STRATEGIC SOLID WASTE MANAGEMENT PLAN

WEST GARFIELD COUNTY LANDFILL

Prepared for

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FINAL

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LIST OF ACRONYMS

AC	Acre
AD	Anaerobic Digestion
ADC	Alternative Daily Cover
APCD	Air Pollution Control Division
AST	Aboveground Storage Tank
BOCC	Garfield County Board of County Commissioners
BLM	Bureau of Land Management
BTU	British Thermal Unit
C&D	Construction & Demolition Debris
CD	Certificate of Designation
CDH	Colorado Department of Health
CDLA	Colorado Department of Local Affairs
CDPHE	Colorado Department of Public Health and Environment
CFM	Cubic Feet per Minute
CM/SEC	Centimeter per Second
CNG	Compressed Natural Gas
COGCC	Colorado Oil and Gas Conservation Commission
CO_2	Carbon Dioxide
CPCP	Closure and Post-Closure Plan
CPCR	Closure and Post-Closure engineering cost estimate report
CPR	Cardiopulmonary Resuscitation

CY	Cubic yards
E&P	Exploration & Production
E-WASTE	Electronic Waste
FOIA	Freedom of Information Act
GCA	Garfield County Administration
GCL	Geosynthetic Clay Liner
GCPWD	Garfield County Public Works Department
HAZWOPER	Hazardous Waste Operations and Emergency Response
HDPE	High Density Polyethylene
H_2	Hydrogen
H_2S	Hydrogen Sulfide
HHW	Household Hazardous Waste
LB	Pound
KWh	Kilowatt hours
LEL	Lower Explosive Limit
LF	Landfill
LFG	Landfill Gas
LNG	Liquefied Natural Gas
MG	Mega-Grams
MM	Million
MMG	Million Mega-Grams
MOLO	Manager of Landfill Operations

MRF	Material Recovery Facility
MSW	Municipal Solid Waste
MSWLF	Municipal Solid Waste Landfill
MW	Megawatts
NMOC	Non-Methane Organic Compounds
NSI	North and South Impoundments
NSPS	New Source Performance Standards
NWCC	NWCC, Inc.
O&M	Operating & Maintenance
P&MR	Planning & Management Region
PCS	Petroleum Contaminated Soils
PCD	Pounds per Capita per Day
PVC	Poly Vinyl Chloride
RCRA	Resource Conservation and Recovery Act
RPPA	Recreation and Public Purposes Act
SAP	Statistical Analysis Plan
SCLF	South Canyon Landfill
SOPP	State of Practice Presentation
SSWMP	Strategic Solid Waste Management Plan
STUDY AREA	Geographic Area including Garfield and 12 nearby counties
SWANA	Solid Waste Association of North America
SWDF	Solid Waste Disposal Fund

SYNGAS	Synthetic gas
TRI-COUNTY	Eagle, Garfield, and Pitkin Counties
TPD	Tons per day
TPY	Tons per year
URS	URS Corporation
Utah DEQ	Utah Department of Environmental Quality
VOC	Volatile Organic Compound
WGCL	West Garfield County Landfill
WGCL Team	NWCC, Inc. and URS Corporation
WI	West Impoundment
WTE	Waste to Energy
YR	Year

1. EXECUTIVE SUMMARY

NWCC, Inc. and URS Corporation (WGCL Team) performed a review of the County's current landfill services and customers and developed a workable Strategic Solid Waste Management Plan (SSWMP) that will assist and guide the County in maintaining the landfill as a self-sustaining enterprise. The West Garfield County Landfill (WGCL) was envisioned to be a regional landfill facility, dating back to studies done in 1991. The landfill receives approximately 25,000 tons per year (tpy) or 100 tons per day (tpd) of non-hazardous municipal solid waste (MSW). The County generally experienced increased waste receipts from 2010 to 2012, while receipts dropped in 2013, yet revenue exceeded 2012 levels.

The WGCL Team assisted the Garfield County Public Works Department (GCPWD) with two planning events prior to the development of the SSWMP. These planning events included the State of Practice Presentation and a Strategic Solid Waste Management workshop. Each planning task culminated in the development of a presentation or data memorandum that was presented to the Garfield County Board of County Commissioners (BOCC), answering questions on potential waste streams to be handled, alternative uses for county landfill property, cursory review of budget and operating costs for the new services, waste streams proposed to be accepted at the WGCL, evaluation of new technologies to landfilling and advantages and disadvantages of public vs. private landfill ownership and operation.

Garfield County Administration (GCA) has an established mission statement and "*provides quality services to the Citizens of Garfield County by implementing the policies of the Board of County Commissioners and supporting the other countywide Elected Officials. GCA is committed to:*

- *Excellence, professionalism and ethical conduct;*
- *Teamwork;*
- *Leadership; Prudent stewardship of public resources;*
- *Innovation;*
- *Continual improvement; and*
- *A courteous and positive work environment.*

On October 21, 2014, the BOCC adopted a mission statement for the landfill which guides the future direction of the WGCL: *The West Garfield County Landfill is an important public asset and public service operated by the Board of County Commissioners as a self-sustaining enterprise.*

The Landfill operates with best management practices and sound business judgment, using the Solid Waste Disposal Fund prudently for its capital needs.

These elements from the Mission Statement were used as guiding principles incorporated into the SSWMP which identifies current and future factors within a 13 county Study Area in Colorado (including Garfield County) that could affect WGCL's ability to continue as a self-sustaining enterprise (refer to **Figure 1**). The SSWMP was prepared to be a visionary plan as it considers and identifies new waste streams and services that the landfill does not currently provide. At the same time, the SSWMP is also conservative, since the projections for the WGCL's market capture and steps for implementation are conservatively low. The SSWMP identifies new recycling and waste disposal services the landfill might offer, to expand the current customer base and accept new waste streams. The Plan identifies and quantifies the waste streams potentially available for acceptance including:

- septage
- petroleum contaminated soils
- non-hazardous liquid wastes that require solidification prior to disposal
- other non-liquid Exploration & Production (E&P) waste

The facilities identified to process the waste streams identified above include a Petroleum Contaminated Soils (PCS) processing land farm, an E&P liquids solidification basin, an E&P waste lined monofill and additional septage evaporation ponds. For each of the new disposal elements, the SSWMP summarizes key design elements, operational considerations, equipment needs, capital and operating budgets and recommendations on implementation. The SSWMP provides preliminary cost estimates for required capital improvements and operational changes needed to accept and process these additional waste streams. The Plan also identifies potential competitors such as other existing disposal facilities including: landfills, septage ponds, solidification basins, compost facilities, materials recovery facilities (MRFs) and transfer stations that are currently operating in the Study Area. The plan suggests the County continue acceptance of out-of-county waste, to grow both the perception and the reality of the landfill as a regional waste disposal facility. The SSWMP discusses renewable energy options such as thermal and biological waste conversion technologies and landfill gas to various forms of energy, including the advantages and disadvantages of each. Future landfill operations and management considerations such as privitization, and partnership potential with recycling industies, waste to energy vendors and E&P companies are offered with recommendations for future consideration.

The SSWMP also presents and discusses strengths and weaknesses of the the current WGCL operations. The plan also provides short-term (0 – 5 year) and long-term (6 – 10 year) planning strategies, including recommendations for future studies and engineering services. Both strategies are intended to have an impact on revenue generation, operational efficiency, environmental protection, and conservation of waste disposal airspace. The key short-term planning strategies include:

FIGURE 1. LIMITS OF THE STUDY AREA

- Implement the Capital Improvements approved in the 2014 Capital Budget.
- Conduct a review and evaluation of current WGCL operations to implement operational efficiencies. (WGCL Team)
- Submit the completed permit revision application to CDPHE increasing the current permitted landfill slope height and to maximize the current landfill's waste disposal capacity within the currently permitted waste footprint.
- Conduct a hydrogeological investigation in the area proposed for the lined monofill cell and solidification basin.
- Develop and implement a plan to accomplish SWANA training for Landfill staff.
- Continue discussions with E&P companies to assess their interest in using the land farm, and potential lined monfill cell and solidification basin, and negotiate waste commitment agreements.
- Expand waste acceptance capabilities.
- Conduct a treatability study for reuse of the septage liquids on-site and/or for marketing to the oil and gas operators.
- Over the next 12 months, develop long-term septage management solutions including conducting feasibility studies of other technologies for septage treatment or reuse and performing a siting study for a new septage impoundment within the CD.
- Pursue strong alliances with other municipalities, economic development organizations and industry within the Study Area.
- Develop marketing materials and utilize technology to advertise the landfill's services.
- Hire part-time marketing staff as appropriate.
- Review and update the SSWMP and the overall operating structure of the GCPWD to adjust for operational efficiencies between departments, at a minimum of every 5 years.
- Re-evaluate the BOCC's mission statement annually.
- Upon final direction by the BOCC regarding the SSWMP, prepare a detailed financial business plan which incorporates 1) operational efficiencies, 2) new landfill infrastructure and 3) revenues from potential new waste streams.

The key long-term planning strategies are:

- Prepare an annual presentation to the BOCC on the status of the landfill operation and recommend potential changes in the tipping fees.
- Regularly review staffing levels and adjust to adequately respond to market changes.

- Develop staff capabilities for sales and marketing staff to effectively promote the WGCL systems' capabilities and/or add a part-time position.
- Periodically review and update the SSWMP and its goals and objectives in order to effectively compete with other landfills in the Study Area.
- Review and update the organizational structure and operating budget of the GCPWD to adjust for operational efficiencies between departments and to account for the competitive nature of the solid waste industry.
- Identify additional solid waste services to address changing markets.
- Consider whether the BOCC should expand the landfill onto additional land for future waste processing and/or disposal capacity.
- Review the efficacy of alternative disposal technologies.
- Re-evaluate the BOCC's mission statement annually.

Ultimately, the SSWMP is a planning guide that the BOCC can use to implement the identified strategies. The development of a strategic plan is an essential precursor to the preparation of a detailed financial business plan. The SSWMP is intended to be a "living document" and should be reviewed and updated on a regular basis, to incorporate and respond to changes in the market or to directives of the BOCC.

2. INTRODUCTION

The purpose of Section 2 is to answer the question: Why are we developing a strategic solid waste management plan and what steps were taken to date to develop this document? The subsections that follow will identify the purpose, the scope, the data collected, the BOCC's mission statement and the goals and objectives of the study.

NWCC, Inc. (NWCC) in conjuntion with URS Corporation (URS), together the West Garfield County Landfill Team (WGCL Team) was retained by the BOCC to perform a review of the County's current landfill management assets and develop a workable Strategic Plan that will assist and guide the County in maintaining a dominant position, as a self-sustaining enterprise. Work conducted by the WGCL Team is based upon information obtained from numerous sources including, but not limited to, the County's audited financials, the 2012 adopted budget, 2014 Capital Budget, local hauling surveys, Garfield County Comprehensive 2030 Growth Management Plan developed by the County, interviews with its staff and other third party consultants working on behalf of the BOCC, review of Federal, State and Local regulations pertaining to solid waste management, and the WGCL Team's general knowledge of the solid waste management industry and understanding of life and business, in general, in this area of Colorado.

2.1. GARFIELD COUNTY MISSION STATEMENTS

2.1.1 GARFIELD COUNTY ADMINISTRATION MISSION STATEMENT[1]

Garfield County Administration has adopted its mission statement which reads:

Garfield County Administration provides quality services to the Citizens of Garfield County by implementing the policies of the Board of County Commissioners and supporting the other countywide Elected Officials.

- *Garfield County Administration is committed to:*
- *Excellence, professionalism and ethical conduct;*
- *Teamwork;*
- *Leadership; Prudent stewardship of public resources;*
- *Innovation;*
- *Continual improvement; and*
- *A courteous and positive work environment.*

[1] http://www.garfield-county.com/administration/index.aspx.

2.1.2 West Garfield County Landfill Mission Statement

In addition to the Garfield County Administration mission statement, on October 21, 2013, the BOCC adopted a Mission Statement for WGCL which includes the following two principles:[2]

- *The West Garfield County Landfill is an important public asset and public service operated by the Board of County Commissioners as a self-sustaining enterprise.*
- *The Landfill operates with best management practices and sound business judgment, using the Solid Waste Disposal Fund prudently for its capital needs.*

The philosophies of the WGCL mission statement were used as guiding principles, in the preparation of the SSWMP.

2.2. Background

Garfield County government is located in west central Colorado and covers nearly two million (MM) acres of land, ranging from rugged alpine mountains to high mountain desert plateaus. The federal government owns more than 60% of the land in the county.[3] Home to more than 56,000 people, Garfield County boasts incredible outdoor adventures, a premier seasonal climate and has major rail, interstate and air access. Industries include energy development, mineral extraction, tourism, ranching and agriculture, live stock and construction farming. Most residents reside in one of six local municipalities; the unincorporated county is home to only about 40 percent of the county's population. The population in the unincorporated areas lies mainly in the Roaring Fork Valley between Carbondale and Glenwood Springs and along the I-70 corridor between Glenwood and Parachute. The County buildings and facilities are also located along the I-70 corridor (see **Figure 2**). Garfield County and Glenwood Springs, have traditionally provided year-round recreational opportunities and related services. Primary attractions include the Hot Springs Pool, Sunlight Ski Area, White River National Forest, the Colorado and Roaring Fork Rivers and Glenwood Canyon. The County owns and operates a permitted MSW landfill identified by the Colorado Department of Public Health and Environment (CDPHE) with Facility ID 1537. The Solid Waste Disposal Department is under the leadership of Betsy Suerth, the Director of Public Works. The Public Works Department (GCPWD) has a total of 22 staff; 8 are assigned full-time to the landfill.

Garfield County provides solid waste disposal services for wastes both within and outside of its incorporated boundaries (County limits). Services are provided to all residences,

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[2]. http://www.garfield-county.com/landfill/

[3] *Garfield County Comprehensive Plan 2030, Appendix A*, Winston Associates, Inc., p. A-2.

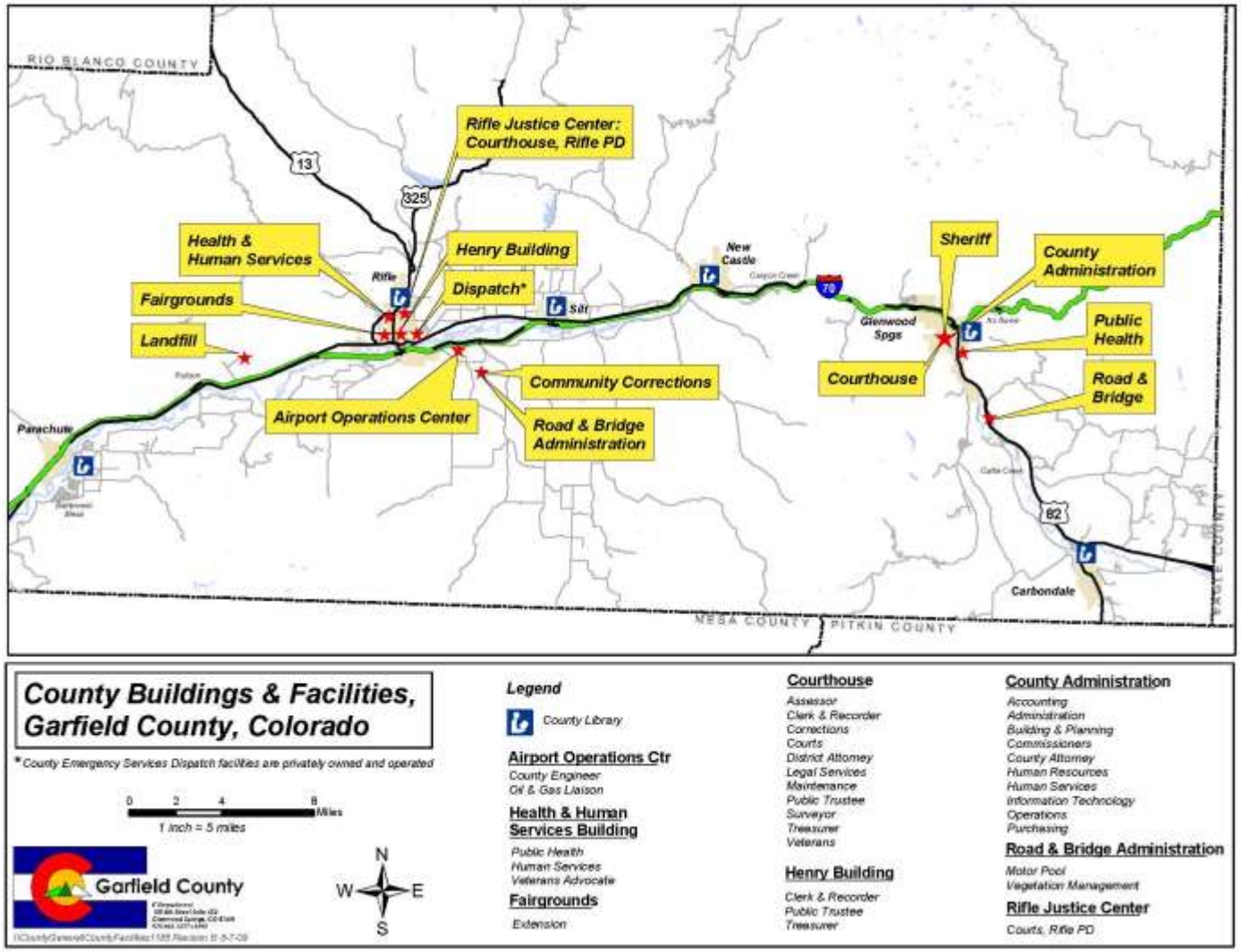

FIGURE 2. LOCATION OF COUNTY FACILITIES ALONG THE I-70 CORRIDOR

industries and commercial businesses located in or near Garfield County. The County does not provide hauling services for these clients. Those services are generally contracted to private, independent haulers.

WGCL was envisioned as long ago as 1991, to be a regional landfill facility, according to a number of studies conducted at that time. Due to the regional service area and for the purposes of this report, the WGCL Team evaluated a geographic area which included Garfield County and other nearby counties with a reported 2010 population of 446,032 (Study Area). (Refer to **Table 1.**) The other counties in the Study Area are presented in **Figure 1** and include:

- Chaffee
- Delta
- Eagle
- Garfield
- Grand
- Gunnison
- Lake
- Mesa
- Moffat
- Montrose
- Pitkin
- Rio Blanco
- Routt

WGCL experienced increased waste tonnage from 2010 to 2012, while revenues have dropped. This decrease in revenue is likely due to WGCL's reduced fee schedules implemented by the BOCC due to competition from area landfills. However, 2013 landfill revenues exceeded 2012 revenues, although the total tons accepted in 2013 were less. The landfill receives approximately 25,000 tpy or 100 tpd on MSW. Recently, WGCL has experienced higher operating costs related to activities such as landfill gas (LFG) migration management issues and soil management. These items along with other operational activities where efficiencies can be improved has prompted the County to reevaluate these operations and to develop a site specific Strategic Plan for the landfill operation. This development of the Strategic Plan allows the County to make informed decisions regarding both the current and future waste disposal and recycling service needs for the County and the region, as well as the financial stability of WGCL. The BOCC contracted with NWCC during 2013 to provide a nunber of services including the development of a SSWMP to guide WGCL in the future, as it adapts to changing markets and regulatory mandates.

2.3 PURPOSE

The purpose of this SSWMP is to identify current and future factors within the Study Area that could affect the WGCL's ability to operate as a self-sustaining enterprise and regional disposal facility. The SSWMP will identify new recycling and waste disposal services the landfill might offer, and quantify the waste streams potentially available for acceptance at the landfill. The SSWMP also evaluated market players including:

- Haulers, landfills and transfer stations operating in and surrounding Garfield County.
- Variety of current and potential future waste streams and sources of waste to be accepted.
- Additional solid waste services to be provided.
- Acceptance of out-of-county waste receipts.
- Capital improvement and operational changes needed to accept the additional waste streams.

The SSWMP was prepared to be a planning guide that the BOCC can use to implement the identified strategies. The SSWMP was prepared to be a visionary plan because it considers and identifies new waste streams and services that the landfill does not currently provide. At the same time, the SSWMP is also conservative, since the projections for the WGCL's market capture and steps for implementation of landfill infrastructure are conservatively low.

The development of a strategic plan is an essential precursor to the preparation of a detailed financial business plan. The SSWMP is a "living document" and should be reviewed and updated on a regular basis, to incorporate and respond to changes in the market, regulations, landfill operations and/or directives of the BOCC.

2.4 Scope

The SSWMP includes WGCL Team review and analysis of publicly available information that included historical trends regarding population, waste types and volumes and competition within the market area. Considerable time was spent with GCPWD staff to gain a thorough insight of the WGCL's strengths and weaknesses and to review the proposed design and closure plans to modify the landfill slopes and thus increase overall waste disposal capacity and extend the landfill life. Solid waste fee reports and facility reports were reviewed to assess quantities of waste being generated in the Study Area and the potential outlets for receipt of the waste, and to determine if capacity and capabilities for receiving additional waste streams was needed. Suggested action plans were then developed consisting of short- and long-range plans, including various facility improvements.

It is important to note that certain population and waste projections contained within this SSWMP are intended to be forward looking and should be utilized for planning purposes only. Changes in one or a series of factors that currently affect the County's landfill operations could result in changes to any recommendations, conclusions, and/or action items provided in this SSWMP.

2.5 Collection of Information

The method and approach utilized in gathering information to develop this plan included:

- Visits by the WGCL Team to the landfill facility.
- Submittal of Freedom of Information requests to CDPHE.
- Review of available information received from the CDPHE.
- Review of data from the Utah Department of Environmental Quality (Utah DEQ).
- In-depth discussions with County management and staff regarding WGCL operations and the County's desired goals and objectives.
- Review of select operational and financial data tracked by the GCPWD.
- Telephone discussions with CDPHE, officials of various solid and medical waste management organizations and waste industry personnel.
- Collection and review of credible published information pertaining to environmental, financial and operational issues of landfills.
- Review of information provided by the County.
- NWCC's general knowledge of the solid waste management industry on Colorado's West Slope.

The WGCL Team completed several planning tasks prior to development of the SSWMP. Each of these tasks involved collection and review of available waste generation and disposal practices within the Study Area. Each planning task culminated in development of a presentation or data memorandum that was presented to the BOCC, to answer their questions regarding potential waste streams, alternative uses for County landfill property, cursory review of budget and operating costs for proposed new services and waste streams to be accepted at the WGCL, evaluation of new technologies to landfilling and advantages of public vs. private landfill ownership and operation. The WGCL Team assisted the County with development of a State of the Practice Presentation (SOPP), a half day workshop on solid waste options for the BOCC and WGCL to consider, and a memorandum, responding to questions raised during the workshop. Each of these planning tasks is discussed below.

2.5.1 State of the Practice Presentation

The WGCL Team assisted the GCPWD Management by reviewing existing and historic data related to the landfill operations, including revenue by market and annual tonnage, expense projections, forecasted capital needs, existing services provided, waste streams currently accepted, potential waste streams to accept, and new services to offer. The GCPWD Management presented the SOPP at a BOCC meeting on July 9, 2013. The SOPP provided estimates of net waste disposal projections for the Study Area in 2010, 2015 and 2020, identified the solid waste landfills, transfer stations, compost facilities, waste tire facilities and MRFs currently permitted in the Study Area, and identified regional recycling flow patterns. The SOPP data was compiled based on materials provided by CDPHE through FOIA requests and historic

and current waste receipts and expenses information at WGCL. The last part of the presentation solicited input from the BOCC regarding topics they would like to see covered at a half-day workshop. A copy of the presentation is presented in Appendix A.

2.5.2 BOCC Strategic Solid Waste Management Workshop

On October 8, 2013, the GCPWD and WGCL Team presented a half-day solid waste management workshop to the BOCC. The workshop was held at the BOCC offices in Glenwood Springs. Topics covered during the workshop included:

- Purpose and Introduction.
- Overview of the County's Current Landfill Management Practices.
- Market Assessment for Current and Available Waste Streams.
- Overview of New Revenue and Recycling Option.
- Summary of Renewable Energy Options.
- Future Landfill Operations and Management Considerations.
- Development of a Mission Statement.

The WGCL Team led an interactive workshop with significant input and questions from the BOCC regarding the topics covered during the presentation. The WGCL Team offered the following recommendations for the BOCC's consideration:

1. Rebuild North and South Impoundments (NSI).
2. Obtain approval from CDPHE of the materials under the demonstration project for use as Alternative Daily Cover (ADC).
3. Pursue economical approaches to providing E&P disposal opportunities.
4. Build a Solidification Basin.
5. Propose a Land Farm Pilot Project for CDPHE approval.
6. Conceptualize a Phasing Plan for an E&P Waste Monofill Development.
7. Consider a Pilot Stop-N-Shop Facility.
8. Conduct a Feasibility Study for Expanding the Current Household Hazardous Waste Program.
9. Use waste tires as ADC because WGCL is in daily and final cover soil deficit.

The BOCC authorized the WGCL Team to take the following actions:

1. Proceed with permitting and building of the NSI while addressing how to handle septage materials in winter months.

2. Consider development of a solidification basin but come back with additional market information regarding quantities of waste materials available.
3. Explore the most economical way to develop a lined E&P cell after talking to E&P companies about their potential needs, the market and competition.
4. Provide development and operating cost data on land farming of PCS for the potential establishment of a pilot project.
5. Do not pursue a compost facility for yard waste or food waste, the development of a tire processing facility, an aggregate processing facility, or a Stop-N-Shop.
6. Identify training courses for the Landfill staff to encourage additional best management practices and to increase health and safety practices.

A copy of the BOCC Workshop presentation is presented in **Appendix B**.

2.5.3 Post BOCC Workshop Research Memorandum

Following the BOCC workshop, the WGCL Team collected additional information to address questions raised by the BOCC. Findings from the additional research were prepared in a Memorandum presented to the BOCC at their November 12, 2013 meeting. The following topics were covered in the memorandum:

- Do other treatment technologies for septage exist in addition to septage impoundments and what is the potential use of the water, once treated?
- What is the maximum year round ability to accept septage at the WGCL?
- What is the opportunity for WGCL to set up a recycling program for E&P drilling pipe?
- What is the adequacy of the current accrual program for closure and post-closure care expenses?
- What is the current interest of E&P companies to use the WGCL landfill and what additional disposal services (land farm, septage impoundment, solidification basin, and lined monofill cell) would be beneficial for them?
- What are the projected permitting and operating costs and revenue for a land farm?
- What are the current tipping fees at Utah landfills and which facilities accept E&P waste from out-of-state?
- What is the potential market for waste to be accepted at a solidification basin?
- Is medical waste worth pursuing for disposal at the WGCL?

- Will the landfill staff be protected when operating near the proposed land farm or solidification basin?
- What training should the landfill staff be provided?

A copy of the memorandum which addresses responses to the questions listed above is presented in **Appendix C**.

2.6 GOALS AND OBJECTIVES

In developing the goals and objectives outlined in this section of the Plan, the WGCL staff has kept in mind that solid waste management is not only competitive but also capital and labor intensive. The BOCC, in striving to promote an environmentally sound and cost efficient system for its citizens and the residents of Garfield County, must be ready to adapt to changes in both waste types and waste volumes within the landfill's market area, regulatory changes impacting on-site operations, competition with private or public operators or other anticipated/unanticipated influences.

The goals and objectives of the SSWMP are as follows:

- Provide a cost efficient and environmentally sound service, in terms of waste handling and disposal, to not only Garfield County citizens and businesses but also to those located within other regions of the Study Area.
- Promote a safe working environment for all County landfill workers and support staff;.
- Provide a safe environment for customers and visitors at the landfill.
- Provide best management practices training for WGCL staff.
- Implement a sales and marketing plan that enables WGCL to successfully compete with other public and privately operated MSW landfills in order for the County to incur economic benefits from services it provides. That plan could recommend adding a part-time sales position.
- Offer new services and accept new waste streams from current and future customers within the Study Area, thereby increasing the landfill's profitability.
- Develop new infrastructure at the landfill to accommodate projected growth in services and waste streams accepted.
- Develop partnerships with private companies and non-profit organizations to offer additional services to county residents and businesses, if economically viable (or as a county service), once approved by the BOCC.
- Promote the WGCL as a driver for future economic development in Garfield County and work with the business community to provide solutions for their service needs.

- Perform an annual landfill operations review, comparing capital and operations costs against market area competitors' tipping fees and adjust rates, strategy, etc., as warranted.
- Improve the quality of life for Garfield County by providing a regional MSW recycling and disposal facility.

3. MARKET ASSESSMENT OF THE STUDY AREA

The purpose of Section 3 is to answer the question: ***How much waste is generated in the study area, whether that waste is accepted at WGCL, and who is the competition?*** *The subsections that follow will identify the quantity and types of waste generated, and the location of competitive facilities in the Study Area.*

Information presented in this section pertains to current and future customers (population) of the WGCL, types and volumes of waste accepted at the facility and identification of competitive factors within the Study Area outlined in **Figure 1**.

3.1 STUDY AREA DESCRIPTION

For the purpose of this SSWMP, the Study Area, as presented in **Figure 1** consists of the 13 counties in close proximity to and including Garfield County. This Study Area includes an approximate 80-mile by 120-mile area surrounding the WGCL. The demographics for the Study Area are described below.

3.2 POPULATION AND HOUSEHOLDS

A summary of the population projections for the Study Area over the time period 2000 to 2040 is presented in **Table 1**. This information was taken from the Colorado Bureau of Labor Statistics and was last updated October 2013.[4] As presented in **Table 1**, the population in the Study Area is projected to generally increase 1% – 3% per year. Overall, the annual population growth is projected to increase from 446,032 in 2010 to 838,745 in 2040. **Figure 3** presents projected population growth data for the Study Area and for the balance of the state for 2010 to 2040.

Table 2 presents household projections by county in the Study Area from 2010 to 2040. This information is for all age groups and was prepared by the Colorado Bureau of Labor Statistics, State Demography Office. As presented in **Table 2** the Study Area is projected to experience an increase of approximately 124,000 homes over the time period 2010 to 2040, representing an increase of 70%. Over this same time period, the number of households in Garfield County is projected to increase 93%. The increased growth in population and number of households will directly impact the amount of waste generated in the Study Area, as discussed in Section 3.4. Therefore, waste generation in the Study Area is expected to increase incrementally over the 2010 to 2040 timeframe.

[4] http://www.colorado.gov/cs/Satellite?c=Page&childpagename=DOLA-Main%2FCBONLayout&cid=1251593346834&pagename=CBONWrapper.

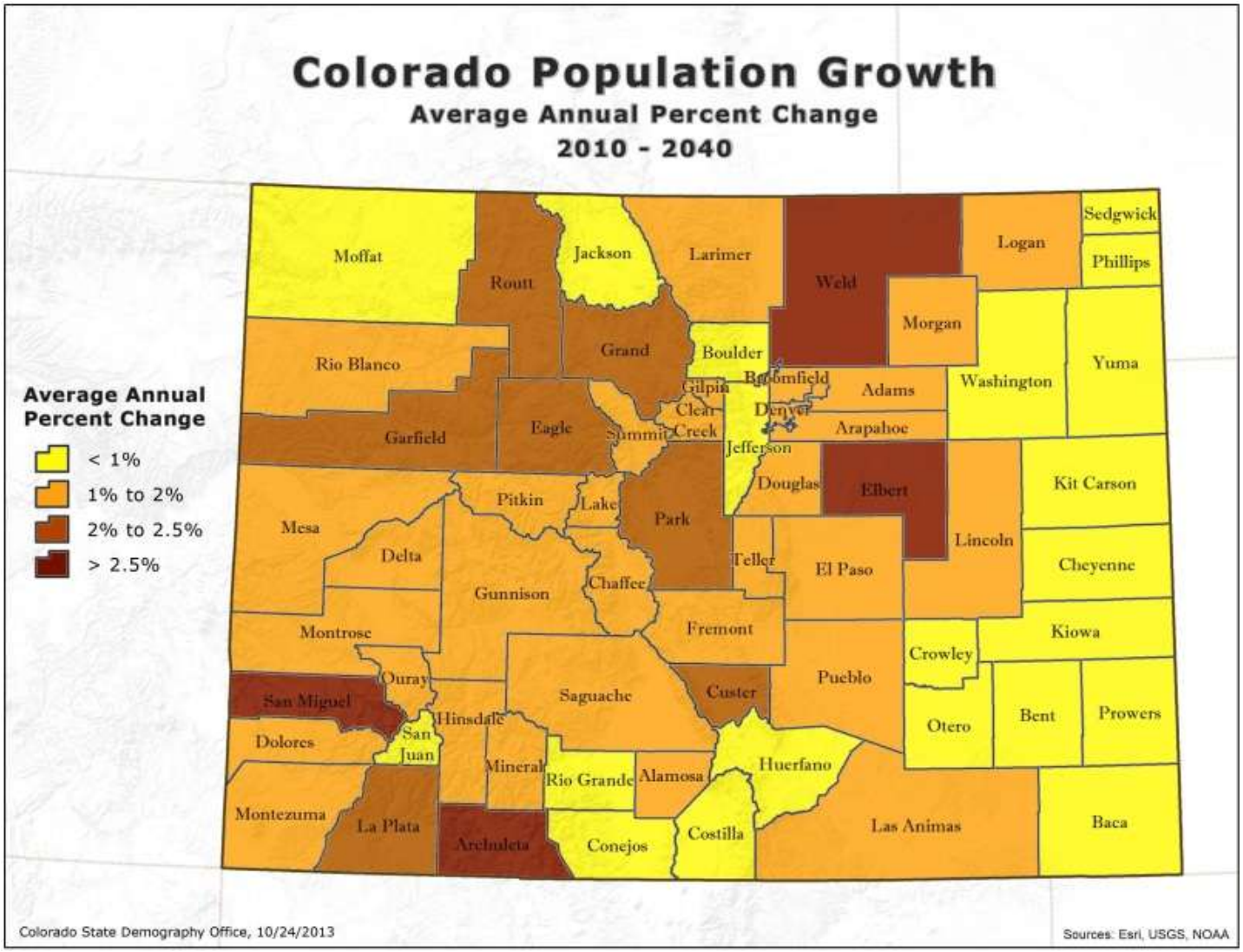

FIGURE 3. CHANGE IN COLORADO POPULATION, 2010 TO 2040

Garfield County encompasses almost 2,950 square miles with an approximate population density of 19.1 people per square mile, which is greater than the Study Area average of 17.08.[5] Population density affects the selected placement of recycling and reuse facilities, routing for waste collection vehicles and ultimate life cycle program costs for waste handling, collection, recyclables processing and disposal. The population masses in each county tend to be centralized in certain areas of each county (generally located in close proximity to main roads and thoroughfares).

3.3 ECONOMIC ACTIVITY

According to the Colorado Department of Local Affairs, (CDLA), job growth in the Study Area is projected to be from 1% to 2.5% per year, from 2010 to 2040, except for Moffat County (see **Figure 4**).

Statewide, in 2012, Colorado is estimated to have 2,901,554 total jobs consisting of 2,455,333 wage and salary (W&S) jobs and 446,221 self-employed proprietor jobs. The 2012 total jobs figure is an increase of 2.4% or 67,195 jobs, over the prior year – the second consecutive period of year-over-year job growth. Colorado is currently at 99.4% of the 2008 employment peak.

The growth in the Study Area compares favorably to the growth seen in the rest of the state. As presented in **Figure 5**, the 2012 employment in the Study Area ranges from 85 – 95% of the 2008 employment, except for Rio Blanco which is less than 85% of 2008 employment and Lake and Chaffee Counties at 95% - 100% of the 2008 levels.

As presented in **Figure 6**, in 2012, the highest areas of job growth in the state are in the internet service providers, data processing, mining, and the oil and gas exploration sectors. Presented in **Figure 7** are the job sectors that have experienced the highest average annual growth, from 2001 to 2012. Oil and Gas and Mining head the top of the list. The WGCL is specifically targeting the Oil and Gas exploration industry as part of future plans for growth in waste acceptance and disposal services and gross revenues.

The State of Colorado has divided the state into planning regions for economic impact and trends analysis. As presented in **Figure 8**, the Study Area falls within Planning & Management Regions (P&MR)s 10, 11, 12 and 13.[6] Each of these regions was evaluated for local information on the key industries and employment information. If the key industries vary between planning regions, the types of waste generated by those industries are also likely to vary.

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[5] http://www.indexmundi.com/facts/united-states/quick-facts/colorado/population-density#table
[6] http://dola.colorado.gov/demog-cms/content/region-profiles.

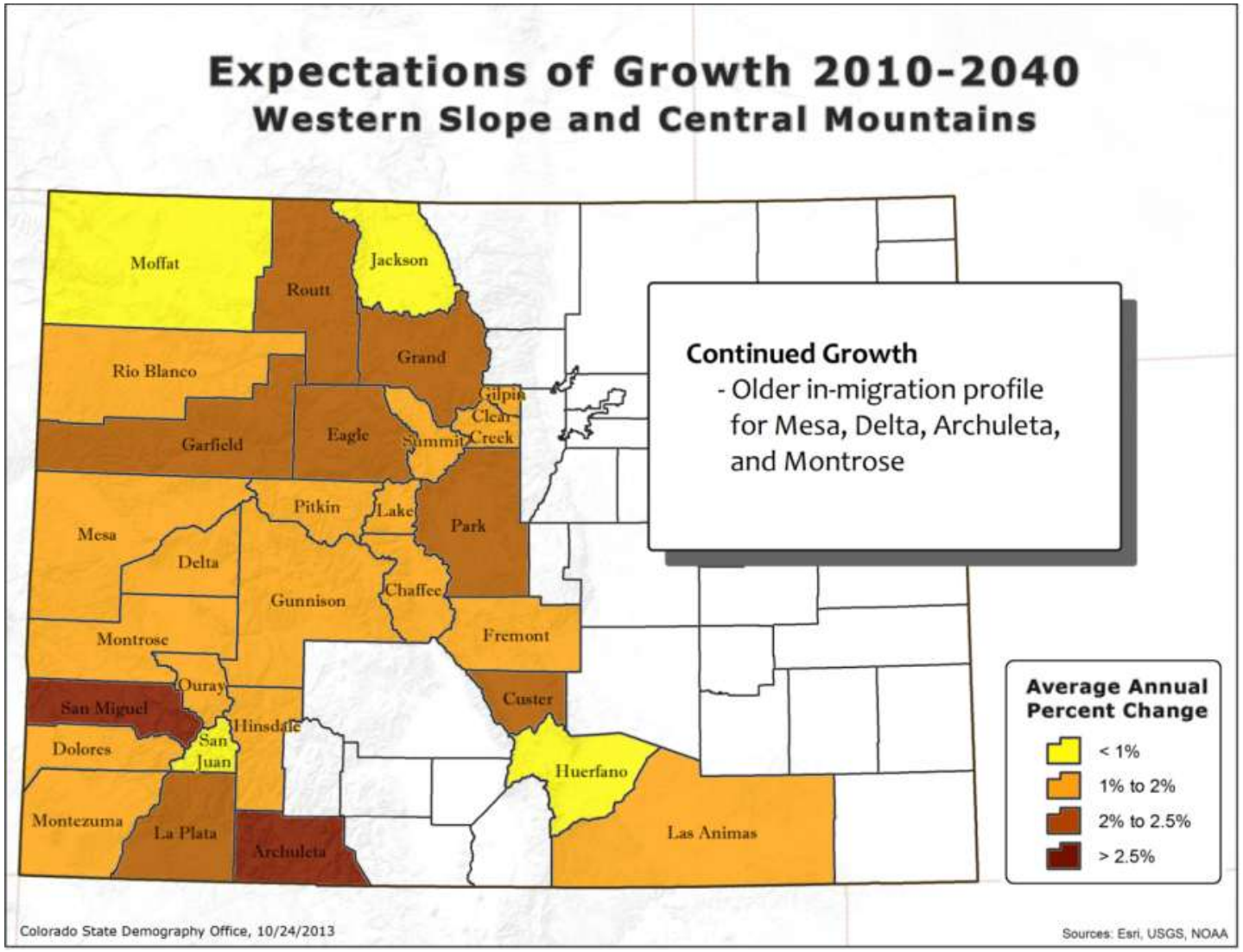

FIGURE 4. PROJECTED JOB GROWTH, 2010 TO 2040

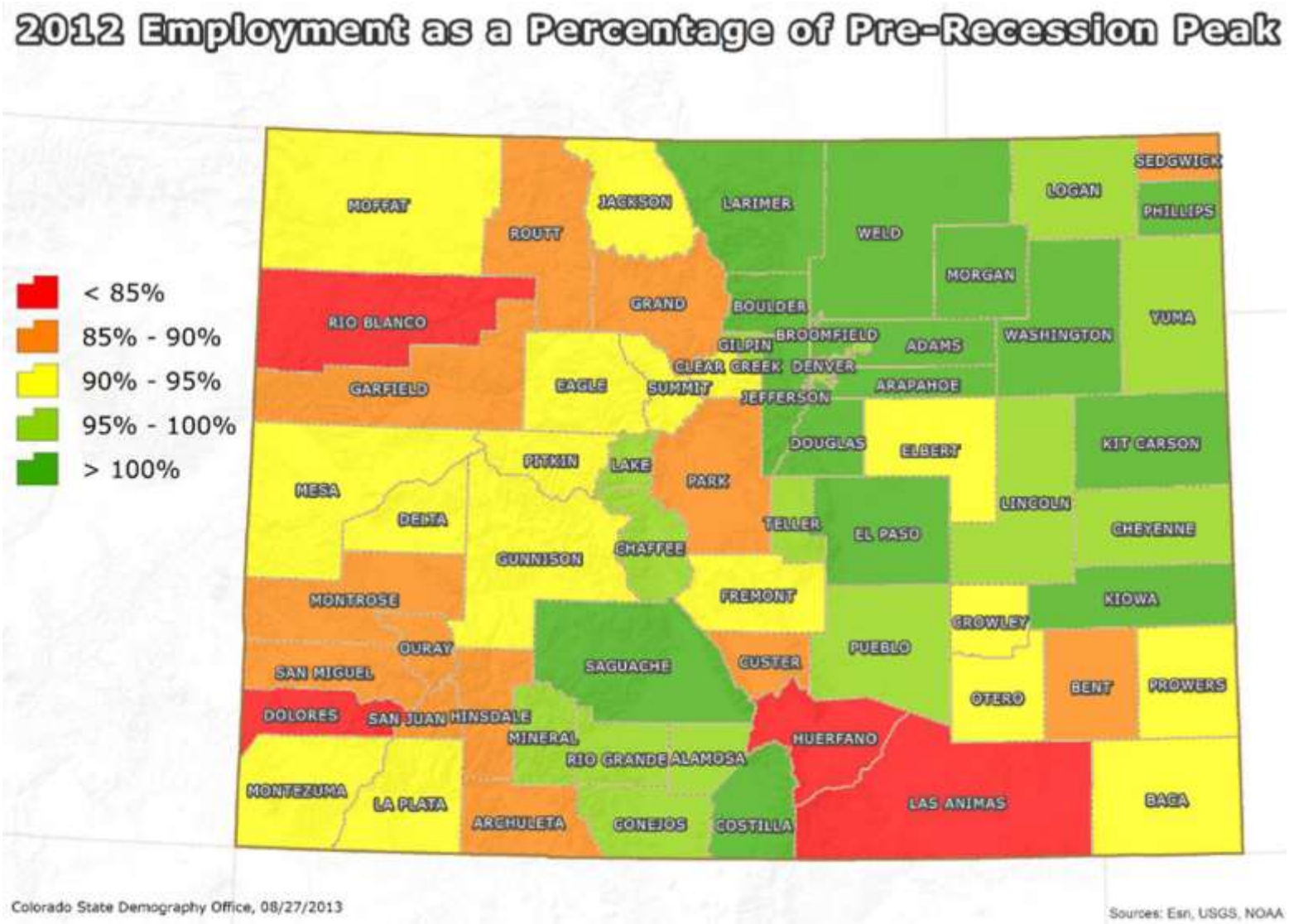

FIGURE 5. 2012 EMPLOYMENT AS A PERCENTAGE OF 2008 EMPLOYMENT

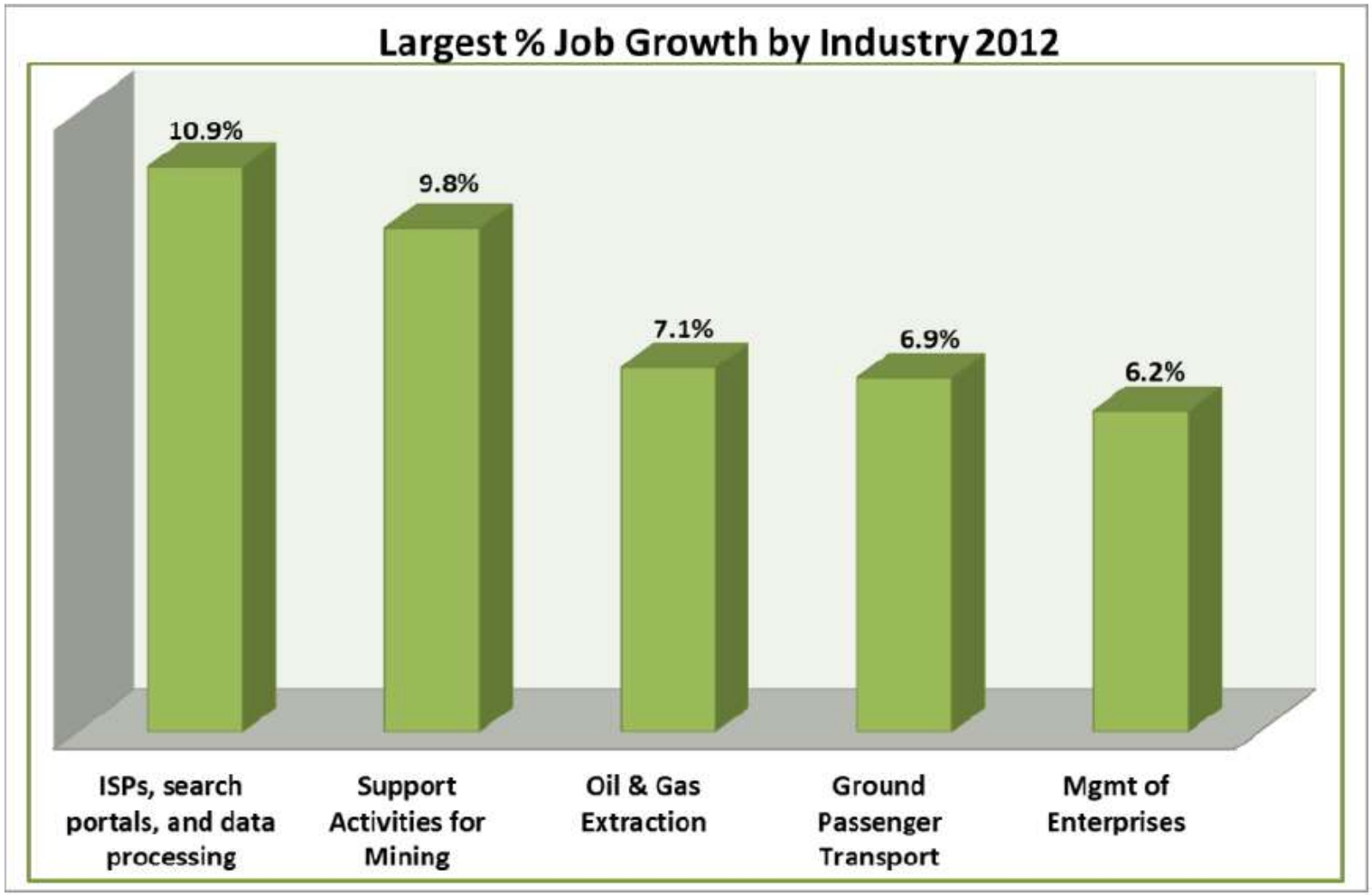

FIGURE 6. 2012 JOB SECTORS WITH HIGHEST GROWTH

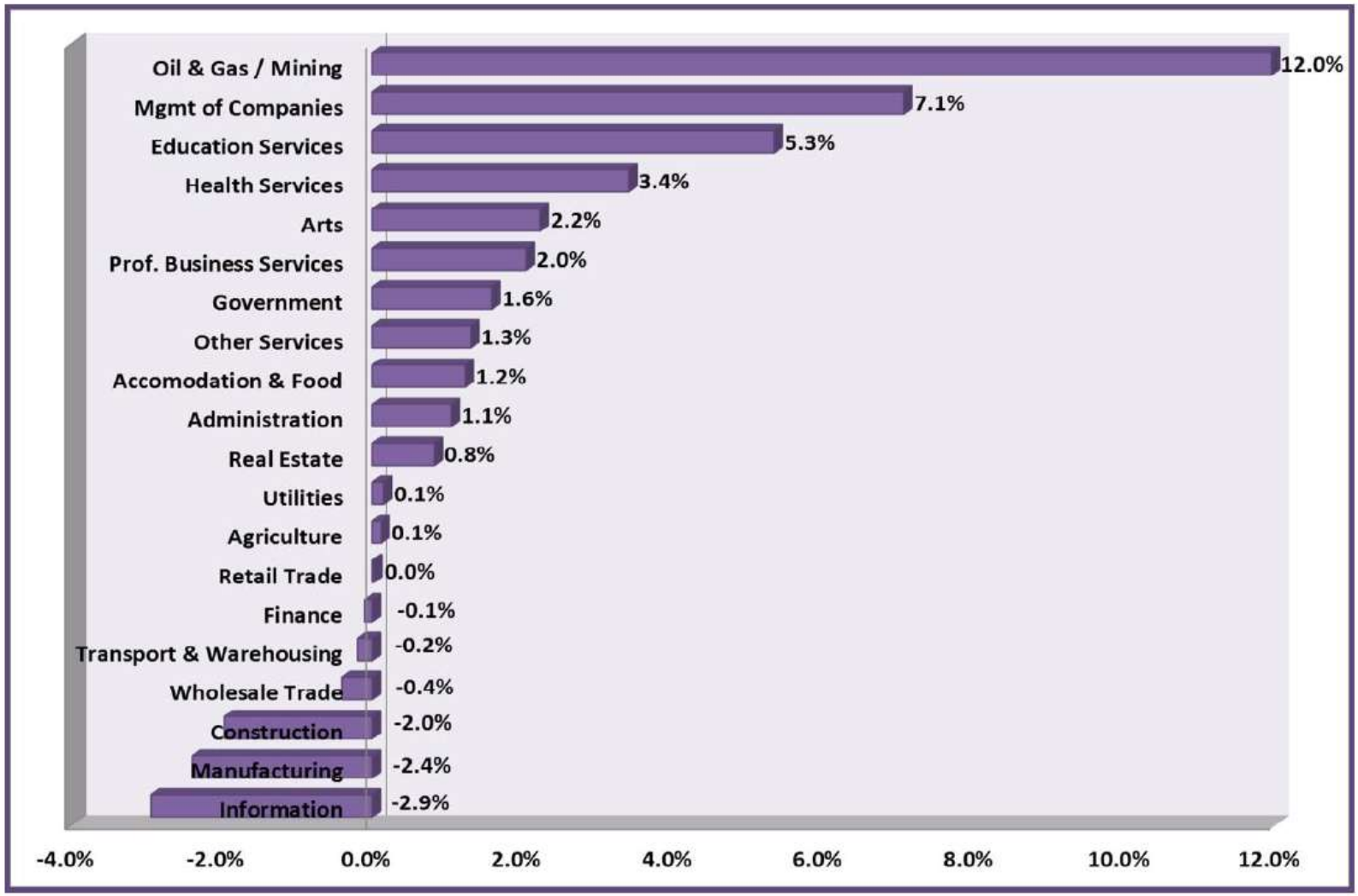

FIGURE 7. AVERAGE ANNUAL JOB GROWTH 2001 – 2012 BY INDUSTRY SECTORS

Garfield, Mesa, Moffat, Rio Blanco and Routt Counties fall under P&MR 11. The key industries in P&MR 11 in 2013 are agriculture, energy development, tourism, government services, health care, transportation and mineral extraction.[7] According to the Region 11 report, Garfield and Moffat counties have the lowest unemployment rates. Cattle and sheep ranching is strong in Garfield County, as is tourism, natural gas drilling and government services.

FIGURE 8. COLORADO PLANNING REGIONS

Eagle and Pitkin Counties fall under P&MR 12. The key industries in P&MR 12 in 2013 are tourism and outdoor recreation, health and wellness, financial services and creative industries, based on the total number of jobs in each sector.[8]

Delta, Gunnison and Montrose Counties fall under P&MR 10. The key industries in P&MR 10 in 2013 are agribusiness, tourism and retiree related expenditures.[9] Since 2012, the majority of job losses in P&MR 10 have been in the construction and real estate industries. The Climax Molybdenum Mine in NW Lake County reopened in 2012 spurning local business growth.

Lake and Chaffee Counties fall under P&MR 13. The key industries in P&MR 13 in 2013 are agribusiness, tourism and retiree related expenditures.[10]

Based on a review of the CDLA's Socioeconomic Profiles for PM&Rs 10, 11, 12, and 13, future job growth is expected from retiree spending and tourism, while jobs in extractive industries (mining, and oil and gas production), health services, and business services are also forecast to experience stronger increases.[11]

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[7] Colorado Department of Local Affairs, *2013 Colorado Planning & Management Region Report, Region 11*, (undated 2013), pg.1. http://dola.colorado.gov/demog-cms/content/region-profiles
[8] Colorado Department of Local Affairs, *2013 Colorado Planning & Management Region Report, Region 12*, (undated 2013), pg.1. http://dola.colorado.gov/demog-cms/content/region-profiles.
[9] Colorado Department of Local Affairs, *2013 Colorado Planning & Management Region Report, Region 10*, (undated 2013), pg.1. http://dola.colorado.gov/demog-cms/content/region-profiles.
[10] Colorado Department of Local Affairs, *2013 Colorado Planning & Management Region Report, Region 11*, (undated 2013), pg.1. http://dola.colorado.gov/demog-cms/content/region-profiles

3.4 WASTE GENERATION AND CHARACTERIZATION IN THE STUDY AREA

Solid waste generation and characterization within the Study Area is briefly presented in this section. An accurate representation of the actual total waste generated and specific characterization of the waste stream is difficult to obtain because of the lack of regional comprehensive data. In the section below, the WGCL Team developed estimates of waste generation for MSW, septage, waste grease, PCS, tires and yard waste, depending on publically available information from CDPHE, published consultant reports or regional planning documents.

3.4.1 MUNICIPAL SOLID WASTE

Total waste generation rates are based on per capita (per person) generation rates. The WGCL Team found two sources of waste generation rates for the Study Area. The first source is the state projection which for the year 2012 is reported as 8.58 pounds per capita per day (pcd). Although that information is published by CDPHE, there is no documentation showing what wastes are included in the definition and there is no regional breakdown of the data.[12] The second source is the *2009 Waste Diversion Quantity Report, Eagle, Garfield & Pitkin County Tri-County Region* prepared by LBA Associates, Inc. (2009 LBA Report). In the 2009 LBA Report, MSW included residential and commercial waste, organics, E-waste, household hazardous waste (HHW), landscape waste and tires. The 2009 waste generation rates varied from 4.3 pcd for Garfield County to 7.0 and 8.7 pcd for Pitkin and Eagle Counties, respectively. The results of 2009 LBA Report suggested that a 6.0 pound pcd rate and a 20% recycling rate were applicable for the Eagle, Garfield and Pitkin Counties (Tri-County) region. These rates were used in the SSWMP to estimate total and net waste generation for the Study Area, because they were developed for the local Tri-County region and will provide a more conservative estimate of waste generation than using the statewide generation rate.

The WGCL Team compiled population projections available from the CDLA for the time period 2005 to 2030, for the counties in the Study Area. In order to calculate total waste generation, the population for a particular county in a specific year is multiplied by the 2009 LBA Report per

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[11] Department of Local Affairs. 2013. *Planning and Management Region 13 Socioeconomic Profile*, pg. 2. The same future job projections were reached for the Socioeconomic Profiles for Planning and Management Regions 10, 11, and 12.

[12] http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%22Annual+Solid+Waste+Diversion+Totals+2007-2012.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251912140226&ssbinary=true.

capita generation rate discussed above, multiplied by 365 days in a year, and then converted to tons.[13] These results are presented in **Table 3**. To determine waste diversion in tons, total waste in tons is multiplied by the 20% recycling rate determined from the 2009 LBA Report.[14] Net waste generation represents the amount of waste requiring disposal at a landfill after waste diversion/recycling programs.[15] As presented in **Table 3**, net waste generation for the Study Area is estimated to range from 390,724 tons in 2010 to 443,385 tons to 2015. Additional waste streams such as septage, waste grease, E&P waste, and PCS are not included in the definition of MSW. The estimated quantities of these wastes were calculated separately and are discussed in the sections below. In 2025, the net waste disposal is estimated at 571,506 tons. By 2035, the Study Area is expected to require disposal of 683,043 tons, a 75% increase from the 2010 estimates.

3.4.2 SEPTAGE

There are three sources of septage received at WGCL: residential, commercial and industrial. Domestic septage is liquid or solid material removed from a septic tank, cesspool, portable toilet, type III marine sanitation device, or a similar system that receives only domestic septage.[16] Commercial septage means non-toxic, non-hazardous wastewater from commercial facilities which is usually similar in composition to domestic wastewater, but which may occasionally have one or more of its constituents exceed typical domestic ranges.[17] Industrial septage means process and non-process wastewater from manufacturing, commercial, mining, and silvicultural facilities or activities.[18]

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[13] For example, for Chaffee County for the year July 2005, Total Waste is calculated as 17,027 (population) x 6.0 pcd x 365 days per year/2000 pounds per ton or 18,645 tons.

[14] For example, for Chaffee County for the year 2005, Waste Diversion is calculated as 18,645 tons (Total Waste) x 20% recycling rate which equals 3,729 tons.

[15] For example, for Chaffee County in the year 2005, Net Waste Disposal is calculated as Waste Generation (18,645 tons) – Waste Diversion (3,729 tons) = 14,916 tons.

[16] Examples include wastes derived from the toilet, bath and shower, sink, garbage disposal, dishwasher, and washing machine. Domestic septage may include household septage as well as septage from establishments such as schools, restaurants, and motels as long as this septage does not contain other types of waste. Northeast Colorado Health Department. *Regulations For Domestic Septage*, adopted April 27, 1994; Effective, July 1, 2007, pgs. 2 – 4.

[17] Examples include wastewaters from commercial and institutional food service operations, commercial laundry facilities, animal holding facilities (such as kennels, veterinary hospitals, and animal grooming facilities), grease trap waste and beauty salons, provided that toxic, hazardous, or industrial wastes are not introduced into the system. Northeast Colorado Health Department. *Regulations For Domestic Septage*, adopted April 27, 1994; Effective, July 1, 2007, pgs. 2 – 4.

[18] Examples include runoff and leachate from areas that receive pollutants associated with industrial or commercial storage, handling or processing, and all other wastewater not otherwise defined as domestic wastewater. Northeast

Between 2011 and 2013, WGCL has accepted increasing quantities of septage: 227,000 gallons in 2011; 281,000 gallons in 2012 and 475,000 gallons in 2013. **Table 4** presents the potential septage generation in the study area based on CDPHE historic records from 2009 – 2013. The volume of septage disposed of in the Study Area has declined each year, from 2009 to 2013. In 2012, approximately 32 MM gallons of septage were disposed of in the study area. Not all facilities reported data for 2013, so the total septage available from the market may be underreported.

3.4.3 Waste Grease

The WGCL Team reviewed and compiled the CDPHE records collected from Waste Grease Transporters and Waste Grease Facilities operating in the State of Colorado. **Table 5** represents the results of this compilation. As noted in the exhibit, many of the transporters indicated their data is confidential so there are no results. Because of the lack of data, it is too speculative to estimate future waste receipts of waste grease. In order to receive waste grease from the market, it will be important to further target the transporters.

3.4.4 Exploration and Production Waste

The Piceance Basin is located in northwest Colorado and stretches across 6,000 square miles. Primarily natural gas, the Piceance Basin is in the Green River Formation area. The Piceance Basin crosses the Colorado River and Interstate 70 and encompasses the following counties: Moffat County, Rio Blanco County, Garfield County, Mesa County, Pitkin County, Delta County, Gunnison County and Montrose County. There is an estimated 300-plus trillion cubic feet of natural gas resource in Colorado's Piceance Basin. Operators who are planning to invest in drilling in the Piceance Basin, hope to recover 60% to 80% of that natural gas resource.[19]

It is difficult to estimate the future quantity of gas and oil field (E&P) waste that will require disposal from the Study Area.[20] These wastes are generally comprised of drill cuttings, sludge, produced water and fracking sand, generated during drilling operations and PCS resulting from spills at drill sites. Specific definitions of these wastes and others are discussed below.

3.4.4.1 Definitions

E & P Waste includes those wastes associated with operations conducted to locate or remove oil or gas from the ground or to remove impurities from such substances and which are uniquely

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Colorado Health Department. *Regulations For Domestic Septage*, adopted April 27, 1994; Effective, July 1, 2007, pgs. 2 – 4.

[19] Shale Oil Gas Production:< http://oilshalegas.com/piceancebasin.html>.

[20] Also referred to as exploration and production waste.

associated with and intrinsic to oil and gas exploration, development, or production operations that are exempt from regulation under Subtitle C of the Resource Conservation and Recovery Act (RCRA), 42 USC Sections 6921, et seq. For natural gas, primary field operations include those production-related activities at or near the wellhead and at the gas plant (regardless of whether or not the gas plant is at or near the wellhead), but prior to transport of the natural gas from the gas plant to market.[21]

Drilling Fluids includes fluids and solids incorporated and/or generated during drilling operations and initial completion procedures.[22]

Oily Waste includes those materials containing crude oil, condensate, or other hydrocarbon-containing exploration and production waste, such as soil, frac sand, drilling fluids, workover fluids, pit sludge, tank bottoms, pipeline pigging wastes, and natural gas gathering, processing, and storage waste.[23]

Other E&P waste includes workover fluids, tank bottoms, pigging wastes from gathering and flow lines, and natural gas gathering, processing, and storage wastes.[24]

Waste from Special Purpose Pits including pits at natural gas gathering, processing and storage facilities:[25]

- **Blowdown Pits** to collect material resulting from, including but not limited to, the emptying or depressurizing of wells, vessels, or gas gathering systems.
- **Flare Pits** used exclusively for flaring gas.
- **Emergency Pits** used to contain liquids during an initial phase of emergency response operations related to a spill/release or process upset conditions.
- **Basic Sediment/Tank Bottom Pits** used to temporarily store or treat the extraneous materials in crude oil which may settle to the bottoms of tanks or production vessels and which may contain residual oil.
- **Workover** Pits used to contain liquids during the performance of remedial operations on a producing well in an effort to increase production.
- **Plugging Pits** used for containment of fluids encountered during the plugging process.

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[21] Colorado Department of Public Health and Environment*, Rules and Regulations, Definitions (100 Series),* pg.4.
[22] Ibid., Definition of drilling pits, pg. 4.
[23] Colorado Department of Health and Environment Regulations, 907.(e) E&P Waste Management, pg.11.
[24] Colorado Department of Health and Environment Regulations, 907.(f) E&P Waste Management, pg.12.
[25] Colorado Department of Public Health and Environment, Rules and Regulations, Definitions (100 Series), pg.12.

Waste from Production Pits shall mean those pits used after drilling operations and initial completion of a well, including pits at natural gas gathering, processing and storage facilities including:[26]

- **Skimming/Settling Pits** used to provide retention time for settling of solids and separation of residual oil for the purposes of recovering the oil or fluid.
- **Waste from Produced Water Pits** used to temporarily store produced water prior to injection for enhanced recovery or disposal, off-site transport, or surface-water discharge including:
- **Percolation Pits** used to dispose of produced water by percolation and evaporation through the bottom or sides of the pits into surrounding soils.
- **Evaporation Pits** used to contain produced waters which evaporate into the atmosphere by natural thermal forces.

Non-E&P waste generated by the oil and gas industry may be hazardous or non-hazardous waste and needs to be disposed of properly according to regulation.[27]

3.4.4.2 Contacts with E&P Companies

The State of Colorado Oil and Gas Conservation Commission (COGCC) tracks the number of wells that are being drilled and the number of wells with permit applications pending, but they do not track how much waste may be generated during the process of drilling a gas well. The best source of information regarding E&P waste generation estimates came through personal contacts made by the WGCL Team and GCPWD staff. These contacts will remain confidential in this report because of ongoing negotiations with potential disposers. Landfill staff made contact with three E&P companies, which expressed an interest in disposing their wastes in a lined monofill cell, in a solidification basin or by landfill, as appropriate. Based on these and other conversations with an oil and gas business line within URS, the WGLF team collected the following information:

- Typical loads of E&P waste transported are 16 – 18 cubic yard belly dumps; yet due to road weight limitations, they may only hold 12 cubic yards (cy)/haul.
- Wastes most likely to be disposed of at landfills originate from oil based drilling cuttings.
- Anticipated future waste generation: One company estimated they will dispose of 90 cy/week, during a total of 50 weeks over the next three years or a total of 13,500 cy or 4,500 cy/year (yr).

[26] Ibid., Definition of Special Purpose Pits, pg. 12.
[27] Colorado Department of Health and Environment Regulations, 907A. Management of Non-E&P Waste, pg. 12.

- Another company estimated typical drill cutting generation of 8,400 cy/well pad. They were drilling approximately 20 wells per pad or 420 cy per well. This firm anticipated 400 wells would be drilled in the Piceance Basin Plateau for a total of 168,000 cy. (assume this over 10 years or 16,800 cy/yr).
- Another firm estimated they would drill 4,000 wells over the next 20 years. Each well would generate 420 cy per well for an estimated total of 1.68 MM cy or 84,000 cy/yr.
- Another source reported they would drill 22 wells in 2014 generating 325 cy per well for a total of 7,150 cy.

Based on these estimates, a potential of 1.87 MM cy is likely to be available within the Study Area, long term. Short term, over the next three years, a potential 112,450 cy of E&P waste may require disposal.[28] Additional PCS waste will likely be generated based on various spills and releases at the well sites. This estimate can increase or decrease significantly depending on whether the E&P companies continue drilling or temporarily cease activities awaiting better market conditions.

3.4.5 Petroleum Contaminated Soils

Table 6 is a summary table based on data provided by CDPHE as of March 2014 of the quantity of PCS, including E&P waste received at landfills in the Study Area. Generally the data indicate an increase in the annual quantity of contaminated soils received at these landfills/disposal sites in the Study Area. It is important to note that not all facilities turned in the 2013 data. According to CDPHE records, the South Canyon Landfill (SCLF) received 33,000 tons in 2012, which decreased to 10,000 tons in 2013. WGCL handled 565 tons of PCS in 2012 which increased to 2,524 tons in 2013. In the Study Area, PCS totals as reported to CDPHE were 59,310 in 2011, increasing to 128,263 tons in 2012, then decreasing to 74,403 tons in 2013.

3.4.6 Tires

The WGCL Team evaluated historic information regarding the quantities of tires generated, collected, reused and disposed in the Study Area. The most current source of information available is the CDHPE 2012 Tire Report (2012 Tire Report) which stated that 5,117,019 waste tires were generated in the state of Colorado that year.

As presented in **Figure 9**, recycling of tires has increased steadily since 2007. According to the CDPHE, the waste tire generation rate in Colorado is slightly less than the nationwide average

[28] This calculation is based on a one year estimate of drilling waste requiring disposal (4,500+ 16,800 + 84,000 + 7,150) = 112,450 cubic yards. For the purpose of this report, we assumed the drilling of the 400 wells in the Piceance Basin would be over a 10 year period.

annual waste tire generation rate of 1 tire per capita. Using this correlation and based on the 2010 population projections for 2010, the Study Area is projected to have a potential waste tire generation rate of 446,032 tires per year.

Figure 10 plots the number of tires generated vs. recycled from 2007 to 2012. According to the 2012 Tire Report, more than 100% of these tires were reused or recycled, using existing markets.[29]

As presented in **Figure 11**, the top two reuses of tires are Tire-Derived Fuel and ADC. Currently, the WGCL is using shredded tires for ADC.

3.4.7 YARD WASTE/ORGANIC WASTE

The WGCL Team evaluated the potential quantities of organics generated in the Study Area. One source of this information was the 2008 LBA Associates New Compost Feasibility Study for Garfield County. In this report, compost, landfill and recycling operations managers were interviewed from the Tri-County area.

The report estimated that for the Tri-County area, approximately 7,000 cy/year of Biosolids, 10,000 cy/year of ground Green Waste, and 170 tons/year of animal bodies were processed/disposed of in 2008. According to the 2009 LBA Report, and presented in Table 7, approximately 50,571 tons of organics/yard waste was generated in the Tri-County area in 2008, based on the quantities landfilled and diverted.[30]

The WGCL team also reviewed the CDPHE Annual Facility Compost Reports for compost facilities operating in the Study Area during the years 2009 – 2012. No data is yet available for 2013. The reports detail the quantity and type of nitrogen (wood, shrubs, grass clippings, manure, etc.) and carbon (wood chips, sawdust, leaves) materials received, the quantity of product produced, sold and remaining at the end of the reporting period. Presented in Table 8 is a summary of information available in these CDPHE annual compost reports. According to reported data, the volume of yard waste/organic materials generated in the Study Area and reported to CDPHE is roughly 100,000 to 108,000 cy/year.[31] The data reported to CDPHE for the Study Area is less than half the quantity estimated by the 2009 LBA Report, which only covered the Tri-County area. One reason for the differences in quantity may be that all compost facilities in the Study Area did not submit 2012 data. Additionally, the quantity of organics

[29] The CDPHE counts tires imported into the state that are recycled or reused into the calculation.
[30] This is equivalent to approximately 252,800 CY of organics based on an average density for organics of 400 pounds per cubic yard.
[31] The values for 2011 and 2012 could be higher, but not all facilities turned in their quarterly reports in 2011 and 2012.

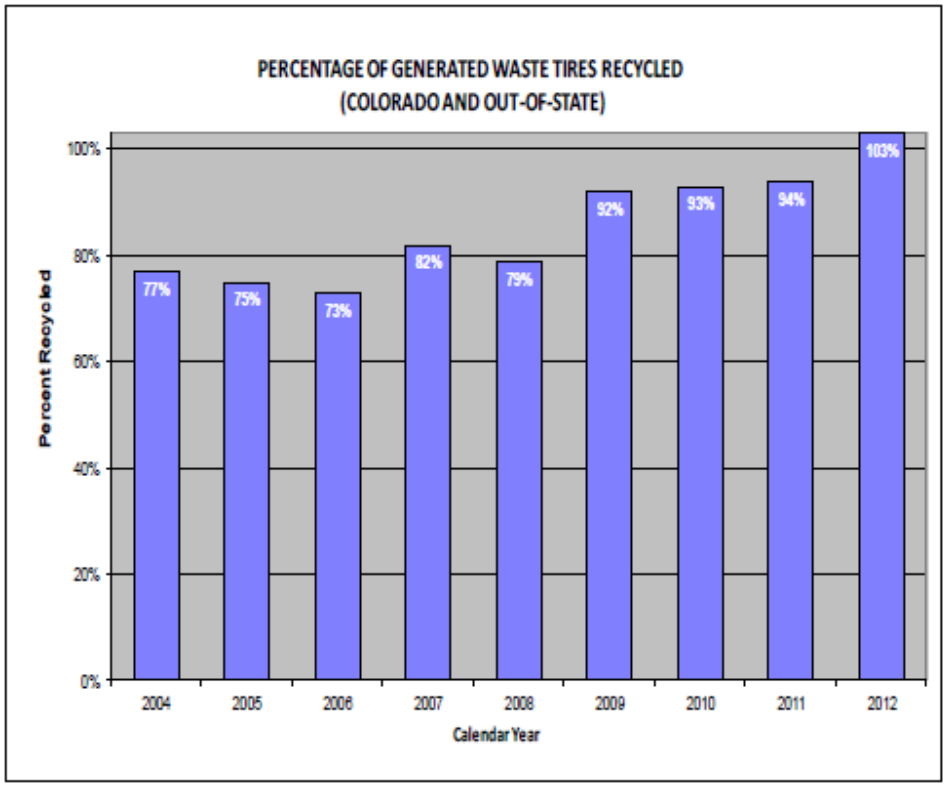

FIGURE 9. HISTORIC TIRE RECYCLING RATES

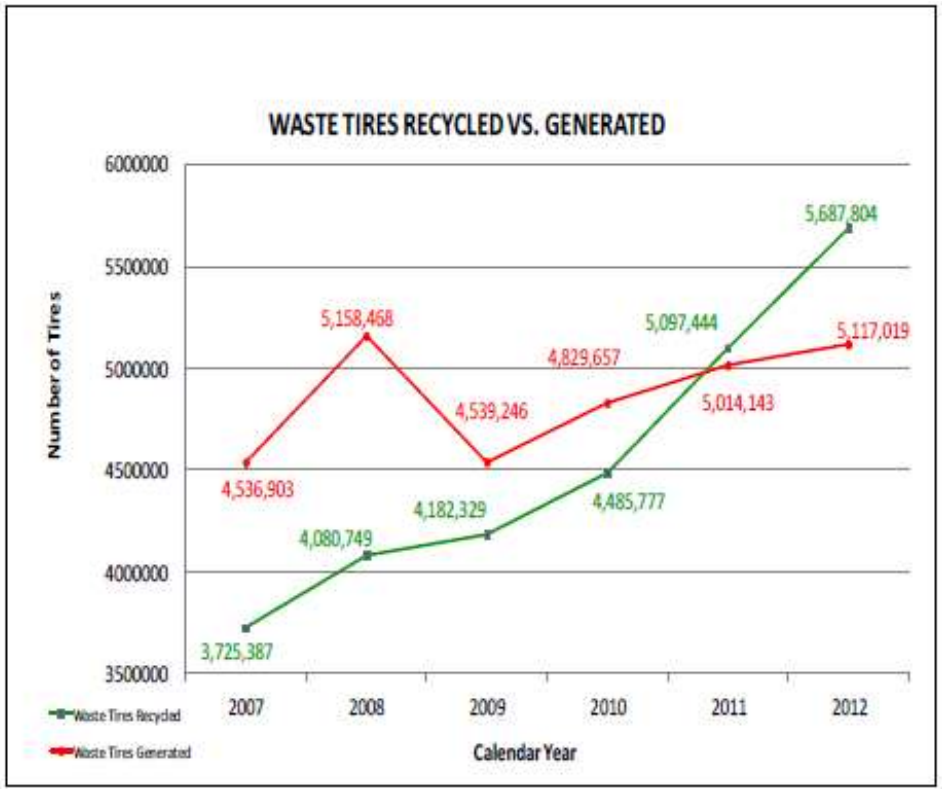

FIGURE 10. ANNUAL TIRE GENERATION/RECYCLING

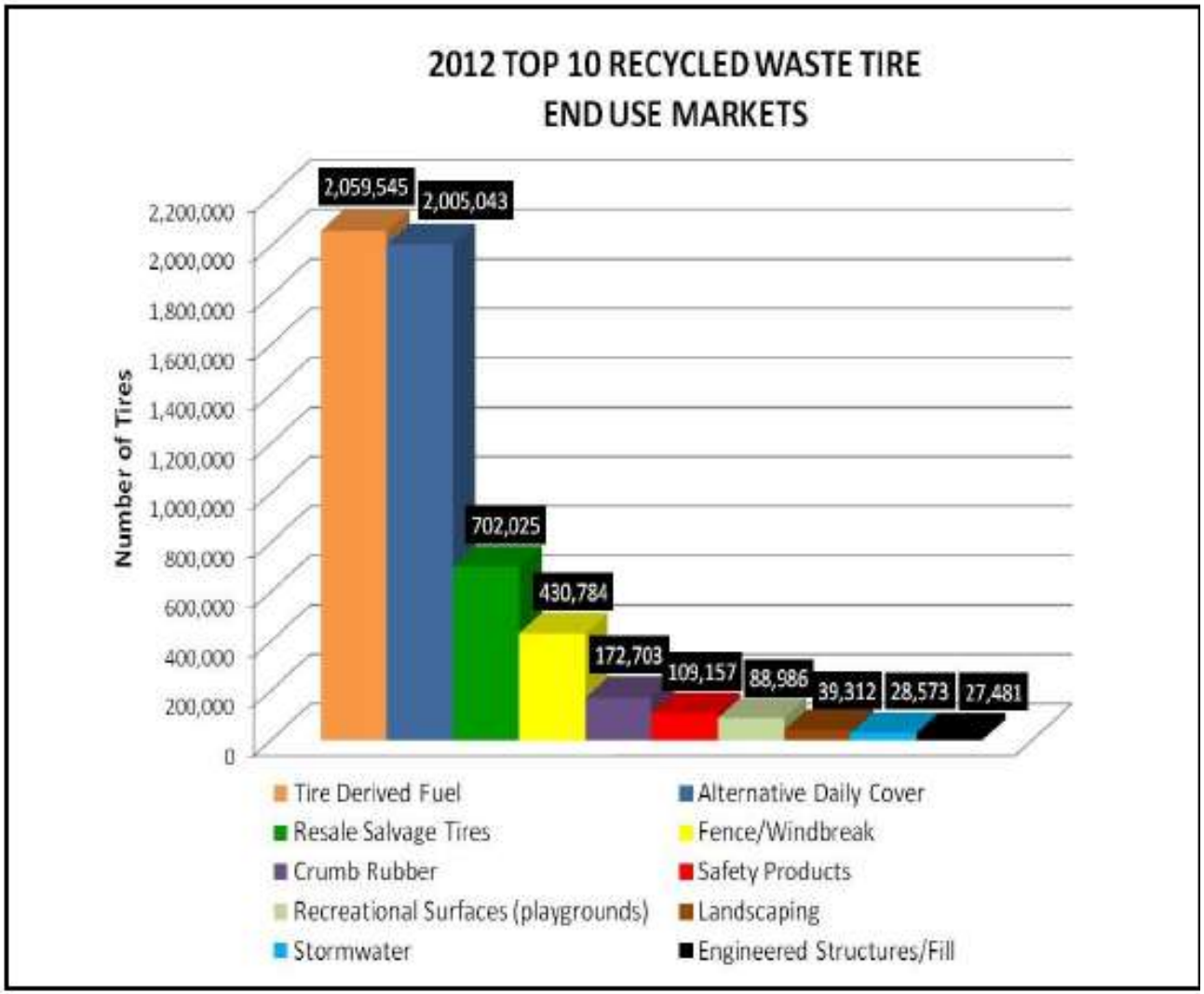

FIGURE 11. 2012 END USES FOR TIRES

estimated in the 2009 LBA Report was based on a visual assessment of the percent of the total waste stream going to landfills in the Tri-County that this waste stream represented. If this percentage was overestimated, it could result in an overestimate of the quantity of organics generated in the Tri-County area, as reported in the 2009 LBA Report.

3.4.8 Electronic Waste/Medical Waste/HHW

The WGCL Team also considered the possibility of collecting/processing/disposing of medical waste, HHW or electronic waste (E-Waste) at the WGCL. Currently WGCL does accept E-Waste and holds a HHW collection program twice a year at the landfill. The WGCL Team was considering the idea of expanding the services offered for these waste streams. It was difficult to estimate quantities of these materials generated in the Study Area for the reasons stated below. In 2009, LBA conducted a survey of the Tri-County area and estimated approximately 993 tons of HHW and E-waste were generated jointly per year. Other information available regarding HHW/E-waste generation was published by Mesa County, Colorado, based on their HHW facility. Mesa County reported that they generally handle between 300,000 to 400,000 pounds (150 – 200 tons) of E-waste/HHW per year.[32]

Because CDPHE does not require medical waste generators, transporters or treatment/ processing facilities to report information with respect to generation or disposal of this type of waste, data is not available. The CDPHE does publish a list of transporters and on-site treatment facilities where medical waste can be delivered for processing or treatment.[33] County staff contacted the Garfield County Health Department and two hospitals located in Garfield County. All materials are currently handled under contract with Stericycle, which provides integrated waste management (from collection to treatment and disposal) of medical waste. In the State of Colorado, medical waste is regulated as a hazardous waste. The WGCL is unable to manage hazardous waste at the landfill per the land patent as will be discussed below.

3.4.9 Hazardous Waste

No estimates of hazardous waste generation in the Study Area were conducted because the landfill is restricted from accepting hazardous waste. Throughout the landfill life, landfill design and operations have been developed and conducted to meet Bureau of Land Management (BLM) lease/property conveyance requirements and Federal and State regulations. BLM issued a lease agreement and Colorado Department of Health (CDH) granted an approval to construct the landfill. BLM lease and CDH requirements and limitations were reflected in the development plan and geotechnical investigation report. One of the limitations was that only household, commercial,

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[32] Mesa County HHW Facility website: http://www.mesacounty.us/swm/hazmat/statistics.aspx.
[33] http://www.colorado.gov/cdphe/medicalwaste.

construction, and sewage sludge waste was allowable for disposal. Toxic or hazardous waste acceptance was not permitted.

3.5 Competitive Factors

WGCL faces a variety of competitive operations within the market area from municipal and private waste industry operators both within and outside of the Study Area. These competitive operations include other landfills, transfer stations, recycling operations, HHW facilities, compost facilities, septage impoundments, and PCS processing/disposal facilities. These facilities will be discussed in the following sections.

3.5.1 Landfills in Colorado

Landfills that compete or have the potential to compete for WGCL waste streams are identified within this section. The WGCL Team obtained and reviewed CDPHE's Solid Waste Facility Inventory Forms, the list of permitted landfills and the solid waste fee reports for landfills in the service area.[34] Presented in **Table 9** are the 17 landfills that reported receiving waste from the Study Area for some period of time between the first quarter of 2009 through the first quarter of 2013. However, in this study we elected to use 2012 data, which is the most current complete year of data. The Granby, Kremmling and 6 Mile Landfills did not report receiving any waste in 2012. (Refer to **Table 9**, facilities L6, L7 and L8.) The general location of each facility is presented in **Figure 12**.

There is limited data on the remaining capacity of the landfills in the Study Area because it is not always reported in the Solid Waste Inventory Forms. The waste acceptance rates for some of the landfills in the Study Area were reported and obtained from their Title V operating permits. Not every landfill, however, is required to have a Title V operating permit so some landfill capacity data was not available. A summary of each of the landfills in the Study Area, estimated remaining years of life (when data was available), and waste acceptance rates for 2012, are presented in **Table 9**.

3.5.1.1 New or Proposed Landfills in the Study Area

Gathering information regarding proposed solid waste facilities is difficult because such projects, particularly privately owned and operated landfills, are typically confidential. At the time of this report, there were no new or proposed landfills found to be in any stages of development within the Study Area, based on review of area news clips, discussions with CDPHE regulators and local knowledge of the solid waste market.

[34] The information was collected in May 2013 and covered the years 2009 through the first quarter of 2013.

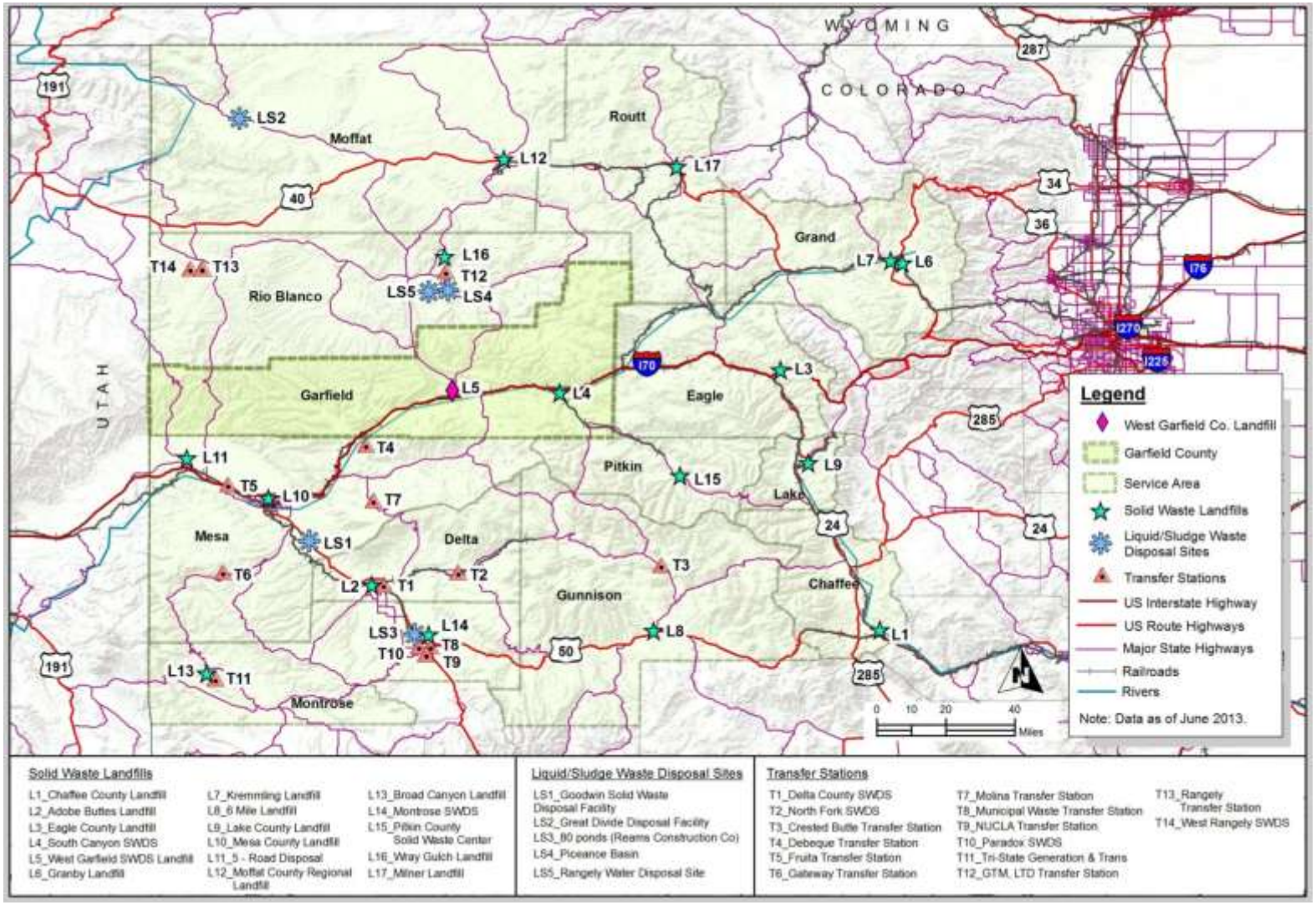

FIGURE 12. SOLID WASTE FACILITIES IN THE STUDY AREA

3.5.2 LANDFILLS IN UTAH

The WGCL Team reviewed the 2013 Utah Landfill Facility Inventory, published by the Utah Division of Solid and Hazardous Waste. The inventory provided contact information including the Landfill owner/operator, and identified the quantity (in tons) and types of waste received at each landfill during 2012. The waste streams were classified as municipal, construction and demolition, industrial, compost and recyclables (refer to Table 10). The WGCL Team identified the Utah landfills that received industrial waste in 2012, and reviewed the 2012 annual landfill reports for each landfill to determine what quantity of the industrial waste was from out-of-state.

Based on the 2012 records, the ECDC landfill in Carbon County Landfill and the Wasatch Regional in Davis County are the two landfills that reported they accepted out-of-state industrial waste. The annual landfill reports to not indicate where the waste came from or the specific type of waste received.

3.5.2.1 NEW OR PROPOSED LANDFILLS IN UTAH

The WGCL Team has reviewed the public hearing schedule for new landfill permits and is not aware of new or pending landfills in Carbon or Davis Counties in the State of Utah. A data request for a list of pending landfill permits is pending with the Utah DEQ.

3.5.3 TRANSFER STATIONS

Several active MSW and other waste material transfer stations exist in the Study Area. **Table 11** presents a list of those transfer stations as well as information on their owners and operators. This data was compiled from the current Transfer Station listing on the CDPHE website and the Transfer Station Solid Waste Facility Inventory Forms received from CDPHE.[35] Several of these transfer stations (located in Mesa County) reported they were not commercial operations so their acceptance of waste is limited. The location of each transfer station is illustrated in **Figure 13**. The transfer stations have the ability to deliver waste to more than one landfill, based on factors including but limited to: the total economics for hauling and disposal, access to the facility, or the landfill's operating hours.

No determination of the volume of waste handled by the transfer stations was made during this report, due to lack of information reported to CDPHE. Several transfer stations reported in their

[35] http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%22Active+Solid+Waste+Transfer+Stations+List.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251929764150&ssbinary=true, current as of January 14, 2014.

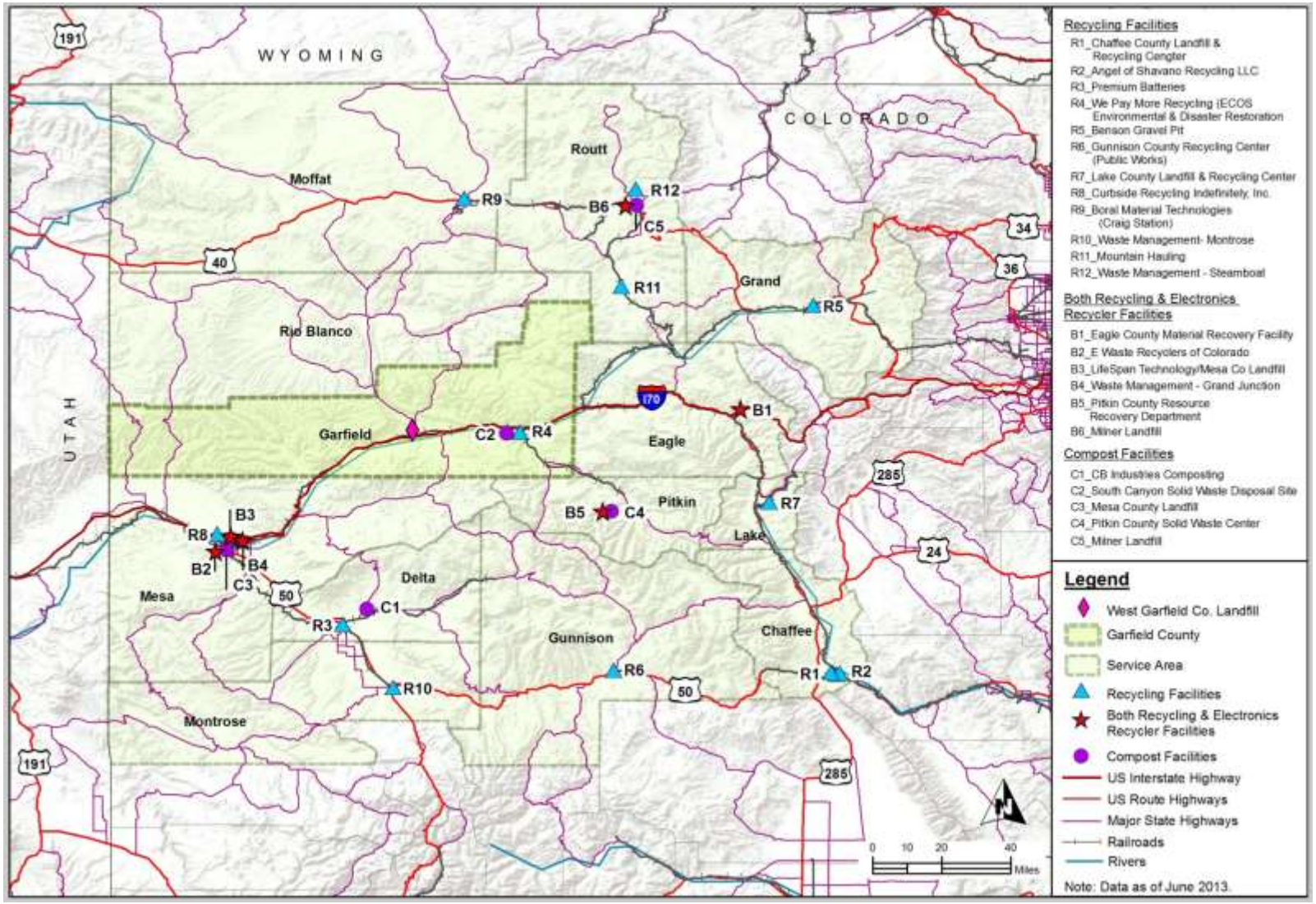

FIGURE 13. RECYCLING & COMPOST FACILITIES IN THE STUDY AREA

Solid Waste Facility Inventory Form that they could not accept materials such as PCS, sludges or construction and demolition debris (C&D), had restrictions on the size of the trailers/trucks using their site, or they received less than 20 tpd of waste.

3.5.3.1 New or Proposed Transfer Stations in the Study Area

One new transfer station is pending in the Study Area. IRMW II LLC, in conjunction with Mountain Roll-off, submitted a proposal to the Garfield County BOCC for a transfer station and recycling center. This facility has an operating capacity of 300 tpd to receive MSW and recyclables, although the application reported 100 tons of MSW will enter and exit the facility each day, and 20 tons of recyclables will be processed each week.[36] On January 6, 2014, the BOCC approved the extension of the Land Use Change Permit, with conditions, that was previously approved, until January 14, 2015. The CDHPE has not issued a permit for this transfer station. Once permitted, this facility could deliver waste to the WGCL.

3.5.4 Recycling

Recycling facilities information was compiled from the CDPHE Recycling Facility Initial Registration Form for those facilities located in the Study Area. This form provides point of contact, owner and operator information. The WGCL team also reviewed the lists of Registered Recycling Facilities and Electronics Recyclers found on the CDPHE website and the 2012 annual recycling reports. Several categories of recycling facilities were evaluated including MRFs, E-waste recycling facilities, medical waste and tire facilities, which are discussed in the sections below.

3.5.4.1 Material Recovery Facilities in the Study Area

Presented in Tables 12 and 13 are the lists of MRFs located in the Study Area. Table 12 lists MRFs that recycle MSW and/or C&D, while presented in Table 13 are MRFs that accept both MSW and electronic waste.37 The WGCL team reviewed CDPHE's Recycling Facility Annual Reporting Forms for the years 2011 and 2012, for facilities located within the Study Area. Data regarding the quantities of recyclables received and sent to end users, by material type is sometimes contained in the Annual Reports. In the event, a recycling facility deems this information Business Confidential, no data is reported. Available data from these reports is

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[36] MRI. May 2012. *Waste Transfer/Recycling Center Limited Impact Review, Appendix B, Operating Plan*, pg.18.

[37] The list of electronic recyclers published by CDPHE is found here: http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%22List+of+Registered+Electronics+Recylers.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251903131345&ssbinary=true.

compiled in Tables 12 and 13. The locations of these facilities are shown in Figure 13. Eight facilities in the Study Area are registered as recyclers of both MSW and electronic waste. Details regarding these facilities are presented in Table 13.

3.5.4.2 Household Hazardous Waste Facilities in the Study Area

The WGCL team identified HHW facilities in the Study Area. Some counties use permanent locations, other counties, like Garfield County, offer a HHW drop-off day at an appropriate location. Historically, the County has offered these drop-off days, twice per year at WGCL, as a value added service for Garfield County residents. The WGCL Team evaluated publically available information for three permanent HHW facilities located in Mesa, Boulder and Pitkin Counties. Although, the Boulder County facility is outside the Study Area, it provided good information regarding waste materials accepted and fees charged to residents.

Materials typically collected at these facilities include:

- Aerosol Cans
- Antifreeze
- Electronics
- Fluorescent Light Tubes
- Insecticides
- Degraded old Gasoline
- Road Flares
- Spa and Pool Chemicals
- Used Syringes, Needles, & Sharps
- Ammunition
- Automotive Products (i.e., lubricants, solvents)
- Fireworks
- Garden & Hobby Products
- Latex and Oil Based Paints

3.5.4.3 Fees Charged at Household Hazardous Waste Facilities in the Study Area

The WGCL team identified the following fees being charged at HHW facilities:

- **Boulder County**
    - Boulder charges $45 for each household served. The municipalities involved with the facility are invoiced based on the numbers of households in their community that participate.

  - Open to residents of Boulder County, Boulder City, County of Broomfield and the Town of Erie.
  - Businesses charged based on the type and tons of material delivered.
- **Mesa County**
  - County accepts hazardous materials free of charge from Mesa County households only.
  - Fees charged to residents with > 50 gallons motor oil, > 4 automotive batteries, or > 50 gallons of paint.
  - Residents charged $20 for 5 gallons, if they wish to purchase paint.
  - E-waste charged at $0.42/pound.
  - Businesses charged based on material and volume, including:
    - Aerosols
    - Antifreeze
    - Batteries
    - Fluorescent Tubes
    - Latex Paint
    - Motor Oil
    - PCB Ballast
    - Pricing ranges from $0.1 to $4.25/pound
- **Pitkin County**
  - Commercial: Accepts up to 25 gallons of paint and paint related material per month; other chemicals are not accepted.
  - Residential—Pricing is $5 per gallon container of the following materials:
    - Antifreeze
    - Liquid chemicals, insecticides, etc.
    - Oil and water mixed
    - Used motor oil-- $1.00 per gallon container
    - Paint related material (thinner, etc.)
    - Latex paint
    - Oil base paint/stain
    - Unknown chemical, unmarked- $8.00 gallon container
    - Aerosol cans- $1.00 each
    - Compact fluorescent bulbs--$1.00 each
    - Battery – vehicle-- $1.00 each
- Garfield County
  - Paid for through a County disbursement from the general fund, typically $50,000 per year.

3.5.5 COMPOST FACILITIES

Five operating compost facilities were identified in the Study Area in 2012. **Table 14** presents the quantities of materials received by each compost site in 2012 and the quantity of finished product shipped off-site.[38] **Figure 13** (above) shows the locations of the compost facilities. The Cacaloco Compost Facility was not included in **Figure 13** or **Table 14**, because the facility was shut down by CDPHE and is no longer considered a registered compost facility.[39]

3.5.6 MEDICAL WASTE

CDPHE publishes a list of medical waste transporters and disposal companies for use by health care facilities.[40] These companies may offer transportation or disposal services. Only two companies, Ecodas Corp. and Oncore Technology reported they had on-site treatment facilities. In addition, MSW disposal sites are permitted to receive pharmaceutical waste.[41] There are no medical waste autoclaves or incineration facilities in Colorado, so medical waste may be transported out-of-state. A majority of the service providers provide collection. CDPHE does not collect information from hospitals, clinics or other generators regarding the tons or type of medical waste generated, or where the medical waste is transported to, treated or disposed of.

3.5.7 WASTE TIRE FACILITIES

The WGCL team reviewed the Waste Tire Facility Annual Reports provided by the CDPHE for the tire facilities located in the Study Area. Presented in **Table 15** is a compilation of data from the Tire Facility Annual Reporting forms from 2012. The locations of these facilities are shown in **Figure 14**. As discussed in Section 3.4.6 above, the needs of the waste tire market appear to be satisfactorily handled by the existing waste tire facilities in place.

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[38] 2012 data for the Millner Landfill was not available from CDPHE, so the 2011 Composting Facility Annual Report data was used.

[39] http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%22List+of+Registered+Composters+in+Colorado+%28sorted+by+county%29+.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251903131230&ssbinary=true.

[40] http://www.colorado.gov/cs/Satellite?blobcol=urldata&blobheadername1=Content-Disposition&blobheadername2=Content-Type&blobheadervalue1=inline%3B+filename%3D%22List+of+Medical+Waste+Service+Providers+.pdf%22&blobheadervalue2=application%2Fpdf&blobkey=id&blobtable=MungoBlobs&blobwhere=1251852508804&ssbinary=true.

[41] Email correspondence with Caren Johannes, CDPHE, October 2, 2013.

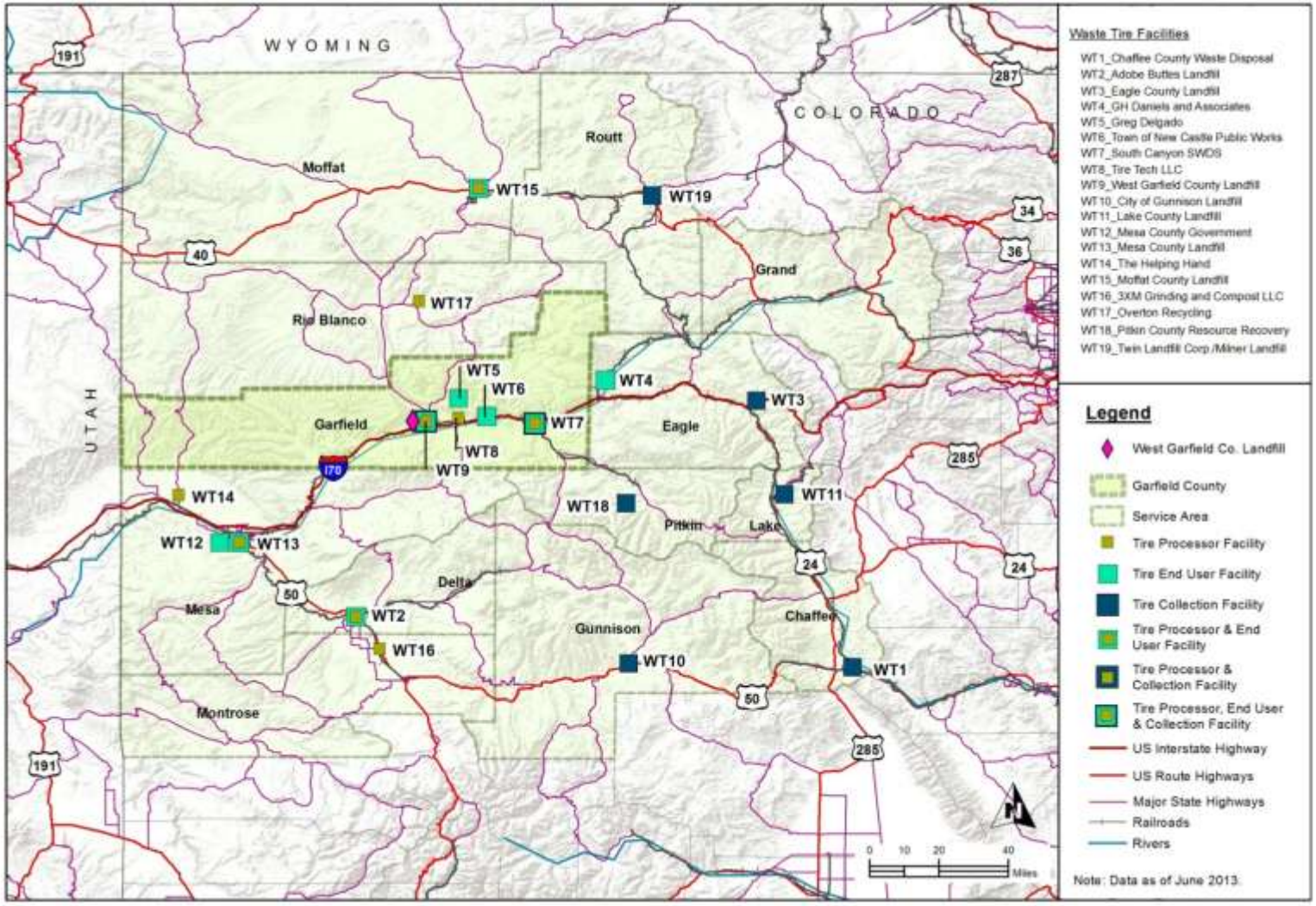


FIGURE 14. WASTE TIRE FACILITIES IN THE STUDY AREA

3.5.8 LIQUID SLUDGE/SEPTAGE IMPOUNDMENTS

As discussed in Section 3.4.2 above, **Table 4** presents the quantity of septage received at liquid/sludge facilities in the Study Area. The location of those facilities is shown on **Figure 12**. The volumes in **Table 4** represent the potential septage generation in the Study Area based on CDPHE historic records from January 2009 – March 2013. According to CDPHE data and as presented on **Figure 12**, there are five (5) liquid sludge impoundments servicing the Study Area. Several solid waste facilities including WGCL, South Canyon, Eagle County, Lake County and Milner Landfills also have septage impoundments. Their locations are included in **Figure 12**. It can be seen by reviewing **Table 4** that if additional septage capacity became available, there is a large available market. WGCL should continue to monitor this market as the NSIs come on-line to identify long term septage management solutions, as will be discussed further in Sections 6.2 and 8.1.

4. EXISTING WEST GARFIELD COUNTY LANDFILL PROGRAM

The purpose of Section 4 is answer the question: ***What services and waste streams does the existing WGCL accept and who are our customers?*** *The subsections that follow will provide an overview of WGCL, will identify how the GCPWD is organized, the history behind the landfill's development and operation, accepted and prohibited wastes, current services provided, proposed future services, and current and proposed landfill capacity.*

4.1 ORGANIZATION

According to the 2012 Garfield County Adopted Budget Book (2012 Budget Book), Garfield County is governed by three elected County Commissioners, and other elected officials. BOCC has the authority to levy taxes, represent the County, be responsible for County property and adopt an annual budget for all departments in County Government including all commissions, boards, spending agencies and departments funded by county disbursements. **Figure 15** provides an overview of the Garfield County organization.

The landfill operates under the Solid Waste Disposal Fund (SWDF) which is an enterprise fund and charges users for services the landfill provides. According to the 2012 Budget Book, the general funds should not be used to subsidize the operation of the SWDF.

The WGCL currently has eight non-exempt employees:

- 2 - scale house operators (1 gatekeeper and 1 clerk)
- 4 - equipment operators, 2 of which have welder certifications and
- 2 - manual laborers.

Employee schedules are staggered to cover the 6 to 7 day per week retail operation. Two staff are assigned to the active cell at all times. Equipment operators complete a significant amount of landfill equipment maintenance, repair and part fabrication in addition to daily and periodic duties such as dust control, ADC processing and aggregate screening for cover.

The organization has experienced a series of changes over the past several years. In 2007, the number of full-time employees was increased from 8 to 12 to offset the reduction of aid from the county inmate population. In 2010, five staff positions were eliminated in response to an economic downturn. One position was reinstated after only a few months. During the period from 2007 through March of 2011, the landfill manager position changed over five times. Since March of 2011, management and staff have remained consistent which has been conducive to productivity and higher employee morale.

Opportunities exist to increase overall County staff productivity by sharing Garfield County

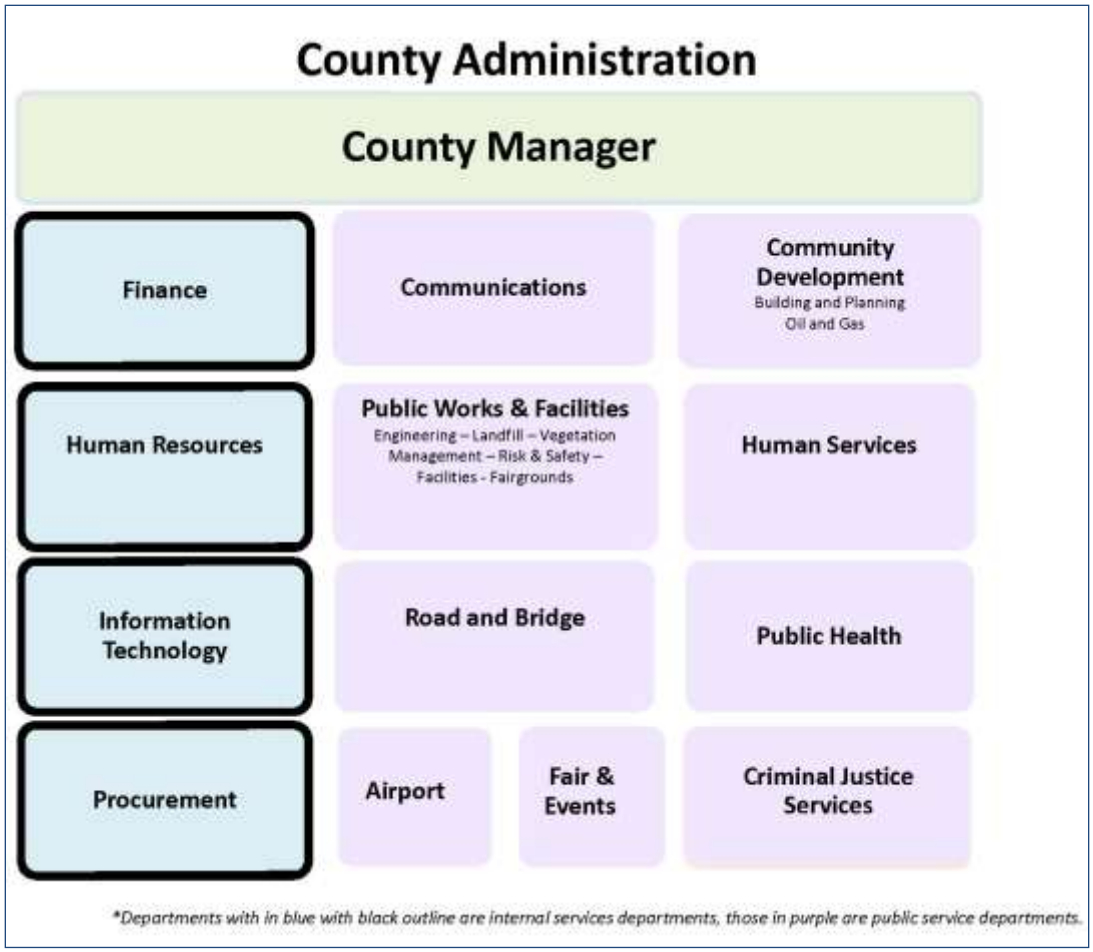


Figure 15. Garfield County Organizational Chart

Road and Bridge Department employees during the winter season for specific projects at the landfill as well as to assist with spotting at the fill face, litter management, daily cover application or other operational tasks, and to cover vacation time.

4.2 History

Based upon a 1981 landfill siting study, the current WGCL, formerly owned by BLM was selected by BOCC as a preferred location for a municipal solid waste landfill (MSWLF). The property is located approximately 6.5 miles west of the Town of Rifle, Colorado in open range land known as Sherrard Park. Access to the site is east off Garfield County Road 246, which extends north from State Highway 6, the frontage road for Interstate 70. The adequacy of the site for the then proposed landfill operations was evaluated in 1982 under provisions of the National Environmental Policy Act, in response to Garfield County's application to construct and operate the proposed landfill. The environmental assessment concluded there would be no significant impact due to the landfill operations. The BLM subsequently issued a Recreation and Public

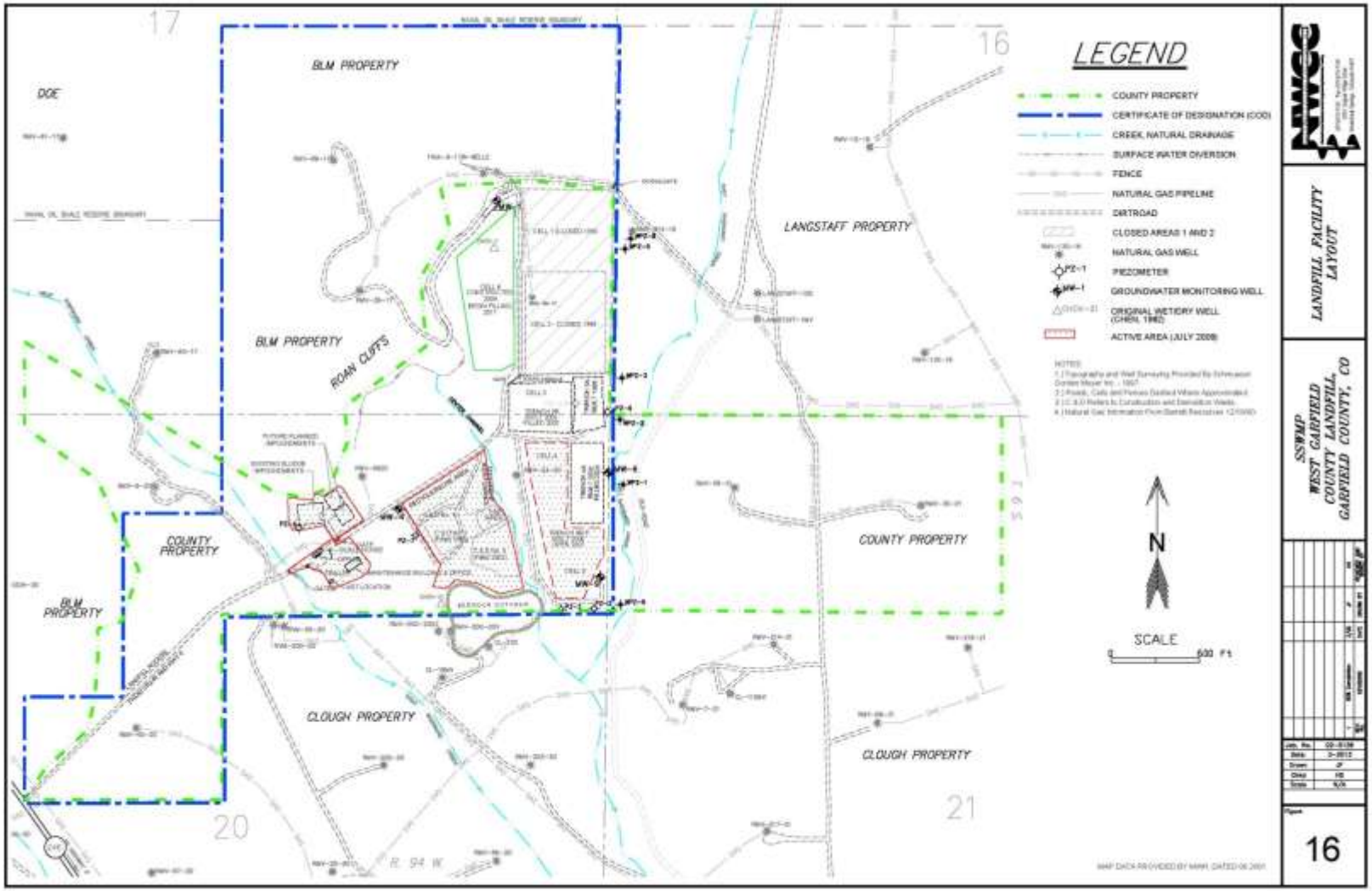
Purposes Act (RPPA) five year lease (lease COC – 35148) to Garfield County for approximately 280 acres of property to be used and operated as the Anvil Points Landfill that eventually became known as WGCL. The lease was in 1987 for an additional five years and annually thereafter. Presented in **Figure 16** is an overview of the land included in the Certificate of Designation (CD) for landfill use, and the property limits of the BLM land leased by Garfield County.

The landfill operates under a CD approved by the BOCC on December 16, 1982 for the entire leased parcel. The landfill support facilities and initial disposal trenches were constructed and operations began during 1983 with a maximum landfill design capacity of 1,088,600 cubic yards. Of particular note, lease restrictions banned disposal of any material classified as hazardous waste including radioactive material, pesticides/herbicides and containers, and volatile materials including explosives, toxic chemicals, or mining waste. Other questionable materials (e.g. infectious waste and hazardous waste) were required to meet Glenwood Springs Area Manager approval prior to being accepted for disposal at the landfill.

The existing WGCL has served the municipal solid waste needs for the west portion of Garfield County since it began operation. The trench and fill operation disposes of approximately 23 tons of waste per day. In addition, historically, septage impoundments at the landfill received approximately 214,000 gallons of septage per year.[42] In 1994, the estimated life of the facility was 45 years (until 2038), considering only the landfillable acreage included in the existing lease and assuming 3 percent growth. The landfill life estimate did not include potential capacity from the additional 100 acres the landfill purchased which is outside the CD. In the Fall of 2013, NWCC, Inc. estimated WGCL had a remaining life until 2041, based on current operations and under the existing CDPHE permit, which is consistent with the 1994 estimates.

The landfill permits control all aspects of landfill waste disposal and operations including design and construction, allowable annual solid waste and septage disposal volume, and throughput of various equipment (i.e., shredder, screen plant). An important aspect to these permits is proper management in order to maintain compliance with various regulations. Proper documentation, annual reporting and permit updates must be conducted as part of permit management. Of special note, annual waste (MSW, PCS and septage) projections must be conducted and air emissions permits updated to reflect these volumes. Technically, waste may not be accepted above the permitted volumes. It should be noted that WGCL has never been issued any compliance advisory for permit violation(s).

[42] Schmueser Gordon Meyer. April 6, 1994. *Operations Plan for West Garfield County Landfill*.


LEGEND
COUNTY PROPERTY
CERTIFICATE OF DESIGNATION (COD)
CREEK, NATURAL DRAINAGE
SURFACE WATER DIVERSION
FENCE
NATURAL GAS PIPELINE
DIRTROAD
CLOSED AREAS 1 AND 2
NATURAL GAS WELL
PIEZOMETER
GROUNDWATER MONITORING WELL
ORIGINAL (METEORY WELL (CHRIS, 1992)
ACTIVE AREA (JULY 2008)
BLM PROPERTY
DOE
ROAN CLIFFS
LANGSTAFF PROPERTY
COUNTY PROPERTY
CLOUGH PROPERTY
SCALE
N
17
16
20
21
R 94 W
LANDFILL FACILITY LAYOUT
SSWMP
WEST GARFIELD COUNTY LANDFILL, GARFIELD COUNTY, CO
16

4.2.1 LAND AUDIT

In 1997, the Land Transfer Audit was signed which conveyed 260 acres of land from BLM to Garfield County. 160 acres of the land was from the original lease. An additional 100 acres of land was purchased (20 acres west and 80 acres east of the CD) for future landfill development. Some of the details of the lease included:

- Annual rent of $560 for 260 acres.
- $15,000 performance bond required.
- Included easements and right-of-way from various entities.
- Limitations and Requirements.
- Comply with EPA 1976 Solid Waste Facility Regulations.
- Construction and Operations.
- Cell bottom scarification and compaction.
- Waste lifts, compaction, cover.
- Revegetation.
- Stormwater controls.
- Site Security.

Limitations of the lease included:

- Groundwater Monitoring.
- No salvaging or scavenging.
- Vector control (animals).
- Wind-blown trash control.
- Landfill Cell waste restrictions:
    - No radioactive waste.
    - No hazardous waste or toxic materials.
    - No liquids or semi-liquids.
    - No pesticides or pesticide containers.
    - No explosive materials or toxic chemicals or mining wastes.
    - No bulk infectious and institutional waste.
    - No highly flammable or volatile substances.
    - No raw sewage, raw sewage sludge from RV type tanks.

Other details included:

- Encouraged recycling operations (temporary storage and removal):

  - Appliances, tires, woody waste, etc.
- Gas management to prevent lateral migration and explosion potential.
- Burning of pulp, wood products, brush and other vegetative materials, if wastes are segregated and permits obtained.
- Closure is required within 6 months if the lease is terminated.

Under federal mandates, the BLM was required to either discontinue leasing landfill properties or patent the lands to local governments to continue landfilling beyond lease expiration. The County performed a landfill audit and submitted a conceptual operations plan to BLM in accordance with the RPPA to satisfy the requirements for property conveyance. Resolution 95-067 signed by the BOCC, authorized Garfield County to:

- Hold and purchase real and personal property.
- Operate solid waste disposal sites.
- Establish a fund.
- Tax its citizens for disposal purposes.
- Sign an application with the BLM to acquire the WGCL and surrounding properties.

4.2.2 Subtitle D Regulations

Subtitle D of RCRA became effective October 1991, regulating management of nonhazardous solid wastes and establishing minimum MSWLF criteria including location, design, operations, groundwater monitoring and corrective action, closure and post-closure care, and financial assurance. Under Subtitle D, Colorado was required to develop a plan proving that the minimum standards were met. CDPHE was authorized by EPA during 1993 to manage MSW facilities in Colorado. However, various extension deadlines were granted through 1997 for regulatory compliance. The CDPHE Regulations Pertaining to Solid Waste Sites and Facilities are the regulations used to comply with Subtitle D. As a result of the regulations, WGCL was required to conduct several investigations and develop various plans to bring the facility into state and federal compliance. As part of permit management, certain facility plans must be periodically updated. The following documents are guidelines associated with WGCL permitting, design, and operations and were prepared in order to bring the facility into compliance with the new regulations.

- Baseline Groundwater Quality Report and Statistical Analysis Plan, 1991.
- Supplemental Operations Plan, 1994.
- Development and Management Plan, 1995.
- Hydrogeologic Characterization Report and Groundwater Monitoring Plan, 1998.
- Closure and Post-Closure Engineer Cost Estimate, 1999.

- West Garfield County Landfill Liner Design Recommendation, 1999.
- Closure and Post-Closure Plan, 2001.

Other documents prepared in order to comply with the regulations and approved by CDPHE include the following.

- Construction Quality Assurance Report for Cells 3 – Trench 3B, 4 – Trench 4A, 4B and 5 and the West Impoundment.
- West Garfield County Landfill Industrial, Special, and Universal Waste Management Plan, 2010.
- Certification Report, Construction Quality Assurance/Control, Cell 6, 2010.
- Landfill Gas Monitoring Probes, 2010.
- Landfill Gas Passive Vent Installations, 2012.
- Passive Horizontal Landfill Gas Vents, 2012.
- North and South Septage Impoundments Technical Specifications and Construction Quality Assurance Plan, 2013.
- Annual Groundwater Monitoring Reports.
- Biannual Statistical Analysis Plan Updates.
- Financial Assurance Updates (5-year plan update and annual inflation adjustments).

These documents all control the development, operation, closure and post-closure of WGCL.

4.2.3 Septage Evaporation Impoundments

The WGCL constructed the NSI during 1983 providing approximately 600,000 gallons of capacity for septage and sludges. Because of regional disposal needs, a third evaporation pond called the West Impoundment (WI) was constructed during 2006, providing approximately 540,000 gallons of additional disposal capacity. Because the NSI's did not meet current regulatory design requirements and were believed to have adversely impacted groundwater at the facility, the impoundments were decommissioned and granted a "No Further Action" status by CDPHE during 2012.

Replacement of the NSI's was planned, however, because of pending regulatory amendments regarding design and operations, CDPHE recommended that WGCL wait until final amendments were approved. CDPHE approved and permitted NSI's construction level plans under the new regulations during July 2013.

The WI is currently operating. Because of regulatory changes discussed above, a required demonstration was completed to document that the WI meets the intent of the new regulations. CDPHE approved the demonstration on December 9, 2013.

4.2.4 Petroleum Contaminated Soils

WGCL was pressured in the past by the E&P industry to dispose of drill cuttings and oil field sludges. However, the current landfill design and construction is not deemed adequate to dispose of a portion of these materials which can be highly contaminated. Moreover, some of the material could be considered hazardous waste except for government exemption of oil field development materials from this classification. The landfill subgrade cell walls are not lined and the cell bottoms are scarified and compacted, native low permeability materials. The design met permitting requirements for MSW landfill liners at the time these cells were constructed; however, they are not considered adequate for highly contaminated materials.

In order to help address E&P industry disposal needs, a conceptual lined monofill cell was designed during 2009, as directed by the County, for the sole purpose of disposing and containing these oil field waste materials. The selected construction site is located within the CD, a short distance before entering the landfill gate at the west side of the landfill road. The robust design includes a double High Density Polyethylene (HDPE) liner system, leak detection and leachate collection systems, stormwater controls, and groundwater monitoring wells. A solidification basin was not included in the original conceptual design, but is now being considered and will be discussed in Section 6.3 below.

4.3 Services Provided

The Solid Waste Department falls under the GCPWD, led by Ms. Betsy Suerth, the Public Works Director. This department was under the direction of the Garfield County Road and Bridge Department until 2007. The primary function of the GCPWD is to provide drop-off recycling services for county residents and disposal services at WGCL. The landfill is owned by Garfield County who currently employs eight landfill personnel.

At the time of the development of this Plan, the County provided the following services:

- Operation of a centralized recycling facility in Rifle, Colorado offering at a drop-off location, accepting:
    - Co-mingled glass beverage containers of all colors, recyclable plastics numbered 1-7, cans made of tin and aluminum, corrugated boxes that are flattened, newspaper - including inserts, magazines and catalogs, office paper and phonebooks.
- Operation of a MSW Landfill
- Operation of a recycling area for source separated recyclables including:
    - Clean wood.
    - Tree/brush debris.
    - Furniture and mattresses.

  - Erosion control products (e.g., straw bales).
  - Tires.
  - Bicycles, grills, small machinery such as snow blowers or lawn mowers.
  - White goods.
  - Rock, brick and concrete.
  - Automotive batteries.
  - Electronic waste (E-waste).
  - ADC materials shredding operation.
- Operation of a screen plant to process local (within landfill property) aggregate for landfill use only.
- Operation of septage evaporation impoundments.
- HHW drop-off program at the landfill, twice per year, in conjunction with an outside Contractor.

4.3.1 Future Services

As will be discussed in Section 6, WGCL is considering additional services for the purpose of becoming a more sustainable operating enterprise. These services may include:

- Expansion of additional waste streams to be received at the landfill:
  - Drill cuttings.
  - HHW.
  - Liquid wastes for solidification (E&P waste).
  - Medical waste.
- Additional Septage Evaporation Impoundments.
- Development of a Land Farm for PCS treatment within the active landfill footprint.
- Development of a compost facility for yard waste or food waste.
- Stop-N-Shop for diversion of building goods and domestic wares.
- Permanent Household Hazardous Waste Facility.
- Solidification basin for non-hazardous liquid wastes or sludges.
- Consideration of waste conversion to energy technologies.
- Strategic Partners to offer new or expanded services to the landfill, if beneficial to the residents and businesses of Garfield County, and consistent with the County's mission statement

4.4 Equipment

One of the most significant costs of operating a landfill is the purchase, operation and maintenance of equipment. Undersized, inadequate, or unreliable equipment results in breakdowns, higher operating costs, and improper landfill operations. In severe situations, this

can result in a loss of waste volume due to private customers using other facilities. Landfill equipment provides the following key functions:

- Waste handling and compaction equipment dispose of the waste by compacting the waste materials on the active working face of the landfill (i.e., track-type tractors, track loader, and landfill compactors).
- Cover material handling machines provide daily cover requirements (i.e., scrapers, track hoes, dump trucks, and bulldozers).
- Support equipment which includes motor graders, water trucks, pumps, etc.

Presented in **Table 16** are the County assets in use at the landfill, the estimated remaining life of the equipment and the current engine hours. Several pieces of equipment were reported in poor condition and are designated for possible replacement in 2014 or 2015. It is important that the WGCL budget include reserve capital to replace the landfill equipment as needed.

Additional equipment may be required based on the New Landfill infrastructure discussed in Section 6.0 below.

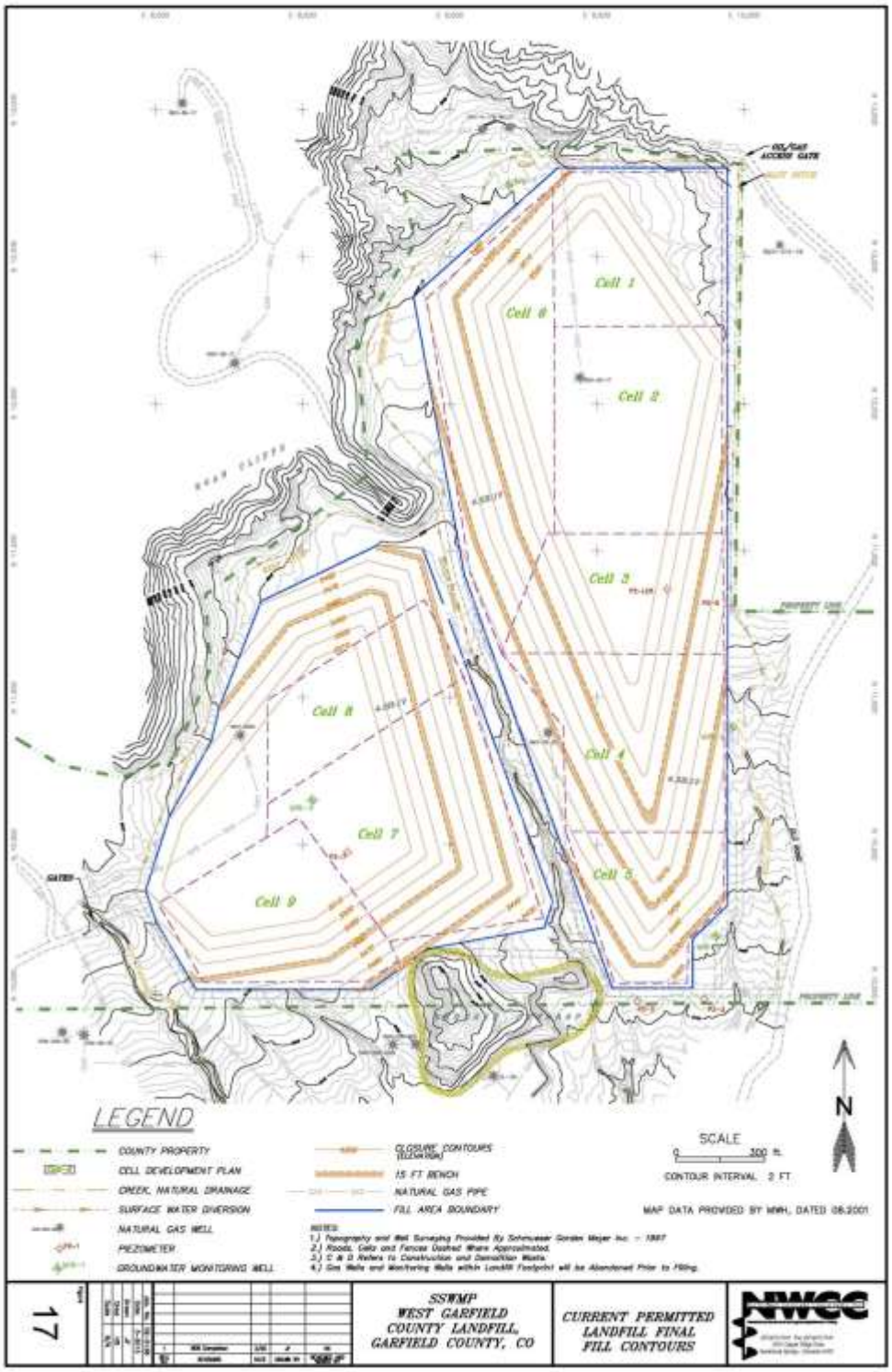
4.5 Disposal Capacity

The current permitted landfill capacity is 2.46 million mega-grams (MMG) (5.7 million cubic yards (MM cy)) based upon 20% daily soil cover and five-foot horizontal to one-foot vertical (5H:1V) side slopes and an approximate 50 foot final build-out above grade elevation.

4.5.1 Existing Capacity

Current final grading plans include two landfill areas referred to as the Main and West landfills separated by a center channel. Estimated trench (subgrade) design capacity is 2.3 MM cy and area fill an additional 3.4 MM cy, for a total of approximately 5.7 MM cy. Waste placement areas will be trench-filled, up to existing grade. These operations once completed, will be followed by area-filling for all above grade waste placement, up to approximately 50-feet above existing local grades. Estimated sub-surface trench-filled waste design capacity is 2.3 MM cy and area fill an additional 3.4 MM cy, for a total waste disposal capacity of approximately 5.7 MM cy.[43] The final cover system includes placement of 4 feet of native material above a half-foot-thick intermediate cover. The projected remaining life of the landfill is until 2041, based on current waste acceptance rates at the landfill and use of ADC. It should be noted that the 100 acres outside the CD can be permitted, providing additional waste capacity and extending the landfill life. Presented in **Figure 17** are the current permitted fill contours and the designation of.

[43] This assumes 20% for daily cover. Montgomery Watson. 2001. *Closure and Post-Closure Plan.*


Cell 1
Cell 6
Cell 2
Cell 3
Cell 8
Cell 4
Cell 7
Cell 5
Cell 9
LEGEND
COUNTY PROPERTY
CELL DEVELOPMENT PLAN
CREEK, NATURAL DRAINAGE
SURFACE WATER DIVERSION
NATURAL GAS WELL
PIEZOMETER
GROUNDWATER MONITORING WELL
CLOSURE CONTOURS
15 FT BENCH
NATURAL GAS PIPE
FILL AREA BOUNDARY
SCALE
CONTOUR INTERVAL 2 FT
MAP DATA PROVIDED BY MWH, DATED 06.2001
N
17
SSWMP
WEST GARFIELD
COUNTY LANDFILL,
GARFIELD COUNTY, CO
CURRENT PERMITTED
LANDFILL FINAL
FILL CONTOURS
NWCC

landfill cells. Presented in **Figure 18** is a typical cross section of the landfill based on the current permitted airspace.

4.5.2 Proposed Capacity

The WGCL Team is considering design alternatives that can add significant additional landfill waste disposal capacity staying within the general solid waste industry standards of practice and within the permitted landfill footprint (edge of permitted waste disposal). One of the capacity increase options is to modify the existing proposed side slope grades from 5H:1V to 3H:1V, while maintaining the landfill final fill height to 50 feet above existing grade. The projected landfill capacity of the WGCL will increase to 6.6 MM cy with a remaining life, at current receipts until 2048. This represents a 16% increase in disposal capacity.

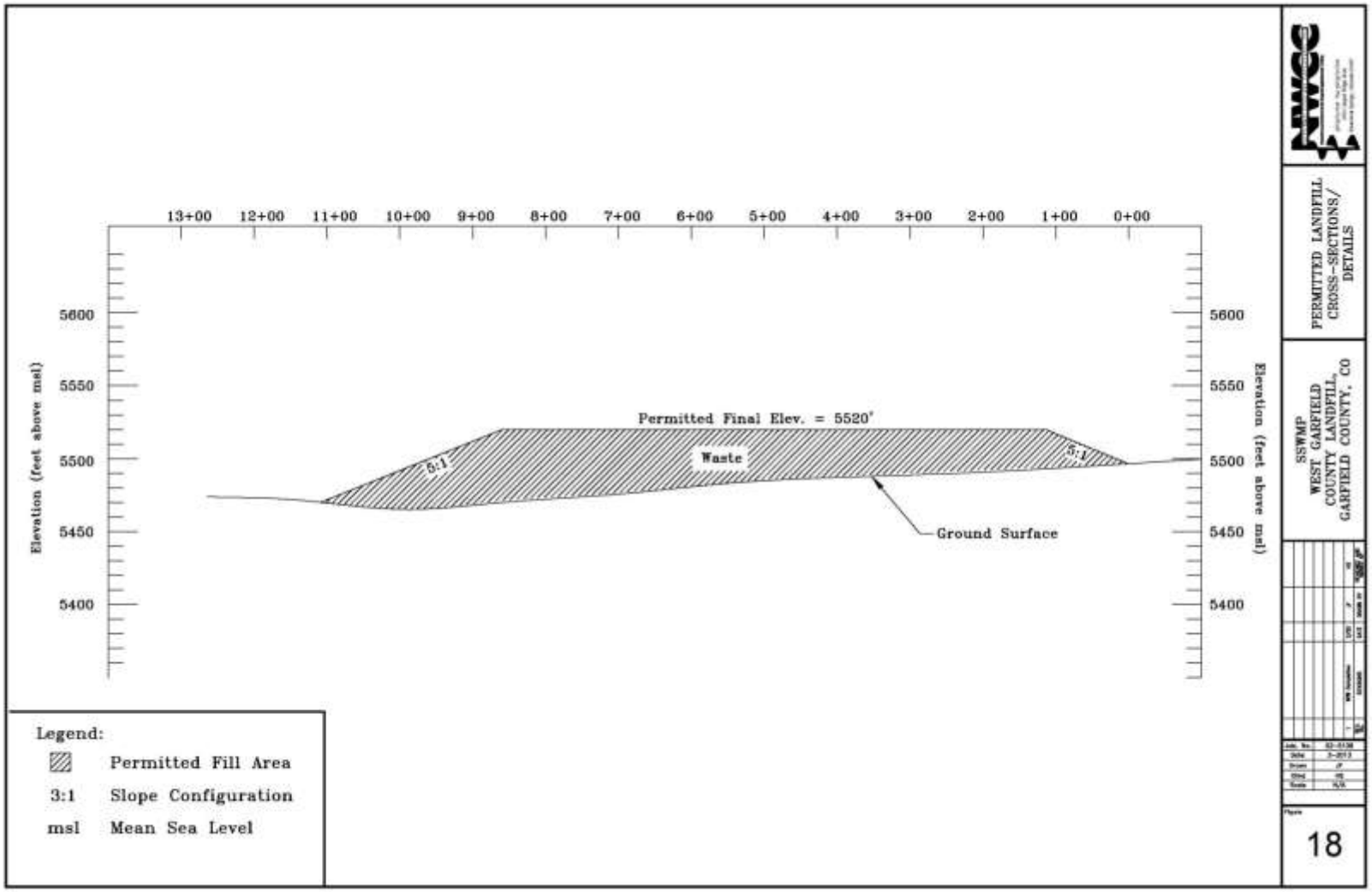
A second option is to utilize the 3H:1V side slope and increase overall waste fill elevation to a maximum of 130 feet above grade. This second option will increase the landfill waste disposal capacity by another 2.7 MM cy, with a remaining life, at current waste receipts, until 2063. This represents an overall increase of 63% in disposal capacity.

A third option to increase airspace and extend the landfill life is to redesign the final cover system using newly implemented CDPHE regulatory guidelines regarding the use of a water balance final soil cover. The intent is to utilize a closure cover system design that meets requirements of the Solid Waste Regulations while reducing the soil cap thickness and increasing the waste disposal volume by the same amount. This option reduces the closure system installation costs. This represents an overall increase of approximately 1% in disposal capacity.

During 2014, the WGCL team is scheduled to revise the Closure/Post-Closure plans for the WGCL, which will address the proposed options to increase the landfill's disposal capacity. Presented in **Figure 19** is a revised conceptual cross-section of the WGCL waste mass with the increased side slopes depicting both options.

4.6 Historic/Projected Waste Volumes

The WGCL Team evaluated both historic and proposed waste streams based on the new facilities proposed for the landfill. These new facilities include a land farm, rebuild of the north and south septage evaporation impoundments, and design and permitting of an E&P monofill. The WGCL Team relied on data published by CDPHE to estimate future projections of waste generation for septage, PCS, and E&P waste.


13+00
12+00
11+00
10+00
9+00
8+00
7+00
6+00
5+00
4+00
3+00
2+00
1+00
0+00
5600
5550
5500
5450
5400
Elevation (feet above msl)
Permitted Final Elev. = 5520'
Waste
3:1
3:1
Ground Surface
Legend:
Permitted Fill Area
3:1 Slope Configuration
msl Mean Sea Level
PERMITTED LANDFILL CROSS-SECTIONS/ DETAILS
SSWMP
WEST GARFIELD COUNTY LANDFILL, GARFIELD COUNTY, CO
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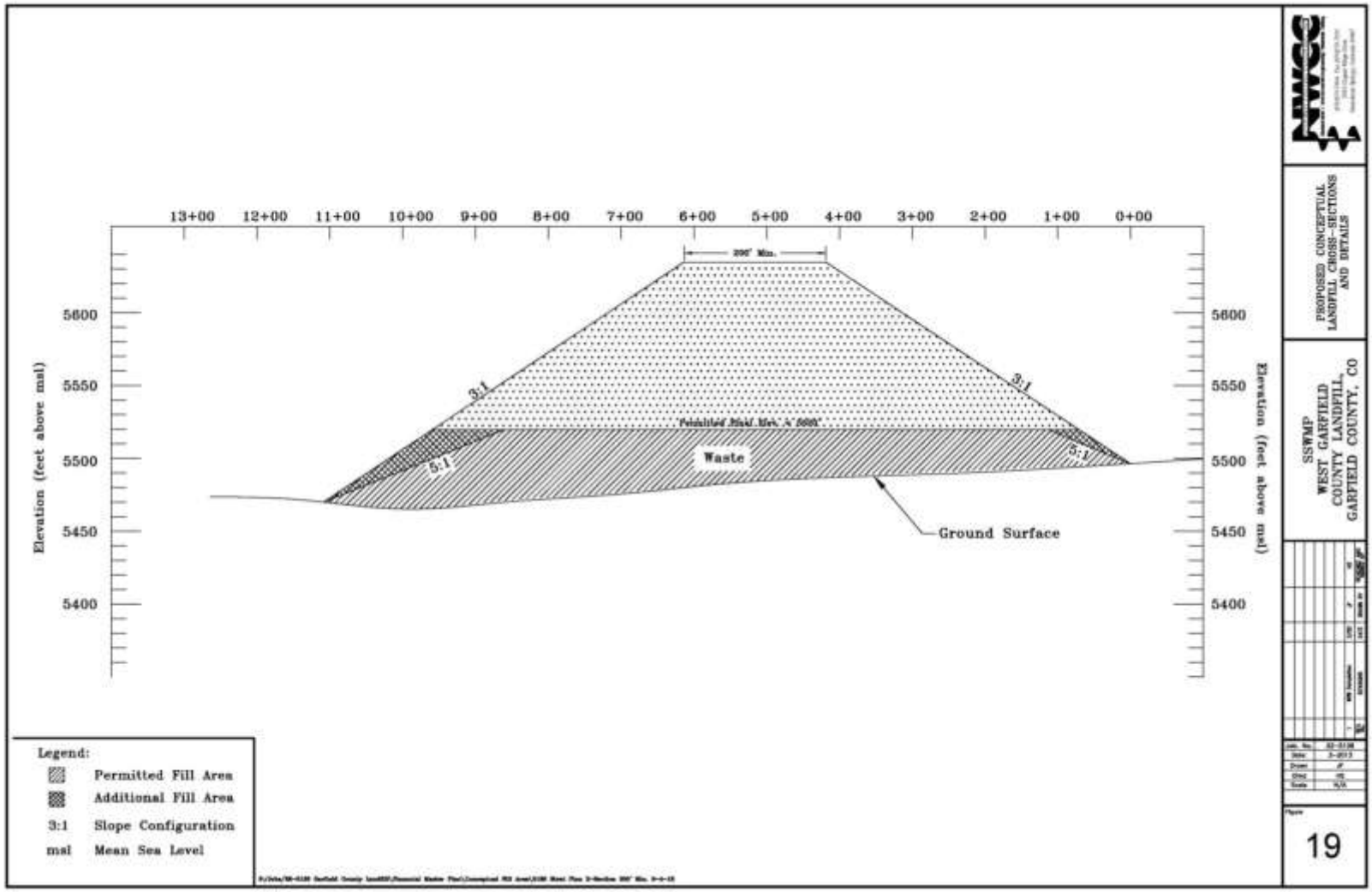
13+00
12+00
11+00
10+00
9+00
8+00
7+00
6+00
5+00
4+00
3+00
2+00
1+00
0+00
200' Min.
5600
5550
5500
5450
5400
Elevation (feet above msl)
3:1
5:1
Waste
Ground Surface
Legend:
Permitted Fill Area
Additional Fill Area
3:1 Slope Configuration
msl Mean Sea Level
PROPOSED CONCEPTIAL LANDFILL CROSS-SECTIONS AND DETAILS
SSWMP
WEST GARFIELD COUNTY LANDFILL, GARFIELD COUNTY, CO
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4.6.1 Historic Waste Volumes

Historical waste volumes for the landfill were obtained from WGCL staff for the years 2010 through 2013. The County classifies WGCL's waste into four categories: Oil and Gas, municipalities, residential and commercial. Typically, the landfill receives 22,000 to 25,000 tons per year (tpy). Presented in **Figure 20** is a breakdown of the waste received from 2010 to 2013. The types of waste received were consistent over the past four years except for the waste delivered by municipalities which has steadily declined. Some variation in waste receipts is also due to changes in tipping fees charged by WGCL. In June 2010, the tipping fee was increased to account for increased operating costs. In June and October 2011, tipping fees were reduced to be competitive in the market. Refer to Section 5.7 for additional information on tipping fee changes. Presented in **Figure 21** are the historic revenues received at the WGCL. Revenues have dropped in 2012 and 2013 from 2010, as a result of lowered tipping fees, even though total volumes have increased from 2011 to the present. Revenues in 2013, however, exceeded 2012 levels.

4.6.2 Projected Waste Volumes

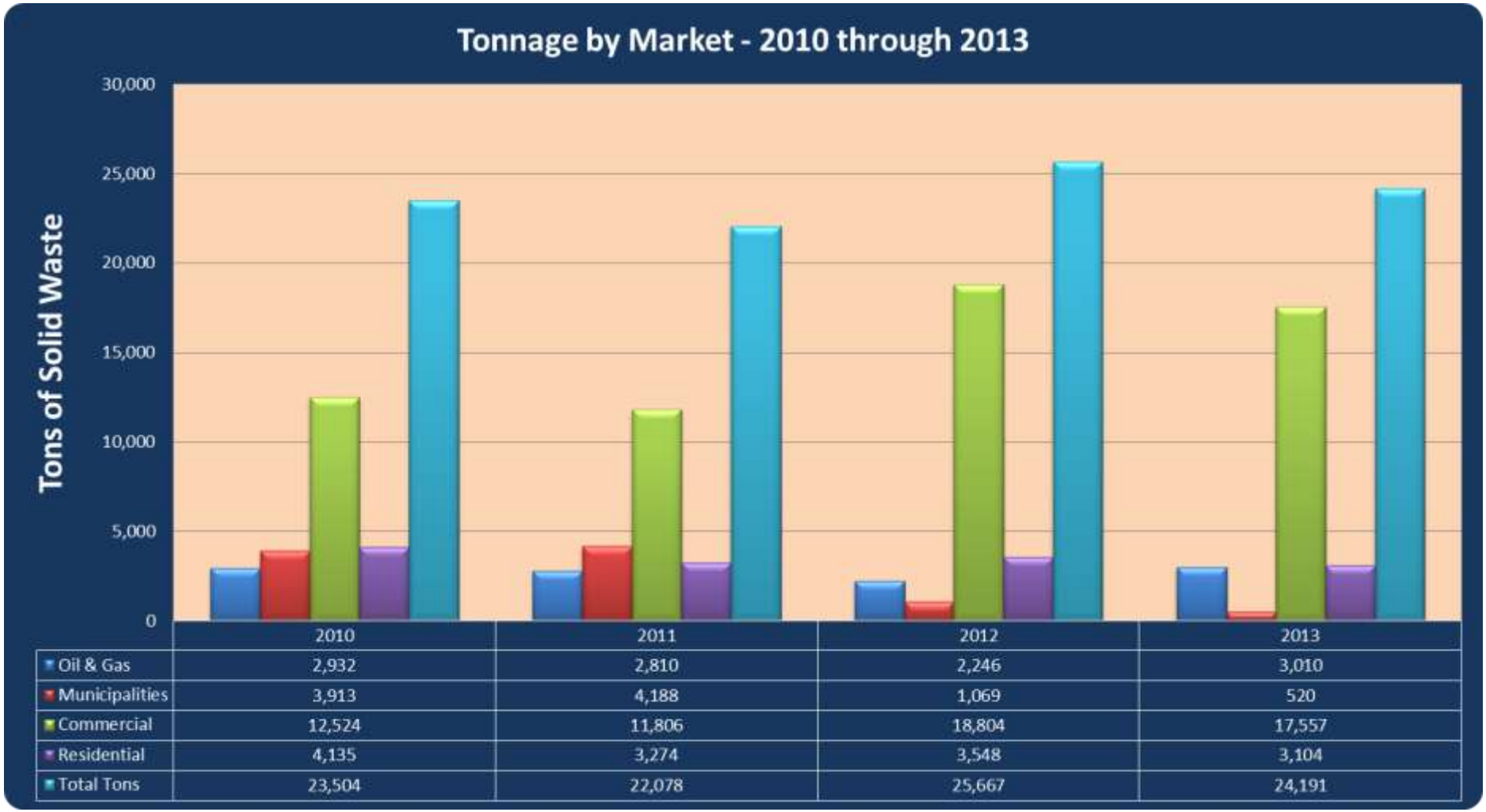
The WGCL Team evaluated potential waste volumes of materials to be received at the WGCL. These wastes include: MSW, septage, E & P waste, waste grease, PCS and yard waste and food waste. Refer to Section 3.4 above and **Tables 3, 4, 5, 6, 7**, and **8** for projected waste volumes in the Study Area, based on 2012 data reported to the CDPHE.

In addition to those waste streams, the WGCL is evaluating the potential acceptance of the following additional waste streams as part of this strategic plan:

- Asbestos
- Drill Cuttings
- Separate oil field plastics
- Leachate (needs surface impoundment-treatment)
- Liquid wastes for solidification (E & P waste)
- Medical Waste/ Pharmaceuticals
- Non-hazardous aqueous wastes for solidification
- Cattle or farm manure
- Sand trap sediment

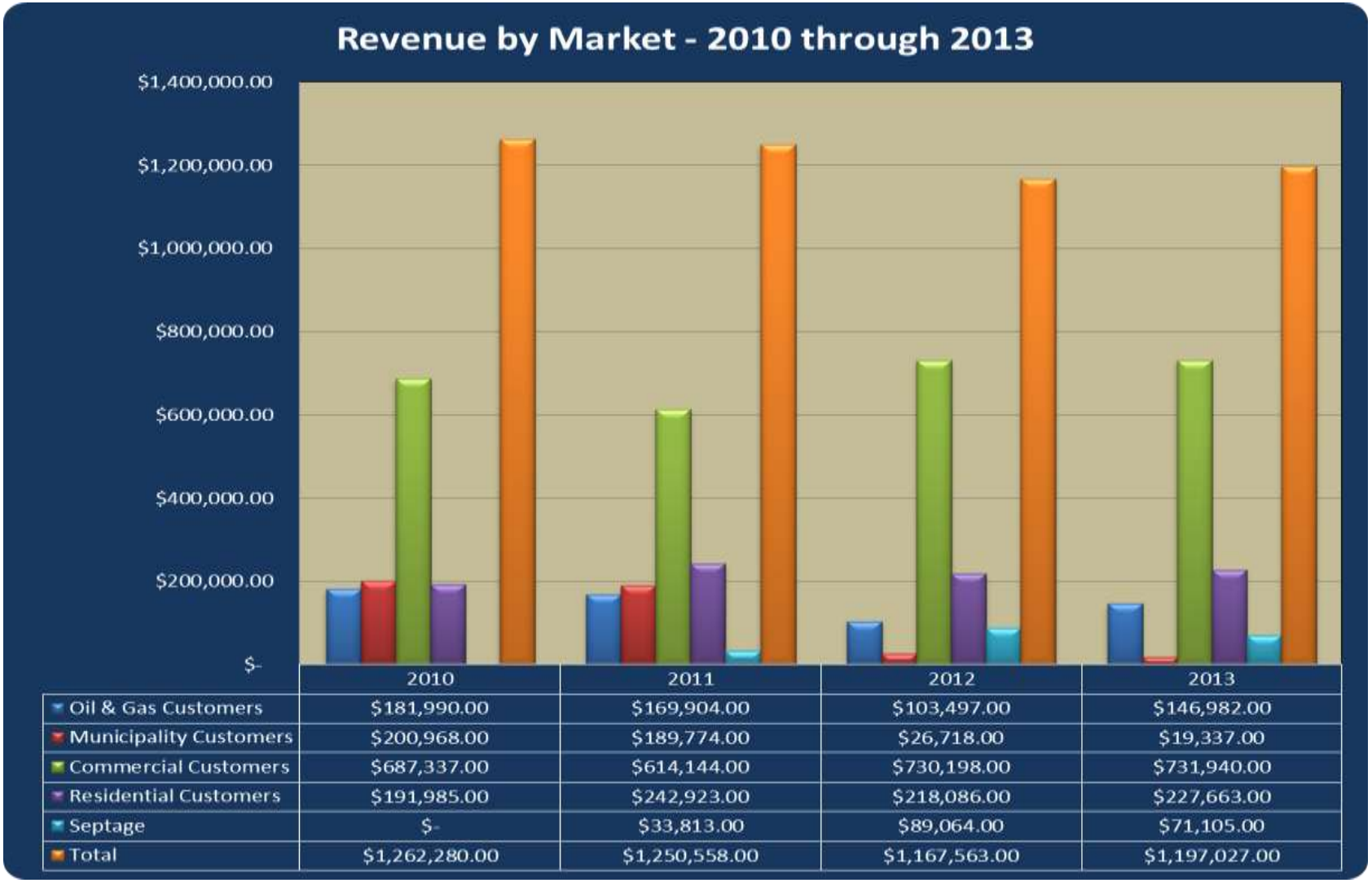
4.7 Landfill Services and Permitted areas

The WGCL provides numerous solid waste management services. These services include receipt and disposal of MSW waste in cells or specific construction and demolition debris monofills, receipt of materials that are diverted from the landfill for recycling or for shredding and use as ADC. A description of these services and the permitted areas within the landfill which accept



	2010	2011	2012	2013
Oil & Gas	2,932	2,810	2,246	3,010
Municipalities	3,913	4,188	1,069	520
Commercial	12,524	11,806	18,804	17,557
Residential	4,135	3,274	3,548	3,104
Total Tons	23,504	22,078	25,667	24,191

FIGURE 20. HISTORIC TONNAGE BY MARKET AT WGCL



	2010	2011	2012	2013
Oil & Gas Customers	$181,990.00	$169,904.00	$103,497.00	$146,982.00
Municipality Customers	$200,968.00	$189,774.00	$26,718.00	$19,337.00
Commercial Customers	$687,337.00	$614,144.00	$730,198.00	$731,940.00
Residential Customers	$191,985.00	$242,923.00	$218,086.00	$227,663.00
Septage	$-	$33,813.00	$89,064.00	$71,105.00
Total	$1,262,280.00	$1,250,558.00	$1,167,563.00	$1,197,027.00

FIGURE 21. HISTORIC REVENUE BY MARKET AT WGCL

these wastes are described below. Presented in **Figure 22** is a detailed overview of the various cell areas described below.

4.7.1 Site Access

The landfill is accessed via County Road 246 located north of Interstate Highway 70 and approximately 6.5 miles west of Rifle. The entrance is secured with a locked gate. A rear locked entrance for O&G personnel is located at the northeast corner of the Main Landfill. A security fence is located along the landfill perimeter except for areas where natural geologic features (Roan Cliffs) provide security.

4.7.2 Building Structures

A scale house including covered ingress and egress scales and administrative office is located at the landfill entrance. A maintenance shop and administrative office building is located to the south of the scale-house facilities. A fuel dispensing system used to service landfill vehicles and equipment is located adjacent to the maintenance shop.

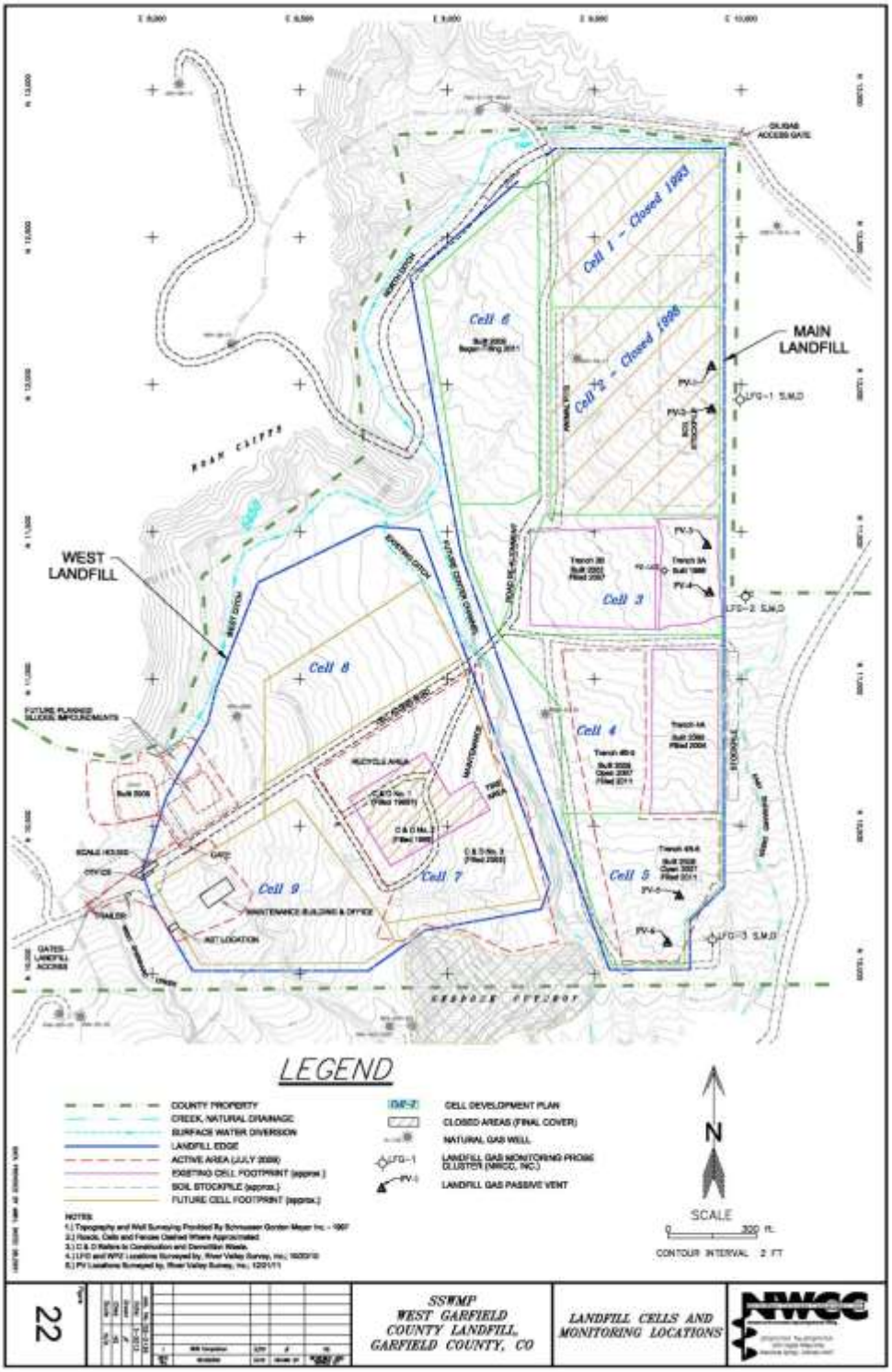
4.7.3 Cells

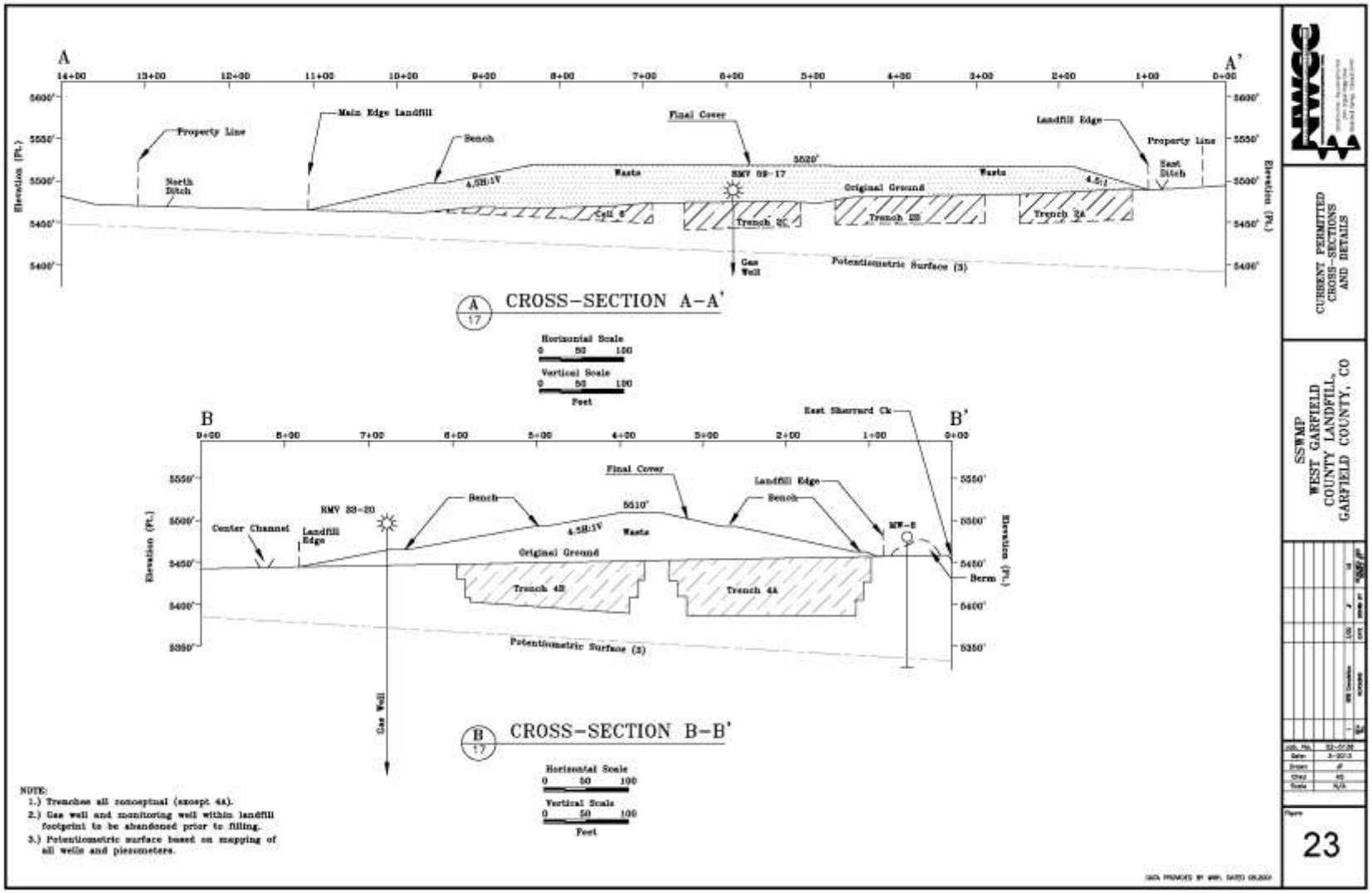
The two main landfill areas are separated by a center stormwater channel. The Main Landfill (Cells 1 through 6) is located at the east side and the West Landfill (Cells 7 through 9) at the west side of the channel (refer to **Figure 22**). Subgrade landfilling using trench and fill methods began at the north end of the facility and progressed to the south from Cells 1 through 5. Presented in **Figure 23** is a cross section showing the trench and above grade filling sequence. Subgrade filling of Cells 1 through 5 has been completed and subgrade filling of Cell 6 is currently being conducted. Based upon current plans, following completion of Cell 6 subgrade filling, area filling (above grade) of the Main Landfill will be conducted from south to north followed by West Landfill filling using similar methods.

General MSW, mixed C&D and PCS is disposed in the landfill cells. Dead animals are disposed in a separate cell area. Because PCS is considered a source of volatile organic compound (VOC) emissions, Air Pollution Control Division (APCD) determined that PCS cannot be used as daily cover and must be covered at days end. PCS is currently disposed in Cell 5, which provides the greatest separation between groundwater and ground surface.

4.7.4 Monofills

Subgrade C&D monofills were constructed within the footprint of MSW Cell 7 and beneath what is now the current recycling area. C&D Monofills 1 and 2 were completed to grade by 1995 and 1998, respectively. The majority of C&D Monofill 3 was filled by 2003, except for a small portion at the east side that is currently being filled. These areas are shown on **Figure 22**.


Cell 1 – Closed 1993
Cell 2 – Closed 1998
Cell 3
Cell 4
Cell 5
Cell 6
Cell 7
Cell 8
Cell 9
MAIN LANDFILL
WEST LANDFILL
LEGEND
COUNTY PROPERTY
CREEK, NATURAL DRAINAGE
SURFACE WATER DIVERSION
LANDFILL EDGE
ACTIVE AREA (JULY 2008)
EXISTING CELL FOOTPRINT (approx.)
SOIL STOCKPILE (approx.)
FUTURE CELL FOOTPRINT (approx.)
CELL DEVELOPMENT PLAN
CLOSED AREAS (FINAL COVER)
NATURAL GAS WELL
LANDFILL GAS MONITORING PROBE CLUSTER (NWCC, INC.)
LANDFILL GAS PASSIVE VENT
N
SCALE
CONTOUR INTERVAL 2 FT
22
SSWMP
WEST GARFIELD COUNTY LANDFILL
GARFIELD COUNTY, CO
LANDFILL CELLS AND MONITORING LOCATIONS
NWCC


A
A'
Property Line
Main Edge Landfill
Bench
Final Cover
Landfill Edge
Property Line
North Ditch
East Ditch
Waste
RMV 09-17
5520'
Original Ground
Cell 6
Trench 2C
Trench 2B
Trench 2A
Gas Well
Potentiometric Surface (3)
Elevation (Ft.)
CROSS-SECTION A-A'
Horizontal Scale
Vertical Scale
Feet
B
B'
East Sherrard Ck
Final Cover
Landfill Edge
Bench
RMV 23-20
Center Channel
Landfill Edge
5510'
Waste
Original Ground
MW-5
Berm
Trench 4B
Trench 4A
Potentiometric Surface (3)
Gas Well
CROSS-SECTION B-B'
Horizontal Scale
Vertical Scale
Feet
NOTE:
1.) Trenches all conceptual (except 4A).
2.) Gas well and monitoring well within landfill footprint to be abandoned prior to filling.
3.) Potentiometric surface based on mapping of all wells and piezometers.
CURRENT PERMITTED CROSS-SECTIONS AND DETAILS
SSWMP
WEST GARFIELD COUNTY LANDFILL
GARFIELD COUNTY, CO
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4.7.5 Recycling

The approximately four acre area overlying C&D filled monofills 1 and 2 is used for recycling and waste shredding operations. Separated recyclables include clean wood, tree/brush debris, furniture and mattresses, erosion control products (e.g. wattle, straw bales), tires, ferrous metals, bicycles, grills, small machinery (e.g. snow throwers, lawn mowers), and white goods. Rock, brick, and concrete are stockpiled in the Cell 8 area for on-site use. Automotive batteries are stored in a secured shed adjacent to the scale house and E-waste is collected and stored in conex storage containers.

Metals, automotive batteries, and E-waste are periodically hauled to a recycling facility. Rock, brick, and concrete are periodically crushed and used beneficially (e.g. road and erosion control maintenance, daily cover) at the landfill. Erosion control products are beneficially used to comply with stormwater permit requirements. Lumber, brush/trees, furniture including mattresses, and waste tires are processed through a shredder and used as ADC. Unprocessed C&D is also used as ADC.

4.7.6 ADC

The WGCL operations staff has been conducting an ADC demonstration in accordance with the CDPHE regulations. Pre-approved waste materials are processed by WGCL staff, through a facility owned shredder. Processing is conducted in the segregated recycled materials areas. The processed materials are transported to the active landfill face and placed in lieu of required soil daily cover. Demonstration results were submitted to CDPHE and subsequently approved. The landfill is permitted to use Posi-Shell™, tarp systems, reduced green waste, reduced tires, C&D not reduced or shredded, and furniture/mattresses reduced to min 12-inch-thick as ADC.[44]

4.7.7 Screen Plant

A County owned screen plant is operated by the WGCL staff to process excavated site soils for various beneficial uses (e.g. landfill roads, stormwater controls maintenance, daily soil cover) throughout the landfill. The EXTEC S-5 double screen plant, permit #12GA2022, is rated at 3,000 tons per hour. It has a Deutz Diesel Engine rated at 99 HP. It is permitted for a throughput of up to 400,000 tons and a diesel fuel consumption of no more than 8,000 gallons per year.

In the past, site soils have also been processed to meet construction specifications of required cell bottom liner materials. The landfill should evaluate whether it is economically beneficial to continue operation of the screen plant.

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[44] Email, from: Robert Peterson – CDPHE, to Betsy Suerth, WGCL, dated: Thursday, December 12, 2013 4:29 PM.

4.7.8 Septage Evaporation Impoundments

Because climatic conditions provide an extremely high evaporation potential in the landfill region, evaporation impoundments are considered the most cost effective method of treatment for septage. Evaporation impoundment operations and maintenance is very minimal. Mainly, each impoundment is periodically allowed to dry, dry sludge is removed and disposed into a landfill cell and the impoundment placed back into operations.

4.7.9 Stormwater Controls

Run-on and run-off stormwater controls were constructed to manage surface water during facility operations and following closure. Run-on diversion channels (North and West Ditch) and a center run-off channel were designed to control peak flow of a 100-year, 24-hour storm event. West Sherrad Creek, located adjacent to the landfill entrance gate, and East Sherrard Creek, located along the east side of the Main Landfill and the west side of the 80-acre parcel, intermittently flow as a result of heavy precipitation and/or snow melt events. Flash flood of East Sherrad Creek resulted in flooding of the south end of the Main Landfill in the past. Therefore, a berm was placed along the southeast end of the Main Landfill to prevent landfill flooding.

WGCL obtained a non-extractive industrial stormwater permit to comply with recent new stormwater regulations. Disposed erosion control materials (e.g. wattle, straw bales) are stored in the recycle area and used beneficially at the facility for stormwater control.

4.7.10 Title V

Based upon current permit design, the landfill design capacity is 2.46 MMG and is almost at the 2.5 MMG threshold requiring a Title V, Tier II, air emissions permit in accordance with the Clean Air Act New Source Performance Standards (NSPS), Subpart WWW. Because the landfill is at the threshold and in order to allow an increase in waste disposal capacity using undeveloped property (e.g. 100-acres), and increasing the design slope, a Title V air emissions application was completed. The individual air emissions permits related to landfill operations are effectively placed under one Title V operating permit that encompasses all landfill air emissions sources.

NSPS Subpart WWW requires active LFG control (extraction) and treatment (flaring) at landfills emitting more than 50 MG of non-methane organic compounds (NMOC) per annum. LFG sampling and analysis were conducted in order to determine actual NMOC emissions at the landfill. Actual calculated NMOC emissions were below the 50 MG threshold; thereby, allowing WGCL to “opt out” of the Tier II option of the NSPS rule requiring LFG extraction and treatment.

4.8 Waste Acceptance

The sections below detail the types of waste accepted and prohibited at the WGCL.

4.8.1 Permitted Waste Streams

The landfill facility, at present, is permitted to accept the following waste streams:

- Animals.
- Appliances.
- C&D.
- E-waste.
- Landscape Rubble (stone, brick, cement).
- Mattresses and Furniture.
- Municipal Waste – In-County and Out-of-County.
- Septage – In-County and Out-of-County.
- Sewage (accepted in the impoundments).
- Scrap Metal.
- Sludge – In-County and Out-of-County.
- PCS.
- Tires.
- Wood.
- E& P waste (i.e., drill cuttings and sludge).
- Materials treated in a solidification basin to amend free liquid.

4.8.2 Prohibited Wastes

The landfill facility, at present is prohibited from accepting the following wastes:

- Refrigerators, freezers, and air conditioners that contain chlorofluorocarbon (CFC) unless the CFC's have been properly drained.
- Polychlorinated Biphenyls (PCB's).
- Radioactive waste.
- Hazardous waste or toxic materials.
- Liquids or semi-liquids.
- Pesticides or pesticide containers.
- Explosive materials or toxic chemicals or mining wastes.
- Bulk infectious and institutional waste.
- Highly flammable or volatile substances.
- Oil field production and drilling mud/fluids.

- Maintenance, repair shop, automotive painting, vehicle wash sand trap sediments.

4.8.3 HAZARDOUS WASTES

The site may not accept hazardous wastes per the facility CDPHE permit and the requirements of the Land Transfer Audit.[45] It should be noted that the WGCL conducts two HHW drop-off events each year at the landfill, although the waste drop-off and processing area is outside the CD to ensure compliance with the landfill permit and the Land Transfer Audit.

[45] TerraMatrix, Inc., Land Transfer Audit, West Garfield County Landfill, May 1995.

5. LANDFILL OPERATIONS

The purpose of Section 5 is to answer the question: ***What are the current conditions at the West Garfield County Landfill?*** *The subsections that follow will identify key operational elements at the landfill, operational issues, equipment needs, and closure and post-closure design requirements.*

5.1 CURRENT LANDFILL CONDITIONS

This section highlights the key operational elements at the landfill, staff equipment, environmental management and the set-aside of appropriate funds for closure/post closure of the landfill.

5.1.1 DAILY AND FINAL SOIL COVER

Under Colorado regulation, adequate soil must be set aside for daily and final soil cover. If there is not enough on-site soil available to meet the daily required 6-inch soil cover minimum, the cost of importing soil must be added to the financial assurance costs. This would significantly increase the funds that the County is required to have available. Adequate soil for daily and final cover has historically been a concern and has driven operational changes at the WGCL. The BLM lease limited trash lift thickness to a maximum two feet which led to higher daily cover soil used, however, the landfill is no longer restricted to this limitation. The typical industry standard ranges from five feet to as much as twenty feet, all to maximize the daily waste materials placed and minimize the waste surface area requiring daily cover.

Additionally, because the landfill is in soil deficit regarding daily and final landfill cover and in order to more efficiently use valuable landfill space for waste, Garfield County chose to use other materials for ADC. In October 2012, WGCL received CDPHE approval to conduct a demonstration study using various materials including green waste, furniture including mattresses, non-asbestos C&D material and shredded tires as ADC. On December 12, 2013, CDPHE approved the results of the demonstration period for ADC and allowed the ongoing use of these materials for ADC. Additionally, the WGCL is permitted to use Posi Shell™ and tarp systems.

ADC processing is conducted in the segregated recycled materials areas. The material is transported to the active landfill face and placed daily in order to prevent wind-blown trash, animal scavenging, and to control odor.

Several advantages of using ADC include an increase of landfill space used for trash placement, thereby increasing revenue and less daily soil cover, potentially reducing operating costs to transport and place daily cover on the active cell. Moreover, using ADC will enhance LFG

management by maintaining trash to trash contact, allowing LFG to naturally migrate to ground surface. Daily cover can inhibit LFG migration and trap the gas in pockets within the waste mass that could potentially increase LFG pressures. The initial landfill design assumed 20% landfill space used for daily soil cover. Using ADC will significantly reduce soil cover that will only be required weekly.

Regardless of the type of daily cover utilized in the coming months and years, the operators will have enhanced training to optimize the waste placement, as described above, to minimize the soil or ADC cover that will be required and maximize the waste disposal capacity within the permitted lateral and vertical limits.

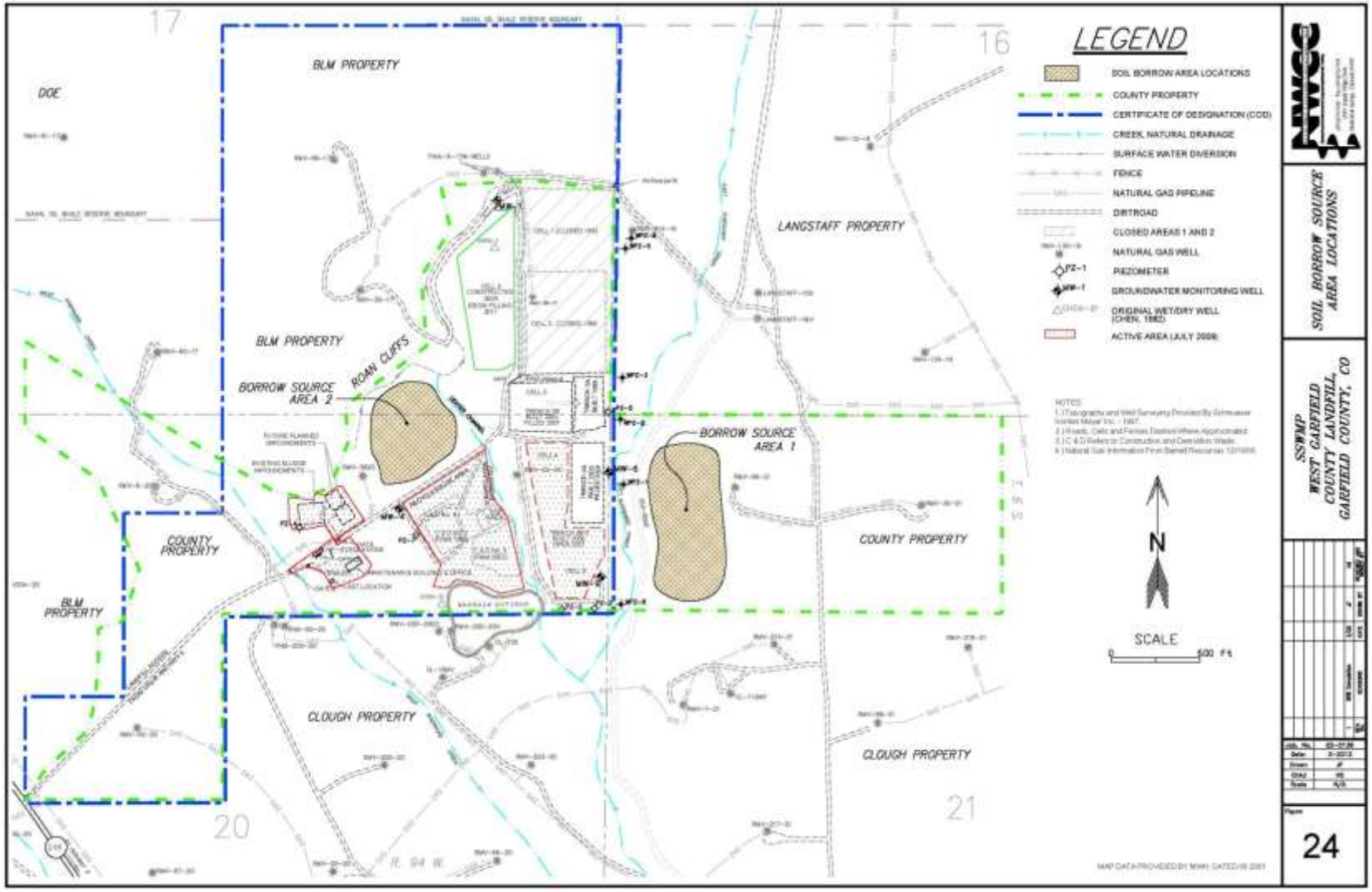
5.2 Operational Issues

Typically, landfill owner liability revolves around environmental issues such as groundwater or surface water contamination, methane gas generation and migration (particularly offsite or into structures), waste acceptance practices including control of unauthorized wastes at the facility and operation of heavy equipment relating to employee safety and the County's duty to protect the general public. This section discusses some of the potential liability issues that the WGCL faces at present, as well as in the future.

5.2.1 Groundwater

Environmental monitoring controls at the facility include four groundwater monitoring wells, and five piezometers where data is collected and used for evaluation of facility compliance. One well (MW-1) is located upstream of the landfill waste cells and the septage ponds, to measure background constituent concentrations to detect chemical constituents and their concentrations that are naturally occurring in the groundwater or potential off-site impacts that may migrate onto the landfill. Two monitoring wells (MW-4 and MW-9) and one piezometer (PZ-5) are located downstream of both the landfill waste cells and the septage impoundments to monitor and verify if these facilities are having any impact on the groundwater underlying and downstream of them. Semi-annual groundwater monitoring includes collecting water elevation data from all monitoring wells and piezometers and collecting groundwater quality samples only from three monitoring wells and one piezometer. The locations of the groundwater monitoring wells are shown on **Figure 24**. Annual reports summarizing the data collected during the monitoring events, data evaluation and any conclusions and/or recommendations are submitted to CDPHE for their review and records.

Field and analytical data is also collected and used to determine compliance with the regulations. Biannually, groundwater quality analytical data are statistically evaluated looking for increasing analyte trends that could be indicative of a landfill release. During the evaluation, future analyte


LEGEND
SOIL BORROW AREA LOCATIONS
COUNTY PROPERTY
CERTIFICATE OF DESIGNATION (COD)
CREEK, NATURAL DRAINAGE
SURFACE WATER DIVERSION
FENCE
NATURAL GAS PIPELINE
DIRTROAD
CLOSED AREAS 1 AND 2
NATURAL GAS WELL
PIEZOMETER
GROUNDWATER MONITORING WELL
ORIGINAL WET/DRY WELL (CHEN, 1982)
ACTIVE AREA (JULY 2009)
BLM PROPERTY
DOE
LANGSTAFF PROPERTY
BORROW SOURCE AREA 2
ROAN CLIFFS
BORROW SOURCE AREA 1
COUNTY PROPERTY
CLOUGH PROPERTY
N
SCALE
SOIL BORROW SOURCE AREA LOCATIONS
SSWMP
WEST GARFIELD COUNTY LANDFILL
GARFIELD COUNTY, CO
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concentration projections are developed and used as compliance standards for the following two years. The facility Statistical Analysis Plan (SAP) must be updated based upon the statistical analysis and submitted to CDPHE.

5.2.2 LANDFILL GAS

The WGCL has historically monitored shallow (approximately 5-feet deep) gas probes to determine whether or not LFG was migrating off-site from the landfill's decomposing wastes. Nine deeper gas probes were installed based upon additional LFG characterization needs. Quarterly methane monitoring is currently conducted at nine landfill gas probes, 7 LFG vents and all building structure interiors. The locations of these landfill gas vents and probes (LFG1-S,M,D; LG2-S,M,D; and LFG-3S,M,D) are presented in **Figure 22**. Additionally, LFG monitoring is conducted at these locations as part of methane mitigation monitoring. Quarterly reports must be submitted to CDPHE which include methane screening of landfill buildings. In the early to mid-2000s, LFG was measured in the monitoring devices, along the eastern boundary of the landfill. At the time, it was unclear whether the measured methane gases were due to the decomposing buried waste materials deposited in the landfill or from the natural gas fields that encompass the landfill and neighboring properties.

Based upon the LFG investigation conducted over the past few years, it appears that methane gas generated within MSW Cells 1,2,3,4 and 5 was migrating beyond the east landfill CD at levels above the regulatory limit of five (5) percent (%) of the lower explosive limit (LEL). In order to bring the facility into compliance with the regulations, a CDPHE approved investigation was and continues to be conducted in a phased approach, to reduce LFG migration to below regulatory limits, while at the same time minimizing investigation and mitigation costs. This phased approach was also deemed acceptable because the impacted area to the east is a heavily developed natural gas well field where health and safety hazards associated with LFG appear negligible. Part of the impacted property outside the CD is the vacant Garfield County owned 80-acre parcel. LFG probes were installed to help characterize the origin and migration path of LFG and to provide monitoring locations, while passive LFG vents were constructed to help relieve gas pressures within the waste mass and clear the LFG probes of elevated methane levels.

In the 1990's and early 2000's, an estimated 340,000 cubic yard stockpile of material excavated from historic landfill cells had been placed atop the major portion of the Main Landfill (Cells 1 through 2, Trench 3A, Cell 4A). This practice was contrary to accepted landfill industry practices. Based upon LFG probe monitoring results, following passive vent installations, probes placed at the southern portion of the landfill (Cell 5) that are not covered by the soil stockpile were cleared of methane. Methane levels in probes associated with portions of the landfill covered by the stockpile did not appear to improve following vent installations.

In 2012, the majority of the stockpiled excavated soils were removed from above the historic landfill cells and placed in a soil stockpile to the southeast (Borrow Source Area 1) at the west side of the so called 80-acre parcel. Refer to **Figure 24** (above). It was believed that this extensive soil stockpile was inhibiting the LFG from venting to the atmosphere. The stockpile was also moved to allow pending vertical area filling. Now that the soils have been removed, it is hoped that the methane detected in the eastern LFG monitoring probes will be below the regulatory limit. If not, the County has additional action items that it has agreed to conduct, as agreed upon with the CDPHE.

Garfield County is currently addressing potential future LFG generation/mitigation issues proactively rather than reactively. Horizontal LFG passive vents were recently approved by CDPHE and will be constructed as area filling progresses. In addition, the existing vertical vents and planned horizontal vents are designed to easily conduct active LFG extraction, if needed.

5.3 Closure/Post-Closure

All waste disposal facility owners are required by both the USEPA and the CDPHE, to both prove to and provide financial assurance for covering both the anticipated costs of closing and the required post-closure care costs if a landfill were to prematurely close and the owner had no funds to conduct the work. The WGCL is currently operated as an enterprise fund. WGCL is planned to be closed once reaching its final permitted waste disposal capacity, in accordance with CDPHE regulations and its current permits. The last closure/post-closure estimate report (2014 CPCR) was updated on March 5, 2014 and is currently under review by GCPWD prior to submittal to CDPHE.[46] This cost estimate represents a "worst case", although realistic, closure scenario.

5.3.1 Closure Cap and Control Systems Design

The following key tasks and assumptions were incorporated into the 2014 CPCR for the purposes of providing a basis on which to develop the closure and post-closure estimates:

1. Clean and close three septage impoundments.[47] Sample and analyze sludge/sub-soil and dispose of at an appropriate facility. Dispose of contaminated soil that cannot be left in place but meets land disposal requirements in an active landfill trench/cell.

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[46] Closure and Post-Closure Cost Estimates, West Garfield County Landfill, Letter from Gary R. Webber, NWCC to Ms. Betsy Suerth, Garfield County Public Works Director, March 5, 2014.

[47] Prior to the 2014 CPCR was submitted, WGCL closed the NSI, resulting in only one impoundment requiring closure. In 2014, however, WGCL intends to rebuild the NSI and the BOCC has approved the capital for this project this year; therefore, the new NSI were included in the CPCR

2. Demolish or salvage all buildings and stockpiled (recyclable) waste as deemed appropriate. Non-salvageable material will be placed in an active landfill trench/cell.
3. Characterize surface soils at recycle/salvage yard area in order to help identify potential impacts from current operations. Based upon analytical results, properly dispose of material.
4. Restore natural drainage patterns at scale house, office, impoundments, maintenance building and salvage/recycling areas using grading techniques. Main access road to remain intact.
5. Grade active trench/cell and any open C&D cells in accordance with the 2001 Closure and Post-Closure Plan (CPCP) and place six inches of intermediate cover using native material.
6. Place final cover system (4 feet of native material) in accordance with the 2001 CPCP and re-vegetate.
7. Additional groundwater and/or methane monitoring wells/probes are not believed to be necessary.
8. Conduct landfill inspections, maintenance, groundwater quality and methane monitoring, and facility repairs for a 30-year period, as required.

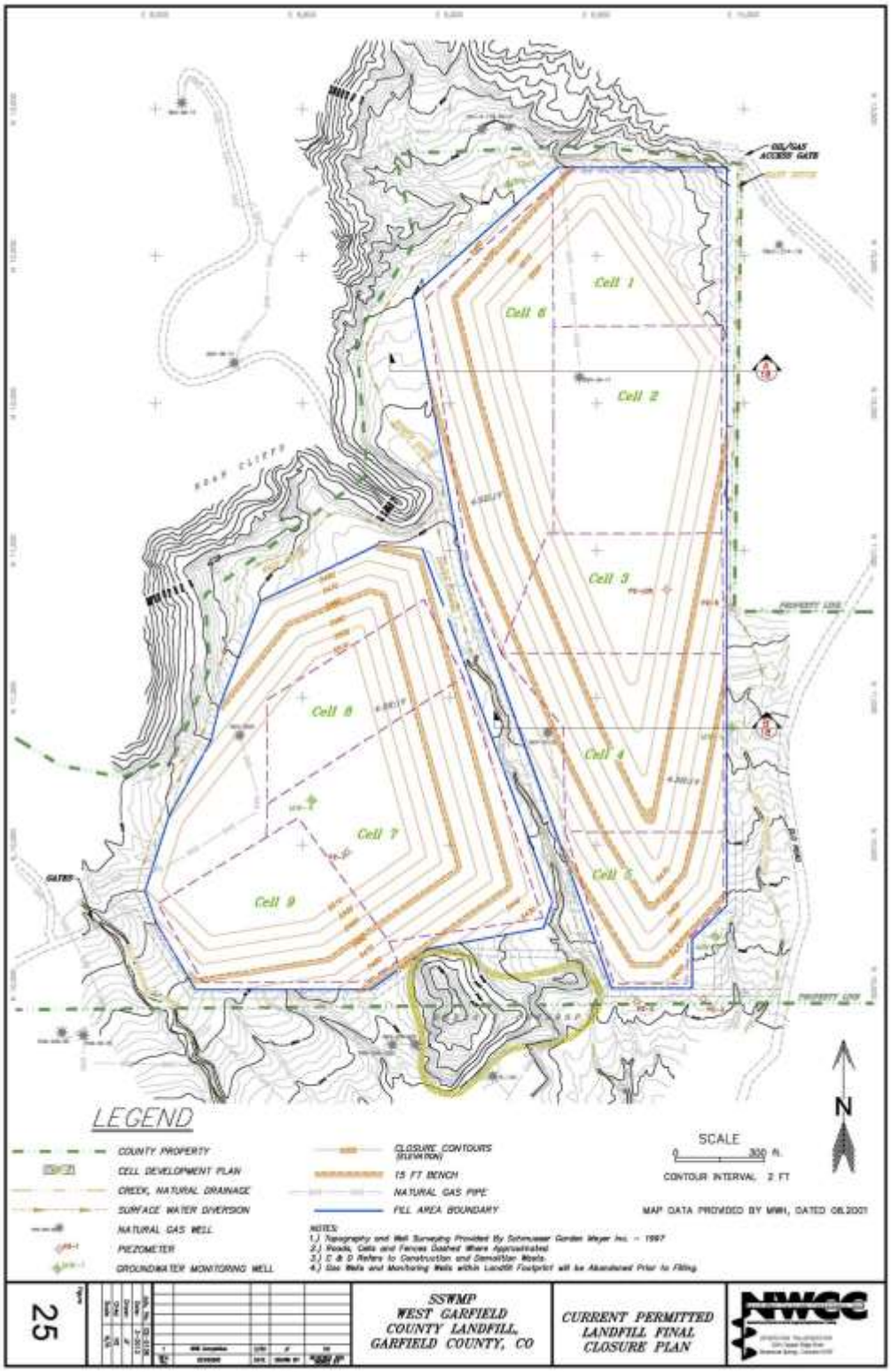
5.3.1.1 Final Grading and Cover Construction

Septage Ponds: Following removal of sludge, pond areas will be graded to facilitate drainage similar to natural surrounding topography. It is assumed that existing berm material and soils adjacent to the ponds will be used for final grading. The estimated volume of material excavated for the WI (14,000 cy) has been used for excavation and hauling costs. Assuming that all sludge and contaminated subsoil are removed, final cover will not be placed in the pond area.

Solid Waste Cells: Historically, final cover was constructed on an entire cell area after each individual trench (within the cell) was filled. However, the 2001 CPCP allowed the facility to use area-fill methods above sub-grade trenches.[48] Therefore, final cover will not be placed on filled trenches until area-fill is completed in that area.

Areas including Cells 3, 4, 5, and 6 (27 acres) are considered the worst case area that requires final cover construction. Refer to **Figure 25** for the cell locations. According to the 2014 CPCR, Cell 6 (7.5 acres) would be the only solid waste trench or cell area that will require intermediate cover 0.5 foot thick and that grading will be necessary prior to construction of the final cover. It was also assumed that the cover will experience a final post-settlement grade of less than 20%

[48] Montgomery Watson. 2001. *Closure and Post-Closure Plan*.


OIL/GAS ACCESS GATE
Cell 1
Cell 6
Cell 2
Cell 3
Cell 8
Cell 4
Cell 7
Cell 5
Cell 9
GATES
LEGEND
COUNTY PROPERTY
CELL DEVELOPMENT PLAN
CREEK, NATURAL DRAINAGE
SURFACE WATER DIVERSION
NATURAL GAS WELL
PIEZOMETER
GROUNDWATER MONITORING WELL
CLOSURE CONTOURS (ELEVATION)
15 FT BENCH
NATURAL GAS PIPE
FILL AREA BOUNDARY
SCALE
0 300 ft.
CONTOUR INTERVAL 2 FT
MAP DATA PROVIDED BY MWH, DATED 08.2001
N
NOTES:
1.) Topography and Well Surveying Provided By Schmueser Gordon Meyer Inc. - 1997
2.) Roads, Cells and Fences Dashed Where Approximated
3.) C & D Refers to Construction and Demolition Waste.
4.) Gas Wells and Monitoring Wells within Landfill Footprint will be Abandoned Prior to Filling.
25
SSWMP
WEST GARFIELD
COUNTY LANDFILL,
GARFIELD COUNTY, CO
CURRENT PERMITTED
LANDFILL FINAL
CLOSURE PLAN
NWCC

and will be constructed consistent with the intent of the 2001 CPCP.

Since the facility is located in an arid environment, a water balance cover was used including four feet of native material vegetated with native species. In accordance with the closure grading plan, erosion estimates are less than one ton per acre per year (1.3cy/ac/yr).

C&D Cells: In the past, landfill operations included three (3) 1½ to 2 acre C&D monofills. (Refer to Cells C&D No. 1, No. 2, and No. 3 on **Figure 22**). The balance of C&D monofill No. 3 is currently being filled based upon material handling needs. Other C&D waste is currently placed into active solid waste trenches and can be used as ADC. Therefore, an assumed two acre area will require final cover, as discussed above.

5.3.1.2 Methane Gas Control

As discussed in Section 5.2.2, LFG mitigation is currently being conducted. Moreover, CDPHE approved horizontal LFG vents will be constructed as waste is placed. Based upon a recent discussion with CDPHE, financial assurance costs for vent installations at closure can be eliminated at this time, as the vents will be in-place at closure. At this time, no active LFG system is anticipated during operation of WGCL or at closure.

5.3.1.3 Surface Water Controls

Although diversion structures and the Center Channel have been re-designed for a 100-year, 24-hour storm event, implementation has only been partially completed during the past several years. The structures include a diversion known as the North and West Ditches located at the north side of the facility along the base of the Roan Cliffs, a natural drainage way known as East Sherrard Creek located along the downgradient side of the landfill, and a Center Channel.[49] These surface water controls are outlined in **Figures 17 and 25**. The Center Channel is designed to help control flow from the cliff area and certain closed landfill sections and to divert storm water through the center of the facility, 1,800 feet to the south and beyond the landfill CD.

5.3.1.4 Groundwater and Methane Monitoring

Current groundwater and methane monitoring discussed in Sections 5.2.1 and 5.2.2, will continue as part of the post-closure care activities. The location of the groundwater monitoring wells, piezometers, and LFG vents and probes are presented in **Figure 24**.

[49] The East Sherrard Creek was always presented in historic reports as a diversion ditch but it is actually a natural drainage way.

5.3.1.5 Site Security

A perimeter fence is currently used to provide security at WGCL. In addition, existing topographic conditions help restrict site access. It is assumed that the fence system and landforms will provide security during the closure and post-closure period. Based upon Garfield County personnel discussions and NWCC experience associated with WGCL since 1993, a knowledge base has been established regarding current and historical operations at the landfill. Unit costs were developed for activities assumed to be required during the landfill closure and post-closure period, based on available information, Garfield County guidance, and current standard industry practices.

5.3.2 Basis of Closure/Post Closure Costs

The intent of conducting closure and post-closure cost estimate activities is to develop a cost in order for a third party to complete tasks associated with closure and post-closure care of WGCL. Based upon County personnel discussions and NWCC experience associated with WGCL since 1993, a knowledge base has been established regarding current and historical operations at the landfill. Unit costs were developed for activities assumed to be required during the landfill closure and post-closure period, based on available information, County guidance and current standard industry practices.

5.3.3 Update to the Closure Post-Closure Plan

In March 2014, the five-year closure and post-closure cost estimate update was prepared based upon current conditions and operations at WGCL.[50] In light of changes to the solid waste regulations, to incorporate operational efficiencies and to accommodate the proposed infrastructure changes at the landfill, discussed in Section 6 below, the financial assurance will be adjusted as facility improvements are completed and CDPHE approvals granted. One design change will be to increase the side slopes of the landfill from 5H:1V to 3H:1V increasing the capacity and life of the WGCL. Upon successful design and permitting of those changes, the closure-post-closure estimates can be updated. Cells 1 – 5 are filled to subgrade. Filling of subgrade areas in Cell 6 is anticipated to be completed in 2014. Pending area fill activities will begin over Cell 5 at the south end of the landfill and proceed north. **Refer to Figure 25** for the active areas of the landfill yet to be filled to final height.

[50] Closure and Post-Closure Cost Estimates, West Garfield County Landfill, Letter from Gary R. Webber, NWCC to Ms. Betsy Suerth, Director, Garfield County Public Works Department, March 5, 2014.

5.3.4 Current Cost Projections and Funding

Long range financial assurance requirements, final landfill design and future environmental monitoring costs will be determined as required by the CDPHE regulations and staff will present to the BOCC recommended fee adjustments to maintain the financial health of the WGCL. The GCPWD staff has discussed with Garfield County Finance the accounting methods used for restricting the closure and post closure funds within the SWD fund. Current practices fulfill the CDPHE requirement to calculate closure and post-closure costs every five years. However, the calculation of the amount of funds to restrict is currently based on a pro-rata of the estimated landfill life in years. The GCPWD staff is recommending that the calculations be based on waste volumes to provide more precision and to take into account fluctuations in the market. The 2014 five-year closure and post-closure cost estimate provides a well-timed opportunity to modify the calculation methods for accruing funds for closure and post-closure care, pro-rated on an airspace basis. Further, the grading and sequencing plan, to be drafted in 2014, will provide a more accurate estimate of waste volumes over time. Staff will return to the BOCC in 2014 to discuss the more precise amount to be restricted.

5.3.5 Proposed Post-Closure Care Accrual

The WGCL Team recommends that the BOCC consider restricting a percentage of the existing tipping fees for closure and post-closure or adding a fee over and above the existing tipping fees to be dedicated to these costs. This method would be a logical follow-up to the new calculation.

5.4 Factors Impacting Cost of Operations

The major factors that could affect the cost of operations are as follow:

- Inefficient use of airspace (poor compaction, excessive cover, poor design).
- Inappropriate equipment (poor compaction, adverse (wet) weather, operator).
- Poor equipment maintenance (over commitment of equipment).
- Inappropriate labor (over or understaffed inexperienced personnel, over commitment of personnel).
- Additional environmental monitoring requirements by CDPHE.
- Additional reporting requirements triggered by:
    - As-built drawings certified by a Registered Professional Engineer.
    - Problems encountered in acceptance of certain wastes or additional operational problems at the facility.
    - Changes in design or operations of the facility.
    - Inspections and repairs to impoundment liner.

- Updated closure and post-closure related reports.
- Responses to violations as requested by CDPHE.
- Findings from annual inspections that may require repairs or replacement in the engineering/environmental controls (monitor wells, gas probes or vents), liner system components, roads, side slopes or cap repair.

5.5 Future Cost of Operations

Future cost of operations will also be impacted by the same factors identified in Section 5.4 above, by the acceptance of new waste streams and development of the new landfill infrastructure discussed in Section 6 below. In addition, as new regulations are issued by CDPHE or new information is collected related to hydrogeological conditions, landfill gas migration, or other environmental testing, additional monitoring controls may be required to be installed, sampled, tested and analyzed followed by submittal of reports. These additional controls may also impact the future cost of operations of WGCL.

5.6 Training

Landfill employee training required under federal and state regulation includes a wide spectrum of subject matter from waste identification and handling to landfill management/operations and basic first aid. Waste Identification training would be similar to the Solid Waste Association of North America (SWANA) training that staff should receive for its day to day solid waste landfill operations. In addition, the drilling industry has developed training for its own staff to monitor for and handle these same wastes and the WGCLF Team could work with the PCS source providers to train our own personnel likewise. The following training programs are recommended based upon the existing and proposed landfill waste streams and landfill operations.

- Landfill Operations Training
  - SWANA Manager of Landfill Operations (MOLO)
  - SWANA Landfill Operations Basics
  - SWANA Waste Screening at Municipal Solid Waste Facilities
  - SWANA Construction & Demolition Debris (C&D) Management
  - Other SWANA Recycling or Planning courses
- Safety Training
  - 40-Hour Hazardous Waste Operations and Emergency Response (HAZWOPER)
  - HAZWOPER 8- Hour (annual HAZWOPER required updates)
  - HAZWOPER Supervisor

  - Standard First Aid and Cardiopulmonary Resuscitation (CPR)
  - Blood borne Pathogens
- Other Training
  - Radiation Detector (Meter) Operations
  - Stormwater Management

5.7 West Garfield County Landfill Disposal Fees

Fees for disposal at the WGCL have changed several times in the past four years, in response to market conditions, increased operating costs and cash flow requirements. A discussion of historic, current and future tipping fees at WGCL follows.

5.7.1 Historic Tipping Fees

Landfill disposal fees at the facility are set by the BOCC. Prior to June 2010, the tipping fees were $48/ton. In June 2010, the tipping fee was increased to $68/ton. The fee increase resulted for a variety of reasons including increased operational costs, lost revenue, and engineering improvements. In June 2011, the tipping fee was reduced to $58/ton to be competitive with the area landfills. In October 2011, the tipping fee was reduced again to $42/ton to respond to market conditions.

5.7.2 Current Tipping Fees

The WGCL has an established rate schedule that is published on their website.[51] The fees for specific waste streams will be discussed in Section 5.8 below. Fees for special projects (PCS spills, E&P liners, pond closures, etc.) are determined on a case by case basis by the GCPWD Director.

5.7.3 Future Tipping Fees

It would be prudent to regularly review landfill fees/rates to assure the WGCL remains competitive with other landfills in the region and to maintain its strategy of being a self-sustaining enterprise. Should nearby landfills raise tipping fees, an opportunity would exist to adopt a closure and post-closure fee to assure adequate funds are restricted for closure and post closure requirements. A description of regional landfill prices follows.

5.8 Regional Comparison of Landfill Tipping Fees

To determine the present gate fees charged at various landfills in the Tri-County area, the WGCL Team compiled the results from the South Canyon Landfill Rate and Operations Cost Study

[51] http://www.garfield-county.com/landfill/fees.aspx

(2013 Rate Study).[52] These facilities are owned by public entities but are operated by either public entities or private operators. The results of the survey are summarized in **Table 17**. Tipping fees for MSW at the WGCL are similar to posted rates at Eagle County and South Canyon landfills. When compared to the other landfills in the Tri-County area, WGCL charges higher rates for PCS and lower rates for C&D waste. The results of the 2013 Rate Study however, recommended that the City of Glenwood Springs raise rates on several categories of waste, including increase PCS disposal from $50/ton to $52/ton.

In addition to the tipping fee, customers may select the use of a disposal site by considering factors such as convenience, transportation distance, operating hours, as directed by third parties, compliance record, environmental liability concerns, or engineering controls.

5.9 Tipping Fees at Utah Landfills

During the data collection phase of this study, it was learned that some E&P waste is currently transported to a few landfills in Utah. Given this fact, the WGCL Team reviewed the Utah 2012 Annual Landfill Reports for each landfill and identified those facilities that received industrial waste in 2012.[53] This information was discussed in Section 3.5.2.

A quick survey of tipping fees for commercial waste at select Utah landfills, based on available published information, (including the 2012 Waste & Recycling News Landfill Survey) indicates a tipping fee of $26/ton. According to conversations the WGCL staff had with E&P companies drilling on the western slope, the transportation costs to use the Utah Landfills may add up to $1,400 per truck load to the cost of disposing of drill cuttings. Typically the materials are transported in 16 – 18 cy belly dumps, with payloads of 12 cy. URS' Flint Energy division estimated the transportation cost of a dump belly truck at $100 per hour for the driver and truck. If the distance to the landfill is estimated at 150 miles one way, the transportation costs can add $55/cy to the cost of disposal.[54] The combined cost for transportation and disposal of drill cuttings at a Utah landfill was estimated at $94/cy.[55]

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[52] American Environmental Consulting, LLC, *Rate Recommendations for South Canyon Landfill*, Letter Report, July 22, 2013.
[53] E&P waste is considered an industrial waste in the State of Utah.
[54] This calculation assumes 150 mile one way transportation distance, 55 mph speed for the dump belly, 0.5 hours to load; 0.6 hours to dump and 12 cubic yards of materials on the truck. Personal correspondence with Flint Energy Manager, October 2013.
[55] This calculation converts disposal fees at $26/ton to $39/cubic yard assuming a conversion factor of 1.5 tons per cubic yard.

6. NEW OPPORUNITIES AND MANAGEMENT CONSIDERATIONS

The purpose of Section 6 is to answer the following questions: 1. ***What new facilities should be permitted and built at the landfill in order to manage potentially new waste streams at the West Garfield County Landfill? 2. Should the landfill partner with other companies to offer services? 3. What other technologies exist to manage waste besides landfilling?*** *The subsections that follow will examine the key design and permitting elements and revenues of the new landfill improvements and address other new services that may increase recycling or revenue at the WGCL.*

6.1 STRATEGIC AND OPERATIONAL ELEMENTS OF THE SSWMP

One important concept to understand about the SSWPMP is there are strategic elements and operational elements to be considered. First we will discuss the Strategic components.

6.1.1 STRATEGIC ELEMENTS OF THE SSWMP

Globally, the strategic components of the SSWMP consider the impact of strategic decisions impacting the WGCL operation, such as:

- How can we increase gross and net revenues at the landfill?
- What can we do to increase the existing waste streams we receive?
- What other types of waste could we accept at the landfill?
- Can the landfill handle these new waste streams or do we need to build new infrastructure?
- What new infrastructure should we consider?
- What other business strategies should we consider?

In order to answer each of these questions, we need to evaluate the impact of those strategic decisions on the components in each of the bubbles shown on **Figure 26**. For example, if the strategic decision is to develop a pilot land farm we need to address:

- What engineering requirements are there to permit the land farm?
- How will we operate the facility, what capital requirements are there?
- What are the permitting considerations?
- What will be the reporting or monitoring requirements?
- Do we have the right staff to run these new operations or can we attract new staff?

Therefore, each strategic concept proposed has many components that need to be considered and analyzed before a final strategic decision is made.

Figure 26. Strategic Components of the SSWMP

6.1.2 OPERATIONAL ELEMENTS OF THE SSWMP

As discussed previously in addition to the Strategic Elements of the SSWMP there are also operational elements which focus on:

- What impacts will there be on the WGCL operation from each of the strategic decisions adopted?
- What regulatory impacts will there be: sampling or reporting requirements?
- Impacts on operating the landfill adjacent to the pilot land farm?
- What new training requirements might be required of existing or new staff?

For example, if we consider the pilot land farm:

The end product of the treatment process will be remediated soil which can be used for daily or intermediate cover, thus reducing the need and extra costs requisite with procuring off-site soils, due to the projected daily cover soil deficit. The use of the remediated soil could therefore reduce the Financial Assurance Requirements. The integration of the land farm with the existing landfill will have operating impacts (additional labor requirements plus potential shared labor and equipment efficiencies).

The inter-relationship of the various landfill operational components is displayed in **Figure 27**. In the sections of the SSWMP that follow, the strategic and operational components of each strategic business idea presented will be evaluated and summarized. Several new landfill improvements are proposed for the BOCC's consideration for the purpose of meeting known in-county and out-of-county disposal needs believed to be manageable and cost effective for the WGCL. The proposed improvements include the development, permitting, construction and operation of the NSI, a solidification basin, a land farm and a lined monofill for receipt of E&P waste and are discussed in the sections that follow.

6.2 SEPTAGE EVAPORATION IMPOUNDMENTS

As discussed previously in Sections 4.2.3, the NSI's were decommissioned in 2012. The WI was constructed during 2006, due to regional septage disposal needs. Even though the NSI was decommissioned, the replacement of the NSI's was planned. CDPHE approved and permitted the NSI's construction level plans under the new regulations during July 2013 and the BOCC approved funding for the construction of the NSI's in the FY 2014 budget.[56] The conceptual layout of the NSI including access roads and the unloading pad locations are presented in **Figure 28**.

[56] BOCC Capital Improvement Budget 2014, adopted December 9, 2013.

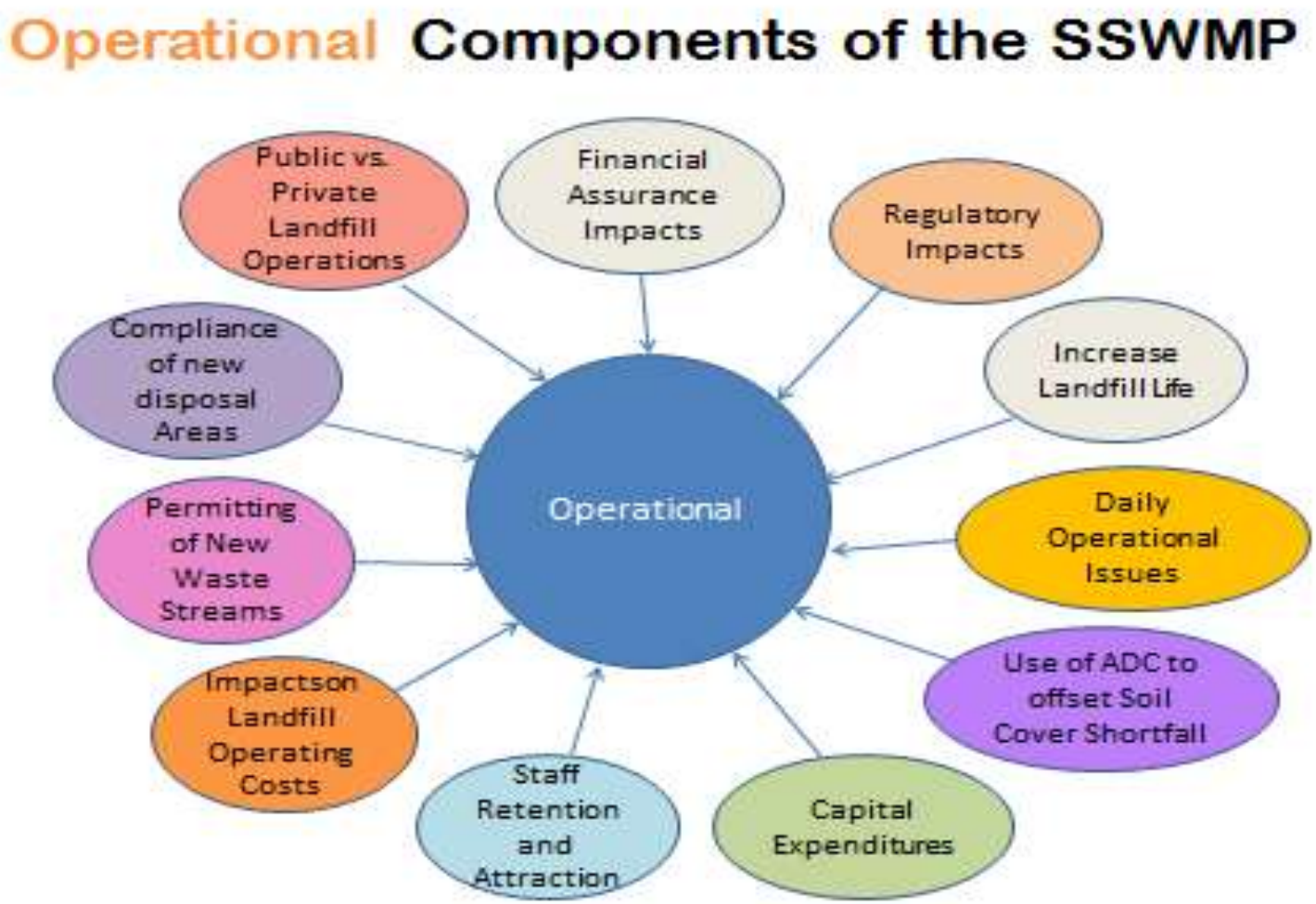
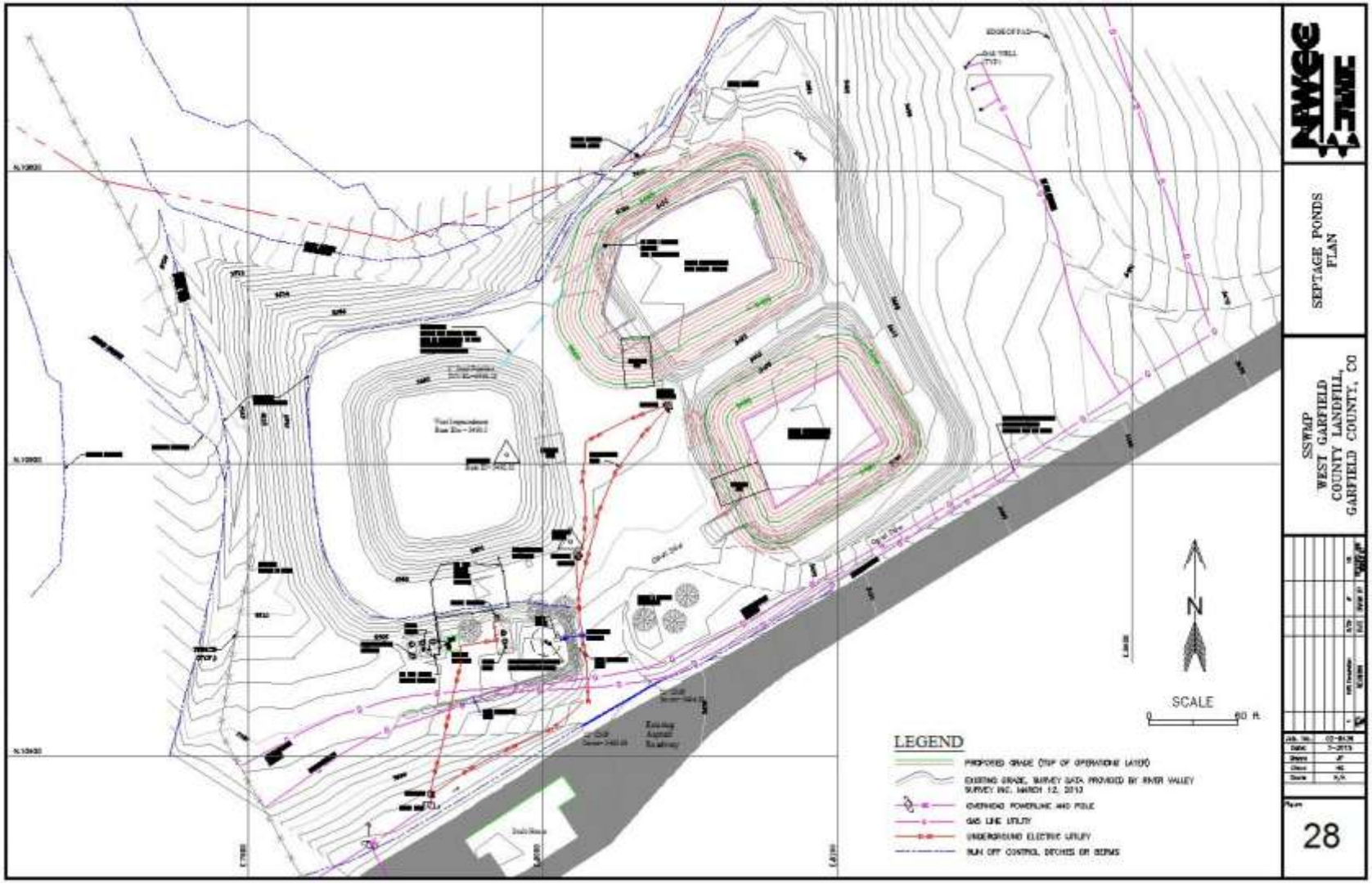


Figure 27. Operational Components of the SSWMP


SEPTAGE PONDS
PLAN
SSWMP
WEST GARFIELD
COUNTY LANDFILL,
GARFIELD COUNTY, CO
28
N
SCALE
LEGEND

6.2.1 Design Elements

A design for the NSI replacements is at the same location as the decommissioned impoundments. The approximate capacity of the North Impoundment is 750,000 gallons and 550,000 gallons for the South Impoundment or a total of 1,300,000 gallons. The liner design includes an 18-inch layer of uniformly compacted native low permeability soil overlain by a geosynthetic clay liner (GCL) that will be keyed into anchor trenches excavated along the perimeter berm. An 18-inch operations layer of native soil will overlie the GCL for liner protection purposes. A concrete pad will be constructed on the impoundment slope in order to inhibit erosion from load-out operations.

Soil liner material underlying the GCL must meet a minimum $1x10^{-6}$ centimeter per second (cm/sec) permeability. To ascertain proper performance with the waste stream, the GCL will consist of a VOLCLAY sodium bentonite dry-blended with polymers. Additionally, the side of the GCL, facing the impoundment waste will be layered with a plastic HDPE geomembrane to minimize contact with the waste or any of the waste's moisture. The GCL permeability will meet a minimum 2.5×10^{-9} cm/sec permeability.

The WI provides a disposal capacity of approximately 500,000 gallons. The WI design exceeded CDPHE regulations at the time it was permitted and is currently in operation. Moreover, the design meets recently revised CDPHE regulatory standards. The liner system includes a bentonite GCL that meets a permeability of $5x10^{-9}$ cm/sec maximum overlain by a two-foot thick secondary liner and operations layer meeting a permeability of $1x10^{-6}$ cm/sec.

6.2.2 Operational Considerations

The BOCC asked the WGCL Team at the October 8, 2013 workshop (2013 Workshop) to evaluate the following operational questions with respect to the operation of septage ponds at the

WGCL:

- Are there other treatment options available besides evaporation in septage ponds?
- Can the septage supernatant (free liquids) be used for other permitted purposes?
- How can one manage the high salt and glycol levels in the septage resulting from man camp waste?
- Does the landfill have the ability to handle the reception of septage all year long, including the coldest times of the year when the ponds are likely to freeze over?
- Is there a method to prevent the ponds from freezing?

Subsequent to the 2013 Workshop, the WGCL staff provided the WGCL Team with septage quality data from the West Septage Pond and an undated list of proposed effluent discharge criteria for the permit conditions for a domestic wastewater treatment system. The WGCL Team

recommended that additional samples should be collected and analyzed and a treatability study conducted to determine what the most appropriate treatment system is for the proposed effluent. The treatment system may be complex and not an off the shelf package system. The estimated cost to conduct the treatability study is $20,000 plus lab testing costs.

With respect to the question of the pond having year round capacity, the WGCL staff noted that although the existing pond does collect ice across the surface overnight during the winter, the off-loading of septage melts an ample sized hole in the ice layer to continue use. The WGCL acquired aerators from the City of Rifle, one of which is currently used in the WI to reduce ice cover and to enhance evaporation by reducing surface tension. In the event that the septage impoundments become full, a back-up temporary storage option is an above ground storage tank(s) (AST(s)). The ASTs could be located adjacent to existing impoundments and valve controlled to gravity feed into the impoundments as liquid evaporation provides capacity. Five-hundred barrel (21,000 gallon) ASTs similar to those used by the oil and gas industry could be used. A heater could be installed to prevent freezing during cold months.

Once the replacement NSI's are constructed, WGCL will be able to cycle the septage through the ponds to maximize their use, while providing AST(s) as a storage option. Preliminary calculations suggest that by cycling the septage through the three ponds over a three year period, there may 4 – 6 months during that time period, in which the ponds may not have capacity and storage tanks will be required.[57] The total capacity from the three ponds, once available, is 1,840,000 gallons.

A longer term strategy should be developed for handling septage, in the event the market exceeds the projections and to identify alternatives for reuse of the effluent. The WGCL Team recommends that in the next 12 months, WGCL should look at options for managing septage, including identification of other treatment technologies (such as an atomizer, anaerobic or aerobic biological treatment, reverse or direct osmosis, or filtration) and the potential use for on-site dust control and/or marketing of the effluent to off-site end users. Additionally, a siting study should be conducted within the CD, within this same time frame, to identify suitable areas for developing an additional surface impoundment to increase the site's septage treatment capacity.

6.2.3 Equipment Needs

The main equipment needed for the septage evaporation impoundments would be a back-up 21,000 gallon AST with a heater and clean out ports. An existing landfill loader can be used to remove sludge from the ponds when necessary, to provide additional capacity.

[57] November 12, 2013 Exhibit B and Memo to the BOCC from Betsy Suerth.

6.2.4 Capital and Operating Budgets

The permitting for the replacement NSI's was completed and the construction of the ponds was approved by CDPHE in July 2013. Construction costs for the ponds are estimated at $177,000. The annual operating costs are estimated to be $121,300, based on historical operations. The capital equipment costs for the AST, including the heater, are estimated at $40,000.[58] The budget costs for the NSI are presented in **Table 18**.

6.2.5 Potential Revenues

As discussed in Section 3.4.2 above and as shown on Table 4, during 2011, approximately 53.8 MM gallons of septage were disposed of in the study area.[59] In 2012, that number dropped to 32.4 MM. The WGCL captured less than 1% of the 2012 market. If in 2011, the proposed three ponds were cycled as described above, the WGCL could have realistically captured at least 2% of this market or 1,025,000 gallons which represents 100% increase in market share and $154,000 in projected revenue.[60] Between 2011 to 2013, WGCL received an average of 327,667 gallons per year.

6.2.6 Recommendations

The WGCL Team recommended and the BOCC approved $182,200 in the 2014 Capital Improvements budget for the new infrastructure, which includes construction and construction quality assurance/quality control services.[61] WGCL staff estimated the potential payback for the rebuilding of NSI is 1.5 years, based on the potential revenue generation discussed in Section 6.1.5. The WGCL Team is also recommending that the BOCC also approve the AST and heater as a back-up for the septage evaporation impoundments.

In order to address long-term management of septage, the WGCL Team recommends in the next 12 months, the WGCL initiate the following:

- Conduct a septage treatability to determine appropriate alternative treatment systems.
- Conduct a feasibility study of select alternate septage treatment technologies including a marketing plan to identify end users.
- Perform a siting study for potential additional septage pond/treatment facility locations within the current CD, to provide additional on-site capacity.

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[58] NWCC correspondence with tank vendors, 11/26/2013.
[59] 2011 is the most current, complete year of data for the Study Area.
[60] This revenue is estimated using a septage tip fee of $0.15/gallon.
[61] BOCC Capital Improvement Budget 2014, adopted December 9, 2013.

6.3 SOLIDIFICATION BASIN

Under RCRA Subtitle D and CDPHE regulations, a landfill may not dispose of materials containing free liquid. Very few landfills on the west slope include solidification basin (basin) facilities to amend materials that are too wet to dispose. Constructing a basin would provide an opportunity to accept a greater variety of non-hazardous materials from the E&P industry that generally contain free-liquids and must be amended prior to disposal in either the currently permitted MSW landfill or in a specially designed and lined monofill. A conceptual design for the solidification basin has been prepared. However, the basin can be constructed independent of the monofill and used to complement general landfill operations. E&P wastes typically include soils containing free liquids that need soil amendment services prior to disposal.

The WGCL would likely receive additional revenues from acceptance of the following new waste streams which could be processed in the basin, subject to market conditions:

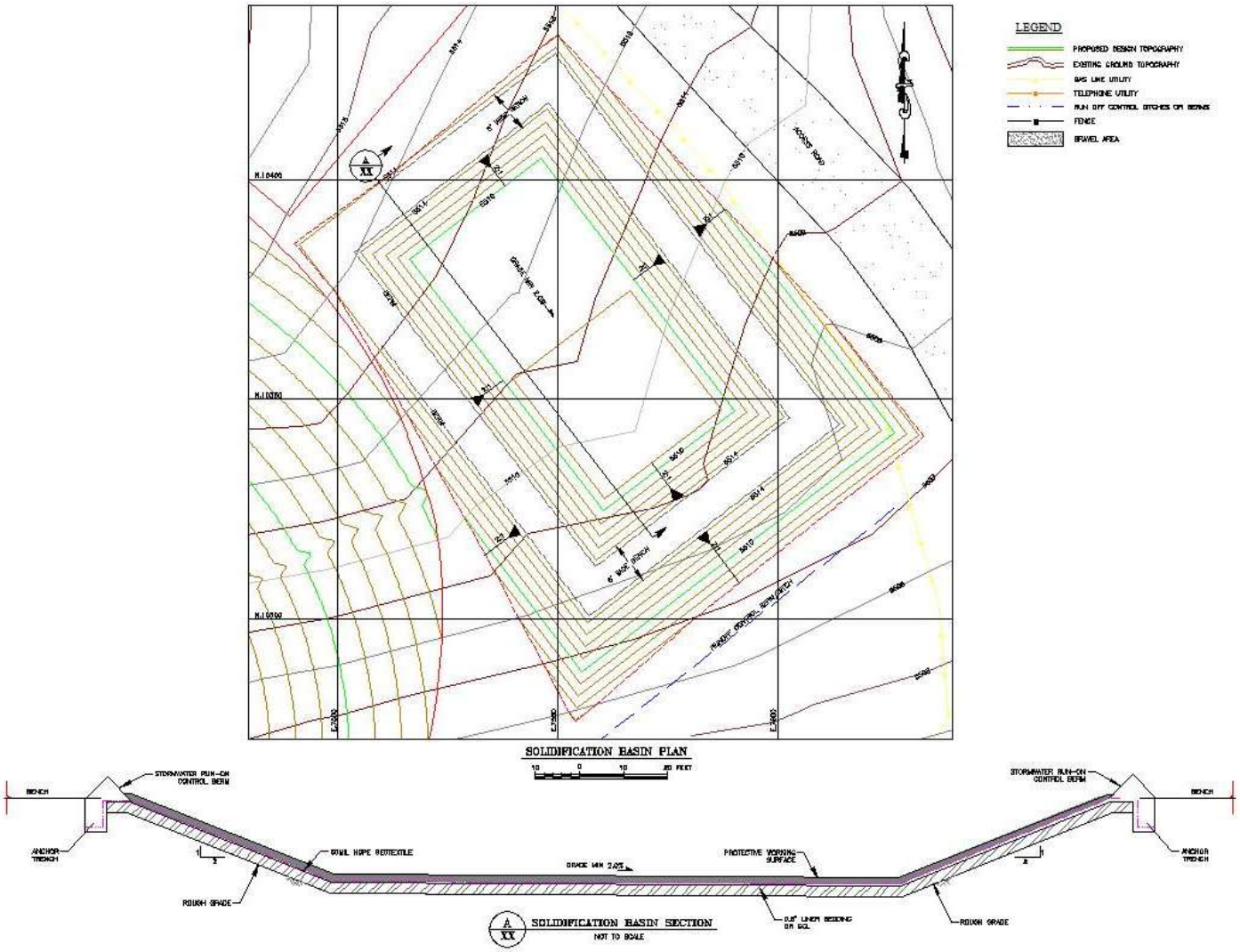
- E&P drilling/fracking mud and sludge.[62]
- Manufacturing sludge that is not classified a hazardous waste.
- Water and wastewater treatment sludge.
- Restaurant grease and grease trap wastes.
- Animal renderings.
- Grease trap or oil and water separator wastes.
- Maintenance, repair shop, automotive painting, and vehicle wash sand trap sediments.

6.3.1 DESIGN ELEMENTS

Although there are no regulations specific to basins, the facilities may have to meet air emission standards and obtain permits to handle E&P wastes. The facility must be designed and permitted to meet the general standards in accordance with CDPHE Solid Waste Landfill Disposal Sites and Facilities. A conceptual layout for the solidification basin is presented in **Figure 29**, along with a typical cross-section showing the proposed side slopes and basin bottom. The preliminary design parameters estimated for the basin are:

- Approximate 115 foot by 175 foot wide by 4 foot deep basin.
- Three sides at a 3:1 slope and one side used for liquid/sludge transport vehicle entrance/exit at a 6:1 slope.
- A double HDPE liner system with a leak detection system.

[62] Wastes that may be processed at the solidification basin include: drilling fluids, oily waste, special purpose pits, waste from produced water pits, and non-E&P wastes as defined in Section 3.4.4.1.



CONCEPTUAL DESIGN

SOLIDIFICATION BASIN
West Garfield County Landfill
Garfield County, Colorado

Job. No.	5134
Date	01.30.14
Drawn	TMC
Chkd	
Scale	AS SHOWN

Sheet 29

- The HDPE liner would be protected with a 12-inch soil cover/operations layer further overlain with concrete slabs.

The proposed location of the solidification basin is shown in **Figure 30**. It is proposed to be adjacent to and east of the lined monofill for E&P waste, which will be described in Section 6.5 below.

6.3.2 Operational Considerations

Additional equipment will be needed to receive the liquid wastes, mix in bulking agents, then load up the material into the dump truck so it can be incorporated into the active fill face at the landfill. Typical bulking agents include: fly ash, sawdust, ground green waste, erosion control products, other drill cuttings and PCS. WGCL would first and foremost use waste materials received at the landfill such as straw, green waste, or erosion control materials. This operation will require additional staff to supervise the unloading and blending operations, and sampling, to verify there are no free liquids in the waste materials after blending.

6.3.3 Equipment Needs

The following equipment will be needed to operate the solidification basin:

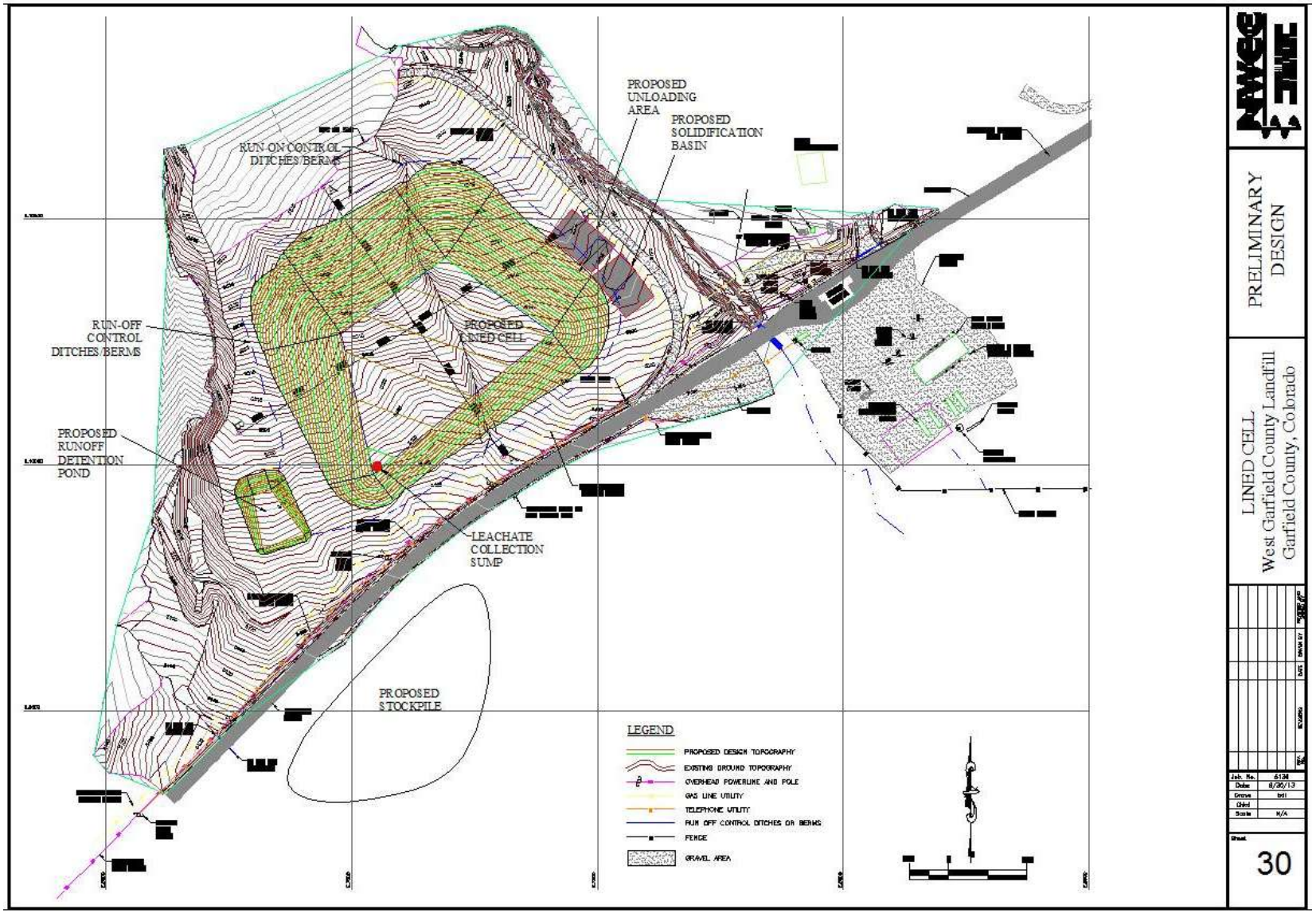
- Loader
- Dump Truck

We assumed that used equipment will be purchased and shared with the E&P monofill operation.

6.3.4 Capital and Operating Budgets

Based on the conceptual design, the solidification basin design, construction, and permitting cost estimate is approximately $232,500. Equipment needs are estimated at $350,000, for a total capital estimate of $582,500.63. The annual operating costs are estimated at $121,300. Presented in Table 18 are the capital and operations costs for the proposed basin. The dump truck could be lined, if needed, prior to loading the solidified waste and then shared with other landfill operations.

[63] Used equipment costs provided by the GCPWD, March 2014.


PROPOSED UNLOADING AREA
PROPOSED SOLIDIFICATION BASIN
RUN ON CONTROL DITCHES/BERMS
RUN-OFF CONTROL DITCHES/BERMS
PROPOSED LINED CELL
PROPOSED RUNOFF DETENTION POND
LEACHATE COLLECTION SUMP
PROPOSED STOCKPILE
LEGEND
PROPOSED DESIGN TOPOGRAPHY
EXISTING GROUND TOPOGRAPHY
OVERHEAD POWERLINE AND POLE
GAS LINE UTILITY
TELEPHONE UTILITY
RUN OFF CONTROL DITCHES OR BERMS
FENCE
GRAVEL AREA
PRELIMINARY DESIGN
LINED CELL
West Garfield County Landfill
Garfield County, Colorado
Job. No. 6138
Date 8/30/13
Drawn bdl
Chkd
Scale N/A
Sheet
30

6.3.5 Potential Revenues

There is limited data on the potential quantities of waste in the Study Area that could be managed at a solidification basin. Estimates of E&P waste were discussed in Section 3.4.4, but data on quantities of non-hazardous liquid waste are limited. Further discussion with the E&P companies is required to better define their need for solidification services. In addition, CDPHE's current permitting process does not require generators of materials such as waste grease to report where they ship materials or the types or quantities of materials they ship for solidification. Because of the lack of data, the WGCL Team could not prepare potential revenue projections for a solidification basin.

6.3.6 Recommendations

The WGCL Team recommends that the E&P companies be contacted to determine their interest in having access to a solidification basin, If there is strong interest and potential market for a solidification basin, then the GCPWD should approach the BOCC to authorize that one be designed, permitted and constructed. Although the BOCC did not approve the development of the Solidification Basin in the 2014 Capital Improvement Budget, they approved the conceptual development of the facility at the April 22, 2014 presentation of the draft SSWMP.

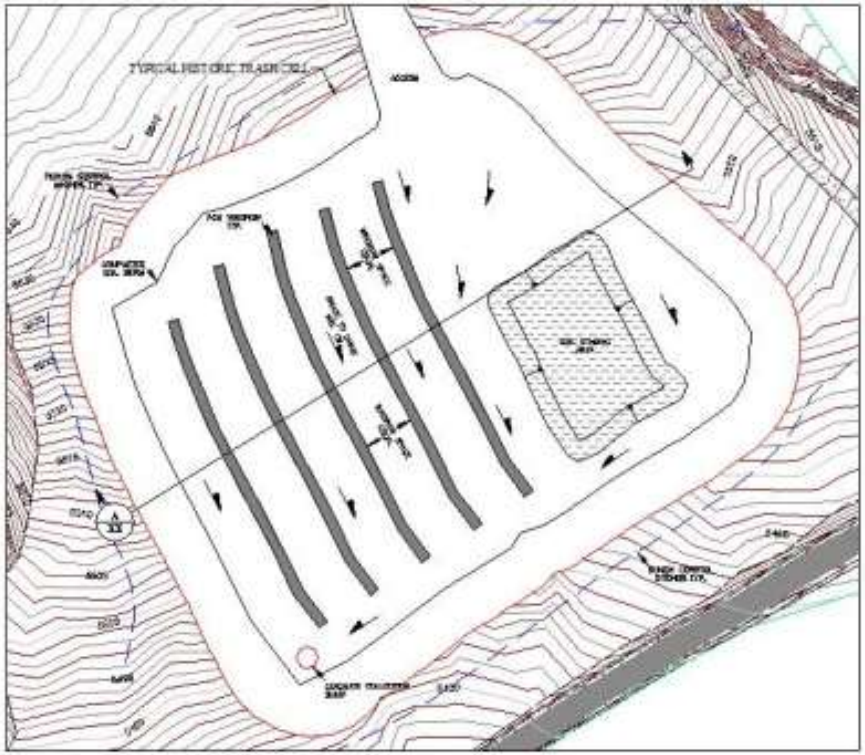
The solidification basin should be developed on a pilot scale, in conjunction with a marketing plan, so there is sufficient staff and equipment available as E&P waste acceptance increases. The marketing plan can be developed based on information gleaned from the ongoing discussions with the E&P companies and published information from the COGCC.

6.4 Land Farm - Windrow Pilot Study

6.4.1 Design Elements

Industry standards, for the design and operation of land farms, vary from location to location, by climate conditions, availability of land, and by the source of PCSs that would be processed at them. The method that best suits the WGCL, for conducting a treatment pilot program is to use a system of windrows.

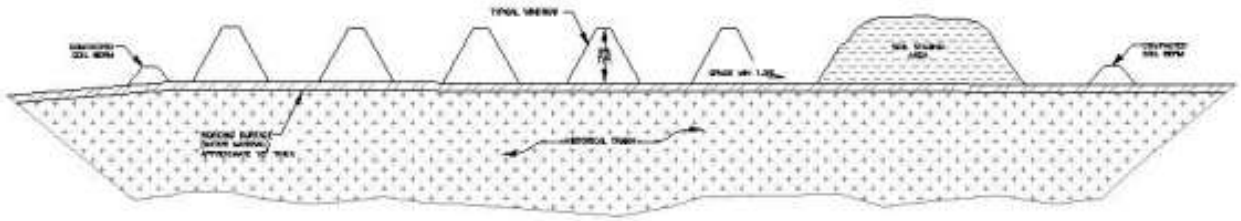
Windrows are typically constructed approximately 5-6 feet high and by 20-25 feet wide, as shown in **Figure 31**. Initially, these windrows would be constructed on an approximate 5 acre area on top of the existing MSW landfill footprint. No liner will be required as the landfill itself is underlain by a compacted clay liner. However, the area would be surrounded by stormwater controls (e.g. berms) to prevent stormwater run-on from other portions of the site and run-off from the land farm operation. Because stormwater comes into contact with the windrow pile soils and could potentially become contaminated by the PCS, run-off will be contained and



LEGEND

NOTES:

TYPICAL LANDFARM PLAN



TYPICAL CROSS-SECTION

CONCEPTUAL WINDROW TREATMENT DESIGN

LAND FARM
West Garfield County Landfill
Garfield County, Colorado

31

prevented from leaving the land farm area. The soil treatment area would be graded to drain to one corner of the site into a lined sump area designed to capture and temporarily store run-off until the liquid can be sampled, analyzed and properly disposed of.

For purposes of conducting the pilot study, the 5-acre windrow treatment area would be constructed approximately 500-feet by 450-feet, with between 8-10 windrows, typically 400-foot long, by 20-25-foot wide, by 6 foot high. This area could process between 8,500 and 10,700 total cy of PCS at any one time. In addition, the layout allows for a small building to house blower(s) used to aerate the windrows and assist and speedup the bacterial decomposition of VOCs in the soils, if there is a need for such a system. The blowers can also be used to push captured air emissions through an activated treatment system to remove VOCs from the blower exhaust.

6.4.2 Operational Considerations

It is proposed that this initial operation be conducted as a pilot study to specifically determine how to best optimize the treatment of PCS soils with respect to required amendments, to identify optimum methods to construct and maintain the windrows, and to determine the time needed to treat various soil types (e.g. sands to clays) based upon contaminant concentrations in soils delivered to the site. For this study, landfill staff will utilize as much of its existing equipment as can be used, to keep capital costs to a minimum. Once the pilot study is complete, a better understanding of areal as well as specific treatment requirements for operating a full scale land farm operation can be determined. The capital and operational costs for conducting a permanent operation can also be determined at that time. Typically, soil amendments and moisture (if and as necessary) are added to the PCS to enhance the biological treatment of the petroleum materials. The type and quantity of such materials are dependent on the PCS soil characteristics and available amendments. The evaluation of amendments would be one of the activities included as part of the pilot study.

The processing time generally depends on the amount of contaminants in the soils to begin with and the amount of effort put into each pile to remediate them. The PCS soils could generally be processed anywhere between 4 to 12 months, to bring the air emissions down to within the acceptable limits and then the soils could be used for daily or final cover. WGCL is currently discussing the permit requirements with the APCD and Solid Waste and Materials Management Program at CDPHE.

The best management practices used for PCS land farm treatment in an arid climate include surrounding the piles with drainage berms, lining the berms and designing a leachate collection sump at a low point in the facility. It is assumed that the leachate collection sump used to collect stormwater run-off can be constructed of compacted native soils located at the landfill. Underlying each of the windrows would be shallow, HDPE lined, gravel filled trenches with

perforated pipes to extract soil gas. This piping network would be placed under vacuum to pull atmospheric air into the windrow to keep the petroleum materials aerobically digesting. This system also collects liquids/ leachate for treatment recirculation for application to the windrows. Each windrow would also be covered with plastic sheeting to keep moisture in and stormwater out, thereby limiting the production of leachate requiring disposal.

6.4.3 Equipment Needs

For the purpose of this evaluation, it is anticipated that, at a minimum, the WGCL will need a dedicated skip loader and dump truck to operate the land farm. However, it should be noted that the County may also choose, for this pilot study, to utilize the site's existing skip loader and dump truck. The skip loader will be used to mix nutrient materials and possibly bulking agents used for treatment, to mix moisture with the PCS impacted soils, and to construct the land farm windrows, described earlier. This loader would also be used to construct the containment area(s) within which the land farm will be built, separating the windrows from the rest of the landfill and retaining all stormwater that does come in contact with these treatment piles. The stormwater can then be collected and sampled and treated, if necessary, before discharge from the site. Stormwater that comes in contact with the windrows will be limited by the placement of plastic sheeting on the piles and stormwater diversion berms to divert clean stormwater around them. The dump truck will be needed to transport the remediated soil for use as daily cover.

For high clay content soils, the typical treatment train to prepare soils would include the use of a set of parallel metal bars (grizzly) for bulk separation followed by soil shredding and then addition of water and nutrients. **Figure 31** (above) provides a conceptual windrow treatment design for the land farm.

Electrical service and blower and piping network systems will be required to aerate windrows and potentially a carbon treatment filter at the blower discharge. (To suppress costs, this active system would be utilized only if enough oxygen cannot be provided to the windrows passively, though active aeration is deemed more efficient).

6.4.4 Capital and Operating Budgets

The actual revenues would have to consider the amount of capital and operations, maintenance and monitoring costs it would take to construct and operate such a system. These costs include the purchase of both a dedicated loader and dump truck, although as discussed above existing landfill equipment could be used for the pilot study. Other requirements include aeration polyvinyl chloride (PVC) piping, a blower system, carbon filtration and electrical service, 1-2 inch poorly graded gravel rock, geotextile fabrics, 6-20 mil thick scrim-reinforced HDPE plastic sheeting to cover the windrows once constructed, a source of water, nutrients to build up and support the microbial population that will treat the PCS, and potentially some bulking agents

(such as wood chips [from mulching operations]) for potentially high clay content PCS soils). As discussed above, a passive treatment approach will initially be used and evaluated before active aeration treatment methods are considered.

The land farm windrow design, construction, and permitting cost estimate is approximately $195,000. Equipment needs are estimated at $455,000 (not including blower system and electric service costs), for a total capital estimate of $650,000 (The use of onsite equipment, for the pilot study, would reduce these costs to $195,000). The annual operating costs are estimated at $156,300. These costs have not been completely developed as of the writing of this report but are presented in **Table 18**.

6.4.5 Potential Revenues

Presented in **Table 6** is the summary of the quantity of PCS received at landfills in the Study Area, as of March 2014. Generally, the data shows an increase in the annual quantity of contaminated soils received at landfills/disposal sites in the Study Area. In 2011, the SCLF Landfill received 16,600 tons of contaminated soils which increased to 33,000 tons in 2012. Wray Gulch and SCLF will be the biggest competition for these waste streams, however waste receipts at Wray Gulch are restricted based upon the facility air permit.[64] From 2011 to 2013, the average reported PCS materials received at landfills in the Study Area was 87,325 tons. If WGCL were to capture 10% of the market, based on the three-year average, this would represent approximately 8,700 tons of PCS. In 2013, WGCL received 2,500 tons of PCS, which represents approximately 3% of the study area market, based on the three year average. Potential gross revenue for 8,700 tons of PCS @ $58/ton (WGCL rate) = $504,600. As presented in **Table 17**, Eagle County Landfill's tipping fee for PCS is $37.68/ton, WGCL is $58/ton, while SCLF's tipping fee is $52/ton for PCS.[65] We are recommending that WCCL consider lowering the PCS disposal rates to be more competitive in the market.

6.4.6 Recommendations

A land farm at the WGCL will have to compete with the local landfills, with Utah Landfills that are currently receiving a majority of the PCS from Colorado's western slope oil/gas drilling fields and other permitted land farms in the Study Area. We recommend the land farm be permitted and constructed to respond to industry needs to dispose of the material, and to provide a source for daily cover once the material is remediated; thereby helping to bridge the soil deficit

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[64] In addition, the landfill does not accept out-of-county waste. http://www.co.rio-blanco.co.us/departments/landfill.html.

[65] SCLF tipping fees were recently raised to $52/ton following the recommendations of the 2013 Rate Study. < http://www.ci.glenwood-springs.co.us/departments/publicworks/landfill/sclandfill_neww_2013.htm>.

at WGCL. A marketing plan should be developed based on the outcome of discussions with the E&P industries and marketing to existing customers.

The WGCL Team recommends that the WGCL develop an initial pilot PCS land farm on top of their existing MSW cells to eliminate additional hydrogeologic study and engineering design that would be required by permit. This approach will also minimize capital costs and allow the use of existing or leased equipment. In this way, the WGCL can minimize its overall capital and operational costs, as it determines the interest by the oil and gas industry to bring PCS to the site, can develop an actual per ton operational cost, and can determine relatively how long these types of PCS wastes will need to be treated. Once treated, the soils are clean enough to be used either as on-site MSW landfill daily cover or for other on-site uses. A key advantage of developing a pilot land farm operation is that it can be ramped up to a larger operation, based on E&P industry needs, capital and staffing requirements, CDPHE permit requirements, and the directives of the BOCC.

The BOCC adopted the recommendation of a pilot land farm and approved funding for Engineering and Design Actions for the facility in the 2014 Capital Budget. The WGCL Team has initiated discussions with CDPHE and APCD regarding the permitting and design requirements for this facility.

The PCS land farm operation will need to be competitive with the $26/ton ($39/cy) disposal fees plus the transportation costs to get these wastes to the Utah disposal facilities, as discussed in Section 5.9. It is anticipated that this can be met with the current WGCL compacted low permeability lined cells and existing labor and equipment.

6.5 Lined Monofill for Exploration and Production Waste

NWCC developed a conceptual E&P waste monofill lined cell design in 2009/2010 for WGCL staff, addressing E&P industry needs to dispose of pit liners and/or impacted PCS. Because E&P wastes can be highly contaminated, a robust and conservative design was prepared. Selection of wastes to be disposed of in the monofill should be based upon the concentrations of contaminants identified in the waste. Waste exhibiting higher contaminant concentrations would be disposed of in the monofill and lesser contaminated wastes would be disposed of in a landfill cell to maximize benefits of the monofill. The development and design of this robust lined cell helps reduce the potential environmental releases and associated liabilities. Potential waste stream sources to be received at the monofill include:

- E&P drill cuttings and sludges.[66]
- PCS waste.
- Maintenance, repair shop, automotive painting, and vehicle wash sand trap sediments.
- Materials treated in a solidification basin to amend free liquid.

6.5.1 Design Elements

The design and operational elements of the conceptually designed lined monofill include:

- The facility was designed and shall be permitted to meet CDPHE's Solid Waste Sites and Facilities requirements.
- Total capacity of 575,000 cy assuming below and above grade 3H:1V slope and 5% daily cover, based on a conceptual design maximizing the capacity at the selected location.
- Daily cover is assumed to be a Posi-Shell™ type product that will minimize space used by cover.
- Weekly soil cover application is generally required by the regulators.
- Approximately 86,000 cy of daily and final cover soil material required.
- Based upon excavation quantities, there is anticipated to be a net soil gain of approximately 214,000 cy, which could be used for daily cover operations at the MSW landfill.
- Double HDPE liner system including leak detection and leachate collection systems,.
- Run-on and run-off stormwater control systems including a retention pond.
- Lined load-out area.
- Material to be disposed does not contain free-liquid, unless the solidification basin discussed above is constructed and used to amend (solidify) the material before disposal.

6.5.2 Operational Considerations

Care would be taken during construction to protect the HDPE liner system. Once the liner is placed, a 12-inch leachate collection layer would be placed, followed by an additional 12-inches of protective soil cover and operations layer placed on top of the liner system. A ramp will be built into the cell as the protective soil is placed, to provide access to other areas of the cell and allow waste trucks to drop their loads. Compaction of the protective soil layer will be minimal to prevent damage to the liner system; however sufficient compaction is needed to allow vehicles access to the cell and keep soils on the side slopes. It will also be important to contain run-off

[66] Wastes that may be processed at the lined monofill include: wastes that were processed at the solidification basin and pass EPA Method 9095B, Paint Filter Test, and E&P and non- E&P waste as defined in Section 3.4.4.1.

that has mixed with the E&P waste materials so it can be collected, treated if necessary and recirculated in the active fill area.

6.5.3 Equipment Needs

The equipment needed for the lined monofill will be a Dozer and Operator, a dump truck, skip loader, a dedicated pump or pump truck and a Posi-Shell™ applicator (hydroseeder). The WGCL Team proposed that the dozer, dump truck, skip loader and pump truck are all used equipment.

6.5.4 Capital and Operating Budgets

The design, construction, and permitting cost estimate for the lined monofill for E&P waste is approximately $2,544,840. Equipment needs are estimated at $656,600, for a total capital estimate of $3,201,440. The equipment costs may be reduced if the equipment can be shared with other operations at WGCL. In the event the leachate is pumped into the septage impoundment or recirculated in the lined cell, the annual operating costs can be reduced. The annual operating costs are estimated at $377,219. Presented in **Table 18** are the capital and operations costs for the proposed lined monofill.

6.5.5 Potential Revenue

The BOCC recommended during the 2013 Workshop that the WGCL staff continue contact with E&P companies to gauge their interest in potential financing of a lined cell. WGCL staff had discussions with several E&P companies whose names will remain confidential. Based on these discussions with multiple companies, the following estimates of E&P waste generation and disposal needs within the Piceance Basin were developed:

- 400 wells to be drilled in the Piceance Basin Plateau, 20 wells per well pad and 8,400 cubic yards of waste per well pad for a total of 168,000 cubic yards total. We estimated these wells may be drilled over the next 10 years, resulting in 16,800 cy/yr.
- 90 cubic yards a week for the next three years of 13,500 cubic yards or 4,500 cy/yr.
- 4,000 wells over the next 20 years, assuming 420 cubic yards per well or 1.68 MM cubic yards or 84,000 cy/yr.
- 22 wells in 2014, averaging 325 cubic yards per well or 7,150 cy/yr.
- If we assume 10% of the total market, this potentially represents 11,245 cy/yr requiring disposal.[67]

[67] The annual E&P market, based on discussions with E&P companies is estimated as (16,800 + 4,500 + 84,000 +7,150) or 11,245 cy.

If we use SCLF's existing PCS rate of $52/Ton ($78/cy), which is less than WGCL's tipping fee at $58/ton, this represents a potential revenue of $877,110.[68] This disposal rate would need to account for transportation costs from the well pad to the WGCL.

These projections need to be tempered however, by market pressures. In the past month, Encana reported they are slowing down exploratory well development due to the drop in natural gas prices. Therefore, this revenue may not be realized immediately.

6.5.6 Recommendations

The WGCL Team recommends that WGCL staff develops a relationship with one or more E&P companies and actively recruit their participation in the financing and development of a lined cell with a minimum guaranteed annual waste flow. Once an agreement with one or more E&P companies is reached, then the WGCL staff should make a recommendation to the BOCC to proceed with the construction level designs and specifications, permitting, construction and operation of the lined monofill cell for E&P waste.[69]

6.6 New Revenue and Recycling Options

The WGCL Team also evaluated several potential new programs for the purpose of increasing the County's recycling rates, reducing the demand on the landfill's disposal capacity (i.e. extending the life of the landfill by diverting wastes from it) and generating revenues to pay for the programs and increase the WGCL's overall gross income. The programs evaluated are .discussed below.

6.6.1 Composting Operations

In 2009, LBA Associates conducted an organic waste feasibility study. The materials to be accepted included yard waste, clean wood waste, waste water treatment biosolids and animal mortalities. The equipment required included: loader, tractor, self-powered composter turner, a mortality grinder, a green waste grinder, a screen and a small loader for scooping finished compost for end users. At that time, the capital costs to develop a compost site were estimated at $784,000. Incoming biosolids would have to be charged $20/cubic yard for processing the material and the compost would have to be sold at $20/cubic yard, in order to break even, and the report estimated it would take at least three years to break even.

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[68] This calculation converts disposal fees at $52/ton to $78/cy assuming a conversion factor of 1.5 tons per cubic yard.

[69] During the April 22, 2014 presentation on the draft SSWMP, Commissioner Jankovsky suggested that the County does not necessarily need to rely on the E&P companies for financing the solidification or lined monofill.

During the 2013 Workshop, the WGCL Team suggested the possibility of developing a compost site at the WGCL to accept food waste and other organics. Presently WGCL diverts green waste from the waste stream and shreds it for use as ADC. The BOCC stated during the workshop they were not interested in establishing a compost operation at the WGCL or expanding into food waste processing, due to concerns over existing operations in the Study Area. Therefore, the WGCL Team did not pursue this option any further.

6.6.2 Household Hazardous Waste Facility

As discussed in Sections 3.4.8, 3.5.4.2 and 4.8.3 above, the WGCL Team presented the idea of the development of a permanent HHW collection facility to the BOCC at the 2013 Workshop. The BOCC stated they do not want to develop a permanent facility and they intend to continue to sponsor two HHW collection events at the WGCL, in conjunction with a private contractor.

6.6.3 New Options for Tires

As was discussed in Section 3.4.6, the need for processing or disposing of tires in the State of Colorado is being met by existing facilities, collectively achieving more than 100% recycling, with the inclusion of imported tires processed in the State of Colorado. Tires are currently received at WGCL and shredded for use as ADC. That practice will continue in the future.

At the 2013 Workshop, the BOCC indicated they did want to pursue other options with handling tires, beyond the current methods in place at WGCL. Therefore, the WGCL Team did not pursue this option any further.

6.6.4 Stop-N-Shop

During the 2013 Workshop, the WGCL Team presented the concept of developing a pilot Stop-N-Shop Facility to increase recycling. These facilities are locations such as buildings, storage rooms, or portable locations where household items can be dropped off by one family and then "sold" to another interested party. Often, the facility is co-located with the landfill. The main purpose of this service is to divert waste from the landfill. Materials frequently accepted include:

- Dishes.
- Working appliances.
- Antiques.
- Quality Clothing.
- Yard and garden.
- Building materials/paint/flooring.
- Old skis and snowboards.
- Computers.

- Stereos and small electronics.

The concept presented was to develop this as a pilot project, using a storage area/room at a county facility that could be used as a staging area. There are opportunities to partner with other volunteer organizations or non-profits. The potential revenues are unknown and those communities that have these programs typically charge enough for the cost of the staff and office utility costs.

The BOCC stated it was not an idea they wanted to pursue at this time. Therefore, the WGCL Team did not pursue this option any further.

6.6.5 Recycling of Drilling Pipe

The GCPWD staff noticed drilling pipe being disposed at the WGCL and one of the Commissioners inquired whether this material could be recycled. The GCPWD Director has had conversations with one or more E&P companies and is exploring the logistics of segregating this material from the fill face, storing it and then recycling it or selling it back to the E&P companies for reuse. This opportunity will continue to be explored in the future.

6.7 New Technologies for Renewable Energy

The use of MSW, such as those wastes disposed of at the WGCL, for an alternative energy source is not a new concept. In fact, there are many "waste-to-energy" (WTE) facilities operating in the United States and the world that generate electricity. These facilities use combustion processes to generate power using various types of wastes, including forestry material, mill residue, agricultural residue, urban waste, used tires, and MSW.

This section provides a brief description of other waste conversion technology alternatives in addition to WTE facilities that have the potential to convert MSW into energy. Each of these technologies has advantages and disadvantages and can be considered on their own merits.

6.7.1 Types of Key Conversion Technology Alternatives

Conversion technologies are a group of technologies that convert the organic or carbon-based portion of solid waste into useful end-products. In turn, these products can be used to produce electricity, green fuels, fertilizers, and/or marketable products.

On the basis of their technical definitions, conversion technologies are divided into two major types:

- Thermal conversion technologies: These technologies are characterized by higher temperatures (higher than 400°F) to process solid waste and produce useful products.

- Biological conversion technologies: These technologies proceed at lower temperatures (lower than 400°F) to convert the organic portion of solid waste into useful products.

The following pages describe thermal and biological conversion technologies that are currently available in various stages of full-scale development.

6.7.2 Thermal Conversion Technologies

Thermal conversion technologies are not incinerators. They are technologies that thermally convert MSW into useful products and by-products, and typically operate in a temperature range of 700°F to 10,000°F.

Most thermal conversion technologies are used to produce synthetic natural gas (syngas) as a primary by-product, and which will be used as fuel to generate electricity. Unlike incineration, conversion technologies do not directly burn the waste.

These technologies include:

- Pyrolysis.
- Conventional gasification (fixed bed and fluid bed).
- Pyrolysis/gasification.
- Plasma gasification.

These technologies are briefly described in the following sections.

6.7.2.1 Pyrolysis

Pyrolysis is a process whereby organic materials are decomposed or gasified with indirect heat with no air or oxygen present. During this process, organic compounds are volatilized at high temperatures and their bonds thermally crack, breaking larger molecules into gases and liquids composed of smaller molecules. No direct burning takes place.

Pyrolysis systems utilize a wide range of designs, temperatures, and pressures to initiate the pyrolysis reactions. Variations in these conditions produce specific products. For example, low temperatures generally produce liquid oils while higher temperatures produce syngas, which consists mostly of carbon monoxide and hydrogen.

The solid by-products generated by pyrolysis are carbon char and any non-heat degradable material such as metals, concrete debris, sand and gravel, silica, etc.

Natural gas, propane, or syngas created during pyrolysis can be used as a source of the external heat required for the process. If the feedstock has high heating value (British thermal unit ((Btu)/lb), it takes very little fossil fuel to maintain the process. Pyrolysis systems accept a wide range of feedstock. In order to increase efficiency, many systems incorporate drying to 10 to 20 percent moisture content, using steam or process waste heat. Depending on the supplier, some feedstock may need sizing ranging from 2 to 12 inches. Many systems incorporate an auger or ram feeder that compacts the feed stock to as little as 1/10th of the original volume.

A typical pyrolysis system uses a drum, kiln-shaped structure, or pyrolysis chamber, which is externally heated using either recycled syngas or another fuel or heat source to heat the pyrolysis tube/chamber as shown in **Figure 32**.

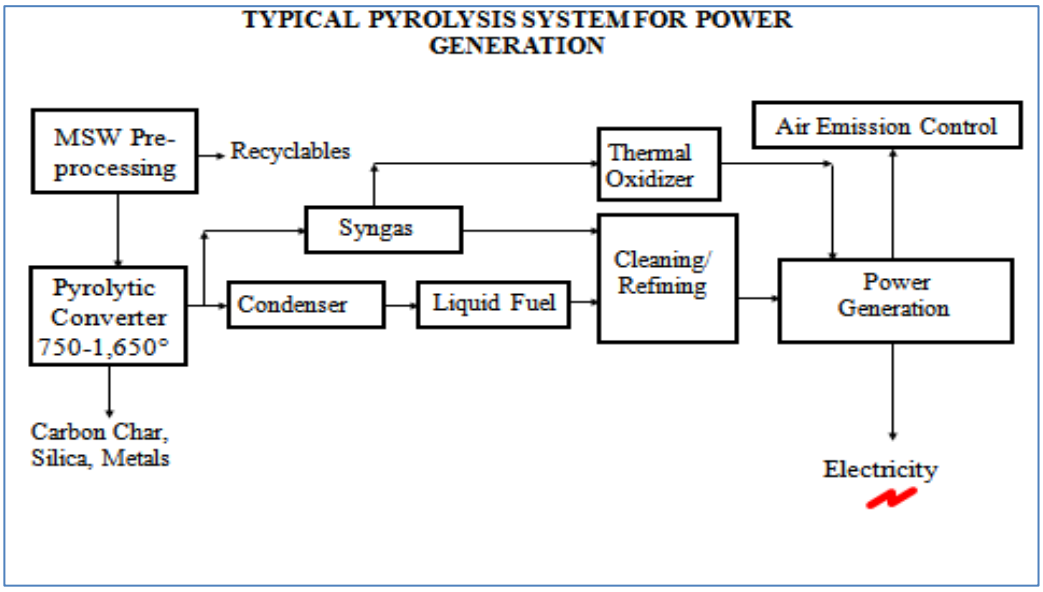


FIGURE 32. PYROLYSIS SYSTEM FOR POWER GENERATION

6.7.2.2 GASIFICATION

Conventional gasification involves the partial oxidation of carbon-based feedstock to generate a syngas which can be used as fuel to generate electricity. In the gasification process the addition of air or oxygen leads to a small amount of combustion, forming some carbon dioxide (CO_2) and releasing heat. Depending on the system design, 10 to 30 percent of the heating value of the feedstock is used in this reaction.

In order to increase efficiency, many systems incorporate drying to 10 to 20 percent moisture content, using steam or engine exhaust. Depending on the nature of the waste, some pre-

processing will likely be required, some feedstock may need sizing ranging from 2 to 12 inches, and many systems incorporate an auger or ram feeder that compacts the processed feedstock.

Gasifiers are typically characterized as being horizontal or vertical, and utilize one of three specific reactor designs: 1) fixed bed, 2) fluid bed, and 3) entrained bed. Utilizing the heat released during the minimal combustion process, the organic compounds in the feedstock begin to thermally degrade, forming gases, oils, liquids, and char. As these products move through the bed, or downstream through the gasifier, they encounter air, oxygen, and/or steam, which are injected to further the gasification reactions, producing carbon monoxide, hydrogen, and methane, the primary components of syngas.

The solid by-product from the gasification is ash, and in the case of high-temperature gasification, the solid by-product is slag. A typical gasification system is shown in **Figure 33**.

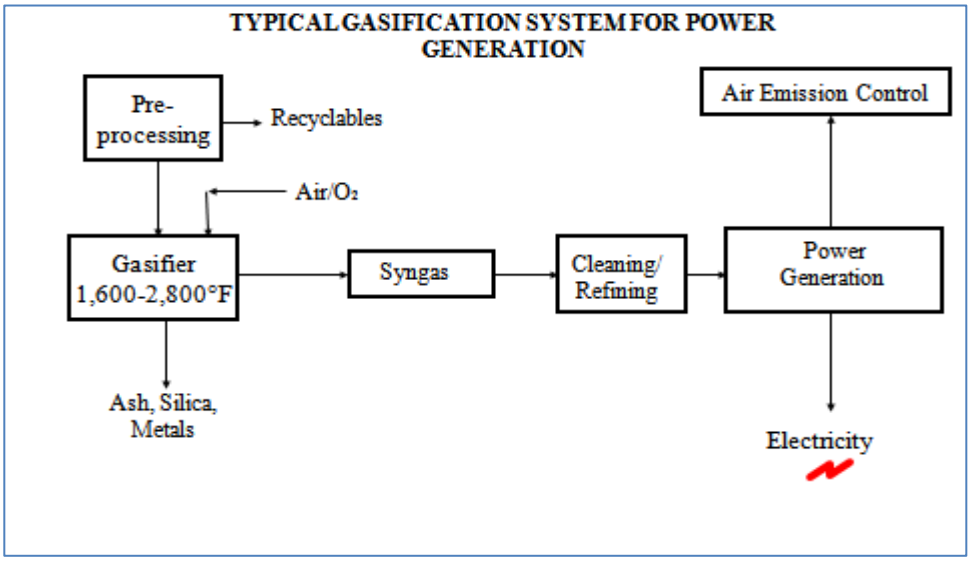


FIGURE 33. GASIFICATION SYSTEM FOR POWER GENERATION

6.7.2.3 PYROLYSIS/GASIFICATION

Some technologies employ a pyrolysis system close-coupled to a follow-on gasification step or separate reactor **(Figure 34)**. The carbon char produced in the pyrolysis or "degassing" chamber is pushed through into the gasification chamber, where the char and any pyrolysis liquids are gasified by way of additional reactions in this chamber. While the pyrolysis reactor operates without free oxygen, the gasification reactor may use air, oxygen, and/or steam to provide the oxygen needed for the gasification reactions.

Significant pre-processing is often required for this process. While some systems state that they can operate with little or no pre-processing, most include manual picking for large appliances, followed by primary and secondary rotary/stationary trommel screens, primary and secondary shredders, air classifiers, and magnetic and eddy-current separators to remove glass and metals and reduce the feedstock size.

In low-temperature gasification (below the melting point of most inorganic constituents), a powdery- to clinker-type of bottom ash is formed. In high-temperature gasification, the inorganic ash materials exit the bottom of the gasifier in a molten state, where the slag falls into a water bath and is cooled and crystallized into a glassy, non-hazardous slag. The slag is crushed to form a grit that can be easily handled. Slag can be used in the manufacture of roofing tiles, sandblasting grit, and as asphalt filler. Bottom ash may require landfilling, although some suppliers have been able to manufacture ceramic-like bricks or paving stones.

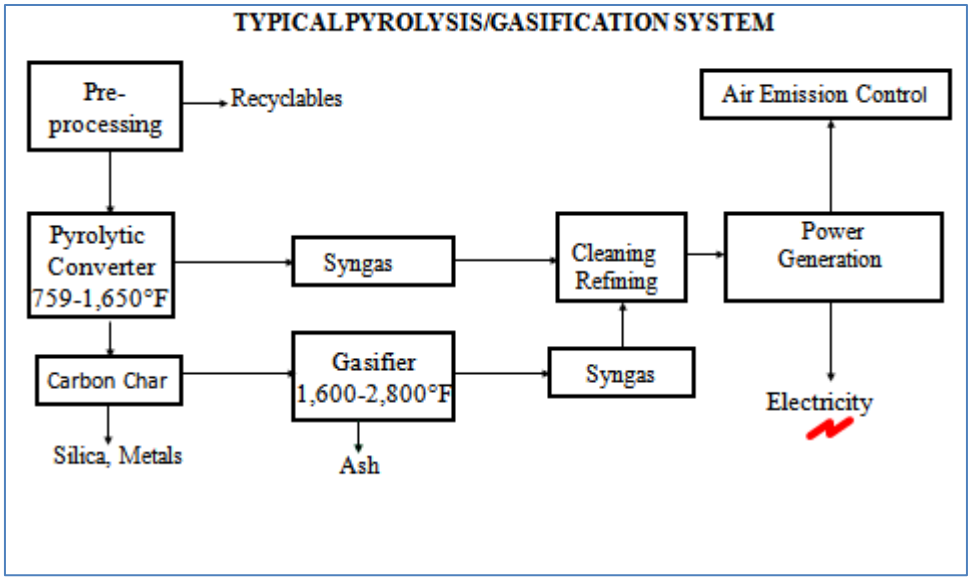


FIGURE 34. PYROLYSIS/GASIFICATION SYSTEM FOR POWER GENERATION

6.7.2.4 PLASMA GASIFICATION

Plasma gasification uses an electrical discharge (some use AC, some DC) to heat a gas, typically air, oxygen, nitrogen, hydrogen, or argon, or combinations of these gases, to temperatures above 7,000°F. The heated gas, or plasma, can then be used for welding, cutting, or treating waste materials.

In a typical plasma gasification system **(Figure 35)** the feedstock enters the reactor, where it comes into contact with the hot plasma gas. The inorganic constituents are converted to molten form, then quench-cooled to form a glassy, non-hazardous slag.

Feedstock preparation is similar to what is described above under conventional gasification, and the by-products of plasma gasification are similar to those produced in high-temperature gasification, as noted above. Due to the very high temperatures of plasma gasification process, carbon conversion nears 100%.

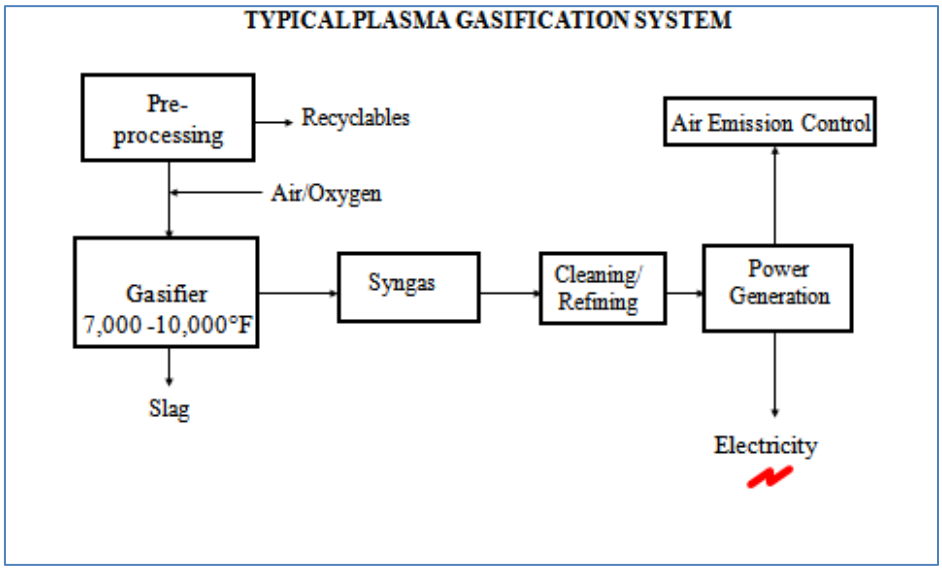


FIGURE 35. PLASMA GASIFICATION SYSTEM FOR POWER GENERATION

6.7.3 BIOLOGICAL CONVERSION TECHNOLOGIES

Biological conversion technologies use lower temperatures (lower than 400°F) and bacteria to convert the organic portion of waste into useful products. Biological technologies can only process biodegradable material and cannot process non-biodegradables such as plastics, etc.

Biological conversion technologies are briefly described below:

6.7.3.1 ANAEROBIC DIGESTION

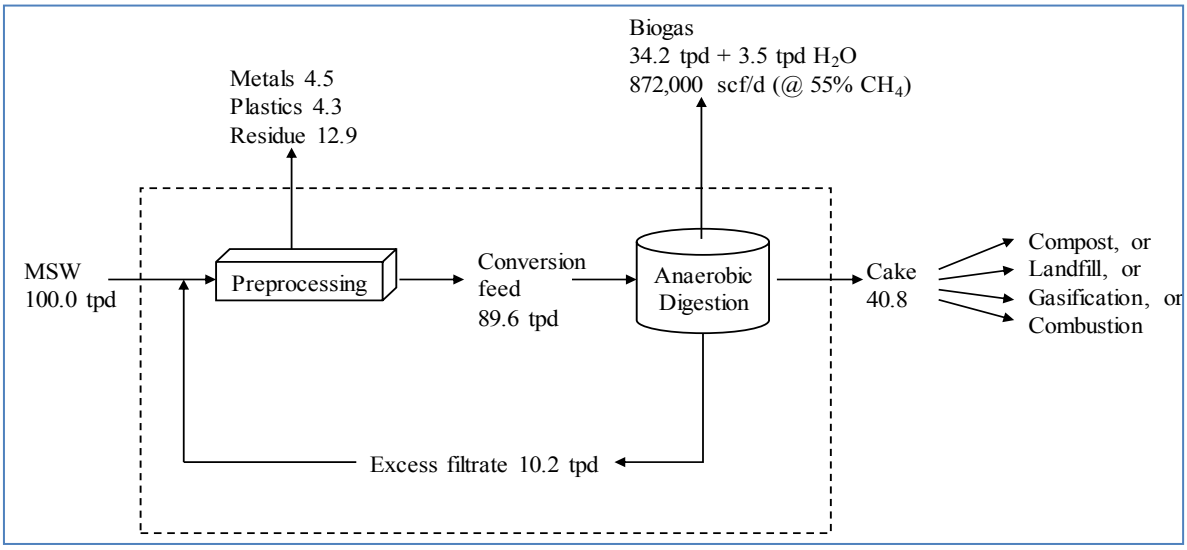
In anaerobic digestion (AD), biodegradable material is converted by a series of bacteria groups into methane and CO_2. During the process, a first group breaks down large organic molecules into small units, like sugar; this step is referred to as hydrolysis. Another group of bacteria converts the resulting smaller molecules into volatile fatty acids, mainly acetate, but also hydrogen (H_2) and CO_2; this process is called acidification. The last group of bacteria, the

methane producers, or methanogens, produce biogas (methane and CO_2) from the acetate, hydrogen and CO_2. This biogas contains 50-70% methane and can be used in boilers and different types of generators, with minimal pretreatment; it can also be upgraded to pipeline quality and used as a vehicular fuel.

The biogas produced can also be used on-site to generate electricity and heat using a generator (reciprocating engine, microturbine, conventional turbine, etc.). If there is a nearby industrial user, the biogas can be conveyed over short distances for such uses as boiler fuel. The biogas can also be purified extensively (dehydrating, hydrogen sulfide (H_2S) removal, CO_2 removal) to pipeline quality and pressurized, for example, to be used as compressed natural gas (CNG), a safe and clean vehicular fuel, and can be converted into methanol and/or used in fuel cells.

In addition to biogas, AD generates a residue consisting of inorganics, non-biodegradable organics, non-degraded biodegradables, and bacterial biomass. If this material is sufficiently free of objectionable materials, like colorful plastics, it can have market value as compost. Otherwise, it may be used as landfill cover.

The contents of an anaerobic digester can have different solids concentrations that range from liquid slurry to solid material. Some AD processes rely on a two-stage approach in which the



In order for this system to work, the source materials need to have a high biodegradable material content.

6.7.3.2 Aerobic Digestion

This process applies mainly to food waste, agricultural waste, and sewage biosolids. The waste material is homogenized into a slurry, which is mixed with air in a bioreactor. Aerobic microorganisms in this reactor oxidize the easily biodegradable material, just like in an aerobic compost pile, producing substantial heat. The heat and retention time are enough to pasteurize the material, which is processed into several liquid and solid fertilizers. Note that this process differs from anaerobic digestion in that no fuel is produced.

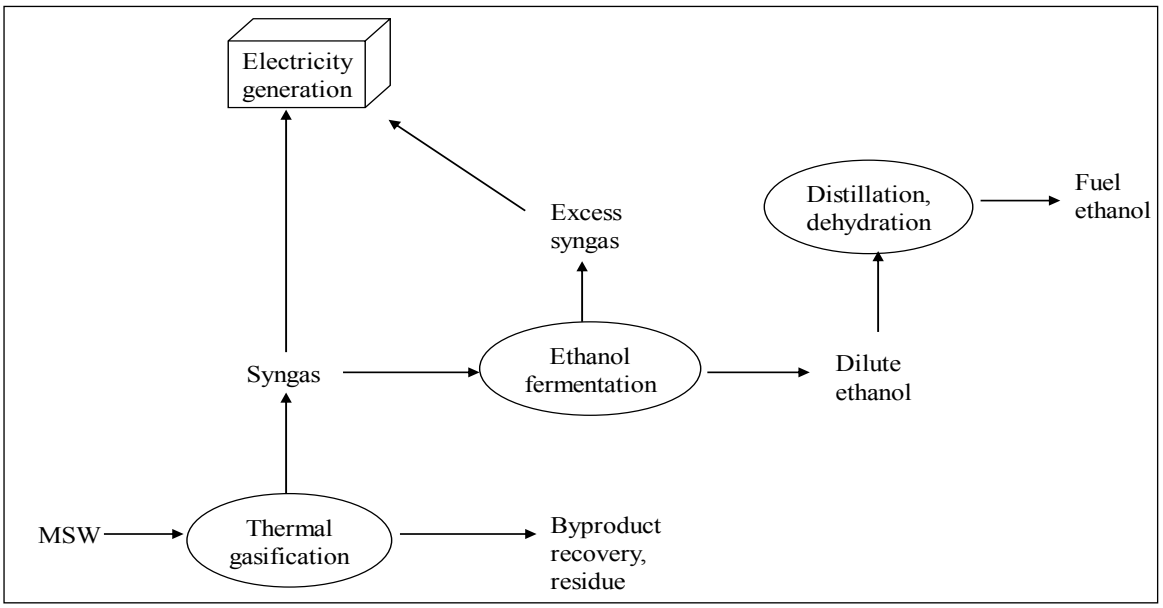
6.7.4 Hybrid Technologies and Others

Some of the emerging conversion technologies utilize a combination of biological and thermal processes to convert waste into energy. For example, the syngas-ethanol process is illustrated in **Figure 37**. The organics are converted to syngas via thermal gasification. The hot syngas is cooled, generating steam in the process, and is introduced into a fermenter containing a specialized microbial population that converts the syngas into ethanol and CO_2. The resulting diluted ethanol is distilled and dehydrated to fuel grade ethanol, as described in the previous section. Unconverted syngas from the fermenter is used to generate electricity via a steam turbine. If desired, some of the syngas can bypass the fermenter and go directly to electricity generation.

The main advantage of this process is that it makes all of the organics in the feedstock accessible to ethanol production, including plastics and hard-to-degrade woody materials. Therefore, the ethanol yield per ton of feedstock should be significantly greater than it would be using the chemical or biochemical hydrolysis route to ethanol.

This technology would minimize the landfilled residue to the same extent as does gasification. Note also that there would be some flexibility in the quantity of electricity generated versus ethanol produced, so the facility could adapt to changing market conditions. There are also other conversion technologies, like catalytic cracking and thermal depolymerization, etc.

Hybrid and other conversion technologies are emerging technologies and are not yet fully commercialized. There are no large-scale commercial facilities utilizing these technologies processing MSW in the United States or overseas, and therefore, these technologies are not further considered for processing MSW at the WGCL.



In this section, relative costs for the thermal conversion technologies are compared for an MSW Conversion facility large enough to handle between 150-200 tpd (approximately twice the capacity of the County's current waste stream, allowing for future growth) based on cost estimates for similar sized facilities proposed to be located in the US. The cost and revenue data were based on publicly available information and non-confidential information received by URS through Requests for Qualifications and Requests for Proposals for other projects, or through its relationships with suppliers. These costs were not independently verified by URS or any other qualified firms.

These cost estimates were provided by conversion technology suppliers that have operational facilities overseas and were modified and revised for the WGCL specific throughput.

6.7.5.1 Capital Costs

The capital costs for thermal conversion technologies required for the WGCL with throughput of approximately 170 tpd were not available for every thermal conversion technology. URS adjusted and rescaled suppliers' data based on professional judgment. The estimated capital cost of processing shredded MSW ranged from $7.6M to $12.8M.

6.7.5.2 Annual Operating and Maintenance (O&M) Costs

The annual O&M costs of thermal conversion facilities with a throughput of approximately 170 tpd MSW were also not available for every thermal conversion technology. URS adjusted and rescaled suppliers' data based on professional judgment. The estimated annual O&M cost of processing MSW ranged from $3.5M to $5.9M per year.

Table 19 lists the estimated capital and annual O&M costs for the four thermal conversion technologies discussed above with a processing throughput of approximately 170 tpd.

6.7.6 Energy Generated

The energy efficiency of thermal conversion technologies processing MSW as feedstock varies, and generally depends on the following factors:

- Feedstock composition.
- Feedstock heating value (Btu/lb) and moisture content.
- Boilers and generators efficiency.
- Thermal technologies system design.

For the purpose of this study, the following assumptions were made based on the previous conversion technologies evaluation conducted by URS for other cities and counties in the United States and typical feedstock characteristics assumed for the WGCL:

- The annual MSW to be processed by conversion system is estimated to be approximately 170 tpd.
- The average heating value of the MSW is 4,500 Btu/lb (for typical/average waste streams)

The estimated energy efficiency of conversion systems processing MSW ranges from 470 to 730 kilowatt hours per ton (kWh/ton). Estimated electricity generated using conversion system ranges from 3.7 to 5.1 Megawatts (MW).

6.7.7 Conclusions

The following conclusions are made regarding the technical feasibility, permitting, and environmental issues related to conversion technology:

- Conversion technologies are capable of processing MSW received by the WGCL.

- Biological conversion technologies can process only biodegradable fraction of MSW.
- The WGCL's MSW is estimated to be a typical waste stream with average quantity of organics and moisture and thus a typical high heating value (4,500 Btu/lb).
- Thermal conversion technologies can process mixed waste that includes MSW, biomass, and biosolids. Should Garfield County decide to add biomass and/or biosolids in the future, it will be possible to process these waste streams by thermal conversion systems.
- Permits for siting a Conversion Facility at the WGCL will need to be obtained for land use and air emissions.
- Environmental issues related to thermal conversion technologies are not significant. Air emissions from burning syngas will not likely produce significant quantities of criteria or toxic air pollutants.
- There are no commercial conversion technology facilities operating in the United States as of the time of this report, which makes it difficult to demonstrate these are proven systems which can consistently operate.
- The capital and operating costs for any of the conversion technologies described above are significantly more expensive than the current landfill operation, based on waste receipts of 170 tpd.

6.8 Landfill Gas to Electricity

Landfill gas generated at the WGCL has been an operational challenge with off-site migration occurring on the property's east boundary. However, it can also be another potential energy resource that can be used in a variety of different ways at the landfill, by Garfield County internally, and/or provided to utilities or neighbors in need of heat, steam, or electricity.

Different uses of LFG generally depend on the quantity and the quality of the gas generated. LFG generally produces a low-Btu gas, generally in the range of 500 Btu/cubic foot. This low-Btu energy source has been typically used for industrial uses, as a natural gas replacement. This usage requires moisture removal from the gas and compression. In this form, LFG can be used to generate steam for either space heating and/or for industrial use. Some landfills have also used this low-Btu gas to heat on-site ornamental and/or vegetable plant growing greenhouses, during the winter months.

Summarized below is a list of technologies that are typicallly used for utilizing engergy generated from LFG,based on the quantity of LFG generated.

Technology Type	Range LFG Processed (cubic feet per minute)	Range of Electrical Production (megawatts)
Internal combustion engines	150 – 500	0.4 – 2.0
Natural gas turbines	>800	4.0 – 5.0
Natural Gas Fired Boilers	5,000 – 10,000	10 – 20
Micro-turbines	10 – 100	0.03 – 1.0

For high-Btu gas production, the landfill gas typically reaches a higher heating value of 900 – 1,000 Btu/cubic foot. This form of LFG requires moisture removal and the removal of CO_2 and other NMOCs. Finally this gas, once compressed to relatively high pressures, can be sold to and injected into natural gas industry pipelines. The production of high-Btu gas can be very expensive due to both the removal of CO_2 and the high pressures that need to be developed in order to inject into the pipeline. These types of projects typically need to have a large quantity of LFG present to be economically justified.

High-Btu gas can also be used to produce vehicle fuels such as CNG, and liquefied natural gas (LNG). To do so, the high-Btu gas would need to reach even higher pressures than for pipeline quality, convert to liquid or to be able to fill high pressure cannisters that can be attached to and easily exchanged with vehicles that have been appropriately converted to utilize the type of fuel (LNG or CNG) generated.

Of all the energy development projects that utilize LFG as its energy source, electricity generation is the most prevelant in the United States and across the world. Electricity can also be generated from low-Btu LFG using a number of different technologies, generally depending on the quantity and quality of landfill gas that is generated at a landfill. These technologies and their approximate range of landfill gas processed and electricity generated are listed below:

The WGCL Team has calculated preliminary LFG quantities generated at the WGCL, based on the EPA's LandGEM model (that calculates worst – conservative – case air emissions from landfills). This model was adjusted to better represent more realistic LFG production rates at the WGCL accounting for its relatively dry climate. The resulting estimate indicates that total LFG generation ranges from approximately 140 cubic feet per minute (cfm) in 2014 and likely increases to approximately 240 cfm the year after the landfill receives its last ton of waste (projected in 2062), and is shown in **Figure 38**. Because the concentrations of NMOCs are so low, compared to the Methane and NMOC constituents, their values are shown in the key but not on the graph above.

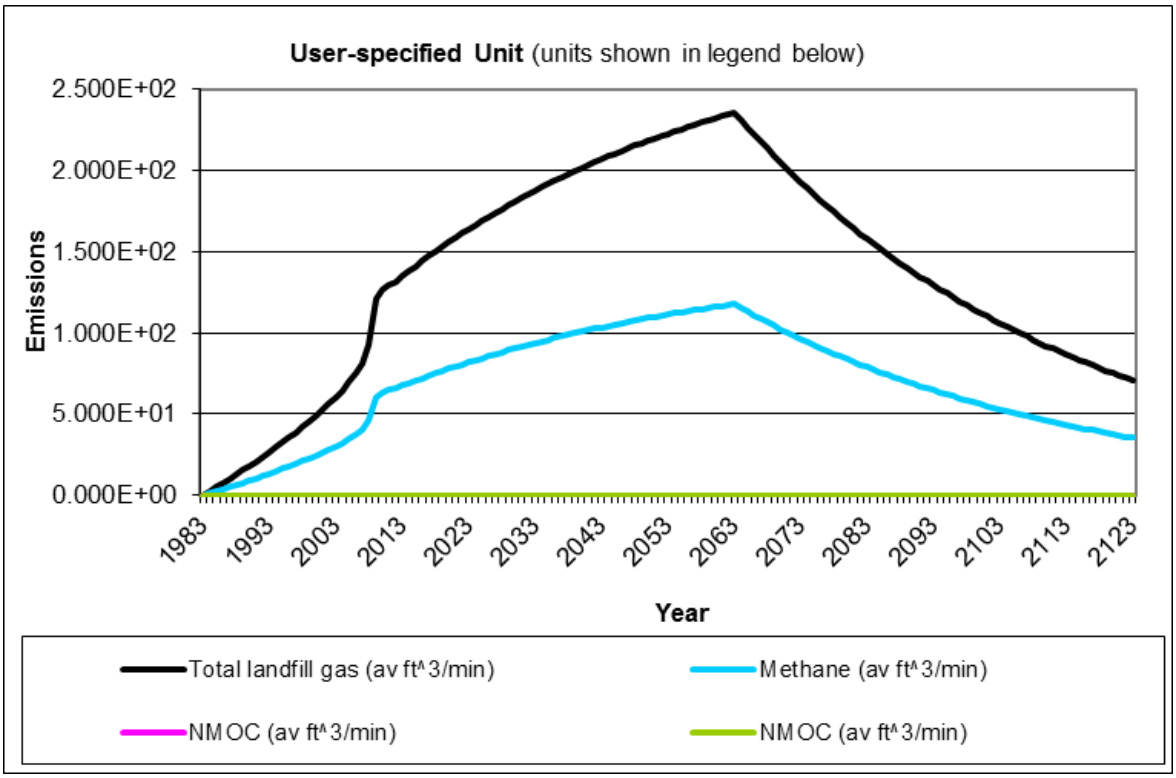


FIGURE 38. ESTIMATED LANDFILL GAS GENERATION MODEL FOR WGCL

The advantages and disadvantages of each of these end uses for LFG are presented in **Table 20**. Based on current LFG generation rates, it is not cost effective to use LFG at WGCL. Additional on-site and off-site potential users of the LFG need to be identified.

6.9 FUTURE LANDFILL OPERATIONS AND MANAGEMENT CONSIDERATIONS

The subsections below discuss the proposed capital and operations budgets for the new infrastructure proposed at the landfill and the schedule to design, permit and construct these new systems. This section also identifies potential partners WGCL could team with to offer new or expanded waste services to its customers.

6.9.1 BUDGET FOR SITE IMPROVEMENTS

As discussed in Section 6, the permitting, capital, equipment and operating cost budgets for the landfill infrastructure is presented in **Table 18**.

6.9.2 Schedule for Site Improvements

Presented in **Table 21** is the proposed schedule to permit and design and construct each of the proposed new systems described in Section 6. These systems include the lined monofill for E&P waste, the solidification basin, the replacement NSI's, and a land farm.

6.9.3 Public vs. Private Operation

The BOCC may want to consider privatization of all or a portion of its landfill system. There are many reasons for privatization include managing liabilities, improving efficiency, cutting costs or debt, improving access to capital, and improving accountability in the operations. Each reason, or combination of reasons, lends itself to a different option for managing landfills. Privatization options range from cooperative agreements with private firms for support services, to management contracts, assets sales, and even complete reliance on the landfill market for services.

There are private landfill operators such as Herzog Waste Management, Waste Management of Colorado and Heartland Environmental Services, LLC (Heartland) that currently operate landfills owned by the public sector in the Study Area, including the Pitkin County Landfill, SCLF, Mesa County Landfill and the Montrose County Landfill. The BOCC was presented with two unsolicited proposals from Heartland to take over private operation of the landfill in 2013. Staff reviewed these proposals with the County Manager and concluded neither proposal presented any significant cost savings to the county. On the contrary, the second proposal showed the WGCL would realize a financial loss if the proposal were accepted. Further, there are inherent risks to turning a landfill over to a private company since Garfield County will still be subject to enforcement action, including potential fines imposed and criminal prosecution by the CDPHE and/or EPA from violations by the actions of the operator.

Summarized in **Table 22** are the pros and cons of public verses private ownership/operation of a MSW landfill and supporting operations, as presented at the 2013 Workshop.

At the present time, as stated in the Garfield County Mission Statement presented in Section 2.5 above, the County intends to operate the WGCL as a public operation.

6.10 Partnership Potential

The WGCL Team identified potential teaming partners to provide additional recycling or disposal services for the residents and businesses of Garfield County. In addition, over the past year, several vendors approached the GCPWD Director about offering waste diversion or recycling services at the WGCL. Those partnerships could offer the following services:

- Expanded E-waste recycling.

- Privately operated landfill.
- Development of a compost site to manage organic waste including yard waste, food waste, sludges and other similar materials.
- Reuse Shop.
- WTE project.
- Co-financing of facilities for managing E&P waste.

A discussion of the status of these opportunities follows. For any opportunity, the County can be exposed to liabilities associated with the activities of their partner at a county operation.

6.10.1 Electronics

Vocational Electronics Recycling Network/Blue Star (VERN) approached WGCL in August 2013 regarding a training program to encourage development of local e-waste recycling programs. For a $20,000 fee, VERN conducts a resource assessment of a county to identify how much E-waste is generated, who the stakeholders are, where the materials would be sent and prepares preliminary budget estimates for running a program. VERN identifies potential funding sources to offset the cost of the program and will then train developmentally challenged staff to help implement the program. VERN provides logistics and assessment support during the first year of operation and then turns the program over to the local community or county.

At the time of this report, the GCPWD Director determined additional supervisory staff would be needed to oversee the program, even while VERN was engaged, and no funds or additional staff are available to implement the program. In addition, the WGCL already has an E-waste program in place and works with an outside vendor to responsibly manage these wastes when they are picked up from the landfill.

6.10.2 Landfill Operations

Private and public sector opportunities to own and/or operate the WGCL exist, although the advantages and disadvantages of these options were discussed in Section 6.8 above. The County can explore future potential partnerships, as they arise, consistent with their Mission Statement.

6.10.3 Compost Operations

In March 2013, the GCPWD Director was contacted by Evergreen Events, a provider of Zero Waste services for businesses and residences in Colorado. Evergreen proposed the development of an industrial organics waste compost operation at the WGCL. Evergreen and CacaLoco Composting had partnered together offering industrial composting operations. Under this partnership, Evergreen would provide the equipment, run the operations and provide Garfield County with 10% of the compost sales and revenue from the operation. This partnership was not

pursued by GCPWD staff because of the recent closure of one of the partnership's compost sites. Additionally, at the 2013 Workshop, the BOCC determined they were not interested in pursuing a compost site at the landfill.

6.10.4 Stop-N-Shop

There are numerous partnership possibilities for running a Stop-N-Shop or Reuse store. In other communities, non-profits like the Salvation Army, YMCA, girl scouts and cub scouts have participated with local landfills or solid waste districts to run and share in the revenues from these facilities. However, as discussed in Section 6.5.4, the BOCC stated at the 2013 Workshop, they did not wish to pursue this type of reuse opportunity at this time.

6.10.5 Waste-to-Energy Projects

Developers of WTE projects often look for counties or municipalities to team with, but typically look to develop facilities with throughputs that are several hundred to several thousand tpd. As discussed in Section 6.6, technologies for waste-to-energy may be technically viable but until a facility is up and operating with significant operating hours behind it, the technology has not been proven. Inquiries from developers have come to the GCPWD Director in the past few months, but no concrete leads were developed. This type of partnership can be considered in the future, depending on many factors including, but not limited to, the contract terms, funding requirements, waste commitment, tipping fees, competitor facilities, payback period and other county commitments.

6.10.6 Exploration and Production Companies

At the 2013 Workshop, the BOCC directed the GCPWD staff to contact local E&P companies to assess their interest in the disposal of waste in a lined monofill, land farm and/or solidification basin, depending on the the nature of the waste requiring disposal. Partnership opportunities exist to reserve disposal capacity for potential customers in return for waste commitments or financial assistance. The GCPWD Director has initiated preliminary discussions with local E&P companies which will continue as the SSWMP is adopted and implemented. One of the advantages of this approach is to guaranteee cash flow for the landfill while minimizing some or all of the capital outlay for the new disposal systems discussed above. We recommend that the County continue these discussions due to the interest expressed by the E&P companies to find disposal alternatives like land farms, solidification basins and lined monofill cells to dispose of their drilling wastes.

7. STRENGTHS AND WEAKNESSES

The purpose of Section 7 is to answer the question: ***What are the strengths and weaknesses of the WGCL?*** *The subsections that follow will identify key strengths and weaknesses of the WGCL operations.*

At present, the WGCL has several strengths and weaknesses, which the BOCC must understand when deciding which goals and objectives of the SSWMP to implement. The strengths and weaknesses of the system are highlighted below, although not in any priority order.

7.1 STRENGTHS

The strengths of the WGCL are as follows:

- Progressive BOCC and GCPWD staff who understand the value of owning and operating a regional solid waste management program and landfill system for county residents, businesses and industries.
- Longevity of employees who are open to providing new services to customers.
- Experienced GCPWD Management are currently operating a Subtitle-D landfill.
- Visualized by the community as a valuable asset and service for the residents, businesses and industries in Garfield County and surrounding communities.
- The WGCL is operated utilitzing an Enterprise Fund, rather than part of the General Fund of Garfield County; revenues received go directly into the Enterprise Fund to support landfill capital and operation costs.
- As currently permitted, and due to improved design and operational efficiencies which will be implemented, the landfill has sufficient airspace until 2041 that allows the WGCL to realize the short-term and long-term planning strategies presented in this SSWMP.
- Potential expansion capacity, after permit application submittals and CDPHE approval, until the year 2048 (with revised side slopes from 5V:1 H to 3V:1 H) at the current final height or until 2063, if the maximum elevation is increased to 130 feet above grade.
- Available acreage currently under the CD in which to expand the present facility and create additional airspace, accept new waste streams and extend the operating life of the facility.
- Additional 100 acres outside the CD that could be permitted and developed for landfill use, consistent with the concept to expand and be a regional landfill in the future.
- Determined availability of new waste streams and new potential customers in the Study Area, based on the results of the SSWMP; and permitted to receive some of these wastes.

- Garfield County is located within the Piceance Basin which stretches across 6,000 square miles and contains primarily natural gas, in the Green River Formation area. As production in this basin, continues, waste streams will be generated requiring disposal or stabilization and businesses will benefit from the economic activity,
- The landfill is an economic driver to local communities and surrounding counties, and long-term disposal capacity may be a draw for businesses looking to move into Garfield County.
- The present strong relationships that the County has with other municipalities and private companies, including the E & P companies that can help secure these new waste streams for the facility.
- The existing location of WGCL on the I-70 corridor on the West Slope presents an opportunity to intercept E&P waste destined for disposal in Utah landfills.
- WGCL is currently receiving and disposing of E&P waste and has experienced increased revenues from this waste sector in 2013, as a direct result of initiating conversations with these companies over the past year.
- WGCL has a good compliance record and excellent relationships with CDPHE, resulting in expedited reviews and approvals for permit applications.
- WGCL has a strong health and safety culture and a strong safety record.

7.2 WEAKNESSES

The weaknesses of the WGCL are as follows:

- The WGCL set its disposal rates partly in response to local competition and/or the cost of operation, not as part of a comprehensive business plan for the landfill.
- The inherent environmental liability associated with the older unlined or partially lined portions of the landfill (built to permit requirements and standards of practice when constructed) due to groundwater or gas migration.
- Susceptibility of the County to fluctuating waste stream volume due to influx or reduction of activity from the private sector, municipalities and the E&P companies, in response to changes in the local economy.
- Limitation of waste receipts now due to lack of a lined cell or solidification basin for E&P waste, and loss of impoundment capacity.
- Lack of permits in place to develop and operate the new disposal operations, which could impact the County's ability to implement its short-term and long term planning goals presented in this SSWMP.

- Lack of permits to create additional capacity by increasing the side slopes from 5V:1H to 3V:1H, maximizing the use of the existing waste footprint;.
- Additional training required for GCPWD staff to manage both existing and new disposal areas.
- Competition from Utah landfills and other land farms and septage ponds in the Study Area to accept waste grease, septage or other E&P waste.
- No targeted marketing strategies have been employed by the WGCL in the Study Area to accept new wastes.
- Historically, the landfill has operated in a reactive role due to lack of planning.

8. RECOMMENDATIONS

The purpose of Section 8 is to answer the question: ***What are the short-term and long-term planning strategies the WGCL Team recommends based on the information compiled in the SSWMP?*** *The subsections that follow will summarize the recommendations for implementing the strategies outlined in the SSWMP over the next five years and then six years and beyond.*

8.1 SHORT-TERM PLANNING (0 -5 YEARS)

Short-range plans include additions, changes, and modifications to the facility or facility operating structure that will have an immediate impact on revenue generation, operational efficiency, environmental protection, and conservation of airspace. Short-range strategies for the facility include the following:

- Implement the Capital Improvements approved in the 2014 Capital Budget;
  - Install Methane Mitigation Slotted Horizontal Piping.
  - Prepare Development & Operations Plan for Septage Impoundments.
  - Implement the SSWMP.
  - Prepare the Grading & Sequencing Plan.
  - Implement the Title V Permit.
  - Construct the NSI Ponds and provide Construction and Quality Assurance/Quality Control services.
  - Provide Engineering/Design and Permitting Actions for the Land Farm.
- Conduct a third party review and evaluation of current WGCL operations and work with the GCPWD Director to implement operational efficiencies;
- Submit the completed permit revision application to CDPHE, revising the designed side slopes from 5V:1 H to 3V:1H and increasing the current permitted landfill height, to maximize the current landfill's waste disposal capacity within the currently permitted waste footprint;
- Approve SWANA training for Landfill staff so they will be experienced in the receipt, processing and management of the proposed new waste streams and in the state of the practice in current MSW operations:
  - Develop a schedule for Landfill Management Training.
  - Develop a schedule for SWANA and other training classes.
- Continue discussions with E&P companies to assess their interest in using the land farm and the potential lined monfill cell and solidification basin and negotiate waste commitment agreements.

- Expand waste acceptance capabilities.
- Evaluate options for managing septage, including identification of other treatment technologies (such as an atomizer, aerobic or anaerobic biological treatment, reverse or direct osmosis, filtration and the potential use for on-site dust control and/or marketing of the effluent to off-site end users, within 12 months of SSWMP adoption.
- Conduct a siting study within the CD to identify suitable areas for developing another surface impoundment to extend the capacity, within 12 months of SSWMP adoption.

- Pursue strong alliances with other municipalities, economic development organizations and industry within the Study Area.
- Develop marketing materials, marketing plan and utilize technology (special page on County website, email communications, Facebook page, etc.) to advertise the landfill's services and to market to generators and industries promoting the septage ponds, land farm, and the lined E&P monfill and solidification basin, if approved by the BOCC.
- Review and update the SSWMP and the overall operating structure of the GCPWD to adjust for operational efficiencies between departments and to respond to the competitive nature of the solid waste industry, at a minimum of every 5 years.
- Re-evaluate the BOCC's mission statement annually.
- Upon final direction by the BOCC regarding the SSWMP, prepare a detailed financial business plan which incorporates 1) operational efficiencies, 2) new landfill infrastructure and 3) revenues from potential new waste streams.

8.2 LONG-TERM PLANNING (6 -10 YEARS)

Long-range strategies include more complex or funded additions, changes and modifications to the landfill itself or to the management structure that will have an impact on revenue generation, operational efficiency, environmental protection, conservation of airspace, and protection of the BOCC's interests, while providing disposal capacity to the Study Area. These strategies include:

- Prepare an annual presentation to the BOCC which identifies potential changes to landfill operations and recommends potential changes in the tipping fees.
- Regularly review staffing levels and adjust to adequately respond to market changes.
- Develop staff capabilities for sales and marketing staff and/or hire new staff to effectively promote the WGCL systems' capabilities.
- Review and modify the SSWMP and its goals and objectives in order to effectively compete with other landfills in the Study Area.

- Consider expansion of the pilot land farm and solidification basins to full-scale operations, based on the results of the initial operation and in coordination with the E&P industry.
- Review and update the organizational structure and operating budget of the GCPWD to adjust for operational efficiencies between departments and to account for the competitive nature of the solid waste industry; at a minimum of every 5 years.
- Identify additional solid waste services to address changing markets.
- Diversify and adapt solid waste services to promote environmental awareness, waste minimization and recycling to the various communities within the Study Area.
- Consider whether the landfill should expand operations onto additional land for future waste processing and/or disposal capacity.
- Pursue strong alliances with other municipalities, economic development organizations and industry within the Study Area.
- Review the efficacy of alternative disposal technologies.
- Re-evaluate the BOCC's mission statement annually.

9. LIMITATIONS

This information is developed for the sole and exclusive use of Garfield County in relation to planning of its solid waste landfill operation based on specific and limited objectives set forth in our proposal dated April 4, 2013. Reuse of this document is not permitted without NWCC's written approval.

The objective of this Plan was to assemble publicly available information regarding demographics, waste volumes and competitive factors, gather information regarding Garfield County's solid waste management landfill operations and assist the BOCC and GCPWD staff in developing a clear and concise, yet flexible strategic plan for growing the landfill business into a sustainable enterprise. This strategic plan includes offering additional services, accepting new waste streams, expanding the disposal infrastructure at WGCL and exploring potential partnerships to expand the current landfill's profitability.

Some of the information presented within this report is from published and unpublished sources, the accuracy of which cannot be verified. We assume no responsibility for the unauthorized use of this report by other parties and for conclusions, opinions, or recommendations made by others based on the information presented within this document.

This plan contains forward looking statements and as a result, opinions have been expressed by the WGCL Team where deemed necessary and appropriate. These opinions are intended to assist the BOCC in making future decisions affecting the described Study Area and the WGCL. They are based on our knowledge in the west slope of Colorado and the WGCL Team's experience working in the waste management industry.

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TABLES

TABLE 1. PRELIMINARY POPULATION PROJECTIONS BY COUNTY, 2000 T0 2040

COUNTIES	SDO Est. July, 2000	SDO Proj. July, 2005	SDO Proj. July, 2010	SDO Proj. July, 2015	SDO Proj. July, 2020	SDO Proj. July, 2025	SDO Proj. July, 2030	SDO Proj. July, 2035	SDO Proj. July, 2040		Average Annual Percent Change 00-05	05-10	10-15	15-20	20-25	25-30	30-35	35-40
COLORADO	4,338,789	4,658,216	5,046,990	5,499,618	6,043,504	6,567,980	7,058,020	7,520,178	7,958,167		1.4%	1.6%	1.7%	1.9%	1.7%	1.4%	1.3%	1.1%
Chaffee	16,294	17,027	17,873	19,832	22,982	25,573	27,589	29,034	30,208		0.9%	1.0%	2.1%	3.0%	2.2%	1.5%	1.0%	0.8%
Delta	28,011	29,364	31,069	35,612	41,445	47,601	52,962	57,254	61,445		0.9%	1.1%	2.8%	3.1%	2.8%	2.2%	1.6%	1.4%
Eagle	43,355	47,080	52,438	60,260	68,299	73,262	80,826	90,189	99,346		1.7%	2.2%	2.8%	2.5%	1.4%	2.0%	2.2%	2.0%
Garfield	44,263	49,073	56,738	68,807	88,490	103,561	116,155	128,005	139,630		2.1%	2.9%	3.9%	5.2%	3.2%	2.3%	2.0%	1.8%
Grand	12,885	13,909	14,914	16,748	19,665	22,302	24,817	27,150	29,302		1.5%	1.4%	2.3%	3.3%	2.5%	2.2%	1.8%	1.5%
Gunnison	13,963	14,469	15,356	16,414	17,786	18,998	20,048	20,960	21,809		0.7%	1.2%	1.3%	1.6%	1.3%	1.1%	0.9%	0.8%
Lake	7,906	7,255	7,362	9,426	11,689	14,023	16,588	18,061	18,825		-1.7%	0.3%	5.1%	4.4%	3.7%	3.4%	1.7%	0.8%
Mesa	117,653	128,803	147,379	163,019	180,949	196,913	212,772	228,804	245,007		1.8%	2.7%	2.0%	2.1%	1.7%	1.6%	1.5%	1.4%
Moffat	13,182	12,945	13,880	14,800	16,812	18,973	20,052	20,908	21,566		-0.4%	1.4%	1.3%	2.6%	2.4%	1.1%	0.8%	0.6%
Montrose	33,671	36,914	41,484	47,618	54,806	62,140	69,179	74,853	79,961		1.9%	2.4%	2.8%	2.9%	2.5%	2.2%	1.6%	1.3%
Pitkin	15,914	16,129	17,176	19,009	21,260	23,569	25,898	28,205	30,432		0.3%	1.3%	2.0%	2.3%	2.1%	1.9%	1.7%	1.5%
Rio Blanco	5,984	5,786	6,793	7,966	9,476	10,814	12,024	13,013	13,881		-0.7%	3.3%	3.2%	3.5%	2.7%	2.1%	1.6%	1.3%
Routt	20,099	21,413	23,570	26,636	30,480	34,675	39,062	43,294	47,333		1.3%	1.9%	2.5%	2.7%	2.6%	2.4%	2.1%	1.8%
TOTALS:	**373,180**	**400,167**	**446,032**	**506,147**	**584,139**	**652,404**	**717,972**	**779,730**	**838,745**	**AVERAGE PERCENTAGE CHANGE**	**0.79%**	**1.78%**	**2.64%**	**3.01%**	**2.40%**	**2.00%**	**1.58%**	**1.31%**

The State Demography Office has produced an update to its population estimates and forecasts to incorporate the recently released 2010 Census count population totals. Updated intercensal population estimate totals are now available for the years 2000 through 2010 for all Colorado Counties and Municipalities. The intercensal estimates are based on the 2000 and 2010 Census counts and also incorporate information from the postcensal estimates that were developed during the decade. Draft population forecast totals based on a July adjustment of the April 2010 Census count are also available. These population totals are not consistent with the detailed estimates and forecasts also currently available from the State Demography Office which were prepared in the fall of 2010 prior to the release of the 2010 Census counts. The detailed Conservation Trust Fund Estimates, components of change, race, age, and gender estimates and forecasts will be updated to be consistent with the 2010 Census in the fall after the detailed population characteristic data has been released.

Source of Data: Colorado Department of Local Affairs, October 2013

COUNTY/ YEAR	2010	2015	2020	2025	2030	2035	2040	TOTAL Household Increase	Total % Increase
CHAFFEE	7,601	8,468	9,475	10,416	11,249	11,828	12,387	4,786	63%
DELTA	12,676	13,311	14,248	15,751	17,579	19,093	20,718	8,042	63%
EAGLE	19,209	21,576	24,742	26,979	30,033	33,742	37,260	18,051	94%
GARFIELD	20,268	22,947	26,289	29,989	33,234	36,271	39,129	18,861	93%
GRAND	6,448	6,688	7,543	8,571	9,593	10,586	11,502	5,054	78%
GUNNISON	6,510	7,090	7,636	8,157	8,629	9,050	9,414	2,904	45%
LAKE	2,943	3,365	3,832	4,321	4,770	5,047	5,243	2,300	78%
MESA	57,932	60,439	66,585	73,247	79,645	85,704	91,278	33,346	58%
MOFFAT	5,475	5,385	5,741	6,200	6,673	7,041	7,318	1,843	34%
MONTROSE	16,447	17,979	20,452	23,265	26,057	28,407	30,679	14,232	87%
PITKIN	8,158	8,644	9,378	10,246	11,169	12,111	13,048	4,890	60%
RIO BLANCO	2,628	2,737	2,955	3,224	3,647	3,896	4,059	1,431	54%
ROUTT	9,866	10,697	11,832	13,154	14,812	16,455	18,049	8,183	83%
TOTALS:	**176,161**	**189,326**	**210,708**	**233,520**	**257,090**	**279,231**	**300,084**	**123,923**	**70%**

Source of Data: Colorado Department of Local Affairs, State Demography Office

TABLE 3. WASTE GENERATION ESTIMATES BY COUNTY, 5 YEAR INCREMENTS, 2005 - 2030

COUNTIES	SDO Population Projection July, 2005	Waste Generation in Tons July, 2005	Waste Diversion in Tons July, 2005	Net Waste Disposal in Tons July, 2005	SDO Population Projection July, 2010	Waste Generation in Tons July, 2010	Waste Diversion in Tons July, 2010	Net Waste Disposal in Tons July, 2010	SDO Population Projection July, 2015
Chaffee	17,027	18,645	3,729	14,916	17,873	19,571	3,914	15,657	19,832
Delta	29,364	32,154	6,431	25,723	31,069	34,021	6,804	27,216	35,612
Eagle	47,080	51,553	10,311	41,242	52,438	57,420	11,484	45,936	60,260
Garfield	49,073	53,735	10,747	42,988	56,738	62,128	12,426	49,702	68,807
Grand	13,909	15,230	3,046	12,184	14,914	16,331	3,266	13,065	16,748
Gunnison	14,469	15,844	3,169	12,675	15,356	16,815	3,363	13,452	16,414
Lake	7,255	7,944	1,589	6,355	7,362	8,061	1,612	6,449	9,426
Mesa	128,803	141,039	28,208	112,831	147,379	161,380	32,276	129,104	163,019
Moffat	12,945	14,175	2,835	11,340	13,880	15,199	3,040	12,159	14,800
Montrose	36,914	40,421	8,084	32,337	41,484	45,425	9,085	36,340	47,618
Pitkin	16,129	17,661	3,532	14,129	17,176	18,808	3,762	15,046	19,009
Rio Blanco	5,786	6,336	1,267	5,069	6,793	7,438	1,488	5,951	7,966
Routt	21,413	23,447	4,689	18,758	23,570	25,809	5,162	20,647	26,636
TOTALS:	400,167	438,183	87,637	350,546	446,032	488,405	97,681	390,724	506,147

Population Data updated by the Colorado Division of Local Government, Demography Office to incorporate Census 2010 data.

TABLE 3. WASTE GENERATION ESTIMATES BY COUNTY, 5 YEAR INCREMENTS, 2005 - 2030

COUNTIES	Waste Generation in Tons July, 2015	Waste Diversion in Tons July, 2015	Net Waste Disposal in Tons July, 2015	SDO Population Projection July, 2020	Waste Generation in Tons July, 2020	Waste Diversion in Tons July, 2020	Net Waste Disposal in Tons July, 2020	SDO Population Projection July, 2025	Waste Generation in Tons July, 2025
Chaffee	21,716	4,343	17,373	22,982	25,165	5,033	20,132	25,573	28,002
Delta	38,995	7,799	31,196	41,445	45,382	9,076	36,306	47,601	52,123
Eagle	65,985	13,197	52,788	68,299	74,787	14,957	59,830	73,262	80,222
Garfield	75,344	15,069	60,275	88,490	96,897	19,379	77,517	103,561	113,399
Grand	18,339	3,668	14,671	19,665	21,533	4,307	17,227	22,302	24,421
Gunnison	17,973	3,595	14,379	17,786	19,476	3,895	15,581	18,998	20,803
Lake	10,321	2,064	8,257	11,689	12,799	2,560	10,240	14,023	15,355
Mesa	178,506	35,701	142,805	180,949	198,139	39,628	158,511	196,913	215,620
Moffat	16,206	3,241	12,965	16,812	18,409	3,682	14,727	18,973	20,775
Montrose	52,142	10,428	41,713	54,806	60,013	12,003	48,010	62,140	68,043
Pitkin	20,815	4,163	16,652	21,260	23,280	4,656	18,624	23,569	25,808
Rio Blanco	8,723	1,745	6,978	9,476	10,376	2,075	8,301	10,814	11,841
Routt	29,166	5,833	23,333	30,480	33,376	6,675	26,700	34,675	37,969
TOTALS:	554,231	110,846		584,139	639,632	127,926	511,706	652,404	714,382

Population Data updated by the Colorado Division of Local Government, Demography Office to incorporate Census 2010 data.

	Waste Diversion in Tons	Net Waste Disposal in Tons	SDO Population Projection	Waste Generation in Tons	Waste Diversion in Tons	Net Waste Disposal in Tons
COUNTIES	July, 2025	July, 2025	July, 2030	July, 2030	July, 2030	July, 2030
Chaffee	5,600	22,402	27,589	30,210	6,042	24,168
Delta	10,425	41,698	52,962	57,993	11,599	46,395
Eagle	16,044	64,178	80,826	88,504	17,701	70,804
Garfield	22,680	90,719	116,155	127,190	25,438	101,752
Grand	4,884	19,537	24,817	27,175	5,435	21,740
Gunnison	4,161	16,642	20,048	21,953	4,391	17,562
Lake	3,071	12,284	16,588	18,164	3,633	14,531
Mesa	43,124	172,496	212,772	232,985	46,597	186,388
Moffat	4,155	16,620	20,052	21,957	4,391	17,566
Montrose	13,609	54,435	69,179	75,751	15,150	60,601
Pitkin	5,162	20,646	25,898	28,358	5,672	22,687
Rio Blanco	2,368	9,473	12,024	13,166	2,633	10,533
Routt	7,594	30,375	39,062	42,773	8,555	34,218
TOTALS:	142,876	571,506	717,972	786,179	157,236	628,943

Population Data updated by the Colorado Division of Local Government, Demography Office to incorporate Census 2010 data.

CalYear	Facility	County	Gallon Quantity	CY Quantity
2010	CHAFFEE COUNTY LANDFILL	CHAFFEE	3,280	16,400
2011	CB INDUSTRIES COMPOSTING	DELTA	690	3,450
2012	CB INDUSTRIES COMPOSTING	DELTA	869	4,345
2013	CB INDUSTRIES COMPOSTING	DELTA	888	4,440
2009	EAGLE COUNTY LANDFILL	EAGLE	48	242
2010	EAGLE COUNTY LANDFILL	EAGLE	42	208
2011	EAGLE COUNTY LANDFILL	EAGLE	26	131
2012	EAGLE COUNTY LANDFILL	EAGLE	14	72
2013	EAGLE COUNTY LANDFILL	EAGLE	6	32
2009	SOUTH CANYON SWDS	GARFIELD	4,388	21,940
2010	SOUTH CANYON SWDS	GARFIELD	4,198	20,992
2011	SOUTH CANYON SWDS	GARFIELD	2,980	14,900
2012	SOUTH CANYON SWDS	GARFIELD	2,571	12,855
2013	SOUTH CANYON SWDS	GARFIELD	3,399	16,995
2009	WEST GARFIELD SWDS LANDFILL	GARFIELD	4,299	21,495
2010	WEST GARFIELD SWDS LANDFILL	GARFIELD	5,399	26,994
2011	WEST GARFIELD SWDS LANDFILL	GARFIELD	227	1,135
2012	WEST GARFIELD SWDS LANDFILL	GARFIELD	281	1,370
2013	WEST GARFIELD SWDS LANDFILL	GARFIELD	475	2,377
2009	LAKE COUNTY LANDFILL	LAKE	10	50
2009	LAKE COUNTY LANDFILL	LAKE	35	173
2009	LAKE COUNTY LANDFILL	LAKE	33	163
2009	LAKE COUNTY LANDFILL	LAKE	56	279
2009	LAKE COUNTY LANDFILL	LAKE	133	665
2010	LAKE COUNTY LANDFILL	LAKE	118	592
2011	LAKE COUNTY LANDFILL	LAKE	252	1,260
2012	LAKE COUNTY LANDFILL	LAKE	131	654
2013	LAKE COUNTY LANDFILL	LAKE	105	526
2010	BLACK MOUNTAIN DISPOSAL	MESA	40	200
2011	BLACK MOUNTAIN DISPOSAL	MESA	3,190	15,952
2009	DEER CREEK SOLID WASTE FACILITY	MESA	4,423	22,117
2010	DEER CREEK SOLID WASTE FACILITY	MESA	1,216	6,080
2011	DEER CREEK SOLID WASTE FACILITY	MESA	1,057	5,285
2012	DEER CREEK SOLID WASTE FACILITY	MESA	510	2,550
2013	DEER CREEK SOLID WASTE FACILITY	MESA	5,036	25,180
2013	GOODWIN SERVICES	MESA	790	3,950
2009	GREAT DIVIDE DISPOSAL FACILITY	MOFFAT	13,030	65,151
2010	GREAT DIVIDE DISPOSAL FACILITY	MOFFAT	18,180	90,898
2011	GREAT DIVIDE DISPOSAL FACILITY	MOFFAT	6,652	33,260
2012	GREAT DIVIDE DISPOSAL FACILITY	MOFFAT	10,502	41,732
2013	GREAT DIVIDE DISPOSAL FACILITY	MOFFAT	2,020	10,099
2009	80 PONDS (REAMS CONSTRUCTION CO)	MONTROSE	10,564	52,819
2010	80 PONDS (REAMS CONSTRUCTION CO)	MONTROSE	4,295	21,477
2011	80 PONDS (REAMS CONSTRUCTION CO)	MONTROSE	18,266	91,328
2012	80 PONDS (REAMS CONSTRUCTION CO)	MONTROSE	5,064	25,322
2013	80 PONDS (REAMS CONSTRUCTION CO)	MONTROSE	6,015	30,074
2010	MONTROSE SWDS	MONTROSE	7,045	35,227

CalYear	Facility	County	Gallon Quantity	CY Quantity
2009	PEACOCK ON-SITE DISPOSAL	RIO BLANCO	11,751	58,753
2010	PEACOCK ON-SITE DISPOSAL	RIO BLANCO	1,875	9,375
2011	PEACOCK ON-SITE DISPOSAL	RIO BLANCO	3,949	19,744
2009	PICEANCE CREEK PRODUCED WATER DISPOSAL	RIO BLANCO	776	3,880
2010	PICEANCE CREEK PRODUCED WATER DISPOSAL	RIO BLANCO	5,139	50,310
2009	RN INDUSTRIES - RANGELY	RIO BLANCO	31,875	159,375
2010	RN INDUSTRIES - RANGELY	RIO BLANCO	18,898	94,490
2011	RN INDUSTRIES - RANGELY	RIO BLANCO	2,046	10,230
2011	RN INDUSTRIES - RANGELY	RIO BLANCO	1,694	8,470
2011	RN INDUSTRIES - RANGELY	RIO BLANCO	1,803	9,015
2011	RN INDUSTRIES - RANGELY	RIO BLANCO	790	3,950
2011	RN INDUSTRIES - RANGELY	RIO BLANCO	6,333	31,665
2012	RN INDUSTRIES - RANGELY	RIO BLANCO	3,351	16,755
2013	RN INDUSTRIES - RANGELY	RIO BLANCO	0	0
2010	RN Industries	RIO BLANCO	438	2,190
2011	RN Industries	RIO BLANCO	10,188	50,940
2012	RN Industries	RIO BLANCO	5,893	29,465
2013	RN Industries	RIO BLANCO	2,430	12,150
2009	MILNER LANDFILL	ROUTT	21	106
2010	MILNER LANDFILL	ROUTT	23	114
2011	MILNER LANDFILL	ROUTT	67	335
2012	MILNER LANDFILL	ROUTT	31	154
2013	MILNER LANDFILL	ROUTT	2,364	11,819
			Thousands of Gallons	**Cubic Yards**
	2009 TOTALS		**81,309**	**406,543**
	2010 TOTALS		**70,186**	**375,547**
	2011 TOTALS		**53,877**	**269,387**
	2012 TOTALS		**32,408**	**151,225**
	2013 TOTALS		**22,738**	**113,691**
NOTES:	1. Data reported quarterly to the CDPHE.			
	2. Not all data was reported each quarter.			
	3. The data for gallons of septage are reported in units of thousands of gallons.			
	4. Database provided by CDPHE, March 2014.			
	5. State CDPHE records represented above do not reflect the landfill's septage quantity records which are used in the SSWMP.			

Number	County	Facility	Type	Cert of RegID	City	2012 Pickups from Colorado Sources	In State Waste Grease (gallons)	Out-of-State Pickups	Out-of-State Waste Grease (gallons)	In-State Waste Grease Deliveries	In-State Waste Grease Delivered (gallons)
1	Delta County	CB Industries - Delta, Inc.	WG Facility	38	Austin	No data	N/A	N/A	N/A	N/A	N/A
2	Eagle County	Plumbing Systems, Inc.	WG Facility	54	Edwards	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential
3	Garfield County	Mountain Roll-off	WG Transporter	52	Carbondale	No data-did no waste grease hauling in 2012					
4	Garfield County	B&R Septic Service, Inc.	WG Transporter	4	Carbondale	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential
5	Garfield County	All Valley Resource, LLC	WG Transporter	16	Carbondale	158	46,800	0	0	105	46,800
6	Garfield County	South Canyon Landfill	WG Facility	34	Glenwood Springs		N/A	N/A	N/A	N/A	N/A
7	Garfield County	United Site Services/ fka/Down Valley Septic LLC	WG Transporter	58	Rifle	7	8,000	0	0	7	8,000
	Garfield County	Cacaloco Compost Inc.	Not registered but WG Facility	28	Rifle	N/A	N/A	N/A	N/A	N/A	N/A
8	Garfield County	Warren Industries, Inc. dba Roto Rooter Plumbing	WG Transporter	66	Glenwood Springs	337	329,440	0	0	250	329,440
9	Gunnison County	Schmalz Construction, Ltd.	WG Transporter	62	Gunnison	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential
10	Mesa County	Goodwin Services	WG Transporter/WG Facility	17	Whitewater	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential
11	Mesa County	Warren Industries, Inc. dba Roto Rooter Plumbing	WG Transporter	67	Grand Junction	No data -Did not register as a waste grease transporter until 2013					

Number	County	Facility	Type	Cert of RegID	City	2012 Pickups from Colorado Sources	In State Waste Grease (gallons)	Out-of-State Pickups	Out-of-State Waste Grease (gallons)	In-State Waste Grease Deliveries	In-State Waste Grease Delivered (gallons)
12	Montrose County	Power Business Group/dba/Benjamin Franklin Plumbing	WG Transporter	44	Montrose	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential
13	Montrose County	Widegren Holdings Inc. dba A Rooter-Man	WG Transporter	32	Montrose	32	31,564	0	0	32	31,564
14	Montrose County	Eagle Plumbing & Septic	WG Transporter	35	Montrose	No data	No data	No data	No data	No data	No data
15	Pitkin County	Mike Jenrette Services	WG Transporter	63	Aspen	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential
16	Rio Blanco	Redi Services LLC	WG Transporter	43	Meeker	No data-did no waste grease hauling in 2012					
	TOTALS:					534	415,804	-	-	394	415,804

TABLE 5. WASTE GREASE TRANSPORTERS AND FACILITIES IN THE STUDY AREA

Facility	Out-of-State Waste Grease Deliveries	Out-of-State Waste Grease Delivered (gallons)	Destination	County	Amount Delivered (gallons)	Destination	County	Amount Delivered (gallons)	Waste Grease Loads Received/ Sent Off-site	Waste Grease Processed (gallons)	Waste Grease Land Applied (gallons)	Waste Grease Disposed (gallons)	Amount stored on-site at end of 2012
CB Industries - Delta, Inc.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	135,381	135,381	0	0	0
Plumbing Systems, Inc.	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	N/A	N/A	N/A	N/A	N/A
Mountain Roll-off									N/A	N/A	N/A	N/A	N/A
B&R Septic Service, Inc.	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	N/A	N/A	N/A	N/A	N/A
All Valley Resource, LLC	0	0	South Canyon Landfill	Garfield					N/A	N/A	N/A	N/A	N/A
South Canyon Landfill	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	No Data	395,305	0	0	0
United Site Services/ fka/Down Valley Septic LLC	0	0	South Canyon Landfill	Garfield	No data	No data	No data	No data	N/A	N/A	N/A	N/A	N/A
Cacaloco Compost Inc.	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	8	10,535	0	0	0
Warren Industries, Inc. dba Roto Rooter Plumbing	0	0	South Canyon Landfill	Garfield	197,845	Persigo WWTF	Mesa	131,595	N/A	N/A	N/A	N/A	N/A
Schmalz Construction, Ltd.	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	N/A	N/A	N/A	N/A	N/A
Goodwin Services	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	N/A	N/A	N/A	N/A	N/A
Warren Industries, Inc. dba Roto Rooter Plumbing									N/A	N/A	N/A	N/A	N/A

TABLE 5. WASTE GREASE TRANSPORTERS AND FACILITIES IN THE STUDY AREA

Facility	Out-of-State Waste Grease Deliveries	Out-of-State Waste Grease Delivered (gallons)	Destination	County	Amount Delivered (gallons)	Destination	County	Amount Delivered (gallons)	Waste Grease Loads Received/ Sent Off-site	Waste Grease Processed (gallons)	Waste Grease Land Applied (gallons)	Waste Grease Disposed (gallons)	Amount stored on-site at end of 2012
Power Business ~~Group/dba/Benjamin~~ Franklin Plumbing	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	N/A	N/A	N/A	N/A	N/A
Widegren Holdings Inc. dba A Rooter-Man	0	0	CB Industries	Delta	31,564	No data	No data	No data	N/A	N/A	N/A	N/A	N/A
Eagle Plumbing & Septic	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data	No data
Mike Jenrette Services	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	Confidential	N/A	N/A	N/A	N/A	N/A
Redi Services LLC									N/A	N/A	N/A	N/A	N/A
	-	-			229,409	-	-	131,595	135,389	541,221	-	-	-

TABLE 6. HISTORIC CONTAMINATED SOILS SUMMARY 2009 TO 2013

Year	Facility	County	Tons Quantity	Cubic Yards Quantity
2009	CHAFFEE COUNTY LANDFILL	CHAFFEE	414	311
2010	CHAFFEE COUNTY LANDFILL	CHAFFEE	17	13
2011	CB INDUSTRIES COMPOSTING	DELTA	293	220
2012	CB INDUSTRIES COMPOSTING	DELTA	440	330
2010	ADOBE BUTTES LANDFILL	DELTA	4,727	3,545
2012	ADOBE BUTTES LANDFILL	DELTA	2,572	1,929
2009	EAGLE COUNTY LANDFILL	EAGLE	8,485	6,363
2010	EAGLE COUNTY LANDFILL	EAGLE	75	56
2011	EAGLE COUNTY LANDFILL	EAGLE	822	617
2012	EAGLE COUNTY LANDFILL	EAGLE	1,509	1,132
2013	EAGLE COUNTY LANDFILL	EAGLE	756	567
2009	SOUTH CANYON SWDS	GARFIELD	1,227	920
2010	SOUTH CANYON SWDS	GARFIELD	1,974	1,480
2011	SOUTH CANYON SWDS	GARFIELD	16,646	12,485
2012	SOUTH CANYON SWDS	GARFIELD	33,380	25,035
2013	SOUTH CANYON SWDS	GARFIELD	10,410	7,807
2009	WEST GARFIELD SWDS LANDFILL	GARFIELD	6,122	4,592
2010	WEST GARFIELD SWDS LANDFILL	GARFIELD	537	403
2011	WEST GARFIELD SWDS LANDFILL	GARFIELD	165	124
2012	WEST GARFIELD SWDS LANDFILL	GARFIELD	565	424
2013	WEST GARFIELD SWDS LANDFILL	GARFIELD	2,524	1,893
2009	MESA COUNTY LANDFILL	MESA	1,019	764
2010	MESA COUNTY LANDFILL	MESA	111	83
2011	MESA COUNTY LANDFILL	MESA	3,835	2,876
2012	MESA COUNTY LANDFILL	MESA	6,496	4,872
2013	MESA COUNTY LANDFILL	MESA	5,453	4,089
2009	MOFFAT COUNTY REGIONAL LANDFILL	MOFFAT	138	104
2010	MOFFAT COUNTY REGIONAL LANDFILL	MOFFAT	144	108
2011	MOFFAT COUNTY REGIONAL LANDFILL	MOFFAT	657	493
2012	MOFFAT COUNTY REGIONAL LANDFILL	MOFFAT	734	551
2013	MOFFAT COUNTY REGIONAL LANDFILL	MOFFAT	493	370
2010	80 PONDS (REAMS CONSTRUCTION CO)	MONTROSE	884	663
2009	MONTROSE SWDS	MONTROSE	726	545
2010	MONTROSE SWDS	MONTROSE	5,784	4,338
2011	MONTROSE SWDS	MONTROSE	294	220
2012	MONTROSE SWDS	MONTROSE	349	262
2013	MONTROSE SWDS	MONTROSE	73	55
2009	PITKIN CTY SOLID WASTE CENTER	PITKIN	1,435	1,076

TABLE 6. HISTORIC CONTAMINATED SOILS SUMMARY 2009 TO 2013

Year	Facility	County	Tons Quantity	Cubic Yards Quantity
2010	PITKIN CTY SOLID WASTE CENTER	PITKIN	5,944	4,458
2011	PITKIN CTY SOLID WASTE CENTER	PITKIN	437	328
2012	PITKIN CTY SOLID WASTE CENTER	PITKIN	12,747	9,560
2013	PITKIN CTY SOLID WASTE CENTER	PITKIN	18,670	3,482
2010	WRAY GULCH LANDFILL	RIO BLANCO	34,500	25,875
2011	WRAY GULCH LANDFILL	RIO BLANCO	36,161	27,120
2012	WRAY GULCH LANDFILL	RIO BLANCO	53,120	39,840
2013	WRAY GULCH LANDFILL	RIO BLANCO	32,310	24,233
2010	MILNER LANDFILL	ROUTT	10	8
2012	MILNER LANDFILL	ROUTT	16,790	12,593
2013	MILNER LANDFILL	ROUTT	3,714	2,786

	TONS	CUBIC YARDS
2009 TOTALS	**19,566**	**14,675**
2010 TOTALS	**52,920**	**39,690**
2011 TOTALS	**59,310**	**44,483**
2012 TOTALS	**128,263**	**96,197**
2013 TOTALS	**74,403**	**45,281**

NOTES:
1. Data reported quarterly to CDPHE.
2. Not all data was reported each quarter.
3. Database provided by CDPHE, March 2014.

TABLE 7. ORGANIC WASTE ESTIMATES IN EAGLE, GARFIELD AND PITKIN COUNTIES, 2009

	EAGLE COUNTY	GARFIELD COUNTY		PITKIN COUNTY	TOTALS
Material		West Garfield County Landfill	South Canyon Landfill		
	2009 Tons	2009 Tons	2009 Tons	2009 Tons	2009 Tons
Landfilled					
Recyclables	16,976	3,914	9,313	5,853	36,056
Yard Waste/Organics	17,151	3,954	9,409	6,043	36,557
HHW & E Waste	525	121	288	185	1,119
Diverted Tons					
Recyclables	6,020	5,663	(Combined with WGCL)	5,853	17,536
Yard Waste/Organics	6,082	4,296	(Combined with WGCL)	3,636	14,014
HHW & E Waste	28	60		74	162
Total MSW from Diverted waste and Landfilled that included recylables, organics, HHW and E waste					
Recyclables	**22,996**	**18,890**		**11,706**	**53,592**
Yard Waste/Organics	**23,233**	**17,659**		**9,679**	**50,571**
HHW & E Waste	**553**	**181**		**259**	**993**
Source: 2009 Waste Diversion Quantity Report LBA Associates, Eagle, Garfield & Pitkin Tri-County Region					
Organics includes yard waste, food waste, wood chips and clean wood.					

COUNTY	FACILITY NAME	Year of Data	Materials Accepted	Total Material Collected (Cubic Yards)	Finished Product shipped off-site, CY	Finished product stored on site at end of year, CY	Compost Facility Classification	Type of Operation	Notes	Processed Animals Received	Processed Animals Used	Biosolids Received	Biosolids Used	Food Waste Received	Food Waste Used
Delta	CB Industries Composting	2009	Biosolids, Grease sludges, septage, wood chips, cured compost,	5,738	247	1,518	I	Static Pile				2,794	168		
Delta	CB Industries Composting	2010	Biosolids, Grease sludges, septage, wood chips, cured compost,	5,073	0	2,373	I	Static Pile				2,092	983		
Delta	CB Industries Composting	2011	Biosolids, Grease sludges, septage, wood chips, cured compost,	3,263	26	2,268	I	Static Pile				2,112	520		
Delta	CB Industries Composting	2012	Biosolids, Grease sludges, septage, wood chips, cured compost,	5,175	27	2,903	I	Static Pile				2,748	384		
Garfield	South Canyon Solid Waste Disposal Site	2009	Biosolids, grass, manure, septage, tree/shrubs, hay, leaves, sawdust, wood chips. Clean C&D	21,281	580	2,200	I	Static Pile	11,455 Gallons Septage = 2,314,000 cy also accepted			2,619	2,619		
Garfield	South Canyon Solid Waste Disposal Site	2010	septage, tree/shrubs, hay, leaves, sawdust,	18,500	1,500	2,000	I	Static Pile	19,429 Gallons Septage =						
Garfield	South Canyon Solid Waste Disposal Site	2011	Grass, septage, tree/shrubs, leaves, wood chips.	16,354	711	7,400	I	Static Pile	13,892 gallons septage =						
Garfield	South Canyon Solid Waste Disposal Site	2012	Grass, septage, tree/shrubs, leaves, wood chips.	18,047	488	7,200	I	Static Pile	11455 gallons septage =						
Garfield	Cacaloco Compost, inc.	2011	Biosolids, food waste, liquid waste (Rifle WW), paper, grass, manure, septage, tree/shrub, wood chips, clean C&D	15,062	0	2,000	I	Static Pile				1,769	1,769	504	504
Mesa	Mesa County Landfill	2009	Tree/shrub, leaves	42,325	17,195	10,067	I	Windrow							
Mesa	Mesa County Landfill	2010	Tree/shrub, leaves	49,480	10,164	13,805	I	Windrow							
Mesa	Mesa County Landfill	2011	Tree/shrub, leaves	41,205	10,653	10,139	I	Windrow							

COUNTY	FACILITY NAME	Year of Data	Materials Accepted	Total Material Collected (Cubic Yards)	Finished Product shipped off-site, CY	Finished product stored on site at end of year, CY	Compost Facility Classification	Type of Operation	Notes	Processed Animals Received	Processed Animals Used	Biosolids Received	Biosolids Used	Food Waste Received	Food Waste Used
Mesa	Mesa County Landfill	2012	Tree/shrub, leaves	38,392	13,959	8,732	I	Windrow							
Mesa	Biosolids/Animal Mortalities	2009	No materials accepted	0	7,200	9,100	I	Aerated Static Pile		No materials reported.					
Mesa	Biosolids/Animal Mortalities	2010	Animal mortalities, biosolids, food waste	7,004	2,015	7,865	I	Aerated Static Pile		119	119	6,478	6,478	407	407
Mesa	Biosolids/Animal Mortalities	2011	No materials accepted	0	6,607	1,258	I	Aerated Static Pile		No materials reported.					
Pitkin	Pitkin County Solid Waste Center	2009	Biosolids, grass, manure, tree/shrub, wood chips	20,738	1,031	3,900	V	Aerated Static Pile				2,916	2,916		
Pitkin	Pitkin County Solid Waste Center	2010	Biosolids, manure, tree/shrub, leaves, wood chips, Clean C&D	20,740	3,457	0	V	Aerated Static Pile				2,790	2,790		
Pitkin	Pitkin County Solid Waste Center	2011	Biosolids, food waste, manure,Tree/shrub, leaves, wood chips, Clean C&D	29,523	1,029	0	V	Aerated Static Pile				2,921	2,921	68	68
Pitkin	Pitkin County Solid Waste Center	2012	Biosolids, food waste, grass, manure, Tree/shrub, leaves, wood chips, Clean C&D	34,338	15,092	2,020	V	Aerated Static Pile				2,944	2,944	1,007	1,007
Routt	Milner Landfill	2009	Biosolids, food waste,	10,118	0	7,760	I	Aerated Static Pile				2,568	2,568		
Routt	Milner Landfill	2010	Biosolids, food waste, wood chips	8,178	230	10,710	I	Aerated Static Pile				2,646	2,646	80 (Rifle Waste water)	80
Routt	Milner Landfill	2011	Biosolids, food waste, wood chips	9,601	325	12,812	I	Aerated Static Pile				2,255	2,255	945	945
TOTALS	2009			100,200	26,253	34,545					0	10,897	8,271	0	0
TOTALS	2010			108,975	17,366	36,753				119	119	14,006	12,897	0	487
TOTALS	2011			99,946	19,351	33,877				0	0	7,288	5,696	1,013	1,013
TOTALS	2012			95,952	29,566	20,855				0	0	5,692	3,328	1,007	1,007

COUNTY	FACILITY NAME	Liquid Waste Received	Liquid Waste Used	Paper Waste Received	Paper Waste Used	Sludges Received	Type	Sludges Used	Grass Received	Grass Used	Manure Received	Manure Used	Septage Received	Septeage Used	Tree/Shrub Received	Tree Shrub Used	Hay Received
Delta	CB Industries Composting					186	grease trap	186					888	888			
Delta	CB Industries Composting					155	grease trap	155					823	823			
Delta	CB Industries Composting					122	grease	122					586	583			
Delta	CB Industries Composting					135	grease	135					614	614			
Garfield	South Canyon Solid Waste Disposal Site								19	19	3	3	17,935	17,935	422	295	2
Garfield	South Canyon Solid Waste Disposal Site								400	400	50	50	3,924,666	3,924,666	8,250	6,600	250
Garfield	South Canyon Solid Waste Disposal Site			4,160	4,160				500	500			2,806,267	2,806,267	8,894	7,000	
Garfield	South Canyon Solid Waste Disposal Site			4,650	4,650				475	475			2,314,000	1,157,000	12,152	8,000	
Garfield	Cacaloco Compost, inc.	93	93	504	504				163	163	760	760	5,990	5,990	40	40	
Mesa	Mesa County Landfill														34,725	34,725	
Mesa	Mesa County Landfill														43,530	43,530	
Mesa	Mesa County Landfill														35,349	35,349	

COUNTY	FACILITY NAME	Liquid Waste Received	Liquid Waste Used	Paper Waste Received	Paper Waste Used	Sludges Received	Type	Sludges Used	Grass Received	Grass Used	Manure Received	Manure Used	Septage Received	Septeage Used	Tree/Shrub Received	Tree Shrub Used	Hay Received
Mesa	Mesa County Landfill														33,446	33,446	4,946
Mesa	Biosolids/Animal Mortalities																
Mesa	Biosolids/Animal Mortalities																
Mesa	Biosolids/Animal Mortalities																
Pitkin	Pitkin County Solid Waste Center								6,833	6,833	337	337			7,367	7,367	
Pitkin	Pitkin County Solid Waste Center										302	N/A			2,800	2,800	
Pitkin	Pitkin County Solid Waste Center										109	109			11,079	11,079	
Pitkin	Pitkin County Solid Waste Center								9,614	9,614	927	927			19,846	19,846	
Routt	Milner Landfill																
Routt	Milner Landfill																
Routt	Milner Landfill																
TOTALS	2009	0	0	0	0	186		186	6,852	6,852	340	340	18,823	18,823	42,514	42,387	2
TOTALS	2010	0	0	0	0	155		155	400	400	352	0	3,925,489	3,925,489	54,580	52,930	250
TOTALS	2011	0	0	4,160	4,160	122		122	500	500	109	109	2,806,853	2,806,850	55,322	53,428	0
TOTALS	2012	0	0	4,650	4,650	135		135	10,089	10,089	927	927	2,314,614	1,157,614	65,444	61,292	4,946

COUNTY	FACILITY NAME	Hay Used	Leaves received	Leaves used	Sawdust Received	Sawdust used	Wood Chips Received	Wood Chips Used	Clean C&D Received	Clean C&D Used	Cured Compost Received	Cured Compost Used	Type of Operation	Total Material Collected (Cubic Yards)	Feedstock onsite at beginning of year (CY)	Feedstock at end of year (CY)	Bulking Material beginning of year (CY)
Delta	CB Industries Composting						580	480			1,290	1,290	Static Pile	5,738			
Delta	CB Industries Composting						1,130	553			873	873	Static Pile	5,073	8,341	9,450	100
Delta	CB Industries Composting						146	568			300	300	Static Pile	3,263	9,450	11,042	677
Delta	CB Industries Composting						395	205			1,283	1,283	Static Pile	5,175	11,042	13,406	255
Garfield	South Canyon Solid Waste Disposal Site	2	100	100	2	2	25	25	102	71			Static Pile	21,281	0	0	250
Garfield	South Canyon Solid Waste Disposal Site	250	500	500	300	300	2,000	2,000	2,750	2,200			Static Pile	18,500	-	-	158
Garfield	South Canyon Solid Waste Disposal Site		700	700			2,100	2,100					Static Pile	16,354	0	0	100
Garfield	South Canyon Solid Waste Disposal Site		770	770									Static Pile	18047	0	0	200
Garfield	Cacaloco Compost, inc.						4,314	4,314	87	87			Static Pile	15,062	0	1,000	0
Mesa	Mesa County Landfill		7600	7600									Windrow	42,325	2,700	9,000	2,100
Mesa	Mesa County Landfill		5,950	5,950									Windrow	49,480	9,000	1,908	1,827
Mesa	Mesa County Landfill		5,856	5,856									Windrow	41,205	1,908	377	1,929

COUNTY	FACILITY NAME	Hay Used	Leaves received	Leaves used	Sawdust Received	Sawdust used	Wood Chips Received	Wood Chips Used	Clean C&D Received	Clean C&D Used	Cured Compost Received	Cured Compost Used	Type of Operation	Total Material Collected (Cubic Yards)	Feedstock onsite at beginning of year (CY)	Feedstock at end of year (CY)	Bulking Material beginning of year (CY)
Mesa	Mesa County Landfill	4,946											Windrow	38,392	377	616	1,915
Mesa	Biosolids/Animal Mortalities												Aerated Static Pile	-	2,100	2,400	-
Mesa	Biosolids/Animal Mortalities												Aerated Static Pile	7,004	2,400	3,762	5,200
Mesa	Biosolids/Animal Mortalities												Aerated Static Pile	-	-	-	1,200
Pitkin	Pitkin County Solid Waste Center						60	60					Aerated Static Pile	20,738	0	0	2,600
Pitkin	Pitkin County Solid Waste Center		11,185	11,185			1,103	1,103	2,560	2,560			Aerated Static Pile	20,740	-	-	8,000
Pitkin	Pitkin County Solid Waste Center		6,893	6,893			6,507	6,507	1,946	0			Aerated Static Pile	29,523	0	0	11,000
Pitkin	Pitkin County Solid Waste Center												Aerated Static Pile	34,338	-	-	-
Routt	Milner Landfill						7,550	7,550					Aerated Static Pile	10,118	657	603	1,314
Routt	Milner Landfill						5,452	5,452					Aerated Static Pile	8,178	603	586	1,245
Routt	Milner Landfill						640	640			5,761	5,761	Aerated Static Pile	9,601	586	774	909
TOTALS	2009	2	7,700	7,700	2	2	8,215	8,115	102	71	1,290	1,290		100,200	5,457	12,003	6,264
TOTALS	2010	250	17,635	17,635	300	300	9,685	9,108	5,310	4,760	873	873		108,975	20,344	15,706	16,530
TOTALS	2011	0	13,449	13,449	0	0	9,393	9,815	1,946	0	6,061	6,061		99,946	11,944	12,193	15,815
TOTALS	2012	4,946	770	770	0	0	395	205	0	0	1,283	1,283		95,952	11,419	14,022	2,370

COUNTY	FACILITY NAME	Bulking material end of year (CY)	Finished Product Stored on Site at beginning of year (CY)	Finished Product used onsite during the year (CY)	Finished Product shipped off-site (CY)	Finished product stored on site at end of year (CY)	Compost Facility Classification
Delta	CB Industries Composting		1,765	0	247	1,518	I
Delta	CB Industries Composting	677	1,518	-	-	2,373	I
Delta	CB Industries Composting	255	2,373	79	26	2,268	I
Delta	CB Industries Composting	445	2,268	-	27	2,903	I
Garfield	South Canyon Solid Waste Disposal Site	158	0	0	580	2,200	I
Garfield	South Canyon Solid Waste Disposal Site	300	2,200	-	1,500	2,000	I
Garfield	South Canyon Solid Waste Disposal Site	200	2,000	0	711	7,400	I
Garfield	South Canyon Solid Waste Disposal Site	270	7400	0	488	7200	I
Garfield	Cacaloco Compost, inc.	400	0	0	0	2,000	I
Mesa	Mesa County Landfill	1,827	10,500	-	17,195	10,067	I
Mesa	Mesa County Landfill	1,929	10,067	0	10,164	13,805	I
Mesa	Mesa County Landfill	1,915	13,805	-	10,653	10,139	I

COUNTY	FACILITY NAME	Bulking material end of year (CY)	Finished Product Stored on Site at beginning of year (CY)	Finished Product used onsite during the year (CY)	Finished Product shipped off-site (CY)	Finished product stored on site at end of year (CY)	Compost Facility Classification
Mesa	Mesa County Landfill	1,826	10,139	0	13,959	8,732	I
Mesa	Biosolids/Animal Mortalities	5,200	7,150	-	7,200	9,100	I
Mesa	Biosolids/Animal Mortalities	1,200	9,100	0	2,015	7,865	I
Mesa	Biosolids/Animal Mortalities	1,200	7,865	-	6,607	1,258	I
Pitkin	Pitkin County Solid Waste Center	8,000	1,500	0	1,031	3,900	V
Pitkin	Pitkin County Solid Waste Center	11,000	3,900	1,300	3,457	-	V
Pitkin	Pitkin County Solid Waste Center	14,000	0	471	1,029	0	V
Pitkin	Pitkin County Solid Waste Center	-	724	17,226	15,092	2,020	V
Routt	Milner Landfill	1,245	3,946	0	0	7,760	I
Routt	Milner Landfill	909	7,760	N/A	230	10,710	I
Routt	Milner Landfill	773	10,710	N/A	325	12,812	I
TOTALS	2009	16,430	24,861	0	26,253	34,545	
TOTALS	2010	16,015	34,545	0	17,366	36,753	
TOTALS	2011	18,343	36,753	0	19,351	33,877	
TOTALS	2012	2,541	20,531	17,226	29,566	20,855	

COUNTY	LABEL	FACILITY NAME	OWNER	OPERATOR	CITY	ZIPCODE	ACTIVE	COMMERCIAL	Subject to SW User Fee	Tons Received 2012	CUBIC YARDS RECEIVED 2012	2012 CONTAMINATED SOIL RECEIVED	2012 NON COMMERCIAL VEHICLES	2012 AUTOS/CARS/VANS	2012 SEPTAGE IN 1,000 GALLONS	ALL WASTE QUANTITIES IN CUBIC YARDS	ANTICIPATED CLOSURE DATE (1)	MAXIMUM WASTE ACCEPTANCE RATE IN TONS/YEAR
Chaffee	L1	Chaffee County Landfill	Chaffee County Commissioners	Chaffee County Landfill	Salida	80201	Yes	Yes	Yes	10,040	7,345	0	3,139	10,495	0	46,393	No data	No data
Delta	L2	Adobe Buttes Landfill	Gary Vance Delta County	Delta County	Eckert	81416	Yes	Yes	Yes	26,471	0	2,572	1,866	52	0	91,418	No data	No data
Eagle	L3	Eagle County Landfill	Eagle County Commissioners	Eagle County Road and Bridge Dept.	Wolcott	81655	Yes	Yes		61,487	0	1509	6,805	979	14	210,998	2022 (2)	142,718 (3)
Garfield	L4	South Canyon SWDS	City of Glenwood Springs	City of Glenwood Springs	Glenwood Springs	81601	Yes	Yes	Yes	51,806	15,917	33380	0	0	2,571	226,475	2020 (4)	74,423 (4)
Garfield	L5	West Garfield SWDS Landfill	Garfield County Commissioners	Garfield County Commissioners	Rifle	81650	Yes	Yes	Yes	17,191	0	565	7,098	667	274	64,039	2062	75,078 Cubic yards/year (4)
Grand	L6	Granby Landfill	Grand County Commissioners	Grand County Commissioners	Granby	80446	Yes	Yes	NO	No data	No data	No data	No data	No data	No data	0	No data	No data
Grand	L7	Kremmling Landfill	Grand County Commissioners	Grand County Commissioners	Kremmling	80446	Yes	Yes	No	No data	No data	No data	No data	No data	No data	0	No data	No data
Gunnison	L8	6 Mile Landfill	Gunnison County Commissioners	Gunnison County Commissioners	Gunnison	81230	Yes	Yes	Yes	No data	No data	No data	No data	No data	No data	0	2075	No data
Lake	L9	Lake County Landfill	Lake County Commissioners	Lake County Commissioners	Leadville	80461	Yes	Yes	Yes	0	10,271	0	9,804	1,256	131	17,873	No data	No data
Mesa	L10	Mesa County Landfill	Mesa County Commissioners	Mesa County Commissioners/Herzog Environmental	Grand Junction	81503	Yes	Yes	Yes	155,579	0	6,496	0	0	0	523,416	2055	No data
Mesa	L11	5-Road Disposal	5-Road Disposal	5-Road Disposal/ALTUS Environmental, LLC (Consultant)	Mack	81525	Yes	Yes	No	0	1,776	0	0	0	0	1,776	2042	No data
Moffat	L12	Moffat County Regional Landfill	Moffat County Road and Bridge	N/A	Craig	81625	Yes	Yes	Yes	12,986	0	734	0	0	0	43,833	2041	No data
Montrose	L13	Broad Canyon Landfill	TS Landfill Corporation	TS Landfill Corporation	Grand Junction	81506	Yes	Yes	Yes	0	77,401	0	824	0	0	77,950	No data	No data
Montrose	L14	Montrose SWDS	Montrose County Finance	Waste Management, Inc.	Montrose	81401	Yes	Yes	Yes	25,327	0	349	5,473	1,856	0	88,941	2028 (5)	154,700 (6)
Pitkin	L15	Pitkin County Solid Waste Center	Pitkin County Recycling Center	Pitkin County Recycling Center/Heartland Environmental (Contractor)	Aspen	81611	Yes	No	Yes	42,093	9,188	12,747	0	0	0	159,042	2030 (1)	No data
Rio Blanco	L16	Wray Gulch Landfill	Rio Blanco County Commissioners	Rio Blanco County Commissioners	Meeker	81641	Yes	Yes	Yes	7,912	0	53,120	94	75	0	66,367	No data	No data
Routt	L17	Milner Landfill	Twin Landfill Corp of Fremont County	Twin Landfill Corp of Fremont County	Steamboat Springs	80487	Yes	Yes	Yes	26,595	6,921	19,777	1,967	811	31	136,100	2079 (7)	No data
Mesa	LS1	Goodwin/Deer Creek Solid Waste Disposal Facility	Goodwin Services , Inc.	Alanco Energy Services	Whitewater	81527	Yes	Yes	No	0	0	0	0	0	510	2,550	No data	No data
Moffat	LS2	Great Divide Disposal Capacity	Bruce Barnes	Bruce Barnes	Maybell	81640	Yes	N/A	Yes	0	0	0	0	0	10,502	41,732	No data	No data
Montrose	LS3	80 ponds (Reams Construction Co)	Diana Reams/Reams Construction Co.	Diana Reems, Reams Construction Co.	Naturita	81422	Yes	Yes	Yes	75	13,964	0	0	0	5,064	39,286	No data	No data
Rio Blanco	LS4	RN Industries	Jana Terry	Piceance Creek Produced Water Disposal/RN Industries	Rangeley	81648	Yes	Yes	Yes	0	0	0	0	0	5,893	29,465	No data	No data
Rio Blanco	LS5	RN Industries-Rangely	Jana Cairoli/RN Industries	RN Industries	Rangeley	81648	Yes	Yes	Yes	0	0	0	0	0	3,351	16,755	No date	No data

Notes:
1. Closure date taken from the Solid Waste Facility Inventory Form for each landfill.
2. Eagle County Landfill Revised Technical Review Document (Mar 1, 2007)
3. Waste Acceptance Rates Taken From the Eagle County Revised Permit (Mar 1, 2007).
4. Rate and Service Study, City of Glenwood Springs, Final, July 22, 2013.
5. WM Montrose SWDS Technical Permit
6. WM SWDS Montrose Revised Permit (February 1, 2012)
7. Twin Landfill Amended Special Use Permit PP2013-039.

TABLE 10. 2013 UTAH LANDFILL FACILITY INVENTORY (2012 DATA)

General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type					Residential Tip Fees $/ton	Large Load Tip Fees $/ton	Commercial Tip Fees $/ton	PCS Tip Fees $/ton	NOTES
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					
Beaver (Southwest Utah Public Health Department)																			
Beaver County SSD 5 MSW Landfill		Mike Neilsen	Landfill Manager	Beaver County Special Service District #5	PO Box 278	Milford	UT	84751	(435) 386-2530	7,304	1,345	0	0	46					
Beaver County SSD 5 CD Landfill	IVb	Mike Nielsen	Landfill Manager	Waste Management Service District #5	PO Box 278	Milford	UT	84751-0278	(435) 386-2530	0	1,128	0	0	24					
Box Elder County (Bear River Health Department)																			
Box Elder-Little Mountain MSW Landfill		Gina C. Allen	Director of Solid Waste	Box Elder County	01 South Main Street	Brigham City	UT	84302	(435) 730-3153	25,059	2,200	1,650	0	325					
Utah Landfill and Ballast LLC-Promontory MSW Landfill		Garry L. Bolinder	Managing Member	Utah Landfill and Ballast, LLC	1830 West Highway 112	Tooele	UT	84704	(435) 843-1550	No Waste Disposed In 2012									
Utah Test and Training Range-Oasis MSW Landfill	II	Wayne Downs	Solid Waste Program Manager	Hill Air Force Base	75 CEG/CENE	Hill AFB	UT	84056-5137	(801) 777-4325	76	55	0	0	0					
Western Metals Recycling LLC Plymouth Landfill	IIIb	Eric Logsdon	Corp. Environmental Manager	Western Metals Recycling, LLC	300 Pike Street	Cincinnati	OH	45202	(513) 419-6200	0	0	119,648	0	0	N/A	N/A	N/A		Nonhazardous industrial waste generated on-site, including waste generated during the processing of scrap metal, non-metallic auto fluff and railroad car parts, and non-hazardous contaminated soil. No out of
ATK Launch Systems-Promontory Landfill	IIIb	Robert Ingersoll	Director, Environmental Services	ATK Thiokol Inc.	PO Box 707 M/S 301	Brigham City	UT	84302-0689	(801) 251-4643	0	0	2,324	0	131					
Nucor Bar Mill Group Landfill	IIIb	Doug Jones	Environmental Department Manager	Nucor Steel	PO Box 100	Plymouth	UT	84330	(435) 458-2300	0	0	2,167	0	0					
Cache County (Bear River Health Department)																			
Logan City-Cache County MSW Landfill		Issa Hamud	Environmental Department Director	City of Logan	450 North 1000 West	Logan	UT	84321	(435) 716-9752	73,217	0	0	0	7,320					
Logan City-Cache County CD Landfill	IVb	Issa Hamud	Environmental Department Director	City of Logan	450 North 1000 West	Logan	UT	84321	(435) 716-9752	0	25,930	0	0	0					
Carbon County (Southeastern Utah District Health Department)																			
Carbon County CD Landfill	IVb	John Jones	Commissioner	Carbon County	120 East Main	Price	UT	84501	(435) 636-3271	0	18,132	0	0	259					
ECDC Environmental	V	Darin Olson	Environmental Manager	ECDC Environmental LC	PO Box 69	East Carbon	UT	84520	(435) 888-4418	16,006	0	295,756	0	0	$22/ton	N/A	N/A	N/A	287,730 tons of industrial waste from out-of-state.
Daggett County (Tri-County Health Department)																			
Manila MSW Landfill	II	Chuck Dickison	Mayor	Manila Town	PO Box 189	Manila	UT	84064	(435) 784-3143	4,000	0	0	0	0					
General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type									
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					
Davis County (Davis County Health Department)																			
Wasatch Integrated Waste Management District MSW Landfill	I	Nathan Rich	Director	Wasatch Integrated Waste Management District	PO Box 900	Layton	UT	84041-0900	(801) 614-5601	132,525	0	32,181	0	5,378	$5/load		$25/ton	$82/ton	All industrial waste in-county; 45 tons total from out of state.
Bountiful City MSW Landfill	I	Todd Christensen	Assistant City Engineer	Bountiful City Corporation	PO Box 140102	Salt Lake City	UT	84114-0102	(801) 298-6125	34,537	20,890	0	0	386	$3/load	$6/load	$25	Prohibited	
Hill Air Force Base CD Landfill	IVb	Wayne Downs	Solid Waste Program Manager	Department of the Air Force	7274 Wardleigh Road 75 CEG/CENE	Hill AFB	UT	84056-5137	(801) 777-8791	0	40,545	0	0	0					
Duchesne County (Tri-County Health Department)																			
Duchesne_Wasatch- Bluebench MSW Landfill	I	Hal Giles	Manager of Operations	Duchesne County	PO Box 356	Duchesne	UT	84021	(435) 738-2468	36,878	7,597	0	0	142					
Emery County (Southeastern Utah District Health Department)																			
Emery County MSW Landfill	I	Wayde Nielsen	Road Department Supervisor	Emery County	PO Box 889	Castle Dale	UT	84513	(435) 381-5450	10,390	0	0	0	129					
PacifiCorp-Hunter Landfill	IIIb	Tyson Ekker	Environmental Engineer	PacifiCorp Power Supply	PO Box 569	Castledale	UT	84513	(435) 748-6274	0	0	397	0	748					
PacifiCorp-Huntington Landfill	IIIb	Darce Guyman	Environmental Analyst	PacifiCorp Energy	PO Box 680	Huntington	UT	84528	(435) 687-4305	0	0	169	0	0					
Nielson Construction Landfill	V	W. Wayne McCandless	Environmental Manager	Nielson Construction Co.	PO Box 620	Huntington	UT	84528	(435) 687-2494	0	0	2,905	0	600					
Green River Landfill LLC-Solitude MSW Landfill	V	Marlene P. Wheaton	Vice President, Treasurer	TransLoad America Inc.	76 South Orange Avenue, Suite 208	South Orange	NJ	7079	(973) 762-6060	No Waste Disposed In 2012									
Garfield County (Southwest Utah Public Health Department)																			
Garfield County-Johns Valley MSW Landfill	I	Brian Bremner	County Engineer	Garfield County	PO Box 77	Panguitch	UT	84759	(435) 676-1119	8,148	2,487	0	0	8					
Garfield County-Ticaboo MSW Landfill	II	Brian Bremner	County Engineer	Garfield County	PO Box 77	Panguitch	UT	84759	(435) 676-1119	977	0	0	0	0					
Escalante CD Landfill	IVb	Vickie Schulkoski	City Recorder	Escalante City	PO Box 189	Escalante	UT	84726	(435) 826-4644	0	420	0	0	160					
Panguitch CD Landfill	IVb	Lori Talbot	City Manager	Panguitch City Corporation	PO Box 75	Panguitch	UT	84759	(435) 676-8585	0	600	0	0	60					
Boulder Town CD Landfill	IVb	Bill Muse	Mayor	Boulder Town	PO Box 1329	Boulder Town	UT	84716	(435) 335-7300	0	99	0	0	30					
Antimony Town CD Landfill	IVb	Leon Twitchell	Councilman	Town of Antimony	PO 120046	Antimony	UT	84712	(435) 624-3227	0	10	0	0	0					
Garfield County-Dead Animal Landfill	IVb	Brian Bremner	County Engineer	Garfield County	PO Box 77	Panguitch	UT	84759	(435) 676-1119	0	150	0	0	0					
General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type									

General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type					Residential	Large Load	Commercial	PCS	NOTES
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					
Grand County (Southeastern Utah District Health Department)																			
Grand County-Klondike MSW Landfill	I	Tom Edwards	District Manager	Solid Waste Management Special Service District #1	PO Box 980	Moab	UT	84532	(435) 259-3867	8,782	0	0	0	0					
Intrepid Potash-Moab Landfill	IIIb	Kevin Harmison	Production Superintendent	Intrepid Potash - Moab LLC	PO Box 1208	Moab	UT	84582	(435) 259-1213	0	0	36	0	0					
Grand County-Moab CD Landfill	IVb	Tom Edwards	District Manager	Solid Waste Management Special Service District #1	PO Box 980	Moab	UT	84532	(435) 259-3867	0	16,916	0	0	0					
Iron County (Southwest Utah Public Health Department)																			
Iron County MSW Landfill	I	Jaren C. Scott	Solid Waste Supervisor	Iron County	PO Box 743	Cedar City	UT	84720	(435) 865-7015	37,164	5,073	0	0	176					
CML Metals-Comstock Mountain Lion Landfill	IIIb	Dan Crackel	Technical Services Manager	CML Metals Corporation	2708 South Comstock Road	Cedar City	UT	84720-1901	(435) 587-5370	No Waste Disposed In 2012									
Circle Four LLC Landfill	IIIb	Jim Webb	Environmental Manager	Circle Four Farms LLC	PO Box 100	Milford	UT	84751	(435) 387-6046	0	0	7	0	0					
Iron County-Parowan CD Landfill	IVb	Shayne Scott	City Manager	Parowan City	1 South Main	Parowan	UT	84761	(435) 477-1032	0	1,215	0	0	0					
Cedar City-Bulloch Pit CD Landfill	IVb	Kit Wareham	City Engineer	Cedar City Corporation	10 North Main Street	Cedar City	UT	84721	(435) 586-5119	0	8,230	0	0	0					
Juab County (Central Utah Public Health Department)																			
Juab Rural Development Agency MSW Landfill	II	Mike Seely	Secretary	Juab Rural Development Agency	160 North Main Street	Nephi	UT	84648	(435) 623-3408	5,115	2,115	0	0	0					
Fish Springs MSW Landfill	II	Brian Allen	Refuge Manager	US Fish and Wildlife Service, Fish Springs NWR	PO Box 568	Dugway	UT	84022	(435) 693-3122	3	3	0	0	2					
Kane County (Southwest Utah Public Health Department)																			
Western Kane County Special Service District- Long Valley MSW Landfill	II	Nyle Willis	Treasurer	Western Kane County Special Service District #1	PO Box 36	Kanab	UT	84741	(435) 644-5089	4,000	0	0	0	0					
Western Kane County Special Service District- Kanab MSW Landfill	II	Nyle Willis	Treasurer	Western Kane County Special Service District #1	PO Box 36	Kanab	UT	84741	(435) 644-5089	4,000	0	0	0	0					
Millard County (Central Utah Public Health Department)																			
Millard County-Delta MSW Landfill	I	Sheryl Dekker	Landfill Operations Director	Millard County	PO Box 854	Delta	UT	84624	(435) 864-1405	12,372	0	0	0	0					
Intermountain Power Service Corp-Sanitary landfill	IIIb	James A. Hewlett	Assistant General Manager	Intermountain Power Agency	10653 South River Front Parkway, Suite 120	South Jordan	UT	84095	(801) 938-1333	0	0	970	0	0					
General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type									
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					
Millard County (Continued)																			
Intermountain Power Service Corp-Combustion By-products Landfill	IIIb	James A. Hewlett	Assistant General Manager	Intermountain Power Agency	10653 South River Front Parkway, Suite 120	South Jordan	UT	84095	(801) 938-1333	0	0	413,153	0	0					Combustion By-Products Landfill: Fly ash, bottom ash, economizer rejects, pulverized rejects, and flue gas desulfurization ie. scrubber sludge coal combustion by-products and flue gas emission wastes. Non-hazardous waste, common refuse, miscellaneous, and special wastes generated on
Materion Natural Resources-Mill Landfill	IIIb	Porter W. Gregory	President	Materion Natural Resources	PO Box 815	Delta	UT	84624-0815	(435) 864-2701	0	0	33	0	0					
Millard County-Fillmore CD Landfill	IVb	Sherly Dekker	Landfill Operations Director	Millard County	PO Box 854	Delta	UT	84624	(435) 864-1405	0	1,140	0	0	15					
Holden CD Landfill	IVb	Ross M. Stevens	Councilman	Holden Town	PO Box 360044	Holden	UT	84636	(435) 795-2605	0	78	0	0	0					
Morgan County (Weber-Morgan Health Department)																			
No Landfills																			
Piute County (Central Utah Public Health Department)																			
Piute County Special Service District-Marysvale CD Landfill	IVb	Valeen Brown	County Clerk	Piute County Special Service District #1	PO Box 99	Junction	UT	84740	(435) 577-2840	0	0	0	0	0					
Piute County Special Service District-Tri City CD Landfill	IVb	Valeen Brown	County Clerk	Piute County Special Service District #1	PO Box 99	Junction	UT	84740	(435) 577-2840	0	0	0	0	0					
Rich County (Bear River Health Department)																			
Rich County MSW Landfill	II	Scott Jacobson	Supervisor	Rich County	PO Box 218	Randolph	UT	84067	(435) 881-9700	3,888	0	2,134	0	26					
Salt Lake County (Salt Lake County Health Department)																			
Salt Lake Valley SWMF MSW Landfill	I	Thomas M. Burrup	Environmental Compliance	Salt Lake Valley Solid Waste Management	6030 West California Avenue	Salt Lake City	UT	84104	(801) 975-2367	425,317	0	0	0	735	$10/truck	$30/trailer	$26	Prohibited	
Trans-Jordan MSW Landfill	I	Dwayne J. Woolley	General Manager	Trans-Jordan Cities	PO Box 95610	South Jordan	UT	84095-0610	(801) 569-8994	253,885	28,497	0	0	2,138	$26	$26	$26	$26 estimated	
Kennecott Utah Copper-Tailings Landfill	IIIb	Kelly Payne	Manager, Environment	Kennecott Utah Copper Corporation	4700 Daybreak Parkway	South Jordan	UT	84095	(801) 569-6000	0	0	154,088	0	3,994	N/A	N/A	N/A	N/A	2012 Annual Report not posted on UTAH DEQ website; estimated to be captive landfill.
Kennecott Utah Copper- Used Tire Monofill	IIIb	Kelly Payne	Manager, Environment	Kennecott Utah Copper Corporation	4700 Daybreak parkway	South Jordan	UT	84095	(801) 569-6000	0	0	95	0	2,122					

General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type					Residential	Large Load	Commercial	PCS	NOTES
Kennecott Utah Copper-Smelter Landfill	IIIb	Kelly Payne	Manager, Environment	Kennecott Utah Copper Corporation	4700 Daybreak Parkway	South Jordan	UT	84095	(801) 569-6000	0	0	3,626	0	0					
South Valley Water Reclamation Monofill	IIIb	Lee Rawlings	Facility Operations Director	South Valley Water Reclamation District	7495 South 1300 West	West Jordan	UT	84084	(801) 566-7711	No Waste Disposed In 2012									
Waste Control Management Class V	V	Joe Belton	Manager	Waste Control Management	5142 Hollister Avenue #119	Santa Barbara	CA	93111	(805) 291-2566	0	0	1,341	0	0					
General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type									
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					
Salt Lake County (Continued)																			
Waste Management-Mountain View Asbestos Landfill	V	Farid Abuchaibe	District Operations Manager	Mountain View Landfill	6976 West California Avenue	Salt Lake City	UT	84104	(801) 401-0322	0	0	1,718	0	0					
Waste Management- Mountain View CD Landfill	VI	Farid Abuchaibe	District Operations Manager	Mountainview Landfill, Inc.	6976 West California Avenue	Salt Lake City	UT	84104	(801) 529-6163	0	62,712	0	0	65					
Construction Waste Management CD Landfill	VI	Jeremy Bland	Manager	Construction Waste Management	6879 South 700 west, Suite 10	Midvale	UT	84047	(801) 503-8901	0	218,232	0	0	4,931					
Waste Control Management Class VI	VI	Joe Belton	Manager	Waste Control Management	5142 Hollister Avenue #119	Santa Barbara	CA	93111	(805) 291-2566	No Waste Disposed In 2012									
San Juan County (Southeastern Utah District Health Department)																			
San Juan County MSW Landfill	I	Preston Grover	Landfill Operations Manager	San Juan County	PO Box 5	Blanding	UT	84511-0005	(435) 678-3070	62,671	1,040	449	0	425					
Blue Mountain Meats Landfill	IIIb	Allan Frost	Vice President/Manager	Blue Mountain Meats, Inc.	PO Box 279	Monticello	UT	84535-0279	(435) 587-2289	0	0	26	0	0					
Monticello CD Landfill	IVb	Nathan Langston	Public Works Director	Monticello City	PO Box 457	Monticello	UT	84535	(435) 587-2271	0	156	0	0	25					
Contract Environmental Landfill	V	Tsuyoshi Okano	President	Contract Environmental Services, Inc.	925 South Broadway, Suite 251	Cortez	CO	81321	(970) 565-1198	0	1,798	859	0	0					
Sanpete County (Central Utah Public Health Department)																			
Sanpete County Coop- White Hills MSW Landfill	I	Garry Bringhurst	Landfill Administrator	Sanpete Sanitary Landfill Cooperative	PO Box 650087	Sterling	UT	84665	(435) 835-3431	11,429	0	5,337	0	0					
Sanpete County Coop- Chester CD Landfill	IVb	Garry Bringhurst	Landfill Administrator	Sanpete Sanitary Landfill Cooperative	PO Box 650087	Sterling	UT	84665	(435) 835-3431	0	1,524	0	0	0					
Madsen CD Landfill	IVb	David Madsen	Owner	Madsen Construction Company	PO Box 457	Mayfield	UT	84643	(435) 528-3661	0	940	0	0	0					
Sevier County (Central Utah Public Health Department)																			
Sevier County-Sage Flat MSW Landfill	I	Rex Conder	Landfill Manager	Sevier County	250 North Main	Richfield	UT	84701		17,169	5,793	0	0	0					
US Gypsum-Jumbo Landfill	IIIb	Skyler Davies	Project Engineer	United States Gypsum Company	PO Box 570160	Sigurd	UT	84657	(435) 896-2423	0	0	11,430	0	0					
Georgia-Pacific Gypsum LLC-Crescent Landfill	IIIb	Carmine Perri	VP Manufacturing	Georgia-Pacific Corporation	133 Peachtree Street NE	Atlanta	GA	30303-1847	(702) 643-8100	No Waste Disposed In 2012									
Georgia-Pacific Gypsum LLC-Mill Site Landfill	IIIb	Carmine Perri	VP Manufacturing	Georgia-Pacific Corporation	133 Peachtree Street NE	Atlanta	GA	30303-1847	(404) 652-4722	No Waste Disposed In 2012									
General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type									
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					

General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type					Residential	Large Load	Commercial	PCS	NOTES
Summit County (Summit County Public Health Department)																			
Summit County-Three Mile Canyon MSW Landfill	I	Jaren Scott	Solid Waste Superintendent	Summit County	PO Box 128	Coalville	UT	84017	(435) 336-3983	36,808	0	0	0	286					
Summit County-Henefer CD Landfill	IVb	Jaren Scott	Solid Waste Superintendent	Summit County	PO Box 128	Coalville	UT	84017	(435) 336-3983	0	13,691	0	0	0					
Tooele County (Tooele County Health Department)																			
Dugway-English Village Landfill	II	Gerald Mason	Environmental Protection Spc	U.S. Army Dugway Proving Grounds	Building 5330 Valdez Cir MS#1, Room 2306	Dugway	UT	84022	(435) 831-3369	780	9,350	1,467	0	347					
US Magnesium LLC Landfill	IIIb	David Gibby	Environmental Manager	US Magnesium LLC	238 North 2200 West	Salt Lake City	UT	84116	(801) 532-1522	0	0	18,000	0	0	N/A	N/A	N/A	N/A	2012 annual report not filed. Estimated to be a captive site.
Stockton Industrial Landfill	IIIb	Mark Whitney	Mayor	Stockton Town	18 North Johnson Street	Stockton	UT	840471	(435) 882-3877	0	0	0	0	0					
Tooele County-Bauer CD Landfill	IVb	Robert Warner	Solid Waste Director	Tooele County	47 South Main	Tooele	UT	84074	(435) 833-9520	0	47,925	0	0	128					
Tooele County-Ibapah CD Landfill	IVb	Robert Warner	Solid Waste Director	Tooele County	47 South Main	Tooele	UT	84074	(435) 833-9520	0	60	0	0	0					
Wasatch Regional MSW Landfill	V	Les Lemmon	Site Manager	Wasatch Regional Landfill, Inc.	675 South Gladiola Street	Salt Lake City	UT	84104	(801) 924-8540	497,357	0	55,793	0	0	No data	No data	No data	No data	3,788 total tons of industrial waste were from out of state.
EnergySolutions	V	Timothy Orton	Environmental Engineer	EnergySolutions	423 West 300 South, Suite 200	Salt Lake City	UT	84101	(801) 321-0453	0	0	83,787	0	0	N/A	N/A	N/A	Prohibited	The first type contains both low level radioactivity and a hazardous waste component, known as mixed waste, and the second type of waste contains only a low level radioactive component.
Clean Harbors Grassy Mountain LLC	V	Brian Olson	VP Landfills	Clean Harbors Grassy Mountain, LLC	PO Box 22750	Salt Lake City	UT	84122	(781) 792-5000	0	0	56,325	0	0	N/A	N/A	N/A		The Grassy Mountain Facility is capable of managing hazardous wastes, PCB contaminated wastes and oils, industrial wastes and other non-hazardous wastes. The facility can accept liquid, solid or semisolid waste forms for treatment, storage, and/or disposal.
Uintah County (Tri-County Health Department)																			
Uintah County-Vernal MSW Landfill	I	Greg Jensen	Landfill Manager	Uintah County	152 East 100 North	Vernal	UT	84078	(435) 789-6018	44,562	0	0	0	423	No data	No data	No charge accounts	Prohibited except with County Approval	
Simplot Phosphates Landfill	IIIb	John Spencer	Environmental/Senior Mining Engineer	Simplot Phosphates LLC	9410 North Highway 191	Vernal	UT	84078	(435) 781-3348	No Waste Disposed In 2012									
Ashley Valley Landfill	IIIb	Dean Gibbs	Plant Operator	Ashley Valley Sewer Management Board	PO Box 426	Vernal	UT	84078	(435) 789-9805	0	0	166	0	0					
QEP-Redwash Landfill	IIIb	Mark Peak	Senior Engineer - EHS	Questar Exploration and Production - Uintah Basin, Inc.	1050 17th Street, Suite 500	Denver	CO	80265	(303) 573-3441	No Waste Disposed In 2012									
Uintah County-Lapoint CD Landfill	IVb	Greg Jensen	Landfill Manager	Uintah County	152 east 100 North	Vernal	UT	84078	(435) 781-5380	0	177	0	0	40					
Utah County (Utah County Health Department)																			
South Utah Valley Solid Waste District-Bayview MSW Landfill	I	Terry Ficklin	General Manager	South Utah Valley Solid Waste District	PO Box 507	Springville	UT	84663-0507	(801) 489-3027	122,862	0	0	0	0					
General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type									
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					
Utah County (Continued)																			
Pacific States Pipe Landfill	IIIb	David Georgeson	Environmental Engineer	Pacific States Cast Iron Pipe Co.	PO Box 1219	Provo	UT	84603	(801) 373-6910	0	0	17,082	0	0	N/A	N/A	N/A	Prohibited	Industrial wastes associated with the production of steel and the manufacture of cast iron pipes, packaging and shipping waste (approximately 20 waste streams)
Santaquin CD Landfill	IVb	Wade Eva	Public Works Director	Santaquin City	275 West Main Street	Santaquin	UT	84655-5509	(801) 420-5006	0	1,008	0	0	0					
Lehi CD Landfill	IVb	Wade Allred	Streets Superintendent	Lehi City Corporation	153 North 100 East	Lehi	UT	84043	(801) 836-1106	0	2,500	0	0	0					
Hadco Construction CD Landfill	IVb	Scott Roberts	Controller	Hadco Construction Inc.	PO Box 437	Lehi	UT	84043	(801) 766-7611	0	2,072	0	0	0					
Niels Fugal Landfill	IVb	Travis Carpenter	Manager	Niels Fugal Sons Company	PO Box 650	Pleasant Grove	UT	84062	(801) 785-3152	0	8,732	0	0	0					
Payson City MSW Landfill	V	Kent Fowden	Streets Superintendent	Payson City Corporation	439 West Utah Avenue	Payson	UT	84651	(801) 465-5200	17,025	0	0	0	0					
ROC-Intermountain Regional MSW Landfill	V	Robert Richards	General Manager	ROC Fund Landfill Holdings, LLC	PO Box 1889	Salt Lake City	UT	84110	(801) 403-7651	18,517	0	0	0	18					
Peck Rock Products CD Landfill	VI	Clay Peck	Owner	Peck Rock and Products, Inc.	1512 North 1300 East	Lehi	UT	84043	(801) 368-3937	0	55,399	0	0	0					
North Pointe CD Landfill	VI	Roger Harper	District Manager	North Pointe Solid Waste Special Service District	2000 West 200 South	Lindon	UT	84042-1503	(801) 225-8538	0	38,936	0	0	0					

TABLE 10. 2013 UTAH LANDFILL FACILITY INVENTORY (2012 DATA)

General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type					Residential	Large Load	Commercial	PCS	NOTES
Payson City CD Landfill	VI	Kent Fowden	Streets Superintendent	Payson City Corporation	439 West Utah Avenue	Payson	UT	84651	(801) 465-5200	0	25,358	0	0	0					
Wasatch County (Wasatch County Health Department)																			
No Landfills																			
Washington County (Southwest Utah Public Health Department)																			
Washington County MSW Landfill	I	Neil Schwendimen	District Manager	Washington County Special Service District #1	325 North Landfill Road	Washington	UT	84780	(435) 673-2813	146,168	15,418	0	0	1,781					
ONP-Purgatory CD Landfill	VI	Stacy Hughes	President	ONP LLC	PO Box 910278	St George	UT	84791-0278	(435) 634-0274	No Waste Disposed In 2012									
Wayne County (Central Utah Public Health Department)																			
Wayne County-Long Hollow MSW Landfill	II	Bruce Johnson	Landfill Manager	Wayne County	18 South Main Street	Loa	UT	84747	(435) 691-2228	2,065	1,736	0	0	50					
Wayne County-Hanksville CD Landfill	IVb	Bruce Johnson	landfill Supervisor	Wayne County	PO Box 189	Loa	UT	84747	(435) 691-2228	0	67	0	0	20					
Weber County (Weber-Morgan Health Department)																			
Weber Basin Water-Water Treatment Monofil	IIIb	Scott Paxman	Assistant General Manager	Weber Basin Water Conservancy District	2837 East Highway 193	Layton	UT	84040	(801) 771-1677	0	0	3,160	0	0					
Weber Properties LLC-Advanced Paving CD Landfill	IVb	Wil van der Stappen	President	Weber Properties LLC	PO Box 12847	Ogden	UT	84412	(801) 731-7882	0	2,425	0	0	1,800					
Pappas Brick Landfill	IVb	Monte Berrett	Landfill Manager	Pappas Brick and Stone	1860 Lincoln Avenue	Ogden	UT	84401	(801) 430-2148	0	3,380	0	0	3,300					
General Facility Information		Landfill Owner Contact Information								Tons Received by Waste Type									
Facility Name	Class	Name	Title	Company	Address	City	State	Zip	Phone	Municipal	C/D	Industrial	Compost	Recycled					
Weber County (Continued)																			
Plain City CD Landfill	IVb	Don Weston	Environmental Services Director	Plain City Corp.	4160 West 2200 North	Plain City	UT	84404	(801) 731-4908	0	752	0	0	24					
Weber County CD Class VI	VI	Gary Laird	Director of Solid Waste	Weber County	867 West Wilson Lane	Ogden	UT	84401	(801) 399-8803	0	39,259	0	0	0	C&D Only		$35/$100/load	Prohibited	

TABLE 11. TRANSFER STATIONS IN THE STUDY AREA

COUNTY	LABEL	FACILITY NAME	OWNER	OPERATOR	CITY	ZIPCODE	COMMERCIAL	Greater than 20 Tons per day	Materials Accepted	General comments	Waste Types
Delta	T1	Delta County SWDS	Delta County Commissioners	Delta County	Delta	81416	Yes	Unknown		No data	Agricultural, Batteries, C&D, E-waste, Used Oil, White goods and Yard waste. (1)
Delta	T2	North Fork SWDS	Delta County Commissioners	Delta County Commissioners	Hotchkiss	81419	No	No		Free Recycling drop-off at the transfer station. Material is hauled to the Delta County Landfill.	MSW, Recyclables, large scrap, vehicle batteries, used oil. Other restrictions may apply. (3)
Gunnison	T3	Crested Butte Transfer Station	No data	Waste Management of Colorado, Inc.	Crested Butte	81224	Yes	Yes		Free recycling drop-off at the transfer station for Crested Butte residents.	Partners with Mt Crested Butte and Crested Butte to offer free drop-off recycling. (4)
Mesa	T4	Debeque Transfer Station	Mesa County Commissioners	Herzog Environmental	Debeque	81630	No	No		$15/load; limited to trailers/trucks with less than 9 feet of bed length.	No contaminated soils, sludges or construction/demolition debris. Accepts MSW and yard waste. (1)
Mesa	T5	Fruita Transfer Station	Mesa County Commissioners	Herzog Environmental	Fruita	81521	No	No		$15/load; limited to trailers/trucks with less than 9 feet of bed length.	No contaminated soils, sludges or construction/demolition debris. Accepts MSW and yard waste. (1)
Mesa	T6	Gateway Transfer Station	Mesa County Commissioners	Herzog Environmental	Gateway	81522	No	No		$15/load; limited to trailers/trucks with less than 9 feet of bed length.	No contaminated soils, sludges or construction/demolition debris. Accepts MSW and yard waste. (1)
Mesa	T7	Molina Transfer Station	Mesa County Commissioners	Herzog Environmental	Molina	81643	No	No		$15/load; limited to trailers/trucks with less than 9 feet of bed length.	No contaminated soils, sludges or construction/demolition debris. Accepts MSW and yard waste. (1)
Montrose	T8	Municipal Waste Transfer Station	Montrose County Solid Waste Department	Montrose County Solid Waste Department	Paradox	81402	Yes	Unknown		Contract with Cornerstone Enterprise at $11.25 to $11.80/compacted cubic yard.	Municipal solid waste
Montrose	T9	NUCLA Transfer Station	Montrose County Solid Waste Department	Waste Management, Inc.	Nucla	81402	Yes	Unknown		No data	No data
Montrose	T10	Paradox SWDS	No data	No data	Paradox	81402	No	Unknown		No data	No data
Montrose	T11	Tri-State Generation & Trans	No data	No data	Naturita	81422	No	Unknown		No data	No data
Rio Blanco	T12	GTM, LTD Transfer Station	GTM, LTD Transfer Station	No data	Meeker	81641	Yes	Unknown		No data	No data
Rio Blanco	T13	Rangely Transfer Station	Rangely Trash Service	Rangely Trash Service	Rangely	81648	Yes	No	Household waste, yard waste, tires, white goods	Pays CDHPE solid waste fees	MSW, yard waste, tires, white goods
Rio Blanco	T14	West Rangely SWDS	No data	No data	Rangely	81648	No	Unknown		Pays CDHPE solid waste fees	No data

NOTES:
1. Data compiled from the 2012 Colorado Department of Public Health and Environment (CDPHE) Solid Waste Facility Inventory Form for Transfer Stations.
2. Data also compiled from the CDPHE Transfer Station List.
3. Delta County Solid Waste website: http://www.deltacounty.com/15/Integrated-Solid-Waste-Management-Landfi.
4. The Crested Butte Transfer Station is no longer listed on the CDPHE Transfer Station List, dated January 14, 2014.

TABLE 12. MATERIAL RECOVERY FACILITIES IN THE STUDY AREA

COUNTY	LABEL	FACILITY NAME	OWNER	OPERATOR	CITY	ZIPCODE	FACILITY TYPE	MATERIALS RECYCLED
Chaffee	R1	Chaffee County Landfill & Recycling Center	Chaffee County	Chaffee County	Salida	81201	MRF	MSW recyclables (Paper, plastic, glass, metal)
Chaffee	R2	Angel of Shavano Recycling LLC	Not Available	Not Available	Poncha Springs	81242	MRF	MSW recyclables (Paper, plastic, glass, metal)
Delta	R3	Premium Batteries	Not Available	Not Available	Delta	81416	Not available	Batteries
Eagle County	R3A	Eagle County Recycled Materials Recovery Facility	Eagle County	Eagle County	Wolcott	81655	MRF	MSW recyclables (Paper, plastic, glass, metal)
Garfield	R4	We Pay More Recycling (ECOS Environmental & Disaster Restoration)	Not Available	Not Available	Glenwood Springs	81601	Not available	No data
Garfield	R4A	Next Generation Recycling	Next Generation Recycling	Next Generation Recycling	Rifle	81650	Not available	No data
Grand	R5	Benson Gravel Pit	Benson Gravel Pit	Benson Gravel Pit	Sulphur Springs	80451	Industrial	Industrial/ C&D/ Aggregate Materials
	R6		Gunnison County	Gunnison County	Gunnison	81230	MRF	MSW recyclables (Paper, plastic, glass, metal)
Lake	R7	Lake County Landfill & Recycling Center	Lake County Government	Lake County Government	Leadville	80461	MRF	MSW recyclables (Paper, plastic, glass, metal)
Mesa	R8	Curbside Recycling Indefinitely, Inc.	Not Available	Not Available	Grand Junction	81505	MRF	MSW recyclables (Paper, plastic, glass, metal)
Mesa	R8A	River Road	Oldcastle SW Group, Inc. dba United Companies	Oldcastle SW Group, Inc. dba United Companies	Grand Junction	81505	No data	No data
Moffat	R9	Boral Material Technologies (Craig Station)	Boral Material Technologies	Boral Material Technologies	Craig	81625	Industrial	Industrial/ C&D/ Aggregate Materials
Montrose	R10	Waste Management-Montrose	Montrose County	Waste Management of Colorado, Inc.	Montrose	81401	MRF	MSW recyclables (Paper, plastic, glass, metal)
Montrose	R10A	Cornerstone Waste & Recycle	Cornerstone Waste & Recycle	Tom Fritz	Montrose	81401	MRF	No data
Montrose	R10B	Bruin Recycling	No data	No data	Montrose	81401	MRF	No data
Routt	R11	Mountain Hauling	Not Available	Not Available	Yampa	80483	MRF	MSW recyclables (Paper, plastic, glass, metal)
Routt	R12	Waste Management - Steamboat	Waste Management of Colorado, Inc	Waste Management of Colorado, Inc.	Steamboat	80487	MRF	MSW recyclables (Paper, plastic, glass, metal)
	NOTES:	1. Data taken from CDPHE List of Registered Recycling Facilities, January 28, 2014.						

COUNTY	LABEL	FACILITY NAME	OWNER	OPERATOR	CITY	ZIPCODE	FACILITY TYPE	MATERIALS RECYCLED
		2. Data taken from the 2011 Recycling Facility Annual Reporting Form.						
		3. Data represents tons of materials shipped in that year to end use markets.						

TABLE 13. LIST OF RECYCLERS OF MSW AND ELECTRONIC WASTE IN THE STUDY AREA

COUNTY	LABEL	FACILITY NAME	OWNER	OPERATOR	CITY	ZIPCODE	Facility Type
Chaffee	B1A	Chaffee County Landfill & Recycling Center	Chaffee County	Chaffee County	Salida	81201	MRF
Eagle	B1	Eagle County Material Recovery Facility	Eagle County Government	Eagle County Government	Wolcott	81655	MRF
Gunnison	R6	Gunnison County Recycling Center (Public Works)	Gunnison County	Gunnison County	Gunnison	81230	MRF
Mesa	B2	E Waste Recyclers of Colorado	Not Available	Not Available	Grand Junction	81501	MRF
Mesa	B3	LifeSpan Technology/Mesa Co Landfill	Mesa County Landfill	Not Available	Grand Junction	81503	Landfill
Mesa	B4	Waste Management-Grand Junction	Waste Management-Grand Junction	Waste Management-Grand Junction	Grand Junction	81504	Hauling Company
Pitkin	B5	Pitkin County Resource Recovery Department	Pitkin County	Pitkin County/Heartland Environmental Services	Snowmass Village	81615	Landfill
Routt	B6	Milner Landfill	Twin Landfill Corp of Fremont County	Twin Landfill Corp of Fremont County	Milner	80487	Landfill
NOTES:	1, Data taken from the 2011 Recycling Facility Annual Reporting Form.						
	2. Data represents tons of materials shipped in that year to end use markets.						
	3. Data taken from CDPHE Lists of Registered Recycling Facilities http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251616361890.						
	4. Data taken from CDPHE Lists of Electronics Recyclers http://www.colorado.gov/cs/Satellite/CDPHE-HM/CBON/1251616361890.						

2012	LABEL	FACILITY NAME	CITY	ZIPCODE	TYPE OF OPERATION	2012 BIOSOLIDS IN CUBIC YARDS	2012 FOOD WASTE IN CUBIC YARDS	2012 PAPER WASTE IN CUBIC YARDS	2012 SLUDGES IN CUBIC YARDS	2012 GRASS CLIPPINGS IN CUBIC YARDS	2012 HAY OR STRAW IN CUBIC YARDS
Delta	C1	CB Industries Composting	Austin	81410	Static Pile	2,748			135 - Grease		
Garfield	C2	South Canyon Solid Waste Disposal Site	Glenwood Springs	81601	Static Pile			4,650		475	
Mesa	C3	Mesa County Landfill	Grand Junction	81503	Aerated Static Pile					33,446	4,946
Pitkin	C4	Pitkin County Solid Waste Center	Snowmass Village	81615	Aerated Static Pile	2,944	1,007			9,614	
Routt	C5	Milner Landfill	Steamboat Springs	80487	Aerated Static Pile	2,255		945			
TOTALS:						**7,947**	**1,007**	**5,595**	**0**	**43,535**	**4,946**

Notes:
1. Data compiled from CDPHE Composting Facility Annual Reporting Form - Calendar Year 2012.
2. Data for the Millner Landfill was from Calendar Year 2011.

LABEL	2012 MANURE IN CUBIC YARDS	2012 SEPTAGE IN CUBIC YARDS	2012 TREES/SHRUBS IN CUBIC YARDS	2012 LEAVES IN CUBIC YARDS	2012 WOOD CHIPS IN CUBIC YARDS	2012 OTHER IN CUBIC YARDS	2012 TOTAL QUANTITY RECEIVED IN CUBIC YARDS	2012 TOTAL FINISHED PRODUCT SHIPPED OFFSITE IN CUBIC YARDS
C1		614			395	1,283 - Cured Compost	5,175	27
C2		2,314,000	12,152	770			2,332,047	468
C3							38,392	13,959
C4	927		19,846				34,338	15,092
C5					640	5,761 - Compost	9,601	325
	927	**2,314,614**	**31,998**	**770**	**1,035**	**0**	**2,419,553**	**29,871**

COUNTY	LABEL	FACILITY NAME	OWNER	OPERATOR	CITY	ZIPCODE	END USER	COLLECTION FACILITY	PROCESSOR
Chaffee	WT1	Chaffee County Waste Disp	N/A	N/A	Salida	81201		1	
Delta	WT2	Adobe Buttes Landfill	Gary Vance Delta County	Delta County	Eckert	81416	1		1
Eagle	WT3	Eagle County Landfill	Eagle County Commissioners	Eagle County Road and Bridge Dept.	Wolcott	81655		1	
Eagle	WT4	GH Daniels and Associates	N/A	N/A	Gypsum	81637	1		
Garfield	WT5	Greg Delgado	N/A	N/A	Silt	81652	1		
Garfield	WT6	Town of New Castle Public Works	New Castle Public Works	New Castle Public Works	New Castle	81647	1		
Garfield	WT7	South Canyon SWDS	City of Glenwood Springs	City of Glenwood Springs	Glenwood Springs	81601	1	1	1
Garfield	WT8	Tire Tech LLC	N/A	N/A	Silt	81652			1
Garfield	WT9	West Garfield County Landfill	Garfield County Commissioner	Garfield County Commissioners	Rifle	81650		1	1
Gunnison	WT10	City of Gunnison Landfill	City of Gunnison	City of Gunnison	Gunnison	81230		1	
Lake	WT11	Lake County Landfill	Lake County Commissioners	Lake County Commissioners	Leadville	80461		1	
Mesa	WT12	Mesa County Government	Mesa County Government	Department of Parks, Landscape and Operations	Grand Junction	81503	1		

COUNTY	LABEL	FACILITY NAME	OWNER	OPERATOR	CITY	ZIPCODE	END USER	COLLECTION FACILITY	PROCESSOR
Mesa	**WT13**	Mesa County Landfill	Mesa County Commissioners	Mesa County Commissioners/Herzog Environmental	Grand Junction	81503	**1**		**1**
Mesa	**WT14**	The Helping Hand	N/A	N/A	Loma	81524			**1**
Moffat	**WT15**	Moffat County Landfill	Moffat County Commissioners	Moffat County Road and Bridge	Craig	81625	**1**		**1**
Montrose	**WT16**	3XM Grinding and Compost LLC	N/A	N/A	Olathe	81425			**1**
Rio Blanco	**WT17**	Overton Recycling	N/A	N/A	Meeker	81641			**1**
Pitkin	**WT18**	Pitkin County Resource Recovery	N/A	N/A	Snowmass Village	81615		**1**	
Routt	**WT19**	Twin Landfill Corporation	Milner Landfill	N/A	Steamboat Springs	80487		**1**	
TOTALS:									

LABEL	WASTE TIRES RECEIVED IN 2012	WHOLE TIRES SHREDDED IN 2012	WHOLE TIRES BALED IN 2012	2012 TIRES RECEIVED FROM OUT-OF-STATE	ON-SITE USE	COMMENTS	OFFSITE USE	COMMENTS2
WT1	11,397	Not reported	Not reported	Not reported	7,397	Shredded/Cut tires for Alternative Daily Cover	0	
WT2	-	-	-	-	-	-	-	CDPHE reported there are no waste tire annual reports for this facility.
WT3	149,030	Not reported	Not reported	Not reported	0		8,215	Whole tires sent off-site for recycling or disposal (sent to South Canyon Landfill). Report noted they received tires as they hauled tires out; restriction of no more than 7,500 tires at the site.
WT4	-	-	-	-	-	-	-	2012 Tire Report marked confidential so data could not be provided.
WT5	-	-	-	-	-	-	-	2012 Tire Report marked confidential so data could not be provided.
WT6	-	-	-	-	-	-	-	CDPHE reported there are no waste tire annual reports for this facility.
WT7	22,557	27,481	0	0	27,481	Shredded/cut tires used for engineered fill	0	
WT8	-	-	-	-	-	-	-	2012 Tire Report marked confidential so data could not be provided.
WT9	5,912	0	0	0	0		5,937	Whole tires sent off-site for recycling or disposal (sent to South Canyon Landfill for beneficial use)
WT10	546	0	0	0	0		820	Whole Tires for Recreational Surfaces (play grounds)
WT11	3,845	Not reported	Not reported	Not reported	0		10,000	Whole tires sent off-site for recycling or disposal (sent to Colorado Tire Recycling, Denver, Colorado)
WT12	-	-	-	-	-	-	-	CDPHE reported there are no waste tire annual reports for this facility.

LABEL	WASTE TIRES RECEIVED IN 2012	WHOLE TIRES SHREDDED IN 2012	WHOLE TIRES BALED IN 2012	2012 TIRES RECEIVED FROM OUT-OF-STATE	ON-SITE USE	COMMENTS	OFFSITE USE	COMMENTS2
WT13	8,746		7,980	0	Stormwater Control			Created 114 bales
WT14	-	-	-	-	-	-	-	2012 Tire Report marked confidential so data could not be provided.
WT15	-	-	-	-	-	-	-	CDPHE reported there are no waste tire annual reports for this facility.
WT16	0	0	0	0	0		0	
WT17	-	-	-	-	-	-	-	CDPHE reported there are no waste tire annual reports for this facility.
WT18	2,900	0	0	Not reported	0		2,913	Whole tires sent off-site for recycling or disposal (sent to Colorado Tire Recycling, Hudson, Colorado)
WT19	-	-	-	-	-	-	-	CDPHE reported there are no waste tire annual reports for this facility.
	204,933	**27,481**	**7,980**	**0**	**34,878**		**27,885**	

VEHICLE	Date Acquired	Engine Hours	Existing Condition Description
LF600022 - #LF08 HaasGrinder	11/1/2010	700	Good
LF600023 - #LF10 MTM Hot Water Pressure Washer	5/1/2011	72	Excellent
LF600024 - #LF11 Trailblazer 302 Kohler 200 AMP AC/DC Welder	12/1/2011	121	Excellent
LF700003 - #348 - D8R II Caterpillar Dozer	1/1/2003	4,932	Good
LF700004 - #280 320CL Track Hoe	1/1/2003	8023	Hydraulics getting weak, aging cylinders, replace in 2015?
LF700006 - #015 - Water Truck from Transwest Trucks	11/2/2005	3,112	Good
LF700007 - #317 - CAT Grader	6/1/2005	10,966	Fair and adequate for existing operations
LF700008 - #172-'95 Mack Dump Truck from GWS R&B to Landfill for no value in 2005	6/30/2005	11,646	Poor - replace in 2015?
LF700009 - #417 CAT 816F2 Compactor	11/30/2007	7,516	Fair
LF700010 - #464 '98 Mack Dump Truck from R&B	11/30/2007	11,909	Poor - replace in 2015?
LF700011 - #272 2008 Volvo L150FP/O Wheel Loader	9/1/2008	5,627	Fair to Good
LF700012 - #001 - 2001 GMC Sierra PU from R&B	1/1/2008	179,808	Poor - replace in 2015?
LF700015 - #LF70 - 2009 Volvo BL70 Rubber Tire Backhoe Loader w/Hydraulic Thumb	8/31/2009	3,820	Fair to Good
LF700016 - #505 - 1999 Chevy CR3100 (R&B Transfer)	1/1/1999	80,590	Good
LF700017 - #175 - '99 Mack Dump Truck from R&B #273	2/28/2011	10,605	Good
LF700018 - #388 - '99 Mack Dump Truck from R&B #388	2/28/2011	11,689	Good
LF12 - #??? - '13 Cat 816F2 Compactor	12/1/2013	0	New
MP700037 - #551 - 2001 SWD GMC Sierra Pickup (no MP monthly mileage charges)	1/1/2000	164,006	Good
MP700185 - #593 - SWD - 2008 Ford F250	6/30/2008	37,421	To be replaced in 2014

Data provided by the DPW Staff, December 2013.

Material Type	West Garfield County Landfill	South Canyon	Eagle County	Pitkin County
Biosolids		$30.27/CY	$18/ton	$25/ton
Septic Sludge	$0.15 - $0.30/gallon	$0.15/gallon	No pricing	No pricing
Leaves/Grass	No rates	Free	Free	$15/cy
Brush/Lumber	No rates	$3.20/CY	No pricing	$15/CY
Compacted Waste	$42/$84	$36	$39	$52
Loose Waste	$42/$84	$36	$29	$130
C/D Waste	$42/$84	$48	$47.45	$62
Petroleum Contaminated Soils	$58	$50	$37.68	Not available
E-Waste	TVs: $10 - $30; Monitors and Laptops $5 - $10			$5 - $25 based on the size of the electronics
HHW	Organized by third party; no fee to residents			Paints: $5/gallon

Notes:

1. Data provided in Rate Recommendations for South Canyon Landfill Report, July 22, 2013.
2. Rates for WGCL are in-county vs. out-of-county.
3. Rates are per ton basis unless noted otherwise.

TABLE 18. BUDGET FOR SITE IMPROVEMENTS

New Waste Handling Systems	Permitting & Design	Construction	Equipment	Totals	Annual Operations
Exploration & Production Wastes Monofill	$208,000	$2,336,840	$656,600	$3,201,440	$377,219
Solidification Basin	$20,000	$212,000	$350,000	$582,500	$121,300
Septage Evaporation Impoundments	completed	$177,000	$40,000	$177,000	$121,300
Land Farm Pilot Windrows (Equipment and Lined Area)	$49,000	$145,200	$455,000	$649,200	$156,300

Technology	Capital Cost ($M)	Annual O&M Cost ($M/year)
Pyrolysis	7.6	3.5
Gasification	8.5	4.3
Pyrolysis/Gasification	10.5	4.7
Plasma Gasification	12.8	5.9

NOTES:

1. The cost estimates for Pyrolysis Technology, Gasification Technology, Pyrolysis/Gasification Technology, and Plasma Gasification Technology were based on existing information from different technology suppliers.

2. The Plasma Gasification Technology information was based on a proposed facility provided by the supplier. No commercial plasma gasification facilities are available at this time.

3. The capital cost includes syngas cooling system, syngas cleaning system, acid gas removal and sulfur recovery, and ash removal system.

4. These cost estimates do not include costs of enclosed buildings, boilers, or electrical generation equipment which would be virtually the same for each of these conversion technologies evaluated. These additional costs could amount to roughly $500,000 for a building and $3.5-$4MM for boilers/elect gen sets (*Gasification of Non-Recycled Plastics From Municipal Solid Waste In the United States* , for The American Chemistry Council, by Gershman, Brickner & Bratton, Inc., August 2013) for each technology listed above.

TABLE 20. Advantages and Disadvantages of Landfill Gas End Uses

Energy Type	Complexity	Relative Cost to Develop	End User available	Pros	Cons
Low-Btu Gas	Low	Low	Unclear	Easiest to implement if adjacent user or use on-site	Need to identify user or develop on-site use
High-Btu Gas for Pipeline	High	High	Next Door possible	Natural Gas field next to facility low cost of transmitting processed gas	Success of negotiations with natural gas developer unclear.
Vehicle Fuel	High	High	Must be developed by either converted County or City vehicles or other fleet users.	Good use of LFG. Can be used by County vehicles if converted to LNG or CNG vehicles. Low air pollutant generating fuel.	Costly to implement. County vehicle fuel use would need to changed or other fuel users identified.
Electricity Generation	Medium	Medium	Nearest Transmission line, currently unknown	Technology available for small electricity generation	Not enough gas currently to make cost effective, unless direct use on-site and for neighboring facility(ies)

New Waste Handling Systems	Schedule (Months)		
	Permitting & Design	Construction	Totals
Exploration & Production Wastes Monofill	8-10	7-8	15-18
Solidification Basin	3-4	5-6	8-10
Septage Evaporation Impoundments	0	5-6	5-6
Composting (Equipment & Lined Area)	3-4	5-6	8-10
Land Farm Pilot (Equipment and Lined Area)	5-6	6-7	11-13

Issue	Public Ownership/ Public Operation	Public Ownership/ Private Operation
Financial Responsibility	• County fully accountable to itself, state and federal government and to its users and residents.	• Maximum return to the investor or owner, and to the County through a contract.
	• All finances a matter of public record	• Finances not a matter of public record
	• Public operation, **if run efficiently**, can be less costly than private operation, since no profit is included above the cost of capital and operations	• Private operator tends to run operation, especially in a competitive environment, as **cost efficient**ly as possible.
	• County liable for closure and post closure care and costs	• County still liable for closure and post closure care and costs
Service Levels	• Public policies can add inefficiencies to a system	• Primary driver is return on investment; profit motive determines service levels. Can be more flexible; greater ability to change, as needed
	• Policy considerations sometimes have a higher priority than finances alone	• Service levels are driven by economics limited by County contract.
	• Ability to waive fees for disposal of disaster debris	• Based upon County contract.
Environmental Standards	• Complies with environmental rules and regulations	• Complies with environmental rules and regulations. May limit meeting such standards as long as economically viable.
	• Ready to comply with changing regulatory environment.	• Will comply with regulatory changes after negotiating contract change order.
Environmental Liabilities	**• County is liable for all past, present, and future environmental liabilities, due to soil, groundwater, air, stormwater impacts into the future.**	• Private firm is liable for same environmental liabilities due to activities conducted after County contracts with them, only.
	• County has the reserves to accept liability.	• Private firm can go bankrupt if not fiscally capable of cleaning-up environmental impacts, leaving the County (owner) responsible for remaining cleanup.
	• County is responsible, as permit holder, for all activities that occur onsite for environmental and other forms or liabilities	• County, as permit holder, would be ultimately responsible for any and all permit violations, due to County or Private Operator's activities on the site. County's exposure due to permit violations can result in criminal fines and/or potential criminal prosecution.
Labor Issues	• Existing labor contracts affect ability to be flexible	• Different labor contracts, usually lower wages and/or not as strong on benefits
	• Less flexibility with labor force (inability to hire and fire)	• More flexibility with labor force (ability to hire and fire).
Other Issues	**• County is responsible, as landowner, for all activities that occur onsite, attributable to County employees or other contractors.**	• County, as landowner, would be responsible for any and all activities that transpire on the site, with reduced control over private operator's employee actions.

APPENDIX A

STATE OF THE PRACTICE

WEST GARFIELD COUNTY LANDFILL PRESENTATION

JULY 9, 2013

Garfield County

NWCC URS

The Path Forward

1. July 9, 2013: State of Practice of the West Garfield County Landfill Presentation
2. October 8, 2013 : Workshop
3. October – December 2013: Develop Strategic Solid Waste Plan (SSWP)
4. January 2014: Present the SSWP
5. Plan Implementation

DRAFG

OUTLINE

- Types of Waste Accepted at the Landfill
- Historic Customer Base
- Historic Waste Receipts
- Tonnage and Revenue By Market
- Trends in Revenues and Expenses
- Current Services Provided by the Landfill
- Additional Services to Target

OUTLINE (cont'd)

- Additional Waste Streams to Target
- Current Revenue Sources
- Four Year Capital Plan (2014 – 2017)
- Net Waste Disposal Projections
- Competitors
- Regional Recycling Flows
- Topics for Inclusion – October Workshop

Types of Waste Currently Accepted at West Garfield County Landfill (WGCL)

- Animals
- Appliances
- Construction & Demolition Waste
- E-Waste
- Landscape Rock
- Mattresses
- Municipal Waste – In-County
- Municipal Waste – Out-of-County

- Septage – In-County
- Septage – Out-of-County
- Scrap Metal
- Sludge – In-County
- Special soils
- Tires
- Wood

Municipality Customers 2010 - 2012

- B.L.M.
- CDOT GWS AND RIFLE
- CITY OF RIFLE
- COLO STATE VET NRSG HOME
- GARFIELD COUNTY – ALL DEPARTMENTS
- RE-2 SCHOOL DISTRICT
- TOWN OF PARACHUTE
- TOWN OF SILT
- U.S. FOREST SERVICE

Septage Customers 2010 - 2012

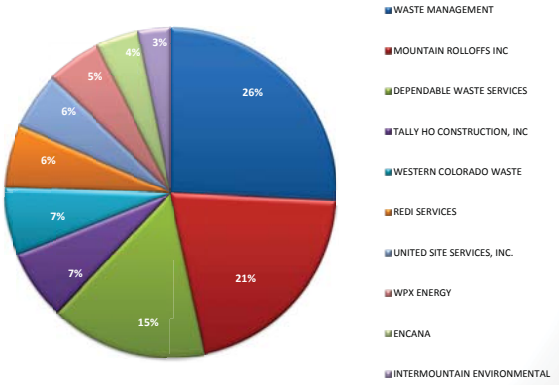
- DOWN VALLEY SEPTIC LLC
- MOUNTAIN ROLLOFFS INC
- REDI SERVICES
- STALLION OILFIELD SERVICES
- TOBY'S VACUUM SERVICE
- UNITED SITE SERVICES
- WESTERN COLORADO WASTE

Oil and Gas Customers 2010 - 2012

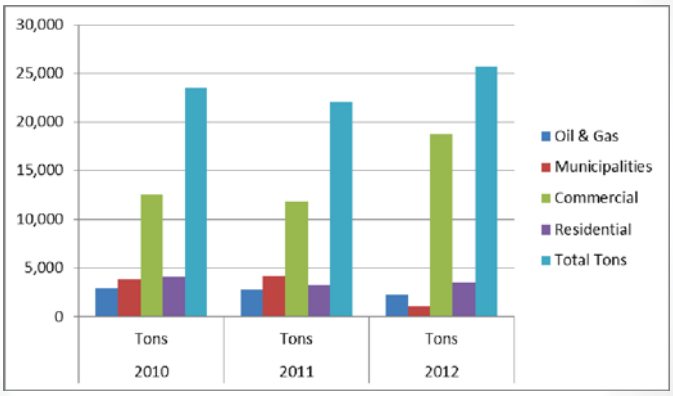
- ADVANCED OILFIELD SERVICES
- ANTERO RESOURCES
- BILL BARRETT CORP
- BLAC FRAC TANKS INC
- CASCADE TANKS LLC
- ENCANA
- FLINT ENERGY SERVICES
- HYLAND ENTERPRISES, INC

- HYLAND ENTERPRISES INC
- NORTHWIND INC
- PETROLEUM DEVELOPMENT CORP
- ROUSTABOUT SPEC
- TOBY'S VACUUM SERVICE
- WILLIAMS PRODUCTION
- WPX ENERGY

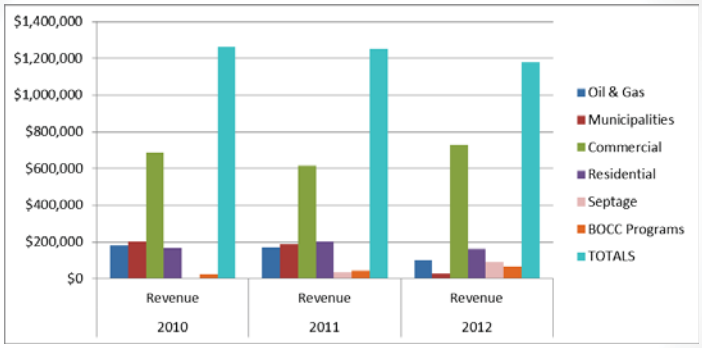
Breakdown of Key Customers By Revenue - 2012



TONNAGE BY MARKET - 2010 – 2012



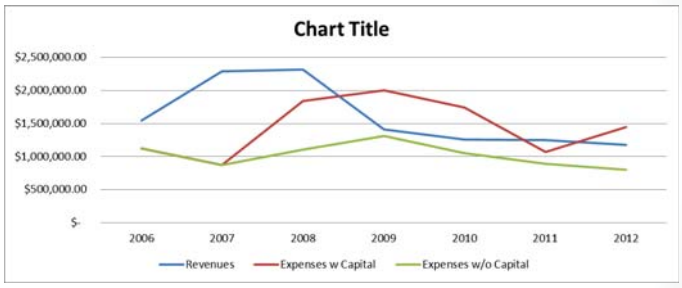
REVENUE BY MARKET - 2010 – 2012



- **Prior to June 2010 the tipping fees were $48/ton.**
- **In June 2010, tipping fee increased to $68/ton.**
- **June 2011, tipping fee reduced to $58/ton.**
- **October 2011, tipping fee reduced to $42/ton.**

Landfill Budget Actuals 2006 – 2012

Expenses depicted both with capital expenditures and without capital expenditures



- **Late 2007: Added staff after loss of inmate support**
- **Mid 2010: Reduction in Force (further reduction not feasible without significant operational adjustments)**
- **2010 – 2012, the revenues include the BOCC interfund transfer.**

Current Services Provided by the Landfill

- Monofill
  - Construction and Demolition Debris
  - Dead Animals

- Landfill Cell
  - Municipal Solid Waste
  - Construction and Demolition Debris
  - Petroleum Contaminated Soils
  - Yard Waste

- Recycling Collection
  - Batteries
  - Electronics
  - White Goods
  - Metal Scrap
- Proposed Alternative Daily Cover
  - Mattresses
  - Tires
  - Wood
  - Yard Waste
- Surface Impoundment
  - Septage

Additional Services To Consider

- Compost Facility
  - Yard Waste
  - Shrubs
  - Septage
  - Biosolids
  - Food waste
  - Manure

- Citizen's Drop Off Area
  - Cardboard
  - Paper
  - Cans
  - Metal

- Recycling
  - Household Hazardous Waste
  - Used Oil
  - Antifreeze
  - Aggregates
- Stop 'N' Shop
  - Reuse and repurpose shop
  - Charge small fee

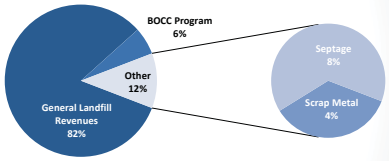
Potential Additional Waste Streams to Target

- Asbestos
- Drill Cuttings
- Household Hazardous Waste
- Separate oil field plastics
- Landscape Waste
  - Commercial
  - Residential
- Leachate (needs surface impoundment-treatment)

- Liquid wastes for solidification (E & P waste)
- Medical Waste/ Pharmaceuticals
- Mining waste
- Non-hazardous aqueous wastes for solidification
- Cattle or farm manure
- Sand trap sediment

Current Revenue Sources - 2012

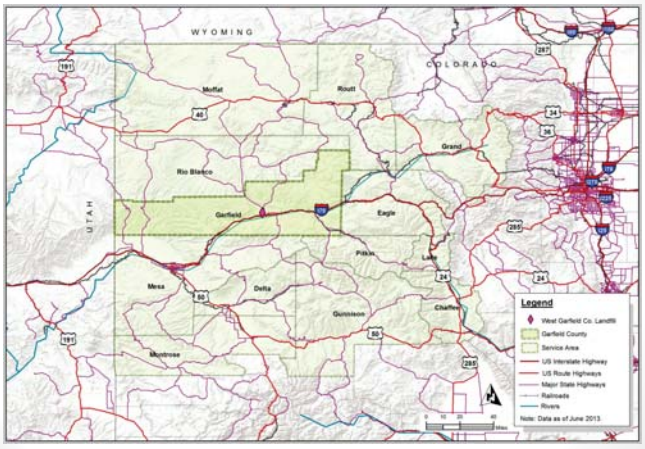
- General Landfill Revenues = $972,464
- BOCC Community Benefit Programs: $68,374
- Scrap Metal: $48,661
- Septage: $89,064
- Total Landfill Revenues = $1,178,563



Capital Requirements 2014 - 2017

YEAR	2014	2015	2016	2017	TOTALS
CAPITAL ITEM					
Compactor	$ 400,000				$ 400,000
Roller	$ 150,000				$ 150,000
Rebuild North/South Septic Ponds	$ 200,000				$ 200,000
Methane Mitigation (contingency)	$ 200,000				$ 200,000
Concrete Crushing		$ 150,000			$ 150,000
Screen Plant		$ 400,000			$ 400,000
TOTALS:	$ 950,000	$ 550,000	$ -	$ -	$ 1,500,000

Limits of the Service Area



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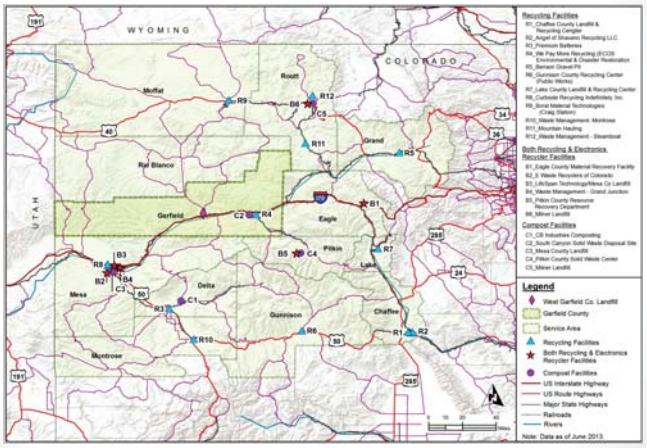
NET WASTE DISPOSAL PROJECTIONS

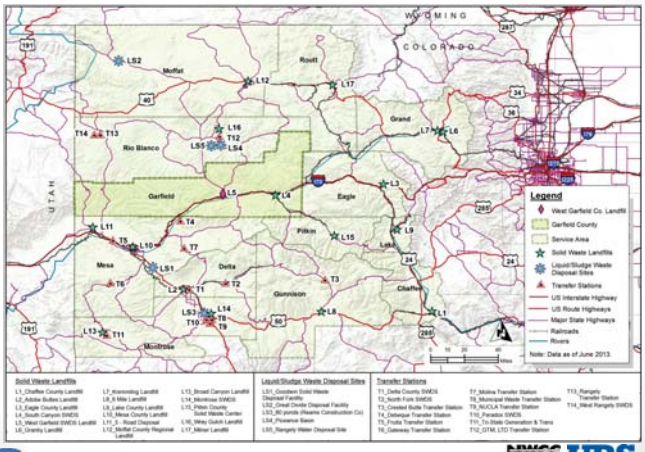
	July, 2010			July, 2015			July, 2020		
COUNTIES	Population Projections	Total Waste Generation in Tons	Net Waste Requiring Disposal in Tons	Population Projections	Total Waste Generation in Tons	Net Waste Requiring Disposal in Tons	Population Projections	Total Waste Generation in Tons	Net Waste Requiring Disposal in Tons
Chaffee	17,797	19,488	15,590	19,594	21,455	17,164	22,467	24,601	19,681
Delta	30,889	33,823	27,059	33,694	36,895	29,516	39,206	42,931	34,344
Eagle	52,057	57,002	45,602	59,265	64,895	51,916	68,350	74,843	59,875
Garfield	56,150	61,484	49,187	63,098	69,092	55,274	72,691	79,597	63,677
Grand	14,790	16,195	12,956	15,778	17,277	13,822	18,008	19,719	15,775
Gunnison	15,309	16,763	13,411	16,552	18,124	14,499	17,987	19,696	15,757
Lake	7,282	7,974	6,379	8,303	9,092	7,273	9,514	10,418	8,334
Mesa	146,587	160,513	128,410	153,296	167,859	134,288	166,683	182,518	146,014
Moffat	13,806	15,118	12,094	13,862	15,179	12,143	14,619	16,008	12,806
Montrose	41,188	45,101	36,081	43,319	47,434	37,947	49,721	54,444	43,556
Pitkin	17,156	18,786	15,029	18,445	20,197	16,157	20,585	22,541	18,032
Rio Blanco	6,617	7,246	5,796	6,920	7,577	6,062	7,502	8,215	6,572
Routt	23,439	25,666	20,533	25,407	27,821	22,257	28,243	30,926	24,741
TOTALS:	443,067	485,158	388,127	477,533	522,899	418,319	535,576	586,456	469,165

1. Population Projections from the Colorado Department of Local Affairs.
2. Waste generation at 6.0 pounds per capita per day for residential/commercial waste with a 20% recycling rate (LBA 2009 Waste Diversion Quantity Report 2009).
3. C&D Waste and E&P wastes are not included in the estimates above.
4. In 2012, Garfield County received approximately 26,000 tons of waste.

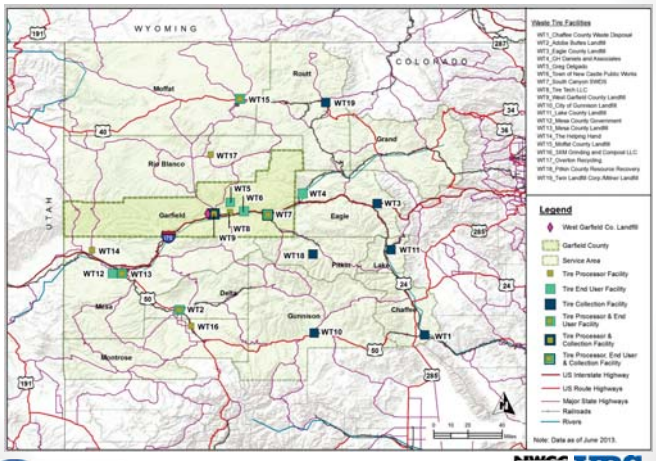
Recycling & Compost Facilities in Service Area



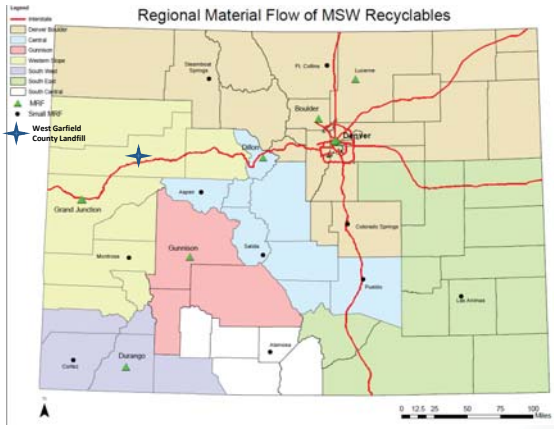
Solid Waste Facilities in Service Area



Waste Tire Facilities in Service Area



REGIONAL RECYCLING FLOWS



Topics for Inclusion in the October Workshop

WASTE STREAMS

- Types of wastes that existing operation can handle – no modifications?
- Types of new waste streams – requiring modifications?
  - Drill Cuttings/Mud
  - Liquid wastes for solidification (E & P waste)
  - Other
- Other industrial waste streams/clients?
- Out of County wastes?

IMPACTS TO LANDFILL OPERATIONS

- Potential capital costs required to accept additional waste streams?
- Potential permitting requirements to accept these wastes?
- Potential impacts on current operations costs?

Topics for Inclusion in the October Workshop

REVENUE ENHANCEMENT

- Expand/reduce current recycling materials focus?
- Can some wastes we accept be re-processed or reused?
- Strategic partners to team with as we expand our operations (haulers, recyclers)?
- Enlarge septage impoundments?
- Other waste conversion to energy technologies we should consider?
  - Gasification, anaerobic digestion, combustion, vehicle fuel, landfill gas to energy, etc.

Topics for Inclusion in the October Workshop

BUSINESS STRATEGIES

- Private vs public solid waste management operations?
- Use the 80 acres parcel for other business ventures(i.e. solar farm, etc.)?
- Conduct a tipping fee comparison and explore potential changes to the pricing structure?
- Evaluate long term sustainability of the landfill operations?

QUESTIONS

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APPENDIX B

STRATEGIC SOLID WASTE MANAGEMENT WORKSHOP

OCTOBER 8, 2013

Strategic Solid Waste Management Workshop
West Garfield County Landfill
October 8, 2013

Garfield County

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The Path Forward

1. July 9, 2013: State of Practice of the West Garfield County Landfill Presentation
2. October 8, 2013 : Workshop
3. October – December 2013: Develop Strategic Solid Waste Management Plan (SSWMP)
4. January 2014: Present the SSWMP
5. Plan Implementation

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Outline

- Purpose and Introduction
- County's Mission Statement
- County's Current Landfill Management Practices
- Current and Available Waste Streams
- New Revenue and Recycling Options
- Renewable Energy Options
- Future Landfill Operations and Management Considerations
- Mission Statement (cont'd)
- Wrap-up and Next Steps

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PURPOSE AND INTRODUCTION

Mission Statement

Definition of A Mission Statement

- Concise description of the purpose of the BOCC.
- Why does our organization exist?
- What are our values?
- What is the nature of the goods and services that we provide?
- Who are the various groups of customers that we provide these services to?
- What are the short term and long-term goals of the BOCC?
- The statement should give direction and focus on the plans and operations of the BOCC.

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Garfield County's Mission Statement

- The Board of County Commissioners is committed to:
  - Maintaining the West Garfield County Landfill as an important public asset, serving the citizens of Garfield County;
  - Operating the landfill as an enterprise by sustaining landfill day-to-day operations through fees as nearly as possible;
  - Participating only in those landfill markets and activities consistent with sound business judgment; and
  - Using the Capital Investment Fund prudently and only as needed regarding the capital needs of the landfill.
  - Exploring additional markets in order to get us there (some viable and some not)

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COUNTY'S CURRENT LANDFILL MANAGEMENT PRACTICES

Landfill Background
Where we came from

Overview

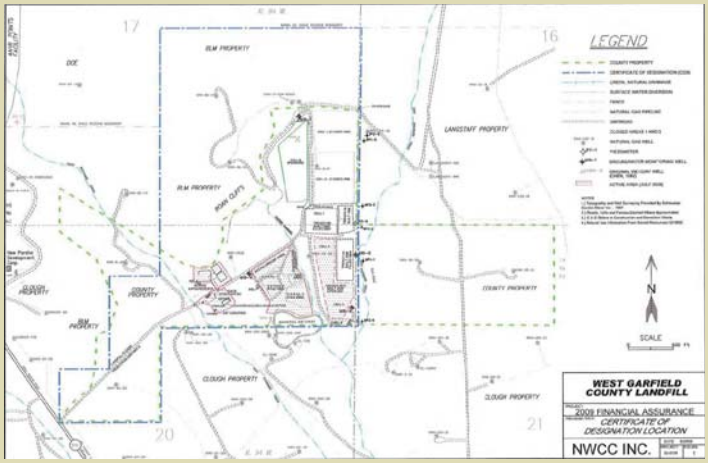
- 1981
  - Landfill Siting Study, Development Plans and Geotechnical Investigation reports.
- Certificate of Designation (CD) issued in 1982
- Constructed and operating in 1983
  - Was Anvil Points Landfill, later changed to West Garfield County Landfill (WGCL)
  - 260 acres of property leased from Department of Interior, Bureau of Land Management (BLM).
- Late 1980's - Federal statute required landfills operating on Federal land to close or property conveyance to County.

Landfill Background – Where we came from

Overview (cont'd)

- 1997 Land Transfer Audit
  - 260 acres of land conveyed from BLM to Garfield County.
  - 160 acres from the original lease
  - Additional 100 acres (20 acres west and 80 acres east of the CD) purchased
    - Based on 1991 Northwest Colorado Council of Governments Solid Waste Assessment Planning Study identifying WGCL as becoming a regional facility.

WGCL Certificate of Designation



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Landfill Background (cont'd)

Details of Land Lease with BLM

- Annual rent of $560 for 260 acres.
- $15,000 performance bond required
- Included easements and right-of-way from various entities
- Limitations and Requirements
  - Comply with EPA 1976 Solid Waste Facility Regulations
  - Construction and Operations
    - Cell bottom scarification and compaction
    - Waste lifts, compaction, cover
    - Revegetation
    - Stormwater controls
    - Site Security

Landfill Background (cont'd)

Details of Land Lease with BLM (cont'd)

- Limitations and Requirements (cont'd)
  - Groundwater Monitoring
  - No salvaging or scavenging
  - Vector control (animals)
  - Wind blown trash control
  - Landfill Cell waste restrictions:
    - No radioactive waste
    - No hazardous waste or toxic materials
    - No liquids or semi-liquids
    - No pesticides or pesticide containers
    - No explosive materials or toxic chemicals or mining wastes
    - No Bulk infectious and institutional waste
    - No highly flammable or volatile substances
    - No raw sewage, raw sewage sludge from RV type tanks

Landfill Background (cont'd)

Details of Land Lease with BLM

- Encouraged recycling operations (temporary storage and removal):
  - Appliances, tires, woody waste, etc.
- Gas management to prevent lateral migration and explosion potential.
- Burning of pulp, wood products, brush and other vegetative materials, if wastes are segregated and permits obtained.
- Closure is required within 6 months if the lease is terminated.

Landfill Background (cont'd)

Land Conveyance Initiation

- Resolution 95-067 signed by the BOCC, authorized Garfield County to:
  - Hold and purchase real and personal property
  - Operate solid waste disposal sites
  - Establish a fund
  - Tax its citizens for disposal purposes.
  - Sign an application with the BLM to acquire the West Garfield County Landfill (WGCL) and surrounding properties

Landfill Background (cont'd)

Details of Conveyance (1/13/1998)

- Restrictions:
  - Right-of-way for ditches and canals constructed under the August 30, 1890 Act (43 U.S.C. 945).
  - All oil and gas deposits in the land patented, and to it, or persons authorized by it, the right to prospect for, mine, and remove the deposits.
  - Liability for damages resulting from oil and gas exploration and production including hazardous materials and by-products is regulated by Federal and State law.
  - Patent subject to rights of prior permittees or lessees to use land surface as required for mining operations without compensation to patentee for damages resulting from proper mining operations.

Landfill Background (cont'd)

Details of Conveyance (1/13/1998) (cont'd)

- Restrictions (cont'd):
  - An easement and right-of-way over and across a 60 foot wide strip of land until the authorized officer determines that the easement and right-of-way is no longer needed.
  - Rights for telephone purposes to West Communications, Inc., successors, and assigns by right-of-way.
  - Patentee shall comply with all Federal and State laws applicable to disposal, placement, or release of hazardous substances. (Note that the landfill is **NOT** permitted to accept or dispose hazardous materials.)
  - If patentee transfers any portion of the property not used for landfill purposes, the patentee must pay BLM fair market value of the land including any improvements.

Landfill Background (cont'd)

Details of Conveyance (1/13/1998) (cont'd)

- Restrictions (cont'd):
  - Garfield County shall defend, indemnify, and save harmless the United States from all claims resulting from injury and damages attributable directly or indirectly resulting from disposal of solid waste or release of hazardous substances from the property.
  - Future land uses should be limited to those that do not penetrate landfill liners or final cover unless excavation is subject to applicable State and Federal requirements.

Landfill Background (cont'd)

Landfill Permitting History (Pre-Subtitle D)

- Original Permit Documents
  - Proposed Landfill Development Plan (1981)
  - Geotechnical Investigation Report (1982) prepared in support of the landfill development design and operations plan
  - Submitted to BLM as an application to the property lease and to Colorado Department of Health (CDH) for approval.
  - BLM issued a lease agreement and CDH granted an approval to construct the landfill.

Landfill Background (cont'd)

Landfill Operations Requirements (Pre-Subtitle D)

- Applicable to Cells 1 and 2
- General operations (e.g. daily soil cover, waste placement and compaction, reseeding, cell closure)
- Cell liner not required
  - cell bottom scarification
  - recompaction prior to waste placement
- Only household, commercial, construction, and sewage sludge waste allowable for disposal.
- Toxic or hazardous waste acceptance **not** permitted.

Landfill Background (cont'd)

Landfill Operations Requirements (Pre Subtitle-D) (cont'd)

- Two septage evaporation impoundments including compacted clay liner
- Facility improvements: stormwater controls, gates, signage, wind fencing
- Tire storage area
- Recycling
- Groundwater monitoring
- O&G development and various right-of-ways within the landfill property

Landfill Design Elements

Resource Conservation and Recovery Act (RCRA) Subtitle D

- October 1991 - RCRA Subtitle D becomes effective
- 1993 - U.S. Environmental Protection Agency (EPA) authorized Colorado Department of Public Health and Environment (CDPHE) to manage municipal solid waste (MSW) facilities in Colorado
- Through 1997 - Extension deadlines granted to comply with the regulations
- Regulations Pertaining to Solid Waste Sites and Facilities, 6 CCR 1007-2, Part 1 (CDPHE, Hazardous Materials and Waste Management Division) are the regulations used by Colorado to comply with Subtitle D

Landfill Design Elements (cont'd)

RCRA Subtitle D (cont'd)

- Subtitle D was enacted to regulate management of nonhazardous solid wastes and establish minimum MSW landfill criteria including:
  - Location
  - Design
  - Operations
  - Groundwater Monitoring
  - Corrective Action
  - Closure and Post-Closure care
  - Financial Assurance

Landfill Design Elements (cont'd)

- Subtitle D required plans demonstrating compliance.
- CDPHE approved plans became part of the facility permit. Key elements:
  - Design (e.g. liner system, closure grading plans, stormwater control)
  - Operations (e.g. trash placement, compaction, cover)
  - Waste Management Plan (waste acceptance standards)
  - Environmental Monitoring (Groundwater, stormwater, landfill gas)
  - Air Emissions
  - Closure and Post-Closure (C-PC): cost estimates for 3rd party C-PC care used for financial assurance purposes.

Landfill Design Elements (cont'd)

- Liner System
  - Cells 3 – 6: 30 feet of native material between the cell base and groundwater elevation.
  - Cell base required scarification to a minimum 12-inch depth, moisture conditioning, and recompaction
  - Top 6-inches of recompacted soil must meet a permeability of $1x10^{-6}$ centimeters per second (cm/sec) or less.
  - Site materials have been processed using the facility screen plant.
  - Subgrade cell wall liners were not required or constructed.

Landfill Design Elements (cont'd)

- 1995 Leachate Assessment
  - Leachate generation at the landfill is unlikely
    - dry climate conditions
    - high evaporation rate in the region
  - Leachate collection sump installed beneath Cell 3 for assessment purposes.
  - No leachate observed in the sump.
- Monofills
  - Three monofill cells (C&D 1, 2, and 3) were excavated approximately 35 feet below grade to dispose of inert construction and demolition (C&D) and wood (e.g. furniture) debris.
  - Cells not lined.

Landfill Design Elements (cont'd)

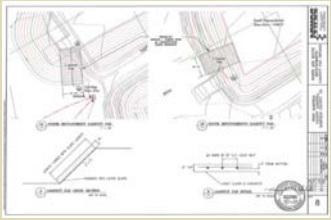
Septage Evaporation Impoundments

- In this climate, evaporation impoundments are considered the most cost effective method of treatment.
- Evaporation methods not as effective in wetter climatic conditions, such as Glenwood Springs.
- Operations and maintenance is minimal.
- Each impoundment is periodically allowed to dry and sludge is removed.
- If treated septage is used beneficially (e.g. dust control), additional costs (e.g. analytical, treatment) would be incurred.

Landfill Design Elements (cont'd)

Septage Evaporation Impoundments (cont'd)

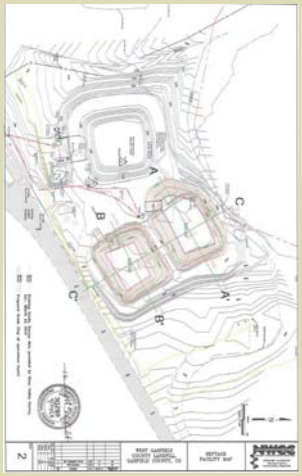
- 2006 -West Impoundment (WI) constructed.
  - Provided 540,000 gallons of additional disposal capacity.
  - Design exceeded CDPHE regulations at the time.
  - WI liner system includes a bentonite GCL that meets a permeability of $5x10^{-9}$ cm/sec max
  - 2-foot thick secondary liner/operations layer with permeability of $1x10^{-6}$ cm/sec.



Landfill Design Elements (cont'd)

Septage Evaporation Impoundments (cont'd)

- New regulations required demonstration that WSI meets the intent of the new regulations.
- CDPHE approval of the demonstration is pending.



Landfill Design Elements (cont'd)

Septage Evaporation Impoundments (cont'd)

Recommendation: Rebuild North and South Impoundments.

- Capacity of the proposed North Impoundment is 750,000 gallons; 550,000 gallons for the proposed South Impoundment.
- Liner design includes:
  - 18-inch layer of uniformly compacted native soil overlain by a geosynthetic clay liner (GCL).
  - Soil to meet a minimum $1x10^{-6}$ cm/sec permeability.
  - 18-inch operations layer of native soil.

Landfill Design Elements (cont'd)

Stormwater Controls

- Run-on and run-off stormwater controls to manage surface water.
- Run-on diversion channels designed to control peak flow of a 100-year, 24-hour storm event.
- West Sherrad Creek and East Sherrard Creek intermittently flow due to heavy precipitation or snow melt.
- Flash flood of East Sherrad Creek resulted in flooding of the south end of the Main Landfill in the past.

Landfill Design Elements (cont'd)

Stormwater Controls (cont'd)

- Berm along the southeast end of the landfill to prevent landfill flooding.
- Disposed erosion control materials (e.g. wattle, straw bales) are recycled for stormwater control.

Landfill Design Elements (cont'd)

Environmental Monitoring

- Semi-annual groundwater quality monitoring
  - Four groundwater monitoring wells
  - Five piezometers
- Quarterly landfill gas (LFG) monitoring
- Quarterly methane monitoring
  - Nine landfill gas probes.
  - All building structure interiors.
  - Seven LFG passive vents.
- Leachate collection sump (LCS) is also used for monitoring purposes.

Current Landfill Conditions

Site Access

- The landfill is accessed via County Road 246.
- Entrance secured with a locked gate.
- Locked entrance in Northeast Corner for O&G personnel.
- Fencing and natural geologic features (Roan Cliffs) provide required security.

Building Structures

- Scale house
  - Covered scale
  - Administrative office
- Maintenance shop and administrative office building are located to the south.
- Fuel dispensing system located adjacent to the maintenance shop.

Current Landfill Conditions (cont'd)

Cells

- General MSW, mixed Construction and Demolition (C&D debris), and petroleum contaminated soil (PCS) commingled.
- Dead animals are disposed in a separate cell area.
- Current permitted landfill capacity is 2.46 million mega-grams
  - Cover, slope and build-out elevation discussed later.

Current Landfill Conditions (cont'd)

Recycling

- Four acre area:
  - Overlying filled monofills is materials staging for recycling
  - Waste shredding operations.
- Separated recyclables include:
  - clean wood
  - tree/brush debris
  - furniture and mattresses
  - erosion control products (e.g. wattle, straw bales)
  - Tires
  - Ferrous metals
  - Bicycles, grills, small machinery (e.g. snow throwers, lawn mowers)

Current Landfill Conditions (cont'd)

Separated recyclables include (cont'd):

- White goods
- Rock, brick, and concrete are stockpiled in the Cell 8 area for on-site use.
- Automotive batteries stored in a secured shed adjacent to the scale house
- Electronic waste is collected and stored in conex storage containers.
- Recycling Disposition
  - Metals, automotive batteries, and electronic waste is periodically hauled to a recycling facility.

Current Landfill Conditions (cont'd)

Recycling Disposition (cont'd)

- Rock, brick, and concrete are periodically crushed and used
- Erosion control products are beneficially used to comply with stormwater Best Management Practices (BMPs).
- Under a pilot demonstration project, Green Waste, shredded wood, furniture including mattresses, and waste tires are processed through a shredder and used as Alternative Daily Cover (ADC).

Current Landfill Conditions (cont'd)

Daily and Final Soil Cover:

- Adequate volume of cover must be available throughout the landfill's life.
- If cover is not available, the cost of importing cover material must be included in the financial assurance costs.
- Adequate soil for daily and final cover has historically been a concern and has driven operational changes.
- BLM lease limited trash lift thickness to a maximum two feet which led to higher daily cover soil used; Industry standard is several feet.

Daily Cover (million cubic yards)	Current Permit Capacity (50' Above Grade @ 5:1 slope) ADC	Current Permit Height (3:1 slope) ADC	Current Permit Capacity (50' Above Grade @ 5:1 slope) soil	Current Permit Height (3:1 slope) soil cover
Main Landfill	0.12	0.20	0.49	0.79
West Landfill	0.07	0.19	0.28	0.74
Total	0.19	0.39	0.77	1.53
Daily Cover Range (20% to 5%): **1,530,000 - 190,000** cy				
Final Cover & Daily Cover Range (20% to 5%): **2,100,000 - 760,000** cy				

Current Landfill Conditions (cont'd)

Alternative Daily Cover (ADC)

Recommendation: Obtain approval from CDPHE of the materials under the demonstration project for use as ADC.

- Preserves landfill space used for waste
  - Initial landfill design assumed 20% landfill space used for daily soil cover.
- Increases revenue over landfill life.
- Enhances landfill gas management.
- Status:
  - Ongoing ADC demonstration.
  - Pilot demonstration approval to use shredded green waste, non-asbestos containing C&D waste and shredded tires as ADC.
    - Demonstration results submittal to CDPHE are pending.

Current Landfill Conditions (cont'd)

Alternative Daily Cover (ADC) (cont'd)

- Waste materials are shredded in recycling area
- Processed material transported to the active landfill face.
- Placed daily in order to prevent wind blown trash, animal scavenging, and to control odor.
- Posi-Shell™ and tarp systems are permitted but cost prohibitive.
- The landfill is in soil deficit and has adopted modified landfilling techniques to reduce soil use.
  - Thicker lifts for waste
  - Disposal over an embankment

Current Landfill Conditions (cont'd)

Landfill Operations (cont'd)

- Screen Plant
  - A screen plant processes excavated site material for various beneficial uses
    - landfill road
    - stormwater controls maintenance
    - daily soil cover throughout the landfill.
    - Site soils have been processed to meet construction specifications of required cell bottom materials.

Landfill Operating Requirements and Permits

Federal

FEDERAL		
United States Environmental Protection Agency – USEPA		
Permit	**Permit Focus Area**	**Requirements**
Resource Conservation and Recovery Act (RCRA)	Solid Waste Disposal	• Minimum MSWLF criteria including: location, design, operations, groundwater monitoring and corrective action, closure and post-closure care, and financial assurance.
	Subtitle D	• The CDPHE *Regulations Pertaining to Solid Waste Sites and Facilities* are the regulations used to comply with Subtitle D.
New Source Performance Standards (NSPS)	Air Emissions	• Minimum MSWLF Air Emissions criteria based on trigger level of total in-place wastes.
	Title V Permit	• The CDPHE Regulations Pertaining to Air Emissions are the regulations used to comply with Subtitle D.
National Pollutant Discharge Elimination System DES	Stormwater	• Industrial Stormwater Permit.

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Permits – State (cont'd)

STATE		
Colorado Department of Public Health & Environment - CDPHE		
Permit	**Permit Focus Area**	**Requirements**
Certificate of Designation (CD – CDPHE/County)	Landfill Construction	• A cell liner was not required; however, cell bottom scarification and recompaction prior to waste placement was required.
	Landfill Operation	• General operations (e.g. waste placement and compaction, daily soil cover, dust control, litter control, stormwater controls, gates, signage, wind fencing cell closure, reseeding.)
		• Places maximum elevation and quantity of wastes that can be disposed in the CD footprint only landfill.
		• Septage impoundments including a designed liner system.

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Garfield County NWCC URS

Permits – State (cont'd)

Certificate of Designation (CD – CDPHE/County)	Waste Types	• Only household, commercial, construction, sewage sludge waste, construction demolition (C&D), petroleum contaminated soils (PCS), and large animals are allowable for disposal. Toxic or hazardous waste acceptance not permitted.
		• Prepare a formal operations plan.
	Groundwater Protection	• Prepared a comprehensive groundwater monitoring plan.
		• Installation of groundwater monitoring wells and conducting periodic monitoring.
	Landfill Gas Subsurface Migration	• Landfill gas monitoring plan.
		• Installation of Landfill gas monitoring probes and conducting periodic LFG Probe and structures monitoring.

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Garfield County NWCC URS

Permits – State (cont'd)

Certificate of Designation (CD – CDPHE/County)	Closure and Post Closure	• Prepare closure design and post closure maintenance and monitoring plan
		• Closure and Post-Closure Engineer Cost Estimate
		• Proof of Closure and Post-Closure Financial Assurance
		• Update Closure design and cost estimate every 5 years
	Other	• O&G development and various right-of-ways within the landfill property.
Certificate to Discharge (CTD - CDPHE)	Stormwater Discharges	• For Non Extractive industrial activities at the West Garfield County Landfill to East Sherrard Creek-Colorado River. Limits discharge 100 mg/L of TSS. Quarterly sampling

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Garfield County NWCC URS

Permits – State (cont'd)

Air Emissions Permit (CDPHE - APCD)		• Limits the quantity of wastes that can be received on a yearly basis.
		• Limits per annum particulate air emissions.
		• Limits topsoil/overburden removal and stockpiling.
		• Limits per annum acceptance of solid waste and septage.
		• Equipment emissions limitations.
		• Greenhouse Gas Emission Restrictions.
		• Non Methane Organic Compounds (NMOC) emissions limitations, based on quantity of wastes placed - Tier II Gas sampled and analyzed to forestall need for installation of a Landfill Gas Collection and Flare Station.

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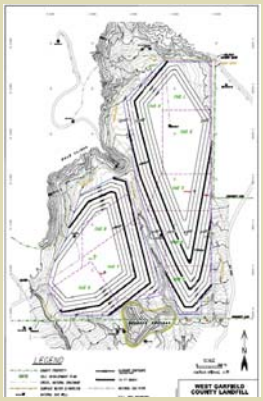
Garfield County NWCC URS

Current Landfill Airspace and Financial Assurance

Current Permitted Design



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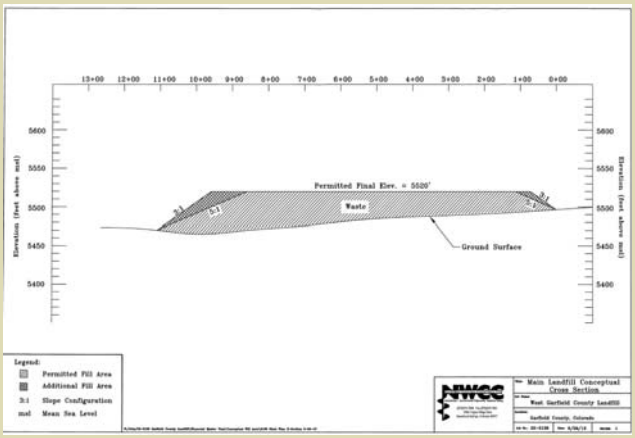
Garfield County NWCC URS

Main Fill Area Cross-Section Steepened Slopes



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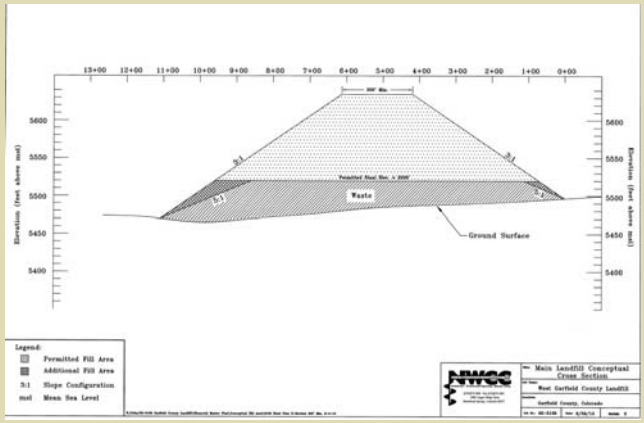
Garfield County NWCC URS

Main Fill Area Cross-Section Maximized Elevation



WGC Landfill Life Expectancy Estimates

Landfill Life Expectancy Estimates - West Garfield County Landfill					
Remaining Capacity	Current Permit Capacity (50' Above Grade @ 5:1 slope)	Current Permit Height (3:1 slope)	% capacity increase	Maximum Elevation 130' - Above Grade (3:1 Slope)	% capacity increase
Totals (MCY)	5.7	6.6	14%	9.3	39%
Closure Year *	2041	2048	-	2063	-

* Assumes use of alternative daily cover, and/or other means of daily cover soil reduction – (i.e. use compost to displace soil cover)

WGC Landfill Life Expectancy + 80-Acre Expansion Area

WGC Landfill Life Expectancy + 80-Acre Expansion Area

Landfill Life Expectancy Estimates - West Garfield County Landfill		
Remaining Capacity	Expansion into 80 - acre Parcel	
	Avoiding 2 Nat. Gas Wells (4 cells)	Assumed Nat. Gas Wells Removed (1 cell)
Totals (MCY)	11.1	14.1
Additional Years *	11 years	18 years

* Assumes use of alternative daily cover, and/or other means of daily cover soil reduction – (i.e. use compost to displace soil cover)

Financial Assurance for Landfill Closure

- Required Cost Estimates for Site Closure and Post-Closure:
  - Capital Costs:
    - Final Closure Cap & Drainage Structures
    - Groundwater and LFG Monitoring Wells
    - Other Environmental Control Systems
  - 30-year Maintenance and Monitoring Costs

Financial Assurance for Landfill Closure (cont'd)

- Current Funding Levels (2012)
  - Capital Costs - $1,405,300
  - 30-Yr Post-Closure Costs - $ 800,178
  - Totals - $2,245,478
  - CDPHE approved Garfield County's 2012 Financial Assurance Mechanism
    - Local Government Financial Test

CURRENT AND AVAILABLE WASTE STREAMS

State of the Practice

Types of Waste Currently Accepted at West Garfield County Landfill (WGCL)

- Animals
- Appliances
- Construction & Demolition Waste
- E-Waste
- Landscape Rock
- Mattresses
- Municipal Waste – In-County
- Municipal Waste – Out-of-County

- Septage – In-County
- Septage – Out-of-County
- Scrap Metal
- Sludge – In-County
- Special soils
- Tires
- Wood

Municipality Customers 2010 - 2012

- B.L.M.
- CDOT GWS AND RIFLE
- CITY OF RIFLE
- COLO STATE VET NRSG HOME
- GARFIELD COUNTY – ALL DEPARTMENTS
- RE-2 SCHOOL DISTRICT
- TOWN OF PARACHUTE
- TOWN OF SILT
- U.S. FOREST SERVICE

Septage Customers 2010 - 2012

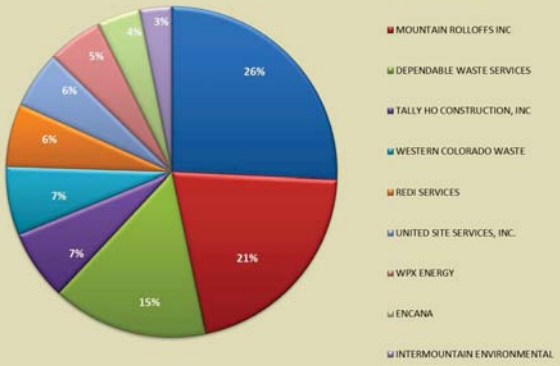
- DOWN VALLEY SEPTIC LLC
- MOUNTAIN ROLLOFFS INC
- REDI SERVICES
- STALLION OILFIELD SERVICES
- TOBY'S VACUUM SERVICE
- UNITED SITE SERVICES
- WESTERN COLORADO WASTE

Oil and Gas Customers 2010 - 2012

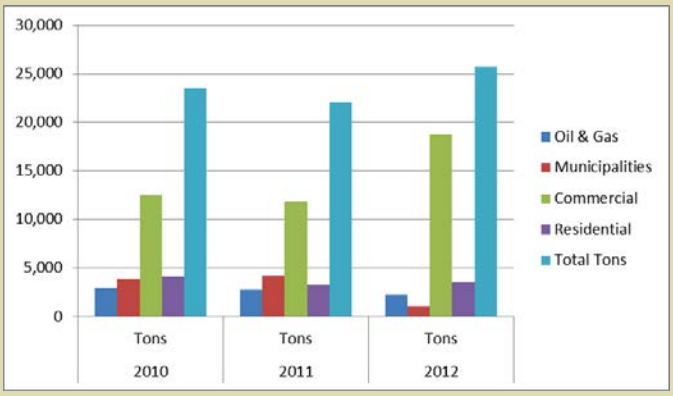
- ADVANCED OILFIELD SERVICES
- ANTERO RESOURCES
- BILL BARRETT CORP
- BLAC FRAC TANKS INC
- CASCADE TANKS LLC
- ENCANA
- FLINT ENERGY SERVICES
- HYLAND ENTERPRISES, INC

- HYLAND ENTERPRISES INC
- NORTHWIND INC
- PETROLEUM DEVELOPMENT CORP
- ROUSTABOUT SPEC
- TOBY'S VACUUM SERVICE
- WILLIAMS PRODUCTION
- WPX ENERGY

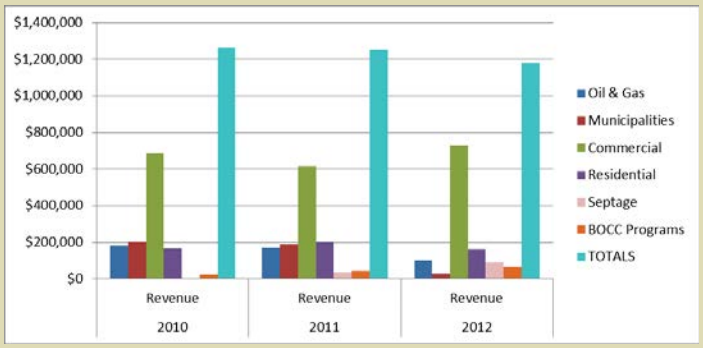
Breakdown of Key Customers By Revenue - 2012



Tonnage by Market - 2010 – 2012



Revenue by Market - 2010 – 2012



- Prior to June 2010 the tipping fees were $48/ton.
- In June 2010, tipping fee increased to $68/ton.
- June 2011, tipping fee reduced to $58/ton.
- October 2011, tipping fee reduced to $42/ton.

Current Services Provided by the Landfill

- Monofill
  - Construction and Demolition Debris
  - Dead Animals

- Landfill Cell
  - Municipal Solid Waste
  - Construction and Demolition Debris
  - Petroleum Contaminated Soils
  - Yard Waste

- Recycling Collection
  - Batteries
  - Electronics
  - White Goods
  - Metal Scrap
- Proposed Alternative Daily Cover
  - Mattresses
  - Tires
  - Wood
  - Yard Waste
- Surface Impoundment
  - Septage

Additional Services to Consider

- Compost Facility
  - Yard Waste
  - Shrubs
  - Septage
  - Biosolids
  - Food waste
  - Manure

- Citizen's Drop Off Area
  - Cardboard
  - Paper
  - Cans
  - Metal

- Recycling
  - Household Hazardous Waste
  - Used Oil
  - Antifreeze
  - Aggregates
- Stop 'N' Shop
  - Reuse and repurpose shop
  - Charge small fee

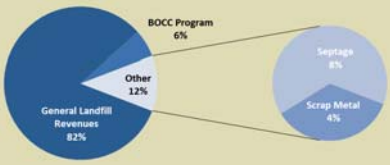
Potential Additional Waste Streams to Target

- Asbestos
- Drill Cuttings
- Household Hazardous Waste
- Separate oil field plastics
- Landscape Waste
  - Commercial
  - Residential
- Leachate (needs surface impoundment-treatment)

- Liquid wastes for solidification (E & P waste)
- Medical Waste/ Pharmaceuticals
- Mining waste
- Non-hazardous aqueous wastes for solidification
- Cattle or farm manure
- Sand trap sediment

Current Revenue Sources - 2012

- General Landfill Revenues = $972,464
- BOCC Community Benefit Programs: $68,374
- Scrap Metal: $48,661
- Septage: $89,064
- Total Landfill Revenues = $1,178,563



Markets for New Waste Streams

- Asbestos
- Drill Cuttings
- Household Hazardous Waste
- Separate oil field plastics
- Landscape Waste
  - Commercial
  - Residential
- Leachate (needs surface impoundment-treatment)

- Liquid wastes for solidification (E & P waste)
- Medical Waste/ Pharmaceuticals
- Mining waste
- Non-hazardous aqueous wastes for solidification
- Cattle or farm manure
- Sand trap sediment

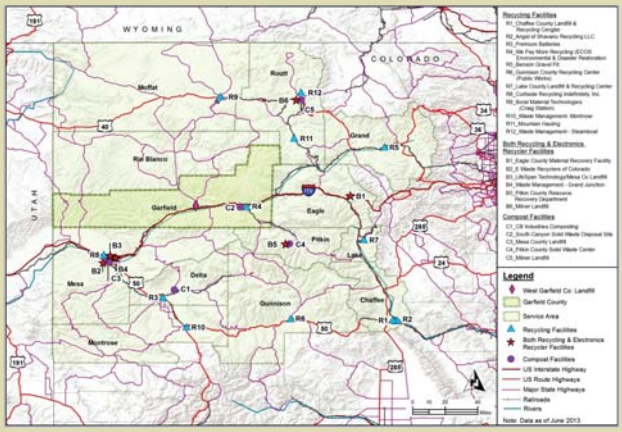
Markets for New Waste Streams (cont'd)

- How To Quantify the Organics In The Study Area
- 2008 LBA Associates New Compost Feasibility Study for Garfield County
  - Identified 7,000 CY/year of Biosolids
  - 10,000 CY/year of Ground Green Waste
  - 170 tons/year of animal bodies
  - Other Key Findings of the Study:
    - Proposed operation had a capital cost of $784,000
    - Tip fees of $20/CY required for biosolids
    - Finished compost to be sold at $20/CY
    - Break even point after 3 years
- 2009 LBA Study surveyed recycling, compost and landfill facilities in Pitkin, Eagle and Garfield Counties

Markets for New Waste Streams (cont'd)

	EAGLE COUNTY	GARFIELD COUNTY		PITKIN COUNTY	TOTALS
Material		**West Garfield County Landfill**	**South Canyon Landfill**		
	Tons	**Tons**	**Tons**	**Tons**	**Tons**
Landfilled					
Recyclables	16,976	3,914	9,313	5,853	36,056
Yard Waste/Organics	**17,151**	**3,954**	**9,409**	**6,043**	**36,557**
HHW & E Waste	525	121	288	185	1,119
Diverted Tons					
Recyclables	6,020	5,663	(Combined with WGCL)	5,853	17,536
Yard Waste/Organics	**6,082**	**4,296**	**(Combined with WGCL)**	**3,636**	**14,014**
HHW & E Waste	28	60		74	162
Total MSW from Diverted waste and Landfilled that included recylables, organics, HHW and E waste					
Recyclables	**22,996**	**18,890**		**11,706**	**53,592**
Yard Waste/Organics	**23,233**	**17,659**		**9,679**	**50,571**
HHW & E Waste	**553**	**181**		**259**	**993**
Source: 2009 Waste Diversion Quantity Report LBA Associates, Eagle, Garfield & Pitkin Tri-County Region					
Organics includes yard waste, food waste, wood chips and clean wood.					

Recycling & Compost Facilities in Service Area



Markets for New Waste Streams (cont'd)

What is happening in the study area?

- Reviewed CDPHE Compost Records for Facilities in the study area
- CB Industries Composting in Delta County:
  - Only compost site in study area to accept sludge
  - 5,000 – 5,700 cubic yards per year, (2009-2012 data)
- South Canyon Landfill
  - Only compost site in study area to accept septage (11,000 to 19,000 gallons/year, 2009 – 2012)
- Cacaloco Compost, Inc.
  - Operational only in 2011, then shut down by CDPHE
  - Only compost site in study area to accept liquids

Markets for New Waste Streams (cont'd)

What is happening in the study area (cont'd)?

- Mesa County Landfill
  - Has two compost operations:
    - One accepts animal mortalities, biosolids and food waste (closed 2012)
    - One accepts trees/shrubs and hay
- Pitkin County Solid Waste Center
  - One of two compost sites in study area to accept food waste and Clean C&D
- Millner Landfill
  - Only accepts food waste, biosolids and wood chips
- Data shows increased 6% - 8% increase in receipts at the existing facilities in the study area from 2009 – 2012.
- 2012 receipts at Garfield and Pitkin County Facilities is 52,285 cubic yards (7,484 tons), excluding 11,455 gallons septage.

Markets for New Waste Streams (cont'd)

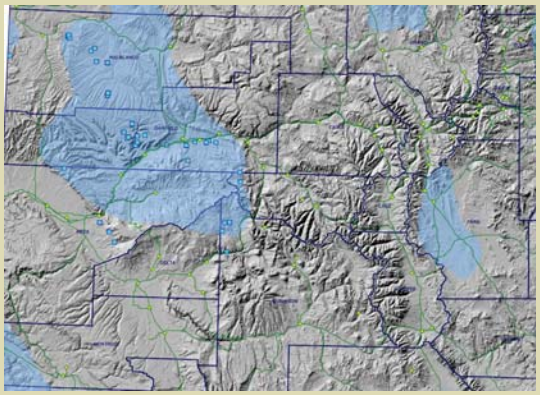
What is happening in the study area (cont'd)?

- 2012 receipts for Garfield and Pitkin County are consistent with LBA estimates for diverted organic waste.

Year	Total Material Received (Cubic Yards)	Notes
2009	100,200	Totals do not include 17, 935 gallons of septage
2010	108,975	Totals do not include 19,429 gallons of septage
2011	115,008	Includes waste from CacaLoco from one year. Totals do not include 13,892 gallons of septage.
2012	95,952	No 2012 data for Milner Landfill or Mesa County Biosolids facility. Totals do not include 11,455 gallons of septage.

Markets for New Waste Streams (cont'd)

E&P Production Wells with Pending Permits



Markets for New Waste Streams (cont'd)

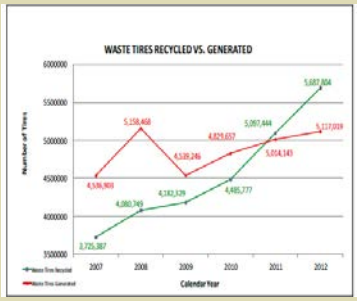
E&P Production Wells with Pending Permits (cont'd)

- Colorado Oil and Gas Conservation Commission (COGCC) tracks the status of pending and active permits for new oil and gas exploration.
- The current pending permits database lists at least 130 wells in Garfield County alone.
- Carus Oil & Gas reported 400 wells will potentially be drilled on Piceance Basin Plateau.
- 8 to 20 wells per pad with up to an estimated 8,400 yd^3 of drill cuttings per pad.
- 20 pads yields 168,000 cubic yards of drill cuttings requiring disposal.
- WPX Energy and Encana USA, continue to operate about five rigs apiece in Garfield and the greater Piceance.
- Encana hopes to drill more than 4,000 wells over 20 years on 50,000 acres of federal land straddling Garfield and Rio Blanco counties.
- Assuming 20 wells/pad; 4,000 wells represents potential 1.68 MM cubic yards of drill cuttings.

Markets for New Waste Streams (cont'd)

Markets for Tires

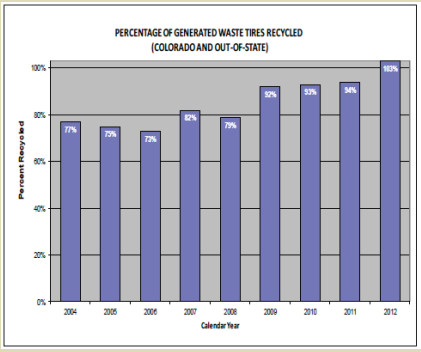
- CDHPE 2012 Tire Report states: 5,117,019 waste tires generated in
- the state of Colorado during 2012.
- Nationwide average generation is 1 tire per capita per year.
- Study area potential of 443,000 tires.
- Garfield/Pitkin/Eagle potential: 125,000 tires.



Markets for New Waste Streams (cont'd)

Markets for Tires (cont'd)

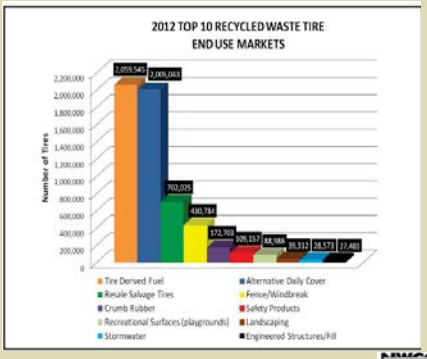
- Increasing trend in percent of tires recycled.
- Includes tires shipped to other end users.



Markets for New Waste Streams (cont'd)

Markets for Tires

- State wide, top two greatest uses are in tire derived fuel and alternative cover at landfills.



Markets for New Waste Streams (cont'd)

Markets for New Waste Streams (cont'd)

Facility Name	Waste Tires in Inventory	Waste Tires Received	Waste Tires Removed from Inventory	Total Tires in Inventory at End of Year	Whole Tires Processed into Shredded Tires	Whole Tires Processed into Baled Tires	Onsite Use	Offsite Use
Chaffee County Waste Disposal	400	1,881	2,266	15	0	0		2,266 whole tires that a hauler picked up.
Eagle County Solid Waste & Recycling	74,665	149,030	184,840	38,845	0	0	8,215 whole tires sent to South Canyon Landfill	
South Canyon Landfill	5,000	22,557	27,481	76	27,481	0	27,481 shredded/cut tires for engineered fill	
West Garfield County Landfill	0	5,212	5,937	0	0	0		5,937 Whole tires sent to South Canyon for beneficial use
Gunnison County Landfill	1,679	546	820	1,405	0	0		820 whole Tires sent off-site for recreational surfaces
Mesa County Solid Waste Campus		954	8,746	7,980	0	7,980	7,980 baled tires used for stormwater control	
JXM Grinding and Compost	0	0	0	0	0	0	N/A	
Pitkin County Solid Waste Center	1,305	2,900	2,913	1,292	0	0		2,913 whole tires sent to Colorado Tire Recycling
TOTALS:	**83,049**	**183,080**	**233,003**	**49,613**	**27,481**	**7,980**	**43,676**	**11,936**

New Waste Stream Design Considerations

Recommendation: Pursue Economical Approaches to Providing E&P Disposal

Recommendation: Build a Solidification Basin

- **Purpose:**
  - To accept wastes containing free liquid that WGCL cannot currently accept:
    - E&P drilling/fracking mud and sludge
    - Manufacturing sludge that is not classified a hazardous waste
    - Water and wastewater treatment sludge
    - Restaurant grease and grease trap wastes
    - Animal renderings
    - Grease trap or oil and water separator wastes
    - Maintenance, repair shop, automotive painting, vehicle wash sand trap sediments.

New Waste Stream Design Considerations (cont'd)

Recommendation: Build a Solidification Basin

- **Benefits:**
  - Augment the lined E&P waste monofill
  - Accept a greater variety of materials that generally contain free-liquids.
  - Conceptual design has been prepared.
  - Few landfills on the West Slope include solidification basins
  - Can be constructed independent of the lined E&P waste monofill.
- **Design Assumptions:**
  - Designed and permitted to meet the general standards in accordance with CDPHE Solid Waste Sites and Facilities.
  - Approximate 115 foot by 175 foot basin.
  - Three sides 3:1 slope and one side used for entrance/exit at 6:1 slope.
  - Double HDPE liner system including leak detection.

New Waste Stream Design Considerations (cont'd)

- **Design Assumptions for Solidification Basin (cont'd):**
  - Liner protection includes 12-inches of soil cover overlain with concrete slabs
- **Permitting and Construction for Solidification Basin:**
  - Conceptual design
  - Engineering cost estimate recently completed
  - Construction plans and specifications to CDPHE for approval.
  - Release Invitation for Bids
  - Construction with construction quality assurance (CQA) to CQA report preparation and submittal to CDPHE.
  - CDPHE certification and permit to use the facility as designed.

New Waste Stream Design Considerations (cont'd)

- **Design and Construction Conceptual Budget: $240,000**
- **Equipment/Material Needs**
  - Loader
  - Dump Truck
  - Amendment materials (e.g. sawdust, fly ash, soils)

New Waste Stream Design Considerations (cont'd)

Recommendation: Propose a Pilot Project for a Land Farm to CDPHE for Approval

- **Purpose:**
  - Beneficial use of E&P and PCS wastes as daily cover
- **Benefits of a Land Farm:**
  - Reduced levels of petroleum constituents in the waste that could potentially impact groundwater quality.
  - If treated PCS is used as daily cover:
    - Decreases the percent daily soil cover
    - Increases the overall landfill design capacity.
    - Helps offset a soil cover deficit at the landfill.

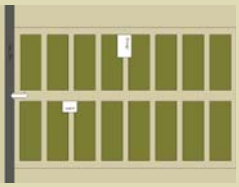
New Waste Stream Design Considerations (cont'd)

- **Benefits of a Land farm (cont'd):**
  - Reduces the potential of groundwater impacts from PCS.
- **Design Assumptions:**
  - Meet CDPHE Solid Waste Sites and Facilities regulations.
- **Review and Permitting:**
  - CDPHE Solid Waste Division
    - Environmental risk assessment results
    - CD Amendment
    - Construction level design plans and specifications.
    - Engineer cost estimate
    - CQA report
    - Financial assurance

New Waste Stream Design Considerations (cont'd)

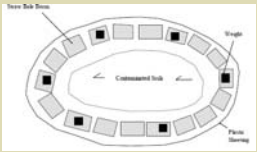
Review and Permitting for a Land Farm (cont'd):

- Certification to use the facility as designed.
- Air Pollution Control Division (APCD)
  - Reasonably Available Control Technology (RACT) evaluation needed.
  - Annual air emissions calculations and reporting
  - Certification to use the facility as designed.
- Various required permit and plan updates addressing the land farm include DOP and ISUWP.



New Waste Stream Design Considerations (cont'd)

- **Operational Requirements for a Land Farm**
  - Best Management Practices (BMPs)
    - BMPs likely include:
      - Water and nutrient application with tilling to help biodegradation
      - Monthly sampling and analysis:
        - heterotrophic plate counts
        - soil moisture content
        - soil pH
        - total nitrogen
        - total phosphorous
        - Waste characterization prior to disposal would likely include total hydrocarbons and RCRA 8 Metals – (As, Ba, Cd, Cr, Pb, Se, Ag, Hg)



New Waste Stream Design Considerations (cont'd)

- **Equipment Needs**
  - Tractor and tiller
  - Loader
  - Dump truck to transport to stockpile

New Waste Stream Design Considerations (cont'd)

Recommendation: Conceptualize Phasing Plan for E&P Waste Monofill Development

- **Purpose:**
- To accept drill cuttings, sludge, petroleum contaminated soil (PCS) for disposal
- **Benefits of an E&P Waste Monofill:**
- Only one of its kind on the west slope for E&P waste and PCS exhibiting elevated contaminant levels.
- Reduces the environmental impact potential and level of potential liability exposure realized by both Garfield County and the waste generator.
- Space savings in landfill cells.
- Segregates this material from the general public that disposes wastes.
- Disposal of this material in a specific small area.
- Opportunity of potential tailings disposal from Anvil Points facility

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New Waste Stream Design Considerations (cont'd)

- **Design Assumptions for E&P Waste Monofill:**
  - Meet CDPHE Solid Waste Sites and Facilities regulations.
  - No free liquid materials accepted.
  - Double HDPE liner system including leak detection and leachate collection systems.
  - Run-on and run-off stormwater controls including a retention pond.
  - Lined load-out area.
  - Posi-Shell™ type daily cover
  - Soil cover application once per week
  - Total capacity of 575,000 cubic yards.

New Waste Stream Design Considerations (cont'd)

- **Permitting and Construction for E&P Waste Monofill:**
  - Conceptual design completed in 2010 located an E&P monofill northwest of the landfill gate.
  - Engineering cost estimate recently completed
  - A hydrogeologic and geotechnical evaluation to characterize the monofill location.
  - Construction plans and specifications to CDPHE for approval.
  - Various required permit and plan updates:
    - Design and Operations Plan (DOP)
    - Closure and Post-Closure Plan
    - Groundwater Monitoring Plan (GMP)
    - Industrial, Special, and Universal Waste Management Plan (ISUWP).
    - Air emissions permits including Title V

New Waste Stream Design Considerations (cont'd)

Permitting and Construction for E&P Waste Monofill (cont'd):

- Release Invitation for Bids
- Construction with construction quality assurance (CQA) to CQA report preparation and submittal to CDPHE.
- CDPHE certification and permit to use the facility as designed.
- Financial assurance must be submitted to and approved by CDPHE before opening the facility.

- **Design and Construction Conceptual Budget: $2.54 MM**
- **Operational Equipment Needs**
  - Dozer
  - Posi-Shell™ applicator (hydroseeder)

NEW REVENUE AND RECYCLING OPTIONS

Additional Services to Consider

- Compost Facility
  - Yard Waste
  - Shrubs
  - Septage
  - Biosolids
  - Food waste
  - Manure

- Recycling
  - Household Hazardous Waste
  - Used Oil
  - Antifreeze
  - Aggregates
- Stop 'N' Shop
  - Reuse and repurpose shop
  - Charge small fee

New Recycling Services

Recommendation: Consider a Pilot Stop and Shop facility to increase recycling.

- **Stop N Shop**
  - Materials frequently accepted:
    - working appliances
    - large and small furniture
    - antiques of all kinds
    - quality clothing, especially outdoor wear
    - tools and equipment
    - yard and garden
    - Building materials/paint/flooring
    - stereo and small electronics
    - computers, p-4 or newer

New Recycling Services

Stop N Shop (cont'd)

- Materials frequently accepted (cont'd):
  - outdoor recreation gear
  - household and kitchen items
  - house plants and pots
  - old skis and snowboards
  - windows
- How to Set It Up
  - Start small with a limited number of materials
  - Find a storage area/room at a County facility that can be used as a staging area
  - Identify several locations in the county and rotate the location
  - Identify local non-profits to team with for labor

- **Conceptual Budget: To be Determined**

New Recycling Services (cont'd)

Recommendation: Conduct a Feasibility Study for Expanding the Current Household Hazardous Waste Program

Program could be modeled after Mesa County, Pitkin County or Boulder County Facilities

- **Household Hazardous Waste Collection Facility**
  - Materials Typically Accepted:
    - Aerosol Cans
    - Antifreeze
    - Electronics
    - Fluorescent Light Tubes
    - Insecticides
    - Old Gasoline
    - Road Flares
    - Spa and Pool Chemicals
    - Used Syringes, Needles, & Sharps
    - Ammunition
    - Automotive Products
    - Fireworks
    - Garden & Hobby Products
    - Latex and Oil Based Paints

New Recycling Services (cont'd)

Household Hazardous Waste Collection Facility (cont'd)

- Materials NOT Accepted
  - Explosive Materials, other than ammunition and Class C fireworks.
  - Radioactive Materials.
  - Bio-Hazardous Materials, other than used syringes and sharps.
  - Ammunition, explosives,
  - flares, fireworks
  - Asbestos-containing insulation, tile, linoleum
  - BBQ propane tanks
  - Electronics
  - Empty containers
  - Fire extinguishers
  - Medical wastes
  - Non-hazardous wastes
  - Smoke detectors

New Recycling Services (cont'd)

- **Household Hazardous Waste Facility**
  - Potential markets: Garfield County (currently holds 2 collection events per year)
  - Potential Revenues: $50,000/year paid for by BOCC
  - Current Fees in the market:
    - **Boulder County**
      - Boulder charges $45/household served, funded by the municipalities served.
      - Open to residents of Boulder County, City, County of Broomfield and the Town of Erie.
      - Businesses charged based on the type and tons of material delivered.
    - **Mesa County**
      - County accepts hazardous materials free of charge from Mesa County households only.
      - Fees charged to residents with > 50 gallons motor oil, > 4 automotive batteries, or > 50 gallons of paint
      - Residents charged $20/ 5 gallons to purchase paint
      - E Waste charged at $0.42/pound

New Recycling Services (cont'd)

- **Household Hazardous Waste Facility**
  - Current Fees in the market: (cont'd)
    - **Mesa County**
      - Businesses charged based on material and volume, including:
        - Aerosols
        - Antifreeze
        - Batteries
        - Fluorescent Tubes
        - Latex Paint
        - Motor Oil
        - PCB Ballast
        - Pricing ranges from $0.1 to $4.25/pound

New Recycling Services (cont'd)

- **Household Hazardous Waste Facility**
  - Current Fees in the market: (cont'd)
    - **Mesa County**
      - User Statistics:

Year	Households Served	Pounds of Hazardous Waste		
		Collected	Recycled	Provided through the Re-Use Program
2011	6,086	320.415	256,332 (80%)	22,024
2010	6,422	398,840	331,037 (83%)	20,291
2009	5,988	334,365	281,703 (84%)	21,009

New Recycling Services (cont'd)

- **Household Hazardous Waste Facility (cont'd)**
  - Current Fees in the Market (cont'd)
    - **Pitkin County**
      - Commercial: Accepts up to 25 gallons of paint and paint related material per month but we do not accept chemicals.
      - Antifreeze-- $5.00 gallon container
      - Chemicals, insecticides, etc.-- $5.00 gallon container
      - Oil and water mixed-- $5.00 gallon container
      - Used motor oil-- $1.00 gallon container
      - Paint related material (thinner, etc.)-- $5.00 gallon container
      - Latex paint-- $5.00 gallon container
      - Oil base paint/stain-- $5.00 gallon container

New Recycling Services (cont'd)

- **Household Hazardous Waste Facility (cont'd)**
  - Pitkin County
    - Unknown chemical, unmarked-- $8.00 gallon container
    - Aerosol cans-- $1.00 each
    - Compact fluorescent bulbs--$1.00 each
    - Battery – vehicle-- $1.00 each
    - Fluorescent bulbs by the foot-- $.50 foot

New Recycling Services (cont'd)

- Compost Facility
  - Current Tipping Fees for Compost Materials in nearby counties:

	South Canyon	Mesa County	Pitkin Landfill
Food Waste	No pricing	No pricing	$35/ton
Biosolids	$30.27/CY	$18/ton	$25/ton
Septic Sludge	$0.15/gallon	No pricing	No pricing
Leaves/Grass	Free	Free	$15/CY
Brush/Lumber	$3.47/CY	Free	$15/CY

New Options for Tires

- Tire Derived Fuel (TDF) - Processed or whole
  - Industries – Cement, pulp and paper, electric utilities, industrial/institutional boilers, tire-to-energy facility.

- Tire-Derived Aggregate (TDA) – Processed or whole
  - Slope stabilization, retaining wall and bridge abutment backfill, subgrade fill and embankments, subgrade road insulation and drainage layers, various landfill applications (backfill in LFG venting systems, leachate collection systems, operational layers, landfill capping, landfill closure, daily cover), wetland establishment.

New Options for Tires (cont'd)

- Rubber Modified Asphalt Pavement/Rubberized Asphalt Concrete (RAC) – Processed
  - Roadways and sidewalks
  - Asphalt-rubber ground/vulcanized recycled tires
  - Terminal blend – ground crumb rubber
- Cut/Stamped/Punched/Molded Products – Processed
  - Product Manufacturing – flooring products (carpet underlayment and padding, tile), patio decks, dock bumpers, railroad crossing blocks, mats, tiles, bricks, speed bumps, curb edging, traffic products, ballistic protection
- Recreation – Processed
  - Synthetic turf, playground surfacing/equipment, various sports equipment.
- Exported – Processed or whole
  - Tire retreading, crumb rubber, TDF.

New Options for Tires (cont'd)

- Grants
  - Colorado Processer and End-User Program
  - WGCL is registered as a collection facility and processer
  - To qualify for the fund –
    - Must take in 50 tons of waste tires in a calendar year (July 1 through June 30)
    - Only Colorado generated waste tires qualify for reimbursement
    - Processing and end-use may be reimbursed only once.
    - Processed waste tires must have an end-use to be reimbursed as a processer

New Options for Tires (cont'd)

- Reimbursement
  - Funded by a Colorado tire sales tax
  - Reimbursed monthly up to $65 per ton
  - Available only if money is in the fund
  - End-users reimbursed first and processers second
  - Must track tonnage processed or utilized as end-use

Engineering Considerations for Tires

New Options for Tires (cont'd)

Recommendation: Use waste tires as ADC because the facility is in daily and final cover soil deficit

- **Processing Options**
  - HAAS Shredder - owned by Garfield County- Permitted by CDPHE, APCD
    - Low-speed drum, size reduction equipment used to shred waste to optimize landfill space for trash.
    - Shred wood (lumber, yard cuttings, trees/brush), tires, furniture, mattresses, straw erosion control products

New Options for Tires (cont'd)

Processing Options (cont'd)

- Cannot adjust size of processed waste
- Currently process waste for use as ADC
- Value: $300,000 to $350,000

- Tire Processer – Process tires into various products
  - Not owned by Garfield County
  - Products include various size pieces from larger drainage layer pieces to crumbles. Removes wire.

New Options for Tires (cont'd)

- Tire Processer – Process tires into various products (cont'd)
  - HAAS shredder would be used as primary shredder to reduce wear and tear on tire processer.
  - Cost of tire processer approximately $2.5 million dollars.
  - Requires a separate air emissions permit similar to HAAS.

RENEWABLE ENERGY OPTIONS

Alternatives to Landfill Disposal

- Thermal Conversion Technologies
  - Combustion
  - Pyrolysis
  - Gasification
  - Pyrolysis/Gasification
  - Anaerobic Digestion
  - Aerobic Digestion
  - Hybrid Technologies

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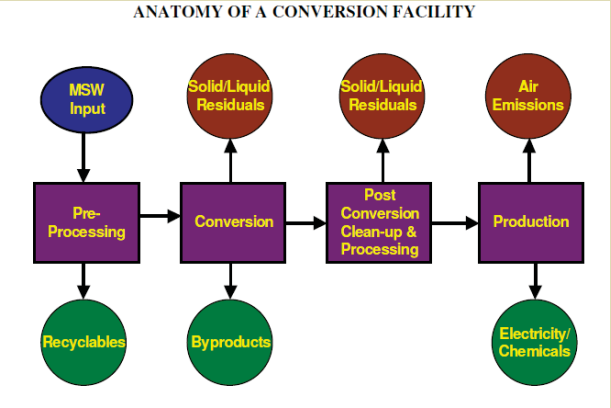
Alternatives to Landfilling (cont'd)



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Conversion Technologies

- Combustion ($56-$64/ton for ~1,000 TPD)
- Thermal Conversion Technologies ($20-$128/ton for ~200TPD)
  - Pyrolysis (Zero oxygen)
  - Conventional Gasification (starved air combustion)
  - Pyrolysis/Gasification (two-phased)
  - Plasma/Gasification (high energy gasification)
- Digestion($19-$97/ton for ~200 TPD)
  - Anaerobic (no oxygen)
  - Aerobic (with oxygen)
- Hybrid Technologies (Conversion to biofuels or other)

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Renewable Energy Options from LFG

- Electricity
- Low Quality Gas Production
- High Quality Gas Production
- Vehicle Fuel

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Renewable Energy Options from LFG (cont'd)

- Electricity
  - Internal combustion engines
    - 150cfm – 500 cfm
    - 0.4 - 2.0MW

  - Natural gas turbines
    - 800 cfm+
    - 4.0 – 5.0 MW

  - Mini-turbines
    - 10 – 100 cfm
    - 30 – 1,000 KW

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Renewable Energy Options from LFG (cont'd)

- Low Btu Gas Production
  - Industrial use for natural gas replacement
    - Moisture removal
    - Compression
- High Btu Gas Production
  - Injection into natural gas main pipeline
    - Moisture removal
    - Compression
    - CO2 and Other Compound Removal
- Produce vehicle fuels
  - Compressed Natural Gas
  - Liquefied Natural Gas
- Pros vs. Cons

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FUTURE LANDFILL OPERATIONS AND MANAGEMENT CONSIDERATIONS

Site Improvements Budget and Schedule

Budget for Site Improvements

Waste Stream	Permitting & Design	Construction	Equipment	Totals	Annual Operations
Exploration & Production Wastes Monofill	$ 208,000	$ 2,336,840	$ 656,600	$3,201,440	$377,219
Solidification Basin	$ 20,000	$ 212,000	$ 455,000	$ 687,000	$121,300
Septage Evaporation Impoundments	completed	$ 177,000	$ -	$ 177,000	$121,300
Composting (Equipment & Lined Area)	$ 47,800	$ 246,800	$1,086,600	$1,381,200	$114,450
Land Farm (Equipment and Lined Area)	$ 161,000	$ 288,300	$ 655,000	$1,104,300	$156,300

Schedule for Site Improvements

Waste Stream	Schedule (Months)		
	Permitting & Design	Construction	Totals
Exploration & Production Wastes Monofill	8-10	7-8	15-18
Solidification Basin	3-4	5-6	8-10
Septage Evaporation Impoundments	0	5-6	5-6
Composting (Equipment & Lined Area)	3-4	5-6	8-10
Land Farm (Equipment and Lined Area)	5-6	6-7	11-13

Public vs. Private Landfill Operation

- Public Ownership/Public Operation
- Public Ownership/Private Operation
- Private Ownership/Private Operation

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Public vs. Private Landfill Operation (cont'd)

Issue	Public Ownership/ Public Operation	Public Ownership/ Private Operation	Private Ownership/ Private Operation
Financial Responsibility	• County fully accountable to itself, state and federal government and to its users and residents.	• Maximum return to the investor or owner, and to the County through a contract.	Not evaluated
	• All finances a matter of public record	• Finances not a matter of public record	
	• Public operation, **if run efficiently**, can be less costly than private operation, since no profit is included above the cost of capital and operations	• Private operator tends to run operation, especially in a competitive environment, as **cost efficient**ly as possible.	
	• County liable for closure and post closure care and costs	• County still liable for closure and post closure care and costs	
Service Levels	• Public policies can add inefficiencies to a system	• Primary driver is return on investment; profit motive determines service levels. Can be more flexible; greater ability to change, as needed	
	• Policy considerations sometimes have a higher priority than finances alone	• Service levels are driven by economics limited by County contract.	
	• Ability to waive fees for disposal of disaster debris	• Based upon County contract.	
Environmental Standards	• Complies with environmental rules and regulations	• Complies with environmental rules and regulations. May limit meeting such standards as long as economically viable.	
	• Ready to comply with changing regulatory environment.	• Will comply with regulatory changes after negotiating contract change order.	

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Public vs. Private Landfill Operation (cont'd)

Issue	Public Ownership/ Public Operation	Public Ownership/ Private Operation	Private Ownership/ Private Operation
Environmental Liabilities	• County is liable for all past, present, and future environmental liabilities, due to soil, groundwater, air, stormwater impacts into the future.	• Private firm is liable for same environmental liabilities due to activities conducted after County contracts with them, only.	Not evaluated
	• County has the reserves to accept liability.	• Private firm can go bankrupt if not fiscally capable of cleaning-up environmental impacts, leaving the County (owner) responsible for remaining cleanup.	
	• County is responsible, as permit holder, for all activities that occur onsite for environmental and other forms or liabilities	• County, as permit holder, would be ultimately responsible for any and all permit violations, due to County or Private Operator's activities on the site. County's exposure due to permit violations can result in criminal fines and/or potential criminal prosecution.	
Labor Issues	• Existing labor contracts affect ability to be flexible	• Different labor contracts, usually lower wages and/or not as strong on benefits	
	• Less flexibility with labor force (inability to hire and fire)	• More flexibility with labor force (ability to hire and fire).	
Other Issues	• County is responsible, as landowner, for all activities that occur onsite, attributable to County employees or other contractors.	• County, as landowner, would be responsible for any and all activities that transpire on the site, with reduced control over private operator's employee actions.	

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Partnership Potential

- **VERN/BlueStar Electronics Recyclers**
- Vocational Electronics Recycling Network (VERN) Electronic Waste Recycling, Colorado Springs/ BlueStar Recyclers
  - Their business model provides local training and jobs, specifically for people with disabilities.
  - Path Forward
    - VERN conducts a market assessment and holds meetings with stakeholders to discuss the community logistics
    - Applies for funding and grant opportunities, working with the local community
    - Provides Development and Training
      - Environmental and Regulatory Training
      - Material Collection, Handling & Separation
      - Market Plan Development
      - Business Development Support
      - Ongoing logistical support.
    - Provides Project Administration
      - Cash Flow Analysis

BlueStarRecyclers

Drop-off Locations:
- Alamosa
- Arvada
- Canon City
- Colorado Springs
- Monument
- Swink
- Pueblo
- Pueblo West
- Wheat Ridge

Partnership Potential (cont'd)

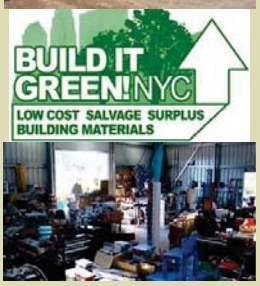
- **Landfill Operations**
  - Joint Venture with other Counties or Communities
  - Private Operators: Heartland Environmental Systems
    - Operates Pitkin County Waste Systems, Pitkin County
    - Operates South Canyon Waste Systems, Glenwood Springs
  - County could retain ownership of the land and control the landfill operations through its contract mechanism
  - Potential Issues of liability and enforcement action due to partner's operations
  - Requires development of a detailed scope of work and strong contract terms.

Partnership Potential (cont'd)

- **Compost Operations, EverGreen Events**
  - Zero Waste Consulting Company based in Aspen
  - Sent inquiry to Garfield County for a partnership to open a food waste and other organics compost facility, in conjunction with CacLoco Composting (EE/CC Team)
  - EE/CC Team would provide equipment
  - Garfield County to meet regulatory checklist and get necessary permits.
  - Garfield County to get 10% of compost sales and 10% of organics tipping fees
  - Other Lessors have recognized $100,000 - $300,000/year.
  - Requires development of a detailed scope of work and strong contract terms.

Partnership Potential (cont'd)

- **Stop N Shop Partnership with Local Non-Profits**
  - Opportunity for waste diversion of clean, reusable, portable items such as clothing, house wares, games, books, dishes, small appliances, & toys that you no longer need, and take home something new-to-you, free!
  - No furniture or large items unless they are easily transported.
  - Facility could be operated by local boy scouts, girl scouts or other non-profits.



Mission Statement (Con't)

Definition of A Mission Statement

- Concise description of the purpose of the BOCC.
- Why does our organization exist?
- What are our values?
- What is the nature of the goods and services that we provide?
- Who are the various groups of customers that we provide these services to?
- What are the short term and long-term goals of the BOCC?
- The statement should give direction and focus on the plans and operations of the BOCC.

Garfield County's Mission Statement

- The Board of County Commissioners is committed to:
  - Maintaining the West Garfield County Landfill as an important public asset, serving the citizens of Garfield County;
  - Operating the landfill as an enterprise by sustaining landfill day-to-day operations through fees as nearly as possible;
  - Participating only in those landfill markets and activities consistent with sound business judgment; and
  - Using the Capital Investment Fund prudently and only as needed regarding the capital needs of the landfill.
  - Exploring additional markets in order to get us there, (some viable and some not)
  - What else would we like to add?

Wrap-Up and Next Steps

1. ***Rebuild North and South Impoundments.***
2. ***Obtain approval from CDPHE of the materials under the demonstration project for use as ADC.***
3. ***Pursue economical approaches to Providing E&P Disposal Opportunities.***
4. ***Build a Solidification Basin.***

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Wrap-Up and Next Steps (cont'd)

5. *Propose a Pilot Project for a Land Farm to CDPHE for Approval.*
6. *Conceptualize Phasing Plan for E&P Waste Monofill Development*
7. *Consider a Pilot Stop and Shop Facility.*
8. *Conduct a Feasibility Study for Expanding the Current Household Hazardous Waste Program*
9. *Use waste tires as ADC because the facility is in daily and final cover soil deficit.*

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Questions

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APPENDIX C

POST-WORKSHOP MEMORANDUM

NOVEMBER 2013

Memo

To: Garfield County Board of County Commissioners

From: Betsy Suerth, Public Works & Facilities Director

Date: November 12, 2013

Re:
1. Exhibit A – 2012 Septage Revenues;
2. Exhibit B – Septage Impoundment Volumes Through Fill and Evaporation Cycles;
3. Exhibit C - Study Area Septage Volume 2009 - 2013
3. Exhibit D – Historic PCS Waste Received at Landfills in the Study Area;
4. Exhibit E - Utah Landfills Tons Received and Typical Tip Fees;
5. Exhibit F – Waste Septage Transporters and Facilities in the Study Area;

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1. TOPIC: Septage Impoundment

a. Questions

i. Other treatment options besides evaporation?
ii. How to deal with high salts and glycol from man camp waste?
iii. Can you use the water for other uses?
iv. Maximum year round ability to handle the water?
v. How to prevent ponds from freezing?
vi. Options to accept seepage in the winter.
vii. How much septage does the landfill take?

b. Response

i. Other Treatment Options

URS conducted a preliminary review of septage quality data collected from the West Septage Pond (9/18/2008 and 9/13/2010) and the proposed effluent discharge criteria for the permit conditions for the domestic wastewater treatment system (undated). This information was provided to the WGCL Team by Staff. The review concluded that the septage water (based on the quality data from the two samples, September 2008 and September 2010) has the following difficult to treat elements:

- Low BOD levels
- High levels of Total Dissolved Solids
- Existence of Volatile Organic Compounds that require removal prior to discharge.

It is the WBCL Team's preliminary findings that additional sampling should be conducted to define why the TDS is so high and why other organic compounds were reported. A treatability study is recommended (estimated at $20,000) to determine the most appropriate treatment system for the septage effluent. The treatment system is likely to be complex and not an off the shelf package unit.

ii. Other Uses for the Water?

The best use of the water would be for dust control on-site at the landfill, if the water can be treated to acceptable discharge limits and permitted by CDPHE. There are no other logical options for the water. We would also have to treat for things like salts because we would not want these to

impact wells used for detection monitoring. Staff reported that the current cost for water for dust control is $4,000 per year.

iii. Maximum Year Round Ability to Accept the Septage

The WGCL Team contacted the City of Rifle Waste Water Treatment Plant (WWTP). They accept septage. Customers have to fill out an application with the city's finance department to be billed. They use an aeration system for their pond which is 560K gallons, and they do see limited freezing around the edges. It has been WGCL's experience that the existing impoundment does collect ice across the surface overnight; however the off-loading of septage melts an ample sized hole in that ice layer readily, regardless of the ambient temperature. The WGCL has not experienced the need to close the existing pond due to ice restricting access. Staff is currently setting up the aerators acquired from the City of Rifle to improve conditions in the impoundments at the landfill including the prevention of ice collection.

In the event the septage impoundments become full, an option for temporary storage an above ground storage tank(s) (ASTs). The ASTs could be located adjacent to existing impoundments and valve controlled to gravity feed into the impoundments, as liquid evaporation provides capacity. Five-hundred barrel (21,000 gallon) ASTs similar to those used by the oil and gas industry could be used. These ASTs can be equipped with heaters to prevent freezing during cold weather conditions and include cleanout ports.

Costs: Staff is currently evaluating the costs for these tanks.

iv. Volumes

Exhibit A presents 2012 data for WGCL of 570,846 gallons of septage. This total includes restricted volumes from January – May 2012. The 2012 revenues were: $89,696.65.

Exhibit B presents septage impoundment volumes through fill and evaporation cycles. The calculations are based on average evaporation losses and precipitation in the region and are only a guide for prediction of operations. This analysis shows that after cycling through all three septage impoundments over 3-4 years, there could be a 4-6 month period when tanks may be needed to continue septage disposal acceptance. Back-up tanks, aeration and more precise management of impoundment volumes could reduce or eliminate this predicted downtime.

Staff has estimated that the general pay-back period is 1.5 years for the cost of rebuilding the north and south impoundment.
Exhibit C presents the potential Septage generation in the study area based on CDPHE historic records from 2009 – March 2013. In 2011, approximately 53 MM gallons of septage were disposed of in the study area. If WGCL were to capture 5% of the market, which is 2.5 MM gallons, this represents total potential annual septage revenues of $375,000, based on a fee of $0.15/gallon. This exhibit shows that if the septage impoundments were managed to provide additional capacity than that estimated in Exhibit C, the market exists to take advantage of that opportunity.

2. **TOPIC: Pipe Recycling**
   a. **Questions:**
   i. Can we recycle drilling pipe?
   ii. Potential cost?
   iii. Potential market for post use?
   b. **Response:**

   i. Recycling of Drilling Pipe

Staff discussed the possibility of recycling the plastic drilling pipe with an oil and gas operator representative. They are interested in establishing a pipe recycling program working with WGCL. One option could be to stage roll-offs at the well pads and sort materials on site and then ship them off-site for recycling. A second option might be to store the pipe at WGCL and locate an end user. The oil and gas operator is looking at some options and will get back to Staff. We believe there may be an opportunity to recycle the pipe. Landfill staff working with this oil and gas operator and potentially other E&P companies will put a plan together. The market for the pipe and the quantity of material to be handled is unknown. Concerns exist about the quality of the pipe for recycling. Staff will continue to explore the opportunities with the operators to devise a proposed plan to be presented to the BOCC.

3. TOPIC: Closure and Post-Closure Accounting
   a. **Questions:**
   i. Restriction of $1.4 MM for closure
   b. **Response:**

   i. Financial Audit Staff

Garfield County Finance and Public Works staff discussed the accounting methods used for restricting the closure and post closure funds within the SWD fund. Current practices fulfill the CDPHE requirement to calculate closure and post-closure costs every five years. However, the calculation of the amount of funds to restrict is currently based on a pro-rata of the estimated landfill life in years. It is recommended that the calculations be based on waste volumes to provide more precision and to take into account fluctuations in the market. The five-year estimate is due in 2014, providing a well-timed opportunity to modify the calculation methods. Further, the grading and sequencing plan, to be drafted in 2014, will provide a more accurate estimate of waste volumes over time. Staff will return to the BOCC with the five-year update in 2014 to discuss the more precise amount to be restricted.

   ii. Potential for a new fee for post closure

The WGCL Team suggests that the BOCC consider restricting a percentage of the existing tipping fees to post closure or adding a fee over and above the existing tipping fees to be dedicated to post-closure costs. This method would be a logical follow-up to the new calculation method discussed above as it would directly relate to waste volumes.

4. **TOPIC: E&P Waste**

a. **Questions:**

i. What is the interest of the E&P Companies related to use and potential financing of a solidification basin, lined cell, land farm or septage pond?

ii. What is the potential quantity of materials that the E&P companies might deliver?

b. Response:

i. Gauging Interest of the E&P Companies

Landfill staff has made contact with three E&P companies. These companies expressed an interest in disposing of their wastes in a lined mono-fill cell, in a solidification basin or by landfill, as appropriate. Based on these conversations and conversations Flint Energy, an oil and gas business line within URS, the WGLF Team collected the following information:

- Disposal fees at Utah landfills are ranging $28 - $30/ton or $42 - $45/cubic yard, based on a conversion of 1.5 tons per cubic yard.
- Typical loads are 16 – 18 cubic yard belly dumps; yet due to road weight limitations, they may only hold 12 cubic yards/haul.
- Wastes most likely to be disposed of at landfills are from oil based drilling cuttings.
- Transportation costs are estimated based on the type of vehicle and material hauled. Drill cuttings and contaminated soils are typically hauled in belly dumps with a payload of 11 – 12 cubic yards of material. Currently transportation costs are $100/ hr for the belly dump with a driver. If dump trucks are used, a payload of 6.5 – 7 cubic yards are expected. Transportation costs of $75/hour for truck and driver are estimated. Therefore, the further the haul distance to the landfill, the higher the transportation fees.
- If the landfill is located 150 miles one way, the projected transportation costs are estimated at $700, assuming 55 mph speed and 0.5 hours for truck loading and 0./6 hours for unloading at the landfill. Assuming 12 cubic yards of material, the transportation costs for this travel distance is estimated at $58/cubic yard.
- Annual profiling for the Utah landfills is required.
- Anticipated future waste generation:
    - 90 cubic yards a week, 50 weeks, 3 years = 13,500 cubic yards
    - Typical drill cutting generation of 8,400 cubic yards/well pad; 20 wells per well pad or 420 cubic yards per well; 400 wells anticipated in the Piceance Basin Plateau = 168,000 cubic yards
    - 4,000 wells x 420 cubic yards/well, over next 20 years = 1.68 MM cubic yards or 84,000 cubic yards per year.
    - 22 wells in 2014 @ 325 cubic yards per well = 7,150 cubic yards
    - Assume 10% of the totals (estimated as 1.87 million cubic yards) or 9,343 cubic yards per year.
    - Potential revenue ($90/cy) or $840,870 per year in the region. The revenue is based on WGCL offering a competitive tipping fee to the combined transport and disposal fees of $58/cubic yard and $ 42/cubic yard, discussed above, for disposal of Colorado-generated E&P waste being disposed of in Utah landfills. The $90 revenue projection is based on a 10% discount to current market rates, based on the information the WGCL Team collected to date.

- Several of the E&P companies have expressed an interest in capital involvement with the proposed lined E&P waste mono-fill.

5. TOPIC: Land Farm

a. **Questions:**

i. What is the cost for development, permitting and operation of Thermal Desorption technology?
ii. What are the air emission issues related to a Thermal Oxidizer?
iii. Cubic yards per windrow of Petroleum Contaminated Soils (PCS)
iv. How long does it take to process the PCS?
v. Estimated projections?
vi. Estimated Revenue?
vii. BMP in an arid climate?
viii. Utah Landfill Locations and Fees

b. Response:

i. Thermal Desorption

Thermal Desorption is a process to separate petroleum constituents from soils. Contaminants are volatilized by the desorber and typically combusted in a controlled afterburner. The different types of thermal desorbers include: rotary dryers, thermal screws, paddle dryers, anaerobic thermal processor, conveyor belt, and a batch vacuum system, (among others). Permitting and design of such systems, are more entailed than for land farming due to the higher level of complexity of these systems. Air permitting will also be much more complex, likely to require air emission modeling efforts. The cost of treatment alone can run anywhere between $131/ton to $375/ton to $724/ton depending on the type of Thermal Desorption technology that is used, the throughput of soils, and their degree of petroleum contamination in the soils.

ii. Land Farm

Permitting

Permitting obtained from CDPHE, Hazardous Materials and Waste Management Division (HMWMD) is anticipated to be straight forward and require minimal effort. HMWMD has suggested constructing a land farm atop historic closed subgrade landfill cells in order to reduce construction costs.

Permitting obtained from CDPHE, Air Pollution Control Division (APCD) is anticipated to require a relatively high level of effort as standards have not been developed. Air emissions must be projected for each specific facility. Waste stream analysis would be required to determine contaminant levels for air emission calculations purposes.

Special waste (e.g. E&P drill cuttings, petroleum contaminated soils) analysis historically has been and continues to be required for waste characterization purposes and consideration for disposal at

the landfill. An extensive data base has been developed and APCD has indicated that this data might be approved to develop expected air emissions from the land f arm.

RACT analysis is required comparing thermal destruction versus land farming methods to treat the soil. The fastest way to obtain a permit is to apply for a land farm stand-alone permit.

A beneficial use standard for the treated PCS/drill cuttings is not established. However, the material may be used as daily cover if total petroleum hydrocarbon concentrations are 500 mg/kg or less in a homogenous material.

All facility air emissions permits will be encompassed under a pending EPA Title V air permit. The Title V air permit will require amendment to reflect the land farm facility; however, the level of effort required is anticipated to be minimal.

iii. Cubic yards per Windrow of Petroleum Contaminated Soils (PCS)

Industry standards vary from location to location and source of PCSs. One typical land farm method, used by the Navy and developed by Battelle, will place 500 cubic yards of soil on a 50-foot by 60-foot by 8-foot tall piles. This averages out to be roughly 6,000 to 8,000 cubic yards per acre, allowing for blower buildings, soil processing areas, and drainage control. Thus a 5 acre parcel, as proposed in the BOCC Specific Planning Workshop, could treat 30,000 to 40,000 cubic yards (or 36,000 tons to 48,000 tons) at any one time.

iv. How Long does it take to Process?

The processing time generally depends on the amount of contaminants in the soils to begin with and the amount of effort put into each pile to remediate them. The PCS soils could generally be processed anywhere between 4 to 12 months, to bring the air emissions down to within the acceptable limit of 500mg/kg, so that the soils could at least be used for daily cover.

v. Estimated Projections

Exhibit D is a summary table based on data provided by CDPHE as of May 2013 of the quantity of PCS received at landfills in the study area. Generally the data shows an increase in the annual quantity of contaminated soils received at landfills/disposal sites in the study area. Please note that not all facilities turned in the 1st quarter 2013 data. South Canyon appears to be on track for 32,000 tons of contaminated soils this year. In 2011, they received 16,000 tons of contaminated soils which increased to 32,000 tons in 2012. Wray Gulch and South Canyon Landfills will be the biggest competition for these waste streams. If WGCL were to capture 10% of the market, based on 2012 totals that could represent 12,000 tons.

vi. Estimated Revenue

Potential gross revenue for 12,000 tons of PCS @ $58/ton (WGCL Rate) = $696,000. According to the 2013 South Canyon Landfill Tip Rate Study (2013 Rate Study), Eagle County charges $37.68/ton and WGCL was $58/ton, while SCLF was charging $50/ton for PCS. As can be seen in Exhibit D,

although Eagle County Landfill's rates are much lower, they received less than 1,500 tons per year in 2010, 2011 and 2012; their high was 8,400 tons in 2009. The 2013 Rate study recommended that South Canyon should raise their rates to $52/ton. We are recommending that WCCL consider lowering the PCS disposal rates to be more competitive in the market.

The actual revenues would depend also on the amount of capital and operations, maintenance and monitoring costs it would take to construct and operate such a system. These costs have not been completely developed, as of the writing of this memorandum.

vii. BMP in an arid climate?

The best management practices used for PCS land farm treatment in an arid climate include surrounding the piles with drainage berms, lining the land farm areas with a 40-60 mil High Density Polyethylene (HDPE) liner, underlying each of the piles with piped trenches to extract soil gasses and liquids/ leachate for treatment recirculation of liquids and release to atmosphere of treated gasses. Each pile would also need to be covered with a plastic sheeting to keep moisture in, stormwater out and limit production of leachate to be treated.

viii. Utah Landfill Locations and Fees

Exhibit E is the 2013 list of Utah landfills (including municipal solid waste and construction and demolition debris) in Utah and the quantities and types of waste they received in 2012. The WGCL Team identified the Utah landfills that received industrial waste in 2012, then reviewed the 2012 annual landfill reports for each landfill, to determine what quantity of the industrial waste was from out-of-state. Based on the 2012 records, the ECDC landfill and the Wasatch Regional Landfill are the two landfills that reported they accepted out of state industrial waste. The annual landfill reports to not indicate where the waste came from or the specific type of waste received. A quick survey of tipping fees for commercial waste at select Utah landfills (including the 2012 Waste & Recycling News Landfill Survey) indicates a tipping fee of $26/ton. In addition, as discussed above, there is a transportation cost that also needs to be included in the evaluation. As the transportation distance increases, so does the transportation cost per truck load.

6. TOPIC: Solidification Basin

a. **Questions:**

i. Potential Waste Streams

1. E&P waste not passing paint filter test
2. Septage
3. Grease
4. Other waste streams

b. Response:

i. Potential Waste Streams

1. E&P Waste (See the discussion in Topic 4 above.)

We believe the market for E&P waste not passing the paint filter test is small compared to drilling cuttings and it is difficult to project the quantity of materials that will be generated and require disposal.

2. Septage (See the discussion in Topic 1 above.)

3. Waste Grease

Exhibit F represents the results of the 2012 Waste Grease Transporters and Waste Grease Facilities data from CDPHE forms WG-3 and WG-4. As noted in the exhibit, many of the transporters indicated their data is confidential so there are no results. Because of the lack of data, it is too speculative to estimate future waste receipts of waste grease. In order to receive waste grease from the market, it will be important to target the transporters. In 2012, the Cacaloco, South Canyon and CB Industries Facilities were the only facilities receiving waste grease; although Cacaloco is no longer operating.

4. Other Waste Streams

There is no quantifiable data on the quantity of wastes such as car wash discharges or auto repair sediment oil/water separators. Once the basin is constructed Staff will focus on attracting additional waste materials for solidification.

7. TOPIC: Medical Waste

a. **Questions:**

i. Is it worth pursuing this waste stream?

b. Response:

Staff contacted the County Health Department and the two hospitals in Garfield County. All materials are currently handled under contract by Stericycle, which provides integrated waste management (from collection to treatment and disposal). The WGCL is unable to manage hazardous waste at the landfill per the land patent. In the state of Colorado, medical waste is regulated as a hazardous waste..

8. TOPIC: Health Risks to Employees

a. **Questions:**

i. Will the employees be protected while operating near the Land Farm or Solidification Basins?

b. Response:

The Design and Operations Plan (D&O) for the landfill will address health and safety issues including worker exposure and hazards for all disposal areas at the WGCL. These areas include the actual MSW landfill disposal cell, the lined E&P waste monofill, the land farm, septage evaporation ponds and the solidification basin. The WGCL Team will use best management practices and will consult with the CDPHE and the WGCL Team certified industrial hygienists for proper training requirements, monitoring, health and safety procedures, safe work practices and reporting requirements for all Landfill staff and will incorporate those into the D&O Plan. These protocols will address all disposal

areas. The 2014 proposed budget includes adequate training funds. If additional funds are needed, Staff will return to the BOCC with a request.

9. **TOPIC: Waste Identification & Training**
   a. **Questions:**
   i. What Landfill Operations Training will be provided to employees?
   ii. What training courses will be provided to employees?

   b. Response:

   i. Landfill Operations Training to be Provided to Employees

Landfill employee training required under federal and state regulation includes a wide spectrum of subject matter from waste identification and handling to landfill management/operations and to basic first aid. Waste Identification training would be similar to the SWANA training that staff should receive for its day to day solid waste landfill operations. In addition, the drilling industry has developed training for its own staff to monitor for and handle these same wastes and the WGCLF Team would work with the PCS source providers to work to train our own personnel likewise. The following training programs are recommended based upon the landfill waste stream and landfill operations.

- **Landfill Operations Training**
  - Solid Waste Association of North America (SWANA) Manager of Landfill Operations (MOLO)
  - SWANA Landfill Operations Basics
  - SWANA Waste Screening at Municipal Solid Waste Facilities
  - SWANA Construction & Demolition Debris (C&D) Management

ii. **Other training courses to be provided to employees**

- **Health and Safety Training**
  - 40-Hour Hazardous Waste Operations and Emergency Response
  - HAZWOPER 8- Hour
  - HAZWOPER Supervisor
  - Standard First Aid and CPR
  - Blood borne Pathogens

- **Other Training**
  - Radiation Detector (Meter) Operations
  - Stormwater Management

Exhibit A. WGCL Sludge Report
January 1 - December 20, 2012

MaterialID	MaterialDescription	JAN	FEB	MAR	APR	MAY	JUN
OCS in Gallons	Out of County Sludge						3,483.00
S in Gallons	IN COUNTY SLUDGE	2,563.00	3,555.00	-	5,575.00	7,448.00	46,866.00

		JUL	AUG	SEP	OCT	NOV	DEC
OCS in Gallons	Out of County Sludge	4,585.00	6,995.00	1,573.00		14,202.00	
S in Gallons	IN COUNTY SLUDGE	54,605.00	59,489.00	78,014.00	130,165.00	76,815.00	55,027.00

		JAN	FEB	MAR	APR	MAY	JUN
OCS income	Out of County Sludge			$0.00			$1,044.90
S income	IN COUNTY SLUDGE	$384.45	$533.25		$836.25	$1,117.20	$7,029.90

		JUL	AUG	SEP	OCT	NOV	DEC
OCS income	Out of County Sludge	$1,375.50	$2,098.50	$471.90		$4,260.60	
S income	IN COUNTY SLUDGE	$8,190.75	$8,923.35	$11,702.10	$19,524.75	$11,522.25	$8,254.05

	JAN	FEB	MAR	APR	MAY	JUN
Total Gallons Monthly	2,563.00	3,555.00	-	5,575.00	7,448.00	50,349.00
Total Monthly Income	$384.45	$533.25	$0.00	$836.25	$1,117.20	$8,074.80

	JUL	AUG	SEP	OCT	NOV	DEC
Total Gallons Monthly	59,190.00	66,484.00	79,587.00	130,165.00	91,017.00	74,913.00
Total Monthly Income	$9,566.25	$11,021.85	$12,174.00	$19,524.75	$15,782.85	$10,681.00

Total Gallons YTD		**570,846.00**
Total Income YTD		**$89,696.65**

EXHIBIT B. SEPTAGE IMPOUNDMENT VOLUMES THROUGH FILL AND EVAPORATION CYCLE

2012 WGCL Septage Received in Gallons

MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Out of County						3,483	4,585	6,995	1,573		14,202	
In County	2,563	3,555	0	5,575	7,448	46,866	54,605	59,489	78,014	130,165	76,815	55,027
Total	2,563	3,555	0	5,575	7,448	50,349	59,190	66,484	79,587	130,165	91,017	55,027

5 month period	Jul - Nov	(used Jul-Nov as the most representative months throughout year if facility was open all year)
Avg gals./mo.	**85,289**	

Impoundment	W Imp	North Imp	South Imp
Evaporation loss May through Sept. (gallons)	367,000	447,740	300,940
Avg Evaporation loss per month (gallons)	**73,400**	**89,548**	**60,188**

West Impoundment projections (capacity 540,000 gallons):

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	20,000	0	0
Cummulative		170,577	263,242	357,631	452,691	474,159	493,040	514,700	537,413	494,646	506,142	514,667
Avg Precip	8238	7376	9100	9771	9579	6993	9771	10825	10633	11495	8526	8909
Tot less evap +precip	93,527	177,953	272,342	367,402	388,870	407,752	429,411	452,125	474,646	506,142	514,667	523,576

Reach capacity in 10 months

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	0	0	0	0	0	0	0	0	0	0	0	0
Cummulative	523,576	531,815	539,191	548,291	558,062	494,242	427,835	364,206	301,630	238,864	250,359	258,885
Avg Precip	8238	7376	9100	9771	9579	6993	9771	10825	10633	11495	8526	8909
Tot less evap +precip	531,815	539,191	548,291	558,062	494,242	427,835	364,206	301,630	238,864	250,359	258,885	267,793

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP			
Estimated Septage	0	0	0	0	0	0	0	0	16,919			
Cummulative	267,793	276,032	283,408	292,508	302,279	238,459	172,052	108,423	62,767			
Avg Precip	8238	7376	9100	9771	9579	6993	9771	10825	10633			
Tot less evap +precip	276,032	283,408	292,508	302,279	238,459	172,052	108,423	45,848	0			

22 months to evaporate (on average)

North Impoundment (capacity 750,000 gallons)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289
Cummulative		180,597	274,857	371,214	468,386	475,778	480,024	487,648	496,554	505,227	604,497	700,155
Avg Precip	10020	8971	11068	11884	11651	8505	11884	13166	12933	13981	10369	10835
Tot less evap +precip	95,308	189,568	285,925	383,098	390,489	394,735	402,359	411,266	419,939	519,208	614,866	700,155

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	85,289	30,000	0	0	0	0	0	0	0	0	0	0
Cummulative	700,155	740,175	749,146	760,214	772,098	694,201	613,158	535,494	459,112	382,496	396,477	406,847
Avg Precip	10020	8971	11068	11884	11651	8505	11884	13166	12933	13981	10369	10835
Tot less evap +precip	710,175	749,146	760,214	772,098	694,201	613,158	535,494	459,112	382,496	396,477	406,847	417,682

Reach capacity in 15 months

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	0	0	0	0	0	0	0	0	0	0	0	0

EXHIBIT B. SEPTAGE IMPOUNDMENT VOLUMES THROUGH FILL AND EVAPORATION CYCLE

Cummulative	417,682	427,702	436,673	447,741	459,625	381,728	300,685	223,021	146,639	70,023	84,004	94,374
Avg Precip	10020	8971	11068	11884	11651	8505	11884	13166	12933	13981	10369	10835
Tot less evap +precip	427,702	436,673	447,741	459,625	381,728	300,685	223,021	146,639	70,023	84,004	94,374	105,209

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	0	0	0	0	0	12,000	0	0	0	0	0	0
Cummulative	105,209	115,229	124,200	135,268	147,152	81,255	212	-77,452	-153,834	-230,450	-216,469	-206,099
Avg Precip	10020	8971	11068	11884	11651	8505	11884	13166	12933	13981	10369	10835
Tot less evap +precip	115,229	124,200	135,268	147,152	69,255	212	-77,452	-153,834	-230,450	-216,469	-206,099	-195,264

26 month to evaporate on average

South Impoundment projections (capacity 550,000 gallons):

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	85,289	0	0	0
Cummulative		177,305	268,618	361,339	454,607	487,531	518,343	551,423	585,364	533,860	543,248	550,211
Avg Precip	6728	6024	7432	7980	7823	5711	7980	8840	8684	9388	6963	7276
Tot less evap +precip	92,017	183,329	276,050	369,319	402,243	433,054	466,135	500,076	533,860	543,248	550,211	557,487

Reach capacity in 10 months

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	0	0	0	0	0	0	0	0	0	0	0	0
Cummulative	557,487	564,215	570,239	577,671	585,651	533,286	478,809	426,601	375,254	323,750	333,138	340,100
Avg Precip	6728	6024	7432	7980	7823	5711	7980	8840	8684	9388	6963	7276
Tot less evap +precip	564,215	570,239	577,671	585,651	533,286	478,809	426,601	375,254	323,750	333,138	340,100	347,376

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	0	0	0	0	0	0	0	0	0	0	0	0
Cummulative	347,376	354,104	360,128	367,561	375,540	323,176	268,699	216,491	165,143	113,639	123,027	129,990
Avg Precip	6728	6024	7432	7980	7823	5711	7980	8840	8684	9388	6963	7276
Tot less evap +precip	354,104	360,128	367,561	375,540	323,176	268,699	216,491	165,143	113,639	123,027	129,990	137,266

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimated Septage	0	0	0	0	0	0	348	85,289	85,289	85,289	85,289	85,289
Cummulative	137,266	143,994	150,018	157,450	165,430	113,065	58,936	92,017	125,958	159,742	254,419	346,670
Avg Precip	6728	6024	7432	7980	7823	5711	7980	8840	8684	9388	6963	7276
Tot less evap +precip	143,994	150,018	157,450	165,430	113,065	58,588	6,728	40,669	74,454	169,130	261,382	353,946

32 months to evaporate on average

Annual Projected Revenues for existing market

West or South Impoundment	527,132 * $0.15 =	$80,079
North Impoundment	749,146 * $0.15 =	$112,372
Total based on exist mkt = 85,289*12*.15		$153,519

Rebuilding N & S impoundments pay back = 1.5 years in current market

Appendix C: Post Workshop Memorandum

Exhibit B - See Table 4

Exhibit C - See Table 6

Exhibit D - See Table 10

Exhibit F - See Table 5