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BUILDING TRADES
UNIONS
IGNITE
LESS
TOBACCO

Toxics & Tobacco ON THE JOB

Protecting Your Health

A curriculum for teaching
building trades workers
about toxics and tobacco

INSTRUCTOR'S MANUAL



Produced by BUILT, State Building and Construction Trades Council of California
in collaboration with The Labor Occupational Health Project, UC Berkeley

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A curriculum for teaching
building trades workers
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This Instructor's Manual is part of a
health and safety education curriculum prepared by

built

BUILDING TRADES UNIONS IGNITE LESS TOBACCO

*A project of the State Building and Construction Trades Council of California
and the Labor Occupational Health Program, University of California, Berkeley*

Based on the WHATEP curriculum, produced by the Workplace Hazard and Tobacco Education Project, funded by the California Department of Health Services and comprised of the Labor Occupational Health Program, American Lung Association of San Francisco and the California Public Health Foundation

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INTRODUCTION

As you know, work in your trade can be dangerous. Building and construction trades workers — like workers in some other occupations — face a higher-than-average risk of cancer, lung disease, damage to the central nervous system and other illnesses.

Every year, more than 5,000 Californians die from work-related causes: occupational cancers, lung diseases, heart disease, kidney and nervous system disorders. Over 35,000 new cases of occupational illness develop each year in California.

When the hazard of tobacco smoke is added to other workplace toxics, the risk for these diseases skyrockets. Building trades workers smoke cigarettes at a rate nearly 60% higher than the general population. They use chewing tobacco at a rate almost double that of white-collar workers.

Training is essential to protect workers from preventable illnesses caused by tobacco and other toxics. Well-informed workers can make their workplaces safer. The purpose of this curriculum is to provide workers with the information and skills they need to take action to reduce the risks they face at work — risks from both occupational and tobacco hazards.

Your classes offer workers and future workers an important opportunity to learn skills they need to protect themselves. In our experience, workers in the trades want more information about the occupational hazards they face and the options available to them. Instructors share these concerns and recognize the need for a curriculum that focuses on chemical hazards and their short- and long-term health effects.

Over the years, we've improved safety and health on construction jobs by requiring the use of hardhats and by educating workers about workplace hazards, including the dangers of drug and alcohol use. Similarly, by educating workers about the risks of toxic chemicals, including tobacco, we can help prevent the devastating effects these substances have on them and their families.

OVERVIEW OF THE CURRICULUM

BUILDING PARTICIPATION INTO THE CLASSES

The goal of this curriculum is for students to use the information we present to become problem solvers on their jobs. For this reason, we use a cooperative learning approach. Our curriculum encourages students to take an active role in the class. We've designed class activities to give students maximum opportunity to learn from their own and one another's experiences. By sharing their experiences, people learn that they are not alone and that by working together they can achieve a safer workplace. Classroom activities give students practice in planning strategies to improve health and safety on their jobs.

Real-life experiences of workers are at the heart of this curriculum. The curriculum also encourages students to ask questions and express their doubts. Sometimes when students do not get a chance to talk about their questions, unresolved concerns may get in the way of taking action to protect their health.

DUAL HAZARD APPROACH

Our curriculum focuses on the dual risks of tobacco smoke and other toxic chemicals at the workplace. Nearly half of all blue collar workers smoke. In the United States population as a whole, smoking is the direct cause of some 435,000 deaths per year from lung cancer, heart disease and emphysema. Environmental tobacco smoke (ETS) — also called secondhand smoke or passive smoking — includes sidestream smoke from the burning end of a cigarette as well as the smoke that is exhaled by the smoker. ETS is dangerous to both smokers and non-smokers.

Smoking and exposure to secondhand smoke take a disproportionately high toll on workers for a number of reasons:

- Tobacco smoke adds harmful chemicals to those already in the work environment, increasing the likelihood of asthma, other respiratory problems, and even more serious health damage.
- Smoking damages the lungs' protective mechanisms, leaving the lungs more vulnerable to toxic chemicals on the job.
- Substances in cigarette smoke chemically combine with other cancer-causing substances in the workplace to increase the likelihood of tumor growth.

- The hand-to-mouth contact involved in smoking makes it more likely that a worker who smokes will swallow or inhale toxic dust, fumes, particles or droplets that may be in the workplace.

For all of these reasons, our curriculum encourages workers to view tobacco smoke as another occupational hazard.

For example, we recommend reducing workers' exposure to toluene, a highly toxic substance found in many solvents, through control measures such as ventilation or substituting a safer chemical. Likewise, we encourage creating smoke-free workplaces to control workers' exposure to tobacco smoke, which also contains toluene.

Our curriculum emphasizes that employers are legally responsible for providing safe work environments. It encourages workers to view smoking as one of the many job hazards that can be controlled to protect their health.

We also cover the health dangers of smokeless tobacco, such as chewing tobacco. Smokeless tobacco is sometimes used as a substitute for smoking, but it also contains many toxic chemicals and is extremely damaging to health.

CURRICULUM ORGANIZATION

We have divided the curriculum into four interrelated units. However, each unit can stand alone, so if you have limited time or already have covered some of the topics, you can choose only one or two units to teach. The learning activities in the second, third and fourth units build on work completed in the previous units, so if you wish, you could use all the units within a relatively short time period — two weeks, for example.

The first and second units require 60 minutes each. The third unit requires 30 minutes. The fourth unit requires 60 minutes. We encourage instructors to allocate more time, if possible, allowing for more complete class discussions. Instructors may choose to adapt the timing, order or content of the units to suit the particular needs of their classes.

The units are:

Unit 1: Threats to Your Health on the Job (60 minutes)

The first unit draws on students' experiences to introduce the basic concepts of how toxic substances, including tobacco, affect the body.

Unit 2: Tobacco Threatens Everyone's Health (60 minutes)

The second unit identifies the range of chemicals on the job that also are found in tobacco smoke. It also discusses the health effects of tobacco use and of secondhand smoke.

Unit 3: Investigating Chemical Hazards on the Job (30 minutes)

The third unit introduces students to the information and skills they need to investigate chemical hazards they may encounter on the job.

Unit 4: Protecting Your Health (60 minutes)

The last unit identifies the various options available for making the workplace safer. It assists students in developing specific strategies and skills for improving health and safety on their jobs.

This **Instructor's Manual** provides you, the instructor, with the material you need to teach each unit:

- A statement of the learning objectives of each unit.
- A **PLANNING GUIDE** for each unit.
- A description of the learning activities and procedures to follow when presenting each unit, including detailed **INSTRUCTIONS** and **DISCUSSION POINTS**. (**INSTRUCTIONS** are suggestions on how to lead an activity. **DISCUSSION POINTS** are suggestions on specific points that should be made during a discussion, either by you or by your students.)
- Master copies of all Handouts used in the curriculum. (You will need to make copies of these for your students.)

We have also prepared a student handbook (**Guide to Toxics and Tobacco on the Job**) for building trades workers. This contains technical and legal information that will be useful to students both in class and on the job. Please encourage students to read the **Guide** and save it as a reference.

RESOURCES
AVAILABLE TO
INSTRUCTORS

BUILT (Building Trades Unions Ignite Less Tobacco), a project of the State Building and Construction Trades Council of California, is available to vocational education and apprenticeship program instructors for consultation and referrals. You can contact BUILT by calling 916-442-8368 or by writing to:

BUILT
921 11th Street, Suite 110
Sacramento, CA 95814.
e-mail: built@sbctc.org

BUILT works in partnership with the Labor Occupational Health Program (LOHP) of the University of California, which provides educational materials and occupational health and safety training. You can call LOHP at 510-642-5507 or write to:

LOHP/UC Berkeley
Center for Occupational and Environmental Health
2223 Fulton St., 4th Floor
Berkeley, CA 94720-5120.
e-mail: lohp@socrates.berkeley.edu



UNIT 1

PLANNING GUIDE

(Total unit time: 60 minutes)

| ACTIVITIES | ESTIMATED TIME | MATERIALS |
|----------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. INTRODUCTORY PRESENTATION | 5 minutes | Instructor's Manual, pg. 1.3 |
| 2. ACTIVITY 1: Voices from the Workplace | | Instructor's Manual, pg. 1.4 Chalkboard, or butcher paper and pen Give each student: <ul style="list-style-type: none">- Guide- Handout 1, <i>Voices from the Workplace</i>- Handout 2, <i>MSDS for Toluene</i>- Handout 3, <i>Some of the Chemicals in Cigarette Smoke</i> |
| a. Students fill out Handout 1 | 10 minutes | |
| b. Discussion and debate | 20 minutes | |
| 3. ACTIVITY 2: Mapping Risks: Identifying Toxic Hazards on Your Work Site | | Instructor's Manual, pg. 1.10 Give each small group: <ul style="list-style-type: none">- Masking tape- Red and black markers- Masking tape |
| a. Break into small groups or pairs to draw maps | 10 minutes | |
| b. Discussion | 15 minutes | |



PREPARATION

- 1** READ through **INSTRUCTIONS, DISCUSSION POINTS** and **HANDOUTS** (including Instructor's Copies) for all sections of the unit before classtime.
- 2** REPRODUCE enough copies of **Handouts 1, 2 and 3** (included with this manual) so that each of your students can have one.
- 3** BRING
 - One **Guide** for each of your students
 - **Handouts 1, 2 and 3** for each student
 - Butcher paper, masking tape and markers. (Later in this unit you will be dividing your class into groups of 3-5 students each. Each group will need at least one sheet of butcher paper, some masking tape, one red marker and one black marker.)
- 4** BEFORE THE CLASS STARTS Write the unit topic on your chalkboard or butcher paper:

**UNIT 1:
THREATS
TO YOUR HEALTH
ON THE JOB**

Also before class, write the Risk Map directions on the chalkboard or butcher paper as follows:

- RISK MAP DIRECTIONS**
1. Use the **black** marker to draw a floor plan of your workplace (or classroom shop). Include work areas, equipment, processes, doors, windows, restrooms, eating and smoking areas.
 2. Use the **red** marker to draw the hazards.

INTRODUCTORY PRESENTATION

UNIT ONE INTRODUCTION (5 MINUTES)

[Distribute **Guide** and **Handouts 1, 2 and 3** to students at beginning of class.]

INSTRUCTOR EXPLAINS:

- Every year more than 5,000 Californians die from work-related causes: occupational cancers, lung diseases, heart disease, kidney and nervous system disorders. More than 35,000 California workers become seriously ill from work-related causes each year.
- Training about health and safety is necessary to protect workers from these illnesses. Well-informed workers can make their jobs safer.
- The purpose of today's training is to provide information about toxic hazards you face on the job, including the extra risks from tobacco smoke. We're going to discuss the basic ways toxic chemicals affect the body, and look at some other ideas about job health and safety.
- One toxic we will emphasize today is tobacco. Every year over 400,000 Americans die because of tobacco use. Tobacco is the largest preventable cause of illness and death in the United States.
- Most people don't think of tobacco as a workplace toxic. However, the effects of tobacco are not confined to the smoker. Secondhand smoke causes over 53,000 deaths a year among non-smokers. Worse news for trades workers is that cigarette smoke interacts with the other toxics on the job to create extra risks.
- We will be looking at this problem by doing two activities. Are there any questions? Let's begin...

ACTIVITY 1

VOICES FROM THE WORKPLACE (30 MINUTES)

INSTRUCTIONS Explain to the students that the purpose of this exercise is to “break the ice” and get them to express their views on health and safety issues. Remind students that there are no right or wrong answers, so it is important to respect everyone’s opinion. The exercise will be more effective if you encourage debate.

1 STUDENTS FILL OUT HANDOUT 1 Depending on the size of your class, have the students pair off or work in groups of three. Ask students to mark the appropriate space: “Agree,” “Disagree,” or “Can’t Decide” for each statement on Handout 1, *Voices from the Workplace*. **Emphasize that this is not an exam.** It is only a way to start people thinking about these issues. Students will keep the handouts; they will not be collected. Students should NOT write their names on the handouts. Let the small groups know they will have 10 minutes to come up with their responses.

2 WRITE DOWN THE STUDENT RESPONSES AND ENCOURAGE DEBATE After the students fill out Handout 1, write two headings on the chalkboard or butcher paper. These headings should be: AGREE and DISAGREE. Read the first statement aloud and ask a representative of each pair or group to give a reason why they either agree or disagree. Write their reasons on the chalkboard or butcher paper. Alternate between asking for an AGREE and DISAGREE response.



The point here is to encourage discussion. Encourage the students to explain why they agree or disagree with the statements on Handout 1. Repeat the process for each statement.

3 GO OVER EACH STATEMENT AND ADD ADDITIONAL KEY POINTS Once the students have quickly noted their reasons for agreeing or disagreeing with each statement, go over each statement and add additional key points that have not been addressed.

See the **DISCUSSION POINTS** in the Instructor’s Copy of Handout 1 to help introduce some basic information about how toxics affect the body and other health and safety issues. It is best for these points to emerge from the students’ discussion, rather than for you to lecture to them. Acknowledge students for the important points they have already covered in their responses.

During the discussion of Statement 1, ask the students to look at Handout 2, the Material Safety Data Sheet (MSDS) for toluene.

- 4** DISCUSS Ask students to look at Handout 3, *Some of the Chemicals in Cigarette*
HANDOUT 3 *Smoke*. Ask if students are surprised at how many chemicals are in
tobacco smoke. Do they recognize any as being toxics found on the
job, as well?

Voices from the Workplace

HANDOUT 1

INSTRUCTOR'S
COPY

1

“Wearing safety equipment slows me down, so I never wear a mask or respirator unless I really smell stuff.”

Agree Disagree Can't Decide

DISCUSSION POINTS



Respirators and other safety equipment can be uncomfortable and slow you down. But smelling a chemical is not a reliable way to find out if something is toxic. Some very toxic chemicals have no odor (and you cannot see them, either).



For example, carbon monoxide has no odor. (Other chemicals, such as hydrogen sulfide, deaden the senses, so you stop noticing the odor after a while.) On the other hand, some chemicals, such as acetone, smell awful, but are not very toxic. The law requires employers to make sure workers are protected against any toxic chemical in the workplace by installing proper ventilation or supplying the proper respirator.

Ask the students to look at Handout 2, the Material Safety Data Sheet (MSDS) for toluene.



Handout 2 is a sample MSDS. MSDS stands for Material Safety Data Sheet. Under California's Hazard Communication Standard, as part of workers' "Right to Know," Cal/OSHA requires employers to make MSDS's easily available to their employees. There should be an MSDS available for each hazardous substance used on the job. MSDS's are usually not easy to read, but they can contain useful information.

Toluene is found in cigarette smoke as well as in workplace solvents.

Ask the students the following questions:



Look at Section 3 on Hazards Identification. How can this toxic chemical enter your body?

Make sure the students mention the three routes of entry: inhaling, swallowing, and absorbing through the skin. Give examples of each: (inhaling vapors from open can or when applying, swallowing if worker smokes without washing hands first, absorbing through skin if splashed.)

DISCUSSION
POINTS
(continued)



What are the long-term effects of this toxic chemical?

Toluene can cause kidney damage and can aggravate alcoholism and central nervous system, skin or liver diseases. A chemical's effect on your health can be long term, short term or both. Some toxics have no immediate effect, but will do great damage over the long term. (Example: lead.) Other toxics do have an immediate effect, whether you notice it or not. (Example: carbon monoxide.)



Look at Section 8 on Exposure Controls/Personal Protection. Does the MSDS recommend wearing safety equipment to protect you and your co-workers from this toxic chemical?

The MSDS recommends eye and skin protection, respirators and ventilation. Point out that these protective measures are not used around tobacco smoke, which also contains toluene, lead and carbon monoxide.

2

“I’m being poisoned anyway, as long as I’m breathing all this toxic stuff at work, so why should I worry about tobacco smoke?”

Agree Disagree Can't Decide

DISCUSSION
POINTS



The risk to your health depends on two things: (1) How toxic a chemical is, and (2) How much of it gets into your body.



A. HOW TOXIC IS IT? Example: Both rubbing alcohol and beer can cause health problems if you drink them. But if you drink rubbing alcohol, which is more toxic, your health problems will be much greater than if you drink an equal amount of beer.

B. HOW MUCH GETS INTO YOUR BODY? Example: Your body may be able to tolerate two beers, but if you drink six beers within a short time, you may get quite sick. This is called an acute effect. If you drink two beers every day, over time you may do long-term damage to your body. This is called a chronic effect.

**THE POINT IS:
THE MORE TOXICS THAT ENTER YOUR BODY,
THE HIGHER THE RISK TO YOUR HEALTH.**



Tobacco smoke adds harmful chemicals to those already in the work environment, increasing the total amount of toxics you're exposed to, and therefore increasing the risk of cancer, heart disease, asthma, various respiratory problems and other diseases.

DISCUSSION
POINTS
(continued)



The hand-to-mouth contact involved in smoking makes it more likely a worker who smokes will swallow harmful chemicals that may be in the workplace.

3

“If you’re going to get cancer, you’re going to get it, no matter what you do.”

Agree Disagree Can’t Decide

DISCUSSION
POINTS



Many people can name someone they know who never worked with cancer-causing chemicals, who never smoked, but who died of cancer anyway. We also know people who smoke and live long lives. These cases are exceptions. The Surgeon General and decades of research have proven that cigarette smoking causes 83% of all lung cancers and about 30% of other kinds of cancer. If you smoke, your odds of dying from lung cancer are five times higher than the odds for a non-smoker.



It is harder to total the number of people who have gotten cancer because they were exposed to industrial chemicals. But many studies have proven that certain chemicals increase your risk of cancer. There is no doubt that thousands of cancer deaths could be prevented by reducing workers’ exposure to asbestos, nickel, chromium and other toxics. When a worker is exposed to one of these chemicals and also smokes, the risk of getting cancer multiplies sharply. The higher your chemical exposure (including tobacco smoke), the higher the risk.



Many substances that formerly were thought to be safe are now recognized as being very harmful to health. Some, such as asbestos and lead, have been banned in many products. Workers’ exposure to others, such as benzene and environmental tobacco smoke, has been severely restricted.

4

“Smoking makes exposure to workplace chemicals even more deadly.”

Agree Disagree Can’t Decide

DISCUSSION
POINTS



If you smoke cigarettes or have to breathe someone else’s secondhand smoke, the risk to your health from other toxic chemicals will be higher. When tobacco smoke combines with other workplace toxics, there’s more risk for several reasons. For example, tobacco smoke contains hydrogen cyanide — a chemical that paralyzes the cilia (tiny filtering hairs) in your lungs. That makes it harder for your lungs to filter out other toxics.

DISCUSSION POINTS

-  Smoking means more chemicals for your body to handle. For example, welding on the construction site produces carbon monoxide. Tobacco smoke also contains carbon monoxide, so you are getting a much larger dose. Long-term exposure to carbon monoxide weakens the heart.
-  When the chemicals in tobacco smoke combine with certain other cancer-causing substances — for example, asbestos — the combination greatly increases the risk of lung cancer. An asbestos worker who doesn't smoke has **five** times the risk of lung cancer as the general population, while an asbestos worker who smokes has more than **50** times the risk of lung cancer.
-  Smoking on the job also increases the risk of fire and explosion.

ACTIVITY 2

MAPPING RISKS: IDENTIFYING TOXIC HAZARDS ON YOUR WORK SITE (25 MINUTES)

INSTRUCTIONS The purpose of this “risk mapping” exercise is to let students use their own work experience to identify dangers at the work site and find ways to control them. Students will draw a map or floor plan of their work site. The map should include the major equipment, processes and areas. Students will also mark the location of hazards on the map. There are two steps to the activity: (1) map drawing and (2) discussion.

STEP ONE

Drawing the Map of Workplace Hazards (10 minutes)

- 1** **DIVIDE INTO GROUPS** Divide the class into groups of three or four students each. There should be no more than five groups. Class members who work at the same site should be in the same group. People who have no work experience should be included in groups that are currently on work sites. One person in each group should volunteer to be the “map-maker.”
- 2** **DISTRIBUTE MATERIALS** Give each group a piece of butcher paper. Give the “map-maker” a black pen. The butcher paper can be taped to the wall, or students can work at a table and tape the map to the wall when they are finished.
- 3** **EXPLAIN THE ACTIVITY** Explain the risk mapping activity and ask the group to draw their maps. Refer to the risk map directions you wrote on the board. (See page 1.2.)

In black: Ask each group to draw a map of their current work site, a previous work site, or the classroom shop. The “map-maker” should draw a simple map that shows work areas, storage areas, doors and windows (if applicable), equipment, and other features of the work site. This can be an indoor or outdoor work site.

In red: Once the basic map is drawn, pass out a red pen and ask them to mark in red the places where workers might be exposed to toxic hazards. If people are having trouble, remind them that the map is supposed to show where they are **exposed**, not just where toxics are stored or used. Give prompting as needed.

The instructor can also list the following questions on the board to help students focus:

- Where is each chemical stored? Where is it between storage and use? Where are vapors, smoke, fumes or mists released into the air?
- Where is a chemical used? Do the people handling the chemical wear protection? Who might be exposed because they don't wear protection?
- Where do people take breaks? Eat? Smoke? Wash up?

Students learn from being involved in a lively discussion when they draw the map. Instructors should encourage everyone to participate.

STEP TWO

Discussing the Maps (15 minutes)

Note: A major purpose of this unit is to show how tobacco, as a toxic substance, adds to the other toxics workers are exposed to. During the discussion, be sure to point out exposures to tobacco in combination with other workplace toxics. The discussion should include hazards of at least two chemicals used at the work site. (It's best if the two chemicals are also found in tobacco, but this is not necessary).

1

GROUPS REPORT ON THEIR MAPS

Bring the whole class back together. Ask the volunteer map-maker from each group to explain his or her group's map to the rest of the class. Make sure the student points out the major toxic hazards. The report on each map should take no longer than two minutes. If groups are identifying the same hazards, ask if any group has identified some different ones.

2

SUM UP THE EXERCISE

Point out the similarities in the maps — the hazards that workplaces have in common. Compare the students' maps to the Hazard Chart on pages 12-19 in the Guide.

Refer students to Handout 3, *Some of the Chemicals in Cigarette Smoke*, which was handed out for use in Activity 1. Ask them to compare the chemical hazards mentioned on their maps to this list of chemicals. What chemicals on the work site are also found in tobacco smoke?

Collect the maps and keep them if you will be teaching Unit 4 to the same group.



Voices from the Workplace

HANDOUT 1

1 “Wearing safety equipment slows me down, so I never wear a mask or respirator unless I really smell stuff.”

Agree Disagree Can't Decide

Explain your opinion if you wish. _____

2 “I’m being poisoned anyway, as long as I’m breathing all this toxic stuff at work, so why should I worry about tobacco smoke?”

Agree Disagree Can't Decide



Explain your opinion if you wish. _____

3 “If you’re going to get cancer, you’re going to get it, no matter what you do.”

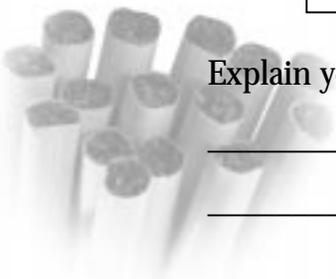
Agree Disagree Can't Decide

Explain your opinion if you wish. _____

4 “Smoking makes exposure to workplace chemicals even more deadly.”

Agree Disagree Can't Decide

Explain your opinion if you wish. _____



MSDS for Toluene

HANDOUT 2

-----1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION -----

| | | | |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| MANUFACTURER.....: EM SCIENCE A DIVISION OF EM INDUSTRIES P.O. BOX 70 480 DEMOCRAT ROAD GIBBSTOWN, N.J. 08027 | PREPARATION DATE.: 3/17/00 INFORMATION PHONE NUMBER.: 856-423-6300 HOURS: MON. TO FRI. 8:30-5 CHEMTREC EMERGENCY NUMBER: 800-424-9300 HOURS: 24 HRS A DAY | CATALOG NUMBER(S): TX0734 TX0735 TX0737 TX0745 TX0750 TX0735P TX0735S TX0735T TX0732 TX0738 TX0737P B30454 VW7230 ACS936 B10284 B86050 | RODUCT NAME: TOLUENE SYNONYMS: TOLUOL, METHYL- BENZENE CHEMICAL FAMILY: AROMATIC HYDROCARBON FORMULA: C6H5CH3 MOLECULAR WEIGHT.: 92.14 |
|------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------|

-----2. COMPOSITION / INFORMATION ON INGREDIENTS -----

| COMPONENT | CAS # | APPR % |
|-----------|----------|--------|
| TOLUENE | 108-88-3 | 100% |

-----3. HAZARDS IDENTIFICATION -----

EMERGENCY OVERVIEW FLAMMABLE LIQUID AND VAPOR. HARMFUL OR FATAL IF SWALLOWED. MAY CAUSE DAMAGE TO CENTRAL NERVOUS SYSTEM, LIVER, KIDNEYS AND LUNGS. VAPOR HARMFUL. CAUSES IRRITATION OF EYES, NOSE AND THROAT.

WARNING: THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

APPEARANCE: CLEAR, COLORLESS LIQUID; AROMATIC ODOR

POTENTIAL HEALTH EFFECTS (ACUTE AND CHRONIC)

SYMPTOMS OF EXPOSURE:

HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL IF INHALED. SYMPTOMS: HEADACHE, DIZZINESS, HALLUCINATIONS, DISTORTED PERCEPTIONS, CHANGES IN MOTOR ACTIVITY, NAUSEA, DIARRHEA, RESPIRATORY IRRITATION, CENTRAL NERVOUS SYSTEM DEPRESSION, UNCONSCIOUSNESS, LIVER, KIDNEY AND LUNG DAMAGE. CONTACT CAN CAUSE SEVERE EYE IRRITATION. MAY CAUSE SKIN IRRITATION.

MEDICAL COND. AGGRAVATED BY EXPOSURE: RESPIRATORY, LIVER AND KIDNEY CONDITIONS

ROUTES OF ENTRY: INHALATION, INGESTION OR SKIN CONTACT

CARCINOGENICITY: THE MATERIAL IS NOT LISTED (IARC, NTP, OSHA) AS CANCER CAUSING AGENT.

-----4. FIRST AID MEASURES -----

EMERGENCY FIRST AID: GET MEDICAL ASSISTANCE FOR ALL CASES OF OVEREXPOSURE.

EYES: IMMEDIATELY FLUSH THOROUGHLY WITH WATER FOR AT LEAST 15 MINUTES.

SKIN: WASH THOROUGHLY WITH SOAP AND WATER.

INHALATION: REMOVE TO FRESH AIR; GIVE ARTIFICIAL RESPIRATION IF BREATHING HAS STOPPED.

INGESTION: CALL A PHYSICIAN IMMEDIATELY. ONLY INDUCE VOMITING AT THE INSTRUCTIONS OF A PHYSICIAN. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

-----5. FIRE FIGHTING MEASURES -----

FLASH POINT (F): 40F (TCC)

FLAMMABLE LIMITS LEL (%): 1.30

FLAMMABLE LIMITS UEL (%): 7.10

EXTINGUISHING MEDIA: USE "ALCOHOL" FOAM, CARBON DIOXIDE, DRY CHEMICAL. WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS.

FIRE FIGHTING PROCEDURES: WEAR SELF-CONTAINED BREATHING APPARATUS.

FIRE & EXPLOSION HAZARDS: DANGEROUS FIRE AND EXPLOSIVE HAZARD. VAPOR CAN TRAVEL DISTANCES TO IGNITION SOURCE AND FLASH BACK.

-----6. ACCIDENTAL RELEASE MEASURES -----

SPILL RESPONSE: EVACUATE THE AREA OF ALL UNNECESSARY PERSONNEL. WEAR SUITABLE PROTECTIVE EQUIPMENT LISTED UNDER EXPOSURE / PERSONAL PROTECTION. ELIMINATE ANY IGNITION SOURCES UNTIL THE AREA IS

DETERMINED TO BE FREE FROM EXPLOSION OR FIRE HAZARDS. CONTAIN THE RELEASE AND ELIMINATE ITS SOURCE, IF THIS CAN BE DONE WITHOUT RISK. TAKE UP AND CONTAINERIZE FOR PROPER DISPOSAL AS DESCRIBED UNDER DISPOSAL. COMPLY WITH FEDERAL, STATE, AND LOCAL REGULATIONS ON REPORTING RELEASES. REFER TO REGULATORY INFORMATION FOR REPORTABLE QUANTITY AND OTHER REGULATORY DATA. EM SCIENCE RECOMMENDS SPILL-X ABSORBENT AGENTS FOR VARIOUS TYPES OF SPILLS. ADDITIONAL INFORMATION ON THE SPILL-X PRODUCTS CAN BE PROVIDED THROUGH THE EM SCIENCE TECHNICAL SERVICE DEPARTMENT (856) 423-6300. THE FOLLOWING EM SCIENCE SPILL-X ABSORBENT IS RECOMMENDED FOR THIS PRODUCT: SX0863 SOLVENT SPILL TREATMENT KIT

-----7. HANDLING AND STORAGE -----

HANDLING & STORAGE: KEEP CONTAINER CLOSED. STORE IN A COOL AREA AWAY FROM IGNITION SOURCES AND OXIDIZERS. DO NOT BREATHE VAPOR OR MIST. DO NOT GET IN EYES, ON SKIN, OR ON CLOTHING. RETAINED RESIDUE MAY MAKE EMPTY CONTAINERS HAZARDOUS; USE CAUTION! ELECTRICALLY GROUND ALL EQUIPMENT WHEN HANDLING THIS PRODUCT.

-----8. EXPOSURE CONTROLS / PERSONAL PROTECTION -----

ENGINEERING CONTROLS AND PERSONAL PROTECTIVE EQUIPMENT: VENTILATION, RESPIRATORY PROTECTION, PROTECTIVE CLOTHING, EYE PROTECTION: RESPIRATORY PROTECTION: IF WORKPLACE EXPOSURE LIMIT(S) OF PRODUCT OR ANY COMPONENT IS EXCEEDED (SEE TLV/PEL), A NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR IS ADVISED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. OSHA REGULATIONS ALSO PERMIT OTHER NIOSH/MSHA RESPIRATORS (NEGATIVE PRESSURE TYPE) UNDER SPECIFIED CONDITIONS (SEE YOUR SAFETY EQUIPMENT SUPPLIER). ENGINEERING AND/OR ADMINISTRATIVE CONTROLS SHOULD BE IMPLEMENTED TO REDUCE EXPOSURE. MATERIAL SHOULD BE HANDLED OR TRANSFERRED IN AN APPROVED FUME HOOD OR WITH ADEQUATE VENTILATION. PROTECTIVE GLOVES SHOULD BE WORN TO PREVENT SKIN CONTACT (VITON OR EQUIVALENT) SAFETY GLASSES WITH SIDE SHIELDS SHOULD BE WORN AT ALL TIMES.

WORK/HYGENIC PRACTICES: WASH THOROUGHLY AFTER HANDLING. DO NOT TAKE INTERNALLY. EYE WASH AND SAFETY EQUIPMENT SHOULD BE READILY AVAILABLE.

EXPOSURE GUIDELINES

OSHA - PEL:

TWA STEL CL
COMPONENT PPM MG/M3 PPM MG/M3 PPM MG/M3 SKIN
TOLUENE

100 375 150 560

ACGIH - TLV:

TWA STEL CL
COMPONENT PPM MG/M3 PPM MG/M3 PPM MG/M3 SKIN
TOLUENE

50 188 X

IF THERE ARE NO EXPOSURE LIMIT NUMBERS LISTED IN THE EXPOSURE GUIDELINES CHART, THIS INDICATES THAT NO OSHA OR ACGIH EXPOSURE LIMITS HAVE BEEN ESTABLISHED.

-----9. PHYSICAL AND CHEMICAL PROPERTIES -----

BOILING POINT (C 760 MMHG) : 110.6C
MELTING POINT (C) : -95C
SPECIFIC GRAVITY (H2O = 1) : 0.866
VAPOR PRESSURE (MM HG) : 21.86 20C
PERCENT VOLATILE BY VOL (%) : 99+%

VAPOR DENSITY (AIR = 1) : 3.2
EVAPORATION RATE (BUAC = 1) : 2.24
SOLUBILITY IN WATER (%) : INSOLUBLE
APPEARANCE : CLEAR, COLORLESS LIQUID; AROMATIC ODOR

-----10. STABILITY AND REACTIVITY -----

STABILITY: YES
HAZARDOUS POLYMERIZATION: DOES NOT OCCUR
HAZARDOUS DECOMPOSITION: COX, HYDROCARBONS

CONDITIONS TO AVOID: HEAT; CONTACT WITH IGNITION SOURCES.
MATERIALS TO AVOID: () WATER () ACIDS () BASES () CORROSIVES (X)
OXIDIZERS (X) OTHER: STRONG MINERAL ACIDS

-----11. TOXICOLOGICAL INFORMATION -----

TOXICITY DATA

IHL-MAN TCLO: 100 PPM ORL-RAT LD50: 636 MG/KG
IHL-MUS LC50: 400 PPM/24H SKN-RBT LD50: 12124 MG/KG

TOXICOLOGICAL FINDINGS:

TEST ON LABORATORY ANIMALS INDICATE MATERIAL MAY PRODUCE ADVERSE MUTAGENIC AND REPRODUCTIVE EFFECTS. CITED IN REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS)

-----12. DISPOSAL CONSIDERATIONS -----

EPA WASTE NUMBERS: TREATMENT: INCINERATION, FUELS BLENDING OR RECYCLE. CONTACT YOUR LOCAL PERMITTED WASTE DISPOSAL SITE (TSD) FOR PERMISSIBLE TREATMENT SITES. ALWAYS CONTACT A PERMITTED WASTE DISPOSER (TSD) TO ASSURE COMPLIANCE WITH ALL CURRENT LOCAL, STATE AND FEDERAL REGULATIONS.

-----13. TRANSPORT INFORMATION -----

DOT PROPER SHIPPING NAME: TOLUENE

-----14. REGULATORY INFORMATION -----

TSCA STATEMENT: THE CAS NUMBER OF THIS PRODUCT IS LISTED ON THE TSCA INVENTORY.

| | | | | |
|-----------|-------|---------|----|--|
| SARA | SARA | CERCLA | | |
| COMPONENT | EHS | EHS TPQ | RQ | |
| (302) | (LBS) | (LBS) | | |

| | | | | |
|--------------|------------|-----------|----------|-----|
| TOLUENE 1000 | | | | |
| OSHA | SARA | DEMINIMIS | | |
| COMPONENT | FLOOR LIST | 313 | FOR SARA | 313 |
| (%) | | | | |
| TOLUENE Y | Y | 1.0 | | |

IF THERE IS NO INFORMATION LISTED ON THE REGULATORY INFORMATION CHART, THIS INDICATES THAT THE CHEMICAL IS NOT COVERED BY THE SPECIFIC REGULATION LISTED.

-----15. OTHER INFORMATION -----

COMMENTS: NONE
NFPA HAZARD RATINGS:
HEALTH : 2
FLAMMABILITY : 3
REACTIVITY : 0
SPECIAL HAZARDS :

REVISION HISTORY: 8/1/81 9/1/83 10/1/85 5/6/86 12/6/86 6/8/87 10/27/87 8/24/88 3/21/89 3/1/91
1/11/93 4/5/95 10/23/96 2/11/97 2/2/99 12/3/99
| = REVISED SECTION
N/A = NOT AVAILABLE
N/E = NONE ESTABLISHED

THE STATEMENTS CONTAINED HEREIN ARE OFFERED FOR INFORMATIONAL PURPOSES ONLY AND ARE BASED UPON TECHNICAL DATA THAT EM SCIENCE BELIEVES TO BE ACCURATE. IT IS INTENDED FOR USE ONLY BY PERSONS HAVING THE NECESSARY TECHNICAL SKILL AND AT THEIR OWN DISCRETION AND RISK. SINCE CONDITIONS AND MANNER OF USE ARE OUTSIDE OUR CONTROL, WE MAKE NO WARRANTY, EXPRESS OR IMPLIED, OR MERCHANTABILITY, FITNESS OR OTHERWISE



Some of the Chemicals in Cigarette Smoke

HANDOUT 3

There are over 4,000 chemicals in cigarette smoke. More than 50 of them are known to be carcinogens (to cause cancer). Many of the chemicals in cigarette smoke are also found in the workplace and regulated by OSHA. Some are found in common household products. This is a small sample of the toxic chemicals in cigarette smoke.

| | |
|---------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Acetaldehyde | Used in glues and resins; suspected carcinogen; may increase the absorption of other hazardous chemicals into the bronchial tubes. |
| Acetone | Used in solvents; irritating to the throat, nose, and eyes; long-term exposure can cause liver and kidney damage. |
| Acrolein | Used in polyester resins and herbicides; an ingredient in tear gas and other chemical warfare agents; extremely toxic; intensely irritating to the upper respiratory tract and eyes. |
| Acrylonitrile | Used in synthetic resins, plastics and rubber, and as a fumigant; also known as “vinyl cyanide”; suspected human carcinogen. |
| 1-aminonaphthalene | Used in weed control; causes cancer. |
| 2-aminonaphthalene | Banned in industrial uses; causes bladder cancer. |
| Ammonia | Used in cleaners; causes asthma and elevated blood pressure. |
| Benzene | Used in solvents, pesticides and gasoline; causes leukemia and other cancers. |
| Benzo[a]pyrene | Found in coal tar pitch, creosote, and some asphalts; causes skin cancer, lung cancer and reduction in reproductive capacity. |
| 1,3-Butadiene | Used in rubber, latex, and neoprene products; suspected carcinogen. |
| Butyraldehyde | Used in solvents and resins; powerful inhalation irritant; affects the lining of nose and lungs. |
| Cadmium | Used in non-corrosive metal coatings, bearings, pigments and storage batteries; causes cancer; damages kidneys, liver and brain. |
| Carbon Monoxide | Produced by burning (in gasoline engines, welding, gas-powered tools, etc.); decreases heart and muscle function; causes fatigue, dizziness, weakness; especially toxic for the unborn, infants and people with lung or heart disease. |
| Catechol | Used as an antioxidant in dyes, inks and oils; causes high blood pressure, upper respiratory tract irritation and dermatitis. |
| Chromium | Used in metal plating and alloys, wood treatment and preservatives, and pigments; causes lung cancer. Stainless steel welding involves the greatest exposure. |
| Cresol | Used in solvents, disinfectants, and wood preservatives; highly irritating to the skin; acute inhalation levels cause upper respiratory, nasal and throat irritation. |
| Crotonaldehyde | Used as a warning agent in fuel gases; causes chromosome aberrations; reported to interfere with immune function. |

| | |
|----------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Formaldehyde | Part of resin used in particleboard, fiberboard, and plywood, also used in foam insulation. Causes nasal cancer; can damage lungs, skin and digestive system. |
| Hydrogen Cyanide | Used in the production of resins and acrylic plastics and as a fumigant; released in metal treatment operations and metal ore processing; used for executions in some states' gas chambers; weakens lungs; causes nausea, headaches, and fatigue. |
| Hydroquinone | Used in paints, varnishes and motor fuel; causes eye injuries, skin irritation and central nervous system effects. |
| Isoprene | Used in rubber; similar to 1,3-butadiene; causes irritation to the skin, eyes and mucous membranes. |
| Lead | Used in paint and metal alloys (solder, brass, bronze); damages brain, nerves, kidneys and reproductive system; causes anemia and stomach problems; may cause cancer; particularly toxic to children. |
| Methyl Ethyl Ketone (MEK) | Used in solvents; irritating to nose, throat, and eyes; depresses the central nervous system. |
| Nickel | Used in stainless steel, other metal alloys and alkaline batteries; causes upper respiratory irritation, bronchial asthma and cancer. |
| Nicotine | Used as a highly controlled insecticide; exposure can result in seizures, vomiting, depression of the central nervous system, growth retardation, developmental toxicity in fetuses; mild nicotine poisoning results in diarrhea, increase in heart rate and blood pressure, headache, dizziness and neurological stimulation. |
| Nitric Oxide | Created by combustion of gasoline; major contributor to smog and acid rain; linked to Huntington's disease, Alzheimer's disease, Parkinson's disease and asthma. |
| NNN, NNK, and NAT | These compounds are found only in tobacco, NNN causes cancer and may cause reproductive damage; NNK is a powerful lung carcinogen; NAT is a possible carcinogen. |
| Phenol | Used in resins in plywood and other construction materials and in epoxy resins; highly toxic; affects the liver, kidney, respiratory, cardiovascular and central nervous system. |
| Propionaldehyde | Used as a disinfectant; causes irritation of the skin, eyes and respiratory system. |
| Pyridine | Used in solvents; causes eye and upper respiratory tract irritation; causes nausea, headaches and nervousness; may cause liver damage. |
| Quinoline | Used as a corrosion inhibitor and as a solvent for resins; causes genetic mutations; possible human carcinogen; severe eye irritant; linked to liver damage. |
| Resorcinol | Used in laminates, resins and adhesives; irritating to skin and eyes. |
| Styrene | Used in insulation, fiberglass, pipes and plastic; possible human carcinogen; may cause leukemia; causes headaches, eye irritation, slowed reaction time, fatigue and dizziness. |
| Toluene | Used in solvents, oils and resins; highly toxic; causes fatigue, confusion, weakness, memory loss, nausea, loss of appetite and drunken-type actions; linked to permanent brain damage. |



UNIT 2

PLANNING GUIDE

(Total unit time: 60 minutes)

| ACTIVITIES | ESTIMATED TIME | MATERIALS |
|------------------------------------------------------------------------|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. INTRODUCTORY PRESENTATION | 5 minutes | Instructor's Manual, pg. 2.3 |
| 2. ACTIVITY 1: Tobacco Exposure Dialogue and Discussion | | Instructor's Manual, pg. 2.4 Give each student: <ul style="list-style-type: none">- Guide- Handout 1, <i>Smoking Affects Everyone</i>- Handout 2, <i>Secondhand Smoke Facts</i> |
| a. Students read dialogue | 5 minutes | |
| b. Discussion | 20 minutes | |
| 3. ACTIVITY 2: Tobacco Facts Quiz | | Instructor's Manual, pg. 2.7 Give each student: <ul style="list-style-type: none">- Handout 3, <i>Tobacco Facts Quiz</i> |
| a. Break into pairs to work on quiz | 10 minutes | |
| b. Discussion | 20 minutes | |



PREPARATION

- 1** READ through **INSTRUCTIONS, DISCUSSION POINTS** and **HANDOUTS** (including Instructor's Copies) for all sections of the unit before classtime.
- 2** REPRODUCE enough copies of **Handouts 1, 2** and **3** (included with this manual) so that each of your students can have one.
- 3** BRING
 - One **Guide** for each of your students
 - **Handouts 1, 2** and **3** for each student
- 4** BEFORE THE CLASS STARTS Write the unit topic on your chalkboard or butcher paper:

**UNIT 2:
TOBACCO
THREATENS
EVERYONE'S HEALTH**

INTRODUCTORY PRESENTATION

UNIT TWO INTRODUCTION (5 MINUTES)

[Distribute **Guide** and **Handouts 1, 2 and 3** to students at beginning of class.]

INSTRUCTOR EXPLAINS:

Building trades and construction workers face a number of health risks on the job. The purpose of this unit is to give you information about toxic hazards you face on the job, including the extra risks from tobacco smoke. In this unit, we will take a look at how toxic tobacco is and how it threatens the health of both people who use it and those around them.

Every year 400,000 people die because of tobacco use. Tobacco is the largest preventable cause of illness and death in the United States. However, the effects of tobacco are not confined to the smoker. Secondhand smoke causes over 53,000 deaths a year among non-smokers. Worse news for trades workers is that cigarette smoke interacts with the other toxics on the job to create extra risks.

Today we'll address these issues:

- What is in tobacco?
- What are the health effects of tobacco use?
- How does tobacco combine with other workplace chemicals to create even more severe health effects?
- What is environmental tobacco smoke? Why is it a hazard to co-workers? What are its effects on a worker's family?

We will be looking at these issues by doing two activities. Are there any questions? Let's begin...

ACTIVITY 1

TOBACCO EXPOSURE DIALOGUE AND DISCUSSION (25 MINUTES)

INSTRUCTIONS Explain to the students that the purpose of this exercise is to get them to express their views on smoking issues. Remind students that there are no right or wrong sides, so it is important to respect everyone's opinion. The exercise will be more effective if you encourage debate.

1 **STUDENT VOLUNTEERS READ PARTS ON HANDOUT 1** Ask the students to look briefly at Handout 1, *Smoking Affects Everyone*. Then ask for three volunteers to come up front and read the three parts. ***Emphasize that this is not a good-guy/bad-guy situation and there are no right or wrong sides.*** It is only a way to start people thinking about these issues.

2 **ENCOURAGE DISCUSSION AND DEBATE** The point here is to encourage discussion. Ask for a response to each of the **DISCUSSION POINTS** on the Instructor's Copy of Handout 1. The Instructor's Copy also suggests some responses that you might look for. Add these points only after students have had an opportunity to respond.

Following the discussion, refer to Handout 2, *Secondhand Smoke Facts*. Ask if any of those points would be helpful in talking with co-workers about smoking issues.

3 **REFER TO THE LIST OF CHEMICALS FOUND IN CIGARETTE SMOKE, ON PAGE 20 OF THE GUIDE** Ask the students if they recognize any of these chemicals from their work sites. For those chemicals on the list that they work with, ask what protection is needed.



Smoking Affects Everyone

HANDOUT 1

INSTRUCTOR'S
COPY

DISCUSSION POINTS

1

What is Manny upset about? Are other people bothered, too? Do you think it's none of your business if someone wants to smoke near you or your co-workers?

 Manny is upset about the subs smoking around other workers. Some of the other workers have been complaining, too. The smoke that comes from the tip of a cigarette and from a smoker exhaling is called *secondhand smoke* or *environmental tobacco smoke*. This is the smoke that non-smokers breathe. It *is* your business if someone smokes near you because the secondhand smoke can affect you.

2

Why does Chris think it's harmful for people to breathe smoke? What chemicals are in secondhand smoke? Do you think secondhand smoke is harmful?

 Chris has heard that there are thousands of chemicals in tobacco smoke. In fact, there are over 4,000 chemicals. Over 50 of these chemicals are carcinogenic. If the students don't mention them, point out that tobacco smoke includes chemicals they also may be exposed to at work, such as carbon monoxide, lead and methyl ethyl ketone. (See the list of chemicals found in cigarette smoke on pg. 20 of the Guide, and choose chemicals that relate to your trade.)

3

What other chemicals do you work with? What protection do you need to work with those chemicals (for example, toluene)? What about protection from secondhand smoke?

 Many of the chemicals workers are exposed to require respiratory and other protection. Carcinogens require very stringent protective measures, which may include use in a closed system only. The best protection from any toxic chemical is to eliminate its use or remove workers from any possible exposure. That applies to tobacco too.

4

Do you agree with Manny that people shouldn't smoke around children? What problems do you think kids might have if they're exposed to secondhand smoke?



Manny doesn't want people to smoke around his kids. Children are highly sensitive to the effects of tobacco smoke because their bodies are still developing. Tobacco smoke causes respiratory problems, including asthma, in children. It is also linked to Sudden Infant Death Syndrome (SIDS).

5

What does the law say about smoking in the workplace? What should the workers in this workplace do?



California state law bans smoking in indoor workplaces. Some cities ban smoking in outdoor areas, too. Employers and owners have the right to ban smoking in outdoor workplaces.

6

Joe is worried about stepping on the rights of smokers. Could these workers mention their problem with secondhand smoke without creating bad feelings among the subs who smoke?



Let the students brainstorm about ways to deal with this problem. If they haven't mentioned these, point out that they can:

- Talk to their co-workers and get their support
- Talk to the subs
- Raise the issue at a tailgate safety meeting or health and safety committee meeting
- Seek help from their union
- Form a group to meet with the employer, or choose a co-worker the employer will listen to.

ACTIVITY 2

TOBACCO FACTS QUIZ (30 MINUTES)

INSTRUCTIONS Explain to the students that the purpose of this exercise is to get them thinking about the health effects of tobacco. Emphasize that, though it is a quiz, they will not be graded on the answers or turn it in.

1 **HAVE STUDENTS PAIR UP** Ask students to break into pairs. They should review the questions together and come up with their “best” answer. Have them write down the answer on their quiz sheet. They should also be able to explain why they believe it is the correct answer. If they disagree with their partner, the pair should settle on one answer to present to the class.

2 **REVIEW ANSWERS** Allow ten minutes for the students to discuss the quiz. Then call on one pair to give their answer. Ask if anybody has a different answer. Encourage discussion about their answers. Then give the correct answer and proceed to the next question.

Some answers are provided in the Instructor’s Copy of Handout 3. Use them to help introduce basic information about the effects of tobacco. It is best for these points to emerge from the students’ discussion, rather than for you to lecture directly to them.



Tobacco Facts Quiz

HANDOUT 3

INSTRUCTOR'S
COPY

1 What is the most common cause of death among non-smokers exposed to secondhand smoke?

- Lung cancer Heart disease Stroke Emphysema

Answer: Heart disease. Over 3,000 non-smokers a year die from lung cancer caused by secondhand smoke. However, the death toll from heart disease attributable to passive smoking is 10 to 20 times as large as deaths from lung cancer (over 50,000). Heart disease is also the most common cause of death among tobacco users.

2 Even tobacco companies have admitted that tobacco use causes cancer. Which of the following are also caused by tobacco use?

- Impotence Drug use Heart disease Gum disease
 All of the above

Answer: All of the above. Tobacco use is linked to impotence, heart disease and gum disease. Also, tobacco use *is* drug use. Nicotine is a highly addictive drug. Cigarettes and chewing tobacco are both ways of ingesting nicotine. The reason people use tobacco is to satisfy their addiction to nicotine. Quitting smoking or chewing tobacco can be at least as difficult as quitting cocaine or heroin.

3 True or false? Environmental Tobacco Smoke (ETS) is not as harmful as mainstream smoke (what a smoker inhales directly).

- True False

Answer: False. ETS contains all the chemicals in mainstream smoke but with higher levels of particulates. Sidestream smoke contains higher levels of several carcinogens than mainstream smoke. Among these are benzene (5-10 times more) and cadmium (7.2 times more). Approximately 10% of a cigarette becomes mainstream smoke; the rest becomes ETS.

**4 Which of the following ingredients are in chewing tobacco?
(Check all that apply)**

- | | |
|-------------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> Polonium 210 (nuclear waste) | <input type="checkbox"/> N—Nitrosamines (NNN and NNK) |
| <input type="checkbox"/> Formaldehyde | <input type="checkbox"/> Nicotine |
| <input type="checkbox"/> Cadmium | <input type="checkbox"/> Cyanide |
| <input type="checkbox"/> Arsenic | <input type="checkbox"/> Benzene |
| <input type="checkbox"/> Lead | <input type="checkbox"/> Fiberglass |
| <input type="checkbox"/> Dirt | |

Answer: All of these ingredients (and more) are in chewing tobacco. Dirt and fiberglass cause abrasions on the skin inside the mouth so the tobacco can enter the bloodstream more readily.

5 Tobacco combined with other toxics can increase the chances of getting certain diseases. For instance, asbestos workers who also smoke are over fifty times more likely to contract lung cancer than asbestos workers who don't smoke. This effect is called:

- Coincidence Synergy Really bad voodoo Additive

Answer: Synergy. While the tobacco companies would like us to believe that this is just “coincidence,” the link is too strong. Some chemicals work together to strengthen their power to cause disease. It is indeed “really bad voodoo.”

6 Environmental Tobacco Smoke is particularly bad for children. It has been linked to many childhood health problems. Which of the following problems has ETS *not* been linked to?

- | | |
|--------------------------------------------------------------|-----------------------------------------|
| <input type="checkbox"/> Asthma | <input type="checkbox"/> Ear infections |
| <input type="checkbox"/> Sudden Infant Death Syndrome (SIDS) | <input type="checkbox"/> Measles |

Answer: Measles. Not every disease is linked to tobacco use. However, secondhand smoke's effects on the lungs and sinuses of young children make them more susceptible to colds and other illnesses. People who smoke around their children are going to be taking those children to the doctor more often.



Smoking Affects Everyone

HANDOUT 1

Manny The subs have been smoking right where our guys are working. Some of the guys have been complaining about it.

Joe What is there to complain about? It's outside – they're not hurting anybody.

Manny Yeah, but we still breathe in the smoke.

Joe Well, if they want to smoke, that's their business and nobody else's. It's a free country.

Chris Wait a minute — I've heard that there are thousands of chemicals in tobacco smoke! Some of them are even the same as what's in the stuff we work with, like toluene. We have to use protection around those chemicals, but what's protecting us from tobacco smoke?

Manny Yeah, that's why I won't let anyone smoke around my kids anymore.

Chris Sure, secondhand smoke is really bad for kids, but it's not good for anybody!

Manny Well, they passed a law on smoking inside, but if we work outside, we have no protection.

Chris So what are we going to do about those guys who smoke around us? Can't the union protect us? What about Cal/OSHA?

Joe Look, let's not make a big deal out of it — I don't want any trouble with the subs.



Secondhand Smoke FACTS

HANDOUT 2

- Secondhand smoke contains over 4,000 chemicals, including over 50 known carcinogens. Smoke from the tip of a cigarette has 20 times the carcinogens as smoke inhaled by a smoker.
- Secondhand smoke is the third leading preventable cause of death in America, killing over 53,000 nonsmokers every year. 50,000 of these deaths are from heart disease. 3,000 are from lung cancer.
- The U.S. Environmental Protection Agency (EPA) has classified secondhand smoke as a Group A carcinogen - a substance known to cause cancer in humans. There is no safe level of exposure to Group A carcinogens, which also include asbestos and benzene.
- If you breathe secondhand smoke, your health risk is higher if you're also exposed to toxic chemicals. For example, tobacco smoke contains hydrogen cyanide, a chemical that paralyzes the cilia (tiny filtering hairs) in your lungs. That makes it harder for your lungs to filter out other toxics.
- Tobacco smoke adds harmful chemicals to those already in the work environment, increasing the total amount you're exposed to and increasing the risk of cancer, heart disease, asthma, respiratory problems and other diseases.
- Breathing secondhand smoke means more chemicals for your body to handle. For example, welding on the construction site produces carbon monoxide. Tobacco smoke also contains carbon monoxide, so you are getting a much larger dose. Long-term exposure to carbon monoxide weakens the heart.
- When the chemicals in tobacco smoke combine with certain other cancer-causing substances, such as asbestos, the combination greatly increases the risk of lung cancer.
- Secondhand smoke hurts kids by causing ear infections and respiratory problems such as asthma. It also has been linked to Sudden Infant Death Syndrome (SIDS).
- California law bans smoking in indoor workplaces to protect workers from secondhand smoke. Some employers and some local laws ban smoking in outdoor areas, too.



Tobacco Facts Quiz

HANDOUT 3

1 What is the most common cause of death among non-smokers exposed to secondhand smoke?

- Lung cancer Heart disease Stroke Emphysema

2 Even tobacco companies have admitted that tobacco use causes cancer. Which of the following are also caused by tobacco use?

- Impotence Drug use Heart disease Gum disease
 All of the above

3 True or false? Environmental Tobacco Smoke (ETS) is not as harmful as mainstream smoke (what a smoker inhales directly).

- True False

4 Which of the following ingredients are in chewing tobacco?
(Check all that apply)

- | | |
|-------------------------------------------------------|-------------------------------------------------------|
| <input type="checkbox"/> Polonium 210 (nuclear waste) | <input type="checkbox"/> N—Nitrosamines (NNN and NNK) |
| <input type="checkbox"/> Formaldehyde | <input type="checkbox"/> Nicotine |
| <input type="checkbox"/> Cadmium | <input type="checkbox"/> Cyanide |
| <input type="checkbox"/> Arsenic | <input type="checkbox"/> Benzene |
| <input type="checkbox"/> Lead | <input type="checkbox"/> Fiberglass |
| <input type="checkbox"/> Dirt | |

5 Tobacco combined with other toxics can increase the chances of getting certain diseases. For instance, asbestos workers who also smoke are over fifty times more likely to contract lung cancer than asbestos workers who don't smoke. This effect is called:

- Coincidence Synergy Really bad voodoo Additive

6 Environmental Tobacco Smoke is particularly bad for children. It has been linked to many childhood health problems. Which of the following problems has ETS *not* been linked to?

- | | |
|--------------------------------------------------------------|-----------------------------------------|
| <input type="checkbox"/> Asthma | <input type="checkbox"/> Ear infections |
| <input type="checkbox"/> Sudden Infant Death Syndrome (SIDS) | <input type="checkbox"/> Measles |



UNIT 3

PLANNING GUIDE

(Total unit time: 30 minutes)

| ACTIVITIES | ESTIMATED TIME | MATERIALS |
|-------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1. INTRODUCTORY PRESENTATION | 3 minutes | Instructor's Manual, pg. 3.3 |
| 2. ACTIVITY 1: Mystery Illness Case Study | | Instructor's Manual, pg. 3.4 Give each student: <ul style="list-style-type: none">- Guide- Handout 1, <i>The Mystery Illness</i>- Handout 2, <i>MSDS for Petroleum Asphalt</i> |
| a. Students read dialogue | 2 minutes | |
| b. Break into small groups | 10 minutes | |
| c. Reconvene entire class and have groups report back | 15 minutes | |



PREPARATION

- 1** READ through **INSTRUCTIONS, DISCUSSION POINTS** and **HAND-OUTS** (including Instructor's Copies) before classtime.
- 2** REPRODUCE enough copies of **Handouts 1** and **2** (included with this manual) so that each of your students can have one.
- 3** BRING
 - One **Guide** for each of your students
 - **Handouts 1** and **2** for each student
- 4** MAKE A TRANSPARENCY Make a transparency (for an overhead projector) of **Handout 2** (optional.)
- 5** BEFORE THE CLASS STARTS Write the unit topic on your chalkboard or butcher paper:

**UNIT 3:
INVESTIGATING
CHEMICAL HAZARDS
ON THE JOB**

INTRODUCTORY PRESENTATION

UNIT THREE INTRODUCTION (3 MINUTES)

[Distribute **Guide** and **Handouts 1** and **2** to students at beginning of class.]

INSTRUCTOR EXPLAINS:

The purpose of today's unit is to learn about your "Right to Know." You have a legal right to certain information about health hazards on your job. We'll focus on some of the information that the law requires your employer to provide you.

We'll divide into small groups to figure out what the health hazards are in a typical workplace. We'll also discuss how you can get more information about the hazards.

On pages 39-42 of the **Guide**, you will find information about laws and regulations that require your employer to provide you with information and training. Two of the most important are the Cal/OSHA Hazard Communication Standard and the Cal/OSHA Injury and Illness Prevention Program Standard. Knowing about these laws and regulations will help you answer some of the discussion questions on the back of Handout 1.

Handout 2 is a sample MSDS. MSDS stands for Material Safety Data Sheet. Under the Hazard Communication Standard, as part of workers' "Right to Know," Cal/OSHA requires employers to make MSDS's easily available to their employees. There should be an MSDS available for each hazardous substance used on the job. MSDS's are usually not easy to read, but they can contain useful information. So it is helpful for workers to become familiar with them.

Are there any questions? Let's begin...

ACTIVITY 1

MYSTERY ILLNESS CASE STUDY (27 MINUTES)

INSTRUCTIONS STEP ONE

Small Group Discussion (12 minutes)

- 1** READ “THE MYSTERY ILLNESS” Ask two student volunteers to read the parts of the two characters in “The Mystery Illness” in Handout 1, in front of the class. (2 minutes)
- 2** DIVIDE THE CLASS INTO GROUPS Divide the class into groups of four or five students each. The discussion will be better if you make sure the more experienced students are scattered among all the groups.
- 3** EXPLAIN THE EXERCISE Using their **Guides** and the sample MSDS (Handout 2), ask each group to talk about the questions on the back of Handout 1, and to try to come up with answers. Ask each group to choose someone to take notes and report back to the class later. Write the following page numbers on the board to remind students where they can find information in their **Guides**: Pages 39-49 (10 minutes.)

STEP TWO

Class Discussion (15 minutes)

- 1** GROUPS REPORT BACK After about 10 minutes of small group discussion, bring the class back together. Choose one group, and ask the person who took notes to talk about the group’s ideas about the first question. Other groups can add information. Ask the note taker from a different group to talk about the second question, etc.

See the Instructor’s Copy of Handout 1 for **DISCUSSION POINTS**. During the discussion, it may be helpful to use an overhead transparency of the MSDS to point out where to find information to answer some of the questions.



The Mystery Illness

HANDOUT 1

INSTRUCTOR'S
COPY

DISCUSSION POINTS

1

How can this worker find out what might be causing his symptoms?

-  One place to start is to talk to co-workers. An informal survey of other workers might show where the problem is worst and give clues about what chemicals might be causing the problem. The workers can then ask for more information from their employer or supervisor.
-  When a worker feels sick, he or she may need to get a check-up from a physician who has training in occupational medicine (job-related illness). The doctor may be able to diagnose the cause of the problem. (See “Where to Get Information and Help” on page 52 in the **Guide**.)
-  Labels on the chemicals and other materials they are working with may give information to help track down the problem. But labels are often incomplete and inaccurate.
-  The workers can ask their employer for a Material Safety Data Sheet (MSDS), which gives information about a specific hazardous substance. In a minute, we’ll talk more about MSDS’s.
-  The workers can ask for training and information under the Injury and Illness Prevention Program regulations, issued by Cal/OSHA. These require every employer to set up and maintain a program to prevent injuries and illnesses. Employers must provide hazard training and workers may not be penalized for requesting information about health hazards on the job. Workers also have the right to see any medical monitoring or exposure data relevant to their work area that the employer may have.
-  Unions are also a source of information about health and safety. Some unions will provide information to any worker in their industry, even non-members.
-  Check page 52 in the **Guide** for other sources of information about health and safety.

2

Handout 2 is an MSDS. What hazardous material is it for?



Petroleum asphalt, which also contains the contaminant hydrogen sulfide.

3

What does the MSDS say about the health effects of this material? Do any of them match this worker's symptoms? What section did you find that in?



In Section IV — Health Hazard Data, it says that the “heated product may release asphalt fumes which may cause nose, throat, mucous membrane irritation, nausea, headaches, or dizziness.” The MSDS also lists health effects if there is skin contact, eye contact or ingestion, which are not the problem in this case.

4

Based on the information on the MSDS, in your Guide, and other things you know about the situation, what do you think is causing this worker's symptoms?



This worker's symptoms may be caused by smoking, by the asphalt fumes, or by a combination of both. The combined effect of cigarettes and certain chemicals is sometimes greater than simply adding the effects of each one alone. This is called synergy.



When the work site is dusty, the dust can get on a cigarette. When this worker puts the cigarette in his mouth, he is swallowing or breathing in even more toxic dusts.



Asphalt fumes can contain small amounts of polycyclic aromatic hydrocarbons (PAH's), which may cause cancer. Cigarette smoke also contains PAH's, so you're getting an extra dose if you both smoke and work with asphalt. (See pages 27-28 in the **Guide** for details.)



Smoking damages the lung's protective mechanisms, which leaves the lungs more vulnerable to other toxic chemicals on the job.



The fact that this worker is feeling symptoms probably means that ventilation is inadequate.

5

According to the MSDS, how should these workers be protected against asphalt fumes?

-  In Section V — Employee Protection, it says that for outdoor use, you should “ensure adequate ventilation and avoid fumes by working upwind.” For indoor use, “ensure adequate building ventilation and local exhaust...”
-  The MSDS recommends the use of respirators in some situations. Respirators are not the best way to protect yourself against chemicals. Other methods, like ventilation, are better. (See page 34 in the **Guide** for more information on respirators.)
-  Under “Work Practices” the MSDS describes ways to limit the amount of asphalt fumes. These include operating kettles at the lowest possible temperature that allows proper application and keeping kettles covered with tight-fitting lids. The MSDS also has information on how workers should protect their eyes and skin.

6

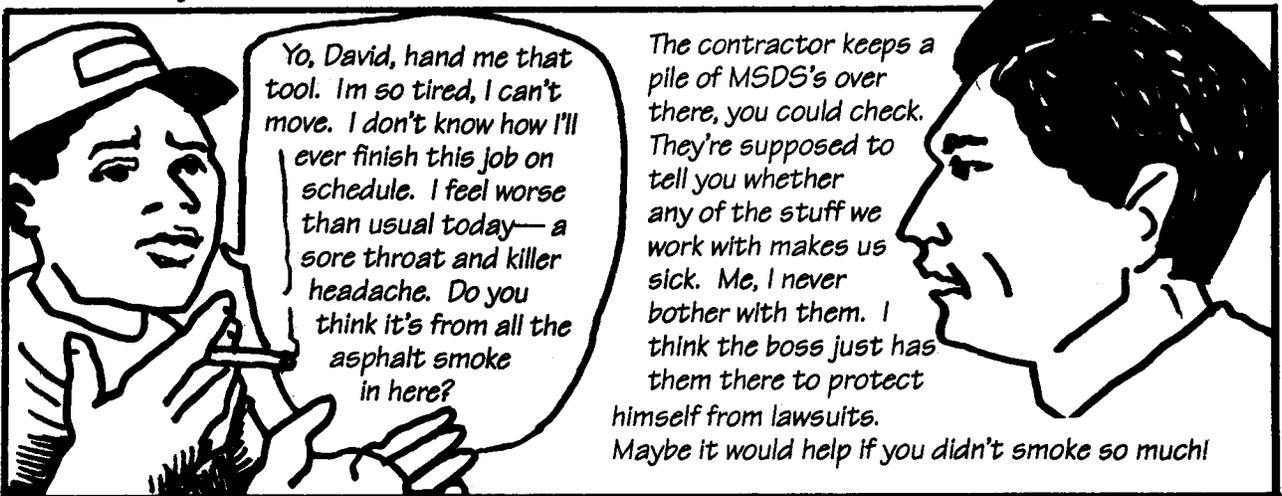
Where could these workers get a copy of the MSDS?

-  They could get it from their employer. The law requires employers to have MSDS’s on all the hazardous materials they use easily available to their employees (not locked in a supervisor’s office).
-  You can ask your shop steward to get the MSDS for you.
-  You can also write or call the manufacturer and ask for a specific MSDS. The law requires the label to include the manufacturer’s phone number.
-  MSDS’s also may be found on the Internet.

The Mystery Illness

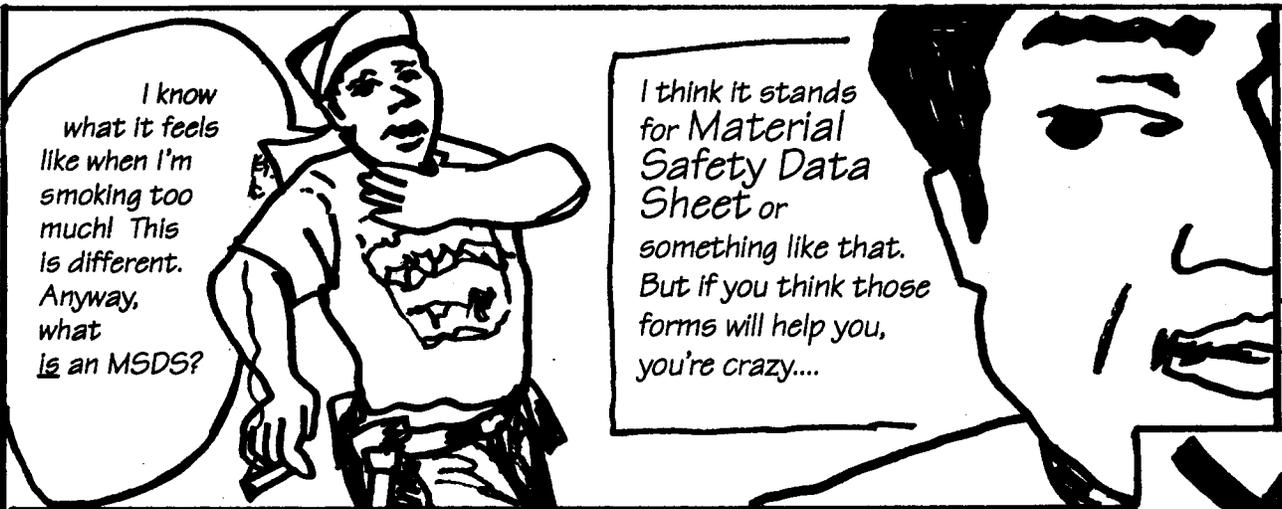
HANDOUT 1

Mop Construction Company is putting up a new apartment building. The project is behind schedule and the trades are working on top of each other to finish soon. Today the roofers are laying down asphalt and the wind is creating a downdraft. The building is framed up, but not all the exterior walls are in place.



Yo, David, hand me that tool. I'm so tired, I can't move. I don't know how I'll ever finish this job on schedule. I feel worse than usual today—a sore throat and killer headache. Do you think it's from all the asphalt smoke in here?

The contractor keeps a pile of MSDS's over there, you could check. They're supposed to tell you whether any of the stuff we work with makes us sick. Me, I never bother with them. I think the boss just has them there to protect himself from lawsuits. Maybe it would help if you didn't smoke so much!



I know what it feels like when I'm smoking too much! This is different. Anyway, what is an MSDS?

I think it stands for Material Safety Data Sheet or something like that. But if you think those forms will help you, you're crazy....

The Mystery Illness

HANDOUT 1 QUESTIONS

1 How can this worker find out what might be causing his symptoms?

2 Handout 2 is an MSDS. What hazardous material is it for?

3 What does the MSDS say about the health effects of this material? Do any of them match this worker's symptoms? What section did you find that in?

4 Based on the information on the MSDS, in your Guide, and other things you know about the situation, what do you think is causing this worker's symptoms?

5 According to the MSDS, how should these workers be protected against asphalt fumes?

6 Where could these workers get a copy of the MSDS?

MSDS for Petroleum Asphalt

HANDOUT 2

MATERIAL SAFETY DATA SHEET

MANUFACTURER: Owens-Corning Fiberglas Corp.
Fiberglas Tower
Toledo, Ohio 43659

HEALTH INFORMATION PHONE & EMERGENCY PHONE:
8:00 AM-5:00 PM (EST); (419)-248-8234
Emergencies only, after 5:00 PM (EST); (419)-248-5330

PRODUCT DIVISION: Trumbull Asphalt Division

TECHNICAL PRODUCT INFORMATION PHONE:
8:00 AM-5:00 PM (EST); (708)-594-6977

DATE PREPARED: February 28, 1991

SUPERSEDES MSDS DATED: April 4, 1986

PRODUCT NAME(s): Base Asphalts, Steep, Dead Level, Industrial and Shingle Laminating, Shingle Adhesive, Paper Satch, Shingle Satch, Roll Satch, Coating, Pipe Coatings, Waterproofing, Burial Vaults, Automotive, Mod Bitumen, Potting Compound, Cutback Base, Crackfiller, Underseal, Emulsion Base, Paving, Culvert Compound, Mineral Rubber

SECTION I - COMPONENT DATA

HAZARDOUS INGREDIENTS:

| <u>COMMON NAME</u> | <u>CHEMICAL NAME</u> | <u>CAS NUMBER</u> | <u>% COMPOSITION</u> | <u>OSHA-PEL</u> | <u>ACGIH-TLV</u> | <u>OTHER</u> |
|--------------------|----------------------|-------------------|----------------------|----------------------------------|-------------------------------------------------|---------------------------------------------|
| Petroleum Asphalt | Petroleum Asphalt | 8052-42-4 | 100 | * None Established | 5 mg/M ³ 8-hr TWA (asphalt fumes) | NIOSH, 5 mg/m ³ Ceiling Limit |
| Hydrogen Sulfide | Hydrogen sulfide | 7783-06-4 | Contaminant | 10 ppm, 8-hr.TWA 15 ppm, STEL | 10 ppm, 8-hr. TWA 15 ppm, STEL | NIOSH, 10 ppm 10 minute max. |

* OSHA has not established a specific PEL for asphalt fumes. They are considered as "particulates not otherwise regulated" with a PEL of 5 mg/m³ for the respirable dust fraction and 15 mg/m³ for the total dust fraction.

SECTION II - EMERGENCY AND FIRST-AID PROCEDURES

INHALATION: Move individual to fresh air immediately. If breathing is difficult or if irritation persists, administer oxygen. If not breathing, administer artificial respiration. Seek medical attention.

SKIN CONTACT: If hot material strikes the skin, immediately drench or immerse the area in water to assist cooling. If available, apply iced water or ice packs to the burned area. (Do not use iced water or cold packs if the burned area covers more than 10% of the body, as this may contribute to shock.) Do not try to remove asphalt from a burn after it has cooled. Seek medical attention. Medical personnel can soften and remove cooled asphalt with petroleum jelly. For contact with cold material, clean exposed skin with waterless hand cleaner, then wash with mild soap and water. If irritation persists seek medical attention.

EYE CONTACT: Immediately flush eyes with running water for at least 15 minutes. Seek medical attention immediately.

INGESTION: **DO NOT INDUCE VOMITING!** In general, no treatment is necessary unless large quantities are ingested; however, get medical advice.

SECTION III - FIRE AND EXPLOSION DATA

FLASH POINT (°F): 400+ for asphalt

METHOD USED: Cleveland Open Cup

AUTO IGNITION TEMPERATURE (°F): Unknown.

FLAMMABILITY LIMITS (%): LEL: Not Determined
UEL: Not Determined

EXTINGUISHING MEDIA: Foam, carbon dioxide, dry chemical.

SPECIAL FIRE-FIGHTING INSTRUCTIONS: Treat as a hydrocarbon fire. Do not use water on asphalt fires as it may cause violent eruptions and spreading of hot asphalt. Water may be used to cool containers in a fire exposed area. In a sustained fire, use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Hot asphalt may ignite flammable materials on contact. Hydrogen sulfide may be released when the product is heated.

SECTION IV - HEALTH HAZARD DATA

PRIMARY ROUTES OF EXPOSURE: Inhalation, skin contact, and eye contact.

HEALTH HAZARDS (Including acute and chronic effects and symptoms of overexposure):

ACUTE: Inhalation: Heated product may release asphalt fumes which may cause nose, throat, mucous membrane irritation, nausea, headaches, or dizziness. See Section VII for health hazards of hydrogen sulfide in confined spaces.

Skin Contact: Prolonged or repeated contact with the cold product may result in dryness, and irritation. Contact with hot product may cause thermal burns. Long term skin exposure to asphalt fumes can increase sensitivity to sun, and cause skin discoloration.

Eye Contact: May cause severe irritation, redness, tearing and blurred vision.

Ingestion: May cause mouth, throat, and gastrointestinal tract irritation and upset with possible nausea, vomiting, and diarrhea.

CHRONIC: Prolonged or repeated skin contact with this product may result in irritation and dermatitis. (See Carcinogenicity below.)

CARCINOGENICITY:

| <u>HAZARDOUS INGREDIENTS:</u> | <u>LISTED AS A CARCINOGEN BY:</u> | <u>ACGIH</u> | <u>IARC</u> | <u>NTP</u> | <u>OSHA</u> |
|-------------------------------|-----------------------------------|--------------|-------------|------------|-------------|
| Petroleum Asphalt (bitumens) | | No | No* | No | No |
| Hydrogen Sulfide | | No | No | No | No |

IARC:

* In March, 1987, the International Agency for Research on Cancer (IARC) classified bitumens (such as the petroleum asphalt in this product) as a Group 3 material, "not classifiable as to its carcinogenicity to humans." This classification was made based on inadequate evidence for the carcinogenicity of undiluted air-refined bitumens in experimental animals and inadequate evidence that bitumens alone are carcinogenic to humans. However, asphalt does contain a small amount of polycyclic aromatic hydrocarbons which have been shown to cause cancer and respiratory damage in animals. NIOSH recently conducted mouse skin painting studies using selected fractions of asphalt fume condensate. Skin application of the condensate fractions resulted in skin tumors in laboratory mice.

CALIFORNIA PROPOSITION 65: This product contains detectable amounts of some chemicals known to the State of California to cause cancer.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Persons with a history of chronic skin or respiratory disorders may be at increased risk for a worsening of their condition from exposure to this product.

SECTION V - EMPLOYEE PROTECTION

VENTILATION: Outdoor use - ensure adequate ventilation and avoid fumes by working upwind. Indoor use - ensure adequate building ventilation and local exhaust. (See Respiratory Protection below and Section VII on dangers of hydrogen sulfide.)

RESPIRATORY PROTECTION: If irritation occurs or if the TLV for asphalt fumes is exceeded, use a NIOSH/MSHA approved air purifying respirator for dust, mists and fumes. In situations where the concentration of H₂S exceeds the PEL or TLV, supplied air respirators or self-contained breathing apparatus are required. Always use respiratory protection in accordance with your company's respiratory protection program and OSHA regulations under 29 CFR 1910.134.

EYE PROTECTION: Wear chemical safety goggles or a face shield when material is in liquid form.

PROTECTIVE CLOTHING: Wear long sleeved shirt and long pants. Leather or lined neoprene coated gloves should be used when there could be direct contact. Sunscreens may decrease the potential for skin discoloration with chronic exposure.

WORK/HYGIENIC PRACTICES: Kettles should be operated at the lowest possible temperature that allows proper application. Kettle should have tight-fitting lids and be used in well ventilated areas. Handle in accordance with good industrial hygiene and safety practices. These include avoiding any unnecessary exposure and removal of the material from the skin, eyes, and clothing. Wash hands and arms frequently. Shower after exposure. Wash work clothes when soiled. Safety showers and eye wash stations should be available.

SECTION VI - REACTIVITY DATA

STABILITY (Conditions to Avoid): Product is stable. However, upon heating, hydrogen sulfide gas (H₂S) may be generated. (See Section VII of this MSDS for more information on H₂S.)

INCOMPATIBILITY (Materials to Avoid): Do not allow hot, molten asphalt to contact water as this may cause violent eruptions and spreading of hot asphalt. Avoid contact with strong oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, sulfur oxides, hydrogen sulfide, and various hydrocarbon fractions. Upon heating, hydrogen sulfide gas may be released. (See Section VII.)

HAZARDOUS POLYMERIZATION: Will not occur.

SECTION VII - STORAGE PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Ensure adequate ventilation. (See Section V above.)

WARNING: Hydrogen sulfide (H₂S), an extremely flammable, highly toxic gas, may be released from heated asphalt and may accumulate in storage tanks and bulk transport compartments. Prolonged breathing of concentrations of H₂S around 50 ppm can produce eye and respiratory tract (mouth, nose, and throat) irritation, and at high concentrations (around 300ppm) is considered immediately dangerous to life and health. Because the sense of smell rapidly becomes insensitive to H₂S, its odor cannot be relied on as an indicator of its concentration. Always exercise caution when working around closed bulk containers of asphalt. Use ventilation or work upwind from sources of fumes or vapors. Asphalt kettles should always be used outdoors for adequate ventilation of fumes. Use supplied air respirators or self-contained breathing apparatus if the PEL or TLV (10 ppm, 8-hr. TWA) for H₂S is exceeded.

SECTION VIII - PHYSICAL DATA

MELTING POINT (°F): Not Applicable

BOILING POINT (°F): 700

SPECIFIC GRAVITY (H₂O=1): Not Determined, Approximately 1

PERCENT VOLATILE BY VOLUME: 0

VAPOR PRESSURE (mmHg @ 20°C): Not Applicable

VAPOR DENSITY (Air=1): Not Applicable

EVAPORATIVE RATE (ETHYL ETHER = 1): Not Applicable

SOLUBILITY IN WATER: Not Applicable

APPEARANCE AND ODOR: Brown to black solid, faint petroleum odor

pH: Not Applicable

SECTION IX - ENVIRONMENTAL PROTECTION

ACTION TO TAKE FOR SPILLS (Use Appropriate Safety Equipment): Dike storage tanks to prevent material from entering sewers or waterways. Absorb with inert materials such as sand or vermiculite. Dispose as a solid regulated waste.

WASTE DISPOSAL METHOD: Dispose in accordance with federal, state and local regulations as a solid waste. The primary method of disposal for dry solid waste are landfills or incineration.

EPA HAZARDOUS WASTE NUMBER: This material is not regulated under the "RCRA" hazardous waste regulations, but may be under state or local regulations.

SECTION X - SHIPPING INFORMATION

DOT SHIPPING DESCRIPTION: Asphalt

HAZARD CLASSIFICATION: (Primary) ORM-C (Water Only)

(Secondary) Not Applicable

ID NUMBER: NA1999

IMO CLASS NUMBER: 9

LABEL(S) REQUIRED (if not excepted): Not Applicable

EPA HAZARDOUS SUBSTANCE: Not Applicable

RQ VALUE: Not Applicable

PACKAGING REQUIREMENTS (49CFR): (Specific) Not Applicable

(Exceptions) Not Applicable

MAXIMUM NET QUANTITY IN ONE PACKAGE: (Cargo only aircraft) Forbidden

(Passenger aircraft) Forbidden

IATA PACKAGING GROUP: Not Applicable

FREIGHT DESCRIPTION: Asphalt

UNIT 4



PLANNING GUIDE

(Total unit time: 60 minutes)

| ACTIVITIES | ESTIMATED TIME | MATERIALS |
|----------------------------------------------------------------------------------------------------------------------------|----------------|-------------------------------------------------------------------------------------------------|
| 1. INTRODUCTORY PRESENTATION | 2 minutes | Instructor's Manual, pg. 4.3 |
| 2. ACTIVITY 1: Controlling Hazards | | Instructor's Manual, pg. 4.3 Chalkboard, or butcher paper and pen |
| a. Brainstorm workplace hazards | 5 minutes | Give each student: - Guide - Handout 1, <i>Hazard Controls</i> |
| b. Break into small groups to discuss controls for those hazards or revise risk maps (if students completed Unit 1) | 10 minutes | Give each small group: - Risk map (if students completed Unit 1) - Blue and green markers |
| c. Reconvene entire class and have groups report back to discuss controls | 15 minutes | |
| 3. ACTIVITY 2: Making an Action Plan | | Instructor's Manual, pg. 4.7 |
| a. Break into small groups to write plans | 10 minutes | Give each student: - Handout 2, <i>Action Plan</i> |
| b. Reconvene entire class and have groups discuss their plans | 15 minutes | |
| 4. ACTIVITY 3: Conclusion and Review | | |
| a. Students answer review questions | 3 minutes | Instructor's Manual, pg. 4.9 |



PREPARATION

- 1** READ through **INSTRUCTIONS, DISCUSSION POINTS** and **HANDOUTS** (including Instructor's Copies) before classtime.
- 2** REPRODUCE enough copies of **Handouts 1** and **2** (included with this manual) so that each of your students can have one.
- 3** BRING
 - One **Guide** for each of your students
 - **Handouts 1** and **2** for each student
 - The “risk maps” that the students drew during Unit 1 (if applicable)
 - A blue and green marker for each group that did a risk map
- 4** BEFORE THE CLASS STARTS Write the unit topic on your chalkboard or butcher paper:

UNIT 4:
PROTECTING
YOUR HEALTH

INTRODUCTORY PRESENTATION

UNIT FOUR INTRODUCTION (2 MINUTES)

[Distribute **Guide** and **Handouts 1** and **2** to students at beginning of class.]

INSTRUCTOR EXPLAINS:

You encounter various health hazards in the workplace, including the extra hazards caused by tobacco smoke and by other trades working around you. In this unit, we'll be discussing what can be done to control some of these health hazards. We'll be doing two activities. Are there any questions? Let's begin...

ACTIVITY 1

CONTROLLING HAZARDS (30 MINUTES)

INSTRUCTIONS

- 1 BRAINSTORM WORK HAZARDS** Ask class members to name some of the main hazards in their own workplaces. Write them on a chalkboard or butcher paper (5 minutes)
- 2 DIVIDE CLASS INTO GROUPS** Divide the class into small groups of three or four students each. (If the class completed Unit One, break into the same groups they were in when they drew the maps in Unit One. Give each group the map it drew in Unit One.)
- 3 EXPLAIN THE ACTIVITY** You've identified the hazards in your workplaces. During this class, we're going to figure out how to reduce or eliminate the health problems at work.

Write each hazard on Handout 1, *Hazard Controls*, in the first column. Then fill in the second column in the handout, noting what protective measures are currently in place. An example would be a ventilation system. Then, try to identify a kind of protection that might do a better job. An example might be substituting a safer material. Write that in the third column.

(For groups with risk maps: Remember that in Unit One you marked the hazards in your workplace in red. Now, with the blue markers, draw or write in the protective measures that are currently in place. An example would be a ventilation system. Then, try to identify a kind of protection that might do a better job. An example might be substituting a safer material. Write that with the green marker.) (10 minutes)

4 GROUPS REPORT BACK

Bring the whole class back together. Ask a spokesperson from each group to briefly describe the control measures they have written in both columns on their worksheet or on their map.

5 DISCUSS

Use the following questions to discuss the pros and cons of the different ways hazards can be controlled in the workplace. Ask each group a different question, selected from those below, as they report on their control measures. The **DISCUSSION POINTS** after each question suggest some answers you might look for. (See pages 30-31 and the Hazards Chart on pages 10-17 in the Guide for more details.)

5a

Point out the ventilation system one group has listed.

DISCUSSION
POINTS

Is this the best method to protect you from this hazard? Why or why not?



Ventilation is an important method of protection from chemical hazards. The most effective ventilation system draws the toxics away from the worker at the source of the contamination, through a “sucker” or hood. This is called local ventilation. General ventilation, such as open doors or a large overhead fan, brings fresh air into an indoor area and dilutes the toxic substances in the air, but doesn’t remove them as quickly and effectively.



If possible, an even better way to control a hazard is to eliminate it by changing to a less hazardous material, such as a safer solvent.

5b

Point out a hazard listed by students which is not being controlled very well.

DISCUSSION
POINTS

Is there a better way to protect you from this hazard? If so, what would you suggest?



The best type of control changes the equipment, materials or processes so that the toxic substance is either eliminated or workers’ exposure to it is reduced. When possible, the best way to protect workers is to

substitute a safer chemical for the hazardous one. If the hazard cannot be removed, it may be enclosed. This means that workers are protected from the hazard by a physical barrier.

5c

Point out an area listed by students where workers are protected by certain safety rules.

DISCUSSION
POINTS

Do these rules or safety procedures protect you? Are there other safety rules that should be set up?



Another way to control toxic hazards is to set up rules or procedures that reduce or eliminate workers' exposure. It may be possible to limit the number of people doing the job, limit the amount of time the workers are exposed or establish certain protective housekeeping and washing procedures. For example, special vacuuming or wet mopping may help reduce exposure to some hazardous dusts. Rules against smoking in indoor workplaces also limit workers' exposure to dangerous chemicals and safety hazards. California's Smokefree Workplace law is in the section of the Labor Code that requires employers to provide safe and healthy workplaces.

5d



Point out a work area listed by students where workers use personal protective equipment.

DISCUSSION
POINTS

Is this protective equipment the best way to protect yourself from this hazard? Why or why not?



Employers are responsible for supplying and properly maintaining personal protective equipment. Respirators, hoods, gloves, goggles and other kinds of protective clothing may be the only feasible protection in certain jobs. They can save lives. However, they do nothing to eliminate the hazard. Safety equipment is often uncomfortable and inconvenient to wear. It may not be effective if it's not the right kind, isn't well maintained or doesn't fit properly. Respirators, in particular, should only be considered as a last resort. Cal/OSHA standards require that respirators only be used as a last resort or as a temporary measure until a more effective control such as ventilation is put in place.



It is the employer's legal responsibility to provide a safe workplace. Sometimes instructions to use personal protective equipment shift this responsibility to the worker. Wear your personal protective equipment, but keep looking for more effective ways your employer can make your workplace safer.

 In general, the most effective control is one that eliminates the use of the toxic chemical. But often that is not possible. Before workers decide which control or set of controls to aim for, it's important to consider all the options, and the advantages and feasibility of each one. You may decide to work for the long-term elimination of a certain chemical, but in the meantime, have a plan for a short-term solution, too. We will be discussing this more in the next part of the unit.

ACTIVITY 2

MAKING AN ACTION PLAN (25 MINUTES)

INSTRUCTIONS

STEP ONE

Developing the Plan (10 minutes)

1

EXPLAIN THE EXERCISE

Explain to the students that the purpose of this exercise is to give them some practice in problem solving. What would be a realistic Action Plan for getting a certain control measure installed at their work sites? It's important that the discussion give students a chance to talk about real barriers they face when they try to use their rights, and what they can do to overcome those barriers. In the exercise, students will develop an Action Plan to overcome those barriers, using Handout 2.

Refer students to Handout 2, *Action Plan*. Based on the “brainstorm” list students just created, or their “risk maps,” they have decided which of their suggested changes are most needed. For example, one shop may need a new ventilation system and another may need to change solvents. The purpose of the Action Plan each group will prepare is to list what people can do to accomplish these changes.

Explain that it is important for groups to complete the back of Handout 2, “Obstacles” and “Strategies.” Finding ways to overcome obstacles may be the most important part of an Action Plan.

2

DIVIDE INTO GROUPS

Break the class into the same small groups that met during Activity 1. Encourage students to work together and share ideas about how to design an Action Plan. Refer them to pages 37-38 in the Guide.

STEP TWO

Discussing the Plan (15 minutes)

1

DISCUSS ACTION PLAN AND STRATEGIES

Bring the class back together. Ask one group to explain their Action Plan to the class. Encourage the whole class to discuss it and to suggest other strategies, based on their own Action Plans. Then have other groups explain their Action Plans.

2

RAISE KEY POINTS

Raise the following points that should be included in effective Action Plans if the students have not covered them in the discussion:

DISCUSSION POINTS



Get support of co-workers. All workers have the right to file a complaint and get a Cal/OSHA inspection of their workplace. But

you really cannot rely on the government to do your job for you. As you know, Cal/OSHA and other health and safety agencies are understaffed, underfunded and overburdened. No matter whether you're trying to get your employer to supply respirators that fit, install a ventilation system or establish a workplace smoking ban, the first and **most important** step to take is to get the support of your co-workers.



Change takes time. It takes time to convince co-workers that it's worth taking some action to eliminate a hazard. In many workplaces, people have found it useful to:

- Seek help from the union (or consider organizing one).
- Take a survey of the workforce to document the symptoms and illnesses that seem to be related to each worker's job.
- Identify other workers who are concerned.
- Identify resources for information and help.
- Have a meeting.
- Form a health and safety committee, or join one that's already been set up.
- Form a group to meet with the employer, or choose a co-worker the employer will listen to.



Talk to your employer. Some employers take their responsibility for providing a safe workplace seriously. Once they understand that conditions on their sites can cause serious health problems, they will attempt to cooperate in changing them. Some possible approaches are:

- Explain how serious the problem is.
- Explain how many workers' compensation claims there could be, and point out that they could be expensive and increase insurance rates.
- Show how production, absenteeism and morale will improve if hazards are reduced.
- Show the advantages of a health and safety committee.
- Request that the employer talk with their insurance carrier about health and safety services the insurer may provide.
- Tell them about Cal/OSHA's free consultation service for employers.



If your employer won't cooperate...When employers don't cooperate, workers still can:

- Seek help from a union (or consider organizing one).
- File a grievance (if there's a contract).
- File a Cal/OSHA complaint or get someone else to file one.
- File a complaint with the National Labor Relations Board.
- Tell the press about the problem. Go public in the community.
- Consider a job action or strike (only as a last resort).

ACTIVITY 3

CONCLUSION AND REVIEW (3 MINUTES)

INSTRUCTIONS For those students who have completed the entire course, use the following questions to review the main points in all four units. For those who have completed only individual units, use the questions that pertain to those units.

DISCUSSION POINTS

1

**What are some of the toxic hazards on your job?
(UNIT ONE)**



Students should mention some of the chemicals they are exposed to on their own jobs, as well as their health effects.

2

**What are some of the ways the combination of tobacco smoke and other chemical hazards creates extra risks?
(UNIT ONE OR UNIT TWO)**



Make sure students mention synergy (the combination of tobacco smoke and other chemicals, such as asbestos, greatly increasing the risk of disease), and the fact that smoking weakens the lungs' ability to filter out other chemicals.

3

**What are some of your legal rights to know about health hazards on the job? What does the law require your employer to do to make sure you have the information you need? Where else can you get information about the hazards on your job?
(UNIT THREE)**



Students should mention the employer's responsibility to provide MSDS's and to train them about health and safety hazards on the job. Other places they can get information include their union and Cal/OSHA.

4

**What are the best ways to control toxic hazards, including the hazard of tobacco smoke?
(UNIT FOUR)**



Students should say that substituting safer chemicals and eliminating tobacco smoke are the best controls for these hazards. They also should mention that ventilation is a better control method than wearing a respirator.

5

**What steps can workers take to make sure these protective measures are used in their workplace?
(UNIT FOUR)**



Students should list getting co-workers' support, asking the union for help, meeting with the employer, filing an OSHA complaint if necessary, etc.



Action Plan

HANDOUT 2

INSTRUCTIONS It is your job to come up with a realistic plan of action to deal with one health problem at your workplace. Some of the things a good plan should include are:

- Ways to involve your co-workers and work together.
- Strategies for approaching the employer
- What your resources are (for information, legal assistance).
- Contingency plans in case things don't go the way you expect them to.

THE GOAL OF THIS PLAN IS (Write down the protective measure you are trying to get, to deal with the health problem you've chosen).

STEPS TO ACHIEVE THIS GOAL

Step 1: _____

Step 2: _____

Step 3: _____

List on the back some of the obstacles you think you might run into in working on these problems, along with strategies you could use to get around them.

