

#### **IV. Population and Waste Generation Projections [ORC Section 3734.53(A)(5)-(6)]**

This section of the plan contains all population projections, and waste generation projections for each year of the planning period. All assumptions and sources of information used in developing the analysis are included.

##### **A. Planning Period**

The Mercer County Solid Waste Management District established 1995 as the reference year for a 23-year plan, 1997 - 2020.

This plan projects all population figures and waste amounts through 2020 and provides strategies to meet waste management needs for those years.

The Mercer County Solid Waste District has experienced numerous delays in the progress of this Plan amendment and, as a result, this Plan is significantly behind schedule. Therefore, although this Plan covers a period of more than 15 years, the District will submit an update to the Ohio EPA within three years of Plan approval.

##### **B. Population Projections**

The population estimates in Table IV-1 are prepared using information obtained in 1996 from the Ohio Data User's Center, Ohio Department of Development. Those population projections are broken down by the years 1990, 1995, 2000, 2005, and 2010. Straight line projections are made for the intervening years,.

The Mercer County SWMD shares a municipality with the Darke County Solid Waste District. According to the 1990 US Census figures, the majority of the population of the Village of Burketsville lies in Mercer County (181 residents in 1990). Following the directions in the District Solid Waste Management Plan State Format, that portion of the Village of Burketsville that lies in Darke County (estimated at 88 residents in 1990) is added to the total population of Mercer County. The estimates for changes in population for that portion during the planning period follow the same changes as estimated for Mercer County. Because that rate of change (0.2%) and the population involved (88) is small, the rounding to a whole number of the population adjustments appears to remain constant at 89.

The population projections for this revised plan are approximately 3% higher than the projections made in the previous approved plan due to more recent information obtained from the Department of Development.

**Table IV-1. District Population Projections**

| Year | Mercer County<br>Projected<br>Populations <sup>1</sup> | Adjustments to-<br>Population <sup>2</sup> | Total Dis-tribut Popu-la-tion |
|------|--|--|-------------------------------|
| 1995 | 39,800   | 89   | 39,889                        |
| 1996 | 39,820   | 89   | 39,909                        |
| 1997 | 39,840   | 89   | 39,929                        |
| 1998 | 39,860   | 89   | 39,949                        |
| 1999 | 39,880   | 89   | 39,969                        |
| 2000 | 39,900   | 89   | 39,989                        |
| 2001 | 40,899   | 89   | 40,988                        |
| 2002 | 40,874   | 89   | 40,963                        |
| 2003 | 40,849   | 89   | 40,938                        |
| 2004 | 40,824   | 89   | 40,913                        |
| 2005 | 40,799   | 89   | 40,888                        |
| 2006 | 40,774   | 89   | 40,863                        |
| 2007 | 40,750   | 89   | 40,839                        |
| 2008 | 40,725   | 89   | 40,814                        |
| 2009 | 40,700   | 89   | 40,789                        |
| 2010 | 40,675   | 89   | 40,764                        |
| 2011 | 40,650   | 89   | 40,739                        |
| 2012 | 40,625   | 89   | 40,714                        |
| 2013 | 40,601   | 89   | 40,690                        |
| 2014 | 40,576   | 89   | 40,665                        |
| 2015 | 40,551   | 89   | 40,640                        |
| 2016 | 40,526   | 89   | 40,615                        |
| 2017 | 40,502   | 89   | 40,591                        |
| 2018 | 40,477   | 89   | 40,566                        |
| 2019 | 40,452   | 89   | 40,541                        |
| 2020 | 40,428   | 89   | 40,517                        |

2 The population projections have been adjusted for the Village/City of Burketsville

3 Table was updated with 2000 Census figure for Ohio Data User Center for Mercer County Ohio with 2000 population of 40,924. All population figures post-2000 reflect the updated census figures.

Sample Calculation:

$$1995 \text{ population} = 39,800 \quad 200 \text{ population} = 39,900$$

$$\text{Rate of population Growth each year for five year period} = \frac{(39,900 - 39,800)}{39,800 * 5} = 0.0005025 \text{ rate of change}$$

$$\begin{aligned}
 1997 \text{ population} &= 39,800 + 2(39,800 * 0.0005025) \\
 &= 39,840 + 89 \\
 &= 39,929
 \end{aligned}$$

Source of information: Ohio Data User's Center Ohio Department of Development

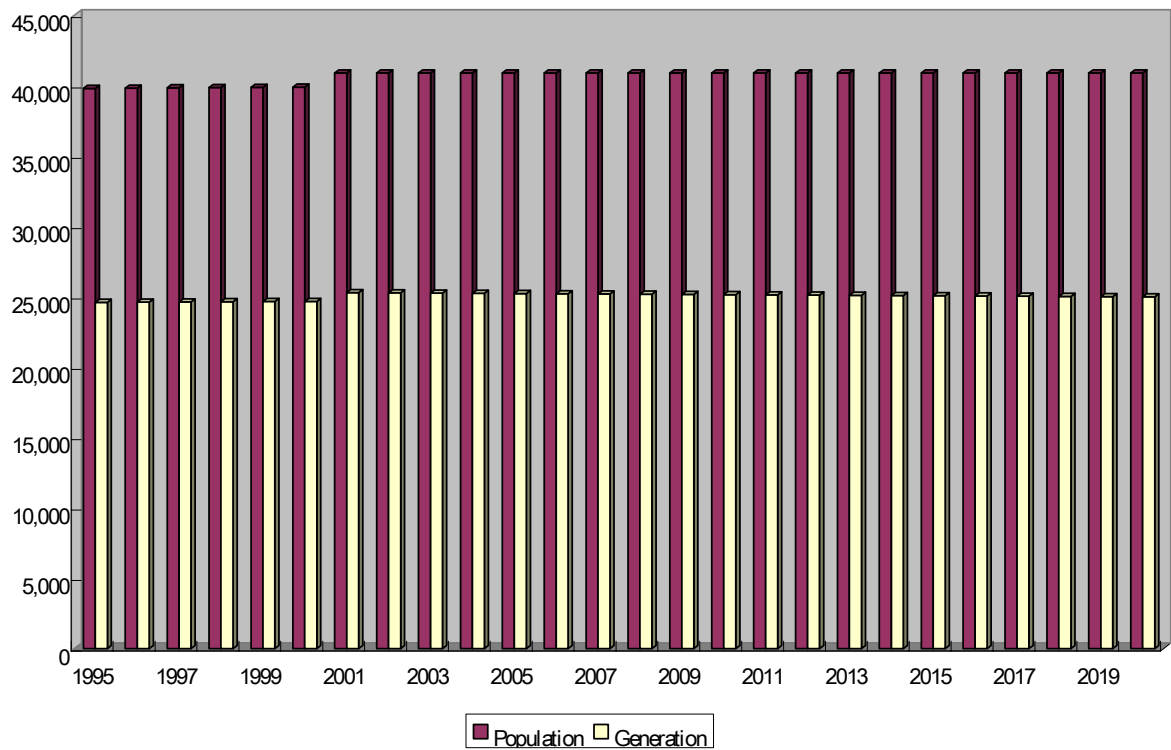
### C. Residential/Commercial Waste Generation

Population is generally considered to be a reasonably good predictor of residential/commercial waste generation. As a result, the *Characterization of Municipal Solid Wastes in the United States: 1992 Update (1992 Update)* prepared by Franklin Associates for the U.S. Environmental Protection Agency provides national average waste generation estimates per capita for 1990 and 2000. Using the per capita estimates for these two years and straight-line projections for 1991-1999 and 2001-2005 results in the following values:

| Pounds  |      | Pounds  |      | Pounds  |      |
|---------|------|---------|------|---------|------|
| /Capita |      | /Capita |      | /Capita |      |
| Year    | /Day | Year    | /Day | Year    | /Day |
| 1990    | 4.30 | 2000    | 4.33 | 2010    | 4.33 |
| 1991    | 4.32 | 2001    | 4.33 | 2011    | 4.33 |
| 1992    | 4.34 | 2002    | 4.33 | 2012    | 4.33 |
| 1993    | 4.36 | 2003    | 4.33 | 2013    | 4.33 |
| 1994    | 4.38 | 2004    | 4.33 | 2014    | 4.33 |
| 1995    | 4.33 | 2005    | 4.33 | 2015    | 4.33 |
| 1996    | 4.33 | 2006    | 4.33 | 2016    | 4.33 |
| 1997    | 4.33 | 2007    | 4.33 | 2017    | 4.33 |
| 1998    | 4.33 | 2008    | 4.33 | 2018    | 4.33 |
| 1999    | 4.33 | 2009    | 4.33 | 2019    | 4.33 |
|         |      |         |      | 2020    | 4.33 |

The preceding projections for residential/commercial waste generation are approximately 19% higher than the estimates in the recently approved District plan. The higher projections are due to two factors: 1) higher population projections due to more recent information and 2) higher per capita residential/commercial generation rates.

Population vs. Waste Generation Projections



Mercer County is a rural community of farms and some industry. The Policy Committee considers it unlikely that the District will produce as much waste as projected above. However, the District’s historic financial problems have not allowed for funding that would be necessary to do a waste audit. As a result, the District does not have the District-specific generation rates. Therefore, the District has decided to make use of Ohio EPA’s “per capita” generation rate of 3.38 pound per person per day in Table IV-2. For comparison purposes, the result of using national averages is indicated above.

Table IV-2.

**District Residential/Commercial  
Waste Generation (TPY)<sup>2</sup>**

| Year | District<br>Population | Per Capita<br>Gener-ation<br>Rate <sup>1</sup> | Total Residen-tial/<br>Commercial<br>Genera-tion<br>(TPY) |
|------|------------------------|--|---|
| 1995 | 39,889                 | 3.38   | 24,606  |
| 1996 | 39,909                 | 3.38   | 24,618  |
| 1997 | 39,929                 | 3.38   | 24,630  |
| 1998 | 39,949                 | 3.38   | 24,643  |
| 1999 | 39,969                 | 3.38   | 24,655  |
| 2000 | 39,989                 | 3.38   | 24,667  |
| 2001 | 40,988                 | 3.38   | 25,283  |
| 2002 | 40,963                 | 3.38   | 25,268  |
| 2003 | 40,938                 | 3.38   | 25,253  |
| 2004 | 40,913                 | 3.38   | 25,237  |
| 2005 | 40,888                 | 3.38   | 25,222  |
| 2006 | 40,863                 | 3.38   | 25,207  |
| 2007 | 40,839                 | 3.38   | 25,191  |
| 2008 | 40,814                 | 3.38   | 25,176  |
| 2009 | 40,789                 | 3.38   | 25,161  |
| 2010 | 40,764                 | 3.38   | 25,145  |
| 2011 | 40,739                 | 3.38   | 25,130  |
| 2012 | 40,714                 | 3.38   | 25,115  |
| 2013 | 40,690                 | 3.38   | 25,099  |
| 2014 | 40,665                 | 3.38   | 25,084  |
| 2015 | 40,640                 | 3.38   | 25,069  |
| 2016 | 40,615                 | 3.38   | 25,054  |
| 2017 | 40,591                 | 3.38   | 25,038  |
| 2018 | 40,566                 | 3.38   | 25,023  |
| 2019 | 40,541                 | 3.38   | 25,008  |
| 2020 | 40,517                 | 3.38   | 24,993  |

1 *Characterization of Municipal Solid Wastes in the United States: 1995 Update* prepared by Franklin & Associates for the United States Environmental Protection Agency

2 The District believes that waste generation will not increase as fast as projected here. The new *Franklin Report Update* has projected lower waste generation rates than the ones used in this plan.

Sample Calculation:

$$\begin{aligned}
 \text{Total Residential/Commercial Generation 1995} &= \frac{1995 \text{ population} * \text{generation rate} * 365 \text{ days}}{2,000 \text{ pounds per ton}} \\
 &= \frac{39,889 * 3.38 * 365}{2,000} \\
 &= 24,606
 \end{aligned}$$

#### D. Industrial Waste Generation

The District conducted a survey of all industries in Mercer County for the reference year 1995.

The results of the District's industrial survey identified:

- the Standard Industrial Classification (SIC) category for each industry;
- the amounts of each type of waste generated by each industry;
- the management methods used and amount managed by each method, including on-site and off-site disposal, recycling, and source reduction;
- total number of employees within each SIC category;
- number of industries in the District (SIC categories 20 and 22-39);
- number of industries surveyed by the District within each SIC category;
- number of industries within each SIC category responding to the survey with surveys judged to be reliable;
- number of employees in responding industries within each SIC category; and
- the type and amount of each waste reported generated by responding industries within each SIC category.

An updated list of industries operating in the Mercer County was obtained from the *1995 Ohio Harris Industrial Directory* from Harris Infosource International. The Mercer County SWMD made an effort to obtain usable surveys from all industries within each SIC category, especially industries with large employment or generating large amounts of waste. Although not all industries completed the surveys, the majority of the industries with the largest waste generation and the highest number of employees completed the survey for 1995.

|   |        |
|---|--------|
| Number of industries responding                   | 41     |
| Number of industries not responding               | 34     |
| Total number of industries                        | 75     |
| % of industries represented by survey information | 54.67% |

|   |        |
|---|--------|
| Number of employees of industries responding                | 3,349  |
| Number of employees of industries not responding            | 1,241  |
| Total number of employees                                   | 4,590  |
| % of industrial employees represented by survey information | 72.96% |

Appendix F of this plan includes the total amounts of waste generated, recycled, source reduced, composted, incinerated, landfilled and the employee generation rate for each type of waste within each two-digit SIC category.

In order to estimate the waste generated by non-responding industries, the District first determined the average generation rate per employee for material in each of the two-digit SIC categories.

The average generation rate for each material per employee was determined by dividing the total waste generated for that material as reported by the industries in that two-digit SIC category by the number of employees as reported by those industries.

Each average generation rate per employee for each material in the solid waste stream was compared to a similar data bank (compiled in a joint effort between Woolpert LLP and the "Fayette, Highland, Pickaway, and Ross County Joint Solid Waste District") from other industries throughout Ohio to determine if any unusual variances existed. None were found and the employee generation rate as calculated for the Mercer County SWMD were used to provide consistency in projections. If no industries responded to the 1995 survey for a particular two-digit SIC code, the generation rate in the data bank for that material in each two-digit SIC category was used to estimate the waste for non-reporting industries in that two-digit SIC category.

The *1995 Harris Ohio Industrial Directory* provided employment numbers for each non-responding industry. The number of employees from non-responding industries were then multiplied by the average employee waste generation rate for each material in each SIC category to estimate generation. The totals for each material were then added to yield the total waste estimated to be produced by the number of employees in that SIC category.

Reported waste totals and estimates of waste generated for non responding industries were added together to yield an estimated total industrial waste generation for the District. (A complete listing for the generation rate per employee for each material in each SIC category is shown in Appendix F.) The results are shown in Table IV-3.

Sample Calculation: For Cardboard in SIC 20

$$\begin{aligned}
 \text{Employee generation rate} &= \frac{\text{reported tons of cardboard generated}}{\text{reported number of employees}} \\
 \text{for cardboard} &= \frac{127.1 \text{ tons of cardboard reported generated}}{68 \text{ employees reported}} \\
 &= 1.869118 \\
 &= 1.87 \text{ tons of cardboard generated per employee}
 \end{aligned}$$

$$\begin{aligned}
 \text{Estimated cardboard generated} &= \text{Number of employees} * \text{employee generation rate} \\
 \text{by non-responding industries} &= 676 * 1.87 \\
 &= 1,264.12
 \end{aligned}$$

Table IV-3.

**Industrial Waste Generation  
Survey Respondents vs. Non-Respondents**

| Standard Industrial Classification Category (SIC) | Survey Respondents |                |                         |                              | Survey Non-Respondents |                |                         | Total Waste Generated (Tons) |
|---|--------------------|----------------|-------------------------|------------------------------|------------------------|----------------|-------------------------|------------------------------|
|   | # of Industries    | # of Employees | Tons of Waste Generated | Generation Rate <sup>1</sup> | # of Industries        | # of Employees | Tons of Waste Generated |                              |
| 20  | 5                  | 68             | 910.20                  | 13.39                        | 8                      | 676            | 9,058.40                | 9,968.60                     |
| 22  | 1                  | 2              | 0.00                    | 0.00                         | 0                      | 0              | 0.00                    | 0.00                         |
| 23  | 0                  | 0              | 0.00                    | 3.81                         | 1                      | 125            | 476.25                  | 476.25                       |
| 24  | 3                  | 48             | 36.85                   | 0.77                         | 5                      | 22             | 17.16                   | 54.01                        |
| 25  | 0                  | 0              | 0.00                    | 10.18                        | 0                      | 0              | 0.00                    | 0.00                         |
| 26  | 1                  | 25             | 5.75                    | 0.23                         | 0                      | 0              | 0.00                    | 5.75                         |
| 27  | 2                  | 674            | 3,572.06                | 5.30                         | 5                      | 25             | 132.75                  | 3,704.81                     |
| 28  | 6                  | 79             | 37.15                   | 0.47                         | 1                      | 59             | 27.73                   | 64.88                        |
| 29  | 0                  | 0              | 0.00                    | 0.54                         | 0                      | 0              | 0.00                    | 0.00                         |
| 30  | 0                  | 0              | 0.00                    | 4.72                         | 0                      | 0              | 0.00                    | 0.00                         |
| 31  | 0                  | 0              | 0.00                    | 5.29                         | 0                      | 0              | 0.00                    | 0.00                         |
| 32  | 2                  | 33             | 93.10                   | 2.82                         | 2                      | 17             | 47.77                   | 140.87                       |
| 33  | 0                  | 0              | 0.00                    | 17.86                        | 0                      | 0              | 0.00                    | 0.00                         |
| 34  | 6                  | 453            | 11,556.90               | 25.51                        | 3                      | 46             | 1,173.00                | 12,729.90                    |
| 35  | 10                 | 796            | 3,083.60                | 3.87                         | 6                      | 211            | 820.79                  | 3,904.39                     |
| 36  | 0                  | 0              | 0.00                    | 3.31                         | 0                      | 0              | 0.00                    | 0.00                         |

|                      |    |       |           |        |    |       |           |           |
|----------------------|----|-------|-----------|--------|----|-------|-----------|-----------|
| 37                   | 1  | 1035  | 6,315.40  | 6.10   | 1  | 45    | 396.90    | 6,712.30  |
| 38                   | 0  | 0     | 0.00      | 44.09  | 0  | 0     | 0.00      | 0.00      |
| 39                   | 4  | 136   | 467.53    | 3.44   | 2  | 15    | 51.75     | 519.28    |
| <b>Totals (tons)</b> | 41 | 3,349 | 26,078.54 | 151.70 | 34 | 1,241 | 12,202.50 | 38,281.04 |

1 "Generation Rate" means the generation rate in tons per employee per year.

2 Approximately 12,000 TPY of waste is projected for non responding industries. This waste is not documented, but is estimated due to the methods available for projecting waste for non respondents.

**Table IV-4a Mercer County SWMD Projected Industrial Employment**

|    | A                           | B                               | C     | D     | E     | F     | G     | H     | I     | J     | K     | L     | M     | N     | O     | P     | Q     | R     | S     | T     | U     | V     | W     | X     | Y     | Z     | AA    | AB    |    |
|----|-----------------------------|---------------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|----|
|    | NUMBER OF EMPLOYEES BY YEAR |                                 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 1  | SIC Category                | Annual Rate of Change in SDA 2% |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 2  |                             |                                 |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |    |
| 3  |                             |                                 | 1995  | 1996  | 1997  | 1998  | 1999  | 2000  | 2001  | 2002  | 2003  | 2004  | 2005  | 2006  | 2007  | 2008  | 2009  | 2010  | 2011  | 2012  | 2013  | 2014  | 2015  | 2016  | 2017  | 2018  | 2019  | 2020  |    |
| 4  | 20                          | -0.4                            | 744   | 741   | 738   | 735   | 732   | 729   | 726   | 723   | 721   | 718   | 715   | 712   | 709   | 706   | 703   | 701   | 698   | 695   | 692   | 690   | 687   | 684   | 681   | 679   | 676   | 673   |    |
| 5  | 22                          | -0.7                            | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     | 2     |    |
| 6  | 23                          | 0.3                             | 125   | 125   | 126   | 126   | 127   | 127   | 127   | 128   | 128   | 128   | 129   | 129   | 129   | 130   | 130   | 131   | 131   | 131   | 132   | 132   | 133   | 133   | 133   | 134   | 134   | 135   |    |
| 7  | 24                          | 1.4                             | 70    | 71    | 72    | 73    | 74    | 75    | 76    | 77    | 78    | 79    | 80    | 82    | 83    | 84    | 85    | 87    | 88    | 89    | 90    | 92    | 93    | 94    | 96    | 97    | 98    | 100   |    |
| 8  | 25                          | 0.4                             | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| 9  | 26                          | 0.3                             | 25    | 25    | 25    | 25    | 25    | 25    | 25    | 26    | 26    | 26    | 26    | 26    | 26    | 26    | 26    | 26    | 26    | 26    | 27    | 27    | 27    | 27    | 27    | 27    | 27    | 27    |    |
| 10 | 27                          | 0.8                             | 699   | 705   | 710   | 716   | 722   | 727   | 733   | 739   | 745   | 751   | 757   | 763   | 769   | 775   | 781   | 788   | 794   | 800   | 807   | 813   | 820   | 826   | 833   | 840   | 846   | 853   |    |
| 11 | 28                          | 0.4                             | 138   | 139   | 139   | 140   | 140   | 141   | 141   | 142   | 142   | 143   | 144   | 144   | 145   | 145   | 146   | 146   | 147   | 147   | 148   | 149   | 149   | 150   | 150   | 151   | 152   | 152   |    |
| 12 | 29                          | -1.1                            | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| 13 | 30                          | 1.6                             | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| 14 | 31                          | -2.4                            | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| 15 | 32                          | -0.9                            | 50    | 50    | 49    | 49    | 48    | 48    | 47    | 47    | 47    | 46    | 46    | 45    | 45    | 44    | 44    | 43    | 43    | 43    | 42    | 42    | 41    | 41    | 41    | 41    | 40    | 40    | 40 |
| 16 | 33                          | -1.3                            | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| 17 | 34                          | -0.1                            | 499   | 499   | 498   | 498   | 497   | 497   | 496   | 496   | 495   | 495   | 494   | 494   | 494   | 493   | 493   | 492   | 492   | 491   | 491   | 490   | 490   | 489   | 489   | 488   | 488   | 487   |    |
| 18 | 35                          | 0.2                             | 1007  | 1009  | 1011  | 1013  | 1015  | 1017  | 1019  | 1021  | 1023  | 1025  | 1027  | 1029  | 1031  | 1033  | 1035  | 1037  | 1039  | 1041  | 1043  | 1046  | 1048  | 1050  | 1052  | 1054  | 1056  | 1058  |    |
| 19 | 36                          | 0                               | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| 20 | 37                          | 0                               | 1080  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  | 1171  |    |
| 21 | 38                          | 0.5                             | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     | 0     |    |
| 22 | 39                          | 0.9                             | 151   | 152   | 154   | 155   | 157   | 158   | 159   | 161   | 162   | 164   | 165   | 167   | 169   | 170   | 172   | 173   | 175   | 176   | 178   | 179   | 181   | 183   | 184   | 186   | 188   | 189   |    |
| 23 | Totals TPY                  |                                 | 4,590 | 4,689 | 4,695 | 4,703 | 4,710 | 4,717 | 4,722 | 4,733 | 4,740 | 4,748 | 4,756 | 4,764 | 4,772 | 4,780 | 4,789 | 4,797 | 4,805 | 4,814 | 4,823 | 4,832 | 4,841 | 4,850 | 4,859 | 4,868 | 4,877 | 4,887 |    |

**Table IV-4. Projected Industrial Waste Generation**

|    | B               | C                           | D      | E      | F      | G      | H      | I      | J      | K      | L      | M      | N      | O      | P      | Q      | R      | S      | T      | U      | V      | W      | X      | Y      | Z      | AA     | AB     |       |   |
|----|-----------------|-----------------------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-------|---|
| 27 | S/C<br>Category | NUMBER OF EMPLOYEES BY YEAR |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |       |   |
| 28 |                 |                             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |       |   |
| 29 |                 |                             |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |        |       |   |
| 30 |                 | 1995                        | 1996   | 1997   | 1998   | 1999   | 2000   | 2001   | 2002   | 2003   | 2004   | 2005   | 2006   | 2007   | 2008   | 2009   | 2010   | 2011   | 2012   | 2013   | 2014   | 2015   | 2016   | 2017   | 2018   | 2019   | 2020   |       |   |
| 31 | 20              | 9,969                       | 9,922  | 9,883  | 9,843  | 9,804  | 9,765  | 9,725  | 9,687  | 9,648  | 9,609  | 9,571  | 9,532  | 9502   | 9464   | 9426   | 9388   | 9351   | 9313   | 9276   | 9239   | 9202   | 9165   | 9128   | 9092   | 9056   | 9019   |       |   |
| 32 | 22              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     | 0 |
| 33 | 23              | 476                         | 478    | 479    | 481    | 482    | 483    | 485    | 486    | 488    | 489    | 491    | 492    | 493    | 494    | 496    | 497    | 499    | 500    | 502    | 503    | 505    | 506    | 508    | 509    | 511    | 513    |       |   |
| 34 | 24              | 54                          | 55     | 55     | 56     | 57     | 58     | 59     | 59     | 60     | 61     | 62     | 63     | 64     | 65     | 66     | 67     | 68     | 69     | 70     | 71     | 72     | 73     | 74     | 75     | 76     | 77     |       |   |
| 35 | 25              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     |   |
| 36 | 26              | 6                           | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6      | 6     |   |
| 37 | 27              | 3,705                       | 3,734  | 3,764  | 3,794  | 3,825  | 3,855  | 3,886  | 3,917  | 3,949  | 3,980  | 4,012  | 4,044  | 4076   | 4109   | 4142   | 4175   | 4208   | 4242   | 4276   | 4310   | 4345   | 4379   | 4414   | 4450   | 4485   | 4521   |       |   |
| 38 | 28              | 65                          | 65     | 65     | 66     | 66     | 66     | 66     | 67     | 67     | 67     | 68     | 68     | 68     | 68     | 68     | 69     | 69     | 69     | 70     | 70     | 70     | 70     | 71     | 71     | 71     | 72     |       |   |
| 39 | 29              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     |   |
| 40 | 30              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     |   |
| 41 | 31              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     |   |
| 42 | 32              | 141                         | 140    | 138    | 137    | 136    | 135    | 134    | 132    | 131    | 130    | 129    | 128    | 126    | 125    | 124    | 122    | 121    | 120    | 119    | 118    | 117    | 116    | 115    | 114    | 113    | 112    |       |   |
| 43 | 33              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     |   |
| 44 | 34              | 12,730                      | 12,717 | 12,704 | 12,691 | 12,679 | 12,666 | 12,653 | 12,641 | 12,682 | 12,615 | 12,603 | 12,590 | 12,589 | 12,577 | 12,564 | 12,552 | 12,539 | 12,527 | 12,514 | 12,501 | 12,489 | 12,476 | 12,464 | 12,452 | 12,439 | 12,427 |       |   |
| 45 | 35              | 3,904                       | 3,905  | 3,913  | 3,921  | 3,928  | 3,936  | 3,944  | 3,952  | 3,960  | 3,968  | 3,976  | 3,984  | 3,990  | 3,998  | 4,006  | 4,014  | 4,022  | 4,030  | 4,038  | 4,046  | 4,054  | 4,063  | 4,071  | 4,079  | 4,087  | 4,095  |       |   |
| 46 | 36              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     |   |
| 47 | 37              | 6,712                       | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,134  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143  | 7,143 |   |
| 48 | 38              | 0                           | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0      | 0     |   |
| 49 | 39              | 519                         | 524    | 529    | 534    | 538    | 543    | 548    | 553    | 558    | 563    | 568    | 573    | 580    | 585    | 590    | 595    | 601    | 606    | 612    | 617    | 623    | 628    | 634    | 640    | 645    | 651    |       |   |
| 50 | Totals<br>TPY   | 38,281                      | 38,689 | 38,679 | 38,672 | 38,664 | 38,650 | 38,649 | 38,643 | 38,683 | 38,631 | 38,629 | 38,623 | 38,637 | 38,634 | 38,631 | 38,629 | 38,627 | 38,626 | 38,625 | 38,625 | 38,625 | 38,626 | 38,628 | 38,630 | 38,632 | 38,635 |       |   |

**E. Exempt Waste**

This category includes all waste disposed in solid waste landfills within the District which is not characterized as solid waste. For example, construction and demolition debris is not solid waste, but is frequently disposed in solid waste landfills. In addition, non-toxic foundry sand is not characterized as solid waste but is also frequently disposed in a solid waste landfill. According to page 8 of the Facility Data Reports of facilities receiving District waste in 1995, 15.01 tons of exempt waste generated in the District was disposed of at the local (Celina) landfill. Additional investigations found that 24.43 tons of exempt waste generated in the District went to the Greenville Recycling and Transfer Station in Darke County.

**Table IV-5.  
Exempt Waste Generated in the District and Disposed in Landfills**

| Year | Tons of Each Waste Stream                    |                 |        |                      | Total<br>Other<br>Waste<br>(TPY) |
|------|--|-----------------|--------|----------------------|----------------------------------|
|      | Construction<br>&<br>Demolition<br>Materials | Foundry<br>Sand | Flyash | Unknown <sup>2</sup> |                                  |
| 1995 | 0  | 0               | 0      | 39                   | 39                               |
| 1996 | 0  | 0               | 0      | 40                   | 40                               |
| 1997 | 0  | 0               | 0      | 40                   | 40                               |
| 1998 | 0  | 0               | 0      | 40                   | 40                               |
| 1999 | 0  | 0               | 0      | 40                   | 40                               |
| 2000 | 0  | 0               | 0      | 40                   | 40                               |
| 2001 | 0  | 0               | 0      | 41                   | 41                               |
| 2002 | 0  | 0               | 0      | 41                   | 41                               |
| 2003 | 0  | 0               | 0      | 41                   | 41                               |
| 2004 | 0  | 0               | 0      | 41                   | 41                               |
| 2005 | 0  | 0               | 0      | 41                   | 41                               |
| 2006 | 0  | 0               | 0      | 42                   | 42                               |
| 2007 | 0  | 0               | 0      | 42                   | 42                               |
| 2008 | 0  | 0               | 0      | 42                   | 42                               |
| 2009 | 0  | 0               | 0      | 42                   | 42                               |
| 2010 | 0  | 0               | 0      | 43                   | 43                               |
| 2011 | 0  | 0               | 0      | 43                   | 43                               |
| 2012 | 0  | 0               | 0      | 43                   | 43                               |
| 2013 | 0  | 0               | 0      | 43                   | 43                               |
| 2014 | 0  | 0               | 0      | 43                   | 43                               |
| 2015 | 0  | 0               | 0      | 44                   | 44                               |
| 2016 | 0  | 0               | 0      | 44                   | 44                               |
| 2017 | 0  | 0               | 0      | 44                   | 44                               |
| 2018 | 0  | 0               | 0      | 44                   | 44                               |
| 2019 | 0  | 0               | 0      | 44                   | 44                               |
| 2020 | 0  | 0               | 0      | 45                   | 45                               |

1 Source for 1995 exempt waste: Page 8 of Facility Data Reports for 1995 (for each individual solid waste facility).

2 Fifteen (15) tons of exempt waste was reported by the Ohio EPA in the *Facility Data Report*. The Greenville transfer station reported 24.44 tons of exempt waste in a separate report. The District was not supplied with what type of exempt material was excepted at either facility. For planning purposes, it was classified under "Other".

Sample Calculation: Assumptions:

**F. Total Waste Generation**

**Table IV-6. Total Waste Generation for the District During the Planning Period (in TPY)**

| Year | Residential-/<br>Commercial<br>Tons<br>(Table IV-2) | Industrial<br>Tons<br>(Table IV-4) | Exempt <sup>1</sup><br>Tons<br>(Table IV-5) | Total Waste<br>Generation<br>(Tons) | Generation<br>Rate (lbs/<br>p-erson/d-ay) <sup>2</sup> |
|------|---|------------------------------------|---|-------------------------------------|--|
| 1995 | 24,606  | 38,281                             | 39  | 62,926                              | 8.64   |
| 1996 | 24,618  | 38,688                             | 39  | 63,345                              | 8.70   |
| 1997 | 24,630  | 38,680                             | 40  | 63,350                              | 8.69   |
| 1998 | 24,643  | 38,671                             | 40  | 63,354                              | 8.69   |
| 1999 | 24,655  | 38,664                             | 40  | 63,359                              | 8.69   |
| 2000 | 24,667  | 38,656                             | 40  | 63,363                              | 8.68   |
| 2001 | 25,283  | 38,649                             | 41  | 63,973                              | 8.55   |
| 2002 | 25,268  | 38,643                             | 41  | 63,952                              | 8.55   |
| 2003 | 25,253  | 38,683                             | 41  | 63,977                              | 8.56   |
| 2004 | 25,237  | 38,631                             | 41  | 63,910                              | 8.56   |
| 2005 | 25,222  | 38,629                             | 41  | 63,892                              | 8.56   |
| 2006 | 25,207  | 38,623                             | 42  | 63,871                              | 8.56   |
| 2007 | 25,191  | 38,637                             | 42  | 63,870                              | 8.57   |
| 2008 | 25,176  | 38,634                             | 42  | 63,852                              | 8.57   |
| 2009 | 25,161  | 38,631                             | 42  | 63,834                              | 8.58   |
| 2010 | 25,145  | 38,629                             | 43  | 63,816                              | 8.58   |
| 2011 | 25,130  | 38,627                             | 43  | 63,800                              | 8.58   |
| 2012 | 25,115  | 38,626                             | 43  | 63,783                              | 8.58   |
| 2013 | 25,099  | 38,625                             | 43  | 63,768                              | 8.59   |
| 2014 | 25,084  | 38,625                             | 43  | 63,753                              | 8.59   |
| 2015 | 25,069  | 38,625                             | 44  | 63,738                              | 8.59   |
| 2016 | 25,054  | 38,626                             | 44  | 63,724                              | 8.60   |
| 2017 | 25,038  | 38,628                             | 44  | 63,710                              | 8.60   |
| 2018 | 25,023  | 38,630                             | 44  | 63,697                              | 8.60   |
| 2019 | 25,008  | 38,632                             | 44  | 63,685                              | 8.61   |
| 2020 | 24,993  | 38,635                             | 45  | 63,673                              | 8.61   |

- 1 "Exempt Waste" includes only materials which are exempted from the definition of solid waste but are processed at solid waste facilities such as landfills.
- 2 Totals are calculate for this column by multiplying the adjacent column ("Total Waste Generation") by 2,000 pounds and dividing by the District population and 365 days.

Sample Calculation:

$$\begin{aligned}
 \text{Total Generation rate in} & \\
 \text{pounds/person/day 1995} & = \frac{\text{Total Waste Generation} * 2,000 \text{ pounds/ton}}{\text{Population} * 365 \text{ days/year}} \\
 & = \frac{62,926 * 2,000}{39,889 * 365}
 \end{aligned}$$

$$= 8.64 \text{ lb/person/day}$$

The results of the preceding table illustrates the sensitivity and volatility of the results of waste projection, methods, and the strengths and weaknesses of the methods employed and the time period studied. Methods which use landfill reporting and recycling inventories almost always indicate lower waste generation, because they do not consider the "lost", source-reduced or misreported waste deposition. Theoretical methods, such as those employed above, usually estimate higher generation rates because they do not consider where the waste was taken for management went. Each sampling of data is likely to result in differing estimates of waste generation, accounting for seasonal variations and industrial output in local manufacturing facilities. Variations (resulting use of one method or another or sampling performed from one time to another) are inevitable. Historical "discrepancies" are merely of differing methods and time periods.

## **G. Waste Composition**

### **1. Residential/Commercial Sectors.**

Waste composition for the residential/commercial sectors was estimated by using national averages in the *1995 Update*. The percentages as listed in Table 42, "Generation of Municipal Solid Waste, 1994 Arranged in Descending Order by Weight" of the *1995 Update* show the percentage of the total weight for various materials. Some categories were combined to reduce the number of categories. The categories shown are those most useful for the District for recycling purposes.

**Table IV-7. Estimated Residential/Commercial Waste Stream Composition for the District for the Reference Year<sup>1</sup>**

| Waste Stream Type          | Percent Composition of Residential/Commercial Waste Stream <sup>1</sup> | Tons          |
|----------------------------|---|---------------|
| Major Appliances           | 1.60%   | 394           |
| Rubber Tires               | 1.80%   | 443           |
| Lead-acid Batteries        | 0.80%   | 197           |
| Newspapers                 | 6.50%   | 1,599         |
| Magazines                  | 1.00%   | 246           |
| Office Paper               | 3.20%   | 787           |
| Telephone Books            | 0.20%   | 49            |
| Corrugated                 | 13.60%  | 3,346         |
| Other Paperboard           | 0.10%   | 25            |
| Other Paper                | 10.80%  | 2,657         |
| Glass Packaging            | 5.80%   | 1,427         |
| Steel Packaging            | 1.50%   | 369           |
| Aluminum Cans              | 1.00%   | 246           |
| Plastic Soft Drink Bottles | 0.30%   | 74            |
| Plastic Milk Bottles       | 0.30%   | 74            |
| Furniture & Furnishings    | 3.60%   | 886           |
| Wood Packaging             | 4.90%   | 1,206         |
| Food Wastes                | 6.70%   | 1,649         |
| Yard Trimmings             | 14.60%  | 3,592         |
| Misc. Inorganic wastes     | 1.50%   | 369           |
| Clothing & Footwear        | 2.10%   | 517           |
| Misc.                      | 18.10%  | 4,454         |
| <b>TOTALS</b>              | <b>100.00%</b>  | <b>24,606</b> |

<sup>1</sup> Percent composition taken from *Characterization of Municipal Solid Wastes in the United States: 1995 Update* prepared by Franklin & Associates for the United States Environmental Protection Agency.

Assumptions: Assumes composition of Mercer County's residential/commercial waste stream are comparable to the national average.

Sample Calculation:

Estimated tons of waste stream type = Total tons of R/C waste \* Percent composition waste stream type of total R/C tons

= 24,606 \* 6.5% newspaper

= 1,599 tons of ONP

## **2. Industrial Waste Sector.**

Knowledge of the types of waste generated by industry is also important for designing strategies and projections for future industrial recycling and source reduction. The District used the 1995 industrial waste survey results to identify industrial waste composition.

Amounts of each type of waste generated by survey non-respondents were estimated by examining information from other companies in the same SIC category. The results are shown in Table IV-8. In Appendix F, both the reported and estimated amounts of industrial waste generated by type of waste stream are shown

**Table IV-8. Estimated Industrial Waste Composition for the Reference Year in the District**

| Waste Stream Type       | Reported by Industries | Estimated for Non-Responders | TPY           |
|-------------------------|------------------------|------------------------------|---------------|
| Cardboard               | 804                    | 1,405                        | 2,209         |
| Paper                   | 3,738                  | 3,860                        | 7,598         |
| Fabric & Cloth          | 52                     | 303                          | 355           |
| Sawdust, Bark           | 0                      | 0                            | 0             |
| Pallets                 | 866                    | 135                          | 1,001         |
| Wood Scrap              | 380                    | 117                          | 497           |
| Aluminum                | 81                     | 9                            | 90            |
| Ferrous Metals          | 12,857                 | 1,941                        | 14,798        |
| Non-ferrous Metals      | 4,327                  | 90                           | 4,417         |
| Glass                   | 36                     | 255                          | 291           |
| Plastics                | 41                     | 1,293                        | 1,334         |
| Rubber                  | 0                      | 1                            | 1             |
| Stone/clay/sand         | 144                    | 80                           | 224           |
| Concrete                | 70                     | 134                          | 204           |
| Foundry Sand            | 0                      | 0                            | 0             |
| Ash                     | 2                      | 0                            | 2             |
| Sludge                  | 309                    | 139                          | 448           |
| Non-hazardous Chemicals | 80                     | 24                           | 104           |
| Composites              | 1,931                  | 414                          | 2,345         |
| Other                   | 361                    | 2,002                        | 2,363         |
| <b>TOTAL</b>            | <b>26,079</b>          | <b>12,202</b>                | <b>38,281</b> |

1 Include additional waste stream types as necessary to represent all industrial activity in the district.

Sample Calculation:  
Assumptions: