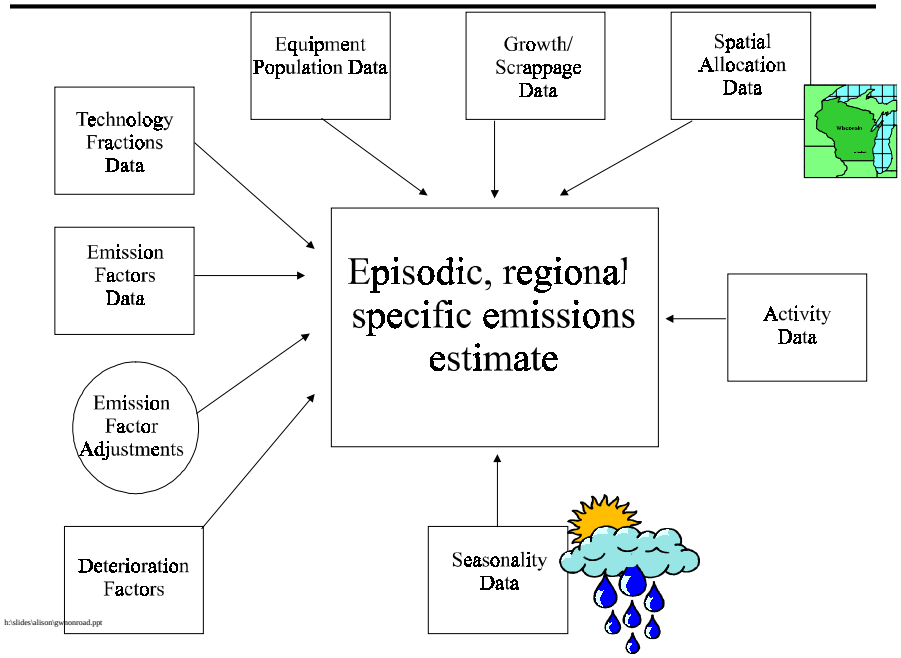
ENVIRON



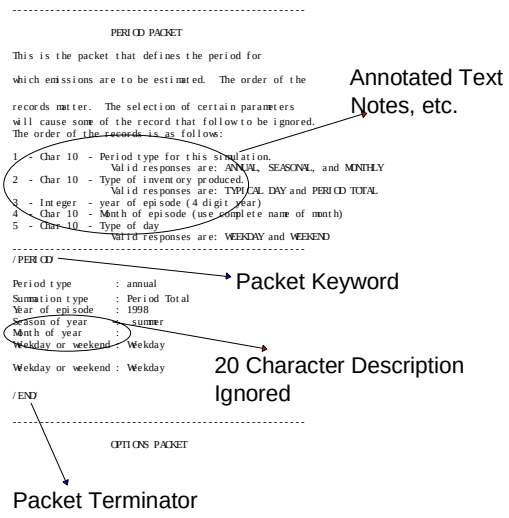
ENVIRON

PACKET STRUCTURE

- Packet begins with packet identifier “/KEYWORD/”.
- Packet ends with packet terminator “/END/”.
- Mixed case is supported.
- Packets can appear in any order.
- Any text (notes, caveats, etc.) can appear between packets.
- Some packets have indeterminate number of records.
- In most cases, the first 20 characters of a record are ignored.

ENVIRON

Example of Packet Structure



ENVIRON

BEST MATCH CRITERIA

- State County Code:
  - Specific County 06031
  - State 06000
  - Entire US 00000
- Source Category Code:
  - Specific Equipment type 2265004001
  - Source Classification 2265004000
  - Fuel type 2265000000

ENVIRON

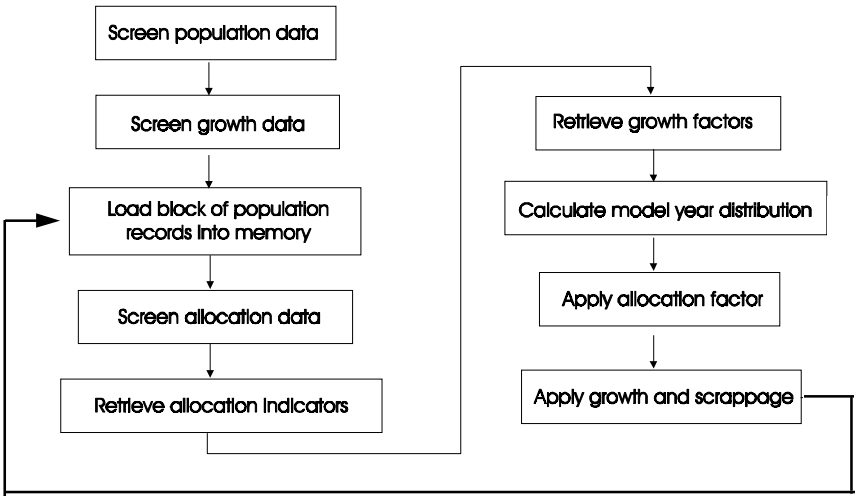
BEST MATCH CRITERIA (concluded)

- Technology Type:
  - Specific Technology Type: G2N2
  - Global Tech Type: ALL
- Horsepower Range:
  - Smallest range containing the average HP of the equipment

    For example: For a 5 HP lawnmower the range of 0 to 25 is a better match than the range of 0 to 500

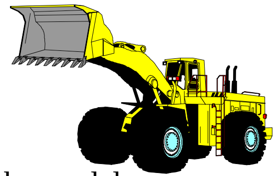
ENVIRON

PROCESSING EQUIPMENT POPULATION



ENVIRON

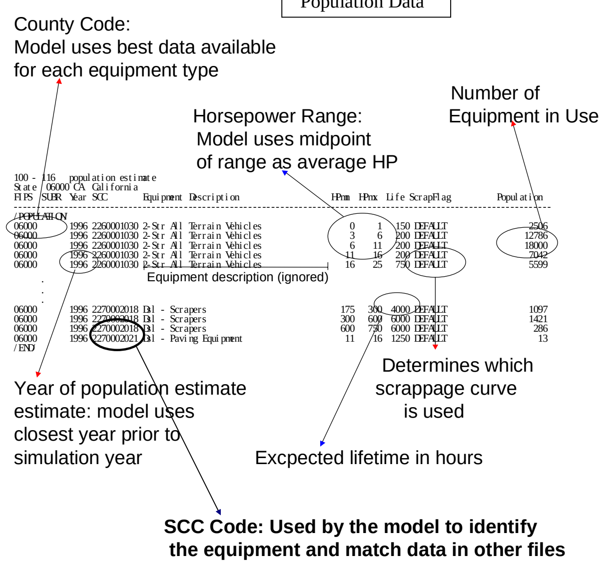
POPULATION DATA



- Drives the rest of the model
- Must correspond to HP ranges coded into the model
- Model uses best data it can find for specified region
- Data is screened and sorted and written to a temporary file
- When processing, data is read into memory one block at a time (all records with the same SCC)

ENVIRON

Population Data


County Code:
Model uses best data available
for each equipment type
Number of
Equipment in Use
Horsepower Range:
Model uses midpoint
of range as average HP
100 - 116 population estimate
State 06000 CA California
FIPS SUBR Year SCC Equipment Description HPmn HPmx Life ScrapFlag Population
/POPULATION/
06000 1996 2260001030 2-Str All Terrain Vehicles 0 1 150 DEFAULT 2506
06000 1996 2260001030 2-Str All Terrain Vehicles 3 6 200 DEFAULT 12786
06000 1996 2260001030 2-Str All Terrain Vehicles 6 11 200 DEFAULT 18000
06000 1996 2260001030 2-Str All Terrain Vehicles 11 16 200 DEFAULT 7042
06000 1996 2260001030 2-Str All Terrain Vehicles 16 25 750 DEFAULT 5599
Equipment description (ignored)
06000 1996 2270002018 Dsl - Scrapers 175 300 4000 DEFAULT 1097
06000 1996 2270002018 Dsl - Scrapers 300 600 6000 DEFAULT 1421
06000 1996 2270002018 Dsl - Scrapers 600 750 6000 DEFAULT 286
06000 1996 2270002021 Dsl - Paving Equipment 11 16 1250 DEFAULT 13
/END/
Year of population estimate
estimate: model uses
closest year prior to
simulation year
Determines which
scrappage curve
is used
Excpected lifetime in hours
SCC Code: Used by the model to identify
the equipment and match data in other files

ENVIRON

ALLOCATION DATA

- Allocation indicators, such as employees in manufacturing facilities, are used as a surrogate for spatial distribution of equipment populations
- Equipment types are mapped to allocation indicator using a "best match" criteria
- Allocation indicator code is arbitrary 3 character code, such as MFG for Manufacturing and LSC for Landscape and Horticultural Services

ENVIRON

ALLOCATION DATA (concluded)

- If multiple years are supplied, the model uses the closest year prior to the simulation year or interpolates between years
- The allocation factor is a linear combination of the ratio of the smaller region's allocation value to the larger region's allocation value
- Allocation supported for:
  - US to State
  - State to County
  - County to Subcounty

ENVIRON

Allocation Indicator Data

Allocation Indicator Code: Mapped to equipment types in the allocation.xrf file

Year of Estimate

```
16-20  Year of estimate or prediction
21-40  Indicator value
----------------------------------------------------------------------
/INDICATORS/
HOU  06000     1997          7253545
HOU  06001     1997           321870
HOU  06009     1997            16162
      .
      .
      .
      .
HOU  06109     1997            19761
HOU  06111     1997           171372
HOU  06113     1997            33729
HOU  06115     1997            14303
/END/
```

Actual Estimate for the specified region

State/County Code: Indicates the region to which the data applies

ENVIRON

GROWTH FACTOR DATA

- Growth indicators are derived from historical growth in equipment population
- Equipment growth applied to base year model population
- Two years of data must be provided. Model uses the best two years to solve the exponential growth equation to get the annual growth rate

ENVIRON

GROWTH FACTORS DATA (concluded)

- Growth factor data can be specified for:
  - Equipment Type
  - Technology Type
  - Region Code
  - Horsepower Range
- Best match criteria applied in mapping growth codes

ENVIRON

Growth Code Mapping Data

County Code: growth factor mapping can be region specific

Horsepower range

```
008 -- Transportation by air
009 -- Total Population
------------------------------------------------------------------------
/INDICATORS/
00000 001   2260001000      0 9999 ALL      2-Stroke Recreational Vehicles
00000 004   2260002000      0 9999 ALL      2-Stroke Construction Equipment
00000 005   2260003000      0 9999 ALL      2-Stroke Industrial Equipment
                .
                .
00000 007   2285000000      0 9999 ALL      Railroad Equipment
/END/
```

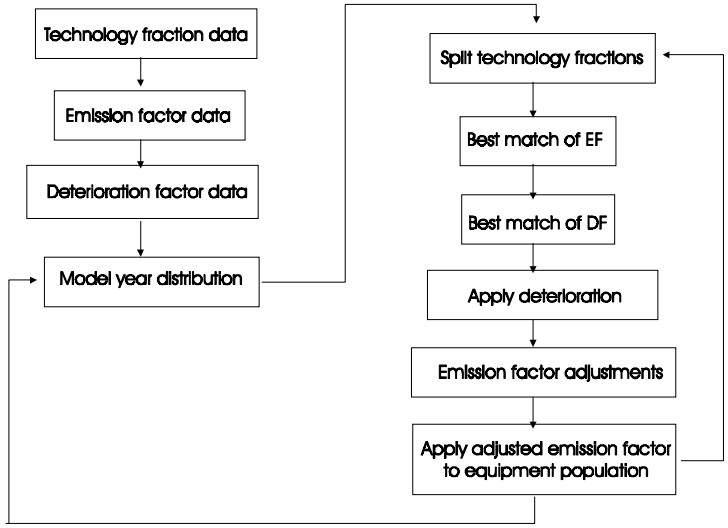
Equipment description (ignored)

Technology type: Must be either the global ALL or match a tech type in the tech fractions file

Arbitrary 3-character growth factor code

ENVIRON

PROCESSING EMISSION FACTOR DATA



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ENVIRON

Growth Factor Data

County code:
Model uses best match

Projected value

```
/GROWTH/
00000      1995  001                1000
00000      1995  002                1000
00000      2000  001                1079
00000      2000  002                1064
    .
    .
    .
00000      2000  003                1027

00000      2010  001                1285

00000      2010  002                1167
00000      2025  001                1467
00000      2025  002                1305
/END/
```

Arbitrary growth code:
must match code in cross reference file

Year of estimate:
Model uses closest two
Year to base population year

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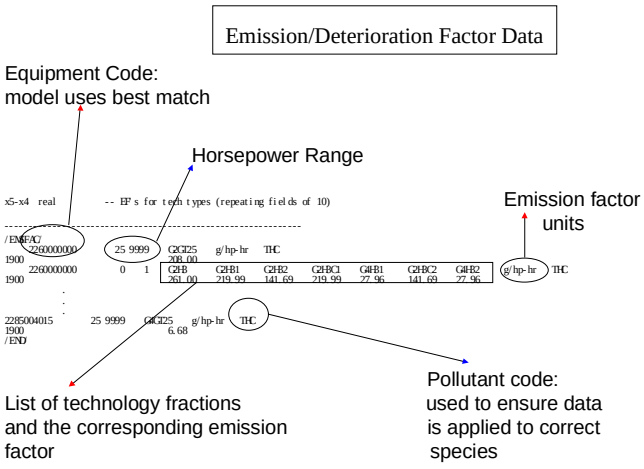
ENVIRON

EMISSION/DETERIORATION FACTOR DATA

- One file for each pollutant
- Best match criteria applied to equipment code (SCC) and horsepower range
- Emission factor supplied by technology type code
- Multiple years can be supplied -- model uses best year prior to current model year

ENVIRON



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ENVIRON

TECHNOLOGY FRACTION DATA

- Technology codes are arbitrary codes of length 10
- Best match criteria applied to equipment code (SCC) and horsepower range
- Can phase-in technology types by supplying data for a succession of years
- Any equipment type not included in the technology fractions file is assumed to consist entirely of the default technology code of ALL

ENVIRON

Technology Fractions Data

Year: technology types are phased in

Horsepower range

```
35 - end   Fractions for each tech type (each in field of 10 chars)
                                T1        T2        T3        T4        T5        T6        T7        T8        T9        T10
-------------------------------------------------------------------------------------------------------------------------------
/ TECH FRAC/
      2260000000          0 9999    G2CGT25
1900                              1.000
      2265000000          0 9999    G4CGT25
1900                              1.000
      2260000000          0    1    G2HB      G2HB1     G2HB2     G2HBC1    G4HB1     G2HBC2    G4HB2
1900                              1.000     0.000     0.000     0.000     0.000     0.000     0.000
1996                              0.500     0.495     0.000     0.005     0.000     0.000     0.000
1997                              0.000     0.990     0.000     0.010     0.000     0.000     0.000
2001                              0.000     0.792     0.198     0.008     0.000     0.002     0.000
2002                              0.000     0.594     0.396     0.006     0.000     0.004     0.000
2003                              0.000     0.297     0.693     0.003     0.000     0.007     0.000
2004                              0.000     0.000     0.990     0.000     0.000     0.010     0.000
      .
      .
      .
      2285004015          25 9999   G4CGT25
1900                              1.000
/ END/
```

Equipment code: Model uses best match

List of tech types and corresponding tech fractions

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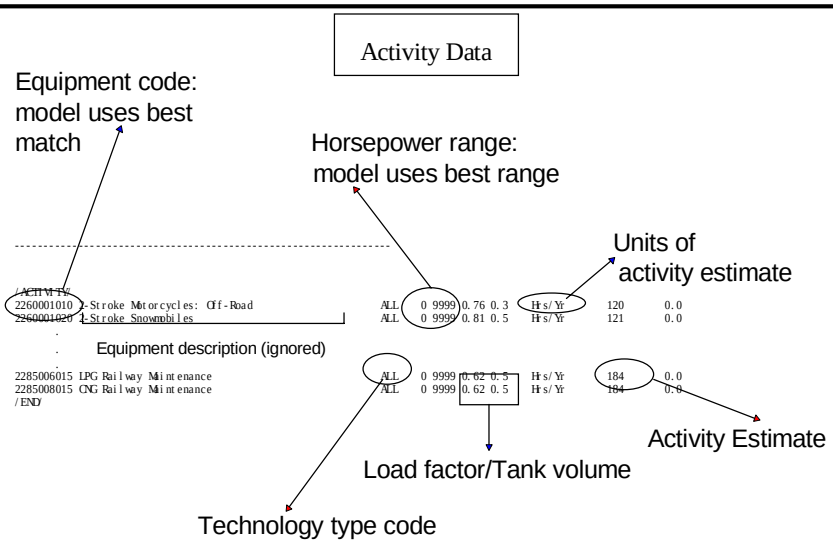
ENVIRON

ACTIVITY DATA

- Best match criteria applied to equipment code, technology type code, and horsepower range
- Can provide region specific activity by specifying a region code
- Activity estimates can be hrs/year of use or hrs/day of use
- Activity file also contains the load factor and tank volume data

ENVIRON



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ENVIRON

SEASONALITY DATA

- Temporal distribution of activity provided for:
  - Months of Year
  - Days of Week
- Factors can be supplied for specific regions or can be nation-wide
- Best match criteria applied to equipment code
- Day-of-week data is for typical weekday and typical weekend-day

ENVIRON

Region Definition Data

User defined region code:
Used to identify the region
in other data files

```
/REGIONS/
SE      Southeast                01000 Alabama
MW      Great Lakes/Midwest      02000 Alaska
SW      Southwest                04000 Arizona
SC      South Central            05000 Arkansas
WCST    West Coast               06000 California
.
.
.
CE      Central East             54000 West Virginia
MW      Great Lakes/Midwest      55000 Wisconsin
CW      Central West             56000 Wyoming
/END/
```

State/county description (not used)

Region description (ignored)

State/County Code:
Model uses best match

ENVIRON

Seasonality Data

Region code:
Must match a code
in region definition file

```
/MONTHLY/
CE       2260000000 Average                    0.080 0.080 0.074 0.074 0.074 0.105 0.105 0.105 0.074 0.074 0.074 0.080
CE       2260001020 Snowblowers/Snowmobiles    0.333 0.333 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.000 0.333
WEST     2270008000 Airport Service            0.083 0.083 0.083 0.083 0.083 0.083 0.083 0.083 0.083 0.083 0.083 0.083
WEST     2282000000 Recreational Marine        0.023 0.023 0.075 0.075 0.075 0.160 0.160 0.160 0.075 0.075 0.075 0.023
/END/
```

Fraction of annual activity in each month

Equipment code:
Model uses best match

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