February 20, 1997

Senator Craig A Peterson
Representative Tim Moran
State Capitol Bldg
Salt Lake City UT 84114

Subject: **Waste Tire Recycling** (Report # 93-03)

Dear Senator Peterson and Representative Moran:

We have completed a limited review of the state's waste tire recycling program in response to your questions regarding the purpose and intent of the state's existing legislation. That legislation was passed during the 1990 legislative session and has had little effect on the waste tire problem. Utah's only waste tire processor has gone out of business and speculators have begun to store tires in anticipation of more lucrative state support of recycling. You further questioned whether or not the direction taken in the 1990 legislation, supporting use of tires as fuel, was truly recycling. Our review of Utah's program has identified the lack of controls over the disposal of tires in landfills in combination with the low subsidy rate as the most likely causes of the program's failure. An associated problem is that the temporary fee, or tax, placed on new tire sales to fund a recycling program has not been well utilized. The fund is now worth approximately $3,900,000.

Waste tire recycling has been successfully addressed in a number of states. There is, however, no clear consensus as to how such a program should be operated because each state has unique market systems determined by their own regulations over landfills and waste tire generation and further complicated by the cost of fuel. Even given that there is no best way of addressing the problem of waste tires we believe that legislation that addresses the required changes is necessary as quickly as possible. The following information addresses the elements of a tire recycling program we believe to be of greatest importance. This review discusses the legislative intent and definition of recycling, operation of a waste tire recycling program, and identifies some options available for such a program.

Intent of Waste Tire Recycling

Waste tire disposal is recognized as a national environmental problem. Size and non-biodegradable characteristics make tires unsuitable for landfill. High landfill fees charged per tire have resulted in the establishment of tire-only disposal and storage facilities, or tire piles, known to be prone to fires and vermin infestation. There is no need for either of these problems because waste tires lend themselves to recycling. There is retrievable value in waste tires, most notably from fuel energy uses.

Utah's existing legislation has given rise to questions within the legislature as to what should be recycled in a subsidized program and what types of processes should be subsidized. Utah's existing program and other states' programs we reviewed first address the disposal of "new" waste tires. New waste tires is the nomenclature for tires recently removed from vehicles. Addressing new waste tires first aids in preventing tire pile growth. Second, establishing a market for newly generated waste tires can also create a demand for waste tires kept in storage and in landfills because the supply of "new" waste tires is usually insufficient to meet market demand. When demand exceeds the supply of "new" tires, tire piles are cleaned-up. Some states have reached this point.

Nationally, use of tires as an energy source has been accepted as a tire recycling alternative. This is primarily because energy conversion is the only current use that can efficiently absorb the waste tires being generated each day and address the tires discarded in the past and now stored in tire piles. Other waste tire products are possible but their consumption of tires is not yet sufficient to utilize the entire supply of "new" waste tires and waste tires already in storage or landfill. Additionally, some of the other uses, such as use for road surfacing, are not yet viable alternatives. In essence, a viable waste tire recycling program must consider energy conversion as the primary recycling use.

A waste tire program in Utah needs to address both the 1.6 million tires generated each year and the approximately 5 million tires stored in piles around the state. The newly generated tires represent a collection problem while the tires in piles represent both collection and sanitary problems. Figure I details Utah's known, major tire piles.

Figure I
Major Waste Tire Piles

Location (Nearest Community)	Number of Tires (Estimated)
Magna	2,000,000
Lehi	1,500,000
Elberta	200,000
West Valley	200,000
Salt Lake City	200,000
Grantsville	130,000
North Salt Lake	60,000
Totals	4,290,000

There are approximately 100 light vehicle tires per ton, so Utah generates 16,000 tons of waste tires each year and has an additional 50,000 tons in storage. Most of the annual generation of tires comes from the Wasatch front and, as Figure I indicates, most of the stored tires are also located in piles along the wasatch front. Utah's waste tire recycling program must be based on this supply of tires if both "new" waste tire generation and tire piles are to be recycled.

Tire Recycling Program Operation

Our review of other states' programs indicates that successful waste tire recycling programs have two components: incentives, usually in the form of subsidies, and controlling regulations. A functioning program can operate effectively with any incentive level as long as there are sufficient regulations. The difficultly is in addressing all of the system's participant operations and controlling the transactions between the participants by effectively balancing free market and regulatory control.

Waste tire recycling programs are dependent on private and public sector participants. Private sector participants include: tire retailers who serve as the collection point for waste

tires and as a possible collection point for funding; tire transporters who collect waste tires from retailers, sort tires for resale or recycling, and deliver waste tires to processors and ultimate users; processors who transform waste tires from whole tires to a usable form; and ultimate users who actually recycle the tires or tire derived product. Public sector participants include: local agencies, state environmental agencies, tax commissions, and state financial agencies.

The interaction between each of the participants results in the transfer of both waste tires and the funding to support the tire recycling program. The program's funding usually is generated from a tax or fee retailers collect from new tire purchasers. This fee, set between one and two dollars in Utah, is the funding for the waste tire subsidy. Depending on the system, retailers may also charge their customers for the transportation and disposal of waste tires left at the store. This money is used to pay a tire transporter to collect, transport, and deliver waste tires to a suitable disposal facility. Transporters can legally dispose of the tires in landfills, tire storage piles, processors, or end users. Each of these will in turn charge the tire transporter a fee to accept the waste tires.

A major problem with Utah's existing legislation is the resulting speculation over what the subsidy rate will be. This speculation has taken the supply of tires away from processors and ultimate users and placed them in storage. Transporters can deliver waste tires to storage sites for less than the tires can be delivered to processors. Under the existing legislation, processors are dependent on tire transporters not only for the supply of tires but also for a portion of their cost reimbursement in the form of a waste tire acceptance fee charged to the transporter. Processors receive both the subsidy and the acceptance fee from transporters to keep the cost of tire fuel energy at a competitive market rate with coal. Without this subsidy the cost of tire fuel energy is prohibitively high and the ultimate user, in this case cement kilns, will not burn tires.

Conversion of tires to a usable energy source is possible in two Utah cement kiln operations and may be possible for a number of other similar burn operations. Tires can be supplied to cement kilns either as whole tires which are feed into the kiln through a specially designed system or as shredded tires in two inch squares called tire derived fuel (TDF) which can be mixed with existing fuels to utilize existing fuel feed systems. Both whole tire and TDF systems need a tire recycling program to establish tire collection and centralization components for the handling of waste tires and incentive components to make capital investments in tires-for-fuel conversions beneficial.

We reviewed the system cost of taking tires from the initial collection point (retail tire dealers) to the ultimate user (cement kilns) and found that it costs between $38 and $78 per ton of tires (38 to 78 cents per tire) to operate a recycling system. This cost is far more than that of coal, the primary fuel source for cement kilns, which costs about $16 per ton and about $22 for the energy equivalent of one ton of tires. Figure II demonstrates that some level of subsidy

is necessary as an incentive for the kilns and other possible users.

The actual system cost is different for whole tire and TDF operations. Recycling whole tires requires collection and transportation of the tires to the ultimate user and some capital and labor investment by that user. Recycling tires in a TDF system is by nature more expensive. The tires must still be collected and transported and the ultimate user has some capital investment. Additional costs are required to process the tires into TDF, this process of shredding tires into TDF is both labor and capital intensive but yields a more acceptable product for some users. Estimated costs for both systems are shown in Figure II.

Figure II
Recycling System Cost Ranges

	Shredding Cost per Tire		Whole Tire Cost per Tire	
	LOW	HIGH	LOW	HIGH
Transportation (Initial)	.15	.25	.15	.25
Processor	.28	.40	.00	.00
Transportation (Processor to User)	.04	.08	.08	.16
Ultimate User:				
Labor	0.00	0.00	0.07	0.07
Capital	0.03	0.05	0.08	0.08
Total System Cost	0.50	0.78	0.38	0.56

One possible way of reducing the share of the system's costs paid by a subsidy is to allow the market to bear some of the costs. Under the existing legislation the initial transportation has been paid by the retailers; secondary transportation has been paid by the ultimate user; and processing costs have been paid by the retailers, ultimate user, and the state subsidy That user elected to use a shredding (TDF) system that is more expensive than a whole tire system. Utilizing the cost approach of Utah's existing legislation requires that only the cost of subsidizing the processor be paid by the tire recycling fund. Figure III shows these processor-only costs.

Figure III
Processing Cost Ranges

	Shredding Cost per Tire		Whole Tire Cost per Tire	
	LOW	HIGH	LOW	HIGH
Total System Cost	.50	.78	.38	.56
Less Other Revenues:				
Transportation	0.15	0.25	0.15	0.25
Ultimate User Payment	0.12	0.16	0.00	0.00
Processor System Cost	0.23	0.37	0.23	0.31

The costs displayed in Figure III represent our best estimate of operating costs for Utah processors. These costs reflect a range of operating efficiencies which includes some profit for the operators but, depending on individual operating efficiency, may not include any incentive to enter the tire recycling business. It is possible that no more incentive would be necessary. Utah's sole recycler told us that he believed he could have operated with the $20 per ton subsidy if other controls had been included in the legislation. Our review of his cost found that had he been operating at the necessary capacity his costs would have been in the range of 31 to 36 cents per tire processed. This is within the range we estimated in Figure III and is slightly more than the 28 to 29 cents quoted by major out-of-state tire processors.

Establishing a subsidy rate, unfortunately, is not as simple as determining operating break-even points for the parties involved. Market uncertainty and the reduction of waste tire supplies as tire piles are reduced make possible users hesitant to invest in tire recycling operations. As an example, users are faced with the problem of a diminishing supply of tires combined with a possible increase in waste tire demand. They must determine how much they are willing to risk in investment of recycling equipment given both supply and costs could change in three to five years.

Some of the inherent risk can be eliminated by the design of the regulatory program. Program options can be addressed through future legislation by setting controls that force the market to operate in the designed manner. As stated earlier, a complete system can operate any where between a system with a strong market control and a low subsidy or a high subsidy with little control driving a competitive market.

Tire Recycling Program Options

Our review of tire recycling found a variety of options being used to address the clean-up and disposal of waste tires. While there is no sure method that will work every where, there are several important components or options which we believe the Legislature should consider when making changes in Utah's tire recycling legislation. These options can be divided into two areas: those components concerning program funding and market incentives, and those concerning industry regulation and program control.

Funding and Market Incentive Components

Most states have developed market incentives to encourage the recycling of waste tires. Market incentives are typically funded by the waste tire disposal fee mentioned earlier. For example, Utah's current law imposes a fee of $1, $1.50, or $2 per new tire, based on the size or diameter of the tire. This fee is used in Utah and some other states as a market incentive that provides processors or end users with a subsidy based on the weight of tires recycled. Other states provide grants or contracts, usually to local government entities, to encourage recycling and tire pile cleanup. Figure IV identifies the fees collected to fund market incentives and the subsidy and grant market incentives used by Utah and six other states.

Figure IV
Funding and Market Incentive Comparison

State	Fee or Tax	State Subsidy Based on Weight	Grants or Contracts
Arizona	2% sales tax	No	Yes
Idaho	$1 per tire fee	Yes	Yes
Minnesota	$4 vehicle title transfer	No	Yes
Oregon	$1 per tire fee	Yes	Yes
Texas	$2 per tire fee	Yes	No
Washington	$1 per tire fee	No	Yes

Utah	$1-2 based on tire size	Yes	No

As shown above five states, including Utah, impose a set fee per tire. As a market incentive, four of the states, including Utah, provide a subsidy to processors or end users of scrap tires based on weight. Idaho and Utah provide a subsidy of $20 per ton, Oregon .01 cent per pound (about $20 per ton), and Texas 85 cents per 18.75 pounds of waste tire (approximately $90.67 per ton).

Figure IV also shows that five of the six states we contacted provide grants or contracts. Of these, Arizona and Idaho provide funds through grants to counties to collect tires and provide temporary disposal sites for waste tires. Counties may operate collection and disposal sites, or contract with the private sector to provide these services. Tires are transported from these sites to processors or end users. Funds may also be used to clean up old tire piles. Minnesota provides grants or loans to businesses for research and development into new uses for waste tires or for the purchase of processing equipment. Funds are also used to clean up old tire piles by competitive bid. Both Oregon and Washington also contract through competitive bid to clean up old tire piles.

Each state we contacted has found it necessary to provide some form of incentive to deal with waste tires. Even in the case of the grant programs operated by some of the states, incentives reach the waste tire recycling market. Grants to counties for temporary storage facilities are incentives to the market because they create sites for tire collection thus reducing the collection cost of the recycler. Grants, directly to the processor for capital investment can allow lower cost entry into the recycling market.

Regulation and Control Components

Along with funding and incentives, some regulation and control is needed to ensure that waste tires are disposed of properly. Our review found that the most important regulations and controls for a tire recycling system include: restricting the landfilling and storage of whole tires; regulating by registering the system participants involved in transporting, processing, or storing waste tires; and developing a manifesting system that can account for waste tires from the retailer to the ultimate user. In addition, the Legislature should consider whether the system should be regulated and controlled at the state or local level, or a combination of the two.

Restricting Landfilling and Storage. Restriction of whole waste tire landfilling and long-term storage is beneficial for a number of reasons. First, whole tires are difficult to landfill because the design of tires causes them to work their way to the surface of the landfill.

Second, tires whether in landfills or stored separately provide an excellent breeding ground for disease carrying insects and rodents. Third, tires are susceptible to fire which

can result in air, ground, and water contamination. At least three large tire fires have occurred in the past three or four years along the Wasatch front. Fourth, cheap landfilling and storage of tires has, in part, contributed to the current recycling law not working.

Most other states along with individuals we contacted locally in the tire business told us that whole tires should be banned from landfills. They added that some leeway can exist for landfilling shredded tires if no recycling demand exists. Figure V shows four (Arizona, Idaho, Minnesota, and Oregon) of the six states we contacted ban whole tires from landfills. Typically in these states county or area collection facilities are established where tire transporters, retailers, and citizens can deposit tires free of charge. Periodically, tires are transported to a processing center, or in some cases a mobile processing equipment is brought to the storage site. The other two states (Texas and Washington) report that many landfills in their states ban whole tires, or charge high fees which make landfilling too costly. Some Utah landfill operators have higher fees for tire disposal to discourage landfilling of tires.

Waste tire landfilling and storage has been the least costly option for tire transporters. Restricting landfill and storage options forces the development of recycling and directs any subsidy toward that goal by making recycling the most profitable venture for the waste tire system's participants.

Figure V
Regulation and Control Comparison

State	Landfill Restrictions	Registration	Manifesting	Control Level
Arizona	Yes	Partial	Yes	Joint
Idaho	Yes	Partial	Yes	Joint
Minnesota	Yes	Yes	Yes	State
Oregon	Yes	Partial	No	State
Texas	No	Yes	Yes	State
Washington	No	Yes	No	Joint
Utah	No	No	No	Joint

Registration and Manifesting of Waste Tires. Regulating waste tire handlers and manifesting the movement of waste tires should also be considered in any tire recycling legislation. Registration and manifesting legislation attempts to ensure waste tires find their way to processors and end users by controlling the system's participants and the flow of tires. These controls could also reduce illegal dumping, and help prevent the payment of a Utah subsidy for out-of-state waste tires. Figure V shows that three of the six states we contacted require tire transporters, processors, and storage facilities be registered. Three states have some registration of active participants. Of these states, Arizona requires registration for processors and storage facilities, Idaho registers storage facilities and plans to begin registering transporters and processors, and Oregon required registration of all three but through compliance now only registers transporters.

Four (Arizona, Idaho, Minnesota, Texas) of the six states shown in Figure V also require a manifest system which tracks waste tires from the retail store (cradle) to final use (grave). This cradle to grave process ensures that waste tires are recycled. Two states that do not manifest the movement of their waste tires from cradle to grave, Oregon and Washington, found that tight controls on transporters and viable recycling markets made manifesting unnecessary. In each case, the states we contacted believed it necessary to maintain a higher level of control over the transportation of waste tires. This level of control is meant to prevent any state subsidy from being paid for out-of-state waste tires and ensures that tires are not landfilled.

All four Wasatch front counties (Weber, Davis, Salt Lake, Utah) require tire transporters to be registered. However, only Salt Lake County requires a manifest system to ensure that tires are disposed of properly. As a result, while Salt Lake County officials can track the movement and disposal of tires within their county, other counties cannot. We believe that registration and manifesting can be beneficial to the success of a recycling program in the early years until recycling markets are better established.

Level of Regulation and Control. A final issue we believe the legislature needs to consider is the governmental level tire recycling regulation and control should occur. The current law places the funding and market incentives at the state level, and within some statutory guidelines, allows rules and regulations to be established at the local level by the local health district. Three states (Minnesota, Oregon, Texas) we contacted have retained control at the state level, while the other three states (Arizona, Idaho, Washington) have chosen to split control between the state and local government.

Some individuals have suggested that to ensure consistency, control of the program should be placed at the state level, most likely with the Department of Environmental Quality (DEQ). Others, including officials in local health districts feel control should be given to the local level, citing that local officials are in a better position to monitor transporters, processors, and storage facilities. A third group have advocated a combination of joint state and local control.

Regardless of which option is chosen, officials locally and in other states have told us that regulations such as landfill bans and registration of transporters, processors, and storage facilities need to be consistent statewide.

There is no one correct method for dealing with waste tires. It is, however, our opinion that some form of control is needed and can be workable. Any waste tire recycling system selected by the Legislature will need to be both subsidized and regulated. Setting the rate of the subsidy and outlining the regulating controls for the system are questions of legislative policy.

We hope this letter provides you with the information you need on these issues. If you have any questions or need additional information, please let me know.

Sincerely.

Wayne L Welsh
Auditor General

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