**Database – LMOP Data Modifications**

**Document Key**

* Existing data fields (i.e., columns) for each landfill are in “”
* New data fields for each landfill are **BOLDED** and in “”
* Existing data for each landfill are in UNDERLINED.
* New data fields for each landfill are **BOLDED**.

1. Gap filling using archived data
   1. [to be determined]
2. Categorization of landfills for the WtE model
   1. “**Landfill status**”
      1. Create a new category of data called “**Landfill Status**”
      2. Potential classifications
         1. **Active**
         2. **Inactive**
      3. Equations to classify each landfill:
         1. If “Current Landfill Status” = closed, then label the landfill as **inactive**
         2. If “Current Landfill Status” = open, then label the landfill as “**active**”
         3. If “Current Landfill Status” = unknown, then label the landfill as **active**
   2. **“Landfill size”**
      1. Create a new category of data called “**Landfill Size**”
      2. Potential classifications
         1. **Small**
         2. **Large**
      3. Equations to classify each landfill:
         1. If data in “Waste In Place (tons)” > 2.76 million tons, then label the landfill as **larg**”
         2. If data in “Waste In Place (tons)” <= 2.76 million tons, then label the landfill as **small**
         3. If there is no data in in “Waste In Place (tons)”, then label the landfill as **small**
   3. “**Landfill activity**”
      1. Create a new category of data called “**Landfill Activity**”
      2. Potential classifications
         1. **Potential**
         2. **Candidate w/ Flares**
         3. **Candidate w/o Flares**
         4. **Developing Electricity WtE**
         5. **Developing CNG WtE**
         6. **Developing Other WtE**
         7. **Electricity WtE**
         8. **CNG WtE**
         9. **Other WtE**
      3. Equations to classify each landfill:
         1. If “Project Status” = Potential then the landfill should be labeled as **potential**
         2. If “Project Status” = Candidate or Other or Shutdown and
            1. “LFG Collection System In Place?” = yes then the landfill should be labeled as “**candidate w/ flares**”
            2. “LFG Collection System In Place?” = no then the landfill should be labeled as “**candidate w/o flares**”
            3. “LFG Collection System In Place?” = unknown then the landfill should be labeled as “**candidate w/o flares**”
         3. If “Project Status” = Construction or Planned and
            1. “Project Type Category” = electricity then the landfill should be labeled as **developing electricity WtE**
            2. “Project Type Category” = Upgraded LFG then the landfill should be labeled as **developing CNG WtE**
            3. “Project Type Category” = [Any other entry] then the landfill should be labeled as **developing other WtE**
         4. If “Project Status” = Operational and
            1. “Project Type Category” = electricity then the landfill should be labeled as **electricity WtE**
            2. “Project Type Category” = Upgraded LFG then the landfill should be labeled as **CNG WtE**
            3. “Project Type Category” = [Any other entry] then the landfill should be labeled as **other WtE**
   4. “**Landfill Climate**”
      1. Create a new category of data called “**Landfill Climate**”
      2. Use the following table to classify the climate of a landfill based on the “State” category in the table below and in the LMOP data:

|  |  |  |
| --- | --- | --- |
|  | “State” | “**Landfill Climate”** |
| Alaska | AK | Non-arid |
| Alabama | AL | Non-arid |
| Arkansas | AR | Non-arid |
| Arizona | AZ | Arid |
| California | CA | Arid |
| Colorado | CO | Arid |
| Connecticut | CT | Non-arid |
| District of Columbia | DC | Non-arid |
| Delaware | DE | Non-arid |
| Florida | FL | Non-arid |
| Georgia | GA | Non-arid |
| Guam | GU | Non-arid |
| Hawaii | HI | Non-arid |
| Iowa | IA | Non-arid |
| Idaho | ID | Arid |
| Illinois | IL | Non-arid |
| Indiana | IN | Non-arid |
| Kansas | KS | Non-arid |
| Kentucky | KY | Non-arid |
| Louisiana | LA | Non-arid |
| Massachusetts | MA | Non-arid |
| Maryland | MD | Non-arid |
| Maine | ME | Non-arid |
| Michigan | MI | Non-arid |
| Minnesota | MN | Non-arid |
| Missouri | MO | Non-arid |
| Mississippi | MS | Non-arid |
| Montana | MT | Arid |
| North Carolina | NC | Non-arid |
| North Dakota | ND | Arid |
| Nebraska | NE | Arid |
| New Hampshire | NH | Non-arid |
| New Jersey | NJ | Non-arid |
| New Mexico | NM | Arid |
| Nevada | NV | Arid |
| New York | NY | Non-arid |
| Ohio | OH | Non-arid |
| Oklahoma | OK | Non-arid |
| Oregon | OR | Non-arid |
| Pennsylvania | PA | Non-arid |
| Puerto Rico | PR | Non-arid |
| Rhode Island | RI | Non-arid |
| South Carolina | SC | Non-arid |
| South Dakota | SD | Arid |
| Tennessee | TN | Non-arid |
| Texas | TX | Non-arid |
| Utah | UT | Arid |
| Virginia | VA | Non-arid |
| Virgin Islands | VI | Non-arid |
| Vermont | VT | Non-arid |
| Washington | WA | Non-arid |
| Wisconsin | WI | Non-arid |
| West Virginia | WV | Non-arid |
| Wyoming | WY | Arid |

Source: Milbrandt 2005 (<25 in. annual precipitation)

* 1. Landfill Annual Methane Generation
     1. Create a new category of data called “**Methane Generation (m3/yr for a ton)**”
     2. Assign a methane generation rate for each landfill based on the following table and the data categories of “**Landfill Climate**” and “Waste in Place (tons)”.

|  |  |  |
| --- | --- | --- |
| “**Landfill Climate**” | “Waste in Place” | **“Methane Generation (m3/yr for a ton**)” |
| Arid | <= 1.1 million tons | 2.78 |
| Non-arid | <= 1.1 million tons | 3.62 |
| Arid | >1.1 million tons | 5.96 |
| Non-arid | >1.1 million tons | 6.99 |

Source: Milbrandt 2005

* 1. **“When a Potential Landfill Becomes a Candidate "**
     1. GOAL: Forecast the year a potential landfill becomes a candidate landfill based on forecasts of waste in place from 2015 to 2040.
     2. Create a new category of data called "**When a Potential Landfill Becomes a Candidate"**
     3. Use the following equation to calculate dates.
        1. If the following conditions are met:
           1. “**Landfill Activity**” = **potential**
           2. “**Landfill Status**” = **active**
           3. “Year Landfill Opened” ≠ [blank]
        2. Then apply the following equation.
  2. **“When a Candidate Landfill Needs to Install Flares"**
     1. GOAL: Forecast the year a candidate landfill w/o flares landfill becomes a candidate landfill w/ flares based on forecasts of waste in place from 2015 to 2040.
     2. Create a new category of data called "**When a Candidate Needs to Install Flares"**
     3. Use the following equation to calculate dates.
        1. If the following conditions are met:
           1. “**Landfill Activity**” = **candidate w/o flares**
           2. “**Landfill Status**” = **active**
           3. “Year Landfill Opened” ≠ [blank]
        2. Then apply the following equation.

1. **Data preprocessing**
   1. Fix data in “Landfill Design Capacity (tons)”
      1. If “**Landfill Status**” = **inactive** and “Landfill Design Capacity (tons)” = [blank] then “Landfill Design Capacity (tons)” = “Waste In Place (tons)”
2. **Calculations in the database for inputs to the WtE model**
   1. **initial stocks -** Count the number of landfills
      1. Report data stratified by the following categories:
         1. “**Landfill Activity**” [9 classes]
         2. “**Landfill Size**” [2 classes]
         3. “**Landfill Status**” [2 classes]
         4. 9 x 2 x 2 = 36 initial values
   2. **Init per LF Loading –** Sum data in “Waste In Place (tons)”
      1. Report data stratified by the following categories:
         1. “**Landfill Size**” [2 classes]
         2. “**Landfill Status**” [2 classes]
         3. 2 x 2 = 4 initial values
      2. Convert the data (in tons) 🡪 metric tons.
   3. **Avg landfill capacity by size –** Average data in “Landfill Design Capacity (tons)”
      1. Report data stratified by the following category:
         1. “**Landfill Size**” [2 classes]
         2. 2 initial values
      2. Convert the data (in tons) 🡪 metric tons
   4. **Methane conversion coeffs** – Average data in “Methane Generation (m3/yr for a ton)”
      1. Report data stratified by the following categories:
         1. “**Landfill Size**” [2 classes]
         2. “**Landfill Status**” [2 classes]
         3. 2 x 2 = 4 initial values
      2. Convert the data (in tons) 🡪 metric tons.
   5. **frac potential to cand** – Count the number of potential landfills becoming candidate landfills in each year.
      1. Report data stratified by the following categories for each year, 2015-2040:
         1. “**Landfill Size**” [2 classes]
         2. 2 set of values from 2015 to 2040
   6. **frac cand to flare** – Count the number of candidate landfills w/o flares becoming candidate landfills w/ flares in each year.
      1. No stratification of the data is needed except reporting for each year from 2015-2040.