

INSTRUCTOR GUIDE

RINGS OF FIRE

Tire Fire Prevention and Suppression

Lesson Plan 03 TIRE MARKETS

TOPIC: Tire markets and Applications

LEVEL: I

TIME: 30 Minutes

BEHAVIORIAL OBJECTIVE:

Condition: Complete evaluation with 70% accuracy

Behavior: The student will . . .

1. Cite how tires are being used in a wide variety of products and civil engineering applications.
2. Identify potential tire storage operations and locations.

Standard: According to the referenced text

REFERENCES: Slaughter, Rodney. "RINGS OF FIRE: Tire Fire Prevention and Suppression" California State Fire Marshal, June 2004.

MATERIALS NEEDED: PC projector, projection screen, VCR, multimedia slide show on CD-ROM, speakers.

PREPARATION: Tires are a lot like icebergs. Ice traps water in a solid form while tires hold oil in a solid form. You only see a portion of the iceberg floating in the ocean. Similarly, with large scrap tires you only see the problem of outdoor tire storage-- you may not see or even realize that there are many legitimate scrap tire dealers, business people and government agencies working to develop markets for our discarded tires and finding a solution to the outdoor tire storage problem.

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PRESENTATION	APPLICATION
<p>I. Tire Market Objective</p> <ul style="list-style-type: none">A. Cite how tires are being used in a wide variety of products and civil engineering applicationsB. Identify potential tire storage operations and locations <p>II. Waste Tire Markets and Usage</p> <ul style="list-style-type: none">A. Many different uses in industries: Sports, Agriculture and Civil EngineeringB. CWIMB estimates 74% of scrap tires in California are diverted to other sourcesC. CWIMB and other agencies are continuously encouraging new marketsD. Of these markets we are going to discuss:<ul style="list-style-type: none">1. Retreading2. Ground Rubber3. Civil Engineering4. Fuel Supplement	<p>From the Background Menu click on the Tire Market button.</p> <p>Tire Market Objective Slide 01</p> <p>Tire Market Slide 02 Market Pie Chart</p> <p>Instructors Note: Review information on pie chart with class</p> <p>Tire Market Slide 03 Markets</p>

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<p>III. Retreading</p> <ul style="list-style-type: none">A. The most direct form of reuse / diversionB. Old casing is removed from the tire, the casing is buffed, and new casing is appliedC. Old tread is used in some other application and the new casing is put back into active serviceD. Retreading mostly applies to heavy truck tiresE. The United States Fire Administration and Federal Emergency Management Agency report as of Dec 1998 approx. 38 million passenger car tires and truck tires were retreaded <p>IV. Ground Rubber</p> <ul style="list-style-type: none">A. Some examples of uses:<ul style="list-style-type: none">• Athletic mats and Running tracks• Playground chips and Carpet padding• Toys and Airplane shock absorbers• Stock Feeders and Fences• Dock Bumpers and Boots• Door mats and Gloves• Hockey pucks and Soles for sandals• Mud flaps and Speed bumps• Roofing materials and Soaker hoses	<p>Tire Market Slide 04 Retread</p> <p>Tire Market Slide 05 Crumb Rubber 1</p> <p>Instructors Note: Pass around samples of crumb rubber products.</p>

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<p>2. Imagine fighting a tire product fire in these winter conditions?</p>	
<p>V. Civil Engineering Applications</p>	<p>Tire Market Slide 10 Civil Engineering 1</p>
<p>A. Artificial reefs, breakwaters, retaining walls, and crash barriers, alternative Daily Cover (ADC), loose fill, slope stabilization, levee slurry walls, landfill leachate collection systems</p>	
<p>B. Civil Engineering Applications of Scrap Tires are covered in ASTM Standard 6270</p>	<p>Tire Market Slide 11 Civil Engineering 2</p>
<p>C. Tire Derived Aggregate (TDA)</p> <ul style="list-style-type: none"> • Half the weight of soil • Half the pressure of soil • Good thermal insulating qualities • Better drainage than soil • Vibration dampening • 56 million tires a year used for C.E. 	<p>Tire Market Slide 12 Civil Engineering 3</p>
<p>D. Diagram example of a San Jose Freeway interchange where tires are being used as opposed to dirt and rock in wet clay soils</p>	<p>Tire Market Slide 13 Civil Engineering 4</p>
<p>E. Photo Sample showing the actual use of tire product on the interchange</p>	<p>Tire Market Slide 14 Civil Engineering 5</p>
<p>F. Diagram of a Freeway Retainer wall in Riverside</p>	

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<p>G. Photo of actual tire material used in the retaining wall</p> <p>VI. Fuel Supplement</p> <p>A. The largest market for reuse of waste tires both in the nation and in California is the use of tires as a fuel supplement</p> <p>B. Pulp and paper mills, cement kilns, and coal co-generation facilities</p> <p>C. Nearly 39 percent of all waste tires generated in California in 1999 were used as fuel</p> <p>D. While conducting scientific experiments with U.C. Berkeley temperature of our test pile peaked at 1103 degrees Centigrade</p> <p>E. The results of these test became the table of separation distances in NFPA 231 D, 230 Annex G and will soon appear in NFPA 1</p> <p>F. Tire Derived Fuel, or Tire Diverted Fuel (TDF), is a high quality fuel that can produce up to 15,000 British Thermal Units (BTU) per pound of tire material</p> <p>G. Table of Heat Release Values</p> <p>H. Tires generally create less ash and sulfur than some types of coal, and when mixed with coal, burn completely minimizing chemical emissions to the atmosphere</p>	<p>Tire Market Slide 15 Civil Engineering 6</p> <p>Tire Market Slide 16</p> <p>Tire Market Slide 17 Heat Release</p> <p>Tire Market Slide 18 Heat Release 2</p> <p>Instructors Note: Discuss slide for Heat Release Values</p>

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PRESENTATION	APPLICATION
<p>I. Three cement kilns in California used 4.1 million tires as supplemental fuel</p> <p>J. Tires were used because they have higher heat energy by weight and they reduce emissions of certain regulated pollutants</p> <p>K. Additionally, the steel belts in many tires produce minor amounts of iron ore, which is used in the cement making process</p> <p>L. Coal co-generation plants can burn shredded tires with the coal to produce energy</p> <p>M. The CIWMB funded emissions tests at two coal co-generation plants in northern California revealing that these two coal co-generation plants could use 1-2 million tires per year</p>	<p>Tire Market Slide 19 Co-generation</p> <p>Instructors Note: Background photo is of the Westley, Calif. Co-generation Plant.</p>
<p>VII. Combustion Byproducts Barriers to Reuse / Recycling</p> <p>A. The CIWMB and other agencies across the nation are continually encouraging the development of new markets</p> <p>B. One barrier to use of waste tires for recycling purpose is the byproducts of burning tires</p> <p>C. Markets, however, have been identified for many of the combustion products</p> <p>D. Table 5 below shows some of the uses for the major combustion byproducts</p>	

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<p>E. Byproduct Use/Market</p> <ul style="list-style-type: none">• Calcium sulfate (gypsum) - Agricultural additive for clay soils• Zinc oxide (from fly ash) - Smelting, fertilizer and cattle feed companies• Iron oxide (from furnace) - Cement production	<p>Instructors Note: Give summary and then read evaluation questions</p> <p>Tire Market Slide 20 Market Questions</p>

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SUMMARY:

In order to completely understand the tire situation and all the economic aspects involved, it is important to view the tire storage problem from different perspectives. This section highlights a few of the alternative uses for waste tires. Remember that the tires you replace on own family car or emergency response vehicle all contribute to the problem.

EVALUATION:

1. Name three uses for waste tires?

Answer: Material in new products, civil engineering applications and as fuel or fuel supplement.

2. How much energy is generated from a pound of tire material?

Answer: 15,000 btu per pound or 34,950 kilojoules per kilogram

3. Where could you locate a large feedstock of waste tires?

Answer: Retreading shops, ground rubber facilities, outdoor storage yards, automotive wrecking yards and some retailers

ASSIGNMENT:

None