



Used Report to the Legislature Tire Recycling and Reuse in 2006 Tire Pile Cleanup Status for 2007

Abstract

Each year, the Department of Ecology (Ecology) collects data on tire recycling and reuse (RCW 70.95.545). This annual report summarizes the increase or reduction in the rates of recycling and reuse since 2002. The Legislature received Ecology's first *Scrap Tire Report* in 2002 (<http://www.ecy.wa.gov/biblio/0207029.html>).

Publication Information

This report is available on the Department of Ecology Web site at
<http://www.ecy.wa.gov/biblio/0807014.html>

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2007 Report to the Legislature

Tire Recycling and Reuse in 2006

Tire Pile Cleanup Status for 2007



**Department of Ecology
Solid Waste and Financial Assistance Program**

January 7, 2008

Tire Recycling and Reuse in 2006

Each year, the Department of Ecology (Ecology) collects data on tire recycling and reuse (RCW 70.95.545). This annual report summarizes the increase or reduction in the rates of recycling and reuse since 2002. The Legislature received Ecology's first *Scrap Tire Report* in 2002 (<http://www.ecy.wa.gov/biblio/0207029.html>).

The table below provides the recycling, reuse, disposal, and generation data from 2002 to 2006. The 2006 totals are not impacted by Ecology's tire cleanup efforts, which started in June of 2007. This information came from various sources:

- Annual disposal reports from landfills, transfer stations, drop boxes, tire haulers, tire businesses, and tire storage sites.
- Reports and survey responses from recycling facilities.

Used tire generation, recycling, and reuse changes from 2005 to 2006 include:

- Washington generated 1,462 tons more used tires in 2006.
- Reports showed recycling, reuse, and disposal decreased by 5,719 tons.
- The percent of tires landfilled increased from 26 percent in 2005 to 42 percent in 2006.

Used/Waste Tires	2002 tons	2003 tons	2004 Tons	2005 tons	2006 tons
Baled Tires*	NA	NA	NA	NA	7,702
Landfill Disposal	21,273	22,226	15,246	22,446	33,697
Recycled Tires	27,102	27,753	37,568	53,777	23,532
Retreaded Tires	1,170	12,976	251	4,089	5,579
Tire Derived Fuel	2,817	9,664	15,400	5,167	9,250
Total Reported End Use	52,362	72,619	68,465	85,479	79,760
Unknown End Use	28,626	11,267	12,301	NA	5,594
Generation	80,988	83,886	80,766	83,892	85,354

* Baled tires are not reported separately for 2002 through 2005

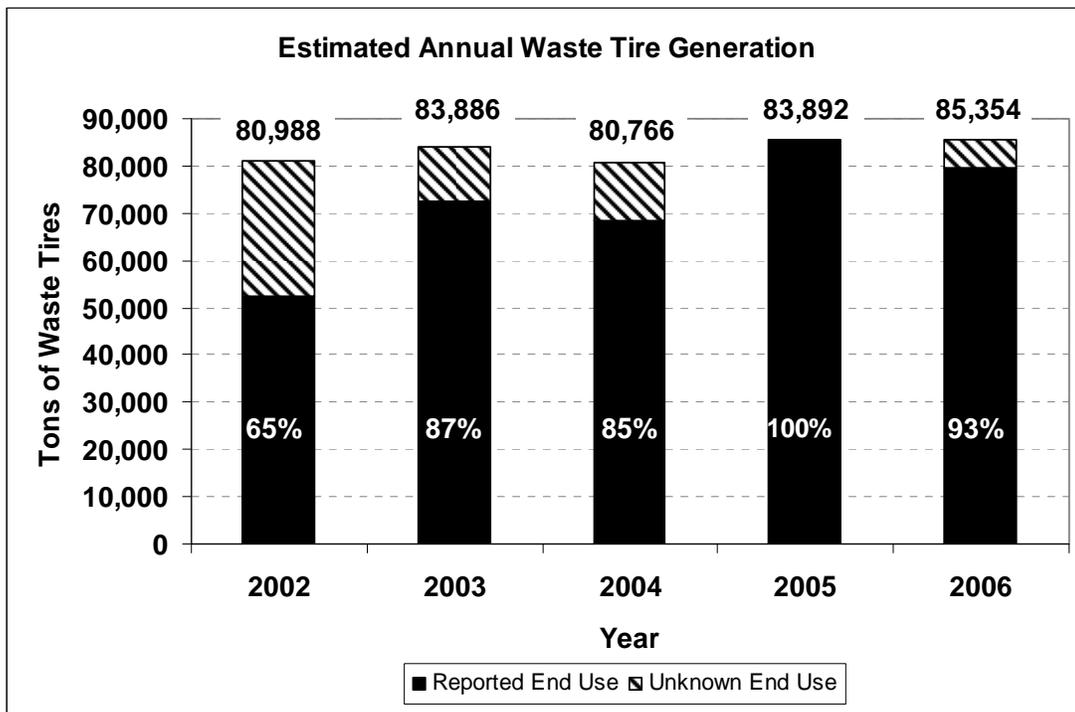
In the sections that follow, we describe in more detail the categories listed in the table above.

Annual Waste Tire Generation

In Washington, we base the annual generation of used tires on the number and types of vehicles licensed in the state. The national average is one used tire a year from each passenger vehicle. The national average for other vehicles, such as trucks, trailers, motorcycles, is less than one, ranging from 0.25 to 0.4 used tires a year. We applied these percentages to the number of vehicle types registered to

estimate the total number of used tires generated. The nearly 6.8 million vehicles licensed in Washington in 2006 generated approximately 5 million used tires.

The chart below shows total generation of used tires estimated for each year. In 2006, 85,354 tons of used tires were generated. Each year landfills, recyclers, and tire businesses send reports of waste tire end use to Ecology. The black portion of the column shows the total reported end use. In 2006 reported end use of tires was 93 percent of the total. Most years the generated total is higher than the reported end use total (shown below in black). The difference between the total reported to Ecology and the estimated generation is shown as the hatched “unknown end use” portion of the chart. The hatched portion of the chart represents recycling and disposal not reported to Ecology.



Tire Bales Used for Construction

Because we have data on the use of tire bales only for 2006, there isn't a graphic of this data. A tire bale contains about 100 passenger tires compressed into a block wrapped with galvanized steel bands. The bales take the place of other fill materials at construction sites. In Washington, 7,702 tons of tire bales (about 10 percent) were used for road base, noise reduction walls, erosion control, and racetrack walls. The photo to the right shows use of tire bales as road base.



Landfill Disposal of Waste Tires Continues

Tires are a problem for landfills because they are difficult to compact and do not decompose easily. Tires take up valuable landfill space, and over time the tires tend to float to the top, working their way up through the waste and soil. Tires disposed of in landfills are usually shredded or at least cut in half before disposal.

The following chart shows the changes in the reported total tons of tires landfilled each year from 2002 to 2006. The percentages shown on the graph represent the landfilled waste tires compared to the total reported uses of tires. The highest volume and percentage of waste tire landfilling was reported in 2006.



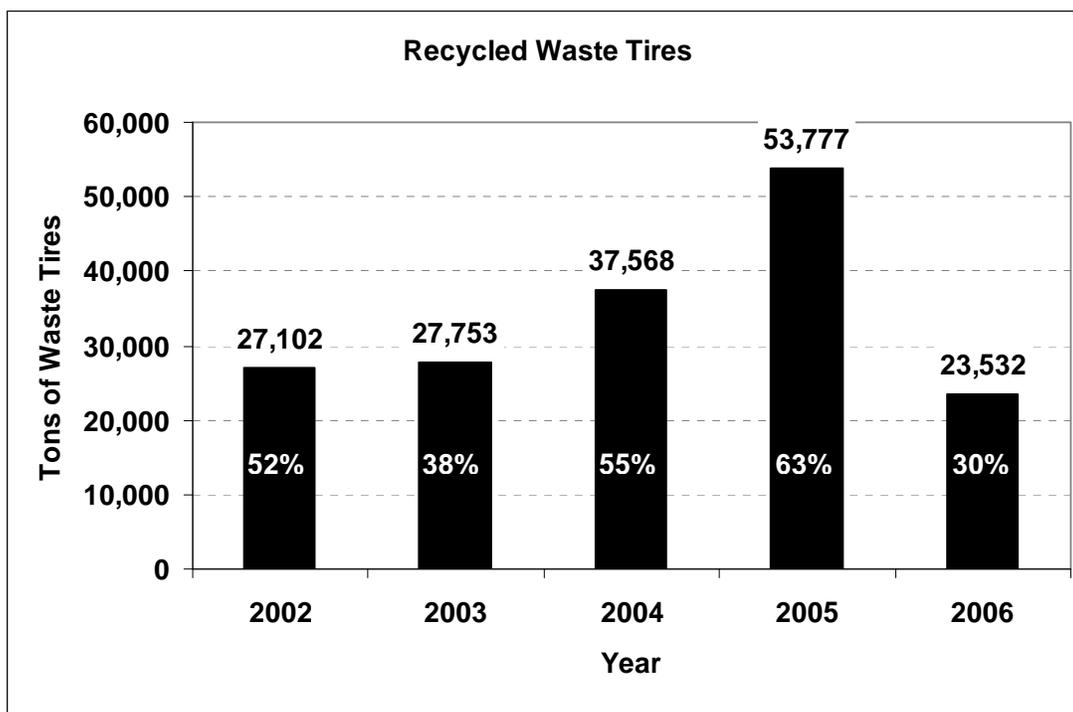
Recycling Waste Tires Creates New Products

Tires can be recycled by grinding up the rubber and remolding it for other purposes. Some uses of ground rubber include ground cover under playground equipment, running track material, and components of sports and playing fields. Tires can also be cut, punched, or stamped into various rubber products, including floor mats, belts, gaskets, shoe soles, dock bumpers, seals, muffler hangers, shims, and washers.



The annual totals and percentages of recycled tires are shown in the chart below. The amount of tires recycled is based on tire business reports and recycling facility surveys. During the first few years of collecting these reports, we found that some businesses included retreaded tires as recycled. That may be the reason for the high recycling totals reported in 2004 and 2005.

The ground rubber product market has shown the greatest growth in recycled tire materials. However, the conversion to synthetic field turfs for football, soccer, and other playing surfaces will be limited by the finite number of athletic fields. The cut, punched, and stamped rubber products market is limited to tires that do not have steel belts, known as “bias-ply” tires. There is a limited supply of bias-ply tires available for this market.

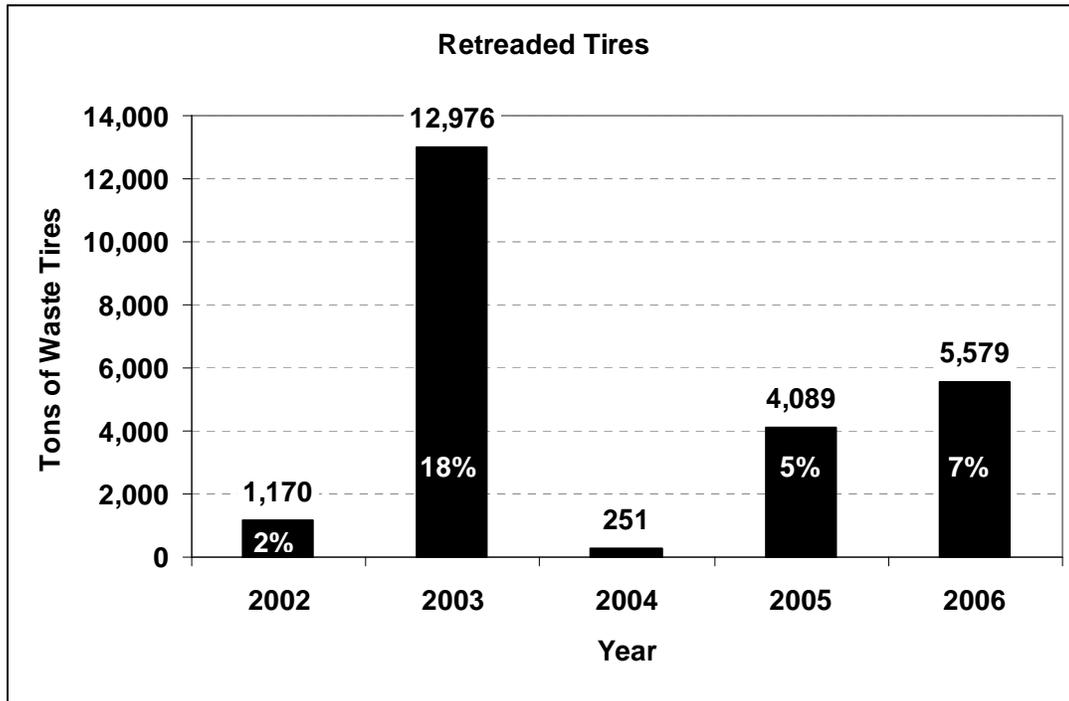


Retreading a Tire Saves 15 Gallons of Oil

Retreaded tires contain up to 75 percent recycled content. Manufacturing one new truck tire takes 22 gallons of oil. Most of the oil is found in the casing. The retreading process places a new tread on the old tire casing. As a result, it takes only 7 gallons of oil to produce a retread.

Reported tire retread data show retreading varied greatly between 2002 and 2006. During the early years some businesses lumped several categories together in their reports to Ecology. The spike in the chart in 2003 was because some tire companies combined some recycled and retreaded tires into one category. Then in 2004 some tire company reports included retreaded tires in the recycled category. The retread data shown for 2005 and 2006 provide a more reliable data trend.

The following chart shows the reported retreaded tires in total tons and percent of total reported uses.



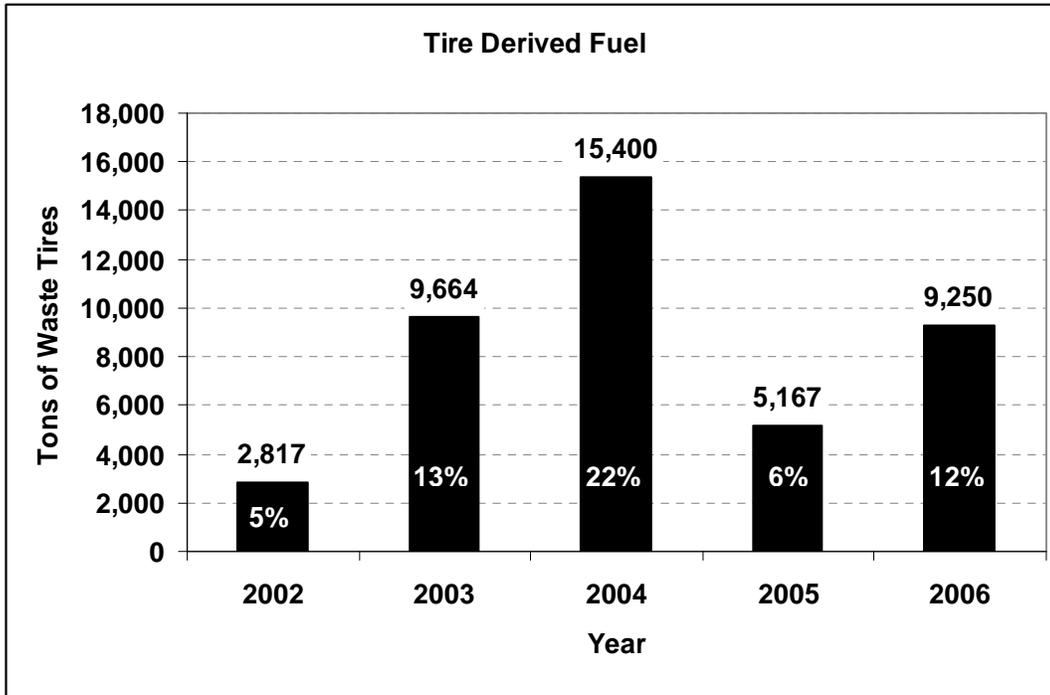
Tire-Derived Fuel Provides Energy for Cement Kilns

Because of their high heating value, waste tires make a good fuel. Tire-derived fuel (TDF) can provide up to 15,000 British thermal units (BTUs) per pound, which is higher than coal, oil, and wood. Burning waste tires is not recycling (under the state's definition), but we consider it a higher use than landfilling. Tires serve as fuel either shredded or whole, depending on the type of combustion device.

In Washington, cement kilns use whole tires as fuel. The higher BTUs provided by tires allows the cement plant to reduce their use of other fuel sources. This results in a cost savings to the cement plant. Cement kilns operate at very high temperatures (around 2,600 degrees Fahrenheit) and have long residence times. This results in complete combustion of the tires. The metal in the steel belted tires combine with the cement product. Compared to coal, use of tires in cement kilns reduces nitrogen oxide emissions.

Cement kilns or other industrial facilities that use tires as fuel need to have a tire storage and handling plan, have secured a permit for all applicable state and federal environmental programs, and be in compliance with all the requirements of that permit.

The following chart shows total tons (and percentage) of tires used for fuel each year. Cement kiln demand for TDF determines the variation of fuel use over the years. The greatest reported TDF use occurred in 2004.



Tire Pile Cleanup Status for 2007

In 2005, the Legislature passed Substitute House Bill (SHB) 2085, creating a Waste Tire Removal Account to fund cleanup of unauthorized and unlicensed tire piles. Funds for this account come from a \$1 fee charged on each new replacement tire sold in Washington. Under SHB 2085, the state will collect this fee until July of 2010.

To be eligible for the cleanup program, piles must contain more than 800 waste tires (or the combined weight of 16,000 pounds of tires). Ecology coordinates cleanups of waste tire piles with local health departments, fire departments, businesses, tribes, and private citizens.

2007 Cleanup Removes Over Half the Waste Tires in Washington

By the end of 2007, Ecology identified 97 tire pile sites in Washington State, containing approximately 4 million waste tires. Cleanup data are provided in tons of tires; one ton of tires equal about 100 passenger tires. Efforts in 2007 resulted in cleanup of nearly 3 million tires at 22 sites. The remaining 75 sites contain about 1.3 million tires.

Summary of Numbers of Tire Pile Sites

Region	Sites Completed	Sites Remaining	Total Number of Sites
Southwest	17	8	25
Eastern*	5	47	52
Northwest	0	20	20
TOTALS	22	75	97

* Includes the Goldendale-Wing Road site

The following table summarizes the cleanup activities completed through the end of 2007. The entire Goldendale-Wing Road cleanup is complete, representing nearly 50 percent of the cleanup work in the state.

Summary of Tire Pile Cleanup in Tons

Region	Tons Removed	Tons Remaining	TOTAL TONS	Percent Reused/Recycled
Wing Road	20,240	0	20,240	8.4%
Southwest	6,693	2,238	8,931	38.2%
Eastern	1,102	8,364	9,466	71.1%
Northwest	0	2,551	2,551	0%
TOTALS	28,035	13,153	41,118	18%

At the end of this report a map of Washington illustrates where the known tire piles are located and how many sites and tons are in each county. Counties shown in black represent locations of completed

tire cleanup. Counties or boxes that show numbers in grey represent remaining tire cleanup sites. Counties shown in white have not reported any tire pile sites needing cleanup.

Goldendale-Wing Road Tire Pile Cleanup is Complete

Ecology's first priority was to quickly clean up the largest tire pile in the state. Nearly fifty percent of the state's waste tires were located in one pile on Wing Road in Goldendale, in Klickitat County. The contractor completed the cleanup in 100 working days, removing an average of 230 tons of tires from the site each day. Because local tire recycling and reuse markets do not have the capacity to absorb this much material in so short a time, most of the tires were shredded and landfilled.



An aerial photograph of the site shows the 9 piles that contained about 2 million tires. Photographs of the cleanup are provided below. The October 2006 picture shows the tire piles before the removal started. Cleanup of this site started in June of 2007 and was completed in November 2007. The November 2007 picture shows the site during final cleanup activities.



Goldendale Tire Pile October 2006



Goldendale Site, November 2007

Total tons and disposition of tires removed from the Goldendale-Wing Road site are provided in the following table. Recycling and reuse of 8 percent of the material included retreads, crumb rubber, punched rubber bumpers, tire rings, and scrap steel (wheel rims).

Goldendale-Wing Road Tire Pile Cleanup

Location	No. of Sites	Tons of Tires Removed	Tons Recycled or Reused	Tons Used for Fuel	Tons Landfilled
Wing Road Tire Pile*	1	20,240	1,697	0	18,543
Percentages			8.4%	0%	91.6%

* Located in Klickitat County

Southwest Region Cleanup Nearly Completed

The second cleanup phase included sites in Ecology’s Southwest Region, where the next largest piles were located. The second and third largest piles were in Lewis County, in Napavine, containing 2,800 tons of tires, and in Toledo, containing 2,000 tons of tires. These piles were much smaller than the one in Goldendale. The smaller volume of tires and slower pace allowed for more recycling and reuse.

Photographs show the site in Toledo before and during cleanup. The one month cleanup effort at the site in Toledo removed 2,000 tons of tires. About 42 percent of these tires were reused or recycled.



Site in Toledo in Lewis County



Toledo site during cleanup

Total tons and disposition of tires removed from the sites in the southwest counties are provided in the following table. By the end of 2007, cleanup has been completed at 17 southwest sites containing 6,693 tons of tires. Recycling and reuse of these tires depended on their condition. Over 60 percent of the tires were too old and dirty for anything but disposal at a landfill. About 38 percent of the tires were recycled or reused. Tire recycling and reuse included crumb rubber, stamped rubber bumpers, tire rings, scrap steel (wheel rims), and fuel for cement kilns.

Southwest Region Tire Pile Cleanup

Location	No. of Sites	Tons of Tires Removed	Tons Recycled or Reused	Tons Used for Fuel	Tons Landfilled
Clark	1	66	66	0	0
Cowlitz	1	25	0	25	0
Lewis	7	5,867	1,371	616	3,880
Jefferson	3	241	45	74	122
Mason	2	126	43	59	24
Pierce	1	242	72	133	37
Thurston	2	126	61	26	39
Southwest Total Completed	17	6,693	1,658	933	4,102
Percentages			24.8%	13.9%	61.3%

Eight more tire pile sites remain to be cleaned up in the Southwest Region counties. The location of these sites is detailed in the following table. There are an estimated 2,238 tons of tires at these sites. It is possible that more sites will be discovered as this cleanup work continues. Cleanup at sites in this region will continue into 2008.

Southwest Region Remaining Tire Piles

County	Number of Sites	Estimated Tons
Clark	2	380
Cowlitz	2	550
Jefferson	2	410
Lewis	1	20
Thurston	1	878
Southwest Remaining Totals	8	2,238

Eastern Washington Cleanup Just Started

The third cleanup phase includes sites located in the counties of Eastern Washington. Excluding the Goldendale-Wing Road tire pile in Klickitat County, Yakima County contains the greatest accumulation of tires in Eastern Washington with 3,660 tons of tires. Again, the smaller piles and slower cleanup allows for greater recycling and reuse.

Some tire pile sites are well organized piles of tires that will be simple and relatively inexpensive to remove. An example of this type of site is shown in the Pasco photograph, where the tires are sorted and stacked for easy removal. Other sites are more difficult and more expensive to cleanup. The photograph of the site near Lamona shows a more complex site that will be a longer and more expensive cleanup effort.



Organized tire pile in Pasco



Tire dump in Lamona

Total tons and disposition of tires removed from the eastern Washington sites are provided in the following table. Four site cleanups have been completed in Eastern Washington. Recycling and reuse of over 70 percent of these tires has occurred.

Eastern Washington Tire Pile Cleanup

Location	No. of Sites	Tons of Tires Removed	Tons Recycled or Reused	Tons Used for Fuel	Tons Landfilled
Benton	1	308	308	0	0
Chelan	1	538	209	102	227
Grant	1	165	0	165	0
Klickitat	1	91	0	0	91
Eastern Total Completed	4	1,102	517	267	318
Percentages			46.9%	24.2%	28.9%

Forty-seven tire pile sites in Eastern Washington still need to be cleaned up. These sites contain about 8,364 tons of tires. Cleanup of three of the sites located within the boundaries of the Yakama Nation reservation will be coordinated with the Yakama Nation. This cleanup effort will continue through 2008.

Eastern Washington Remaining Tire Piles

County	Number of Sites	Tons
Adams	1	20
Benton	5	441
Franklin	2	280
Grant	8	1,680
Kittitas	6	1,175
Klickitat	6	358
Lincoln	4	270
Okanogan	1	50
Pend Oreille	3	60
Spokane	1	200
Stevens	1	130
Walla Walla	2	40
Yakima	7	3,660
Eastern Remaining Totals	47	8,364

Northwest Region Cleanup Planned for 2008

The last phase of tire pile cleanup will address the sites located in the counties of Ecology's Northwest Region. A tire pile site located in Skyway is shown on the right.

In the Northwest Region, a total of 20 sites contain about 2,551 tons of tires. Cleanup of these sites will begin in spring 2008 and continue into 2009. Recycling and reuse of about 50 percent of these tires is expected.



Northwest Region Remaining Tire Piles

County	Number of Sites	Tons
King	10	1,916
Kitsap	3	255
Skagit	4	210
Snohomish	3	170
Northwest Remaining Totals	20	2,551

The following map of Washington illustrates where the known tire piles are located and how many sites and tons are in each county. It is likely that more sites will be discovered as cleanup work continues.

- Black counties show locations of completed tire pile cleanups.
- Grey counties or boxes show remaining tire pile cleanup sites.
- White counties have not reported any tire pile sites needing cleanup.

