Conservation
Fall 2011

Name: _____
Lab Day (circle one): Monday Wednesday

LABORATORY 8: WASTE AND RECYCLING AT PLU

Due November 7th or 9th

Purpose:

Human civilization generates a large amount of waste. As our landfills fill up, we are faced with finding new ways of disposing of our solid waste. The purpose of this lab is to identify different categories of waste and measure the amount of waste generated in these categories on our campus. We will also calculate the energy value of materials in our waste stream. **Chrissy Cooley**, Sustainability Manager, will be leading today's lab with the assistance of several student workers from the Sustainability Office.

Part I: Sorting the Trash

1. Use Table 1 to record the weight of the materials in each category into which the waste was sorted. (*15 points)*

2. Determine the percentage out of the total of each type of material (**show an example calculation on back page**). Record this in Table 1 as well. *(19 points)*

Part II: Waste Autopsy Data *(38 points)*

3. Where was the waste collected? _____
4. How much waste did we sort (express in total pounds)? _____
5. Approximately how long did it take to accumulate this much waste?_____
6. How many pounds of recyclable material did we find in the garbage? _____
7. What percentage of the material in the garbage was recyclable material (show your work)?

8. What happens to waste once it is collected from waste bins?

9. What happens to recycling once it is collected from recycling bins?

10. Approximately what percent of PLU's waste stream is recycled? _____

11. What are some other items (other than paper, aluminum, glass and plastic) that are diverted from the landfill at PLU? What is done with these items?

12. When students move out of a residence hall at the end of the academic year, what items can be recycled on campus rather than put into the garbage?

13. Name at least ***three*** actions that ***you*** can practice on a daily basis to facilitate recycling at PLU.

14. Would you expect the percentage of waste that is recycled to be higher or lower in **Rieke Science Center** or **Morken Center for Learning and Technology** than in other ***non-residence hall buildings*** on campus? Explain your answer. *Hint: Consider the types of material that can be recycled and which buildings might generate different types of waste.*

15. Would you expect the percentage of waste that is recycled to be higher or lower than **Rieke** and **Morken** in ***residence halls*** on campus? Explain your answer. *Hint: Consider the availability of recycling bins and the types of material that can be recycled. If you haven't lived in a residence hall, consult with some of your classmates.*

16. How does recycling benefit the environment? List multiple ways.

17. Other than benefiting the environment, how does recycling benefit PLU?

18. Besides carefully recycling material, what other actions can you take to promote resource **reuse** rather than use of new resources?

Part III: Energy Value of Waste *(16 points)*

19. Examine "Table B1" shown below. Based on the information shown in Table B1, what is another possible way of dealing with waste?

20. What might the environmental benefits of such a strategy be?

21. What might the environmental harm be?

22. Using the **average** heat content per ton of MSW, as shown in "Table B1," calculate the heat value of the **total** weight of trash you sorted today. For your calculations, remember that 1 ton is equal to 2000 pounds. Show your work.

Table B1. Calculations to Obtain Average Million Btu Per Ton for Municipal Solid Waste (MSW)

Material Group	Discards (Million tons)[a]	Heat Content (Million Btu per ton)[b]	Heat Contributed Trillion Btu)
Newsprint	6.03	16	96.48
Paper	16.44	6.7	110.15
Containers & Packaging	19.53	16.5	322.25
Plastics			
PET	2.7	20.45	55.22
HDPE	5.55	19	105.45
PVC	1.55	16.5	25.58
LDPE/LLDPE	6.08	24.1	146.53
PP	3.77	38	143.26
PS	2.44	35.6	86.86
Other	5.17	20.5	105.99
Rubber	4.88	26.86	131.08
Leather	0.86	14.4	12.38
Textiles	9.4	13.8	129.72
Yard Trimmings	12.23	6	73.38
Food Wastes	28.5	5.2	148.2
Wood	12.59	9.96	125.4
Other	8.3	18.1	150.23
Glass	10.02	0	0
Metals	11.74	0	0
Total	167.78	11.73	1968.14

Total Btu/Total Tons → 1968.14 ÷ 167.78 = 11.73 Million Btu/Ton of MSW

[a] Table A1.

[b] Table 4.

Notes: Discards includes all MSW material available for combustion with energy recovery, discards to landfill, and other disposal. For explanation of plastics abbreviations, see Appendix C.

Source: Environmental Protection Agency, Municipal Solid Waste in the United States, 2005.

http://www.epa.gov/msw/msw99.htm

23. What assumptions are you making in your calculation in 22? Why might your answer be inaccurate?

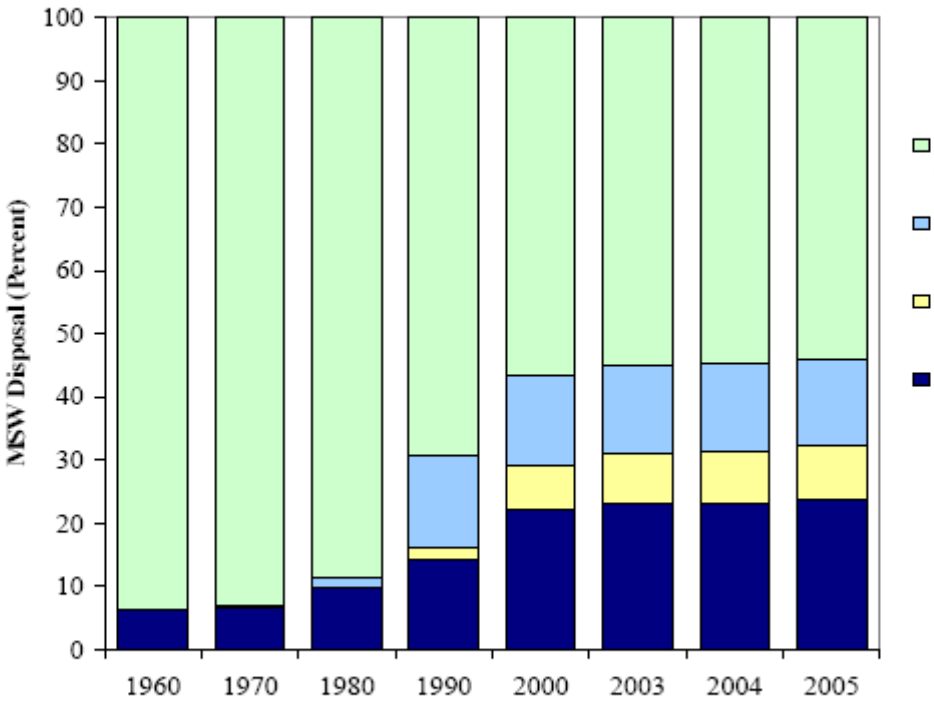
24. How does the heat value you calculated in 22 compare to the amount of BTUs you use each day? Use your baseline data to answer this question, and report which baseline value you use in your answer.

Part IV: Nationwide Recycling Rates *(12 points)*

25. Examine "Figure 2" below. How does PLU's campus-wide recycling rate compare with the national recycling rate? Provide some reasons that might explain this difference.

26. What suggestions do you have for improving the **national** recycling rate?

Figure 2. Municipal Solid Waste (MSW) Disposal



Source: Table 1 and Environmental Protection Agency, Municipal Solid Waste in the United States: 2005 Facts and Figures. http://www.epa.gov/msw/msw99.htm

27. What suggestions do you have for reducing the amount of municipal solid waste produced in this country?

Table 1: Categories, weights, and percentages of waste collected

MATERIAL	WEIGHT (LBS)	PERCENTAGE
TOTAL		100%

Sample Calculation: Please show **one** sample calculation below to demonstrate how you calculated the percentage of one of the above categories of waste (note that "TOTAL" is not a waste category).