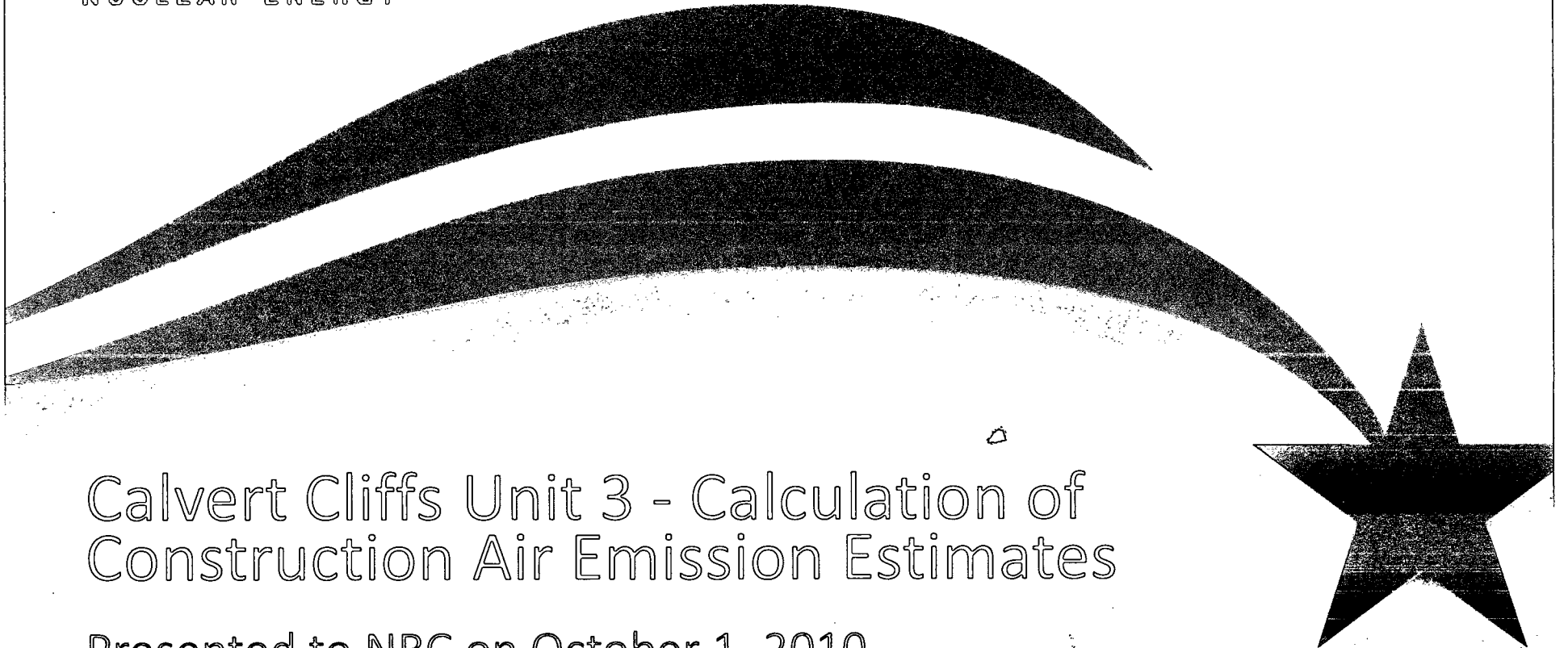
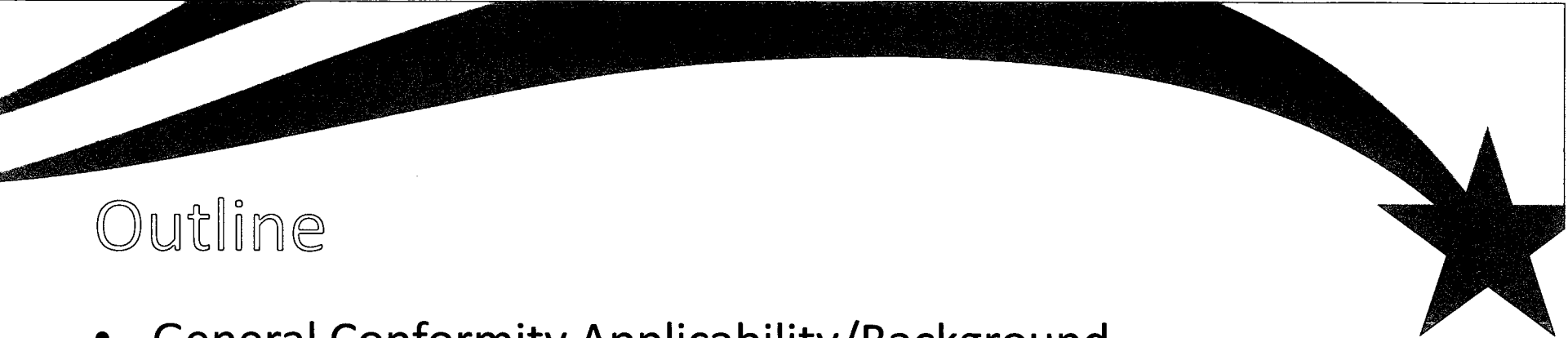




Calvert Cliffs Unit 3 - Calculation of Construction Air Emission Estimates

Presented to NRC on October 1, 2010

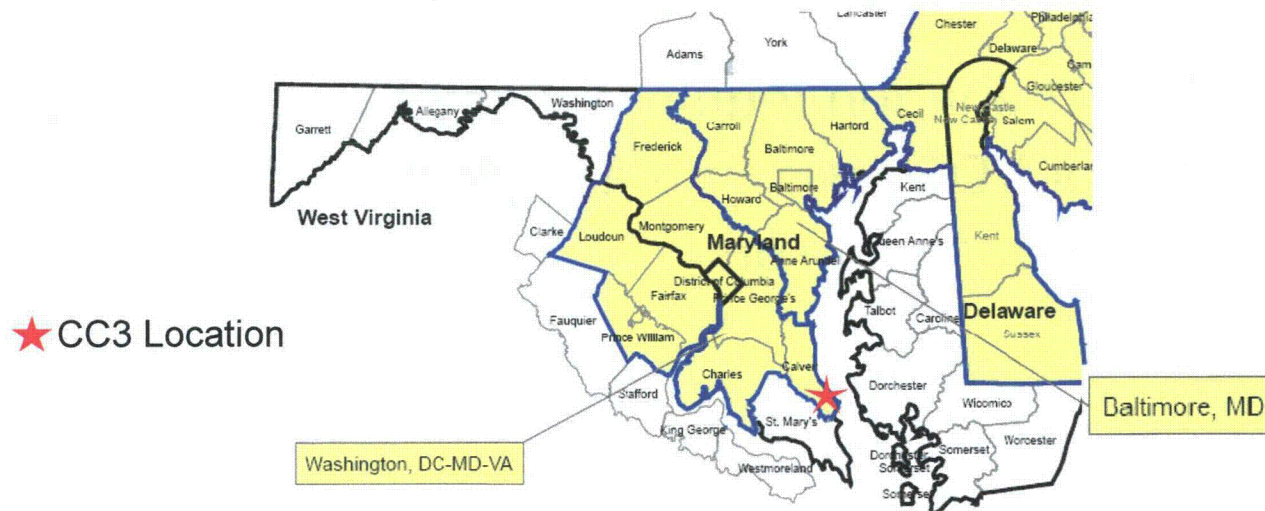


Outline

- General Conformity Applicability/Background
- Air Emission Calculation Approach
- Reporting of Results
- Determining Safety-Related Emissions
- UniStar's Conclusion of General Conformity Applicability

General Conformity Applicability/Background

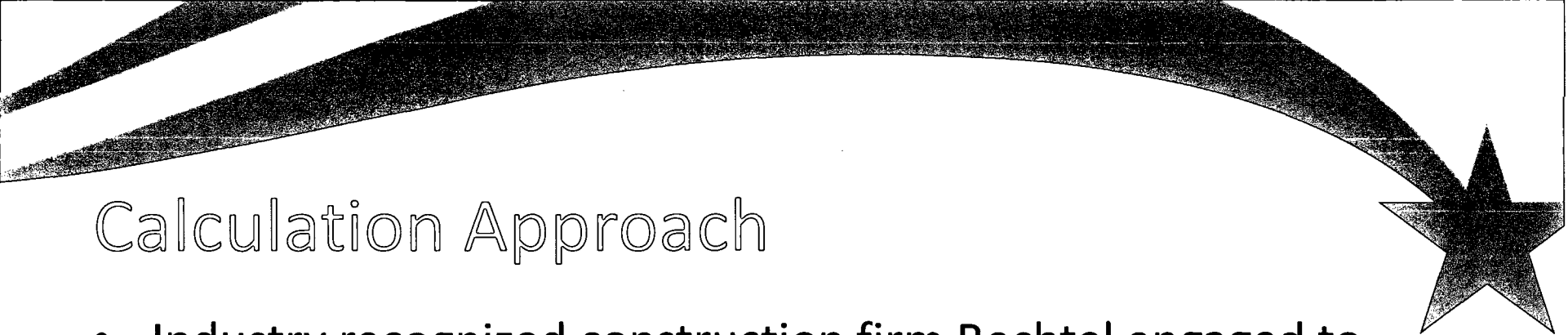
- CC3 is in the Washington, DC-VA-MD region which is a moderate nonattainment area for the 8-hour ambient ozone standard and is affected by both direct and indirect project-related construction emissions
- Baltimore region is also moderate 8-hour ozone nonattainment area affected by indirect emissions





General Conformity Applicability/Background

- General Conformity Applicability Analysis applies to CC3 from both direct and indirect project-related construction emissions of ozone precursors
 - Oxides of nitrogen (NO_x) de minimis threshold is 100 tons/yr
 - Volatile organic compounds (VOC) de minimis threshold is 50 tons/yr
- Conformity Determination required if “reasonably foreseeable emissions” NO_x or VOC emissions are greater than de minimis thresholds as ozone precursors



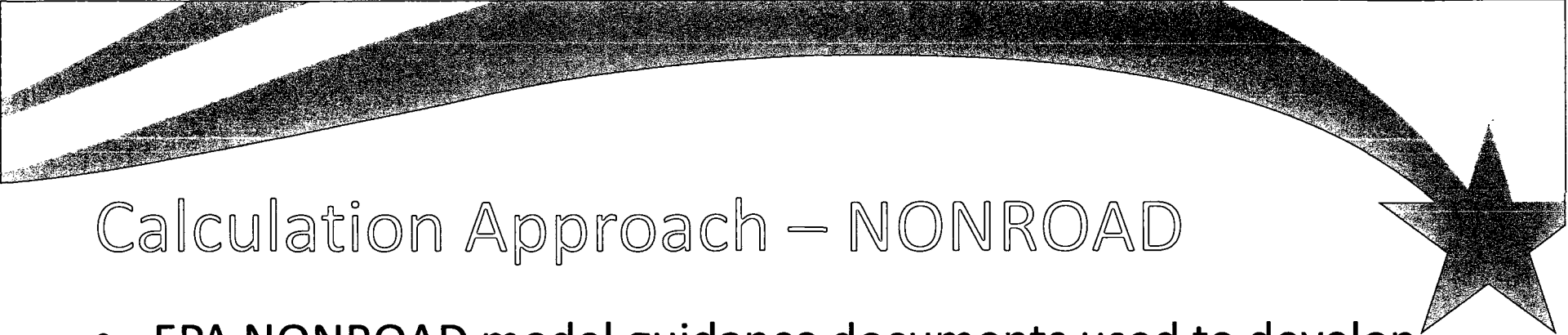
Calculation Approach

- Industry recognized construction firm Bechtel engaged to develop detailed construction equipment list and associated operating hours
- Identification of sources of NO_x and VOC from construction-related activities which are “reasonably foreseeable emissions”
 - Direct emissions from combustion sources: construction equipment, engines and boilers
 - Indirect emissions from employee commuting, commercial deliveries, marine operations



Calculation Approach – Methodology

- Industry recognized air experts AECOM engaged to conduct detailed emission calculation
- Emissions calculation methodology from appropriate references
 - EPA's NONROAD methodology for off-road
 - EPA's MOBILE6.2 model for on-road vehicles
 - EPA sponsored report "Current Methodologies in Preparing Mobile Source Port-Related Emission Inventories" for marine operations
 - EPA's AP-42 Fuel Oil Combustion section for boiler combustion



Calculation Approach – NONROAD

- EPA NONROAD model guidance documents used to develop emissions calculations from standardized methodology

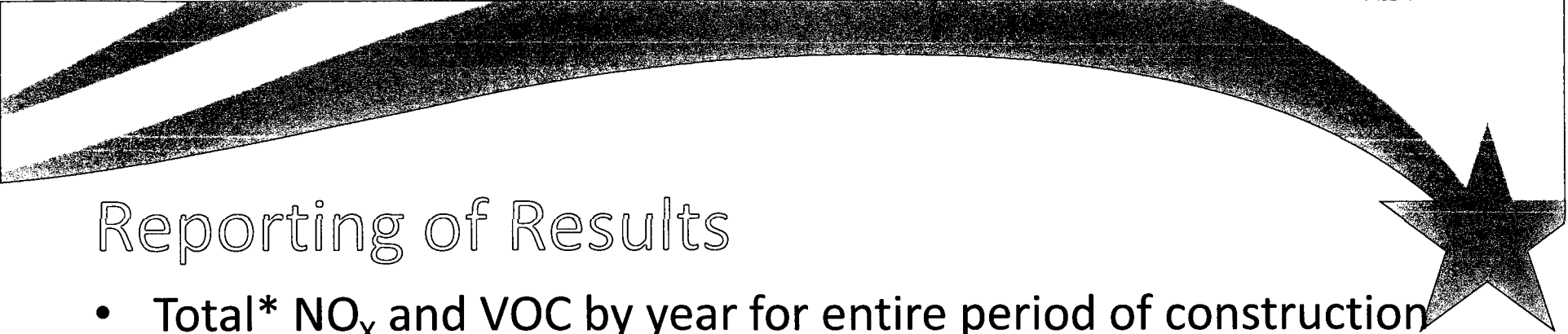
Emissions = Emission Factor * Hours of Use * Engine HP * Load Factor

- Emission factor and load factor assigned by SCC code and engine tier
 - Load Factor is percentage of operating time at rated maximum horsepower (i.e. accounts for idling and part load operation)
 - Assigned SCC code by equipment type
 - Engine Tiers assigned by anticipated placement into use
- Assumed engines are fully deteriorated (i.e. assumed highest emitting)



Calculation Approach – Other Methods

- **MOBILE6.2**
 - Assigned on-road vehicles to MOBILE6.2 vehicle classifications based on gross vehicle weight rating
 - Emissions based on estimated vehicle miles traveled (separately for Washington DC and Baltimore nonattainment areas)
 - Performed calculations across anticipated years of construction
- **Marine Operations**
 - Emissions calculation similar to off-road engines
 - Classification based on engine size, boat type
 - Separated barge travel between Washington DC and Baltimore areas
- **AP-42 Section 1.3**
 - Concrete batch plant boiler assumed to operate during wintertime
 - Standard AP-42 emission factors for oil-fired boilers



Reporting of Results

- Total* NO_x and VOC by year for entire period of construction
 - Two areas of interest (Washington, DC-MD-VA and Baltimore**)
 - Five major categories (off-road diesel, off-road gasoline, on-road vehicles, marine, boiler)
- Only DC-MD-VA area emissions are more than de minimis
 - Only NO_x is greater than threshold

Year	Off-Road Diesel NOx	Off-Road Gasoline NOx	On-Road Vehicles NOx	Marine NOx	Boiler NOx	NOx (Tons)	Exceeds Conformity Threshold (Yes/No)	VOC (Tons)	Exceeds Conformity Threshold (Yes/No)
2010	36.4	0.12	4.0	0	0	40.5	No	8.2	No
2011	138.1	0.5	20.6	6.8	0	166.0	Yes	32.7	No
2012	48.1	0.4	24.3	2.1	1.5	76.5	No	24.4	No
2013	150.9	1.8	34.4	2.1	4.6	193.8	Yes	40.7	No
2014	188.8	2.4	43.1	2.1	4.6	241.0	Yes	46.8	No
2015	193.0	2.4	39.8	2.1	4.6	242.0	Yes	43.4	No
2016	170.9	2.3	29.3	2.1	3.1	207.8	Yes	37.3	No
2017	101.3	2.2	14.5	0	0	118.0	Yes	21.2	No

* All safety and non-safety related emissions

** For indirect activities

Determining Safety-Related Emissions

- NRC requested breakdown of safety-related emissions
Conformity Applicability Analysis
- Certain equipment identified as “dedicated to non-safety-related” only (e.g., Marine Operations, Concrete Batch Plant, On-Road Motor Vehicles)
- All “Pre-construction” (NRC definition) work is defined as non-safety-related

Year	Off-Road Diesel NOx	Off-Road Gasoline NOx	On-Road Vehicles NOx	Marine NOx	Boiler NOx	Total NOx (Tons)	10 CFR 50 Construction Resource Utilization	10 CFR 50 Construction Emissions NOx (Tons)	Exceeds Conformity Threshold (Yes/No)
2010	0	0	0	0	0	0	0.0%	0	No
2011	0	0	0	0	0	0	0.0%	0	No
2012									
2013									
2014									
2015									
2016									
2017									



Determining Safety-Related Emissions

- UniStar developed a “Resource Utilization” approach to “Construction activities”
- Construction emission are determined for activities associated with Safety-Related structures, systems, or components (SSCs)
- Equipment utilization is defined to be proportional to the predicted Resource Utilization associated with the Nuclear Island, the Turbine Island or the Balance of Plant (BOP)
- Safety-Related equipment utilization is defined as that portion of the total devoted to the Nuclear Island



Determining Safety-Related Emissions

- Major SSC of the Nuclear Island
 - Containment
 - ESW cooling towers
 - Safeguards building, fuel building, diesel generator building
- Major SSC of the Turbine Island
 - Turbine building
 - Switchgear building
- Major SSC of Balance of Plant (BOP)
 - CWS cooling tower
 - Desalination plant
 - Other support buildings



Determining Safety-Related Emissions

- “Resource Utilization” developed based on “Bulk Commodities” (BC)
 - Concrete..... Cu Yd
 - Large Bore Piping..... Linear Ft
 - Large Bore Hangers..... Each
 - Small Bore Piping..... Linear Ft
 - Scheduled Conduit..... Linear Ft
 - Cable Tray..... Linear Ft
 - Wire & Cable..... Linear Ft
 - Terminations..... Each
- Breakdown of “Bulk Commodities” relatively mature and extensive, and incorporates numerous components as basis

Determining Safety-Related Emissions

- Commodities required normalization to common factor
- Unit Rate (UR) applied to obtain standard normalized unit “Commodity-Hrs” (CHR)

$$\text{BC} * \text{UR} = \text{CHR}$$

- *Commodities are the basis for deriving Safety-Related emission component of total construction-related emissions*
- CHR derivative expanded to three major construction activities by year

	2012	2013	2014	2015	2016	2017
Nuclear Island	72.2%	60.5%	58.4%	80.9%	85.1%	100%
Turbine Island	0.10%	13.8%	13.7%	16.1%	14.9%	0%
Balance of Plant	27.7%	25.6%	27.9%	3.0%	0%	0%
	100%	100%	100%	100%	100%	100%

Determining Safety-Related Emissions

- All equipment not previously identified as “dedicated to non-safety-related” has Nuclear Island percentage applied to derive safety-related emissions

Year	Off-Road Diesel NOx	Off-Road Gasoline NOx	On-Road Vehicles NOx	Marine NOx	Boiler NOx	Total NOx (Tons)	10 CFR 50 Construction Resource Utilization	10 CFR 50 Construction Emissions NOx (Tons)	Exceeds Conformity Threshold (Yes/No)
2010	0	0	0	0	0	0	0.0%	0	No
2011	0	0	0	0	0	0	0.0%	0	No
2012	22.3	0.41	3.1	0	0	25.8	72.2%	18.6	No
2013	132.2	1.83	5.5	0	0	139.5	80.5%	84.4	No
2014	167.1	2.41	4.7	0	0	174.2	88.4%	101.7	Yes
2015	171.3	2.40	4.1	0	0	177.8	80.9%	143.9	Yes
2016	157.7	2.34	3.4	0	0	163.4	85.1%	139.1	Yes
2017	100.1	2.23	0	0	0	102.4	100.0%	102.4	Yes

Excludes dedicated to non-safety-related equipment emissions



Conclusion of Conformity Applicability

- The CC3 construction project will trigger the need for a General Conformity Determination
- Several years are estimated to be greater than the 100 ton/yr NO_x de minimis threshold in the Washington DC-MD-VA area
 - Six years of total construction (maximum 242 tons)
 - Four years of safety-related construction (maximum 144 tons)
- No year is greater than the 50 ton/yr VOC de minimis threshold