

Status of and Alternatives for the Management of Waste Tires in Montana



**Final Report to the 56th Legislature
of the State of Montana
October 1998**

**Prepared by the Legislative Environmental Policy Office
Study Conducted by the
Environmental Quality Council Waste Tire Study Working Group
August 1997-August 1998**

Environmental Quality Council

The Environmental Quality Council (EQC) is a state legislative committee created by the 1971 Montana Environmental Policy Act (MEPA). As outlined in MEPA, the EQC's purpose is to encourage conditions under which people can coexist with nature in “productive harmony”. The Council fulfills this purpose by assisting the Legislature in the development of natural resource and environmental policy, by conducting studies on related issues, and by serving in an advisory capacity to the state’s natural resource programs.

The EQC is bipartisan, meets 4-6 times a year, and has 17 members--6 state senators, 6 state representatives, 4 public members, and a representative of the governor.

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Acknowledgments

The Environmental Quality Council and staff would like to thank the members of the Waste Tire Working Group, listed in Appendix A. Without the contribution of their time and expertise, this study would not have been possible.

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Introduction

The 1997 Montana Legislature approved Senate Bill 332 (SB 332) which amended the Solid Waste Management Act to require that new waste tire recycling or disposal facilities provide financial assurance to address any problems that could result from those activities. When waste tires are allowed to accumulate and are stored above ground they may create fire hazards, harborage for pests, and aesthetic and property value impacts. However, when waste tires are buried, they consume valuable landfill space. A ban on the disposal of tires in landfills may solve the one problem but it may only intensify the other in the absence of other management alternatives.

In addition to establishing financial assurance requirements, SB 332 also directed the Environmental Quality Council (EQC) to conduct a waste tire study to help identify future management policies. Specifically, the bill required the EQC to:

- 1) study the issues associated with managing, processing, treating, and disposing of waste tires, and***
- 2) report the results of the study, including any recommendations for legislation, to the legislature no later than October 1, 1998.***

! Environmental Quality Council Study Efforts

The EQC elected to accomplish this task by directing staff to organize and facilitate a working group of landfill owners and operators, tire dealers, tire processors, regulatory officials, public interest groups, and other volunteers from Montana and the region (see **Appendix A**). This core group of 25 to 30 citizens is quite familiar with tire management issues and alternatives that have been tried in other states. The group held three meetings during the legislative interim to hear presentations and hold discussions on waste tire management problems and to address current and potential solutions. The recommendations of the group were presented to the EQC for its consideration. The Council's recommendations to the Legislature are as follows.

Final Conclusions/Findings and Recommendations

Conclusion/finding-

1) AT THIS TIME, MONTANA DOES NOT HAVE A PROBLEM WITH WASTE TIRE MANAGEMENT WHICH IS SIGNIFICANT ENOUGH TO WARRANT STATEWIDE POLICY CHANGES IN THE CURRENT SITUATION.

Recommendations:

NONE

Conclusion/finding-

2) SEVERAL ILLEGAL TIRE DUMPS EXIST IN MONTANA AS IN OTHER STATES.

Recommendations:

- A. ALLOW CURRENT STATE AND LOCAL ENFORCEMENT AUTHORITIES TO RESOLVE THESE PROBLEMS AS NECESSARY THROUGH ENFORCEMENT OF EXISTING LAW.
- B. LOCAL AUTHORITIES SHOULD SEEK TO PREVENT ILLEGAL DUMPING BY ADDRESSING THE CAUSE AND ASSURING THAT ECONOMICALLY FEASIBLE LOCAL WASTE TIRE MANAGEMENT ALTERNATIVES EXIST.

Conclusion/finding-

3) WASTE TIRE HAULERS ARE NOT REGULATED IN MONTANA.

Recommendations:

- A. REGULATION BY LICENSING, CERTIFICATION OR OTHER MEANS IS NOT BELIEVED TO BE NECESSARY AT THIS TIME.

Conclusion/finding-

4) WITH PROPER ADMINISTRATION, THE FINANCIAL ASSURANCE REQUIREMENTS IN SENATE BILL 332 APPEAR TO BE SUFFICIENT TO PREVENT POTENTIAL

PROBLEMS RESULTING FROM NEW WASTE TIRE MANAGEMENT FACILITIES WITHOUT PREVENTING THE ESTABLISHMENT OF NEW FACILITIES AND ADDITIONAL VIABLE ALTERNATIVES.

Recommendations:

NONE

Conclusion/finding-

5) THE MAJORITY OF MONTANA'S WASTE TIRES ARE DISPOSED OF BY LANDFILLING. LANDFILLS HAVE THE AUTHORITY TO UNILATERALLY DETERMINE CONDITIONS FOR THE ACCEPTANCE OF WASTES AT THEIR FACILITIES WITHIN THE PROVISIONS OF STATE ISSUED PERMITS AND THROUGH MODIFICATIONS IN THEIR OPERATION PLANS FILED WITH THE STATE.

Recommendations:

A. AT THIS TIME, THE ISSUE OF BANNING THE DISPOSAL OF TIRES AT LANDFILLS SHOULD REMAIN WITH THE INDIVIDUAL FACILITIES AND NOT BE THE SUBJECT OF A STATEWIDE POLICY DECISION.

B. LANDFILL BANS ON THE DISPOSAL OF WASTE TIRES SHOULD NOT BE IMPLEMENTED UNTIL OR UNLESS ECONOMICALLY FEASIBLE WASTE TIRE MANAGEMENT ALTERNATIVES ARE AVAILABLE WITHIN THE AREA SERVED BY THE DISPOSAL FACILITY.

Conclusion/finding-

6) THERE IS NO PRESENT NEED TO ESTABLISH A PUBLICLY FUNDED WASTE TIRE SUBSIDY PROGRAM IN MONTANA.

Recommendations:

A. THE STATE SHOULD CONTINUE TO SUPPORT AGENCY EFFORTS TO ASSIST IN THE DEVELOPMENT AND ANALYSIS OF ALTERNATIVE WASTE TIRE MANAGEMENT SOLUTIONS THROUGH THE IMPLEMENTATION OF THE MONTANA INTEGRATED SOLID WASTE MANAGEMENT PLAN.

! Generation Rate...How Many Tires?

Identifying the number of waste tires generated in the state is not a simple task. A summary of Montana retail tire sales figures is not available. Reported as “special wastes” on questionnaires returned by landfill operators, annual waste tire disposal figures from the Montana Department of Environmental Quality (DEQ) are shown in **Table 1A**. According to various industry estimates and estimates by the federal Environmental Protection Agency (EPA),¹ waste tires are generated in the U.S. at the rate of approximately 1 tire per person per year. Using 1995-96 statistics, 879,000 Montanans registered 968,468 cars, trucks and buses.² The U.S. Department of Transportation federal highway statistics for 1995 showed that Montana ranked second in the nation behind Wyoming in the number of vehicles (automobiles, trucks, and buses) per capita at 1.11. The national average is about .77 vehicles per capita.³

A review of tire program revenues generated on a per tire sold basis in other states when compared to those states’ population again seems to lend credibility to the 1 tire per person per year estimates.⁴ A 1994 waste tire study report for the state of Nevada, however, indicated that a generation rate of about 0.7 tires per capita per year may be more accurate based on the revenues collected on a \$1 per tire fee collected at each retail sale.⁵ Reports from the state of Oregon which had a similar tire program revenue collection system indicated that perhaps only 40% of the fees collected was being sent in to the state program account.⁶ After relying on the EPA waste tire generation rate estimates for many years, some of Montana’s tire dealers have recently

¹ Markets for Scrap Tires, US EPA-Office of Solid Waste, October 1991.

² State Rankings 1997, Morgan Quitno, Lawrence KS, 8th Edition.

³ Highway Statistics 1995, U.S. Department of Transportation, Federal Highway Administration.

⁴ See Table 3C Other State Tire Programs; columns 2 and 3

⁵ Waste Tire Management Plan, Nevada Dept of Conservation and Natural Resources, 1994

⁶ Waste Tire working group minutes 11-12-98, Jerry Noble comment

TABLE 1A Waste Tires Disposed at Licensed Disposal Sites - 1997*

County	Facility {Landfills}	Number of Tires Accepted for Disposal	Number of Tires Accepted for Recycling	Cost Per Tire (range; low to high)	Landfill Capacity as of 1998	
					Cubic Yards	Years Left
Beaverhead	Dillon Class 2	N.A.	N.A.	\$0.00-\$0.00	494,000	50
Big Horn	Hardin Class 2	5,649.00		\$1.00-\$7.00	650,000	31
Broadwater	Broadwater Transfer Station	700.00		\$0.00-\$0.00	-	-
Carter	Ekalaka Class 3		2,000.00	\$1.00-\$2.00	-	-
Cascade	High Plains Class 2	35,200.00		\$0.51-\$0.73	10,435,886	36
Custer	Miles City Class 2		1,600.00	\$1.50-\$1.50	50 acres	100
Daniels	Daniels County Class 2		1,000.00	\$1.50 -\$5.00	-	-
Dawson	Glendive Class 2		2,529.00	\$1.50-\$15.00	277,000	31
Deer Lodge	Anaconda Class 3	7,099.00		\$0.00	648,000	42
Fallon	Coral Creek Class 2	675.00		\$1.00-\$1.00	300,000	11
Fergus	Sanitation Inc. Class 2	200.00		\$4.00-\$13.50	500,000	20
Flathead	Rasmussen Class 3	33,400.00		\$0.75-\$1.25	-	-
Gallatin	Bozeman City Class 2	7,800.00	1,560.00	\$3.25-\$22.50	1,026,162	13
Garfield	Jordan Class 3	100.00		\$0.00-\$0.00	4,500	4.7
Glacier	Cut Bank Class 3	1,200.00		\$1.00-\$25.00	19,800	39
Granite	Lower Flint Creek Class 3	N.A.	N.A.	\$2.50-\$2.50	-	-
Hill, Blaine, Chouteau	Unified Disposal District Class 2	10,000.00	1,500.00	\$0.00-\$0.00	3,787,336	13
Jefferson	City/County Class 3	300.00		\$2.00-\$2.00	150,000	49
Lake	Tire Depot Recovery Class 3	45,500.00	19,500.00	\$1.00-\$1.00	-	-
Lewis and Clark	Lewis/Clark County Class 2		2,800.00	\$2.00-\$10.00	-	46.3
Lincoln	Libby Class 2	2,268.00	7,815.00	\$1.25-\$15.00	614,904	14
Missoula	BFI Missoula Class 2	N.A.	N.A.	\$3.50-\$36.50	6,000,000	20
Park	Park County Waste Incinerator	N.A.		\$1.00-\$1.00	-	-
Phillips	Malta Class 2		1,354.00	\$0.00-\$0.00	-	71
Pondera	Northern Mt Joint Class 2	4,800.00		\$1.00-\$25.00	1,340,920	53
Powder River	Powder River County Class 2		84.00	\$1.00 -\$22.50	269,150	49
Ravalli	Victor Transfer Station	2,500.00		\$3.00-\$6.00	-	-
Richland	Richland Class 2		1,200.00	\$0.00-\$0.00	3,000,000	212
Roosevelt	Wolf Point City Class 2	5,000.00		\$2.00-\$6.00	932,400	23
Rosebud	Rosebud Class 2	900.00		\$0.00-\$0.00	101,000	7.1
Sanders	Trout Creek Class 3	600.00		\$1.50-\$8.00	-	-
Sheridan	Sheridan County Class 2	3,622.00		\$0.00-\$0.00	287,000	96
Silver Bow	Butte Silver Bow Class 2	8,193.00		\$1.75-\$1.75	2,728,000	37
Stillwater	Reed Point Class 3	200.00		\$1.00-\$10.00	-	-
Teton	Choteau Class 3	400.00		\$1.00-\$25.00	39,000	39
Toole	Shelby Class 2	2,508.00		\$1.00-\$20.00	-	48
Valley	Valley County Refuse Class 2	900.00		\$0.00-\$0.00	18,083,343	184
Wibaux	Wibaux Class 3	500.00		\$0.00-\$0.00	100,000	99
Yellowstone	Tires For Reclamation Class 3	76,097.00		\$1.00-\$5.00	-	-
Yellowstone	Billings Class 2	1,230.00		\$1.75-1.75	33,944,521	44
TOTAL 1997		257,541.00	42,942.00	\$1.28-\$6.58	85,732,972	

*Source: Montana DEQ Air and Waste Management Bureau, 1998 report for 1997 disposal.

estimated that a lower figure of 0.6 or 0.75 tires per capita is perhaps more accurate, given a perceived increase in the manufacturing and sales of longer lasting tires.⁷

Using the tire dealer's and the EPA's estimates, (.6 and 1.0) factored with the 1997 Montana population estimate of about 879,000, Montana may generate between 527,400 and 879,000 waste tires annually. For the purposes of this study, pending verification of the lower estimate from the tire dealers, a generation rate of approximately 800,000 waste tires per year will be assumed. The figure is somewhat important because it provides a basis for market decisions, investments in alternative solutions, and public policy decisions. However, readers are advised here that business decisions to invest in waste tire management alternatives should not be made on the estimates and calculations in this report without further detailed market research and analysis.

! Regulating Waste Tires in Montana

The Montana Solid Waste Management Act

Waste tires are considered Group 3 solid wastes for purposes of landfill disposal in Montana. A Group 3 waste is defined as a nonsoluble and generally inert solid waste.⁸ This is the most innocuous category of solid waste regulated by the Montana Solid Waste Management Act (SWMA-Title 75, Chapter 10, Part 2, MCA) and includes items such as unpainted brick, dirt, rock, and concrete. Group 3 materials, such as waste tires, may be landfilled at a Class 2, Class 3, or Class 4 landfill.

Class 2 landfills are the typical household refuse landfills, authorized to accept most solid waste materials (except hazardous wastes) in most cases. Class 3 sites are authorized only and exclusively for the inert and nonsoluble Group 3 wastes previously mentioned. These wastes are characterized by their low potential for adverse environmental impacts. The Class 4 site is a new category provided for by a

⁷ Brad Griffin, Montana Tire Dealer's Assoc., July 1998 correspondence.

⁸ 17.50.503 Administrative Rules of Montana (ARM)

DEQ rule adopted in 1997.⁹ The rule provides for the establishment and operation of construction and demolition waste disposal sites which are regulated less than Class 2 landfills but more than Class 3 landfills. Examples of waste groups that can be accepted at various classifications of landfills are shown below.

More regulation Less regulation

<u>Class 2 landfill</u>	<u>Class 4 landfill</u>	<u>Class 3 landfill</u>
household trash, sludges, organic waste, non hazardous, waste tires	demolition debris, construction materials, asphalt, non hazardous, waste tires	rocks, bricks, brush, dirt, concrete, non hazardous, waste tires

More regulation generally means the presence of an increased environmental risk requiring additional effort and expense in establishing and operating waste management sites. State and federal environmental, health, and safety requirements for leachate collection and control, methane gas management, daily cover, closure and post closure monitoring and financial assurance, hydro geological siting analyses, and other costs have increased the value of space in the community Class 2 landfill.

The establishment and operation of a Class 3 landfill is considerably less expensive than that for Class 2 landfills due to the inert nature of Group 3 wastes. For example, refuse is only required to be covered every 90 days and the ground water protection needs are minimal. The cost of establishing and operating a Class 4 demolition/construction waste landfill are greater than that of a Class 3 site, but substantially less than that of a Class 2 landfill.

State and federal laws have required Class 2 landfills to obtain financial assurance since 1997 to maintain compliance with landfill operating and future closure requirements. The enactment of SB 332 in 1997 authorized the DEQ to adopt financial assurance rules for new Class 3

⁹

Solid waste fee and operational rules; Section 17.50. Subchapters 4 and 5 ARM

management facilities that primarily or only manage waste tires (tire monofills or resource recovery facilities).

The Montana SWMA prohibits disposal of tires (solid waste) anywhere in the state unless permitted by law. The law allows a person to dispose of his own tires on his own (or leased) land, provided that the disposal doesn't create a nuisance or a public health hazard and the parcel of land is greater than 5 acres in size. Otherwise, tires must be disposed of at a permitted (licensed) solid waste management system.

Such systems can include facilities that control the storage, treatment, recycling, recovery, or disposal of solid wastes, including waste tires. Technically, tire shops, auto dealers, tire processing facilities, recycling centers, temporary storage lots, and other locations can fall within the purview of the Montana SWMA. In reality, and in the case of tires in particular due to their relatively minimal environmental impact and agency staffing priorities, strict enforcement of the state law at these types of facilities is rarely imposed. The requirements are more often imposed in situations where complaints are registered due to a backlog of tires that may be creating a nuisance or a public health hazard. Local ordinances, covenants, or zoning requirements may also control these types of situations but they are beyond the scope of this study.

Regulation of Waste Tire Haulers in Montana

Waste tire haulers are regulated in some states and, prior to 1995, they were regulated in Montana by the Public Service Commission (PSC). Currently, there is no state regulation of waste tire haulers in Montana. Anyone may solicit tires in any form from a generator and transport them to any destination. Disposing of the tires, however, subjects the transporter, the land owner, and possibly the generator to the requirements of the SWMA (above).

The Montana PSC is authorized by Title 69, Chapter 12, MCA to regulate motor carriers and, with exceptions, requires a Class D certificate for a commercial transporter of garbage. Waste tires used to be considered garbage by the PSC and therefore subject to transport permitting. Prior to 1995, if a

commercial waste tire transporter was hauling tires for disposal (and not resale, retreading etc.), then a PSC issued Class D certificate was required. However, a 1995 legislative amendment specifically exempted waste tires from the definition of garbage.

69-12-101. Definitions. Unless the context requires otherwise, in this chapter the following definitions apply:

- (6) "**Garbage**" means ashes, trash, waste, refuse, rubbish, organic or inorganic matter that is transported to a licensed transfer station, licensed landfill, licensed municipal solid waste incinerator, or licensed disposal well. The term does not include wastewater and **waste tires**.

The process of obtaining a Class D certificate involves applying to the PSC for approval to haul in a specific geographical area and submitting the appropriate fee. The applicant must also submit financial information to show that the business is "fit, willing, and able" to provide the services offered and letters or supporting statements from prospective customers within the proposed service area to indicate that there is a "public convenience and necessity" for the service. The PSC notifies the existing certificate holders that another business intends to operate in their permitted area and an opportunity to protest is provided. A hearing then follows at which the applicant must prove to the satisfaction of the PSC that the business is financially sound and that there is a need for additional hauling services in the areas the application covers. In terms of reporting, a holder of a Class D certificate is required to show that it serves 20 customers a month and produced \$5,000 in gross revenue during the previous calendar year. The PSC only regulates the entry of additional motor carriers into the marketplace and does not regulate the disposal end of the business or the rates charged by Class D certificate holders. An individual transporting his own waste tires has never been regulated by the state.

Several states have licensing, certification, identification, or approval requirements for waste tire haulers. The perception is that the illegal dumping of tires in unauthorized locations is partly caused by inadequate waste tire hauler regulation. The degree of regulation varies from state to state. The range includes programs that simply require hauler registration with a state agency to those programs that require hauler licensure and bonding, and manifesting of waste tires from the generator through the hauler to the final destination.

The working group held many discussions on the situation in Montana and the need to regulate waste haulers in the state. Some members advocated a return to the PSC regulations, others suggested a tire manifesting and tracking regulation. The majority preferred a simple registration or approval process by a state regulatory agency. While this approach may deter waste tire generators from using a “nonapproved” waste tire hauler, it was generally concluded that the result of such a program would simply be a registry of approved haulers, that enforcement would still be necessary to assure proper disposal by all haulers, and that the illegal dumping problem was not so severe in Montana that additional regulatory programs would be necessary at this time.

Air Quality Act Regulations

Montana air quality permits are required for most stationary air emission sources. The open burning of tires is expressly prohibited in Montana except under specific circumstances for the purpose of training firefighters.¹⁰ A person proposing the burning of tires or processed tires (tire derived fuel or TDF) would first need to obtain a solid waste management system license as an incinerator under the Montana SWMA. Before construction or modification of the facility however, an air quality permit would also be necessary. Before an air quality permit could be issued for solid waste incineration, the DEQ must make a determination that the proposed incineration would pose no more than a negligible risk to human health and the environment.¹¹

Although risk assessments on potential air emissions are often required depending on the source, the standard of negligible risk is unique to Montana and applies only to solid and hazardous waste incinerators.

¹⁰ Section 17.8.604 ARM

¹¹ Dave Klemp, DEQ Air Program, Waste Tire Working Group meeting 11-12-97; see also 75-2-103(11)(a), 75-2-215 MCA and Rules 17.8.701(10) and 17.8.706(5) ARM.

! Landfills in Montana

Landfills are currently the disposal option of choice for the vast majority of the tires generated in Montana. This is simply due to economics. Alternatives to landfilling are only marginally available and seldom as inexpensive as landfilling.

There are currently 37 active Class 2 landfills operating in the state; 5 are privately owned and operated and the remainder are operated by local governments. That number and that private/public relationship is anticipated to remain fairly stable in the foreseeable future given the cost of establishing new landfills and the limited Montana markets for refuse disposal. Over the longer term, it is likely that there will be slightly fewer sites and there may be an increase in the numbers of sites that will be privately owned and operated.

Landfill locations are shown on **Map 1A**. All these sites are authorized by the state to accept waste tires. However, owners and operators of landfill facilities have the discretion to accept or reject materials they are otherwise permitted by the state to accept. With the exception of the Kalispell landfill (Flathead Regional Solid Waste) all will accept tires. Some facilities, like the city of Helena and Bozeman landfills, discourage the acceptance of tires by policy or by price. Others provide price differentials to encourage volume reduction of tires before they are brought to the landfill.

Additionally, there are 53 Class 3 sites licensed for operation by the state. These sites are authorized to accept waste tires along with other inert, non water soluble wastes (rock, cement, brick, etc.). Approximately 31 of these Class 3 sites are public disposal sites. The remainder are usually private sites for the benefit of a specific business. Class 3 sites are generally landfills of convenience for smaller communities attempting to minimize disposal costs. If significant volumes of Group 3 materials can be removed from the waste stream and landfilled locally, then the costs of transporting and disposing the remaining Group 2 household wastes to distant Class 2 landfills can be reduced.

MAP 1A

Illustration is on file at the EQC Office.

There are 3 operating Class 3 landfills which are licensed and operated for the exclusive disposal of waste tires. These tire only landfills or “monofills” are located near Kalispell, Polson, and Silesia near Billings. A fourth site located in Sanders County near Hot Springs was licensed in July 1998 under the new financial assurance requirements of SB 332 and is the only tire monofill so licensed in the state. The 3 sites pre-existing the law change were allowed to continue operating without having to obtain state required financial assurance for their operations. A fifth site near Columbus is abandoned and no longer licensed or in business. No Class 4 construction and demolition waste facilities have been licensed under the 1997 rules but two applications are pending.

Approximately 892,000 total tons of municipal solid waste were disposed of in Montana landfills in 1995.¹² Three Class 2 sites--the Billings City landfill, the High Plains landfill in Great Falls, and the BFI landfill in Missoula--accounted for approximately 50% of this total. These three sites, plus the five Class 2 landfills in Kalispell (Flathead County Solid Waste), Helena (Lewis and Clark County), Butte-Silver Bow, Bozeman, and Polson (Lake County) accounted for the disposal of 75% of the total Group 2 waste in Montana.¹³

The situation is different for the disposal of tires however. The Rasmussen Tire Site near Kalispell, Tires for Reclamation near Silesia (Billings), and The Tire Depot near Polson are privately operated Class 3 monofills (tires only). Those three sites alone accounted for a total of 174,497 or nearly 51% of the waste tires reported to the DEQ as having been disposed of or recycled in 1997.

Table 1A shows the most current tire disposal data from the Montana DEQ for Class 2 and Class 3 landfill sites. Data are gathered through landfill questionnaires returned to the agency. **Table 1A** data are figures from 1997 reported in 1998. According to the report, 257,541 tires were landfilled in the state and another 42,942 were recycled for a total of 300,483. This figure for 1996 was 305,735. The discrepancy between the landfill totals of 300,483 and the estimated 800,000 tires Montana generates

¹² EQC, Our Montana Environment, 1996.

¹³ Communication with Pat Crowley DEQ solid waste program, 7-29-98

each year is probably due to several reasons,¹⁴ including:

- 1) Reporting gaps. Only the three Class 3 tire monofills (see above) are required by law to track and report the number of tires they accept for disposal. The Class 2 sites may be under reporting the number of tires accepted for disposal since reporting is not required and tires often arrive at the facilities in mixed loads of unseparated waste. For example, the BFI site in Missoula, which is the third largest landfill in Montana by volume landfilled, did not report any disposal of tires for 1997. However, significant numbers of waste tires are landfilled there annually.
- 2) Land owner landfill exemption. Agricultural operations in particular often dispose of waste on their own lands in accordance with the exemption in Section 75-10-214, MCA.
- 3) Illegal disposal. In the past 2 years, the DEQ has identified 14 illegal tire dumps ranging in size from sites containing forty to several thousand tires each. It is not certain how many of these sites are active. It is also not certain whether this represents an increase in illegal dumping or merely an increase in the reporting of existing illegal sites.

Costs of tire disposal

The cost of landfilling tires varies between facilities just as the individual costs of operation of a landfill vary depending on economies of scale, volumes handled, efficiency of the site, the cost of land, and landfill development costs. **Table 1A** lists the gate charges for tires at most landfills in Montana. These assessments are typically charged to the individual disposing of identifiable loads of tires a few or several at a time. Volume price arrangements are often made between facilities and large quantity generators such as area tire businesses. The low range price is that charged for the typical passenger car or pickup tire, the high range is for large heavy equipment or farm machinery tires.

Costs associated with waste tire disposal differ greatly. Several community facilities do not have separate charges for tires because the solid waste facility is supported by a universally applied refuse district fee assessed with property tax statements. Others charge additional or separate assessments for

¹⁴

Rick Thompson, Montana DEQ, phone conversation 7-24-98

problem wastes like tires, especially if they are brought to the site in volume by businesses that generate large numbers of waste tires. Examples include the Anaconda Class 3 landfill and the Hill-Blaine-Chouteau County Unified Disposal District landfill which do not currently charge residents extra for waste tire disposal. Tires For Reclamation, a privately operated Class 3 tire monofill near Billings (Silesia) charges \$1 per passenger tire. In Bozeman, however, a resident can be charged \$3 for the disposal of a passenger tire. The Billings City landfill currently does not charge a fee for the first four tires accepted. However, it does charge \$1.50 per tire thereafter.¹⁵

Capacity issues

Tires are large consumers of landfill space. About 75% of a whole tire is air space and tires are difficult to compact. A landfill operator that can compact and bury 1,000 to 1,200 pounds of household refuse into one cubic yard of landfill space may only be able to bury 200 to 400 pounds (ten to twenty whole passenger car tires) of tires into the same space.

Landfills are in the business of selling landfill space by the cubic yard. This is the commodity that is for sale and must be replaced at tomorrow's costs once it is used. Using the above in-place landfill estimates, the same weight of whole tires may consume 3 to 5 times the landfill volume that an equal weight of standard household waste uses. On a loose weight basis, Class 2 landfill facilities that accept and landfill both types of waste often charge a commensurately higher fee for the whole tire material to cover the cost of the additional landfill space consumed.

Class 2 Landfill Capacities¹⁶

The permitting process for a new Class 2 landfill can be lengthy, expensive, and politically contentious. Policy decisions about the landfilling of waste tires are often made in an effort to

¹⁵ EQC phone survey, Jim Driscoll, July 1998.

¹⁶ DEQ survey data, 1997

conserve landfill space and extend the life of an existing landfill. The remaining landfill capacity of Montana Class 2 landfills varies from facility to facility as illustrated in **Table 1A**.

The average life expectancy of all the Class 2 landfills in the state is 48 years. Landfills in eastern Montana generally predict a much longer landfill life span than those in the western part of the state. Usually property available for landfilling is not as limited in eastern Montana, land use conflicts are not as contentious, and solid waste volumes are not as large. For instance, Richland County estimates that at its current rate of fill, the Sidney landfill will last until the year 2210. The Valley County site (Glasgow) is estimated to last until the year 2181. In contrast, the city of Bozeman estimates that the life capacity of its landfill is 13 years and Libby estimates a remaining capacity of 14 years. The current BFI landfill serving Missoula County and much of western Montana is expected to reach capacity in 20 years. However, the Logan landfill west of Bozeman has sufficient future capacity for area residents, BFI-Missoula has land expansion alternatives, Flathead County owns unpermitted property adjacent to its landfill, and the Libby landfill is located on public land and expansion may be possible.

Is landfill capacity an issue in the state and how does it relate to the decisions regarding waste tire management? Assuming that Montana generates roughly 800,000 (passenger sized) tires per year and all were landfilled with an average volume conversion of 10 whole tires to the cubic yard¹⁷, approximately 80,000 cubic yards of (uncompacted)¹⁸ landfill space would be consumed statewide for waste tire disposal. This is a deliberately large number based on the following assumptions: all waste tires generated are disposed of in landfills, Montana generates waste tires at close to the 1 per capita per year figure (no tires imported for disposal from out of state are included in the estimate), there is an average of 10 tires (all sizes) to the cubic yard, no compaction is calculated, and no pre-disposal processing is assumed (chopping, slicing, or shredding).

¹⁷ Scrap Tire and Rubber Users Directory, Recycling Research Institute, 1997 edition p 62.

¹⁸ This figure would actually be approximately 20-25% less as some compaction of whole tires is possible.

Excluding those sites that did not submit a report to the DEQ, an estimated 85,000,000 cubic yards of current landfill capacity is reported to exist in Montana (**Table 1A**). The exaggerated figure of 80,000 cubic yards of tires generated each year in Montana represents approximately 1/10th of 1% of the 85 million cubic yards of the total landfill capacity reported by the landfill facilities in **Table 1A**. The actual figure would be less than this given some volume reduction due to landfill compaction, chopped or processed tires, reused and retreaded tires, and others not entering the landfill waste disposal stream.

Waste tires are bulky and consume landfill space, but they do not represent the bulk of the solid waste that is landfilled in Montana. In comparison with the rough estimate of 80,000 cubic yards of waste tires generated annually, the BFI landfill in Missoula accepts between 20,000 and 30,000 cubic yards of solid waste per month. The city of Billings landfill accepts approximately 70,000 cubic yards of solid waste at the gate each month. These volumes are about two times larger than the compacted-in-place landfill capacity that is actually consumed in the landfills. The Billings landfill estimates that by weight, tires represent approximately 0.05% of the total solid waste accepted at the landfill annually.¹⁹

! Waste Tire Generators

Waste tires are generated primarily by new tire dealers, auto dismantlers and recyclers, and auto service centers. There are approximately 180 tire dealers in Montana and 5 companies (with multiple outlet locations) account for approximately 80% of the tire business.²⁰

Nationally, approximately 7.5% of the vehicles registered each year end up in the recycling stream.²¹ In Montana this represents approximately 60,000 salvaged vehicles or a potential for

¹⁹ Phone log, Barbara Butler, Billings Solid Waste Program, August 1998.

²⁰ Correspondence with Brad Griffin, Montana Tire Dealers Assn., 1998

²¹ Darrell Stanky, DEQ communication July 1998, Mont Junk Vehicle program

240,000 tires. Based again on national estimates, approximately 3% of the waste tires from salvage vehicles are utilized in the used tire market and 14% are utilized as retreads.²²

Tire dealers generate waste tires in the natural course of business. Many are currently charging new tire customers between \$1 and \$2 per tire either directly as a tire disposal charge or indirectly through the price of the new tire. **Table 1B** shows some current examples of tire dealer charges and disposal options in Montana.²³

Customers are generally given a choice to keep their used tires or pay the disposal fee and leave them with the dealer. The cost of disposing of the waste tire is thus internalized and assessed to the person responsible for generating the waste tire. Information presented during the August working group meeting estimated that only one in fifty customers objects to the tire disposal fee.²⁴ The cost to the dealer can be a significant bottom line item. One large volume tire dealer in Montana advised that waste tire disposal costs for a recent 9 month period totaled over \$113,000. The dealer cost of waste tire disposal varies depending on the disposal options in the immediate area. Options for disposal always include the least expensive legal solution available. These options can change over time, depending on variations in the availability and pricing of tire haulers, negotiated prices with landfills, volumes in need of disposal and other factors.

²² Markets for Scrap Tires, US EPA, October, 1991, EPA/530-SW-90-074A .

²³ EQC survey, 1998

²⁴ August 19, 1997 EQC Working group minutes testimony.

TABLE 1B Selected tire dealer locations disposal charges and customer charges *

City of generator	Estimated weekly tire storage	Frequency of disposal	Collection/disposal charges	Destination - for disposal	Customer per tire charges
Anaconda	100	weekly	no charge	landfill	no charge
Billings	112	monthly	corporate pd	California	\$1
Billings	63	monthly	N.A.	landfill	\$1
Bozeman	75	bi weekly	N.A.	landfill	\$2
Bozeman	N.A.	N.A.	\$1.25	landfill	\$1.25
Butte	650	weekly	\$650/load	Polson	\$2.00
Deer Lodge	130	monthly	N.A.	Polson	\$0
Helena	800	biweekly	\$900/load	Polson	\$2.50
Helena	90		\$1.65	Helena dealer	\$2.50
Lewistown	125	bi weekly	\$2	Gt Falls	\$0
Miles City	850	weekly	\$980/load	BFI landfill	\$0
Missoula	250	weekly	\$700/load	Polson	\$0
Missoula	70	monthly	\$300/load	landfill	\$3
Plentywood	100	weekly	\$0	landfill	\$0

* EQC phone survey July 1998

Chapter 2 Problem Identification

The working group identified several tire management problems during the course of the meetings and individually in discussions with staff. They are summarized here.

! Illegal Disposal

Working group participants raised concerns and allegations that not all waste tires were finding their way to properly licensed solid waste management disposal sites. Discussions with the DEQ Enforcement Division indicated that since 1997 there have been 14 complaints filed with the agency concerning illegal waste tire disposal sites. These sites range from one containing 30 to 40 tires in Valley County to a site located in Three Forks, Montana which reportedly has several thousand illegally dumped tires. There are four known illegal sites in Yellowstone County. Two illegal sites are located in Flathead County. Mineral County, Richland County, Fergus County, Gallatin County, Carbon County, Pondera County, and Valley County each have one reported illegal active site.

Ignoring these sites can result in the following problems: increased potential for accidental or arson fires, visual blight, habitat for pests and vermin, unfair competition in the retail tire business, and potential public costs for removal. A large pile of waste tires in Black Eagle near Great Falls caught fire a few years ago. Another large tire fire occurred near a Livingston wrecking yard in the 1980's. Tire fires in other states are reported in the press fairly routinely. Solid waste program officials from the DEQ advised the working group that the SWMA has sufficient enforcement authority to deal with these problems as necessary. The authorities to act and the penalty provisions in the SWMA are sufficient to address the problems. Violations can be addressed by state or county attorneys. When and if actions are taken depends primarily on the perceived risk and the staffing priorities of the officials authorized to take actions. Members of the working group who are tire dealers advised that they are willing to assist officials in the enforcement effort by working with other waste tire generators to convince them of the need to comply with proper disposal requirements.

! Above Ground Storage

Other states have established publicly funded waste tire programs to assist in the removal of waste tire backlogs. Nationally, the Scrap Tire Management Council estimated that in 1996 there were nearly 549 million tires in scrap tire stock piles.²⁵ The sparsely populated and previously unregulated state of Maine had 60 million, and Ohio had 100 million waste tires in stockpiles. In contrast, Montana reported 2 piles totaling 500,000 tires.

Tire piles generally occur in two ways. Either they are the result of illegal dumping often caused by a lack of disposal alternatives due to landfill bans or the perceived high costs of proper disposal, or they are the result of recycling plans that were not economically viable due to the lack of or loss of a market for the material.

Montana has two such facilities which are now abandoned. Approximately 300,000 tires are stored on private and state leased land near Columbus where a facility that was licensed as a resource recovery facility accumulated tires with the prospect of shredding them at a future date for the production of rubber materials for tire derived fuel or asphalt rubber pavement. The state is taking an enforcement action in this case to attempt to remediate the site. The other is a tire baling operation near Noxon where a substantial number of tires and baled tires have been abandoned for lack of a market for the material. Until an economically viable, long term market or disposal alternative is developed, national waste tire experts have warned the state against storing tires above ground.²⁶

! Landfill Availability, Costs and Capacities

Several working group members expressed concerns about future landfill disposal costs and availability for waste tire disposal. With a reduced number of disposal sites over time, resulting in greater haul distances to authorized sites, it is believed that disposal rates will continue to increase. Montana's waste

²⁵ Scrap Tire Management Council, Scrap Tire Use/ Disposal Study, April 1997 update

²⁶ Mary Sikora, editor Scrap Tire News, phone conversation, August 1997.

tire generators and others are concerned that, if individual landfill facilities or statewide policy prohibits the landfill disposal of tires or requires tires to be processed before disposal, there could be an increase in the potential for illegal dumping. A primary issue and concern of the generators is that economically feasible disposal options must remain available to the generators and their customers.

The impact of a landfill ban on waste tires in Kalispell at the Flathead County Solid Waste facility was offset by the establishment of two privately operated Class 3 tire monofills in the area. A third private site in the Kalispell area has recently been licensed by the DEQ under the new financial assurance requirements of SB 332. With the recent establishment and licensing of a private Class 3 monofill near Billings, the number of tires disposed of in the city of Billings landfill, one of the most cost efficient in the state, has dropped off dramatically.²⁷ While the choices are not unlimited for the removal and disposal of waste tires, there do appear to be options currently available in some areas. For example, the Lake County tire collection and disposal program recently received competing bids for its business.

! Tire Hauler Regulation

The working group debated the issue that Montana does not regulate the independent waste tire hauler. The issue is assumed to be closely tied to that of illegal dumping and the economics of disposal. In addition to the solid waste collection firms that operate in the state, there are perhaps five or six businesses that specialize in the collection and hauling of waste tires.²⁸ The DEQ and the waste tire industry are familiar with these companies and the services they provide. However, waste tire generators are occasionally solicited by other individuals offering to remove and dispose of or accept tires for disposal at a discounted rate. Once the tires are removed from the generator, the concern of the generators, the state regulators and the competing hauling-disposal businesses is that the tires may not be disposed of properly. No data were available to quantify how serious this problem is or how it was connected to the issue of illegal dumping beyond some

²⁷ July 1997 correspondence, Barbara Butler, City of Billings, solid waste division,.

²⁸ DEQ collector/transporter list

anecdotal evidence that it was occurring in various locations in the state. However, several of the members of this working group are in the best position to know if this is occurring in Montana.

! Recycling Opportunities

“Montana seems to have enough tires to be a problem but not enough to provide a solution.”²⁹ The working group reviewed current and past waste tire recycling efforts in Montana and elsewhere in the country. Despite a general desire to support and accommodate such efforts, the consensus of the group seemed to be that collection and transport of Montana’s waste tires to an out-of-state manufacturing firm would likely be cost prohibitive. Similarly, the relative lack of waste tires and market demand (population) in Montana appear to make it unlikely that a manufacturing firm would locate in the state when much more raw material (waste tires) can be obtained within a smaller geographic area elsewhere. For example, there are likely more waste tires and more potential purchasers of waste tire products within a 30 mile radius of Denver, Colorado than there are in the entire state of Montana.

²⁹

Kathy Goroski, Waste Tire Study meeting August 19,1997

Chapter 3 Possible Solutions

! National Background

A variety of management solutions to the problem of waste tires have been and are being tried around the country. An estimated 270 million tires are generated annually in the United States.³⁰ In 1989 approximately 10% of the scrap tires generated in the U.S. were utilized in some fashion.³¹ By 1997, the reuse/recovery rate for scrap tires was estimated at 84% or 228 million tires with only 16% or 42 million tires being landfilled (**Table 3A**). These figures only address the annual generation of new waste tires and do not include the estimated backlog of 549 to 800 million tires in stockpiles around the country.

Fuel recovery was predicted to be the primary market for waste tires in 1997, estimated at 64% of the annual generation rate. Tires or shredded tires as tire derived fuel (TDF) represent a hydrocarbon fuel source with a heat content of approximately 15,000 Btus per pound compared to coal at 13,000 Btus per pound. According to Goodyear, a million tires can replace 12,170 tons of coal as a fuel source. The TDF market has grown rapidly as more facilities are being permitted to utilize tires as a supplemental fuel source.

Other uses include a smaller but increasing market that produces a variety of products from waste tires. This includes the market for sized reduced rubber (15 million tires or 6% of the 1997 market), which includes ground rubber or chipped tires which can be used in the manufacture of a variety of products, used in asphalt surfaces, playground surfaces, traffic cones and other rubberized products. There is also a flat market (8 million or 3% of the total) for items like dock bumpers, door mats, tailpipe hangers, snowshoes, sandals, and other items which can be cut, stamped, or punched from a decreasing supply of fabric belted tires. Another 15 million tires or

³⁰ Scrap Tire Management Council, April 1997

³¹ Goodyear Tire and Rubber Company, Scrap Tire Recovery, An Analysis of Alternatives, January 1998.

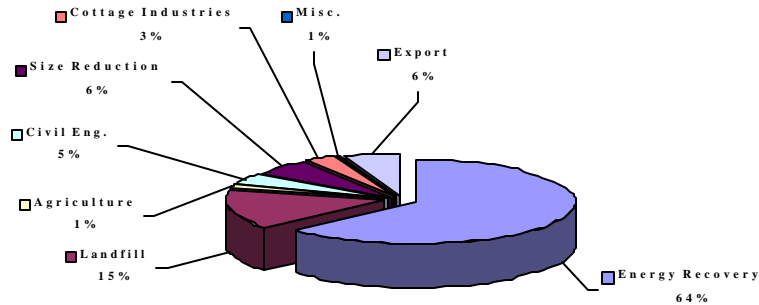
TABLE 3A**Reported and Estimated* Market Demand for Scrap Tires by Market Segment****

(Millions of tires, except totals)

Market Segment	1996	1997*	1998*
<u>Tire derived fuel</u>			
cement kilns	45.5	53	58
pulp and paper mills	35	37	39
utility boilers	29.5	32	36
dedicated tire to energy plants	15	15	10
industrial boilers	0.5	23	25
resource recovery facilities, lime kilns, copper smelters, iron cupola foundries	7	12	18
TOTAL FUEL	152.5	172	186
<u>Products</u>			
size reduced rubber	12.5	15	18
cut, stamped or punched rubber products	8	8	8
<u>Civil engineering</u>	10	14	18
<u>Pyrolysis</u>		unknown	unknown
<u>Agricultural</u>	2.5	2.5	2.5
<u>Export</u>	15	15	15
<u>Miscellaneous uses</u>	1.5	1.5	1.5
TOTALS	202,000,000	228,000,000*	249,000,000*
ANNUAL GENERATION	226,008,000	270,000,000*	249,000,000*
Scrap Tire Markets as % of Total Generation	75.9%	84%	90%

**Source, Scrap Tire Management Council, 1997

FIGURE 3A
1997 Utilization of 270 Million Tires per year



STMC/SCRAP TIRE MARKET
 REPORT
 APRIL/1997

6% of the total are utilized in the “export” market which is defined as those tires exported from the waste stream as used tires or as good retreadable tire casings. The increasing civil engineering use of tires or shredded tires as a replacement for construction fill materials in roadbeds, landfills, septic system drainfields, and others accounts for an estimated 14 million tires or about 5% of the 1997 market. Agricultural uses include a variety of not clearly defined but diverse uses. The remainder of the waste tire market is defined as miscellaneous uses. **(Figure 3A)**

! Application of Management Alternatives in Montana

In contrast to the 270 million waste tires generated in the U.S., Montana generates approximately 800,000 annually (see introduction) or 3/10ths of 1% of the national total (.003). Tire management alternatives available elsewhere must be carefully reviewed for application in

Montana by first considering the relative number of tires available and the geographic size of the state.

These circumstances (population and geography) make waste recycling a difficult proposition for Montana. For solid waste generally, the states in the Rocky Mountain region have the highest landfilling rate (83%) and the lowest recycling rate (15%). For Montana these figures are 93% and 5% respectively.³² The economics of collecting recyclable/reusable materials, transporting them to markets of dubious strength and reliability, and the development of a market for the end product in a state of less than 1 million people all combine to create a tenuous situation for recycling businesses.

Montana's tires are as scattered as our population. The conclusion of the Scrap Tire Management Council (1997) analysis for the state is that "Montana's scrap tires are typically landfilled due to the sparseness of its population and the distances between population centers." SB 332 asks whether or not that is the best alternative for waste tire management in Montana. In keeping with the directive of SB 332, the working group conducted a review of other management alternatives available and discussed the possibility of their use or application in the state.

Tire Retreading

The retreading industry in Montana consists of 11 facilities that concentrate on retreading over-the-road semi truck tires where there is a strong market. The market for retread automobile tires is minimal due to low demand and an insufficient price differential between retreads and new tires.³³

However, the trucking industry relies on retread tires to a significant degree. Information provided to the working group indicated that an estimated 60-65% of the trucking industry uses retreaded tires. Retreadable semi tire casings can be worth from \$60 to \$100 each and casings can be retread 2 or 3 times for a total mileage run of up to 300,000 miles per casing. Good condition semi truck tire casings

³² Biocycle, The State of Garbage in America, April 1997

³³ Personal communication, 11-27-97 with Don Wilson, Exec. Dir. Tire Association of North America, formerly the NTDR National Tire Dealers and Retreaders Assn.

are not disposed of as waste tires because of these casing values and prices. Fleet owners, new tire dealers, scrap tire collectors, and waste tire disposers comprise the system that actively sorts and removes usable tire casings from the waste stream.

The waste tire working group held discussions with the MDT Maintenance Division regarding its use of retread tires on the state fleet.³⁴ The Montana Integrated Waste Management Act (Section 75-10-801 MCA) passed in 1991 required the state to develop a plan by 1992 to reduce waste going to landfills through source reduction, reuse, recycling, composting, and then landfilling or incinerating the remainder. The Department of Health and Environmental Sciences, now the DEQ, produced the plan in 1994. The plan must be reviewed every 5 years and updated as necessary. The law also required the Department of Administration to write purchasing specifications for the state procurement of materials and supplies to emphasize the purchase of items made from recyclables if it is technologically practical and cost effective.

According to information presented to the working group, the MDT utilizes retread tires on most of its off road vehicles such as graders and loaders. However, side by side tests between 16 retreads and 16 new truck tires conducted between 1990 and 1992 on the snowplow/sander fleet showed early failure on 12 of the retreaded tires. Tread wear was similar. The department believes that overloading, other use factors, cost differentials, emergency needs, and service downtime precludes the use of retreads on these vehicles.

The retreading businesses in Montana report recapping approximately 65,520 tires per year.³⁵ It is not known whether or not additional markets for retreaded semi tires would remove additional casings from the waste tire stream in Montana or if the market for retreads already equals or exceeds those retreads already available.

³⁴ EQC Waste Tire Working Group meeting, 11-12-97 John Blacker, MDT.

³⁵ Communication with Emmitt Whalen, Whalen Tire, Butte Mt, 7-23-98

Volume Reduction

There is a sizable industry involved with the shredding, slicing, chopping and baling of waste tires. Machinery for all of these tire processing methods can be either portable or stationary. Prices for the equipment range from \$12,000 for an in-shop tire slicer or chopper to \$180,000 and more for a shredder operation. Since whole tires are approximately 75% air space, these processing methods can reduce the volume of a waste tire by three or four to one.³⁶ The advantage of processing tires is in the conservation of space and cost savings realized for transportation or disposal. The disadvantage is in the cost of handling and processing. If these costs don't offset the savings in transportation or disposal, then the processing costs are simply an unnecessary additional cost.

Balers

Balers are machines that compress and bind waste tires into compact bales that can be landfilled or used in a variety of ways. The working group reviewed information regarding a portable baling operation that services landfills and others in the states of Wyoming, Washington, and Oregon. The machinery is capable of reducing about one ton or 100 loose waste tires (about 10 cubic yards) into a one ton bale with a volume of about 2 cubic yards. The cost varies but is estimated to be about \$75 per bale or about 75 cents per tire. If saving 8 cubic yards of landfill space is worth \$75, then this may be a viable alternative.

Although markets are limited for using the bales resulting from this process, there may be local interest in using them in a variety of applications and thus saving the landfilling cost completely. Tire bales have been used in streambank erosion projects, livestock windbreak and corral applications, firing range backstops, feedlot drainage applications, and other imaginative uses. Producing marketable bales from waste tires is not currently profitable to the tire owner because the cost of collection, baling, and transportation exceeds the value of the bale. The defunct tire baling operation near Noxon is evidence of the adverse market economics of attempting to profit from the sale of the baled material. The quality of the material produced is relevant, as are the costs of baling, transportation to an end use destination,

³⁶

Communication with Randy Barclay, Barclay Shredders, Stockton, California, 1-21-98

installation costs, landfill avoidance costs, and the cost of alternative materials for the intended use or application.

Tire baling companies may profit in performing the service provided the tipping fee or charge to produce the bales is sufficient to cover mobilization costs and the labor and equipment costs of the baler. The tire generator may “profit” through reduced landfilling charges providing the tipping fee assessed upon acceptance of the tires is sufficient to cover the handling, storage, and contract baling costs of the operation. Landfills that assess \$1 per tire could possibly pay \$.75 to have it contract baled and save 80% of the landfill space the tire would consume in the process. As a source reduction and landfill space saving measure, baling has some obvious merit.

Choppers and Slicers

Tire choppers or slicers (slitters) are typically in-house tire shop machines that either slice a tire vertically into 2 halves or chop a tire horizontally. The machinery can cost between \$12,000 and \$19,000, is powered electrically or by gasoline or diesel, can usually be operated by one person, and it can be made portable. The advantage of these systems is that landfill disposal costs can be drastically reduced. These types of machines are used by various tire dealers in Billings, Bozeman, Helena, Missoula, and Great Falls. Landfill charges for processed tires are often similar to those for general household waste. For example, a 32 cubic yard rolloff container of whole tires (approximately 320 tires) is assessed \$569 for pickup, transportation, and disposal at the city of Billings landfill. For the same container of sliced or halved tires (at a 3 to 1 volume reduction or 960 tires) the pickup, transport, and disposal charge is \$156 of which \$46.40 is disposal at \$1.45 per cubic yard, the same as loose refuse.³⁷ The owner of a tire chopping operation in Bozeman estimates that he can get between 200-250 whole tires into a 30 cubic yard container or about 700-800 tires into the same volume if they are chopped. Since the landfill charges by the ton, his disposal costs are the same but his transportation costs are reduced significantly. The disadvantage of the tire chopper or slicer is that the machinery can be labor intensive and relatively slow. About 30-40 tires per hour can be handled by this

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Barbara Butler 7-30-97

type of machinery. Labor and operational costs can range from 20 cents to 50 cents per tire.³⁸

Shredders

Shredding tires for various purposes is another volume reduction method. Shredding waste tires can reduce whole tire volumes from 4 to 1. Beyond volume reduction, some shredders are an integral component of a manufacturing process that uses the material in an end market. Tires are fed into a machine that produces tire strips or chips or crumbs depending on the machinery and the configuration of the devices. The capital costs are substantial for these heavy duty machines and the operational costs can also be significant. They are best utilized in situations where a large volume of material is available or in a stationary manufacturing setting where material of defined specifications is being produced for specific markets. For example, some equipment is designed and operated to produce crumb rubber which is of a specific mesh size for a particular application. It is sufficient to know here that the finer the grind, the more costly the process.

Single pass tire shredders are capable of producing tire chips or strips of shredded rubber for about 20 to 40 cents per tire.³⁹ They are capable of processing up to 20 tons of tires per hour.⁴⁰ Assuming Montana generates 800,000 tires per year, and if there are 100 to the ton in rough numbers, a machine with this capability could shred Montana's 8,000 tons of tires in 400 hours (10 work weeks). For the purposes of this study, a verbal bid was obtained from a portable shredding operation in California that would be able to shred the tires profitably for 50 cents each or \$500,000, provided the state could accumulate 1 million tires into one location.⁴¹ The logistics of such an operation for Montana would obviously be challenging. The EQC working group was advised that a stockpile of at least 150,000 tires would be necessary to justify the mobilization of a portable tire shredder.⁴²

38 John Chepulis, Bozeman Tire World, 1-27-98

39 Reduction Technology, Scrap Tire and Rubber Users Directory 1997

40 Barclay shredders, EQC working group meeting 11-12-97

41 Personal communication, Ted King, UTK, Los Angeles, California, 7-20-98

42 Tom Floyd, Idaho Tire Recovery 11-12-98

Civil Engineering Use of Processed Tires

Processing waste tires by shredding or slicing adds a cost to the tire which may often be recovered by reducing landfill disposal costs three to four fold depending on the volume reduction realized by the processing and the local or regional costs of landfill disposal. However, if the processing of waste tires creates a marketable product or at least a usable product that does not need traditional landfill disposal, then the landfill costs could be avoided entirely. The production of a usable product has been the long time quest of several companies that manufacture a variety of tire shredders and processors and the businesses that have purchased them. Unfortunately, the development of markets for shredded tire material has not been strong.⁴³ Shredded tire material can be produced to various sizes and specifications from one inch or two inch chips to longer strips of tire shreds. Depending on demand, tire chips have been marketed at various negative costs or positive prices as tire derived fuel, used for further processing to crumb rubber specifications, and are utilized as a replacement material in civil engineering applications where drainage is required and or where a light weight fill material is needed.

Tire shreds have been incorporated into leachate collection and methane gas collection systems in landfills, as intermediate cover for landfills, as replacement fill in septic tank drainfields, as roadbed fill in designs requiring a light weight fill material to avoid settling, for roof top fill bases for landscaping, and a variety of other uses in an attempt to create a usable product and avoid landfilling tire shreds as a waste material.^{44 45 46}

The use of tire shred as road subgrade fill material has the potential to utilize large numbers of waste tires. Using recommended specifications for roadbed construction, shred from approximately 3,700

⁴³ See Table 3A

⁴⁴ Shredded Tires as Alternative Daily Cover, California Integrated Waste Management Board, Sacramento, October 1997.

⁴⁵ Scrap Tire and Users Directory, 1997 edition, Recycling Research Institute.

⁴⁶ Scrap Tire News, Dec. 1997, Vol. 11, No 12.

tires could be used per 100 lineal feet of roadbed or over 14,000 tires per mile.^{47 48} The MDT has estimated that using waste tires in rubberized asphalt road surfaces (see following section on Rubberized Asphalt) would only use approximately 4,000 to 5,000 tires per mile of two lane roadway.⁴⁹ Tire shred material has been used successfully, especially in Minnesota, as roadbed fill in wet areas. The value and use of the material will depend on the costs of alternative materials, tire processing and transportation costs, and the design needs of each particular installation.

There have been two well publicized instances in Washington state where tire shreds were apparently improperly utilized in deep road subgrade fills which subsequently caught fire⁵⁰. The circumstances involved with this “heating incident” were extensively studied and new design specifications were written limiting the depth of fill to 3 meters and specifying more control over the size and quality of the shred used.^{51 52} The problems with the application have been identified and are not evident at other sites where shreds have been used. However, the publicity over these two incidents has damaged the potential market for the use of tire shreds for this application. Those who may have been initially uncertain and reluctant to use shreds in civil engineering applications have used the Washington state incidents to justify rejection of this application. Additionally, the use of tire shreds must be economically justified and provide advantages over the use of more conventional materials. More efforts to develop consistent engineering standards and specifications for the use of tire shreds are being made in an attempt to develop uses or potential markets for the material and to remove the institutional barriers to its

47 ASTM Z5499Z Draft “Specification for Use of Scrap Tires in Civil Engineering Applications”, Dr. D.N. Humphrey

48 Tire Chips in Road Subgrades, Nebraska State Recycling Assn., Omaha, Nebraska.

49 Correspondence to EQC from John Rothwell, MDT, October 25, 1990.

50 Investigation of Exothermic Reaction in Tire Shred Fill Located on SR 100 in Illwaco, Wn., Dr. D.N. Humphrey, University of Maine, 1996

51 Design Guidelines to Minimize Internal Heating of Tire Shred Fills, International Tire and Rubber Association, Louisville, KY, 1997

52 Tire Chip Embankment Heating: Comparison of Four Projects in Oregon and Washington, Dr. Gunnar Schlieder, Federal Highway Administration , 1998.

use. For example, the Nebraska State Recycling Association has recently developed tire chip utilization guidelines for use there.⁵³

Montana has one tire shredding processor which has been attempting to develop markets for tire shreds in the area. The Tire Depot is a tire shredding operation which was established in 1995 near Polson, Montana. Waste tires are collected by the business primarily from generators in western Montana, transported to the site, culled for reusables and retreadables, and the remainder are shredded into random sized strips approximating 4 inches wide and 18 inches in length. About 3,000-4,000 tires per day can be shredded at the facility. Shredding costs are estimated by the owner at about 50 cents per tire. Depending on the location, the firm charges generators approximately \$1 to \$1.50 per tire for tire pickup, transport, shredding, and disposal. The owner has sought to develop a civil engineering market for the tire shreds for use as a gravel replacement material in septic tank drainfields, lightweight roadbed fill material in wet areas needing drainage, and other uses. Discussions have been held with local county road departments, the MDT and others in an effort to find a use for the material. Stockpiles of the material have been provided to the Lincoln County and Lake County road departments and the Stimson lumber yard in Libby, but they have not been utilized as of this time. The Tire Depot is presently landfilling the shredded material on site as local markets have not been developed. Whether or not a market will develop for tire shreds in Montana depends on the product being produced and marketed, and the demand for its application.

Nationally, unless additional local or regional markets or uses for the material produced are developed, the primary value of processing tires is to reduce the volume of a waste tire for landfilling or in the preparation of tire derived fuel for supplemental fuel markets. Even with its greater number of markets and available waste tire management alternatives, the current trend in waste tire management in California is toward the large scale shredding and landfilling option due to the volume reduction economics of landfilling tires.⁵⁴

⁵³ Tire Chip Utilization Study, Nebraska State Recycling Association, Omaha, May 1997

⁵⁴ Personal communication, Ted King, UTK, Los Angeles, Cal., 7-20-98

Rubberized Asphalt

The EQC Working Group held discussions with MDT engineers regarding the feasibility of utilizing waste tires as raw material for the manufacture of crumb rubber to be incorporated into the asphalt roadbeds of state highways.⁵⁵ Rubber from waste tires has been incorporated into some roadbed surfaces in the southwestern states since the late 1960s. Rubberized asphalt surfaces have also been applied with success on running tracks, walkways, and in other applications. It is yet another use for waste tires if the economics are acceptable.

A technology for using rubber tire chips as a replacement for gravel aggregate (the “dry” process) has been developed in the past and is now generally discounted. The initial cost of producing the tire chips (in comparison to the cost of gravels), problems with chip adhesion and subsequent surface repairs have not made this technology widely used.⁵⁶

Another road surfacing technology that involves blending (at about 20%) crumb rubber from waste tires into the hot asphalt mix (the “wet” process) has been widely used, most notably in Arizona where it was developed. Advocates maintain that rubberized asphalt surfaces, although more costly to install, result in longer road surface life, reduced road noise, and can be installed in thinner layers than conventional asphalt, thus reducing the cost of materials. The crumb rubber used in the process is costly to manufacture as it requires a tire to be peeled or shredded, cleaned of debris, and ground down to specific sizing. Approximately 40% of the tire is left over as waste steel, fabric, etc. The capital costs for machinery designed to granulate rubber can be in the \$500,000 to \$600,000 range.⁵⁷ Facilities that produce the material are distant from Montana and have sufficient raw material available locally. Montana’s waste tires would not likely be needed to fill the supply nor would a tire granulating firm be likely to locate in Montana given the minimal supply of waste tires and the lack of a regional demand for the product.

⁵⁵ EQC working group meeting 11-12-97, Jim Walther, MDT.

⁵⁶ Ibid.

⁵⁷ Ted King, UTK.

The MDT has constructed experimental sections of roadway using both types of rubberized asphalt surfaces. The initial costs of the material is higher than that of conventional asphalt, but in some circumstances, and with proper design and application, the surface may last longer. According to MDT engineers, the type of road failure best treated with rubberized asphalt in the Southwest (pavement oxidization due to ultraviolet radiation resulting in brittle cracking) does not occur often or in many locations in Montana due to climatic differences. Montana's road surface failures are more typically from horizontal thermal cracking of the asphalt roadway and rutting.

A rubber chip surface (dry process) applied over the top of MacDonald Pass lasted with satisfactory results from 1983 until it was repaved in 1996. Two other highway projects using rubber chips in chip sealing projects failed prematurely, reportedly due to improper application. The MDT is currently testing a crumb rubber asphalt surface (wet process) installed in 1993 on Highway 56 near Bull Lake in Lincoln County. The department is conducting side by side performance comparisons of the surface with conventional asphalt. The agency is aware of alternative materials testing elsewhere and is willing to review its applicability to Montana road surface needs. However, the agency is admittedly cautious in the use of public road construction and maintenance funds. The potential for an expensive road failure and re-do is not easily accepted by highway engineers. A five year study of the use of crumb rubber modifiers in asphalt pavement was initiated in 1994 and funded by the Federal Highway Administration. Early findings of the report based on data from projects in California, Florida, and Arizona indicate that the data is insufficient to determine whether the benefits of using the material in pavements exceeds the extra cost of its use.⁵⁸ The Rubber Pavements Association is a group of contractors and rubber suppliers that advocates the process and can provide further information and research on the subject.⁵⁹

⁵⁸ Crumb Rubber Modifiers in Asphalt Pavements, R.G. Hicks et. al., Transportation Research Institute, OSU, Corvallis, Oregon, 1995.

⁵⁹ Rubber Pavements Association, Tempe, Arizona.

Tire Derived Fuel

The incineration of waste tires as fuel has by far been the growth market for the material. According to the Scrap Tire Management Council, in 1996 approximately 152 million of the estimated 266 million tires generated were incinerated as supplemental fuel in a total of 107 facilities. Users included 35 cement kilns, 23 pulp and paper facilities, 15 electric utilities, and 34 other industrial and electrical generating facilities. The feasibility of burning whole or shredded tires in these facilities varies with the configuration and design of the burner, emission control needs, conventional fuel costs, and the costs of using tires as supplemental fuel.

Environmental health concerns have been raised about the potential for emissions of hazardous air pollutants given the chemical mix that is used to manufacture today's modern tires. The issue of hazardous air emissions from proposals using tire derived fuel is always controversial according to information obtained from permitting agencies in several states. Each proposal must be analyzed during the permitting process for its potential impact on air quality. The Waste Tire Study Working Group reviewed information provided to the California Integrated Waste Management Board on the issue of burning tires in cement kilns and other facilities that expresses skepticism about the ability of these facilities to operate in continuous compliance while incinerating wastes. Information was presented specific to the issue of incineration of waste tires as supplemental fuel in cement kilns that indicated that tire burning is "likely to increase carbon monoxide, particulate, zinc and/or PAH (poly aromatic hydrocarbons) emissions." Concerns about the production of various hazardous air pollutants like dioxins and furans were also raised.⁶⁰

Several air pollution studies have been conducted by states and the EPA and stack testing is required by regulatory permitting agencies.^{61 62} A 1997 EPA study of air emissions from the burning of tires in

⁶⁰ Neil Carman, October 27, 1997 correspondence to the California Integrated Waste Management Board.

⁶¹ Air Emissions Associated With the Combustion of Scrap Tires for Energy Recovery, Malcolm Pirnie, 1991

⁶² Analysis of Emissions Test Results and Residual Byproducts from Facilities Using Tires as a Fuel Supplement, Dames and Moore, October 1997

controlled combustion devices utilizing a rotary kiln incinerator simulator concluded “that, with exception of zinc emissions, potential emissions from TDF (tire derived fuel) are not expected to be very much different than from other conventional fossil fuels, as long as combustion occurs in a well designed, well operated, and well maintained combustion device.”⁶³ The study analyzed source data from 22 industrial facilities (2 cement kilns, 1 lime kiln, and 19 boilers) that have used TDF and concluded that in general, properly designed combusters could burn between 10 and 20% TDF and still satisfy their environmental compliance emission limits. The report also concluded on the basis of a review of source test data from a dedicated tires to energy facility (100% tires as a fuel source) that it is possible to have emissions “much lower” than those produced by existing solid fuel fired boilers, given proper design and operation. The California Air Resources Board has recently concluded after studying the issue that “there does not appear to be a significant difference in emissions with or without the use of tires as a fuel supplement. Although there are some increases in emissions of certain compounds, these do not appear to be significant.”⁶⁴ The Board goes on to state that site specific assessments are necessary in each instance in order to consider the variability in the design and operation of each facility that proposes the incineration of waste tires.

Cement kilns burned nearly 30% of the total number of tires used for TDF in 1996 (**Table 3A**). The number of waste tires consumed by the cement industry is projected to increase significantly from 45.5 million tires to 70 million tires by the year 2001.⁶⁵ A 1991 EPA report concluded that cement kilns appear to be particularly suitable for the incineration of tires for several reasons.⁶⁶ The combustion temperatures and fuel retention times are high enough to apparently minimize the need and expense for additional air emission controls other than controls for particulates. Kilns require large quantities of fuel and they are capable of being easily modified to load whole tires into the fuel stream. As of 1996, 35 cement kilns were permitted to burn waste tires in 21 states. Cement kiln facilities near Montana that

⁶³ Air Emissions from Scrap Tire Combustion, EPA-600/R-97-115, October 1997.

⁶⁴ Correspondence to the chairman of the California Integrated Waste Management Board, from John Dunlap, chairman, California Air Resources Board, December 12, 1997.

⁶⁵ Scrap Tire Use/Disposal Study 1996 Update, STMC, April 1997

⁶⁶ Markets for Scrap Tires, p. 53, U.S. EPA, EPA/530-SW-90-074A, October 1991.

burn tires as supplemental fuel include the Ash Grove Cement kilns in Inkom, Idaho; Durkee, Oregon; Leamington, Utah; and Seattle, Washington. Holnam Cement is burning tires at its facilities in Devil's Slide, Utah (near Ogden) and Seattle, Washington.

Ash Grove Cement operates a cement kiln in Montana City near Helena, and Holnam Cement operates a kiln in Trident near Three Forks, Montana. The Working Group held discussions with representatives of Ash Grove regarding the feasibility of burning tires as supplemental fuel at that facility. Ash Grove Cement currently has cement kilns permitted to burn waste tires at facilities in 8 other states. The operation at Montana City is physically capable of burning waste tires with minor modifications. The kiln could be loaded with whole tires, minimizing the cost of tire handling and avoiding the costs of processing by shredding. At the rate of 2 tires per rotation, with the kiln rotating about 76 times per hour, the Ash Grove facility could incinerate all the tires (estimated at 900,000) generated in Montana in approximately 6 months.⁶⁷ The Holnam facility in Trident has approximately the same fuel demand.

From an engineering standpoint, Ash Grove estimates that the facility could be modified and operational in about 90 days. However, officials at the Montana City facility have not expressed serious interest in this type of operation for a variety of reasons. The plant is located in an industrial use zone in which burning tires for fuel is a conditional use that must be approved by the county government. The site is adjacent to a residential community and school area that is very sensitized to any modifications of the facility's air quality permit. A modification to the state issued air quality permit would be required. The institutional costs of obtaining the necessary permits in the face of past citizen opposition to applications for permit modifications at this location make this option for waste tires seem remote at this time.

The Holnam Cement plant at Trident had a similar experience when it applied for a permit modification to burn hazardous wastes in the early 1990's. Holnam has 14 cement facilities in the country and has experience and is permitted to burn waste tires at 7 of them including the facilities in Seattle, Washington and Devil's Slide, Utah. Contacts with Holnam officials at Trident have indicated that the

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Phone conversation with Joe Scheeler, Ash Grove Cement, June 30, 1998.

facility is interested in minimizing its fuel costs, but that state law imposes too many obstacles to allow the burning of waste tires at the plant. Specific references were made to the potential costs of complying with the state's additional air quality permitting requirements for solid and hazardous waste incinerators.⁶⁸ Additionally, the facility does not believe that current economics support a decision to modify the facility to burn tires. Montana's low volume of tires and previous capital investments in other fuel source systems at the Trident plant limit interest in using TDF at this time. In any case, the facility would likely not be in a position to pay for TDF. Given current low fuel costs, a no cost TDF price or a tipping fee paid to the facility would make the economics of conversion more attractive.⁶⁹

Lime kilns have also been users of waste tires as a fuel supplement. However, the lime kiln is often shorter in length than that of a cement kiln and fuel burn retention times are shorter. Also there is some industry concern about discoloration of the final lime product from the steel in scrap tires. A lime kiln near Salt Lake is currently using tires as supplemental fuel. There are several lime kilns in Montana, most notably at the Continental Lime facility near Townsend and others associated with the Stone Container pulp paper facility in Missoula. Officials at Continental Lime did not express any interest at this time in the utilization of waste tires as supplemental fuel,⁷⁰ and Stone Container is similarly not interested in tires as a fuel source.⁷¹

Other potential users of waste tires in Montana include industrial boilers associated with the wood products industry and an electrical co-generating facility in Billings. **Map 3A** shows the locations of some of the larger industrial boilers in the state. No analysis of their capability to modify existing air permits to allow for the burning of waste tires was conducted for this study.

⁶⁸ Phone conversation with Mike Morrison, Holnam Cement, June 18, 1997.

⁶⁹ Phone conversation with Bill Springman, Holnam plant manager, August 4, 1998

⁷⁰ Phone conversation with Elton Chorney, plant manager, 1997

⁷¹ EQC staff interview with Stone Container officials, November 14, 1998.

The decision to utilize an alternative fuel source depends primarily on economics, engineering, and the environment, but the political impacts of the decision must also be considered. Currently, none of the potential fuel users in Montana have expressed an interest in utilizing scrap tires as a fuel supplement given the relatively low cost of energy and the potential cost of the conversion in economic and political terms.

As indicated in **Table 3A**, there are several facilities elsewhere in the country that are currently permitted to burn waste tires as supplemental fuel. **Map 3B** shows the location of those closest to Montana. They include two Montana Dakota Utility (MDU) electrical generating facilities that supplement their coal fired boilers with a small percentage of waste tires. The R.M. Heskett plant at Mandan, North Dakota is a 100 Megawatt plant that burns 20 tons of shredded tires (TDF) per week.⁷² The tires are shredded by Waste Not Recycling, a tire collector/processor in Bismarck, North Dakota, that is also operating in eastern Montana and removing Montana tires from the Glendive-Baker area. The MDU facility currently pays a state subsidized \$18 per ton for TDF. The nonsubsidized price is estimated to be about \$10 per ton.⁷³

⁷² Phone call, Duane Stene, MDU, July 29, 1997

⁷³ Personal conversation, New Deal Tire, Groton, South Dakota, July 31, 1998

Illustration is on file at the EQC Office.

Illustration is on file at the EQC Office.

The Ottertail MDU plant at Groton, South Dakota is a 461 megawatt electrical generating facility that burns 500 tons of TDF per week. This plant is currently paying \$16 per ton for TDF but the price is tied to facility coal prices which recently have been declining. Neither of these facilities were reported to require additional boiler modifications or air emission controls. Assuming that one ton of tires represents about 100 passenger car tires weighing 20 pounds each, these prices calculate to about 16 or 18 cents per tire as fuel delivered on site. Shredding costs are about twice this amount. Collection and delivery is additional. Establishing a cost effective system to transport Montana's tires to these existing facilities would be a significant challenge provided there was room for additional tires in those fuel markets.

Some incinerator facilities assess a tipping fee for tires or TDF delivered to the site, despite the fuel value of the material which can offset the cost of most coals pound for pound. The Ash Grove facility at Inkom, Idaho (near Pocatello) does not assess a tipping fee but it is currently operating at capacity with tires delivered from Idaho and the Salt Lake area. Given current fuel economics, the incineration of tires should be viewed in the context of an alternative disposal method (with energy benefits) to the disposal costs of landfilling. Waste tires are not currently valuable enough as a fuel source to be actively solicited as such.

Transport Out-of-State

The working group heard information from scrap tire transporters from Montana, Oregon, and Idaho. Additional information was gathered through phone conversations with tire transporters, trucking companies, and railroads. Again the issue is one of volume and costs. The labor and transportation costs of gathering Montana's scattered 800,000 waste tires to a central or to a few central shipping sites is substantial. Essentially, that is what is occurring now with 3 or 4 large landfilling operations now handling more than 50% of the tires that are disposed. To reload waste tires at these locations and ship them from these (or other) points to an out-of-state end user would result in additional costs that currently cannot be fully recovered at the destination. At some point in the process, a tipping fee is required to pay the costs of the management alternative.

Waste tires are now accumulated at the generator and removed by hire or by the generator and taken to the least cost disposal option available within the generator's specific local market. Sometimes this means disposal or storage at the local landfill where the tires are landfilled or accumulated and removed by another contractor to a shredder in Bismarck, North Dakota; a shredder in Minneapolis, Minnesota; the Ash Grove cement plant in Inkom, Idaho; or a more distant but less expensive landfill. Given sufficient volumes, hauling contractors are sometimes able to transport directly from the generator to the end point destination, leaving the landfill out of the loop. Market economics drive the process and sufficient revenue must be available at each step in order to cover the subsequent costs. Also, the generate-accumulate-collect-transport and dispose-reuse cycle includes a problematic component. Waste tire management solutions that rely on volume price reductions often require an "accumulate" feature. As noted earlier, the accumulation of waste tires above ground creates visual, fire, and pest concerns. If a contracted disposal option changes due to market conditions (loss of disposal agreement, loss of contractor, increases in prices) the generator or collector can be left with a serious and expensive solid waste disposal problem.

Information gathered in the course of this study indicates that a waste tire generator should be able to find an acceptable removal and disposal option for \$1 and, certainly, no more than \$2 per tire. Passenger tires are collected, hauled, shredded, and disposed of by The Tire Depot near Polson for between \$1 and \$1.50. Passenger tires are collected and disposed of at the Tires For Reclamation tire monofill near Billings for approximately \$1 each. The Rassmussen tire monofill site in Kalispell provides disposal only for 75 cents per passenger tire. Other alternatives and verbal pricing include \$1.25 per tire to transport from Montana to the Ash Grove facility in Inkom, Idaho; \$1.50 per tire to transport from eastern Montana to Bismarck, North Dakota; and \$150 per ton (approximately \$1.50 per tire) and \$175 per ton (\$1.75) to transport passenger car tires from eastern and western Montana respectively to the shredding facility in Groton, South Dakota.

Trucking companies have quoted prices of around 95 cents per one way mile to ship tires to markets in the Los Angeles area.⁷⁴ Per mile prices are reportedly lower in the summer months when there are more trucks seeking backhaul loads to population centers. Per mile prices may be higher to ship to more remote locations like Inkom, Durkee, or Groton. Shipping whole tires presents a problem in that trucks are out of space before they are at their load limits. A standard trailer unit is capable of hauling approximately 1,400-1,500 whole tires weighing only about 14 or 15 tons before it is out of capacity. However, the same trailer is actually capable of hauling a payload of 23 or 24 tons or 2,300-2,400 tires. Mixing whole and processed tires to make the weight maximums would reduce hauling costs, but this savings would have to be offset by the cost of processing the whole tires.

Rough estimates of railroad freight rates for a gondola car are shown in **Table 3B**. A gondola has a capacity of about 100 cubic yards and a weight limit of approximately 110 tons. Costs for a wood chip car are about 40% higher than those shown in **Table 3B**. Capacities for a wood chip car are approximately 250 cubic yards with a weight limit of about 97 tons. The difficulty of utilizing rail transportation is in establishing a central shipping location(s) that can handle the tire volumes required to maximize the efficiency, covering the tire handling and processing costs, and establishing a stable long term market (or paying the costs) for the material on the receiving end of the shipment. No attempt to calculate an economic analysis of the feasibility of shipping waste tires by rail is included in this report. The information is provided for comparison of alternatives only.

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Phone conversation with Mike O'Dell, Watkins-Shepard Trucking , July 17, 1998.

TABLE 3B **Approximate Rail Shipping Rates for a Gondola Car***

City of Origin	Groton, SD	Savage, MN.	Inkom, ID.
Glendive	\$ 900	\$1,325	\$1,865
Billings	\$1,100	\$1,325	\$1,865
Bozeman	\$1,550	\$2,000	\$1,515
Great Falls	\$1,775	\$2,250	\$1,515
Missoula	\$2,000	\$2,475	\$1,515

*Conversation with Tom Cousten, Montana Rail Link, July 30, 1998

Other State Tire Management Programs

The working group reviewed information from other states regarding how waste tires are managed elsewhere. About 35 states have instituted some kind of prohibition on the landfilling of tires. Twenty three of these states ban tires from landfills and 11 more ban the disposal of whole tires from landfills.⁷⁵ This means that tires must be processed to some degree (slit, chopped, shredded, etc.) before they can be landfilled.

The information in **Table 3C** shows some comparisons of state funded waste tire programs in states similar to or near Montana. About 33 states have established a dedicated tire disposal fee to generate revenue for waste tire management efforts in their states. Most assess a fee on the retail sale of new tires. These fees are typically collected by the dealer and submitted to state agencies. Some state programs assess a waste tire management fee on vehicle registrations.⁷⁶ The use of the fees varies from paying for state funded cleanup of abandoned tire stockpiles to funding grant and loan programs to assist in the reuse or recycling of waste tires. Public subsidies are applied to the waste tire management cycle at various points from subsidizing collection, processing, end market use, and the purchase of materials made from recycled tires. **Table 3D** summarizes state scrap tire laws and regulations in 48 states as of January 1996.

⁷⁵ Biocycle, The State of Garbage in America, May 1997

⁷⁶ State Tax Notes, A Survey of State Initiatives, April 20, 1998.

TABLE 3C TIRE PROGRAM SUMMARY . . . SIMILAR STATES

STATE	1996 POPULATION	# TIRES/YEAR	TIRE FEE	FEE COLLECTED	TIRES BANNED FROM LANDFILLS	MARKETS
IDAHO Todd Montgomery DEQ (208) 373-0464	1,189,000	1,200,000 tires (1,043,074 vehicles)	\$1 per tire	fees were sunset on 7-1-96	Yes; allowed at permitted tire storage sites only	Inkom, Id. and Durkee, Or. cement kilns, Potlatch in Lewiston using 2" shred.
NEBRASKA M.J, Rose Jane Myerhenry DEQ 402-471-4210	1,652,000***	1,500,000 tires** (1,466,635 vehicles*; 1995)	\$1 per tire	\$1.4 -1.5 million per year; collected monthly by Dept of Rev. from tire dealers; also a fee on new cars @ \$1 per tire and collected by county assessors	whole tires banned	Markets: there are 3; 1) crumb rubber processor in Nebraska City, Neb. 2) Company from Iowa with mobile baler 3) agric. use in Nebraska; silage covers, blowout stabilization (sandy soils)

TABLE 3C TIRE PROGRAM SUMMARY . . . SIMILAR STATES

STATE	1996 POPULATION	# TIRES/YEAR	TIRE FEE	FEE COLLECTED	TIRES BANNED FROM LANDFILLS	MARKETS
<p>NEVADA Les Gould DEP (702) 687-4670 ext. 3018</p>	<p>1,603,000</p>	<p>1,000,000 tires plus (1,047,226 vehicles). Estimates 1 to 1 ratio of population to tires. Reported 1995 tire sales were 1,025,000</p>	<p>\$1 per tire</p>	<p>by the Dept of Taxation, Collected with sales taxes. Fees not earmarked for tire program</p>	<p>No</p>	<p>mostly landfilled; some in the Las Vegas area may get hauled to California for incineration in the Modesto plant and elsewhere.</p>

TABLE 3C TIRE PROGRAM SUMMARY . . . SIMILAR STATES

STATE	1996 POPULATION	# TIRES/YEAR	TIRE FEE	FEE COLLECTED	TIRES BANNED FROM LANDFILLS	MARKETS
<p>NORTH DAKOTA Steve Tillotson DEH (701) 221-5166</p>	<p>644,000</p>	<p>630,000 tires (694,675 vehicles)</p>	<p>\$2 per new vehicle fee for a state junk vehicle program. Some can be used for tire mgmt. \$75,000 in funds have been provided to city of Bismarck which sponsored a grant to a tire shredder. (Grant funds must go from state to local govt. and then to recipient)</p>	<p>Unk.</p>	<p>No</p>	<p>landfills, Private Bismarck shredder makes TDF for Mandan MDU Plant. Also markets in Moorhead and other areas in Minnesota for TDF, crumb rubber and misc. May also include Big Stone City, So Dakota power plant (a.k.a. Ottertail, MDU) Waste Not Recycling 701-222-3108, Dave Barth; hauls and shreds and sells to MDU</p>

TABLE 3C TIRE PROGRAM SUMMARY . . . SIMILAR STATES

STATE	1996 POPULATION	# TIRES/YEAR	TIRE FEE	FEE COLLECTED	TIRES BANNED FROM LANDFILLS	MARKETS
SOUTH DAKOTA David Templeton DENR (605)773-3153	732,000	700,000 tires (708,613 vehicles)	no tire fee but a \$0.25 per tire vehicle registration fee not to exceed \$1 per vehicle (4 tires/car =\$1 per vehicle reg for tire fee to be used for sw, tires, other uses. Grants can be used for SW projects.		Yes, but processed tires may be monofilled	Same as North Dakota; also a tire shredder in Groton SD which shreds for power facilities
UTAH Wade Hansen DEQ Ralph Bond (801) 538-6170	2,000,000	1,500,000 for disposal; doesn't count usable (1,446,866 vehicles)	was \$1 as of 7-1-97. Currently \$.50 per tire at point of sale. Legislature thought fund was getting too large @ .50 = net \$1.198 million .	5% retained and split by dealer and tax commission which collects it with the sales tax	Yes, but processed tires may be monofilled	Incinerators, Inkom cement kiln, local lime kiln. State pays \$70 per ton to end users of waste tires.

TABLE 3C TIRE PROGRAM SUMMARY . . . SIMILAR STATES

STATE	1996 POPULATION	# TIRES/YEAR	TIRE FEE	FEE COLLECTED	TIRES BANNED FROM LANDFILLS	MARKETS
WYOMING Dianna Gentry-Hogle DEQ (307) 332-6924	481,000	(601,336 vehicles)	no program . Up to the local landfill jurisdiction. Some cities and counties have banned them from disposal and stockpile; others treat as special waste and charge extra.	None	No	landfills
ALBERTA, CANADA Kevin O'Neal TRMC (403) 990-1111		2.5 million	\$4 per tire fee used for end market development	\$4/tire collected by Tire Recycling Mgmt Association	No-tires used as cover and fill	heavy emphasis on end mkts Civil engineering projects NO TDF
MONTANA DEQ (406) 444-4323	879,000	900,000? tires (968,468 vehicles)	No		No	landfills, monofills

*includes auto trucks and buses; not motorcycles Source U.S. Department of Transportation, federal Highway Administration "Highway Statistics 1995" as reported in State Rankings 1997: A Statistical View of the 50 United States, Morgan Quitno, Lawrence Kansas, 8th Edition

**Source; State Scrap Tire Management Programs, 8th Annual Report, January 1996, Recycling Research Institute, Suffield, Connecticut

***Source U.S. Bureau of the Census Press Release (CB96-224, December 30, 1996) as reported in State Rankings, ibid. 8th Edition

Illustration is on file at the EQC Office.

Programs that are reported to have been the most successful are those that subsidize efforts at the end use side of the cycle. Paying to collect and or shred tires simply produces a large pile of shredded tires unless the effort also involves the development of a market for the shredded material or a market for the products made from the material. Subsidizing the manufacturing of a product is not useful unless there is a market for the end product. Subsidizing a fuel market may get tires burned as long as the subsidy remains intact. The greatest benefit of many state tire programs has been the abatement of backlogs of tires.⁷⁷ Often the problem was created in the first place by a lack of markets for the material, a landfill ban, or excessive landfill fees. Several states like Idaho, Oregon, and Connecticut have discontinued their fee assessments. Others have recently initiated programs.

The working group held discussions on the prospect of instituting a publicly funded tire management program in Montana. Several members of the group were familiar with the efforts and results of programs elsewhere in the country. Group members discussed several tire management operations that have been encouraged by public policies or subsidized funding that have ultimately failed with changes in the policy or the degree of funding. Often the failures were accompanied by a resulting tire problem that was worse than the one sought to correct in the first place. Advice from other state program officials in this regard is readily available. From the state of Nebraska comes “Don’t try to push tires somewhere...pull them somewhere. Waste tires must have stable alternative and economic markets to divert to if a state is to consider prohibitions on existing management choices.”⁷⁸ It may be important to note the number of states which have banned the landfill disposal of tires is very similar to the number of states that have established state subsidized waste tire programs.

Assuming there is a public policy problem that requires a public solution, the dilemma in making policy choices is whether to create a market alternative and then direct the flow of material towards it or to shut off the flow of material first in order to stimulate the creation of solutions. The timing of the effort is important. A 1993 legislative audit of the initial Utah tire program concluded that the early legislation

⁷⁷ Modern Tire Dealer, Lloyd Stoyer, April 1997, Vol 78, Issue 4 p 36

⁷⁸ Personal conversation, M.J. Rose, Nebraska DEQ, Waste Tire Program.

erred by trying to create TDF markets for tires at cement plants through subsidization, but not commensurately stopping the flow of tires to the landfills. Because landfilling remained a less expensive tire disposal alternative despite the subsidized tire markets, the two competed for the same tire material.⁷⁹

In Montana, waste tires could be considered a revenue stream to those landfills that currently accept them by the tens of thousands. There are 4 landfills in the state, all of which are privately owned and operated, that accept more than 69% of the waste tires reportedly disposed of in Montana. If one were to include the unreported figures for the large BFI landfill in Missoula, also privately owned and operated, the percentage would likely increase. Policy decisions may need to be evaluated with the impacts of these and other existing businesses in mind.

⁷⁹ Personal conversation, M.J. Rose, Nebraska DEQ, Waste Tire Program.

! Conclusions

The EQC Waste Tire Study Working Group attempted during its final meeting to develop and submit universally acceptable group findings, conclusions, and recommendations to the EQC. The draft report was reviewed and suggested changes were offered. After considerable effort and discussion, the study group offered several individual opinions regarding what the findings of the report should be. Eventually the group agreed on one conclusion and deferred the drafting of the final conclusions and draft recommendations to EQC staff. The group concluded, in general, that

“At this time, Montana does not have a problem with waste tire management which is significant enough to warrant statewide policy changes in the current situation.”

Problems Not Evident

From the beginning of the project, the group struggled with the problem identification portion of the study. The tire dealer representatives were concerned that they have available an inexpensive disposal alternative for their waste material. Most were satisfied that the local or regional landfilling options were economically feasible and they were able to recover some or all of their tire disposal costs by assessing the new tire customer a reasonable tire disposal fee. No payers of these fees were specifically represented at the meetings except that each study group member is individually subject to these fees when they are assessed. At current levels, no one raised the payment of these fees as an issue. Should either the landfill costs for tire disposal or the fees assessed to tire generators increase significantly, this generally tolerable balance could shift. However, other tire management alternatives become more feasible as these costs increase and existing and future market competition for properly managing waste tires should be sufficient to address the problem in the long run.

Landfills

The landfill representatives were generally content with the present situation although the representation was primarily from privately owned and operated sites in the state. The publicly operated landfills were under represented but were aware of the study and participated through phone conversations with staff. Some concern was expressed about the space waste tires consume in landfills, but it was generally concluded that the landfills had sufficient capacity for the future and managers were able to resolve landfill space considerations through unilateral landfilling policies or pricing as necessary.

Illegal Dumping - Hauler Registration

Considerable discussion was focussed on the “illegal dumping” problem. Tire haulers and disposers saw it as a loss of business, tire dealers view it as a threat to their reputations and a potential catalyst for further undesirable regulatory controls, and citizen groups were concerned about potential environmental and health consequences. Regulatory officials viewed the illegal dumping situation as a localized nuisance that needed policy work with local waste tire generators and solid waste officials or the problem needed additional state or local enforcement efforts as priorities allowed. Discussions were held regarding a need to register tire haulers, increase penalties for illegal dumping, provide additional enforcement efforts, reinstate tire hauling regulations through the PSC, provide for penalties for generators of tires that are subsequently illegally dumped, and other provisions. Ultimately, the group generally concluded that the potential individual solutions were more than what was necessary to address the problem. Essentially, Montana does not appear to have a significant problem with the illegal disposal of tires especially in comparison with other states. In terms of the number of sites and the number of tires at each site, the problem may be addressed more effectively through the enforcement of existing solid waste management law. The problem of the illegal dumping of tires is not necessarily any more unique than the illegal dumping of trash, appliances, and other solid wastes. The group did not universally agree that a special recommendation in regard to the hauling of waste tires was warranted.

Senate Bill 332 Impacts

In conjunction with the discussion on the illegal dumping of tires, the group did not find that the financial assurance requirements of SB 332 were negatively impacting the waste tire management situation in Montana. Over the interim, several inquiries were made to DEQ regarding the permitting requirements for establishing a waste tire site. Most of these initial contacts did not result in any further action. However, one facility applied, provided an engineered landfilling proposal, and obtained and provided financial assurance to the state under the new draft rules. It was recently issued a license for a Class 3 tire only mono-fill. There are now four such sites licensed in the state including the three pre-existing sites which were exempted from the financial assurance requirements of SB 332.

Data Gaps

The study group had a difficult time addressing economically feasible options for tire management in Montana since the state does not generate enough tires within a geographically economic area to attract tire processors or recyclers, and the markets for products produced from waste tires are lacking. Despite these obstacles, policy recommendations are made even more difficult because the group did not have precise data on the number of tires generated in the state, disposed of in the state, or imported into the state for disposal. Tire dealers do not report new tire sales. There is no mechanism for tracking the efforts of tire haulers or collectors. Montana law only requires the four Class 3 tire monofills to report the number of tires accepted for disposal on an annual basis. The remainder of the landfill sites are not required to track or report tire numbers, volumes, or tonnages. The study group made no recommendations in regard to improving the reporting of waste management reporting data.

State Initiatives

Statements that Montana should do more to encourage alternative uses and markets for tires were common in the discussion but no recommendations were made. The 1994 Montana Integrated Solid Waste Management Plan, written in response to the Montana Integrated Waste Management Act, outlines the state's management proposal and direction for minimizing waste generation, increasing recycling opportunities, and decreasing landfilling needs. The Montana DEQ has the responsibility for updating and assisting in the implementation of the plan. The group was advised that the DEQ has some

current state and federal funding and staffing to review solid waste management alternatives and to assist in the development of feasible market opportunities. The agency could be a contact point for assisting with the development of alternative public or private waste tire management efforts.

The working group reviewed state subsidized tire management programs in other states. Most tire subsidy programs assess a state fee on tire sales or a fee on motor vehicles upon licensing. The funds are used for a variety of purposes. Many state programs were established in response to serious waste tire backlogs often created by previous waste tire management policy decisions. Others attempted to force a recycling market which often could not be sustained without continued public financial support. The group reviewed state funded waste tire subsidy programs in other states and generally agreed that such a program was not warranted or desirable in Montana at this time.

Appendix A

EQC Waste Tire Working Group Meetings

August 19, 1997

November 12, 1997

August 14, 1998

List of Working Group Participants

Robert Bakke, Bakke Tire, Missoula

Cliff Boyd, BFI, Missoula

Jerry Brooking, J. B. Hauling, The Dalles Or.

Jim Leiter, BFI, Missoula

Helen Craig, Tires For Reclamation, Silesia

Tom Daubert, Waste Management, Helena

Roxanne Reum, Tire Depot, Polson

Anne Hedges, MEIC, Helena

Jay Craig, TFR, Silesia

Nichole Richius, Holnam Cement

Noel Cicero, Tire Rama

Kathy Goroski, City of Helena

Tom Floyd, Idaho Tire Recovery

Vern Miller, Helena, MT

Senator Ken Miller, Laurel

Rep. Carley Tuss, Gt Falls

Jim Roth, Columbia Falls, MTDA

Gary Keeler, Butte Silver Bow landfill

Jerry Noble, Jerry Noble Tires, Gt. Falls

Jon Dilliard, DEQ, Solid Waste Program, Helena

Peggy Likens, Keep Mt Clean and Beautiful, Helena

Wally Welander, Tire Resources Systems, Sioux City, Iowa

Sarah Merrill, Montanans Against Toxic Burning, Bozeman

Dave Klemp, DEQ, Air Quality Permitting, Helena

Mark Lambrecht, DEQ, Pollution Prevention Bureau, Helena

Peggy Nelson, DEQ, Pollution Prevention Bureau, Helena

Louise Moore, DEQ, Pollution Prevention Bureau, Helena

Stan Sternberg, DOT, Helena

Rick Thompson, DEQ, Solid Waste Permitting, Helena

Paul Johnson, Montanans For a Healthy Future

Vern Reum, Tire Depot, Polson

Sue Weingartner, S. Waste Contr. Assn, Helena

Dennis Johnson, Eagle Sanitation

James Weatherwax, Ballentine, Mt

D. John Blacker, Montana DOT, Helena

Kurt Bosch, Mont DOT

Jim Walther, Montana DOT

Doug Sparrow, City-County Sanitation, Helena

Joe Scheeler, Ash Grove Cement

Tom Whalen, Whalen Tire, Butte

Don Moranco, Farmer's Union Oil Co, Gt. Falls

Brad Griffin, Montana Tire Dealer's Association, Blgs.