



Clallam County

Solid Waste

Composition Study



CLALLAM COUNTY

WASTE COMPOSITION STUDY

FINAL REPORT

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EXECUTIVE SUMMARY

INTRODUCTION

This study examined the quantity and composition of solid waste (garbage) disposed by homes and businesses in Clallam County in 2002-2003. The primary goals of this waste composition study were to:

- provide accurate data on the composition and quantity of disposed materials for planning and implementation of waste diversion programs.
- provide data that can be used in the future to evaluate the need for new programs, especially when the Port Angeles Landfill closes in 2006.

This waste composition study was conducted by the environmental consulting firm Green Solutions, with assistance from County Environmental Health staff and the consulting firm Environmental Practices, LLC. Assistance was also provided by the Clallam County Sheriffs Department Chain Gang, who provided labor for the waste sorting crews, and the operators of the two disposal facilities in the County (the City of Port Angeles and West Waste & Recycling).

Funding for this study was provided by the Washington Department of Ecology (Ecology), with in-kind matching funds provided by Clallam County and Port Angeles.

OVERVIEW OF THE STUDY'S METHODOLOGIES

The methodology used for this study was based on parameters initially proposed by Ecology, with additional refinements developed through a joint effort by Environmental Practices, Cascadia Consulting, and Green Solutions. These refinements dealt largely with the list of materials and sources (types of generators) to be examined. These procedures were finalized in July and August, 2002, prior to the first fieldwork conducted in Clallam County in late August.

For the purpose of this study, all solid waste received at the Port Angeles Landfill and West Waste Transfer Station was classified into one of three broad categories: consumer (or residential), commercial and industrial. For sampling and quantification purposes, these categories were further broken down into several sub-categories, called waste generators, according to source and delivery method. Later, Tribes were also added as a separate category because there was an interest in the composition of their waste and there was an opportunity to gather samples from the Quileutes' waste loads delivered to the West Waste Transfer Station.

The data collection procedures used for this study addressed both the quantity and composition of the wastes disposed by these sources (waste generators).

The categories of waste generators used for this study are:

Consumer (Residential)

- ┌ **Residential:** waste brought in by garbage haulers from single-family homes and apartment buildings.
- ┌ **Residential Self-Haul:** residential waste brought in by the people who generated the waste.

Commercial

- ┌ **Commercial and Institutional:** waste brought in by garbage haulers from commercial and institutional sources.
- ┌ **Non-Residential Self-Haul:** waste brought in by an employee of the business or organization that generated the waste.

Industrial

- ┌ **Construction and Demolition (C&D):** waste generated through construction, demolition and remodeling activities, generally brought in by an employee of the construction firm that generated the waste but also including waste brought in by a garbage hauler or by a homeowner (i.e., waste that otherwise would have been classified as residential self-haul).
- ┌ **Daishowa:** as a major contributor to the waste stream in Clallam County, this company was tracked separately for waste quantity and composition purposes.
- ┌ **Other Industrial:** all other industrial wastes, including self-hauled waste and waste delivered by a garbage hauler, and including waste generated by manufacturing activities (Standard Industrial Classification codes 20-39); agriculture, forestry and fisheries (SIC codes 01-09); and mining (SIC codes 10-14).

Tribes

- ┌ **Tribes:** a mixture of residential and non-residential waste from the Tribes with separate collection and/or disposal systems (i.e., the Quileute and Makah Tribes).

The quantity (tonnage) of solid waste disposed by each generator at the Port Angeles Landfill was determined through a combination of existing City records and customer surveys. Existing City records collected at the scalehouse for the Port Angeles Landfill provided a breakdown of tonnages by type of customer or vehicle, and the results of a survey conducted for this study each quarter allowed these tonnages to be allocated to the different types of waste generators. Waste quantities handled by the West Waste Transfer Station were allocated to the generator categories based on information provided by West Waste & Recycling, Inc.

The composition of the County's solid waste was determined by randomly selecting and sorting samples of waste from incoming loads. Sampling was conducted for four days each quarter. Most of the fieldwork was conducted at the Port Angeles Landfill because most of the County's

waste stream (about 90%) is disposed at that site, but two days were also spent at the West Waste Transfer Station in Forks.

This study included a survey of industrial generators that addressed all wastes generated, not just the wastes disposed in a landfill. Besides this survey data, the waste quantity and composition data gathered in this study addresses only the disposed waste stream and does not include materials recycled or sent out of county for special disposal.

RESULTS AND CONCLUSIONS

Waste Quantities

The waste quantity results are summarized in Table E-1. Of the three main groups, Residential generators dispose of the most waste (44.5% of the County's annual amount). For individual sources, however, the amount of waste collected by garbage trucks from single-family homes (29.9%) is just slightly higher than the waste collected from businesses and institutions (28.5%).

**TABLE E - 1
QUANTITIES OF DISPOSED WASTES**

| Type of Waste Generator | Annual Amounts | |
|------------------------------------|----------------|---------------|
| | Tons per Year | Percent |
| Residential (homes and apartments) | 15,190 | 29.9% |
| Residential Self-Haul | <u>7,430</u> | <u>14.6%</u> |
| Residential Subtotal | 22,620 | 44.5% |
| Commercial and Institutional | 14,480 | 28.5% |
| Non-Residential Self-Haul | <u>2,490</u> | <u>4.9%</u> |
| Commercial Subtotal | 16,970 | 33.3% |
| Construction and Demolition | 5,090 | 10.0% |
| Daishowa | 3,460 | 6.8% |
| Other Industrial | <u>1,010</u> | <u>2.0%</u> |
| Industrial Subtotal | 9,560 | 18.8% |
| Tribes | 1,740 | 3.4% |
| Total | <u>50,870</u> | <u>100.0%</u> |

Waste Composition Results

Waste composition results for the entire County are shown in Table E-2 and summarized in Figure E-1. As can be seen in that figure, Clallam County's waste stream contains significant amounts of paper (19.9% of the total), organic materials (which is primarily food waste), and wood and C&D (construction and demolition waste). Individual materials that are present in large quantities include food waste (15.4% of the County's total waste stream), wood (7.5%), other construction debris (6.5%), low-grade paper (5.3%), and plastic film and bags (4.8%).

There are distinct differences in the waste streams of the different types of waste generators (see Table E-2). For each of the generators, a few noteworthy conclusions can be drawn:

- ┌ **Residential:** the two largest materials in this waste stream are both organic: food waste (18.5% by weight) and yard debris (6.9%). There are also significant quantities of low-grade paper (6.3%), plastic film and bags (4.8%), textiles (4.8% altogether), compostable paper (4.2%), and diapers (3.9%). Since this generator disposes of the largest amount of waste (29.9% of the County's total), even small amounts of materials could translate to significant amounts of materials available for recycling or other waste diversion programs.
- ┌ **Residential Self-Haul:** self-haul loads from residential sources have more wood, construction debris and special wastes than other residential sources, and less "regular" household trash (paper and plastic), reflecting the activities such as remodeling and other special projects that are often the source of Residential Self-Haul waste. Food waste is still the material present in the single largest quantity, however, at 20.0%, followed by wood (10.3%), compostable paper (5.3%), construction debris (4.5%), low-grade paper (4.1%), other plastic products (3.9%), and cardboard (3.7%). In the special waste category, a significantly higher amount of waste was found that qualifies as hazardous waste (0.5% for Residential Self-Haul versus 0.1% for Residential).
- ┌ **Commercial/Institutional:** waste from this source also contains large amounts of food waste (19.2%), as well as low-grade paper (7.0%), plastic film and bags (6.8%), compostable paper (6.7%), wood (5.8%), and cardboard (5.1%). Because this waste stream is so large (at 28.5% of the County's total, it runs a close second to waste from single-family homes), even small amounts of materials (on a percentage basis) add up to significant tonnages of materials that could be available for recycling or other waste diversion programs.
- ┌ **Non-Residential Self-Haul:** these generators dispose of more cardboard (7.1%) than any of the other generators, but the overall tonnages of this waste stream are relatively small (4.9% of the entire waste stream), so that the total tonnage of cardboard being disposed by this group is not that great. The waste from these generators is also high in other plastic products (10.3%), food waste (10.0%), furniture and mattresses (9.5%), and wood (6.2%).
- ┌ **Construction and Demolition:** this waste stream is high in wood and construction debris, as can be expected from the activities that generate the waste. Altogether, wood and construction debris make up 76.8% of this waste stream. The other one-quarter of this waste stream is largely made up of related materials (carpet, cardboard boxes, metals, etc.).

TABLE E - 2
WASTE COMPOSITION RESULTS BY SOURCE
CLALLAM COUNTY WASTE COMPOSITION STUDY

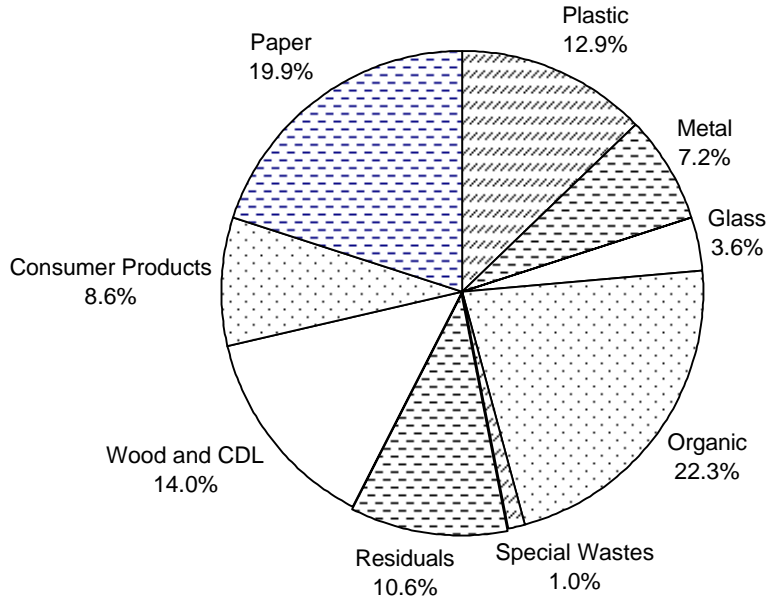
| | <u>Residential</u> | | <u>Commercial</u> | | <u>Industrial</u> | | | <u>Tribes</u> | <u>Average for Entire County</u> |
|-------------------------|--------------------|------------------|-------------------|------------------|-------------------|-----------------|---------------|---------------|----------------------------------|
| | <u>Residential</u> | <u>Self-Haul</u> | <u>Comm/Inst.</u> | <u>Self-Haul</u> | <u>C&D</u> | <u>Daishowa</u> | <u>Other</u> | | |
| PAPER | | | | | | | | | |
| Cardboard | 3.09% | 3.66% | 5.08% | 7.11% | 3.21% | 0.68% | 4.22% | 4.58% | 3.86% |
| Newspaper | 3.29% | 1.11% | 2.09% | 1.69% | 0.02% | 0.03% | 0.72% | 2.44% | 1.92% |
| Other Groundwood | 0.43% | 0.32% | 0.67% | 0.08% | 0.01% | 0.01% | 0.36% | 0.14% | 0.38% |
| High-Grade Paper | 0.90% | 1.33% | 1.38% | 0.20% | 0.02% | 0.02% | 0.38% | 4.55% | 1.03% |
| Magazines | 2.56% | 2.73% | 0.94% | 4.35% | 0.02% | 0.03% | 0.51% | 1.60% | 1.71% |
| Low-Grade Paper | 6.30% | 4.11% | 6.96% | 3.26% | 0.31% | 5.62% | 3.15% | 5.72% | 5.29% |
| Compostable | 4.15% | 5.28% | 6.74% | 2.93% | 0.06% | 0.16% | 3.04% | 5.75% | 4.35% |
| Other Paper | 0.66% | 2.05% | 1.06% | 0.46% | 3.01% | 2.69% | 0.72% | 1.09% | 1.36% |
| Paper Subtotal | 21.38% | 20.59% | 24.92% | 20.08% | 6.65% | 9.24% | 13.10% | 25.87% | 19.90% |
| PLASTIC | | | | | | | | | |
| PET Bottles | 1.06% | 0.43% | 1.32% | 0.73% | 0.09% | 2.27% | 0.65% | 5.51% | 1.15% |
| HDPE Bottles, Clear | 0.73% | 0.29% | 0.35% | 0.16% | 0.01% | 2.39% | 0.08% | 0.97% | 0.57% |
| HDPE Bottles, Colored | 0.54% | 0.94% | 0.56% | 0.16% | 0.03% | 0.64% | 0.09% | 0.52% | 0.53% |
| Film and Bags | 4.83% | 2.67% | 6.79% | 3.56% | 1.81% | 5.90% | 1.83% | 6.27% | 4.77% |
| Bottles 3-7 | 0.08% | 0.09% | 0.08% | 0.07% | 0.00% | 0.17% | 0.00% | 0.00% | 0.07% |
| Expanded Polystyrene | 0.42% | 0.69% | 0.63% | 3.77% | 0.07% | 0.19% | 0.27% | 1.82% | 0.68% |
| Other Plastic Packaging | 1.57% | 1.76% | 1.77% | 0.70% | 0.29% | 2.78% | 0.30% | 1.01% | 1.52% |
| Other Plastic Products | 2.02% | 3.91% | 2.68% | 10.30% | 2.59% | 0.85% | 1.56% | 1.04% | 2.83% |
| Other Plastic | 0.59% | 1.07% | 0.46% | 0.15% | 0.05% | 0.21% | 14.83% | 0.00% | 0.78% |
| Plastic Subtotal | 11.85% | 11.84% | 14.65% | 19.61% | 4.94% | 15.40% | 19.61% | 17.14% | 12.91% |
| METAL | | | | | | | | | |
| Aluminum Cans | 0.85% | 0.84% | 0.79% | 0.94% | 0.03% | 2.48% | 0.25% | 2.51% | 0.91% |
| Aluminum Foil | 0.16% | 0.16% | 0.18% | 0.12% | 0.02% | 0.18% | 0.09% | 0.10% | 0.15% |
| Other Aluminum | 0.00% | 0.20% | 0.03% | 0.28% | 0.00% | 0.07% | 0.00% | 0.00% | 0.06% |
| Copper | 0.00% | 0.00% | 0.01% | 0.02% | 0.00% | 0.10% | 0.22% | 0.00% | 0.01% |
| Other Non-Ferrous | 0.09% | 0.00% | 0.01% | 0.05% | 0.00% | 0.03% | 0.02% | 0.00% | 0.04% |
| Tin Cans | 2.06% | 1.64% | 1.12% | 0.30% | 0.09% | 5.53% | 0.22% | 1.40% | 1.63% |
| White Goods | 0.00% | 0.00% | 1.60% | 0.00% | 3.60% | 0.00% | 0.00% | 0.00% | 0.82% |
| Ferrous | 1.02% | 2.16% | 2.07% | 4.38% | 1.92% | 1.39% | 1.60% | 1.54% | 1.79% |
| Mixed | 2.22% | 2.66% | 1.57% | 0.80% | 0.09% | 0.66% | 6.04% | 2.27% | 1.79% |
| Metal Subtotal | 6.40% | 7.66% | 7.37% | 6.89% | 5.76% | 10.44% | 8.45% | 7.81% | 7.18% |
| GLASS | | | | | | | | | |
| Clear Beverage | 1.64% | 1.29% | 1.65% | 1.33% | 0.04% | 0.00% | 0.48% | 1.93% | 1.29% |
| Clear Other | 0.68% | 1.45% | 0.40% | 0.15% | 0.07% | 0.00% | 0.00% | 0.29% | 0.55% |
| Brown Beverage | 1.26% | 0.89% | 0.94% | 1.03% | 0.00% | 0.00% | 0.50% | 2.40% | 0.91% |
| Brown Other | 0.00% | 0.01% | 0.01% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Green Beverage | 0.60% | 0.85% | 0.69% | 0.23% | 0.00% | 0.00% | 0.00% | 0.61% | 0.53% |
| Green Other | 0.01% | 0.06% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.01% |
| Plate Glass | 0.05% | 0.00% | 0.01% | 0.04% | 0.00% | 0.00% | 0.01% | 0.00% | 0.02% |
| Non-Glass Ceramics | 0.19% | 0.29% | 0.13% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.13% |
| Other Glass | 0.15% | 0.17% | 0.08% | 0.01% | 0.00% | 0.00% | 0.01% | 0.11% | 0.10% |
| Glass Subtotal | 4.57% | 5.01% | 3.90% | 2.80% | 0.12% | 0.00% | 0.99% | 5.35% | 3.56% |

Table E-2, continued

| | | <u>Residential</u> | | <u>Commercial</u> | | <u>Industrial</u> | | | <u>Tribes</u> | <u>Average for Entire County</u> |
|------------------------------|----------------------------------|--------------------|------------------|-------------------|------------------|-------------------|-----------------|----------------|----------------|--------------------------------------|
| | | <u>Residential</u> | <u>Self-Haul</u> | <u>Comm/Inst.</u> | <u>Self-Haul</u> | <u>C&D</u> | <u>Daishowa</u> | <u>Other</u> | | |
| ORGANICS | Yard Debris | 6.93% | 2.68% | 2.21% | 0.11% | 0.00% | 0.03% | 0.02% | 0.26% | 3.11% |
| | Food Waste | 18.50% | 19.98% | 19.16% | 9.95% | 0.84% | 0.54% | 2.47% | 23.92% | 15.37% |
| | Manure | 3.03% | 2.46% | 0.22% | 0.08% | 0.00% | 0.15% | 0.00% | 1.46% | 1.39% |
| | Diapers | 3.85% | 1.45% | 2.18% | 1.25% | 0.01% | 0.37% | 0.00% | 4.52% | 2.23% |
| | Carcasses | 0.00% | 0.12% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.02% |
| | Other Organics | 0.12% | 0.30% | 0.23% | 0.01% | 0.00% | 0.00% | 0.21% | 0.00% | 0.15% |
| | Organics Subtotal | 32.44% | 26.97% | 24.01% | 11.41% | 0.85% | 1.10% | 2.70% | 30.17% | 22.26% |
| CONSUMER PRODUCTS | Computers | 0.64% | 0.34% | 0.27% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.32% |
| | Other Electronics | 1.32% | 0.00% | 0.30% | 3.29% | 0.00% | 0.00% | 0.08% | 0.00% | 0.64% |
| | Synthetic Textiles | 0.47% | 0.30% | 0.21% | 1.60% | 0.00% | 0.16% | 0.01% | 0.00% | 0.33% |
| | Organic Textiles | 0.84% | 0.51% | 0.36% | 0.33% | 0.04% | 0.19% | 0.24% | 0.00% | 0.46% |
| | Mixed/Unknown Textiles | 3.48% | 2.28% | 1.38% | 3.92% | 0.04% | 1.15% | 0.52% | 3.76% | 2.18% |
| | Shoes | 0.37% | 0.56% | 0.12% | 0.30% | 0.00% | 0.00% | 0.00% | 0.00% | 0.24% |
| | Tires, Other Rubber | 0.97% | 0.03% | 0.65% | 0.00% | 0.00% | 0.98% | 0.23% | 0.13% | 0.55% |
| | Furniture | 0.11% | 1.97% | 0.00% | 9.46% | 0.00% | 0.00% | 1.34% | 0.00% | 0.81% |
| | Carpet | 0.07% | 0.09% | 3.07% | 4.36% | 2.28% | 0.17% | 0.23% | 0.00% | 1.37% |
| | Carpet Padding | 0.00% | 0.00% | 1.95% | 2.68% | 1.67% | 0.00% | 0.00% | 0.00% | 0.85% |
| | Rejected Products | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 9.72% | 0.41% | 0.00% | 0.67% |
| | Other Composite | 0.58% | 0.00% | 0.03% | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 0.18% |
| | Consumer Prod. Subt. | 8.84% | 6.09% | 8.34% | 25.96% | 4.02% | 12.37% | 3.05% | 3.89% | 8.61% |
| WOOD and C&D | Wood | 1.38% | 10.28% | 5.79% | 6.15% | 28.08% | 1.69% | 31.75% | 1.93% | 7.48% |
| | C&D | 1.58% | 4.49% | 1.50% | 2.07% | 48.75% | 0.17% | 0.02% | 0.00% | 6.55% |
| | Wood and C&D Subtotal | 2.96% | 14.77% | 7.30% | 8.22% | 76.84% | 1.87% | 31.78% | 1.93% | 14.03% |
| SPECIAL | Special Waste | 0.60% | 1.66% | 0.99% | 0.37% | 0.00% | 0.07% | 12.87% | 0.18% | 0.99% |
| RESIDUALS | Ash | 0.01% | 0.02% | 0.11% | 0.06% | 0.00% | 0.91% | 0.00% | 0.00% | 0.10% |
| | Dust | 0.14% | 0.41% | 0.13% | 0.14% | 0.00% | 0.00% | 0.00% | 0.00% | 0.15% |
| | Fines/Residue | 10.80% | 4.98% | 8.29% | 4.45% | 0.81% | 1.79% | 2.73% | 7.67% | 7.05% |
| | Sludges/Other | 0.00% | 0.00% | 0.00% | 0.00% | 0.00% | 46.81% | 4.72% | 0.00% | 3.28% |
| | Residual Subtotal | 10.96% | 5.40% | 8.53% | 4.65% | 0.82% | 49.52% | 7.45% | 7.67% | 10.57% |
| TOTALS | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | |

Note: All figures are percent by weight.

**FIGURE E-1
WASTE COMPOSITION RESULTS
CLALLAM COUNTY WASTE COMPOSITION STUDY**



SUMMARY OF WASTE COMPOSITION RESULTS:

| | | | | | |
|----------------|-------------------------|-------------|----------------------------|--------------------------|-------------|
| PAPER | Cardboard | 3.9% | ORGANIC | Food Waste | 15.4% |
| | Newspaper | 1.9% | | Yard Waste | 3.1% |
| | Low-Grade | 5.3% | | Diapers | 2.2% |
| | Compostable | 4.3% | | Other Organics | <u>1.6%</u> |
| | Other Grades of Paper | <u>4.5%</u> | | Organic Subtotal | 22.3% |
| | Paper Subtotal | 19.9% | SPECIAL WASTES | Special Waste Subtotal | 1.0% |
| PLASTIC | Plastic Bottles | 2.3% | | (Actual Hazardous Waste) | 0.3% |
| | Plastic Film, Pkg, Foam | 7.0% | WOOD, C&D | Wood | 7.5% |
| | Other Types of Plastic | <u>3.6%</u> | | C&D | <u>6.5%</u> |
| | Plastic Subtotal | 12.9% | | Wood, C&D Subtotal | 14.0% |
| METAL | Aluminum Cans | 0.9% | RESIDUALS | Sludges | 3.3% |
| | Tin Cans | 1.6% | | Other | <u>7.3%</u> |
| | Ferrous Metals | 1.8% | | Residuals Subtotal | 10.6% |
| | Other Metals | <u>2.9%</u> | CONSUMER PRODUCTS | Textiles, Shoes | 3.2% |
| | Metal Subtotal | 7.2% | | Computers, Electronics | 1.0% |
| GLASS | Clear Glass Containers | 1.8% | | Other | <u>4.4%</u> |
| | Brown Glass Containers | 0.9% | | Consumer Prod. Subtotal | 8.6% |
| | Green Glass Containers | 0.5% | RECYCLABLE SUBTOTAL | | 33.6% |
| | Other Glass | <u>0.3%</u> | | | |
| | Glass Subtotal | 3.6% | | | |

*Recyclable Subtotal includes recyclable paper, plastic bottles, all metals, glass bottles, yard waste, textiles and tires.
All figures are percent by weight.*

- ┌ **Daishowa:** Daishowa's waste stream consists primarily of a wet tangled mass of materials screened out of the paper they process. Although rich in other recyclables (materials such as cans and plastic bottles that have been carried along with the recyclable paper that Daishowa buys), many of these materials are not easily recycled after being through Daishowa's processing system.

- ┌ **Other Industrial:** the composition of this waste stream reflects the wood products companies that make up much of the other industry in Clallam County.

- ┌ **Tribes:** the results from the Quileute Tribe samples are relatively high in recyclable materials, but the small number of samples taken for this source means these results are uncertain.

In addition to the primary waste composition data discussed above, other information was gathered and is shown in the full report. This information includes data on industrial waste generation; a detailed breakdown of wood, construction/demolition, and special wastes; data on the amount of reusable materials found in the waste stream; and a comparison of Clallam County's results to other counties.

RECOMMENDATIONS

A goal of this study was to provide recommendations for materials and sources that could be targeted for additional recycling and other programs. Based on the results of this study, materials and sources that are recommended for additional recovery efforts are shown in Table E-3.

If programs could be implemented or expanded to capture or divert 50 to 75% of the materials indicated in Table 21, then an additional 7,100 to 10,700 tons per year, or 14.0 to 21.1% of the solid waste stream in Clallam County, could be diverted from landfilling or waste export.

Daishowa's waste contains significant amounts of recyclable materials, but no recommendations are being made here based on the understanding that they are already looking into additional recovery options. For the Tribes, general improvements are recommended, although again it should be noted that the limited amount of data available for the Tribes makes any conclusions uncertain.

**TABLE E - 3
MATERIALS AND SOURCES FOR ADDITIONAL RECOVERY**

| Type of Waste Generator | Paper | | | Plastic | | Metal | | Other | | | | Comments |
|------------------------------|-------|-----|-----------|---------|------|-------|------|---------------|-------------|------|-----|---|
| | All | OCC | Low-Grade | Bottles | Film | All | Cans | Glass Bottles | Yard Debris | Wood | C&D | |
| Consumer | | | | | | | | | | | | |
| Residential (Homes and Apt.) | X | | | X | | | X | X | X | | | |
| Residential Self-Haul | X | | | | | | | X | | X | | |
| Commercial | | | | | | | | | | | | |
| Commercial and Institutional | | X | X | | X | | | | | | | |
| Non-Residential Self-Haul | | X | | | | | | | | X | | |
| Industrial | | | | | | | | | | | | |
| Construction and Demolition | | | | | | | | | | X | X | |
| Daishowa | | | | | | | | | | | | Daishowa is already looking into options. |
| Other Industrial | | X | | | | X | | | | X | | |
| Tribes | | | | | | | | | | | | More recycling in general could be done. |

SECTION I INTRODUCTION

A. SCOPE AND OBJECTIVES

This study examined the quantity and composition of solid waste (garbage) disposed by homes and businesses in Clallam County in 2002-2003. The primary goals of this waste composition study were to:

- provide accurate data on the composition and quantity of disposed materials for planning and implementation of waste diversion programs.
- provide data that can be used in the future to evaluate the need for new programs, especially when the Port Angeles Landfill closes in 2006.

This waste composition study was conducted by the environmental consulting firm of Green Solutions, with assistance from County Environmental Health staff and the consulting firm Environmental Practices, LLC. Assistance was also provided by the Clallam County Sheriffs Department Chain Gang, who provided labor for the waste sorting crews, and the operators of the two disposal facilities in the County (the City of Port Angeles and West Waste & Recycling).

Funding for this study was provided by the Washington Department of Ecology (Ecology), with in-kind matching contributions provided by Clallam County and the City of Port Angeles. The methodology used for this study was based in part on parameters (for the types of generators and materials) developed by Ecology.

B. BACKGROUND

The collection and disposal of solid waste in Clallam County is currently stable and effective, but major changes are anticipated for the eastern, more populated portion of the County. In 2006, the Port Angeles Landfill, which serves the eastern part of the County and handles the majority of the waste stream, is expected to close and be replaced by a transfer station and waste export system. The western part of the County is already served by a waste export system operated by West Waste & Recycling. The Makah Reservation, in the northwestern corner of the County, is served by the Neah Bay Landfill.

With the magnitude of the upcoming change for the disposal of much of the County's waste stream, Clallam County pursued the funds for this study when grant monies became available from Ecology. Conducting this study was an opportunity to learn about the waste streams currently being generated in the county, such as the overall amount of construction and demolition (C&D) waste currently being disposed. C&D waste is of particular interest because these wastes may not fit easily into the future waste export system. Studying the waste streams

in Clallam County was also an opportunity to learn more about specific materials, such as the amount and types of hazardous waste still being disposed with solid waste.

This study serves Ecology interest in learning more about wastes disposed throughout the State of Washington. The Clallam County study is part of a broader project that included studies in Grant, Okanogan and Yakima Counties. One part of this broader project was to develop methodologies and sorting categories that will help support the increasing interest in sustainability, as well as provide more data for waste reduction and recycling programs. Another aspect of the broader project will involve using the results from Clallam County, the other three counties, and studies previously conducted for other counties, to project the composition of solid waste statewide.

SECTION II WASTE CHARACTERIZATION RESULTS

A. INTRODUCTION

This section provides waste quantity and composition results for each type of waste generator and for the county overall. This section addresses only the disposal-site samples, taken at the Port Angeles Landfill and West Waste Transfer Station. Data collected through the industrial surveys, which also addresses waste handled through recycling and other means, is shown in Section IV.

B. OVERVIEW OF PROCEDURES

Types of Waste Generators

For the purpose of this study, all solid waste received at the Port Angeles Landfill and West Waste Transfer Station was classified into one of three broad categories: consumer (or residential), commercial and industrial. Later, Tribes were added as a separate category because there was interest in the composition of waste from this source and there was an opportunity to gather samples directly from the Quileute Tribe. For sampling and quantification purposes, the broad categories were further broken down into several sub-categories, called waste generators, according to source and delivery method. The data collection procedures for this study allowed information to be gathered on the quantity as well as the composition of the waste disposed by the different waste generators.

The categories of waste generators used for this study are:

Consumer (Residential)

- ┌ **Residential:** waste brought in by garbage haulers from single-family homes and apartment buildings.
- ┌ **Residential Self-Haul:** residential waste brought in by the people who generated the waste.

Commercial

- ┌ **Commercial and Institutional:** waste brought in by garbage haulers from commercial and institutional sources.
- ┌ **Non-Residential Self-Haul:** waste brought in by an employee of the business or organization that generated the waste.

Industrial

- ┌ **Construction and Demolition (C&D):** waste generated through construction, demolition and remodeling activities, generally brought in by an employee of the construction firm that generated the waste but also including waste brought in by a garbage hauler or by a homeowner (i.e., waste that otherwise would have been classified as residential self-haul).
- ┌ **Daishowa:** as a major contributor to the waste stream in Clallam County, this company was tracked separately for waste quantity and composition purposes.
- ┌ **Other Industrial:** all other industrial wastes, including self-hauled waste and waste delivered by a garbage hauler, and including waste generated by manufacturing activities (Standard Industrial Classification codes 20-39); agriculture, forestry and fisheries (SIC codes 01-09); and mining (SIC codes 10-14).

Tribes

- ┌ **Tribes:** a mixture of residential and non-residential waste from the Tribes with separate collection and/or disposal systems (i.e., the Quileute and Makah Tribes).

Waste Quantities

The quantity (tonnage) of solid waste disposed by each generator at the Port Angeles Landfill was determined through a combination of existing City records and customer surveys. Existing City records collected at the scalehouse for the Port Angeles Landfill provided a breakdown of tonnages by type of customer or vehicle, and the results of a survey conducted for this study each quarter allowed those tonnages to be allocated to the different types of waste generators. Waste quantities handled by the West Waste Transfer Station were allocated to the generator categories based on information provided by West Waste & Recycling, Inc. The tonnage figure for the Tribes is based on the amount of waste delivered to the West Waste Transfer Station by the Quileute Tribe, plus an estimate for the amount of waste disposed by the Makah Tribe at the Neah Bay Landfill (data for the other Tribes is not available).

Waste Composition

The composition of the County's solid waste was determined by randomly selecting and sorting samples of waste from incoming loads. Most of this fieldwork was conducted at the Port Angeles Landfill because most of the County's waste stream (about 90%) is disposed at that site, but two days were also spent at the West Waste Transfer Station in Forks. Sampling was conducted for four days each quarter (except only three days in August). The final numbers of samples for each quarter is shown in Table 1.

Samples from large vehicles were taken using a list of random numbers corresponding to a grid that was mentally superimposed over the load. For these samples, the target sample size was a minimum of 200 pounds, which has been shown in the past to provide statistically-valid results. For small loads, often the entire load was taken for the sample. Each sample was sorted into 91

TABLE 1
NUMBER OF SAMPLES BY TYPE OF GENERATOR

| Type of Waste Generator | August | November | February | April | Totals | |
|---------------------------|----------|----------|----------|----------|-----------|------------|
| | | | | | Number | Percent |
| Consumer | | | | | | |
| Residential | 5 | 9 | 6 | 6 | 26 | 17% |
| Residential Self-Haul | <u>3</u> | <u>5</u> | <u>5</u> | <u>7</u> | <u>20</u> | <u>13%</u> |
| Consumer Subtotal | 8 | 14 | 11 | 13 | 46 | 30% |
| Commercial | | | | | | |
| Comm. and Institutional | 12 | 7 | 18 | 15 | 52 | 33% |
| Non-Residential Self-Haul | <u>5</u> | <u>5</u> | <u>4</u> | <u>3</u> | <u>17</u> | <u>11%</u> |
| Commercial Subtotal | 17 | 12 | 22 | 18 | 69 | 44% |
| Industrial | | | | | | |
| C&D | 3 | 5 | 6 | 3 | 17 | 11% |
| Daishowa | 3 | 3 | 3 | 3 | 12 | 8% |
| Other Industrial | <u>3</u> | <u>2</u> | <u>2</u> | <u>2</u> | <u>9</u> | <u>6%</u> |
| Industrial Subtotal | 9 | 10 | 11 | 8 | 38 | 24% |
| Tribes | 0 | 3 | 0 | 0 | 3 | 2% |
| Totals | 34 | 39 | 44 | 39 | 156 | 100% |

categories of materials. A copy of the field data form used for this study is shown in Figure 1, and definitions for the material categories are shown in the Glossary. Notes were also recorded on the field data form on the amount of hazardous wastes and reusable materials that were found in each sample.

C. WASTE QUANTITY RESULTS

The results of the waste quantity analysis are shown in Table 2. As can be seen in this table, Residential generators dispose of the most waste (44.5% of the County's annual amount), followed by Commercial (33.4%) and Industrial (18.8%). A test of the accuracy of these figures indicates that the results are +/-5%.

Waste disposal rates are often expressed as the total amount of waste disposed divided by the population of the area. Based on the County's 2000 population of 64,525 and a total waste quantity of 50,870 tons per year, Clallam County's waste disposal rate is 0.79 tons per person per year, or 4.3 pounds per person per day. For comparison purposes, Thurston County's waste disposal rate is 3.9 pounds per person per day (1999 data), and Yakima County's rate is 5.2 pounds per person per day (2003 data).

**FIGURE 1
SAMPLE DATA FORM**

SAMPLE ID: _____

| | | |
|--|--|--|
| SOURCE (CIRCLE ONE) <u>Residential</u> 1a) Single-Family 1b) Apartments 1c) Self-Haul Company / City / Area: _____ | <u>Commercial</u> 2a) General Comm. 2b) Non-Res. Self-Haul | SITE DATA Site: _____ Recorder: _____ Date: _____ Time: _____ |
| | <u>Industrial</u> 3a) C&D 3b) Daishowa 3c) Other Industrial | VEHICLE DATA Type: _____ Company: _____ Lic. No.: _____ |

| PAPER | Reuse? | ORGANICS | Reuse? |
|-------------------------------------|----------|--|--------|
| Cardboard | | Yard, Garden, Prunings | |
| Newspaper | | Food | |
| Other Groundwood | | Manure | |
| High Grade | | Diapers | |
| Magazines | | Carcasses | |
| Mixed/Low Grade | | Crop Residues | |
| Compostable | | Septage | |
| RC | | RC | |
| Industrial Sludge | | | |
| PLASTIC | | CONSUMER PRODUCTS | |
| PET Bottles | | Computers | |
| HDPE Bottles, Clear | | Other Electronics | |
| HDPE Bottles, Pigmented | | Textiles, Synthetic | |
| Film and Bags | | Textiles, Organic | |
| Bottles 3-7 | | Textiles, Mixed/Unk. | |
| Expanded Polystyrene | | Shoes | |
| Other Rigid Packaging | | Tires, Other Rubber | |
| Other Products (identify) | | Furniture | |
| RC | | Carpet | |
| | | Carpet Padding | |
| METALS | | Rejected Products | |
| Aluminum Cans | | Returned Products | |
| Aluminum Foil, Trays | | Other Composite | |
| Other Aluminum | | | |
| Copper | | | |
| Other Non-Ferrous | | RESIDUALS | |
| Tin Cans | | Ash | |
| White Goods | | Dust | |
| Other Ferrous | | Fines / Residue | |
| RC | | Sludges, Other Ind. Wastes (identify): | |
| | | | |
| GLASS | | WOOD WASTES | |
| Beverage | Other | Natural Wood | |
| Clear | | Treated Wood | |
| Brown | | Painted | |
| Green | | Dimension Lumber | |
| Plate Glass | | Engineered Wood | |
| Ceramics | | Pallets, Crates | |
| RC | | Other Untreated | |
| HAZARDOUS AND SPECIAL WASTES | Aerosol? | Byproducts | |
| Used Oil | | RC | |
| Oil Filters | | | |
| Antifreeze | | | |
| Batteries, Vehicle | | | |
| Batteries, Household | | C&D WASTES | |
| Pesticides, Herb. | | Insulation | |
| Latex Paint | | Asphalt | |
| Oil-Based Paint | | Concrete | |
| Medical Wastes | | Drywall | |
| Fluorescent Bulbs | | Soil, Rocks, Sand | |
| Asbestos | | Roofing | |
| Other Hazardous (identify): | | Ceramics, Porc., Bricks, Tile | |
| | | RC (identify): | |
| Other Non-Hazardous (identify): | | | |
| | | | |

Sample ID: _____

COMMENTS (describe source of load and any special problems with the load or with the materials shown above)

**TABLE 2
QUANTITIES OF DISPOSED WASTES**

| Type of Waste Generator | Annual Amounts | |
|------------------------------------|----------------|---------------|
| | Tons per Year | Percent |
| Residential (homes and apartments) | 15,190 | 29.9% |
| Residential Self-Haul | <u>7,425</u> | <u>14.6%</u> |
| Residential Subtotal | 22,610 | 44.5% |
| Commercial and Institutional | 14,480 | 28.5% |
| Non-Residential Self-Haul | <u>2,490</u> | <u>4.9%</u> |
| Commercial Subtotal | 16,970 | 33.4% |
| Construction and Demolition | 5,090 | 10.0% |
| Daishowa | 3,460 | 6.8% |
| Other Industrial | <u>1,010</u> | <u>2.0%</u> |
| Industrial Subtotal | 9,560 | 18.8% |
| Tribes | 1,740 | 3.4% |
| Total | <u>50,870</u> | <u>100.0%</u> |

D. WASTE COMPOSITION RESULTS

Countywide Average Composition Results

Table 3 shows the annual averages for each broad category of generator and for the County as a whole. The results for the County as a whole are also illustrated in Figure 2. As can be seen in Table 3, there are substantial differences in the composition of wastes from the different sources. These differences can be explained by the different activities that created the wastes, and are discussed in greater detail in the following sections.

Residential Waste Composition Results

The results for the residential waste streams are shown in Table 4 and illustrated in Figure 3.

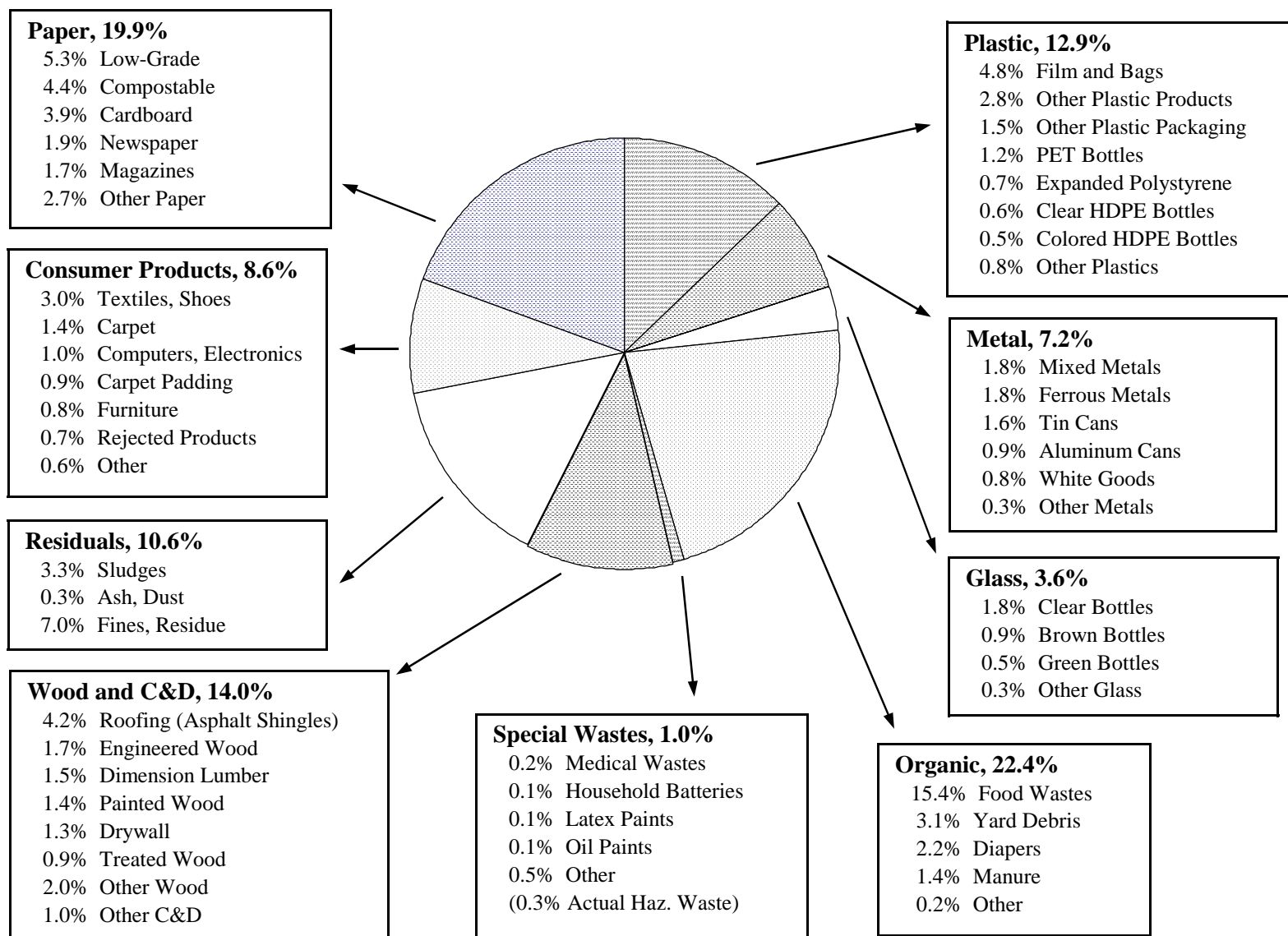
Residential waste is influenced by the activities associated with living in, owning and maintaining a home. Residential Self-Haul waste contains some “regular” household garbage but also contains a large amount of construction debris and other materials that are the result of special projects, since it is these projects that often motivate people to make a special trip to disposal facilities.

**TABLE 3
WASTE COMPOSITION RESULTS BY PRIMARY WASTE STREAM
CLALLAM COUNTY WASTE COMPOSITION STUDY**

| | | <u>Residential</u> | <u>Commercial</u> | <u>Industrial</u> | <u>Tribes</u> | <u>Average for County</u> | |
|--------------------------|----------------------------------|--------------------|-------------------|-------------------|----------------|-------------------------------|--------|
| PAPER | Cardboard | 3.28% | 5.37% | 2.40% | 4.58% | 3.86% | |
| | Newspaper | 2.57% | 2.03% | 0.10% | 2.44% | 1.92% | |
| | Other Groundwood | 0.40% | 0.58% | 0.05% | 0.14% | 0.38% | |
| | High-Grade Paper | 1.04% | 1.21% | 0.06% | 4.55% | 1.03% | |
| | Magazines | 2.62% | 1.44% | 0.07% | 1.60% | 1.71% | |
| | Low-Grade Paper | 5.58% | 6.42% | 2.53% | 5.72% | 5.29% | |
| | Compostable | 4.52% | 6.18% | 0.41% | 5.75% | 4.35% | |
| | Other Paper | 1.12% | 0.97% | 2.65% | 1.09% | 1.36% | |
| | Paper Subtotal | 21.12% | 24.21% | 8.27% | 25.87% | 19.90% | |
| PLASTIC | PET Bottles | 0.86% | 1.23% | 0.94% | 5.51% | 1.15% | |
| | HDPE Bottles, Clear | 0.59% | 0.32% | 0.88% | 0.97% | 0.57% | |
| | HDPE Bottles, Colored | 0.67% | 0.50% | 0.25% | 0.52% | 0.53% | |
| | Film and Bags | 4.12% | 6.32% | 3.30% | 6.27% | 4.77% | |
| | Bottles 3-7 | 0.08% | 0.08% | 0.06% | 0.00% | 0.07% | |
| | Expanded Polystyrene | 0.51% | 1.09% | 0.13% | 1.82% | 0.68% | |
| | Other Plastic Packaging | 1.63% | 1.61% | 1.19% | 1.01% | 1.52% | |
| | Other Plastic Products | 2.65% | 3.80% | 1.85% | 1.04% | 2.83% | |
| | Other Plastic | 0.75% | 0.42% | 1.67% | 0.00% | 0.78% | |
| | Plastic Subtotal | 11.85% | 15.38% | 10.27% | 17.14% | 12.91% | |
| | METAL | Aluminum Cans | 0.85% | 0.81% | 0.94% | 2.51% | 0.91% |
| Aluminum Foil | | 0.16% | 0.17% | 0.08% | 0.10% | 0.15% | |
| Other Aluminum | | 0.07% | 0.06% | 0.02% | 0.00% | 0.06% | |
| Copper | | 0.00% | 0.01% | 0.06% | 0.00% | 0.01% | |
| Other Non-Ferrous | | 0.06% | 0.02% | 0.01% | 0.00% | 0.04% | |
| Tin Cans | | 1.92% | 1.00% | 2.07% | 1.40% | 1.63% | |
| White Goods | | 0.00% | 1.37% | 1.92% | 0.00% | 0.82% | |
| Ferrous | | 1.40% | 2.41% | 1.69% | 1.54% | 1.79% | |
| Mixed | | 2.36% | 1.45% | 0.93% | 2.27% | 1.79% | |
| Metal Subtotal | | 6.82% | 7.30% | 7.73% | 7.81% | 7.18% | |
| GLASS | Clear Beverage | 1.52% | 1.60% | 0.07% | 1.93% | 1.29% | |
| | Clear Other | 0.94% | 0.36% | 0.04% | 0.29% | 0.55% | |
| | Brown Beverage | 1.14% | 0.95% | 0.05% | 2.40% | 0.91% | |
| | Brown Other | 0.01% | 0.01% | 0.00% | 0.00% | 0.01% | |
| | Green Beverage | 0.68% | 0.62% | 0.00% | 0.61% | 0.53% | |
| | Green Other | 0.02% | 0.00% | 0.00% | 0.00% | 0.01% | |
| | Plate Glass | 0.03% | 0.02% | 0.00% | 0.00% | 0.02% | |
| | Non-Glass Ceramics | 0.22% | 0.11% | 0.00% | 0.00% | 0.13% | |
| | Other Glass | 0.16% | 0.07% | 0.00% | 0.11% | 0.10% | |
| | Glass Subtotal | 4.71% | 3.74% | 0.17% | 5.35% | 3.56% | |
| | ORGANICS | Yard Debris | 5.54% | 1.90% | 0.01% | 0.26% | 3.11% |
| | | Food Waste | 18.98% | 17.81% | 0.90% | 23.92% | 15.37% |
| Manure | | 2.84% | 0.20% | 0.06% | 1.46% | 1.39% | |
| Diapers | | 3.06% | 2.05% | 0.14% | 4.52% | 2.23% | |
| Carcasses | | 0.04% | 0.00% | 0.00% | 0.00% | 0.02% | |
| Other Organics | | 0.18% | 0.20% | 0.02% | 0.00% | 0.15% | |
| Organics Subtotal | | 30.64% | 22.16% | 1.13% | 30.17% | 22.26% | |
| CONSUMER PRODUCTS | | Computers | 0.54% | 0.23% | 0.00% | 0.00% | 0.32% |
| | Other Electronics | 0.89% | 0.74% | 0.01% | 0.00% | 0.64% | |
| | Synthetic Textiles | 0.41% | 0.42% | 0.06% | 0.00% | 0.33% | |
| | Organic Textiles | 0.73% | 0.35% | 0.11% | 0.00% | 0.46% | |
| | Mixed/Unknown Textiles | 3.09% | 1.75% | 0.49% | 3.76% | 2.18% | |
| | Shoes | 0.43% | 0.15% | 0.00% | 0.00% | 0.24% | |
| | Tires, Other Rubber | 0.66% | 0.55% | 0.38% | 0.13% | 0.55% | |
| | Furniture | 0.72% | 1.39% | 0.14% | 0.00% | 0.81% | |
| | Carpet | 0.08% | 3.26% | 1.30% | 0.00% | 1.37% | |
| | Carpet Padding | 0.00% | 2.06% | 0.89% | 0.00% | 0.85% | |
| | Rejected Products | 0.00% | 0.00% | 3.56% | 0.00% | 0.67% | |
| | Other Composite | 0.39% | 0.03% | 0.00% | 0.00% | 0.18% | |
| | Consumer Prod. Subt. | 7.94% | 10.92% | 6.94% | 3.89% | 8.61% | |
| WOOD and C&D | Wood | 4.30% | 5.85% | 18.92% | 1.93% | 7.48% | |
| | C&D | 2.53% | 1.59% | 26.04% | 0.00% | 6.55% | |
| | Wood and C&D Subtotal | 6.84% | 7.43% | 44.96% | 1.93% | 14.03% | |
| RESIDUALS | Ash | 0.02% | 0.10% | 0.33% | 0.00% | 0.10% | |
| | Dust | 0.23% | 0.13% | 0.00% | 0.00% | 0.15% | |
| | Fines/Residue | 8.89% | 7.73% | 1.37% | 7.67% | 7.05% | |
| | Sludges/Other | 0.00% | 0.00% | 17.44% | 0.00% | 3.28% | |
| Residual Subtotal | 9.14% | 7.96% | 19.14% | 7.67% | 10.57% | | |
| SPECIAL | Special Waste Subtotal | 0.95% | 0.90% | 1.38% | 0.18% | 0.99% | |
| | TOTALS | 100.00% | 100.00% | 100.00% | 100.00% | 100.00% | |

Note: All figures are percent by weight.

FIGURE 2
COMPOSITION OF DISPOSED WASTES
CLALLAM COUNTY WASTE COMPOSITION STUDY



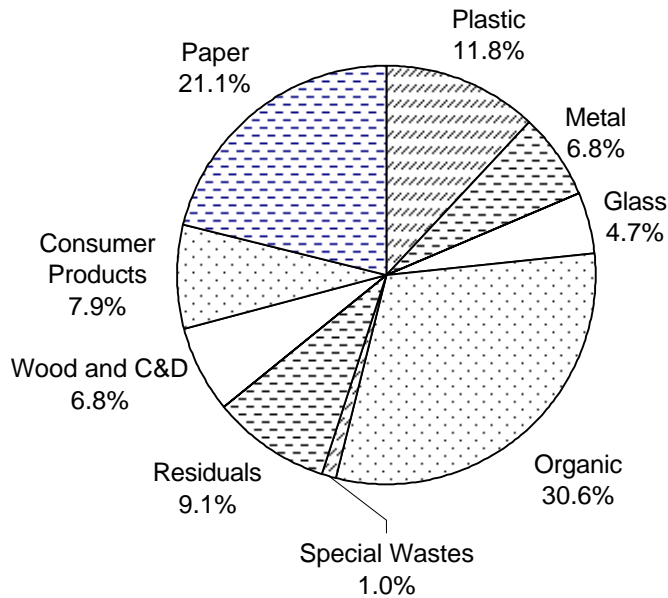
Note: All figures are percent by weight.

**TABLE 4
CONSUMER WASTE COMPOSITION
CLALLAM COUNTY WASTE COMPOSITION STUDY**

| | | <u>Residential</u> | <u>Residential Self-Haul</u> | <u>Average Residential</u> |
|----------------------------------|-------------------------------|--------------------|----------------------------------|--------------------------------|
| PAPER | Cardboard | 3.09% | 3.66% | 3.28% |
| | Newspaper | 3.29% | 1.11% | 2.57% |
| | Other Groundwood | 0.43% | 0.32% | 0.40% |
| | High-Grade Paper | 0.90% | 1.33% | 1.04% |
| | Magazines | 2.56% | 2.73% | 2.62% |
| | Low-Grade Paper | 6.30% | 4.11% | 5.58% |
| | Compostable | 4.15% | 5.28% | 4.52% |
| | Other Paper | 0.66% | 2.05% | 1.12% |
| | Paper Subtotal | 21.38% | 20.59% | 21.12% |
| | PLASTIC | PET Bottles | 1.06% | 0.43% |
| HDPE Bottles, Clear | | 0.73% | 0.29% | 0.59% |
| HDPE Bottles, Colored | | 0.54% | 0.94% | 0.67% |
| Film and Bags | | 4.83% | 2.67% | 4.12% |
| Bottles 3-7 | | 0.08% | 0.09% | 0.08% |
| Expanded Polystyrene | | 0.42% | 0.69% | 0.51% |
| Other Plastic Packaging | | 1.57% | 1.76% | 1.63% |
| Other Plastic Products | | 2.02% | 3.91% | 2.65% |
| Other Plastic | | 0.59% | 1.07% | 0.75% |
| Plastic Subtotal | | 11.85% | 11.84% | 11.85% |
| METAL | | Aluminum Cans | 0.85% | 0.84% |
| | Aluminum Foil | 0.16% | 0.16% | 0.16% |
| | Other Aluminum | 0.00% | 0.20% | 0.07% |
| | Copper | 0.00% | 0.00% | 0.00% |
| | Other Non-Ferrous | 0.09% | 0.00% | 0.06% |
| | Tin Cans | 2.06% | 1.64% | 1.92% |
| | White Goods | 0.00% | 0.00% | 0.00% |
| | Ferrous | 1.02% | 2.16% | 1.40% |
| | Mixed | 2.22% | 2.66% | 2.36% |
| | Metal Subtotal | 6.40% | 7.66% | 6.82% |
| | GLASS | Clear Beverage | 1.64% | 1.29% |
| Clear Other | | 0.68% | 1.45% | 0.94% |
| Brown Beverage | | 1.26% | 0.89% | 1.14% |
| Brown Other | | 0.00% | 0.01% | 0.01% |
| Green Beverage | | 0.60% | 0.85% | 0.68% |
| Green Other | | 0.01% | 0.06% | 0.02% |
| Plate Glass | | 0.05% | 0.00% | 0.03% |
| Non-Glass Ceramics | | 0.19% | 0.29% | 0.22% |
| Other Glass | | 0.15% | 0.17% | 0.16% |
| Glass Subtotal | | 4.57% | 5.01% | 4.71% |
| ORGANICS | | Yard Debris | 6.93% | 2.68% |
| | Food Waste | 18.50% | 19.98% | 18.98% |
| | Manure | 3.03% | 2.46% | 2.84% |
| | Diapers | 3.85% | 1.45% | 3.06% |
| | Carcasses | 0.00% | 0.12% | 0.04% |
| | Other Organics | 0.12% | 0.30% | 0.18% |
| | Organics Subtotal | 32.44% | 26.97% | 30.64% |
| CONSUMER PRODUCTS | Computers | 0.64% | 0.34% | 0.54% |
| | Other Electronics | 1.32% | 0.00% | 0.89% |
| | Synthetic Textiles | 0.47% | 0.30% | 0.41% |
| | Organic Textiles | 0.84% | 0.51% | 0.73% |
| | Mixed/Unknown Textiles | 3.48% | 2.28% | 3.09% |
| | Shoes | 0.37% | 0.56% | 0.43% |
| | Tires, Other Rubber | 0.97% | 0.03% | 0.66% |
| | Furniture | 0.11% | 1.97% | 0.72% |
| | Carpet | 0.07% | 0.09% | 0.08% |
| | Carpet Padding | 0.00% | 0.00% | 0.00% |
| | Rejected Products | 0.00% | 0.00% | 0.00% |
| | Other Composite | 0.58% | 0.00% | 0.39% |
| | Consumer Prod. Subt. | 8.84% | 6.09% | 7.94% |
| | WOOD and C&D | Wood | 1.38% | 10.28% |
| C&D | | 1.58% | 4.49% | 2.53% |
| Wood and C&D Subtotal | | 2.96% | 14.77% | 6.84% |
| RESIDUALS | Ash | 0.01% | 0.02% | 0.02% |
| | Dust | 0.14% | 0.41% | 0.23% |
| | Fines/Residue | 10.80% | 4.98% | 8.89% |
| | Sludges/Other | 0.00% | 0.00% | 0.00% |
| | Residual Subtotal | 10.96% | 5.40% | 9.14% |
| SPECIAL | Special Waste Subtotal | 0.60% | 1.66% | 0.95% |
| | TOTALS | 100.00% | 100.00% | 100.00% |

Note: All figures are percent by weight.

**FIGURE 3
CONSUMER WASTE COMPOSITION
CLALLAM COUNTY WASTE COMPOSITION STUDY**



SUMMARY OF WASTE COMPOSITION RESULTS, CONSUMER WASTES:

| | | | | | |
|----------------|-------------------------|-------------|----------------------------|--------------------------|-------------|
| PAPER | Cardboard | 3.3% | ORGANIC | Food Waste | 19.0% |
| | Newspaper | 2.6% | | Yard Waste | 5.5% |
| | Low-Grade | 5.6% | | Diapers | 3.1% |
| | Compostable | 4.5% | | Other Organics | <u>3.1%</u> |
| | Other Grades of Paper | <u>5.2%</u> | | Organic Subtotal | 30.6% |
| | Paper Subtotal | 21.1% | | | |
| PLASTIC | Plastic Bottles | 2.2% | SPECIAL WASTES | Special Waste Subtotal | 1.0% |
| | Plastic Film, Pkg, Foam | 6.3% | | (Actual Hazardous Waste) | 0.2% |
| | Other Types of Plastic | <u>3.4%</u> | WOOD, C&D | Wood | 4.3% |
| | Plastic Subtotal | 11.8% | | C&D | <u>2.5%</u> |
| METAL | Aluminum Cans | 0.9% | | Wood, C&D Subtotal | 6.8% |
| | Tin Cans | 1.9% | RESIDUALS | Sludges | 0.0% |
| | Ferrous Metals | 1.4% | | Other | <u>9.1%</u> |
| | Other Metals | <u>2.6%</u> | | Residuals Subtotal | 9.1% |
| | Metal Subtotal | 6.8% | CONSUMER PRODUCTS | Textiles, Shoes | 4.7% |
| GLASS | Clear Glass Containers | 2.5% | | Computers, Electronics | 1.4% |
| | Brown Glass Containers | 1.1% | | Other | <u>1.8%</u> |
| | Green Glass Containers | 0.7% | | Consumer Prod. Subtotal | 7.9% |
| | Other Glass | <u>0.4%</u> | RECYCLABLE SUBTOTAL | | 39.1% |
| | Glass Subtotal | 4.7% | | | |

*Recyclable Subtotal includes recyclable paper, plastic bottles, all metals, glass bottles, yard waste, textiles and tires.
All figures are percent by weight.*

Both self-haul waste streams (residential and non-residential) display significant seasonal variations in quantity and composition. For Residential Self-Haul wastes, these fluctuations are tied to seasonal activities such as construction and yard work. Waste from single-family homes used to show a stronger variation in waste quantities and composition, but the increased diversion of yard debris has helped to even out the seasonal differences.

Recyclable subtotals shown in Figures 3 through 6 are based on the entire amount of certain materials measured in this study, although there is no program that can capture and recycle 100% of any one of these materials. In addition to the materials easily recycled through curbside, drop-off and commercial programs (i.e., cans, bottles, paper and yard debris), the recyclable subtotal includes textiles because recycling opportunities for this material are widely available. The recyclable subtotal also includes all metals and tires, again because programs are available for these materials.

Commercial Waste Composition Results

The results for the commercial waste streams are shown in Table 5 and illustrated in Figure 4.

The Commercial waste stream typically shows only a weak seasonal variation, tied to holiday (especially Christmas) activity levels and summer vacations, but Commercial waste is generally the least variable of the waste generators.

Industrial Waste Composition Results

The results for the industrial waste streams are shown in Table 6 and illustrated in Figure 5. The average industrial waste composition is strongly influenced by the large amount of wood and other construction debris present in the C&D waste stream, but wood is also contributed by other industrial waste generators (such as K-Ply and various wood products companies).

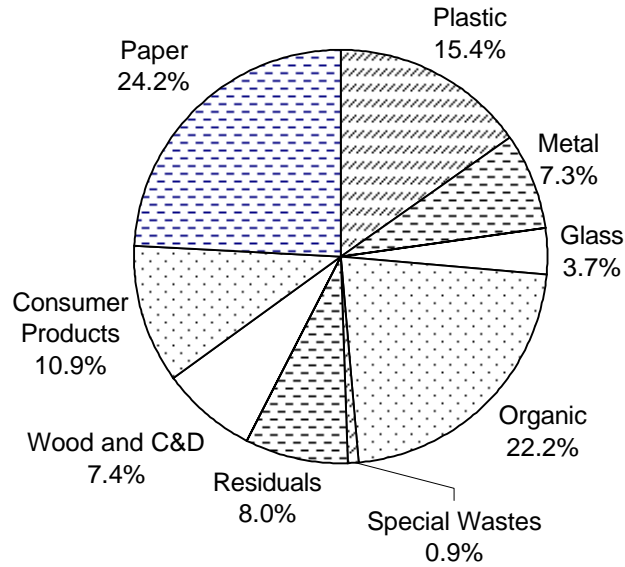
The average industrial waste composition is also influenced by the Daishowa waste stream. Daishowa America brings significant amounts of waste to the Port Angeles Landfill. This waste includes typical office and employee break room trash, but much of it is non-recyclable paper and other materials screened out of the paper being recycled by Daishowa. It is interesting to note that the amount of waste disposed by Daishowa increased substantially shortly before the fieldwork began for this study, from an average of 133 tons to 340 tons per month, apparently due to the higher contamination levels associated with paper from single-stream recycling programs. Single-stream recycling programs are where all materials are placed in the same container for curbside or commercial collection. Although recycling processing facilities have been upgraded with new equipment to separate these materials, the resulting materials are not as clean as recycling programs that previously avoided mixing of the materials. Hence, a large amount of bottles (glass and plastic) and cans (tin and aluminum) are being lost from the recycling system because these materials are being sent to paper mills like Daishowa. In addition to cans and bottles, Daishowa also disposes of significant amounts of milk cartons and other forms of paperboard that do not break down easily in their pulper.

**TABLE 5
COMMERCIAL WASTE COMPOSITION
CLALLAM COUNTY WASTE COMPOSITION STUDY**

| | | <u>Commercial and Institutional</u> | <u>Non-Residential Self-Haul</u> | <u>Average Commercial</u> |
|-----------------------------|----------------------------------|---|--------------------------------------|-------------------------------|
| PAPER | Cardboard | 5.08% | 7.11% | 5.37% |
| | Newspaper | 2.09% | 1.69% | 2.03% |
| | Other Groundwood | 0.67% | 0.08% | 0.58% |
| | High-Grade Paper | 1.38% | 0.20% | 1.21% |
| | Magazines | 0.94% | 4.35% | 1.44% |
| | Low-Grade Paper | 6.96% | 3.26% | 6.42% |
| | Compostable | 6.74% | 2.93% | 6.18% |
| | Other Paper | 1.06% | 0.46% | 0.97% |
| | Paper Subtotal | 24.92% | 20.08% | 24.21% |
| | PLASTIC | PET Bottles | 1.32% | 0.73% |
| HDPE Bottles, Clear | | 0.35% | 0.16% | 0.32% |
| HDPE Bottles, Colored | | 0.56% | 0.16% | 0.50% |
| Film and Bags | | 6.79% | 3.56% | 6.32% |
| Bottles 3-7 | | 0.08% | 0.07% | 0.08% |
| Expanded Polystyrene | | 0.63% | 3.77% | 1.09% |
| Other Plastic Packaging | | 1.77% | 0.70% | 1.61% |
| Other Plastic Products | | 2.68% | 10.30% | 3.80% |
| Other Plastic | | 0.46% | 0.15% | 0.42% |
| Plastic Subtotal | | 14.65% | 19.61% | 15.38% |
| METAL | Aluminum Cans | 0.79% | 0.94% | 0.81% |
| | Aluminum Foil | 0.18% | 0.12% | 0.17% |
| | Other Aluminum | 0.03% | 0.28% | 0.06% |
| | Copper | 0.01% | 0.02% | 0.01% |
| | Other Non-Ferrous | 0.01% | 0.05% | 0.02% |
| | Tin Cans | 1.12% | 0.30% | 1.00% |
| | White Goods | 1.60% | 0.00% | 1.37% |
| | Ferrous | 2.07% | 4.38% | 2.41% |
| | Mixed | 1.57% | 0.80% | 1.45% |
| | Metal Subtotal | 7.37% | 6.89% | 7.30% |
| GLASS | Clear Beverage | 1.65% | 1.33% | 1.60% |
| | Clear Other | 0.40% | 0.15% | 0.36% |
| | Brown Beverage | 0.94% | 1.03% | 0.95% |
| | Brown Other | 0.01% | 0.00% | 0.01% |
| | Green Beverage | 0.69% | 0.23% | 0.62% |
| | Green Other | 0.00% | 0.00% | 0.00% |
| | Plate Glass | 0.01% | 0.04% | 0.02% |
| | Non-Glass Ceramics | 0.13% | 0.00% | 0.11% |
| | Other Glass | 0.08% | 0.01% | 0.07% |
| | Glass Subtotal | 3.90% | 2.80% | 3.74% |
| ORGANICS | Yard Debris | 2.21% | 0.11% | 1.90% |
| | Food Waste | 19.16% | 9.95% | 17.81% |
| | Manure | 0.22% | 0.08% | 0.20% |
| | Diapers | 2.18% | 1.25% | 2.05% |
| | Carcasses | 0.00% | 0.00% | 0.00% |
| | Other Organics | 0.23% | 0.01% | 0.20% |
| | Organics Subtotal | 24.01% | 11.41% | 22.16% |
| CONSUMER PRODUCTS | Computers | 0.27% | 0.00% | 0.23% |
| | Other Electronics | 0.30% | 3.29% | 0.74% |
| | Synthetic Textiles | 0.21% | 1.60% | 0.42% |
| | Organic Textiles | 0.36% | 0.33% | 0.35% |
| | Mixed/Unknown Textiles | 1.38% | 3.92% | 1.75% |
| | Shoes | 0.12% | 0.30% | 0.15% |
| | Tires, Other Rubber | 0.65% | 0.00% | 0.55% |
| | Furniture | 0.00% | 9.46% | 1.39% |
| | Carpet | 3.07% | 4.36% | 3.26% |
| | Carpet Padding | 1.95% | 2.68% | 2.06% |
| | Rejected Products | 0.00% | 0.00% | 0.00% |
| | Other Composite | 0.03% | 0.00% | 0.03% |
| Consumer Prod. Subt. | 8.34% | 25.96% | 10.92% | |
| WOOD and C&D | Wood | 5.79% | 6.15% | 5.85% |
| | C&D | 1.50% | 2.07% | 1.59% |
| | Wood and C&D Subtotal | 7.30% | 8.22% | 7.43% |
| RESIDUALS | Ash | 0.11% | 0.06% | 0.10% |
| | Dust | 0.13% | 0.14% | 0.13% |
| | Fines/Residue | 8.29% | 4.45% | 7.73% |
| | Sludges/Other | 0.00% | 0.00% | 0.00% |
| | Residual Subtotal | 8.53% | 4.65% | 7.96% |
| SPECIAL | Special Waste Subtotal | 0.99% | 0.37% | 0.90% |
| | TOTALS | 100.00% | 100.00% | 100.00% |

Note: All figures are percent by weight.

**FIGURE 4
COMMERCIAL WASTE COMPOSITION
CLALLAM COUNTY WASTE COMPOSITION STUDY**



SUMMARY OF WASTE COMPOSITION RESULTS, COMMERCIAL WASTES:

| | | | | | |
|----------------|-------------------------|-------------|----------------------------|--------------------------|-------------|
| PAPER | Cardboard | 5.4% | ORGANIC | Food Waste | 17.8% |
| | Newspaper | 2.0% | | Yard Waste | 1.9% |
| | Low-Grade | 6.4% | | Diapers | 2.0% |
| | Compostable | 6.2% | | Other Organics | <u>0.4%</u> |
| | Other Grades of Paper | <u>4.2%</u> | | Organic Subtotal | 22.2% |
| | Paper Subtotal | 24.2% | | | |
| PLASTIC | Plastic Bottles | 2.1% | SPECIAL WASTES | Special Waste Subtotal | 0.9% |
| | Plastic Film, Pkg, Foam | 9.0% | | (Actual Hazardous Waste) | 0.5% |
| | Other Types of Plastic | <u>4.2%</u> | WOOD, C&D | Wood | 5.8% |
| | Plastic Subtotal | 15.4% | | C&D | <u>1.6%</u> |
| METAL | Aluminum Cans | 0.8% | | Wood, C&D Subtotal | 7.4% |
| | Tin Cans | 1.0% | RESIDUALS | Sludges | 0.0% |
| | Ferrous Metals | 2.4% | | Other | <u>8.0%</u> |
| | Other Metals | <u>3.1%</u> | | Residuals Subtotal | 8.0% |
| | Metal Subtotal | 7.3% | CONSUMER PRODUCTS | Textiles, Shoes | 2.7% |
| GLASS | Clear Glass Containers | 2.0% | | Computers, Electronics | 1.0% |
| | Brown Glass Containers | 1.0% | | Other | <u>7.3%</u> |
| | Green Glass Containers | 0.6% | | Consumer Prod. Subtotal | 10.9% |
| | Other Glass | <u>0.2%</u> | RECYCLABLE SUBTOTAL | | 34.9% |
| | Glass Subtotal | 3.7% | | | |

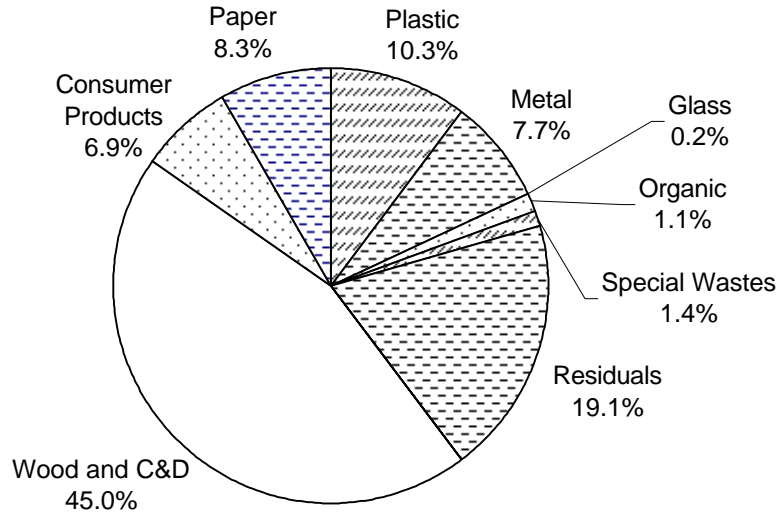
*Recyclable Subtotal includes recyclable paper, plastic bottles, all metals, glass bottles, yard waste, textiles and tires.
All figures are percent by weight.*

**TABLE 6
INDUSTRIAL WASTE COMPOSITION
CLALLAM COUNTY WASTE COMPOSITION STUDY**

| | | <u>Construction and Demolition</u> | <u>Daishowa</u> | <u>Other Industrial</u> | <u>Average Industrial</u> | |
|--------------------------|----------------------------------|--|-----------------|-----------------------------|-------------------------------|-------|
| PAPER | Cardboard | 3.21% | 0.68% | 4.22% | 2.40% | |
| | Newspaper | 0.02% | 0.03% | 0.72% | 0.10% | |
| | Other Groundwood | 0.01% | 0.01% | 0.36% | 0.05% | |
| | High-Grade Paper | 0.02% | 0.02% | 0.38% | 0.06% | |
| | Magazines | 0.02% | 0.03% | 0.51% | 0.07% | |
| | Low-Grade Paper | 0.31% | 5.62% | 3.15% | 2.53% | |
| | Compostable | 0.06% | 0.16% | 3.04% | 0.41% | |
| | Other Paper | 3.01% | 2.69% | 0.72% | 2.65% | |
| | Paper Subtotal | 6.65% | 9.24% | 13.10% | 8.27% | |
| PLASTIC | PET Bottles | 0.09% | 2.27% | 0.65% | 0.94% | |
| | HDPE Bottles, Clear | 0.01% | 2.39% | 0.08% | 0.88% | |
| | HDPE Bottles, Colored | 0.03% | 0.64% | 0.09% | 0.25% | |
| | Film and Bags | 1.81% | 5.90% | 1.83% | 3.30% | |
| | Bottles 3-7 | 0.00% | 0.17% | 0.00% | 0.06% | |
| | Expanded Polystyrene | 0.07% | 0.19% | 0.27% | 0.13% | |
| | Other Plastic Packaging | 0.29% | 2.78% | 0.30% | 1.19% | |
| | Other Plastic Products | 2.59% | 0.85% | 1.56% | 1.85% | |
| | Other Plastic | 0.05% | 0.21% | 14.83% | 1.67% | |
| | Plastic Subtotal | 4.94% | 15.40% | 19.61% | 10.27% | |
| | METAL | Aluminum Cans | 0.03% | 2.48% | 0.25% | 0.94% |
| Aluminum Foil | | 0.02% | 0.18% | 0.09% | 0.08% | |
| Other Aluminum | | 0.00% | 0.07% | 0.00% | 0.02% | |
| Copper | | 0.00% | 0.10% | 0.22% | 0.06% | |
| Other Non-Ferrous | | 0.00% | 0.03% | 0.02% | 0.01% | |
| Tin Cans | | 0.09% | 5.53% | 0.22% | 2.07% | |
| White Goods | | 3.60% | 0.00% | 0.00% | 1.92% | |
| Ferrous | | 1.92% | 1.39% | 1.60% | 1.69% | |
| Mixed | | 0.09% | 0.66% | 6.04% | 0.93% | |
| Metal Subtotal | | 5.76% | 10.44% | 8.45% | 7.73% | |
| GLASS | | Clear Beverage | 0.04% | 0.00% | 0.48% | 0.07% |
| | Clear Other | 0.07% | 0.00% | 0.00% | 0.04% | |
| | Brown Beverage | 0.00% | 0.00% | 0.50% | 0.05% | |
| | Brown Other | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Green Beverage | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Green Other | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Plate Glass | 0.00% | 0.00% | 0.01% | 0.00% | |
| | Non-Glass Ceramics | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Other Glass | 0.00% | 0.00% | 0.01% | 0.00% | |
| | Glass Subtotal | 0.12% | 0.00% | 0.99% | 0.17% | |
| | ORGANICS | Yard Debris | 0.00% | 0.03% | 0.02% | 0.01% |
| | | Food Waste | 0.84% | 0.54% | 2.47% | 0.90% |
| | | Manure | 0.00% | 0.15% | 0.00% | 0.06% |
| Diapers | | 0.01% | 0.37% | 0.00% | 0.14% | |
| Carcasses | | 0.00% | 0.00% | 0.00% | 0.00% | |
| Other Organics | | 0.00% | 0.00% | 0.21% | 0.02% | |
| Organics Subtotal | | 0.85% | 1.10% | 2.70% | 1.13% | |
| Consumer Products | | 0.00% | 0.00% | 0.00% | 0.00% | |
| CONSUMER PRODUCTS | Computers | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Other Electronics | 0.00% | 0.00% | 0.08% | 0.01% | |
| | Synthetic Textiles | 0.00% | 0.16% | 0.01% | 0.06% | |
| | Organic Textiles | 0.04% | 0.19% | 0.24% | 0.11% | |
| | Mixed/Unknown Textiles | 0.04% | 1.15% | 0.52% | 0.49% | |
| | Shoes | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Tires, Other Rubber | 0.00% | 0.98% | 0.23% | 0.38% | |
| | Furniture | 0.00% | 0.00% | 1.34% | 0.14% | |
| | Carpet | 2.28% | 0.17% | 0.23% | 1.30% | |
| | Carpet Padding | 1.67% | 0.00% | 0.00% | 0.89% | |
| | Rejected Products | 0.00% | 9.72% | 0.41% | 3.56% | |
| | Other Composite | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Consumer Prod. Subt. | 4.02% | 12.37% | 3.05% | 6.94% | |
| WOOD and C&D | Wood | 28.08% | 1.69% | 31.75% | 18.92% | |
| | C&D | 48.75% | 0.17% | 0.02% | 26.04% | |
| | Wood and C&D Subtotal | 76.84% | 1.87% | 31.78% | 44.96% | |
| RESIDUALS | Ash | 0.00% | 0.91% | 0.00% | 0.33% | |
| | Dust | 0.00% | 0.00% | 0.00% | 0.00% | |
| | Fines/Residue | 0.81% | 1.79% | 2.73% | 1.37% | |
| | Sludges/Other | 0.00% | 46.81% | 4.72% | 17.44% | |
| | Residual Subtotal | 0.82% | 49.52% | 7.45% | 19.14% | |
| SPECIAL | Special Waste Subtotal | 0.00% | 0.07% | 12.87% | 1.38% | |
| | TOTALS | 100.00% | 100.00% | 100.00% | 100.00% | |

Note: All figures are percent by weight.

**FIGURE 5
INDUSTRIAL WASTE COMPOSITION
CLALLAM COUNTY WASTE COMPOSITION STUDY**



SUMMARY OF WASTE COMPOSITION RESULTS, INDUSTRIAL WASTES:

| | | | | | |
|----------------|-------------------------|-------------|----------------------------|--------------------------|--------------|
| PAPER | Cardboard | 2.4% | ORGANIC | Food Waste | 0.9% |
| | Newspaper | 0.1% | | Yard Waste | 0.0% |
| | Low-Grade | 2.5% | | Diapers | 0.1% |
| | Compostable | 0.4% | | Other Organics | <u>0.1%</u> |
| | Other Grades of Paper | <u>2.8%</u> | | Organic Subtotal | 1.1% |
| | Paper Subtotal | 8.3% | | | |
| PLASTIC | Plastic Bottles | 2.1% | SPECIAL WASTES | Special Waste Subtotal | 1.4% |
| | Plastic Film, Pkg, Foam | 4.6% | | (Actual Hazardous Waste) | 0.0% |
| | Other Types of Plastic | <u>3.5%</u> | WOOD, C&D | Wood | 18.9% |
| | Plastic Subtotal | 10.3% | | C&D | <u>26.0%</u> |
| | | | | Wood, C&D Subtotal | 45.0% |
| METAL | Aluminum Cans | 0.9% | RESIDUALS | Sludges | 17.4% |
| | Tin Cans | 2.1% | | Other | <u>1.7%</u> |
| | Ferrous Metals | 1.7% | | Residuals Subtotal | 19.1% |
| | Other Metals | <u>3.0%</u> | CONSUMER PRODUCTS | Textiles, Shoes | 0.7% |
| | Metal Subtotal | 7.7% | | Computers, Electronics | 0.0% |
| GLASS | Clear Glass Containers | 0.1% | | Other | <u>6.3%</u> |
| | Brown Glass Containers | 0.1% | | Consumer Prod. Subtotal | 6.9% |
| | Green Glass Containers | 0.0% | RECYCLABLE SUBTOTAL | | 16.2% |
| | Other Glass | <u>0.0%</u> | | | |
| | Glass Subtotal | 0.2% | | | |

*Recyclable Subtotal includes recyclable paper, plastic bottles, all metals, glass bottles, yard waste, textiles and tires.
All figures are percent by weight.*

Tribal Waste Composition Results

Table 7 and Figure 6 show the results of the samples taken of the Quileute Tribe's waste stream on November 7, 2002. Also shown in Table 7 is one other sample from Tribal lands that happened to be randomly selected while fieldwork was being conducted at the Port Angeles Landfill on November 5, 2002. That sample was taken from a roll-off container from the Seven Cedars Casino, which is operated by the Jamestown S'Klallam Tribe. It cannot be stressed enough that a single sample such as this cannot be assumed to be representative of the waste stream from the casino. Likewise for the Quileute Tribe samples, although there are three samples in their case, all of these samples were taken from the same load of garbage and so cannot be assumed to be representative of the annual waste stream or representative of the entire Tribe.

**TABLE 7
SAMPLES OF TRIBAL WASTES
CLALLAM COUNTY WASTE COMPOSITION STUDY**

| | | <u>Quileutes</u> | <u>Seven Cedars Casino</u> |
|----------------------------------|-------------------------------|------------------|--------------------------------|
| PAPER | Cardboard | 4.58% | 8.26% |
| | Newspaper | 2.44% | 0.12% |
| | Other Groundwood | 0.14% | 0.00% |
| | High-Grade Paper | 4.55% | 0.00% |
| | Magazines | 1.60% | 0.12% |
| | Low-Grade Paper | 5.72% | 3.02% |
| | Compostable | 5.75% | 29.78% |
| | Other Paper | 1.09% | 0.12% |
| | Paper Subtotal | 25.87% | 41.42% |
| | PLASTIC | PET Bottles | 5.51% |
| HDPE Bottles, Clear | | 0.97% | 0.23% |
| HDPE Bottles, Colored | | 0.52% | 0.00% |
| Film and Bags | | 6.27% | 9.07% |
| Bottles 3-7 | | 0.00% | 0.70% |
| Expanded Polystyrene | | 1.82% | 1.40% |
| Other Plastic Packaging | | 1.01% | 2.44% |
| Other Plastic Products | | 1.04% | 1.05% |
| Other Plastic | | 0.00% | 0.00% |
| Plastic Subtotal | | 17.14% | 15.82% |
| METAL | Aluminum Cans | 2.51% | 0.93% |
| | Aluminum Foil | 0.10% | 0.06% |
| | Other Aluminum | 0.00% | 0.00% |
| | Copper | 0.00% | 0.00% |
| | Other Non-Ferrous | 0.00% | 0.00% |
| | Tin Cans | 1.40% | 1.51% |
| | White Goods | 0.00% | 0.00% |
| | Ferrous | 1.54% | 0.70% |
| | Mixed | 2.27% | 0.00% |
| | Metal Subtotal | 7.81% | 3.20% |
| GLASS | Clear Beverage | 1.93% | 4.19% |
| | Clear Other | 0.29% | 0.00% |
| | Brown Beverage | 2.40% | 3.72% |
| | Brown Other | 0.00% | 0.00% |
| | Green Beverage | 0.61% | 1.40% |
| | Green Other | 0.00% | 0.00% |
| | Plate Glass | 0.00% | 0.00% |
| | Non-Glass Ceramics | 0.00% | 0.00% |
| | Other Glass | 0.11% | 0.00% |
| | Glass Subtotal | 5.35% | 9.31% |
| ORGANICS | Yard Debris | 0.26% | 0.00% |
| | Food Waste | 23.92% | 19.43% |
| | Manure | 1.46% | 0.00% |
| | Diapers | 4.52% | 0.00% |
| | Carcasses | 0.00% | 0.00% |
| | Other Organics | 0.00% | 0.00% |
| Organics Subtotal | 30.17% | 19.43% | |
| CONSUMER PRODUCTS | Computers | 0.00% | 0.00% |
| | Other Electronics | 0.00% | 0.00% |
| | Synthetic Textiles | 0.00% | 0.00% |
| | Organic Textiles | 0.00% | 0.00% |
| | Mixed/Unknown Textiles | 3.76% | 0.00% |
| | Shoes | 0.00% | 0.00% |
| | Tires, Other Rubber | 0.13% | 0.00% |
| | Furniture | 0.00% | 0.00% |
| | Carpet | 0.00% | 0.00% |
| | Carpet Padding | 0.00% | 0.00% |
| | Rejected Products | 0.00% | 0.00% |
| | Other Composite | 0.00% | 0.00% |
| | Consumer Prod. Subt. | 3.89% | 0.00% |
| | WOOD and C&D | Wood | 1.93% |
| C&D | | 0.00% | 0.00% |
| Wood and C&D Subtotal | | 1.93% | 0.00% |
| RESIDUALS | Ash | 0.00% | 0.00% |
| | Dust | 0.00% | 0.00% |
| | Fines/Residue | 7.67% | 10.12% |
| | Sludges/Other | 0.00% | 0.00% |
| | Residual Subtotal | 7.67% | 10.12% |
| SPECIAL | Special Waste Subtotal | 0.18% | 0.70% |
| | TOTALS | 100.00% | 100.00% |

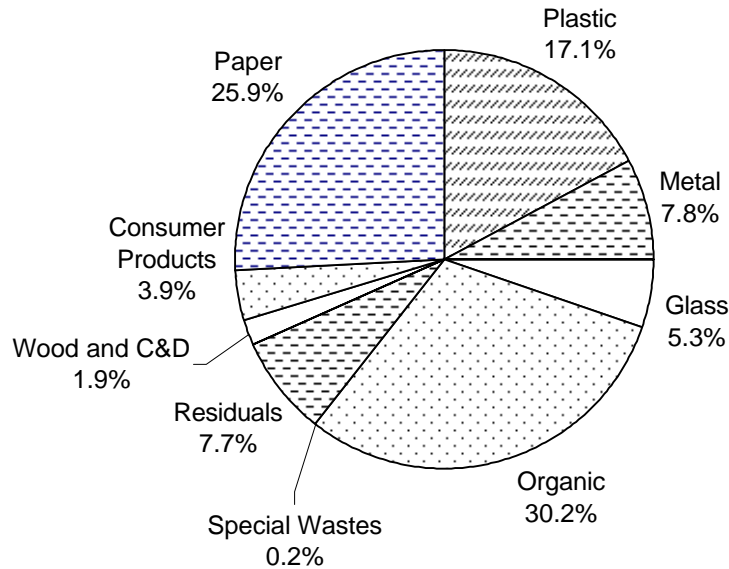
Number of Samples:

3

1

Note: All figures, except number of samples, are percent by weight.

**FIGURE 6
TRIBAL WASTE COMPOSITION
CLALLAM COUNTY WASTE COMPOSITION STUDY**



SUMMARY OF WASTE COMPOSITION RESULTS, INDUSTRIAL WASTES:

| | | | | | |
|----------------|-------------------------|-------------|----------------------------|--------------------------|-------------|
| PAPER | Cardboard | 4.6% | ORGANIC | Food Waste | 23.9% |
| | Newspaper | 2.4% | | Yard Waste | 0.3% |
| | Low-Grade | 5.7% | | Diapers | 4.5% |
| | Compostable | 5.7% | | Other Organics | <u>1.5%</u> |
| | Other Grades of Paper | <u>7.4%</u> | | Organic Subtotal | 30.2% |
| | Paper Subtotal | 25.9% | | | |
| PLASTIC | Plastic Bottles | 7.0% | SPECIAL WASTES | Special Waste Subtotal | 0.2% |
| | Plastic Film, Pkg, Foam | 9.1% | | (Actual Hazardous Waste) | 0.0% |
| | Other Types of Plastic | <u>1.0%</u> | WOOD, C&D | Wood | 1.9% |
| | Plastic Subtotal | 17.1% | | C&D | <u>0.0%</u> |
| | | | | Wood, C&D Subtotal | 1.9% |
| METAL | Aluminum Cans | 2.5% | RESIDUALS | Sludges | 0.0% |
| | Tin Cans | 1.4% | | Other | <u>7.7%</u> |
| | Ferrous Metals | 1.5% | | Residuals Subtotal | <u>7.7%</u> |
| | Other Metals | <u>2.4%</u> | CONSUMER PRODUCTS | Textiles, Shoes | 3.8% |
| | Metal Subtotal | 7.8% | | Computers, Electronics | 0.0% |
| GLASS | Clear Glass Containers | 2.2% | | Other | <u>0.1%</u> |
| | Brown Glass Containers | 2.4% | | Consumer Prod. Subtotal | 3.9% |
| | Green Glass Containers | 0.6% | RECYCLABLE SUBTOTAL | | 43.2% |
| | Other Glass | <u>0.1%</u> | | | |
| | Glass Subtotal | 5.3% | | | |

*Recyclable Subtotal includes recyclable paper, plastic bottles, all metals, glass bottles, yard waste, textiles and tires.
All figures are percent by weight.*

SECTION III

ADDITIONAL WASTE COMPOSITION DATA

A. INTRODUCTION

This section contains several pieces of supplemental data, including:

- the breakdown of wood waste, construction and demolition wastes, and special wastes for the disposal-site samples.
- the amount of reusable materials and products found in the waste composition samples.
- data for Residential and Commercial/Institutional wastes from Port Angeles and Sequim separately from the remainder of Clallam County.
- comparison of Clallam County's results to other counties.

B. BREAKDOWN OF WOOD, C&D AND SPECIAL WASTES

Additional data on the materials that comprise the wood, construction and demolition waste, and special waste categories is shown in Table 8. This data generally does not have the same level of statistical certainty as the results for the primary categories, due to the lower quantities and greater variability of these materials, but may still provide useful information for future planning or program development purposes.

The figure for “actual hazardous” wastes includes those materials from the other special waste categories that are classified as hazardous wastes (see also Glossary). For example, the category of medical wastes includes all materials related to health care, such as tubing and bags for administering intravenous solutions, but only items such as used syringes (and other materials contaminated with blood) are considered hazardous. Thus, the figure for medical wastes from Residential sources (0.1%) includes only a small portion of materials that are also included in the “actual hazardous” waste category. Another example is household batteries, where most of the batteries found are the typical alkaline battery that does present significant hazards, but any rechargeable batteries that were found (such as Ni-Cd batteries, which are considered hazardous due to the metals these contain), were counted both under household batteries and also included in the “actual hazardous” waste category.

Since almost none of these types of materials were found in the Tribal samples, separate figures for the Tribes are not shown in Table 8. Their data is, however, included in the Countywide average.

stream. Data on reusable materials was not collected for every sample. In addition, the precision of this survey could be affected by the small amount of reusables present in the samples.

Another difficulty with this data is the lack of a standard definition for reusable materials and products. The criteria described above are based on reasonable judgment and should be viewed as conservative in the sense that relatively strict standards were employed in judging materials as reusable, while others may argue for broader acceptance criteria, depending on their personal interest in resource conservation.

D. COMPARISON OF CITIES TO REST OF COUNTY

Table 10 compares the results from the two cities with curbside recycling programs (Port Angeles and Sequim) to the rest of the county. These results for some of the materials show the effects that can be anticipated from the increased availability of recycling programs in the two cities, but the trend for other materials indicates that other factors are also affecting the results.

E. COMPARISON OF RESULTS TO OTHER COUNTIES

Table 11 compares the results from Clallam County to three other counties. The other counties include Clark County and Thurston County, the fieldwork for which was conducted in 1999, and Yakima County, a study that was conducted on a schedule nearly identical to this study. The average of the four counties is also shown, strictly for comparison purposes, as well as the statewide average (from another study recently completed by Green Solutions).

Some modifications to the sorting categories were needed in order to compare the results from the different studies.

SECTION IV INDUSTRIAL SURVEYS

A. ON - SITE INDUSTRIAL SAMPLING

Several industrial categories were targeted for Clallam County to be studied for full waste generation in addition to the analysis of disposed materials. The goal of this effort was to collect information about materials that were disposed outside of landfills or diverted through reuse and recycling by select industries. This effort was part of the broader interest by Ecology in collecting industry-specific data.

For this study, forty-six samples were taken from the following agricultural and industrial categories: (1) orchards, (2) berries and vegetables, (3) livestock, (4) mining, (5) food and kindred products (6) construction and demolition, (7) paper and allied products, and (8) logging, lumber, and primary wood products. In addition, permit information was requested from Port Angeles, Sequim, Forks, and the County to further define construction activity.

On-site visits were conducted at selected sites within these categories. The purpose was to quantify all waste material from the business activities and document the handling of it, whether the material was recycled, composted, burned, stockpiled, donated, or landfilled. Information about each site was gathered by extensive interviews with the owner or manager and a tour of the facilities. As accurately as possible, the data describes the activity at each site over a full year, even though the tours and observations took place during a single season.

B. ORCHARDS

Clallam County has approximately 6,100 acres of cropland. This number is based on the USDA 1997 census. Of this, 0.8%, or 49 acres, is cultivated in orchards, mostly apples and cherries. The waste from this industry sector consists of wood byproducts, yard debris, crop residues, and motor oil (see Table 12).

The majority of materials generated by this sample are organic matter with none of it going to the landfill. Stumps are kept on site and used in creeks to enhance fish habitat. Limbs and sawdust are composted on-site. Weeds are tilled under. Larger tree trunks and branches are sold to the

**TABLE 12
ORCHARD WASTES**

| Material | Percentage | Handling Method |
|-----------------|-------------------|---------------------------|
| Organics | 51.1% | Tilled under or composted |
| Wood | 48.8% | Composted |
| HHW & Special | 0.14% | Re-refined |

public for firewood. The organic and woody materials represent 99.9% of the wastes from this category. Motor oil from the farm equipment is re-refined and reused, representing 0.14% by weight of the waste stream.

C. BERRY AND VEGETABLE FARMS

This category represents 1.6% of the farm acreage, or 97 acres. The samples for this category were from organic vegetable farms. The various waste streams from organic produce farms consist of crop residues, waxed cardboard boxes, spoiled hay, grain sacks, and plastic lime sacks (see Table 13). The samples in this sector showed a high level of reuse.

Over 97% of the waste stream for Berry and Vegetable Farms is organic, including food waste, crop residue, and spoiled hay. The crop residues are tilled under in the fields. Some of the crops are processed and sold to the public, creating some food waste from the processing. This is composted on site, as is the spoiled hay. Waxed cardboard boxes, used for the harvested crops, are reused until they no longer function, at which point they are burned for heat.

Burlap grain sacks are used for customer orders. These bags are reused and leave the site with the customer. Lime, a soil additive, is delivered in plastic bags. These bags are not reusable nor are they recyclable in the area, so they are landfilled.

**TABLE 13
BERRY AND VEGETABLE FARM WASTES**

| Material | Percentage | Handling Method |
|-------------------|-------------------|---------------------------|
| Paper | 0.2% | Burned for heat |
| Plastic | 1.3% | Landfilled |
| Organics | 97.3% | Tilled under or composted |
| Consumer Products | 1.3% | Textiles - landfilled |

D. LIVESTOCK RANCHES

There are close to 350 farms raising livestock of various kinds in Clallam County. There are beef as well as milk cows, hogs, sheep, chickens, fur animals, and pets, representing close to 10,000 animals. Most of the farms or ranches are small operations with less than 35 animals per site. The samples taken for this industry sector (see Table 14) were also from small operations. The material handling practices for the small operations sampled for this sector may not be universal.

Manure represents a large portion of the waste product generated. For the operations surveyed, the manure was dried, collected and mixed with hay and spread back on the pasture.

About half of the plastic mesh feedbags that are generated are reused at the farm. The other half is landfilled. The landfilled wastes also include plastic baling twine, cardboard, plastic film, paper towels, and paper cores. Wooden pallets are reused on site, then burned. Hay is combined with grass clippings and composted on site.

**TABLE 14
LIVESTOCK RANCH WASTES**

| Material | Percentage | Handling Method |
|-----------------|-------------------|------------------------|
| Paper | 1.9% | Landfilled |
| Plastic | 0.5% | Landfilled |
| Organics | 97.1% | Beneficial use on site |
| Wood | 0.6% | Landfilled |

E. MINING

The mining activity in Clallam County consists primarily of gravel. There are eight companies listed as active in this business, each with a small number of employees. These samples were taken at a site that produced about 100,000 tons of various products in 2002. These products are 3/8" pea gravel, 1/4" buckshot, 7/8" aggregate, 1 1/2" grain rock, and sand.

The waste streams from this industry include mud/silt, oils, anti-freeze, tires, mixer drums, rags, scrap metal, office waste paper, and lunchroom waste (see Table 15). Mud and silt are pumped back on site. The oils, anti-freeze, and tires are re-refined for reuse. Large mixer drums, about 10 per year, are donated to a local game farm for bear dens. Due to the tonnage of silt returned to the site, the percentages of the remaining waste are negligible.

**TABLE 15
MINING WASTES**

| Material | Percentage | Handling Method |
|-------------------|-------------------|------------------------|
| Paper | negligible | Landfilled |
| Plastic | negligible | Landfilled |
| Metal | negligible | Donated for reuse |
| Glass | negligible | Landfilled |
| Consumer Products | negligible | Landfilled |
| Residuals | 100% | Returned to site |

F. FOOD AND KINDRED PRODUCTS

There are a variety of food processing businesses in the County, including meat packing plants, seafood processors and canneries, bakeries, wineries, and soft drink bottlers. Most of these businesses in Clallam County are relatively small operations with only a few employees, and individual businesses do not generate large amounts of waste. The data represented in this category reflects the waste streams from a winery (see Table 16).

The majority of the waste is the pressing brick and is organic. This is composted locally, but off-site. Wooden pallets are currently being stockpiled at the winery, with no utility or outlet foreseen. All of the corks from the tasting room are taken by customers. Many of the cardboard boxes are also reused by customers. The tasting room's bottles and the remaining cardboard boxes are recycled. Magazines and mail are recycled at the transfer station. Newspaper, paperboard boxes, paper towels and cores are burned on site for heat. The bins containing the incoming grapes are emptied and sent back to the grower immediately. The bottle labels are pressure sensitive rather than glued so there is poly-coated paper backing from these as well as the hard paper core. Both the backing and the core are sent to the landfill. Plastic film is used to cover the grape bins as well as to shrink wrap the cases of empty bottles. Products that are sold in the tasting room occasionally come shrink wrapped. Those are the sources of the plastic that is landfilled.

TABLE 16
FOOD AND KINDRED PRODUCT WASTES

| Material | Percentage | Handling Method |
|-----------------|-------------------|---------------------------------|
| Paper | 20.2% | Recycled, burned, or landfilled |
| Plastic | 6.9% | Landfilled |
| Glass | 4.6% | Recycled |
| Organics | 46.3% | Composted |
| Wood | 22.2% | Stockpiled |

G. CONSTRUCTION AND DEMOLITION

In 2002, 1,664 construction and demolition permits were issued in the cities and unincorporated county areas. The dollar value of this construction activity was recorded as \$68,150,584. This total does not include permits for plumbing or electrical inspection only, nor does it include gas stove installations, tank installations or relocations, nor mobile home site inspection.

On site visits were performed at various active construction sites to gather this data (see Table 17). New single-family homes and residential remodeling represent the highest activity in the region (24% and 59% of total permits, respectively). New commercial construction and tenant

**TABLE 17
CONSTRUCTION AND DEMOLITION WASTES**

| Material | Percentage | Handling Method |
|-------------------|-------------------|-------------------------------|
| Plastic | 3.1% | Landfilled |
| Metal | 1.4% | Landfilled |
| Organics | 0.2% | Landfilled |
| Consumer Products | 0.3% | Landfilled |
| Wood | 58.8% | Burned, reused, or landfilled |
| C&D | 36.2% | Landfilled |

improvement had lower activity and lower dollar valuation totals (1% and 16% of the total permits). The waste generated at each site varies depending upon the stage of construction.

Construction projects often begin with land clearing or demolition, then progress through foundation, framing, roofing, sheetrocking, and interior finishing. Each of these phases has a unique waste stream. The samples here have caught the construction process in various stages.

Clean scrap wood is often burned at home in wood stoves and fireplaces by the construction crew. This may vary with the season, but the information shared by the contractors stated it as a year-round fact. Most waste is collected at a construction site in a drop box. There is rarely an attempt to separate any materials for other purposes. Leftover concrete is usually poured on site and used as fill, either under driveways, or other locations.

H. PAPER AND ALLIED PRODUCTS

The data for this category represent the activities of one dominant company in the County. The waste streams consist of primary and secondary solids that are dewatered and burned for energy recovery on site; ash (hog fuel residue) that is taken to the company monofill; scrap metal that is recycled; used oil that is re-refined; and landfilled waste from the office, drum pulper and other locations (see Table 18).

**TABLE 18
PAPER AND ALLIED PRODUCT WASTES**

| Material | Percentage | Handling Method |
|-----------------|-------------------|------------------------|
| Metal | 0.98% | Recycled |
| Residuals | 90.1% | Burned, or landfilled |
| HHW & Special | 0.03% | Re-refined |
| Mixed garbage | 8.9% | Landfilled |

I. LOGGING, LUMBER AND PRIMARY WOOD PRODUCTS

The logging and lumber industry is active in Clallam County. There are medium to small logging companies, large to small sawmills, cabinetmakers, and other wood product manufacturers. Samples for this industry were from a plywood manufacturer and cabinetmakers.

As is expected, the majority of the waste is wood (see Table 19). The plywood manufacturer burns it as hog fuel. The cabinetmakers send it to the landfill, but much of the wood waste from the cabinetmakers is laminated, painted, or otherwise treated. The balance of the cabinet makers' waste, almost all of which is landfilled, includes rags, containers for paints and glues, laminate trim, and sawdust.

TABLE 19
LOGGING, LUMBER AND PRIMARY WOOD PRODUCT WASTES

| Material | Percentage | Handling Method |
|-------------------|-------------------|-----------------------------------|
| Metal | 0.1% | Landfilled |
| Consumer Products | 0.1% | Landfilled |
| Wood | 99.7% | Landfilled or burned for hog fuel |
| HHW & Special | negligible | Recycled |

SECTION V CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

This section provides conclusions and recommendations based on the data collected by this study.

B. CONCLUSIONS

Weight of Materials Disposed

The waste quantity and composition results can be combined to show the total weight of disposed materials. Table 20 shows this information for each waste generator, combining the composition data for these generators with their annual waste quantities to show the tons of each material that are disposed each year. This type of data can be useful for planning recycling or other waste diversion programs, or for making alternative disposal plans for specific materials.

Waste Composition

There are distinct differences in the waste streams of the different types of waste generators. For each of the generators, a few noteworthy conclusions can be drawn:

- ┌ **Residential:** the two largest materials in this waste stream are both organic: food waste (18.5% by weight) and yard debris (6.9%). There are also significant quantities of low-grade paper (6.3%), plastic film and bags (4.8%), textiles (4.8% altogether), compostable paper (4.2%), and diapers (3.9%). Since this generator disposes of the largest amount of waste (29.9% of the County's total), even small amounts of materials could translate to significant amounts of materials available for recycling or other waste diversion programs.

- ┌ **Residential Self-Haul:** self-haul loads from residential sources have more wood, construction debris and special wastes than other residential sources, and less "regular" household trash (paper and plastic), reflecting the activities such as remodeling and other special projects that are often the source of Residential Self-Haul waste. Food waste is still the material present in the single largest quantity, however, at 20.0%, followed by wood (10.3%), compostable paper (5.3%), construction debris (4.5%), low-grade paper (4.1%), other plastic products (3.9%), and cardboard (3.7%). In the special waste category, a significantly higher amount of waste was found that qualifies as hazardous waste (0.5% for Residential Self-Haul versus 0.1% for Residential).

- ┌ **Commercial/Institutional:** waste from this source also contains large amounts of food waste (19.2%), as well as low-grade paper (7.0%), plastic film and bags (6.8%), compostable paper (6.7%), wood (5.8%), and cardboard (5.1%). Because this waste stream is so large (at 28.5% of the County's total, it runs a close second to waste from single-family homes), even small amounts of materials (on a percentage basis) add up to significant tonnages of materials that could be available for recycling or other waste diversion programs.
- ┌ **Non-Residential Self-Haul:** these generators dispose of more cardboard (7.1%) than any of the other generators, but the overall tonnages of this waste stream are relatively small (4.9% of the entire waste stream), so that the total tonnage of cardboard being disposed by this group is not that great. The waste from these generators is also high in other plastic products (10.3%), food waste (10.0%), furniture and mattresses (9.5%), and wood (6.2%).
- ┌ **Construction and Demolition:** this waste stream is high in wood and construction debris, as can be expected from the activities that generate the waste. Altogether, wood and construction debris make up 76.8% of this waste stream. The other one-quarter of this waste stream is largely made up of related materials (carpet, cardboard boxes, metals, etc.).
- ┌ **Daishowa:** Daishowa's waste stream consists primarily of a wet tangled mass of materials screened out of the paper they process. Although rich in other recyclables (materials such as cans and plastic bottles that have been carried along with the recyclable paper that Daishowa buys), many of these materials are not easily recycled after being through Daishowa's processing system.
- ┌ **Other Industrial:** the composition of this waste stream reflects the wood products companies that makes up much of the other industry in Clallam County.
- ┌ **Tribes:** the results from the Quileute Tribe samples are relatively high in recyclable materials, but the small number of samples taken for this source means these results are uncertain.

RECOMMENDATIONS

A goal of this study was to provide recommendations for materials and sources that could be targeted for additional recycling and other programs. Based on the results of this study, materials and sources that are recommended for additional recovery efforts are shown in the following table. If programs could be implemented or expanded to divert 50 to 75% of the materials indicated in Table 21, then an additional 7,100 to 10,700 tons per year, or 14.0 to 21.1% of the solid waste stream in Clallam County, could be diverted from landfilling or waste export.

Daishowa's waste contains significant amounts of recyclable materials, but no recommendations are being made here based on the understanding that they are already looking into additional recovery options. For the Tribes, general improvements are recommended, although again it should be noted that the limited amount of data available for the Tribes makes any conclusions or recommendations uncertain.

**TABLE 21
MATERIALS AND SOURCES FOR ADDITIONAL RECOVERY**

| Type of Waste Generator | Paper | | | Plastic | | Metal | | Other | | | | Comments |
|------------------------------|-------|-----|-----------|---------|------|-------|------|---------------|-------------|------|-----|---|
| | All | OCC | Low-Grade | Bottles | Film | All | Cans | Glass Bottles | Yard Debris | Wood | C&D | |
| Consumer | | | | | | | | | | | | |
| Residential (Homes and Apt.) | X | | | X | | | X | X | X | | | |
| Residential Self-Haul | X | | | | | | | X | | X | | |
| Commercial | | | | | | | | | | | | |
| Commercial and Institutional | | X | X | | X | | | | | | | |
| Non-Residential Self-Haul | | X | | | | | | | | X | | |
| Industrial | | | | | | | | | | | | |
| Construction and Demolition | | | | | | | | | | X | X | |
| Daishowa | | | | | | | | | | | | Daishowa is already looking into options. |
| Other Industrial | | X | | | | X | | | | X | | |
| Tribes | | | | | | | | | | | | More recycling in general could be done. |

GLOSSARY

GLOSSARY

INTRODUCTION

This document defines the types of generators and waste sorting categories used for the 2002-2003 waste sorting projects for the Department of Ecology and Clallam County. Note that the order that the materials are listed is important and for many materials represents a hierarchy where the topmost category should be used first.

GENERATOR CATEGORIES

Consumer (Residential): waste originating from single-family homes and apartments, delivered to a disposal facility by a municipal or private garbage hauler or by the generator (self-haul).

Commercial: non-residential waste, including waste from businesses and institutions in SIC's 40-89 and municipal functions (SIC's 91-97), delivered by a municipal or private garbage hauler (or other third party who is paid to transport the waste), or by the generator of the waste (self-haul).

Industrial: waste originating from SIC's 01-39, including agricultural, mining, construction and manufacturing.

WASTE SORTING CATEGORIES

PAPER

Newspaper: printed groundwood newsprint, including glossy ads and Sunday edition magazines that are delivered with the newspaper (unless these are found separately during sorting).

Cardboard: unwaxed kraft paper corrugated containers and boxes, unless poly- or foil-laminated. Note that this category includes brown kraft paper bags.

Other Groundwood: other products made from groundwood paper, including phone books, paperback books, and egg cartons.

High-Grade Paper: high-grade white or light-colored bond and copy machine papers and envelopes, and continuous-feed computer printouts and forms of all types, except multiple-copy carbonless paper.

Magazines: magazines, catalogs and similar products with glossy paper.

Mixed / Low-Grade Paper: low-grade recyclable papers, including colored papers, notebook or other lined paper, envelopes with plastic windows, non-corrugated paperboard, carbonless copy paper, polycoated paperboard packaging, and junk mail.

Compostable: non-recyclable papers that can be composted, such as towels, cups, tissues, plates, pizza boxes, and waxed cardboard. This category includes all paper that is contaminated or soiled with food or liquid in its normal use.

Residual / Composite Paper: non-recyclable and non-compostable types of papers such as carbon paper and hardcover books, and composite materials such as paper packaging with metal or plastic parts.

Processing Sludges, Other Industrial: paper-based materials from industrial sources that do not easily fit into the above categories, such as sludges.

PLASTIC

PET Bottles: polyethylene terephthalate (PET) bottles, including soda, oil, liquor and other types of bottles. No attempt will be made to remove base cups, caps, or wrappers, although these materials will be categorized separately if received separately. The SPI code for PET is 1.

HDPE Bottles, Clear: high density polyethylene (HDPE) milk and other bottles that are not colored. The SPI code for HDPE is 2.

HDPE Bottles, Pigmented: high density polyethylene (HDPE) juice, detergent, and other bottles that are colored. The SPI code for HDPE is 2.

Film and Bags: all plastic packaging films and bags. To be counted in this category, the material must be flexible (i.e., can be bent without making a noise).

Bottles Types 3 - 7: all bottles that are not PET or HDPE, where the neck of the container is narrower than the body. Includes SPI codes 3 - 7.

Expanded Polystyrene: packaging and finished products made of expanded polystyrene. The SPI code for polystyrene (PS) is 6.

Other Rigid Plastic Packaging: all plastic packaging that is not a bottle and is not film or bag.

Other Plastic Products: finished plastic products such as toys, toothbrushes, vinyl hose and shower curtains. In cases where there is a large amount of a single type of product, the name of the product should be noted on the data collection form.

Residual / Composite Plastic: other types of plastic that do not fit into the above categories and items that are composites of plastic and other materials.

METAL

Aluminum Cans: aluminum beverage cans.

Aluminum Foil / Containers: aluminum foil, food trays and similar items.

Other Aluminum: aluminum scrap and products that do not fit into the above two categories.

Copper: copper scrap and products, excluding composites such as electrical wire.

Other Non-Ferrous Metals: metallic products and pieces that are not aluminum or copper and not derived from iron (see “other ferrous”) and which are not significantly contaminated with other metals or materials (see “residual/composite”).

Tin Cans: tin-coated steel food containers. This category includes bi-metal beverage cans, but not paint cans or other types of cans.

White Goods: large household appliances or parts thereof. Special note should be taken if any of these are found still containing refrigerant.

Other Ferrous: products and pieces made from metal to which a magnet will adhere (but including stainless steel), and which are not significantly contaminated with other metals or materials (in the latter case, the item will instead be included under “residual/composite”). This category will include paint and other non-food “tin cans”, as well as aerosol cans.

Residual / Composite: items made of a mixture of ferrous and non-ferrous or a mixture of metal and non-metallic materials (as long as these are primarily metal). Examples include small appliances, motors, and insulated wire.

GLASS

Clear, Green and Brown Beverage Glass: these are three separate categories for bottles and jars that are clear, green or brown in color. Note that blue glass will be included with brown glass.

Other Glass Containers; Clear, Green and Brown: these are three separate categories for bottles and jars that are clear, green or brown in color. Note that blue glass will be included with brown glass.

Plate Glass: flat glass products such as windows, mirrors, and flat products.

Residual / Composite Glass: other types of glass products and scrap that do not fit into the above categories, including light bulbs, glassware and non-C&D fiberglass. Note that ceramics (plates and knickknacks) will not be included here but will be placed in “Non-Glass Ceramics” below.

Non-Glass Ceramics: ceramics not composed of true glass and not typically used as building materials. Examples include Pyrex, dishes, etc.

ORGANICS

Yard, Garden and Prunings: grass clippings, leaves and weeds, and prunings six inches or less in diameter.

Food Waste: food waste and scraps, including bones, rinds, etc., and including the food container when the container weight is not appreciable compared to the food inside.

Manures: animal manures and human feces, including kitty litter and any materials contaminated with manures and feces.

Disposable Diapers: disposable baby diapers and protective undergarments for adults (including feminine hygiene products).

Carcasses, Offal: carcasses and pieces of small and large animal, unless the item is the result of food preparation in a household or commercial setting. For instance, fish or chicken entrails from food preparation and raw, plucked chickens will typically be classified as food, not as an animal carcass, unless the material is from an agricultural or industrial source.

Crop Residues: vegetative materials that are left over from growing crops, and that are treated as a waste.

Septage: the liquid or semi-liquid material removed from septic tanks.

Residual / Composite: other organics that do not easily fit into the above categories, must note identity of whatever material is placed in this category.

WOOD WASTES

Natural Wood: wood that is not been processed, including stumps of trees and shrubs, with the adhering soil (if any), and other natural woods, such as logs and branches in excess of six inches in diameter.

Treated Wood: wood treated with preservatives such as creosote, CCA and ACQ. This includes dimensional lumber and posts if treated, but does not include painted or varnished wood. This category may also include some plywood (especially “marine plywood”), strandboard, and other wood.

Painted Wood: wood that has been painted, varnished or coated in similar ways.

Dimensional Lumber: wood commonly used in construction for framing and related uses, including 2 x 4’s, 2 x 6’s and posts/headers (4x8’s, etc.).

Engineered: building materials that have been manufactured and that generally include adhesive as one or more layers. Examples include plywood (sheets of wood built up of two or more veneer sheets glued or cemented together under pressure), particle board (wood chips pressed together to form large sheets or boards), fiberboard (like particle board but with fibers), “glu-lam” beams and boards (built up from dimensional or smaller lumber), and similar products.

Packaging: partial or whole pallets, crates and similar shipping containers.

Other Untreated Wood: other types of wood products and materials that do not fit into the above categories, excluding composite materials (See Residual / Composites, below).

Wood Byproducts: sawdust and shavings, not otherwise identifiable.

Residuals/ Composites: items that consist primarily of wood but that do not fit into the above categories, including composite materials that consist primarily (over 50%) of wood. Examples of composites include wood with sheetrock nailed to it or with tiles glued to it (such that the materials cannot be easily separated)

CONSTRUCTION, DEMOLITION AND LAND CLEARING (C&D) WASTES

Insulation: all pad, roll, or blown-in types of insulation, but not expanded polystyrene.

Asphalt: asphalt paving material.

Concrete: cement (mixed or unmixed), concrete blocks, and similar wastes.

Drywall: used or new gypsum wallboard, sheetrock or drywall present in recoverable amounts or pieces (generally any piece larger than two inches square will be recovered from the sample).

Soil, Rocks and Sand: rock, gravel, soil, sand and similar naturally-occurring materials.

Roofing Waste: asphalt and fiberglass shingles, tar paper, and similar wastes from demolition or installation of roofs. Does not include wooden shingle or shakes.

Ceramics: includes clay, porcelain bricks and tiles, such as used toilets, sinks and bricks of various types and sizes.

Residual / Composites: other construction and demolition materials that do not fit easily into the above categories or that are composites made up of two or more different materials.

HAZARDOUS AND SPECIAL WASTES

Used Oil: used or new lubricating oils and related products, primarily those used in cars but possibly also including other materials with similar characteristics.

Oil Filters: used oil filters, primarily those used in cars but possibly including similar filters from other types of vehicles and other applications.

Antifreeze: automobile and other antifreeze mixtures based on ethylene or propylene glycol, also brake and other fluids if based on these compounds.

Auto Batteries: car, motorcycle, and other lead-acid batteries used for motorized vehicles.

Household Batteries: batteries of various sizes and types, as commonly used in households.

Pesticides and Herbicides: includes a variety of poisons whose purpose is to discourage or kill pests, weeds or microorganisms. Fungicides and wood preservatives, such as pentachlorophenol, are also included in this category.

Latex Paint: water-based paints.

Oil Paint: solvent-based paints.

Medical Waste: wastes related to medical activities, including syringes, IV tubing, bandages, medications, and other wastes, and not restricted to just those wastes typically classified as pathogenic or infectious.

Fluorescent Tubes: in addition to the typical fluorescent tubes (including fluorescent light bulbs and other forms), this category includes mercury vapor and other lamps listed as universal wastes.

Asbestos: pure asbestos, and asbestos-containing products where the asbestos present is the most distinguishing characteristic of the material.

Other Hazardous Waste: problem wastes that do not fall into one of the above categories, such as gasoline, solvents, gunpowder, other unspent ammunition, fertilizers, and radioactive materials.

Other Non-Hazardous Waste: problem wastes that do not fall into one of the above categories, but that are not hazardous, such as adhesives, weak acids and bases (cleaners), and automotive products (car wax, etc.).

Actual Hazardous Waste: items measured in the above special waste categories that also meet one or more of the criteria (flammable, toxic, corrosive, infectious, etc.) to be classified as a hazardous waste. Note these materials are counted in this category and in the appropriate category above.

CONSUMER PRODUCTS

Computers: computers and parts of computers, including monitors, base units, keyboards, other accessories and laptops.

Other Electronics: other appliances and products that contain circuit boards and other electronic components (as a significant portion of the product), such as televisions, microwave ovens and similar products.

Textiles, Synthetic: cloth, clothing, and rope made of synthetic materials.

Textiles, Organic: cloth, clothing, and rope made of 100% cotton, leather, wool or other naturally-occurring fibers. Composites of several different naturally-occurring fibers (such as a wool jacket with a cotton liner) can be included in this category, but not if the item has zippers or buttons made from a different material. The working guideline for this category was whether the item could be composted without leaving an identifiable residue or part.

Textiles, Mixed or Unknown: cloth, clothing, and rope made of unknown fibers or made from a mixture of synthetic and natural materials, or containing non-textile parts such as metal zippers or plastic buttons.

Shoes: all shoes and boots, whether made of leather, rubber, other materials, or a combination thereof.

Tires and Other Rubber: vehicle tires of all types, including bicycle tires and including the rims if present, and finished products and scrap materials made of rubber, such as bath mats, inner tubes, rubber hose and foam rubber (except carpet padding, see below).

Furniture and Mattresses: furniture and mattresses made of various materials and in any condition.

Carpet: pieces of carpet and rugs made of similar material.

Carpet Padding: foam rubber and other materials used as padding under carpets.

Rejected Products: for industrial samples only, various products that failed internal QA/QC tests.

Returned Products: for industrial samples only, various products that were returned by the consumer who purchased the item.

Other Composite: this is a catch-all category for objects consisting of more than one material.

RESIDUALS

Ash: fireplace, burn barrel or firepit ash, as well as boiler and other ash from industrial sources.

Dust: baghouse and other dusts from industrial sources, as well as bags of vacuum cleaner dust.

Fines / Sorting Residues: mixed waste that remains on the sorting table after all the materials that can practicably be removed have been sorted out. This material will consist primarily of small pieces of various types of paper and plastic, but will also contain small pieces of broken glass and other materials. May also include material less than one-half inch in diameter that falls through a bottom screen during sorting, for those using sorting boxes with screens, and if the material cannot otherwise be identified.

Sludges and Other Special Industrial Wastes: sludges and other wastes from industrial sources that cannot easily be fit into any of the above categories. Can include liquids and semi-solids but only if these materials are treated as a solid waste.

APPENDIX A
STATISTICAL CERTAINTY OF RESULTS

APPENDIX A STATISTICAL CERTAINTY OF RESULTS

A. INTRODUCTION

There is a quantifiable degree of error associated with the waste composition results shown in this report, and this error can be expressed as confidence intervals. This appendix shows the confidence intervals associated with waste composition results.

B. METHODOLOGY

For this type of study, statistical certainty can be expressed using confidence intervals. Confidence intervals are the range of values for which one can be confident (to a given degree, such as 90% confident) that the true value falls within. The confidence limits are also sometimes shown as a “plus or minus value”. For example, the results of this study show that the potential amount of aluminum cans in the County’s waste stream is 0.91% +/- 0.5%. This is based on a confidence interval of 90%, so that in this example one can be 90% confident that the true value for aluminum cans falls between 0.41% to 1.41%.

The calculation of confidence intervals for this study is complicated slightly by the use of weighted averages. The calculation of confidence intervals for weighted averages begins with calculating standard deviations for each material for each generator and for each quarter. The standard deviation is then converted to the standard error of the mean (SEM) by dividing the standard deviation by the square root of the number of samples. Once the SEM has been determined for each material, each quarter and each waste generator, it can be manipulated in the same way as the average composition figures by using weighted averages as appropriate for the data being combined. The final SEM’s can then be multiplied by a factor of 1.64 and then added or subtracted from the average composition values to derive the upper and lower confidence limits, respectively. The factor of 1.64 is determined by the choice of a 90% confidence interval.

C. RESULTS

Table A-1 shows the confidence limits associated with the composition results for each generator and for the entire County.

