AERMOD Helper Files for Point and Airport sources

1 Introduction

The SMOKE4AERMOD postprocessing scripts create "helper" files for point and airport sources in the National Emissions Inventory (NEI) which help create emissions inputs for AERMOD. The helper files allow the AERMOD modeler[1] to create AERMOD inputs for each *source* within each facility based on a unit emissions rate (1000 g/s or for fugitives 1000 g/s divided by the area of the source). In the NEI, airports and railyards are categorized as point sources. SMOKE4AERMOD creates separate helper files for point and airport sources. Railyard are included in the point helper files. The NEI website provides a description of point sources, see https://www.epa.gov/air-emissions-inventories/national-emissions-inventory-nei.

1.1 Helper Files and Helper File Types

Point and airport source helper file types are listed below. Any facility which has **non-zero** emissions for one or more of the selected pollutants will be present in multiple file types except that a facility would not necessarily be in both the Temporal Profiles (4) and have an Hourly (5) file if, for example, the facility has no sources with hourly emissions. Facilities for which we do not have hourly temporalization will not have an Hourly file.

[1] James Thurman, Thurman.james@epa.gov, is the AERMOD modeler for the 2014 National Air Toxics Assessment and 2017 Hazardous Air Pollutant + Criteria Air Pollutant (HAP+CAP) Modeling Platform

Helper File Types – Point Sources

1. Locations by facility/src_id
2. Source Parameters – Point parameters by facility /src_id
3. Source Parameters – Area (or fugitive) parameters by facility / src_id
4. Temporal Profiles[2] – temporal scalars and qflag by facility /src_id. The qflag (flag that tells what type of variation, e.g., hour-of-day (HROFDAY); MONTH; month, hour-of-day and weekday-Saturday-Sunday; month, hour-of-day and day-of-week MHRDOW7, etc.)
5. Hourly unit factors[2] by facility and src_id (1 file **per facility**, 1 factor per hour, this file will only have sources that are in the ptegu sector[3])
6. Emissions by facility (airports) or for non-airports: Emissions by facility/src_id/process-id/releasepoint-id/AERMOD pollutant

1.2 The concept of the AERMOD Source (Source ID)

The point source data category of the NEI is exported from the Emission Inventory System into the Flat File 2010 (FF10) format, referred to as 'SMOKEFF' or 'FF10', which is compatible with SMOKE (see the SMOKE4.7 documentation's FF10 description). When running SMOKE for photochemical modeling, EPA typically breaks out the NEI point FF10 into several modeling sectors (see EPA's platform documentation): airports, ptegu, ptnonipm and pt_oilgas. For the SMOKE processing for AERMOD, the ptnonipm sector is combined with pt_oilgas. Although defined differently from the SMOKE processing for photochemical modeling, we still use the name 'ptnonipm' for this sector in the SMOKE4AERMOD readme and this document; we also refer to these sources as nonegu. The ptegu is run through SMOKE4AERMOD separately from ptnonipm due some different settings. Also, all CONUS ptegu sources use hourly temporal profiles (but some non-CONUS sources could have month, week and diurnal temporal profiles). There are no hourly sources in ptnonipm. Airports use different source characterization so their helper files (other than temporal) are constructed separately from non-airport sources (covered in Section 3).

The source ID (**src_id)**, which identifies the source for input into AERMOD is defined as each unique combination of temporal profile assignments and release point parameters (release point type, release parameters and geographic coordinates) associated with emissions of the AERMOD-selected pollutants (typically HAP and diesel PM10, but could be others) within a specific facility. Note that for facilities with a ptegu component, the process/release point combinations at a facility with the same hourly profile and release parameters are treated as a single source.

The following SMOKEFF fields when combined (and after missing parameters are gap-filled) must be unique WITHIN a facility to create a src_id:

1. Temporal profile assignments (diurnal, month, day of week) or hourly
2. ERPTYPE
3. STKHGT
4. STKDIAM

[2] Just the scalars – no 1000 g/s or area division

[3] However, there will be ptegu sources that don't have hourly emissions (e.g., there are non-CONUS sources in ptegu that do not have hourly profiles)

5. STKTEMP
6. STKFLOW
7. STKVEL
8. LONGITUDE
9. LATITUDE
10. FUG_HEIGHT
11. FUG_WIDTH_XDIM
12. FUG_LENGTH_YDIM
13. FUG_ANGLE

Src_ids within a facility for non-airport sources are numbered SN001 through SN# for ptnonipm sector sources and SE001 to SE# for ptegu sources, where # is the number of unique combinations of temporal/release parameters within the facility. We pad zeroes in the numbering scheme such that there is always 3 digits after the "SN" or "SE". For airport sources the source id begins with AP and are padded with just one zero since there would never be more than 99 runways at an airport (AP01 to AP99).

2 Helper files for Point sources – no airports

The point source sectors helper files covered in this section are for non-airport point source sectors such as ptnonipm, ptegu and pt_oilgas. Ptegu should be split out separately from other point sources, but pt_oilgas and ptnonipm can be combined.

2.1 Point Location Helper Files

Table 1 Fields for Point Location Helper File

Filename: point_combined_location.csv **Format:** one row per facility ID/source ID **Notes:** This file contains all point sources that have greater than zero emissions of the selected AERMOD pollutants in the SMOKEFF other than airports, sources without geographic coordinates (county FIPS = "777") and Federal Waters sources (FIPS begins with "85"). Ptegu and Ptnonipm sectors are run separately through different SMOKE4AERMOD scripts and are then merged into a single file with the format listed below. Sources within the continental US (CONUS) and outside (e.g. AK/HI/PR/VI) are combined (they must be run separately) which is why "combined" is in the filename.	
Field Name	**Description**
state	2-digit state FIPS. Use 88 for tribe
facility_id	EIS facility ID (SMOKEFF)
facility_name	Facility name from the SMOKEFF, put in double quotes
src_id	Unique source within facility based on temporal and release location/parameters
grid_x	Lambert x coordinate
grid_y	Lambert y coordinate
Longitude	From SMOKEFF
Latitude	From SMOKEFF
UTM_X	UTM_X and UTM_Y and UTM_ZONE are the UTM coordinates for the release point with respect to the utm zone of the facility (all release points for the
UTM_Y	

UTM_ZONE	same facility are in the same UTM zone). The UTM zone for a facility is set based on the location of the first release point processed for that facility. If a facility is in both ptegu and ptnonipm, the zone determined from the ptegu inventory is used for the entire facility. All UTM coordinates computed for all sources within the facility (i.e., point, line, AREAPOLY) are referenced to that one zone. For fugitives, these coordinates represent the most western endpoint of the fugitive (In Figure 1, it is the location of the pin).
COL ROW	Grid cell the facility falls into (col, row) based on the geographic coordinates of the release points and the particular grid. If a facility spans two grid cells, then the facility will be assigned to a single grid cell –it would use the ptegu grid cell if the facility is in both ptegu and ptnonipm. For CONUS facilities, this is used to determine the appropriate gridded met file to use. For nonCONUS facilities, these fields are not used. Leading zeroes for col/row are not provided in this file.
Quality Assurance (QA) Checks: 1. Each unique facility (across the combined sectors) must have the same COL, ROW for all sources at the facility and the same UTM Zone for all sources at the facility. Develop a list of facility, sector, UTM zone, col row. 2. The facility/src_id must be unique, based on the all temporal and release/location parameters for that facility. 3. Every facility_id/source ID in this file should be in either the point_ srcparam.csv or the point_fug_srcparam.csv file. 4. Every facility_id/src_id in this file should be in either the point_ temporal.csv or one of the facility-specific temporal files. 5. Determine UTM coordinates (x,y and zone) based on the lat/lon of each src_id and compare to the UTM in this helper file.	

2.2 Point Source Parameter Helper Files

There are two types of parameter files: (1) non-fugitive point sources such as emissions that come from stacks and (2) fugitive point sources. They have different fields so there needs to be different parameter files. A facility could have records (i.e., sources) in both files if it has both fugitive and non-fugitive release points.

Table 2 Fields for Point Source Parameter Helper File for non-fugitive point sources

Filename: point_ combined_point_srcparam.csv **Format:** one row per facility_id/src_id **Notes:** As with the locations file, ptnonipm and ptegu sectors are run separately and are combined into a single file. This file should have facility_id/src_id records for which the emission release point type is NOT fugitive. In the FF10 file, the ERPTYPE field indicates the release point type. Sources within the continental US (CONUS) and outside (e.g. AK/HI/PR/VI) are run separately and then combined -which is why "combined" is in the filename.	
Field Name	**Description**
facility_id	EIS facility id (SMOKEFF)
facility_name	facility name from the SMOKEFF, put in double quotes
src_id	
aermod_src_type	If ERPTYPE=2 (vertical): POINT

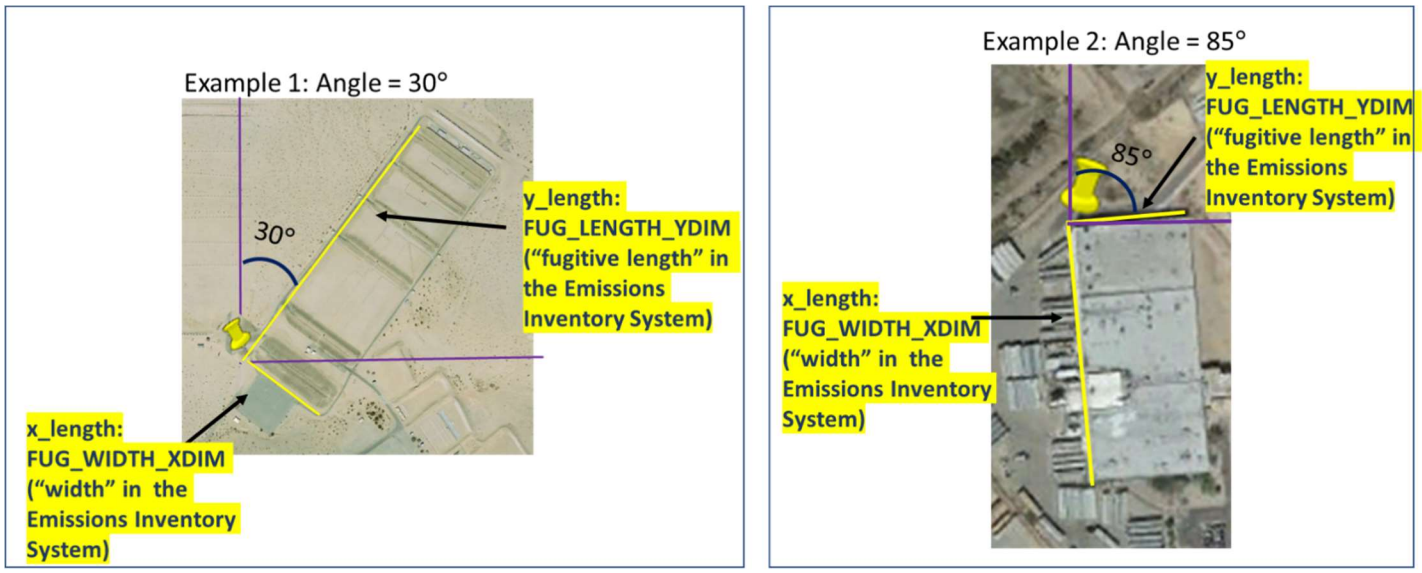
	If ERPTYPE=3 (horizontal) or 4 (goose neck), or 6 (downward facing vent): POINTHOR If ERPYTPE=5 (vertical with rain cap): POINTCAP
height	Stack height in meters, Height (meters)=0.3048 * STKHGT →where STKHGT is the value (in feet) of the stack height in the SMOKEFF
temp	Temperature in Kelvin, Temp (Kelvin) = (STKTEMP + 459.67) × 5/9 →where STKTEMP is the value (in F) of the stack temperature in the SMOKEFF
velocity	Velocity in m/s, Velocity (m/s)= 0.3048 *STKVEL If velocity is not available (and release point type =2) then compute velocity from STKFLOW (ft3/s) as: Velocity (m/s)= 4* STKFLOW * (0.3048) / (Pi* STKDIAM^2) → where STKVEL is the value (in ft/s) of the stack velocity in the SMOKEFF, STKDIAM is the diameter (in ft) in the SMOKEFF, and STKFLOW is the value (in ft^3/s) of the stack flowrate in the SMOKEFF
diameter	Diameter in meters, Diameter (m) = 0.3048 * STKDIAM →where STKDIAM is the value (in feet) of the stack diameter in the SMOKEFF
Quality Assurance (QA) Checks: 1. Every facility_id/src_id combination in this file should also be in the point_location file 2. Calculate helper parameters in English units (ft, ft/s, degrees F) and compare to SMOKEFF	

Table 3 Fields for Point Source Parameter Helper File for Fugitive point sources

Filename: point_combined_fug_srcparam.csv **Format:** one row per facility_id/src_id **Notes:** As with the locations file, ptnonipm and ptegu sectors are run separately and are merged into a single file. This file should only have facility_id/src_id records for which the emission release point type is fugitive. In the FF10 file, the ERPTYPE field indicates the release point type. Sources within the continental US (CONUS) and outside (e.g. AK/HI/PR/VI) are run separately and then combined -which is why "combined" is in the filename.	
Field Name	**Description**
facility_id	EIS facility id (SMOKEFF)
facility_name	Facility name from the SMOKEFF, put in double quotes
src_id	
aermod_src_type	Value is: AREA
rel_ht (m)	This is the release height in meters. Convert FF10 fugitive height field from feet to meters FUG_HEIGHT (ft)*0.3048 → where FUG_HEIGHT is the value (in ft) of the fugitive height in the SMOKEFF
x_length (m)	This is the length of side of the AREA source in the X-direction (east-west) in meters, measured from the most western corner of the source (indicated by the latitude/longitude or UTM in Table 1), if the angle were 0 degrees. See Figure 1.

	Convert FF10 field from feet to meters FUG_WIDTH_XDIM (Ft)*(0.3048) (EAST/WEST) → where FUG_WIDTH_XDIM is the value (in ft) of the fugitive width in the SMOKEFF
y_length (m)	This is the length of side of the AREA source in the Y-direction (north-south) in meters, measured from the most western corner of the source (indicated by the latitude/longitude or UTM in Table 1), if the angle were 0 degrees. See Figure 1. Convert FF10 field from feet to meters FUG_LENGTH_YDIM (Ft)*(0.3048) (North/South) → where FUG_LENGTH_YDIM is the value (in ft) of the fugitive length in the SMOKEFF
angle	FUG_ANGLE (The orientation angle for the area in degrees from North, measured positive in the clockwise direction.) → where FUG_ANGLE is the value (in degrees) of the fugitive angle in the SMOKEFF
szinit (m)	This is the initial vertical dispersion. If the FUG_HEIGHT is > 10 m, szinit = FUG_HEIGHT*(0.3048)/4.3 Otherwise szinit = 0 → where FUG_HEIGHT is the value (in ft) of the fugitive height in the SMOKEFF
Quality Assurance (QA) Checks: 1. Every facility_id/src_id combination in this file should also be in the point locations file 2. Calculate helper parameters in English units (ft) and compare to SMOKEFF	

Figure 1 Representation of a fugitive source described in Table 2, with fugitive parameters, x_length and y_length (pin represents geographic coordinates specified in Table 1)



2.3 Point Source Temporal Helper Files

Table 4 Fields for Point Temporal (non-hourly) Helper File

Filename: point_combined_temporal.csv **Format:** one row per facility_id/src_id **Notes:** This file is for facility_id/src_id combinations in ptnonipm only; CONUS and nonCONUS are run separately and the 2 separate files are combined into a single file.	
Field Name	**Description**
facility_id	EIS facility id (SMOKEFF)
facility_name	Facility name from the SMOKEFF, put in double quotes
src_id	
qflag	Depends on temporal variability. Could be MONTH, MHRDOW, HROFDAY, MHRDOW7
Scalar1,…, Scalar N	These provide the temporal scalars from which hourly emissions can be computed. The value and number of scalars depends on the qflag. **For qflag=MONTH, N=12**. The scalars equal the monthly temporal profile factors (after normalization) in the PTPRO SMOKE temporal profile file. Scalar1=January, Scalar2=February, Scalar3=March…Scalar12=December **For qflag = HROFDAY, N=24.** the 24 scalars equal the 24 hourly temporal profile factors (after normalization) in the PTPRO SMOKE temporal profile file. Scalar 1 = 12am to 12:59am, Scalar 2= 1am to 1:59 am,…Scalar 24=11 pm – 11:59 pm **For qflag=MHRDOW, N=864 (24 hours*3day types * 12 months)** The SMOKE helper file scalars represent the hourly emissions fraction for representative month/day/hour combinations for which all weekdays are of equal

weighting but Saturdays and Sundays may be different. They are computed from the SMOKE year-to-month temporal weighting factors, month-to-week temporal weighting factors and day-to-hour temporal weighting factors based on the following equation:

$$Scalar_{mdh} = \frac{Monthfac_{mont}}{\sum_{i=1}^{12} Monthfac_{month} \times \#days\_in\_month_{month}} \times dayfac_{daytype} \times diurnal_{hourofday} \times 7$$

Where mdh is a value between 1 and 864 and is based on the following order: Hours 1-24 for January Weekday, hours 1-24 for February Weekday …hours 1-24 for December Weekday, …hours 1-24 January Saturday… hours 1-24 December Saturday, hours 1-24 January Sunday…hours 1-24 December Sunday. Therefore, the first scalar, $Scalar_{1,}$ is the first hour of any weekday (Mon,Tues,Wed,Thurs or Fri) in January and $Scalar_{864}$ is the 24th hour for a Sunday in December.

And where:

- $Monthfac_{month}$ is the year-to-month temporal weighting factor for the specific *month*
- $dayfac_{daytype}$ is the month-to-week temporal weighting factor for the Weekday, Saturday or Sunday. Thus, every day between Monday and Friday has the same "Weekday" factor
- $diurnal_{hourofday}$ is the day to hour temporal weighting factor for the specific hour of day (1 is 12am to 12:59am, 2 is 1am to 1:59am… 24 is 11pm to 11:59pm)

For qflag=MHRDOW7, N=2016 (24 hours*7 day types * 12 months)

The SMOKE helper file scalars represent the hourly emissions fraction for representative month/day/hour combinations for which each day of the week could have a different weighting. They are computed from the SMOKE year-to-month temporal weighting factors, month-to-week temporal weighting factors and day-to-hour temporal weighting factors based on the following equation:

$$Scalar_{mdh} = \frac{Monthfac_{month}}{\sum_{i=1}^{12} Monthfac_{month} \times \#days\_in\_month_{month}} \times dayfac_{daytype} \times diurnal_{hourofda} \times 7$$

Where mdh is a value between 1 and 2016 and is based on the following representative month/day/hour combinations in the following order: Hours 1-24 for January Monday, hours 1-24 for February Monday…hours 1-24 for December Monday, hours 1-24 January Tuesday,…hours 1-24 December Tuesday, hours 1-24 January Saturday,…hours 1-24 December Saturday, hours 1-24 January Sunday…hours 1-24 December Sunday. Therefore, the first scalar, $Scalar_{1,}$ is the first hour of any Monday in January, $Scalar_{25}$ is the first hour of any Monday in February, and $Scalar_{2016}$ is the 24th hour for a Sunday in December.

And where:

- $Monthfac_{month}$ is the year-to-month temporal weighting factor for the specific *month (e.g., Jan, Feb, etc.)*
- $dayfac_{daytype}$ is the month-to-week temporal weighting factor for the specific *day of the week (e.g., Mon, Tues, Wed, Thurs, Fri)*
- $diurnal_{hourofday}$ is the day to hour temporal weighting factor for the specific hour of day (1 is 12am to 12:50am, 2 is 1am to 1:59am… 24 is 11pm to 11:59pm)

QA Checks:

1. Every facility_id/src_id combination in this file should also be in the point_locations file
2. There should be no facility_id/src_id combinations that are in the hourly temporal csv file.
3. qflag =For HROFDAY and MONTH; sum of scalars=1
4. qflag = MHRDOW7, sum of scalars * 8760/2016 should be between 0.98 and 1.09
5. qflag= MHRDOW,(5*sum of weekday scalars + Saturday scalars + Sunday scalars)*8760/2016 should be between 0.98 and 1.09

Table 5 Fields for Point EGU HOURLY Temporal Helper Files

Filename: Facilityid_2digitstateFIPS_hourly.csv, where Facilityid is the Facility_ID (EIS facility id) and the 2digitstateFIPS is the FIPS code of the state. For tribal facilities, "88" is used in place of the 2-digit state FIPS.
Format: one row per facility_id/src_id and hour of the year
Notes: There is one file per facility resulting from 2 separate runs (CONUS and nonCONUS). These files are for facility_id/src_id combinations in the ptegu sector only. The scalars should be provided in local time and that every month, day and hour needs to be contained in this file even if there are no emissions for that month, day, hour.

Field Name	Description
facility_id	EIS facility id (SMOKEFF)
src_id	
year	YYYY (e.g., 2017)
month	MM
day	DD
hour	HH
factor	Hourly fraction computed by SMOKE based on CEMS data or average CEMS data
Temperature (K)	
Velocity (m/s)	

QA Checks:

1. Every facility_id/src_id combination in this file should also be in the point_locations file
2. There should be no facility_id/src_id combinations that are in the point_temporal csv file in this file.
3. Scalars should sum to 1
4. Check that every hour should be filled in, even if the scalar is 0
5. Spot check to make sure that LOCAL time is used (not GMT)

2.4 Point Source Emissions Helper Files

SMOKE4AERMOD produces emissions helper files for Point (non-Airport) which provide emissions of SMOKE pollutant by src_id and process ID/releasepoint ID. This file should have only records where the emissions are greater than zero for the selected AERMOD pollutants.

2.4.1 Process ID-Releasepoint ID Level Emissions Helper Files

Table 6 Fields for POINT (NOT AIRPORTS) EMISSIONS Helper File –Process-Releasepoint ID Level

Filename: point_combined_process_releasept_emis.csv

Format: one row per unique facility_id/src_id/ **process/release_pt** /pollutant

Notes: Point contains both egus and nonegus, conus and nonConus except for airports. There is a separate emissions file that contains only airports. The pollutant is based on the SMOKE pollutant and the SMOKE name is used. That means individual pollutants in the SMOKEFF10 are aggregated (e.g., glycol ethers are grouped into a single SMOKE pollutant) if the SMOKE name specified in the INVTABLE is "GLYCOLETHER" for all NEI glycol ether pollutants. Sources within the continental US (CONUS) and outside (e.g. AK/HI/PR/VI) are run separately and then combined -which is why "combined" is in the filename.

Field Name	Description
state	2-digit state FIPS. Use 88 for tribe
facility_id	
facility_name	Facility name from the SMOKEFF, put in double quotes
fac_source_type	Code indicating facility type (from the SMOKEFF). Note that the fac_source_type for rail yards is 151, if there is no facility type, then use 000
src_id	
Unit ID	EIS unit ID from the SMOKEFF
Process ID	EIS process ID from the SMOKEFF
Releasepoint ID	EIS release point ID
pollutant name	Use SMOKE name from the INVTABLE
Emissions (tons)	Emissions from the src_id multiplied by the INVTABLE factor that is specific to the SMOKE pollutant (for most pollutants, this factor is 1)

QA Checks:

1. Every facility_id/src_id combination in this file should also be in the point_locations file
2. INVTABLE factor should be equal to the Metal/CN speciation factor from the year-specific pollutant information file that includes SMOKENAME, pollutant codes and other pollutant information.
3. Compare emissions by facility/unit/process/release point and compare with Smkreport
4. Make sure this file has all pollutants from the INVTABLE with KEEP=Y.

3 Airports Point Sources – Runway and Nonrunway

Airports have 2 sets of helper files- one for runway airports and one for nonrunway airports. Other than the temporal helper files, the formats of each helper file type is different for runway airports than nonrunway airports. Only sources with non-zero emissions of the selected pollutants emissions should be included in these helper files.

Airports are facilities extracted from the FF10 based on the FAC_SOURCE_TYPE field. FAC_SOURCE_TYPE =100 means it is an airport. Airports will be further divided into 2 groups: airports with runways and airports without runways. An airport cannot be in both groups.

For the runways: In addition to the FF10, which gives us the information to use for the temporal profile and the NEI facility name, we will use an ancillary runway file with the following parameters that will help with the LOCATION file.

This ancillary runway file contains only runway airports and is called: Final_2017_Runway_Source_Airports_Endpoints.csv. It was built using Final_2014_Runway_Source_Airports_Endpoints_4.csv as a starting point, and adding additional runways for airports that are present in 2017 but not in the 2014 NEI.

- LOCType (not used)
- Siteno (not used)
- Airport name (not used)
- Width
- EIS Facility ID
- Start_x (this is an endpoint longitude)
- Start y (this is an endpoint latitude)
- End_x (this is an endpoint longitude)
- End y (this is an endpoint latitude)

The runway length should be computed based on the endpoints in the ancillary runway file.

The runway area should be computed from the runway length and a width that is provided in the ancillary runway file.

3.1 Locations file – for Runway Airports

Table 7 Fields for AIRPORT RUNWAY Location Helper File

Filename: **airport_combined_line_locations.csv** **Format:** one record per facility_id/src_id (i.e., one record per runway at a facility) **Notes:** CONUS and nonCONUS are run separately and afterwards the location files are combined together.	
Field Name	**Description**
state	2-digit state FIPS. Use 88 for tribe
facility_id	EIS facility id (SMOKEFF)
facility_name	Facility name from the SMOKEFF, put in double quotes

src_id	Id for each runway (AP01, AP02, etc.). The maximum number of runways is 8, so there could be an AP08 for src_id.
xs1	Utm x of endpoint 1 -- assume it is at the center of runway with regards to runway width
ys1	Utm y of endpoint 1
xs2	Utm x of endpoint 2
ys2	Utm y of endpoint 2
utm_zone	Based on the longitude of the facility in the FF10 inventory
col	Grid cell the facility falls into (col, row). The grid cell for a facility is assigned based on the location of the release point with the highest total emissions. The FF10 release point is used. Leading zeroes for col/row are not provided in this file.
row	
QA Checks: 1. Ensure this file has all facility ids that are in the ancillary runway file 2. Calculate the UTM X and UTM Y for both the start and end points of the runway using the single calculated UTM zone. Compare to UTM locations and helper file.	

3.2 Locations file – Non-runway airports only

Table 8 Fields for AIRPORT NON-RUNWAY Location Helper File

Filename: **airport_combined_nonrunway_locations.csv** **Format:** one record per facility **Notes:** CONUS and nonCONUS are run separately and afterwards the location files are combined together.	
Field Name	**Description**
state	2-digit state FIPS. Use 88 for tribe
facility_id	EIS facility id (SMOKEFF)
facility_name	Facility name from the SMOKEFF, put in double quotes
src_id	AP01
grid_x	Lambert x coordinate
grid_y	Lambert y coordinate
Longitude	From FF10
Latitude	From FF10
utm_x	utm_x and utm_y and utm_zone are the UTM coordinates for the release point with respect to the utm zone of the facility (all release points for the same facility are the same and therefore in the same UTM zone). For the UTM zone, use the longitude of release point from the SMOKE FF10 and calculate the zone from a standard formula: zone = floor(((lon+180)/6)+1)
utm_y	
utm_zone	
col	grid cell the facility falls into (col, row) based on the geographic coordinates of the release points. For nonCONUS facilities the grid cell is not used by AERMOD.
row	
QA Checks: 1. Ensure this file has all facility ids that have fac_source_type =100 but are not in the runway ancillary file 2. Check release point lat lon of helper file is same as in the FF10 (in lat/lon and utm coordinates)	

3.3 Source Parameters for Runway Airports

Table 9 Fields for Airport Runway Source Parameter Helper File

Filename: airport_combined_line_params.csv **Format:** one row per facility_id/src_id **Notes:** CONUS and nonCONUS are run separately and afterwards the runway source parameter files are combined together. This file should have facility_ids that are in ancillary runway file. Each src_id represents a runway at an airport.	
Field Name	**Description**
facility_id	Get from ancillary runway file
facility_name	Get from matching to FF10
src_id	Determine based on number of runways (AP01, AP02, etc.). The maximum number of runways is 8 so there could be up an AP08 for src_id.
src_type	LINE
runway area	Computed based on using endpoints and width in the ancillary file, square meters
frac	number of runways (they are equally divided) If there are two runways, fac value = 0.5. This value is for splitting emissions not for AERMOD
relhgt	Release height in meters: value is always 3
width	Width, in meters. Read value from ancillary file and is either 50 or 25
szinit	Initial vertical dispersion, in meters: value is always 3
QA Checks: 1. Ensure this file has all facility_ids and src_ids that are in the airport runway locations file.	

3.4 Source Parameters for Non-Runway Airports

Table 10 Fields for AIRPORT NON-RUNWAY Source Parameter Helper File

Filename: **airport_combined_nonrunway_params.data** **Format:** one record per facility **Notes:** CONUS and nonCONUS are run separately and afterwards the source parameter files are combined together.	
Field Name	**Description**
facility_id	EIS facility id (SMOKEFF)
facility_name	Facility name from the SMOKEFF, put in double quotes
src_id	AP01
Release height (m)	Release height in meters: value is always 3
lengthx	Length of side of AREA source in X-direction in meters: value is always 10
lengthy	Length of side of AREA source in Y-direction in meters: value is always 10
angle	0
Szinit (m)	Initial vertical dispersion, in meters: value is always 3
QA Checks:	

1. Ensure this file has all facility and src_ids that are in Airport_nonrunway_locations.csv.

3.5 Temporal profiles – Runway and Non-runway airports

The file format is the same for runway and non-runway airports. However the data for runway airports are in a different file than the data for non-runway airports.

Table 11 Fields for AIRPORT Runway OR Non-runway Temporal Helper File

Filename (nonrunway): **airport_combined_nonrunway_temporal.csv** **Filename (runway)** : **airport_combined_runway_temporal.csv** **Format:** one record per facility per src_id (in the nonrunway temporal file, it is just one record per facility because there is only one source ID per facility). In the runway temporal file there may be many records per facility, one for each runway (source ID). **Notes:** CONUS and nonCONUS are run separately and afterwards the temporal files are combined together.	
Field Name	**Description**
facility_id	EIS facility ID (SMOKEFF)
facility_name	
src_id	
qflag	For airports it will be MHRDOW7
Scalar1	
…	
…	
…	
Scalar N	N is the number of scalars and because we have a different day profile for every day of the week, the number of scalars is 24*7*12=2016
QA Checks: 1. Ensure this file has all facility and src_ids that are in airport_combined_nonrunway_locations.csv. 2. The sum of scalars * 8760/2016 should be between 0.98 and 1.09	

3.6 Airports Emissions helper files (for runway and non-runway airports)

There are no sub-facility airport concentrations computed even though runway airports may have multiple sources (runways). This is because we don't have sufficient information to know which runway(s) are dominant and instead we choose to divide airport emissions from all SCCs equally across the runways. Because there are no sub-faciity airport concentrations, there is no need to have sub-facility emissions in the emissions helper files. As a result, the runway and non-runway emissions are in the same file.

Table 12 Fields for AIRPORT (both runway and non-runway) EMISSIONS Helper Files

Filename: airport_combined_facility_emis.csv **Format:** one row per facility/pollutant Sources within the continental US (CONUS) and outside (e.g. AK/HI/PR/VI) are run separately and then combined -which is why "combined" is in the filename.	
Field Name	**Description**
state	2-digit state FIPS. Use 88 for tribe
facility_id	

facility_name	Facility name from the SMOKEFF, put in double quotes
fac_source_type	Code indicating facility type (from SMOKEFF) should always be 100 for all records in this file
pollutant name	Use SMOKE name from the INVTABLE
Emissions (tons)	Emissions by airport from the FF10. For metals only -- multiply emissions from (2275050011=General Aviation /Piston; 2275060011=Air Taxi /Piston) by 0.5 Note that the Cntlmat program in SMOKE can apply SCC and pollutant-sepecific factors to the emissions. See source matching hierarchy built in Cnltmat program. https://www.cmascenter.org/smoke/documentation/4.5/html/ch06s02.html#sect_programs_cntlmat_source_match
QA Checks: 1. Every airport (fac_source_type =100) should be in this file. 2. Check emissions between FF10 and helper file	

4 Source ID to facility/process/releasepoint crosswalk file

This allows someone to determine which process/release points in the FF10 correspond to each facility/source ID that the SMOKE4AERMOD generates.

Table 13 Fields for Facilty/source id to FF10 Facility/Process ID/Releasepoint ID CROSSWALK Helper Files

Filename: point_combined_srcid_xwalk.csv and airport_combined_srcid_xwalk.csv **Format:** one row per facility_id/unit id/process id/ release point id **Notes:** This file could be used to determine which process/release points at a facility have the highest risks. There may be multiple files for point (nonegu), airport (nonrunway), airport (runway) or all will be put into the same file.	
state	2-digit state FIPS. Use 88 for tribe
facility_id	EIS facility id (SMOKEFF)
facility_name	Facility name from the SMOKEFF, put in double quotes
unit_id	EIS unit id (SMOKEFF)
process_id	EIS process id (SMOKEFF)
rel_point_id	EIS release point id (SMOKEFF)
src_id	
QA Checks: 1. Every facility_id/src_id combination in this file should also be in the point_locations file	

5 Overall QA Summaries

Several QA reports are produced and incorporated into a QA workbook. The QA scripts use the environment variables from the EMF/SMOKE run scripts so they can be dropped in to the processing stream to give greater automation to the QA. They have a few other helpful pieces in them as well such as the facility in a single cell check and some lat/lon->UTM checks.