

# **RESIDUAL WASTE CHARACTERIZATION STUDY FOR THE SOUTH LAKE TAHOE SERVICE AREA Spring 2001**

## **I. PURPOSE AND SCOPE**

The purpose of this report is to document the methodology and results of a residual waste characterization study performed at the request of El Dorado County at the South Lake Tahoe Transfer Station during May 2001.

The sections that follow discuss the background of the study and describe the waste generation populations, the methodology used, and the results of the sampling effort.

## **II. BACKGROUND**

Regulations promulgated as a result of AB 939, the Sher Bill (specifically Title 14, Chapter 9, Article 6.1, Section 18722), mandated that each city and county in California prepare an integrated waste management plan, including a waste generation study and a source reduction and recycling element (SRRE). That waste characterization study was completed in 1991, providing a representative sampling and characterization of wastes, including identifying the appropriate populations and sub-populations in the South Tahoe sampling area.

One of the immediate goals of the initial waste generation study and SRRE was to provide the groundwork for achieving a 25 percent reduction in solid waste disposal by 1995 and 50 percent reduction by the year 2000. This goal was adopted by the state legislature as a means of (1) preserving and prolonging the diminishing landfill space in the state, and (2) conserving our natural resources through source reduction, recycling, and composting.

This residual waste characterization study is conducted at the request of El Dorado County to quantify residual materials that are currently being disposed of at landfills. This residual waste characterization study is current-status information applicable to the Request for Statement of Qualifications for Mixed Solid Waste Processing Facilities issued by El Dorado County Environmental Management Department in March 2001. The initial waste sampling was conducted at the South Lake Tahoe Transfer Station for a one-week period during May 2001.

This study does not attempt to verify waste disposal in the Tahoe Basin portion of the County. Instead, it is assumed that essentially all residential, commercial, and industrial wastes are deposited at the South Lake Tahoe Transfer Station. Some of the waste generated nearer the Placer and Alpine County lines and the Nevada state line may be disposed outside of El Dorado County, and some out-of-county waste may be deposited at the transfer station. However, the problem of inter-county waste disposal is not generally considered a significant one.

### **III. WASTE GENERATION**

The South Lake Tahoe service area is comprised of the east-slope area of El Dorado County, the City of South Lake Tahoe, and the Stateline portion of Douglas County, Nevada.

The South Lake Tahoe area is a well-known vacation and resort area, with snow skiing in the winter and hiking, camping, boating, water skiing, and many other outdoor activities in the summer. The proximity of the Nevada gambling casinos just across the state line adds to the year-round activities that draw tourists and sightseers to the Lake Tahoe Basin. The waste types reflected in the South Lake Tahoe service area waste stream are primarily residential and commercial. No industrial generators have been identified by either the transfer station operators or the City of South Lake Tahoe.

Based on the waste generation sources noted in the waste characterization study of 1991, the established collection routes and the geographic and socioeconomic similarities of the waste generators, the following two sub-populations of the South Lake Tahoe service area were selected for sampling purposes for this residual waste generation report. The following is an abbreviated description of each of these sub-populations.

#### **A. SUB-POPULATIONS**

##### **1. Residential**

This sub-population is typical of the vacation/resort character of the South Lake Tahoe service area. It contains a highly mixed combination of full-time single family and multi-family units, apartments, and vacation homes with a wide range of income levels.

##### **2. Commercial**

Most of the commercial businesses in the South Lake Tahoe service area are located along Highways 50 and 89 and include resorts, casinos, restaurants, motels, medical offices, grocery stores, shopping centers, printers, retail, offices, and general commerce.

#### **B. WASTE STREAMS**

Three (3) waste streams can be found in the South Lake Tahoe service area. They are:

##### **1. Residential**

As is typical of a vacation/resort area, residential waste in the South Lake Tahoe service area contains a mixed combination of recyclables, yard waste, and other organics from full-time single family and multi-family units, apartments, and vacation homes.

Residential service is provided by packer trucks, which consolidate all materials for sorting at the South Tahoe Refuse Transfer Station/Material Recovery Facility (MRF).

## **2. Commercial**

Waste for a portion of the commercial sub-population is collected by packer trucks within the South Lake Tahoe service area as well as through regularly scheduled commercial roll-off service. The boxes and compactors are available in various sizes, but typically 20 to 33 cubic yards. Most regularly scheduled roll-off boxes and compactors are picked up at least once per week from commercial businesses in the Lake Tahoe service area. Special order boxes are picked up on an as-needed basis.

Commercial waste is comprised of widely varying materials, including “dry” retail waste, compacted and “wet” resort and restaurant waste and construction and demolition waste. Most materials are collected as mixed materials and brought to the South Tahoe Refuse Transfer Station/MRF for material recovery. However, some recyclables are source separated for material recovery and others are direct hauled for either material recovery or disposal.

## **3. Self-Haul**

Generally, self-haul wastes include pickup trucks hauling a mix of residential waste, yard waste, construction projects, and residential cleanup to the South Lake Tahoe Transfer Station/MRF. A portion this waste is from the typical residential population disposing of wastes that cannot be picked up by normal collection vehicles. It also includes some self-hauls wastes from less populated rural areas where residents choose not to use commercial collection service. The more significant portion of self-haul waste comes from small commercial operators, contractors, and property maintenance businesses.

A portion of the residential and commercial streams is commingled with one another via a shared fleet of collection vehicles and combined collection routes. Quarterly surveys have produced consistent data on proportional allocations between these waste streams.

Self-Haul materials are received at the Transfer Station and are unloaded on the MRF floor along with roll-off loads. Although self-haul accounts for a wide variety of load types and a large portion of traffic through the Transfer Station/MRF, this element generates less than 6 % of the overall waste stream.

## **IV. WASTE CATEGORIES AND DEFINITIONS**

A multitude of material types are commonly found in the solid waste stream. For the purpose of this study, targeting residual material types, waste was grouped into one of fourteen (14) categories. These categories are organized in accord with the California Integrated Waste Management Board waste sampling categories utilized in the 1991 waste characterization report. The criteria for grouping in this manner was based on the general nature of residual materials, the type and design of current Material Recovery Facility operations and potential facility technologies and expansions. The categories were used when sorting each sample. The categories and definitions include:

## WASTE CATEGORIES

### **Corrugated Containers:**

Cardboard that usually has three layers, such as shipping boxes; and sheets and pieces of boxes and cartons

**Mixed Paper:** Newspaper, office paper, magazines and catalogs, paper bags, phone books, other miscellaneous paper such as chipboard and remainder/composite paper such as wax coated milk cartons, waxed paper, tissue, paper towels, blueprints, fast food wrappers, carbon paper, etc.

**Plastic:** Film plastic, HDPE containers, PETE containers, and miscellaneous plastic containers, remainder/composite plastic such as plastic bubble packaging, drinking straws, foam drinking cups, produce trays, egg cartons, etc.

**Glass:** Clear, colored and brown glass bottles and containers, and all other remainder/composite glass such as Pyrex, Corningware, crystal and other glass tableware, mirrors, and auto windshields.

**Metal:** Aluminum cans, tin/steel cans, appliances, other ferrous and other non-ferrous materials.

**Yard Waste:** Natural vegetation, including slash, prunings, trimmings, wood chips, pine needles, and leaves.

**Food Waste:** Food material resulting from the processing, storage, preparation, cooking, handling, or consumption of food. Examples include discarded meat scraps, dairy products, egg shells, fruit or vegetable peels, and other food items from homes, stores, and restaurants.

**Milled Wood:** Lumber, pallets, plywood, wooden furniture without textiles.

**Textiles:** Clothing, carpeting, drapes and other miscellaneous materials made from fabric.

**Inert solids:** Rock, concrete, dirt

### **Household Hazardous Waste:**

Paint, vehicle and equipment fluids, and other materials which if improperly put in the solid waste stream may present health, safety and environmental hazards.

### **Sheetrock**

### **Disposable Diapers**

### **Mixed Residue:**

Mixed waste materials that cannot be put in any other type or subtype in other categories, and/or materials that cannot be further sorted.

## V. WASTE SAMPLING METHODOLOGY

### A. BACKGROUND

Although the ultimate goal of this specific residual waste characterization study is to identify and quantify residual materials bound for disposal, that information should be presented in the context of the overall waste generation, diversion and disposal. Data from the year 2000 was utilized to provide such a framework. That information can be summarized as follows:

<b>TABLE I</b>		
<b>WASTE GENERATION AND DISPOSITION- 2000</b>		
<b>Total Tons Generated</b>	<b>Total Tons Diverted</b>	<b>Total Tons Disposed</b>
<b>94,653.9</b>	<b>30,889.2</b>	<b>63,764.7</b>
<b>100%</b>	<b>32%</b>	<b>67%</b>

South Tahoe Refuse operates the only Transfer Station located in the South Lake Tahoe service area. That Transfer Station includes a Material Recovery Facility (MRF) that accepts mixed waste from packer trucks, roll-off trucks and self-haul vehicles. This consolidated waste is sorted through both floor and line sort operations for recovery for end-use markets.

In order to increase the efficiency of recovery operations, reduced tip fees are set for clean loads of a variety of materials which are received from roll-off and self-haul loads. Loads of clean recyclable materials are unloaded directly into material storage areas. Because the focus of this study is residual materials, clean loads received at the Transfer Station were excluded from the sampling process.

#### **Two compatible characterization approaches were used in this study, specifically the use of existing data and landfill/transfer station sampling**

Quarterly diversion and disposal reports are available for the South Lake Tahoe service area for the past 5 years. These reports provide detailed information regarding both the generation of materials by sub-populations and identification of disposed material by type. These reports were utilized to the extent applicable for data analysis, while sampling provided the actual constituents of residual materials. Although certified scales are not available to record each load received at the Transfer Station, axle scales are used to quantify quarterly survey weights. A computerized Transfer Station program also provides detailed information on material types received, jurisdiction of origin and sub-population types.

To determine the sampling methodology, it is necessary to delineate between the residential and commercial streams. This was achieved by assigning the three waste

streams to a waste generator sector, either residential or commercial, and determining the amount of annual tonnage to be assigned to each sector.

This study analyzed the quarterly survey reports for 2000 reflecting the relative amount of waste that can be attributed to each sub-population from each waste stream. Based on the collection, roll-off and self-haul quarterly survey information, **Table II** below provides that analysis.

<b>TABLE II</b>				
<b>Residential and Commercial Waste Stream by Collection Type - 2000</b>				
	<b>Residential</b>	<b>Commercial</b>	<b>% by Type</b>	<b>Annual Tons</b>
Packer Truck	34.3%	25.2%	59.5%	<b>56,357.1</b>
Roll-Off Truck	0.2%	34.6%	34.8%	<b>32,911.4</b>
Self-Haul	1.0%	4.7%	5.7%	<b>5,385.4</b>
<b>Total</b>	<b>35.5%</b>	<b>64.5%</b>	<b>100.0%</b>	<b>94,653.9</b>

It is important to note that the relative allocations between residential and commercial simply identify the proportion of material attributed to either sub-population and the minimum number of sample selected. The amount assigned to each sub-population does not affect the overall statistical representation of the data.

## **B. SELECTION OF SAMPLES**

### **1. Number of Samples Per Generator Sector**

**Table III** indicates the number of samples per year considered to be statistically representative for waste disposal characterization studies. This information is taken from the California Integrated Waste Management Board’s (CIWMB) document entitled “*Collecting Your Own Solid Waste Characterization Data.*”

<b>TABLE III</b>	
<b>MINIMUM NUMBER OF SAMPLES</b>	
<b><i>Generator Sector</i></b>	<b><i>Minimum Number of Samples per Year</i></b>
Residential	30, distributed over a minimum of 2 seasons
Commercial	40, distributed over a minimum of 2 seasons

Further, the minimum number of samples may be split between sampling periods, i.e., for residential landfill/transfer station studies 15 samples may be taken in a minimum of two seasons, so that the minimum number of samples for the year (30) will be statistically representative of the sub-population for the year and reflect seasonal variation. Because of the significant seasonal fluctuations in South Lake Tahoe, bi-annual sampling was determined to provide the most accurate data.

### **2. Seasonal Considerations**

The composition of the total waste stream varies during the calendar year due to cyclical patterns of local climate, demography, trade and commerce. Specifically, the South Lake

Tahoe service area is unique in that the resident population is approximately 35,000 while the South Lake Tahoe basin area attracts more than 4,000,000 tourists to the service area each year. Additionally, regulations established by the Tahoe Regional Planning Agency (TRPA) restrict the disturbance of the ground within the Lake Tahoe basin from October through April, which significantly restricts the building season. Therefore, two primary seasons occur each year due to seasonal tourist activities and construction projects.

The South Lake Tahoe peak season includes the months from May through October. This period coincides with the primary tourist season and summer home occupancy as well as with the calendar-driven construction and demolition season.

The non-peak season includes the months of October through April. While the permanent resident population remains stationary, tourist related business decreases significantly. The major winter snow-related tourist activities draw a more targeted group of visitors and are dependent on sufficient snowfall, particularly over the winter holiday weekends.

**C. SAMPLE SCHEDULE**

While this waste characterization study of residual waste relies on the general waste characterization process outline in the California Integrated Waste Management Board Uniform Waste Disposal Characterization Method, the focus is narrowed to characterization of specific waste types known to be destined for the landfill.

Specific material types identified as residual materials are as follows:

- **Residual material from packer truck operations (MRF conveyor recovery line) applicable to both residential and commercial waste sectors**
- **Residual material from roll-off truck operations (MRF floor sort operations) applicable to commercial waste sector, including compacted waste**
- **Residual material from self-haul operations – applicable to both residential and commercial waste sectors**

<b>TABLE IV</b>		
<b>Minimum Sample By Waste Sector Type</b>		
<b>Waste Stream</b>	<b>Residential</b>	<b>Commercial</b>
Packer Truck	14	12
Roll-Off Truck	0	7
Self-Haul	1	1
<b>Total</b>	<b>15</b>	<b>20</b>

A full week of sampling was conducted for each of the three waste streams; residential, commercial and self-haul. Based on the assignment of streams to sub-populations and

minimum number of samples required per year, **Table V** shows the sample schedule for each waste stream in the residential and commercial sectors respectively.

<b>Table V</b>							
<b>Residual Waste Survey</b>							
<b>Actual Sample Schedule</b>							
<b>Waste Stream</b>	<b>Wed</b>	<b>Thurs</b>	<b>Fri</b>	<b>Sat</b>	<b>Sun</b>	<b>Mon</b>	<b>Tues</b>
<b>Packer</b>	<b>3</b>	<b>3</b>	<b>3</b>			<b>3</b>	<b>2</b>
<b>Roll-Off</b>	<b>21</b>	<b>17</b>	<b>16</b>	<b>10</b>	<b>4</b>	<b>21</b>	<b>13</b>
<b>Self-Haul</b>	<b>14</b>	<b>14</b>	<b>14</b>	<b>14</b>		<b>14</b>	<b>14</b>

This sample schedule exceeds the minimum requirements of the CIWMB guidelines. The sampling for the roll-off and self-haul waste streams was increased because of the wide range of material types anticipated from these loads and the lack of scale weights. The actual sampling for roll-off was increased to 100% of incoming loads. Residential was allocated one self-haul load. Although residential self-haul vehicles account for 15% to 20% of this traffic, weight and volume records allocate it at a far lower percentage, as shown in **Table II** above. The MRF line residual samples account for the balance of the residential samples. It is noted that the residual material from the MRF line is expected to vary significantly due to the influx of large quantities of yard waste (pine needles) and moisture during early spring cleanup and also between the two sample seasons because of building season restrictions.

#### **D. SAMPLING PROCEDURES**

Sampling procedures were taken from the California Integrated Waste Management Board’s uniform waste disposal characterization method for collecting data on the waste stream. This ensured a high degree of accuracy and reliability of the data. Two compatible characterization approaches were used in this study, specifically the use of existing data and landfill/transfer station sampling

The dual approach was selected for the following reasons:

- Availability of extensive quarterly reporting data;
- The intended use of the data to quantify residual materials sent for disposal;
- Resources available for collection of the data; and
- The availability of the Transfer Station and related equipment for conducting the study.

All sample selections and sorting were performed at the South Tahoe Refuse Transfer Station. A specific sorting area was designated next to the MRF working face for the sorting of all samples.

Samples were chosen randomly from the MRF line residual pile. The targeted minimum sample weight was 200 pounds for each sample. Once samples were selected they were deposited at the designated sorting station. A positive sort was then applied to each

sample whereby all materials were sorted into one of the fourteen material categories described in Section IV above. Finally, the total weight of the samples and their respective material types were recorded for further analysis.

Roll-off loads were sampled at 100% during the sample week. Each load was visibly monitored as it was unloaded and percentage allocations by material type applied to a tracking sheet for that load. Clean, presorted loads of recyclable materials were excluded from this sampling process so that only mixed, potential residual materials were categorized.

Self-haul loads were also visibly monitored and percentages by material type applied to each load. The loads from which the samples were selected were chosen randomly in that no specific information about individual loads influenced the likelihood of their selection. Also, the number of the daily loads and the pattern in which loads arrive at the Transfer Station is uncertain. Therefore, loads to be sampled were designated as the “first and second self-haul vehicle arriving at 8:30 a.m. and each hour thereafter through 4:30 p.m. each day of operation”. Loads were designated as either residential or commercial. Clean, presorted loads of recyclable materials were also excluded from this sampling process to avoid allocation of recyclables to the residual samples.

## **VI. WASTE COMPOSITION RESULTS**

This section addresses the waste composition of the residual materials currently disposed of at regional landfills.

### **A. OVERVIEW OF RESULTS**

**Table II** above shows that approximately 65% of the waste generated in the South Lake Tahoe service area is assigned to the commercial sub-population. The residential sub-population accounts for the other 35%. This table also shows that of the South Lake Tahoe waste stream sectors, packer truck operations account for 59.5% of waste collected, while roll-off operations and self-haul contributed 34.8% and 5.7%%, respectively.

These statistics are developed from quarterly reports of incoming loads, all of which are mixed loads subject to either floor sort or conveyor line sort operations. Although a wider range of materials are sorted through conveyor line operations, floor sort accounts for recovery of materials of greater weight. Since the state required reporting system is weight-based, it is anticipated that the percentages of recovery and disposal do not significantly vary from the percentages indicated by the incoming loads.

In reality, the residual materials are eventually commingled themselves before transfer to the landfill, therefore, the origin of residual materials may be of less significance than the allocation to category types found in the residual materials themselves.

## B. DISPOSAL DATA

**Table VI** provides historical weight-based disposal data. This information can be used to extrapolate possible material categories available in residual materials on an annual basis. It should be noted that the increase in disposal during the years 1999 and 2000 coincides with an increasing shift from residential to commercial waste generation. This may be due, in large part, to current redevelopment projects within the South Lake Tahoe service area and may reflect a temporary shift until property upgrades begin to taper off.

## C. MATERIALS BY CATEGORY

**Table VII** is a summary of all the residual waste streams by percentage attributed to material type. This table reveals several distinguishing characteristics of the waste stream. The first is that organic components constitute nearly 65 % of the entire waste stream by volume. These components are paper wastes which total 15 %, yard waste at 24 % and other organics, (wood wastes, textiles and food wastes), which total 26 %. The estimated percentage of these materials by weight is 62 %.

An interesting point in comparing this study with the initial 1991 waste characterization study is that several materials, for which no markets have been identified, remain as residuals in virtually the same percentages as originally estimated, such as food waste (10.5 %) sheetrock (1.3 %) and disposable diapers (1.6 %). Conversely, household hazardous waste, which is subject to several levels of load checking during the Transfer Station/MRF process is reduced to less than 0.5 %. Any comparisons between this residual waste data and the initial 1991 waste characterization study should consider the fact that a large quantity of the highly recyclable materials have already been sorted and recovered through MRF operations.

## D. PERTINENT CONSIDERATIONS

The information provided by this residual waste study is intended to provide an analysis of the waste category types to be found in the residual materials from the South Lake Tahoe service area currently being disposed at landfill. The sample period represents a specific point in time. The following points are pertinent to application of these percentages in relation to total waste disposal.

➤ **The yard waste generation percentages reflect a seasonal peak.**

The survey was conducted during a week in early May 2001, a time at which South Lake Tahoe is in transition from winter to summer. During May the waste stream experiences an unusually large volume of yard waste, approximately 90% of which is pine needles which fall during early spring winds and are traditionally cleaned up as soon as the weather permits. Because of contamination problems, this material is not sorted from the conveyor line and adds significant volume to the MRF line residual during this period. These volumes do not continue throughout the summer season, but rather taper off dramatically by July.

- **Conversions for volume to weight.**

Residuals from the MRF line operation, reflecting packer truck loads, were sampled using scale weights. Due to lack of customer scales, roll-off and self-haul samples were estimated by volume. **Table VII** provides material category percentage allocations by both volume and converted weight. Conversions from volume to weight are provided at **Table VIII**. These conversion factors were taken from available Transfer Station data and verified against a Conversion Factor sheet for density conversions provided by the California Integrated Waste Management Board. Use of this data for planning purposes should take this distinction into account.
- **Commingled Loads**

Although this study provides extensive categorization of residual materials, it should be noted that these residual materials are, in fact, commingled. All residual piles sampled in this study were received as mixed loads. Adequate space and time are not available for extensive sorting of the majority of loads from roll-off operations and self-haul customers.
- **Self-Haul Customer Base**

Although vehicle numbers for the self-haul waste stream shows a residential customer base between 15% and 20%, both volume and weight records reflect a significant shift to waste generation on the commercial side. In any event, the materials received from self-haul are clearly not another form of general residential waste. The 34% wood wastes, 2.5% sheetrock and 17% textiles, including carpeting and mattresses, indicate the strong construction component being experienced at South Lake Tahoe due to the effects of current redevelopment efforts.
- **Mixed Residue**

An additional category was added to this residual waste survey categorized as “Mixed Residue”. As defined before, “mixed residue” is waste materials that cannot be put in any other type or subtype in other categories, and/or materials that cannot be further sorted. This is the point at which further sorting or investigation confronts health and safety issues and which current resources and technology do not adequately address.

Detailed residual waste composition backup data sheets are available for review upon request.