Solid Waste Management Plan and Plan Element of the Regional Plan for Washoe County

Washoe County

Health District

Approved by the District Board of Health on October 27, 2011
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The Washoe County Solid Waste Management Program

Solid Waste Management Plan Element of the Regional Plan for Washoe County

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Glossary

Class I landfill/site (DBHR 010.112): means a disposal site which:

A. Is comprised of at least one municipal solid waste landfill unit including all contiguous land and structures, other appurtenances and improvements on the land used for the disposal of solid waste; and

B. Is not a Class II or Class III site.

Class II landfill/site (DBHR 010.116): means a disposal site which:

A. Is comprised of at least one municipal solid waste landfill unit;

B. Accepts less than 20 tons of solid waste per day on an annual average;

C. There is no evidence of contamination of ground water originating form the site;

D. Serves a community that has o other practicable alternatives for waste management; and

E. Is located in an area which annually receives no more than 2 inches of precipitation.

The term includes all contiguous land and structures, other appurtenances and improvements on the land used for the disposal of solid waste.

Class III landfill/site (DBHR 010.120): means a disposal site which only accepts industrial solid waste.

Commercial waste (DBHR 010.128): means solid waste generated as the result of commerce or trade; this includes but is not limited to solid waste produced at offices, retail or wholesale stores, warehouses, transient lodging facilities or public accommodation facilities.

Diversion (DBHR 010.248): means activities which reduce or eliminate the amount of solid waste from solid waste disposal.

Eco-Industrial Parks: Also called an ecopark, this is a land development technique to cluster waste technologies in order to maximize material recovery and energy recovery.

Garbage (DBHR 010.300): means:

A. Putrescible animal and vegetable waste resulting from the handling, storage, preparation, cooking, sale and serving of food and beverage. This includes, but is not limited to:

1. Offal, swill, kitchen and table waste, and other organic animal and vegetable waste;

2. Bottles, cans, cups, plates, utensils, containers, and/or covering, or any construction or material that has been in intimate contact with food, confection, and/or beverage;

3. Any component used in the preparation or manufacture of matter intended for animal or human consumption; and

4. Such matter and/or materials listed in (1) through (3) above that have been discarded without first being sterilized.

B. Biohazardous Waste (See DBHR Section 080)

C. The mixing, addition, or comingling of garbage with rubbish, trash, or other waste matter exclusive of biohazardous and hazardous wastes, renders the entire resulting mixture as garbage and requires the mixture to be handled as garbage.

Hazardous materials (DBHR 010.320): means any material, substances, or wastes which possess one or more of the following characteristics: poisonous, toxic, corrosive, radioactive; a skin, eye, or mucous membrane irritant; volatile, a strong sensitizer, oxidizer, flammable, combustible, explosive, or gases under pressure greater than one (1) atmosphere.

Hazardous waste (DBHR 010.324): means any waste or combination of wastes, including, without limitation, solids, semisolids, liquids or contained gases, except household waste, which:

A. Because of it quantity or concentration or its physical, chemical or infectious characteristics may:

1. Cause or significantly contribute to an increase in mortality or serious irreversible or incapacitating illness; or

2. Pose a substantial hazard or potential hazard in human health, public safety or the environment when it is given improper treatment, storage, transportation, disposal or other management.

B. Is identified as hazardous by the Health Authority as a result of studies undertaken for the purpose of identifying hazardous wastes.

C. The term includes any:

1. Hazardous waste or constituent of hazardous waste which is subject to regulations under 40 CFR Part 261;

2. Waste containing polychlorinated biphenyl; and

3. Waste brought in this state which is designated as hazardous waste in the state of its origin.

The term includes, among other wastes, toxins, corrosives, flammable materials, irritants, strong sensitizers and materials which generate pressure by decomposition, heat or otherwise.

Industrial waste (DBHR 010.360): means solid waste derived from industrial or manufacturing processes, including, but not limited to, the solid waste generated by the: (See DBHR for A-P).

The term does not include waste generated by mining, oil and gas industries.

Materials Recovery Facility (DBHR 010.444): means a solid waste management facility that provides for the extraction from solid waste of recyclable materials, materials suitable for use as a fuel or soil amendment, or any combination of those materials. The term does not include:

A. A facility the receives only recyclable materials that have been separated at the source of waste generation if further processing of the material generated less than 10 percent waste residue by weight on an annual average;

B. A salvage yard for the recovery of used motor parts; and

C. A facility that recovers less than 10 percent by weight of the recyclable material from the solid waste received on an annual average.

Municipal Solid Waste (EPA): Common garbage or trash generated by industries, businesses, institutions, and homes.

Recycling (DBHR 010.592): means the process by which salvaged materials are transformed into new products.

Residential waste (010.600): means solid waste generated from private residences to include, but not limited to, single family dwellings, multiple family dwellings, apartment complexes, condominiums, mobile home parks, or similar dwelling places or bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds and recreation areas used during the daytime.

Reuse (DBHR 010.608): means using an object or material again, either for its original purpose or for a similar purpose, without significantly altering the physical form of the object or material.

Solid waste (DBHR 010.672): means garbage, rubbish, junk vehicles, ashes or incinerator residue, street refuse, dead animals, demolition waste, construction waste, solid or semisolid commercial and industrial waste. The term does not include hazardous waste managed pursuant to NRS 459.400 to 459.600, inclusive.

Rubbish (DBHR 010.610): means non-putrescible waste containing of both combustible and noncombustible waste(s) such as but not limited to: old tin and iron cans and containers, old wood and paper boxes, old metals, wire, rope, cordage, bottles, bags and bagging, rubber and rubber tires, paper, glass, bedding, crockery and all used castoff articles, material or trash, including old plaster, brick, cement, glass and all old building material.

Trash (EPA): Material considered worthless or offensive that is thrown away. Generally defined as dry waste material, but in common usage it is a synonym for garbage, rubbish, or refuse.

Waste-to-Energy (EPA): Facility where recovered municipal solid waste is converted into a usable form of energy, usually via combustion.

Acronyms

AD	Anaerobic Digestion
BTU	British Thermal Unit
C&D	Construction and Demolition
C&I	Commercial & Industrial
CFR	Code of Federal Regulations
DBHR	District Board of Health Regulations
DEA	Drug Enforcement Administration
EIP	Eco-industrial Parks
EDMP	Emergency Debris Management Plan
EPR	Extended Producer Responsibility
HHW	Household Hazardous Waste
IVGID	Incline Village General Improvement District
LRL	Lockwood Regional Landfill
M&P	Medication and Prescription
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
NAC	Nevada Administrative Code
NDEP	Nevada Department of Environmental Protection
NRS	Nevada Revised Statutes
PAYT	Pay-As-You-Throw
PLPT	Pyramid Lake Paiute Tribe
RCRA	Resource Conservation Recovery Act
RDF	Refuse Derived Fuel
SS	Single Stream
SUP	Special Use Permit
SW	Solid Waste
TS	Transfer Station
UNR	University of Nevada, Reno
USEPA	United Stated Environmental Protection Agency
WC	Washoe County
WCHD	Washoe County Health District
WtE	Waste-to-Energy
WM	Waste Management, Inc.

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None

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Chapter 8

None

Chapter 9

None

Chapter 10

None

EXECUTIVE SUMMARY

The Evolution of Solid Waste Management in Washoe County

The political forces that would lead to the development of a solid waste management plan in Washoe County began in the 1960s with the passage of the Federal Solid Waste Disposal Act. This was the first attempt to regulate the disposal methods of solid waste including garbage and rubbish. The Act also began a push for the improvement and advancement of disposal and address recycling on a national level. This Act forced the County and local governments to address solid waste and begin to formulate strategies for appropriate disposal. In response to these regulations, and in anticipation of future legislation, the Nevada Department of Human Resources designated the Health District as the Washoe County entity that would be responsible for fulfilling federal mandates from the Solid Waste Disposal Act. In 1976 the Federal Solid Waste Disposal Act was amended to include requirements for hazardous waste disposal restrictions, which changed the name of the regulation to the Resource Conservation and Recovery Act (RCRA). It was amended again in 1986 by adding Subtitle D requiring state and local authorities to inspect solid waste and hazardous waste disposal methods and facilities. RCRA regulations have become the backbone of underground storage tank, hazardous waste and solid waste programs across the nation and in Washoe County. After the passage of Subtitle D, it became apparent in the Nevada Legislature that Washoe County would need to develop a program to manage the federal mandates and a tool to document and guide the progression of this program.

In 1991 the Nevada State Legislature passed NRS 444.510 which required the Washoe County Health District to produce a solid waste management plan and update it no less than every 5 years. All updates must then be submitted to the Nevada Department of Conservation and Natural Resources for review and approval. The Washoe County Solid Waste Management Plan would contain descriptive statistics on the current status of the solid waste management and hazardous waste programs, disposal and recycling trends; serve as a community-wide needs assessment for services and programs and describe progressive tools, technologies and pertinent issues for future advancement of the solid waste system. To manage federal solid waste mandates, the State Legislature passed NRS 444.580 which gave the District Board of Health the ability to pass regulations to create a solid waste system that was able to manage solid waste and make available proper disposal sites. As a result, the Solid Waste Management Program was created and given the responsibility of producing and updating the Washoe County Solid Waste Management Plan.

When the original Washoe County Solid Waste Management Plan was written in 1991, solid waste management was still in its infancy in Washoe County and landfilling was, and still is, the preferred disposal method. By restricting the disposal avenues for different waste streams the door was opened for innovation, the development of new industries and forever influenced the way most jurisdictions looked at waste. Landfilling could no longer be the catch-all for difficult waste streams or unknowns; all these new regulations forced communities to take hard look at the refuse they produced and re-evaluate their relationship with garbage.

In the twenty years since the first the Solid Waste Management Plan was written, solid waste management has become a science and an evolving multi-billion dollar industry; collecting and disposing of refuse is only one facet of this dynamic field. The Washoe County Solid Waste Management System infrastructure has expanded to meet some of the growing needs of the community, comply with new solid waste legislation and stay abreast with current solid waste trends both regionally and nationally. Typical municipal garbage and rubbish is managed with local haulers, but private businesses have lead the way in managing the more obscure and difficult streams including hazardous waste, universal waste, electronic waste, biohazardous waste and other textiles. Private businesses have also been pivotal in increasing the County's diversion rate by applying progressive technologies and creating more outlets for recyclable materials.

The EPA has developed a solid waste management hierarchy that places landfilling and incineration (without energy recovery) on the bottom of a list of solid waste management alternatives, suggesting that all jurisdictions should move away from this option. Nevada and most of the western states have been slow to move away from landfilling; nearly 75% of all waste in the West Coast finds it final resting place in an earth tomb. This community's disincentive to move away from landfilling is also based on availability of space and the frugality of land disposal. Therefore, alternative arguments must be raised to reduce our dependence on landfilling, and direct our attention in protecting local resources and establishing a preventive atmosphere for future generations. Though we have an abundance of land, water quality and availability are always a concern, both for human health and for the health of the ecosystems that depend on local watersheds. Air quality and emission control are also a concern in the Washoe County Solid Waste System in regards to solid waste management.

Environmental public health stems from the traditional discipline of general public health in that the aim is to maintain, protect and prevent human disease/injury and promote well-being. Environmental health also utilizes similar analytical techniques, control objectives and techniques for the development of outreach programs as does public health, yet environmental public health is less preventative in nature than traditional public health programs. Environmental health has traditionally been reactionary in managing issues like recycling, landfilling, composting and resource recovery; it hasn't been until the last ten years the technologies like waste-to-energy and landfill mining have given jurisdictions economical alternatives and technological options to develop long-term solid waste solutions. National and international issues have also been influential in developing a more proactive approach to solid waste management; this includes, but is not exclusive to, the energy crisis, the finite volume of fossil fuels, international environmental impact from the export of electronics and issues with the utilization of virgin materials versus recycling or reuse.

The 2011 Washoe County Solid Waste Management Plan

Understanding the particulars of solid waste generation in Washoe County is the first step to designing and improving the Solid Waste Management Program. Usually this entails collecting data and conducting analysis to produce solid waste projections in conjunction with detailed knowledge about the waste stream composition. The data available for Washoe County is limited and scattered; true projections could not be produced due to an absence of information regarding tourist solid waste generation and limited historical solid waste generation data. However, based on the decreasing

population trend, low tourist numbers and a dramatic reduction in construction and demolition debris, the solid waste generation rate of Washoe County has begun, and will continue, to decrease over the next five to ten years. Nevada has been affected more significantly then surrounding states by the 2009-10 recession. Projections indicate that reliance on gaming and the construction industries for economic recovery are unrealistic. Solid waste generation is tied to economic conditions; therefore divaricating, both economically and in the solid waste management field are key to long-term recovery.

Garbage service is mandated throughout Washoe County while recycling is still an optional service offered through the local franchised waste haulers. Other recycling outlets and services for the recycling and disposal of household hazardous waste, composting, green waste, textiles and tires also exist in the community. Most of these augmented services are offered by private businesses and have helped increase Washoe County's diversion rate to above 30% which is similar to the national rate. Though many diversion outlets exist in the community, they are scattered and usually carry a fee to drop off or collect waste and recyclables.

Illegal dumping has been a persistent nuisance in the community even though it was not addressed in the 1991 or the 1996 update of the Solid Waste Management Plan. Illegal dumping has the potential to be very damaging to the environment and costly for tax-payers to clean-up. There are local non-profits that focus on combating this issue, but they usually operate with limited funding and resources. Waste Management of Nevada, Inc. offers free dump days to residents through the year as stipulated in the garbage franchise agreements which have been very popular. However, despite the resources available to residents and organized clean-up efforts, illegal dumping remains an issue throughout Washoe County.

The solid waste industry has incorporated a variety of technologies to treat, to dispose of, decrease the volume of, sequester energy from solid waste and increase collection efficiency. Waste-to-energy technology is the most popular way to get energy and electricity from waste, and the technology has been improving rapidly in the last five years; more facilities are being installed as the technology becomes more efficient and more reliable. Currently there are no waste-to-energy facilities in Washoe County, though one is being built in Storey County, NV and will utilize a portion of the local waste stream as feedstock. There are also three generators at Lockwood Regional Landfill that will utilize landfill gas to make energy. Composting is also becoming a popular treatment method for green waste, especially as the market for specialized compost increases and more outlets exist for compost application beyond agricultural uses.

The management of solid waste can be influenced prior to disposal, even before the consumer has produced waste. Source reduction and procurement practices can be effective in reducing solid waste generation or altering the composition of waste streams. Institutional source reduction programs can be found throughout the County, but community-wide focuses have not been imitative outside of events sponsored by local non-profit organizations. Solid waste and recyclable materials can also be managed between the generator and disposal/treatment. Different methods to pick-up recyclable material and municipal waste can alter the recovery rate of materials and dictate future development of recovery and recycling facilities. The most popular facilities for recyclable material recovery are called material recovery facilities (MRFs) and they are

becoming an essential component to increasing recycling, diversion and profit. This said, no MRFs currently exist in Washoe County.

Public outreach and educational programs are essential to understanding the needs of the community and connecting them to successful solid waste and recycling programs. Outreach and education programs for the public have been limited and sporadic in Washoe County. The development of these programs was usually dependant on the experiences and opinions of the professionals in the Solid Waste Management Program and not based on the needs of the community. Initiating community needs assessment in conjunction with community outreach will also become important to future program development and evaluation.

The majority of funding for the Washoe County Solid Waste Management Program comes from a small tax on the sale of vehicle tires. The rest is from general County funding which derives from property taxes, sales tax and other permit fees charged by the Solid Waste Management Program for services. The money from the sale of tires was established to support the infrastructure of a Solid Waste Management Program and to develop public education materials and outreach programs. Very little of the latter has materialized due to the increased demands of the Solid Waste Management Program to oversee more waste stream types (e.g., biohazardous waste, green waste, etc.), manage complaints and assist in emergency incident events. To expand the program and maintain a consistent funding base regardless of the economic environment, more funding sources will need to be explored and utilized.

As of late 2010 Washoe County developed an emergency debris management plan and had submitted it for FEMA for approval. Emergency debris management plans are important to develop and establish prior to emergencies so local solid waste systems are not overwhelmed with debris and waste which can impact the health of the environment and the public during an emergency. A copy of the debris management plan is located in the appendices.

Program evaluation is a systematic management tool used to analyze a program's need, merit and barriers to guide improvement. Findings from such evaluations can determine if a program is being implemented with fidelity based on objectives or if the services offered by the program are producing the intended outcomes. Evaluation results can also be pertinent for federally funded institutions or local governments where programs are granted funding based on performance. Prior to this 2011 Plan, there was no discussion of how the Solid Waste Management Program would measure program success or feedback mechanisms that could be used to gauge the program's progress. The Solid Waste Management Program does have written performance measures based on the Washoe County Board of Health Strategic Plan, but they are generic and offer little to no guidance on how those strategic priorities should be translated into service. The evaluation chapter utilized program evaluating techniques to develop measurable outcomes that could be used to direct the evolution of the Solid Waste Management Program based on the performance measures, and marry them to the Solid Waste Management Program. The next big step for the Solid Waste Management Program will be to conduct community-wide needs assessments to determine if the needs of citizens are being met and where improvements can be made.

This 2011 Washoe County Solid Waste Management Plan serves two purposes; one, to inform the reader of the regulatory and contextual factors that led to the genesis of local solid waste management, and two, provide information on the current status of the solid waste management system, the strength, the shortcomings and a list of new techniques and technologies that could be incorporated into the system to make it more progressive, efficient, beneficial, cost-effective and accessible for residents and businesses.

CHAPTER 1
INTRODUCTION

1.1 CONTENTS AND ORGANIZATION

In light of impending landfill regulations, in 1991 the Nevada State Legislature passed NRS 444.510 requiring the development and implementation of a solid waste management plan for "every municipality or district board of health." Prior to 1991, solid waste management was a very small regulatory function in the Washoe County Health District (WCHD). After the passage of NRS 444.510, a solid waste management "program" was organized in the Environmental Health Services Division of the Department. The program did not maintain any full-time staff members; all solid waste (SW) complaints and matters were shared by the existing investigators. Though the development of a solid waste management plan was not a federal requirement, the State Legislature and members of the WCHD felt this would be the most efficient way to manage the new landfill regulations. After the passage of the State regulations in conjunction with the Tire Fund, the Solid Waste Management (SWM) Program in Washoe County (WC) has solidified and has grown in an attempt to meet the changing demands of the community and adhere to evolving solid waste trends.

The WC SWM Plan (hereafter called the Plan) element has been developed to identify County-wide solid waste management problems, needs, issues and to recommend action plans for County implementation. This 2011 Plan is divided into two volumes. Volume One contains nine chapters, while Volume Two includes all appendices. At the end of each chapter in Volume One, findings and recommended goals are identified. A summary of the information included in each chapter of the report follows:

A. Chapter 2- Solid Waste Generation

This chapter discusses SW generation exclusive of hazardous waste. The information that is discussed includes current waste generation rates for residents of WC and for tourism, imported, exported, and recycled waste. Future impacts of WC as it pertains to current trends of waste generation, population growth or decline, local economic and social factors are also discussed.

B. Chapter 3- Overview of Solid Waste Management System

This chapter provides the definitions of residential, commercial, and industrial waste as well as identifies the current SW collection, operation system and diversion outlets within WC. SW facilities and services are identified as well as current recycling, junk vehicle recycling, composting, liquid waste and medical waste treatment programs.

C. Chapter 4- Waste Diversion Technologies

This chapter describes five alternatives for the disposal of SW that is currently being landfilled by WC. These alternatives include: source reduction, recycling, composting, waste-to-energy and landfilling. Advantages, disadvantages and design concerns are discussed.

D. Chapter 5- Diversion Management Alternatives

This chapter describes different management systems and approaches to SWM that have been employed nation-wide and internationally that have been successful in increasing diversion.

E. Chapter 6 - Public Education & Information

This chapter indentifies ways in which the public may be educated or informed of SW issues, problems and programs that are planned for WC. This chapter will also discuss how knowledgeable the public is about how to properly dispose of solid and hazardous waste and where disposal facilities exist in the community.

F. Chapter 7- Financial Sustainability

This chapter explores the funding sources and atmosphere behind the solid waste systems in WC. It describes the limitations of these funding sources in relation to expanding or updating the SW system.

G. Chapter 8 – Washoe County Emergency Debris Management Plan

This chapter serves a brief summary and discussion of recommended goals for the Emergency Debris Management Plan that is included in Appendix W.

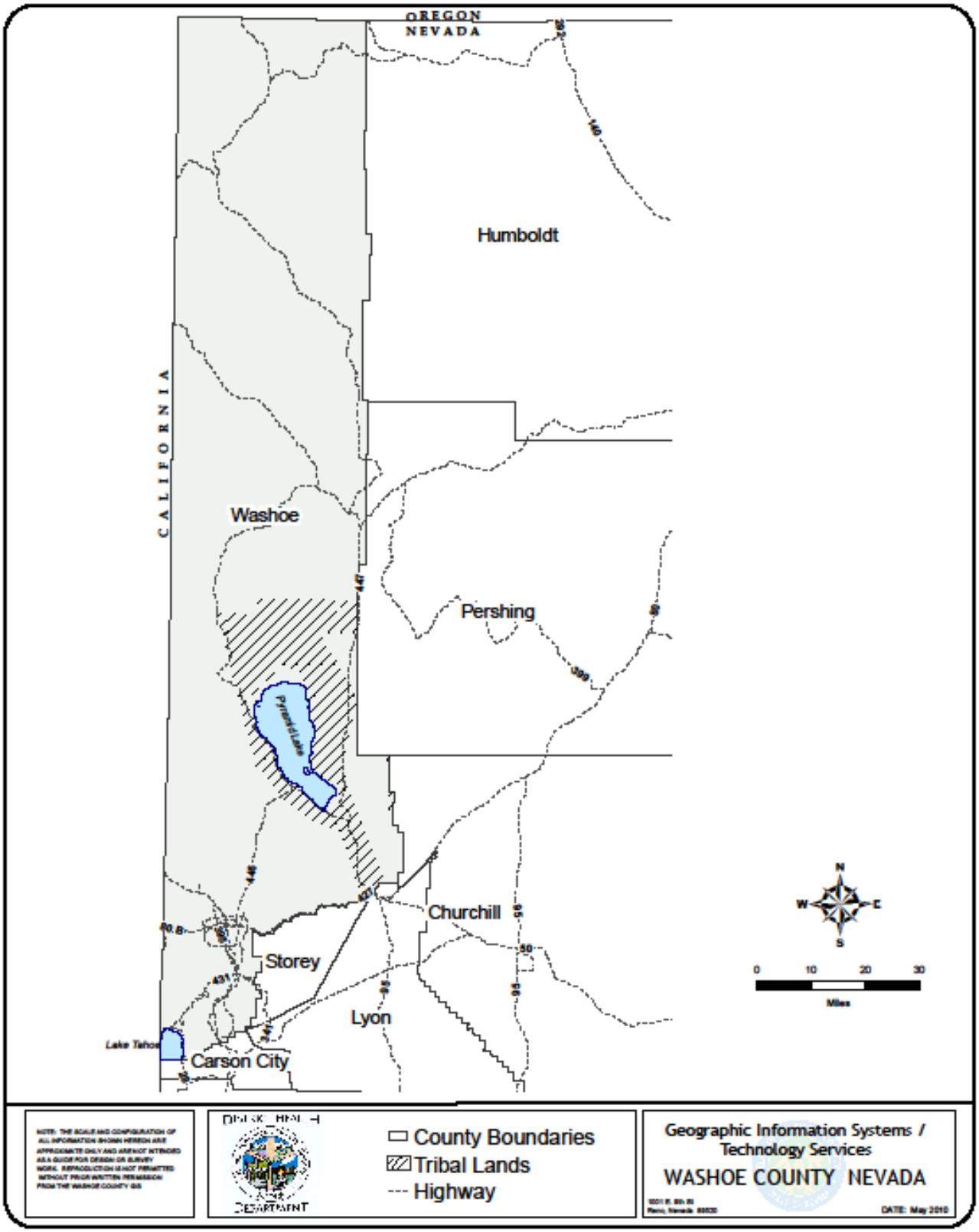
H. Chapter 9 – Program Evaluation

Program evaluations are used to determine how well and effective programs are working. This chapter incorporates program evaluation techniques and the SWM Program performance measures to produce measurable outcomes to enhance future program evaluations.

I. Chapter 10 - Implementation Plan

This chapter contains information which describes the actions required to implement the policies, recommendations, and projects described in the 2011 Plan element. Two types of implementation schedule are also included, one is categorized by subject and the other is categorized by priority.

WASHOE COUNTY VICINITY MAP
FIGURE 1.1



CHAPTER 2
SOLID WASTE GENERATION

2.1 INTRODUCTION

One of the most important issues of SW management planning requires a clear understanding of SW generation. Without this information, long term planning for future SW facilities (transfer stations, landfills, and recycling facilities) that is responsive to the community needs is impossible. This form of planning requires a good data base of information which includes that amount of SW generated in the community as well as the composition of the waste stream.

This section of the report describes the quantities of waste disposed at the Lockwood Regional Landfill (LRL) and other disposal facilities that accept WC waste. In addition, this chapter presents estimates of the current and future quantity of SW generation and generation patterns in WC.

2.2 CURRENT AND FUTURE GENERATION

A. Generation Rate

When used in conjunction with accurate complementary data such as population, tourism, and imported/exported SW estimates, waste projections can be used to estimate that facilities necessary for adequate SW services. These data can also be used to estimate the potential for additional recycling in WC.

The amount of waste that is generated now and in the future in WC is a key consideration in long-term planning for waste disposal. The amount of waste originating from WC that is landfilled is dependent upon the quantity 1) generated; 2) recycled and/or diverted; 3) exported for disposal in other locations; 4) imported to WC from other jurisdictions; and 5) resulting from tourism.

1. Washoe County Residents

The quantity of SW received in WC is based on records kept by Refuse, INC., Nevada Department of Environmental Protection (NDEP) and Pyramid Lake Paiute Tribe (PLPT) Environmental Department. Refuse, INC. collects information from both LRL and 4 transfer stations in located in Reno, Incline Village, Gerlach and Stead. All waste disposed at LRL is weighed and categorized as either compacted commercial, residential noncompacted, or industrial and special waste. Quarterly SW reports are provided by Refuse, INC. which includes tonnage reports from all counties (including WC) that dispose of waste at LRL, total tire volume disposed and breakdown of specific volumes of industrial and special wastes whether residential, commercial or industrial. All of these quarterly tonnage reports from Refuse, INC. are included in the SW

Disposal Reports[1] which are kept on-site at the WCHD in the SWM Program.

There are 4 transfer stations that receive municipal solid waste (MSW) from WC residents; Sage Street Transfer Station (TS), Stead TS, Gerlach TS and Incline Village TS. Waste is not weighed at each of the TSs, but numbers are estimated by waste tickets issued at the time of disposal into the transfer stations for all transactions. In 2007, Refuse, INC. reported declining tonnage rates at all transfer stations. Of these, the Stead TS had the greatest decline of tonnage at13.66 percent and Incline TS had the least decline of 2.33 percent. Yearly tonnage reports are required for all TSs per the conditions on their permit to operate. However, tonnage reports are only available for Sage Street, Stead and Incline TS. Additionally, tonnage reports are only up to 2007. MSW generation data is not available for WC land located in the Pyramid Lake Paiute Reservation (called "fee lands"); this data is included in the total tonnage generation numbers for the entire reservation. All SW from the reservation, which includes the fee lands, is either disposed of at LRL or the Russell Pass Landfill in Fallon, NV. WCHD does not oversee tribal lands, but does have authority over fee lands located within the reservation which is not considered tribal land.

There are two landfills that receive SW from WC; LRL located in Storey County and Carson City Sanitary Landfill located in Carson County. Capital Sanitation Co. provides garbage service for communities located in the southern end of WC including residents in Washoe Valley. The MSW from Washoe Valley accounts for less than 1% of WC waste generation. NDEP reported that in 2009[2], the Carson City Sanitary Landfill only received 1,885.51 tons of SW from WC, of which only 351.25 tons was from residential sources.

Based on quarterly tonnage reports[3] from Refuse, INC., the annual amount of MSW being disposed of in LRL from WC has been decreasing since 2005 at a rate just shy of 10 percent and slowed to around 1 percent in 2008 and 2009. Total SW disposed of at LRL from WC was more dramatic with a 39 percent reduction between 2006 and 2008. The significant difference between the SW and MSW rates was due to the decrease of construction and demolition waste after 2005. Prior to 2006, construction of houses in WC was extensive and Reno was one of the fastest growing cities in the nation. However, after the housing market bubble popped and the economy went into recession, house construction and landscaping halted and dramatically decreased the volume of construction and demolition waste being produced and disposed of in LRL. The significant decrease could also be attributed to a decrease in

[1] SW Disposal Reports, (2001-2009), compiled by the Washoe County SW Management Program from data from businesses in the community
[2] Based from data from the NDEP SW Branch
[3] *Transfer Station Tonnage Reports,* Refuse, INC. (2005-2007)

tourism generated SW with less people traveling for vacation due to reduced incomes from the recession.

Discrepancies exist in the literature concerning the per capita waste generation for WC and the State of Nevada. In 2007, NDEP produced a SWM Plan[4] that estimated the per capita MSW generation at 12.5 lbs/day/person and the State's generation rate at 10 lbs/day/person; it was not discussed or clarified if this figure corrected for municipal SW that was produced by tourists. In a nation-wide study conducted by Biocycle and the Earth Engineering Center of Columbia University[5] it was reported that the per capita waste generation of Nevada was 8.76 lbs/person/day. However, based on the per capita generation from USEPA[6], WC is over three times the national average of 4.5 lbs/person/day. Currently, no publically available data detailing the composition of MSW in WC to compare with national or regional data is available. Further, there have been no WC-specific studies conducted to confirm or refute the NDEP or Biocycle waste generation figures.

2. Tourism

Estimates

Current or historical tourist MSW data for WC is not available. Tourism rates have been decreasing since 2005[7]; only 4,345,423 people visited WC in 2009 which was a 5 percent decrease from 2008. However, there was a slight increase in 2010 with 4,406,270 tourists, though it is unknown if this is an increasing trend or simply an isolated increase. Even without tourist MSW data, due to overall decreasing tourism numbers, tourism generated SW volume will continue to shrink as a percentage of the entire WC waste stream.

Conversations with individuals from the University of Nevada, Reno (UNR), Small Business Development Center have highlighted increasing involvement with local hotels, motels and casinos to reduce energy and waste generation. Though many are focusing on reducing energy demand, many have also initiated administrative controls to reduce SW generation. For their efforts, some of the local hotels and motels can also be found on websites that list "green" hospitality destinations. However, data and information regarding specific programs or reductions of hospitality waste reduction is not available.

[4] *SW Management Plan,* NDEP, 2007, http://ndep.nv.gov/bwm/swmp/SWMPlan.pdf retrieved April 13, 2010.
[5] *The State of Garbage,* Biocycle & The Earth Engineering Center of Columbia University, 2006.
[6] *Municipal SW Generation: Facts and Figures for 2008,* USEPA, 2008.
[7] *Estimated Visitor Count to Reno-Sparks and Washoe County*, RSCVA, 2009

B. Current Waste Flow Impacts to Washoe County

In order to evaluate the total volume of waste generated and disposed in and by WC, it is necessary to review the movement of waste into and out of the WC in conjunction with data about recycling.

1. Imported waste

After the closure of the Mustang Landfill in 1993 waste was no longer being imported into WC for disposal. A copy of the Mustang Landfill closure letter is in appendix M. Medical waste is imported into WC from various sites in California to the Sage Street RIM (medical waste treatment center). This facility houses two autoclaves and was specifically built to treat medical waste; after the medical waste is treated, it is then disposed of at LRL. The volume of medical waste imported for treatment will probably diminish in the future due to the cost of transportation and construction of similar treatment facilities in California.

2. Exported waste

Most SW from WC is consolidated in TS then transported across county lines into Storey County for disposal at LRL. In addition, residential customers and commercial trash haulers can self haul waste to LRL for disposal. Based on quarterly tonnage reports from Refuse, INC.,[1] seasonal increases are observed from all importing counties in both the second and third quarters suggesting that warmer weather favors increased MSW generation and disposal.

3. Recycled Waste

Recycling data for WC is collected in-house from two sources; recyclers who are permitted to operate in WC, and data from Waste Management Recycle America who operate two drop-off sites on Greg Street and Sage Street in Reno. Collected data is compiled into a yearly recycle report that is submitted to NDEP. In 2008 the recycling rate in WC was 32% which is just shy of the national rate of 33.2% and above the 25% recycling goal established by the Nevada State Legislature. The recycling trend in WC has been increasing since 2005 mirroring national recycling percentages. The majority of recycled materials are metal (63%) followed by paper (24%), organic materials (8%), plastic (4%) and glass (1%). Textiles, special wastes (which include HHW and used tires), and other waste like toner, account for less than 1% of all materials recycled. Recycling rates for plastic, metals (especially aluminum) and glass can be sensitive to the market recovery costs. As the recovery price of these materials increases, so does the recycling rate since it becomes more economical for individuals or companies to collect these products and sell for profit.

Optional curbside recycling is offered to residential customers in WC. However, this service is not offered as part of curb-side service for

residents living in multi-family dwelling units like apartment complexes and condominiums. The WC Assessors Office tracks the number of single and multi-family dwelling units and has documented an increase of multi-family dwelling units for the past 5 years. Looking at crude WC Assessor dwelling data[8], the number of multi-family units has been relatively steady over the past four years. This data only reflects the number of units and buildings available, not the number of occupants, therefore it is difficult to determine how many people actually live in these buildings. In 1997 Western Nevada Clean Communities[9], Inc. was commissioned by WC to quantify the recycling rate of multi-family dwellings and to document the barriers related to recycling for these commercial properties. Condominiums had a 39% recycling rate compared to 33% for apartment complexes, this was attributed to the fact that most condominiums resemble single-family dwellings and have less issues with access for recycling receptacles. Though the recycling rate for apartment complexes is comparable to the recycling rate of WC, the number of multi-family dwelling units included in this study only constituted 19% of the number of total units in WC. In addition to the study, a survey was mailed to multi-family dwelling unit communities in the area; response highlighted the fact that there were still a large portion of communities that do not have recycling service for multi-family dwellings and of those offered, only 55% participate. There have been no follow-up studies to observe recycling or resident trends for multi-family dwelling units. Though it is impossible to determine the total population living in multi-family dwellings in WC, it is possible that more people are or will be living in apartments or condominiums due to the high home foreclosure rate that has been plaguing WC for the past three years. In 2007, 750 homes were foreclosed in WC[10] which was a 600% increase from 2006; in 2008 that number increased to 2,445. Increasing foreclosure rates may increase the demand for apartments or condominiums, and considering only 55% of the multi-family units in the area had recycling programs in 1997, recycling rates for WC may decrease due to these economic forces.

C. Future Quantity of Solid Waste

In the 1991 version of this Plan, future SW projections were based on projected population growth and adjustments for waste generated by tourists. This same analysis cannot be conducted for future projections because, one, total municipal SW generation data by tourists is not currently available, two, SW trends are declining and have been for the past 5 years, three, the 2010 census sets the WC population at 420,000 although this number my be decreasing due to high unemployment and foreclosure rates, and four, tourism numbers are decreasing

[8] *Housing Units Report Prepared for the Washoe County Health Department*, Washoe County Assessors Office, received April 7, 2010

[9] A Needs Assessment for Recycling In Multi-Family Dwellings in Washoe County, Western Nevada Clean Communities, Inc., 1997

[10] *Home Sales & Foreclosure Rates*, Center for Regional Studies, 2009 http://centerforregionalstudies.org/about/what-we-provide/home-sales-activity/home-foreclosures-report/monthly-home-foreclosure-report/ , retrieved May 15, 2010

and have been for the last three years with some stabilization in early 2011. Another complication in determining *total SW generation* is due to the dramatic decline of construction and demolition (C&D) from 2005 to present. MSW generation has been less dramatic, so municipal SW generation will be projected instead of total waste generation. When the average MSW generation tonnage per person per year is calculated for the years 2002-2008, the average is 2 tons per person per year. Applying this average to the projected WC population projection yields a crude estimate of future MSW generations. In ten years the projected municipal SW projection will be 1,049,888 tons and by 2030 that number is projected to rise to 1,159,330 tons.

2.3 FINDINGS AND RECOMMENDED GOALS

A. Generation Rate

Findings

- WC waste generation data that is currently collected and maintained on site at the WCHD in the SWM Program is not in a form that can easily be manipulated for statistical analysis.
- Publicly available composition data of WC SW streams is not available.
- Per capita SW generation data of WC from NDEP does not clarify if the data corrects for tourist waste generation.
- Both MSW generation and total SW generation have decreased in the last 5 years with total waste generation decreasing the fastest.
- Tourist waste generation data is unavailable, however, due to decreasing tourism numbers in the last 5 years, the impact of tourism waste generation has and will continue to decrease.
- Based on the NDEP SW Report of 2007, the per capita waste generation was 12.5 lbs/person/day which is over three times the national average.

Recommended Goals

- WCHD should compile an electronic document that will outline all of the sources and reports used to update the 2010 version of The Plan and where they were obtained. This document should be updated as needed but more often than The Plan.
- All data collection conducted by the WCHD SWM Program should develop data sets in a spread sheet format. This includes, but is not limited to, SW Disposal Reports, Recycling Reports and TS reports.
- WCHD should conduct a waste generation and diversion study of the SW stream to determine the composition.
- WCHD should partner with the Reno-Sparks Convention and Visitors Authority (RSCVA) to conduct an independent study to determine the impact of tourism generated SW in WC.

- WCHD should request updated tonnage reports from Refuse, Inc. for all TS's.

B. Current Waste Flow Impacts to Washoe County

Findings

- The majority of the SW generated in WC is disposed outside of the County at LRL located in Storey County.
- Very small amounts of SW are disposed of at the Carson City Landfill in Carson County.
- Marginal amounts of SW from "fee lands" on the Pyramid Lake Paiute Reservation are disposed in Churchill County; however, no data is available on this waste stream.
- The only waste that is being imported into WC is medical waste from various sites in California. This waste is treated at the WM RIM and disposed in LRL.
- As of January 1, 2009, WC no longer has regulatory oversight of LRL, but still has authority to issue waste release permits for waste originating in WC for disposal at LRL.
- WC has no agreement with Storey County. Rather, Waste Management has long term franchise agreements with WC municipalities. Part of the franchise ordinances requires access to a landfill. LRL's current status and proposed expansions provide stability for long range SW disposal planning.

Recommended Goals

- No recommended goals at this time.

C. Future Quality of Solid Waste

Findings

- Both total and MSW generation is decreasing, however total SW generation is decreasing at a much faster rate due to declines in construction and demolition disposal.
- MSW generation has been on a decreasing trend but is probably plateauing.
- The recycling rate for WC was 32% in 2009.
- Due to high foreclosure rates, the percentage of homeownership will decrease and possibly effect the SW generation, recycling rate, and waste stream composition as people move into multi-unit dwellings.
- Local hospitality venues have been engaging in waste and energy reduction activities, however there is no data to determine how much waste and energy savings have been produced.

Recommended Goals

- Develop and administer a study to determine the specific differences between SW generation and waste stream composition of multi-unit dwellings and single-unit dwellings in WC.
- Complete the unfinished sections of the Emergency Debris Management Plan.
- Partner with local hospitality venues to collect data concerning waste and energy reduction and projected waste and energy reduction.

CHAPTER 3
OVERVIEW OF MUNICIPAL SOLID WASTE MANAGEMENT SYSTEM

3.1 INTRODUCTION

A County-wide SWM plan must identify and address issues related to waste types, population, sources, storage, collection, transfer and disposal. WM has separate garbage franchise agreements with each local government and develops appropriate collection routes for SW collection. The exception to this is in Washoe Valley where due to proximity, these customers are serviced by Capital Sanitation from Carson City. WM Recycle America Inc. also provides recycling services and recycling drop-off facilities for the public. Trash-only service is provided by a variety of local haulers.

The County's residential, commercial and industrial waste stream is transported either directly or via one of four transfer stations located in WC and is ultimately hauled to LRL located in Storey County. All franchise agreements offer curbside recycling that is picked up at least twice a month. In addition to public recycling drop-off facilities offered by Waste Management, of Nevada, Inc., there are various local companies that accept a variety of recyclable and SW products from the public. This includes facilities that accept HHW, tires, non-RCRA hazardous wastes, electronic waste, green waste, biosolids and various metals.

This following section of The Plan provides a description of the current SWM system shown in Figure 3.2 and 3.3. The major elements of SWM system include: types of SW, collection and SW facilities.

WASHOE COUNTY FRANCHISE AREAS
FIGURE 3.1

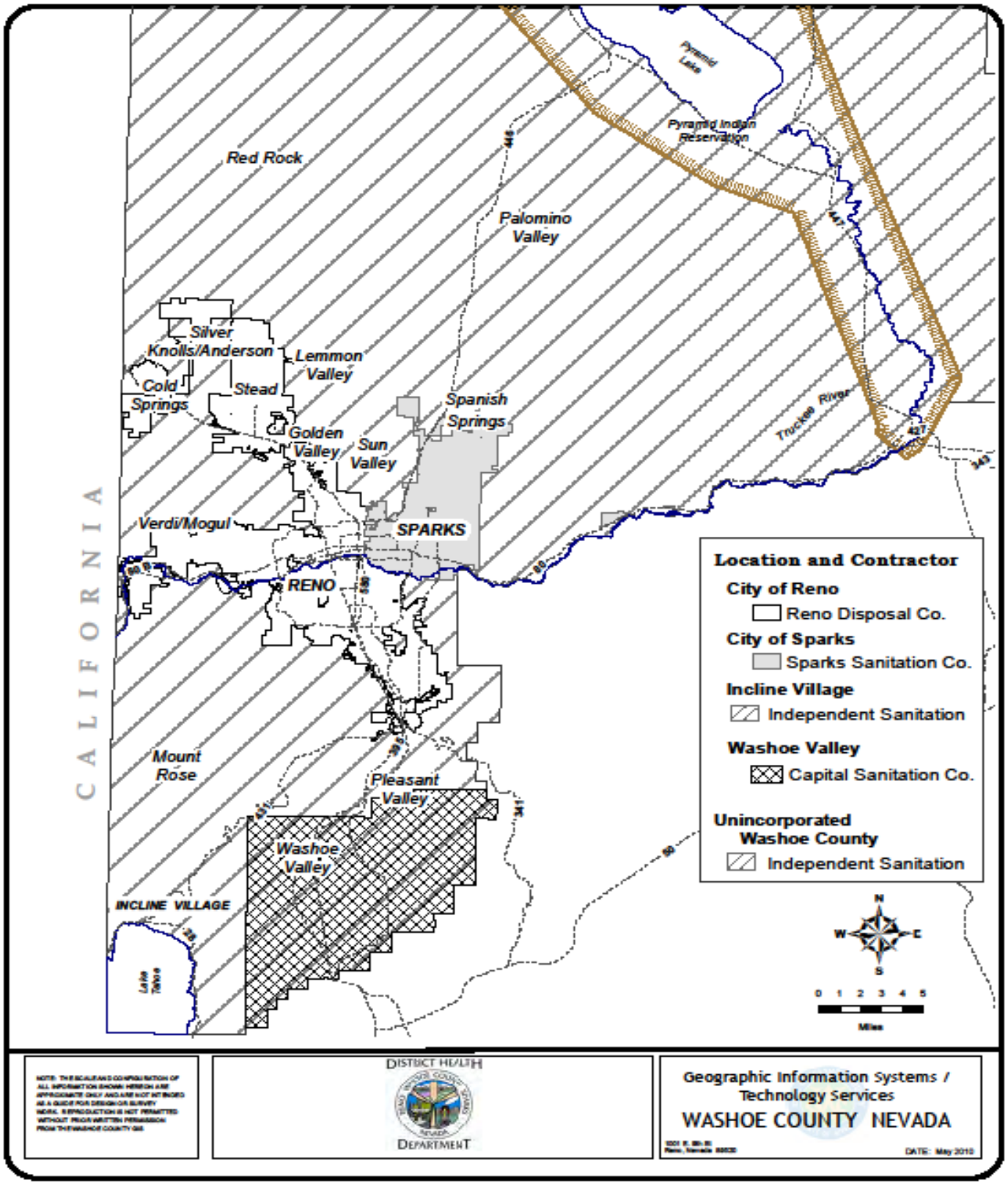
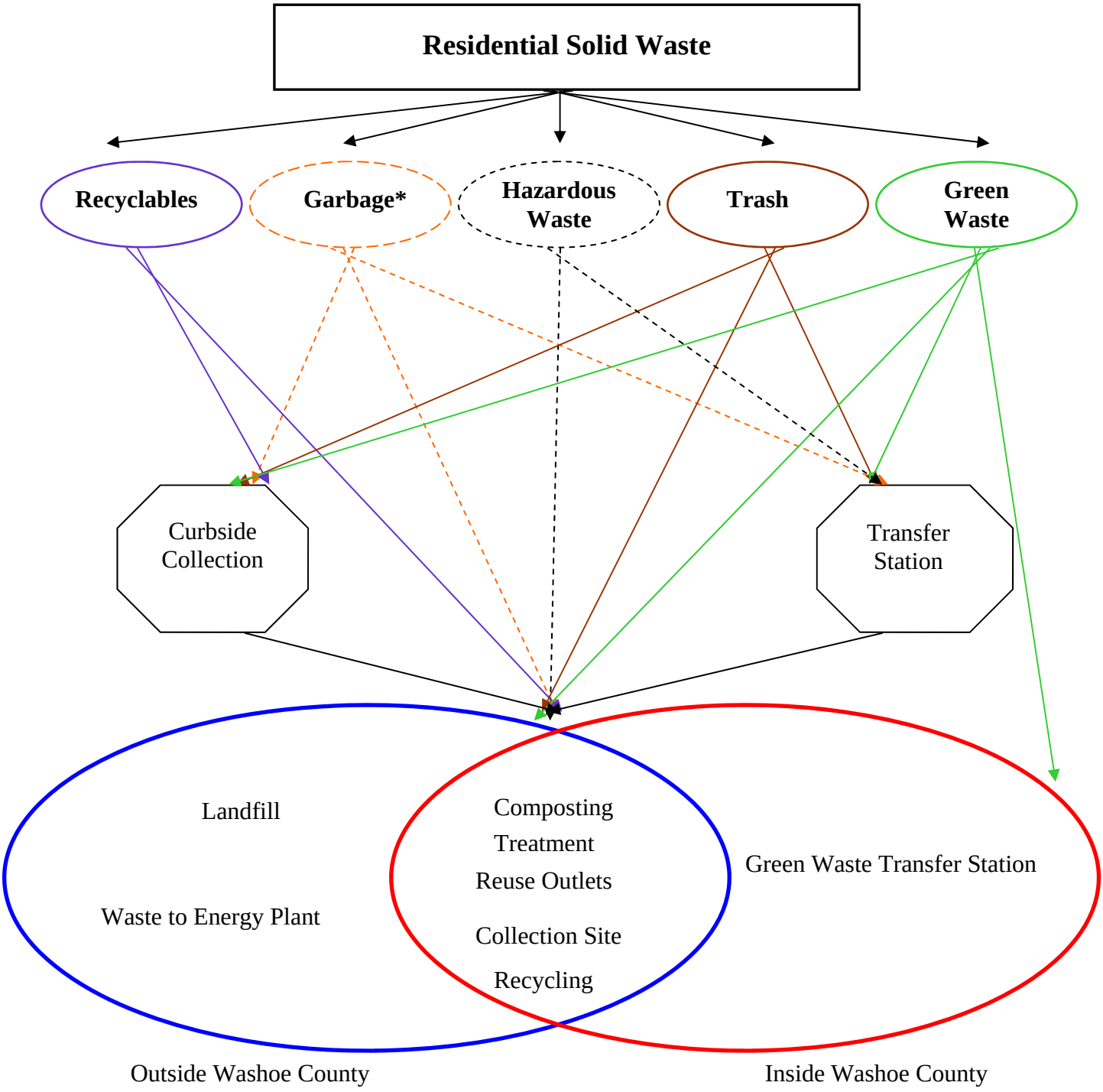
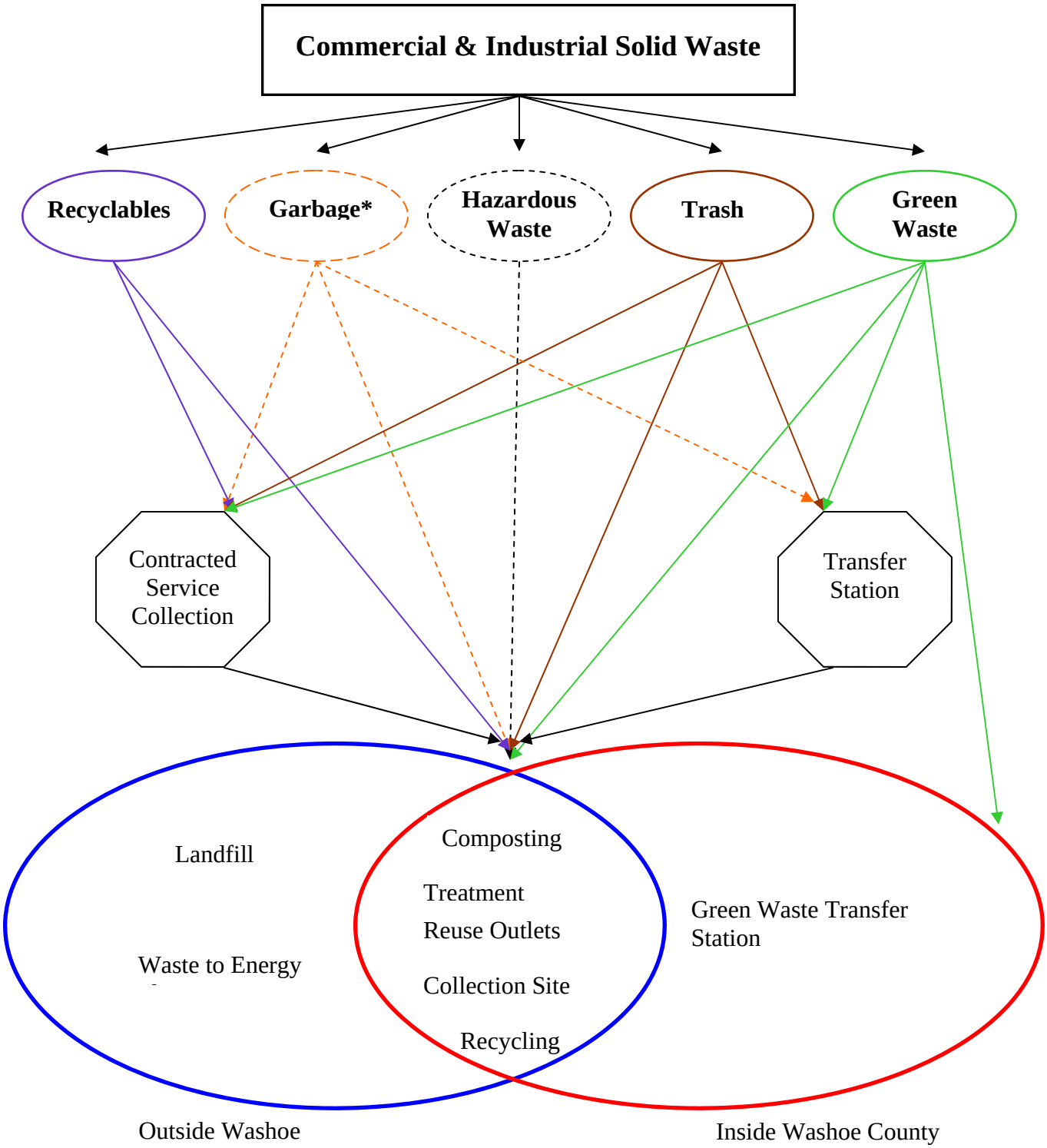


Figure 3.2
Washoe County
Existing Solid Waste Management System



Curbside garbage collection and hauling is controlled solely by Waste Management INC. based on contract franchise agreements. However, residents can apply for an exemption from required garbage service so they can self-haul garbage.

Figure 3.3
Washoe County
Existing Solid Waste Management System
Commercial & Industrial Solid Waste



* Garbage collection and hauling from commercial and industrial businesses is controlled solely by Waste Management INC. based on contracted garbage franchise agreements to fulfill mandatory garbage service mandated by local ordinances

3.2 TYPES AND DEFINITIONS OF SOLID WASTE

SW is a mixture of items discarded as useless or unwanted arising from residential, commercial, and industrial activities in WC communities. In order to understand the SWM system in WC, a short review of types and definitions of wastes generated follows. The waste classification system in WC is based on an assessment of potential risk to the health and the safety of the County's residents. The system provides a basis for determining which wastes may be deposited in a particular disposal facility.

The Washoe County District Board of Health Regulations (DBHR) Governing Solid Waste Management defines **SOLID WASTE** as the follows:

> (010.672) [M]eans garbage, rubbish, junk vehicles, ashes or incinerator residue, street refuse, dead animals, demolition waste, construction waste, solid or semisolid commercial and industrial waste. The term does not include hazardous waste managed pursuant to NRS 495.400 to 459.600, inclusive.

Disposal of SW from Washoe County occurs at the following type of facility as defined in the (DBHR):

> (010.452) **MUNICIPAL SOLID WASTE LANDFILL UNIT (MSWL)** means a discrete area of land or and excavation that receives household waste and that is not a land application unit, surface impoundment, injection well, or a waste pile as defined by these regulations. A municipal SW landfill until may receive other types of RCRA subtitle D wastes, such as commercial solid waste, nonhazardous solid waste. A municipal solid waste landfill until may be a new municipal solid waste landfill unit, an existing municipal solid waste landfill until or a lateral expansion.

A. Residential Waste

> (010.600) **RESIDENTIAL WASTE** means solid waste generated from private residences to include, but not limited to, single family dwellings, multiple family dwellings, apartment complexes, condominiums, mobile home parks, or similar dwelling places or bunkhouses, ranger stations, crew quarters, campgrounds, picnic grounds and recreation areas used during the daytime.

The DBHR (010.300) defines **GARBAGE** as follows:

> A. Putrescible animal and vegetable waste resulting from the handling, storage, preparation, cooking, sale and serving of food and beverage. This includes, but is not limited to:
>
> 1. Offal, swill, kitchen and table waste, and other organic animal and vegetable waste.

2. Bottles, cans, cups, plates, utensils, containers, and/or covering, or any construction or material that has been in intimate contact with food, confection, and/or beverage;

3. Any component used in the preparation or manufacture of matter intended for animal or human consumption; and

4. Such matter and/or materials listed in (1) through (3) above that have been discarded without firs being sanitized.

B. Biohazardous Waste (See Section 080)

C. The mixing, addition, or commingling of garbage with rubbish, trash, or other waste matter exclusive of biohazardous and hazardous wastes, renders the entire resulting mixture as garbage and requires the mixture to be handled as garbage.

The DBHR (010.610) defines **RUBBISH** as:

> [N]onputrescible waste consisting of both combustible and noncombustible waste(s) such as but not limited to: old tin and iron cans and containers, old wood and paper boxes, old metals, wire, rope, cordage, bottles, bags and bagging, rubber and rubber tires, paper, glass, bedding, crockery and all used or castoff articles, material or trash, including old plaster, brick, cement, glass and all old building material.

B. Commercial Solid Waste

The DBHR (010.128) defines **COMMERCIAL WASTE** as follows:

> [S]olid waste generated as the result of commerce or trade; this includes but is not limited to SW produced as offices, retail or wholesale stores, warehouses, transient lodging facilities or public accommodation facilities.

Commercial SW in WC is collected from casinos, hotels, shopping centers, food stores, office complexes and other retail establishments which dispose of their waste in small metal or in large dumpsters which are supplied and serviced by the garbage hauler. Currently there is no publically available data to confirm the composition of commercial waste generated in WC.

C. Industrial Solid Waste

The DBHR (010.360) defines **INDUSTRIAL WASTE** as follows:

> [S]olid waste derived from industrial or manufacturing processes, including, but not limited to, the SW generated by:
>
> A. Generation of power:

B. Manufacture of fertilizer and agricultural chemicals;
C. Manufacture of food and its related products and by-products;
D. Manufacture of inorganic chemicals;
E. Manufacture of leather and products made form leather;
F. Manufacture of nonferrous metals, including the foundries which manufacture those metals;
G. Manufacture of organic chemicals;
H. Manufacture of plastics, resins and other miscellaneous products made from plastic;
I. Pulp and paper industry;
J. Manufacture of rubber and other miscellaneous products from rubber;
K. Manufacture of products from stone, glass, clay and concrete;
L. Manufacture of textiles;
M. Manufacture of transportation equipment;
N. Treatment of water;
O. Manufacture of iron and steel; and
P. Construction, refurbishing or demolition of buildings or other structures.

The term does not include waste generated by the mining, oil and gas industries.

3.3 SOLID WASTE COLLECTION

A. Franchised Collection

Collection of garbage in WC is strictly limited to Reno Disposal Company, Sparks Sanitation Company and Independent Sanitation Company; The complete franchise agreements are listed in the appendices E though J. The specific franchise contractors are identified in Figure 3.1 with some built in inaccuracy since franchise areas seem to be fluid and open to modification.

The differentiation between rubbish (or trash) and garbage in local regulations is a relic of historical solid waste collection environment prior to WM domination of the local industry. Many of the other terms in the WC SW regulations that are included in this Plan are also a product of historical events and situations, factors that can effect their contemporary application and should be considered when the regulations are being reviewed or updated.

All of the garbage franchise agreements in WC maintain the same language concerning exclusivity of garbage collection for Waste Management stating, "…all residential, commercial, industrial and community activities within (the specific city or district) shall be required to utilize the collection and other services provide by Waste Management of Nevada, Inc. (WM), hereunder." IVGID is the only exception to this exclusivity; exclusions were written into the franchise agreement to allow IVGID facilities and residents to self-haul specific recyclable and compostable materials.

All of the franchise agreements besides that with IVGID are also required to work with the designated landfill to offer the public a free disposal opportunity during the annual "Spring Cleanup Campaign" sponsored by WC. Cost of this event will be considered as reasonable costs to the companies and incurred by the respective franchise company. All franchise agreements also offer a residential recycling program with curbside recycling capacity; this is a collaboration with the related company RSW Recycling, Inc. Rates for recycling service are included in the normal rates for garbage collection and the respective collector has sole title to all recyclable materials collected. The franchise agreement with IVGID has exclusions on the exclusivity of recyclable materials similar to those for garbage.

Garbage service is mandatory to combat and prevent specific public and environmental health issues; one, the house fly egg hatching cycles is on average 8 days, so once per week pick-up decreases the propagation of flies, two, it decreases the probability of illegal burning or disposal on private property, and three, and it decreases the development of nuisances related to compiling SW. Though garbage service is mandatory, residents can be approved for exemptions either because of limited volume, due to existing business service or the desire to self-haul. The original intent of the garbage exemption was solely for residents who did not want to utilize local garbage hauler services and self-haul. Additional types of exemptions were added to address emerging issues related to garbage service. For WC, Incline Village, City of Reno and City of Sparks Ordinances, exemptions from franchised garbage service is available only with approval from the District Health Officer administered though the SWM Program.

1. Unincorporated Areas

It should be noted that in section 2.1 of the garbage franchise agreement with Independent Sanitation Company, garbage service is not mandatory in outlying or sparsely populated areas of WC unless required or requested. However, WC Ordinances (90.037(1)) states,

> "Every owner of read property who accumulates or causes the accumulation of garbage as defined in this chapter upon any premises in the area described in section 90.035 must subscribe to the collection, hauling, and disposal of garbage pursuant to the provisions of this chapter, unless such person qualifies for an exemption pursuant to the sections."

Nonetheless, because this WC Ordinance requires garbage service, mandatory service is required in both WC and all unincorporated areas.

Table 3.1
Washoe County Franchise Contractors

Contractor	Service Area	Mandatory Collection	Curb-side recycling service	Term	Term Expiration	Duration	Extensions	Franchise Fee
Reno Disposal Co.	City of Reno	Yes	Yes	10/01/94	2009 w/o extension, 2019 w/ extension	15 yr	1x 10yr	8% of "gross receipts"
Sparks Sanitation Co.	City of Sparks	Yes	Yes	07/21/08	2018 w/o extension	10 yr	2x 5yr	5% of "gross receipts"
Independent Sanitation Co.	Unincorporated Areas of Washoe County	Yes	Yes	12/12/00	2015 w/o extension	15 yr	1x 5yr	5% of "gross receipts"
Independent Sanitation Co.	Incline Village	Yes	Yes	03/29/07	2017 w/o extension	10 yr	1x 5yr	15% of "revenue billed"

w/ = with
w/o = without

Table 3.2
Washoe County Franchise Contractors Financial Summary

Contractor	Pick up frequency	Billing frequency	Free services	Bond dollars	Insurance	Provided container	Materials Ownership
Reno Disposal Co.	once a week or once a month	Advance Quarterly	City of Reno Facilities	$50,000	3 mill/occ & 1 mill/inj	96 gal, min size is 32 gal	at the time the SW is deposited by residential customers in containers and left at the curb for collection
Sparks Sanitation Co.	not less than once a week	Advance Quarterly	City of Sparks Facilities	$50,000	3 mill/occ &1 mill/inj	96 gal or 64 gal (no cubic yd waste)	at the time the SW is deposited by residential customers in containers and left at the curb for collection
Independent Sanitation Co.	once a week	Advance Quarterly	Washoe County Facilities	$50,000	3 mill/occ &1 mill/inj	"designated container" 32 gal, or approved by franchise	From the time that garbage or any SW is picked up from the customers
Independent Sanitation Co. (IVGID)	at least once a week	Advance Quarterly	ND	$50,000	5 mill/occ & 3 mill/inj	"designated container" 32 gal, or approved by franchise, up to (2) 96 gal	at the time the SW is deposited by residential customers in containers and left at the curb for collection

p/u = picked up
ND = not discussed
mill/occ = million per occurrence
mill/inj = million per injury

According to franchise agreements, Independent Sanitation Company has the exclusive right to collect the residential garbage. The agreement states that all collection charges will be billed and collected by the franchise hauler. A percentage, currently 5% of "gross receipts" will be the franchise fee and is collected in monthly installments by the County. Collection rates are set by WC code and are supposed to be reviewed annually. Rates are adjusted periodically to allow Independent Sanitation Company to recover reasonable operation costs and receive a fair return on its gross income. The current garbage rates for WC are identified in appendix Y. The majority of WM customers in WC are residential and live in the City of Reno. Table 3.3 below shows a breakdown of customer types and numbers. Before Sun Valley was absorbed into WC, it maintained an independent garbage franchise agreement with Washoe Management, Inc. and a copy of this agreement is in appendix E.

Table 3.3 Garbage Franchise Customer Counts

	Commercial	Residential
Reno Disposal Co.	2,642	60,876
Sparks Sanitation Co.	930	27,498
Independent Sanitation Co.	264	33,279
Capital Sanitation Co.	26	1,520
Independent Sanitation Co. (IVGID)	272	3,800
Total	**4,134**	**126,973**

2. City of Reno

The City of Reno's residential garbage service is managed through the use of a mandatory franchise agreement. Reno Disposal Company was awarded the contract for a 15-year term commencing on October 1, 1994. This franchise contract applies to all areas within the incorporated area of the City of Reno.

The City of Reno Franchise Agreement states that all collection fees will be billed and collected by the franchise hauler, Reno Disposal Company. A percentage, currently 8%, of "gross receipts" is the franchise fee and is collected monthly by the City of Reno from Reno Disposal Company. The rates for service are set and approved by the City of Reno Council and are adjusted based on the Consumer Price Index with approval by the City Manager of Reno before they go into affect and can be reviewed annually. The current City of Reno garbage rates are shown in Appendix R.

According to the City of Reno Franchise Agreement, the downtown business area litter baskets, as well as all city offices, county offices, and parks, receive collection service from Reno Disposal at no charge.

Garbage collection in the City of Reno is unlimited service. Unlimited garbage service consists of waste collection from a "designated container" which is defined in the City of Reno Municipal Code section 10.08.060 (appendix O), currently a 96 gallon semi automated container, and one additional cubic yard of waste located at curbside for garbage disposal. Residential collection occurs weekly on the basis of a five day work week.

In some instances, Federal and State owned landed within WC is serviced under the franchise agreement for that jurisdiction. For example, the Nevada Air Guard is located within the City of Reno city limits. Therefore, disposal service is under the City of Reno's franchise agreement with Reno Disposal Company.

3. City of Sparks

The City of Sparks residential SW is managed through the use of a mandatory franchise agreement. Sparks Sanitation Company was awarded the contract to service the residential, commercial, and industrial sectors of the City of Sparks on July 21, 2008. The franchise agreement is for a 10-year term with the option of two (2) 5-year extensions. The previous agreement was supposed to expire in 2007, but was extended due to litigation between WM, City of Sparks, Castaway Trash Hauling, and a handful of other haulers in WC; a copy of the extension letter is in appendix I. The current franchise agreement grants the Sparks Sanitation Company the exclusive franchise for the disposal and collection of garbage and recyclable materials within the incorporated limits of the City. The terms "garbage" and "recycled materials" are defined in Chapter 7.08 of the Sparks Municipal Code (Appendix P).

Sparks Sanitation Company bills and collects charges prescribed in Chapter 7.12 of the Sparks Municipal Code; the garbage rates are listed in appendix H. The franchise fee collected by the City of Sparks from the Sparks Sanitation Company is based on a percentage, currently 5%, of the "gross receipts" subject to the franchise agreement and is due monthly.

All residents of the City of Sparks are provided a 96-gallon semi-automated container with the option of a 64-gallon container. Residents are allowed to place one additional cubic yard of garbage at their curb for weekly collection if they are utilizing the 96-gallon container service. Residential collection occurs once a week on a five-day per week basis.

Since the current franchise agreement is exclusive, all refuse, residential, commercial and industrial garbage are also collected by the Sparks Sanitation Company. Commercial and industrial garbage disposal among individual customers varies. Containers from one cubic yard to 30 cubic yards are offered and collection schedules vary with customer need.

4. Incline Village General Improvement District (IVGID)

Incline Village's residential, commercial, industrial and recycling collection is managed through the use of a franchise agreement; currently, Independent Sanitation Company is the franchised hauler. The current franchise agreement commenced on March 29th, 2007 for a 10 year term.

IVGID bills and collects for garbage services provided by the Independent Sanitation Company. A monthly flat rate fee is given to Independent Sanitation Company services rendered. A franchise fee equaling a percentage of 15% of the "revenue billed" by the Independent Sanitation Company will be paid to the IVGID in monthly installments. In addition, the IVGID will also receive 1.5% of all monies billed by the IVGID on accounts for which they provide billing of collection services as an administrative fee. The franchise fee charged to the Independent Sanitation Company is highest of all the franchise agreements because IVGID offers more SW disposal services to customers, especially to residents. Part of the IVGID franchise fees help fund the "Waste Not" program which offers information on sustainability, water conservation and organizes various recycling events and services. Residential single stream garbage and recycling service is also part of the franchise agreement.[1] The franchise agreement does not include a stipulation requiring free dumping periods as part of the "Spring Clean-up" for residents as do other franchise agreements with entities in Washoe County.

In addition to weekly garbage service, residents are allowed to place up to one additional cubic yard of garbage at curbside for collection and up to one cubic yard of pine needles. Industrial and commercial customers are supplied with a variety of different container sizes that range from 2 to 30 yards. Free service of Incline Village facilities is not stipulated in the agreement since IVGID and other municipal departments exercise self-haul.

Rates for residential, commercial and industrial collection are established by IVGID and are listed in appendix T. Any changes to the rate schedule must be submitted to the IVGID in application form for approval. A copy of the Independent Sanitation Company franchise agreement is in appendix J. This franchise agreement does not include free service for facilities operated by Incline Village; the city reserved the right to maintain self-haul so the city can transport biosolids from the waste water treatment plant for composting. All commercial, industrial and city maintained facilities must utilize commercial containers for garbage disposal.

[1] IVGID Waste Not Programs 2008 Annual Report, 2008

B. Non-Franchised Collection

1. The Commercial and Industrial Collection

Though garbage collection is strictly controlled by local franchise agreement, trash and debris collection is allowed by permitted trash haulers. A list of permitted trash haulers is listed in Table 3.1. The size of containers supplied to the customers varies from 1 cubic yard to 40 cubic yard depending upon the specific needs of the customer.

3.4 SOLID WASTE FACILITIES

A. Transfer Stations

DBHR (010.575) defines **TRANSFER STATION** as follows:

> "[A] site where waste is transferred from one vehicle to another vehicle, or storage bin for temporary storage until transferred to a disposal site. Some processing may be included therein."

Sections 060.001 through 060.080 of the DBHR describe transfer station (TS) regulations in regards to design parameters, operation and maintenance.

Refuse, Inc. owns and operates the TS's at Sage Street, Stead and Incline Village. The transfer station in Gerlach is owned by Gerlach GID. SW is collected on the TS floor or pit, a tractor compacts the garbage and pushes it into semi-trailer trucks on the lower level, from where it is hauled to LRL. Approximately 60-65 round trips are made daily to LRL by covered Reno/Sparks/Incline Village TS transfer trucks for disposal. The transfer trucks are weighed empty and full to determine the amount of waste loaded. Each truck is filled with a maximum of 80,000 pounds of waste to maintain DOT truck weight standards for highway travel. Periods of time delay for unloading waste have been observed in busy hours of the day. Transfer station fees are listed in appendix U.

The Gerlach TS functions differently than the facilities listed above. Residents and commercial businesses self-haul their garbage to the Gerlach TS (which only consists of a roll-off bin) which is serviced by WM once a week. Gerlach customers are billed for garbage service through the Gerlach GID monthly. Residential customers pay $20.05 and commercial business pay $75.20. The TS is only open a few days a week and there is an attendant on-site to regulate the waste stream.

There is one non-franchise permitted transfer station in Washoe County. This facility is managed by Nevada Recycling & Salvage and is located in Reno. Because WM is the exclusive franchised garbage collector, this transfer station cannot accept garbage or recyclables from the general public; it is open to commercial businesses only. However, this facility does accept trash and waste from commercial and industrial customers. Materials are separated on the transfer station floor in to a variety of separate waste streams (e.g., paper, cardboard,

green waste, etc.). Materials that cannot not be recycled or used in alternative disposal methods are shipped to LRL for disposal.

B. Landfills

All SW generated in WC is taken to landfills for disposal. The location of LRL which is used for disposal of WC waste is identified in Figure 3.5. The following is a description of existing landfill facilities and their operations.

1. Lockwood Regional Landfill (LRL)

The LRL is a class I landfill with an approved alternative liner. At 1,555 acres it is the second largest landfill in Nevada[2]. The LRL is a typical canyon-type landfill where the operator fills the available space within the canyon with lifts of SW. When completed, each lift of refuse is compacted, graded to provide adequate surface drainage, and is covered with 24 inches of cover soil. The active face of the landfill is covered with six inches of soil. The landfill is located south of I-80 at the Mustang Exit in Story County. This landfill is owned and operated by Refuse, Inc., a Nevada corporation. Information about volume received is detailed in Chapter 3 of the Plan. Based on an inerlocal agreement between Storey County and WC dated January 15, 1980 (Appendix K), the WC District Board of Health was designated as the responsible agency to permit and monitor the operation of LRL. However, by mutual consent, this agreement was not renewed and expired on December 31, 2009. As of January 1, 2009 technical and regulatory oversight of LRL was transferred to NDEP. The Storey County Commission meeting and correspondences discussing the termination of the Interlocal Agreement are in Appendix L.

A special use permit (SUP) was issued to BEM Company by Storey County Board of Supervisors in 1959. The SUP was revised to change the legal name for BEM to Refuse, Inc. A new SUP was adopted by the Storey County Commissioners on July 23, 1990. LRL has a minimum remaining life of approximately 17 years[3], but a northern, southern lateral extension to the landfill footprint is proposed which will extend the Landfill's life expectancy closer to 75 years. Washoe County does have regulations regarding landfills and planning requirements when the life expectancy is less than 20 years, however, since LRL is not located in Washoe County and the WCHD no longer has regulatory oversight over t5he landfill, WC cannot enforce these restrictions for LRL. Table 3.9 lists the disposal rates for LRL.

2. Historical Sites

There was a small (300-acre) improved dump called Happy Valley that was located near Mustang Landfill and was closed before Mustang Landfill. In addition to the Happy Valley Improved Dump and the

[2] NDEP website http://ndep.nv.gov/BWM/landfill_lockwood.htm retrieved April 30, 2010
[3] *Existing Landfill Capacity Report*, Bill Carr, P.E. for Waste Management Inc., 2008

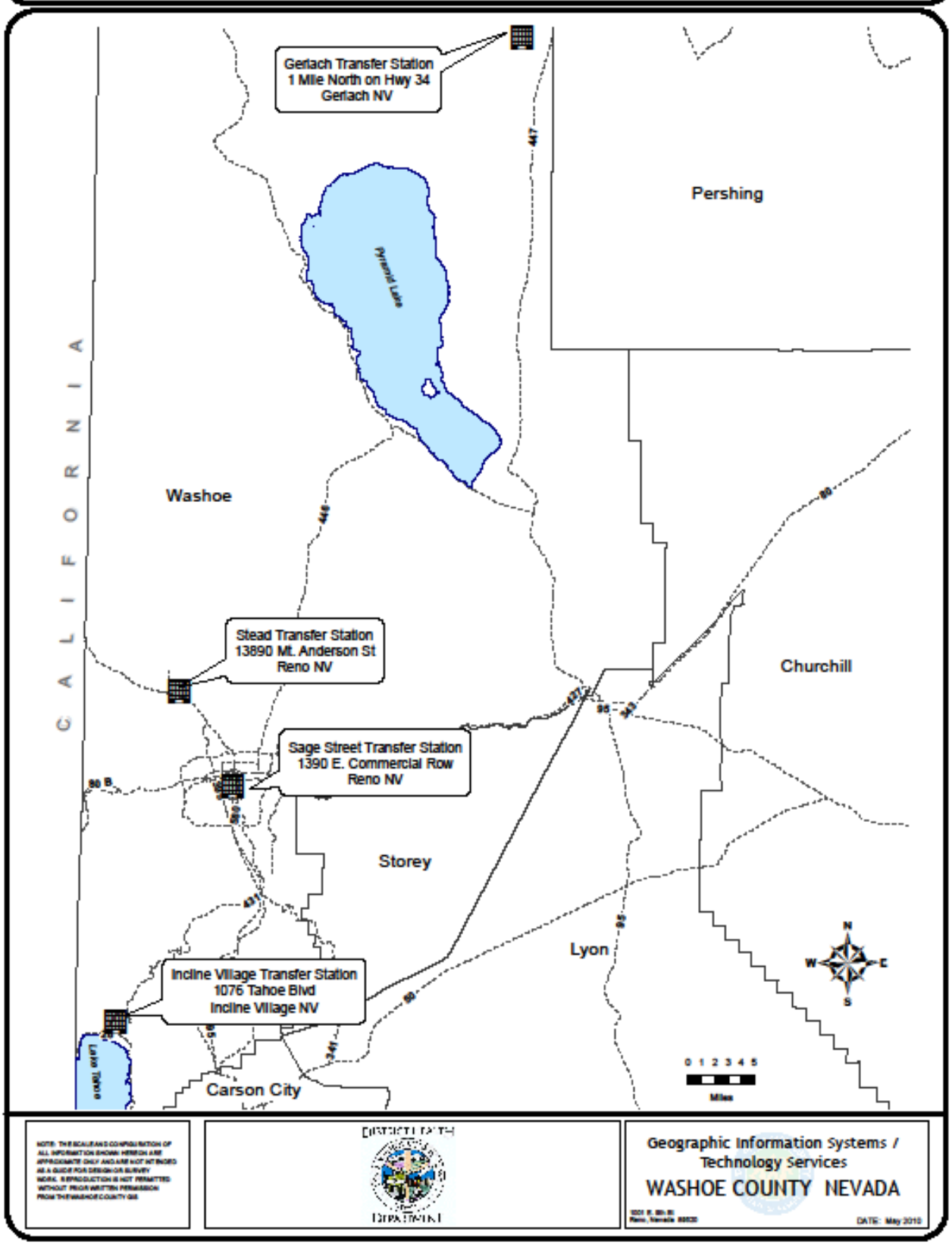
Mustang Landfill, there are other historical dumping sites throughout WC that were unpermitted and served as ad hoc dumping sites prior to established permitting procedures. This includes sites in Stead used by the military, north Reno, sites in Sun Valley, and other undocumented sites throughout the County. Depending upon what was disposed of in these sites, the WC SWM Program remediates them as them emerge. Lastly, there was a small landfill located north of Gerlach on Bureau of Land Management property. I was officially closed in the early 1990's.

3. Jungo Landfill

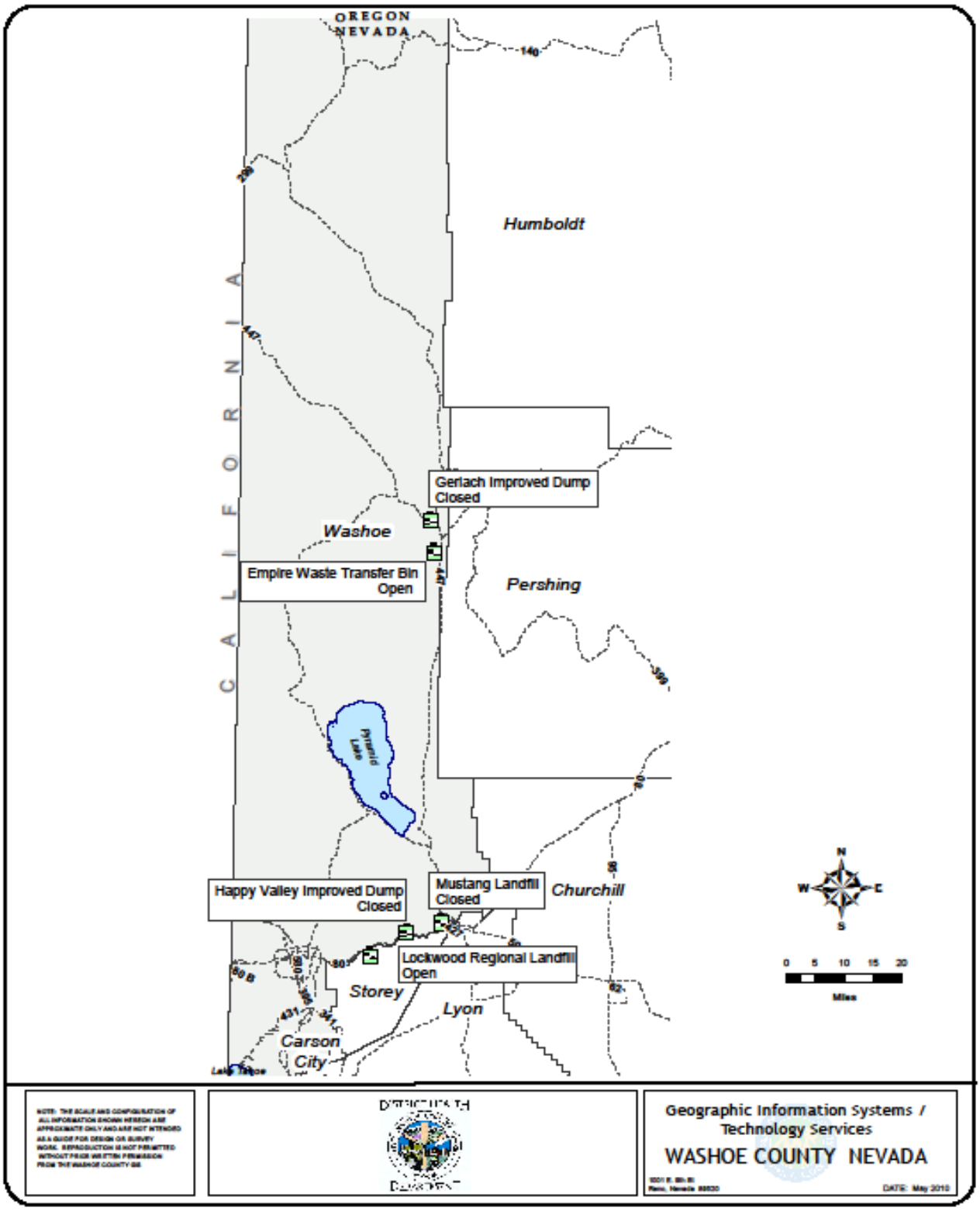
In 2007 a SUP was issued for the development of a Class I landfill 30 miles west of Winnemucca in Humboldt County. It is proposed to receive MSW from Northern California, Nevada and Humboldt County. Public comment is expected to begin late in 2010 and completion is projected between 2012-2013.[4]

[4] NDEP website http://ndep.nv.gov/jungo/index.htm Retrieved November 16, 2010

WASHOE COUNTY TRANSFER STATIONS
FIGURE 3.4



LANDFILL LOCATIONS
FIGURE 3.5



3.5 FRANCHISE RECYCLING PROGRAM

A. Residential

City of Sparks, City of Reno, Incline Village, WC and the unincorporated areas have ordinances that require residents (i.e. anyone who accumulates SW) to have garbage service. Recycling service on the other hand, is not required. Voluntary residential curbside recycling is available to all residents, and the cost of this program is included in their quarterly garbage fee.

The USEPA supports and pushes programs to utilize recycle, reduction and reuse techniques or technologies to increase the volume of SW being diverted from landfills[5]. Recycling technologies and innovations are constantly being introduced into the market; some increase the efficiency of recovery while others create outlets for materials that previously could not be recycled. Recycling and resource recovery will continue to become integral components of SWM programs domestically and internationally.

1. Curbside Recycling Program

City of Reno, City of Sparks and WC residents who wish to utilize the franchise recycling programs must contact their local franchise offices to receive recycling service. This service includes a minimum of bimonthly pick-up service and receptacles for separating recycling materials; one container is designated for glass and the other is for aluminum/steel cans and plastic bottles without lids. Old newspaper print (ONP), old magazine print (OMG) and phone books are also accepted. Independent Sanitation Company in Incline Village also offers voluntary recycling services to residents as part of the garbage fee. However, they offer augmented services that will be discussed later in this chapter.

2. Transfer Stations (TS)

TSs in WC are the main hubs for MSW consolidation for transfer to LRL; most residential and commercial SW goes though one of the 4 TSs. In the last 20 years they have also played a larger role in the collection of HHW, tires, universal wastes and biohazardous wastes. In 1999 the Nevada state legislature passed Assembly Bill 564 that required municipalities with a population over 100,000 to broaden their programs for collection of "source-separated recyclables." A minimum of three recyclable materials needed to be collected from residents; to fulfill this requirement, all WC TSs take limited quantities of antifreeze, oil and car batteries for a fee as part of their franchise agreement.

Progressive community-backed initiatives in Incline Village have produced extended recycling options in that community, additionally, the IVGID supports many more collection events and educational programs for the public that any other WC entity. The TS in Incline Village serves

[5] *Municipal SW Generation, Recycling, and Disposal in the United States*, USEPA, 2008

as an example of how TSs are an important factor to increase the WC diversion rate. Moving from a TS-based system to "green" systems will not require re-inventing the wheel locally; municipalities across the nation, and the world, use central hubs similar to TSs to manage MSW for alternative disposal methods. San Jose and Roseville, CA currently have green waste facilities, extensive material recovery facilities (MRF's), composting outlets and waste-to-energy (WtE) facilities (including proposed construction of a biogas plant) hinging on their ability to direct their MSW stream.

3. Lockwood Regional Landfill

LRL also collects limited amount of antifreeze, oil and car batteries from the public for a fee as do the TSs. LRL is not considered a recycling facility per se, but does pull some recyclable materials and divertible materials out of the waste stream on site. This includes large appliances like refrigerators, dryers, construction and demolition (C&D), scrap metal and waste wood. LRL management has also partnered with a local carpet and carpet pad recycler to divert that waste stream from disposal. A 40-yard dumpster is maintained at the landfill for old/used residential and commercial carpet and carpets pads, and the public can use this service free of charge. Fostering more of these exchanges with local businesses may yield a cost effective way to increase landfill diversion and public education about recycling and diversion opportunities.

4. Drop-Off Locations for Recyclables

a. Grocery Store Locations

Drop-off locations for recycling are managed by local franchise companies at the Smith's on Baring Boulevard in Sparks and the Scolari's on Mira Loma in Reno. These sites were established for residents who do not have access to curbside recycling; specifically this targets residents who live in multi-family dwelling units and condos. However, in a 1997 Needs Assessment for Recycling in Multi-Family Dwellings in Washoe County was conducted[6] and it showed that only 42% of respondents were aware of these drop-off locations in the community. There is no current information about how well known these drop-off locations are among people living in multi-family dwellings or in the general community. Additionally, there is no data available from WM to determine utilization or volume collected from each these drop-off locations; all drop-off collections are recorded with total volume of recyclable collections.

[6] *A Needs Assessment for Recycling In Multi-Family Dwellings in Washoe County*, Western Nevada Clean Communities, Inc., 1997

b. Washoe County Health District

The WC Complex at 1001 E. 9th Street has containers in the parking lot to collect newspaper, glass and plastic bottles. These containers are only available for residential recyclable material and are only accessible when the County Complex Premises is open. Specific data about utilization and volume collected is not available from WM.

c. Waste Management Recycle America

There are two main drop-off facilities for recyclable materials in the Reno/Sparks area. The Reno location is on Commercial Row and is very close the Sage Street TS. The location is open to the public and accepts all materials allowed in curbside service. In addition, they have dumpsters for OCC, ONP, OMP, mixed paper and office paper. There is no fee for dropping off materials; however, they do not buy materials (e.g., aluminum cans) from customers. The other facility is on Greg Street in Sparks and accepts that same materials as the Reno Facility. There is no data confirming the volumes of recyclable material generated at these facilities. As with the other drop-off outlets provided by WM franchises, all the recyclable collections data is lumped together and not separated by facility. The plant manager of the WM Recycle America in WC said that the facility at Commercial Row was the more utilized facility by far[7].

3.6 NON-FRANCHISE DIVERSION PROGRAMS AND OUTLETS

Garbage franchisees, county, state government and private business all play a part in diverting SW from the landfill. In the last 5 years, the number of non-franchised diversion companies been a strong force behind WC's increased diversion rate.

The Washoe County DBHR (010.248) defines **DIVERSION** as:

"[A]ctivities which reduce or eliminate the amount of SW from disposal."

Diversion can include recycling, reuse, reduction or redirection of a waste stream. The USEPA has long been a strong proponent of diversion activities; both for maintaining environmental health and reducing the total amount of waste that is landfilled. Their support has also grown in tandem with "Green" movements or zero waste movements aimed at reducing environmental impact of human activities. Historically, waste streams were diverted from LRL due to engineering limitations or after the passage of federal landfill regulations. Tables 3.5 and 3.6 list all the items that have diversion outlets in WC. LRL is classified as a Class I landfill and has an engineered alternative liner. LRL cannot accept a variety of material for disposal like liquid wastes and hazardous waste and diversion is mandatory. Because water quality is a

[7] Email correspondence with Kevin Reilly at WM Recycle America, Inc., April 22, 2010

priority, it is not confirmed at this time if the projected landfill expansions will utilize prescriptive liners. Definitions for landfill Classes I-III can be found in the section 444.5705 of the NAC, 444.560 of the NRS and in sections 010.112 through 010.120 of the DBHR.

A. Residential

1. Recycling Facilities and MRF's

The current DBHR (010.592) defines **RECYCLING** as follows:

"[T]he process by which salvaged materials are transformed into new products."

The DBHR (010.584) also defines **RECYCABLE MATERIAL** as,

"[S]olid waste that can be processed and returned to the economic mainstream in the form or raw materials or products including use as a feed stock in the generation of energy. "Recyclable material" includes, but is not limited to:

A. Newspaper;
B. Corrugated Cardboard;
C. Aluminum;
D. Yard Debris;
E. Office Paper;
F. Glass;
G. Tin and Steel cans;
H. Metal;
I. Motor Oil;
J. Plastic;
K. Antifreeze;
L. Wood;
M. Food Waste;
N. Or other materials capable of being recycled because of new and current proved technologies in the area of recycling and solid waste management.

Table 3.4
Residential Diversion Outlets

Recycling	Reuse	Disposal	Waste-to-Energy	No Outlet
Aluminum cans	Automotive parts	Ammunition	Grease	Paperboard
Antifreeze	Bikes	Fire extinguishers	Waste wood	Plastic 3-7, o/t bottles, bags
Appliances, Lg.	Bubble Wrap & Peanuts	Grease		
Appliances, Sm.	Bulky items	HHW		
Asphalt/Cement	Cartridges	Pesticides		
Automobiles	Clothing	Pharmaceuticals		
Batteries, car	Computers	Tires		
Batteries, household				
Books, Lg. quantities				
Cardboard, corrugated				
Carpet/carpet pads				
Cartridges				
Cell phones				
Compact fluorescent light bulbs (CFL's)				
Computers				
Electronics				
Glass				
F.O.G. (fats, oil, grease)				
Magazines				
Newspaper				
Oil				
Paint, Latex/oil-based				
Paper				
Phone books				
Plastic, bags				
Plastic, bottles (1-2)				
Scrap metal				
Steel, cans				
Tires				
TV's				
Wood				o/t = other than

Table 3.5
Residential Diversion Outlet Matrix

* limited quantities accepted	Curbside Recycling Program	Transfer Stations for Free	Transfer Stations for Cost	Local Businesses for Free	Local Businesses for Cost	Lockwood Landfill for Free	Lockwood Landfill for Cost
Aluminum cans	X			X			
Antifreeze		X*	X	X*	X	X*	X
Appliances, Lg.				X*		X*	
Asphalt/Cement					X		
Automobiles				X			
Batteries, car		X*	X		X	X*	
Batteries, Household					X	X	
Books, Lg. quantities					X		
Cardboard, corrugated (OCC)				X			
Carpet/Carpet Pads				X		X	
Cartridges				X	X		
Cell phones				X	X		
Compact fluorescent light bulbs (CFL's)				X	X		
Computers				X	X		
Electronics (e-waste)					X		
Glass (jars & bottles)	X						
F.O.G. (fats, oils, grease)					X		
HHW					X		
Magazines (OMG)	X			X			
Newspaper (ONP)	X			X			
Oil		X*		X*	X	X*	
Paper, office				X			
Phone books	X						
Plastic, bags				X			
Plastic, bottles	X						
Scrap metal				X			
Steel, cans	X			X			
Tires			X		X		

Currently there are no MRF's permitted in WC, however there are 18 permitted recycling facilities. To attract and facilitate the development, DBHR regulations were updated in May of 2010 to include a definition of a MRF and there is also a definition in the NRS; the MRF definition replaced an existing definition of resource recovery facility. Recycling facilities that take materials from the public are required to obtain a permit from WC. More traditional recyclable materials are usually recycled for free for residents like aluminum cans and paper, while services for HHW and other electronic recycling are usually associated with a fee due to transportation costs, regulations and limited number of treatment facilities. Some waste streams have both free and at-cost outlets in the community; some examples include CFL's and used motor oil.

2. Reuse Opportunities

The DBHR regulation updates in May of 2010 also added a definition of **REUSE** (010.608) as follows:

"[U]sing an object or material again, either for its original purpose or for a similar purpose, without significantly altering the physical form of the object or material."

Table 3.4 also shows all of the materials being reused in WC. These figures do not include antique shops, garage sales, second hand stores and discount stores. Historically, all of the community clean-up programs the County has participated in focused mostly on recycling and collection. Reduction and reuse were not major components. However, in 2009 the County Health Department developed a program called "I refill" to reduce the number of plastic water bottles thrown away in WC. Individuals in the community were given plastic Nalgene® bottles after they signed a personal agreement stating they would reuse the container for water consumption instead of buying plastic water bottles. This program's reuse and reduce components were designed to increase public awareness of the volume of plastic bottles being discarded, increase plastic bottle recycling, and reduce the number of plastic bottles sent to the landfill. As of June 30, 2010, over 300 personal agreements have been signed and over 400 Nalgene® bottles have been distributed. This was the first reuse program administered by the County; currently there are no other active reuse program proposals.

3. Reduction

Programs that target source reduction, reducing the production of SW or reduction of public consumption of materials and goods to reduce waste, generally focus on changing public behaviors and increasing public

awareness. These activities and programs will be discussed in Chapter 6 under public education and outreach.

4. Composting

The DBHR (010.152) defines **COMPOSTING** as follows:

"[A] controlled process of biological degradation of solid wastes, principally organic matter, to a humus-like product."

The DBHR composting regulations are covered in section 055 and correspond with NAC 444.670. Though composting facilities in WC are permitted through the WC SWM Program, operation cannot commence until written approval is given by "the Health Authority, Regional Planning Commission, and other appropriate approval agencies." The NDEP website[18] only lists 8 commercial composting facilities in the State of Nevada, 3 of which are located in Clark County in Las Vegas.

Currently there is only one active, permitted composting facility in WC that accepts yard waste from WC residents; it is located off Pyramid Highway and is operated by RT Donovan Company INC. This facility accepts commercial and residential yard waste for a fee which includes rock, manure, gravel and concrete. They are not procuring compost for sale, but are working in that direction. RT Donavan has only been permitted and operating since June of 2009; between July of 2009 and 2010 they received 10,942 cubic yards of compost feedstock from WC residents and businesses[19]. There are two composting facilities located in Minden, NV called Full Circle Compost and Bently AgrowDynamics. They are permitted and regulated through Douglas County; they also accept yard waste for a fee from residents and businesses to produce composted soil for purchase. Only Full Circle accepts food waste from residents for composting. Currently only commercial meat scraps and meat products can be processed and recycled in WC at Reno Rendering INC. Full Circle Compost received 843.15 tons of waste for composting in 2009 from WC residents and businesses[20]. Of the total, 81% was from food waste and zero-waste events, while the rest was green waste.

A second proposed composting project is pending approval from county commissioners in Golden Valley at the Golden Valley Regional Park. This proposed facility is very small; it is only 60' by 12' and would only be accessible to residents of Golden Valley and belong to the Golden Valley Property Owner's Association (GVPOA). Composting data from

[18] *Nevada Composting Facilities*, NDEP, http://ndep.nv.gov/bwm/landfill.htm#compost, Retrieved May 19, 2010
[19] *2009-2010 Recycling Reports from RT Donavan*, RT Donavan Permit File
[20] *2009 Full Circle Compost, Inc. Recycling Report*, Full Circle Compost Inc. Permit File

these two sites are collected and reported in the annual WC Waste Diversion Rate Reports. However, the data is reported as yard waste recycling not composting; a single category for composting is not included in the report. Composting volume was also not reported in the most recent State of Nevada SWM Plan released in 2007. The USEPA [21] has reported an increasing trend of composting since 1990 of 0.09 lb/person/day to 0.4 lb/person/day suggesting that popularity and access to composting facilities is increasing in the United States and is becoming a more substantial tool to increase diversion (these numbers do not include backyard composting but include food scraps). There are other uses of yard waste besides composting. One example is employed by Incline Village using pine needles for erosion control.

The DBHR (010.148) defines **COMPOSTED SEWAGE SLUDGE** as:

"[S]ludge which has been processed by controlled microbial degradation whereby pathogenic organisms are destroyed and all portions of the material are exposed to a temperature of 60^{o}C (140^{o} F) for forty (40) hours, followed by curing until the material is stabilized."

There is no sewage sludge composted in WC. However, sewage sludge from the Incline Village Waste Water Reclamation Facility is shipped to a composting and farming facility in Minden, NV called Bently Agrowdynamics. The resulting compost is applied on-site to non-human consumption crops. Land application of biosolids or sewage sludge is regulated by NDEP and requires the issuance of a permit from the State of Nevada. On average, 300 dry tons a year are exported from Incline Village to Douglas County.[22]

5. Waste-to-Energy (WtE)

There is no definition of WtE in the DBHR, NRS or NAC. The USEPA defines waste to energy as "a process in which waste is brought to a facility and burned to generate steam or electricity."[23] There are no WtE facilities in WC and no businesses interests outside of small biodiesel businesses.

There is one business in Reno called the Pallet Depot that does export waste wood from shredded pallets to two (2) WtE cogeneration plants in Loyalton and Honey Lake, California. The Loyalton plant is run

[21] Municipal SW Generation: Facts and Figures 2008, USEPA, 2008
[22] Phone conversations with Harvey Johnson from Incline Village Waste Water Reclamation Facility June 6th, 2010
[23] *Wastes Glossary of Terms,* http://www.epa.gov/waste/education/quest/gloss1a.htm, USEPA, Retrieved July 8th 2010.

by Sierra Pacific Industries and is temporarily not operating. The Honey Lake facility is operated by Honey Lake Power; both are incinerators that can produce heat and electricity. In 2009, Pallet Depot exported a combined total of 7,300 tons two both facilities[24]. The projected 2010 number are significantly less at around 5200 tons. The LRL is also proposing to have a wood grinder on site by 2011. Resulting wood product will also have the potential to be used a fuel for incinerators.

6. Pharmaceuticals

In 2007 the USEPA changed its guidelines for medication and prescription drug (M & P) disposal. Flushing M&Ps into the municipal sewage systems or individual septic systems is no longer the preferred method of disposal; traces of various M&Ps and intermediates have been found in various water sources across the nation and prompted the recommendation of landfill disposal, take-back programs or buy-back programs. There are no take-back or buy-back programs in WC so landfill disposal is the only consistent means for residents to dispose of medication. A local non-profit organization called Join Together Northern Nevada has partnered with the Reno Police Dept (RPD) to sponsor biannual prescription drug round up programs; the first two were in October of 2009 and April of 2010. During the October event, over 39,000 pills were collected and over 93,000 were collected in April[25]. This is the only collection event in WC. Lyon, Carson, and Storey County offer similar collection programs. Collected medications were incinerated using Department of Agriculture's incinerator in compliance with Drug Enforcement Administration (DEA) disposal regulations. The difficulty with disposing and collecting prescription medication are legal issues related to the chain of custody restrictions; any medication that has been prescribed to an individual cannot be under the possession of any other person unless it is surrendered to an officer of the law. Certain medications can also be considered hazardous waste, further complicating and increasing the expense of disposal. The USEPA is proposing to change the classification of hazardous prescriptions as universal waste, but this would still not remove DEA restriction of controlled substances. Increasing volume of M&P for disposal could possibly increase over the next two years due to the aging Nevadan demographics, parallel to an overall aging population trend in the United States[26].

[24] Phone conversations with John Hasket of the Pallet Depot May 11, 2010.
[25] Phone conversation with Stacy Shambling of Reno Police Department, May 18th 2010
[26] *Age, Sex, Race and Hispanic Origin estimates from 2000 to 2005 and projections from 2006 to 2026 for Nevada and its counties,* Nevada State Demographers & Hardcaske, J., 2006

7. Biohazardous/Medical Waste

The DBHR (010.068) defines **BIOHAZARDOUS WASTE** as follows:

[W]aste which, because of its characterists may cause, or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or pose a substantial potential hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Biohazardous waste means any of the following:

A. Laboratory waste, including but not limited to:
    1. Human specimen cultures from medical and pathology laboratories.
    2. Cultures and stocks of infectious agents from research and industrial laboratories.
    3. Wastes from the production of bacteria, viruses, spores, discarded live and attenuated vaccines used in human health care or research and culture dishes and devices used to transfer, inculcate and mix cultures.
B. Pathological or human surgery specimens, tissues, or anatomical body parts removed at surgery or autopsy.
C. Waste, which at the point of transport from the generator's site, at the point of disposal, or thereafter, contains recognizable fluid human blood, fluid blood produces, containers or equipment containing human fluid blood.
D. Isolation wastes.
E. Sharps waste.
F. Trace chemotherapy waste, including but not limited to, gloves, disposable gowns, towels, and intravenous solution bags and attached tubing; which are empty, or that are contaminated through contact with, or having previously contained chemotherapeutic agents.

[See regulations for specifics for section F.]

Bulk chemotherapy, pharmaceutical wastes or dead or diseased animals subject to regulations by the State of Nevada Department of Agriculture are excluded from this definition.

There are no biohazardous or medical waste streams being imported into WC for *direct disposal*, however some biohazardous waste streams outside WC are imported into WC for thermal treatment prior to disposal at LRL. There are only three means of disposal for residents in WC; WM facility on Commercial Street, Mail-in-programs (both at large and in Incline Village) and in home care arrangements. WC SWM Program has delivered and made available sharps containers to local

residents when requested. Residents are then directed to take their sharps waste to the WM Medical Waste Facility (MWF) for free disposal through an informal agreement with WM, INC. and the WC SWM Program. Utilization of this outlet is limited, and occasionally sharps waste in sharps containers from immobile residents will also be picked up by the SWM Program and delivered to WM. There are no concrete numbers of residents who drop off sharps to the Waste Management MWF, the program manager said on average there were only 5 residents a month who drop off syringes or medical waste; this includes medical waste from home dialysis, syringes from diabetes or medical treatment, and syringes from animal medical treatment. There are a variety of nation-wide companies that offer sharp mail-in services to residents, some of which are directed specifically at diabetics but can be used for any sharps, both for humans and pets. Utilization numbers for any of these mail-in companies are unavailable for WC.

Incline Village offers two different sharp services for residents. Residents can use a mail-back option through a third party company who bills WM for the services. Residents can also pick-up and drop-off sharps containers at the transfer station. Program costs are covered by the local franchise agreement fees so use of the programs does not incur extra cost to residents. Utilization of this program is also very low; only one (1) 30 gallon container of sharps are collected from the Incline facility every six months which equates between 20-50 people. The last outlet of biohazardous waste and medical waste are though home health care providers. There are many hospital, clinics, and private health care companies that can offer home health to WC residents, all of which either autoclave the waste at a central hub or contract with a licensed biohazardous waste hauler for disposal.

The following section will focus primarily on residential sharps disposal since most medical waste is managed through hospitals or home health. In the 2007 Nevada SW Plan states that “WC District Health Department is currently working with the garbage franchise holder to implement a "Sharps by Mail" program for sharps generated within households.” Besides the informal agreement with WM, INC. in regards to isolated residential biohazardous waste drop-offs, currently there is no designated sharps program in WC besides the mail-in-program through the IVGID for Incline Village Residents. The USEPA encourages all communities to have a medical waste program and adequate sharp collection sites or outlets. The primary threat of improperly disposed sharps is accidental exposure of blood borne pathogens (BBP) and/or infectious agents to sanitation workers. The program manager for the MWF said there were no incidents at the WM facilities involving workers

being stuck with improperly disposed of sharps either in the transfer stations or out on trash pick-up routes.[27]

The number of syringes being disposed of in WC over the next ten years may increase due to an aging population, and increase of prevalence and incidence of diabetes, and increases of other chronic conditions like kidney disease and arthritis which can be treated with injectable medications. Obesity and age increases the risk of developing diabetes (especially type II), both of which are increasing trends in Nevada and the United States[28]. The prevalence of diabetes in WC rose from 6.2 percent in 2007 to 6.4 in 2008, however, WC is below both the Nevada and National Average for diabetes prevalence. Looking back to 1980, the Center for Disease Control (CDC) data vividly illustrates an increasing trend of diabetes in the United States, a trend that will greatly increase the number of people who will be insulin dependant and require insulin injections[29]. Very little national and international research has looked at syringe behaviors in the private sector, and there is no local data for WC or Nevada. Of the few studies published looking at syringe disposal behaviors, most of them have been conducted in the United Kingdom. Though these studies cannot be directly applied to local communities, the findings do raise important concerns that can be address when evaluating the WC Plan. The most recent of these British studies was a 2003 article by Olowokure et al. where less than 50% of all residents who disposed of sharps did so either by throwing them in the regular trash stream, or in containers not appropriate for syringe disposal (i.e. beer cans) which were placed with household trash.[30] Developing an effective medical waste and sharps collection and disposal program may also require specific strategies to serve rural and frontier communities. Russell et al. (1995) conducted a study of rural residents in Alberta, Canada where one quarter of residents interviewed administered medication to either themselves or animals using syringes or needles, most of which were used on animals; this finding was not compared to urban or frontier communities.[31] Not all veterinarians in the area will take syringes back from WC residents who administer injectable animal medication and it is unknown how these syringes are normally disposed of. Though these studies were not done locally or even in the United States, the findings for both sharp/needle disposal literacy

[27] Phone conversations with Sal Mazza of Waste Management's Medical Waste Department in Reno June 7th, 2010

[28] Health, United States, 2009: With special feature on medical technology. National Center for Health Statistics, 2009.

[29] *Number of civilian, non-institutionalized persons with diagnosed diabetes, United States, 1980-2008,* CDC, http://www.cdc.gov/diabetes/statistics/prev/national/figpersons.htm, Retrieved October 25, 2010.

[30] Olowokure et al. (June 2003). The disposal of used sharps by diabetic patients living at home. *International Journal of Environmental Health Research*, 13, 117-123.

[31] Russell et al. (1995) Needle and syringe use & sharps disposal by a rural population. Journal of Environmental Health, 58(1), 16-19.

and rural issues need to be explored for WC to determine if the current SW Plan is sufficient for sharps/needle disposal.

8. Green Transfer Stations

There is no definition in the DBHR for green TS, however, their concept is similar to that of a regular SW TS but is more selective to materials collected. Green waste is collected and accumulated on site, sorted if needed, and then shipped off to other disposal, recycle or reuse facilities. There are three permitted green waste transfer stations in WC, two of which where permitted in 2009 and one in 2010. Because all the facilities are relatively new, none of them have reported any volumes from customers. All of them operate in a similar manner; discarded wood from home and construction sites, yard waste (including leaves and grass) and old brush are received from both residents and commercial business for a fee. All waste is sold to cogeneration plants in Loyalton and Honey Lake, California. Future plans include the production of compost and erosion control media. There are no other pending plans or interest to build any other green TS in WC.

9. Waste Tire Hauler and Waste Tire Management Facilities

The definition of a waste tire hauler or waste tire management is not included in the DBHR but is scheduled to be included after January 2011; they are defined in NAC 444A.230 444A.250 respectfully. Currently there are no permitted waste tire management facilities in WC, nor are there any facilities outside WC that are permitted *through* WC as waste tire management facilities and receive tires from WC residents. There are 9 permitted waste tire haulers in WC, only 6 of which have current permits and only 3 of those collect and haul tires actively. The majority of the tires collected are by Ray's Tire Company, who in 2009 collected over 300,000 tires. Ray's Tires collects tires and stores them at the facility in Reno until they are shred for disposed of in LRL. The other two companies are Golden By-Products and TRI-C and they are located in California; both of them recycle the tires for use in landscaping and in other commercial products. TRI-C only collected 1,000 tires from WC in 2009 while Golden By-Products collected 50,000 tires in 2009. Residents may also dispose of waste tires at TSs and LRL for a fee and only for limited volumes. Recycling rates for tire disposal in WC has only been recorded in the Nevada Recycling Report since 2008, however the recycling rate of waste tires did rise from 266.96 tons in 2008 to 744.98 ton s in 2009.

The management of waste tires is important for various reasons. Improperly stored, stockpiled, or illegally dumped tires can pool water and increase the prevalence of vector borne disease in the area by promoting

mosquito breeding grounds. Tires are also difficult to manage in a landfill unless they are shredded, and do not biodegrade easily if they are made of a material other than unvulcanized natural rubber. If they are not shredded for landfill disposal, they can trap methane gas inside the internal void space and become buoyant and rise to the surface of the landfill. Correct tire storage is also important to decrease the likelihood of tire fires which are very difficult to extinguish and emit toxic smoke.

The majority of tires in WC, and the state, are disposed of in landfills due to a lack of alternatives.[32] There are no facilities in the WC that utilize WtE technology for tires or use tire derived fuel (TDF). In Clark County there is one waste tire recycling facility that opened in 2009 with the advertised potential to recycle up to 2 million tires a year. The lack of waste tire disposal alternatives for the majority of the state, and especially for WC, is unfortunate since markets for waste tire products and derived energy and readily available. In 2008 the Rubber Manufacturers Association released a report that showed nearly 87% of all tires produced in the United States were utilized by end users for other treatment besides traditional landfill, of which 53% were used to produce TDF. Other tire products like ground rubber and rubber used in other civil engineering projects have also seen increasing demand in the last couple of years as well.

10. Rendering & Rendering Services

Rendering is a disposal outlet for food waste, deceased animals, scraps from animal processing (e.g., slaughter houses) and by-products of commercial cooking processes (e.g., grease or cooking oil). Rendering is an old process that has been utilized for thousands of years. A basic rendering process involves grinding products into smaller pieces, cooking at high temperature and dehydrating them to produce fat and protein meal.[33] The resulting fat products can be used in an array of industries including soap manufacturing, energy production (burning grease for energy), chemical manufacturing, rubber processing, and animal feed production. The protein meal can be used in animal feed manufacturing and fertilizer due to the high protein and nitrogen content.

Based on a report from the National Renderers Association, around 50% of the total weight of commercially raised animals for human consumption is not eaten and discarded[33]. Composition of this 50%

[32] *SW Management Plan*, NDEP, 2007, http://ndep.nv.gov/bwm/swmp/SWMPlan.pdf. Retrieved April 13, 2010.

[33] Meeker, D. L.; Hamilton, C. R., 2006. An overview of the rendering industry. In: Essential rendering. Meeker (Ed). National Renderers Association.

includes animal bones, skin and inedible animal products from the slaughtering process (i.e. offal). This yields a large of volume of waste would be directly be landfilled without alternative disposal or treatment methods. Decomposition, in landfills or traditional composting, of such putrescible waste produces green house gases including methane and can leach high levels of nitrogen and phosphorus into soil and water. On average these food and animal waste products constitutes less than 15% of the overall waste stream, however it is an important component of municipal solid waste and rendering services need to be considered in the WC SWM infrastructure. Rendering not only provides needed collection for these products, but contributes to the overall WC recycling rate and may be important in reducing total carbon emissions into the atmosphere.

Despite the benefits of rendering, this practice is not always encouraged due to misnomers about odors and gases produced. There is also no Nevada State Legislation that directly addresses rendering and certifications of rendering operations. Currently there are no facilities in WC that conduct rendering activities. There are only two businesses that collect waste products that can be used in the rendering process in WC: Simple Fuels collects grease from commercial cooking establishments and Reno Rendering picks up animal products, grease from cooking establishments and expired animals. Neither of these businesses actually conduct rendering activities; Reno Rendering does recycle use cooking oils and grease trap material, but does transfers of inedible meat and dead stock (e.g., expired or dead animals) to full a rendering facility out of state. Simple Fuels uses the grease to make biodiesel and the El Dorado Casino which uses cooking grease as fuel for their boiler.

In 2010, Reno Rendering alone picked up and delivered 13,000 tons of material for rendering (based on phone interviews with Ryan Koewler, April 13, 2011). This highlights the magnitude of material produced by WC and how pivotal this industry has been in diverting these waste products from the local landfill. Though the rendering capacity of WC is currently limited, it has the potential to become a more prominent fraction of the WC recycling and diversion rate. More focus needs to been directed onto this disposal alternative.

B. Commercial & Industrial

There are two forms of commercial & industrial (C&I) recycling and diversion outlets that occur in WC; internal and external. Some businesses have onsite and/or in-house programs to manage internal waste streams. Some of this is due to manufacturing planning, green business initiatives, cost saving techniques, and markets for recyclable materials. Some of these businesses will lend their diversion information to the Health District and is included in the state recycling reports, which is not a requirement of their operating permit if they do not accept

recycling materials from the public. Others businesses consider their recycling/diversion numbers or technology proprietary, and do not submit their recycling numbers. Companies can also contract with a variety of other recyclable, hazardous and SWM companies in the community for external diversion needs. WM offers a variety of recycling services to C&I customers for a fee in addition to regular garbage service which is listed in the specific franchise agreements in the appendices.

Solely looking at the number of business/recycling customers from WM over the last 10 years, it is obvious there are an increasing number of businesses in WC that are recycling or diverting materials. Recycling patterns are definitely affected by fluctuations in the market for materials in relation to the cost of recycling service, origin of the business and management practices. Businesses that provide services and products to a "greener" base of customers or are considered more "environmentally conscious" are more likely to recycle materials, either due to demands of customers or to maintain an image of a green company. Businesses with strong administrative recycling policies like Patagonia are able to recycle virtually everything from production to sale. The last big influence of business recycling practices can depend on the origin of the business, especially when businesses come from other states with more stringent recycling mandates. Because Nevada has much lower corporate taxes and less stringent environmental mandates, many businesses come from California while maintaining their original recycling procedures. Many of them are surprised by the lack or mandated recycling and oversight of green activities in Nevada compared to the regulatory environment in California.

3.7 ILLEGAL DUMPING

The DBHR (010.340) defines **ILLEGAL DUMPING** as follows:

> [C]ausing solid waste to be placed, deposited or dumped in or upon any street, alley, public highway or road in common use, or upon any private property, public park, or other property other than the property designated or set aside for such a purpose by the government for proper land disposal. The term SW includes, but is not limited to, an overflow of any sewage, sludge, cesspool or septic tank effluent, or an accumulation of human excreta. Illegal dumping may be referred to as unlawful dumping.

The DBHR (010.256) defines **DUMP SITE** as follows:

> [A] location at which solid waste is disposed of unlawfully.

The DBHR (010.492) defines **OPEN DUMP** as follows:

> [A]n uncontrolled disposal site where solid waste is disposed of in a manner which does not comply with these regulations or any permit issued pursuant thereto.

WC has an abundance of open spaces that are constantly spotted with illegal dump sites. It has been suggested from within the SWM Program that the public will generally dump SW illegally due to cost of disposal, access to open land or distance from transfer station, lack of awareness of illegal dumping laws and rules or a lack of concern for environmental or public welfare. Illegal dumping sites can become an eyesore, physical hazard for both the public and nature, become a potential fire hazard, propagation point for future illegal dumping sites and increase the chances for environmental contamination depending upon the items dumped. Cost associated with complaint investigation and abatement can also be expensive to tax payers; illegal dumping cases can take months and man hours to close, for both WC investigators but also for Sheriff's Deputies who are also involved with complaint investigations. When a responsible party is located for an illegal dumping, they assume all legal and economical responsibility to clean-up the site; civil and criminal penalties can be imposed by state law (NRS 444.630, 444.635) for dumping on both private and public land which can include fines, jail time and community service. As of October 1, 2009 all monies collected as civil penalties for illegal dumping are to be redirected back to the Health District for use as rewards for information leading to arrests of illegal dumping, education programs, clean-ups and SWM. In early 2010 a fund was established for the collection of civil penalties. However, historically, very few of these cases have been prosecuted that would yield monetary deposits.

In addition to the WCHD, the WC Sheriff's office (who also maintain the illegal dumping hotline) and other non-profit organizations work to combat the illegal dumping issue in WC. The most involved is Keep Truckee Meadows Beautiful which hosts annual clean-up events, raises money for education programs and sponsors the Illegal Dumping Task Force. There is a growing sentiment within these groups that a more aggressive or alternative strategy for combating illegal dumping needs to be adopted and more directly involve WC residents. One strategy that has been discussed is adding an extra fee to all resident's garbage bill to fund more free dumping opportunities dumping. Further discussion is needed among

Because not all illegal dumping sites and complaints can be connected to a responsible party for abatement, the SWM Program also budgets $10,000 a year for dumpsters to facilitate community clean-ups. In light of the economic downturn, funding for clean-up of illegal dumping sites (including abandoned vehicles) has already begun to dry up. Though the amount of funding for clean-ups is decreasing, so are the number of illegal dumping complaints and total SW complaints received by the WC. Figures 3.4-.5 show the historical number of SW complaints since 1994; the numbers of illegal SW complaints seem to be leveling since 2000 while total SW complaints seem to also be stabilizing since 2005. Reduction in the number of complaints received by WCHD does

not necessarily mean the number of dump sites is decreasing, especially since the WC Sheriff's office also receives illegal dumping complaint. Significant projection rates for illegal and SW complaints could not be calculated due to the small number of data points available. The distributions of SW complaints are not evenly distributed throughout Sparks, Reno, Incline Village and the rest of WC. Based on annual SW reports specific to assigned inspector areas, northern Reno and Sparks produce the most complaints, the most coming from Northeast Reno North of Interstate 80. The most accepted hypothesis of why Northern Sparks and Reno produce the most SW complaints is because there is more land for illegal dumping and parcels usually larger which may facilitate SW accumulation, however, no formal research has been done on the issue.

In 2006 an Illegal Dumping Task Force was created from a community clean-up event organized by Keep Truckee Meadows Beautiful. This task force includes WM; citizens members from WC, City and federal agencies and law enforcement. This organization disseminates public education to curb illegal dumping and also has been supportive of specific legislation for their cause. Nearly twenty years prior a similar task force was in place in the Reno-Sparks Area, suggesting that illegal dumping, especially in open spaces has historically been a an issue in WC.

A 2009 study done by UNR Professor Margret Cowee, M.S., highlighted the issues related to illegal dumping in WC both in residents awareness of illegal dumping and how informed the public is about SW disposal issues.[34] Nearly three-fourths of the 452 people interviewed said they had seen an illegal dump site yet only 15% were aware of the illegal dumping hotline. The high number of illegal dump sightings suggests there are persistent dump sites in WC despite the number of abated and closed complaints. Residents were also quizzed on 8 SW disposal opportunities (i.e. free dump days and LRL refrigerator program), for all 8 options, barely 50% of them were even aware of the programs. More on this topic is discussed in the Public Information & Education Chapter.

3.8 LIQUID WASTE

A. Liquid/Aqueous Waste

1. Septic Tank Pumpings, Sewage or Sludge

Below is a list of DBHR definitions pertinent to liquid waste:

(010.044) **AQUEOUS WASTE** means liquid waste consisting of a waste matrix containing other solid waste, either in the true solution, colloidal, or particulate.

(010.216) **DIGESTED SEWER SLUDGE** means sewage sludge that has been digested to a point where the sludge is practically odorless, drains readily, and contains not over fifty (50) percent of

[34] Cowee, M. (2009) *Illegal Dumping in Northern Nevada: Resident Perceptions and Willingness to Pay for Expanded Cleanup and Enforcement.* Department of Resource Economics, University of Nevada Reno.

the total solid matter in the volatile form, with a moisture content of less than seventy-five (75) percent (stabilized so it will not further decompose so as to attract, sustain, or propagate insects, birds, or other animals).

(010.428) **LIQUID WASTES** means waste materials that are unable to be spaded or pass a paint filter test as defined in EPA Method 9095B.

(010.644) **SEWAGE** means a combination of the liquid and water which carried waste from any building or plumbing fixture from portable toilets, out-houses, or privies.

(010.648) **SEWAGE SLUDGE** means the residue separated from the domestic sewage by a wastewater treatment plant, consisting of solids and variable amounts of water.

The SWM Program has limited involvement with liquid waste, liquid waste disposal, and the issuance of waste release permits for liquid waste originating from Washoe County for disposal at LRL. The only areas of concern are disposal of sewage, sand/oil separator waste, grease trap/interceptor waste and finding alternatives to disposal at LRL. LRL cannot receive free liquids for disposal on the working face; accepted liquids are taken to a solidification area on a patch of land adjacent to the landfill but not included on the working face and then disposed of in the landfill. Diverting liquids from the landfill has been a priority of the SW Program since 1994, three years after the passage of 40 CFR subtitle D which outlined the restrictions of all landfill types and stated that Class I landfills like LRL cannot accept free liquid waste. Despite the lack of a relatively close industrial waste water treatment center, alternatives for liquid waste land disposal are available and highly utilized. Sewage, sewage sludge and various aqueous wastes can be taken to the Truckee Meadows Water Reclamation Facility for treatment, grease trap/interceptor waste can be applied for agriculture purposes and other aqueous water and sand/oil separator waste can be managed by local SW and hazardous waste companies for disposal at private facilities. The latter is the least used alternative, and the majority of liquid waste transported from WC to LRL is sand/oil separator waste.

Figure 3.6
Washoe County Total Solid Waste Complaint Graph

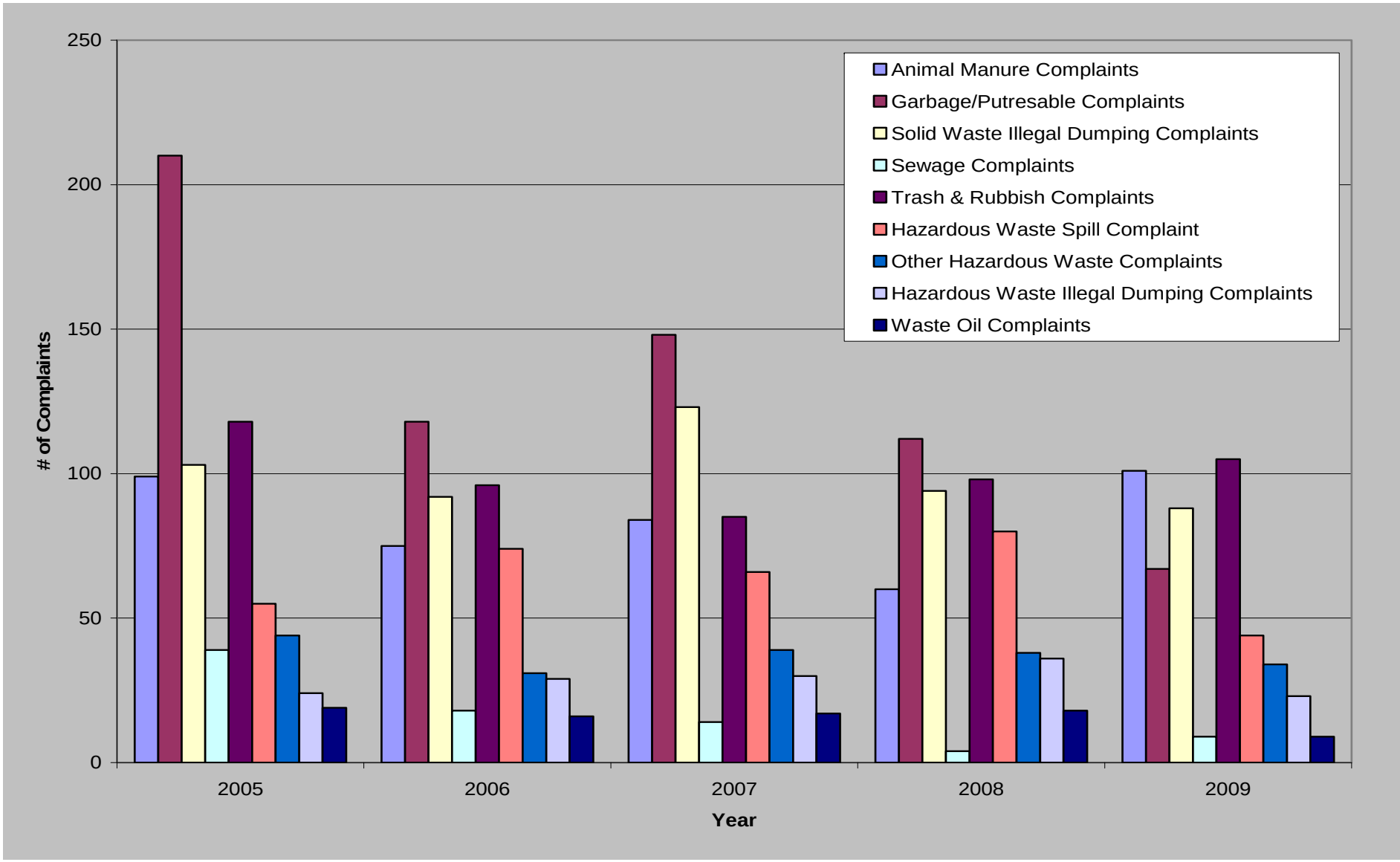
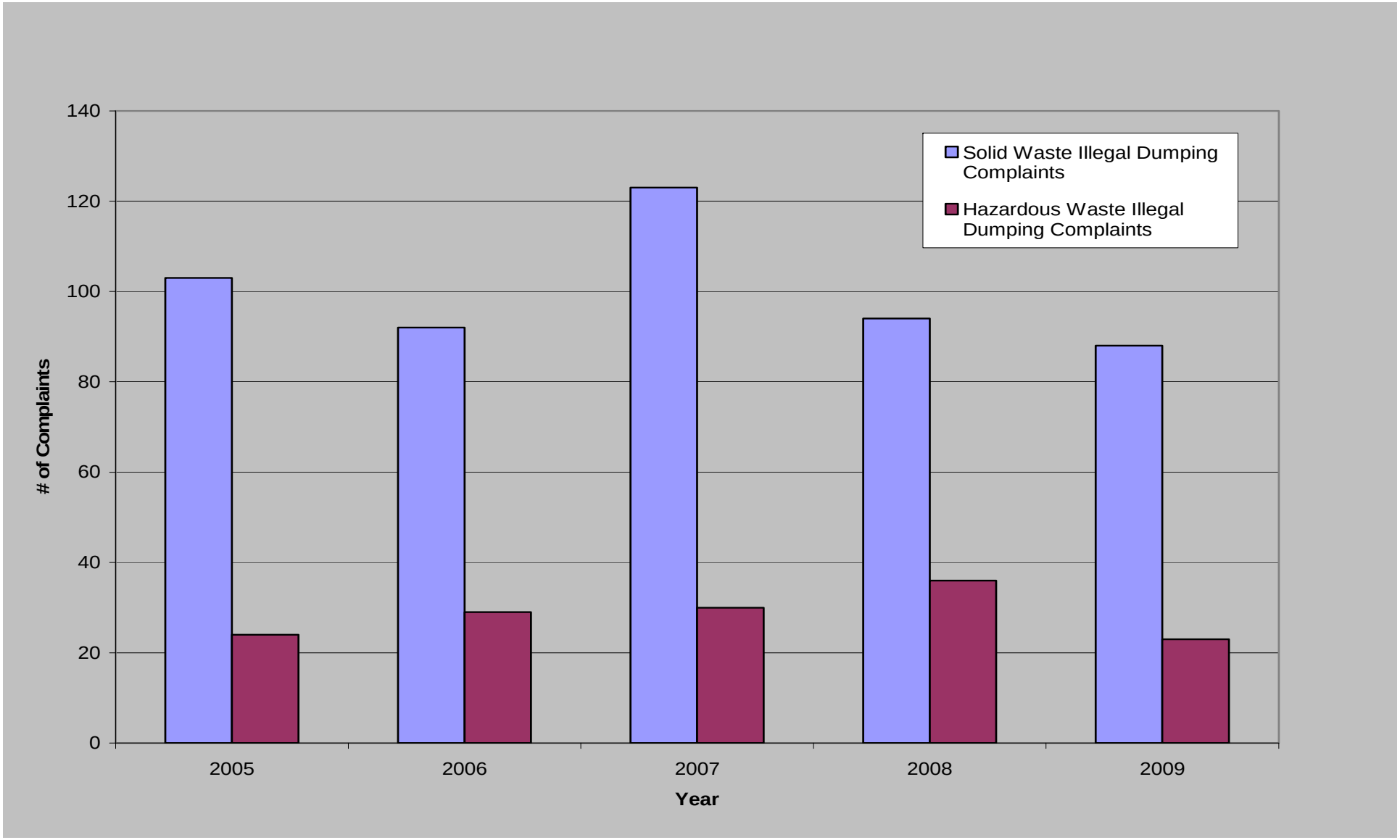
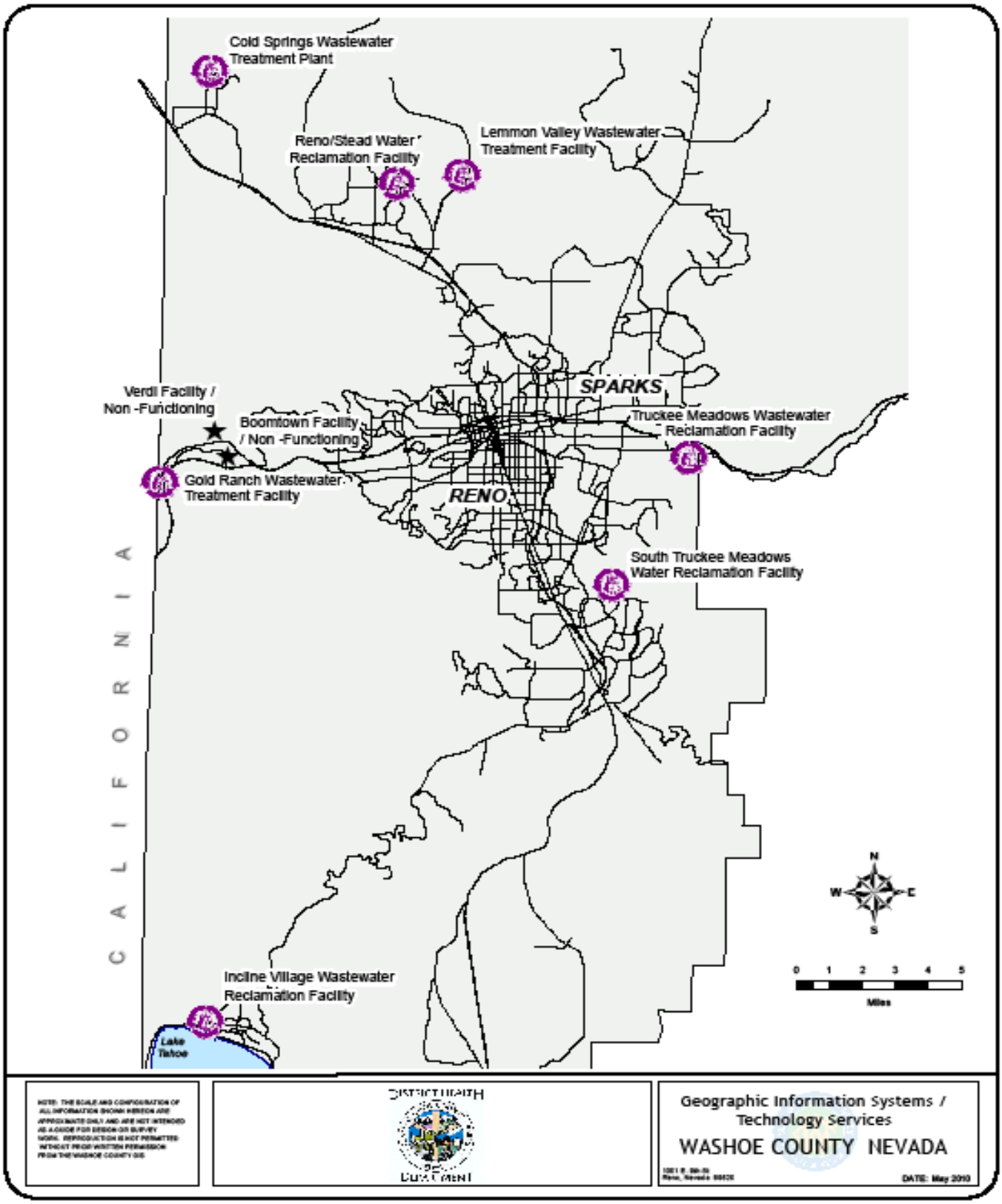


Figure 3.7
Washoe County Solid & Hazardous Waste Illegal Dumping Complaints



WASHOE COUNTY WATER RECLAMATION FACILITIES
FIGURE 3.8



3.9 FINDINGS AND RECOMMENDATIONS

A. TYPES AND DEFINITIONS OF SOLID WASTE

Findings

- In 2010, the WC SWM Regulations for resource recovery facilities was replaced with MRF regulations.
- Recent additions, deletions and modifications to the WC SWM Regulations made them more consistent with State of Nevada and federal SW regulations.

Recommended Goals

- Continue to strive for updates within the WC SWM Regulations to ensure the consistency with State of Nevada and Federal regulatory agencies.

B. SOLID WASTE COLLECTION

Findings

- All garbage collection is automated in some capacity between collection and disposal.
- Established frequency of garbage franchise agreement reviews are not consistent for all agreements.
- Expiration dates and fees for garbage franchise agreements vary
- Incline Village Garbage Franchise Agreement has the highest franchise fee, however, WM and the Incline Village General Improvement district include more diversion services to residents.
- The majority of "Fee" lands on the Pyramid Lake Indian Reservation are serviced by the Reservation garbage hauler even though they are considered part of WC and fall under the scope of the Independent Sanitation Company franchise areas.
- All residents of WC who accumulate garbage, and do not have an exemption, are required to have garbage service.
- There are a number of permitted trash haulers operating in WC in addition to WM.

Recommended Goals

- Standardize garbage franchise agreement expiration dates to facilitate the development of a regional garbage agreement.
- Determine or establish a standard to measure the adequacy of garbage collection.

C. SOLID WASTE FACILITIES

Findings

- Facility design for green transfer stations, compost facilities and MRF's are based on standard transfer station regulations, however, daily operating procedures are specific to the waste stream.
- LRL receives the vast majority of SW from WC.
- The life expectancy of the current foot print at LRL is 17-20 years; Northern, Southern and lateral expansions have been proposed, but not yet permitted.
- Both undocumented and documented historical dumping sites exist in WC.
- There are no open landfills located in WC.
- A proposal for a Class I landfill near Winnemucca, NV was submitted in 2007 and is making its way through the appropriate regulatory agencies for approval.

Recommended Goals

- Document historical dumps sites as they are encountered.
- Determine or establish a standard to measure the adequacy of transfer station capacity and operation for SW stream.

D. FRANCHISE RECYCLING PROGRAMS

Findings

- Optional, curbside recycling service is available to all WC residents. Additional recycling services are available for a fee to commercial and industrial customers.
- WC utilizes a multi stream recycling system and drop-off facilities are available to residents who do not have curbside recycling.
- The WC Recycling Rate for 2009 was 32%, which is above the state goal of 25% but, below the national recycling rate of 33%.
- TSs and LRL have begun to play a bigger role in the collection of recyclable and reusable materials for local businesses.
- Residents of multi-family dwelling units do not always have access to on-site recycling unless the facility has service.
- Two of the biggest factors that influence recycling behaviors are local policies/legislation and access to services (including convenience).

Recommended Goals

- Update the Needs Assessment for Recycling In Multi-Family Dwellings Report.

- Support the fostering of more collaborations between local recycling/reuse businesses and Waste Management at their facilities.
- Investigate progressive garbage and recycling collection technologies and systems.

E. NON-FRANCHISE DIVERSION PROGRAMS

Findings

- Reuse and recycle programs are easier to implement than reduction.
- Outside of the state recycling goal, there is no state-wide or county-wide vision regarding diversion.
- There are a variety of free and at cost diversion outlets available for residents.
- The market value of recyclable materials, lack of in-state/in-county end source users and separator technology are limiting factors for businesses to collect recyclable from the public.
- As of August 2010 there was 1 composting facility and 2 green transfer stations operating in WC.

Recommended Goals

- Conduct waste stream composition study to encourage waste-to-energy incineration plants to come to area.
- Increase public's awareness of local diversion outlets.
- Develop a more centralized location for drop-off of materials.
- Establish firm recycling/diversion goals with time frames for advancement.

F. ILLEGAL DUMPING

Findings

- The number of reported SW complains and illegal dumping complaints are either going down or stabilizing.
- As of 2009, all civil fines recovered from the prosecution of illegal dumping cases will be put into an account specifically for WC to use in the development of preventative and informative programs to reduce illegal dumping.
- A majority of residents have seen an illegal dump site but are unaware of the illegal dumping hotline.

Recommended Goals

- Increase the public's awareness and usage of the illegal dumping hotline.

G. LIQUID WASTE

Findings

- LRL cannot accept free/bulk liquids.
- Most liquid waste streams that were historically disposed of at LRL are now being diverted to other, more appropriate outlets.

Recommended Goals

- Continue efforts to find end users for all liquid waste stream.
- Foster the development of in-plant or on-site treatment facilities in commercial and industrial businesses.

CHAPTER 4
WASTE DIVERSION TECHNOLOGIES

4.1 INTRODUCTION

The purpose of this chapter is to provide an overview of presently available waste management technologies. This overview covers a range of alternatives for a variety of SW streams including recycling, composting and waste-to-energy (WtE) technologies.

4.2 RECYCLING

A. Material Recycling Facilities (MRFs)

MRFs have been around the United States since the 1970s[35] and even longer in Europe. Due to increasing efficiency of sorting technology in the last two decades, the number of MRFs operating has increased; as of 2010, there were 1,200 facilities in the United States[36]. MRFs are becoming the SW "gatekeeper" for diversion and are usually the first step in separating waste for waste-to-energy usage.

The WM recycling center on Sage Street is similar to a MRF in that they receive source separated material from customers and exercise some additional sorting of the recycling waste stream. Currently this facility is permitted as a TS, but there is an interest to become a true MRF in the near future. This transition has also been facilitated by the addition of a MRF definition in the 2010 WC Regulations.

Sorting of recyclables or recyclable material from the MSW stream occurs either manually from workers on sorting lines or from mechanical sorting machines; application of magnetic, optical recognition or weight based technology are used to remove ferrous and recyclable materials. Recyclable materials that cannot be recovered for resale or for energy production are usually landfilled. In some cases, waste is used for compost or WtE if these options are available.

The two biggest factors that should be considered when building a MRF are the regional prices of recyclable materials and the size of the facility. Smaller facilities may be more appropriate for smaller communities or communities that have limited recyclable streams. However, it may not be cost effective if the return from resale of recyclables does not off set the high up-front building costs and operational cost.

[35] Colville, E.E. & McFeron, N.J (November 1,1994) The Large, the small, the clean and the dirty: Equipping MRFs. *Waste Age Magazine.*

[36] United Nations Environment Programme website, http:www.unep.or.jp/ietc/estdir/pub/msw/north_a/topic_a.asp, retrieved December 1, 2010.

1. "Dirty" MRFs

There are essentially two types of MRFs; dirty and clean. The difference between the types depends on the waste stream utilized. Dirty MRFs receive recyclables comingled with MSW which is sometimes called "single stream" collection (this will be discussed later in chapter 5). There is only one curbside receptacle and separation of the waste stream occurs at the MRF not from the customers.

2. "Clean" MRFs

Clean MRFs receive recyclable material that has been separated from MSW by customers at the point of generation. In some of these systems, the different recyclable materials can also be separated by type (e.g., plastic, glass, etc.); this is how recyclable material and MSW is currently collected and managed in WC.[37](Note: the recyclable material currently collected is limited to glass, aluminum, steel cans, news paper, phone books and plastic 1-2.) In systems where recyclables are commingled, this is refereed to as "single stream recycling."

3. Material Price Trends

Materials recovered from recycling in WC are sold to markets throughout the United States, but usually to the California, Utah and Oregon. WM also utilizes oversee markets for material sales. The prices paid for the recycled materials varies based on the demand and value of the dollar in the world market. Aluminum cans have the highest price and green glass (and glass in general) has the lowest price. The prices of materials can vary within regions, and additional cost can be incurred if materials need to be transported to end-source facilities out of County.

All commodity prices, with the exception of white metals, took a drastic fall in 2008 at the beginning of the economic downturn but have been slowly increasing over the past 2 years. The prices however, have not returned to pre-2008 prices. [38]

4.3 COMPOSTING

Out of the 8 composting facilities in Nevada, only 1 is located in WC[39]. Composting programs can be designed to handle different organic feedstocks including

[37] Filtz, R. & Hauck, P. (Sep-Oct-2010) MRFs in the Age of The Green Energy. *MSW Management Magazine.*

[38] Harris, Thomas R., Robert M. Dick, Man-Keun Kim, Anthony Oliver and Charles Coronella. Economic Analysis of Waste Recycling Options for Washoe County, University Center for Economic Development, University of Nevada, Reno, University Center Technical Bulletin UCED 2009/10-12, January 2011.

[39] NDEP, Bureau of Solid Waste Management website, http://ndep.nv.gov/bwm/landfill.htm retrieved December 1, 2010.

biosolids. There are 5 basic composting technologies; discussion of the different types is listed below[40].

A. Technologies

1. *Windrows*: Basic and most inexpensive technology. Piles or rows of organic matter utilize microorganisms for the decomposition with occasional rotation of the soil and organic matter.

2. *Enclosed Aerated Windrows*: similar concept as basic windrows, except air is forced into the piles or rows to acceleration decomposition.

3. *Aerated Static Pile* (regular or enclosed): Similar to enclosed aerated windrows but, can be completely enclosed by a covering. Air is pumped into the core of the pile which contains porous materials to accelerate decomposition.

4. *In-Vessel*: Usually in a building, silo or a drum that facilitates mechanized turning and forced aeration.

5. *Anaerobic Digestion*: In a container or sealed building that utilizes anaerobic bacteria for decomposition; usually produces methane for energy sources.

B. Cost Discussions

The capital costs and operating costs for composting facilities can vary greatly. Below is a brief table of the major factors that should be considered prior to developing a composting facility. Windrows and static piles are considered low tech facilities while in-vessel and anaerobic digestion facilities are considered high tech facilities.

Table 4.1 Cost Considerations for Composting Facilities

Factors That Increase Cost	Factors That Decrease Cost
· large facility size · land purchases · low tech facilities require more labor and equipment · high tech facilities need more engineering and more maintenance	· high tech facilities require less labor to operate · Tipping fees ·high tech facilities produce a better product which has a better market price ·low tech facilities require less investment

This discussion of composting technologies is based on facilities that would be able to manage a feedstock volume appropriate for a municipality; this usually refers to a facility that can handle more than 3,000 tons per year. It is

[40] Composting Council of Canada & Compost Quality Alliance (2006) Composting Processing Technologies.

difficult to find cost comparison data since all operations have different capital costs, feedstock volume and compost composition production. However, in a report produced by the Composting Council of Canada, 4 composting technologies were ranked from least capital cost to most, where windrow was the cheapest at $40-60 per ton, followed by enclosed windrowing ($100-150 pre ton), in-vessel aerobic digestion ($300-500 per ton) and anaerobic digestion (AD) was the most expensive at $500-700 per ton.[41] This is of course for an operation that treats 55,000 tons of MSW per year, but this ranking is consistent throughout the literature.

Windrows & Static Piles

Capital costs can range from $200,000 to $750,000 with the high end of the cost spectrum associated more with turned and aerated windrow operations. Equipment usually account for two-thirds of the cost, land purchasing and structure construction account for most of the remaining costs. Annual operational costs are between $150,000 and $200,000, the majority for wages and labor; this equates to $36-72 per ton. The range of capital costs for static aerated piles are similar to windrows; the operations are heavily dependant on equipment and can incur additional costs due to water collection systems and asphalt floor requirements.

In-vessel

The basic equipment requirements for an in-vessel operation are the same for windrows; shredders, loaders and screening mechanism; cost for this equipment ranges between $80,000-100,000. The vessel and facility design constitutes much higher capital costs than windrowing ranging between $300,000 and $1.3 million. Operating costs are also higher for in-vessel since the vessel is mechanical and requires more maintenance by trained staff. Operating costs for average operations are between $200,000 and $340,000. However, because the composting process can be more precisely controlled in the vessel, the quality of composting product is usually higher and has the potential for higher resale which can dramatically reduce the operating costs with appropriate end-source markets.

Anaerobic Digestion

This composting technique has the highest capital costs due to the extensive site design and technology installation. Costs can be reduced by incorporating aerobic digestion with existing waste water reclamation facilities[42], but can still range from $1 to 3 million dollars with operating costs usually over $300,000 for simple operations. Anaerobic digestion also produces methane which can be burned to produce energy or recycled within the facility to reduce energy costs. As with in-vessel composting, operating costs can be significantly reduced with the resale of compost product and tipping fees.

[41] Composting Council of Canada (2006) Composting Processing Technologies. Abridged excerpt from a report produced for the Ontario Ministry of the Environment.

[42] Resource Conservation, Composting, USAEP, http://www.epa.gov/epawaste/conserve/rrr/composting/highway/index.htm, retrieved August 10, 2010.

C. Composting in Washoe County

In addition to different composting technologies available, other types of composting that can be done in WC.

1. *Backyard composting*: It is unknown how many people compost yard and food waste in WC. There is also nothing on the County website about back yard composting. In the past the County has given some seminars about composting, but most educational classes are done through community businesses or non-profit organizations. NDEP does have education material for composting as part of a SW & recycling curriculum.

2. *Biosolid (Sewage Sludge) Composting*: This technology is similar to in-vessel and anaerobic composting which produces a product that can be land applied. Only IVGID composts its biosolids using Bentley AgrowDynamics in Minden, NV. Historically biosolids from the Truckee Meadows Water Reclamation Facility were taken to farms and/or ranches in northern WC for land application. This practice was discontinued primarily due to increased transportation costs and a desire by the treatment facility to explore multiple re-use options for biosolids.

D. Potential Compost Applications

1. *Roadside Applications*: maintains and balances soil chemistry and moisture. Can also degrade contaminants, specifically petroleum-based.

2. *Forest Land/Habitat Application*: Improves quality of top soil to facilitate the recovery of forest ecosystems and land improvement in a similar manner as compost is used for agriculture applications. In this same vein, it can also be used as a disease control for a variety of plants and seedlings.

3. *Remediation of Hazardous Materials and Petroleum Contaminated Soil:* tailored composting techniques can be used to remediate soils contaminated with heavy metals, detonated explosives residue and organics petroleum products. Different mixes of soil can be used to remove contaminates from solids; occasionally this technique includes the use of plants to aid the remediation process.[43]

4. *Erosion Control and Landscaping: Compost has an enhanced ability to hold and slow the velocity of water on slopes, making it a useful tool against erosion. Compost can also be used to increase foliage on barren sites to retard the lost of top soil from weathering.*[44]

[43] USEPA, Innovative Uses of Compost: Bioremediation and Pollution Prevention, http://www.epa.gov/epawaste/conserve/rrr/composting/pubs/bioremed.pdf, retrieved December 8, 2010.
[44] USEPA, Innovative Uses of Compost: Erosion Control, Remediation, and Landscaping, http://www.epa.gov/epawaste/conserve/rrr/composting/pubs/erosion.pdf, retrieved December 8, 2010.

4.4 WASTE-TO-ENERGY (WtE)

A. Introduction

Several (WtE) technologies are currently on the market with new advances and upgrades developing daily. Different WTE (technologies) exist to manage different waste stream constituents and can be scaled to any volume of waste. In the 2006 State of Garbage survey done by Biocycle[45], 7.5% of America's garbage is combusted in WtE plants with New England states combusting a third of their garbage. WtE technology will also become important in light of two energy acts passed in the last 10 years and as nations become more focused on reducing Green House Gas Emission (GHG). The Energy Policy Act 2005 states that, "by 2013, 7.5% of the energy consumed by the federal government must be from renewable source," of which WtE is considered renewable (U.S. Government Printing Office, 2005). This legislation also developed tax incentives and loans for renewable and alternative energy technologies. The Energy Independence and Security Act pushes the United States to become less dependant on oil for energy and demands more efficiency from consumer products (e.g., cars) to decrease energy cost and consumption.

Currently there are no WtE plants in WC, however, one is being built in Storey County that will eventually receive feedstock from the WC MSW stream. WM has made a 15 year deal with Fulcrum BioEnergy which utilizes gasification and thermal recovery technology to produce electricity and ethanol. The feedstock for this technology will require some processing of the waste stream prior to utilization; this is projected to be done in a MRF-like processing facility that will either be run by WM or constructed in conjunction with the WtE plant.

B. Technologies[46]

1. Combustion/Thermal Process/Incineration

This process is the oldest WtE technology; older versions produced large volumes of hazardous chemicals contributing to public resistance. As with gasification, the SW stream needs to be segregated and shredded prior to incineration. Usually this process is conducted in tandem with a thermal process to produce energy.

a. Types

i. Mass Burning: This is the simplest form of incineration. Less consideration is given to the feedstock and the incineration environment. This process usually yields the most ash products.

[45] *The State of Garbage*, Biocycle & The Earth Engineering Center of Columbia University, 2006.
[46] Wagner, Leonard & Mora Associates (July 2007) Waste-to-Energy (WtE) technology Report.

ii. Cement Kiln (Tire-Derived-Fuel): Tire incineration is the fastest growing disposal method of tires in the United States.[47] This process is also used to incinerate hazardous waste because of the high temperatures.

iii. Pyrolysis: Using heat to break down SW in the absence of reactive gases. Can be used with gasification; still more of an experimental technology.[48]

iv. Refuse Derived Fuel (RDF): This is a processing technique of SW not a specific technology. When SW waste streams are shredded, dehydrated and recyclable materials have been removed, then is can be considered a RDF.

2. Gasification

This process turns waste into combustible gases and ash in an oxygen deficient environment; usually conducted in tandem with a thermal process to produce energy. Prior to incineration, the waste stream must be segregated to remove noncombustible materials.[49]

a. Types

i. Concurrent/counter current fixed bed.

ii. Fluidized bed.

iii. Plasma arc: utilizes high electrical energy.

C. Landfill/Biomass Gas Capture

The two biggest products of natural organic decomposition in landfills are methane and carbon dioxide which are important in GHG monitoring as required by the EPA and are considered integral components for climate change. Landfills account for seventeen percent of all methane emissions in the United States and are the third largest source of man-made methane emissions which can trap a much higher percentage of heat in the atmosphere than carbon dioxide[50]. Landfill gas (LFG) capture is relatively wide-spread across the United States and increasing. Methane is collected via horizontal or vertical wells in landfills and either burned off or combusted for use in energy production. The efficiently of LFG systems can range fifty and ninety percent and depends on the organic composition of landfills, design of collection systems and daily cover.[51]

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[47] Rubber Manufactures Association, Scrap Tire Markets in the United States 9th Biennial Report, 2009
[48] Friends of the Earth (Sep 2009) Briefing: Pyrolysis, gasification and plasma.
[49] Khoo, H.H. (2009) Life cycle impact assessment of various waste conversion technologies, *Waste Management, 29, 1892-1900.*
[50] EPA, Landfill Methane Outreach Program, http://www.epa.gov/lmop/basic-info/index.html#a02, retrieved July 18, 2011.
[51] Gardner, R.S., Is garbage a waste, or a resource? *MSW Management*, June 2011, p14-25.

LRL has a methane gas collection system and three methane generators that will utilize the landfill generated methane. The generators can produce enough electricity to satisfy the facility's energy requirements and power up to two-thousand homes. This system should be operational by spring of 2015 and excess energy will be returned to the grid. Because landfilling is highly utilized in the Washoe County due to convenience and relatively low cost, LFG capture will continue to be an increasing important component of local landfill and SWM.

D. Biochemical Processing

1. Anaerobic Digestion: Similar to the process used at waste water treatment facilities during the decomposition of organic solids into methane and biosolids.

E. Chemical Digestion

1. Waste-to-Ethanol (WtEtOH): Syngas can be manufactured into ethanol and is being utilized in the new WtE process in Storey County.

2. Biodiesel production (etherification): Produces biodiesel from food by extracting the oils and fats.

F. Thermal Depolymerization: Produces crude oil from the degradation of processing of petroleum products like tires.

4.5 LAND DISPOSAL

Landfilling is the oldest method of SW disposal and is still one of the most utilized disposal methods for solid waste. Landfilling has become more of a science due to the regulations on leachate control, water quality, advances in methane capture technology and the passage of other environmental regulations. In many cases it is the most economical disposal method of SW. Here in Nevada (and most of the West), the landfill crisis has not been as critical an issue as in other parts of the country, due to the abundance of nigh, unused, barren and unoccupied land. This abundance of land also serves as a buffer between the landfill and the general public, however, vast open spaces for disposal may also facilitate a general lack or need in the community to increase diversion, attract new diversion technologies, initiate new diversion collection management systems and possibly even reduce the development of prudent environmental values.

4.6 DEVELOPMENT CONSIDERATIONS FOR WASTE-TO-ENERGY TECHNOLOGIES

A. Introduction

True cost comparisons are difficult among technologies unless the particulars of the actual plant, feedstock, products and transportation costs are known. This is especially true for the new WtE technologies like gasification and pyrolysis where most capital cost and operational cost data is from the companies

who developed and piloted the technology. This section is a discussion of factors that must be considered when proposing the installation of any WtE facility; particulars to WC are also discussed.

B. Preliminary Facility Considerations

1. Solid Waste Stream Caloric Value & Composition

Most technologies rely on heat to breakdown SW streams, so it is important to determine the BTU value of a waste stream prior in order to choose the most appropriate technology. If caloric value is low, energy will need to be added to the system to initiate unless a low temperature system is used. SW streams with high caloric value may be considered for RDF treatment prior to treatment and increase efficiency of recovery. Paper products and plastics have very high BTU values in MSW streams, but issues with emissions can arise when plastics are incinerated. The utilization of MRFs or singe stream recycling can decrease the cost of separation and increase the energy recovery, while other WtE technologies can take comingled SW streams with similar recovery.

2. Moisture Content

Conversations with staff from the WC SW Management Program suggest that the moisture content of the SW stream going to LRL is around 65%; relatively high considering the arid environment. Average moisture content for MSW is between 20-70%, so it can vary greatly on the waste stream composition.[52,53] Organics and food waste are the biggest contributors of moisture content; waste-based dust control techniques can also increase water content during treatment or transport. Feedstock that is high in water content can decrease the efficiency of incinerating. Dehydration of the SW stream is another draw of energy that must be considered when calculating total system energy recovery.

3. Transportation & Transmission

Transmission refers specifically to the transportation of electricity from WtE or anaerobic digestion (AD) plants to local utility grids. Not all utility companies can easily or cheaply accept energy from off the grid. Costly transmission lines or stations may need to be installed which can greatly increase capital costs of projects.

Transportation of feedstock and end-products (including electricity) must also be considered in cost analysis. If products like diesel oil or ethanol will be produced, market value and proximity of end-source

[52] Cointreau, S (2001). Environmental Management of Urban SWs in Developing Countries: A Project Guide. Urban Development Department, World Bank, Washington, D.C..
[53] Olinger, D.S. & Lilley, D.G. (2007). Combustion of Municipal SW under HiTAC Conditions: Some General Calculations. AIAA Aerospace Sciences Meeting and Exhibit.

users will determine not only the logistics of transport but are vital in deciding if chemical products or electricity should be the end product.

4. Waste Products & Residuals

WtE technologies that utilize thermal processes will inevitably produce ash or vitrified residuals. Higher temperature processes will yield less ash, but require more energy to run. The disposal of ash depends on its constituents and proximity to disposal facilities[54]; if ash is not inert it may need further treatment to meet land disposal restrictions. Ash without hazardous constituents has the capacity to be used as a fertilizer or can be landfilled. Vitrified residuals from very high temp processes (e.g., plasma arc technology) has been used in asphalt and other construction materials. Waste biosolids from AD or fermentation processes can also be used as a fertilizer, landfilled or incinerated based on the caloric value.

5. Gas production

Gas production is advantageous for two reasons; one, it can be reintroduced into the system for combustion, and two, it can be converted into chemical products for retail. Biogas (methane, carbon dioxide) and syngas (hydrogen, carbon dioxide) are the most significant products of thermal processes. Both biogas and syngas can be burned, but have a lower BTU value than natural gas; syngas is nearly 30% less combustible than natural gas.[55] The quality of gases is also dependant on the efficiency of the process and the composition of the feedstock.[56] The last consideration with gas production is the cost of scrubbing emissions, to meet air quality requirements.

C. Financial Considerations

1. Capital Costs & Operating Costs

As mentioned above, it is difficult to determine capital costs unless the particulars of the facility and products are known. However, the costs are significant with average cost being between $10-100 million.
The Waste to Energy Research and Technology Council[57] calculated the average cost of WtE plants at $1650 per annual ton. Tipping fees, electricity retail and product retail are the biggest means to reduce capital costs, operational costs and secure financing (in conjunction with meeting feedstock requirements). Lastly, when considering size of facility, taking into account economies of scale is also important when determining the

[54] Themelis, N.J. (2008) Developments in Thermal Treatment Technologies. Proceedings of the North American Waste-to-Energy Conferences, Philadelphia, Penn.
[55] GE website on IGCC Technology, http://www.gepower.com/prod_serv/products/gas_turbines_cc/en/igcc/technology.htm, retrieved November 4, 2010.
[56] Friends of the Earth Limited. (2009). Briefing: Pyrolysis, gasification and plasma.
[57] The Waste to Energy Research and Technology Council website http://www.seas.columbia.edu/earth/wtert/faq.html Retrieved November 1, 2010.

size of the plant in relation to out put and cost. Operational costs depend on the efficiency of feedstock processing (if applicable to the technology), efficiency of energy recovery and maintenance costs.

Table 4.2 WtE Technology Comparisons

Technology	Advantages	Disadvantages	Other Comments
RDF	• Dehydrates SW • Shredding creates more surface area for reactions • can be used in tandem with MRF	• increases processing cost	• Facilitates material recovery
Gasification (of Tires)	• Less emissions than incineration • Can produce commodities in addition to electricity	• Tires still need to be shred • High temp process that is energy expensive	
Gasification (low temp)	• Less energy required to run • Gasses can be fed back into the system • More efficient than traditional incineration • Can produce commodities in addition to electricity	• Produces more ash that high temp processes, but less than traditional incineration	• Popular in Japan & Europe
Gasification (plasma arch)	• Less emissions than incineration • Significant volume reduction • High gas production that can be fed back into the system • Can produce commodities in addition to electricity • Less emissions than incineration	• Produces ash and char • High energy demand	• Popular in Japan & Europe
Pyrolysis	• Less sensitive to feedstock • The formation of combustion by-products is limited	• May require more cleaning and processing of gases and liquids	• Still considered an experimental technology will few large-scale examples
Pyrolysis & Gasification	• Most efficient system • Can produce commodities in addition to electricity • Highest energy recovery • Less sensitive to feedstock	• Produces ash and char • High maintenance cost	• Becoming more popular than either technology alone
Incineration	• Usually cheaper to build and operate • Significant volume reduction • Proven technology	• Emissions, though this is becoming less of an issue • Only produces thermal energy • Significant ash production	• This is what most facilities in the US are
AD	• Produces methane which is more combustible than syngas • Requires less energy to maintain • Biological process	• High capital and operational costs • Need to find more markets for by-product • Needs specific feedstock	• Can be used with landfills, water treatment facilities and composting

4.7 FINDINGS & RECOMMENDATIONS

A. RECYCLING

Findings

- MRF's are becoming increasingly important in recycling management and fulfilling diversion initiatives.
- Currently there are no permitted MRF's in WC, however the WM facility on Sage Street conducts some material recovery activity.
- A MRF definition, construction and operational requirement were added to the WC SWM Regulations in 2010.
- The majority of end source users for recyclable materials are out of WC and Nevada which can decrease profit margins.
- Collection of recyclable materials is limited by what the franchised garbage hauler will accept; this applies to both residential and commercial customers.
- Small, private businesses have begun to fill disposal voids in the community by accepting materials not collected by garbage franchise companies (e.g., cardboard, organic waste, wood, etc.).
- The WC MRF regulations set the WC recycling rate goal at 35% by 2015.

Recommended Goals

- Work with local waste haulers, local governments and other non-governmental organizations to promote the development of recycling systems that can increase diversion.

B. COMPOSTING

Findings

- There is only one commercial composting facility in WC; this facility takes green feedstock from residents for a fee.
- Due to advances in composting technology, there are more outlets for tailored compost products which may increase the demand for compost on the market.
- Water constraints will always be an issue with large composting facilities in WC due to the arid environment.
- Markets for generic compost are limited; high quality compost is generated via labor intensive and scientific processes.
- Windrow composting is still the most inexpensive and effective compost technology, but start up cost can be substantial if all equipment and materials need to be purchased; however, inexpensive does not equal cost effective.

Recommended Goals

- Encourage residents and businesses to divert green waste to local composting facilities.
- Investigate the feasibility of launching a composting facility in conjunction to the landfill to increase diversion of organics.
- Improve public outreach to increase composting by individuals.

C. WASTE-TO-ENERGY (WtE)

Findings

- There are no WtE facilities in WC.
- Negative stigma associated with incinerators is still prevalent in the public and can hinder the progress of facility development.
- Advancing emission reduction technology has greatly decreased the emission of WtE technologies from when they first emerged in the SW field.
- Thermal treatment is still the most cost effective WtE technology on the market, though new technologies are becoming more viable and effective.
- LRL is currently preparing to install three generators that will produce electricity from captured landfill methane.
- WtE technologies usually have high capital costs that require substantial investments.
- Infrastructure limitations for local WtE development are dependant upon the capacity of local utilities to accept and store power coming from sources external to the grid and integrate the two sources.
- The development of WtE plants functions as a chicken and egg conundrum: financing WtE plants is dependant on firm contracts with utility companies; lack of financing limits development; lack of development limits feedstock commitments.

Recommended Goals

- SW stream composition studies may need to be done as a first step to entice WtE technologies to the area.
- WtE must be considered as an adjunct to other technologies (e.g., material recovery, composting, etc.).
- Conduct cost and life cycle analyses to determine potential WtE systems appropriate for WC.
- Conduct composition and caloric studies on waste stream to determine feasibility for different WtE technologies.

D. LAND DISPOSAL

Findings

- Landfilling is still the most utilized and cheapest waste disposal method in the United States, Western States, Nevada and WC.
- There are different classes of landfills in the United States including hazardous waste landfills.
- Landfilling is very cheap in Nevada and for WC residents due to the abundance of available land and low population density.
- LRL has a life expectancy of around 75 years and is easily accessible to residents and businesses of WC.

Recommended Goals

- Establish landfill diversion rates for WC.

E. DEVELOPMENT CONSIDERATIONS FOR WASTE-TO-ENERGY TECHNOLOGIES

Findings

- Determining the cost of appropriate facilities for WC will require cost and life cycle analysis of different technologies depending on the type of plant and commodities produced.
- Combining of different WtE technologies can increase the efficiency of a WtE system and increases the output of energy.
- The most cost effective SW system for WC will probably be a combination of all previously outlines technologies and methods.

Recommended Goals

- Educate decision/policy makers on the pro’s and con’s of various methods and technologies.
- Support public/private collaboration to develop cost effective and reasonable systems for use of existing SW streams as an energy source.

CHAPTER 5
DIVERSION MANAGEMENT ALTERNATIVES

5.1 INTRODUCTION

Producing an effective SWM system requires an effective utilization of waste diversion technologies in conjunction with effective management systems. The previous chapter focused on the treatment of SW and the end-sources; this chapter discusses management alternatives that affect the quantity, quality and composition of MSW streams prior to collection, treatment and disposal.

5.2 RECYCLING

A. Clean MRFs

1. Single Stream (SS) Recycling

Since it first started being implemented in California in the early 1990's, SS recycling has been becoming more popular across the United Stated. SS recycling can increase utilization up to 80% and increase the volume of recyclable materials between 50 and 75%. In 2007, WM and City of Reno administered a pilot single stream program in NW Reno for 3 months to 866 homes.[58] The project was successful in increasing both utilization and intake of recyclable materials. Participation increased from 42% to 80%, and recyclable volume collection tripled. Residents were given a single 96 gallon tote and were allowed to dispose of all types of plastics, glass, cardboard, all paper, and steel/aluminum cans. In April of 2009 WM also partnered with the WC School District to implement a single stream recycling program at over 100 local schools and administrative buildings.

IVGID institutes a SS recycling program called the "Blue Bag Program."[59] SS recycling systems doe not require source separation; all recyclable materials are placed into one container for pick-up. Separation of recyclables occurs at "clean" MRFs or other recycling facilities. Clean and dirty MRFs both serve as a separation site for recyclable, but in a dirty MRF, recyclable materials are intermingled with municipal SW thereby requiring more labor for sorting. Recyclable materials from Incline Village Curbside Program are taken to a dirty MRF in Truckee, CA. The IVGID Blue Bag program accepts glass bottles, aluminum foil/cans, steel/tin cans, mixed paper, corrugated cardboard, paperboard, rigid plastics and all plastics #1-7 except Styrofoam. Residents also have outlets for HHW (including latex paint), a sharps take-back program, yard waste recycling and pine needle recycling programs.

[58] Email correspondence with Kevin Reilly of WM, April 20, 2010
[59] IVGID, Waste Not Program Annual Report, 2008

2. Dual and Multi Stream Recycling

SS and duel stream recycling are the two most utilized pick-up systems in the United States.[60] Duel stream usually denoted a separation of paper from the main SW stream or the SW is separated from the recyclable materials. In a multi stream recycling system, subtypes of material may also be separated (e.g., amber and green glass) due to varying market prices or local outlets (e.g., plastic 3-7). WM administers a multi stream collection system. Different color bins are made available for customers to separate their materials; yellow for steel/tin/aluminum cans and plastic (1-2) without lid in the shape of a bottle, green for glass. Customers can also place old newspaper and magazines curbside for collection. Dual and multi systems can require a larger collection fleet or facilities to manage the different streams, but the prevalence of contamination of the recyclables decreases and can yield high recovery costs. [61]

B. Dirty MRFs

Dirty MRFs utilize SS SW collection where *both* recyclables and SW are collected together in the same container. Complete segregation is done at the MRF facility either by mechanical means, manual or a combination of both. MRFs are becoming more and more important in the management of SW streams, very often paired with WtE facilities that require RDF. In an article from Municipal Solid Waste Magazine[62] the authors echoed this sentiment stating that MRFs are becoming pivotal in increasing the efficiency and capacity in the green energy industry and the quest of communities to increase their diversion rates.

1. Hybrid System

This system marries the SS recycling system with dirty MRF's to maximize collection of recyclable materials. In practice, recyclables and MSW are collected separately in a dual collection system, then recyclable material would be recovered from the MSW stream similar to a SS operation. Recovery of recyclable materials would potentially be higher than the administration of only SS or dual stream collection, continuation would be less, but capital costs would be more. (UNR study).

C. Pay-As-You-Throw (PAYT)

These programs base billing on volume of generated SW similar to how other public utilities base pay on consumption (e.g., water or gas usage). In addition to increasing municipal SW diversion, PAYT programs have been shown to increase recycling rates. Close to 25% of the US population utilizes a PAYT garbage system; this equates to about 7,000 jurisdictions nation-wide. PAYT

[60] Chester, M. & Martin, E. (2009) Cellulosic Ethanol from Municipal SW: A Caste Study of the Economic, Energy and Greenhouse Gas Impacts in California.
[61] Conservatree, Kinsella & Gleason, *Single Stream*, March 2003.
[62] Filtz R. & Hauck P., (Sep-Oct 2010) *MRF's in the Age of Green Energy*, MSW Management Magazine.

programs vary in design, some utilize tags, single bags or designated bin sizes. Weight-based systems are being piloted in the U.S. and Canada, but none are operational on a large scale. In a report published by Austin, Texas initiated a successful PAYT program in 1991 that greatly increased diversion and saved diminishing landfill space, and has moved the municipality to pass a zero waste initiative in 2005.[63]

D. Incentive-Based Recycling

Incentive based recycling utilizes monetary incentives to encourage recycling and waste reduction. There are few examples of this system in the United States, especially on a community-wide level. RecycleBank™ is a nonprofit program independently designed to reward people for recycling or reusing materials. If functions similarly to credit cards where customers earn miles or bonus points for usage; patrons earn points by using facilities contracted with RecycleBank™ that can by applied to various rewards like trips, merchandise, etc. RecycleBank™ operates nation-wide, but local utilization depends upon which businesses are contracted with RecycleBank™ in order for people to get credit for their efforts.

In 2009 the city of Atlanta, GA initiated an incentive based pilot program in conjunction with RecycleBank™ with 10,000 residents. Currently, this is the only program in the United States; this program will serve as the first indicator whether or not this type of recycling program can effectively function on a community-wide scale.[64]

Direct financial incentives in the form of bottle bills or container redemption programs have also been effective in increasing the recovery of recyclable materials. Currently there are ten states that have redemption programs including California and Oregon. There have been various attempts to pass similar legislation in Nevada. The most recent was AB427 which was introduced in the 2011 Nevada legislative secession. The bill did not pass as initially written, however, it was later changed to initiate a study of the impact and logistics of how such a program could be developed in Nevada. This will be an important step in planning considering these programs can also produce unintended negative consequences.

Though container redemption programs have been very successful in increasing recycling rates, they also have the potential to increase fraud and organized crime. Between 2010 and the summer of 2011 there have been a variety of arrests related to fraud and illegal recycling operations of cans and plastic bottles that have drained millions of dollars from the California redemption programs. Some of this crime has spilled over the borders into Nevada and made larger cities like Las Vegas and the Reno-Sparks staging areas for recyclable materials moving into California. WM has also seen financial ramifications from illegal recycling operations and individuals raiding curbside recycling containers.

[63] McHale, R. (March 2010) *The Pay-AS-You-Throw Payoff*, Waste Age Magazine.
[64] Waste Age Magazine (April 5, 2009) RecycleBank Expands into Suburban Atlanta.

From 2009 to 2010 WM saw a fifty percent drop in income from the sale of recyclable materials due to losses of curbside recyclable volume.

E. Eco-Industrial Parks (Eco Parks)

This has been interpreted to represent various different business organizations related to diversion, green initiatives and energy recovery. Specifically for this document, Eco-Industrial Parks (EIPs) refers to a land development technique to cluster waste technologies in order to maximize material recovery and energy recovery. An example would be building a WtE and MRF in conjunction to a landfill with methane capture; waste stream(s) would first go through the MRF for separation then appropriate feedstock would be directed to the WtE facility for energy production. Everything else would be directed to the landfill for disposal or digestion. Pockets of EIP exist across the nation and the world; an outstanding example is in San José, California where the SW program has a landfill diversion rate of 62% (City of San José website, retrieved September 24th, 2010). EIPs take a holistic approach to SWM that can be tailored to the needs of any community when applied based on appropriate life cycle analyses, cost analyses, and SW needs assessments.

5.3 SOURCE REDUCTION & REUSE

Source reduction is the process by which the generator administers methods to eliminate or reduce the production or manufacture of wastes. All of the suggestions below can be applied to local residential, commercial or industrial facilities.

A. Zero Waste Initiatives

In 1991 the Nevada State Legislature established NRS 444A.010-110 which set the 25% recycling goal for the State. Review of WC Recycling/Diversion Rate Reports show that since 2001, WC has only fallen below that rate twice (2002 & 2006). WC has risen above the expectations of the state legislation, but still falls below the national average recycling average of 33%. WC also lags in the utilization of new SWM and waste diversion technologies. The west coast in general, besides California, also lags behind the rest of the country in this regard. WtE utilization is less than two percent for the Midwest, West and Rocky Mountain states compared to 9% in the south and 35% in New England.[65]

To increase diversion some cities and states from across the nation are also going beyond recycling and diversion mandates and adopting zero waste initiatives. These initiatives are less official than mandates, but serve as a uniting vision that both the government and the public work towards. Berkeley, CA and New York, New York have all seen increased diversion rates after this philosophy was adopted; building WtE, composting, green waste and MRFs all build networks and progress toward zero waste goals.[66] This has also become an

[65] *The State of Garbage*, Biocycle & The Earth Engineering Center of Columbia University, 2006.
[66] Zero Waste Alliance & Chalfan, L. (2001) Zero-Waste the Key to our Future Presentation, http://www.zerowaste.org/publications/06i_Case_for_ZW.pdf retrieved May 12th 2010.

international phenomenon; densely populated countries faced with limited space for landfilling like Japan, Germany, and New Zealand have also adopted zero waste initiatives on a federal level.

B. Source Reduction Alternatives:

1. Reduce the use of non-recyclable materials.

2. Buy or replace disposable materials and products with reusable material and products.

3. Use refillable containers.

4. Reduce yard waste generation.

5. Purchase products that are reparable.

C. Implement Rate Structure Modifications:

1. Modify local waste disposal fees.

2. Create economic incentives such as loans, grants, loan guarantees, tax credits, rebates and reduction business license fees.

D. Implement Technical Assistance, Instructional and Promotional Alternatives which may include:

1. Waste evaluations - There are no local companies that do waste audits for residential customers for free. Auditing for commercial and industrial is more common and done through environmental consulting firms. The University of Nevada Reno, Small Business Development Center has also been working with local businesses, especially those in the hospitality industry, to increase recycling and decrease energy usage.

2. On-site compost programs for organic generators - Space and water usage are common road blocks for on-site implementation.

3. Educational efforts such as consumer awareness programs, school curricula development, seminars and pubic forums. Currently there are no consumer awareness programs sponsored by the County that focus on recycling or source reduction. School curricula regarding source reduction is not standardized and is sporadic, though more environmental classes are being offered at the high school level. Seminars and public forums are usually sponsored by local non-profits and have low attendance.

4. Awards and other types of public recognition for source reduction activities. Neither the state of Nevada nor WC has any form of award or recognition for businesses or individuals. Of the few awards given to businesses, all come from non-profit organizations. However, there are

some “green” certifications available to businesses from national organizations (e.g., LEED certification).

As of 2010, the mandated WC diversion rate is 35% while the state recycling goal remained at 25%. Meeting, and hopefully surpassing, this diversion mandate will require the development of a unified diversion vision from which progressive objectives can be established. There are essentially two philosophies the county can use as the foundation for these objectives; one, using mandates, ordinances, etc., to increase diversion rates and building an infrastructure to handle the increase, and two, develop a regulatory environment that fosters the development of businesses that offer diversion services. This could be used in conjunction with social marketing and public outreach to develop a business environment that would be attractive to new diversion technologies. This is especially important since one of the many benefits of diversion programs is economic development. However, until the WC and the state decide how to proceed and develop a vision of diversion in Nevada and WC, we will continue to lag behind national and international trends in SWM.

E. Regulatory Programs which may include:

1. Ordinance that specify that one or more of the following criteria be considered in the procurement selection of products and packaging by WC
- Durability
- Recyclability
- Reusability
- Recycled material content

2. Establishment of incentives and disincentives to land use development that promote source reduction

3. Establishment of requirements for waste reduction planning and reporting by waste generators or manufactures

F. Local Government Source Reduction Programs including:

1. Purchasing preferences for reusable products

2. Purchasing specifications or set-asides for recycled products or reusable products

3. Improve reporting, data capturing systems and standardize reporting measurements based on industry or federal standards

4. Non-procurement source reduction programs, such as education of employees, office changes to increase of scrap paper, increased use of electronic mail, and increased double side copying

The first internal attempts to address recycling in WC buildings began in the Environmental Health Services Division of the Health District back in the late 1990's. These efforts were facilitated by the SWM Program "Green Team" which led efforts to segregate paper products and beverage containers from their general waste stream for recycling. Over time this practice grew throughout the county; paper recycling and beverage container recycling receptacles are now permanent fixture in most WC offices. In 1998 the WC procurement policy was also updated to address the purchasing of recycled products or products with recycled content; this occurred around the same time a similar policy was codified in the NRS (332.065 and 444A.010).

In 2008 a coalition of WC employees from a variety of different departments came together to form a new Green Team whose specific goals were to create more sustainability within the county structure and to reduce the County's impact on the environment. The Green Team has focused on reducing energy use and initiated an in-house recycling program, etc. The Green Team specifically focuses on WC government facilities and is not involved in community outreach.

City of Sparks and Reno have also established internal green projects or action plans that focus on reducing the city's environmental impact, provide public outreach and community-wide environmental education. City of Reno's Green Initiative has been around for almost 5 years and supports an annual Green Summit to increase community involvement and innovation by integrating local green businesses on projects. City of Sparks established its Sustainability Action Plan in early 2008 with focus on a variety of short-term goals to jump start the program.

G. Extended Producer Responsibility (EPR)

Also referred to as cradle-to-cradle responsibility, EPR places the primary responsibility of safe production and disposal of hazardous products on the shoulders of the manufacturers. EPR has been around in Europe since the 1970's, but recently made its way into the agendas of various cities and counties in the United States. EPR mandates transplant the burden of product disposal from government and consumers back onto the companies that produce the products. EPR mandates have also pushed for better and more environmentally prudent design of products; this can mean increasing energy efficiency or utilizing less toxic or hazardous components. There is obvious opposition by various industries to such mandates due to increase cost of production and lack of end sources, but some companies have already established buy-back programs in the same vein without mandates.

5.4 FINDINGS AND RECOMMENDATIONS

A. RECYCLING

Findings

- WC utilizes a multi-stream recycling system.
- The choice of recycling system organization is dependant on how the materials will be processed or what products the end source manufacturers are producing.
- There have been two SS projects administered in WC in the last five years. One was a pilot, residential-based program in Reno and other is the blue-bag program in Incline Village. Both of which were successful in increasing utilization.
- IVGID is the only part of WC that has SS recycling.
- There are no EIPs in WC though WM is considering the expansion of the Sage Street transfer station to become an EIP.
- Mandates and access to services are the biggest factors in increasing recycling utilization in customers.

Recommended Goals

- Increase the state or county recycling/diversion rate mandate.
- Work with local franchised garbage haulers, local government agencies and other non-governmental organizations to increase the number of different types of materials that can be recycled.
- Develop regulatory framework to support a variety of recycling and diversion options.

B. SOURCE REDUCTION & REUSE

Findings

- IVGID's SS recycling has been very successful and popular in that community.
- Strategies or programs to address residential, commercial and industrial source reduction issues will probably differ based on the target audience.
- WC does not utilize any fee strategy to influence the recycling behaviors of customers (e.g., no incentives or rebates).
- WC, IVGID, City of Sparks and City of Reno all have green initiatives or action plans that have been successful in increasing internal sustainability and reduction-related activities.
- WC does not have a program or system to recognize or award community members efforts to increase diversion/source reduction or who have achieved green certifications.
- Public education and outreach specific to recycling, waste reduction and reuse is not required as part of existing franchise agreements.

Recommended Goals

- Use behavior based theories to develop educational and outreach programs to promote reduction and reuse behaviors in the general public.
- Increase WC's diversion rate with an end goal of zero waste.
- Increase efforts to recognize local citizens and businesses that have adopted green initiatives or been involved in increasing diversion either internally or for the community.
- Develop future franchise agreements that incentivize waste reduction, recycling and recycling.
- Require public outreach and education be included in franchise agreements either through financial support or direct provision of service.

CHAPTER 6
PUBLIC EDUCAITON & INFORMATION

6.1 INTRODUCTION

The public education and information plan for the SWM Program and Plan must be dynamic and targeted to meet the specific needs of the residents of WC. This plan should use information and education as a means to facilitate positive changes in behaviors by providing solid evidence and behavior-based theory about how these changes will benefit this county, as well as the environment. In order to establish specific needs, a comprehensive survey must be done to determine the level of knowledge about solid waste issues, and what the citizens expect from solid waste handlers. This will provide a road map for an appropriate public information and education plan.

It should be noted that surveys from local environmental groups and agencies are available and do provide valuable information. There are also national surveys that discuss specific marketing and communication tools that are applicable to our market as well, and should be reviewed.

6.2 PUBLIC EDUCATION AND INFORMATION PROGRAMS AND CAMPAIGNS

Educational campaigns can be made up of various components aimed at teaching the public – in this case, about elements that actually make up SW. This can be anything from recycling to composting to home hazardous product disposal to weekly garbage pickup schedules. Once the topic and budget have been decided, the campaign will be designed to reach the target audience using the most appropriate mediums. The Public Information Officer or Health Educator has the public relations knowledge to be able to either build specific campaigns, or hire the appropriate outside agency to build and launch an educational campaign.

A. Electronic Communications Now and in the Future -- Internet, Smart Phones, Social Media, E-Mail.

Looking back at the 70s, people got their news from the morning and/or evening newspaper and from the nightly news on television. It was a rare occasion to receive basic news during daytime. That image has changed dramatically over the past 30 years. While some still read the daily newspaper and watch the evening news, the younger generations, as well as older generations, are tuned into instant information around the clock. The electronic age has moved with lightening speed, providing everyone and anyone with laptop computers and cell phones access to worldwide news at the blink of the eye.

The challenge this has brought to all communicators is how does the news or press release story compete within this age of instant access? While government agencies are notorious for becoming the last to embrace change, the time has come to make use of all media tools at our disposal. Instead of opening the daily newspaper, people go to their favorite news page on the internet. When multi-million dollar companies find it challenging to keep the reader focused for

longer than one minute, the government agency will find it next to impossible to compete in the high tech, high cost, laser-fast communication medium.

This is why the public information specialist must have experience with posting stories and updates on the agency web page, and must be allowed to use such social media tools as FaceBook and Twitter to update the public every single day. While some governmental agencies are wary about using social media, the public, as well as the advertising community, has embraced this method of mass communication. The public's use of smart phones (iPhone, Blackberry) provides the communicator the ability to instantly reach the market. As the electronics world continues to grow, so must the ability of governmental agencies to harness this powerful communication link.

Having e-mail lists provide the agency with the ability to target those individuals who have specifically requested your information. The costs of using any and all of the electronic media outlets is minimal, and should be considered first in any marketing plan and or budget.

6.3 LOCAL PITFALLS

Over the years, the WCHD SWM, Public Information and Education program has worked without the benefit of a needs assessment. Outreach programs have been based on internal beliefs that the topics chosen were what concerned the citizens. Efforts have been made to provide information on proper disposal of hazardous products used in the home; on basic recycling; encouraging the use of reusable bottles for water rather than single-use plastic bottles; and small efforts toward teaching home composting. While these programs may have been well received by limited audiences, without the road map that proves these programs are what the public wants, and with no tangible way to measure success, staff has just been shooting in the dark and hoping for success.

It is also extremely difficult to promote residential recycling in WC because it is not mandatory and because so few items can actually be accepted for recycling. Residents can recycle glass, newspaper, aluminum cans and only plastic bottles that the openings are smaller than the rest of the bottle. There is also virtually no recycling available to apartment dwellers. One local waste hauler did try a pilot single-stream residential recycling program that received rave reviews from the participants. That is as far as the program has gone at this time. A committee which represents Reno, Sparks and WC as well as other members, is currently meeting to determine how and when to implement single-stream recycling in Northern Nevada.

It is difficult to promote composting of green waste because there are few local facilities, but more importantly, residents must find a way to get their green waste to those facilities. As these businesses grow and provide more services, these alternatives will become easier to promote.

There is a line here – should a government agency with limited funds be promoting the services of a private company that does not encourage residents to partake of recycling services?

6.4 FINDINGS AND RECOMMENDED GOALS

A. PUBLIC EDUCATION AND INFORMATION PROGRAMS AND CAMPAINGS

Findings

- Public outreach and education program are used to inform citizens about current programs and services with the intent of changing community behaviors.
- Public outreach or education campaigns must be targeted and appropriate for the intended audience to be effective.
- Creating effective and appropriate media campaigns may require contracting with private social marketing companies.
- The public is receiving more information and news with electronic media.
- Effectiveness, breadth nor depth of message penetration for public outreach and education programs is not consistently documented or measured.

Recommended Goals

- Utilize more electronic medias for public outreach and education campaigns and programs.
- Build in feedback mechanisms for public outreach and education campaigns.
- Due to the complexity and underlying social marketing theory incorporated into outreach and information campaigns, maintain an public information office or health educator on staff.

B. LOCAL PITFALLS

Findings

- Historically, outreach and information campaigns were not based on documented needs of the community.
- Systemic limitations of local recycling services limits the volume and variety of materials that can be accepts which in turn makes the promotion of recycling in Washoe County difficult.
- Promoting local composting is also difficult because there are few available outlets.

Recommended Goals

- Conduct a community-wide needs assessment to determine the public's knowledge of disposal options and general solid waste needs.
- Continue to educate and inform the public about local disposal options and events.

- Place all program evaluation and effectiveness duties with the public affairs specialist.

CHAPTER 7
FINANCIAL SUSTAINABILITY

7.1 INTRODUCTION

Financial sustainability was not addressed in the original 1991 Plan, but it has become apparent that in order for the WC SWM Program to expand or incorporate enhancements of the SWM system in order to keep abreast with national and international trends, the financial capacity of the SW program will need to be re-evaluated. IVGID blue bag program is an example of government-based diversion program that has set the standard in WC in the funding and development of a comprehensive and successful SW system that has greatly increased that community's diversion rate. In the last 5 years, private businesses have been the main catalyst in WC surpassing the state mandated 25% recycling rate as SW technology has matured. If WC is going to set more ambitions diversion standards it will have to come from community partners, governmental action, mandates and education outreach funding.

7.2 CURRENT FUNDING SOURCES

A. Permits and Fees

The philosophy of the WC DBOH is to fully recover the cost of permit issuance and compliance inspections. Therefore, the methodology utilized to develop fees is based on permit type, time-accounting and indirect costs. There are three types of fees administered by the SWM Program; permit issuance, plan review and other fees. This is smallest of the SWM Program's funding source constituting only 7% of the total budget. Permit fees are charged at the time of application and renewed annually; plan reviews are charged on conjunction with the initial permit application fee and examples of other fees include garbage exemptions and waste release permits for the transport of waste from WC to LRL.

B. Tire Fund

The majority of the funding for SW Program is from fees collected on the sale of each tire sold in Nevada. As stated in NRS 444A.090, the sale of each tire yields the collection of $1 which is then put into a SWM Account in the General Fund. The funding is split between 4 entities in the sate; NDEP receives 44.5%, WCHD receives 25%, Southern Nevada Health District (SVHD) 30% and the Nevada Department of Taxation 0.5%. Prior to the tire fund, there was oversight of SW issues in WC, but the passage of unfunded federal landfill and disposal restriction mandates created the need for more oversight infrastructure and funding sources. Additionally, the tire fund money was also supposed to be used for public education and outreach efforts.

C. Grants

The SWM Program is not utilizing any grant funding currently. There are various grant monies available for SWM, however, the logistics of administering the grant can significantly decrease the amount of money available for

application, usually making the grant too small to be effective. Figure 7.1 shows the breakdown of funding sources of the SWM Program.

Historically the NDEP has offered SW and recycling grants, but as stated on their website they cannot currently offer any funds for programs due to budget constraint.[67] Even if NDEP has funding for grants, WC and Clark County are excluded from utilizing this funding source.

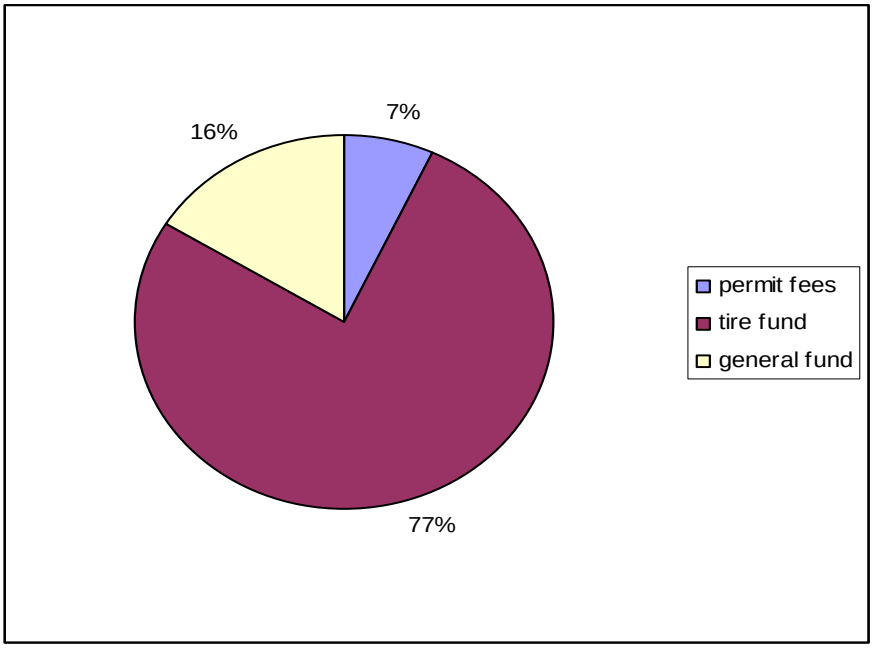

Figure 7.1: Washoe County, Solid Waste Management Program Budget, Fiscal Year 2011

7.3 POTENTIAL FUNDING SOURCES

Many SW and recycling management programs in the US are funded with general monies derived from property taxes.[68] WC is part of a very small group of SWM systems that is funded by state grants, which given the current economic environment in Nevada, has shielded the program from any dramatic reductions of funding. However, it is hard to project the longevity of the tire fund even though historically it has been less sensitive to economic influences. Looking forward, the best strategy may be to diversify the funding sources of the program for the same reasons people use mutual funds; the diversification protects the funding from dramatic changes in one area of investment. There are a variety of different mechanisms that can be implemented to generate funds, below is a discussion of different funding options.

[67] Recycling or Solid Waste Grant Program, NDEP website, http://ndep.nv.gov/bwm/grant.htm, retrieved Oct 5, 2010.

[68] O, Brien, J.K (2011) Sustainable Funding Strategies for Local Government Recycling Programs. *The Journal for Municipal Solid Waste Professionals*, 12-19.

A. Fees on Garbage Service

Garbage service is mandatory in WC, and initiating a small fee on garbage bills would spread the cost of financing the solid waste program to everyone. Most likely, the addition of such a fee would occur in the negotiation of garbage franchise agreements. It could either occur by requesting a direct fee on the bills from which the direct revenue could go to the solid waste management fund, or simply by an increase in the franchise fees. This tactic could be problematic considering each municipality has a different franchise agreement and further supports for the need of a regional franchise garbage agreement.

B. Service Charge

Service charges are another way to distribute the burden of financing the SWM Program throughout the community. They are flat basic fees that are applied to a customer's bills. This could include, but it not limited to movie tickets, fuel purchases, other commodities, etc. Because service charges are connected to purchases or services rendered, it can also generate funding from out of county visitors.

C. Property Taxes

The current recession and dramatic drop in property value on WC has exhibited the inelasticity of this funding source, and should be considered only as an augmentation funding source and should not be relied as a principle income source. Besides the sensitivity of property taxes to economic status, property taxes disproportionately place a financial burden for SWM on homeowners and business owners.

D. Sales Tax

Another option could be to increase the Washoe County sales tax and earmark some of the revenue for the SWM Program. As with service charges, this technique spreads the cost to everyone in the County including those who are out of County. However, using sales tax still required the Nevada Department of Taxation to charge administration fees. Additionally, this requires voter support over several years before implementation.

E. Tipping Fees

Collecting tipping fees at landfills can be useful if the SWM system has oversight on the landfill. This is not the case for WC which sends most of its garbage to LRL which is located in Storey County and is regulated by NDEP. If Washoe County was going to utilize a form of tipping fees, this would have to come form the solid waste facilities located in Washoe County, specifically the transfer stations.

7.4 FINANCE LIMITATIONS

The history and interactions of all the different SW program funding sources is important to understanding the limitations faced by this administration and how it hinders the creation of large-scale public outreach programs. When the tire fund came into existence it was in response to proposed landfill regulations referred to as 40 CFR Subtitle D. The consensus in the state was we either had to make county-specific SW programs to oversee the new regulations or the USEPA would fulfill the required duties. The tire fund was implemented to enhance SWM programs in Nevada, Clark County and WC. As the program has grown in response to Board of Health requests and community need, utilization of tire funds has grown leaving less for large-scale community outreach, though smaller programs have been successful. The longevity of tire funding is also uncertain due to the economic downturn since funding levels are based on consumer purchases of tires. Currently, tire purchases has remained consistent, but it is unknown if this trend will continue.

The most obvious question to ask is, if tire funding is not sufficient, why doesn't the SWM Program ask for more general fund monies? Historically, programs with external funding have been less likely to receive portions of general funding, even during more prosperous times. Working with general funding can also be difficult since all funding not spent at the end of the financial year is considered unused and can be returned to the general fund. Therefore this makes it difficult to build up a reserve of funding for a large outreach program (Based on interviews with Jeanne Rucker, WC SWM Program, September 13, 2010; October 15, 2010). Lastly, the most obvious answer to why the County does not ask for more general funding is because there is none. In actuality the general funding pot is shrinking and asking for funding for outreach and education is not going to happen any time soon.

A. Local Funding Atmosphere

The section investigates funding sources at the municipal level and throughout the community and how it can be used in conjunction with County and State funding. When the tire fund was established to fund SW programs, it was implemented to fund the program infrastructure, but more importantly, to create a pot a money that could be used for public outreach programs including grants. In WC, the use of the tire fund for the latter has been limited based on reasons discussed above. Public outcry for more SW services has apparently been sufficient enough for cities to implement large programs in conjunction with substantial public outreach/education program (with the exception of IVGID). Increasing, or simply creating, funding focused on diversion and expanding the SW system would have to come from a tax or fee imposed on customers/residents, a very unpalatable concept in light of the current economy and in the absence of community outcry for more services.

B. Infrastructure Ownership

Not all SW systems are the same across the county. Each one is tailored differently based on geographical limitations, population size, mandated services, etc. One of the biggest factors that has shaped the SW system in WC is ownership of the SWM infrastructure. The landfill, transfer stations, and garbage hauling

equipment in WC are privately owned by WM. Some municipalities own the entire system or specific facilities. The City of Phoenix, for example, owns everything whereas the City of Connecticut only owns the transfer stations. Ownership of a SWM program has its positives and negatives; it is definitely a huge cost to build and maintain an entire SW system, especially when the cost of liability is incurred. However, if managed appropriately, it can also bring in substantial revenue. Ownership of systems can also give the proprietor more flexibility to design and alter programs and based on emerging trends or demands. The National Solid Waste Management Association (NSWMA) also released a research bulletin in March of 2011 stating that other benefits of privately owned waste collection systems included lower recycling rates, lower costs due to private competition, bigger capacity to weather changing recyclable market fluxes and a faster capacity to adopt new technologies in processing and collection.

7.5 FINDINGS & RECOMENDATIONS

A. CURRENT FUNDING SOURCES

Findings

- Three-fourths of the SWM Program funding come from the Tire Fund, the remaining amount comes from permit fees and general WC funds.
- Grant funding through NDEP is currently not available due to lack of funds.

Recommended Goals

- Investigate alternative sources or methods to increase funding for the WC SWM Program.
- Initiate discussions with community stakeholders to gain support for proposed funding augmentation.

B. FINANCE LIMITATIONS

Findings

- The growth of the SWM Program has decreased the availability of Tire Funds for public education/outreach programs.
- There is little perceived support in local governments to increase fees or initiate new fees to support the extension or development of new solid waste programs due to the economic down turn; lack of public demand for such programs may also play into this phenomenon as well.

CHAPTER 8
WASHOE COUNTY
DEBRIS MANAGEMENT PLAN

8.1 INTRODUCTION

Local emergencies, both from natural or human forces, can produce an excessive volume of debris that can quickly overwhelm the existing solid waste system. Emergency debris management plans (EDMPs) establish emergency procedures to collect, clear, recycle, categorize/identify, handle and dispose of solid waste. They also establish how information will be disseminated to the public about SW collection and how the local emergency response will interface with national disaster relief support. The federal government, Nevada State Legislature nor the WC Code require the County, included municipalities or districts to have an EDMP, but the Federal Emergency Management Agency (FEMA) is encouraging all communities to prepare a framework to manage emergency debris generations. The events of the 1994 Northridge earthquake in California, Hurricane Katrina in New Orleans and the 9/11 attack in New York highlighted the need to have debris management plans established prior to an emergency so the local SWM system does not become overwhelmed. Communities also have a monetary incentive to develop an EDMP and submit it to FEMA for approval in advance of an emergency. The Stafford Emergency Relief Act permits federal funding to communities for disaster relief and the reimbursement amounts to those communities will be increased if the affected area has an established EDMP approved by FEMA.

8.2 THE WASHOE COUNTY EMERGENCY DEBRIS MANAGEMENT PLAN

The WC Emergency Management and Homeland Security Department (EMHS) submitted an EDMP to FEMA December of 2010 and is currently awaiting approval; a copy of the EDMP is in appendix W. This plan suggests that the following events present the highest debris producing potential: earthquakes, floods, winter storms, fires and terrorism attacks. The Plan is organized into 5 sections: debris management (DM) staff response with a description of responsibilities and hierarchy, DM response and recovery operations, contractor oversight, special precautions and procedures for weapons of mass destruction and terrorism attacks and debris generation estimation including locations for temporary storage. This EDMP also interfaces with the WC Regional Emergency Operational Plan (REOP) and utilizes strategies from Incident Command Systems (ICS) for staff organization and information dissemination. The appendices contain a variety of templates for load tickets, contracts, right-of-way and other applicable forms.

8.3 FINDINGS AND RECOMMENDATIONS

A. THE WASHOE COUNTY EMERGENCY DEBRIS MANAGEMENT SYSTEM

Findings

- The WC EMHSP has been submitted a EDMP to FEMA for approval.
- The WC EDMP adequately follows EPA and FEMA templates for EDMPs.
- The definitions of terms included in the EDMP do not match state and county definitions.
- Appendix C of the Plan is supposed to discuss critical facilities and road clearance pathways, but critical facilities are not listed.
- Appendix D of the Plan includes LRL capacity but does not discuss the average or maximum daily accepted volume.
- The duties of a PIO officer are included, but it is unclear if the County maintains any public service announcements or printed materials specifically to be used during an emergency.
- The names and contact information for the regional partnership members is not listed.
- It is not discussed how often the EDMP is updated or should be updated.
- The discussion about recycling emergency debris needs to be expanded and updated to reflect local recycling capacity.
- The EDMP does not discuss the size of the local solid waste collection fleet including those available from Waste Management of Nevada, Inc.

Recommended Goals

- Develop annual training modules for members of the regional partnership and other pivotal players.
- Establish and document a list of names and contact information for regional partners.
- Establish and document how often the WC EDMP should be updated either through policy or ordinance.
- Design and print model code tickets in preparation for an emergency.
- Develop PSAs and printed materials specific to emergency debris management and solid waste collection and post them on the local emergency preparedness networks.
- Update terms and definitions used in the WC EDMP so it is consistent with the NRS and the WC Code.
- Develop and augment the recycling section of the EDMP with local emergency recycling capacity.
- Create an all inclusive list of critical facilities and flood plains in WC.

- Include information about LRLs daily average and maximum solid waste acceptance volume including narratives how this facility will adjust operations to accommodate increase solid waste volume during debris emergency.
- Establish a list of approved scrap metal, hazardous waste haulers and composting vendors.
- Include a list of local volunteers or volunteer emergency groups who can assist during emergencies and their contact information (e.g., CERT).
- Augment the equipment list to include small tools (e.g., radios, shovels, etc.) & PPE.

CHAPTER 9
PROGRAM EVALUATION

9.1 INTRODUCTION

Program evaluation is a systematic management tool used to determine if a program is being implemented with intended fidelity, achieving expected outcomes and maintains appropriate internal feedback mechanisms for future improvement. Evaluations are important for program planning, implementation, improvement and to produce evidence of a program's adherence of responsible fiscal practices. There are many different types of evaluations that can be employed at various stages of a program's development. One type is called outcome evaluation and it focuses on a program objectives and outcomes to determine if a program is producing the intended effects. Every program and division in the Health District has a documented mission statement and objectives in the form of performance measures. However, these performance measures are very generic and lack any measurable components, though they do address general areas of focus. A copy of the SWM Program's performance measures for FY11 can be found in Appendix X. To correct this issue, each item under the work plan was broken down into individuals areas of concern. Under each of these sections, specific measurable questions were developed. Data is already being collected for some of these items, while others will begin after the approval of this Plan. Below is a list of all the proposed data collection questions. Prior to this 2011 there was no discussion of how the SWM Program's progress would be evaluated based on the established program mission and applicative Board of Health strategic priorities. The Plan was developed to ensure the District Health Department was managing solid waste and solid waste facilities, so it seems prudent to establish data collection systems to determine if the program is fulfilling its duties. It is also important to develop data collection system now to facilitate future Plan updates and produce more concrete picture of what the program is accomplishing.

Outcome measurements from the Solid Waste Management Program Performance Measures.

[DBOH 4: Enforce public health laws and regulations]

A) Identify all waste management systems within the Washoe County Health District
   - *# of permitted facilities compared to business licenses to make sure we caught them all*

B) Permit all waste management systems within the Washoe County Health District
   - *# of permitted facilities*

C) Inspect all waste management systems within the Washoe County Health District
   - *# of facilities permitted*
   - *% of facilities inspected*
   - *# of permitted facilities with violations*
     - *categorize into different types of violations, e.g., minor, severe, etc.*
   - *length of time they are out of compliance*
   - *% of facilities with repeated violations*

- # man hours/ abatement or violations
- % of facilities in compliance with conditions
- categories of non-compliance
- review the rejection lists from LRL and see what items or waste streams caused the load to be rejected
- # of invalid solid waste complaints
- # of valid solid waste complaints
- categorize the different types of complaints that are invalid

E) Hazardous Waste Program
- confirming that hazardous waste program is fulfilling all the requirements in our contract with the State of Nevada
- # of invalid complaints

[DBOH 2: Protect population for health problems and health hazards]

A) Assisting in the emergency mitigation of hazardous materials & waste releases/spills
- # of emergency responses we respond to in WC
- # of emergency responses we respond to in WC vs. the number of spills in WC reported to NDEP
- # and types of spills (e.g., chemical, etc.)

B) Provide technical regulatory oversight
- # of ER vs. "hazardous" waste responses by the local fire department(s)
- review the rejection lists from LRL and see what items or waste streams caused the load to be rejected
- # of exposures to hazardous waste or spills
- # of WC employees vs. non-WC employees
- # of joint responses with any agencies on spills and/or releases
- # of recovery/remediation cases

[DBOH 3: Give people information they need to make healthy choices]

A) To increase waste reduction
- how to measure: calculate to following [*(recycling) + (total tonnage disposed)]*

B) To increase waste diversion
- volume diverted from the landfill

C) To increase recycling rates
- volume of materials recycled
- Increase types of recyclable materials that can be accepted in curbside recycling service
- # of different recyclable materials that can be recycled in WC
- volume of specific recycling materials that are recycled in WC

D) To educate the public concerning proper disposal of solid waste
- # of PSAs
- # of programs offered
- $ spent of public outreach/programs

- *# illegal dumping sites*
- *# of illegal dumping complaints*

E) To educate the public concerning proper disposal of hazardous waste
- *# of PSAs*
- *# of programs offered*
- *$ spent of public outreach/programs*
- *# of incidents of garbage contamination of HW, e-waste, etc.*

F) To educate the public concerning recycling opportunities in Washoe County
- # of phone calls on the recycling hotline or webpage hits
- # of outreach events held
- # of people who were in attendance and/or # of people reached/educated at event

9.2. FINDINGS AND RECOMMENDATIONS

Findings

- Program evaluation is a useful tool to improve the effectiveness and efficiency of developing or established programs.
- Currently the WC SWM Program does not employ any established or specific mechanism to determine program effectiveness and efficiency.
- The progress of the WC SWM system is guided by a program mission and three generic performance measurements derived from District Board of Health strategic priorities.

Recommended Goals

- Collect data on the proposed outcome measures and review annually in tandem with the program performance measures.
- Use data collected to develop annual program goals and objectives to achieve continuous improvement.

CHAPTER 10
IMPLEMENTATION PLAN AND SCHEDULE

10.1 INTRODUCTION

The Findings and Recommended Goals section of each chapter of the 2011 Washoe County Solid Waste Management Plan (SWMP) provides the current status on solid waste issues in Washoe County and the associated goals of the Solid Waste Management Program of the Washoe County Health District. This chapter combines the findings and goals from each section and provides a time frame for completion. The goals have been given a priority ranking from one (1) to three (3). The rankings were based as follows:

Priority 1 – These goals can be achieved within 18 -24 months because the WCHD has the funding, authority and resources to complete the goal. These goals were also determined to be of highest importance, serve the greatest need in the community and time sensitive. These are considered the short-term goals.

Priority 2 – These goals cannot be achieved until other recommendations or goals have been adopted or completed. Specifically, many of these goals rely on the completion of *Priority 1* goals. Resources may also be a limiting factor. These are chosen to be completed within 18 – 36 months.

Priority 3 – These goals are considered "nice to do", but not necessary at the moment. There is either no funding/ budget for these goals or they are dependent on action or assistance from another agency, advocacy group or legislative action. These goals may also be dependent on another agency to complete. These are considered long term goals.

The goals and established time frames have been placed in a matrix for quick reference; additionally, the goals have been provided in their order of priority as follows:

10.2 IMPLEMENTATION SCHEDULE (Priority 1)

A. Solid Waste Generation

1. Generation Rate

   Goal: Washoe County Health District should compile an electronic document that will outline all of the sources and reports used to update the 2011 version of the SWMP and where they were obtained. This document should be updated as needed but more often than the SWMP.

   Goal: All data collection conducted by the WCHD SWM Program should be developed into data sets in a spreadsheet format. This includes, but is not limited to, SW Disposal Reports, Recycling Reports, and Transfer Station throughput reports.

Goal: WCHD should request updated tonnage reports from Refuse, Inc. and other solid waste companies for all transfer stations.

Responsible Agency: WCHD

B. Municipal Solid Waste Management System

1. Types and Definition of Solid Waste

   Goal: Continue to strive for updates within the WCHD SWM regulations to ensure consistency with the State of Nevada and Federal regulatory agencies.

   Responsible Agency: WCHD

2. Solid Waste Facilities

   Goal: Document historical dump sites as they are encountered.

   Responsible Agency: WCHD

3. Franchise Recycling Programs

   Goal: Update Needs Assessment for Recycling in Multi-Family Dwellings Report.

   Responsible Agency: WCHD

4. Non-franchise Diversion Programs

   Goal: Increase public's awareness of local diversion outlets.

   Goal: Establish firm recycling/diversion goals with time frames for advancement.

   Responsible Agency: WCHD

5. Illegal Dumping

   Goal: Increase the public's awareness and usage of the Illegal Dumping Hotline.

   Responsible Agency: WCHD, Keep Truckee Meadows Beautiful, Washoe County Sheriff's Office and local municipalities

6. Liquid Waste

   Goal: Continue efforts to find end users for all liquid waste streams.

Responsible Agency: WCHD

C. Diversion Management Alternatives

1. Recycling

   Goal: Develop regulatory framework to support a variety of recycling and diversion options.

   Responsible Agency: WCHD and Nevada Division of Environmental Protection

2. Source Reduction and Reuse

   Goal: Increase efforts to recognize local citizens and businesses that have adopted green initiatives or been involved in increasing diversion either internally or for the community.

   Responsible Agency: WCHD

D. Public Education and Information

1. Public Education, Information and Campaigns

   Goal: Utilize electronic medias for public outreach and education campaigns and programs.

   Goal: Build in feedback mechanisms for public outreach and education campaigns.

   Responsible Agency: WCHD

E. Financial Sustainability

1. Current Funding Sources

   Goal: Investigate alternative sources or methods to increase funding for the WCHD SWM Program.

   Responsible Agency: WCHD

F. Washoe County Debris Management Plan

1. Washoe County Emergency Debris Management System

   Goal: Establish a list of approved scrap metal, hazardous waste, solid waste haulers and composting vendors and their capabilities.

Goal: Augment the equipment list to include small tools (e.g. radios, shovels, etc.) and PPE.

Responsible Agency: WCHD, WC Emergency Management Coordinator

G. Program Evaluation

1. Recommended Goals

Goal: Collect data on the proposed outcome measures and review annually in tandem with the program performance measures.

Goal: Use data collected to develop annual program goals and objectives to achieve continuous improvement.

Responsible Agency: WCHD

10.3 IMPLEMENTATION SCHEDULE (Priority 2)

A. Solid Waste Generation

1. Generation Rate

Goal: WCHD should conduct a waste generation and diversion study of the solid waste stream to determine composition.

Responsible Agency: WCHD

2. Future and Quality of Solid Waste

Goal: Develop and administer a study to determine the specific differences between solid waste generation and waste stream composition of multi-unit dwellings and single unit dwellings in WC.

Responsible Agency: WCHD

Goal: Partner with local hospitality venues to collect data concerning waste and energy reduction and projected waste and energy reduction.

Responsible Agency: WCHD with cooperation from local hospitality businesses and their representatives, (e.g. Nevada Restaurant Association, Retail Association of Nevada, etc.), University of Nevada, Business Environmental Program

B. Municipal Solid Waste Management System

1. Solid Waste Collection

Goal: Determine or establish a standard to measure the adequacy of garbage collection.

Responsible Agency: WCHD and the local franchised garbage hauler.

2. Solid Waste Facilities

Goal: Determine or establish a standard to measure the adequacy of transfer station capacity and operation for the solid waste stream.

Responsible Agency: WCHD and transfer station owner/operator.

3. Franchise Recycling Programs

Goal: Investigate progressive garbage and recycling collection technologies and systems.

Responsible Agency: WCHD

4. Non-franchise Diversion Programs

Goal: Conduct waste stream composition study to encourage waste-to-energy incineration plant to come to this area.

Responsible Agency: WCHD and local/state economic development agencies.

5. Liquid Waste

Goal: Foster the development of in-plant or on site treatment facilities in the commercial and industrial businesses.

Responsible Agency: WCHD and local Environmental Control agencies

C. Diversion Management Alternatives

1. Recycling

Goal: Work with franchised garbage haulers, local government agencies and other non-governmental organizations to increase the number of different types of materials that can be recycled.

2. Source Reduction and Reuse

Goal: Use behavior based theories to develop educational and outreach programs to promote reduction and reuse behaviors in the general public.

Responsible Agency: WCHD

D. Public Education and Information

1. Public Education, Information and Campaigns

   Goal: Due to the complexity and underlying social marketing theory incorporated into outreach and information campaigns, maintain a public information office or health educator on staff.

   Responsible Agency: WCHD

E. Financial Sustainability

1. Current Funding Sources

   Goal: Initiate discussions with community stakeholders to gain support for proposed funding augmentation.

   Responsible Agency: WCHD, stakeholders (e.g. solid waste industry, local government, research facilities such as the University of Nevada, Reno, etc.)

10.4 IMPLEMENTATION SCHEDULE (Priority 3)

A. Solid Waste Generation

1. Generation Rate

   Goal: WCHD should partner with the Reno-Sparks Convention and Visitors Authority (RSCVA) to conduct an independent study to determine the impact of tourism generated solid waste in WC.

   Responsible Agency: WCHD and RSCVA

2. Future Quality of Solid Waste

   Goal: Complete unfinished sections of the Emergency Debris Management Plan.

   Responsible Agency: WCHD and the Washoe County Emergency Management Dept.

3. Solid Waste Collection

   Goal: Standardize garbage franchise agreement expiration dates to facilitate the development of a regional franchise agreement.

   Responsible Agency: WCHD and the governing bodies of each local municipality in WC.

4. Franchise Recycling Programs

   Goal: Support the fostering of more collaborations between local recycling/reuse businesses and Waste Management at their facilities.

   Responsible Agency: WCHD, Waste Management of Nevada, local waste reduction and reuse promoters.

5. Non-franchise Diversion Programs

   Goal: Develop a more centralized location for drop-off of materials.

   Responsible Agency: WCHD, local recycling and waste reduction businesses, local municipalities.

B. Diversion Management Alternatives

1. Recycling

   Goal: Increase the county recycling/diversion rate mandate, as benchmarks are achieved.

   Responsible Agency: WCHD and the governing bodies of local municipalities.

2. Source Reduction and Reuse

   Goal: Increase WC's diversion rate with an end goal of zero waste.

   Responsible Agency: WCHD, governing bodies of local municipalities, waste reduction/diversion/recycling businesses, public

   Goal: Develop future franchise agreements that incentivize waste reduction, diversion and recycling.

   Responsible Agency: WCHD, governing bodies of local municipalities and franchise holders.

   Goal: Require public outreach and education be included in franchise agreements either through financial support or direct provision of service.

   Responsible Agency: WCHD, governing bodies of local municipalities and the franchise holder.

C. Washoe County Debris Management Plan

1. Washoe County Emergency Debris Management System

Goal: Develop annual training modules for members of the regional partnership and other pivotal players.

Goal: Establish and document a list of names and contact information for regional partners.

Goal: Establish and document how often the WC EDMP should be updated either through policy or ordinance.

Goal: Design and print model code tickets for preparation in an emergency.

Goal: Develop PSAs and printed materials specific to emergency debris management and solid waste collection and post them on the local emergency preparedness networks or websites.

Goal: Update the terms and definitions used in the WC EDMP so it is consistent with the NRS and WC codes and regulations.

Goal: Develop and augment the recycling section of the WC EDMP with local emergency recycling capacity.

Goal: Create an all inclusive list of critical facilities and flood plains in WC.

Goal: Include list of local volunteers or volunteer emergency groups who can assist during emergencies and their contact information (e.g. CERT volunteers)

Responsible Agency: WCHD and Washoe County Department of Emergency Management

Goal: Include information about Lockwood Regional Landfill daily average and maximum solid waste acceptance volume including narratives how this facility will adjust operations to accommodate increased solid waste volume during debris emergency.

Responsible Agency: WCHD, Nevada Division of Environmental Protection, Waste Management of Nevada and the WC Department of Emergency Management.

10.5 BUDGET AND FINANCIAL RESOURCES

Specific funding and/or necessary resources have not been established for each goal. This is due to the fact that the budget process for Washoe County is done on an annual basis. The proposed budget for each fiscal year will be developed based on available funding, staff or contract resources and the outlined prioritization. In some instances this may delay completion of a goal; however, this plan must be considered a template and flexibility must be exercised to ensure that immediate needs of the community are addressed in addition to the short and long term goals established herein.

10.6 USE OF IMPLEMENTATION SCHEDULE AND PLAN

This section of the 2011 Solid Waste Management Plan is intended to be a bi-annual document. This section will be reviewed every two (2) years and revised accordingly, indicating goals achieved, benchmarks met, and ongoing projects. Task specific timelines will be established for each goal and documentation maintained to demonstrate progress towards completion of each goal.

The overall 2011 Solid Waste Management Plan is intended to provide a road map for the next five (5) years. Updates to the Plan will begin in 2015 with final revisions presented to the Washoe County District Board of Health for approval in 2016.

The Solid Waste Management Program has never utilized program evaluation tools effectively. It is the intent of this plan to establish baseline evaluation tools in years 1, 2, and 3 and to measure progress using these tools in years 4 and 5.

2011 SOLID WASTE MANAGEMENT PLAN IMPLEMENTATION SCHEDULE

Goal	Priority	2012	2013	2014	2015	2016	Ongoing	Date Completed
Section 2								
Generation Rate								
WCHD should compile an electronic document that will outline all of the sources and reports used to update the 2010 version of The Plan and where they were obtained. This document should be updated as needed but more often than The Plan.	1		X				✓	
All data collection conducted by the WCHD SWM Program should develop data sets in a spread sheet format. This includes, but is not limited to , SW Disposal Reports, Recycling Reports and TS Reports.	1		X					
WCHD should conduct a waste generation and diversion study of the SW stream to determine the composition.	2				X			
WCHD should partner with the Reno-Sparks Convention and Visitors Authority (RSCVA) to conduct an independent study to determine the impact of tourism generated SW in WC.	3					X		
WCHD should request updated tonnage reports from Refuse, Inc. for all TS's.	1		X					2011
Future Quality of Solid Waste								
Develop and administer a study to determine the specific differences between SW generation and waste stream composition of multi-unit dwellings and single-unit dwellings in WC.	2				X			
Complete the unfinished sections of the Emergency Debris Management Plan.	3					X		
Partner with local hospitality venues to collect data concerning waste and energy reduction and projected waste and energy reduction.	2				X			
Section 3								
Types and Definitions of Solid Waste								
Continue to strive for updates within the WC SWM Regulations to ensure the consistency with State of Nevada and Federal regulatory agencies	1		X				✓	
Solid Waste Collection								
Standardize garbage franchise agreement expiration dates to facilitate the development of a regional garbage agreement.	3					X		
Determine or establish a standard to measure the adequacy of garbage collection.	2				X			
Solid Waste Facilities								
Document historical dump sites as they are encountered.	1		X				✓	
Determine or establish a standard to measure the adequacy of transfer station capacity and operation for SW stream.	2				X			
Franchise Recycling Programs								
Update the Needs Assessment for Recycling In Multi-Family Dwelling Report.	1		X					
Support the fostering of more collaborations between local recycling/reuse businesses and Waste Management at their facilities.	3					X		

Goal	Priority	2012	2013	2014	2015	2016	Ongoing	Date Completed
Investigate progressive garbage and recycling collection technologies and systems.	2				X			
Non-Franchise Diversion Programs								
Conduct waste stream composition study to encourage waste-to-energy incineration plant to come to area.	2				X			
Increase public's awareness of local diversion outlets.	1		X				✓	
Develop a more centralized location for drop-off of materials.	3					X		
Establish firm recycling/diversion goals with time frames for advancement.	1		X					2010
Illegal Dumping								
Increase the public's awareness and usage of the illegal dumping hotline.	1		X					
Liquid Waste								
Continue efforts to find end users for all liquid waste stream.	1		X				✓	
Foster the development of in-plant or on-site treatment facilities in commercial and industrial businesses.	2				X			
Section 5								
Recycling								
Increase the county recycling/ diversion rate mandate, as benchmarks are achieved.	3					X	✓	
Work with local franchised garbage haulers, local government agencies and other non-governmental organizations to increase the number of different types of materials that can be recycled.	2				X			
Develop regulatory framework to support a variety of recycling and diversion options.	1		X				✓	
Source Reduction & Reuse								
Use behavior based theories to develop educational and outreach programs to promote reduction and reuse behaviors in the general public.	2				X			
Increase WC's diversion rate with an end goal of zero waste.	3					X		
Increase efforts to recognize local citizens and businesses that have adopted green initiatives or been involved in increasing diversion either internally or for the community.	1		X				✓	
Develop future franchise agreements that incentivize waste reduction, recycling and recycling.	3					X		
Require public outreach and education be included in franchise agreements either through financial support or direct provision of service.	3					X		
Section 6								
Public Education and Information Programs and Campaigns								
Utilize more electronic medias for public outreach and education campaigns and programs.	1		X				✓	
Build in feedback mechanisms for public outreach and education campaigns.	1		X				✓	
Due to the complexity and underlying social marketing theory incorporated into outreach and information campaigns, maintain an public information office or health educator on staff.	2				X			

Goal	Priority	2012	2013	2014	2015	2016	Ongoing	Date Completed
Section 7								
Current Funding Sources								
Investigate alternative sources or methods to increase funding for the WC SWM Program.	1		X				✓	
Initiate discussions with community stakeholders to gain support for proposed funding augmentation.	2				X			
Section 8								
The Washoe County Emergency Debris Management System								
Develop annual training modules for members of the regional partnership and other pivotal players.	3					X		
Establish and document a list of names and contact information for regional partners.	3					X		
Establish and document how often the WC EDMP should be updated either through policy or ordinance.	3					X		
Design and print model code tickets in preparation for an emergency.	3					X		
Develop PSAs and printed materials specific to emergency debris management and solid waste collection an post them on the local emergency preparedness networks.	3					X		
Update terms and definitions used in the WC EDMP so it is consistent the NRS and the WC Code.	3					X		
Develop and augment the recycling section of the EDMP with local emergency recycling capacity.	3					X		
Create and all inclusive list of critical facilities and flood plains in WC	3					X		
Include information about LRLs daily average and maximum solid waste acceptance volume including narratives how this facility will adjust operations to accommodate increase solid waste volume during debris emergency.	3					X		
Establish a list of approved scrap metal, hazardous waste haulers and composting vendors.	1		X				✓	
Include a list of local volunteers or volunteer emergency groups who can assist during emergencies and their contact information (e.g., CERT).	3					X		
Augment the equipment list to include small tools (e.g., radios, shovels, etc.) & PPE.	1		X				✓	
Section 9								
Recommended Goals								
Collect data on the proposed outcome measures and review annually in tandem with the program performance measures.	1		X				✓	
Use data collected to develop annual program goals and objectives to achieve continuous improvement.	1		X				✓	