FLAT FILE GENERATION METHODOLOGY
Version: EPA 2022 Reference Case using EPA Platform v6

SECTION I: INTRODUCTION

This document provides the flat file generation methodology for the EPA 2022 Reference Case using EPA Platform v6. The methodology takes Integrated Planning Model (IPM®) run results and generates the formatted flat file that the U.S. Environmental Protection Agency (U.S. EPA) uses as inputs into the air-quality modeling framework. Section II provides data descriptions. Section III (see page 2) describes data processing steps in detail. Section IV (see page 12) describes the layout of the formatted flat file.

SECTION II: DATA DESCRIPTIONS

IPM run results: This file contains IPM run results that have been disaggregated to the unit, emission control technology, and fuel type level. The file provides records of existing and retrofitted units and committed and new-build aggregates[1]. The committed and new-build aggregates are hereafter referred to as "generic" aggregates. All records contain the following:

i. Population characteristics, including state FIPS codes, county FIPS codes, recognized ORIS codes (<80,000), and unit IDs for existing and retrofitted units. Generic aggregates have state-level information only.

ii. Sulfur dioxide (SO_2), nitrogen oxides (NO_x), and particulate matter (PM) control information for existing and retrofitted units, as well as generic aggregates.

iii. Annual and seasonal heat input (TBtu).

iv. Heat contents (MMBtu/ton, K gallon, MMcf) and SO_2 contents (lb/MMBtu).

v. Annual and summer NO_x emissions (MTon), annual SO_2 emissions (MTon), HCL emissions (MTon), and mercury emissions (Ton).

Table 1 provides the rest of the input data descriptions and table locations.

Table 1 - Input Data Descriptions and Locations

No.	Table Name	Description	Location
1	EIS	This table contains Emission Inventory System (EIS) unit-specific data that include unit facility name, facility code, boiler ID, tribal code, reg code, NAICS, longitude, latitude, facility ID, unit ID, release point ID, process ID, agency facility ID, agency unit ID, agency release point ID, agency process ID, stack height, stack diameter, stack temperature, stack flow, and stack velocity.	Flat File Inputs EPA 2022 Reference Case.xlsx
2	GenericUnitSite	This table contains all existing plants that serve as sister plants in siting generic units. The data include NEEDS v6 plant's state FIPS code, county FIPS code, county's most recent 8-hour ozone or $PM_{2.5}$ attainment/non-attainment status, ORIS code, latitude-longitude coordinates, and zip code.	Flat File Inputs EPA 2022 Reference Case.xlsx
3	LatLonDefault	This table contains latitude-longitude coordinates by ORIS code, state FIPS code, and county FIPS code.	Flat File Inputs EPA 2022 Reference Case.xlsx

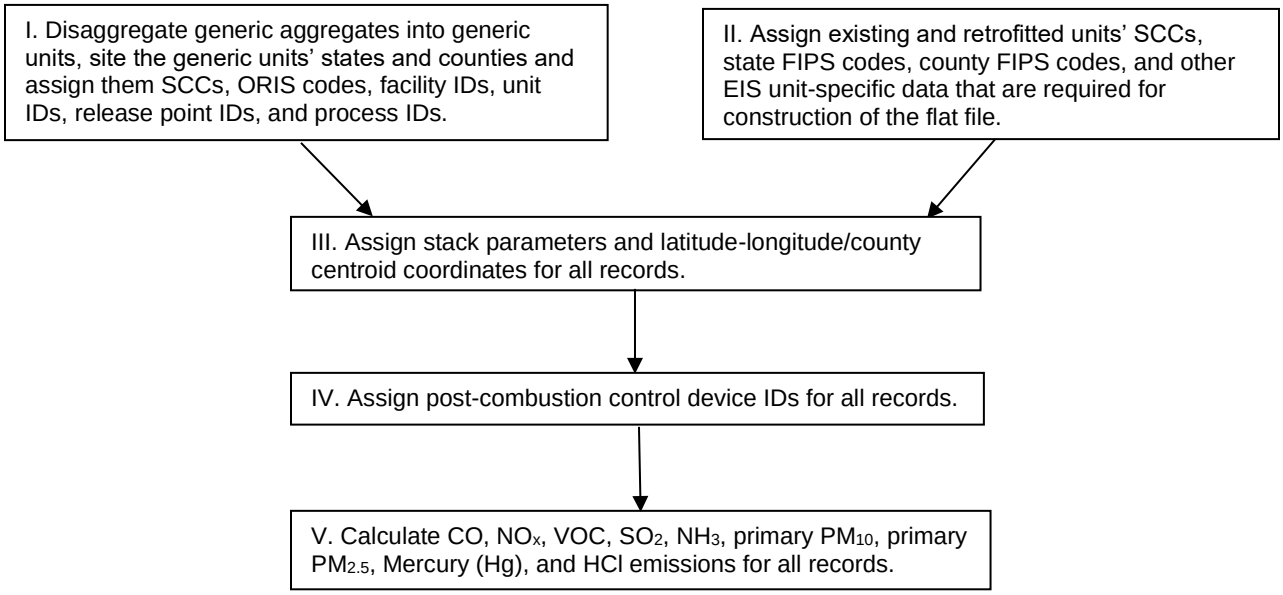
[1] All fossil, geothermal, landfill gas, non-fossil waste, municipal solid waste, tires, and biomass fired units are included in this process. Nuclear, hydro, wind, solar, fuel cell, and energy storage units are not included.

No.	Table Name	Description	Location
4	SCC	This table contains Source Classification Codes (SCCs) by plant type, fuel type, coal rank, firing, and bottom type (for boilers).	Table 6
5	PlantTypeStackParameters	This table contains stack parameters (height, diameter, temperature, and velocity) by plant type.	Table 7
6	SCCDefaultStackParameters	This table contains default stack parameters (height, diameter, temperature, and velocity) by SCC.	Table 8
7	ControlDevices	This table contains post-combustion control devices and their associated control IDs.	Table 9
8	PM_{10}, $PM_{2.5}$, CO, VOC, and NH_3 Emission Factors	This table contains PM_{10}, $PM_{2.5}$, carbon monoxide (CO), volatile organic compounds (VOC), and ammonia (NH_3) emission factors for existing units.	Flat File Inputs EPA 2022 Reference Case.xlsx
9	Generic PM_{10} and $PM_{2.5}$, CO, VOC, and NH_3 Emission Factors	This table contains PM_{10}, $PM_{2.5}$, CO, VOC, and NH_3 emission factors for generic units.	Table 10

SECTION III: DETAILED DATA PROCESSING

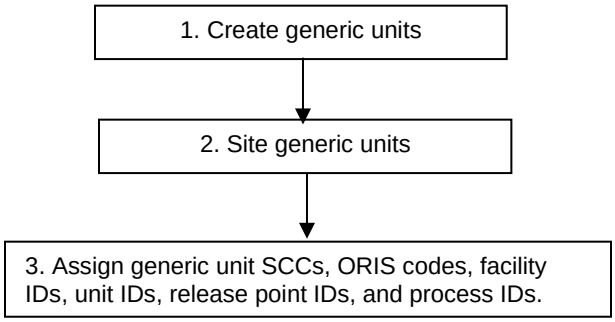
Flow Chart 1 describes general data processing steps. A more detailed description of each step is provided in the subsections that follow.

Flow Chart 1 - Data Processing Steps



Step 1. Disaggregate Generic Aggregates into Individual Generic Units, Site the Generic Units to their States and Counties and Assign SCCs, ORIS Codes, Facility IDs, Release Point IDs, and Process IDs: Generic unit data are prepared by transforming the generic aggregates into units similar to existing units in terms of the available data. First, the generic aggregates are disaggregated to create generic units. Second, the generic units are sited and given the state, county, and county-centroid-based latitude-longitude coordinates. Third, the generic units are assigned SCCs, ORIS codes, facility IDs, unit IDs, release point IDs, and process IDs. This process is performed in three steps as described in Flow Chart 2.

Flow Chart 2 - Generic Unit Processing



1. Creating generic units: Generic aggregates are first disaggregated to create generic units. The process entails two steps: i) The generic aggregates are first aggregated by state, plant type and, for coal steam and IGCC, coal rank. ii) They are then split into smaller generic units by dividing the aggregated capacity by a reference capacity. The result is the number of generic units created in each state for each plant type and fuel type. The reference capacity is varied by plant type as shown in Table 2.

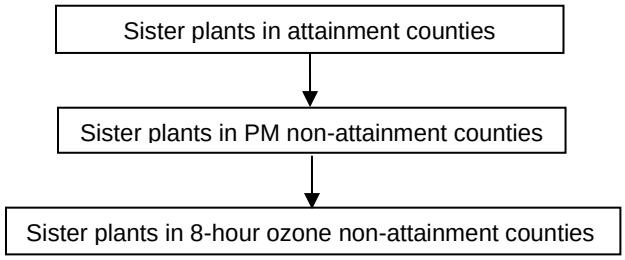
Table 2 - Generic Unit Reference Capacity

Plant Type	Reference Capacity (MW)
Biomass	50
Coal Steam	650
Combined Cycle	1,083
Combined Cycle with CCS	377
Combustion Turbine	237
Fossil Waste	36
Oil/Gas Steam	100
Landfill Gas	36
Geothermal	50

Aggregated heat input and emissions are then divided evenly among all generic units created in a given state for each plant type.

2. Siting generic units: The generic units are given a state FIPS code, county FIPS code, and latitude-longitude based on an algorithm that sites generic units in counties within their respective states. The generic unit siting data table, GenericUnitSite, is used in this algorithm to assign each generic unit a sister plant in a county based on the county's attainment/non-attainment status. Within a state, the hierarchy for assignment of sister plants in the order of county code and ORIS code is shown in Flow Chart 3. All generic units are sited so that their ORIS codes are unique, and the same ORIS code has the same county and latitude-longitude across all runs of the same base case origin.

Flow Chart 3 - Generic Unit Siting Hierarchy



3. Assigning generic unit SCCs, ORIS codes, facility IDs, unit IDs, release point IDs, and process IDs: SCC assignment is based on the unit's plant type, fuel type, and coal rank as shown in Table 3. Generic unit ORIS code consists of a six-digit number. The units are first sorted by plant type in the order of combined cycle, fossil waste, combustion turbine, IGCC, and coal steam.

Table 3 - Generic Unit SCC

Plant Type	Fuel Type / Coal Rank	SCC
Coal Steam	Bituminous	10100202
Coal Steam	Subbituminous	10100222
Coal Steam	Lignite	10100301
Fossil Waste	Process Gas	10100701
Biomass	Biomass	10100902
Combined Cycle	Natural Gas	20100201
Combined Cycle	Oil	20100101
Combustion Turbine	Natural Gas	20100201
Combustion Turbine	Oil	20100101
IGCC	Coal	20100301
IGCC	Petroleum Coke	20100301
Oil/Gas Steam	Natural Gas	10100601
Landfill Gas	Landfill Gas	00000000
Geothermal	Geothermal	00000000

Then generic unit ORIS codes are assigned. The first digit of the ORIS code represents the unit's plant type as shown in Table 4. The next three digits are a counter, starting with "000" and incrementing with each generic unit created within a given state for each plant type. The last two digits are the state FIPS code. For example, the first combined-cycle generic unit in Arizona used in the example above has a plant ID of "ORIS700104".

Table 4 - Generic Unit 1st Digit ORIS Code

Plant Type	1st Digit of the ORIS Code
Biomass	3
Coal Steam	9
Combined Cycle	7
Combustion Turbine	8
Fossil Waste	5
Geothermal	2
IGCC	6
Landfill Gas	1
Oil/Gas Steam	4

Generic unit's facility ID consists of a concatenation of the word "ORIS" and the unit's ORIS code. Generic unit's unit ID consists of a concatenation of a three-letter unit ID code representing the unit's plant type as shown in Table 5 and the unit's state FIPS code. For example, the first combined-cycle generic unit in Arizona used in the example above has a unit ID of "ORISGCC04".

Table 5 - Generic Unit ID Code

Plant Type	Unit ID Code
Biomass	GSC
Coal Steam	GSC
Combined Cycle	GCC
Combustion Turbine	GGT
Fossil Waste	GFW
Geothermal	GGE
IGCC	IGC
Landfill Gas	GLF
Oil/Gas Steam	GSC

Generic unit's release point ID is the same as the unit's unit ID. Generic unit's process ID is the same as the unit's facility ID.

Step 2. Assigning Existing and Retrofitted Unit's SCCs, State FIPS Codes, County FIPS Codes, Facility IDs, Release Point IDs, Process IDs, and Other EIS Unit-Specific Data That Are Required for Construction of the Flat File.

First, existing, and retrofitted units' SCCs are assigned. SCC, or Source Classification Code, describes a generating unit's characteristics. The assignment of SCC for existing and retrofitted units is based on a unit's configuration that includes plant type, fuel type, and, if the unit is a boiler, firing and bottom type. The SCC is an eight-digit numeric code that describes the characteristics of the units. Beginning from the left the first digit of the SCC represents the type of unit (boiler [=1] or turbine [=2]). The third digit of the SCC represents the economic sector of the unit (electric power sector=1). And the fifth through eighth digits of the SCC represent the unit's attributes including fuel type and, if the unit is a boiler, bottom and firing type. The second and fourth digits are zero. Table 6 displays the SCCs.

Table 6 - SCC Assignment for Existing and Retrofitted Units

Plant Type	Boiler / Generator	Fuel Type / Coal Rank	Firing	Bottom	SCC
Coal Steam	Boiler/Generator	Bituminous		Wet	10100201
Coal Steam	Boiler/Generator	Bituminous	Vertical	Wet	10100201
Coal Steam	Boiler/Generator	Bituminous	Wall	Wet	10100201
Coal Steam	Boiler/Generator	Bituminous	Vertical	Dry	10100202
Coal Steam	Boiler/Generator	Bituminous	Wall	Dry	10100202
Coal Steam	Boiler/Generator	Bituminous		Dry	10100202
Coal Steam	Boiler/Generator	Bituminous			10100202
Coal Steam	Boiler/Generator	Bituminous	Wall		10100202
Coal Steam	Boiler/Generator	Bituminous	Vertical		10100202
Coal Steam		Bituminous	Turbo		10100202
Coal Steam	Boiler/Generator	Bituminous	Cyclone	Wet	10100203
Coal Steam	Boiler/Generator	Bituminous	Cyclone	Dry	10100203
Coal Steam	Boiler/Generator	Bituminous	Cyclone		10100203
Coal Steam	Boiler/Generator	Bituminous	Stoker/SPR	Wet	10100204
Coal Steam	Boiler/Generator	Bituminous	Stoker/SPR		10100204
Coal Steam	Boiler/Generator	Bituminous	Stoker/SPR	Dry	10100204
Coal Steam	Boiler/Generator	Bituminous	Tangential	Wet	10100211
Coal Steam	Boiler/Generator	Bituminous	Tangential		10100212
Coal Steam	Boiler/Generator	Bituminous	Tangential	Dry	10100212
Coal Steam	Boiler/Generator	Bituminous	Cell	Wet	10100215
Coal Steam	Boiler/Generator	Bituminous	Cell		10100215
Coal Steam	Boiler/Generator	Bituminous	Cell	Dry	10100215
Coal Steam	Boiler/Generator	Bituminous	FBC		10100218
Coal Steam	Boiler/Generator	Bituminous	FBC	Wet	10100218
Coal Steam	Boiler/Generator	Bituminous	FBC	Dry	10100218
Coal Steam	Boiler/Generator	Subbituminous		Wet	10100221
Coal Steam	Boiler/Generator	Subbituminous	Wall	Wet	10100221
Coal Steam	Boiler/Generator	Subbituminous	Vertical	Wet	10100221
Coal Steam	Boiler/Generator	Subbituminous			10100222
Coal Steam	Boiler/Generator	Subbituminous		Dry	10100222
Coal Steam	Boiler/Generator	Subbituminous	Vertical	Dry	10100222
Coal Steam	Boiler/Generator	Subbituminous	Wall	Dry	10100222
Coal Steam	Boiler/Generator	Subbituminous	Wall		10100222
Coal Steam	Boiler/Generator	Subbituminous	Cyclone	Dry	10100223
Coal Steam	Boiler/Generator	Subbituminous	Cyclone	Wet	10100223
Coal Steam	Boiler/Generator	Subbituminous	Cyclone		10100223
Coal Steam	Boiler/Generator	Subbituminous	Stoker/SPR		10100224
Coal Steam	Boiler/Generator	Subbituminous	Stoker/SPR	Wet	10100224
Coal Steam	Boiler/Generator	Subbituminous	Stoker/SPR	Dry	10100224
Coal Steam	Boiler/Generator	Subbituminous	Tangential	Wet	10100226
Coal Steam	Boiler/Generator	Subbituminous	Tangential	Dry	10100226
Coal Steam	Boiler/Generator	Subbituminous	Cell	Wet	10100235

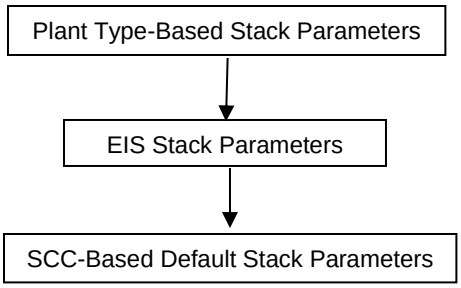
Plant Type	Boiler / Generator	Fuel Type / Coal Rank	Firing	Bottom	SCC
Coal Steam	Boiler/Generator	Subbituminous	Cell	Dry	10100235
Coal Steam	Boiler/Generator	Subbituminous	Cell		10100235
Coal Steam	Boiler/Generator	Subbituminous	FBC	Dry	10100238
Coal Steam	Boiler/Generator	Subbituminous	FBC	Wet	10100238
Coal Steam	Boiler/Generator	Subbituminous	FBC		10100238
Coal Steam	Boiler/Generator	Lignite	Wall	Dry	10100301
Coal Steam	Boiler/Generator	Lignite		Wet	10100301
Coal Steam	Boiler/Generator	Lignite	Tangential	Wet	10100302
Coal Steam	Boiler/Generator	Lignite	Tangential	Dry	10100302
Coal Steam	Boiler/Generator	Lignite	Cyclone		10100303
Coal Steam	Boiler/Generator	Lignite	Cyclone	Wet	10100303
Coal Steam	Boiler/Generator	Lignite	Stoker/SPR	Wet	10100306
Coal Steam	Boiler/Generator	Lignite	Stoker/SPR		10100306
Coal Steam	Boiler/Generator	Lignite	Stoker/SPR	Dry	10100306
Coal Steam	Boiler/Generator	Lignite	FBC		10100318
Coal Steam	Boiler/Generator	Lignite	FBC	Wet	10100318
Coal Steam	Boiler/Generator	Lignite	FBC	Dry	10100318
O/G Steam	Boiler/Generator	Oil			10100401
O/G Steam	Boiler/Generator	Oil	Wall	Dry	10100401
O/G Steam	Boiler/Generator	Oil	Tangential		10100404
O/G Steam		Orimulsion	Wall		10100409
O/G Steam		Orimulsion	Other		10100409
O/G Steam	Boiler/Generator	Natural Gas			10100601
O/G Steam	Boiler/Generator	Natural Gas	Wall		10100601
O/G Steam	Boiler/Generator	Natural Gas	Wall	Dry	10100601
O/G Steam		Natural Gas	Wall	Wet	10100601
O/G Steam		Natural Gas	Vertical	Dry	10100601
O/G Steam		Natural Gas	Vertical		10100601
O/G Steam	_	Natural Gas	Cell	_	10100601
O/G Steam		Natural Gas	Cyclone	Dry	10100601
O/G Steam		Natural Gas	Cyclone	Wet	10100601
O/G Steam		Natural Gas	Cyclone		10100601
O/G Steam		Natural Gas	Other	Dry	10100601
O/G Steam		Natural Gas	Tangential	Dry	10100604
O/G Steam		Natural Gas	Tangential	Wet	10100604
O/G Steam	Boiler/Generator	Natural Gas	Tangential		10100604
Fossil Waste	Boiler	Process Gas			10100701
Coal Steam	Boiler/Generator	Petroleum Coke	Vertical	Dry	10100801
Coal Steam		Petroleum Coke	Wall		10100801
Coal Steam	Boiler/Generator	Petroleum Coke			10100801
Coal Steam	Boiler/Generator	Petroleum Coke	FBC	Dry	10100818
Coal Steam	Boiler/Generator	Biomass			10100902
Coal Steam	Boiler/Generator	Waste Coal			10102001
Coal Steam	Boiler/Generator	Waste Coal	Wall		10102001
Coal Steam	Boiler/Generator	Waste Coal	FBC		10102018
Combined Cycle	Generator	Oil			20100101
Combustion Turbine	Boiler/Generator	Oil			20100101
Combined Cycle	Boiler/Generator	Natural Gas			20100201
Combined Cycle		Natural Gas			20100201
Combustion Turbine	Boiler/Generator	Natural Gas			20100201
Fossil Waste	Generator	Process Gas			20100201
IGCC	Boiler/Generator				20100301

We then assign existing and retrofitted units' state FIPS codes, county FIPS codes, facility IDs, release point IDs, and process IDs. State FIPS codes, county FIPS codes, facility IDs, release point IDs, and process IDs are obtained from the EIS unit-specific data table. Where the EIS provides no data, default values are used. Appendix A describes the default values in detail.

Step 3. Assigning Stack Parameters and Latitude-Longitude/County Centroid Coordinates for All Units

Stack Parameters: Existing and retrofitted unit's stack parameters are assigned based on the hierarchy described in Flow Chart 4.

Flow Chart 4 - Stack Parameters Assignment Hierarchy



Stack parameters are first assigned based on plant type as shown in Table 7.

Table 7 - Plant Type-Based Stack Parameters

Plant Type	Stack Height (ft)	Stack Diameter (ft)	Stack Temperature (degree F)	Stack Velocity (ft/sec)	Stack Flow (cft/sec)
IGCC	150	19	340	75.8	21491.48

If Table 7 provides no plant type-based stack parameters, the units are assigned EIS stack parameters from the EIS unit-specific data table. If the EIS data table provides no stack parameters, the units are assigned default stack parameters based on a unit's SCC as shown in Table 8.

Table 8 - SCC-Based Default Stack Parameters

SCC	Stack Height (ft)	Stack Diameter (ft)	Stack Temperature (ºF)	Stack Velocity (ft/sec)
10100201	603.2	19.8	281.2	076.5
10100202	509.7	14.6	226.0	062.0
10100203	491.6	16.6	278.4	080.5
10100204	225.0	00.6	067.2	002.4
10100211	490.0	17.4	280.0	076.4
10100212	445.6	17.4	275.2	077.6
10100215	509.7	14.6	226.0	062.0
10100218	399.3	10.8	245.6	040.1
10100221	983.0	22.8	350.0	110.0
10100222	468.5	16.0	254.7	065.6
10100223	446.8	15.9	308.0	093.6
10100224	255.5	10.0	251.3	015.3
10100226	495.8	18.9	259.2	091.2
10100235	468.5	16.0	254.7	065.6
10100238	600.0	22.5	315.0	078.0
10100301	427.5	22.3	232.8	074.2
10100302	483.5	21.0	229.4	092.4
10100303	462.0	21.7	271.3	072.5
10100306	300.0	07.2	441.0	067.0
10100318	326.7	12.3	326.7	074.7
10100401	252.9	10.1	258.1	042.6
10100404	322.1	14.0	301.8	062.8
10100409	252.9	10.1	258.1	042.6
10100601	263.9	10.3	236.0	046.9
10100604	308.0	15.2	275.2	066.0

SCC	Stack Height (ft)	Stack Diameter (ft)	Stack Temperature (ºF)	Stack Velocity (ft/sec)
10100701	239.2	09.4	238.0	042.3
10100801	371.3	05.5	122.4	020.4
10100818	399.3	10.8	245.6	040.1
10100902	303.4	03.3	137.7	016.1
10102001	509.7	14.6	226.0	062.0
10102018	399.3	10.8	245.6	040.1
20100101	057.7	09.6	655.8	064.9
20100201	062.0	10.0	585.3	061.3
20100301	150.0	19.0	340.0	075.8

Generic units are assigned SCC-based default stack parameters.

Stack flow data are assigned from the EIS data table for all existing and retrofitted units, except for IGCC units which receive default stack flow by plant type as shown in Table 7. If the EIS data table does not provide stack flow data or if the SCC-based default stack parameters are assigned, stack flows are calculated as follows:

$$Stack\ Flow\,(cft/sec) = 3.141592 * \left(\frac{Stack\ Diameter\ (ft)}{2}\right)^2 * Stack\ Velocity\ (ft/sec)$$

Coordinates: Latitude-longitude coordinates are assigned from the EIS data table. If the EIS data table provides no data, latitude-longitude coordinates are assigned based on a unit's sister ORIS code from the table LatLonDefault or based on the county centroid.

Step 4. Assigning Post-Combustion Control Device IDs for All Units

Control IDs are assigned reflecting all post-combustion control devices at a unit in a particular projection year. The control devices reflect both existing and retrofit controls. Table 9 lists the control devices and their associated control IDs.

Table 9 - Post-Combustion Control Devices

Control ID	Description
119	Dry FGD
139	SCR
140	SNCR or other NO_x
141	Wet FGD
206	DSI
207	ACI

Step 5. Calculating CO, NO_x, VOC, SO_2, NH_3, Primary PM_{10}, Primary $PM_{2.5}$, Mercury (Hg), and HCl Emissions

Emissions are calculated at two levels: seasonal and monthly.

Seasonal emission calculations:

i. Seasonal NO_x, SO_2, mercury (Hg), and HCl emissions (tons) are taken directly from IPM run results.

ii. Seasonal primary PM_{10}, primary $PM_{2.5}$, CO, VOC, and NH_3 emissions (tons) are calculated by multiplying the unit's generation and unit specific emission factors for each pollutant as follows:

$$Seasonal\ Emission_{Pollutant}\ (tons) = \frac{Seasonal\ Generation\ (MWh) * Unit\ level\ Emission\ Factor_{Pollutant}\ (lb/MWh)}{2000\ (lb/ton)}$$

Where 2000 converts lb to short ton; seasons are summer, winter, and winter shoulder; and the pollutants are PM_{10}, $PM_{2.5}$, CO, VOC, and NH_3. For existing units, unit-specific emission factor by pollutant is assigned. Appendix B describes the methodology for estimation of PM_{10} and $PM_{2.5}$ emission factors. For generic units, unit specific emission factor is assigned for each pollutant based on plant type as shown in Table 10.

Table 10 - Generic Emission Factors (lb/MWh)

Plant Type	Primary PM10	Primary PM2.5	CO	VOC	NH_3
Ultrasupercritical Coal with 30% CCS	0.146	0.112	0.284	0.013	0.006
Ultrasupercritical Coal with 90% CCS	0.146	0.112	0.284	0.013	0.006
Ultrasupercritical Coal without CCS	0.146	0.112	0.284	0.013	0.006
Combined Cycle	0.029	0.028	0.032	0.01	0.02
Combined Cycle with Carbon Capture	0.029	0.028	0.032	0.01	0.02
Combustion Turbine	0.069	0.065	0.298	0.023	0.046
Biomass	0.089	0.08	1.918	0.155	0.337
Landfill Gas	0.576	0.586	6.98	1.159	0.036

Monthly emission calculations:

Summer, Winter, and Winter Shoulder monthly emissions are calculated by multiplying the seasonal emissions by the number of days in a specific month and dividing by the total number of days in that season. Summer is the 153 days between May 1 and September 30. Winter is the 90 days between December 1 and February 28. And Winter Shoulder is the 122 days between October 1 and November 30 and March 1 and April 30.

SECTION IV: FLAT FILE LAYOUT:

A flat file is generated with the processed data (as explained in the sections above) for use in air quality modeling work. Both criteria and HAP emissions are provided in the same file. The pollutants are provided in the following order: CO, NO_x, VOC, SO_2, NH_3, primary PM_{10}, primary $PM_{2.5}$, Mercury (Hg), and HCl.

The file's naming convention is as follows:

FlatFile_<ipm run alpha-numeric only>_<year4>_<date created using yyyymmdd>.txt

where:

year4 = 4-digit year of the emissions (e.g., 2030)
yyyy = 4-digit year
mm = 2-digit month number (e.g. 01 through 12)
dd = 2-digit date number (e.g., 01 through 31)

For example: 'FlatFile_EPA513_BC_7c_2018_20131108.txt'.

All data fields are comma-delimited and character data, including comma, semi-colon, and space, are enclosed in double-quotes.

The file contains the following header lines:

#FORMAT=ff10_POINT
#COUNTRY=US
#YEAR=<year of emissions>
#VALUE_UNITS=TON
#CREATION_DATE=<date created>

#CREATOR_NAME=US EPA-CAMD
#DATA_SET_ID=1,US EPA IPM
#COUNTRY_CD,REGION_CD,TRIBAL_CODE,EIS_FACILITY_ID,EIS_UNIT_ID,EIS_REL_POINT_ID,EIS_PROCESS_ID,AGY_FACILITY_ID,AGY_UNIT_ID,AGY_REL_POINT_ID,AGY_PROCESS_ID,SCC,POLL,ANN_VALUE,ANN_PCT_RED,FACILITY_NAME,ERPTYPE,STKHGT,STKDIAM,STKTEMP,STKFLOW,STKVEL,NAICS,LONGITUDE,LATITUDE,LL_DATUM,HORIZ_COLL_MTHD,DESIGN_CAPACITY,DESIGN_CAPACITY_UNITS,REG_CODES,FAC_SOURCE_TYPE,UNIT_TYPE_CODE,CONTROL_IDS,CONTROL_MEASURES,CURRENT_COST,CUMULATIVE_COST,PROJECTION_FACTOR,SUBMITTER_FAC_ID,CALC_METHOD,DATA_SET_ID,FACIL_CATEGORY_CODE,ORIS_FACILITY_CODE,ORIS_BOILER_ID,IPM_YN,CALC_YEAR,DATE_UPDATED,FUG_HEIGHT,FUG_WIDTH_YDIM,FUG_LENGTH_XDIM,FUG_ANGLE,ZIPCODE,ANNUAL_AVG_HOURS_PER_YEAR,JAN_VALUE,FEB_VALUE,MAR_VALUE,APR_VALUE,MAY_VALUE,JUN_VALUE,JUL_VALUE,AUG_VALUE,SEP_VALUE,OCT_VALUE,NOV_VALUE,DEC_VALUE,JAN_PCTRED,FEB_PCTRED,MAR_PCTRED,APR_PCTRED,MAY_PCTRED,JUN_PCTRED,JUL_PCTRED,AUG_PCTRED,SEP_PCTRED,OCT_PCTRED,NOV_PCTRED,DEC_PCTRED,COMMENT

The last header line contains comma-delimited field names identifying the data contained in each data field.

Appendix A

Default Values

Field Name	Default Value
COUNTRY_CD	N/A
REGION_CD	N/A
TRIBAL_CODE	N/A
EIS_FACILITY_ID	"ORIS" followed by the ORIS_FACILITY_CODE. For example, ORIS55177.
EIS_UNIT_ID	"ORIS" followed by the ORIS_BOILER_ID. For example, ORISST1.
EIS_REL_POINT_ID	"ORIS" followed by the ORIS_BOILER_ID. That is, the same as the unit ID default value.
EIS_PROCESS_ID	Use the same value as in the [IPM Y/N] field. That is, the NEEDS UniqueID.
AGY_FACILITY_ID	Blank
AGY_UNIT_ID	Blank
AGY_REL_POINT_ID	Blank
AGY_PROCESS_ID	Blank
SCC	N/A
POLL	N/A
ANN_VALUE	N/A
ANN_PCT_RED	Blank
FACILITY_NAME	NEEDS Plant Name
ERPTYPE	Blank
STKHGT	SCC-based default stack parameters from SCCDefaultStackParameters table.
STKDIAM	SCC-based default stack parameters from SCCDefaultStackParameters table.
STKTEMP	SCC-based default stack parameters from SCCDefaultStackParameters table.
STKFLOW	SCC-based default stack parameters from SCCDefaultStackParameters table.
STKVEL	SCC-based default stack parameters from SCCDefaultStackParameters table.
NAICS	Blank
LONGITUDE	County-centroid based longitude by ORIS code, state FIPS code and country FIPS code from LatLonDefault table.
LATITUDE	County-centroid based longitude by ORIS code, state FIPS code and country FIPS code from LatLonDefault table.
LL_DATUM	Blank
HORIZ_COLL_MTHD	Blank
DESIGN_CAPACITY	N/A
DESIGN_CAPACITY_UNITS	N/A
REG_CODES	Blank
FAC_SOURCE_TYPE	"125"
UNIT_TYPE_CODE	"100" for Boiler, "120" for Turbine, "140" for combined cycle (boiler/gas turbine).
CONTROL_IDS	N/A
CONTROL_MEASURES	Blank
CURRENT_COST	Blank
CUMULATIVE_COST	Blank
PROJECTION_FACTOR	Blank
SUBMITTER_ID	N/A
CALC_METHOD	N/A
DATA_SET_ID	N/A
FACIL_CATEGORY_CODE	N/A
ORIS_FACILITY_CODE	NEEDS ORIS Code
ORIS_BOILER_ID	NEEDS Unit ID
IPM_YN	N/A
INV_YEAR	N/A
DATE_UPDATED	N/A
FUG_HEIGHT	Blank
FUG_WIDTH_YDIM	Blank
FUG_LENGTH_XDIM	Blank
FUG_ANGLE	Blank
ZIPCODE	N/A

Field Name	Default Value
ANNUAL_AVG_HOURS_PER_YEAR	N/A
JAN_VALUE	N/A
FEB_VALUE	N/A
MAR_VALUE	N/A
APR_VALUE	N/A
MAY_VALUE	N/A
JUN_VALUE	N/A
JUL_VALUE	N/A
AUG_VALUE	N/A
SEP_VALUE	N/A
OCT_VALUE	N/A
NOV_VALUE	N/A
DEC_VALUE	N/A
JAN_PCTRED	Blank
FEB_PCTRED	Blank
MAR_PCTRED	Blank
APR_PCTRED	Blank
MAY_PCTRED	Blank
JUN_PCTRED	Blank
JUL_PCTRED	Blank
AUG_PCTRED	Blank
SEP_PCTRED	Blank
OCT_PCTRED	Blank
NOV_PCTRED	Blank
DEC_PCTRED	Blank
COMMENT	Blank

Appendix B: PM Emissions

This appendix documents the updated PM Emissions Factor Methodology. This updated approach accomplishes the following:

- Improves consistency of PM emissions rates between the reported base year (2019 NEI inventory) and future year projections (IPM post-processing outputs)
- Enhances transparency by relying on reported emissions rates where possible and calculating estimates only when necessary.
- Expedites creation and review of future year PM projections.

The steps taken to develop the unit specific primary PM_{10} and $PM_{2.5}$ emission factors are explained below. The resulting emission factors are included in the file FlatFile_Inputs.xls.

1. Developed crosswalks between NEEDS v6 and NEI 2019, and NEEDS v6 and 2018 and 2019 EIA Form 923. Additional data sources were reviewed for units that had no PM emissions in NEI 2019. These sources included California Air Resources Board 2018, Florida State Emissions Inventory 2018, Michigan Point Source Emission 2018, New York Emission Inventory 2018, North Carolina State Emissions Inventory 2018, Oklahoma Annual Point Source Emissions 2018, Texas Emission Inventory 2018, and Virginia State Emissions 2018.

2. Calculated NEEDS unit-specific primary PM_{10} and primary $PM_{2.5}$ emission factors in lb/MWh as the ratio between reported PM emissions and reported generation (for those NEEDS units with reported historical emissions and generation).

3. Estimated default primary PM_{10} and $PM_{2.5}$ emission factors by plant type and FGD control status at the national level based on NEEDS units with PM emission factors available from step 2 to use for those NEEDS units with no matching historical emissions or generation or are considered as outliers. NEEDS units with PM emission factors considered outliers are removed while calculating the default emission factors.

4. Identified those units where historical and projected characteristics are different so that correct emissions factors can be applied. For this purpose, FGD controls and fuel types (coal or natural gas) reported in NEEDS, NEI 2019, 2018/2019 EIA Form 923 are compared with the future year IPM projections.

5. If no FGD controls or coal-to-gas fuel changes were projected in IPM, we used primary PM_{10} and primary $PM_{2.5}$ emissions factors calculated in step 2 to projected generation (MWh). In instances of biomass co-firing, NEI-based unit-level primary PM_{10} and primary $PM_{2.5}$ emission factors are used.

6. For units that have changed or are projected to change fuel from coal to gas, we used default primary PM_{10} and $PM_{2.5}$ emission factors for natural gas-fired units from step 3.

7. For units that switch coal rank, we applied unit-specific primary PM_{10} and $PM_{2.5}$ emission factors from step 2. Note that the expected impact of coal rank switching on emissions is minimal and developing a methodology to capture the projected coal rank switch is complex.

8. For coal units projected to add new FGD controls, we applied default primary PM_{10} and primary $PM_{2.5}$ emission factors for coal units with FGD control from step 3 when the default emission factors from step 3 are lower than the emission factors for the coal units without FGD controls.

9. For oil/gas steam, combined cycle, combustion turbine, and all other plant types, we applied steps 1 through 8.

10. For new combined cycle and combustion turbine units, we used primary PM_{10} and primary $PM_{2.5}$ emission factors derived from the NEI for similar units with an online year of 2015 or later. For new units with remaining plant types, we used primary PM_{10} and primary $PM_{2.5}$ emission factors derived from the NEI for similar units with an online year of 2010 or later.

Unit level emissions factors used in calculating PM emissions are presented in the spreadsheet titled “Post Processing Emissions Factors PM CO VOC NH3.”