



Follow The Flow

Where Solid and
Liquid Waste
Come From ...
And Where
They Go

A
Teacher's Guide
To Use
Before and After
Sanitation Districts'
Tours

ACKNOWLEDGEMENTS

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SANITATION DISTRICTS OF LOS ANGELES COUNTY

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WELCOME...

...to Follow The Flow: Where Solid and Liquid Waste Come From...And Where They Go.

This teacher's guide will help you introduce your students to the topics of solid waste management and wastewater treatment and prepare them for a tour of the landfill and wastewater treatment facilities of the Sanitation Districts of Los Angeles County.

ABOUT THE SANITATION DISTRICTS

The Sanitation Districts provide environmentally sound, cost effective wastewater and solid waste management for over half the population of Los Angeles County. In doing so, we take what others had thought of as waste and turn it into resources such as reclaimed water, energy, and recycled materials.

The Sanitation Districts construct, operate, and maintain facilities to collect, treat, recycle, and dispose of sewage and industrial wastes. Our 1,300 miles of main trunk sewers and 11 wastewater treatment plants convey and treat approximately 510 million gallons per day, with 35% available for reuse in the dry Southern California climate.

In addition, the Sanitation Districts operate three sanitary landfills, which handle approximately 40% of the solid waste produced in Los Angeles County. The agency also manages three landfill gas-to-energy facilities, two recycle centers, and two transfer/material recovery facilities and participates in the operation of two refuse-to-energy facilities.

Additional information about the Sanitation Districts is provided in the Appendix of this guide.

GOALS AND OBJECTIVES OF FOLLOW THE FLOW

The goal of *Follow the Flow* is to introduce young people to solid waste management, wastewater treatment, and the issues related to these subjects. Every day, each person in Los Angeles County is responsible for producing approximately 7 pounds of solid waste and 100 gallons of wastewater. These wastes must be managed in a way that protects both public health and the environment.

Most people have no idea what happens to their wastes and where they go. *Follow the Flow* aims to educate young people about this important topic. Students are introduced to landfills and wastewater treatment plants through these lessons and then visit these facilities during their tour.

Furthermore, *Follow the Flow* challenges students to explore the entire waste cycle and think about its impact on the environment. Resource conservation and recycling are critical issues that are discussed in these lessons. For instance, students look at the types and amount of waste they produce and explore ways to reduce it.

After completing *Follow the Flow*, your students will be aware of the solid waste and wastewater they generate, understand what happens to it, and learn what they can do to help manage these wastes. Their knowledge will empower them to improve the environment now and in the years to come.

INTRODUCTION

The following lessons have been developed to help prepare your students for their tours of the Puente Hills Landfill and the San Jose Creek Water Reclamation Plant (or another landfill or wastewater treatment plant) and to help them incorporate the concepts of reducing solid and liquid waste and keeping our environment clean.

This guide is presented in two sections:



Each section contains four lessons. The first two lessons are to be conducted before students go on the tour; the second two lessons should be used after the tour.

LESSON ORGANIZATION

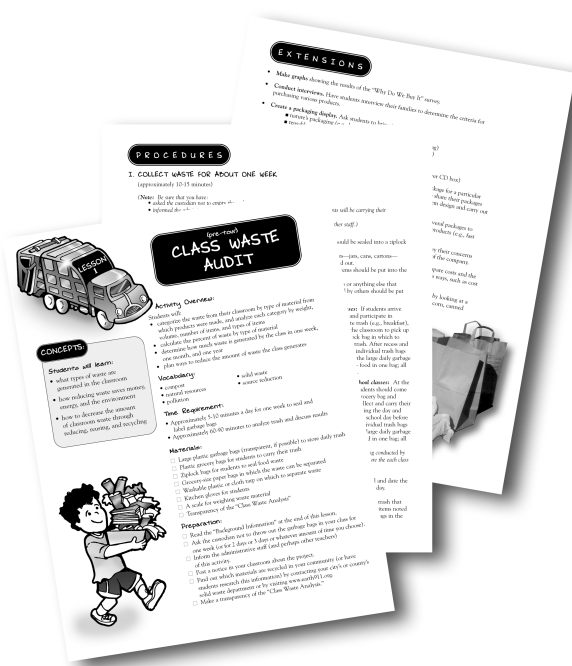
Introduction. At the beginning of each lesson, you will find listed:

- the learning concepts for that lesson
- an overview of the activities students will be doing
- vocabulary words that might be new for students
- the time required for the entire lesson
- the materials needed to conduct the activities
- preparation needed prior to teaching the lesson.

Procedures. Detailed procedures for conducting the lesson's activities with your students are provided. Since students from fifth grade to high school participate in the tours, the lessons have been developed to try to accommodate various skill levels. In some instances, suggestions are provided for adapting the activities to younger or older students. All activities should be appropriate for all students; some activities may need to be slightly simplified for younger learners; students in upper grades will, of course, be able to bring a higher level or complexity.

Time Requirements. Most lessons will take from one to two class periods. For each activity within the lesson, an estimation is given for how much time that activity will require. The time, of course, will vary according to students' skill levels and the pace of instruction. If you don't have time for the entire lesson, you can choose select activities.

Extensions. Following the procedures for each lesson are suggestions for other activities to extend the learning. These activities can be used to provide extra practice, to expand the lesson, and to connect the unit to other curricular areas. In general, the list of extension activities begins with the simplest activities.



Background Information. At the end of each lesson is information for teachers pertaining to the content of that lesson. This information is not needed to conduct the lesson, but it will provide you with brief background and details that you can use to enhance the lesson as you are teaching. For older students, you might want to reproduce and hand out the background information.

Masters. Following each lesson are the masters needed to make the transparencies and student handouts used in that lesson.

MATERIALS

Besides the masters included with each lesson, supplementary materials are provided in the appendix. These materials include:

Brochures

- “Puente Hills Landfill”
- “Water Recycling”
- “Waste Management Solutions” – Information and Activities from the National Energy Foundation
- “Make Waves: Career Paths in the Water Environment” (poster/brochure)
- Sanitation Districts of Los Angeles County Fact Sheet

Posters

- “A Day At The Landfill”
(inside the foldout *Solid Waste: Past, Present and Future*)
- “Where Does Your Trash Go?”
(inside the foldout *Solid Waste Management: A Look Ahead*)
- “River In A Concrete Box”
(inside the foldout *Germis*)

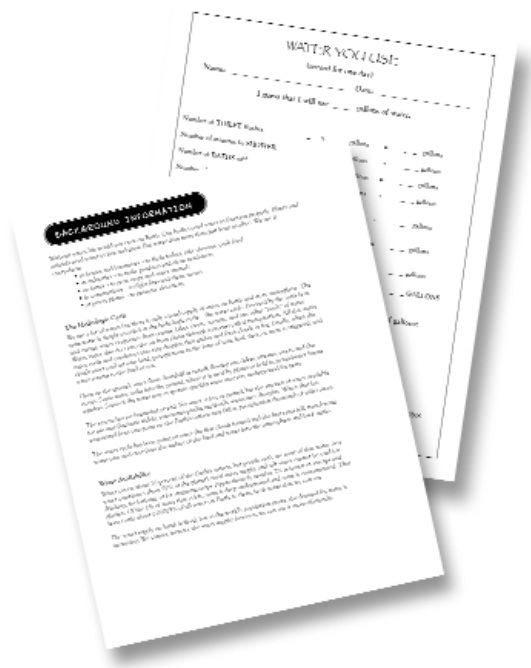
All other materials needed in each lesson are common items; however, some lessons do require a number of materials. Therefore, it is suggested that prior to teaching the lessons, you make a list of the materials you need and perhaps send a letter home with students, asking if any of the materials can be contributed.

GLOSSARY

Definitions for the vocabulary words listed in each lesson are contained in the Glossary following all the lessons.

CORRELATIONS WITH CONTENT STANDARDS

The activities within these lessons can be used to support many of the California Content Standards. Charts are provided showing lesson correlations with standards in History, Language Arts, Science, and Math for grades 5 through 12.



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SOLID WASTE LESSONS

The following four lessons have been developed to use with students before and after their tour of the Puente Hills Landfill or another landfill site.

- Lessons 1 and 2 are to be conducted before students take the tour.
- Lessons 3 and 4 should be conducted after the tour.

The goal is for students to understand the importance of landfills in disposing of our solid waste and to learn practices that reduce the amount of solid waste we produce, thus saving natural resources, including the land needed for landfills.

The concepts that students will learn include:

- People produce many types of solid waste.
- The amount of waste can be decreased through reducing, reusing, and recycling.
- Reducing waste saves money, energy, and the environment.
- Landfills are commonly used to dispose of solid waste.
- Landfills are designed to protect the environment.
- Many natural resources in solid waste are lost once they are buried in landfills.
- Packaging is a major component of our solid waste.
- People buy and throw away many disposable products.
- People can reduce the amount of solid waste they generate by making thoughtful and informed choices when they buy products.
- Most products made by people don't have to be thrown away and can be kept in a cycle through reusing and recycling.



An outline overviewing all four lessons is shown on the following page.

These lessons have been adapted from *Closing the Loop: Exploring Integrated Waste Management and Resource Conservation*, developed by the California Integrated Waste Management Board.

SOLID WASTE LESSONS OVERVIEW

Lesson 1: <i>Pre-Tour</i>	CLASS WASTE AUDIT 7 I. Collect waste for about one week II. Analyze trash III. Discuss results of analysis IV. Plan ways to reduce trash Extensions Background Information Masters - <i>Class Waste Analysis</i>
Lesson 2: <i>Pre-Tour</i>	FILL A LANDFILL15 I. Determine what solid waste is and where it goes II. Construct landfill models III. Prepare for field trip IV. Analyze contents of model landfills (<i>four weeks later</i>) Extensions Background Information Masters - <i>Construction of a Landfill in a Bottle</i> - <i>Layers in a Landfill</i>
Lesson 3: <i>Post-Tour</i>	BUYER BEWARE25 I. Analyze why we buy products II. Analyze packaging III. Discuss buying decisions Extensions Background Information Masters - <i>Why Do We Buy It?</i>
Lesson 4: <i>Post-Tour</i>	CYCLES 33 I. Categorize objects by natural resource base II. Discuss cycles III. Examine life cycle of various objects IV. Plan recycling Extensions Background Information Masters - <i>Papermaking: One Way or a Cycle?</i>