum controls, the control system may not be working properly.

It is critical to maintain adequate water flow and flow to assure the systems are functioning at the required efficiency to protect workers from respirable dust.

The only way to know the type and actual concentration of contaminants in the air at a giv point in time is to perform air monitoring.

Slide 74—Air monitoring

Monitoring is done by trained professionals such industrial hygienists using specialized instrumen that are properly calibrated.

They may perform general on-site monitoring of ambient air or personal monitoring of workers w are engaged in the tasks that are creating the sil dust.

General area monitoring is done to estimate possible exposure of a group of workers in a particular area.

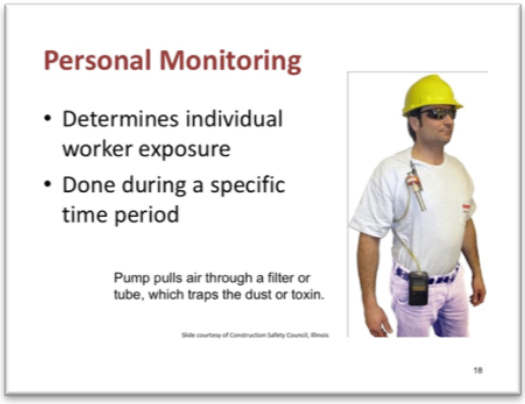
A defined volume of air is needed to accurately calculate the concentration of silica in the sampl collected. In this case that volume is a cubic met air. A concentration of respirable crystalline silica greater than 50 µg/m³ averaged over an 8-hour work day exceeds the new legal limit.

Slide 75—Air sampling equipment

If your employer is going to monitor the air you
breathing while you work, the professional doin
sampling will fit you with some equipment like t
shown in the photo.

It is important that the sampling is performed w
you are doing work that has the greatest potent
expose you to silica dust. Otherwise the results
not accurately represent your exposure levels.

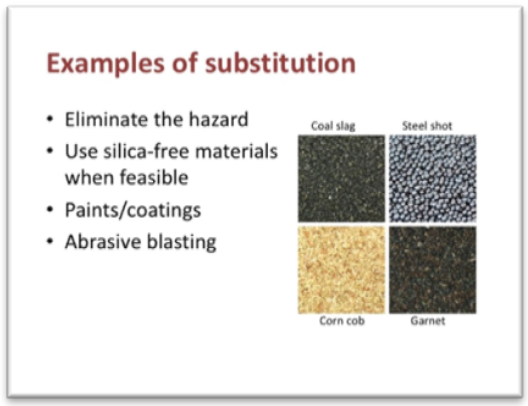
To collect a sample representational of your day
exposure you need to use a personal air-samplir
pump with a cyclone. The way the cyclone work
that there is a small inlet on the side, air whirls
around, dust gets caught. The large/heavy parti
fall to the bottom, the ones greater than 10 mic
in diameter. The particles less than or equal to 1
microns collect on the filter. Personal sampling
to have the cyclone on it to be correct.



Slide 76—Personal Monitoring

Air monitoring may be done in a number of way
Some toxins are measured by placing a small pu
on your belt and a filter cassette or tube clipped
your collar with a flexible tube running between
them. The filter or tube should be located as clo
possible to your breathing zone (the air in front
your nose and mouth which you breathe).

The pump pulls air through the filter or tube, wh
traps the dust or toxin. After the sample has bee
taken, the filter or tube is sent to a laboratory. T
laboratory uses scientific methods to measure tl
amount of contaminant on the filter or tube. It r
take several days or longer before the results are
ready from the laboratory.

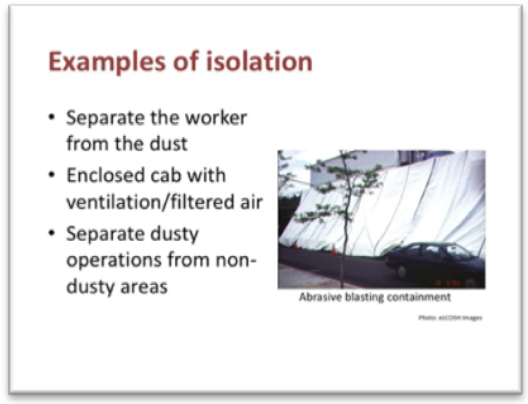


Slide 77—Examples of substitution

Substitution means replacing a more hazardous material with a less hazardous material (silica-fr to do a project.

While this option is not feasible for certain construction materials, it is good to check for sil free options in paints and coatings and for abras blasting.

The photos show 4 alternatives to silica sand for abrasive blasting: coal slag; steel shot; corn cob; garnet.
The OSHA website has a more extensive list of alternatives.



Slide 78—Examples of isolation

Discuss the examples on the slide.

ASK: What precautions do you have to take for workers inside a containment area?
A: While this method protects workers not invo in the dust-generating task, bystanders, and the environment outside the containment structure may substantially increase silica exposures of th workers doing the work inside the structure. Pr control methods need to be used to protect the such as wet methods, ventilation and PPE.

Slide 79—Administrative controls

These controls set policies and procedures and v
practices. They include:

- Work schedules/job rotation
- Staffing levels
- Maintenance
- Supervision
- Inspections
- Job hazard analysis
- Housekeeping
- Providing shower/washing/eating faciliti
- Signage

The next 2 slides give examples of best practices
contractors and workers for silica dust.

Slide 80—Best practices for contractors

Contractors can:

1. Assign an individual to control and monitor fo silica on the job, such as a competent person – someone knowledgeable of applicable standard capable of identifying workplace hazards relatin the specific operation, and has the authority to correct them.

2. Use vacuums, water, substitutes, or different work practices to reduce or eliminate the dust.

3. Provide workers with respiratory protection v other controls are not enough, which are proper fitted and appropriate for the exposure.

4. Use a substitute material instead of sand whe abrasive blasting. For a list of substitutes, visit th OSHA website at: https://www.osha.gov/dsg/etools/silica/protect_against/protect_against.html#Substitute

5. Create a plan for working safely with silica. "Create-A-Plan" section of the Silica-Safe websit http://plan.silica-safe.org/ walks users through simple steps to identify silica hazards, ways to control the dust, and actions to work safely with silica.

Slide 81—Best practices for workers

It is possible to work safely with silica and enjoy long, healthy career in the construction trades b following these simple best practices.

Workers can:

1. Use all equipment and follow work practices provided to them by their employer to control tl dust. *The controls won't work if they're not used*

2. Be aware of the operations and the job tasks can create crystalline silica exposures and know steps that should be taken to prevent exposures Report silica exposures/concerns to their emplo union representative, fellow employees. If the problem does not get resolved, employees can report the problem to OSHA or Cal/OSHA.

3. Participate in training, exposure monitoring, health screening and surveillance programs to monitor any adverse health effects caused by crystalline silica exposures. Raise silica awarene with co-workers.

4. Wear disposable or washable work clothes a shower if facilities are available. Vacuum the dus from your clothes and change into clothin before leaving the work site. **Do not brush or bl the dust off!** Contaminated clothing has been found to be a significant contributor to silica exposures. **Do not bring dust home!**

5. Be aware of the health hazards related to exposures to crystalline silica. Smoking multiplie the lung damage caused by silica exposures.

6. Avoid eating, drinking, smoking, or applying cosmetics in areas where crystalline silica dust is present. Wash your hands and face outside of d areas before performing any of these activities.

7. Provide your doctor with a copy of the CPWR

Slide 82—Personal protective equipment

This is not a respirator training program. The ne few slides are intended to familiarize workers wi the types of respiratory protection they may be asked to wear when working around silica dust. Workers who are required to wear respirators m be appropriately trained in compliance with curr respiratory protection standards.

In some cases workers will be required to wear I when engineering and administrative controls c not keep exposures below the PEL.

Employers must provide employees with appropriate respirators where required by the si standard. The respirators must comply with requirements of the silica standard and with OSI Respiratory Protection standard (29 CFR 1910.13

ASK: What is NIOSH? A: The National Institute Occupational Safety and Health
The Occupational Safety and Health Act of 1970 established NIOSH as a research agency focused the study of worker safety and health, and empowering employers and workers to create sa and healthy workplaces. NIOSH is part of the U.S Centers for Disease Control and Prevention, in th U.S. Department of Health and Human Services.

Slide 83—NIOSH-Approved Respirators

Air-purifying respirators have filters, cartridges c
canisters that remove specific contaminants fror
the air by purifying the air through the cartridge
before it reaches the worker. They can be full-fa
or half-face.

There are four respirator styles that would be go
choices for controlling silica dust on
construction sites. They are:
-- a disposable N95 respirator
-- a half face elastomeric respirator with P100 fil
-- full face elastomeric respirator with P100 filte
-- powered air-purifying respirator (PAPR) with P
or HEPA filter.
ASK: What's the most common type of respirato
used in construction for silica?

Respirator selection depends on the amount of
exposure.

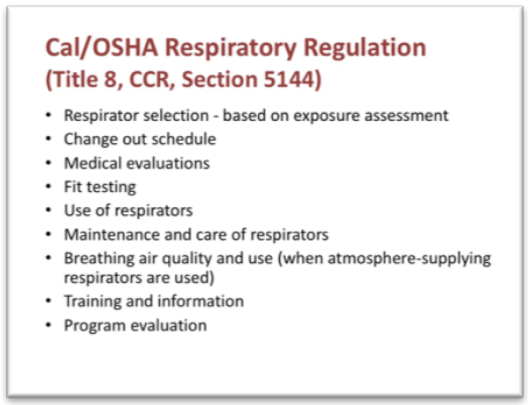
All respirators used should be NIOSH approved.

Commonly used respiratory protection for silica
half-face air purifying respirator with 100 series
filter.

For some crystalline silica generating tasks – for
example jack hammering and wet saw cutting –
half-face respirator with P-100 filters will ordina
provide adequate protection. For other tasks, lik
dry saw cutting, drilling in enclosed spaces, and
grinding, a more protective respirator may be
needed.

ASK: Some standards require use of respirators
a specific "Assigned Protection Factor" (APF). W
does this mean?
A: Assigned Protection Factor is a number assig
by NIOSH representing the minimum anticipated
protection provided by a particular type respirat
that is functioning properly and being used corr

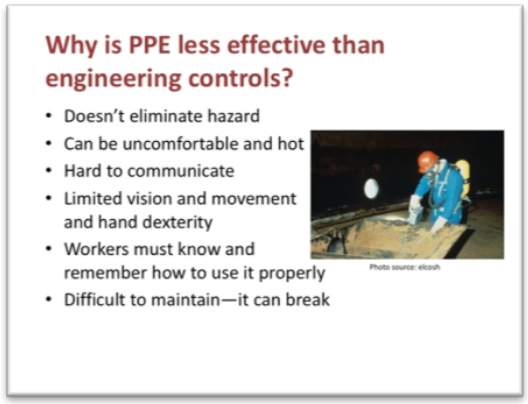
An APF of 10 indicates that a worker using that



Slide 84—Cal/OSHA Respiratory Regulation

Review what is covered under the standard.

ASK: Why do you think medical evaluations and testing are required?
A: Wearing a respirator puts extra strain on you heart and lungs. Workers need to be cleared by physician to assure they are healthy enough to u them. The effectiveness of a respirator depends upon having a good seal/fit so that air is passing through the filter. Leaks allow air with respirabl contaminants to bypass the filter, rendering the respirator ineffective in protecting the worker.



Slide 85—Why is PPE less effective than enginee controls?

ASK: Why do you think PPE is so low on the hierarchy of controls and considered the last lin protection?

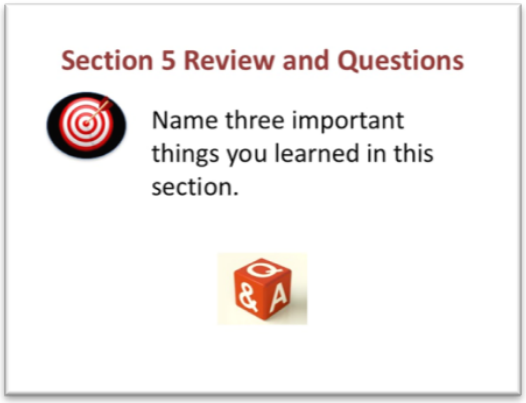
Click slide to reveal answers.

Slide 86—Watch video:

Show the 7 minute SBCTC video "Eliminate the Hazard: McCarthy Drilling Project"

This video shows a large general contractor successfully using vacuum controls for drilling concrete.

The video can be accessed on your flash drive o the Safety HUB website at http://safety.sbctc.or



Slide 87—Review and Questions

ASK: Name three important things you learned this section.

Prompting questions:

- What are 2 engineering controls for silica dust? A: wet methods and Local exhaust ventilation/vacuum systems.
- What kind of PPE is used for silica dust? NIOSH-approved air purifying respirator.
- Why is it important to fit test respirators? a leaky respirator provides no protection the worker wearing it
- What are things you can do to protect yourself and your family from silica dust? Be aware of hazards, use controls proper clean-up before leaving work, wash hand face and don't eat/drink/smoke near silic dust, inform your doctor that you work v silica, participate in training and be invol at work.

Section 6: The New OSHA Standard

(30 minutes)

Key points in this section:

- Understanding basic components of the new 2016 federal silica standard
- Key compliance dates
- Action level and PEL
- Two control strategy options
- What is covered in "Table 1"
- What the Alternative Control option involves
- Requirements for all employers
- Resources for creating a written plan and the new small entity compliance guide

Activity: N/A

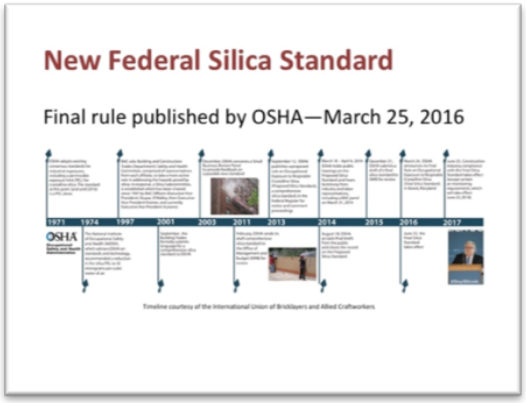
Materials: Flip chart/white board; multi-color markers; Jeopardy Game PowerPoint; time

Handouts: OSHA FactSheet "OSHA's Crystalline Silica Rule: Construction; copy of Federal 2016 Silica standard; Sample Medical Evaluation Form; Post-Test; Course Evaluation form

Props: N/A

Slide 88—Section 6: The New OSHA Standard

This final section of the training discusses basi components of the 2016 federal OSHA Silica Standard for Construction.



Slide 89—New Federal Silica Standard

On March 25, 2016 federal OSHA published a l awaited final rule "§1926.1153 Respirable crystalline silica" for construction.

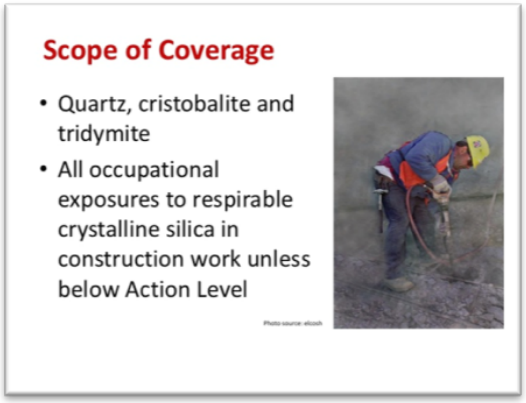
The timeline shown here was shared by the International Union of Bricklayers and Allied Cr It shows the long 45 year effort by unions and other worker advocates to make the case for a enforceable federal standard to protect construction workers from silica dust.

OSHA estimates that the new rule will save mo than 600 lives and prevent over 900 new cases silicosis each year.

Key dates:
June 23, 2016 new standard effective nationall
September 15, 2016 California OSH Standards Board adopted the federal standard
October 17, 2016 federal standard became effective in CA, replacing existing standard CA—Title 8, CA Code of Regulations, Construct Safety Orders, Section 1532.3

Why did we need a new federal standard? The first mandatory exposure limits from the early 1970's were inconsistent and based on outdate studies using old methods of measuring expos Researchers at the time knew those first limits were out of date even when they were put in place.

Federal standards have been slow to evolve an have not kept pace with power tool technolog research about silica exposures and health effe



Slide 90—Scope of Coverage

The standard defines respirable crystalline silic quartz, cristobalite, and/or tridymite containe airborne particles that are determined to be respirable by a sampling device that meets specified standards. All 3 types of crystalline s we talked about in Section 1 on Slide 13 of this training are covered.

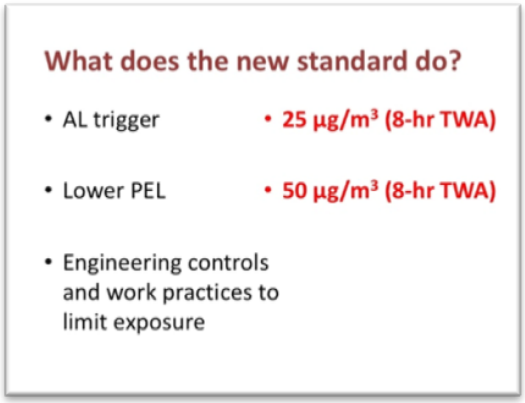
It applies to all occupational exposures to respirable crystalline silica in construction wor except where employee exposure will remain below the **Action Level** under any foreseeable conditions.

Slide 91—Compliance Date

States with OSHA-approved state plans, such a California (Cal/OSHA), had six months to adopt standard that is at least as effective as the Fed OSHA standard.

In 2008 California adopted a silica standard for construction that has been in effect until now, was not equal or better than the new federal standard. On September 15, 2016 the State Occupational Health and Safety Standards Boa voted to adopt the federal standard and it bec effective in California on October 17, 2016.

The construction compliance date (June 23, 20 set forth in the federal standard will also apply California employers.



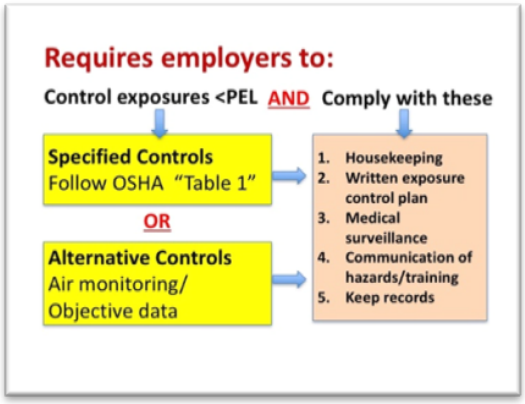
Slide 92—What does the new standard do?

Lowered the PEL to significantly reduce the amount of silica dust that workers can be expo to on the job.

Establishes an Action Level that triggers the standard.

Requires employers to implement feasible engineering controls and work practices that li worker exposures to respirable crystalline silica below a PEL and to take other steps to protect workers.

Provides flexibility to employers by giving the construction industry two different ways to comply.



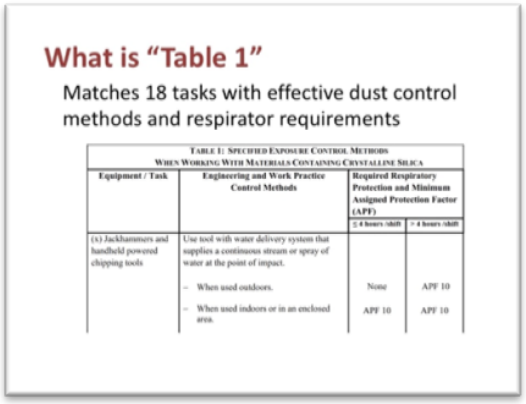
Slide 93—Requires employers to:

This training is intended to inform workers abo the basics of the standard. For specific compli questions, employers should consult with their local OSHA programs. There are many online resources available to help employers. The Resource Section of the Train-the-Trainer cours binder has a number of links.

The new standard is written to allow employer flexibility to choose between two possible compliance strategies as shown on the slide.

To better understand the components of each option, we will look at them individually in mo detail.

We will also look at what ALL employers must under the new standard in later slides.



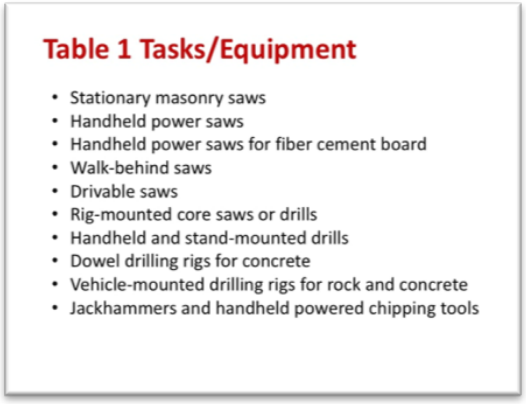
Slide 94—What is "Table 1"

Distribute copies of Table 1 to class participant

For 18 common construction operations know cause high exposures to silica, OSHA has spelle out exact engineering and work practice contr and respiratory protection known to be effecti reduce dust and best protect workers.

Employers who choose to follow Table 1 are no required to conduct sampling to measure work exposure to silica. They are effectively exempt from the PEL.

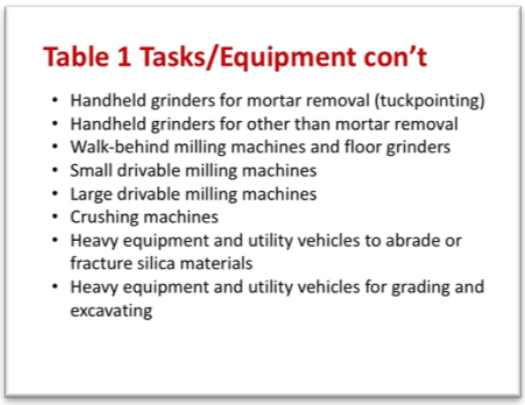
ASK: Why do you think employers don't have t comply with the PEL under this option?
A: As the OSHA standard is written, correctly implementing all controls specified in Table 1 v adequately suppress the dust to reduce worke respirable crystalline silica exposures to the PE Employers are not required to provide any additional protection if they follow Table 1.



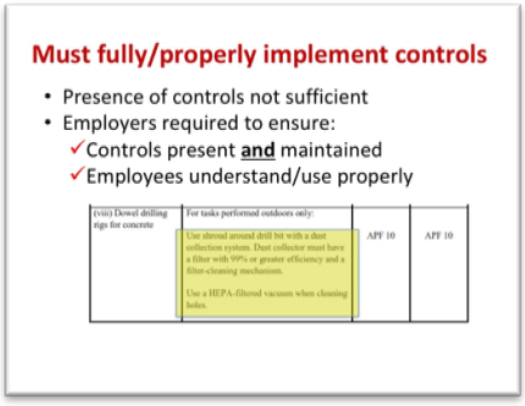
Slide 95—Table 1 Tasks/Equipment

This slide and the next show the complete list the Table 1 entries. OSHA anticipates that this cover the vast majority of construction tasks th involve exposure to respirable crystalline silica

Review the list with the class and compare to t list of tools they created in Section 3 of the training.



Slide 96—Table 1 Tasks/Equipment con't



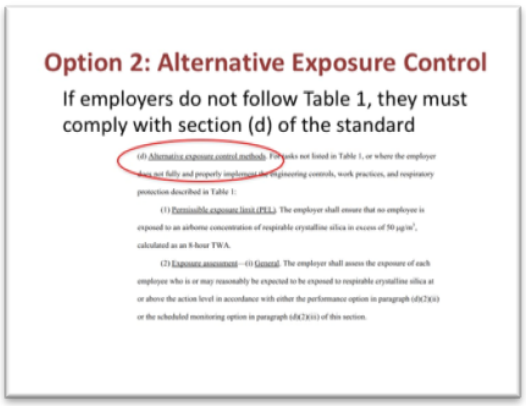
Slide 97—Must fully/properly implement cont

When implementing the controls in Table 1, th term "fully and properly implementing the controls" means that the controls need to be u in a manner that makes them effective.

For example, if you're using a vacuum with a d collection system on a grinder, you need to hav the shroud intact so that it's capturing the dus You need to empty the vacuum and change filt as necessary, in order to ensure its effective.

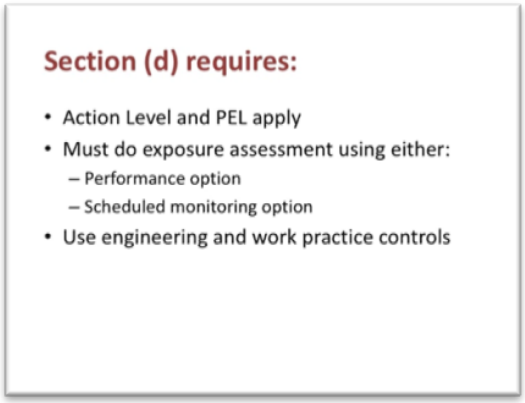
You need to make sure that the hose is maintained, since it can deteriorate over time because silica is an abrasive. You would need t also make sure that the hose isn't tied in knots blocking the airflow, etc.

Click on the slide to activate box that highlight example of instructions in Table 1.



Slide 98—Option 2: Alternative Exposure Contr

If employers chose not to follow the control methods in Table 1, they must follow section (d) "Alternative Exposure Control Methods" of the standard. This means employers must measure workers' exposure to silica and independently decide which dust controls work best to limit exposures to silica in their workplaces. There are parts to using this option that cover PEL, monito and methods of compliance.



Slide 99—Section (d) requires:

Under this option the following requirements ap

1. PEL—the employer shall ensure that no empl is exposed to an airborne concentration of respirable crystalline silica in excess of 50 µg/m³ calculated as an 8-hour TWA.

2. Exposure Assessment— The employers that follow the alternative are required to assess the employees' exposures to respirable crystalline si anytime those exposures may reasonably be expected to be at or above action level of 25 microgram per cubic meter. This means they wi need to do air monitoring at work sites. To meet requirement they must choose one of the two following options:
Performance option OR Scheduled Monitoring option

Performance option: Exposures are assessed us any combination of air monitoring data or objec data sufficient to accurately characterize employ exposures to respirable crystalline silica. What d "objective data" mean? It is defined by the stand as information such as air monitoring data from industry-wide surveys or calculations based on t composition of a substance, demonstrating employee associated with a particular product o material or a specific process, task, or activity. T data must reflect workplace conditions closely resembling or with a higher exposure potential t the processes, types of material, control method work practices, and environmental conditions in employer's current operations. The challenge is there may not be sufficient data available at this time.

Scheduled monitoring option: Employers must perform initial and periodic personal monitoring assess the 8-hour TWA exposure for each emplo on the basis of one or more personal breathing air samples that reflect the exposures of employ

Slide 100—OSHA Small Entity Compliance Guide

OSHA has created this 103 page guide to help employers comply with the new silica standard. accessible online as a PDF or you can order copi from OSHA.

This gives detailed information about each secti the standard.

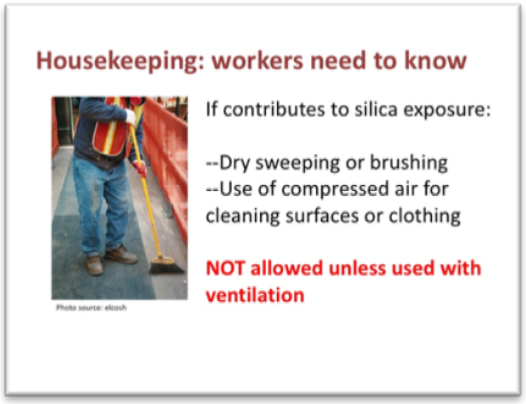
Slide 101—All employers must comply with thes sections of the new standard:

These requirements of the standard apply to **AL** employers regardless of which compliance optic they choose to use when the silica standard is in effect.

The next 6 slides cover some of the requirement

For recordkeeping, employers must maintain rec for the following:

- Air monitoring data—includes exposure measurements, information about samp taken and methods used, and employee information such as name, social securit number*, job classification of all employ represented by the monitoring, PPE usec *This might change in CA due to identity theft concerns.
- Objective data--accurate record of all objective data relied upon to comply wit the requirements of the standard.
- Medical surveillance records--The emplo shall make and maintain an accurate rec for each employee covered by medical surveillance

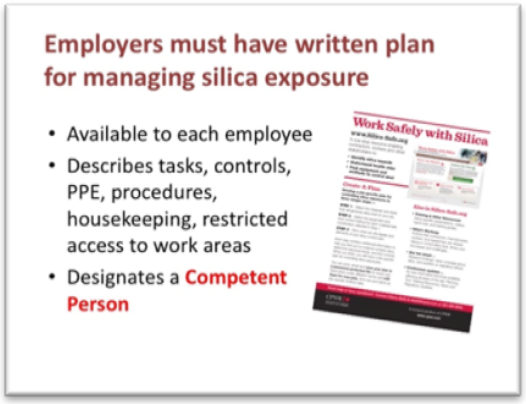


Slide 102—Housekeeping: What workers need t know

Housekeeping requirements are included in the standard because certain housekeeping method can contribute substantially to worker exposure respirable crystalline silica, such as dry sweeping brushing, and use of compressed air.

The standard requires use of methods such as H vacuums, wet sweeping, or use of ventilation sy to capture the dust.

Dry sweeping/ dry brushing or use of compresse air would only be permitted if no other alternati method is feasible.



Slide 103—Employers must have written plan fo managing silica exposure

Employers must establish and implement a writt plan for respirable crystalline silica that includes following:

- Description of tasks that involve exposur
- Description of engineering controls, wor practices and respiratory protection used limit exposures for each task.
- Description of housekeeping measures u to limit exposures.
- A description of the procedures used to restrict access to work areas, when necessary, to minimize the number of employees exposed to respirable crystall silica and their level of exposure, includi exposures generated by other employers sole proprietors.

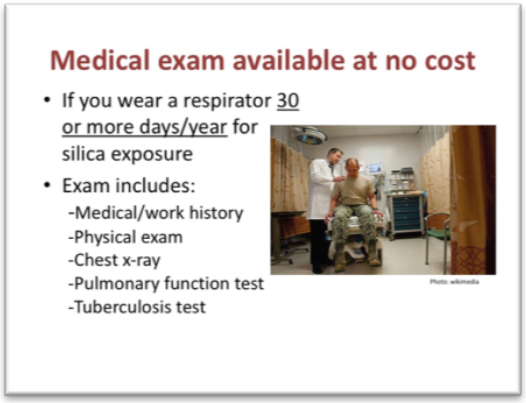
The employer shall:

- Review and evaluate the effectiveness of written exposure control plan at least annually and update it as necessary.
- Make the written exposure control plan readily available for examination and copying, upon request, to each employee covered by this section, their designated representatives, the Assistant Secretary (OSHA) and the Director (NIOSH).
- Designate a **competent person** to make frequent and regular inspections of job s materials, and equipment to implement written exposure control plan.

Slide 104—Duties of competent person

The employer must inform employees of who th competent person is. Workers need to know wh can take action.

The competent person must have the ability to identify the hazards AND the authority to take action.



Slide 105—Medical exam available at no cost

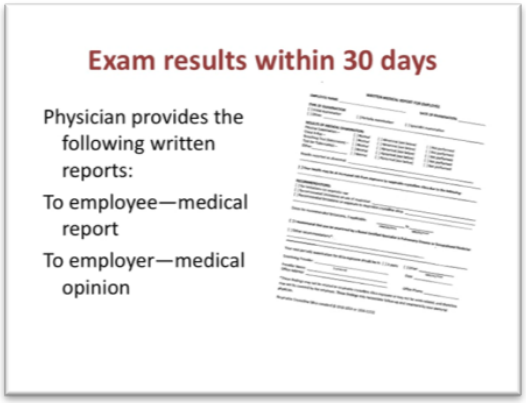
Employers are required to make medical surveill available at no cost to the employee, and at a reasonable time and place, for each employ who will be required under this section to use a respirator for 30 or more days per year. The exa must be performed by a physician or other licen health care professional.

What type of exam can a worker expect to have part of the required medical surveillance?
At the initial exam:
-Medical and work history
-Physical exam with emphasis on respiratory sys
-Chest x-ray
-Pulmonary function test
-Tuberculosis test

Periodic exams--The employer shall make availa medical examinations at least every three years, more frequently if recommended.

Employers are also required to make sure the physician has a copy of the silica standard and provide the following information:

- Description of the employee's former, current, and anticipated duties as they re to the employee's occupational exposure respirable crystalline silica
- Employee's former, current, and anticipa levels of occupational exposure to respir crystalline silica
- Description of any personal protective equipment used or to be used by the employee, including when and for how l the employee has used or will use that equipment
- Information from records of employmen related medical examinations previously provided to the employee and currently within the control of the employer



Slide 106—Exam results within 30 days

What happens with the results of the medical ex
Workers have the right to get a copy.

Training Tip: Pass out copies of the Medical Evaluation form from your course binder

The standard specifies the following:

Employees—Within 30 days of the exam, the physician must provide the employee with a wri medical report and explain the results to the employee. The report must contain the followir information:

- Statement indicating the results of the medical examination, including any medi condition(s) that would place the emplo at increased risk of material impairment health from exposure to respirable cryst silica and any medical conditions that re further evaluation or treatment;
- Any recommended limitations on the employee's use of respirators;
- Any recommended limitations on the employee's exposure to respirable cryst silica; and
- A statement that the employee should b examined by a specialist if the chest X-ra meets certain criteria, or if referral to a specialist is recommended by the physici

Employers—Get a written medical opinion from physician within 30 days of the exam. This writt opinion will contain the following information:

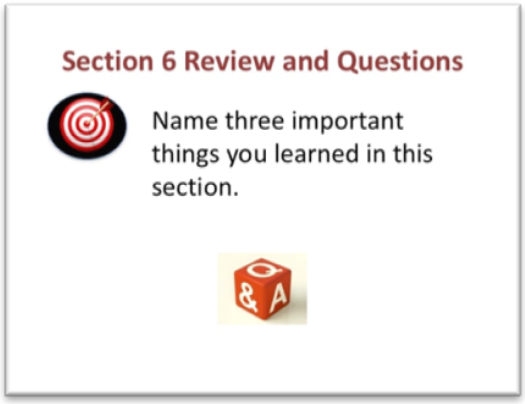
- Date of the examination;
- Statement that the examination has met requirements
- Any recommended limitations on the employee's use of respirators.
- With written authorization from the employee, the employer may also receiv the following medical exam information:

Slide 107—Hazard communication and training

Employers are required to comply with the haza communication standard (HCS) (29 CFR1910.12(The employer shall ensure that each employee h access to labels on containers of crystalline silica safety data sheets, and is trained in accordance the provisions of HCS. They must also ensure th least the following hazards are addressed: Cance lung effects, immune system effects, and kidney effects.

TRAINING: The standard requires employers to provide training to employees so they can demonstrate knowledge and understanding of a least the following:

- The health hazards associated with expo to respirable crystalline silica;
- Specific tasks in the workplace that could result in exposure to respirable crystallin silica;
- Specific measures the employer has implemented to protect employees from exposure to respirable crystalline silica, including engineering controls, work practices, and respirators to be used;
- The identity of the competent person designated by the employer; and
- The purpose and a description of the required medical surveillance program



Slide 108—Review and Questions

ASK: Name three important things you learned this section. Prompting questions:

- Name two compliance options. A: Follo Table 1 or use Alternative exposure cont and do air monitoring
- What is the new PEL for silica? A: 50 µg averaged over 8-hour day
- What must a competent person do? A: Identify hazards; be authorized to take action; frequently inspect job sites, mate and equipment
- Name 4 things a doctor must perform at medical exam. A: physical exam, chest x- pulmonary function test, tuberculosis te

Course Wrap-Up and Review

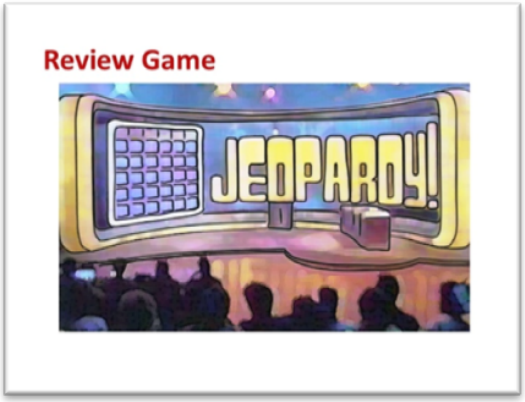
(30 minutes)

Activity: Jeopardy review game

Materials: Flip chart/white board; multi-color markers; Jeopardy Game PowerPoint; timer;

Handouts: Post-Test; Course Evaluation form

Props: N/A



Slide 109—Review game

Activity: Play the review game—teams compete Jeopardy

Materials: Jeopardy PPT file on flash drive; flip chart/white board to keep track of scores; multi colored markers; timer; prizes for winning team

- Divide class into teams; each team choos fun name
- Decide how teams will select categories
- Teams select category and dollar value
- Moderator clicks $xxx on that square to reveal the clue and gives team 30 second answer. If their answer is incorrect, anot team can try.
- Click "Answer" button to reveal correct answer
- Click "Home" button to return to main b
- Each correct answer earns that dollar amount for the team; track scores on flip chart/white board
- Finish all categories and give prizes to th members of winning team

	**Slide 110**—Work safely with silica and enjoy a healthy career in the trades Thank everyone for their participation in the training. ASK: Do you have any questions or comments a anything we've covered today? Be sure everyone knows where they can get mo information if needed. Have students complete their post-tests and cou evaluation form.