

Colorado's Waste Tire Program

Status of Waste Tire Recycling in Colorado

Submitted September
2018

2017 Annual Report to:

The Transportation, Public Health
and Joint Budget Legislative
Committees

and

The Solid & Hazardous Waste
Commission



COLORADO

**Hazardous Materials
& Waste Management Division**

Department of Public Health & Environment

Executive Summary

Calendar year 2017 marks the fourteenth year the Colorado Department of Public Health and Environment (the department) has compiled data related to waste tire recycling, waste tire funds and the status of Colorado's Waste Tire Program. Waste tire processing facilities continue to process tires into products such as tire-derived fuel for cement kilns, alternative daily cover at landfills or as a fencing and windbreak alternative.

The department worked until the end of 2017 with our contractor, Tetra Tech, to promote and facilitate tire-derived product markets in preparation of the repeal of the End Users and Market Development Funds on Jan. 1, 2018. To promote waste tire market development in June of 2017 the department sponsored the fourth annual Colorado Waste Tire Market Development Conference. The Hazardous Materials and Waste Management Division also provided technical assistance to existing and potential companies interested in locating or expanding their waste tire operations and/or markets in Colorado.

This 2017 annual report on waste tire recycling in Colorado is transmitted to the Colorado General Assembly and the Solid and Hazardous Waste Commission. This report includes the following: information on the waste tire fee, the status of a priority abatement list for illegal waste tire disposal sites and an update of waste tire grant fund programs. The total number of waste tires recycled in the state is also included to gauge the generation, management, flow and end use market. The regulated community submits this information to the department pursuant to the Regulations Pertaining to Solid Waste Sites and Facilities (6 CCR 1007-2, Section 10).

Annual reporting forms are submitted to the department from waste tire processors, collection and storage facilities, waste tire haulers, mobile waste tire processors and end users of tire-derived products. Report information is also gathered from new tire fee return forms, funding and grant applications (end user and illegal waste tire clean up) and through waste tire inspection reports.

Principal author:

Shana Baker, Waste Tires Work Leader

Contributing Authors/Technical Assistance:

Brian Gaboriau, Waste Tire Grants Administrator

Lisa Jeffrey, Waste Tire Fee Analyst
Paul Will, GIS Manager

Joe Schieffelin, Solid Waste Program Manager

David Snapp, Materials Management Unit Leader

Kelly MacGregor, Communications Specialist

Statute:

C.R.S 30-20-1401 *et seq.*

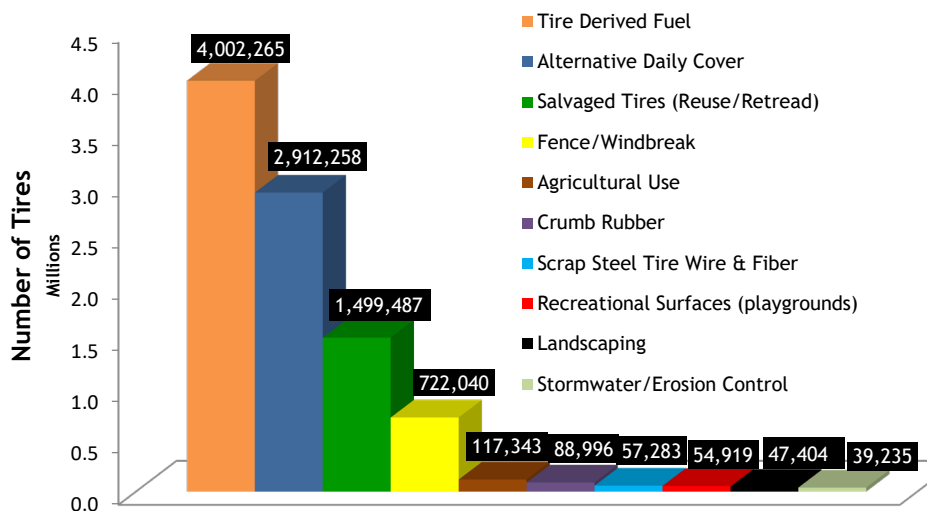
For additional information or copies:

Shana Baker, Waste Tires Work Leader
Colorado Department of Public Health and Environment
shana.baker@state.co.us
(303) 692-3305

www.colorado.gov/cdphe/wastetires

Figure 1

2017 Top 10 recycled waste tire direct use and end use



Tire derived fuel outpaced alternative daily cover as the top end use of waste tires this year. Salvaging tires, by reusing or retreading waste tires, continues to be the third largest use.

Front cover photo credits (top to bottom): A waste tire clean up in Saguache County, a stock image of waste tires, a waste tire collection event in partnership with the Animas Mosquito Control District, a stock photo of children playing on repurposed waste tires and cows enjoying a tire bale windbreak fence at a Weld County dairy farm.

Waste Tire Generation, Management and Flow:

Colorado continues to generate waste tires at a rate higher than the accepted national industry standard of one waste tire per person per year. According to data submitted to the department by waste tire processors, end users, collection facilities, waste tire monofills and waste tire haulers, the waste tire generation rate in Colorado was 1.3 passenger tire equivalents per person per year in 2017. A total of 7,285,910 waste tires were generated in Colorado in 2017, which was about the same amount of waste tires generated in 2016 (7,286,359).

Waste tires continue to be received from and sent to neighboring states (Figure 2). Colorado received 630,489 waste tires from six states, with Nebraska and Wyoming sending 543,551 waste tires into the state. Colorado-generated waste tires were also sent to three states. A Utah recycling facility received 99 percent (148,327 waste tires) of the waste tires sent out of state.

Waste tire distribution into and out of Colorado

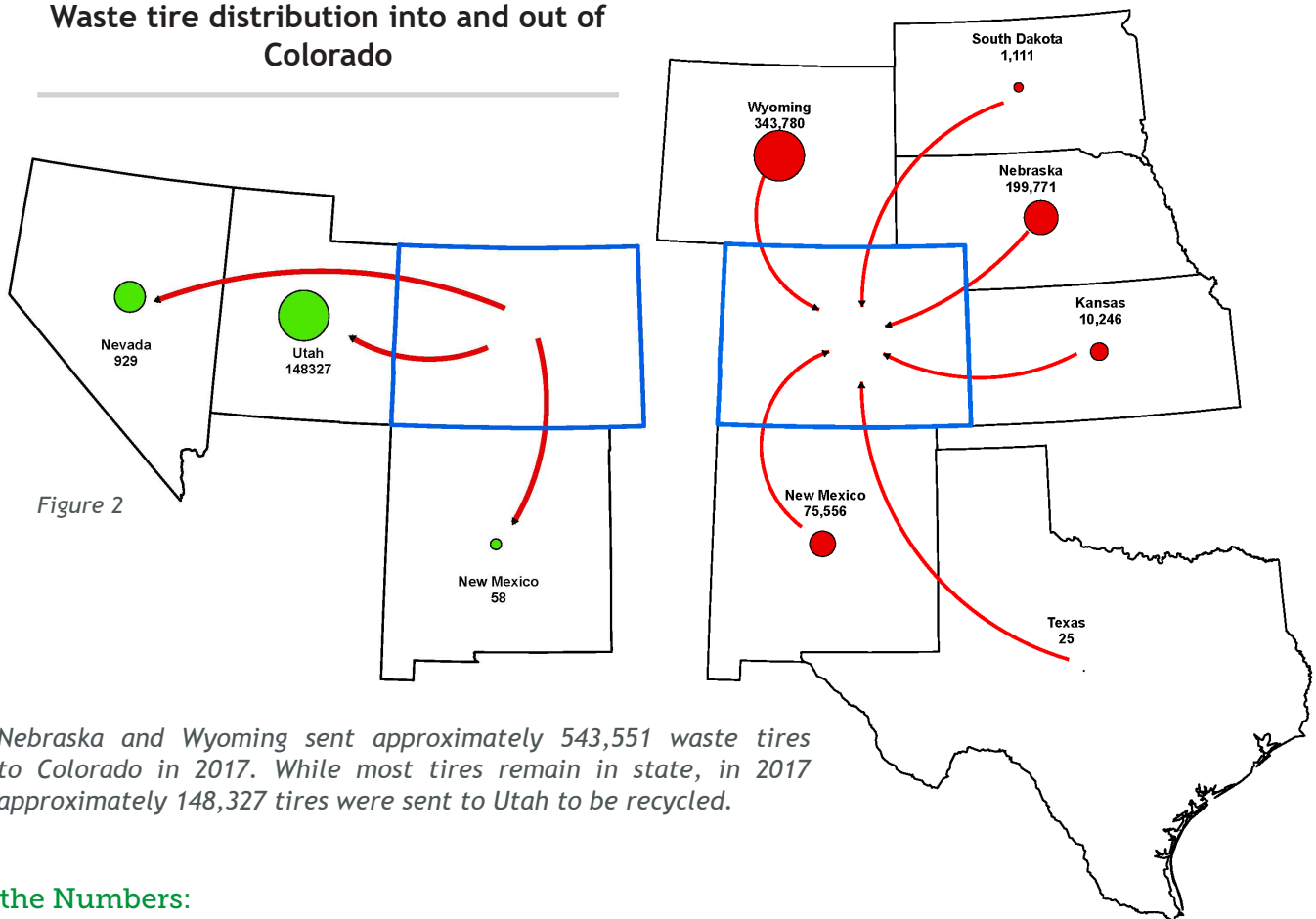


Figure 2

Nebraska and Wyoming sent approximately 543,551 waste tires to Colorado in 2017. While most tires remain in state, in 2017 approximately 148,327 tires were sent to Utah to be recycled.

By the Numbers:

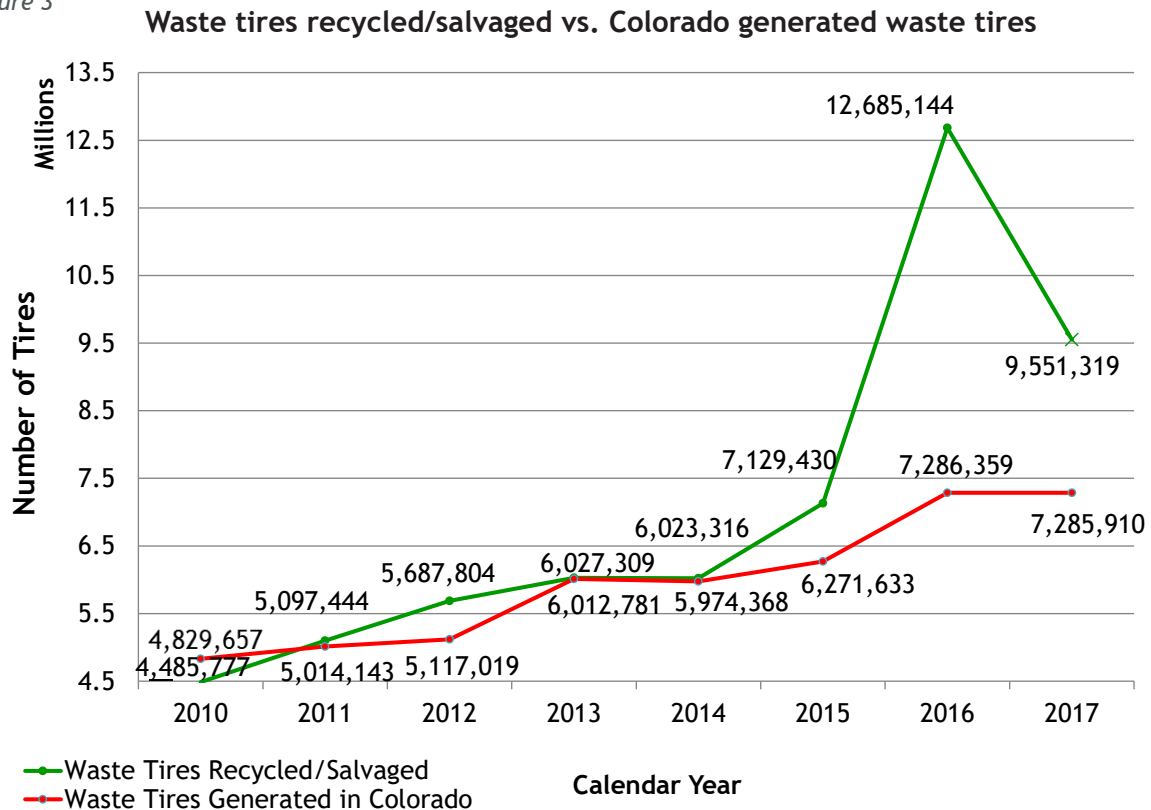
In 2017, the total number of waste tires generated in Colorado and imported from surrounding states was 7,916,399. A small number of these waste tires were sent out of state to be recycled. However most of these tires, and others from storage inventories, were recycled in state. This equates to a recycling rate of 121 percent. Figure 5 (page 7) provides an annual comparison of waste tire recycling and salvaging rates of Colorado-generated and imported waste tires. In 2017, the recycling/salvaging rate was accomplished via the specific end uses of waste tires discussed in Figure 1. Figure 1 captures the top 10 direct use and end use markets for waste tires in calendar year 2017. Tire-derived fuel used at Colorado cement kilns regained the top spot as the use of alternate daily cover at landfills decreased by almost 44 percent compared to 2016.

Figure 3 (page 4) reflects the number of waste tires recycled and salvaged versus the generation rate in Colorado. Since 2011, the amount of waste tires recycled or salvaged has outpaced the waste tire generation rate in the state. In 2017, this trend continued as 9,551,319 waste tires were recycled or salvaged. Although this was a 25 percent decrease from the prior year due to the decrease of the usage of alternate daily cover, the increase in the tire-derived fuel usage was able to keep recycling rates above the generation rate. Figure 6 (page 9) represents the number of waste tires added to waste storage inventories since 2010. This graph shows the waste tire storage inventory decreased in 2017 by 1,741,899 tires. This was mainly due to waste tires from the monofills being used as alternative daily cover and tire-derived fuel.

Waste Tires Summary and Outlook

In 2017, Colorado met its goal of recycling all waste tires generated in Colorado and waste tires brought in from other states. Waste tires were removed from monofills and waste tire processors processed waste tires, although in smaller numbers than in 2016. Compared to 2016, 3.1 million less waste tires were used in 2017 due to the decrease in alternate daily cover usage.

Figure 3



End Users Fund

The End Users Fund provided financial rebates for the beneficial use of waste tires and tire-derived products to End Users, Retailers and Processors. Monthly rebates were set by the Solid and Hazardous Waste Commission at \$75 per ton for 2017 (6 CCR 1007-2, Section 10.12.5). An End User is defined as a person who uses a tire-derived product for a commercial or industrial purpose, uses a whole waste tire to generate energy or fuel, consumes/uses a tire-derived product in its final application or makes a new material that is sold. A Retailer is a person who sells a small quantity of tire-derived product to a customer. A Processor is eligible for the rebate when they sell their tire-derived product to an out-of-state end user.

For calendar year 2017 the department provided rebates totaling \$5,125,660 for a total of 91,160 tons (8,103,111 tires) of end used tire-derived product (Table 1). A total of 29 entities participated in the End Users Fund, including nine new applicants. A total of 5,051 tons were approved for the new applicants, equaling 448,980 waste tires. This fund was repealed on Jan. 1, 2018.

Table 1: Rebates by product type

Type of tire-derived product	Amount that received rebate in 2017
Tire-derived fuel	44,617.09 tons
Alternative daily cover	39,155.80 tons
Tire bales for windbreaks/fences	5,760.53 tons
Agricultural-silage covers	645.81 tons
Landscaping	526.19 tons
Stormwater/erosion control	304.77 tons
Recreational surfaces	88.00 tons
Septic systems	62.00 tons
Total:	91,160.19 tons

Waste Tire Inspection Grants

In 2017, 12 local health agencies participated in the Waste Tire Inspection grant program, in which local governments conducted waste tire inspections on behalf of the department. Local partners conducted 1,212 inspections and technical assistance visits in 2017 (Figure 4). The majority of these inspections and visits were of waste tire generators (e.g., retail tire shops), with several waste tire haulers and illegal waste tire sites also evaluated.

Common issues identified by the local health agencies included: a) facilities unregistered with the department, b) failure to submit the waste tire fee, c) generators not using a registered waste tire hauler, d) incomplete or no manifests kept on site, e) violating waste tire storage limits, f) litter and vegetation control and g) decals not being posted onsite. The total amount reimbursed to local agencies in 2017 for these inspections was \$145,310.

The department's goal is to have partnerships with local governmental agencies in every county to conduct these inspections. These inspections help ensure that waste tires are properly managed in the state. The department conducted outreach in 2017 to promote this grant opportunity to local governmental agencies by exhibiting at the Colorado Environmental Health Association Annual Education Conference, presenting at a Local Environmental Health Directors Quarterly Meeting, and corresponding with local agencies through the department's Office of Planning, Partnerships and Improvement. The department will continue to conduct outreach to local health and other governmental agencies to expand the program statewide.

Figure 4

Local Government Inspections/Technical Assistance Visits 2017

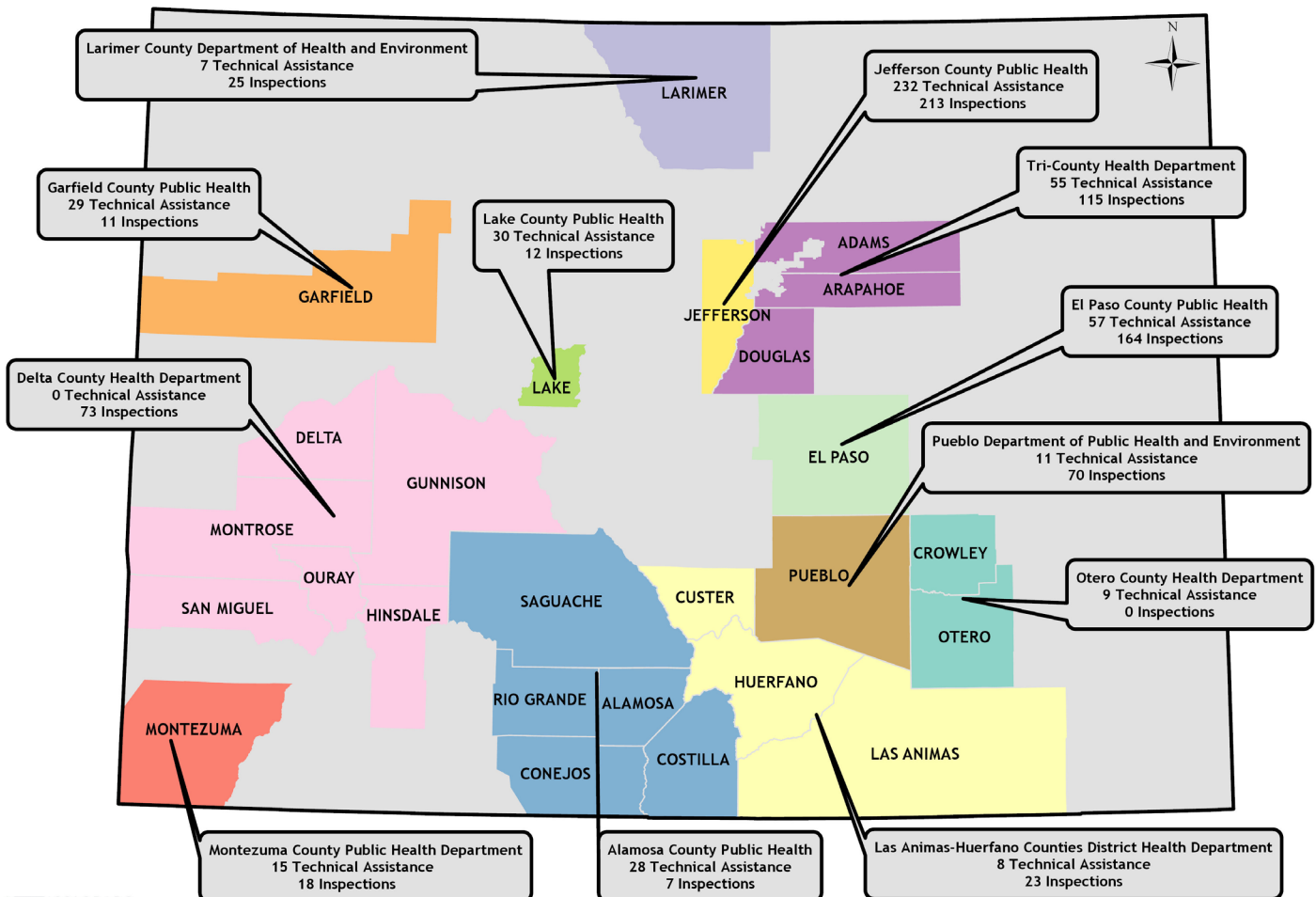


Table 2: 2017 collection events

Location of collection event	Cleanup funds spent	Number of waste tires removed
Animas Mosquito Control District	\$13,841	3,637
Manzanola	\$2,250	750
Swink	\$2,250	750
Ordway	\$3,499	685
Pine	\$1,374	388
Total:	\$23,214	6,210

Illegal Waste Tire Cleanup Grants

The Illegal Waste Tire Cleanup Grant program provides funding for the cleanup of illegal or abandoned waste tire sites. The department is notified of illegal waste tire sites by the public, local governmental agencies, other state agencies and by our Waste Tire Inspectors. The “Illegal Waste Tire Stockpile Identification Form” is available online for local governmental agencies to report potential illegal waste tire sites. A general complaint form is also available online for the public to report potential illegal waste tire sites.

The department inspects potential waste tire cleanup sites to assess the size of the pile, the physical lay-out of the site, if the site is an active or abandoned site and the risk to public safety and the environment in the immediate area. The department also determines if enforcement action against a liable party is appropriate for site cleanup.

To prioritize the order of abatement, sites are ranked. The site is assigned a ranking that is calculated on a point system based on several factors, such as the number of waste tires, population, topography and infrastructure near the site, and stockpile characteristics. Illegal sites ranked “High” and “Medium” are considered priority abatement projects for the department. Table 3 lists identified illegal waste tire sites by county, ranking and the total estimated illegal waste tires (as of December 31, 2017).

Currently the department has identified an additional 46 potential illegal waste tire sites in the state that are pending addition to the abatement list (Table 3). Waste tire inspectors will inspect these sites in the coming months to determine eligibility for cleanup funds.

The department completed eight illegal waste tire cleanups in 2017, as detailed in Table 4. We also funded five collection events for counties and municipalities. These events allow the public to drop off unwanted tires at little or no cost. A list of department-funded collection events, funds spent and waste tires collected can be found in Table 2.

Due to continued interest from counties and municipalities, the department will continue to fund waste tire collection events in 2018. The request form is available at www.colorado.gov/cdphe/illegal-waste-tire-cleanup-grants.

Table 3: Abatement List

Location (County)	Ranking (High, Medium, Low)	Estimated number of illegal waste tires
Logan (2 locations)	High	63,672
Lake (2 locations)	High	25,040
Lake (1 location)	Medium	3,560
Las Animas	Low	1,100
	Total:	93,372

Table 4: 2017 illegal waste tire removals

Location (County)	Funds Spent for Clean-up	Tires removed
Saguache	\$203,560	70,599
Costilla	\$70,637	19,600
Prowers	\$29,853	7,308
Huerfano	\$28,371	6,184
El Paso	\$11,814	3,131
Crowley	\$4,827	1,599
Routt	\$4,146	762
Saguache	\$1,438	388
Total:	\$354,646	109,571

Waste Tire Program Goals

One goal of the Waste Tire Program is to develop sustainable markets for the end use of waste tires and tire-derived products. With the sunset of the Market Development Fund on January 1, 2018, the state moved from a subsidy-based system to a free market system. The department, through the Market Development Fund, worked on several initiatives to assist the state during this transition.

The department put the following performance measures in place in 2014 to determine the effectiveness of the program:

- Increase the tonnage of waste tires end uses approved in the End User Fund by 5 percent over the 2014 baseline.
 - 2014 end use tons approved: 39,187
 - 2015 end use tons approved: 40,196
 - 2016 end use tons approved: 105,365
 - 2017 end use tons approved: 91,160

This goal was met as end use increased by 132.6 percent from 2014 to 2017, although there was a decrease of 14,205 end use tons approved, or a 13.5 percent decrease, from 2016 to 2017.

- Conduct at least five outreach events to promote the Waste Tire Program and market development opportunities each year.

Eight outreach events were held in 2017 including a Metro State University Environmental Class Presentation (February); Local Environmental Health Directors Quarterly Meeting (April); Colorado Waste Tire Market Development

Conference (June); Colorado Environmental Health Association Annual Education Conference (September); Colorado Rocky Mountain Chapter of the Solid Waste Association of North America Annual Conference (September); US Tire Manufacturers Association Annual Conference (October); Colorado Counties Incorporated Conference (November); Colorado LTAP Training (November).

- Increase technical assistance outreach visits with existing and new companies by 10 percent over the 2014 baseline.

- 2014 technical assistance outreach: 23
- 2015 technical assistance outreach: 33
- 2016 technical assistance outreach: 40
- 2017 technical assistance outreach: 31

This goal was met as outreach increased by 34.9 percent from 2014 to 2017, although there was a decrease of eight total existing or new companies who participated in technical assistance from 2016 to 2017.

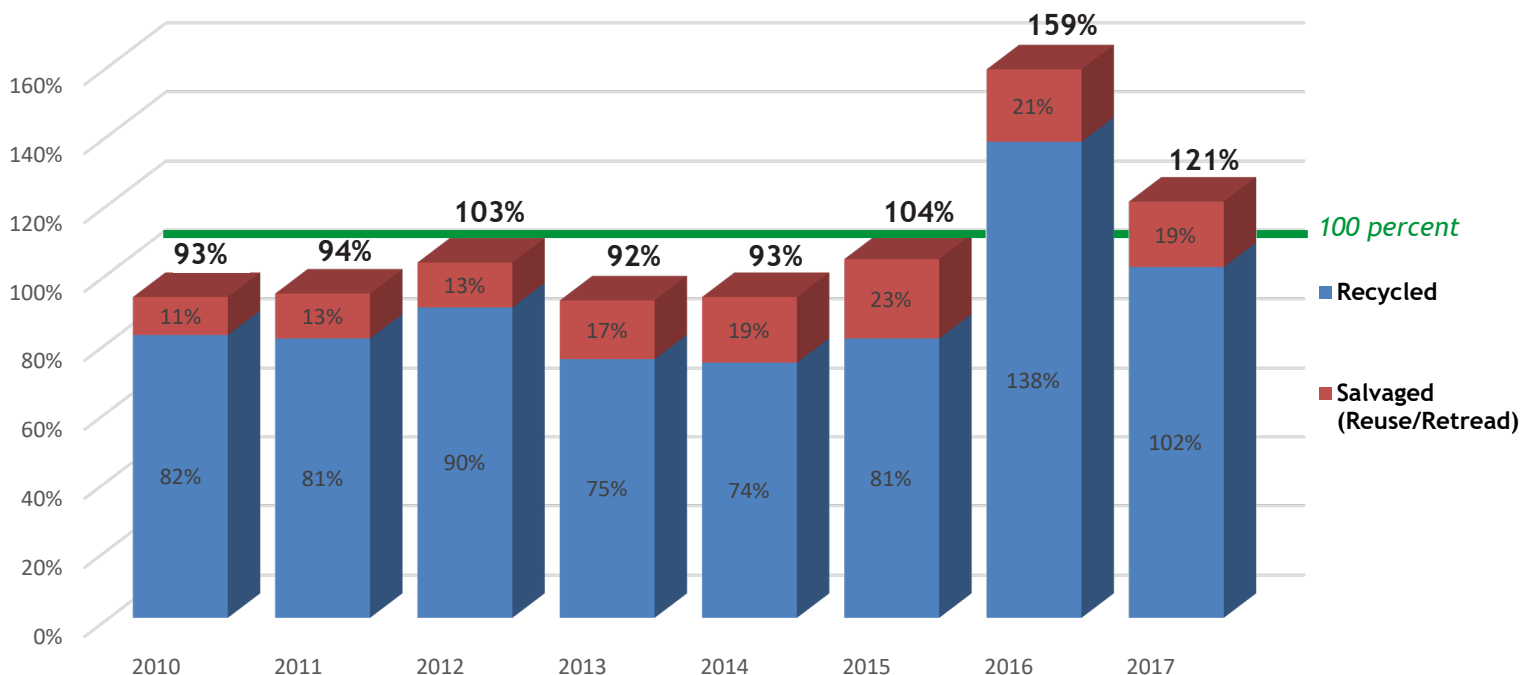
- Increase the overall waste tire state recycling rate by 3 percent over the 2014 baseline.

- 2014 Recycling Rate: 93 percent
- 2015 Recycling Rate: 104 percent
- 2016 Recycling Rate: 159 percent
- 2017 Recycling Rate: 121 percent

This goal was met as recycling increased by 40.8 percent from 2014 to 2017, although the rate dropped by 28 percent from 2016 to 2017.

Figure 5

Percent of waste tires recycled and salvaged



2017 Summary

Tetra Tech was awarded \$199,000 in 2016 and \$99,500 for the second half of 2017 to help implement many of the recommendations in the market development plan. Some of the initiatives included holding a waste tire market development conference, offering technical assistance for both current and potential end users of tire-derived products and assisting with the development of statutory and regulatory changes for the program.

As required by Section 30-20-1404, C.R.S., the department must report any findings or usage of tire-derived aggregates (TDA) by the Colorado Department of Transportation (CDOT). CDOT did not complete any tire-derived aggregate projects in 2017.

In June 2017, the fourth annual Waste Tire Market Development Conference was held in Greenwood Village, Colorado. Eighteen speakers provided the latest information on regional markets, market development and trends, technologies and beneficial end uses for waste tires. Presentations covered potential federal environmental policies in the new administration, impact of mosquito-borne diseases, working with your state's Department of Transportation, moving rubberized markets forward, a pyrolysis panel discussion, an update on the crumb rubber in synthetic turf studies from the EPA, tire-derived aggregate usage in heat-pump systems, an overview of off-the-road tire recycling options and a state regulator panel discussion. There were 94 conference attendees, including Waste Tire Processors, Retailers and End Users, state and local regulators, transportation officials, landfill operators, equipment dealers and industry consultants. Additionally, there were seven vendors that exhibited and displayed their products.

Thirteen regional state regulators and the EPA Region 8 office met before the conference to discuss current waste tire regulations, enforcement techniques, subsidy programs, regional markets for tire-derived products, waste tire operators and haulers, market development and trends, current and emerging tire-derived product technologies and beneficial end uses for waste tires.

Based on positive feedback, a fifth waste tire conference is scheduled for October 2018. Some of the sessions planned include the status of the federal action plan on crumb rubber infill in synthetic turf, fire safety, a retailer panel discussion, the use of tire-derived aggregate in smaller civil engineering projects and an update on tire-derived fuel usage by one of the state's biggest end users.

Technical Assistance

The department, in partnership with Tetra Tech, conducted technical assistance for companies interested in locating or expanding their waste tire operations in Colorado (Tables 5 and 6). Many of these companies inquire about issues such as waste tire availability, current markets, business

Table 5: Technical assistance by industry type

Industry type	Technical assistance provided for each industry type
Waste Tire Processor	6
Molded Products	3
Tire-Derived Fuel	5
Pyrolysis	4
State Agencies	5
Civil Engineering	1
Asphalt	2
Alternative Daily Cover	2
Local Government	3
Total:	31

Table 6: Methods of technical assistance

Methods of Technical Assistance	Number offered
Phone Conversations (one-time or ongoing)	31
Site Visits	1
Grant Projects	3
Meetings	9
Technical Document Review	4
Trainings	4

incentives, registration requirements and permitting requirements. The department meets with these companies regularly to advise them on registration or permitting requirements and what department grant opportunities could be beneficial to them. The department also conducts outreach with other state agencies interested in learning about or using tire-derived products. Tetra Tech provided support by offering advice to these companies, researching market barriers or opportunities and/or conducting an onsite visit to meet with the company and review their current or proposed operations.

The department funded three grants for research and development of new and existing tire-derived products. The three projects included civil engineering use of tire-derived aggregate in geothermal heating and cooling systems, product testing of tire-derived erosion control products, and independent lab testing of carbon black generated from waste tires processed by the use of pyrolysis.



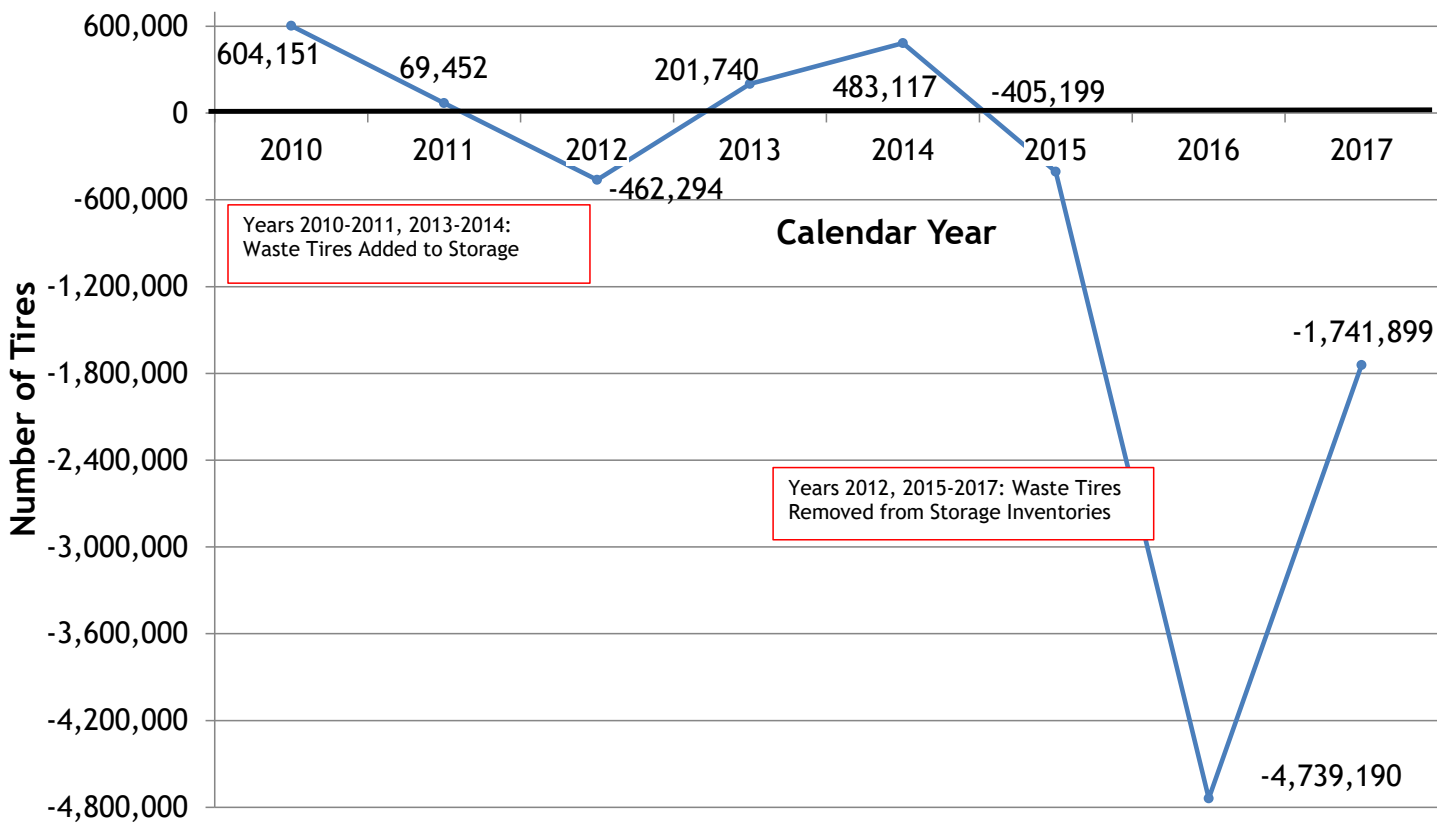
Photo courtesy of Mars Minerals.



An example of a tire-derived erosion control product, pelletized recovered carbon black and tire-derived aggregate going into a geothermal heating and cooling system. The department's waste tire program funded grants for the research and development of these products.

Change in waste tire storage inventories

Figure 6



Beginning in 2015 we saw facilities start to remove waste tires from their inventories, mainly by using the tires as fuel for cement kilns or as alternate daily cover at landfills. Fewer tires were removed in 2017 than in 2016 due to less funds available from the End Users Fund rebate program, which was repealed on Jan. 1, 2018. The recycling rate was still above 100 percent, which helped Colorado reduce its waste tire inventories.

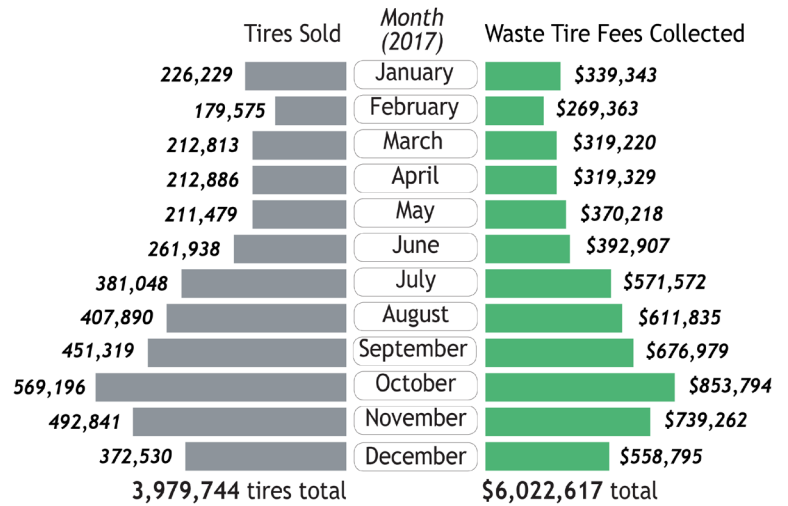
Waste Tire Program: Trends & Accomplishments

Waste Tire Fee

The program collects a \$1.50 waste tire fee on the sale of each new motor vehicle tire and new trailer tire. In 2017, there were 1,675 active accounts for retailers who collect the waste tire fee. Seventeen of these accounts were on-line retailers. Three hundred and twenty nine accounts were inactivated due to closure of the retailer or the retailer no longer sold new tires. Additionally, the program added 411 new waste tire fee accounts. Figure 7 shows the total number of new tires sold in the state and the total waste tire fees collected.

Due to the change of the law, on January 1, 2018, the \$1.50 waste tire fee went down to \$0.55. The program started notifying retailers in August of 2017 to prepare for this fee decrease. Notification postcards and emails were sent from August 2017 to December 2017 to retailers about this fee change. Additionally, the department's main website page displayed the fee decrease information and the department telephone on-hold message included a fee drop notification.

Figure 7



Program Highlights

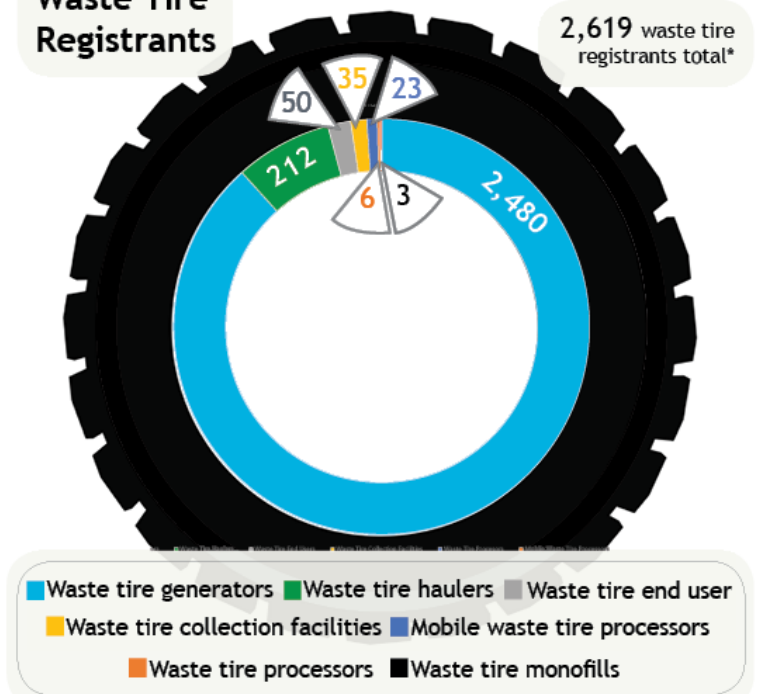
The waste tire program hosted two mountain region states waste tire regulator conference calls during 2017 and held the 4th Annual Waste Tire Market Development Conference and pre-conference regulators meeting. The program continues to provide regulatory information to local governments and the waste tire community. Staff presented on waste tires at a Metro State University environmental course in February 2017 and the November 2017 Colorado Counties Inc. Conference in Colorado Springs. Program staff also exhibited on waste tires at the 2017 Colorado Environmental Health Association Annual Education Conference in Colorado Springs.

Program staff conducted 138 waste tire inspections and compliance assistance visits in 2017. Of these 138 visits, 96 waste tire generator facilities selling new tires were evaluated for compliance with the requirements for submittal of the waste tire fee. Because of these inspections, new tire fee accounts were established for those facilities who had not previously submitted the waste tire fee. Additionally, the program issued three compliance advisories (informal enforcement actions) and two compliance orders (formal enforcement actions for the non-compliance with waste tire laws and regulations).

Program staff continued to process and issue waste tire registrations. The program issued 534 waste tire registrations in 2017. End of 2017 registrant numbers by category are represented in Figure 8.

Figure 8

Waste Tire Registrants



*One registrant can be registered in multiple categories.

2,619 facilities were registered with the waste tire program this year, ranging from waste tire monofills to waste tire haulers and collection facilities.

El Paso County Tire Bale Fire

On March 16, 2018, a tire bale fence that had been constructed and installed on private property decades ago caught fire in El Paso County. The fire was the result of a grass fire that spread offsite from the Fort Carson Army base. The tire bale fence fire was part of the 3,300 acre Carson Midway fire that evacuated area residents, a nearby school and personnel from the second largest waste tire monofill in the state. This fire also burned two homes and outbuilding structures.

Except for the tire bale fire, firefighters were able put out the fire in two days. The Environmental Protection Agency (EPA) and their contractors were brought in to extinguish the tire bale fire and monitor for smoke and possible environmental concerns.

Tire bales can be a challenge to extinguish due to the characteristics of the tire bale and the tire composition. Although baled tires have little to no air between the tires, the surface of the tire bale can still burn. The tire surface also repels water, making it difficult to extinguish. The tire bales that were on the property encased and surrounded with dirt and rock did not burn. However, the 300-yard wall of tire bales that were not encased in earthen materials did burn.

The firefighters' initial response was to cool the approximately 300-yard wall of tire bales with water and foam to prevent the bales from breaking. If the bales broke, then the fire area would have expanded due to the introduction of oxygen into the hollow centers of the individual tires.

The EPA and their contractors were able to extinguish the tire bale fire by using heavy equipment to pull apart tires from the tire bale and the hotspots in a way to minimize fire expansion. They spread the burning tires and applied water and dirt to extinguish the fire.

Because smoke from the tires can contain volatile organic compounds, polynuclear aromatic hydrocarbons, particulate matter, heavy metals, carbon monoxide, dioxins, and sulfur and nitrogen oxides, the EPA monitored the air for worker and public safety. The EPA also removed soil that was impacted by the tire bale fire, as soil contaminated from the tire burn can contain pyrolytic oil that has heavy metals, petroleum hydrocarbons and dioxins. Sampling was done on the remaining soil. The sample results were below the EPA and state target risk range so additional soil removal was not required. The work was completed by removing the fire debris and disposing of it at the local landfill.



The picture on the left shows the tire bale fence burning during the El Paso County tire bale fire. On the right we see tire bales encased in dirt and rock that did not burn.

