



**DESIGNING A CAMPUS NEEDS  
ASSESSMENT FOR YOUR SCHOOL**



**Mariposa County Unified School District**

## **An Introduction to the Mariposa County Unified School District Campus Needs Assessment**

*Environmental concerns that once received relatively little attention have suddenly become statewide priorities. Environmental education is not advocacy for particular opinions or interests, but it is a means of fostering a comprehensive and critical approach to issues. Senate Bill 373 requires that specific environmental topics, such as integrated waste management, be included in the California Education Science Framework. The “Campus Needs Assessment” is a project that addresses community waste management issues.*

**Goal.** The purpose of this campus needs assessment is to raise awareness within the school community (and beyond) about how much waste people generate and what happens to that waste. Most of us are unaware of how much waste we personally generate, where our garbage goes when we throw it “away”, and that waste must be “managed” within a community. We vaguely recognize that we should conserve, reuse and recycle, but we don’t know how much impact our efforts have.

**Academic Standards and Content Integration.** This UES (Unified Education Strategy) project integrates numerous academics standards into a real-life service-learning activity. The first stage of the project is the Campus Needs Assessment, which involves a student led audit of waste generated at their own schools. Advance preparation (Session 1) begins with a pre-survey about conceptual understanding of civic responsibility (p. 12) followed by a student produced KWL chart (p. 13). Both of these activities may be used at the end of the project to determine student growth. Advance preparation continues with five standards-based classroom lessons to introduce concepts of renewable and non-renewable resources and waste management. With these lessons students begin the journal/learning log entries that will become a resource for a culminating report.

**The “Audit”.** Session 2 lessons introduce students to the focus of the UES project – an audit (measure) of waste at each school site. Lessons describe preparation, responsibilities and procedures for conducting the audit. In session 3 students conduct the single-day waste audit at their schools. It is hoped that all participating district schools will be able to conduct the audit on the same day. As part of the audit, students will be recording data on “Waste Data Collection Forms” (p. 35).

**Analyzing Data.** Following the audit day, in Sessions 4 and 5, students analyze their data and survey responses, and (as described in Sessions 6 & 7) prepare summary reports. Reports, along with evidence of raw data, will be submitted to the District’s UES team. Session 8 describes oral presentations that may follow.

**Site Variation.** The project is described for application in grades 5-8, but this important project can involve and *will* have relevancy for the entire school. While each component of the project is described in detail, teachers may make modifications as circumstances dictate at their specific site. Constructivist teachers may find that the project takes on a life of its own, stimulating additional standards-based activities beyond the scope of this project.

**Year Two.** The waste audit is only the first step in this two-year project. Once students understand waste patterns at their schools, they will continue the project into year two by investigating, planning, and possibly implementing solutions to waste management needs.

**Suggestions for Getting Started.** This is a real life service-learning project designed to raise student awareness, provide students with an opportunity to make a difference and to develop and/or understand their sense of responsibility within their community. Students will have opportunities to work together as “teams” responding to true community needs. Teachers can provide the motivation

to help make this an exciting project from the beginning. Some suggested motivational kick-offs include:

- Have students collect their personal trash (not including organic waste) over one day and record and discuss their findings.
- Spread a tarp on the floor at the end of the school day and dump one day's accumulation of classroom trash to spark discussion. Ask open-ended questions of the student's reactions.
- Collect all the trash for an entire day and create a school-wide mountain of trash to be analyzed.

**Why get involved in this project?** Projects such as these enhance scientific and critical thinking skills. They enable students to perceive patterns and processes of nature, research environmental issues and propose reasoned solutions. Further, students gain a personal sense of responsibility for the environment, and consequently, schools are tied more closely to the life of the communities they serve.

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## **Materials Needed for the CNA Process**

- five gallon garbage bags
- thirty gallon garbage bags
- ten 5 gallon buckets
- three 30 gallon buckets
- one journal for each student
- magazines, glue, poster paper (lesson 2)
- copies of Venn Diagram for students (lesson 4)
- labels for each trash can (lesson 6)
- copies of survey pages (lesson 6, 7)
- copies of Waste Data Collection Form (lesson 7)
- copies of Waste Data Analysis Form (lesson 8)

**Standards-based Connections Set and Learning Objectives  
for the Campus Needs Assessment**

**English/Language Arts:**

**Grade 5**

**Writing Strategies Standard 1.0**

**Students write clear, coherent, and focused essays. The writing exhibits the students' awareness of the audience and purpose. Essays contain formal introductions, supporting evidence, and conclusions. Student's progress through the stages of the writing process as needed.**

**Standard 1.2**

- L.O. Students create multiple-paragraph expository compositions
- L.O. Students establish a topic, important ideas, or events in sequence or chronological order.
- L.O. Students provide details and transitional expressions that link one paragraph to another in a clear line of thought.
- L.O. Students offer a concluding paragraph that summarizes important ideas and details.

**Writing Application Standard 2.0**

**Students write narrative, expository, persuasive, and descriptive texts of at least 500 to 700 words in each genre. Student writing demonstrates a command of standard American English and the research, organizational, and drafting strategies outlined in Writing Standard 1.0.**

**Standard 2.3**

- L.O. Students write research reports about important ideas, issues, or events.
- L.O. Students frame questions that direct the investigation.
- L.O. Students establish a controlling idea or topic.
- L.O. Students develop the topic with simple facts, details, examples, and explanations.

**Speaking Applications Standard 2.0**

**Standard 2.2**

- L.O. Students will deliver informative presentations about an important idea, issue, or event

**Grade 6**

**Writing Strategies Standard 1.0**

**Students will write clear, coherent, and focused essays. Writing will exhibit students' awareness of the audience and purpose. Essays contain formal introductions, supporting evidence, and conclusions. Student's progress through the stages of the writing process as needed.**

- L.O. Students will write an expository composition of at least 500-700 words.
- L.O. Student writing will exhibit students' awareness of audience and purpose.
- L.O. Student writing will identify a hypothesis.
- L.O. Student writing will display evidence of a progression through the stages of the writing process.

**Writing Applications Standard 2.0**

**Students write narrative, expository, persuasive, and descriptive texts of at least 500 to 700 words in each genre. Student writing demonstrates a command of standard American English and the research, organizational, and drafting strategies outlined in Writing Standard 1.0.**

**Standard 2.2 Students write expository compositions (e.g., description, explanation, comparison and contrast, problem and solution.**

- L.O. Students state the thesis or purpose.
- L.O. Students explain the situation.
- L.O. Students follow an organizational pattern appropriate to the type of composition.
- L.O. Students offer persuasive evidence to validate arguments and conclusions as needed.

**Speaking Applications Standard 2.0**

**Standard 2.5**

- L.O. Students will deliver presentations on problems and solutions.

**English/Language Arts: continued**

**Grade 7**

**Writing Applications Standard 2.0**

**Students write narrative, expository, persuasive, and descriptive texts of at least 500 to 700 words in each genre. The writing demonstrates a command of standard American English and the research, organizational, and drafting strategies outlined in Writing Standard 1.0.**

**Standard 2.3 Students will write research reports**

- L.O. Students pose relevant and tightly drawn questions about the topic.
- L.O. Students convey clear and accurate perspectives on the subject.
- L.O. Students include evidence compiled through the formal research process (e.g., use of a card catalog, *Reader's Guide to Periodical Literature*, a computer catalog, magazines, newspapers, dictionaries).
- L.O. Students document reference sources by means of footnotes and a bibliography.

**Standard 2.0 Speaking Applications**

**Standard 2.3**

- L.O. Students will deliver research presentations.

**Grade 8**

**Writing Applications Standard 2.0**

**Students write narrative, expository, persuasive, and descriptive essays of at least 500 to 700 words in each genre. Student writing demonstrates a command of standard American English and the research, organizational, and drafting strategies outlined in Writing Standard 1.0.**

**Standard 2.3 Students will write research reports**

- L.O. Students define a thesis.
- L.O. Students record important ideas, concepts, and direct quotations from significant information sources and paraphrase and summarize all perspectives on the topic, as appropriate.
- L.O. Students use a variety of primary and secondary sources and distinguish the nature and value of each.
- L.O. Students organize and display information on charts, maps, and graphs.

**Standard 2.0 Speaking Applications**

**Standard 2.3**

- L.O. Students will deliver research presentations

**Math:**

**Grade 5**

**Statistics, Data Analysis, and Probability**

**Standard 1.0 Students display, analyze, compare, and interpret different data sets, including data sets of different sizes:**

- L.O. Students apply the concepts of mean, median, and mode; compute and compare simple

examples to show that they may differ.

- L.O. Students organize and display single-variable data in appropriate graphs and representations (e.g., histogram, circle graphs) and explain which types of graphs are appropriate for various data sets.
- L.O. Students use fractions and percentages to compare data sets of different sizes.

### **Mathematical Reasoning**

#### **Standard 1.0 Students make decisions about how to approach problems:**

- L.O. Students will analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
- L.O. Students will determine when and how to break a problem into simpler parts.

### **Math: continued**

#### **Grade 5**

#### **Standard 2.0 Students use strategies, skills, and concepts in finding solutions:**

- L.O. Students use estimation to verify the reasonableness of calculated results.
- L.O. Students apply strategies and results from simpler problems to more complex problems.
- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
- L.O. student indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- L.O. Students make precise calculations and check the validity of the results from the context of the problem.

#### **Grade 6**

#### **Statistics, Data Analysis and Probability**

#### **Standard 2.0 Students use data samples of a population and describe the characteristics and limitations of the samples.**

- L.O. Students compare different samples of a population with the data from the entire population and identify a situation in which it makes sense to use a sample.
- L.O. Students identify different ways of selecting a sample and which method makes a sample more representative for a population.
- L.O. Students identify data that represent sampling errors and explain why the sample (and the display) might be biased.
- L.O. Students identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.

#### **Standard 3.0 Students determine theoretical and experimental probabilities and use these to make predictions about events:**

- L.O. Students represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.
- L.O. Students use data to estimate the probability of future events (e.g., batting averages or number of accidents per mile driven).

### **Mathematical Reasoning**

#### **Standard 1.0 Students make decisions about how to approach problems:**

- L.O. Students analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and

observing patterns.

**Standard 2.0 Students use strategies, skills, and concepts in finding solutions:**

- L.O. Students use estimation to verify the reasonableness of calculated results.
- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.

**Math: continued**

**Grade 7**

**Statistics, Data Analysis, and Probability**

**Standard 1.0 Students collect, organize, and represent data sets that have one or more variables and identify relationships among variables within a data set by hand and through the use of an electronic spreadsheet software program:**

- L.O. Students create various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.
- L.O. Students represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level).
- L.O. Students will compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.

**Mathematical Reasoning**

**Standard 1.0 Students make decisions about how to approach problems.**

- L.O. Students analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
- L.O. Students formulate and justify mathematical conjectures based on a general description of the mathematical question or problem posed.
- L.O. Students determine when and how to break a problem into simpler parts in the data analysis piece.

**Standard 2.0 Students use strategies, skills, and concepts in finding solutions:**

- L.O. Students use estimation to verify the reasonableness of calculated results.
- L.O. Students apply strategies and results from simpler problems to more complex problems.
- L.O. Students estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.
- L.O. Students make and test conjectures by using both inductive and deductive reasoning.
- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.

**Standard 3.0 Students determine a solution is complete and move beyond a particular problem by generalizing to other situations.**

- L.O. Students evaluate the reasonableness of the solution in the context of the original situation.
- L.O. Students note the method of deriving the solution and demonstrate a conceptual understanding

of the derivation by solving similar problems.

- L.O. Students develop generalizations of the results obtained and the strategies used and apply them to new problem situations.

## **8<sup>th</sup> Grade Algebra 1**

### **Standard 5.0**

- L.O. Students solve multistep problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.

### **Standard 10.0**

- L.O. Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.

### **Standard 13.0**

- L.O. Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.

## **Science:**

### **Grade 5**

#### **Investigation and Experimentation Standard 6**

**Scientific progress is made when students ask meaningful questions and conduct careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.**

- L.O. Students will develop a testable question. (Science standard 6b)
- L.O. Students will plan and conduct a simple investigation. (Science standard 6c)
- L.O. Students will record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data. (Science standard 6g)
- L.O. Students will draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion. (Science standard 6h)
- L.O. Students will write a report of an investigation that includes conducting tests, collecting data or examining evidence, and drawing conclusions. (Science standard 6i)

### **Grade 6**

#### **Resources Standard 6**

**Students know that sources of energy and materials differ in amounts, distribution, usefulness, and the time required for their formation.**

- L.O. Students will classify different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water and forests as renewable or non-renewable. (Science Standard 6b)
- L.O. Students report on the natural origin of the materials used to make common objects. (Science: Resource Standard 6c)

#### **Science Investigation and Experimentation Standard 7**

**Students will ask meaningful questions and conducting careful investigations.**

- L.O. Students will develop a hypothesis.
- L.O. Students will select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
- L.O. Students will construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
- L.O. Communicate the steps and results from an investigation in written reports and oral presentations.

## **Grade 7**

### **Investigation and Experimentation Standard 7**

**Students will ask meaningful questions and conducting careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.**

- L.O. Students select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.
- L.O. Students use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.
- L.O. Students will communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.
- L.O. Students will communicate the steps and results from an investigation in written reports and oral presentations.

## **Science: continued**

### **Grade 8**

#### **Structure of Matter Standard 3**

**Each of the more than 100 elements of matter has distinct properties and a distinct atomic structure. All forms of matter are composed of one or more of the elements.**

- L.O. Students apply the use of the periodic table to identify elements in simple compounds.

#### **Reactions Standard 5**

**Chemical reactions are processes in which atoms are rearranged into different combinations of molecules.**

- L.O. Students show reactant atoms and molecules interact to form products with different chemical properties.
- L.O. Students write an analysis of how the idea of atoms explains the conservation of matter in renewable and nonrenewable resources: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.
- L.O. Students show that chemical reactions usually liberate heat or absorb heat when they analyze their systems map.

#### **Periodic Table Standard 7**

**The organization of the periodic table is based on the properties of the elements and reflects the structure of atoms.**

- L.O. Students identify regions corresponding to metals, nonmetals, and inert gases.
- L.O. Students show substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity as they analyze their systems map.

#### **Density and Buoyancy Standard 8**

**All objects experience a buoyant force when immersed in a fluid. As a basis for understanding this concept**

- L.O. Students calculate density as mass per unit volume.
- L.O. Students calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.

#### **Investigation and Experimentation Standard 9**

**Students will ask meaningful questions and conduct careful investigations. As a basis for understanding this concept and addressing the content in the other three strands, students should develop their own questions and perform investigations.**

- L.O. Students will plan and conduct a scientific investigation to test a hypothesis.  
L.O. Students will evaluate the accuracy and reproducibility of data.

### **History/Social Studies:**

OPTIONAL as determined by teacher (see assessment strategies section):

#### **6<sup>th</sup> Grade**

**Students analyze the interactions among the various cultures of ancient civilizations, emphasizing their enduring contributions and the link, despite time, between the contemporary and ancient worlds.**

- L.O. Students will locate and describe major river systems and discuss the physical settings that supported the rise of early civilizations such as India, Mesopotamia, Egypt, and Kush.  
L.O. Students will discuss the connections between geography and the development of city-states in the region of the Aegean Sea.

**Other(s): The intellectual skills noted below are to be learned through, and applied to, the content standards for grades six through eight.**

- L.O. Students recognize that interpretations of history are subject to change as new information is uncovered. (6<sup>th</sup>-8<sup>th</sup> History-Social Science Analysis Skills)  
L.O. Students interpret basic indicators of economic performance and conduct cost-benefit analyses of economic and political issues. (6<sup>th</sup>-8<sup>th</sup> History-Social Science Analysis Skills)

#### **Notes to Teachers:**

1. The following advance preparation is required before implementing this unit:
  - a. Identify your school waste hauler and local jurisdiction waste management authority and request their assistance in tailoring your audit to reflect your local situation. These agencies/companies should be able to answer technical questions and may be able to assist with conducting the audit, especially if recruiting parent volunteers is difficult. (Your school or district office should be able to provide you with the necessary contact information.)
  - b. Ask your school waste hauler or local jurisdiction waste management authority how your campus' waste is disposed of, including the name and location of the local landfill and other waste management procedures in place in your city/county. (Session 1).
  - c. Contact either Steve Engfer, Mariposa County Public Works, at 209-966-5356 or [sengfer@mariposacounty.org](mailto:sengfer@mariposacounty.org), or Debra Freitas, MCUSD Science and Service Learning Coordinator, at 209-742-0240 or [dfreitas@mariposa.k12.ca.us](mailto:dfreitas@mariposa.k12.ca.us), to request delivery of 10 five-gallon buckets. You will also need five 30-gallon containers for use during the waste audit conducted in Session 3. If these are not available at your site, contact one of the above. Note: the 30-gallon containers are for use in the cafeteria/lunch area. (Session 2). Determine and procure the number of appropriate size garbage bags that you will need.
  - d. Contact your school waste hauler (Total Waste at 209-9663190) or local waste management authority (Steve Engfer at Public Works 209-966-5356) and determine what can be recycled in your community. Also determine what your school district's waste hauler will collect. Additional information may be available online at [www.ciwmb.ca.gov/profiles](http://www.ciwmb.ca.gov/profiles) or by calling 1-800-CLEANUP. (Session 2).
  - e. Arrange for school staff members to answer questionnaires prior to student audits.
  - f. Prepare a simple campus map, or modify an existing one, to indicate locations of waste handling equipment and facilities on campus.
2. Teachers may substitute alternate instructional activities that cover the concepts indicated in the background sections. Sources of additional related activities are listed in the Waste Resource Manual.

- All audit worksheets are provided and, in order to ensure consistency with data gathering, must be conducted as written. Each worksheet, however, includes extra space so students may add questions tailored to individual or local matters.

**Lesson Planning for the Campus Needs Assessment**

Pre-assessment strategy:

- Conduct Civic Responsibility Survey Pre/post Activity. Read the definitions and instructions aloud with your students.

CAUTION: Your students may not be familiar with the vocabulary on this survey. This is OK. The survey is designed to show growth of civic responsibility over time. You may read the statements aloud, but please do not elaborate.

## Civic Responsibility Survey Pre/Post Activity

Name of Student \_\_\_\_\_ I.D. No. \_\_\_\_\_

**Civic:** of a city, citizen or citizenship

**Responsibility:** the act of being personally accountable, being dependable, reliable, or being a source or cause

**Civic Responsibility:** citizens of a community being personally accountable to and for that community

Circle your choice of answers.

**1-Strongly Agree    2-Agree    3-Don't Know    4-Disagree    5-Strongly Disagree**

What I do in my community can make a difference.	1	2	3	4	5
What I do to participate in local politics matters.	1	2	3	4	5
What I do can help others	1	2	3	4	5
What I do can make a difference with problems in my town.	1	2	3	4	5
What I do can make a difference in the environment	1	2	3	4	5
I am affected by problems in my community.	1	2	3	4	5
I belong to a community where people help each other to get things done.	1	2	3	4	5
I feel a sense of responsibility toward my community.	1	2	3	4	5
I believe that helping others can be a fun and rewarding experience.	1	2	3	4	5

Diversity makes our community unique.

1 2 3 4 5

Working together makes us stronger as a whole.

1 2 3 4 5

**This information will be used to gauge the growth of civic responsibility in our community and the growth of civic responsibility in you. Thank you for your input!**

This survey was developed through College of the Redwoods Del Norte Math 15- Elementary Statistics, taught by Walter Deckert, Assistant Professor of Mathematics. It was a service-learning project for their class.

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2. What I already know, what I want to know, and what I learned (KWL) chart and related discussion. Save the results of this discussion for comparison at the end of the unit.

Remediation strategy for any prerequisite knowledge and skills: From pre-assessment, determine needs related to vocabulary and concepts that are related to this unit, and address determined needs.

What I Know	What I Want to Know	What I Learned

### **SESSION 1 — PREPARATION – KEY WASTE-RELATED CONCEPTS**

Before you begin this discussion, assign student reading of the relevant material in your adopted textbooks:

Language Arts

Grade 5 Houghton Mifflin

Grade 6-8 McDougal Littell

Math

Grade 5-6 Harcourt

Grade 7-8 Prentice Hall

Science

Grade 5 Harcourt

Grade 6 Prentice Hall—Science Explorer, Focus on Earth Science: Unit 1, Chapter 4—Minerals, especially Section 3, p. 124—Mineral Resources; Unit 5, Chapter 20—Living Resources, especially Section 1, p. 646—Environmental Issues; Section 2, p. 653—Forest Resources

Grade 7-8 Prentice Hall Science Explorer

### **Project Introduction: Motivational Kick-off**

Choose one of the following, or develop your own introductory “Kick-off” to inform students of the project, and develop motivation:

1. Have the students collect their personal trash, sans organics, which are simply recorded for reference for one day.
2. Spread a tarp on the floor at the end of the school day and dump one day’s accumulation of classroom trash to spark discussion. Ask open-ended questions to probe student reactions.
3. Collect all the trash for an entire day and create a school-wide mountain of trash to be analyzed.

### **Lesson 1 Natural Resources Make Up Common Objects**

#### **Standards-based Learning objective(s):**

Grade 5

L.O. Students create multiple-paragraph expository compositions

L.O. Students establish a topic, important ideas, or events in sequence or chronological order.

L.O. Students provide details and transitional expressions that link one paragraph to another in a clear line of thought.

L.O. Students offer a concluding paragraph that summarizes important ideas and details.

L.O. Students will plan and conduct a simple investigation. (science standard 6c)

Grade 6

L.O. Students will write an expository composition of at least 500-700 words.

L.O. Student writing will exhibit students’ awareness of audience and purpose.

L.O. Student writing will identify a hypothesis.

L.O. Students state the thesis or purpose.

L.O. Students explain the situation.

L.O. Students demonstrate understanding of the natural origin of the materials used to make common objects. (Science: Resource Standard 6c)

L.O. Students will develop a hypothesis

Grade 7

L.O. Students convey clear and accurate perspectives on the subject.

L.O. Students will communicate the logical connection among hypotheses and science concepts.

Grade 8

L.O. Students define a thesis.

L.O. Students record important ideas, concepts, and direct quotations from significant information sources and paraphrase and summarize all perspectives on the topic, as appropriate.

L.O. Students know how to use the periodic table to identify elements in simple compounds

L.O. Students identify regions corresponding to metals, nonmetals, and inert gases.

L.O. Students show substances can be classified by their properties, including their melting

temperature, density, hardness, and thermal and electrical conductivity.

**Adopted Instructional Materials and Other Resources:**

Prentice Hall Science Explorer Series, 2001 science textbook. Earth Science P.124, 646, 653  
Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

\*\*Student learning log or science journal.

**Summary Description:**

Students will gain an understanding that natural materials make up common objects. *This grade 6 standard deals with the ultimate sources of common objects. Students often do not consider or even know the natural origins of commonly used goods. They must be reminded that manufactured items do not appear magically and that the ultimate cost of acquiring the objects goes far beyond the price sticker. Students can count the objects in their classroom to make an inventory and trace them back to the natural materials from which they were manufactured. They can then classify the materials as renewable or nonrenewable. They may need to do some careful research to discover the origins of some materials. For example, a simple pencil contains wood and lead. But the pencil lead is actually a mixture of graphite and clay. If the pencil has an eraser, the rubber from a plant (or plastic from petroleum) and the metal for the holder must be included. Students may realize in looking at clothing, paper, paint, tiles, windows, projectors, computers, chairs, books, chalk, crayons, brooms, and so on that plastics and synthetic materials are derived from oil. (Science Framework for California Public Schools, a CDE publication, 2003. p. 101.)*

1. Hold up a pencil. Ask your students to name the materials required to manufacture a pencil. (*wood or plastic, graphite, clay, metal, synthetic rubber or vinyl, paint — graphic to be added later*) Involve students in the generation of questions relevant to identifying the natural origins of these materials (*wood or oil, the mineral graphite, clay, oil*).
2. Trace the natural origins of materials used to make other items commonly found in the classroom or on campus, for example, paper, furniture, or the tape dispenser. List the natural materials on the board. Help students understand the connections between these common items and the use of natural resources.
3. **\*\*Assessment:** Have students respond in learning-log/science-journal to the following prompt: “ We have learned that manufactured items, such as pencils, computers, clothing, don’t appear magically. In your own words, explain what it means to say that the “cost” of acquiring such objects goes far beyond the price sticker. Include information about the natural origins of commonly used goods.”
4. Optional extension: Have students present their findings to an audience.
5. Optional extension: Ask groups of students to consider a product found outside the classroom. For example, an article of clothing (shoes), recreational item (skateboard) or common household object (television). Research the origins of materials used to construct one of these items and report back to the class.
6. 8<sup>th</sup> Grade: Have students research the common elements contained in the materials in #2 above. Have them identify the elements on the periodic table, and correlate properties of these elements to their location on the periodic table.

**Responsible individual(s):** Instructional Team

**Timeline:** one 45 minute lesson (with options for extension)

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## **Lesson 2 Renewable and Nonrenewable Resources**

### **Standards-based Learning objective(s):**

Grade 5

- L.O. Students develop the topic with simple facts, details, examples, and explanations.
- L.O. Students will develop a testable question. (science standard 6b)
- L.O. Students will plan and conduct a simple investigation. (science standard 6c)

Grade 6

- L.O. Students explain the situation.
- L.O. Students will develop a hypothesis.
- L.O. Students will demonstrate knowledge of different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water and forests, and know how to classify them as renewable or non-renewable. (Science Standard 6b)

Grade 7

- L.O. Students convey clear and accurate perspectives on the subject.
- L.O. Students use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.

Grade 8

- L.O. Students use a variety of primary and secondary sources and distinguish the nature and value of each.
- L.O. Students know how to use the periodic table to identify elements in simple compounds.
- L.O. Students identify regions corresponding to metals, nonmetals, and inert gases.
- L.O. Students show substances can be classified by their properties, including their melting temperature, density, hardness, and thermal and electrical conductivity.

### **Adopted Instructional Materials and Other Resources:**

Prentice Hall Science Explorer Series, 2001

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

### **Summary Description:**

Students will be able to classify resources into categories of renewable and nonrenewable energy. *Renewable and nonrenewable energy and natural resources depend on both the process and the time needed to create energy sources. Solar energy cannot be exhausted nor can fuels for fusion; therefore they are sometimes referred to as renewable. Hydroelectric power is dependent on the water cycle (driven by solar energy) and is considered a renewable resource. Because biomass will grow back quickly to replace that used for fuel or materials, it is also considered renewable. However, if habitats and species are lost in the process of harvesting the biomass, the resources are nonrenewable in that sense. Trees used for fuel or building materials can be replaced only if the rate of use does not exceed the time needed to grow replacement trees and if the land is not altered to*

become unusable for that purpose. Fossil fuels (coal, oil, natural gas) were formed on geologic time scales and are considered nonrenewable resources. (Science Framework for California Public Schools, a CDE publication, 2003. p. 100.)

1. Ask students to define the terms “renewable” and “nonrenewable” and discuss how they are related to resource management and conservation. Prentice Hall p. 647
2. Classify the natural materials from step 1.b. above into renewable and nonrenewable.
3. Have students cut pictures from magazines and glue to make posters of renewable/nonrenewable resources.
4. 8<sup>th</sup> Grade : Continue periodic table application started in Lesson 1 above. Have the students compare the elements found in nonrenewable and renewable resources.

**Assessment:** Refer to Assessment Strategies on p. for journal/learning log topics.

**Responsible individual(s):** Instructional Team

**Timeline:** one 45 minutes lesson (with options for extension)

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### **Lesson 3 Waste Management**

#### **Standards-based Learning objective(s):**

Grade 5

L.O. Students establish a controlling idea or topic.

L.O. Students will develop a testable question. (Science standard 6b)

Grade 6

L.O. Student writing will identify a hypothesis.

L.O. Students state the thesis or purpose.

L.O. Students will develop a hypothesis.

L.O. Students will demonstrate knowledge of different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water and forests, and know how to classify them as renewable or non-renewable. (Science Standard 6b)

Grade 7

L.O. Students pose relevant and tightly drawn questions about the topic.

L.O. Students will communicate the logical connection among hypotheses and science concepts.

Grade 8

L.O. Students define a thesis.

L.O. Students will plan and conduct a scientific investigation to test a hypothesis.

L.O. Students show reactant atoms and molecules interact to form products with different chemical properties.

L.O. Students demonstrate the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.

#### **Adopted Instructional Materials and Other Resources:**

Prentice Hall Science Explorer Series, 2001 science textbook.

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

**Summary Description:**

Students will develop a hypothesis about the generation of waste at the school site.

*Students are expected to formulate a hypothesis for the first time. A hypothesis is a proposition assumed as a basis for reasoning and often subject to the testing of its validity. The scientific hypothesis provides an explanation of a set of observations and may incorporate observations, concepts, principles, and theories about the natural world. Hypotheses lead to predictions that can be tested. If the predictions are verified, the hypothesis is provisionally corroborated. If the predictions are incorrect, the original hypothesis is proved false and must be abandoned or modified.* (Science Framework for California Public Schools, a CDE publication, 2003. p. 101.)

1. Introduce the concepts of “solid waste” and “waste management” by asking students what things they have already thrown away that day. Discuss what happens to materials that are thrown away. (*Go to landfill, incinerated, composted, etc.*) Explain that solid waste is material that we throw away. (It does not include sewage or organic materials put down a garbage disposal.) Waste management is the combination of practice used to reduce, reuse, recycle, and dispose of waste material. Prentice Hall p.350-356.
2. Ask students to identify everyday practices that generate solid waste at school. Record student responses on the board. If necessary, prompt responses by naming different areas on campus: classrooms, cafeteria/lunch area, office, shops, gardens and landscaping, science labs.
3. Review the list of everyday practices that the students have identified and have the students hypothesize about the areas on campus where the most waste may be generated. Prentice Hall p.716
4. 8th Grade: Extend the discussion to what happens to waste at the molecular level. Relate the discussion to the various processes of waste management. Have students hypothesize and track a simple discarded item, such as a piece of paper, through the waste management process by describing what they think happens to the item at the molecular level.

**Assessment:** Refer to Assessment Strategies on p. for journal/learning log topics.

**Responsible individual(s):** Instructional Team

**Timeline:** one 45-minute lesson

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**Lesson 4 Waste of Resources**

**Standards-based Learning objective(s):**

Grade 5

L.O. Students create multiple-paragraph expository compositions

L.O. Students establish a topic, important ideas, or events in sequence or chronological order.

L.O. Students provide details and transitional expressions that link one paragraph to another in a clear line of thought.

L.O. Students offer a concluding paragraph that summarizes important ideas and details.

- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students will record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data. (Science standard 6g)

#### Grade 6

- L.O. Students will write an expository composition of at least 500-700 words.
- L.O. Student writing will exhibit students' awareness of audience and purpose.
- L.O. Student writing will identify a hypothesis.
- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students will develop a hypothesis.
- L.O. Students will demonstrate knowledge of different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water and forests, and know how to classify them as renewable or non-renewable. (Science Standard 6b)

#### Grade 7

- L.O. Students pose relevant and tightly drawn questions about the topic.
- L.O. Students convey clear and accurate perspectives on the subject.
- L.O. Students know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.
- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.

#### Grade 8

- L.O. Students define a thesis.
- L.O. Students record important ideas, concepts, and direct quotations from significant information sources and paraphrase and summarize all perspectives on the topic, as appropriate.
- L.O. Students demonstrate the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.

#### **Adopted Instructional Materials and Other Resources:**

Prentice Hall Science Explorer Series, 2001 science textbook.

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

Houghton-Mifflin Language Arts adopted text.

#### **Summary Description:**

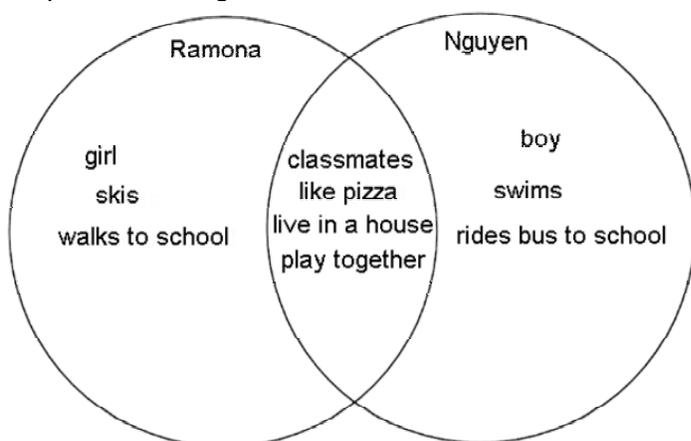
Students will investigate the connection between natural resources and waste.

1. Compare and contrast the concepts, using a Venn Diagram, of “generating solid waste” and “wasting resources.”
2. Instruct students about what happens to the waste generated on campus (i.e., name and location of landfill, incinerator). Have students consider how the concepts of “generating solid

waste” and “wasting resources” are related to the renewability and non-renewability of resources. Brainstorm and record the connections between generating solid waste, wasting resources, renewability and non-renewability, and other community issues such as space for landfills, resource depletion, and contamination of groundwater by landfills, etc.

3. Identify and define the five ways in which the amount of solid waste can be decreased (*source reduction, reuse, recycle, compost, buying products made from recycled materials*). Discuss how each of these approaches relates to the key concepts of renewable and nonrenewable resources, and resource conservation. (*Source reduction: decreasing the amount and/or toxicity of waste before it is generated, decreasing the quantity of materials that must be collected, processed, or disposed of. Reuse: reviving the “once is not enough” philosophy and finding creative ways to reuse items in different ways. Recycle: collecting, extracting and reusing materials found in waste. Compost: converting organic wastes for use as soil replenishers. Buying products made from recycled materials: making informed purchasing decisions.*) <http://www.ciwmb.ca.gov/Schools/WasteReduce/default.htm>
4. 8<sup>th</sup> Grade: Relate the five ways in which the amount of solid waste can be decreased to the concept of conservation of matter at the molecular level. Have the students explain from a chemistry perspective why each of the above approaches does in fact decrease solid waste.

Sample Venn Diagram:



<http://www.graphic.org>

**Assessment:** Refer to Assessment Strategies on p. for journal/learning log topics.

**Responsible individual(s):** Instructional Team

**Timeline:** one 45-minute lesson

## Lesson 5 Develop a Systems Map

### Standards-based Learning objective(s):

Grade 5

L.O. Students establish a topic, important ideas, or events in sequence or chronological order.

L.O. Students will record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data. (Science standard 6g)

L.O. Students will draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion. (science standard 6h)

#### Grade 6

- L.O. Students follow an organizational pattern appropriate to the type of composition.
- L.O. Students offer persuasive evidence to validate arguments and conclusions as needed
- L.O. Students will demonstrate knowledge of different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water and forests, and know how to classify them as renewable or non-renewable. (Science Standard 6b)
- L.O. Students analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.

#### Grade 7

- L.O. Students convey clear and accurate perspectives on the subject.
- L.O. Students include evidence compiled through the formal research process (e.g., use of a card catalog, *Reader's Guide to Periodical Literature*, a computer catalog, magazines, newspapers, dictionaries).
- L.O. Students use a variety of print and electronic resources (including the World Wide Web) to collect information and evidence as part of a research project.

#### Grade 8

- L.O. Students use a variety of primary and secondary sources and distinguish the nature and value of each.
- L.O. Students organize and display information on charts, maps, and graphs.
- L.O. Students demonstrate the idea of atoms explains the conservation of matter: In chemical reactions the number of atoms stays the same no matter how they are arranged, so their total mass stays the same.

#### **Adopted Instructional Materials and Other Resources:**

Prentice Hall Science Explorer series, 2001 science textbook.

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

*Developing a Standards-based Campus Needs Assessment*, State Environment and Education Roundtable, 2003

#### **Summary Description:**

Students will develop a campus "systems map" and trace a raw material to a final manufactured product.

1. Optional: Work with students to develop a "systems map" that identifies the systems, components and interconnections that connect resource use and the waste stream on campus, and within the local community. The systems map should be used to help the students synthesize their understandings into a unified whole.
2. \*DO: Students should map the steps from manufacturing to disposing of a product of their choosing. They should start with the steps of obtaining raw natural resources, manufacturing the product, and using the product, as well as the waste generation or diversion that may result from each of the steps in the process. On these systems maps, the students should also: identify the natural origins of the materials used to manufacture their object; and, classify

as renewable or nonrenewable all of the natural energy and material resources (including air, soil, rocks, minerals, petroleum, fresh water, wildlife, and forests) involved in the manufacture, use and disposal or recycling of their chosen object.

3. 8<sup>th</sup> Grade: Extend exercise #2 above to demonstrating the conservation of atoms in chemical reactions. Have students describe their chosen systems map in terms of each component's molecular makeup and how it changes as it moves along the steps of processing.

**Assessment:** Refer to Assessment Strategies on p. for journal/learning log topics.

**Responsible individual(s):** Instructional Team

**Timeline:** one 45-minute lesson

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## SESSION 2 — INTRODUCTION TO STUDENT AUDITS AND SURVEYS

### General Background/Preparation:

1. While students will always be under the supervision and control of a certificated employee, parental assistance (ideally, at least one parent per team) may be required on the day the audit is conducted (Session 3). It is strongly recommended that parent volunteers also attend the Session 2 orientation so that they will be fully prepared to assist students during the audits. Debra Freitas, MCUSD Science and Service Learning Coordinator, is available to help you conduct your audit by calling and scheduling (209-742-0240). Your school waste hauler, Total Waste, or local jurisdiction waste management authority, Steve Engfer, Public Works 209-966-5356, may be available to help students conduct the waste audit. Additionally, assistance for this type of program is frequently available from members of the groups like the local conservation corps ([www.consrv.ca.gov/DOR/grants/grant\\_seekers/lccc.htm](http://www.consrv.ca.gov/DOR/grants/grant_seekers/lccc.htm)), AmeriCorps, and environmental organizations.
2. Participating students work in four groups. Three groups audit campus waste practices; the fourth group will conduct a student survey to assess knowledge and behaviors related to waste. All three audits and the survey are designed to take place on the same day. Data are shared so that all students end up with a better understanding of campus-wide practices.
3. Each of the three audit groups will assess one specific site and contribute its data to the overall waste audit. The three sites are:
  - Cafeteria/lunch area
  - School office
  - Classroom(s)
4. Should you decide to monitor more than one classroom or lunch area, waste audits may need to be conducted on different days due to the limited availability of collection buckets.
5. Data will be collected through observations, investigations, questionnaires, and student surveys. At least one parent, under the supervision and control of a certificated employee, may work with each team.

6. The audits also require gathering information from school personnel with responsibilities for managing and maintaining campus facilities. Questionnaires are provided for this purpose. Questionnaires can be completed in writing or used as the basis for interviews on the day of the audits, depending on staff availability on the audit day. If implemented as interviews, questionnaires should be distributed one week ahead of time to allow staff to prepare answers. If implemented in writing, staff should be allowed one to two weeks to complete and return the information. Written questionnaires should be completed before the audits are conducted (Session 3).

A letter to staff and announcement in the school bulletin and/or newsletter will help recruit volunteers and prepare staff for the audit.

7. In addition to data collection, student teams are sometimes asked to make and record general observations related to their study areas. Guiding questions are provided on the data collection forms.
8. After conducting the audits, two class sessions will be spent analyzing the data, making any necessary calculations, and drawing conclusions about resource practices on campus.
9. Review audit protocols with students
  - Observations must be made respectfully. No disparaging remarks, accusations or name-calling.
  - Observations must be made unobtrusively.
  - Recognize that staff members are busy and have little time to assist with the campus audits. Be respectful of their time; you will have only one class period during which to make your observations and talk with staff. Make arrangements to visit campus facilities ahead of time and set up your meeting at a mutually convenient time. Thank them for their participation.
10. Distribute appropriate worksheets to each group. Working with the parent assistants, allow each group to review the process outlined on their audit worksheets and make specific plans as needed. This will include, but not necessarily be limited to, assigning specific tasks that are to be carried out on the day of the audit; a task assignment sheet is provided.

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## **Lesson 6 Introduction to the Waste Audit**

Standards-based Learning objective(s):

Grade 5

- L.O. Students establish a topic, important ideas, or events in sequence or chronological order.
- L.O. Students will plan and conduct a simple investigation. (science standard 6c)
- L.O. Students will record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data. (science standard 6g)

Grade 6

- L.O. Students will demonstrate knowledge of different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water and forests, and know how to classify them as renewable or non-renewable. (Science Standard 6b)
- L.O. Students will develop a hypothesis.
- L.O. Students will select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and

display data.

#### Grade 7

L.O. Students select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

#### Grade 8

L.O. Students will plan and conduct a scientific investigation to test a hypothesis.

### **Adopted Instructional Materials and Other Resources:**

Prentice Hall *Focus on Earth Science*, 2001 sixth grade science textbook.

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

*School Campus Waste Audits, Waste, Energy and Water*, CA Integrated Waste Management Board, Draft 2003

### **Summary Description:**

Waste Audit Procedures:

1. Explain the purpose of the audit. (To assess the quantity and type of trash collected on campus and determine what might be diverted from the waste stream.)
2. Explain that in a larger study of the waste stream or in a different setting, more categories of trash would probably be examined. (This study has been simplified so it can be completed in one day.)
3. Divide the students into four groups: three audit groups and one survey group. (See description above.)

### **Audit Team Responsibilities**

a. Before the audit: create three sets of labels for the collection buckets that will be used in the audits. The suggested labels below assume there is no recycling program on your campus. If your campus recycles some items, you may need to adjust these labels as indicated. Suggested labels include:

- FOOD WASTE (compostable food — no meat or bones)
- MIXED RECYCLABLES (aluminum, glass, #1 and #2 plastics, and tin cans) (NOTE: This label reflects items commonly recycled in most communities. If your campus currently recycles some of these, adjust your label to reflect current collection practices.)
- MIXED PAPER (white paper, cardboard, colored paper magazines, newspaper, computer paper, and box board)
- HARD TO RECYCLE ITEMS (milk cartons, other plastics, other metals, Styrofoam, and drink cartons) (NOTE: This category is intended to reflect items that are not commonly recycled,

but for which the technology to recycle exists. If there is already a limited recycling program on campus, this category can also be adjusted to include readily recycled items listed above under “mixed recyclables” that are not collected at your school.)

- TRASH (anything non-recyclable and non-compostable, e.g., contaminated paper food trays, food wrappers, meat and bones, and facial tissue).

b. Label three sets of five collection buckets

c. Before the audit: Schedule and assign delivery of the collection buckets to the cafeteria/lunch area, the school office, and the students’ own classroom. Buckets must be delivered at the end of the school day preceding the audit. The 30-gallon containers are for use in the cafeteria/lunch area and the five-gallon buckets are used in all other locations. (Note: if more than one class is participating, students should select one classroom to monitor or plan a second day of auditing. Using all three sets of buckets, up to three additional classrooms can be monitored simultaneously on this extra day)

d. Schedule and assign monitoring responsibilities for each site. Student monitors will empty the buckets as they are filled during the audit day and track and record the number of times each bucket is filled. (Note: the number of student monitors can be adjusted according to the number of students participating in the audits.)

- Office: Up to five students should track, pick up, empty, and record data at the end of the day. Student monitors may need to be called in before the end of the day to empty and record data from the office buckets if they become full. Designate who office staff should contact if any of the buckets require emptying during the day.
- Cafeteria/lunch area: Teams of up to five students monitor in 10-minute shifts throughout the lunch period, each monitoring one container. Provide student monitors with aprons and gloves. Monitors stand by the buckets and assist other students in separating their refuse. As the collection buckets fill, student monitors empty the buckets into the large trash cans and recycling bins normally used in the cafeteria/lunch area. Each time the buckets are emptied, student monitors record the data by waste category. Parent volunteers will need to assist students with emptying the 30-gallon containers. (Note: For more accurate results, schools that serve Universal Classroom Breakfast or voluntary breakfasts can conduct an additional audit during breakfast using the same procedures as detailed for the lunchtime audit.)
- Classroom: Up to five students per class period, each monitoring one bucket. The students empty their buckets when they are full and record the count, by waste category, on the data collection form.
- Instruct students to be sure to put a garbage bag into the container and to not compact garbage. Buckets need to be filled to the top before removing the bag.

e. Assign students to the cafeteria/lunch area and classroom to observe and answer the additional questions on the data collection forms.

### **Survey Team Responsibilities**

- a. Surveys are to be conducted with a minimum of 30 students who are selected at random from the student population of the whole school. Surveys are carried out through face-to-face

meetings during recess or lunch. (Note: Discuss concerns about selecting a biased sample for the survey. One way to select random students is to count students entering the cafeteria/lunch area for lunch and survey, for instance, every 15<sup>th</sup> student. Another method of randomizing the sample might be necessary in schools where only certain subset of students generally eat in the cafeteria/lunch area.) Smaller sites may be able to utilize the entire school Population.

- b. The survey tool provided to maintain statistical validity should be used without alteration. The survey assesses students' knowledge and behaviors about waste as they relate to the use of resources on campus. (Note: this survey does not gather any personal data regarding students' attitudes or what they do in their homes.)
- c. Determine the number of students each team member must interview by dividing 30 by the number of students on the survey team. (Generally, each student should survey two or three students of different grades.)
- d. Review the survey instrument and make sure the students understand each question.
- e. Review the survey protocol with the students and clarify to them that they: (additional details be added by the statistician who is developing the survey instrument)
  - Should ask the questions exactly as written;
  - Must not influence the person they are interviewing with expressions or tone of voice;
  - Are required to accept and record all answers without making any judgmental comments to those they are interviewing; and,
  - Should thank each interviewee for their time and help.
  - The responder to the survey may not know the answers to the questions or understand the vocabulary used. This is OK. This is information that the students will find out and add as data to the survey. "I don't know" or "I don't understand" is an appropriate response.

<b>Waste Audit Procedures</b>		
<b>Task</b>	<b>Time</b>	<b>Student(s) Responsible</b>
1. Distribute office and cafeteria/lunch area questionnaires to designated staff members, along with letter instructing how and when to return the completed questionnaire	1-2 weeks before the audit	
2. Create three sets of labels and label buckets	Before the audit	
3. Deliver instructions and labeled 5-gallon buckets to the classroom and school	Delivered at the end of the school day preceding the audit	

office. Deliver 30-gallon containers to the cafeteria/lunch area.		
4. Designate whom the office staff should call if pick up is required during the day	Before the audit	Period 1: Period 2: Period 3: Period 4: Period 5: Period 6:
5. Empty office buckets at the end of the day. Track and record data.	End of the school day on the day of the audit	
6. Possible emptying of office buckets during the day. Track and record data.	On call	
7. Monitor cafeteria/lunch area buckets. Assist students with disposal of trash. Empty buckets as they fill. Record count on data collection form.	10-minute shifts throughout the lunch period on the day of the audit, starting 5 minutes before lunch period and remaining 5 minutes after lunch. Adjust the number of shifts to match your school lunch period.  Similar assignments if a breakfast audit is added.	Shift 1:  Shift 2:  Shift 3:  Shift 4:  Shift 5:
8. Monitor classroom buckets each class period. Empty as needed. Track and record data.	Continuous throughout the audit day, different students each period.	Period 1: Period 2: Period 3: Period 4: Period 5: Period 6:
9. Assign observers to answer the additional questions on the data collection forms	During audit	Cafeteria/lunch area: Office: Classroom:
10. Collect questionnaires from designated staff members	One day before the audit	
11. Write thank you notes to staff and parents	Immediately after the audit	

## Survey Questionnaires

### Waste Questionnaire for Facilities Manager/Site Custodian

What normally happens to the trash collected from:

- The school office?
- The cafeteria/lunch area?
- Our classroom?

How many dumpsters does our school have?

What is the capacity (by volume) of the dumpsters?

How often are the dumpsters emptied?

On average, how full are the dumpsters on pick-up day?

Does the school recycle any materials?

If yes, what materials are currently recycled?

How are these materials separated and collected:

- In the office?
- In the cafeteria/lunch area?
- In classrooms?

What size (by volume) are the recycling bins?

How often are these containers emptied?

On average, how full are the recycling containers on pick-up day?

Does the school compost organic waste?

If yes, how are these materials separated and collected:

- In the office?
- In the cafeteria/lunch area?
- In classrooms?

What size (by volume) are the compost containers?

Is the compost used on campus?

If no, how often are the compost containers emptied?

On average, how full are the composting containers on pick-up day?

What improvements would you make to the school's waste management systems?

## **Waste Questionnaire for Office Manager**

Does office paper have post-consumer recycled content?

Does the office purchase any other recycled content products?

Can the copier do two-sided copying?

Are school documents routinely copied on one or both sides of the paper?

Do school newsletters and fliers that go home with students use paper efficiently?

If so, in what ways?

Are memos distributed to each staff member, or are copies circulated?

Do you purchase new phone message pads or use scratch paper?

Do you purchase new or recycled printer and fax toner cartridges?

Does the staff break room use disposable or reusable cups, plates, and silverware?

Does the office participate in any school recycling programs?

If yes, how are wastes separated and collected?

What improvements would you make to the school's waste management systems?

## **Waste Questionnaire for Kitchen/Cafeteria/Lunch Area Manager**

What food is prepared on site?

What food is brought in?

What items, if any, do you buy in bulk?

Does the cafeteria/lunch area allow students to choose the foods they desire, or do automatically serve a prescribed meal?

What happens to leftover food?

Does the cafeteria/lunch area donate leftover food to any other organizations?\

Do you recycle in the kitchen?

If yes, how are wastes separated and collected?

What improvements would you make to the school's waste management systems?

**Responsible individuals:** Instructional Team

**Timeline:** one 45-minute period

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## SESSION 3 — WASTE AUDIT DATA COLLECTION

### Lesson 7 Waste Audit Data Collection

#### Standards-based Learning objective(s):

##### Grade 5

- L.O. Students frame questions that direct the investigation.
- L.O. Students analyze problems by identifying relationships, distinguishing relevant from irrelevant information, sequencing and prioritizing information, and observing patterns.
- L.O. Students will develop a testable question. (science standard 6b)
- L.O. Students will plan and conduct a simple investigation. (science standard 6c)
- L.O. Students will record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data. (science standard 6g)

##### Grade 6

- L.O. Student writing will identify a hypothesis.
- L.O. Students compare different samples of a population with the data from the entire population and identify a situation in which it makes sense to use a sample.
- L.O. Students identify different ways of selecting a sample and which method makes a sample more representative for a population.
- L.O. Students will demonstrate knowledge of different natural energy and material resources, including air, soil, rocks, minerals, petroleum, fresh water and forests, and know how to classify them as renewable or non-renewable. (Science Standard 6b)
- L.O. Students will develop a hypothesis. (Science Standard 7a)
- L.O. Students will select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data. (Science Standard 7b)

##### Grade 7

- L.O. Students pose relevant and tightly drawn questions about the topic.
- L.O. Students analyze problems by identifying relationships, distinguishing relevant from irrelevant information, identifying missing information, sequencing and prioritizing information, and observing patterns.
- L.O. Students select and use appropriate tools and technology (including calculators, computers, balances, spring scales, microscopes, and binoculars) to perform tests, collect data, and display data.

##### Grade 8

- L.O. Students record important ideas, concepts, and direct quotations from significant information sources and paraphrase and summarize all perspectives on the topic, as appropriate.
- L.O. Students use a variety of primary and secondary sources and distinguish the nature and value of each.
- L.O. Students will plan and conduct a scientific investigation to test a hypothesis.

#### **Adopted Instructional Materials and Other Resources:**

Prentice Hall *Focus on Earth Science*, 2001 sixth grade science textbook.

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

*School Campus Waste Audits, Waste, Energy and Water*, CA Integrated Waste Management Board, Draft 2003

### **Summary Description:**

**Note:** Because students are divided into teams that are responsible for specific tasks, the majority of this audit can be conducted in one 45-minute period. Some tasks, as noted in the assignment sheets used in Session 2, require that students arrive early or work during a portion of their lunch period. A few tasks require monitoring throughout the day. These responsibilities are designed to be shared so that no one student works on the audit for more than one class period (45 minutes) on the actual audit day.

1. Waste is to be sorted and collected throughout the day so students can gather data about the quantity and categories (food waste, mixed recyclables, mixed paper, hard to recycle items and, trash) of solid waste generated on campus. For safety reasons, students should not touch any of the waste. Student monitors in the cafeteria/lunch area should wear aprons and gloves.
2. Students deliver labeled buckets (five per site) to the waste monitoring sites (classroom, office, cafeteria/lunch area) at the end of the day preceding the audit, but should not be used until the designated collection period begins on the audit day.
3. Student teams monitor the buckets, emptying the buckets into larger containers or dumpsters as they fill. They record the number of containers collected on the Data Collection worksheet, to be used later in calculating volume and percentage of waste per category.
  - Classroom: monitored throughout the day; students assigned by period
  - Office: monitored at the end of the day and by students throughout the day on call by office staff; designated contact person assigned by period
  - Cafeteria/lunch area: monitored throughout the lunch period only
4. Students collect questionnaires (provided) from kitchen/cafeteria/lunch area, facilities, and office staff and/or make observations regarding waste management practices in designated areas on campus. Questionnaires can also be implemented as interviews on the day of the audit.

## WASTE DATA COLLECTION FORM

Site: \_\_\_ Cafeteria/Lunch Area \_\_\_ Office \_\_\_ Classroom (Room Number: \_\_\_\_\_)

TYPE OF WASTE (Sorted according to bucket labels)	NUMBER OF BUCKETS (Stick Tally)	TIME EMPTIED (Record time each time a bucket is emptied)
FOOD WASTE (food)		
MIXED RECYCLABLES (aluminum, glass, #1 and #2 plastics, tin cans);		
MIXED PAPER (white paper, cardboard, colored paper magazines, newspaper, computer paper, box board)		
HARD TO RECYCLE ITEMS (milk cartons, other plastics, other metals, Styrofoam, drink cartons)		
TRASH (non-recyclable, non-compostable, contaminated with food, facial tissues)		

### Additional Observations Made During Audit

#### **Cafeteria/Lunch Area**

Do students have a choice regarding quantity of food served?

Is there a salad bar?

What types of trays are used?

Do students have access to napkin holders, or are they given one napkin per meal?

Does the cafeteria/lunch area use plastic forks and spoons, plastic sporks, biodegradable utensils, or metal utensils?

Are drinking straws provided?

Are condiments provided in single serve packages or in bulk?

Are beverages provided in single serve packages or in bulk?

Did you observe any specific problems regarding management of solid waste in the school's cafeteria/lunch area?

Any other important observations:

### **Classroom**

Does your teacher accept double-sided printing and use of scratch paper for drafts?

Does your class use a chalkboard, overheads, individual handouts, or an alternative approach such as PowerPoint?

Does your class save one-sided pages for re-use as scratch paper?

Is scrap paper saved and used for art projects?

Did you observe any specific problems regarding management of solid waste in your classroom?

## STUDENT SURVEY DATA COLLECTION FORM

5. The student survey group will conduct face-to-face interviews with 30 students using the tool provided.
6. Each student on the team will interview two or three students of different grades.

**Responsible individual(s):** Classroom teacher and assigned students

**Timeline:** one day divided into 45-minute blocks, depending on the size of the site

### Waste Questionnaire for Students

What happens to the things we throw away? (or Where does our school's trash go?)

What is a landfill?

Have you ever seen a landfill?

What is recycling?

What happens to the waste products when they are recycled?

What materials does our school recycle?

What percentage (or How much) of the school's waste can be recycled?

What materials could the school recycle that it does not already?

Do you use any products made from recycled materials at school?

What is compost?

How is it used?

## SESSIONS 4 & 5— WASTE DATA ANALYSIS

### Lesson 8 Waste Data Analysis

#### Standards-based Learning objective(s):

##### Grade 5

- L.O. Students frame questions that direct the investigation.
- L.O. Students establish a controlling idea or topic.
- L.O. Students develop the topic with simple facts, details, examples, and explanations.
- L.O. Students know the concepts of mean, median, and mode; compute and compare simple examples to show that they may differ.
- L.O. Students organize and display single-variable data in appropriate graphs and representations (e.g., histogram, circle graphs) and explain which types of graphs are appropriate for various data sets.
- L.O. Students use fractions and percentages to compare data sets of different sizes.
- L.O. Students use estimation to verify the reasonableness of calculated results.
- L.O. Students express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
- L.O. Students indicate the relative advantages of exact and approximate solutions to problems and give answers to a specified degree of accuracy.
- L.O. Students make precise calculations and check the validity of the results from the context of the problem.
- L.O. Students will record data by using appropriate graphic representations (including charts, graphs, and labeled diagrams) and make inferences based on those data. (science standard 6g)
- L.O. Students will draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion. (science standard 6h)

##### Grade 6

- L.O. Students state the thesis or purpose.
- L.O. Students explain the situation.
- L.O. Students follow an organizational pattern appropriate to the type of composition.
- L.O. Students offer persuasive evidence to validate arguments and conclusions as needed
- L.O. Students identify data that represent sampling errors and explain why the sample (and the display) might be biased.
- L.O. Students identify claims based on statistical data and, in simple cases, evaluate the validity of the claims.
- L.O. Students represent all possible outcomes for compound events in an organized way (e.g., tables, grids, tree diagrams) and express the theoretical probability of each outcome.
- L.O. Students use data to estimate the probability of future events (e.g., batting averages or number of accidents per mile driven).
- L.O. Students use estimation to verify the reasonableness of calculated results.
- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
- L.O. Students will construct appropriate graphs from data and develop qualitative statements about the relationships between variables.
- L.O. Students will construct appropriate graphs from data and develop qualitative statements about

the relationships between variables.

- L.O. Communicate the steps and results from an investigation in written reports and oral presentations.

#### Grade 7

- L.O. Students pose relevant and tightly drawn questions about the topic.
- L.O. Students convey clear and accurate perspectives on the subject.
- L.O. Students include evidence compiled through the formal research process (e.g., use of a card catalog, *Reader's Guide to Periodical Literature*, a computer catalog, magazines, newspapers, dictionaries).
- L.O. Students know various forms of display for data sets, including a stem-and-leaf plot or box-and-whisker plot; use the forms to display a single set of data or to compare two sets of data.
- L.O. Students represent two numerical variables on a scatterplot and informally describe how the data points are distributed and any apparent relationship that exists between the two variables (e.g., between time spent on homework and grade level).
- L.O. Students understand the meaning of, and be able to compute, the minimum, the lower quartile, the median, the upper quartile, and the maximum of a data set.
- L.O. Students use estimation to verify the reasonableness of calculated results.
- L.O. Students apply strategies and results from simpler problems to more complex problems.
- L.O. Students estimate unknown quantities graphically and solve for them by using logical reasoning and arithmetic and algebraic techniques.
- L.O. Students use a variety of methods, such as words, numbers, symbols, charts, graphs, tables, diagrams, and models, to explain mathematical reasoning.
- L.O. Students express the solution clearly and logically by using the appropriate mathematical notation and terms and clear language; support solutions with evidence in both verbal and symbolic work.
- L.O. Students evaluate the reasonableness of the solution in the context of the original situation.
- L.O. Students note the method of deriving the solution and demonstrate a conceptual understanding of the derivation by solving similar problems.
- L.O. Students develop generalizations of the results obtained and the strategies used and apply them to new problem situations.
- L.O. Students will communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence.

#### Grade 8

- L.O. Students define a thesis.
- L.O. Students record important ideas, concepts, and direct quotations from significant information sources and paraphrase and summarize all perspectives on the topic, as appropriate.
- L.O. Students solve multi-step problems, including word problems, involving linear equations and linear inequalities in one variable and provide justification for each step.
- L.O. Students add, subtract, multiply, and divide monomials and polynomials. Students solve multistep problems, including word problems, by using these techniques.
- L.O. Students add, subtract, multiply, and divide rational expressions and functions. Students solve both computationally and conceptually challenging problems by using these techniques.
- L.O. Students demonstrate density is mass per unit volume.
- L.O. Students calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
- L.O. Students will plan and conduct a scientific investigation to test a hypothesis.
- L.O. Students will evaluate the accuracy and reproducibility of data.

**Adopted Instructional Materials and Other Resources:**

Prentice Hall *Focus on Earth Science*, 2001 sixth grade science textbook.

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

6<sup>th</sup> Grade Adopted math text

**Summary Description:**

1. Working in their groups, students use the forms provided to analyze the data they collected in the audits, interviews and questionnaires.
2. When the individual teams have completed their analyses, students compare costs from schools that have completed programs to divert waste. Comparisons will be of annual costs before and after implementing the diversion programs.
3. Students and teachers develop strategies for analyzing data. For help contact Debra Freitas 209-742-0240 .
4. 8th Grade:  
Students will measure volume, and calculate the mass and density of the garbage collected.
  1. The students will measure the mass of some random samples of the garbage collected for each sampling category.
  2. Based on this data, and utilizing the formula for density = mass/volume, students will calculate the density of various samples of the garbage by sampling category.
  3. The students will then extrapolate this data to figure an estimate of the total masses and densities by category, and for an overall total.

### WASTE DATA ANALYSIS

Calculations				
Data	Cafeteria/Lunch Area	Office	Classroom	Campus Total
# buckets— compost				
# buckets — mixed recyclables				
# buckets — recyclable paper products				
# buckets — hard to recycle				
# buckets — trash				
<b>TOTAL</b>				
Percentage of total waste — compost				
Percentage of total waste — mixed recyclables				
Percentage of total waste — recyclable paper products				
Percentage of total waste — hard to recycle items				
Percentage of total waste — trash				
<b>Total percentages (should total to 100 %)</b>				

Percentage of waste that could be diverted from the waste stream with currently available methods (add composted, mixed recyclables, recyclable paper products)				
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### WASTE DATA ANALYSIS

How accurate was your prediction (from Session 1) about waste generation on campus? What evidence do you have to prove or disprove your prediction?

If the school were to change its waste management practices and recycle or compost the easily managed materials on campus (compost, mixed recyclables, recyclable paper products), how much trash could be diverted from the school's waste stream?

How many dumpster loads could be reduced per year?

Using the sample waste bill provided, figure out how much money your school could save each year by diverting recyclable and compostable items from the waste stream:

Estimate the annual waste bill for the school.

Calculate the annual cost saving from reducing the number of dumpsters filled.

Using the data provided, calculate the initial cost of setting up a recycling program.

Calculate the annual costs of adding pick-up of recycling to the school's waste bill.

Figure out the overall savings per year.

**Graph your results:**

Using bar graphs, show comparisons among different locations and different types of waste, including:

- number of dumpsters currently generated per type of waste and study area and campus-wide versus number of dumpsters if recyclable and compostable waste were diverted (need graphic). Note: this is the amount of waste your school could prevent from going to the landfill.
- costs of current waste management practices versus costs with recycling program

### **STUDENT SURVEY DATA ANALYSIS**

Students will tabulate survey question results and analyze them for patterns. Students will write in their learning log/journal an analysis of patterns they see commenting on:

- Current waste patterns at the site
- Areas of waste stream flow they feel that could be improved and why
- How they think waste stream flow could improve

**Responsible individual(s):** Instructional Team

**Timeline:** Up to 2 - 45 minute periods

## SESSIONS 6 & 7 — REPORT PREPARATION

### Lesson 9 REPORT PREPARATION

#### Standards-based Learning objective(s):

##### Grade 5

- L.O. Students write research reports about important ideas, issues, or events.
- L.O. Students frame questions that direct the investigation.
- L.O. Students establish a controlling idea or topic.
- L.O. Students develop the topic with simple facts, details, examples, and explanations.
- L.O. Students will draw conclusions from scientific evidence and indicate whether further information is needed to support a specific conclusion. (science standard 6h)
- L.O. Students will write a report of an investigation that includes conducting tests, collecting data or examining evidence, and drawing conclusions. (science standard 6i)

##### Grade 6

- L.O. Students will write an expository composition of at least 500-700 words.
- L.O. Student writing will exhibit students' awareness of audience and purpose.
- L.O. Student writing will identify a hypothesis
- L.O. Student writing will display evidence of a progression through the stages of the writing process.
- L.O. Students state the thesis or purpose.
- L.O. Students explain the situation.
- L.O. Students follow an organizational pattern appropriate to the type of composition.
- L.O. Students offer persuasive evidence to validate arguments and conclusions as needed
- L.O. Communicate the steps and results from an investigation in written reports and oral presentations.

##### Grade 7

- L.O. Students pose relevant and tightly drawn questions about the topic.
- L.O. Students convey clear and accurate perspectives on the subject.
- L.O. Students include evidence compiled through the formal research process (e.g., use of a card catalog, *Reader's Guide to Periodical Literature*, a computer catalog, magazines, newspapers, dictionaries).
- L.O. Students document reference sources by means of footnotes and a bibliography.
- L.O. Students will communicate the steps and results from an investigation in written reports and oral presentations.

##### Grade 8

- L.O. Students define a thesis.
- L.O. Students record important ideas, concepts, and direct quotations from significant information sources and paraphrase and summarize all perspectives on the topic, as appropriate.
- L.O. Students use a variety of primary and secondary sources and distinguish the nature and value of each.
- L.O. Students organize and display information on charts, maps, and graphs.

#### **Adopted Instructional Materials and Other Resources:**

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

**Summary Description:**

1. Students prepare written reports that include the following key components:
  - Introduction: summarizing the background information they studied in relation to their particular audit activities. This might include a systems map where the students delineate the systems, components and interconnections that connect resource use and the waste stream on campus, and in the local community.
  - Hypothesis: stating the hypotheses that the students developed about campus patterns of resource use, knowledge and behaviors prior to conducting the audit, collecting the survey, or gathering the questionnaires. (Science #7a)
  - Methods: describing the steps of the investigations. (Science #7d)
  - Data Summary: including the results from the questionnaires, student surveys, and the components of the waste audit they participated in.
  - Data Analysis: describing observed patterns of resource use and waste, documenting how and where on campus specific resources are used, etc. The data analysis section should include appropriate graphs from data and develop qualitative statements about the relationships between variables. (Science #7c) A waste audit team, for example, might list and categorize the places in the school where they observed uneaten food being wasted as the result of disposal rather than composting.
  - Conclusions: discussing whether the evidence gathered from the audit, surveys, and questionnaires is consistent with their initial hypothesis. (Science #7e)
  - Standards Connection: using the information gathered during their campus audit to explain their understanding of one or more connected science standards. For example, students who participated in the waste audit might present a chart that identifies the natural origins of the materials used to make some of the common objects that they found on campus during the audit. (Science #6c) Or, they might produce a table that classifies objects they found during the audit as renewable or nonrenewable resources. (Science #6b)
  - Limitations and Further Study: identifying factors that may have limited the data they collected and presenting ideas for further investigations that would confirm the findings.
  - Summary: describing potential problems with campus resource management that the students have observed that is supported by the evidence gathered through their audit, surveys, and questionnaires.
2. Each student is expected to contribute based on the specific studies they were involved with to create one full report on waste generation and resource use practices.
3. The reports should be composed with appropriate formatting by using word-processing skills and principles of design.

**Responsible individual(s): Instructional Team**

**Timeline:** 2 - 45 minute periods

## SESSION 8 — PRESENTATION OF RESULTS

### Lesson 10 Team Presentation

#### Standards-based Learning objective(s):

Grade 5

L.O. Students will deliver informative presentations about an important idea, issue, or event

Grade 6

L.O. Students will deliver presentations on problems and solutions.

L.O. Students will communicate the steps and results from an investigation in written reports and oral presentations.

Grade 7

L.O. Students will deliver research presentations.

Grade 8

L.O. Students will deliver research presentations

#### **Adopted Instructional Materials and Other Resources:**

Prentice Hall *Focus on Earth Science*, 2001 sixth grade science textbook.

Project Learning Tree *Exploring Environmental Issues: Municipal Solid Waste*, American Forest Foundation, 2002

*School Campus Waste Audit*, The Acorn Group and State Education and Environment Roundtable, Draft 2003

#### **Summary Description:**

Each of the four groups (three audits and survey) presents short oral summaries of their findings. This can entail selecting the five most important discoveries made during their studies and sharing the conclusions and supporting evidence with the remaining students participating in the project.

Suggestion: Invite the administrative and custodial/facilities staff to hear presentations. This may also be an appropriate School Board Presentation. Publish a synopsis of your project and findings in the newspaper.

**Responsible individual(s):** Classroom teacher

**Timeline:** one 45-minute period

## Assessment Strategies for Campus Needs Assessment:

1. After each lesson, have students write a reflection piece in their Science Journal.

### Journal Strategies:

Journals can be structured or unstructured. Some students learn best by writing in a private journal that has no structure. Service learning experiences can stimulate strong independent writing by these students. Many other students, however, do not learn from journals unless they are structured. Teachers can assign a variety of questions and let the students choose which ones to answer, or have everyone answer the same question in order to facilitate group discussion afterward. Here are four suggestions for framing journal questions:

- 1) Journals can become mere reporting ("We went there, we worked."). Avoid this by asking higher-level questions ("Why did it happen; how could it be changed," etc.).
- 2) Help students focus on the people around them.
- 3) Help them express their own emotions, reactions, changes, etc
- 4) Help them articulate the bigger social questions (poverty, racism, literacy, treatment of elders, etc.).

### Samples of Effective Journal Questions

Some of these questions were taken from *Reflection: The Key to Service Learning*.

- What did you do that was fun or satisfying?
- What was the best thing that happened to you while working on this project today? Why was it the best?
- What was the hardest part of this project today? Why?
- With whom did you talk about your project today? Describe the conversation. How did you feel during and after your conversation?
- Look back to your first day working on this project. How did you feel that day, and how different is that from the way you feel there now? What has changed? Why has it changed?
- If you had a magic wand and could make changes on your campus, what would you change, and why?
- What is the most frustrating thing about this project?
- What do you think is the most frustrating thing about waste at your school site? What would it take to ease that frustration?
- Describe two things concerning waste you've done there in the past month that you are proud of.
- How did you feel when you finished the waste audit today? Why?
- What have you learned from the people involved in this project? What have they learned from you?
- What have you learned about the community and waste issues through doing this project?

**Adapted From YOUTH SERVICE CALIFORNIA\*Concise Guide to Reflection**

<http://www.yscal.org/resources/assets/Reflection.doc>

2. At the end of the unit, revisit the Pre-assessment from the beginning of the unit:

Pre-assessment strategy: What I already know, what I want to know, and what I learned (KWL) chart and related discussion. Post and discuss with the class.

How has their knowledge base changed? Have students respond to the above questions again, in their journal.

3. (Optional) To connect to History-Social Science Standards and assess ability to transfer information, conduct the following classroom application framed in the context of History-Social Science Standards listed above:

Identify a social or environmental problem of an ancient civilization that is analogous to a problem facing contemporary society (ie. Waste stream flow). Examine how the problem was addressed in the past and compare to solutions to the problem today.

4. Re-administer the Civic Responsibility Survey as a Post Activity. Compare Pre- to Post-responses.

**Collaborative Instructional Team**

Educators and school staff:

<p>Janette Gamble, Teaching Principal (District Administrator) Catherine Soria, 5-8<sup>th</sup> Grade Teacher Yosemite Valley School</p> <p>Steve Engfer, Manager Mariposa Solid Waste and Recycling</p> <p>Chris Coyle, 8<sup>th</sup> Grade Science Teacher Mariposa Middle School</p> <p>Bill McKay, Principal (District Administrator) Cathey's Valley School</p> <p>Judy Eppler, Director of Curriculum (District Administrator) Mariposa County Unified School District</p>	<p>Iris Wellcome, 6<sup>th</sup> Grade Teacher Mariposa Elementary School</p> <p>Kerri Columbro, 4-6<sup>th</sup> Grade Teacher Woodland Elementary School</p> <p>Phyllis Weber, K-12 Teaching Principal (District Administrator) Ben Swearingen, Teacher's Aide El Portal Elementary &amp; Yosemite Park High School</p> <p>Lynn Breshears, 5-6<sup>th</sup> Grade Teacher Mary James, Teacher's Aide Lake Don Pedro School</p>
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Coach:  
Debra Freitas, Science and Service Learning Coordinator  
Mariposa County Unified School District

Community partners:

<p>Steve Engfer, Manager Mariposa County Solid Waste and Recycling</p> <p>Mark Gallagher Facility Services Recycling Manager Delaware North at Yosemite</p> <p>Barry Broulette Yosemite Motels</p> <p>Susan Crain Public Relations Consultant</p>	<p>Belinda Humphreys Solid Waste Specialist California Rural Water Association</p> <p>Fred Youngren Total Waste – Mariposa County current waste contractor</p> <p>Kerri Gibbons Registered Environmental Health Specialist Mariposa County Health Department</p>
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Additional support mechanisms:  
Mariposa County Unified Mobile Lab Services, Debra Freitas, Coordinator

SEER Support  
Group

Linda Hoody, SEER Project Consultant  
Dr. Gerald Lieberman, Director

Teaming considerations: Each MCUSD School Site is represented by a Lead Teacher from the site, who implements curriculum in the 5-8 Grade Range. The CNA will be implemented by the lead teacher in cooperation with other teachers at the site.

**Timeline for Developing the Campus Needs Assessment:**

Planning: *July – September 2003*

Development: September – December 2003

Implementation: January – February 2004

Evaluation: February – March 2004

Celebration: May 2004

**Workplan for Year One of Your School's UES Program**

Team leader(s):  
Debbie Freitas, Science and Service Learning Coordinator  
Mariposa County Unified School District

Janette Gamble,  
Teaching Principal (District Administrator)  
Yosemite Valley School

Leadership team (include disciplines and grade levels represented on team):

Janette Gamble, Teaching Principal (District Administrator) Yosemite Valley School	Iris Wellcome, 6 <sup>th</sup> Grade Teacher Mariposa Elementary School
Steve Engfer, Manager Mariposa Solid Waste and Recycling	Catherine Soria, 5-8 <sup>th</sup> Grade Teacher Yosemite Valley School
Chris Coyle, 8 <sup>th</sup> Grade Science Teacher Mariposa Middle School	Kerri Columbro, 4-6 <sup>th</sup> Grade Teacher Woodland Elementary School
Bill McKay, Teaching Principal (District Administrator) Cathey's Valley School OC Teacher	Phyllis Weber, K-12 Teaching Principal (District Administrator) El Portal Elementary & Yosemite Park High School
Judy Eppler, Director of Curriculum (District Administrator) Mariposa County Unified School District	Jennifer Housler, K-1 Grade Teacher Coulterville-Greenley Elementary Also teaches 5-6 science.

School and district administrative support that the teams should engage:  
Science and Service Learning Coordinator  
Mobile Science Lab  
Teacher Resource Center at Projects Office  
Administrative Council

Community partners and stakeholders that the teams should engage:

<p>Steve Engfer, Manager Mariposa County Solid Waste and Recycling</p> <p>Mark Gallagher Facility Services Recycling Manager Delaware North at Yosemite</p>	<p>Belinda Green Solid Waste Specialist California Rural Water Association</p> <p>Fred Youngren Total Waste – Mariposa County current waste contractor</p> <p>Kerri Gibbons Registered Environmental Health Specialist Mariposa County Health Department</p>
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**Timeline**

<b>Task</b>	<b>Responsible Person(s)</b>	<b>Due Date</b>
Complete design of Campus Needs Assessment	Leadership Team	December 15, 2003
Implement Campus Needs Assessment	Site teachers	February 5 , 2003
Team reviews results of Campus Needs Assessment and begins implementation planning		February16, 2003
Submit 1st draft of Year 2 Implementation Plan to SEER for review	UES Grantees	March 1, 2004*
Review and comment on Implementation Plan	SEER	March 21, 2004*
Final Year 2 Implementation Plan completed	UES Grantees	March 31, 2004*
Submit Year 2 Implementation Plan for CIWMB approval	UES Grantees	March 31, 2004*
CIWMB staff review Year 2 Implementation Plans	CIWMB staff	April 2004
CIWMB considers Phase Two funding	CIWMB staff	May 2004
Phase Two agreements sent to Grantees and returned to Grantees	CIWMB staff and Grantees	May 2004

\*Pending MCUSD Board approval