SCRAP TIRE RECYCLING

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ABSTRACT

The South Carolina Department of Transportation (SCDOT) generates more than 20,000 used tires each year from on- and off-road vehicles. In the spring of 1991, there were approximately 40,000 tires at the threeacre Supply Depot site owned by SCDOT. Rain water trapped in these tires provided a breeding ground for mosquitoes causing occupational health hazards considered environmentally unacceptable by the Department of Health and Environmental Control (DHEC). This situation became the focus of attention as the result of an Occupational Safety and Health Administration (OSHA) inspection that found mosquitoes at the site that could cause sleeping sickness, yellow fever and other diseases. In addition, "The South Carolina Solid Waste Policy and Management Act of 1991" prohibited the dumping of tires at landfills.

SCDOT reviewed its tire disposal methods and investigated alternative methods of disposal. A win/win situation for SCDOT, DHEC, OSHA and vendors was identified that involved shredding tires and recycling the products in environmentally acceptable ways.

INTRODUCTION

SCDOT recognized in the spring of 1991 that it was facing problems with used tires that had accumulated at its Supply Depot. There were approximately 40,000 tires stored in a three-acre open area (See Figure 1). These tires accumulated primarily because of problems with low bid contracts to remove used tires, landfill disposal of whole tires, and potential liability issues with used tires.

SCDOT used low bid contracts in the past to remove used tires from the Supply Depot storage area. The bidder would be given a specific timeperiod to do the work. The problem was that vendors would come on-site and take only the tires that could be regrooved or recapped. Unusable tires were left. This method was eventually stopped.

The Department also awarded contracts to landfill operators to dispose of used tires. SCDOT hauled the tires to the landfills where they were buried by the landfill operators. The problem was that over time some tires would work their way to the surface. This concerned SCDOT from an environmental and legal perspective.

Tires were also included in public auctions for SCDOT equipment every month. Buyers got a mixed lot of tires, both good and bad. SCDOT was concerned from a legal perspective that as the seller it may be held liable if a tire was found to have contributed to a traffic accident.

The tire problem came into focus when the "South Carolina Solid Waste Policy Management Act of 1991" was passed. This law prohibited the accumulation of tires on any property unless the owner was licensed to landfill or recycle the tires. DHEC also became involved when they discovered mosquitos breeding in the water trapped in the tires. These mosquitos have been linked to sleeping sickness and yellow fever. This discovery led to a frequent monitoring by DHEC to ensure that the storage area was sprayed once a week to reduce health risks.

ALTERNATIVE METHODS OF DISPOSAL

With 40,000 plus tires on hand and the fact that an additional 20,000 tires would be added annually, corrective action was needed. Several alternative methods of tire disposal were investigated including deep burial, cutting tires in half and tire shredding.

Were there any landfill operators willing to take whole tires? A landfill operator was found who claimed tires would be buried under 8 to 10 feet of dirt. The landfill operator had adequate space. However, it was decided there could be legal problems with an anticipated law that would ban the land filling of whole tires.

Landfills would be allowed to accept tires that were cut up or cut in half. Investigation revealed that there were many types of tire shredders available. Costs for the equipment ranged from \$15,000 for a small splitter unit that had a low through put of approximately 12 tires per hour, to a high volume unit that would shred hundreds of tires per hour. The cost for the high volume unit was approximately \$250,000. From an economic standpoint the smaller unit would serve the Department's purpose. Installed, the cost would have



FIGURE 1 Used tires stored in three-acre open area in 1991.



FIGURE 2 Used tire storage under tire recycling program.

been approximately \$20,000 - \$25,000. There was still the job of hauling the remains to a landfill, paying a tipping fee and record keeping costs. The total annual cost of labor, transportation, landfill tipping fees and record keeping was estimated to be \$44,180. In addition, there were still some concerns that there may be legal actions taken against the Department in the future.

At this point attention was shifted to other recycler companies that used shredding machines. Discussions were held with vendors in surrounding states, but there was a great deal of interest in working with a company that had a shredding facility about 30 miles from the SCDOT Supply Depot. A property visit was made to check the facilities and look at recycled products made from the shredded rubber. The visit also revealed that this company was working with other companies to produce floor mats and mud flaps for trucks.

CONTRACT SPECIFICATIONS

A specification was written that included:

• How many tires would be provided to a vendor per year.

- Size of tires, both vehicle and off the road.
- Pick up schedules.
- How the tires were to be processed.
- Final disposition of the tires.
- Documentation for the DHEC.

The unique part of the specification was a section that dictated that the vendor's final disposition of tires would be as a marketable, recycled material subject to the Department's approval. To our knowledge there is not another Department of Transportation that makes that determination. This specification was advertised for bid. There was a pre-bid meeting held and all interested vendors attended as a prerequisite to submitting a bid. The purpose of the meeting was to go through the specification and answer any vendor questions. This meeting also served to identify acceptable vendors.

After bids were received, the proposals were evaluated to determine the low bid and arrangements were made to visit the vendor's site, evaluate facilities and determine final disposition of the shredded tires. One important factor was the cost to transport tires. It was possible that the transportation costs could make the entire job uneconomical for the State or the vendor. We also found that there were nine vendors that could not do the shredding operation as specified. There were two vendors who could do the work as specified. The result of all this work was a five-year contract awarded to a tire recycling processor, approximately 30 miles from the SCDOT property. Table 1 provides an economic summary used in the decision to contract out the shredding job.

In addition, two intangibles entered into the decision to shred the tires:

• Could SCDOT be held responsible in the future for the environmentally unsound practices of disposing tires at a landfill?

• If a tire contributed to an accident, could SCDOT be held liable?

These intangibles helped in the determination to recycle tires. In addition to recycling the shredded tires as described above, SCDOT uses 5% rubber in its asphalt road material according to the Intermodal Surface Transportation Act of 1991. This total increases to 10% in 1994.

RECYCLING PROGRAM AWARDS AND CONCLUSION

SCDOT's recycling program for shredding tires has won two awards:

• The South Carolina Division of Natural Resources' "Keep America Beautiful Award"; and

• Second place in the Federal Highway Administration's "Keep America Beautiful Award."

SCDOT's tire recycling program has been a win/win situation for everyone involved: SCDOT (See Figure 2) vendors, OSHA and DHEC.

TABLE 1 ECONOMIC SUMMARY FOR TIRE DISPOSAL

	SCDOT	VENDOR
<u>CAPITAL</u> <u>Summary</u> : This cost includes equipment required	\$25,000 (One Time) I to split tires (not shredded) plus electric services an	In Place d weather protection.
LABOR AND MATERIAL 1- Labor/Yr. <u>Summary</u> : 12 Tires/hr. x 6.5 hr./day x 5 days/wk splitter at \$19,000 and 1 employee to handle tires	38,000 x 50 wks./yr. = 20,500 tires/yr. Labor will require 2 with fork lift truck at \$19,000.	27,600 (FY 92-93 Contract Cost) e employees/yr.: 1 employee to run tire
2- Transportation 680 Incl. in contractSummary: Fuel 20,000 tires/yr. = 40 trucks/yr.: 500 split tires/truck: Diesel fuel cost = 0.85/gal. ($$.022/Liter$), 20 miles round trip to landfill(32.2 Kilometer), Trucks average 5.7 MPG(9 18 KPG), 20 miles/5.7 MPG = 3.5 gal./trip(13.30 Liters), 40 trips/yr. x 3.5 gal./trip = 140gal./yr. (532 Liters/yr.), 140 gal./yr. x 0.85/gal. = $$120/yr.$ ($$118$ U.S. Dollars). Labor: 2 hrs./trip x 40 trips/yr. = 80 hrs./yr., 80 hrs./yr. x\$7.00/hr. = $$560/yr.$ TOTAL \$120/yr. (Fuel) + \$560/yr. (Labor) = \$680/yr.		
3- Tipping Fees 5,000 0 Summary: \$20.00/ton 500 tires/truck x 25 #/tire = 12,500 # = 6.25 ton (6.34 Long ton), 20,000 tires = 40 trucks/yr. x 6.25 tons/truck x \$20.00/ton, 500 tires truck = \$5,000 (\$5,072 U.S. Dollars)		
4- Record Keeping	500	0
TOTAL (1-4)/Yr.	\$44,180	\$27,600

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