Chapter 2
Waste Stream Components Analysis

Characteristics of the National Waste Stream
Defining the Total Solid Waste Stream
Solid Waste Reduction and Energy Conservation
Legislative Mandates for Waste Reduction
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The 1990 Arizona Solid Waste Recycling Act (A.R.S. §49-832.C.3.) requires that this annual report includes an analysis of the various waste steam components and to propose changes that will conserve energy and reduce solid waste generation. Studies have been completed that analyze specific Arizona municipal and regional waste streams (see Supplement A for a list of waste stream studies available from the Arizona Recycling Program). Each study provides a clear indication of the waste stream components within its specific governmental jurisdiction, and indicate that each jurisdiction has a unique waste stream. The differences between waste streams and the span of years in which the studies took place make it difficult to extrapolate these studies to a statewide level. In addition, the studies do not provide information needed to evaluate the waste streams collected by private sector haulers. However, the Arizona Recycling Program awarded a Waste Reduction Assistance Research and Development Grant (see Chapter 5 of this report) to the Southwest Public Recycling Association (SPRA) to compile waste stream analysis data for representative rural communities across the state. SPRA subcontracted the work to the Garbology Project at the University of Arizona. This grant project has produced a report, which is currently under review, to produce a comprehensive waste stream analysis for the state. Once the review is complete, SPRA will combine the data with the aforementioned waste stream analysis studies to produce a complete and fairly accurate picture of waste streams in Arizona, both locally and for the state as a whole.

EPA defines municipal solid waste (MSW) as wastes such as durable goods, non-durable goods, containers and packaging, food scraps, yard trimmings and miscellaneous inorganic wastes from residential, commercial, institutional and industrial solid waste sources.

The Arizona Recycling Program has data available concerning the total amount of solid waste disposed in landfills (for a list of active landfills and the tonnage accepted, see Supplement A). The information is derived through landfill disposal fees. These data, along with information provided by local governmental jurisdictions within Arizona and national studies of waste composition, are the basis for the development of general waste management strategies.

Characteristics of the National Waste Stream

The United States Environmental Protection Agency (EPA) provides results of studies analyzing the characteristics of the municipal solid waste stream for the United States in the 1998 calendar year. This study, entitled Municipalid Waste Generations, *Recycling and Disposal in the United States: Facts and Figures for 1998*, document number EPA 530-F-00-024, can be downloaded from www.epa.gov/epaoswer/non-hw/muncpl/msw99.htm. A breakdown of the national municipal solid waste stream is illustrated in Figure 2.1. A total of 220.2 million tons of municipal solid waste was generated in 1998. This is an increase of 3.2 million tons from 1997. After two consecutive years of decreases, this is the second straight year with an increase. The amount of waste generated per person per day increased slightly from 4.43 pounds in 1997 to 4.46 pounds in 1998.

Defining the Total Solid Waste Stream

For the purpose of defining recycling rates and diversion rates for Arizona and local

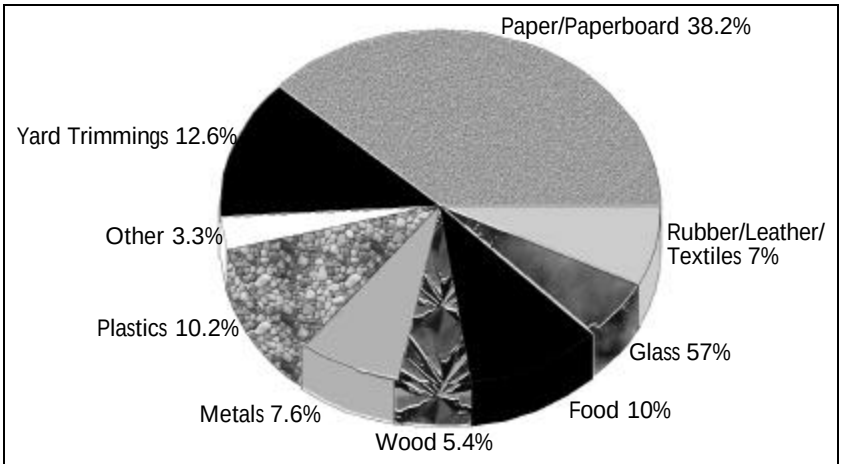

Figure II.1 The components of the U.S. municipal solid waste stream for the 1998 calendar year. The total weight of the national municipal soild waste stream during that year was 220,200,000 tons

jurisdictions, the total solid waste stream is composed of the municipal and non-municipal solid waste streams.

EPA defines municipal solid waste (MSW) as wastes such as durable goods, non-durable goods, containers and packaging, food scraps, yard trimmings and miscellaneous inorganic wastes from residential, commercial, institutional and industrial solid waste sources (Ibid.). Examples of wastes from these categories include appliances, automobile tires, newspaper, clothing, boxes, disposable tableware, office and classroom paper, wood pallets and cafeteria waste. Public concern relating to solid waste management tends to focus on this portion of the solid waste stream as it is the only portion that can be influenced directly from the home, business, or office. Recycling rates are based solely on materials recycled from MSW. The full waste stream produced by the United States includes heavy industrial and commercial wastes. These are considered non-municipal solid waste and constitute a significant portion of the waste stream. Examples of non-municipal solid waste include construction and demolition debris, automobile bodies, municipal sludge, combustion ash and industrial process wastes that might be disposed of in municipal solid waste landfills. This report will attempt to separate the information concerning MSW from the remainder of the waste stream where possible. This will allow the determination of a recycling rate based solely on the amount of MSW recycled. It will also allow the determination of a diversion rate based on the entire waste stream and the total amount of all waste recycled. Both the recycling rate and the diversion rate will be published in a more comprehensive report that will be released in January 2001.

Solid Waste Reduction and Energy Conservation

The efforts that the Arizona Recycling Program recommends to enhance source reduction and energy conservation are the same as last year: buying recycled content products and encouraging backyard composting.

Buying recycled content products creates a demand for materials collected in recycling programs. This not only reduces the amount of waste landfilled, but also significantly reduces the energy needed to produce the products. Paper is a good example.

According to Figure 2.1, paper products comprise approximately 38.2 percent of the waste stream. Recycled-content paper is readily available and performs as well as virgin paper products in computer printers, copying machines and printing presses. Buying paper made with recycled content stimulates markets producing these products. This stimulation is transmitted back through the recycling loop, increasing produc-

tion of recycled content paper, which increases the collection of waste papers for recycling. This is a closed loop in Arizona for old newspaper, which is used as a feedstock at Abitibi-Consolidated, Inc. in Snowflake, Ariz. to produce newsprint. Likewise, industrial paper waste is used by Wisconsin Tissue in Flagstaff, Ariz. to produce recycled-content tissue products.

In addition, the energy savings inherent in this process are significant. The amount of energy saved by recycling waste paper is equivalent to 4,100 kilowatts per ton, according to Wisconsin Tissue's *Environmental Evaluator*, 1991. This type of savings occurs for almost every material. Producing aluminum from used beverage containers (UBCs) saves 95 percent of the energy that using bauxite ore would consume. Producing a glass container from recycled glass (cullet) saves enough energy to light a 100 watt light for four hours. To encourage the buying recycled habit, the Arizona Recycling Program promotes buying recycled products (see Chapter 6 for details on these promotions). The Arizona Recycling Program and the Arizona Department of Commerce (ADOC) have sponsored three Arizona Buy Recycled Expos held between 1995 and 1999. The expos were produced by the Arizona Recycling Coalition and the Southwest Public Recycling Association (for a list of grants, see Supplement C). In addition, buying recycled content products was a major focus of recycling conferences sponsored by the Arizona Recycling Program and ADOC held during this past fiscal year, including the Arizona Recycling Coalition First Annual Conference, described in Chapter 5, and the Southwest Public Recycling Association's Southwest Recycling Market Development Conference, described in Chapter 7.

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Backyard composting is a direct way individual residents can practice source reduction. Second only to paper, yard trimmings represent 12.6 percent of the municipal solid waste stream. Therefore, backyard composting programs have the potential to significantly reduce the waste stream. In addition, by reducing waste at its source, the energy used to transport, process and/or dispose of the material is saved. Because of their decentralized nature, backyard composting programs are extremely hard to track. Therefore, any waste reduction and energy savings produced by the programs have not been quantified.

Individual jurisdictions within the state sponsor many different backyard composting programs sponsored by . During FY 1998, the Arizona Recycling Program sponsored a backyard composting program through Earth's 911 (1-800-Cleanup or www.1800cleanup.org) and through the WRA and WRITE Grant programs. See Supplement C for more information.

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Legislative Mandates for Waste Reduction

The intent of the Arizona State Legislature in passing the Arizona Solid Waste Recycling Act in

1990 was to give Arizona residents the opportunity to recycle. Many local governmental jurisdictions provide a variety of recycling opportunities. During the fall of 1997, discussions were held with recycling and waste disposal stakeholders pertaining to setting a non-mandated state recycling goal. However, feedback from these discussions indicated that a recycling goal was not a priority.

Feedback from small community stakeholders suggests that mandating recycling in Arizona at this time could be counterproductive. It would require cities and towns with scant financial resources to initiate recycling programs having capital costs and transportation costs that, alone, make recycling economically burdensome.

Since Arizona has low landfill disposal fees, as compared to other states, and still has potential land for future landfills, recycling costs in many areas are greater than the cost to dispose of materials. State demographics indicate that many jurisdictions with sparse populations, or those located great distances from recycling markets, have difficulty initiating and maintaining successful recycling programs. For details, see pages 40 to 44 of the 1995 State of Arizona Recycling Annual Report published by ADEQ. To assist small communities, the Arizona Recycling Program has targeted their residents and encouraged them to recycle. Educational materials, technical assistance, grants and seminars were available to help find alternatives that will reduce the solid waste streams entering their landfills for disposal. In addition, a special Waste Reduction Assistance Grant offered in 1997 was restricted to jurisdictions with populations less than 100,000. For more information, see pages 66 to 72 of the 1997 State of Arizona Recycling Annual Report, published by ADEQ. For an assessment of the projects awarded by this grant. The purpose of this grant was to address the special challenges that small and rural communities face when establishing recycling programs.

Feedback from small community stakeholders suggests that mandating recycling in Arizona at this time could be counterproductive. It would require cities and towns with scant financial resources to initiate recycling programs having capital costs and transportation costs that, alone, make recycling economically burdensome. The voluntary approach has resulted in small communities making incremental strides, within their means, to create or expand sustainable recycling programs. The Arizona Recycling Program has been instrumental in assisting such small community programs.

Methods of Solid Waste Disposal

The Arizona Solid Waste Recycling Act of 1990 (A.R.S. §49-836) imposed a 25 cent landfill disposal fee for each ton or cubic yard (six uncompacted cubic yards, or three compacted cubic yards) of waste received at the landfills. Information supplied by reports accompanying payments from the landfill operators or jurisdictions has made it possible to determine the total amount of waste landfilled in Arizona.

Other disposal methods, which represent a small amount of MSW, include exporting the waste across borders, incineration and illegal (wildcat) dumping. Through questionnaires returned to the Arizona Recycling Program by public jurisdictions and surveys returned to the Arizona Department of Commerce's Recycling Market Develop-

ment Study by private sector recyclers, the approximate amount of MSW recycled can be identified. This information is currently being compiled and will be released in a more comprehensive report in January 2001.

A very small amount of MSW from small and remote border communities is exported from Arizona for disposal. This includes the communities of Portal and Paradise, isolated by the Chiriquahua Mountains in eastern Cochise County, which export their waste to New Mexico. Also, waste haulers and the transfer station in Littlefield, which is separated from the rest of the Mohave County waste system by the Grand Canyon and Lake Mead, exported their waste to Nevada. The quantity of MSW exported is not known, but based on the size of the communities concerned, it is estimated that it represents less than 0.1 percent of the waste generated by the state and is, therefore, insignificant. In addition, most hazardous waste is exported from Arizona. Hazardous waste is not considered part of the municipal solid waste stream, but is included in the total waste stream. There are no MSW incinerator facilities in Arizona. There are some medical waste incinerators, however, medical waste represents a very small percentage of the solid waste stream and is also considered non-MSW. However, used oil and tires are combusted in certain manufacturing processes, such as the production of asphalt. The Arizona Recycling Program keeps records concerning this activity to quanitfy the amount of used oil burned (see Chapter 8). Wildcat dumping is a serious problem in some rural areas of the state. However, the amount of material disposed of in this manner is minimal when compared to the amount of waste disposed of in the proper fashion, and is not considered in calculations.

A total of 7,048,500 tons of waste was reported landfilled in Arizona during FY 2000. This total is 859,449 tons, or 13.9 percent more than in FY 1999.

The amount of material landfilled, combined with the amount of material reported recycled, or diverted, supplies a fairly complete picture of the waste generated in Arizona. Once the amount of total waste is determined, it can be used to determine the per capita generation rate of MSW for Arizona, which will be included in the comprehensive report to be released in January 2001.

A total of 7,048,500 tons of waste was reported landfilled in Arizona during FY 2000. This total is 859,449 tons, or 13.9 percent more than in FY 1999. In the 1999 Arizona Recycling Program Annual Report, landfills reported a total of 6,189,051 tons landfilled. This includes not only MSW, but all solid waste. It also includes material imported from other states that are landfilled in Arizona.

Table II.1. Materials diverted as reported by each jurisdiction for FY 2000

Volume is given in tons. Waste tires are included in miscellaneous. Used oil is reported as HHW (household hazardous waste).

Jurisdiction	Newspaper	Cardboard	Office Paper	Chipboard	Other Paper	Green/wood	Yard Waste	Christmas Trees	Organics	Aluminum	Steel	White Goods	Other Metals	PET	HDPE	PET/HDPE	Other Plastic	Glass	HHW Collections	Miscellaneous	Unspecified	Total Diverted
Apache Junction						0.15		1.36				9.15	0.42						0.05			11.14
Cave Creek	14.49	3.09								1.19	0.05		173.00									191.82
Chandler	8,910.00	691.00	11.00		3,086.00		1,100.00			157.00	459.00		702.00	153.00	153.00			612.00	48.77	5,688.00		21,770.77
Coolidge	8.00							10.49			76.50											94.99
Cottonwood	34.07	0.83			37.39		902.26			0.51	2.50			0.29	1.00							978.84
Flagstaff	4,099.38	1,997.44			40.00			24.92		83.54	555.47			65.57	64.03			97.51		24.97	-251.28	6,801.55
Florence			0.40		0.60		206.77					21.50								3.88		233.14
Gilbert	4,881.00	433.92			2,160.00					36.48	104.98			104.48	104.98			442.69				8,268.53
Guadalupe											85.00									0.30		85.30
Holbrook						30.08	120.30			18.00	40.00		13.00						40.25			261.62
Jerome	3.00	26.00	0.60		0.05	37.30	1.20			1.00	1.00		0.03							0.25		70.43
Kearny																			2.72			2.72
Mesa	14,222.00	5,001.00	150.00		365.00		11,658.00			411.00	650.00	299.00	4.83	784.00	462.00			1,105.00	23.78	6.62		35,142.23
Phoenix	54,852.88	10,362.15	37.95		1,911.44	2,387.00	13,005.00			894.39	2,358.58		32.49	1,160.04	1,591.64		30.00	3,466.07	67.49	87.95		92,245.07
Sedona	1,131.59	765.15	82.30		13.00					17.83	18.65			16.90	18.43			312.73				2,376.58
Sierra Vista	733.00	2,804.00	67.00		69.61		979.51	10.49		196.00	1,603.57		230.00						584.00	567.00		7,844.18
Tombstone	19.90	37.03								0.19												57.12
Tucson	8,814.00	2,123.00	205.00		354.00		28.90			337.00	2,157.00			455.00	488.00		50.00	3,516.00	40.11			18,568.01
Williams																					269.31	269.31
Yuma													1.16						10.83	4.12		16.11
Apache County																				62.40		62.40
Coconino County																				1,018.83	251.28	1,270.11
Gila County							4,267.00				808.00		2.30							631.00		5,708.30
Graham County													1.17							311.51		312.68
Maricopa County																				27,471.89		27,471.89
Pima County																				9,342.73		9,342.73
Santa Cruz County		117.63									600.03				19.07			229.25	6.01			971.99
Yavapai County	66.50	19.00	1.00	86.25		15.04	15.04			3.80	3.40	300.00	23.43	2.00	2.00			25.70	36.79	1,093.74		1,693.68
Private Companies																			81,457.40			81,457.40
Combined Volume	97,789.80	24,381.23	555.25	86.25	8,037.09	2,469.41	32,283.97	45.90	0.00	2,157.94	9,523.74	620.50	1,183.40	2,741.28	2,904.15	0.00	80.00	9,806.95	82,318.14	46,315.19	269.31	323,569.49
Percentage	30.22%	7.54%	0.17%	0.03%	2.48%	0.76%	9.98%	0.01%	0.00%	0.67%	2.94%	0.19%	0.37%	0.85%	0.90%	0.00%	0.02%	3.03%	25.44%	14.31%	0.08%	100.00%

Table II.2. Materials diverted as reported by each jurisdiction for FY 2000

Volume is given in cubic yards. Waste tires are included in miscellaneous. Used oil is reported as HHW (household hazardous waste).

Jurisdiction	Newspaper	Cardboard	Office Paper	Chipboard	Other Paper	Green/ Wood	Yard Waste	Christmas Trees	Organics	Aluminum	Steel	White Goods	Other Metals	PET	HDPE	PET/ HDPE	Other Plastic	Glass	HHW Collections	Miscellaneous	Unspecified	Total Diverted
Apache Junction						4.74		1.82				35.19	0.50						0.04			42.30
Cave Creek	36.22	8.23								9.54	0.18		0.31									54.49
Chandler	22,275.00	1,842.67	27.50		7,715.00		1,466.67			1,256.00	1,639.29		2,507.14	861.97	861.97			437.14	42.20	3,648.66		44,581.22
Coolidge	20.00							14.02			273.21											307.23
Cottonwood	85.16	2.21			93.48		1,200.00			4.10	8.93			1.61	5.63							1,401.12
Flagstaff	10,248.45	5,326.51			100.00			33.30		668.32	1,983.82			369.41	360.73			69.65		126.20	-502.56	18,783.83
Florence			1.00		1.50		275.00					82.69								20.66		380.85
Gilbert	12,202.50	1,157.12			5,400.00					291.84	374.93			588.62	591.44			316.21				20,922.65
Guadalupe											303.57									2.73		306.30
Holbrook						40.00	160.00			144.00	142.86		46.43						53.09			586.37
Jerome	7.50	69.33	1.50		0.13	49.73	1.60			8.00	3.57		0.11							0.50		141.97
Kearny																			3.59			3.59
Mesa	35,555.00	13,336.00	375.00		912.50		15,544.00			3,288.00	2,321.43	1,150.00	5.72	4,416.90	2,602.82			789.29	30.21	60.18		80,387.04
Phoenix	137,132.20	27,632.40	94.88		4,778.60	3,182.67	17,340.00			7,155.12	8,423.51		38.53	6,535.44	8,966.99		324.32	2,475.76	87.13	799.55		224,967.09
Sedona	2,828.96	2,040.39			32.50					142.68	66.61			64.05	103.83			223.38				5,502.40
Sierra Vista	1,832.50	7,477.33	167.50		267.50		1,305.98	14.02		1,568.00	1,603.57		434.02						758.16	5,154.55		20,583.12
Tombstone	49.75	98.75								1.52												150.02
Tucson	22,035.00	5,661.33	512.50		885.00		38.53			2,696.00	7,703.57			2,563.38	2,749.30		540.54	2,511.43	52.91			47,949.49
Williams																					538.62	538.62
Yuma													1.38						6.93	37.45		45.76
Apache County																				986.18		986.18
Coconino County																				10,595.55	502.56	11,098.11
Gila County							5,689.33				2,885.71		2.72							5,736.36		14,314.13
Graham County													1.39							2,831.91		2,833.30
Maricopa County																				277,018.58		277,018.58
Pima County																				104,390.49		104,390.49
Santa Cruz County		313.68									208.57				107.44			163.75	7.92			801.36
Yavapai County	166.25	50.67	2.50	86.25		20.00	20.00			30.40	12.14	1,153.85	27.78	11.27	11.27			18.36	48.52	9,943.09		11,602.34
Private Companies																			81,260.70			81,260.70
Combined Volume	244,474.50	65,016.62	1,182.38	86.25	20,186.20	3,292.40	43,041.11	61.34	0.00	17,263.51	27,955.48	2,386.54	3,065.52	15,412.65	16,361.41	0.00	864.86	7,004.96	82,351.36	421,352.64	538.62	971,898.34
Percentage	25.15%	6.69%	0.12%	0.01%	2.08%	0.34%	4.43%	0.01%	0.00%	1.78%	2.88%	0.25%	0.32%	1.59%	1.68%	0.00%	0.09%	0.72%	8.47%	43.35%	0.06%	100.00%