

Revised TexAQS2K6 HGB Point Source Emission Inventory

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Contact

Greg Frost, 303-497-7539, gregory.j.frost@noaa.gov

Reference for data set

Houston-Galveston-Brazoria TexAQS2K6 revised point source emission inventory, <http://www.esrl.noaa.gov/csd/2006/fieldops/emission.html>, Greg Frost, 7 August 2009

Overview of data set

A revised point source emission inventory (EI) for the 8-county Houston-Galveston-Brazoria (HGB) area is now available. Texas counties included in the inventory are Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, and Waller. This revised inventory is based on the best available data from the Texas Commission on Environmental Quality (TCEQ) for the period of the 2006 Texas Air Quality Study (TexAQS2K6), and it is therefore the recommended emission data set for analysis of TexAQS2K6 observations.

Details of data set

This revised point source EI was derived from the TCEQ hourly-annual hybrid EI that was created by John Jolly (TCEQ) in March and April, 2009. For 86 TCEQ accounts in the HGB area (each "account" is an individual industrial facility or site), the reporting company was asked by TCEQ to provide hourly emissions data for the 15 August - 15 September 2006 time period.

However, the companies provided hourly data for only a small subset of the emission sources within each of these 86 facilities. Emissions are reported at the level of a "path", a uniquely defined combination of account + process unit (where the emissions are generated) + emission point (where the emissions leave the facility). Of the 4125 paths within these 86 facilities, only 267 paths (6% of the total) reported hourly emissions for the above time period. Furthermore, these 267 paths represent only about 1% of the 21944 total paths contained in all 506 accounts across the entire HGB area.

For the 267 paths reporting hourly emissions for the period 15 Aug -15 Sept 2006, John produced daily emission totals. For all other emission paths in the HGB, John used the 2006 annual emissions data reported routinely to TCEQ by all companies in Texas. He converted the annual totals to ozone season average daily emissions (ozone season = 1 May - 30 Sept). His resulting inventory is therefore a hybrid daily inventory for the period 15 Aug - 15 Sept 2006, merging hourly emissions for a minor fraction of the paths with annual average emissions for the majority of the paths in the HGB area.

I then did further processing of John Jolly's hybrid path-level inventory to produce an easy-to-use inventory for analysis of TexAQS2K6 observations:

1) I calculated the average of the 32 daily emission values during the 15 Aug - 15 Sept 2006 period for each reported pollutant and each emission path. I then aggregated the average emissions for each account's emission paths to produce account-total average emission values.

The resulting data set has no day-to-day variability. However, only a tiny fraction (~1%) of the HGB paths reported temporal variations in their emissions, so apparent daily variations in account-total emissions derived from the hybrid data set do not accurately depict the true temporal variability of each facility's emissions. Instead, the averages used here are representative of the average account-level emissions reported to TCEQ for the 15 Aug - 15 Sept 2006 period.

2) I updated the NO_x and SO₂ emissions and added CO₂ emissions for the power plant accounts. I changed the NO_x and SO₂ emissions of the 17 power plant accounts in the HGB area to the average daily emission values for September and October 2006 measured by the Continuous Emission Monitoring Systems (CEMS) at these plants. For these 17 accounts, I also included Sept/Oct 2006 daily average CO₂ emissions, since these are also reported in the CEMS data set. These 17 accounts are the *only* accounts in the data set that report CO₂ emissions. The "zero" CO₂ emissions reported for all other accounts are simply a lack of data, not a statement about these sources' CO₂ output.

In my opinion, the resulting revised point inventory gives the best bottom-up estimate of the average emissions of 87 selected pollutants in the HGB area for the TexAQS2K6 study period.

Files

The files are available through links on the Point Source Emission Inventory page of the 2006 TexAQS/GoMACCS web site:

<http://www.esrl.noaa.gov/csd/2006/fieldops/emission.html>

Available files include:

1) List of account-total emissions: TexAQS2K6_PointEI_rev_HGB.xls

- Excel spreadsheet with account information and account-total emissions appropriate for the TexAQS2K6 study period. HGB area totals are given in red in the last row.
- *rn* = a unique TCEQ identifier of the account
- *account* = TCEQ account code. 7 characters, first 2 indicate county: HG or HX = Harris, BL = Brazoria, GB = Galveston, FG = Fort Bend, LH = Liberty, WB = Waller, CI = Chambers, MQ = Montgomery, 90 = mobile site.
- *company* = owner of the facility in the 2006 TCEQ database
- *site* = name of the facility in the 2006 TCEQ database
- *latitude, longitude* = the average coordinates for all emission paths within a given TCEQ account. Degrees, N and E are positive.
- *npaths* = number of emission paths reported for that account
- Emissions are reported in both short tons per day (*tpd*) and molecules per second (*mps*). Note 1 short ton = 2000 pounds = 0.9072 metric ton. The suffix

avg indicates the data are account-total average emission values for the TexAQS2K6 study period, as discussed above. Name of pollutant is the *short_name* given in Pollutant list (see below).

2) Pollutant list: TexAQS2K6_PointEI_pollutant_list.xls

- Excel spreadsheet with information on the 87 pollutants reported in the Emissions list
- *short_name* = abbreviated name of the pollutant appearing in the Emissions list
- *tceq_name* = contaminant name used in TCEQ emission data sets
- *contam_code* = TCEQ contaminant code. 5 characters. All non-methane VOCs = 5XXXX.
- *cas_code* = CAS (Chemical Abstracts Service) chemical substance registry number of the pollutant (*cas_code* = 0 for some TCEQ contaminants that contain a mixture of compounds)
- *mw* = molecular weight (g/mol). For NO_x, the convention is to use the MW of NO₂. For unspicated and total VOC, I assume the MW of propane.
- *compound_name_1,2* = two commonly-used names for pollutant
- Pollutant ordering from top to bottom in this list is the order the pollutants appear from left to right in the Emissions list spreadsheet
- **Pollutants highlighted in red:** For a few pollutants, two different TCEQ contaminant codes and names appear in the emission data base, but they represent exactly the same compound (i.e., the CAS code is identical). In the Emissions list, I have totaled the emissions of these two TCEQ contaminants and reported them under a single *short_name*.

3) Emissions maps: TexAQS2K6_PointEI_rev_HGB.pxp

- IGOR experiment containing same account-level average emissions as the above spreadsheet and maps of emission sources sized by emission strength
- GIS data from ArcView

4) This ReadMe file: ReadMe_TexAQS2K6_PointEI_rev_HGB.pdf