

# Modeling Protocol Example for Evaluation of Inter-Pollutant (IP) Use of Emissions Credits

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## 1.0 INTRODUCTION

### 1.1 Background

Company A intends to use nitrogen oxides (NO<sub>x</sub>) emission reduction credits (ERCs) to offset 123.45 tons per year (tpy) of volatile organic compounds (VOC) emissions at their site, Plant B, as authorized by a nonattainment new source review (NNSR) permit. The Project will be located within the Houston-Galveston-Brazoria (HGB) ozone nonattainment in Deer Park in Harris County. A photochemical modeling demonstration will be performed to show that the IP use of ERCs will not adversely affect the overall air quality or regulatory design value in the HGB ozone nonattainment area.

### 1.2 Deliverables

There are two deliverables.

1. A final modeling report with the total number of NO<sub>x</sub> ERCs required for offsetting the ozone impacts of the VOC emissions from the Project along with details on the model configuration, model results, and analysis of the results.
2. Electronic files to the TCEQ containing the information specified in the TCEQ's *Guidance on the Inter-Pollutant Use of Credits for Nonattainment New Source Review Permit Offset Requirements*.

## 2.0 FACILITY LOCATIONS AND EMISSIONS

### 2.1 Location of Project and Credit Facilities for Modeling Purposes

The Project will be located at Plant B in Deer Park in Harris County. The NO<sub>x</sub> ERCs were generated due to the shutdown of facilities in Texas City in Galveston County. For the purposes of the photochemical modeling demonstration, the shutdown facilities have been moved from their original location to virtual locations within 1 km of the Project site centroid, as required by TCEQ guidance.

***[Note any deviations or special observations regarding location of Project and/or Credit Facilities]***

### 2.2 Project and Credit Facilities and Stack Parameters

The total VOC emissions, 123.45 tpy, from the Project will be modeled in the Project Baseline scenario. The facilities that are planned as part of the Project include a boiler, engine, tank, and flare. The hourly emission rates used to determine the total daily emissions, stack parameters, etc., for the Project facilities are provided in Table 1.

***[If the Project facilities have varying hourly emission rates, a discussion regarding the hourly emissions profile of the Project facilities should be provided]***

**Table 1: Stack Parameters for Project Facilities**

FIN	EPN	Description	VOC (lb/hour)	Location (m), Easting	Location (m), Northing	Height (m)	Temp (K)	Velocity (m/s)	Diameter (m)
D-1	D-1	Source - Unit 1 Boiler Stack A	14.28	012345	678910	50.0	435.93	16.76	2.682
D-2	D-2	Source - Unit 1 Engine Stack B	1.54	012345	678910	15	435.93	16.76	2.682
D-3	D-3	Source - Unit 2 Tank	3.07	012345	678910	20	433.15	3.0	15
D-4	D-4	Source - Unit 3 Flare	9.29	012345	678910	50.0	433.15	16.46	2.682

Only the NO<sub>x</sub> ERCs that Company A proposes to use to offset the 123.45 VOC emissions from the Project will be modeled in the Credit Baseline scenario. The shutdown facilities associated with the NO<sub>x</sub> ERCs to be modeled include two boilers, a heater, and a flare. The stack parameters and emission rates for each emission point that was shutdown to generate the NO<sub>x</sub> ERCs at Texas City are provided in Table 2.

***[If multiple ERCs from different sites and strategies are to be used, provide details for all Credit facilities in this section. The TCEQ recommends including a map showing the locations of the Project emission sources and modeled locations of the Credit facilities, as well as existing sources within 25 km of the proposed Project centroid.]***

**Table 2: Stack Parameters and Emissions for Credit Facilities**

FIN	EPN	Description	NO <sub>x</sub> (lb/day)	Location <sup>1</sup> (m), Easting	Location (m), Northing	Height (m)	Temp (K)	Velocity (m/s)	Diameter (m)
T-1	T-1	Source - Unit 1 Boiler Stack A	10.85	012345	678910	50.0	435.93	16.76	2.682
T-2	T-2	Source - Unit 1 Boiler Stack B	10.85	012345	678910	50.0	435.93	16.76	2.682
T-3	T-3	Source - Unit 2 Heater Stack A	11.98	012345	678910	50.0	433.15	16.46	2.682
T-4	T-4	Source - Unit 3 Flare	11.98	012345	678910	50.0	433.15	16.46	2.682

***[Note any deviations or special observations regarding Project and/or Credit facility emissions]***

## 2.3 Modeling of Project and Credit Emissions

### 2.3.1 Elevation of Emissions

Each stack from the shutdown facilities associated with the NO<sub>x</sub> ERCs will be modeled as an elevated point source. Two of the four stacks (boiler and flare) from the Project facilities will be modeled as elevated point sources, while the other two will be modeled as low level point sources.

***[Note deviation and other information regarding the treatment of the Project and Credit facilities, such as use of plume-in-grid and other options]***

### 2.3.2 Chemical Speciation of Emissions

The VOC emissions from the Project facilities will be speciated based on emission factors used in the related permit application and the appropriate EPA’s SPECIATE profile for the CB05 chemical mechanism. The speciation for each VOC source is specified in Table 3 below.

<sup>1</sup> Per TCEQ guidance, the locations here represent where the credits will be used (or within 1 km thereof).

**Table 3: VOC-to-CB05 Species for Project Facilities**

CB05 Species	VOC Profile Code 0001	VOC Profile Code 0003	VOC Profile Code 0009	VOC Profile Code 1070
BENZENE		0.04	0.079	
CH4	0.11	0.56	0.116	0.8671
ETH			0.287	
ETHA			0.028	
FORM	0.42	0.08		
MEOH				0.0154
OLE			0.2523	
PAR	0.47	0.28	0.1943	0.1175
TOL		0.02		
UNR			0.1223	

The NO<sub>x</sub> emissions from the shutdown facilities associated with the NO<sub>x</sub> ERCs will be speciated to the CB05 species NO and NO<sub>2</sub> using the split of 90% NO and 10% NO<sub>2</sub> commonly assumed<sup>2</sup>.

***[Note deviations and/or other relevant information regarding the speciation of the project and credit facilities]***

#### **4.0 CAMx MODELING**

##### **4.1 Modeling Platform**

The CAMx ozone model input files for the most recent approved HGB AD SIP were obtained from the TCEQ's web site (<http://www.tceq.texas.gov/airquality/airmod/data/hgb8h2>).

##### **4.2 Model Runs**

The TCEQ simulations of the HGB 2018 future year emissions scenario used CAMx v4.53. The modeling grid system consisted of a 36 km domain that encompassed the eastern half of the continental U.S. along with a nested 12 km regional grid, a 4 km grid focused on the HGB/BPA area, and a 2 km grid focused on the HG subdomain. The same source code and modeling domain structure will be used for the three CAMx simulations that will comprise Company A's photochemical modeling demonstration. These three model runs are (1) Attainment Baseline Case, (2) Credit Baseline Case, and (3) Project Baseline Case; each run will be done as described in the TCEQ's *Guidance on the Inter-Pollutant Use of Credits for Nonattainment New Source Review Permit Offset Requirements*.

***[Note deviations and/or other relevant information regarding CAMx version, additional model runs, etc.]***

#### **5.0 DOCUMENTATION AND REVIEW**

Company A will submit the report to the TCEQ in Microsoft Word and PDF formats along with the modeling files containing the information required for TCEQ review as specified in the TCEQ's *Guidance on the Inter-Pollutant Use of Credits for Nonattainment New Source Review Permit Offset Requirements*.

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<sup>2</sup> This example assumes that NO<sub>x</sub> credits will be used to offset VOC emissions. If VOC credits are being used, provide a table showing the speciation of the credits and note the speciation of any project emissions of NO<sub>x</sub>.