

**Solid Waste and Recycling Curriculum**  
**Lesson 15**

**Industrial Paper Recycling**

**Objectives:**

**I will define key vocabulary.**

**I will summarize and present the paper recycling process to the class.**

**Standards:**

**E.12.C.4 Students know processes of obtaining, using, and recycling of renewable and nonrenewable sources. E/S**

**N.12.B.4 Students know scientific knowledge builds on previous information. E/S**



Photo Taken From: [http://industrial-recycling.net/large\\_images/paper.jpg](http://industrial-recycling.net/large_images/paper.jpg)

**SAMPLE RESPONSES**

**Vocabulary:**

- 1. Pulp:** *a soft, wet mass of fibers derived from wood, used in papermaking.*
- 2. De-inking:** *the process of removing ink from the paper pulp.*

3. **Floatation:** *a process of de-inking where air and soap-like chemicals are injected into the pulp. This removes the large particles of ink from the pulp and floats them to the top of the vat.*
4. **Refining:** *the separation of pulp into individual fibers.*
5. **Virgin Fiber:** *new wood fibers.*

**Describe the Process of Each of the Following:**

1. **Sorting:** *Sort your paper by grade, or type of paper. Keep your paper free from contaminants, such as food and other trash.*
2. **Collection and Transportation:** *You may drop your paper off at a transfer station, have your trash man pick it up in your recycling bin, or leave it in a recycling bin at school.*
3. **Storage:** *Paper is stored in warehouses at paper mills. It is kept until needed with cardboard, newspaper, or whatever grade it may be. Forklifts then move the paper from the warehouse to large conveyers*
4. **Re-pulping and Screening:** *The paper moves on the conveyer to a vat called a pulper, which contains water and other chemicals. The pulper chops the recovered paper into small pieces. The mixture is heated to break the paper down faster into tiny strands of cellulose called fibers. The old paper turns into a mushy mixture of pulp. The pulp is then forced through screens which remove contaminants, which is called screening.*
5. **Cleaning:** *Mills clean pulp by spinning it around in large cone-shaped cylinders. Light contaminants collect in the center of the cone and are removed.*
6. **Deinking:** *This removes printing ink and sticky materials like glue residue and adhesives. Small particles of ink are rinsed from the pulp with water in a process called washing. Larger particles and stickies are removed with air bubbles in another process called flotation. During flotation deinking, pulp is fed into a large vat called a flotation cell, where air and soap-like chemicals called surfactants are injected into the pulp. The surfactants cause ink and stickies to loosen from the pulp and stick to the air bubbles as they float to the top of the mixture. The inky air bubbles create foam or froth which is removed from the top, leaving the clean pulp behind.*
7. **Refining, Bleaching, and Color Stripping:** *pulp is beaten to make recycled fibers swell. Color stripping chemicals remove dyes from the paper. White paper is bleached with hydrogen peroxide, chlorine dioxide, or oxygen.*
8. **Papermaking:** *Recycled paper can be used alone or with new wood fiber to make it stronger. Pulp is mixed with chemicals and sprayed onto a screen. Water drains*

*through the screen and fibers begin drying and bond. When dry, the paper is wound into a giant roll.*

**Questions:**

**1. Can all of my recovered paper be recycled? *No, not contaminated paper***

**2. What can be made from recovered paper? *Newspaper, gift wrap, office paper***