October 8, 2010

C373-5011
TC 25109

Mr. Jeff Callahan
Manager
Resource Conservation Division
1901 63rd Street
Boulder, CO 80306

Subject: Final Organic Waste Generation and Management Survey Report for Boulder County, Colorado

Reference: Contract No. 5063-08

With this letter, Tetra Tech, Inc. (Tetra Tech) is submitting the Final Organic Waste Generation and Management Survey Report for Boulder County, Colorado. This report discusses municipal organic waste management programs in Boulder County as well as survey results from commercial organic waste generators in the county. The report concludes with four recommendations to increase organic waste diversion within Boulder County.

For any questions or comments related to this report, please contact the undersigned at (719) 685-6586 or via e-mail benjamin.recker@tetratech.com.

Sincerely,

**TETRA TECH, INC.**

Benjamin C. Recker, P.E., LEED AP
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Attachment: as stated

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Boulder County
Resource Conservation Division

# Final Organic Waste Generation and Management Survey Report for Boulder County, Colorado

## October 8, 2010

*Submitted to:*

Mr. Jeff Callahan
Manager
Resource Conservation Division
1901 63rd Street
Boulder, CO 80306

*Submitted by:*

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# 1.0 INTRODUCTION

Boulder County, Colorado, and its municipalities: Boulder, Erie, Lafayette, Longmont, Lyons, Nederland, and Superior, and the City and County of Broomfield, form a community that is in the forefront in promoting and implementing progressive waste management practices and maximizing waste diversion. Boulder County and the larger communities of Boulder and Longmont have already adopted zero waste resolutions and a community-wide zero waste effort is underway. As a leader in this process, Boulder County has commissioned several reports to provide specific information to assist this process.

## 1.1 PURPOSE

The purpose of this report is to provide Boulder County with an evaluation of organic waste generation and management practices within the county so that decision makers can evaluate current services, monitor program results, and determine if program or process changes are needed to help meet the county's and the community's zero waste goals.

## 1.2 REPORT FORMAT

Section 1.0, Introduction, briefly discusses the county's overall goals and the purpose of this study. Section 2.0, Organic Waste Management Programs, provides a summary of current organic waste services and programs being implemented in Boulder County. Section 3.0, Organic Waste Generation Study Methodology, provides a description of data gathering activities, assumptions, and estimation techniques used to complete this study. Section 4.0, Survey Results, provides the results of the data collection and analysis activities from this study. Finally, Section 5.0, Findings and Recommendations, discusses the results of this evaluation and provides recommendations to increase organic waste diversion within the county.

# 2.0 ORGANIC WASTE MANAGEMENT PROGRAMS

The county and municipalities have established various organic waste management and diversion programs as discussed in the following paragraphs.

## 2.1 BOULDER COUNTY

Boulder County has invested significant resources to implement comprehensive waste management and minimization programs including a single stream modification of the county-owned recycling processing center; a waste hauler licensing ordinance which requires volume based rates, recycling services at no additional cost, and composting service in some parts of the county; a household hazardous waste collection; an in-house zero waste collection system; and extensive countywide education and outreach activities

In November 2005, the Boulder County Commissioners adopted Resolution 2005-138, "Adopting Zero Waste as a Guiding Principle and Supporting the Creation of a Zero Waste Plan," which establishes waste management goals for county government, the unincorporated county and the county as a whole.

In 2009, the County required through its hauler-licensing ordinance, curbside collection of compostable materials in the plains areas of the county. Under this program, haulers are required to provide each residential customer in the designated areas with 96 gallons of organics collections every other week. During the first year of operation, the curbside organic waste program collected over 5,264 tons of organic material (Horton, Gary 2009). Additionally, Boulder County has actively encouraged back yard composting for many years through annual compost bin sales and compost workshops.

The Boulder County yard waste and wood waste drop-off center is co-sponsored by the City of Boulder and is located at 5880 Butte Mill Road in Boulder. This drop-off site accepts yard waste which includes grass clippings, leaves, weeds, flowers, woody waste (up to 6 inches in diameter), sawdust, and food waste. Clean, untreated wood waste is also accepted at this location as long as the material is separated. Sod, large diameter wood waste, manure, chemically treated or painted wood, and plastic wood products are not accepted. Residents of unincorporated Boulder County pay $37.50 per ton for material drop-off at this site (60% of the total cost). Western Disposal Inc., operates the drop-off location and processes the wood waste into mulch, while yard waste is composted. Wood mulch is available for free and compost is available for purchase by the bag or in bulk (Boulder County 2009). Over the past 12 months, the wood and yard waste drop-off center has received over 8,395 tons of materials for processing: 1,715 tons of wood waste, 6,591 tons of yard waste, and 89 tons of Christmas trees (Horton, Gary 2009).

Boulder County has implemented a nationally acclaimed zero-waste program at the annual 10-day Boulder County Fair. The zero waste initiative for the Boulder County Fair began in 2006 and initially focused on educational activities related to recycling and composting. The program has been substantially expanded and currently includes composting of manure and animal bedding, food waste, and compostable products. Staff have worked with vendors to maximize the use of compostable products, which increased waste diversion opportunities. In 2009, 12,000 pounds of organic waste were collected at the fair, up from 3,400 pounds collected in 2008. In addition, approximately 100 tons of manure and animal bedding are collected from the fair ground stalls each year and composted (Bohn, Jennifer 2009).

Boulder County operates two waste transfer and recycling centers serving the mountain communities of Allenspark and Nederland and surrounding areas. Each recycling center accepts commingled containers, mixed paper, and cardboard. At the Nederland facility there is currently a slash drop-off site that accepts tree limbs, branches, and small-diameter limbs (up to 6 inches in diameter), free of charge, from residents, non-residents, and contractors. Patrons wanting to utilize the facility must contact the transfer station to schedule an appointment to ensure space is available at the site. The site does not accept any other organic material for processing. The collected material is periodically processed into wood chips (mulch), which is made available to the public free of charge or transported to Boulder for composting. Annually, this facility collects and processes approximately 100 cubic yards or 32 tons of organic material.

For over 20 years Boulder County has assisted seven smaller communities (Allenspark, Bar K Subdivision, Gold Hill, Jamestown, Nederland, Niwot, and Ward) to hold one-day spring cleanup events by funding roll-off collection containers for trash and other materials. Waste diversion and reuse are important are important aspects of this program. Additionally, Boulder County has operated a community wood waste sort yard serving Allenspark area for the past few years. See section 2.11 Forestry Services for details. A similar facility to serve the Nederland area is being developed and is slated to open in late summer 2010.

## 2.2 CITY OF BOULDER

Similar to Boulder County, the Boulder City Council adopted a zero waste resolution in April 2006. The City of Boulder has been a waste diversion and recycling leader, with curbside recycling programs dating back to 1976. The city continues to expand its waste diversion and recycling services and has recently implemented a single-stream recycling service in partnership with the Boulder County Recycling Center.

In 2009, the city also implemented curbside collection of compostable materials. The curbside organic waste collection program began with a pilot study in 2006; full implementation was approved by the City Council in October 2008. Full scale program implementation was completed in February 2009. Under this program, City of Boulder residents are provided a 32-gallon curbside compost container which is collected by a licensed trash hauler every other week. The following materials are accepted in the curbside compost containers: yard waste, compostable paper products, compostable products made from plant starches, and plant-based food waste (Western Disposal Services 2009). During the first year of operation, the curbside organic waste program collected over 5,264 tons of organic material (Horton, Gary 2009).

In addition to the curbside organic waste program, the City of Boulder co-sponsors the yard and wood waste drop-off center on Butte Mill Road. Boulder residents are not charged to drop off yard or wood waste at the facility. Contractors working at job sites within the city limits of Boulder can bring materials to the drop-off location and pay 50 percent of the standard disposal rate. Western Disposal Inc., operates the drop-off location and processes the wood waste into mulch, while yard and food waste is composted. Wood mulch is available for free and compost is available for purchase by the bag or in bulk. As stated above, over the past 12 months, the wood and yard waste drop-off center has received over 8,395 tons of materials for processing: 1,715 tons of wood waste, 6,591 tons of yard waste, and 89 tons of Christmas trees (Horton, Gary 2009).

## 2.3 UNIVERSITY OF COLORADO – BOULDER

The University of Colorado at Boulder is located within the City of Boulder and has a student and faculty population of over 30,000. The University does not currently participate in city or county waste diversion programs, but internally offers many of the same diversion programs as the City and County of Boulder and has adopted significant zero-waste goals/programs. The University of Colorado Student Union and University Administration jointly operate a recycling program in which recyclables are collected from campus facilities, processed on campus, and marketed to off-site vendors for recycling. The University also provides education and outreach programs on campus to increase awareness of waste diversion programs (University of Colorado 2009b).

Organic waste management and diversion has recently received increased focus on campus as a method to reach zero-waste goals. Folsom Field became the first collegiate or professional stadium in the United States to implement zero-waste practices for events. Service ware is made of compostable materials, and containers are available to collect these products and food waste. Other events, such as Global Jam, on

campus are also moving to zero-waste and specifically include compostable materials collection. Additionally, campus dining facilities are now using compostable service ware and collecting these materials and food waste for composting (University of Colorado 2009c).

The University is also conducting a pilot study to compost bathroom paper towels. It is estimated that the University diverts 234 tons of organic material annually; this figure is expected to increase over the next couple of years as additional programs are implemented (Urie, Heath 2009). The collected organics are brought to the Western Disposal Services composting facility in Boulder for composting (Colorado Buffaloes website 2009).

## 2.4 CITY OF LONGMONT

Similar to other governmental bodies within Boulder County, the City of Longmont adopted a zero-waste resolution that was approved in October 2008. To promote zero-waste goals, the City of Longmont offers curbside, single-stream recycling to city residents as well as annual scheduled tree limb curbside collection, which typically occurs around April. City residents can also schedule additional curbside limb collections throughout the year on an as-needed basis. The curbside limb collection program accepts limbs, branches, and bushes that are no more than 6 feet in length and no greater than 6 inches in diameter. The limbs can be bundled, provided the bundles are no larger than 3 feet in diameter. Leaf piles are not accepted at the curbside, but the city does collect leaves in paper bags at curbside. The curbside collection program is available for free to city residents who subscribe to the trash and recycling programs. All material collected under the curbside limb program is brought to the city's tree limb diversion center for processing into mulch (City of Longmont 2009).

The City of Longmont's tree limb diversion center is located at 140 Martin Street. The center accepts tree limbs, branches, bushes, and leaves only and does not accept grass clipping, weeds, or other organic waste. City residents can drop off materials for free and must bring proof of residency. Non-city residents and contractors can utilize the facility, but must pay a nominal fee. The collected material is processed into mulch which is made available for free to city residents. Historically, the tree limb recycling program has collected and processed 40,000 cubic yards of material (City of Longmont 2009).

## 2.5 CITY OF LAFAYETTE

The City of Lafayette offers curbside refuse and single stream recycling services through the Public Works Department. The city offers residents twice per year organic waste collection opportunities—once in the spring and once in the fall—to coincide with high yard waste generation periods. Historically, the

spring event has collected 1,100 cubic yards of material while the fall event has collected 440 cubic yards of leaves (City of Lafayette 2009).

In addition to these services, the City of Lafayette supports several large, zero-waste events including the Lafayette Peach Festival and the Oatmeal Festival. At both events, the city works with vendors to provide compostable products to maximize the ability to divert material from landfill disposal. The Peach Festival has diverted 4.6 tons of organic material while the Oatmeal Festival has collected 0.5 ton for composting (Eco-Cycle 2009).

## 2.6 CITY OF LOUISVILLE

The City of Louisville has recently contracted for a single hauler refuse, recyclable, and compostable collection program. Under this program a single hauler, Western Disposal Services Inc., was contracted to collect refuse, single-stream recyclables, and compost materials from the curbside for city residents. Single-stream recycling is free under this program, while refuse and composting service fees are based on container sizes under a pay-as-you throw structure. Compost containers are collected bi-weekly with the following materials accepted: food scraps, non-recyclable paper, and plant and yard waste up to 6 inches in diameter. Lumber, treated wood, trash, plastic, frozen food containers, pet or human waste, and liquids are not accepted in the curbside containers (City of Louisville 2009).

In addition to curbside services, the City of Louisville operated a grass-clipping and leaf drop-off site located at the Wastewater Treatment Plant, 1600 Empire Road. The collected material was mulched and made available to city residents free of charge. Non-residents could also use the processed material, but were charged $10.00 per yard. Historically, the City of Louisville collected 10,000 cubic yards of organic waste per year at the drop-off location. For a variety of reasons, including cost and availability of curbside programs, the city's drop-off site will cease operation in 2010 (City of Louisville 2009).

## 2.7 CITY OF BROOMFIELD

The City of Broomfield does not provide consolidated refuse and recycling services; rather, each resident or entity contracts for refuse and recycling services. The city's Public Works Department operates a recycling center located at 225 Commerce Street. The recycling center is available for use by Broomfield residents only. Co-located with the recycling center, the city's Park Service Division operates a tree limb recycling drop-off location. Due to limited space at the drop-off yard, the site is only open Saturdays and Wednesdays and is available to Broomfield residents only, not to contractors or non-residents. The site accepts tree and shrub branches less than 18 inches in diameter and less than 4 feet in length. Sod, grass

clippings, lumber, and other yard waste are not accepted at the site. The collected material is periodically mulched and made available for free to city residents (City of Broomfield 2009). Historically, the City of Broomfield collectes 17,000 cubic yards, or 2,650 tons, of material per year at the drop-off location.

In addition to the year-round tree limb drop-off service, the City of Broomfield offers various organic waste programs that coincide with seasonal demands. For example, the city offers leaf and pumpkin recycling and Christmas tree recycling during certain times of year. In addition, the city's Broomfield Days is a zero-waste event in which all vendors participating in the festival are required to supply recyclable and compostable service ware. During the 2009 Broomfield Days, 10.5 cubic yards of waste were collected and composted instead of being disposed of in a landfill (City of Broomfield 2009; Eco-Cycle 2009).

## 2.8 TOWN OF JAMESTOWN

Jamestown offers a recycling drop-off location behind the post office. The recycling center accepts commingled containers, cardboard, and paper. In addition to the drop-off location, mobile collection service is provided on the second Saturday of each month from 12:00 p.m. to 2:00 p.m. There are currently no organic waste management programs specific to Jamestown. Residents can utilize the wood and yard waste drop-off location in Boulder for a fee or the Boulder County Waste Transfer station in Nederland for free (Boulder County 2009).

## 2.9 TOWN OF NEDERLAND

Boulder County operates a waste transfer and recycling center in the Town of Nederland; the center is located at 286 Ridge Road. The facility is open all days except for Wednesdays and public holidays. The recycling center accepts commingled containers, mixed paper, and cardboard. Co-located with this transfer station is a free slash drop-off site operated by Boulder County. The slash drop-off location accepts tree limbs, branches, and small-diameter limbs (up to 6 inches in diameter) free of charge for residents, non-residents, and contractors. Patrons wanting to utilize the facility must contact the transfer station to schedule an appointment to ensure space is available at the site. The site does not accept any other organic material for processing. The collected material is periodically processed into mulch, which is made available to the public free of charge (Town of Nederland 2009). Annually, the Town of Nederland collects and processes approximately 100 cubic yards or 32 tons of organic material collected at the drop-off facility.

## 2.10 TOWN OF SUPERIOR

The Town of Superior allows residents to contract for refuse and recycling services through various vendors serving the area. Rock Creek residents are offered refuse and recycling service through a single vendor. Currently, no curbside organic waste collection services are offered to town residents. In addition to curbside recycling services, a recycling drop-off location is available at 206 W. Coal Creek Drive. This drop-off site accepts commingled containers and paper, but does not accept cardboard (Town of Superior 2009).

Organic waste diversion services offered in the Town of Superior include a yard waste recycling drop-off site located at Honey Creek Lane and Rock Creek Parkway, next to the wastewater treatment plant. This facility is available to Town of Superior residents only and accepts grass clippings, small branches (3 inches in diameter or less), leaves, and other organic yard material. This site does not accept sod or lumber (Town of Superior 2009).

## 2.11 FORESTRY SERVICES

Forest management within Boulder County is a critical component of sustaining forest health and reducing fire threat in the county. In addition to normal forest management activities, the current epidemic of mountain pine beetle infestations has resulted in increased tree morality and increased organic waste being removed from forests in Boulder County. There are multiple organizations supporting forest management within Boulder County, including the United States Forest Service, Colorado State Parks, Colorado State Forest Service, Boulder County, and the City of Boulder. Each of these agencies manages different forest areas in Boulder County, including tree and slash removal. Most of the tree and slash removal is accomplished by contractors, but some is accomplished using agency employees.

Management of organic waste from forest management varies by agency. For example, the City of Boulder collects all wood waste/debris in a storage yard for periodic processing, while the United States Forest Service primarily uses contractors who use the wood waste for fuel or chip it into mulch products for resale. Records pertaining to organic waste generation from forest management are somewhat limited, especially in terms of volume or weights. Boulder County and the City of Boulder maintain the most data pertaining to this type of organic waste diversion. Historical data from Boulder County Parks and Open Space indicate that 875 tons of organic waste were removed from Lower Montane Forest Restoration/Fuels Reduction and Upper Montane Forest Health/Fuels Reduction projects. This material was used at the County's Open Space Transportation Complex (OSTC) Biomass Heating System (Julian,

Chad 2009). The City of Boulder transported approximately 3,500 cubic yards of organic material to A-1 Organics during each of the past two years, so the amount of organic waste being generated by governmental forest management activities is significant. From a management standpoint, the organic waste that is generated is being diverted from landfill disposal through reuse, mulching, or composting.

In addition to managing public forest lands, Boulder County, in conjunction with Larimer County, operates a Community Sort Yard at Allenspark/Meeker Park to help residents manage materials from private lands. This site accepts trees of any diameter and does not charge residents to drop off materials at the site. This site does not accept any additional yard or wood waste. In 2008, the Meeker Park/Allenspark location collected 1,125.5 tons of organic materials (Julian, Chad 2009). Wood collected at the site is either mulched/chipped by Boulder County, burned in the Air Curtain Burner, or offered to local lumber mills and commercial operations for processing. Similar to other forest management activities, organic waste collected at this site is being diverted from disposal by mulching operations (Julian, Chad 2009).

## 2.12 COMMERCIAL COMPOST OPERATIONS

In addition to—and in support of—Boulder County and municipal zero-waste programs, several commercial operations provide organic waste management services that warrant discussion in this evaluation. While many vendors and commercial operations provide organic waste management services in Boulder County, Eco-Cycle, Western Disposal Services Inc., and A-1 Organics are specifically included in this evaluation because these commercial entities have contracts with Boulder County or municipalities to provide waste diversion services or are in some way integral to organic waste management within Boulder County, as discussed below.

### 2.12.1 Eco-Cycle

Eco-Cycle is one of the largest non-profit recyclers in the United States and has been serving Boulder County since 1976. Eco-Cycle's mission is to identify, explore, and demonstrate the emerging frontiers of sustainable resource management through the concepts and practices of Zero Waste. As such, Eco-Cycle offers a variety of services in Boulder County including operating the Boulder County Recycling Center and the Center for Hard to Recycle Materials, promotion and support of zero-waste programs and events, publishing newsletters promoting zero waste, and providing extensive education and outreach capabilities. Eco-Cycle has helped establish zero-waste programs and events for municipalities in Boulder County, developed the Green School Program, and offers zero-waste event kits (Eco-Cycle 2009).

Finally, Eco-Cycle provides various levels of waste collection and processing to businesses throughout Boulder County. Eco-Cycle provides comprehensive discard collection in which all material is collected from a customer's facility for processing and diversion as appropriate. This level of service is tailored to the customer's needs to maximize waste diversion. Eco-Cycle also offers recycling- and composting-specific services based on customer needs and desires. Over the past 2 years, Eco-Cycle has collected approximately 5,000 tons of organic waste from various customers and events, with 2,800 tons being collected in 2009, a slight increase from 2008 (Lombardi, Eric 2009).

### 2.12.2 Western Disposal Services, Inc.

Western Disposal Services, Inc. has been contracted to operate the Boulder County and City of Boulder Wood Waste and Yard Waste Drop-Off Center, curbside organic waste collection for the cities of Boulder and Louisville, and processing of collected material. Western Disposal Services currently provides collection services to 27,599 residences and 146 commercial customers in Boulder County. Over the past 12 months, the curbside yard waste program has collected 5,264 tons of materials while the commercial customer food waste program collected 850 tons. Combined with the 8,395 tons collected at the drop-off center, Western Disposal Services processed over 14,510 tons of organic materials over the past 12 months (Horton, Gary 2009).

### 2.12.3 A-1 Organics

A-1 Organics is an industrial composting operation that has been recycling organic material into compost for over 33 years. Although this facility is located outside of Boulder County, it receives and processes organic material generated within Boulder County, including receiving and processing most of the organic material collected by Eco-Cycle. Each year, A-1 Organics produces over 350,000 cubic yards of compost at four major processing sites along the Colorado Front Range. A-1 Organics accepts yard waste, animal waste and manure, biosolids, food waste, and wood waste (A-1 Organics 2009).

# 3.0 ORGANIC WASTE GENERATION STUDY METHODOLOGY

The following paragraphs discuss the methods used in this evaluation to identify organic waste generation and management practices in Boulder County, with particular focus on large organic waste generators. The goal of this evaluation is to survey these potential large organic waste generators to determine how much organic waste is being generated and how the organic waste is currently being managed. This information can be used to determine if additional organic waste management services are needed in the county or if specific industries or communities need assistance diverting organic waste, thus supporting the County's zero-waste goals.

### 3.1.1 Identification and Characterization of Organic Waste Generators

According to the United States Environmental Protection Agency's (U.S. EPA's) Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Facts and Figures for 2008, food scraps, yard trimmings, and wood make up 12.7 percent, 13.2 percent, and 6.6 percent, respectively (32.5 percent total) of the municipal solid waste generated in the United States (U.S. EPA 2009). Food waste can be generated at almost any location in Boulder County from office lunchrooms to parks to residences. Restaurants, schools, health care facilities, and grocery stores are known to generate large quantities of food waste because of the nature of the services they provide, so entities performing these types of services were specifically included in this evaluation.

Similar to food waste, yard waste is generated at many locations throughout Boulder County, but is typically generated by landscape maintenance and tree maintenance activities. To account for this waste stream, landscape and tree maintenance companies were included in this evaluation. Wood waste is not as widely generated and includes things such as pallets and lumber. To account for these waste streams, retail lumber facilities and millworks companies were included in this evaluation. In addition to the food waste, yard trimmings, and wood waste, certain industries, such as agriculture, breweries, and wineries, are known to produce large quantities of organic waste and were also included in this evaluation.

### 3.1.2 Survey Methodology and Participation

To accomplish this evaluation, categories of organic waste generators were developed based on potential organic waste generation as discussed above. Table 3-1 summarizes the categories and expected organic waste generated for each category.

**Table 3-1**
**Organic Waste Generator Categories and Expected Waste**

| Organic Waste Generator Category | Expected Organic Waste Stream |
|---|---|
| Food service (restaurants) | Food waste |
| Schools | Food waste |
| Health care facilities | Food waste |
| Grocery stores/food suppliers | Food waste |
| Landscape/Tree care | Yard waste |
| Community service | Food waste, various additional |
| Consulting services | Office related waste, food waste |
| Animal care/agriculture | Animal waste |
| Manufacturing | Various |
| Millwork, wood retail | Wood waste |
| Retail | Various |
| Winery/Brewery | Spent grain, agricultural waste |

Once the generation categories were defined, a search of entities within Boulder County that could potentially fit within each category was accomplished to populate the survey pool. The populated survey pool was used to accomplish the data collection portion of this project. Entities were contacted and asked to describe the types of organic waste generated and how the waste was being managed. Responses were recorded into a standardized tracking worksheet that included entity name, address, phone number, type of waste generated, current management method, and estimated generation rate. In cases where the respondent did not have specific, measured volume or weight data, questions were phrased in such a way that the respondent could provide a reasonable estimate of weight or volume generated. It must be noted that some entities originally identified as potential organic waste generators were no longer in business or refused to participate in this survey. These entities were identified in the data collection worksheet.

### 3.1.3 Assumptions and Estimation Techniques

The scope of this evaluation did not include a waste characterization study or field work to obtain specific, measured volumes and weights from the survey respondents. Some survey respondents did maintain volume and/or weight records that could be utilized for this survey; however, many of the entities contacted for this survey do not maintain records of organic waste generation, so specific volumes and weights were not readily available. In cases where specific volume or weight records were not available, most survey respondents could provide an estimate of generation rates in a useable form such

as the average number of trash bags per day (average 30 gallons) or pickup truck loads per week (average 3 cubic yards per truck load). Based on this information, conversion factors could be applied to determine the estimated annual volume and weight generated at each location. Once the estimated annual volume or weight was determined, standard volume to weight conversion factors were applied to complete volume or weight, whichever was needed. Table 3-2 shows an example application of conversion factors used for this project.

**Table 3-2**
**Conversion Factor Application**

| Respondent Organic Waste Generation Information | Convert to Cubic Yards Per Year | Cubic Yards Per Year | Convert to Tons Per Year | Tons Per Year |
|---|---|---|---|---|
| 200 gallons per day | Response * 365 days * 0.0049511 | 361 | 0.72 * cubic yards | 260 |

**Notes**: To convert from gallons to cubic yards, multiply cubic yards by 0.0049511
To convert cubic yards to tons, multiply by cubic yards by 0.72 (CIWMB 2001)

Some respondents, particularly schools and animal agricultural operations, could not provide specific volumes or weights of organic waste being generated; however, previous studies accomplished by others have determined organic waste generation on a per unit basis. For this evaluation, the following per unit organic waste generation rates were used:

- Food waste at schools – 0.5 pounds per meal per day (Vastola, Ellen 2008)
- Horse manure generation – 50 pounds per horse per day (Smith, Crystal 2009)
- Cow manure generation – 59.1 pounds per 1,000 pound cow per day (United States Department of Agriculture, Natural Resources Conservation Service 1995)

Application of the per unit generation rates and conversion factors was annotated in the standardized data collection worksheet.

# 4.0 SURVEY RESULTS

Over 300 municipal and commercial entities were contacted for this survey to determine organic waste generation and management practices. The following paragraphs discuss the results of the survey.

## 4.1 MUNICIPAL OPERATIONS

As discussed in Section 2.0, Boulder County has implemented various programs to collect, process, and divert organic waste from the municipal solid waste stream. In parts of the unincorporated county, and in the cities of Boulder and Louisville, waste haulers are required to provide bi-weekly organic waste collection from many residences. Boulder County and the City of Boulder also sponsor an organic waste drop-off location within Boulder. Additionally, Longmont, Lafayette, University of Colorado, Superior, and Broomfield offer residents drop-off locations and periodic curbside collection as described in Section 2.0.

According to the U.S. EPA 2008 Municipal Solid Waste Fact and Figures, each person in the United States generates 4.5 pounds of municipal solid waste per day. Of this waste, wood, food scraps, and yard trimmings account for 6.6 percent, 12.7 percent, and 13.2 percent, respectively, of the waste stream (U.S. EPA 2009). Additionally, the U.S. EPA reports that of the wood, food, and yard waste generated, 14.8 percent of wood packaging, 2.5 percent of food waste, and 64.7 percent of yard trimming are recovered and not sent to a landfill for disposal (U.S. EPA 2009). While the U.S. EPA 2008 generation data is not specifically tailored to Boulder County and it is possible that Boulder County residents, on average, generate more or less than the national average, using these U.S. EPA data points allows Boulder County to assess and compare overall organic waste management programs. It should also be noted that the 2008 Municipal Solid Waste Fact and Figures specifically exclude certain waste streams such as agricultural and industrial waste.

The population of Boulder County is approximately 297,000 (Steelman, Toddi 2009). Using the U.S. EPA reported generation rate of 4.5 pounds per person per day, approximately 244,000 tons of municipal solid waste is generated each year. Of this amount, 6.6 percent, or 16,104 tons, is wood waste. Food waste is approximately 30,988 tons, based on 12.7 percent of the total waste stream, and yard trimmings account for 32,208 tons or 13.2 percent of the waste stream. Based on these estimates, the total wood, food, and yard waste generation in Boulder County would be 79,300 tons. As discussed above, the U.S. EPA's national recovery rate for each of these waste streams is 14.8 percent for wood, 2.5 percent for food, and 64.7 percent for yard trimmings. Table 4-1 summarizes the expected wood, food, and yard waste generation and recovery for Boulder County's population.

**Table 4-2**
**Wood, Food, and Yard Waste Generation and Recovery Rates for Boulder County Based on U.S. EPA Nationwide Average Generation and Recovery Data**

| Organic Waste Category | Generation Rate (percent of total waste stream) | Estimated Generation in Tons | Recovery Rate (percent of generation) | Estimated Tons Recovered |
|---|---|---|---|---|
| Wood waste (packaging) | 6.6 | 16,104 | 14.8 | 2,393 |
| Food waste | 12.7 | 30,988 | 2.5 | 775 |
| Yard waste | 13.2 | 32,208 | 64.7 | 20,839 |
| **Total** | 32.5 | 79,300 | | 24,007 |

**Notes**: Population of Boulder County is approximately 297,000
Estimated municipal solid waste generation rate is 4.5 pounds per person per day or 244,000 tons for Boulder County

As shown in Table 4-1, it is estimated that wood, food, and yard waste generated in Boulder County is approximately 79,300 tons per year. Of this amount, if Boulder County was to achieve just the national average for material recovery, 24,007 tons would need to be collected and processed. As discussed in Section 2.0, Boulder County and municipalities have implemented multiple organic waste management programs to recover this material. Table 4-2 summarizes the organic material collected by each of these programs.

**Table 4-2**
**Summary of Boulder County Organic Waste Programs**

| Program | Tons Collected |
|---|---|
| Boulder County and City of Boulder Yard Waste Drop-off Location (includes food waste) | 6,591 |
| Boulder County and City of Boulder Wood Waste Drop-off Location | 1,715 |
| Western Disposal Services Commercial Food Waste Collection | 850 |
| City of Boulder Curbside Organic Waste Collection Program | 5,264 |
| City of Boulder Christmas Tree Collection | 89 |
| Eco-Cycle Organic Waste Collection | 2,800 |
| University of Colorado at Boulder | 234 |
| City of Longmont | 1,500 |
| City of Lafayette | 235 |
| City of Louisville | 1,500 |
| City of Broomfield | 2,650 |
| Boulder County Nederland Transfer Station | 32 |
| Forestry Management (Boulder County and City of Boulder only) | 2,420 |
| Total | 25,880 |

**Notes**: This summary does not include organic waste recovery accomplished by private companies, such as landscape and tree maintenance entities who process their own waste.
This summary does not include material recovery from special events such as Peach Festival or Boulder County Fair.

As shown in Table 4-2, Boulder County and municipal programs within the county are collecting a large amount of organic wastes generated within the county. While the County and municipalities have made great strides in collecting and recovering organic waste, additional materials are available for collection and processing when compared to the expected generation rates.

## 4.2 COMMERCIAL ORGANIC WASTE MANAGEMENT

As discussed in Section 3.0, organic waste can be generated in some degree by all commercial entities in Boulder County depending on the type of business being conducted. Commercial entities such as restaurants and landscape/tree maintenance companies will generate and manage much more organic waste than consulting and office-related entities that will primarily be producing organic waste from

office lunch rooms. The following paragraphs discuss survey results of organic waste management practices for each of categories presented in Table 3-1.

### 4.2.1 Animal Care and Agricultural Services

Animal care and agricultural service entities are primarily engaged in caring for livestock, horses, or pets. The primary organic waste generated at these facilities is animal manure, which is challenging to manage because the municipal organic waste collection and drop-off locations in the county do not accept manure due to the potential presence of pathogens. A-1 Organics and other agricultural manure composting operations outside of Boulder County do accept animal manure for composting, but utilization of these facilities requires hauling the manure, which can be expensive depending on location. There are several companies that provide manure hauling services within Boulder County and take the material to compost locations outside the county. As an alternative to hauling off-site for composting, animal care and agricultural entities may choose to collect the manure and spread it on pasture lands/fields for fertilizer.

A total of 10 animal care and agriculture service entities responded to this survey request, with 8 of the respondents generating waste and 2 of the respondents providing manure management services by hauling or composting. Of the 8 respondents who generate animal manure, all divert the manure from landfill disposal. Four of the respondents who generate large quantities of animal manure collect and spread it on pasture lands/fields as fertilizer. Three of the respondents haul the manure off-site for composting, while the eighth entity uses Eco-Cycle services to manage smaller amounts of pet waste. Based on the results of this survey, animal care and agricultural service entities are generating large quantities of manure, but this organic waste stream is currently being diverted from landfill disposal through on-site or off-site practices that are managed by the generator.

### 4.2.2 Landscape and Tree Maintenance

Landscape and tree maintenance service entities are primarily engaged in lawn, landscape, and tree maintenance activities. The primary organic waste generated from these services is yard waste in the form of grass, tree limbs, brush, and other yard waste. The municipal collection and drop-off locations within Boulder County do accept these types of materials, but there are some restrictions and costs associated with contractors utilizing these facilities. Some municipal locations such as the Boulder County and City of Boulder drop-off location charge a fee for contractors using the location. However, the fee is less than the landfill disposal fee, which provides an incentive for the contractor to divert the material. Some municipal drop-off locations, such as the City of Broomfield's drop-off area, do not accept any materials from contractors. As an alternative to utilizing municipal services offered in Boulder

County, some landscape and tree maintenance entities are managing organic wastes internally by grasscycling, selling tree limbs for fuel, and chipping their own organic waste for mulch.

A total of 15 landscape and tree maintenance service entities responded to this survey request, which includes forest management entities. Of these respondents, 3 indicated that no organic waste was generated because they were strictly landscape designers or retail landscape providers. Of the remaining 12 respondents who generated organic waste, 2 utilize Boulder County drop-off locations, while 7 entities were diverting organic materials by using them as wood fuel, internal chipping, and/or taking the material off-site to a private compost facility. Two of the respondents utilized Eco-Cycle's zero-waste services to manage the organic waste generated at the location. There was one respondent who was burning the collected yard waste. Based on the results of this survey, landscape and tree maintenance service entities are generating large quantities of yard waste, which is currently being diverted from landfill disposal by using Boulder County drop-off services or through internal practices (wood fuel, chipping). The one respondent who is currently burning organic waste without beneficial use expressed interest in utilizing a municipal program, but was concerned about the cost and accessibility of the drop-off locations.

### 4.2.3 Millwork and Wood Retailers

Millwork and wood retailer entities are primarily engaged in processing and selling lumber. The primary organic waste generated from these services is wood waste in the form of scrap wood and sawdust. These entities have a unique understanding of the value of wood as a commodity, so waste minimization and management is a high priority. Many millworks entities support forest management waste diversion activities because millworks take trees and logs from forest management operations and process the materials into lumber. Municipal collection and drop-off locations are somewhat limited in their capacity to manage wood waste, as some drop-off locations outside of Boulder do not accept wood waste or lumber. The Boulder County and City of Boulder drop-off location does accept clean lumber for processing. As an alternative to using municipal programs, most millworks entities are managing wood waste internally by selling sawdust for animal bedding or chipping wood waste for mulch. Wood/lumber retailers also attempt to minimize wood waste buy selling scrap wood bundles, donating bad wood for fuel, or donating the wood to employees.

A total of 9 millworks and wood retailer entities responded to this survey request. Of these respondents, all 9 indicated that organic waste management practices were in place to divert wood waste. Five millworks entities that produce large volumes of sawdust were selling the wood shavings as animal bedding. One entity indicated that all wood waste was chipped and used for mulch at a tree farm. The

remaining 3 respondents were primarily engaged in wood retail. All three of these respondents indicated that wood scraps and bad lumber were diverted through donation, but all three also indicated that small amounts of wood scraps that could not be donated were being disposed of as refuse. Based on survey results, it is estimated that an additional 20 tons of wood waste could be diverted if these 3 wood retailers diverted the additional scrap wood from refuse.

### 4.2.4 Schools

Schools are primarily engaged in educational services for preschool through 12th grade. The primary organic waste stream generated at these facilities is food waste. The only municipal program in Boulder County that accepts this waste stream is the Boulder County and City of Boulder Yard Waste drop-off location. Many refuse and recycling collection service providers do offer food waste collection services, but the collected material is typically brought to the Boulder County and City of Boulder Yard Waste drop-off location for processing. There are alternatives for schools to manage organic waste including on-site composting and delivery to non-municipal composting operations such as A-1 Organics. Eco-Cycle and the Boulder Valley School District have partnered on a zero-waste initiative called Green Star Schools. Currently, there are 21 schools participating in the program, which includes food waste diversion. Under this program, food waste is collected at the school and delivered to an off-site compost facility for processing.

Forty-three schools were included in this survey. Of the schools surveyed, 21 participate in the Green Star School program so organic waste is being collected and diverted. One school collects and composts a portion of the food waste on-site, but the vast majority of the food waste was being disposed of as refuse. Six of the school respondents indicated that all food waste was being disposed of as refuse, representing a significant opportunity for further organic waste management. Based on the number of students attending the 7 schools currently disposing of food waste as refuse, and the estimated 0.5 pounds of food waste per meal per student, an additional 53 tons of food waste could be collected and diverted from landfill disposal.

### 4.2.5 Restaurants

Restaurants, by the nature of their business, are a large source of food waste generation. The only municipal program in Boulder County that accepts this waste stream is the Boulder County and City of Boulder Yard Waste drop-off location. Many refuse and recycling collection service providers, such as Western Disposal Services, do offer food waste collection services, but the collected material is typically brought to the Boulder County and City of Boulder Yard Waste drop-off location for processing. There

are alternatives for restaurants to manage food waste which include internal management or collection and processing at a commercial compost facility such as A-1 Organics. Eco-Cycle does offer this type of collection and commercial composting service.

Sixty-two restaurants were included in this survey with 43 restaurants providing responses. Twenty-two of the respondents indicated they were utilizing Eco-Cycle to manage and divert organic waste. Eco-Cycle collects the organic waste and transports the material to an approved compost facility. Six food service providers indicated that they were involved with some sort of internal organic waste diversion that includes on-site composting, off-site composting, and donation of food waste. It should be noted that not all of the food waste from these entities was being diverted; for example 3 entities only composted coffee grounds while the remaining food waste was disposed of as refuse. Seventeen of the respondents, 40 percent, indicated that a significant volume of food waste was being sent for disposal at a landfill. It is estimated that an additional 600 tons of food waste could be diverted from these restaurants.

### 4.2.6 Grocery Stores and Food Suppliers

Similar to restaurants, grocery stores and food suppliers can produce a large amount of food waste, primarily generated from produce and meat that cannot be sold. The only municipal program in Boulder County that accepts food waste is the Boulder County and City of Boulder Yard Waste drop-off location. Many refuse and recycling collection service providers, such as Western Disposal Services, do offer food waste collection services, and the collected material is brought to Western Disposal Services composting facility in Boulder for processing. Another alternative for grocery stores and food suppliers to manage food waste is through a third party company such as Eco-Cycle, Western, or others that offer a diversion program, collect and transport the material, for composting.

Fifty-nine grocery stores and food suppliers were included in this survey with 44 providing responses. Nineteen of the respondents indicated they were utilizing Eco-Cycle to manage and divert organic waste. Eco-Cycle collects the organic waste and transports the material to an approved compost facility. Eleven entities indicated that little to no food waste was generated because the entity is a transporter, supplier only, or vendors where responsible for management. Fourteen of the respondents, 31 percent, indicated that a significant volume of food waste was being sent for disposal at a landfill. It is estimated that an additional 1,450 tons of food waste could be diverted from the grocery stores and food suppliers included in this survey who are not currently diverting food waste.

### 4.2.7 Breweries and Wineries

Breweries and wineries produce a large amount of organic waste from the production and processing of beer and wine. The only municipal program in Boulder County that accepts food waste is the Boulder County and City of Boulder Yard Waste drop-off location. Many refuse and recycling collection service providers, such as Western Disposal Services, do offer food waste collection services, in which the collected material is typically brought to the Boulder County and City of Boulder Yard Waste drop-off location for processing. Other alternatives for these entities to manage the organic waste stream is internal waste management or using a third party company such as Eco-Cycle to establish a diversion program, collect the material, and send the material off-site for composting.

Eighteen breweries and wineries were included in this survey with 15 providing responses. Six of the respondents indicated they were utilizing Eco-Cycle to manage and divert organic waste. Eco-Cycle collects the organic waste and transports the material to an approved compost facility. Three entities indicated that little to no food waste was generated because the entity is a transporter, supplier only, or no longer produces beer on site. Six of the respondents have established alternative organic waste diversion practices, primarily donating spent grain to local farmers for cattle feed. Only two respondents indicated that a significant volume of organic waste was being sent for disposal at a landfill, primarily in the form of food waste from restaurant activities that are associated with the facility and not from brewing activities. These two respondents would not provide an estimate of food waste quantities going to refuse.

### 4.2.8 Other Commercial Organic Waste Management Activities

As discussed in Section 3.0, organic waste can be generated by virtually every commercial entity in Boulder County including entities that only have office type activities. Organic waste generated in an office environment include employee break/lunch rooms and shipping/receiving areas. As an example, the Google facility in Boulder does not generate any significant organic waste streams from manufacturing or processing, but the 100 employees at this facility have been able to compost approximately 6 tons of organic waste per year from office related wastes (Eco-Cycle 2009). The amount of organic waste generated from office activities will vary based on the number of employees and specific activities conducted at the facility.

For this survey, recycling and composting information from 265 commercial entities was reviewed, including retail, community service, health care, non-wood manufacturing, hospitality, and consulting entities, to determine if organic waste diversion practices were being implemented. Of the 265 commercial entities reviewed, 67 (25 percent) were implementing organic waste diversion practices (Eco-

Cycle 2009). While the volume of organic waste generated at these facilities is expected to be less than 10 tons per year per facility, collection and processing of this small waste stream from the large number of generators could significantly increase the amount of organic waste being diverted.

# 5.0 FINDINGS AND RECOMMENDATIONS

The following paragraphs discuss findings and provide recommendations to improve organic waste management and diversion within Boulder County. This information is based on the methodology and results found in this survey.

## 5.1 COMMERCIAL FOOD WASTE COLLECTION AT RESTAURANTS AND GROCERY STORES

As discussed in Section 4, restaurants and grocery stores can generate a large volumes of food waste. This survey identified that 40 percent of restaurant respondents and 31 percent of grocery store/food supplier respondents were discarding large volumes of organic waste, primarily food waste, as refuse. It is estimated that an additional 2,000 tons of organic waste could be recovered and diverted from landfill disposal if these survey respondents alone would begin collecting and processing food waste. Respondents provided a variety of reasons for not managing food waste, including increases in separation requirements, the perception that costs would increase, the perception that food waste generation was too low to manage, and lack of knowledge concerning available management programs. It is recommended that additional education and outreach activities focus on those entities that are not currently diverting food waste in an attempt to overcome these obstacles. It should be noted that 60 percent of restaurants and 69 percent of grocery stores/food suppliers were participating in some organic waste diversion program.

## 5.2 EXPAND GREEN STAR SCHOOL PROGRAM

As discussed in Section 4, Eco-Cycle and the Boulder Valley School District have partnered under the Green Star School Program to promote zero-waste and organic waste management practices. This is beneficial for diverting current organic waste streams and it helps educate future generations with regards to zero-waste practices. Currently, 21 schools participate in the Green Star School program. This survey identified 7 schools that are not participating in this program and that are disposing of organic wastes as refuse. It is estimated that an additional 53 tons of organic waste could be collected from these 7 schools. Respondents of the 7 schools who are currently not diverting organic waste primarily attributed non-participation to the fact that the school has a low population. While the student enrollment figure may be lower than in some schools, significant amounts of food waste can still be generated. It is recommended that the 7 schools currently not participating in the Green Star School Program be approached about joining the program or for these schools to consider alternative methods to collect and manage organic waste.

## 5.3 CONTINUE ORGANIC WASTE MANAGEMENT EDUCATION AND OUTREACH PROGRAM, TARGET SMALL GENERATORS

Boulder County, municipalities, and commercial operations, particularly Eco-Cycle, have extensive education and outreach programs in place to advertise their services and help generators identify locations to recover or divert organic wastes. While this survey did not specifically evaluate education and outreach activities, several survey respondents, primarily small generators, indicated that they did not know of all the options available to them for organic waste management and diversion. It is recommended that Boulder County, municipalities, and commercial operators specifically target small landscape companies, schools, and manufacturing facilities to ensure these entities are aware of organic waste management and diversion options. During this survey, any respondent indicating they were not familiar with organic waste diversion opportunities was provided the Boulder County Resource Conservation website address to obtain additional information.

Additionally, many entities not diverting organic waste implied the reason for not participating was because they perceived the amounts being generated were so small. While some of these entities are relatively small generators, to meet the zero-waste goals established by Boulder County and municipalities, organic waste at these locations should be managed and diverted from landfill disposal. These entities could benefit from additional education and outreach activities pertaining to zero-waste goals and how everyone needs to participate to achieve those goals.

## 5.4 CONTINUE DEVELOPMENT OF COUNTY AND CITY ORDINANCES TO PROMOTE ORGANIC WASTE COLLECTION FROM COMMERICIAL FACILITIES

Boulder County Ordinance Number 2007-01 "An ordinance for the licensing of those in the business of collecting and transporting discarded materials within the unincorporated area of Boulder County" defines the minimum requirements for refuse, recycling and composting collection service providers within the County. Many municipalities within the county have passed similar ordinances regulating waste haulers operating within city limits. Most of these waste hauler ordinances were recently updated to incorporate zero waste resolutions and goals that have been adopted by governmental agencies as described in Section 3.0. Current waste hauler ordinances in Boulder County promote pay as you throw programs which charge additional fees for refuse disposal while incentivizing recycling and composting diversion activities by charging reduced fees. The Boulder County ordinance requires waste haulers to provide residential customers refuse, recycling and composting containers. This ordinance also requires "haulers that provide Periodic Garbage Collection from Commercial Customers shall offer recycling services for

the same range of materials as required for Residential Customers" (Boulder County 2007). This ordinance does not require waste haulers to provide commercial customers with organic waste or compost collection services. It is recommended that existing waste management and hauler ordinances be updated to further promote organic waste collection, particularly from commercial customers, and include language similar to the recycling services quoted above. Additional incentives for commercial waste generators, such as increased refuse disposal for entities who do not participate in recycling and organic waste programs, could also be considered to further promote commercial waste diversion programs.

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