Prepared for:

DELTA AIR LINES, INC. TECHNICAL OPERATIONS CENTER
1775 MH Jackson Service Rd
Atlanta, Georgia 30354

NONATTAINMENT NEW SOURCE REVIEW PERMIT APPLICATION FOR JET ENGINE TEST CELL NO. 5

Prepared by:

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APPENDICES

1 INTRODUCTION

Delta Air Lines, Inc. (Delta) operates a campus at the Hartsfield-Jackson Atlanta International Airport (Airport) consisting of activities of three distinct operations: (1) General Office Facilities (GOF), which are the corporate headquarters and related administrative and service support operations; (2) Technical Operations Center (TechOps), which conducts the aircraft maintenance, aircraft testing, and other facilities maintenance activities; and (3) Atlanta Station (ATL), which conducts the day-to-day operations and maintenance for Delta's assets at the Airport. The operations conducted at the Delta campus are permitted as one Title V major source consisting of three Title V permitted facilities (GOF, TechOps, and ATL) each with a separate Title V permit.

The Delta campus is an existing major stationary source under the New Source Review (NSR) rules for volatile organic compounds (VOCs), nitrogen oxides (NO_X), sulfur dioxide (SO_2), and carbon monoxide (CO). Atlanta, Georgia is currently within a designated moderate non-attainment area for 8-hour ozone concentrations, but is in attainment or unclassifiable for all other criteria pollutants, including nitrogen dioxide (NO_2).

Based on the projected future operations at Delta, the current jet engine test cells at the TechOps will not accommodate the newer aircraft engine models that Delta plans to begin incorporating into their aircraft fleet later this year. In order to accommodate the engine testing of these newer model aircraft engines, Delta is proposing to install a new test cell, jet engine Test Cell No. 5 (SHEA ID No. 5898). This test cell will be located in a new standalone building to be constructed at the southeast corner of the TechOps property. The NO_X emissions increases associated with Test Cell No. 5 will trigger Non-attainment New Source Review (NNSR) permitting due to the proposed location within the Atlanta ozone non-attainment area. The net emissions increase of VOCs will not exceed 25 tons when aggregated over any period of five consecutive calendar years. As part of this application, Delta is requesting a federally-enforceable allowable NO_X limit of 39.5 tons per year (tpy) to avoid Prevention of Significant Deterioration (PSD) permitting. All other PSD pollutants will be below their respective PSD Significant Emission Rate (SER) thresholds.

Delta is submitting this Title V significant modification with construction application to the Georgia Environmental Protection Division (EPD) pursuant to the Georgia Rules for Air Quality Control Chapter 391-3-1-.03 to request approval for the construction and operation of jet engine Test Cell No. 5. The requirements of an NNSR permit application including, but not limited to, a Lowest Achievable Emission Rate (LAER) evaluation, discussion of emissions offset acquisition, Class I visibility analysis, and additional impact analysis are included in subsequent sections of this document.

With the submittal of this application, Delta is applying for entry into EPD's Expedited Permitting Program. As required under the Expedited Permitting Program, Delta has completed a pre-application meeting with EPD, conducted on November 29, 2016. An Expedited Permitting Program Application is included as Appendix A.

1.1 Facility Description

Delta's TechOps, located at 1775 MH Jackson Service Rd, Atlanta, Georgia (Clayton and Fulton Counties), conducts maintenance and repair operations included but not limited to, surface coating, solvent cleaning, electroplating, depainting, aircraft engine maintenance and testing, and facilities support activities including storage tanks, boilers, emergency power generators, and fire pumps. As part of the aircraft engine testing operations conducted at the TechOps, Delta currently maintains and operates four jet engine test cells: Test Cell 1, Test Cell 2, Test Cell 3, and Test Cell 4. Test Cells 1 and 2 are used to test small commercial aircraft engines, and Test Cells 3 and 4 are used to test large commercial aircraft engines. Delta also operates other test cells for testing and maintenance of auxiliary power units (APUs) which run the electrical systems on aircraft. The operations conducted at the TechOps are permitted under the Title V Operating Permit numbers 4512-063-0105-V-03-0 and V-03-1 issued by the EPD on April 29, 2015 and December 30, 2015.

A site location map is included as Figure 1 of Appendix B.

1.2 Project Description

Jet engine test cells are structures designed to hold and operate aircraft engines for the purpose of performing sophisticated monitoring of engine performance under variable pre-flight and flight conditions. Periodic jet engine testing is required to meet Federal Aviation Administration (FAA) regulatory requirements as well as manufacturer specified maintenance to ensure safe and efficient operation. The principal components of jet engine test cells are: 1) a building that encloses the engine and the instrumentation and provides fuel and structural support during testing; 2) an augmentation tube; and 3) a blast room and exhaust. During the testing, the engine is operated at various power levels to simulate flight conditions and to test the engine over the full test cycle.

Delta uses a combination of gurneys and mobile transportation stands to transfer jet engines from work areas to the test cells. The gurneys and stands are pulled or pushed by tugs, which are essentially small tractors. Typically, an engine is transported from the engine work area by gurney. At that point, hoists are used to hang the engine in a test jig, which simulates the mounting of the engine to an aircraft wing. The test jig also provides fuel, control, and instrumentation connection points for use in the test cell. When mounted in a test jig, the engines are transported using a transportation stand, which provides structure to hang the engine and jig.

The jet engine and jig are transported to the Test Cell No. 5 via an overhead monorail engine transfer system.

As discussed above, Delta plans to construct Test Cell No. 5 in order to accommodate future aircraft engines for which the current test cells do not have the capability to house. The construction of Test Cell No. 5 is scheduled to begin in the summer of 2017. A schematic drawing of Test Cell No. 5 is included as Figure 2 of Appendix B.

With the installation of Test Cell No. 5, Delta is proposing to install two, 25,000-gallon jet-A fuel storage tanks (SHEA ID Nos. 5894 and 5895) and a fuel pump package designed to provide fuel to the jet engines during testing. The two jet-A fuel storage tanks associated with Test Cell No. 5 will be filled via a fuel line connected to the existing system which fills the storage tanks for the current jet engine test cells. Jet-A fuel will be transferred from the two jet-A storage tanks to Test Cell No. 5 via the fuel pump package. There will be two, 200-gallon oil storage tanks installed as part of the project, one for lubrication (SHEA ID No. 5938) and one for preservation oil (SHEA ID No. 5936) which will provide oil to the jet engines being tested within Test Cell No. 5. In addition, Delta is proposing the installation of one 2,000-gallon used oil storage tank (SHEA ID No. 5893) that will collect used lubrication oil from the jet engines through a line connecting to the pre-test bay of the Test Cell No. 5 building. The used oil will be removed from the used oil storage tank by a waste disposal contractor approximately once per month or quarter, depending on need. Delta also plans to install one 200-gallon diesel storage tank and fuel pump station (SHEA ID No. 5890) to provide fuel to the vehicles used to transport jet engines in and around the Test Cell No. 5 building. A 40-gallon pneumatic pressure pot with spray gun (SHEA ID No. 5901) will also be used to perform engine flush cleaning operations for Test Cell No. 5. Other general fugitive material usage operations may also be conducted.

1.3 Application Contacts

The contact persons for additional information about this permit application submittal are Ms. Cheryl Meyers of Delta (404-714-3988, Cheryl.meyers@delta.com) and Mr. Thomas Sweat of EPS (404-315-9113, tsweat@envplanning.com).

1.4 Submittal Organization

This submittal is organized into eight (8) sections with additional appendices. The eight main sections and appendices are as follows:

Section 1.0 (Introduction) provides background information on the modification and facility, the permit application, and identifies the contact personnel. A summary of the permit application organization is provided.

Section 2.0 (Emissions Estimates) contains summary information on emissions from the modification.

Section 3.0 (Regulatory Analysis) presents the results and conclusions of a detailed regulatory review for the modification.

Section 4.0 (LAER) presents the Lowest Achievable Emission Rate (LAER) analysis.

Section 5.0 (Nonattainment NSR Compliance) presents the Nonattainment NSR compliance summary for the modification including the Class I visibility analysis, additional impacts analysis, and Emission Offset Credit requirements

Section 6.0 (Case-by-Case NO_X and VOC RACT Analysis) presents the Case-by-Case NO_X and VOC Reasonably Available Control Technology (RACT) analysis for the modification.

Section 7.0 (Monitoring and Recordkeeping) presents the monitoring and recordkeeping requirements for the modification.

Section 8.0 (Proposed Permit Conditions) presents the proposed permit conditions for the modification.

Appendix A (EPD Expedited Permitting Program Application) contains the application for entry into the EPD expedited review program.

Appendix B (Figures) contains the figures supporting the permit application.

Appendix C (Emissions Calculations) contains the emission calculations supporting the permit application.

Appendix D (GEOS Title V Application Printout) contains a printout of the online GEOS forms for ease of review.

Appendix E (Toxic Impact Assessment) contains the toxic impact assessment (TIA) modeling report supporting the permit application.

Appendix F (LAER Tables) contains the tables supporting the LAER analysis

Appendix G (Class I Visibility Impact Assessment Figures and Tables) contains the figures and tables supporting the Class I Visibility Impact Assessment.

Appendix H (Federal Land Manager Letters) contains the notification letters to the Federal Land Managers (FLMs).

2 EMISSIONS ESTIMATES

The following section outlines the emissions methodology and calculations for the Test Cell No. 5 project. For the purposes of this application, the pollutants of concern were restricted to regulated pollutants under the 1990 Clean Air Act (CAA) Amendments, EPD toxic air pollutants (TAPs), and greenhouse gases (GHGs) as carbon dioxide equivelents (CO_2e). These pollutants include NO_X, SO_2, PM, CO, VOC, hazardous air pollutants (HAPs), TAPs, and CO_2e. Table 1 below (and Table 1 of Appendix C) presents the potential emissions for the Test Cell No. 5 project. Calculations supporting the emission estimates presented in this permit application are provided in Appendix C.

Table 1. Test Cell No. 5 Project Emissions Summary

Pollutant	Test Cell No. 5 Project Potential Emissions (tons/yr)
VOC	3.1
Total HAP	0.57
Individual HAP Formaldehyde	0.20
CO	16
NO_X	39.5*
SO_2	9.7
$PM/PM_{10}/PM_{2.5}$[1]	1.6
GHG (as CO_2e)	5,354

***Proposed PSD avoidance limit**

Note that Delta's Atlanta campus, which includes the TechOps facility, is currently a major source under PSD, NNSR, Title V, and Title III. The proposed increase to the facility-wide emissions from this project does not change the status of the source under PSD, NNSR, Title V, or Title III.

[1] PM2.5 – Particulate Matter less than or equal to 2.5 micrometers in diameter
PM10 - Particulate Matter less than or equal to 10 micrometers in diameter

2.1 Jet Engine Test Cell No. 5 (SHEA ID No. 5898)

2.1.1 Emission Factors

Turbine jet engine tests are conducted through a pre-established operating cycle at various power mode settings: "take-off", "climb-out", "approach", and "idle". For purposes of estimating the potential emissions from Test Cell No. 5, representative test mode durations for each tested jet engine model type were established for each eight-hour test. For example, for engine model type Trent XWB, the following engine testing mode durations were determined: 20% (or 1.6 hours) of test conducted in "take-off" mode, 35% (or 2.8 hours) in "climb-out" mode, 30% (or 2.4 hours) in "approach" mode, and 15% (or 1.2 hours) in "idle" mode. Based on these established operational test mode durations, an estimated emission rate for each test mode was calculated by applying the percent of time within each test mode to the emission rates determined as described below.

CO and NOx emission rates from jet engine testing were obtained from the International Civil Aviation Organization (ICAO) Engine Emissions Databank[2] for each engine model type proposed to be tested in Test Cell No. 5. The ICAO Engine Emissions Databank contains information, voluntarily provided by manufacturers, on CO, NOx, and hydrocarbons (HC) exhaust emissions of production aircraft engines, measured according to the procedures in ICAO Annex 16 Vol II, and where noted, certified by their States of Design as implemented in their national regulations. Delta determined the CO and NOx emission rates for each of the four Test Cell No. 5 tested engine models (Trent XWB, Trent 800, PW4, and CF6) using representative engine model data contained in the ICAO database (Trent XWB-84, Trent 895, PW4060, and CF6-80C2B6F). For the estimation of potential PM emissions from Test Cell No. 5, an emission rate for each operational mode was determined based on a CO to PM emissions ratio from available aircraft engine testing data, assuming a similar CO to PM ratio will exist for the engine models proposed to be tested in Test Cell No. 5. The potential SO_2 emission rate for Test Cell No. 5 was conservatively estimated using the maximum sulfur content of jet-A fuel assuming all of the sulfur contained in the Jet-A fuel would be converted to SO_2 during combustion. In order to estimate the potential VOC emission rate for Test Cell No. 5, Delta applied the HC to VOC emissions conversion method outlined in Volume IV of United States Environmental Protection Agency's (USEPA) AP-42 guidance[3]. The HC emission rate for each of four engine model types was determined based on the same method as the CO and NOx emission rates using the ICAO representative emissions data. No add-on post combustion controls are proposed or feasible for this emission source.

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[2] https://www.easa.europa.eu/document-library/icao-aircraft-engine-emissions-databank#group-easa-downloads (November 2016)

[3] Environmental Protection Agency, Compilation of Air Pollutant Emission Factors, Volume II: Mobile Sources (January 1991) https://www3.epa.gov/ttn/chief/old/ap42/vol_II/ap42vol%202.pdf

The Test Cell No. 5 emission factors for each engine model in each testing mode are outlined in Appendix C, Table 2 (Trent XWB-84), Table 3 (Trent 895), Table 4 (PW4060), and Table 5 (CF6-80C2B6F).

The fuel consumption rate during one complete testing cycle ("take-off", "climb-out", "approach", and "idle" modes) for each engine type has been determined based on manufacturer-provided data and/or Delta estimations based on industry knowledge. Using the fuel combustion rates and determined pollutant emission rates, weighted emission factors in pounds of pollutant per gallon of fuel combusted for all engine model types were estimated. A summary of the fuel consumption rates and pollutant emission factors for each engine model is provided in Appendix C, Table 7.

2.1.2 Calculation Methodology

The potential hourly emission rate for each engine type represents the maximum of the average hourly emissions from all operating test modes. Potential annual emissions, excluding NO_X and greenhouse gases (GHGs) are based on the emissions rates determined as described in Section 2.1.1 and the potential quantity of tested engines in Test Cell No. 5. The basis for determining the potential quantity of tested engines is outlined in the following section.

Based on Delta's knowledge regarding the projected makeup of the future aircraft fleet, a 25 year projection, listed in 5 year increments, outlining the quantity of engines, by model type, to be tested in Test Cell No. 5 is provided in Table 6 of Appendix C. As shown in the table, there is an evident projected trend for the phasing out of older aircraft model engines, which by, 2030 are projected to no longer be tested in Test Cell No. 5. The projections outlined in Table 6 represent the maximum annual number of tested engines for Test Cell No. 5 and, as highlighted by the bold outline in the table, the projections for year 2025 represent the maximum annual projected testing schedule for Test Cell No. 5. Based on Delta's experience with performing jet engine testing within the current test cells at TechOps, the maximum projected testing schedule outlined for year 2025 would be achieved by utilization of Test Cell No. 5 for over half of the year based on a conservative estimate of operations. In other words, Test Cell No. 5 is conservatively anticipated to be utilized over 50% of the year to achieve the 2025 projected potential number of tests. Therefore, the potential quantity of tested engines for Test Cell No. 5, outlined in Table 9 of Appendix C, is conservatively assumed to represent two times the maximum annual projected testing schedule highlighted in Table 6 , or the year 2025 projection.

The potential annual NO_X emissions for Test Cell No. 5 represents a proposed, federally enforceable limit of 39.5 tpy designed to avoid PSD permitting for the project. Table 9 of Appendix C outlines the potential hourly and annual emissions from Test Cell No. 5. The potential speciated compounds, including HAPs and/or toxic air pollutants (TAPs) were calculated based on applying the chemical mass fraction attributed from jet fuel combustion as outlined in USEPA's Recommended Best Practice for Quantifying Speciated Organic Gas

Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines[4] report to the potential hourly and annual VOC emission rate for Test Cell No. 5. A summary of the potential speciated compound emissions can be found in Table 10 of Appendix C.

The greenhouse gas (GHG) emissions are a product of jet fuel combustion from Test Cell No. 5. Delta calculated the maximum jet fuel annual consumption rate for Test Cell No. 5 based on the fuel consumption rate of each engine type and the maximum number of engine model types tested with an applied scaling factor to account for the limit in operation due to the proposed NO_X annual emission limit. The potential CO_2 emissions from Test Cell No. 5 were calculated using the Tier III CO_2 calculation method outlined in Subpart C of 40 Code of Federal Regulations (CFR) Part 98[5], the maximum carbon content from sampling data obtained from quarterly jet fuel analysis conducted by Delta over the last two years, and the maximum annual fuel consumption rate.

The methods for establishing emission factors, as outlined above, is the same accepted methodology implemented for permitting of the existing test cells at TechOps.

2.2 Storage Tanks (SHEA ID Nos. 5890, 5893, 5894, 5895, 5936, and 5938)

VOC emissions for tank standing and working losses were calculated based on the methodologies presented in USEPA AP-42, Section 7[6], which are incorporated into the TANKS model (Version 4.09d[7]). Working losses refer to the combined loss from filling and emptying storage tanks. Standing losses are primarily due to temperature changes and refer to losses from the evaporation of the fuel in the storage tank. The total emissions of VOCs from fuel storage are the sum of tank vent standing and working losses. The TANKS input includes these characteristics for each of the storage tanks. The speciated emissions including HAP and/or TAP emissions are calculated based on the mass fraction of the speciated compound as determined from a review of the Material Safety Data Sheet (MSDS) for the stored fuel. The parameters for the two 25,000-gallon jet-A fuel storage tanks (SHEA ID Nos. 5894 and 5895), the 2,000-gallon used oil storage tank (SHEA ID No. 5893), the 200-gallon diesel storage tank (SHEA ID No. 5890), the 200-gallon lubrication oil storage tank (SHEA ID No. 5938), and the 200-gallon

[4] U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Assessment and Standards Division and Federal Aviation Administration, Office of Environment and Energy, AEE-300 - Emissions Division, Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines (EPA-420-R-09-901), Version 1.0, May 2009 - https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/media/FAA-EPA_RBP_Speciated%20OG_Aircraft_052709.pdf

[5] U.S. Environmental Protection Agency, Title 40, Code of Federal Regulations, Part 98, Subpart C - http://www.ecfr.gov/cgi-bin/text-idx?SID=6d6ee75d04de0d7a62cf5e0a75be83a4&mc=true&node=sp40.23.98.c&rgn=div6

[6] United States Environmental Protection Agency, AP-42: Compilation of Air Emission Factors, 7.1 Organic Liquid Storage Tanks, November 2006

[7] https://www3.epa.gov/ttn/chief/software/tanks/index.html

preservation oil storage tank (SHEA ID No. 5936) are outlined in Table 14 of Appendix C. The maximum annual throughput for the 2,000-gallon used oil storage tank and the 200-gallon diesel storage tank is equivalent to 15 tank turnovers per year, or a once per month turnover rate with a 25% safety factor applied based on conservative projections of potential usage. The maximum annual throughput for each of the two 25,000-gallon jet-A fuel storage tanks represents the maximum potential jet fuel usage based on the number of tests to be conducted in Test Cell No. 5 per year by engine type and the maximum volume of fuel combusted during each test. The estimated potential fuel usage for Test Cell No. 5 was then prorated to reflect the 39.5 tpy proposed NO_X limit with the conservative assumption that the maximum annual fuel throughput could theoretically pass through one tank. The maximum annual throughtput for the lubrication and preservation oil storage tanks are based on a oil usage estimation of 5 gallon of lubrication oil per engine and 7 gallons of preservation oil per engine, the maximum potential number of tested engines for Test Cell No. 5, and a safety factor of 25%.

Emissions calculated using the TANKS Version 4.09d are presented in TANKS output files compiled in Appendix C. The emission contributions for VOCs and HAPs from the storage tanks are presented in Appendix C, Table 15.

As described in Section 1.2 above, a diesel fuel pump station associated with the diesel storage tank (SHEA No. 5890) is proposed to be installed as part of the Test Cell No. 5 project. Potential VOC emissions attributed to the fuel pump station were calculated based on the estimated maximum annual throughput of the diesel storage tank (SHEA No. 5890) as determined on the basis outlined in the previous paragraph. A VOC emission factor for diesel dispensing was conservatively assumed to be equivalent to the VOC emission factor for gasoline outlined in the Revised Emission Factors for Phase II Vehicle Fueling at California Gasoline Dispensing Facilities[8] document with an applied safety factor of 25%. Similar to the calculation method for the storage tanks outlined above, the speciated compounds, including HAP and/or TAP emissions were calculated based on the mass fraction of the speciated compounds as determined from a review of the MSDS for the diesel fuel. A summary of the emissions calculations for the diesel fuel pump station are included in Appendix C, Table 17 and Table 18.

[8] Table I-1 of Attachment A - Revised Emission Factors for Phase II Vehicle Fueling at California Gasoline Dispensing Facilities. California Air Resources Board (CARB) Monitoring and Laboratory Division. December 23, 2013.

2.3 Flush Cleaning Operations and General Fugitive Material Usage

2.3.1 Flush Cleaning Operations (SHEA ID No. 5901)

Similar to the Jet Engine Test Cell No. 5 calculation of potential throughput presented in Section 2.1.1 above, the total potential annual cleaing solvent usage for the flush cleaning operations (SHEA5901) is conservatively assumed to represent two times the maximum annual projected usage. Based on this assumption and Delta's operational knowledge of test cell flush cleaning solvent usage, SHEA5901 has the potential to use 440 gallons of cleaning material, ZOK 27. The annual potential VOC emissions from the flush cleaning operations are estimated using the VOC content as obtained from the MSDS and the potential maximum usage of ZOK 27. The hourly VOC emissions estimate is based on the maximum potential usage of flush cleaner per engine wash, the VOC content of ZOK 27, and the typically duration required to complete one engine flush cleaning process. The potential annual and hourly VOC emissions are outlined in Table 19 of Appendix C. The speciated emissions including HAP and/or TAP emissions are calculated based on the mass fraction of the speciated compound as determined from a review of the MSDS for ZOK 27 and presented in Appendix C, Table 20.

2.3.2 General Fugitive Material Usage

Based on knowledge of general maintenance and cleaning material usage within the existing test cells at TechOps, Delta has estimated the maximum annual usage of miscellaneous general materials for Test Cell No. 5. Some examples of general material usage include lubricants, sealants, greases, bonder, and other cleaning and maintenance materials used during the engine testing process. Using the maximum annual usage quantity and VOC content obtained from SDSs for each projected material utilized in Test Cell No. 5, the estimated actual annual VOC emissions were determined. In accordance with the calculation methods outlined in the above sections, the total potential annual material usage for the general fugitive material usage operations is conservatively assumed to represent two times the maximum annual projected usage. The speciated emissions including HAP emissions are calculated based on the mass fraction of the speciated compound as determined from a review of MSDSs for each material. The potential annual VOC, hourly VOC, and HAP emissions are outlined in Table 21 of Appendix C.

3 REGULATORY ANALYSIS

3.1 Georgia State Air Regulations

Requirements for control of air pollution in Georgia are contained in Georgia's Rules for Air Quality Control, Chapter 391-3-1. Subparts of the Georgia Rule that are potentially applicable to the proposed project are discussed below.

3.1.1 Prevention of Significant Deterioration of Air Quality [391-3-1-.02(7)]

Because the facility is currently classified as a PSD major source, the potential criteria pollutant emissions from the proposed Test Cell No. 5 project are calculated and compared to the relevant PSD SER thresholds. For the potential emissions of NO_X, Delta is proposing a federally enforceable limit of 39.5 tpy to remain below the PSD NO_X SER of 40 tpy.

As shown in Table 2 below and documented throughout this permit application, the Test Cell No. 5 project will not result in an increase in emissions above PSD SERs due to the limit requested here. Therefore, this project is considered a minor modification to a major facility, with respect to PSD. Consequently, the Test Cell No. 5 project is not subject to PSD permitting requirements.

Please see Appendix C for emission calculations.

Table 2. Test Cell No. 5 Project PSD Applicability Assessment

Pollutant	Potential Emissions[1] (tpy)	PSD Significant Emission Rate (tpy)	Significant?
NO_X	39.5*	40	No
SO_2	9.7	40	No
PM	1.6	25	No
PM_{10}	1.6	15	No
$PM_{2.5}$	1.6	10	No
CO	15.9	100	No
CO_2e[2]	5,705	75,000	No

*Proposed PSD avoidance limit

[1] Emissions of other PSD pollutants including, but not limited to hydrogen sulfides, lead, and fluorides from the Test Cell No. 5 are negligible.

[2] Greenhouse gas emissions (shown as CO_2e emissions) should only be compared to SER threshold if the project is a major modification for NSR

3.1.2 Nonattainment Area New Source Review [391-3-1-.03(8)]

As discussed in Section 1, the Delta campus, located in the Atlanta Ozone Nonattainment Area, is an existing major stationary source under NNSR for VOCs and NO_X. NNSR applies to new major sources or major modifications at existing major stationary sources for pollutants where the area the source is located in is classified as non-attainment with respect to the National Ambient Air Quality Standards (NAAQS). Per Georgia Rule 391-3-1-.03(8)(c)(13), a major NNSR source is allowed to increase emissions by the de minimis threshold of 25 tons aggregated over any period of five consecutive calendar years, including the calendar year in which such increase occurred, without triggering NNSR review.

The potential NO_X and VOC emissions from the Test Cell No. 5 project along with other contemporaneous changes (i.e.: Boiler 4794 Burner Replacement; Replacement of Emergency Generators) for the site are compared against the relevant NNSR major modification thresholds in Table 3 below.

Table 3. Ozone NNSR Applicability Assessment

	Annual Emissions Increase Totals (tpy)		5-Year Emissions Increase Totals (tpy)	
Year	**VOC**	**NOx**	**VOC**	**NOx**
2013	0.71	1.58	5.91	5.02
2014	2.69	4.7	8.27	9.09
2015	0.65	4.79	4.86	13.84
2016	0.85	6.65	5.14	20.00
2017	0.15	0.12	5.05	17.84
2018	--	--	4.34	16.26
2019	3.05	39.5*	4.70	51.06
NNSR Major Modification Threshold (tpy)			25	25
NNSR Major Modification?			No	YES

*Proposed PSD avoidance limit

As shown above, the net cumulative NO_X emissions increase over the 5-year period ending in 2019 is above the NNSR major modification threshold; however, the VOC emissions increases do not exceed the NNSR threshold. Therefore, since the NOx emissions from Test Cell No. 5 result in an exceedance of the 25 tpy threshold, the requirements of the NNSR program will apply to Test Cell No. 5.

Additionally, under Georgia Rule 391-3-1-.03(8)(16)(ii), a net emissions increase of direct particulate matter less than or equal to 2.5 micrometers in diameter ($PM_{2.5}$) equal to or exceeding 10 tons per year or a net emissions increase of SO_2 or NOx equal to or greater than 40 tons per year of such air pollutant shall be considered a major NNSR modification. The potential $PM_{2.5}$, NOx, and SO_2 emissions from the proposed Test Cell No. 5 project are compared to the $PM_{2.5}$ NNSR major modification thresholds provided in Table 4 below.

Table 4. Test Cell No. 5 Project $PM_{2.5}$ NNSR Applicability Review

Pollutant	Potential Emissions (tons/yr)	Significant Emissions Rate (tons/yr)	NNSR Major Modification?
$PM_{2.5}$	1.6	10	No
NOx* (Precursor)	39.5*	40	No
SO_2 (Precursor)	9.7	40	No

*Proposed PSD avoidance limit

As shown in Table 4, the applicability of $PM_{2.5}$ NNSR major modification permitting is not triggered for Test Cell No. 5 project.

As presented in Table 3, Table 4, and in Section 3.1.1, Test Cell No. 5 will be a minor modification under all NSR programs with the exception of NNSR for NO_X. The remaining projects occurring during the relevant 5-year periods will remain de minimis with respect to NNSR permitting (i.e., only Test Cell No. 5 is subject to NNSR requirements).

The NNSR program under Georgia Rule 391-3-1-.03(8)(c)(13) requires the application of LAER technology and completion of an analysis of alternative sites, sizes, production processes and environmental control techniques for the proposed source to determine whether the benefits of the proposed source significantly outweigh the environmental and social costs imposed as the result of its proposed location, construction, or modification. Additionally, before construction can begin, the source must obtain emission reductions credits (ERCs, or offsets) of the non-attainment pollutant from other sources that impact the same area as the proposed source. This regulation also requires the applicant to certify that all other sources owned by the applicant in the State are complying with all applicable requirements of the CAA, including all applicable requirements of the State Implementation Plan (SIP). A detailed summary of these requirements is outlined in Section 4 (LAER) and Section 5 (NNSR Compliance).

Since Test Cell No. 5 will undergo NSR permitting and Delta will be obtaining ERCs to offset the potential NO_X emissions, Table 5 below outlines the NNSR applicability assessment for NO_X and VOCs accounting excluding the potential NOx emisisons from Test Cell No.5 . Based on the Test Cell No. 5 NO_X offsets and the annual emissions increase totals presented in Table 5, the remaining project emissions increase totals occurring during the relevant 5-year period will remain below the 25 tpy major modification threshold and continue to be de minimis (i.e., only Test Cell No. 5 is subject to NNSR requirements).

Table 5. Ozone NNSR Applicability Assessment Based on Test Cell No. 5 Project NO_X Emissions Offsets

Year	Annual Emissions Increase Totals (tpy)		5-Year Emissions Increase Totals (tpy)	
	VOC	NOx	VOC	NOx
2013	0.71	1.58	5.91	5.02
2014	2.69	4.7	8.27	9.09
2015	0.65	4.79	4.86	13.84
2016	0.85	6.65	5.14	20.00
2017	0.02	1.6	5.05	17.84
2018	--	--	4.34	16.26
2019	3.05	--*	4.70	11.56
NNSR Major Modification Threshold (tpy)			25	25
NNSR Major Modification?			No	No

* The Test Cell No. 5 PTE emissions of 39.5 tons NOx/yr have been excluded from the de minimus tracking since the emission source will undergo NSR permitting, including the purchase of ERCs

3.1.3 Construction and Operating Permits [391-3-1-.03(1) and (2)]

Georgia Rule 391-3-1-.03 contains requirements related to construction and operating permits. The requirements of Chapter (1): Construction (SIP) Permit and Chapter (2): Operating (SIP) Permit apply to the Test Cell No. 5 project. The construction and operating permit requirements of Georgia Rules 391-3-1-.03(1) and (2) are being met through the submittal of this permit application.

3.1.4 SIP Permit Exemptions [391-3-1-.03(6)]

Under Georgia Rule 391-3-1-.03, Chapter (6): Exemptions identifies source activities which are exempt from SIP permit requirements unless otherwise required by EPD. Under this source exemption list, the storage tanks associated with Test Cell No. 5 are exempt from SIP permit requirements. Per Georgia Rule 391-3-1-.03(6)(c)(1), all petroleum liquid storage tanks storing a liquid with a true vapor pressure of equal to or less than 0.50 psia as stored do not reuire a SIP permit. Since the two 25,000-gallon jet-A fuel storage tanks (SHEA ID Nos. 5894 and 5895) each store a petroleum liquid with a true vapor pressure equal to or less than 0.50 psia, these emissions sources will be exempt from SIP permit requirements.

The 2,000-gallon used oil storage tank (SHEA ID No. 5893), 200-gallon diesel storage tank (SHEA ID No. 5890), 200-gallon lubrication oil storage tank (SHEA ID No. 5938), and 200-gallon preservation oil storage tank (SHEA ID No. 5936) are exempt from SIP permit requirements under Georgia Rule 391-3-1-.03(6)(c)(3) which exempts all petroleum liquid storage tanks with a capacity of less than 10,000 gallons storing a petroleum liquid.

The diesel fuel pump station associated with the 200-gallon diesel storage tank (SHEA ID No. 5890) is exempt from SIP permit requirements under Georgia Rule 391-3-1-.03(6)(i)(3) which exempts cumulative modifications not covered in an existing permit to an existing permitted facility where the combined VOC emission increases from all nonexempt modified activities are below 2.5 tpy for facilities located in Fulton and Clayton counties. The potential VOC emissions from the diesel fuel pump station associated with the 200-gallon diesel storage tank (SHEA ID No. 5890) will be added to Delta's cumulative modification tracking spreadsheet in order to document exemption under Georgia Rule 391-3-1-.03(6)(i)(3).

Although the emissions sources outlined above are classified as exempt from SIP permit requirments, any applicable emission limitations and/or standards under Georgia Rule 391-3-1-.02 will still apply.

3.1.5 Title V Operating Permits [391-3-1-.03(10)]

The requirements for Title V operating permits, codified in Georgia Rule 391-3-1-.03(10) applies to any source subject to any requirements under Title 40 of the Code of Federal Regulations Part 70 (40 CFR 70). The provisions of 40 CFR 70 have been incorporated into EPD's Title V operating permit program under Georgia Rule 391-3-1-.03(10). EPD's Title V operating permit regulations apply to major sources which have a potential to emit 10 tpy or more of any single HAP, 25 tpy of any combination of HAP, and 100 tpy of other regulated pollutants. In addition for the counties of Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, and Rockdale, sources with the potential to emit 25 tpy or more of VOCs or NO_X are considered major sources. Since the Delta facility is located in Clayton and Fulton Counties and has a potential to emit greater than 25 tpy of VOCs and NO_X, the site is considered a major source under the EPD Title V operating permit program. Under the EPD Title V operating permit program, Delta is required to submit a Title V permit modification application for the proposed installation of Test Cell No. 5. The Title V operating permit requirements of Georgia Rules 391-3-1-.03(10) are being met through the submittal of this Title V permit application. A printout of the Title V permit application submitted using the Georgia Environmental Online System (GEOS) is included as Appendix D.

3.1.6 New Source Performance Standards (NSPSs) [40 CFR Part 60; 391-3-1-.02(8)]

Georgia Rule 391-3-1-.02, Chapter (8) incorporates the federal New Source Performance Standards (NSPS) regulations (40 CFR Part 60) by reference. The NSPS regulations require new, modified and reconstructed affected facilities in specific source categories to implement emissions controls to the level achievable by the best demonstrated technology as outlined in the applicable rule.

- 40 CFR Part 60, Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Subpart Kb applies to storage vessels with capacities equal to or greater than 75 cubic meters (approximately 19,800 U.S. gallons) that are used to store volatile organic liquids with true vapor pressure higher than 15.0 kilopascals (kPa). This standard does not apply to the 2,000-gallon used oil storage tank (SHEA ID No. 5893), 200-gallon diesel storage tank (SHEA ID No. 5890), 200-gallon lubrication oil storage tank (SHEA ID No. 5938), or the 200-gallon preservation oil storage tank (SHEA ID No. 5936), since these storage tanks have storage capacities below 75 cubic meters, or 19,800 gallons. Additionally, although the two proposed 25,000 gallon jet fuel storage tanks (SHEA ID Nos. 5894 and 5895) have capacities greater than 75 cubic meters, these storage tanks store jet-A fuel which has a liquid true vapor pressure less than 15.0 kPa. Therefore, this regulation does not apply to any of the storage tanks associated with the Test Cell No. 5 project. Delta will maintain documentation of the volume, contents, and true vapor pressure of the two Jet-A storage tanks associated with the Test Cell No. 5 project.

3.1.7 National Emission Standards for Hazardous Air Pollutants (NESHAP) [40 CFR Parts 61 and 63; 391-3-1-.02(9)]

The federal National Emission Standards for Hazardous Air Pollutants (NESHAP) rules are codified in 40 CFR Part 61 and 63, and are incorporated in Georgia Rule 391-3-1-.02, Chapter (9). As part of the NESHAP program, federal maximum achievable control (MACT) standards are enacted to reduce the emissions of HAPs from source categories. In general, the NESHAP regulations apply to affected sources that are located at (or are themselves) major sources of HAP emissions as defined in 40 CFR 63.2. That is, any stationary source that emits or has the potential to emit, considering controls, in the aggregate, 10 tpy or more of any single HAP or 25 tpy or more of any combination of HAPs. As discussed in Section 2, Delta TechOps is a major source under the NESHAP regulations; therefore, the applicability of each MACT standard is dependent on whether the equipment and operations associated with the Test Cell No. 5 project are defined as affected sources under each regulation.

- 40 CFR Part 63, Subpart GG – National Emission Standards for Aerospace Manufacturing and Rework Facilities

  Subpart GG applies to facilities that are engaged, either in part or in whole, in the manufacture or rework of commercial, civil, or military aerospace vehicles or components and are a major source of HAP emissions. Under Subpart GG, flush cleaning is defined as the removal of contaminants such as dirt, grease, oil, and coatings from an aerospace vehicle or component or coating equipment by passing solvent over, into, or through the item being cleaned. The Subpart GG definition further specifies that the solvent may simply be poured into the item being cleaned and then drained, or be assisted by air or hydraulic pressure, or by pumping and that hand-wipe cleaning operations where wiping, scrubbing, mopping, or other hand action are used are not included. Based on this definition, the engine cleaning operation (SHEA ID No. 5901) proposed as part of the Test Cell No. 5 project is considered a flush cleaning operation under Subpart GG. Since flush cleaning operations are listed as an affected source under

Subpart GG, this regulation would apply to the engine cleaning operation (SHEA ID No. 5901) for Test Cell No. 5. Some of the general fugitive material usage operations may also be regulated under Subpart GG. Delta will continue to comply with the requirements of this regulation as it applies to applicable operations at TechOps. All other emission sources associated with Test Cell No. 5 are not listed as an affected source under Subpart GG; therefore, the requirements of this regulation only apply to the engine cleaning operation (SHEA ID No. 5901).

- 40 CFR Part 63, Subpart PPPPP – National Emission Standards for Hazardous Air Pollutants: Engine Test Cells/Stands

  Subpart PPPPP was promulgated in May 2003, and applies generally to internal combustion engine test cells/stands that are located at major sources of HAP emissions. As a source category, Test Cell No. 5 would be potentially subject to this NESHAP. However, Test Cell No. 5 is exempt from the requirements of this subpart and the NESHAP General Provisions (Subpart A) per 40 CFR 63.9290(d)(1) which exempts "any portion of a new or reconstructed affected source located at a major source" used exclusively for testing combustion turbine engines.

3.1.8 VOC Emissions from Major Sources [391-3-1-.02(2)(tt)]

Georgia Rule 391-3-1-.02(2)(tt) applies to emission sources located in the counties[9] of Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, and Rockdale which have potential VOC emissions exceeding 25 tpy. Rule (tt) requires a case-by-case analysis of VOC Reasonably Achievable Control Technology (RACT) for all emission sources not subject to any other more specific VOC requirements contained in other subsections of the Georgia Rule. As outlined in detail in Section 3.1.10 below, Rule (kkk) applies to the flush cleaning operations (SHEA ID No. 5901) associated with Test Cell No. 5. Since a specific VOC rule applies to the flush cleaning operations (SHEA ID No. 5901), Rule (tt) would not apply to this source.

Because the facility is located in Clayton and Fulton Counties, has potential VOC emissions greater than 25 ton/yr, and there are no specific VOC rules applicable to Test Cell No. 5 (SHEA ID No. 5898), the two 25,000-gallon jet-A fuel storage tanks (SHEA ID Nos. 5894 and 5895), 2,000-gallon used oil storage tank (SHEA ID No. 5893), 200-gallon diesel storage tank and fuel pump (SHEA ID No. 5890), 200-gallon lubrication oil storage tank (SHEA ID No. 5938), or the 200-gallon preservation oil storage tank (SHEA ID No. 5936), these emission sources will be subject to Rule (tt). A detailed case-by-case analysis of VOC RACT for Test Cell No. 5, the two 25,000-gallon jet-A fuel storage tanks, 2,000-gallon used oil storage tank, 200-gallon diesel storage tank and fuel pump, 200-gallon lubrication oil storage tank, and the 200-gallon preservation oil storage tank is outlined in Section 6 of this application.

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[9] 13 counties in the Atlanta ozone non-attainment area

3.1.9 Emissions of Nitrogen Oxides from Major Sources [391-3-1-.02(2)(yy)]

Georgia Rule 391-3-1-.02(2)(yy) applies to emission sources located in the counties of Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, and Rockdale which have potential NOx emissions exceeding 25 tpy. Rule (yy) requires a case-by-case analysis of NOX RACT for all emission sources not specifically regulated by a more specific NOX rule. Since Test Cell No. 5 (SHEA ID No. 5898) is located in Clayton and Fulton counties, is not subject to a specific NOX rule, and is located at a site that has potential NOx emissions greater than 25 tpy, Rule (yy) is applicable to Test Cell No. 5. A detailed case-by-case analysis of NOX RACT for Test Cell No. 5 is outlined in Section 6 of this application. There are no additional potential NOX emission sources associated with the Test Cell No. 5 project; therefore, there are no other sources which are subject to the requirements of Rule (yy).

3.1.10 Volatile Organic Liquid Handling and Storage [391-3-1-.02(2)(vv)]

Rule (vv) requires the transfer of volatile organic liquid from any delivery vessel into a stationary storage tank of greater than 4,000 gallons to be equipped with submerged fill pipes. This regulation applies to specific counties identified in the rule, including Clayton and Fulton counties. Although the two 25,000 gallon jet fuel storage tanks (SHEA ID Nos. 5894 and 5895) have capacities greater than 4,000 gallons, these tanks are not subject to Rule (vv) since there is no transfer of volatile organic liquid from any delivery vessel to these tanks. As described in Section 1.2, the two jet-A fuel storage tanks will be filled via a fuel line connected to the existing system that fills the storage tanks for the current jet engine test cells. The 200 gallon diesel fuel (SHEA ID No. 5890), 2,000 gallon used oil storage tanks (SHEA ID No. 5893), 200-gallon lubrication oil storage tank (SHEA ID No. 5938), and the 200-gallon preservation oil storage tank (SHEA ID No. 5936) are also not subject to the requirements of this rule as the capacities of these tanks are less than 4,000 gallons.

3.1.11 VOC Emissions from Aerospace Manufacturing and Rework Facilities [391-3-1-.02(2)(kkk)]

Rule (kkk) limits VOC emissions from coating and cleaning operations conducted at aerospace manufacturing and rework facilities. This regulation applies to the Test Cell No. 5 flush cleaning operations (SHEA ID No. 5901) due to the usage of a cleaning solvent. Similar to the definition of flush cleaning outlined in 40 CFR Part 63, Subpart GG (see Section 3.1.6 above), the engine cleaning operation is considered a flush cleaning operation based on the definition contained in Rule (kkk). As a flush cleaning operation which uses an aqueous cleaning solvent, the Test Cell No. 5 engine cleaning operation would be subject to recordkeeping requirements to maintain a current list of flush cleaning solvents with documentation that demonstrates that the cleaning solvent complies with the composition requirement for an aqueous cleaning solvent as defined in this regulation. As part of the requirement, Delta is also required to record the annual amount of each applicable solvent used. Some of the general fugitive material usage operations may also be regulated under Rule (kkk). Delta will continue to comply with Rule (kkk) as applicable to the operations at TechOps.

3.1.12 Visible Emissions [391-3-1-.02(2)(b)]

Georgia Regulation 391-3-1-.02, Chapter (2) Rule (b) limits visible emissions of any air contaminant source that is not subject to other more restrictive or specific visible emissions rules under Chapter (2) to 40 percent opacity. Test Cell No. 5 will comply with the regulation by combusting jet fuel only.

3.1.13 Fuel-Burning Equipment [391-3-1-.02(2)(d)]

This regulation limits particulate and visible emissions from fuel-burning equipment based on hourly heat input. Under Georgia Rule, fuel-burning equipment is defined as, "equipment the primary purpose of which is the production of thermal energy from the combustion of any fuel". Since the primary purpose of Test Cell No. 5 is not the production of thermal energy from the combustion of any fuel, this regulation does not apply.

3.1.14 Sulfur Dioxide [391-3-1-.02(2)(g)]

The following limit will apply to the facility:

- Fuel sulfur content of no more than 2.5% by weight (for fuel burning sources with maximum heat input capacity below 100 MMBtu/hr).

The facility will comply with this regulation by burning only jet fuel in Test Cell No. 5, which has a sulfur content well below the limit.

3.1.15 Fugitive Dust [391-3-1-.02(2)(n)]

Delta will be required to take all reasonable precautions to prevent fugitive dust from becoming airborne and to maintain visible emissions from fugitive dust below 20% opacity.

3.2 Toxic Impact Assessment

Under the provisions of Georgia Rule 391-3-1-.02(2)(a)(3)(ii), the EPD regulates the emissions of TAPs. The EPD defines a TAP as any substance which may have an adverse effect on public health, excluding any specific substance that is covered by a state or federal ambient air quality standard. Since the proposed Test Cell No. 5 project will increase the facility's potential to emit TAPs, Delta has prepared a review of the environmental impact of TAP emissions from the project in accordance with EPD's Guideline for Ambient Impact Assessment of Toxic Air

Pollutant Emissions (Guideline).[10] Based on the results of the assessment, the concentration of TAPs resulting from emissions from the project will be below the applicable Georgia Acceptable Ambient Concentrations (AACs). A detailed TAP impact assessment for the Test Cell No. 5 project is included as Appendix E of this application.

3.3 Emissions Offsets [391-3-1-.03(8)(c)(13); 40 CFR 51.165]

Georgia Rule 391-3-1-.03(8)(c)(13) applies to any major source (potential NOx or VOC emissions greater than 25 tpy) located in Clayton or Fulton counties and undergoing a modification. This regulation requires an applicable facility to obtain NOx and/or VOC emissions offsets at a ratio of 1.3 offsets per ton of emission increase. The requirement to obtain emissions offsets ensures that the sum of total NOx and/or VOC emissions, less the sum of total NOx and/or VOC emissions from facilities where the Emission Reduction Credits (ERCs) are obtained, represent reasonable further progress toward National Ambient Air Quality Standards (NAAQS) attainment for the designated non-attainment area. Thus, the net result is no increased impacts on the ozone concentration in the area.

With the proposed Test Cell No. 5 project, Delta will be required to obtain NOx emissions offsets since the facility is a major source of NOx and the project's NOx emissions increases constitute a major modification under the NNSR rules. Although the facility is a major source of VOC emissions, VOC emissions offsets are not required to be obtained as the VOC emissions increases associated with the Test Cell No. 5 project do not constitute a major modification. These requirements as applicable to the Test Cell No. 5 project are discussed further in Section 5.6.

3.4 Federal Regulations

3.4.1 Compliance Assurance Monitoring Program (40 CFR Part 64)

40 CFR Part 64, Compliance Assurance Monitoring (CAM), applies to units which use a control device subject to federally enforceable emission standards at major Part 70 (Title V) sources with uncontrolled emissions above major source thresholds. None of the emission sources associated with Test Cell No. 5 utilize a control device to achieve compliance with any emission limit or standard; therefore, Part 64 does not apply to the Test Cell No. 5 project.

[10] *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*. Georgia Department of Natural Resources, Environmental Protection Division, Air Protection Branch. Revised June 21, 1998. http://epd.georgia.gov/air/sites/epd.georgia.gov.air/files/related_files/document/toxguide.pdf

3.4.2 Accidental Release Prevention Program / Risk Management Plan (40 CFR Part 68)

This regulation mandates that facilities with more than a threshold quantity of a regulated substance in a single process must develop a Risk Management Program that includes a hazard assessment, an accident prevention program and an emergency response program. It also requires that owners or operators of subject facilities submit a summary of their program called a risk management plan (RMP), detailing these program elements to the USEPA. The proposed Test Cell No. 5 project does not include any regulated substances which exceed the threshold quantities; thus, this regulation does not apply to this project.

3.4.3 Stratospheric Ozone Protection Regulations (40 CFR Part 82, Subpart F)

40 CFR 82 Subpart F seeks to reduce emissions of Class I and Class II refrigerants and their substitutes to the lowest achievable level by maximizing the recapture and recycling of such refrigerants during the service, maintenance, repair, and disposal of appliances and restricting the sale of refrigerants consisting in whole or in part of a Class I and Class II ozone depleting substances (ODS) in accordance with Title VI of the Clean Air Act. Appliance means any device which contains and uses a refrigerant and which is used for household or commercial purposes, including any air conditioner, refrigerator, chiller, or freezer. This subpart applies to any person servicing, maintaining, or repairing appliances, or disposing of appliances, including small appliances and motor vehicle air conditioners. In addition, this subpart applies to refrigerant reclaimers, technician certifying programs, appliance owners and operators, manufacturers of appliances, manufacturers of recycling and recovery equipment, approved recycling and recovery equipment testing organizations, persons selling Class I or Class II refrigerants or offering Class I or Class II refrigerants for sale, and persons purchasing Class I or Class II refrigerants.

This subpart prohibits, after June 13, 2005, any person maintaining, servicing, repairing, or disposing of appliances knowingly venting or otherwise releasing into the environment any prohibited refrigerant or substitute from such appliances. Releases associated with good faith attempts to recycle or recover refrigerants or non-exempt substitutes that are deminimis are not subject to this prohibition.

Other requirements of this subpart include repair of leaks for systems containing over 50 pounds of refrigerant. Delta will comply with the prohibition on venting non-exempt refrigerants, and the leak monitoring, repair and reporting requirements for equipment containing over 50 pounds of refrigerant.

3.4.4 Mandatory Greenhouse Gas Reporting (40 CFR Part 98, Subparts A and C)

USEPA promulgated this rule (GHG Reporting Rule) for the mandatory reporting of GHG from sources that in general emit 25,000 metric tons or more of CO_2e per year in the United States. Delta's Atlanta campus is already subject to this requirement as the GHG emissions from all sources currently exceeds 25,000 metric tons of CO_2e. Therefore, for the Test Cell No. 5 project, this rule will apply to any combustion source emitting CO_2, CH_4, and N_2O, equipment leaks of CH_4, and equipment leaks of SF_6. The GHG Reporting Rule applies to Test Cell No. 5 only as this is the sole combustion source associated with the Test Cell No. 5 project. Delta will continue to comply with the requirements of Part 98 following the installation and operation of Test Cell No. 5.

4 LAER ANALYSIS

As discussed in Section 3.1.2, because the proposed Test Cell No. 5 project will be located in the Atlanta Ozone Nonattainment Area and has a net cumulative NO_X emissions increase above the NNSR major modification threshold, Delta is required to implement the LAER level of air pollution control to minimize NO_X emissions. The following section outlines the LAER analysis for NO_X emissions from jet engine Test Cell No. 5 (SHEA ID No. 5898).

4.1 LAER Definition

Under 40 CFR 51.165(a)(1)(xiii) and Georgia Rule 391-3-1-.03(8)(g)(1)(vi), LAER is defined as the more stringent rate of emissions based on the following:

(A) The most stringent emissions limitation which is contained in the implementation plan of any State for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or

(B) The most stringent emissions limitation which is achieved in practice by such class or category of stationary sources. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within or stationary source. In no event shall the application of the term permit a proposed new or modified stationary source to emit any pollutant in excess of the amount allowable under an applicable new source standard of performance.

4.2 Process

As noted above, LAER is the more stringent of any limitation contained in the implementation plan of any State or an emissions limitation which is achieved in practice by such class or category of stationary sources. For Test Cell No. 5, the most stringent NO_X emission limitation can be found in previously permitted projects subject to PSD or NNSR requirements. In order to identify the most stringent emissions limitation achieved in practice by an aircraft engine test cell, the following sources of information were evaluated:

- The USEPA's RACT, Best Achievable Control Technology (BACT), LAER Clearinghouse (RBLC);
- The California Air Resources Board (CARB) BACT Clearinghouse;
- USEPA regional air permitting websites;

- State Implementation Plan (SIP) information found within environmental agency websites; and
- Internet research.

In addition to the sources of information listed above, additional publicly available information such as air permits not listed in the RBLC or agency websites, process knowledge, and engineering experience were also included in this analysis.

4.3 NO_X LAER Determination

Based on a thorough review of the information sources listed above, no determinations were found as a result of the CARB BACT Clearinghouse or SIP searches for jet engine test cells. There were, however, determinations found from the RBLC search, USEPA regional air permitting websites, internet research, and air permit reviews. The following section discusses the details of the results from these reviewed sources.

An RBLC search was completed in January 2017 using the following key searches: “test cell,” “test stand,” “engine test” “engine stand,” “jet engine” and “aircraft engine” for the period of January 1990 to January 2017. The determinations found using these RBLC searches are briefly summarized in Table 6 below.

Table 6. Summary of RBLC Search Results

RBLC ID No.	Facility Name	Process Description	NOx Limit 1	units	NOx Limit 2	units	NOx Control Determination
TX-0699	Turbine Overhaul Center – Solar Turbines	Stationary Gas Turbine test cell	--		--		Good Combustion Practices
OH-0355	General Electric Aviation, Evendale Plant	Test Cell 2 – Aircraft Engine	4.4	lb/MMBtu	80	tons/yr	No Control
		Test Cell 1 – Aircraft Engine	1.7	lb/MMBtu	92	tons/yr	No Control
PA-0282	Johnson Matthey Inc/Catalytic	Engine Test Cells (6) – Stationary Internal Combustion	11	tons/yr	--		No Control
MA-0038	General Electric Aviation	Engine Test Cell – Aircraft	67.2	tons/month	157	tons/yr	No Control
OK-0121	Midwest City Air Depot	Jet Engine Test Cells – Aircraft	323.13	tons/yr	--		No Control
VA-0303	Stihl Incorporate	Engine Test Cells – Small Internal Combustion Engines	4.7	tons/yr	--		Good Combustion Practices
IA-0076	John Deere Product Engineering	Test Cell – Small Internal Combustion Engines	1.52	lb/MMBtu	0.86	lb/hr	Good Combustion Practices
MI-0367	GM Powertrain Division	Engine Test Cells /Dynamometers - Automotive Internal Combustion Engines	1.38	lb/MMBtu (gasoline)	2.2	lb/MMBtu (diesel)	No Control
PA-0233	NSWCCD-SSES	Marine Gas Turbine Test Cell – Small Internal Combustion Engines	341	lb/hr	--		No Control
MI-0360	Daimler Chrysler Corporation	Dynamometer Test Cells, Uncontrolled - Automotive Internal Combustion Engines	0.1049	lb/gal of gasoline	--		Thermal Oxidizers Reduce NOx Emissions as Well as VOC
TN-0103	Arnold Engineering Development	Jet Engine Test Cells – Aircraft	1038	tons/yr	1.087	g/b-hp-h	No Control
MI-0306	Schenck Pegasus	Engine Test Cells, Dynamometer – Stationary Internal Combustion	5.76	lb/hr	25.2	tons/yr	No Control
IL-0065	General Motors - Electromotive Division	Test Cells, Durability, Locomotive Engine,(MU1,2,5)	--		--		Engines to be Tested Must be Equipped with Turbo-Charging & Aftercooling, or Comparable Technology.
PA-0154	General Electric Transportation Systems	Engine , Diesel, Test Cells No. 1 Through 5 - Locomotive	492.2	tons/yr	--		Engine Retard, Split Cooling, Electronic Fuel Injection, Depending on Engine
MA-0030	GE Aircraft Engines	Jet Engine Test Cell – Aircraft	0.0229	grams/second	--		Minimize Use of Afterburner Mode, Restriction on the Number of Hours an Engine May Operate
OH-0299	GE Aircraft Engines Peebles	Jet Engine Test Stand 7 – Aircraft	3113.4	lb/hr	797.2	tons/yr	No Control
OH-0306	GE Aircraft Engines-Peebles Test	Jet Engine Test Stand – Aircraft	3113.4	lb/hr	797.2	tons/yr	Modeling used to meet PSD requirements. Designed emission levels used to determine "no control."
TX-0462	Perkinelmer Automotive Researching Inc	Gasoline Engine Testing- Automotive Internal Combustion Engines	3.3	lb/hr	14.3	tons/yr	None - Limited Operations
		Diesel Engine Testing-CAT Stands - Automotive Internal Combustion Engines	12.2	lb/hr	53.8	tons/yr	None - Limited Operations
		Diesel Engine Testing MCD Stands - Automotive Internal Combustion Engines	11.3	lb/hr	49.3	tons/yr	None - Limited Operations

As shown in the table above, the RBLC search resulted in determinations for automotive, marine, and locomotive engines, as well as aircraft engines. The only physical NOx control devices identified from the search are listed for automotive engine test cells. These control determinations would not apply to Test Cell No. 5 as a jet engine test cell is different from an automotive test cell and involves a different type of engine. None of the remaining RBLC determinations identified any add-on control equipment. There are three determinations which identify the use of good combustion practices for stationary turbine and small engine test cells. These test cells are used to test engines which are much smaller in magnitude than a jet engine and therefore, would not be representative of the Test Cell No. 5 operations. Regardless of whether these determinations are representative of the Test Cell No. 5 operations, the jet engines tested in Test Cell No. 5 are inherently operated with good combustion practices in order to optimize efficiency. In addition to control equipment determinations, there are NOx emission limits listed for a number of jet engine test cells identified in the RBLC search. However, none of these limits are based on the use of pollution control equipment. The application of mass-based NOx limits (i.e., ton/yr, lb/MMBtu, lb/gal, lb/hr) for these uncontrolled test cells is engine-specific. Therefore, consideration of these limits as LAER is not appropriate.

A more detailed summary of the RBLC determinations presented in Table 6 above is outlined in Table 1 of Appendix F.

Table 2 of Appendix F summarizes Delta's review of publically available air permits for potential jet engine test cell facilities determined from industry knowledge and independent research. Based on the results of the review, there are no identified pollution control devices for control of NOx emissions. There are a few NOx emission limits which were contained in the air permits for a few test cell facilities; however, not all of the equipment or operations for which there are NOx emission rates identified are similar in scope to Test Cell No. 5. For example, Test Cell A-11 located at the General Electric Aviation, Evendale Plant in Ohio is not representative of the operations of Test Cell No. 5 because Test Cell A-11 is permitted to combust a range of fuels other than jet fuel and has a much smaller testing capacity than Test Cell No. 5. The test cells located at the Honeywell - Engines, Inc facility in Arizona conduct testing on auxiliary power units (APUs) which are small gas turbine engines used to provide electricity, compressed air, and/or shaft power for main engine start, air conditioning, electric power and other aircraft systems. While APUs can have similar emissions in scope as jet engines, they ultimately are not similar in magnitude and would not be a good representation of Test Cell No. 5 operation. Additionally, the jet engine test cells located at the Rolls-Royce Corporation facility located in Indiana are designed to test engines with a maximum thrust of 10,000 pounds while the jet engines tested in Test Cell No. 5 have a maximum thrust of 92,000 pounds. Therefore, these test cells are considerably smaller in scope than Test Cell No. 5 and should not be considered as comparable in operations. As discussed above, the application of mass-based NOx limits for these uncontrolled jet test cells is engine-specific. Therefore, consideration of these limits as LAER is not appropriate.

Based on the discussions above, LAER is considered to be no add-on control for NOx. For Test Cell No. 5, Delta is proposing a LAER emission limit for NOx of 39.5 tpy based on design emissions levels. This annual NOx emission limit will be met by calculating the NOx emissions from each engine test based on the engine type, time in operational mode, and the fuel consumption rate. Then, the per-test NOx emissions will be used to calculate the monthly and the 12-month rolling total NOx emissions.

5 NONATTAINMENT NSR COMPLIANCE

5.1 Class I Visibility Analysis

Class I area impact analysis is included in the NSR program in order to protect federal wilderness areas such as national parks, wilderness areas, national forests, and wildlife refuges from deterioration in air quality. As described in Section 3.1.2, the Test Cell No. 5 project is subject to the requirements of the NSR program due to its NOx emissions increase. This Class I area quantitative impact analysis is being performed as part of the NSR application process.

The Federal Land Managers (FLM) are responsible for protecting the Class I area Air Quality Related Values (AQRV). The primary areas of concern with respect to air pollution emissions are visibility impairment, ozone effects on vegetation, and effects of pollutant deposition on soils and surface waters. An "Initial Screening Test," as recommended by the FLAG 2010[11] report, was conducted for the project.

The initial screening test consists of the following three steps:

Step 1: Class I areas within 300 km from the project were identified (see Figure 1 of Appendix F). The distance in kilometers from the project to each Class I area was measured and assigned the value D. Five Class I areas were identified as being located within 300 km of the project: the Cohutta Wilderness, Joyce Kilmer-Slickrock Wilderness, Great Smoky Mountains National Park, Shining Rock Wilderness, and Sipsey Wilderness.

Step 2: The combined annual emissions increase from the project for the visibility-impacting pollutants was calculated in tpy (Q). This annual emissions increase was calculated based on the maximum 24-hr average emission rate in pounds per hour. The visibility-impacting pollutants from the project are NOx, SO2, PM10, and PM2.5. Note that there are no sulfuric acid (H_2SO_4) emissions from the project.

Each test cycle lasts 8 hours. There is a minimum 4-hour downtime required between the end of one test cycle and the start of the next cycle. Therefore, a maximum of two tests can be conducted in one 24-hr period. The maximum 24-hr average emission rate was calculated based on the highest emitting engine model type for each pollutant. These calculations are included in Table 1 of Appendix F.

[11] Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010) https://www.nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf

Step 3: A Q/D analysis was conducted for each Class I area. Per the FLAG 2010 report guidelines, if the Q/D values from the project are less than or equal to 10 (i.e., Q/D $\leq$ 10) then the project is expected to have negligible impact on Class I AQRV's and no further AQRV analysis is expected to be requested by the FLMs. As shown in Table 2 of Appendix F, the maximum Q/D value was 4.5. Therefore, Class I AQRV impacts from the project are expected to be negligible and no further AQRV analysis is proposed for the project.

Separate letters to the appropriate FLMs requesting their agreement with the Class I AQRV findings are being submitted concurrently. Copies of the letters to the FLMs are included in Appendix G.

5.2 Additional Impact Analysis

The additional impacts analysis, required for projects subject to NSR review, evaluates project impacts pertaining to associated growth; soils and vegetation; and visibility impairment. Each of these topics is discussed in the following subsections.

5.2.1 Growth Impacts

Growth impacts are intended to assess the additional residential, commercial, and industrial development that is likely to occur as a result of the project. In this case, the addition of Test Cell No. 5 at Delta's Tech Ops facility, the infrastructure already exists to support the many operations, including existing test cells, currently at Tech Ops. As discussed in the introduction section, Test Cell No. 5 is being proposed for construction in order to accommodate the new aircraft fleet engines of the future, not necessarily to accommodate the testing of more total aircraft engines at TechOps. So, as older aircraft engines are retired and/or phased out, more new model aircraft will enter the fleet and require testing within Test Cell No. 5 building rather than in the existing test cells at TechOps. Additional staff, if any, will come from the existing community and no additional commercial or industrial services are expected to result from the project.

Minor impacts due to construction of Test Cell No. 5 are expected to the surrounding area as the building will be located within the existing TechOps property boundary. The construction site for the Test Cell No. 5 building is located on an existing parking lot so minimal earth moving and paving will be required. Additionally, Delta and the contractors working on the construction of Test Cell No. 5 will implement procedures and practices to mitigate potential emissions due to construction activities. Therefore, additional growth from the project is expected to be minimal, if any.

5.2.2 Soils, Vegetation and Wildlife

Assessment of the impact on soils and vegetation in the surrounding area is limited to the impact from ozone resulting from the increased emissions of NOx as a precursor to ozone formation. All pollutant emission increases are below their respective Significant Emission Rates (SERs) as established in the PSD regulations. The area surrounding the facility is currently designated as non-attainment for ground-level ozone. As noted in Section 3.3 of this application, Delta will be required to obtain offsetting NOx emission reduction credits in excess of the NOx emissions increase resulting from this project. Therefore, it is expected that the project will reduce the overall impact of ozone on the surrounding soils and vegetation.

5.2.3 Visibility Impairment

The visibility impairment analysis required by the NSR program is intended to address the impacts to visibility at airports, state parks, and scenic vistas located within the Significant Impact Area (SIA) as determined in the dispersion modeling normally associated with PSD permit applications. In this case, none of the pollutant increases are at or above the SER thresholds established in the PSD rules to require modeling. Therefore, no SIAs were determined as part of this application process.

Nevertheless, the following qualitative analysis is provided as assurance that the impact on visibility in the surrounding area will be negligible. The emissions of particulate matter, which is the pollutant most associated with visibility impairment, are minimal and are not expected to have any appreciable effect on the ambient particulate concentrations in the area. Additionally, the NOx emissions, which can be a precursor in the formation of fine particulate matter and therefore impact visibility, will be offset as described in the section above. Therefore, the project's impact on local visibility will be negligible.

5.3 Alternative Site Assessment

The Delta TechOps facility, where Test Cell No. 5 is proposed to be constructed, is located at the Airport which allows Delta to conduct efficient maintenance and testing of the jet engines in the aircraft fleet. As discussed in Section 1.2, periodic testing of jet engines is required in order to meet FAA regulatory requirements as well as manufacturer specified maintenance to ensure safe and efficient operation. This requires that jet engines from the aircraft fleet be periodically brought offline to undergo testing and maintenance within a test cell. Based on the projection of newer, next generation jet engines being incorporated into the aircraft fleet in the upcoming years, the required testing and maintenance would be performed within Test Cell No. 5 as the existing test cells could not accommodate these types of engines. In order to minimize the period of downtime for the testing and efficiently conduct required maintenance on the engines, the close proximity of Test Cell No. 5 to the Airport is a crucial aspect of the project. Additionally, locating Test Cell No. 5 outside of the Airport (and outside of the Atlanta Ozone

Nonattainment Area) would not be feasible as aircraft engines would have to be transported off-site via truck trailers from the Airport for testing. The extended transportation distance of jet engines would increase the impact of emissions from the transport equipment, cause increased likelihood of damage to the jet engines, and add safety issues related to the transport of large equipment via large trucks on the roads in and out of the Airport. As such, an alternative site is not feasible for Test Cell No. 5.

5.4 Alternative Process Analysis

The proposed Test Cell No. 5 utilizes new, state-of-the-art technology to conduct engine testing and analysis on next generation aircraft fleet. Many years of design and planning have been completed to determine the optimum process and equipment to conduct the aircraft testing within Test Cell No. 5. Jet engine testing is a tightly controlled process that requires dedicated structures with specialized test equipment and instrumentation in order to comply with FAA regulations and engine manufacturer maintenance requirements. The design of Test Cell No. 5 will result in a state-of-the-art facility designed to maximize testing efficiency while minimizing the acoustical impact on the surrounding environments. As such, alternative process equipment, and to a great extent process material alternatives, are not available.

5.5 Major Source Compliance Statement

In addition to TechOps, Delta owns and operates two other major stationary sources in the State of Georgia: General Office Facilities (Facility AIRS No. 04-13-121-00807) and Atlanta Station (Facility AIRS No. 04-13-063-00059). All of these Delta facilities are in compliance, or on a schedule for compliance, with all applicable emission limitations and standards. The compliance statement outlined above is based on a review of the most recent Title V compliance reports for the three Delta facilities.

5.6 Emission Offset Credits

As discussed in Section 3.3, the potential NOx emissions from Test Cell No. 5 must be offset by the purchase of ERCs at a ratio of 1.3 offsets per ton of emissions increase. Thus, for this proposed project, Delta must aquire 52 tons of NO_X ERCs in order to offset the proposed emission limit of 39.5 tons of NO_X per year for Test Cell No. 5. Note, VOC ERCs are not required to be obtained as the VOC emissions increases associated with the Test Cell No. 5 project do not constitute a major modification.

Delta will complete the ERC acquisition process in accordance with the requirements outlined in Georgia Rule 391-3-1-.03(8)(c)(12), including the requirement that ERCs must be obtained from within the same non-attainment area, which includes the following 13 counties: Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, and Rockdale counties. Additionally, at least 30 days prior to commencement of operation of Test Cell No. 5, Delta is required to provide EPD with applicable documentation of the possession of sufficient offsets, specific to requirements dependent on whether the offset credits are obtained from the ERC Banking Program or outside of the ERC Banking Program. In accordance with this requirement, Delta is proposing Title V Operating Permit numbers 4512-063-0105-V-03-0 and V-03-1 be modified to include Condition 3.3.46 (see Section 8.1.1 below) requiring the facility to obtain and retire at least 52 tons of NO_X emission reduction credits prior to the startup of Emission Unit 5898 (Test Cell No. 5).

6 CASE-BY-CASE NOx AND VOC RACT ANALYSIS

6.1 NOx RACT

6.1.1 Introduction

This Case-by-Case RACT determination is being provided pursuant to Georgia Air Quality Rule 391-3-1-.02(2)(yy), "Emissions of Nitrogen Oxides from Major Sources." [Rule (yy)]. Rule (yy) requires that any source located in one of 13 counties[12] in the Atlanta ozone non-attainment area, with potential emissions exceeding 25 tpy of NOx and not subject to any other more specific NOx rules, to implement RACT to control those NOx emissions. A portion of Delta's potential NOx emissions are not regulated by any state specific NOx rule and exceed a site-wide rate of 25 tpy. These NOx emission, therefore, are subject to Rule (yy).

As defined under 40 CFR 51.100, RACT means:

"…devices, systems, process modifications, or other apparatus or techniques that are reasonably available taking into account: (1) The necessity of imposing such controls in order to attain and maintain a national ambient air quality standard; (2) The social, environmental, and economic impact of such controls; and (3) Alternative means of providing for attainment and maintenance of such standard. (This provision defines RACT for the purposes of §51.341(b) only.)."

The RACT determination process consists of:

Identification of all sources of Rule (yy) NOx emissions – i.e., emissions not subject to a specific rule;

1. Calculation of NOx emission rates from those sources;
2. Identification of all technically feasible control options;
3. Evaluation of those control options for economic feasibility; and
4. Determination of RACT based on the most cost-effective measure.

[12] Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, and Rockdale Counties.

6.1.2 NOx Sources

The following NOx emitting sources from the proposed project have been identified, and the corresponding applicable NOx rules are provided. All other sources proposed as part of the Test Cell No. 5 project do not have the potential to emit NOx emissions.

Table 7. Identification of NOX Sources and Applicable NOX Rule

Source	Specific Applicable NOx Rule
Test Cell No. 5 (SHEA ID No. 5898)	None

6.1.3 NOx Emissions from Rule (yy) Sources

As noted in the previous section, the NOx emissions from Test Cell No. 5 are not subject to specific NOx rules. Therefore, this source is subject to Rule (yy). The table below provides the potential NOx emissions from Test Cell No. 5.

Table 8. Potential NOX Emissions

Source	Potential NOx Emissions (tons/yr)
Test Cell No. 5 (SHEA ID No. 5898)	39.5*

*Proposed PSD Avoidance Limit.

6.1.4 Technically Feasible Control Options

The following resources were reviewed to identify technically feasible control technology options for jet engine test cells:

- Review of the most stringent NOX emissions control measures for testing of aircraft engines in an engine test cell approved in the past 27 years by various states, as listed in EPA's RBLC;
- Nitrogen Oxide Emissions and Their Control from Uninstalled Aircraft Engines in Enclosed Test Cell, Joint EPA - U.S. Department of Transportation (DOT) Report, Report No. EPA 453/R-94-068, October 1994;
- Regulatory Support Document, Control of Air Pollution from Aircraft and Aircraft Engines, for the Direct Final Rule for Aircraft Emission Standards, U.S. EPA, February 1997;
- NOx Removal in Jet Engine Test Cell Exhaust, Los Alamos National Laboratory, LA-UR- 99-3072;
- The CARB BACT Clearinghouse; and

- Publicly available information such as air permit applications and air permits not listed in the RBLC.

Based on the review, the following potential theoretical control technologies were identified:

- Low NO_X Engines
- Combustion Controls
- Selective Catalytic Reduction (SCR) with Ammonia Injection
- Selective Non-Catalytic Reduction (SNCR)
- Reburn NOx Control Technology
- NOx Sorbent Technology
- Water or Steam Injection
- Non-thermal Plasma Systems
- Direct Atmospheric Exhaust (No Control)

Low NO_X engines are not considered further because neither the combustor in the engine nor the combustion characteristics of the engine can be altered without significantly affecting the performance of the aircraft engine itself. However, with the replacement of older model aircraft engines by newer model (Next Gen) engines within the aircraft fleet, potential NO_X emissions attributed from engine testing will inherently be reduced as the Next Gen engines are certified to be lower emitting than older model engines.

Combustion control methods that prevent or reduce NOx formation during the combustion process were not evaluated. This is due to the fact that changing the combustion process during testing will directly and adversely impact the design, safety, operation and performance of the aircraft engine.

The joint report submitted to the U.S. Congress in October 1994 by the EPA and the DOT entitled "Nitrogen Oxide Emissions and Their Control from Uninstalled Aircraft Engines in Enclosed Test Cell," Report No. EPA-453/R-94-068, October 1994, concludes that there are no existing technologies for control of NOx that have been applied (full scale) to aircraft engine test cells in the United States. The differences in engines, engine tests, engine test cell sizes, and engine types complicate the application of NOx control systems to engine test cells.

Potential NOx control technologies for jet engine test cells were obtained from the EPA Report, 453/R-94-068, October 1994, and the Los Alamos National Laboratory presentation, LA-UR-99-3072, titled "NOx Removal in Jet Engine Test Cell Exhaust." These technologies are considered post-combustion control methods. Post-combustion control methods address NOx emissions after formation.

Post-combustion control technologies include:

- Selective Catalytic Reduction (SCR) with Ammonia Injection
- Selective Non-Catalytic Reduction (SNCR)
- Reburn NOx Control Technology
- NOx Sorbent Technology
- Water or Steam Injection
- Non-thermal Plasma Systems

6.1.4.1 Selective Catalytic Reduction (SCR) with Ammonia Injection

Through the injection of a nitrogen based reagent such as ammonia (NH_3) into the ductwork, downstream of the combustion unit, the SCR control process chemically reduces the NO_X molecule into molecular nitrogen and water. The combustion unit exhaust gas mixes with the ammonia and enters a reactor module containing catalyst where the ammonia reacts selectively with the NO_X within a specific temperature range and in the presence of the catalyst and oxygen. A high temperature exhaust gas is required to convert the injected ammonia into free radicals which provide the activation energy for the reaction to occur.

The required catalyst temperature is approximately 700°F, though some catalysts can operate near 500°F. Several catalysts, including platinum and titanium oxide, are available. Proper operation depends on many factors including correct stoichiometric ratio of ammonia to NO, reaction temperature, and condition of catalyst, in addition to the "space velocity," which is expressed as exhaust gas volumetric flow rate per unit catalyst volume. The NOx reduction efficiency for SCR with ammonia injection has been demonstrated at 80 to 90 percent.

This technology is available in the United States, and is used with stationary gas turbine applications for power plants. However, there are significant differences between exhaust gas characteristics of power plant stationary gas turbines and those from jet engine test cells. The design of a jet engine test cell requires the exhaust from the mounted jet engine undergoing testing to be directed through the augmentor tube prior to being redirected to a vertical flow through the exhaust stack. The engine exhaust gas passage throught the augmentor tube is required in order to attenuate noise, reduce the test cell pressure to a level equivalent to the pressure at the engine compressor inlet, provide engine cooling normally obtained by the motion of the aircraft in flight, and reduce the temperature of the exhaust gas for purposes of protecting the integrity of test cell. As a result of this required cooling of the engine exhaust gas, the test cell stack gas temperatures following the augmentor tube are well below those required by SCR systems. Additionally, the stack gas temperature and the NOx emission rates will vary with engine thrust and the augmentation air as the jet engine runs through the various test modes of a full flight simulation test. The stack gas flow rate and the stack gas temperature vary significantly as the augmentation ratio increases as occurs with turbojet and turbofan engines. At temperatures below the specified SCR operating range, the reaction kinetics decrease and ammonia (EPD air toxic) passes through (ammonia slip). Ammonia slip can cause health effects, visibility of the stack effluent, and the formation of ammonium sulfates. Due to the relatively low stack gas temperatures associated with the operation of test cells, the application of SCR in most cases would require reheating of the exhaust gas to maintain the stack gas temperature within the appropriate catalyst temperature range. Both the duct burner, which would be required to reheat the exhaust gas, and the ammonia injection system must be tightly controlled via the use of feedback control systems to follow the characteristically rapid variations in gas temperature, mass flow rate, and NO_X concentration of the test cell exhaust gas. The rapid and frequent changes in engine output would place demands on the SCR controller not found in current (non jet engine test-cell) installations where SCR technology is used; therefore, it is uncertain how effective the required feedback systems would be at tracking such a highly transient emission source. Lag time in the response of the ammonia injection system to changes in exhaust gas conditions would result in increased unreacted ammonia emissions and decreased NOx removal efficiency. Additionally, there would be a potential for greater NOx production associated with the heating of exhaust gases to raise the temperature to that required by SCR.

Due to the variance in operation and performance of jet engine testing, SCR control is not an appropriate technical application and is therefore, not considered a technically feasible control option.

6.1.4.2 Selective Non-Catalytic Reduction (SNCR)

The basis of SNCR technology is a non-catalyzed chemical reaction utilizing an ammonia based reagent (such as urea or ammonia) for reducing NOx into nitrogen (N_2) and water (H_2O) by injecting this reagent into the post combustion gas stream at temperatures ranging from 1600-2400°F. Within the appropriate temperature range, the gas-phase urea or ammonia decomposes into free radicals including NH_3 and NH_2. After a series of reactions, the ammonia radicals come into contact with the NO_X and reduce it to N_2 and H_2O. The conventional SNCR process occurs within the combustion unit, which acts as the reaction chamber when the reagent is injected. This technology has been demonstrated on utility boilers and other fossil-fuel systems to achieve up to 50 percent NO_X removal.

The test cell stack gas temperatures are significantly below the 1600°F to 2400°F range where SNCR is viable. In addition, a uniform NOx control distribution and an ammonia or urea injection system are required to ensure maximum NOx reduction, and to prevent release of excess NH_3. As with SCR, application of SNCR would require substantial reheating with a gas duct burner to maintain the stack exhaust gas temperature within the appropriate temperature range. The reheat requirements are a function of test cell operating characteristics, which are highly transient and differ depending on the type of engine tested.

Due to SNCR's lower NO_X removal efficiency, and the NO_X emissions from the duct burner, SNCR may actually cause a net increase in NO_X emission from the test cell under most operating conditions. Additionally, implementation of a reagent injection system within the jet engine combustion chamber would not be feasible. Due to the variance in operation and performance of the engine testing, SNCR is not considered a technically feasible control option.

6.1.4.3 Reburn NOx Control Technology

Reburn is a NOx control technology that removes NOx by injecting natural gas in a secondary combustion zone just above the main combustion zone, followed by downstream injection of additional combustion air. The injection of the gas lowers NOx formation in the main combustion zone, where the NOx is reduced by reaction with hydrocarbon fragments formed by the natural gas combustion in fuel-rich conditions.

Exhaust from the jet engine test cell consists of oxygen-rich gas that would require lean reburning, where local fuel-rich conditions occur in an overall fuel-lean exhaust gas. Bench-scale studies of reburning in an oxygen-rich gas such as that from a test cell exhaust have been performed[13]. The study showed that lean burn respective removal efficiencies for 1,000 parts per million (ppm) and 500 ppm NOx inlet concentrations were reported at 60 and 30 percent. No studies have been conducted at NOx concentration of 100 ppm that is typical of test cell operation. Until more research and evaluations are performed, the safety and performance issues of this technology cannot be addressed. Thus, reburn NOx control technology was not considered a technically feasible control option.

6.1.4.4 NOx Sorbent Technology

The exhaust gas passes through a bed of vermiculite impregnated with magnesium oxide (MgO). The NOx is adsorbed on the bed and forms magnesium nitrate. Unlike SCR and SNCR, sorbent technology does not require exhaust gas reheat or ammonia injection. When used with a bed of virgin vermiculite upstream of the one containing magnesium oxide, the removal efficiency of 50 to 70 percent has been reported. This technology has not been demonstrated in practice on a full scale, working test cell. Demonstrated in practice generally means that the control technology has been used in a production situation, and has been demonstrated to be successful at achieving the claimed performance. In such a case, the control option would be technically feasible for consideration in the RACT analysis. Bench scale and pilot plant trials alone are generally not sufficient. Until more research and evaluations are performed, the safety and performance issues of this technology cannot be addressed, and thus this was not considered a technically feasible control option.

6.1.4.5 Water or Steam Injection

Water/steam injection is an established NOx control technology for stationary gas turbines. The water or steam injected into the primary combustion zone of a gas turbine engine provides a heat sink, which lowers the flame temperature and thereby reduces thermal NOx formation.

The use of water/steam injection would require temporary engine modifications and would alter the performance characteristics of the engine being tested. These modifications would result in the evaluation of an aircraft engine within the test cell that would require further modification

[13] Feasibility of Reburning for Controlling NOx Emissions from Air Force Jet Engine Test Cells, S.A. Johnson & C.B. Katz, June 1989

before being returned to in-flight service. In addition, these modifications would result in engines tested with performance characteristics that are unrealistic or non-representative of the engine operation during in-flight service. Since the engines are tested in a cell to evaluate their performance characteristics, any modifications affecting performance would run counter to the actual reason for testing the engines.

In addition, it would result in generating significant quantities of wastewater contaminated with hydrocarbons, requiring treatment. Therefore, water/steam injection is not considered a technically feasible control option.

6.1.4.6 Non-Thermal Plasma (NTP)

NTP systems are a type of advanced oxidation and reduction process making use of "cold combustion" via free-radical reactions. Exhaust gases are contacted with electrical energy to create free radicals, which in turn decompose pollutants such as NOx, SO_2, and VOC in the gas phase. The removal efficiency depends on plasma chemistry (free radical yield), reaction chemistry, and applied plasma specific energy. The process is carried out on the exhaust gases without any preheating and has demonstrated removal efficiencies greater than 50 percent in bench-scale and field-pilot demonstration studies. The study describes five candidate NTP systems: pulsed corona, dielectric barrier, hybrid NTP reactor-adsorber, plasma-catalytic hybrid, and corona radical shower. In pulsed corona, dielectric barrier, and corona radical shower systems, ammonia or methane can be added to generate radicals that drive reactions, leading to the formation of particulates that can be removed using an electrostatic precipitator.

This is an emerging technology, and has only been demonstrated on a field-pilot scale in one test cell in practice. A bench scale or pilot plant trial alone is generally not a demonstration of a in-practice control technology. Until more research and evaluations are performed, the safety, operation and performance issues of this technology cannot be addressed, so this was not considered a technically feasible control option.

6.1.5 Economic Feasibility Evaluation

Since no control technology has been identified as technically feasible, it is unnecessary to evaluate cost effectiveness for this application.

6.1.6 RACT Selection

The joint report submitted to the U.S. Congress in October 1994 by U.S. EPA and DOT concludes that there are no existing technologies for control of NOx that have been applied (full scale) to aircraft engine test cells in the United States. The RBLC and CARB BACT reviews also yielded no add-on control for the permitted jet engine test stands and similar sources. The differences in engines, engine tests, engine test cell sizes, and engine types complicate the application of NOx control system to engine test cells.

Additionally, as summarized in Section 6, Test Cell No. 5 is subject to Lowest Achievable Emission Rate (LAER) requirements for NOx emissions. Pursuant to 40 CFR 51.150, LAER is defined as:

"… for any source, the more stringent rate of emissions based on the following:

(A) The most stringent emissions limitation which is contained in the implementation plan of any State for such class or category of stationary source, unless the owner or operator of the proposed stationary source demonstrates that such limitations are not achievable; or

(B) The most stringent emissions limitation which is achieved in practice by such class or category of stationary sources. This limitation, when applied to a modification, means the lowest achievable emissions rate for the new or modified emissions units within or stationary source. In no event shall the application of the term permit a proposed new or modified stationary source to emit any pollutant in excess of the amount allowable under an applicable new source standard of performance."

As indicated in Section 4 of this application, LAER for Test Cell No. 5 has been determined to be no control.

Based on the discussion above, RACT is considered to be no add-on control for NOx and the RACT emission limits are those based upon design emissions levels.

6.2 VOC RACT

6.2.1 Introduction

This Case-by-Case RACT determination is being provided pursuant to Georgia Air Quality Rule 391-3-1-.02(2)(tt), "VOC Emissions from Major Sources" [Rule (tt)]. Rule (tt) requires that any source located in one of 13 counties[14] in the Atlanta ozone non-attainment area, with potential emissions exceeding 25 tpy of VOC and not subject to any other more specific VOC rules, to implement RACT to control those VOC emissions. A portion of Delta's potential VOC emissions are not regulated by any state specific VOC rule and exceed a site-wide rate of 25 tpy. These VOC emission, therefore, are subject to Rule (tt).

In addition to the definition provided in 40 CFR 51.100, Rule (tt) defines RACT as:

".. the utilization and/or implementation of water based or low solvent coatings, VOC control equipment such as incineration, carbon adsorption, refrigeration or other like means as determined by the Director to represent reasonably available control technology for the source category in question."

The RACT determination process consists of:

[14] Cherokee, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Forsyth, Fulton, Gwinnett, Henry, Paulding, and Rockdale Counties.

1. Identification of all sources of Rule (tt) VOC emissions – i.e., emissions not subject to a specific rule;
2. Calculation of VOC emission rates from those sources;
3. Identification of all technically feasible control options;
4. Evaluation of those control options for economic feasibility; and
5. Determination of RACT based on the most cost-effective measure.

6.2.2 VOC Sources

The following VOC sources have been identified, and the corresponding applicable VOC rules are provided.

Table 9. Identification of VOC Sources and Applicable VOC Rule

Source	Specific Applicable VOC Rule
Test Cell No. 5 (SHEA ID No. 5898)	None
2,000 gal Used Oil Storage Tank (SHEA ID No. 5893)	None
200 gal Diesel Storage Tank and Fuel Pump Station (SHEA ID No. 5890)	None
25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5894)	None
25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5895)	None
200 gal Lubrication Oil Storage Tank (SHEA ID No. 5938)	None
200 gal Preservation Oil Storage Tank (SHEA ID No. 5936)	None
Flush Cleaning Operations (SHEA ID No. 5901)	Rule kkk [391-3-1-.02(2)(kkk)]
General Fugitive Material Usage Operations	Rule kkk [391-3-1-.02(2)(kkk)]

As explained in Section 3.1.9, Rule (vv) – Volatile Organic Liquid Handling and Storage – does not apply to the 2,000 gal Used Oil Storage Tank (SHEA ID No. 5893), 200 gal Diesel Storage Tank and Fuel Pump Station (SHEA ID No. 5890), 200 gal Lubrication Oil Storage Tank (SHEA ID No. 5938), or the 200 gal Preservation Oil Storage Tank (SHEA ID No. 5936), because each of these tanks have a storage capacity of less than 4,000 gallons. Rule (vv) does not apply to the 25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5894) or 25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5895) either because these tanks are not filled by delivery vessel (e.g., tank truck).

Since Rule (kkk) applies to the flush cleaning operations (SHEA5901) associated with Test Cell No. 5, Rule (tt) would not apply to this source. Also, general fugitive material usage operations would involve operations that are either aerospace operations subject to Rule (kk) or facilities maintenance operations exempt from Rule (kkk). Therefore, Rule (tt) would not apply to general fugitive material usage operations.

6.2.3 VOC Emissions from Rule (tt) Sources

As noted in the previous section, the VOC emissions from Test Cell No. 5 (SHEA ID No. 5898), 2,000 gal Used Oil Storage Tank (SHEA ID No. 5893), 200 gal Diesel Storage Tank and Fuel Pump Station (SHEA ID No. 5890), 200 gal Lubrication Oil Storage Tank (SHEA ID No. 5938), or the 200 gal Preservation Oil Storage Tank (SHEA ID No. 5936), 25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5894), and 25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5895) are not subject to specific VOC rules. Therefore, these sources are subject to Rule (tt). The table below provides the potential VOC emissions from these sources.

Table 10. Potential VOC Emissions

Source	Potential VOC Emissions (tons/yr)
Test Cell No. 5 (SHEA ID No. 5898)	1.6
2,000 gal Used Oil Storage Tank (SHEA ID No. 5893)	4.0E-05
200 gal Diesel Storage Tank and Fuel Pump Station (SHEA ID No. 5890)	8.5E-04
200 gal Lubrication Oil Storage Tank (SHEA ID No. 5938)	5.0E-06
200 gal Preservation Oil Storage Tank (SHEA ID No. 5936)	5.0E-06
25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5894)	0.010
25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5895)	0.010

Test Cell No. 5 has potential VOC emissions of 1.6 tpy. The aircraft engines that will be tested emit VOC due to incomplete combustion. These engines are designed for fuel efficiency (i.e., high combustion efficiency); therefore, VOC emissions are inherently minimized. Additionally, there are currently no add-on controls in use for jet engine test cells. Therefore, RACT for Test Cell No. 5 is deemed to be “no control”.

As indicted by the potential emission rates outlined above, the 2,000 gal Used Oil Storage Tank (SHEA ID No. 5893), 200 gal Diesel Storage Tank and Fuel Pump Station (SHEA ID No. 5890), 200 gal Lubrication Oil Storage Tank (SHEA ID No. 5938), or the 200 gal Preservation Oil Storage Tank (SHEA ID No. 5936), 25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5894), and 25,000 gal Jet A Fuel Storage Tank (SHEA ID No. 5895) have negligible VOC emissions and are exempt from Rule (vv). Therefore, these sources can be dismissed from VOC RACT consideration.

7 MONITORING AND RECORDKEEPING

7.1 Jet Engine Test Cell No. 5

Delta maintains a computer monitoring system with database tools to estimate and track regulated air pollutant emissions from jet engine testing operations. This system is a computer software-based tool that calculates and records real-time emissions estimates during engine tests based on engine fuel flow rate data and power setting/emission factor correlations. The software is populated with the same ICAO Data Bank emission factors used to calculate the potential emissions from Test Cell No. 5 as outlined in Section 2.1.1 above. This allows real-time emissions calculation and recording during engine testing, and provides a robust, and accurate means of estimating emissions.

Using the computer emission monitoring system, multiple fuel flow measurements per minute are made by the computer system, and emissions are calculated and reported in real time based on the programmed function of emission factor versus power setting.

Delta will use the results of the computer emission monitoring system to calculate monthly and 12-month rolling total NO_X emissions from Test Cell No. 5 to compare with applicable emissions limits, including the NO_x emission limit of 39.5 tpy (proposed PSD avoidance limit). Additionally, to further monitor compliance with the proposed PSD avoidance limit for NO_X of 39.5 tpy, Delta is proposing the addition of an applicable permit condition requiring that Delta notify EPD if the 12-month rolling total NO_X emissions exceed 35.5 tons, or 90% of the proposed NO_X limit.

The proposed monitoring and recordkeeping permit conditions related to Test Cell No. 5, including the NO_x PSD avoidance limit are outlined in the following section of this application (Section 8).

7.2 Flush Cleaning Operations

As required by NESHAP GG and Rule (kkk), Delta will maintain a current list of flush cleaning solvents used in Test Cell No. 5 with documentation that demonstrates that the cleaning solvent complies with the composition requirement for an aqueous cleaning solvent as defined by the regulations. Delta will also maintain a record of the annual amount of each applicable solvent used as required by the applicable rules.

8 PROPOSED PERMIT CONDITIONS

Based on the proposed operations associated with the Test Cell No. 5 project as outlined in the above sections of the application, Delta has outlined proposed permit conditions for Test Cell No. 5 and the flush cleaning operations.

8.1 Jet Engine Test Cell No. 5

Delta requests that Test Cell No. 5 (SHEA ID No. 5898) be added to Emission Group ET01, Jet Engine and APU Test Cells due to the similarity of operations to the sources within this group as well as the similarity in generally applicable regulations. Additionally, due to the proposed NOx PSD avoidance limit of 39.5 tpy for Test Cell No. 5, Delta is requesting that a new NSR Avoidance Group, NSR14 be created for Test Cell No. 5. Delta is requesting the following revisions to the permit conditions related to Test Cell No. 5 as contained in Title V Operating Permit numbers 4512-063-0105-V-03-0 and V-03-1:

Condition 3.1 - Emission Units

NSR AVOIDANCE GROUPS					
Emission Units/Groups		**Specific Limitations/Requirements**		**Air Pollution Control Devices**	
ID No.	Description	Applicable Requirements/Standards	Corresponding Permit Conditions	ID No.	Description
NSR14	Test Cell No. 5	PSD Avoidance NO_X	3.2.11, 3.3.46, 6.2.51 through 6.2.53,	N/A	N/A

Condition 3.2.11 - Equipment Emission Caps and Operating Limits

The Permittee shall not discharge or cause the discharge into the atmosphere, from NSR Avoidance Group NSR14, nitrogen oxides (NOx) in amounts equal to or exceeding 39.5 tons during any consecutive 12-month period.
[Avoidance of 40 CFR 52.21]

Condition 3.3.46 – Test Cell No. 5

The Permittee shall obtain and retire at least 52 tons of NO_X emission reduction credits prior to the startup of Emission Unit 5898 (Test Cell No. 5).
[40 CFR 51.165 and 391-3-1-.03(8)c]

Condition 6.1.7(b)(xvi) - General Record Keeping and Reporting Requirements

Identification of any exceedance(s) of the limit for NSR Avoidance Group NSR14 and a table containing, for each month in the reporting period, the monthly emissions and the 12-month rolling total period as specified in Condition 3.2.11.

Condition 6.2.51 – Specific Record Keeping and Reporting Requirements, NSR Offsets and Avoidance Limits, NO_X PSD Avoidance Limits in NSR14

The Permittee shall maintain monthly records of the quantity of fuel consumed and types of engines tested in NSR Avoidance Group NSR14. The Permittee shall maintain a list of manufacturer-approved NOx emission factors for each engine type tested.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

Condition 6.2.52 – S Specific Record Keeping and Reporting Requirements, NSR Offsets and Avoidance Limits, NO_X PSD Avoidance Limits in NSR14

The Permittee shall use the usage records and emission factors required in Condition 6.2.51 to calculate total monthly NOx emissions from NSR Avoidance Group NSR14.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

Condition 6.2.53 – Specific Record Keeping and Reporting Requirements, NSR Offsets and Avoidance Limits, NO_X PSD Avoidance Limits in NSR14

The Permittee shall use the records required in Condition 6.2.51 and the monthly calculations of Condition 6.2.52 to calculate the 12-month rolling total of NOx emissions from NSR Avoidance Group NSR14 for each calendar month in the reporting period. The Permittee shall notify the Division in writing if 12-month rolling total NOx emissions exceed 35.5 tons. This notification shall be postmarked by the fifteenth day of the following month and shall include an explanation of how the Permittee intends to maintain compliance with the emission limits in Condition 3.2.11.
[391-3-1-.02(6)(b)1 and 40 CFR 70.6(a)(3)(i)]

Attachment D – List of Emission Units Per Equipment Group

REGULATORY GROUPS	
EQUIPMENT GROUP	EMISSION UNIT I.D. NUMBERS
ET01	0077, 0078, 0080, 0081, 1123, ***5898***

NSR AVOIDANCE GROUPS	
EQUIPMENT GROUP	EMISSION UNIT I.D. NUMBERS
NSR14	5898

8.2 Flush Cleaning Operations

Delta requests that the flush cleaning operations (SHEA ID No. 5901) proposed as part of Test Cell No. 5 project be added to Emission Unit FC01, Aerospace Flush Cleaning due to the similarity of operations to the sources within this group as well as the similarity in generally applicable regulations. Specific to the flush cleaning operations, Delta is requesting the following revision to the Title V Operating Permit numbers 4512-063-0105-V-03-0 and V-03-1:

Attachment D – List of Emission Units Per Equipment Group

REGULATORY GROUPS	
EQUIPMENT GROUP	EMISSION UNIT I.D. NUMBERS
FC01	0021, 0023, 0024, 0025, 0027, 0029, 0030, 0032, 0074, 0084, 0088, 0103, 0104, 0197, 0201, 0202, 0215, 0216, 0220, 0244, 0258, 0268, 0274, 0288, 0289, 0290, 0291, 0299, 0362, 0380, 0383, 0418, 0499, 0527, 0528, 0529, 0533, 0534, 0547, 0549, 0553, 0587, 0590, 0592, 0593, 0600, 0615, 0768, 0802, 0805, 0834, 0846, 0861, 0862, 0864, 0869, 0872, 0873, 0875, 0878, 0930, 0936, 0940, 0947, 0949, 0964, 1029, 1030, 1031, 1064, 1072, 1073, 1103, 1105, 1110, 1112, 1113, 1114, 1128, 1163, 1223, 1224, 1225, 1386, 1447, 1455, 1655, 1686, 1687, 1697, 1699, 1701, 1711, 1718, 1720, 1776, 1823, 1824, 2009, 2013, 2016, 2020, 2038, 2039, 2044, 2057, 2058, 2114, 2122, 2138, 2139, 2140, 2141, 2142, 2168, 2173, 2216, 4473, 4515, 4523, 4540, 4657, 4674, 4685, 4690, 4757, 4798, 4844, 4847, 4851, 4853, 4873, 4878, 4879, 4880, 4881, 4882, 4883, 4886, 4894, 4905, 4912, 4940, 4942, 4972, 4973, 4993, 4994, 4999, 5119, 6164, 6227, 6247, 6248, 6255, 6263, 6264, 6265, 6268, 6285, 6361, 6532, 6533, 6574, 6580, 6581, 6593, 6630, 6679, 6809, 6811, 6874, 6875, 6876, 6879, 6943, 6993, 7107, 7265, 7279, 7420, 7459, 7484, 8043, 8335, 8336, 8356, 9406, 9412, 9416, 9472, 9473, 9548, ***5901***

APPENDIX A

EPD Expedited Permitting Program Application

State of Georgia
Department of Natural Resources
Environmental Protection Division
Air Protection Branch

Stationary Source Permitting Program
4244 International Parkway, Suite 120
Atlanta, Georgia 30354
404/363-7000
Fax: 404/363-7100

EXPEDITED PERMITTING PROGRAM – APPLICATION FOR ENTRY TO PROGRAM FOR AIR PERMITS

EPD Use Only

Date Received: ____________ Application No. ____________

To be eligible for expedited review, this application form must be accompanied by the complete permit application for the type of air permit being requested.

1. Contact Information

Facility Name: Delta Air Lines, Inc. – Technical Operations Center

AIRS No. (if known): 04-13-063 - 00105

Contact Person: Cheryl Meyers Title: Program Manager - Air Quality

Telephone No.: 404-714-3988 Alternate Phone No.: ____________

Email Address: cheryl.meyers@delta.com

If EPD is unable to contact me, please contact the alternate contact person:

Contact Person: Tommy Sweat, P.E. Title: Senior Principal - EPS, Inc.

Telephone No.: 678-336-9113 Alternate Phone No.: 404-315-9113

Email Address: tsweat@envplanning.com

On Page 2 of this form, please check the appropriate box for which type of air permit you are requesting expedited review.

I have read the Expedited Review Program Standard Operating Procedures and accept all of the terms and conditions within. I have participated in the required pre-application meeting with EPD. I understand that it is my responsibility to ensure an application of the highest quality is submitted and to address any requests for additional information by the deadline specified. I understand that submittal of this request form is not a guarantee that expedited review will be granted.

Signature: ____________ Date: 2/20/2017

2. **Applying For Which Type Of Permit: (Please Check Appropriate Box)**

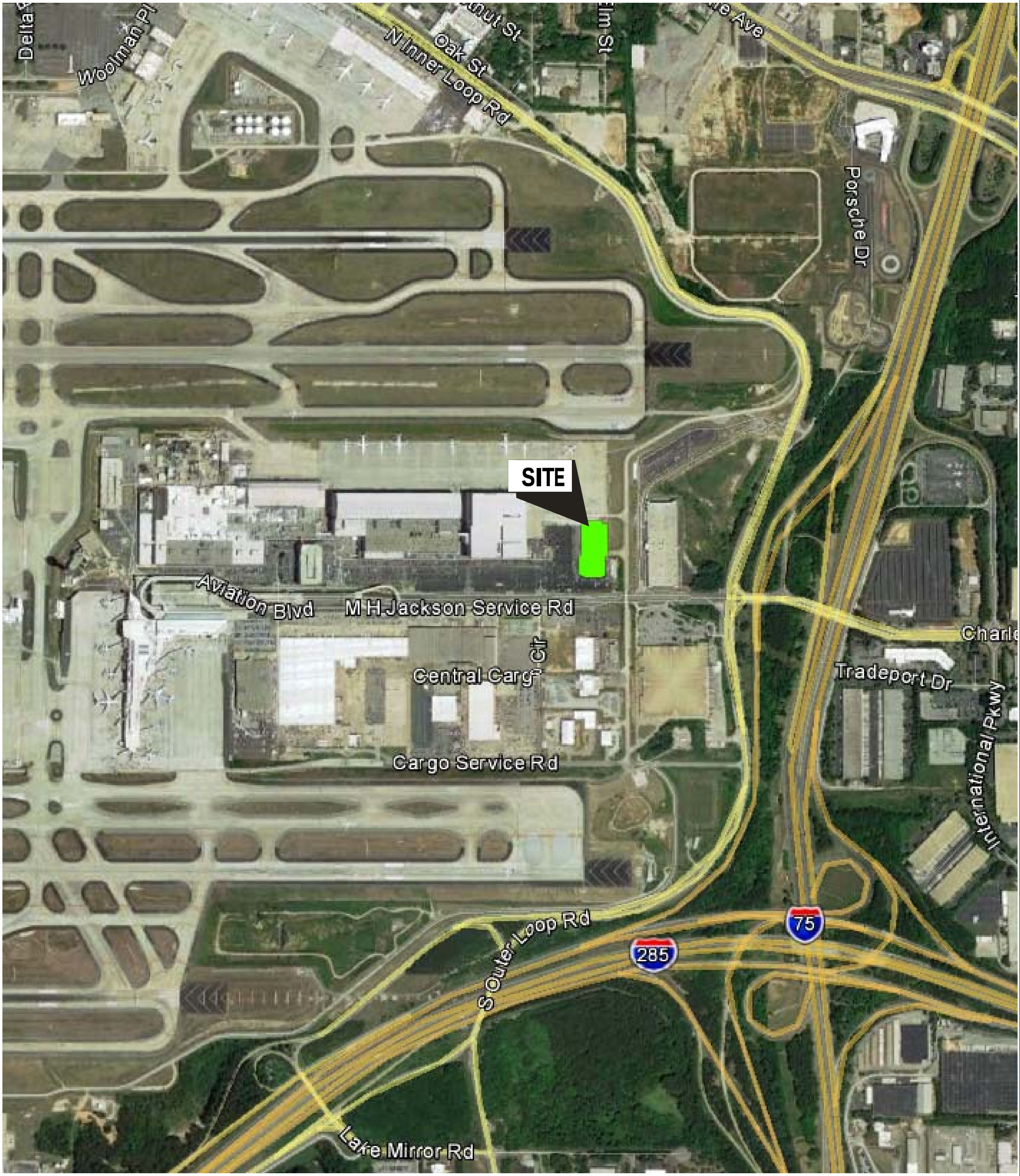
Expedited Review Fees for Air Permits	
Permit Type – Please Check One	**Expedited Review Fee***
☐ Generic Permit: Concrete Batch Plant – Minor Source	$1,000
☐ Generic Permit: Concrete Batch Plant – Synthetic Minor Source	$1,500
☐ Generic Permit: Hot Mix Asphalt Plant – Synthetic Minor Source	$2,000
☐ Minor Source Permit (or Amendment)	$3,000
☐ Synthetic Minor Permit (or Amendment)	$4,000
☐ Major Source SIP Permit not subject to PSD or 112(g)	$6,000
☐ Title V 502(b)(10) Permit Amendment	$4,000
☐ Title V Minor Modification with Construction	$4,000
☐ Title V Significant Modification	$6,000
☐ Major Source SIP Permit subject to 112(g) but not subject to PSD	$15,000
☐ PSD Permit (or Amendment) not subject to NAAQS and/or PSD Increment Modeling	$15,000
☐ PSD Permit (or Amendment) subject to NAAQS and/or PSD Increment Modeling but not subject to Modeling for $PM_{2.5}$, NO_2, or SO_2	$20,000
☐ PSD Permit (or Amendment) subject to NAAQS and/or PSD Increment Modeling for $PM_{2.5}$, NO_2, or SO_2	$25,000
☐ PSD Permit (or Amendment) subject to NAAQS and/or PSD Increment Modeling for $PM_{2.5}$, NO_2, or SO_2 and also impacting a Class I Area	$30,000
☑ Nonattainment NSR Review Permit (or Amendment)	$40,000
* Do not send fee payment with this form. Upon acceptance of application for the expedited permit program, EPD will notify you by phone. Fees must be paid via check to "Georgia Department of Natural Resources" within ten (10) business days of acceptance.	

3. **Comments.**

This section is optional. Applicants may use this field to include specific comments or requests for EPD consideration. For example, the applicant may use this field to request a public hearing or to remind EPD of review time needs and/or expectations that may differ from the time frames in the procedures.

APPENDIX B

Figures



N

Delta Air Lines, Inc. Technical Operations Center
1775 MH Jackson Service Road
Atlanta, Georgia 30354

NONATTAINMENT NEW SOURCE REVIEW PERMIT APPLICATION
FOR JET ENGINE TEST CELL NO. 5
FIGURE 1 - GENERAL AREA MAP

Figure 2 - Site Layout

GRAPHIC SCALE 0 15' 30' 60'
SCALE: 1" = 30'

NO	DESCRIPTION	DATE	BY	REFERENCE DRAWINGS
A	SCHEMATIC DESIGN RELEASE	6/15/2016	RDJ	

NOT FOR CONSTRUCTION
SCHEMATIC DESIGN

OWNER: DELTA
Hartfields-Jackson Atlanta International Airport
1775 M H Jackson Service Rd, Atlanta, GA 30354

ARCHITECT/ENGINEER OF RECORD: hargrove engineers+constructors
Hargrove and Associates
6470 East Johns Crossing, Suite 300, Johns Creek, GA 30097
678.477.7450 - hargrove-epc.com

DRAWN BY	R. JOHNSON	DATE 06/01/16
CHECKED BY	D. BROWN	DATE 06/02/16
APPROVED BY	B. THORNTON	DATE 06/03/16
RELEASED BY		DATE

P/N: 900218-001 DOC CLASS B
FluiDyne | AeroSystems
358 East Fillmore Avenue · St. Paul, MN 55107 · USA
SIZE ARCH 'E1' | FSCM NO 54933 | DRAWING NO T15017-C-003 | PROJECT NO T15017

DRAWING/SHEET TITLE
ENGINE TEST FACILITY, 48 FT, DELTA AIR LINES
PRELIMINARY LAYOUT PLAN

OWNER NO -
ARCHITECT/ENGINEER NO 1142.151191.20
SHEET NUMBER C-003 REV A
SCALE: 1" = 30' As indicated
SHEET 1 OF 1

APPENDIX C

Emission Calculations

Delta Air Lines, Inc. - Technical Operations Center

Appendix C - Emission Calculations

Potential Emissions Summary - Jet Engine Test Cell No. 5 Project

Table 1 - Potential Emissions Summary for Jet Engine Test Cell No. 5 Project

Emission Source	Total Potential Emissions													
	NO_X		CO		$PM/PM_{10}/PM_{2.5}$		SO_2		VOC		Maximum Individual HAP[2]	Total HAPs	CO_2e	
	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	tons/yr	tons/yr	lb/hr	tons/yr
Jet Engine Test Cell No. 5 (SHEA ID No. 5898)	331	39.5[1]	102	16	4.9	1.6	22	9.7	15	1.6	0.20	0.45	5,769	5,354
Used Oil Storage Tank (SHEA ID No. 5893)	--	--	--	--	--	--	--	--	9.1E-06	4.0E-05	--	--	--	--
Diesel Fuel Storage Tank and Pump Station (SHEA ID No. 5890)	--	--	--	--	--	--	--	--	0.32	8.5E-04	--	6.3E-05	--	--
Jet-A Fuel Storage Tank (SHEA ID No. 5894)	--	--	--	--	--	--	--	--	2.4E-03	0.01	--	9.6E-04	--	--
Jet-A Fuel Storage Tank (SHEA ID No. 5895)	--	--	--	--	--	--	--	--	2.4E-03	0.01	--	9.6E-04	--	--
Lubrication Oil Storage Tank (SHEA ID No. 5938)	--	--	--	--	--	--	--	--	1.1E-06	5.0E-06	--	--	--	--
Preservation Oil Storage Tank (SHEA ID No. 5936)	--	--	--	--	--	--	--	--	1.1E-06	5.0E-06	--	--	--	--
Flush Cleaning Operations (SHEA ID No. 9031)	--	--	--	--	--	--	--	--	1.05	0.09	--	--	--	--
General Fugitive Material Usage	--	--	--	--	--	--	--	--	0.30	1.3	--	0.12	--	--
Total	**331**	**39.5[1]**	**102**	**16**	**4.9**	**1.6**	**22**	**9.7**	**17**	**3.1**	**0.20**	**0.57**	**5,769**	**5,354**

[1] Proposed synthetic NOx PTE limit to avoid Prevention of Significant Deterioration (PSD) permitting.

[2] Maximum Individual HAP = Formaldehyde

Delta Air Lines, Inc. - Technical Operations Center
Appendix C - Emission Calculations
Jet Engine Test Cell No. 5 Emissions Summary: Criteria Emission Factors

Table 2 - Summary of Emissions by Test Stage: Trent XWB-84 (Trent XWB) Engine

Testing Stage	Duration of Test Stage (hrs)[2]	Emissions during test cycle per engine[1] (lbs)				
		NO_X	CO	$PM/PM_{10}/PM_{2.5}$[3]	SO_2	VOC
T/O - Take Off	1.6	344	3.0	6.6	24	0
C/O - Climb Out	2.8	457	5.2	0.8	41	0
AI - Approach	2.4	130	14	4.7	35	0
MI - Idle	1.2	27	117	5.6	18	5.8
Trent XWB-84 (Trent XWB) Total =	**8**	**958**	**139**	**18**	**118**	**6**

Table 3 - Summary of Emissions by Test Stage: Trent 895 (Trent 800) Engine

Testing Stage	Duration of Test Stage (hrs)[2]	Emissions during test cycle per engine[1] (lbs)				
		NO_X	CO	$PM/PM_{10}/PM_{2.5}$[3]	SO_2	VOC
T/O - Take Off	1.6	529	3.0	6.7	35	0.24
C/O - Climb Out	2.8	665	3.7	0.55	60	0
AI - Approach	2.4	189	9.0	3.1	52	0
MI - Idle	1.2	42	122	5.9	26	8.1
Trent 895 (Trent 800) Total =	**8**	**1426**	**138**	**16**	**173**	**8**

Table 4 - Summary of Emissions by Test Stage: PW4060 (PW4) Engine

	Duration of Test Stage (hrs)[2]	Emissions during test cycle per engine[1] (lbs)				
		NO_X	CO	$PM/PM_{10}/PM_{2.5}$[3]	SO_2	VOC
T/O - Take Off	1.2	62	0.70	1.6	5.9	0.21
C/O - Climb Out	2	78	1.6	0.24	10	0.10
AI - Approach	2	38	5.6	1.9	10	0.48
MI - Idle	2.8	22	90	4	14	8.0
PW4060 (PW4) Total =	**8**	**200**	**98**	**8**	**39**	**9**

Table 5 - Summary of Emissions by Test Stage: CF6-80C2B6F (CF6) Engine

Testing Stage	Duration of Test Stage (hrs)[2]	Emissions during test cycle per engine[1] (lbs)				
		NO_X	CO	$PM/PM_{10}/PM_{2.5}$[3]	SO_2	VOC
T/O - Take Off	1.2	56	0.90	2.0	5.4	0.13
C/O - Climb Out	2	67	1.5	0.23	9.0	0.25
AI - Approach	2	26	5.5	1.9	9.0	0.60
MI - Idle	2.8	15	177	8.5	13	43
CF6-80C2B6F (CF6) Total =	**8**	**164**	**185**	**13**	**36**	**44**

[1] Emission data obtained from EngineTestWeighted Measure tool in 'EmissionsWeightedAverag es_TestCellFactors_041513_unprotected.xls' - NOx and CO factors based on ICAO emissions databank as provided by engine manufacturers; PM emissions based on ratio of PM to CO from available aircraft engine test data; SO2 emissions based on maximum sulfur content in fuel assuming all sulfur is converted to SO2; VOC emissions based on AP-42, Vol IV (Mobile Sources) (B) equation [= 1.0947 * THC (total hydrocarbons)] using ICAO databank THC emissions

[2] Based on information obtained from Delta - Duration of entire engine testing = 8 hours (Nov. 30, 2016 email from Delta - Subject: Test Cell 5 Information Needs); Duration of stage testing ('EngineTestWeighted Measure tool in 'EmissionsWeightedAverag es_TestCellFactors_041513_unprotected.xls')

Total Duration of Full Engine Test (hrs) = 8

Engine Type	Fraction of Full Test Duration by Stage			
	T/O - Take Off	C/O - Climb Out	AI - Approach	MI - Idle
Trent XWB-84/ Trent 895	0.2	0.35	0.3	0.15
PW4060/ CF6-80C2B6F	0.15	0.25	0.25	0.35

[3] PM emitted from combustion of fuel in aircraft is predominantly below 2.5 micrometers in aerodynamic diameter based on Guidance for Quantifying the Contribution of Airport Emissions to Local Air Quality by the Airport Cooperative Research Program, 2012 (Page 33/68) - http://www.trb.org/Publications/Blurbs/167479.aspx

Table 6 - Projected Number of Tests Conducted Each Year, by Engine Model Type

Engine Type	Projection - Quantity of Tested Engines by Model Type per Year[1]					
	2020	2025	2030	2035	2040	2045
NextGen (Trent XWB)	6	**58**	58	60	42	42
Trent 800	5	**5**	0	0	0	0
PW4	40	**31**	0	0	0	0
CF6	26	**22**	0	0	0	0

[1] Tested projections based on data obtained from Delta (Delta TechOps Test Cell 5 Emissions Study presentation)

Table 7 - Criteria Pollutant Emission Factors, by Engine Model Type

Engine Type	Volume of Fuel Combusted during Test[1] (gal/engine)	Emission Factor[2] (lb/gal)				
		NO_X	CO	$PM/PM_{10}/PM_{2.5}$	SO_2	VOC
NextGen (Trent XWB)	5,600	0.17	2.5E-02	3.2E-03	2.1E-02	1.0E-03
Trent 800	8,200	0.17	1.7E-02	2.0E-03	2.1E-02	1.0E-03
PW4	1,870	0.11	5.2E-02	4.3E-03	2.1E-02	4.7E-03
CF6	1,710	9.6E-02	1.1E-01	7.4E-03	2.1E-02	2.6E-02

[1] Fuel combustion data obtained from manufacturer (Delta TechOps Test Cell 5 Emissions Study presentation)

[2] Factors estimated using calculated emissions per test and volume of fuel combusted during testing

EX. [NOx emission factor for Trent XWB: 958.02 lbs NOx per test / 5,600 gallons of fuel combusted during test = 0.17 lbs NOx per gallon of fuel combusted]

Delta Air Lines, Inc. - Technical Operations Center
Appendix C - Emission Calculations
Jet Engine Test Cell No. 5 Emissions Summary: Criteria and Speciated Pollutants

Table 8 - Test Cell No. 5 Projected Actual Emissions Summary

Engine Type	Maximum Projected Actual Number of Engines Tested per Year[1]	Total Projected Actual Emissions[2,3]									
		NO_X		CO		$PM/PM_{10}/PM_{2.5}$		SO_2		VOC	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
Trent XWB-84	58	215.0	27.8	97.7	4.0	4.7	0.5	14.8	3.4	4.9	0.2
Trent 895	5	330.8	3.6	101.8	0.3	4.9	0.0	21.6	0.4	6.7	0.0
PW4060	31	51.8	3.1	32.1	1.5	1.5	0.1	4.9	0.6	2.9	0.1
CF6-80C2B6F	22	63.4	1.8	46.4	2.0	3.0	0.1	4.5	0.4	15.4	0.5
	TOTAL	**331**	**36.2**	**102**	**7.9**	**5**	**0.8**	**22**	**4.9**	**15**	**0.8**

[1] Tested projections based on data obtained from Delta (Delta TechOps Test Cell 5 Emissions Study presentation)

[2] Total projected actual emissions estimated from total emissions per test and maximum projected number of engines tested per year [CO actual emissions for Trent XWB: 138.94 lbs CO per test * 58 Trent XWB model engines tested per year / 2,000 lbs per ton = 4.0 tons CO per year]

[3] Hourly emissions by engine type represent the maximum hourly emission rate from all engine testing stages. The total hourly emission rate represents the maximum hourly emission rate across all engine models.

Table 9 - Test Cell No. 5 Potential Emissions Summary

Engine Type	Maximum Potential Number of Engines Tested per Year[1]	Total Potential Emissions[1]									
		NO_X		CO		$PM/PM_{10}/PM_{2.5}$		SO_2		VOC	
		lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
Trent XWB-84	116	215.0	55.6	97.7	8.1	4.7	1.0	14.8	6.8	4.9	0.3
Trent 895	10	330.8	7.1	101.8	0.7	4.9	0.1	21.6	0.9	6.7	0.0
PW4060	62	51.8	6.2	32.1	3.0	1.5	0.2	4.9	1.2	2.9	0.3
CF6-80C2B6F	44	63.4	3.6	46.4	4.1	3.0	0.3	4.5	0.8	15.4	1.0
	TOTAL	**331**	**39.5[2]**	**102**	**15.9**	**5**	**1.6**	**22**	**9.7**	**15**	**1.6**

[1] Total potential emissions estimated from total emissions per test and the maximum projected number of engines tested per year with an applied scaling factor. The scaling factor represents the increase in actual to potential operational rates based on production data from other TOC operations. Test Cell 5 is conservatively anticipated to be utilized over 50% of the year. [CO potential emissions for Trent XWB: 138.94 lbs CO per test * 116 Trent XWB model engines tested per year / 2,000 lbs per ton = 8.1 tons CO per year]

Scaling Factor = 2

[2] Proposed synthetic NOx PTE limit to avoid Prevention of Significant Deterioration (PSD) permitting.

Table 10 - Test Cell No. 5 Toxic Emissions Summary

Speciated Pollutant Compounds	CAS#	HAP (112) - Y/N?[1]	Mass Fraction[2]	Potential Emissions[3] (lb/hr)	Potential Emissions (lb/yr)	Potential Emissions (tpy)	Actual Estimated Emissions (tpy)
1,3-Butadiene	106-99-0	Yes - Section 112 of CAA	1.7E-02	0.26	55	2.7E-02	1.4E-02
Acetaldehyde	75-07-0	Yes - Section 112 of CAA	4.3E-02	0.66	139	6.9E-02	3.5E-02
Acrolein	107-02-8	Yes - Section 112 of CAA	2.4E-02	0.38	80	4.0E-02	2.0E-02
Benzene	71-43-2	Yes - Section 112 of CAA	1.7E-02	0.26	55	2.7E-02	1.4E-02
Ethylbenzene	100-41-4	Yes - Section 112 of CAA	1.7E-03	0.03	6	2.8E-03	1.4E-03
Formaldehyde	50-00-0	Yes - Section 112 of CAA	1.2E-01	1.89	400	2.0E-01	1.0E-01
Isopropylbenzene	98-82-8	Yes - Section 112 of CAA	3.0E-05	0.00	0	4.9E-05	2.4E-05
Methanol	67-56-1	Yes - Section 112 of CAA	1.8E-02	0.28	59	2.9E-02	1.5E-02
Naphthalene	91-20-3	Yes - Section 112 of CAA	5.4E-03	0.08	18	8.8E-03	4.4E-03
o-xylene	95-47-6	Yes - Section 112 of CAA	1.7E-03	0.03	5	2.7E-03	1.3E-03
Phenol	108-95-2	Yes - Section 112 of CAA	7.3E-03	0.11	24	1.2E-02	5.9E-03
Propionaldehyde	123-38-6	Yes - Section 112 of CAA	7.3E-03	0.11	24	1.2E-02	5.9E-03
Styrene	100-42-5	Yes - Section 112 of CAA	3.1E-03	0.05	10	5.0E-03	2.5E-03
Toluene	108-88-3	Yes - Section 112 of CAA	6.4E-03	0.10	21	1.0E-02	5.2E-03
Xylenes (m- & p-)	108-38-3/ 106-42-3	Yes - Section 112 of CAA	2.8E-03	0.04	9	4.6E-03	2.3E-03
2-Methylnaphthalene	91-57-6	No	2.1E-03	0.03	7	3.3E-03	1.7E-03
benzaldehyde	100-52-7	No	4.7E-03	0.07	15	7.6E-03	3.8E-03
1,2,3-trimethylbenzene	526-73-8	No	1.1E-03	0.02	3	1.7E-03	8.6E-04
1,2,4-trimethylbenzene	95-63-6	No	3.5E-03	0.05	11	5.7E-03	2.8E-03
1,3,5-trimethylbenzene	108-67-8	No	5.4E-04	0.01	2	8.8E-04	4.4E-04
1-decene	872-05-9	No	1.9E-03	0.03	6	3.0E-03	1.5E-03
1-heptene	25339-56-4	No	4.4E-03	0.07	14	7.1E-03	3.6E-03
1-hexene	592-41-6	No	7.4E-03	0.11	24	1.2E-02	6.0E-03
1-methyl naphthalene	90-12-0	No	2.5E-03	0.04	8	4.0E-03	2.0E-03
1-nonene	124-11-8	No	2.5E-03	0.04	8	4.0E-03	2.0E-03
1-octene	25377-83-7	No	2.8E-03	0.04	9	4.5E-03	2.2E-03
1-pentene	109-67-1	No	7.8E-03	0.12	25	1.3E-02	6.3E-03
2-methyl-1-butene	563-46-2	No	1.4E-03	0.02	5	2.3E-03	1.1E-03
2-methyl-1-pentene	763-29-1	No	3.4E-04	0.01	1	5.5E-04	2.8E-04
2-methyl-2-butene	513-35-9	No	1.9E-03	0.03	6	3.0E-03	1.5E-03
2-methylpentane	107-83-5	No	4.1E-03	0.06	13	6.6E-03	3.3E-03
3-methyl-1-butene	563-45-1	No	1.1E-03	0.02	4	1.8E-03	9.1E-04
4-methyl-1-pentene	691-37-2	No	6.9E-04	0.01	2	1.1E-03	5.6E-04
acetone	67-64-1	No	3.7E-03	0.06	12	6.0E-03	3.0E-03
acetylene	74-86-2	No	3.9E-02	0.61	128	6.4E-02	3.2E-02
butyraldehyde	123-72-8	No	1.2E-03	0.02	4	1.9E-03	9.7E-04
c14-alkane	No CAS	No	1.9E-03	0.03	6	3.0E-03	1.5E-03
c15-alkane	No CAS	No	1.8E-03	0.03	6	2.9E-03	1.4E-03
c16-alkane	No CAS	No	1.5E-03	0.02	5	2.4E-03	1.2E-03
c18-alkane	No CAS	No	2.0E-05	0.00	0	3.2E-05	1.6E-05
c4-benzene + c3-aroald	No CAS	No	6.6E-03	0.10	21	1.1E-02	5.3E-03
c5-benzene + c4-aroald	No CAS	No	3.2E-03	0.05	11	5.3E-03	2.6E-03

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Appendix C - Emission Calculations
Jet Engine Test Cell No. 5 Emissions Summary: Criteria and Speciated Pollutants

Speciated Pollutant Compounds	CAS#	HAP (112) - Y/N?[1]	Mass Fraction[2]	Potential Emissions[3] (lb/hr)	Potential Emissions (lb/yr)	Potential Emissions (tpy)	Actual Estimated Emissions (tpy)
cis-2-butene	590-18-1	No	2.1E-03	0.03	7	3.4E-03	1.7E-03
cis-2-pentene	627-20-3	No	2.8E-03	0.04	9	4.5E-03	2.2E-03
crotonaldehyde	4170-30-3	No	1.0E-02	0.16	34	1.7E-02	8.4E-03
dimethylnapthalenes	28804-88-8	No	9.0E-04	0.01	3	1.5E-03	7.3E-04
ethane	74-84-0	No	5.2E-03	0.08	17	8.5E-03	4.2E-03
ethylene	74-85-1	No	1.5E-01	2.38	502	2.5E-01	1.3E-01
glyoxal	107-22-2	No	1.8E-02	0.28	59	2.9E-02	1.5E-02
isobutene/1-butene	106-98-9	No	1.8E-02	0.27	57	2.8E-02	1.4E-02
isovaleraldehyde	590-86-3	No	3.2E-04	0.00	1	5.2E-04	2.6E-04
methacrolein	78-85-3	No	4.3E-03	0.07	14	7.0E-03	3.5E-03
methylglyoxal	78-98-8	No	1.5E-02	0.23	49	2.4E-02	1.2E-02
m-ethyltoluene	620-14-4	No	1.5E-03	0.02	5	2.5E-03	1.3E-03
m-tolualdehyde	620-23-5	No	2.8E-03	0.04	9	4.5E-03	2.3E-03
n-decane	124-18-5	No	3.2E-03	0.05	10	5.2E-03	2.6E-03
n-dodecane	112-40-3	No	4.6E-03	0.07	15	7.5E-03	3.8E-03
n-heptadecane	629-78-7	No	9.0E-05	0.00	0	1.5E-04	7.3E-05
n-heptane	142-82-5	No	6.4E-04	0.01	2	1.0E-03	5.2E-04
n-hexadecane	544-76-3	No	4.9E-04	0.01	2	8.0E-04	4.0E-04
n-nonane	111-84-2	No	6.2E-04	0.01	2	1.0E-03	5.0E-04
n-octane	111-65-9	No	6.2E-04	0.01	2	1.0E-03	5.0E-04
n-pentadecane	629-62-9	No	1.7E-03	0.03	6	2.8E-03	1.4E-03
n-pentane	109-66-0	No	2.0E-03	0.03	6	3.2E-03	1.6E-03
n-propylbenzene	103-65-1	No	5.3E-04	0.01	2	8.6E-04	4.3E-04
n-tetradecane	629-59-4	No	4.2E-03	0.06	14	6.8E-03	3.4E-03
n-tridecane	629-50-5	No	5.4E-03	0.08	17	8.7E-03	4.3E-03
n-undecane	1120-21-4	No	4.4E-03	0.07	14	7.2E-03	3.6E-03
o-ethyltoluene	611-14-3	No	6.5E-04	0.01	2	1.1E-03	5.3E-04
o-tolualdehyde	529-20-4	No	2.3E-03	0.04	7	3.7E-03	1.9E-03
p-ethyltoluene	622-96-8	No	6.4E-04	0.01	2	1.0E-03	5.2E-04
p-tolualdehyde	104-87-0	No	4.8E-04	0.01	2	7.8E-04	3.9E-04
propane	74-98-6	No	7.8E-04	0.01	3	1.3E-03	6.3E-04
propylene	115-07-1	No	4.5E-02	0.70	147	7.4E-02	3.7E-02
trans-2-hexene	4050-45-7	No	3.0E-04	0.00	1	4.9E-04	2.4E-04
trans-2-pentene	646-04-8	No	3.6E-03	0.06	12	5.8E-03	2.9E-03
valeraldehyde	110-62-3	No	2.5E-03	0.04	8	4.0E-03	2.0E-03

[1] Environmental Protection Agency, Clean Air Act, Section 112(b) - List of Hazardous Air Pollutants (Updated December 2005)

[2] Chemical mass fractions obtained from U.S. Environmental Protection Agency, Office of Transportation and Air Quality, Assessment and Standards Division and Federal Aviation Administration, Office of Environment and Energy, AEE-300 - Emissions Division, Recommended Best Practice for Quantifying Speciated Organic Gas Emissions from Aircraft Equipped with Turbofan, Turbojet, and Turboprop Engines (EPA-420-R-09-901), Version 1.0, May 2009 - https://www.faa.gov/regulations_policies/policy_guidance/envir_policy/media/FAA-EPA_RBP_Speciated%20OG_Aircraft_052709.pdf

[3] The short term emission rate (lb/hr) is based on the maximum hourly VOC emission rate across all engine models with the mass fraction of the individual HAP applied.

Total HAP - PTE:	**0.45 tons/yr**	**Highest Individual HAP - PTE:**	**0.20 tons/yr**	*Formaldehyde*
Total HAP - Actual:	0.23 tons/yr			

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Appendix C - Emission Calculations
Jet Engine Test Cell No. 5 Emissions Summary: Greenhouse Gases

Test Cell No. 5 Maximum Fuel Usage[1]		
Jet-A Fuel	502,855	gal

[1] Maximum Jet-A fuelusage based on the maximum potential annual number of tests conducted by engine type and the maximum volume of fuel combusted during each test prorated to the 39.5 tons NOx per year cap

Table 11 - 40 CFR Part 98 Greenhouse Gas Emission Factors

Pollutants			
Type	Emission Factor[1]	Units	GWP[2]
CO_2	-	-	1
CH_4	0.00300	kg/MMBtu	25
N_2O	0.00060	kg/MMBtu	298

[1] Greenhouse gas emission factors obtained from Table C-2 (Petroleum - All fuel types in Table C-1) to Subpart C of 40 CFR Part 98

[2] Global warming potentials (GWP) obtained from Table A-1 to Subpart A of 40 CFR Part 98

Table 12 - Summary of Test Cell No. 5 Potential Greenhouse Gas Emissions

Test Cell 5 Total GHG Emissions by Pollutant			
Pollutant	metric tons/yr	tons/yr[4]	lbs/hr[5]
CO_2[1]	4,839	5,335	5,749
CH_4[2]	0.2	0.2	0.2
N_2O[2]	0.04	0.04	0.05
CO_2e[3]	4,857	5,354	5,769

[1] Total CO_2 emissions calculated using Tier III, Equation C-4 from §98.33(a)(3)

CO_2 = 44/12 * Fuel * CC * 0.001

[2] Total CH_4 and N_2O emissions calculated using Equation C-8 from §98.33(c)(1)

CH_4 or N_2O = $1x10^{-3}$ * Fuel Volume* High heat value (MMBtu/gal) * Emission Factor from Table 11 (kg/MMBtu)

Default High heat value (MMBtu/gal) = 0.135 Obtained from Table C-1 of 40 CFR Part 98, Subpart C

[3] Total CO_2e emissions are calculated by summing the products of individual pollutants (CO_2, CH_4, and N_2O) and associated GWP rates

[4] Total GHG emissions converted from metric tons to short tons using conversion factor of 2204.62 lbs per metric ton/2000 lbs per short ton

[5] Hourly GHG emission rate based on total testing duration and maximum number of tests per year

Table 13 - Jet-A Fuel Carbon Content Sampling Results

Jet-A Fuel Carbon Content Sample Results[1]				
Sample Date	Density (kg/L)	Carbon Content (wt%)	Carbon Content (kg C/L)	Carbon Content (kg C/gal)
12/7/2016	0.8031	85.13	0.6837	2.588
8/23/2016	0.8055	85.00	0.6847	2.592
4/22/2016	0.8035	86.04	0.6913	2.617
2/2/2016	0.8020	86.01	0.6898	2.611
10/29/2015	0.8058	86.01	0.6931	2.624
7/27/2015	0.8026	85.62	0.6872	2.601
4/28/2015	0.8022	85.80	0.6883	2.605
1/28/2015	0.8031	86.09	0.6914	2.617
10/24/2014	0.8069	85.48	0.6897	2.611
7/24/2014	0.8042	86.22	0.6934	2.625
4/25/2014	0.8050	85.82	0.6909	2.615
1/27/2014	0.8022	85.60	0.6867	2.599
			Maximum Carbon Content of Fuel =	2.6247

[1] Sampling data obtained from quarterly fuel analysis conducted by Delta to test for carbon content of the Jet-A Fuel as required by the regulations.

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Appendix C - Emission Calculations
Emissions Summary: Storage Tanks Associated with Jet Engine Test Cell No. 5

Table 14 - Specifications for Storage Tanks Associated with Test Cell No. 5 Project

Tank ID (SHEA#)	Contents	Maximum Capacity[1] (gal)	Maximum Annual Throughput[2] (gal)	Dimensions[1] - length/height, diameter (ft)	Type[1] (horizontal, vertical; fixed, floating roof)	Paint Color[1]	Vent Settings[1] (press/vac, atm)
SHEA5893	Used Oil	2,000	30,000	12 x 5.33	Horizontal Fixed Roof	white	Atmosphere
SHEA5890	Diesel	200	3,000	4 x 3.17	Horizontal Fixed Roof	white	Atmosphere
SHEA5894	Jet-A Fuel	25,000	502,855	38.75 x 10.5	Horizontal Fixed Roof	white	Atmosphere
SHEA5895	Jet-A Fuel	25,000	502,855	38.75 x 10.6	Horizontal Fixed Roof	white	Atmosphere
SHEA5938	Lubrication Oil	200	2,030	5.83 x 3.0	Vertical Fixed Roof	white	Atmosphere
SHEA5936	Preservation Oil	200	1,450	5.83 x 3.1	Vertical Fixed Roof	white	Atmosphere

[1] Tank parameter data provided by Delta (Nov. 30, 2016 email - Subject: Test Cell 5 Information Needs and February 7, 2017 email - Subject: Application Submittal)

[2] Maximum throughput of Jet-A fuel tanks based on the maximum potential number of tests per year by engine type and the maximum volume of fuel combusted during each test prorated to the 39.5 tons NOx per year cap assuming the maximum fuel throughput has the potential to pass through 1 tank -
[Max Annual Fuel Throughput (gallons) = ∑Fuel Consumption Rate per Engine Type (gal/test) *Maximum Number of Tests per Engine Type per Year *39.5 tpy NOx limit /Calculated Maximum NOx Emissions w/o Limit (tpy)]

Maximum throughput of used oil and diesel tanks conservatively assumed to be equivalent to 15 turnovers per year. Actual annual throughput will be much less as used oil tank stores used lubrication oil only and diesel tank is used to fuel vehicles used for loading/unloading/transporting aircraft engines around Test Cell building (estimated around 60 miles travelled per year total for all TC5 vehicles with an average of 10 miles per gallon vehicle fuel consumption results in approximately 60 gallons per year of diesel usage)

Maximum annual throughtput of lubrication and preservation oil storage tanks based on oil usage estimations of 7 gallon of lubrication oil/engine and 5 gallons of preservation oil/engine, the maximum potential number of tested engines, and a safety factor of 25%.

Table 15 - Summary of Potential Emissions for Storage Tanks Associated with Test Cell No. 5 Project

Tank ID (SHEA#)	Potential VOC Emissions[1] (lbs/yr)	Potential VOC Emissions (tons/yr)	Potential VOC Emissions[2] (lbs/hr)	Potential Total HAPs[3] (tons/yr)
SHEA5893	0.08	4.0E-05	9.1E-06	--
SHEA5890	0.13	6.5E-05	1.5E-05	7.8E-06
SHEA5894	20.91	0.010	2.4E-03	9.6E-04
SHEA5895	20.91	0.010	2.4E-03	9.6E-04
SHEA5938	0.01	5.0E-06	1.1E-06	--
SHEA5936	0.01	5.0E-06	1.1E-06	--

[1] Potential VOC emissions estimated using EPA TANKS 4.0.9d
[2] Hourly emissions estimated assuming annual operation of 8,760 hours
[3] Potential Total HAPs (tons/yr) = Potential VOC Emissions (tons/yr) * ∑Mass Fraction for Each HAP Listed in Table 16

Table 16 - Summary of Potential Toxic Emissions for Storage Tanks Associated with Test Cell No. 5 Project

Speciated Pollutant Compounds	Fuel Type	CAS#	HAP (112) - Y/N?[1]	Mass Fraction[2]	Potential Emissions (lb/hr)	Potential Emissions (lb/yr)	Potential Emissions (tpy)
Naphthalene	Diesel	91-20-3	Yes - Section 112 of CAA	2.0E-02	3.0E-07	2.6E-03	1.3E-06
Naphthalene	Jet-A Fuel	91-20-3	Yes - Section 112 of CAA	3.0E-02	1.4E-04	1.3	6.3E-04
Total Naphthalene					1.4E-04	1.3	6.3E-04
Biphenyl	Diesel	92-52-4	Yes - Section 112 of CAA	2.0E-02	3.0E-07	2.6E-03	1.3E-06
Cumene	Diesel	98-82-8	Yes - Section 112 of CAA	1.0E-02	1.5E-07	1.3E-03	6.5E-07
Xylenes, mixed isomers	Diesel	1330-20-7	Yes - Section 112 of CAA	1.0E-02	1.5E-07	1.3E-03	6.5E-07
Xylene	Jet-A Fuel	1330-20-7	Yes - Section 112 of CAA	2.0E-02	9.6E-05	8.4E-01	4.2E-04
Total Xylene					9.6E-05	0.84	4.2E-04
Ethylbenzene	Diesel	100-41-4	Yes - Section 112 of CAA	1.0E-02	1.5E-07	1.3E-03	6.5E-07
Ethylbenzene	Jet-A Fuel	100-41-4	Yes - Section 112 of CAA	5.0E-03	2.4E-05	0.21	1.0E-04
Total Ethylbenzene					2.4E-05	0.21	1.1E-04
Benzene	Jet-A Fuel	71-43-2	Yes - Section 112 of CAA	2.0E-03	9.6E-06	0.08	4.2E-05
Toluene	Jet-A Fuel	108-88-3	Yes - Section 112 of CAA	5.0E-03	2.4E-05	0.21	1.0E-04
Cyclohexane	Jet-A Fuel	110-82-7	No	1.0E-02	4.8E-05	0.42	2.1E-04
1,2,4 Trimethylbenzene	Jet-A Fuel	95-63-6	No	2.0E-02	9.6E-05	0.84	4.2E-04
Ethyltoluene	Diesel	25550-14-5	No	3.0E-02	4.5E-07	3.9E-03	2.0E-06
Trimethylbenzene, all isomers	Diesel	25551-13-7	No	2.0E-02	3.0E-07	2.6E-03	1.3E-06

[1] Environmental Protection Agency, Clean Air Act, Section 112(b) - List of Hazardous Air Pollutants (Updated December 2005)
[2] Chemical mass fractions obtained from Material Safety Data Sheets

Total HAP - PTE: **1.3E-03** **tons/yr** **Highest Individual HAP - PTE:** **6.3E-04** **tons/yr** *Total Naphthalene*

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Appendix C - Emission Calculations

Emissions Summary: Jet Engine Test Cell No. 5 Project Fuel Pump Associated with SHEA ID No. 5890 (Diesel Storage Tank)

Table 17 - Summary of Potential Emissions from Diesel Fuel Pump Station Associated with SHEA ID No. 5890 (Diesel Storage Tank)

Fuel Type	Maximum Throughput[1]	Potential VOC Emissions[2]		
	(gal/yr)	(lb/yr)	(lb/hr)	(tpy)
Diesel	3,000	1.6	0.32	7.9E-04

[1] Diesel throughput value obtained from SHEA5890 maximum annual throughput provided in Table 14 (equivalent to 15 tank turnovers per year).

[2] VOC emission factor for diesel dispensing conservatively assumed to be equivalent to VOC emission factor for gasoline. A safety factor of 25% has been included in the potential emission calculation.

VOC Emission factor for Gasoline Dispensing: 0.42 lbs/Mgal

Source: Table I-1 of Attachment A - Revised Emission Factors for Phase II Vehicle Fueling at California Gasoline Dispensing Facilities. California Air Resources Board (CARB)

For dispensing, VOC emissions is calculated using the following equation:

Potential VOC Emissions (lb/yr) = Diesel Throughput (gal/yr) / 1,000 (gal/Mgal) * VOC Emission Factor (lb/Mgal) * 1.25

Potential VOC Emissions (lb/hr) = VOC Emissions (lb/yr) / [Diesel Throughput (gal/yr) / Fuel Pump Flowrate (gal/min) / 60 min/hr]

Typical fuel flowrate of fuel pump = 10 gal/min

Potential VOC Emissions (tpy) = VOC Emissions (lb/yr) / 2,000 (lb/ton)

Table 18 - Summary of Speciated Emissions for Diesel Fuel Pump Station Associated with SHEA ID No. 5890 (Diesel Storage Tank)

Speciated Pollutant Compounds	CAS#	HAP (112) - Y/N?[1]	Mass Fraction[2]	Potential Emissions (lb/hr)	Potential Emissions (lb/yr)	Potential Emissions (tpy)
Naphthalene	91-20-3	Yes - Section 112 of CAA	2.0E-02	6.3E-03	3.2E-02	1.6E-05
Biphenyl	92-52-4	Yes - Section 112 of CAA	2.0E-02	6.3E-03	3.2E-02	1.6E-05
Cumene	98-82-8	Yes - Section 112 of CAA	1.0E-02	3.2E-03	1.6E-02	7.9E-06
Xylenes, mixed	1330-20-7	Yes - Section 112 of CAA	1.0E-02	3.2E-03	1.6E-02	7.9E-06
Ethylbenzene	100-41-4	Yes - Section 112 of CAA	1.0E-02	3.2E-03	1.6E-02	7.9E-06
Ethyltoluene	25550-14-5	No	3.0E-02	9.5E-03	4.7E-02	2.4E-05
Trimethylbenzene	25551-13-7	No	2.0E-02	6.3E-03	3.2E-02	1.6E-05

[1] Environmental Protection Agency, Clean Air Act, Section 112(b) - List of Hazardous Air Pollutants (Updated December 2005)

[2] Chemical mass fractions obtained from Material Safety Data Sheets

Total HAP - PTE: 5.5E-05 tons/yr **Highest Individual HAP - PTE: 1.6E-05 tons/yr** *Naphthalene*

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Appendix C - Emission Calculations

Emissions Summary: Flush Cleaning Operations Associated with Jet Engine Test Cell No. 5

Table 19 - Flush Cleaning Operations (SHEA5901) Summary of Potential VOC Emissions

Material	Maximum Throughput[1]	Density[2]	VOC Content[2]	Potential VOC Emissions[3]		
	(gal/yr)	(lb/gal)	(lb/gal)	(lb/yr)	(lb/hr)	(tpy)
ZOK 27	440	8.42	0.42	185	1.05	0.09

[1] Cleaning material throughput value provided by Delta based on operational knowledge of volume of cleaning material to quantity of tested engines with an applied scaling factor of 2.

[2] Based on information contained in MSDS for ZOK 27

[3] Potential VOC emissions are calculated using the following equation:

Potential VOC Emissions (lb/yr) = Material Throughput (gal/yr) * VOC Content (lb/gal)

Potential VOC Emissions (lb/hr) = Cleaning Material Usage (gal/wash) * VOC Content (lb/gal) / Cleaning Duration (hours)

Typical duration to clean 1 engine = 2 hours

Cleaning material usage per engine wash = 5 gallons

Potential VOC Emissions (tpy) = VOC Emissions (lb/yr) / 2,000 (lb/ton)

Table 20 - Flush Cleaning Operations (SHEA5901) Summary of Speciated Emissions

Speciated Pollutant Compounds	CAS#	HAP (112) - Y/N?[1]	Mass Fraction[2]	Potential Emissions (lb/hr)	Potential Emissions (lb/yr)	Potential Emissions (tpy)
Isotridecylalcohol, ethoxylated	9043-30-5	No	3.0E-01	0.3	55	2.8E-02
3-butoxypropan-2-ol	5131-66-8	No	5.0E-02	0.05	9.2	4.6E-03
Oleoyl Sarcosinic Acid	110-25-8	No	5.0E-02	0.05	9.2	4.6E-03

[1] Environmental Protection Agency, Clean Air Act, Section 112(b) - List of Hazardous Air Pollutants (Updated December 2005)

[2] Chemical mass fractions obtained from MSDS for ZOK 27

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Appendix C - Emission Calculations

Emissions Summary: General Fugitive Material Usage Associated with Jet Engine Test Cell No. 5

Table 21 -General Fugitive Material Usage Operations - Emissions Summary

Material	Density	Estimated Annual Quantity to Be Used		Conversion Factor	Converted Usage	Converted Usage	VOC Content	Actual VOC Emissions	Potential VOC Emissions	HAP Composition and Potential Emissions																			
										Trichloroethylene	Glycol Ethers	Toluene	Chromium Compounds	Hydroquinone	Hexane	Ethyl Benzene	Xylenes	HDI	Methanol	Trichloroethylene	Glycol Ethers	Toluene	Chromium Compounds	Hydroquinone	Hexane	Ethyl Benzene	Xylenes	HDI	Methanol
Description	(lb/gal)	(Numeric)	(Units)	to Gallons	Gallons	Pounds	(lb/gal)	(lbs)	(lbs)	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)	(wt %)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)	(lbs)
ZEP Aerosolve II	12.18	1,176.00	oz	0.0078125	9.19	111.90	12.18	111.90	223.81	100.00										223.81									
Once Over Wall Cleaner	8.34	56.00	oz	0.0078125	0.44	3.65	1.25	0.55	1.09		5.00										0.36								
Isopropanol	6.59	9.00	pt	0.125	1.13	7.41	6.59	7.41	14.83																				
Super Bonder 495	9.17	2.33	oz (wt)	0.0068157	0.02	0.15	0.17	0.00	0.01																				
LOCTITE SF 712 ACTIVATORS FOR ACRYL (LOCTITE 712 ACCELERATOR TAK)	6.59	2.92	oz	0.0078125	0.02	0.15	6.58	0.15	0.30																				
3145 RTV MIL-A-46146 Adhesive/Sealant Clear	9.35	2.00	oz (wt)	0.0066845	0.01	0.13	0.50	0.01	0.01																				
Primer / Zinc Chromate, TT-P-1757B1C-Y, Aerosol	7.11	8.00	oz	0.0078125	0.06	0.44	3.74	0.23	0.47			2.00	18.00									0.02	0.16						
BLACK MAX 380 BLACK TOUGH INSTANT ADHESIVE	9.19	4.33	oz	0.0078125	0.03	0.31	0.18	0.01	0.01					1.00										0.01					
Loctite Super Bonder 496 Instant Adhesive	9.09	0.67	oz	0.0078125	0.01	0.05	0.17	0.00	0.00																				
Turco 5948 DPM thick	8.51	275.00	gallon	1.00	275.00	2,340.25	1.45	398.75	797.50																				
DOW CORNING 734 FLOWABLE SEALANT, CLEAR	8.59	5.00	oz	0.0078125	0.04	0.34	0.23	0.01	0.02																				
Super 77 Classic Spray Adhesive	5.81	5.58	oz (wt)	0.0107573	0.06	0.35	4.40	0.26	0.53						1.50										0.01				
Cee Bee Intex 8201	8.93	55.00	gallon	1.00	55.00	491.15	0.38	20.90	41.80																				
Tamper-Proofer Cross Check 83314 Orange (1oz/tu)	8.51	2.00	oz	0.0078125	0.02	0.13	3.83	0.06	0.12							1.00										0.00			
Hard Hat Primers & Topcoats 2164 (Bright Red)	6.41	90.00	oz (wt)	0.0097504	0.88	5.63	4.38	3.84	7.69							5.00	10.00									0.56	1.13		
Durethane DTM Neutral Base - KIT	9.49	5.33	gallon	1.00	5.33	50.61	2.01	10.72	21.44								0.83	0.17									0.84	0.17	
Durethane DTM Neutral Base - KIT	9.49	7.67	gallon	1.00	7.67	72.76	2.01	15.41	30.82								0.83	0.17									1.21	0.25	
Durethane DTM WHITE Base - KIT	11.23	12.00	gallon	1.00	12.00	134.76	2.01	24.12	48.24								0.86	0.15									2.30	0.39	
Durethane DTM WHITE Base - KIT	11.23	0.67	gallon	1.00	0.67	7.49	2.01	1.34	2.68								0.86	0.15									0.13	0.02	
Durethane DTM WHITE Base - KIT	11.23	1.00	gallon	1.00	1.00	11.23	2.01	2.01	4.02								0.86	0.15									0.19	0.03	
Durethane DTM Yellow Base Component	9.49	4.33	gallon	1.00	4.33	41.12	2.01	8.71	17.42								0.83	0.17									0.68	0.14	
Durethane DTM Red Base	9.43	7.67	gallon	1.00	7.67	72.30	2.08	15.95	31.89								1.00										1.45		
C-200 High Temp Lubricant	12.03	0.87	lb	0.0831255	0.07	0.87	0.73	0.05	0.11			1.00				5.00	5.00					0.02				0.09	0.09		
Quantum 2000 (Aerosol)	6.67	1,698.67	oz (wt)	0.0093703	15.92	106.17	6.39	101.71	203.42																				
Molykote (R) 321 Dry Film Lubricant	8.76	7.33	oz	0.0078125	0.06	0.50	7.73	0.44	0.89																				
Dow Corning 4 Electrical Insulating Cmpd	8.34	8.83	oz	0.0078125	0.07	0.58	0.08	0.01	0.01																				
Silicone #5 Compound	8.35	1.77	oz	0.0078125	0.01	0.12	0.10	0.00	0.00																				
SYLGARD 170 FAST CURE SILICONE ELASTOMER KIT (PART A/B)	11.09	70.00	mL	0.0002642	0.02	0.21	0.04	0.00	0.00																				
F-900 Torque Seal	8.95	0.83	oz	0.0078125	0.01	0.06	4.00	0.03	0.05										40.00										0.05
F-925 Skydrol	9.00	1.83	oz	0.0078125	0.01	0.13	4.68	0.07	0.13																				
LOCTITE LB 8008 C5-A, C5-A Copper Based Anti-Seize Lubricant	10.84	1.33	lb	0.0922509	0.12	1.33	0.33	0.04	0.08																				
Isoblast (GR - SX - 94 AERO)	6.09	905.67	oz	0.0078125	7.08	43.09	5.26	37.22	74.43																				
DC - G-N Metal Assembly Spray	8.35	7.33	oz	0.0078125	0.06	0.48	6.27	0.36	0.72																				
Miracle Powder DGF 123 (CPC Free) Dry Graphite Lubricant	8.34	12.00	oz	0.0078125	0.09	0.78	4.84	0.45	0.91																				
Kroil Petroleum Lubricant	7.26	82.33	oz (wt)	0.0086088	0.71	5.15	2.90	2.06	4.11																				
LPS 1 Greaseless Lubricant	6.68	3.67	oz (wt)	0.0093563	0.03	0.23	1.67	0.06	0.11																				
Super Bonder 416 Gap Filling Inst ADH	9.17	2.67	oz (wt)	0.0068157	0.02	0.17	0.17	0.00	0.01																				
Brayco 460	7.33	8.33	gallon	1.00	8.33	61.08	7.33	61.08	122.17																				
Solvent 142-66	6.59	16.67	gallon	1.00	16.67	109.83	6.59	109.83	219.67																				
Marvel Mystery Oil	7.31	1.67	gallon	1.00	1.67	12.18	1.83	3.05	6.10																				
RTV 102 - white	8.84	12.13	oz	0.0078125	0.09	0.84	0.22	0.02	0.04																				
RTV 103	8.84	9.33	oz	0.0078125	0.07	0.64	0.21	0.02	0.03																				
RTV 108	8.85	9.33	oz	0.0078125	0.07	0.65	0.22	0.02	0.03																				
RTV 159	9.17	0.13	lb	0.1090513	0.01	0.13	0.35	0.00	0.01																				
730 FS Solvent Resistant Sealant (replaces RTV 730 FS)	11.76	4.00	oz	0.0078125	0.03	0.37	0.77	0.02	0.05																				
Flat Black Topcoat 2178	6.81	10.00	oz (wt)	0.0091777	0.09	0.63	4.43	0.41	0.81							1.00	5.00									0.01	0.06		
Isopropanol 99% USP grade	6.55	55.00	gallon	1.00	55.00	360.25	6.55	360.25	720.50																				
Isopropyl Alcohol	6.59	2.00	gallon	1.00	2.00	13.18	6.59	13.18	26.36																				
							Totals:	1,312.73	**2,625.45**										Totals:	223.81	0.36	0.04	0.16	0.01	0.01	0.66	8.07	1.01	0.05
																			Total HAP:	**234.17**									

Delta Air Lines, Inc. - Technical Operations Center

Appendix C - Emission Calculations

Test Cell No. 5 Project - Hazardous Air Pollutant Emissions Summary

Table 22 - Summary of Potential HAP Emissions For Test Cell No. 5 Project

Hazardous Air Pollutants[1]	CAS#	Emission Source(s)	Potential Emissions (tpy)
1,3-Butadiene	106-99-0	Test Cell 5	0.03
Acetaldehyde	75-07-0	Test Cell 5	0.07
Acrolein	107-02-8	Test Cell 5	0.04
Benzene	71-43-2	Test Cell 5, TK3, TK4	0.03
Biphenyl	92-52-4	TK2, DP1	1.7E-05
Chromium Compounds	--	Gen Fug Material Usage	8.0E-05
Cumene	98-82-8	TK2, DP1	8.5E-06
Cyclohexane	110-82-7	TK3, TK4	2.1E-04
Ethylbenzene	100-41-4	Test Cell 5, TK2, TK3, TK4, DP1, Gen Fug Material Usage	3.3E-03
Formaldehyde	50-00-0	Test Cell 5	0.20
Glycol Ethers	--	Gen Fug Material Usage	1.8E-04
HDI	822-06-0	Gen Fug Material Usage	5.0E-04
Hexane	110-54-3	Gen Fug Material Usage	5.2E-06
Hydroquinone	123-31-9	Gen Fug Material Usage	3.1E-06
Isopropylbenzene	98-82-8	Test Cell 5	4.9E-05
Methanol	67-56-1	Test Cell 5, Gen Fug Material Usage	0.03
Naphthalene	91-20-3	Test Cell 5, TK2, TK3, TK4, DP1	9.4E-03
Phenol	108-95-2	Test Cell 5	0.01
Propionaldehyde	123-38-6	Test Cell 5	0.01
Styrene	100-42-5	Test Cell 5	5.0E-03
Toluene	108-88-3	Test Cell 5, TK3, TK4, Gen Fug Material Usage	0.01
Trichloroethylene	79-01-6	Gen Fug Material Usage	0.11
Xylenes	1330-20-7	Test Cell 5, TK2, TK3, TK4, DP1, Gen Fug Material Usage	0.01
		TOTAL HAP Emissions =	**0.57**

[1] Environmental Protection Agency, Clean Air Act, Section 112(b) - List of Hazardous Air Pollutants (Updated December 2005)

Highest Individual HAP - PTE: **0.20** tons/yr ***Formaldehyde***

APPENDIX D

GEOS Title V Application Printout

A. GENERAL INFORMATION

Construction or Modification Date	08/01/2017
Project Description	Construction of Jet Engine Test Cell No. 5

A.4 General Comment

Section A General Comment

A.1. APPLICATION INFORMATION

Application Processing	Expedited
Application Reason	Modification
Application Type	Significant Modification with construction
A Summary of all the Modifications being made	Jet engine test cells are structures designed to hold and operate aircraft engines for the purpose of performing sophisticated monitoring of engine performance under variable pre-flight and flight conditions. Periodic jet engine testing is required to meet Federal Aviation Administration (FAA) regulatory requirements as well as manufacturer specified maintenance to ensure safe and efficient operation. The principal components of jet engine test cells are: 1) a building that encloses the engine and the instrumentation and provides fuel and structural support during testing; 2) an augmentation tube; and 3) a blast room and exhaust. During the testing, the engine is operated at various power levels to simulate flight conditions and to test the engine over the full test cycle. Delta uses a combination of gurneys and mobile transportation stands to transfer jet engines from work areas to the test cells. The gurneys and stands are pulled or pushed by tugs, which are essentially small tractors. Typically, an engine is transported from the engine work area by gurney. At that point, hoists are used to hang the engine in a test jig, which simulates the mounting of the engine to an aircraft wing. The test jig also provides fuel, control, and instrumentation connection points for use in the test cell. When mounted in a test jig, the engines are transported using a transportation stand, which provides structure to hang the engine and jig. The jet engine and jig are transported to the Test Cell No. 5 via the overhead monorail engine transfer system. As discussed above, Delta plans to construct Test Cell No. 5 in order to accommodate future aircraft engines for which the current test cells do not have the capability to house. The construction of Test Cell No. 5 is scheduled to begin in the summer of 2017. A schematic drawing of Test Cell No. 5 is included as Figure 1-2 of Appendix B. With the installation of Test Cell No. 5, Delta is proposing to install two, 25,000-gallon jet-A fuel storage tanks (SHEA ID Nos. 5894 and 5895) and a fuel pump package designed to provide fuel to the jet engines during testing. The two jet-A fuel storage tanks associated with Test Cell No. 5 will be filled via a fuel line connected to the existing system which fills the storage tanks for the current jet engine test cells. Jet-A fuel will be transferred from the two jet-A storage tanks to Test Cell No. 5 via the fuel pump package. There will be two, 200-gallon oil storage tanks installed as part of the project, one for lubrication (SHEA ID No. 5938) and one for preservation oil (SHEA ID No. 5936) which will provide oil to the jet engines being tested within Test Cell No. 5. In addition, Delta is proposing the installation of one 2,000-gallon used oil storage tank (SHEA ID No.

	5893) that will collect used lubrication oil from the jet engines through a line connecting to the pre-test bay of the Test Cell No. 5 building. The used oil will be removed from the used oil storage tank by a waste disposal contractor approximately once per month or quarter, depending on need. Delta also plans to install one 200-gallon diesel storage tank and fuel pump station (SHEA ID No. 5890) to provide fuel to the vehicles used to transport jet engines in and around the Test Cell No. 5 building. A 40-gallon pneumatic pressure pot with spray gun (SHEA ID No. 5901) will also be used to perform engine flush cleaning operations for Test Cell No. 5. Other general fugitive material usage operations may also be conducted. Delta requests that Test Cell No. 5 (SHEA ID No. 5898) be added to Emission Group ET01, Jet Engine and APU Test Cells due to the similarity of operations to the sources within this group as well as the similarity in generally applicable regulations. Additionally, due to the proposed NOx PSD avoidance limit of 39.5 tpy for Test Cell No. 5, Delta is requesting that a new NSR Avoidance Group, NSR14 be created for Test Cell No. 5.
A Summary of Name or Ownership Change	
Application Submitted for	
Describe facility at a Part 70 site covered by the application	
List out other facilities included in a Part 70 site	

PermitConditionChanges

PermitNumber:

PermitConditionNumber:

PermitRequestChange:

PermitReasonChange:

A.2. FACILITY INFORMATION

Facility	DELTA AIR LINES INC. - TECHNICAL OPERATIONS CENTER
AIRS Number	06300105
Mailing Address 1	P.O. Box 20706
Mailing Address 2	7500 Airline Drive
County	Clayton
City	Atlanta
State	GA
Zip	30320
Latitude	33.6433
Longitude	-84.4139
Does your facility have less than 100 employees?	No
SIC Code	4512 (Air transportation, scheduled)
NAICS Code	481111 (Scheduled Passenger Air Transportation)

Facility Description	Delta's TechOps, located at 1775 MH Jackson Service Rd, Atlanta, Georgia (Clayton and Fulton Counties), conducts maintenance and repair operations included but not limited to, surface coating, solvent cleaning, electroplating, depainting, aircraft engine maintenance and testing, and facilities support activities including storage tanks, boilers, emergency power generators, and fire pumps. As part of the aircraft engine testing operations conducted at the TechOps, Delta currently maintains and operates four jet engine test cells: Test Cell 1, Test Cell 2, Test Cell 3, and Test Cell 4. Test Cells 1 and 2 are used to test small commercial aircraft engines, and Test Cells 3 and 4 are used to test large commercial aircraft engines. Delta also operates other test cells for testing and maintenance of auxiliary power units (APUs) which run the electrical systems on aircraft. The operations conducted at the TechOps are permitted under the Title V Operating Permit numbers 4512-063-0105-V-03-0 and V-03-1 issued by the EPD on April 29, 2015 and December 30, 2015.

FacSignifProcess

ProcessName:

Description:

FacCAPEmissions

PollutantID:	NOX
PTE:	315.8
AllowableLimitRequested:	No
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

PollutantID:	VOC
PTE:	408.6
AllowableLimitRequested:	No
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

PollutantID:	SO2
PTE:	2636.0
AllowableLimitRequested:	No
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

PollutantID:	CO
PTE:	154.3
AllowableLimitRequested:	No
AllowableLimit:	

PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

PollutantID:	PM
PTE:	35.9
AllowableLimitRequested:	No
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

PollutantID:	PM-PRI
PTE:	35.9
AllowableLimitRequested:	No
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

PollutantID:	PM25-PRI
PTE:	35.9
AllowableLimitRequested:	No
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

PollutantID:	TOTAL-HAP
PTE:	57.1
AllowableLimitRequested:	No
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	
FutureMax:	

FacCAPOther

PollutantID:	
PTE:	
AllowableLimitRequested:	
AllowableLimit:	
PastMax:	
DateStart:	
DateEnd:	

FutureMax:

A.2.3 Facility Wide HAP Emissions

Total Facility Wide HAP PTE(tpy)	57.1

A.3. Title VI Level

Does our facility have any air conditioners or refrigeration equipment that uses CFC's, HFC's or other stratospheric ozone-depleting substances listed in 40 CFR Part 82, Subpart A, Appendices A and B?	true
Does any air conditioner or any piece of refrigeration equipment contain a refrigerant charge of greater than 50 lbs?	true
Do your facility personnel maintain, services, repair, or dispose of any motor vehicle air conditioners (MVAC's) or appliances?	false
Titile VI Comment	

Equipment

EquipmentName:

NoOfUnits:

FacVOCEmissions

CasNumber:	111-42-2
VOCName:	Diethanolamine
PTE:	4.28
CasNumber:	108-10-1
VOCName:	Methyl Isobutyl Ketone
PTE:	8.98
CasNumber:	127-18-4
VOCName:	Tetrachloroethylene
PTE:	11.52
CasNumber:	79-01-6
VOCName:	Trichloroethylene
PTE:	13.15
CasNumber:	1330-20-7
VOCName:	Xylenes
PTE:	3.91

A. GENERAL INFORMATION

This application includes Information the Applicant Claims is Protected Under Georgia Law from Disclosure to the Public:	No

FacHAPEmissions

* [Group 1]

PollutantName:	Chromium
PollutantID:	454

PollutantCd:	7440473
SubDescription:	Chromium
SubstanceChemName:	HAP
CasNumber:	
PTE:	5.64
AllowableLimitRequested:	No
AllowableLimit:	

* [Group 2]

PollutantName:	Diethanolamine
PollutantID:	79
PollutantCd:	111422
SubDescription:	Diethanolamine
SubstanceChemName:	HAP
CasNumber:	
PTE:	4.28
AllowableLimitRequested:	No
AllowableLimit:	

* [Group 3]

PollutantName:	Methyl Isobutyl Ketone
PollutantID:	58
PollutantCd:	108101
SubDescription:	Methyl Isobutyl Ketone
SubstanceChemName:	HAP
CasNumber:	
PTE:	8.98
AllowableLimitRequested:	No
AllowableLimit:	

* [Group 4]

PollutantName:	Tetrachloroethylene
PollutantID:	131
PollutantCd:	127184
SubDescription:	Tetrachloroethylene
SubstanceChemName:	HAP
CasNumber:	
PTE:	11.52
AllowableLimitRequested:	No
AllowableLimit:	

* [Group 5]

PollutantName:	Trichloroethylene
PollutantID:	536
PollutantCd:	79016
SubDescription:	Trichloroethylene
SubstanceChemName:	HAP
CasNumber:	
PTE:	13.15

AllowableLimitRequested: No
AllowableLimit:

* [Group 6]
PollutantName: Xylenes (Mixed Isomers)
PollutantID: 165
PollutantCd: 1330207
SubDescription: Xylenes (Mixed Isomers)
SubstanceChemName: HAP
CasNumber:
PTE: 3.91
AllowableLimitRequested: No
AllowableLimit:

FacilityRule

* [Group 1]
RuleID: 145
RefType: MACT(Part 63)
RefCode: DDDDD
Description: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers and Process Heaters

* [Group 2]
RuleID: 350
RefType: MACT(Part 63)
RefCode: ZZZZ
Description: National Emissions Standards for Hazardous Air Pollutants for Stationary Reciprocating Internal Combustion Engines

* [Group 3]
RuleID: 198
RefType: NSPS(Part 60)
RefCode: IIII
Description: Standards of Performance for Stationary Compression Ignition Internal Combustion Engines

* [Group 4]
RuleID: 54
RefType: SIP
RefCode: .02(2)(rrr)
Description: NOx Emissions from Small Fuel-Burning Equipment

* [Group 5]
RuleID: 37
RefType: SIP
RefCode: .02(2)(lll)
Description: NOx Emissions from Fuel-burning Equipment

* [Group 6]
RuleID: 12
RefType: SIP

RefCode: .02(2)(d)
Description: Fuel-burning Equipment

* [Group 7]
RuleID: 6
RefType: SIP
RefCode: .02(2)(b)
Description: Visible Emissions

* [Group 8]
RuleID: 3
RefType: SIP
RefCode: .02(2)(5)
Description: Open Burning

* [Group 9]
RuleID: 2
RefType: SIP
RefCode: .02(2)(3)
Description: Sampling

* [Group 10]
RuleID: 62
RefType: SIP
RefCode: .02(2)(vv)
Description: Volatile Organic Liquid Handling and Storage

* [Group 11]
RuleID: 34
RefType: SIP
RefCode: .02(2)(kkk)
Description: VOC Emissions from Aerospace Manufacturing and Rework Facilities

* [Group 12]
RuleID: 20
RefType: SIP
RefCode: .02(2)(g)
Description: Sulfur Dioxide

* [Group 13]
RuleID: 15
RefType: SIP
RefCode: .02(2)(e)
Description: Particulate Emission from Manufacturing Processes

* [Group 14]
RuleID: 40
RefType: SIP
RefCode: .02(2)(n)
Description: Fugitive Dust

* [Group 15]

RuleID:	58
RefType:	SIP
RefCode:	.02(2)(tt)
Description:	VOC Emissions from Major Sources

* [Group 16]

RuleID:	67
RefType:	SIP
RefCode:	.02(2)(yy)
Description:	Emissions of Nitrogen Oxides from Major Sources

* [Group 17]

RuleID:	96
RefType:	NSPS(Part 60)
RefCode:	A
Description:	General Provisions

* [Group 18]

RuleID:	137
RefType:	NSPS(Part 60)
RefCode:	Dc
Description:	Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

* [Group 19]

RuleID:	94
RefType:	MACT(Part 63)
RefCode:	A
Description:	General Provisions

* [Group 20]

RuleID:	174
RefType:	MACT(Part 63)
RefCode:	GG
Description:	National Emission Standards for Aerospace Manufacturing and Rework Facilities

* [Group 21]

RuleID:	238
RefType:	MACT(Part 63)
RefCode:	N
Description:	National Emission Standards for Chromium Emissions From Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks

* [Group 22]

RuleID:	297
RefType:	MACT(Part 63)
RefCode:	T
Description:	National Emission Standards for Halogenated Solvent Cleaning

* [Group 23]

RuleID:	354
RefType:	Other
RefCode:	OTH
Description:	Other - Facility Wide Rule

General Comment

Section B General Comment

FacContact

* [Group 1]

FirstName: Cheryl
LastName: Meyers
Responsibility: Facility Air Compliance Contact
Phone: 404-714-3988
Email: cheryl.meyers@delta.com
Address1: Delta Air Lines, Inc. - Dept. 885
Address2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320
-- Detail --:

First Name: Cheryl
Last Name: Meyers
Job Title: Program Manager - Air Quality
Responsibility: Facility Air Compliance Contact
E-mail: cheryl.meyers@delta.com
Phone Number: 404-714-3988
Fax: 404-714-3310
Address Line 1: Delta Air Lines, Inc. - Dept. 885
Address Line 2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320

* [Group 2]

FirstName: Cheryl
LastName: Meyers
Responsibility: Facility Air Permit Contact
Phone: 404-714-3988
Email: cheryl.meyers@delta.com
Address1: Delta Air Lines, Inc. - Dept. 885
Address2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320
-- Detail --:

First Name: Cheryl
Last Name: Meyers
Job Title: Program Manager - Air Quality

Responsibility: Facility Air Permit Contact
E-mail: cheryl.meyers@delta.com
Phone Number: 404-714-3988
Address Line 1: Delta Air Lines, Inc. - Dept. 885
Address Line 2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320

* [Group 3]

FirstName:	Cheryl
LastName:	Meyers
Responsibility:	Facility Air Fee Contact
Phone:	404-714-3988
Email:	cheryl.meyers@delta.com
Address1:	Delta Air Lines. Inc. - Dept. 885
Address2:	P.O Box 20706
City:	Atlanta
State:	GA
Zip:	30320
-- Detail --:	

First Name: Cheryl
Last Name: Meyers
Job Title: Program Manager - Air Quality
Responsibility: Facility Air Fee Contact
E-mail: cheryl.meyers@delta.com
Phone Number: 404-714-3988
Address Line 1: Delta Air Lines. Inc. - Dept. 885
Address Line 2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320

* [Group 4]

FirstName:	Cheryl
LastName:	Meyers
Responsibility:	Facility Air EI Contact
Phone:	404-714-3988
Email:	cheryl.meyers@delta.com
Address1:	Delta Air Lines, Inc. - Dept. 885
Address2:	P.O Box 20706
City:	Atlanta
State:	GA
Zip:	30320
-- Detail --:	

First Name: Cheryl
Last Name: Meyers

Job Title: Program Manager - Air Quality
Responsibility: Facility Air EI Contact
E-mail: cheryl.meyers@delta.com
Phone Number: 404-714-3988
Address Line 1: Delta Air Lines, Inc. - Dept. 885
Address Line 2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320

* [Group 5]

FirstName:	Cheryl
LastName:	Meyers
Responsibility:	Facility Air Monitoring Contact
Phone:	404-714-3988
Email:	cheryl.meyers@delta.com
Address1:	Delta Air Lines, Inc. - Dept. 885
Address2:	P.O Box 20706
City:	Atlanta
State:	GA
Zip:	30320

-- Detail --:

First Name: Cheryl
Last Name: Meyers
Job Title: Program Manager - Air Quality
Responsibility: Facility Air Monitoring Contact
E-mail: cheryl.meyers@delta.com
Phone Number: 404-714-3988
Address Line 1: Delta Air Lines, Inc. - Dept. 885
Address Line 2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320

* [Group 6]

FirstName:	Don
LastName:	Mitacek
Responsibility:	Facility Air Responsible Official
Phone:	404-714-0126
Email:	don.mitacek@delta.com
Address1:	1775 Aviation Blvd.
Address2:	P.O Box 20706
City:	Atlanta
State:	GA
Zip:	30320

-- Detail --:

First Name: Don

Last Name: Mitacek
Job Title: Senior Vice President - Technical Operations
Responsibility: Facility Air Responsible Official
E-mail: don.mitacek@delta.com
Phone Number: 404-714-0126
Address Line 1: 1775 Aviation Blvd.
Address Line 2: P.O Box 20706
City: Atlanta
State: GA
Zip: 30320

C.3. Generic Fuel Burning Equipment

Fuel burning equipment with a rated heat input capacity of less than 10 million BTU/hr burning only natural gas and/or LPG. Quantity:	2
Quantity in Compliance:	2
Comment:	
Fuel burning equipment with a rated heat input capacity of less than 5 million BTU/hr, burning only distillate fuel oil, natural gas and/or LPG. Quantity:	2
Quantity in Compliance:	2
Comment:	
Any fuel burning equipment with a rated heat input capacity of 1 million BTU/hr or less. Quantity:	10
Quantity in Compliance:	10
Comment:	

InsignificantActAnyOther

Name:	Same as C.1.2 1)
Quantity:	82
Comment:	

InsignificantActLT10000

Name:	Anodizing Process Tanks
Quantity:	1
Comment:	
Name:	Aqueous Non-VOC Acid Etch Process Tanks (Metal Finishing)
Quantity:	12
Comment:	
Name:	Chromic Acid Bright Dip Tanks (Metal Finishing)
Quantity:	4
Comment:	
Name:	Fixture Treatment Tanks
Quantity:	2
Comment:	
Name:	Heated Petroleum Liquid Storage Tanks
Quantity:	1
Comment:	
Name:	Inorganic Acid Process Tanks (Metal Finishing)
Quantity:	4
Comment:	
Name:	Non-Chrome Plating and Anodizing Tanks (Metal Finishing)

Quantity:	21
Comment:	

Name:	Non-Spray Gun Surface Coating Ventilation Booths
Quantity:	16
Comment:	

Name:	Plasma Spray Units
Quantity:	13
Comment:	

Name:	Portable Cadmium Plating Units
Quantity:	6
Comment:	

Name:	Ultrasonic Cleaners
Quantity:	2
Comment:	

InsignificantActLT2500

Name:	Same as C.1.2 1)
Quantity:	82
Comment:	

InsignificantActLT5000

Name:	Same as C.1.2 1)
Quantity:	82
Comment:	

C.6 General Comment

Section C General Comment

GenericEmissionsGroup

GenericGroupName:
NumberOfUnits:
NumberOutofCompliance:
GARuleB:
GARuleE:
GARuleN:
Comment:

InsignificantAct

* [Group 1]

InsignificantActivityID:	7
Name:	Combustion Equipment
RefCode:	
Description:	Stationary engines burning: natural gas, gasoline, diesel fuel, or dual fuels which are used exclusively for emergency power generation.
Quantity:	11
Comment:	SHEA ID# 0631 / 0632 / 0639 / 0640 / 0676 / 0687 / 2086 / 2087 / 2088 / 2089 / 4525

* [Group 2]
  - InsignificantActivityID: 33
  - Name: Industrial Operations
  - RefCode:
  - Description: Photographic process equipment by which an image is reproduced upon material sensitized to radiant energy (e.g., blueprint activity, photographic developing and microfiche).
  - Quantity: 7
  - Comment: SHEA ID#0620 / 0621 / 0623 / 1767 / 7860 / 9413 / 9560

* [Group 3]
  - InsignificantActivityID: 32
  - Name: Industrial Operations
  - RefCode:
  - Description: Carving, cutting, routing, turning, drilling, machining, sawing, surface grinding, sanding, planing, buffing, shot blasting, shot peening, or polishing; ceramics, glass, leather, metals, plastics, rubber, concrete, paper stock or wood, also including roll grinding and ground wood pulping stone sharpening, provided that: Activity is performed indoors; and No significant fugitive particulate emissions enter the outdoor atmosphere; and No visible emissions enter the outdoor atmosphere.
  - Quantity: 194
  - Comment: SHEA ID# 0039 / 0040 / 0041 / 0048 / 0072 / 0138 / 0139 / 0140 / 0141 / 0142 / 0143 / 0205 / 0225 / 0239 / 0260 / 0297 / 0304 / 0308 / 0309 / 0310 / 0311 / 0313 / 0369 / 0371 / 0374 / 0381 / 0382 / 0390 / 0397 / 0401 / 0406 / 0407 / 0433 / 0434 / 0435 / 0436 / 0437 / 0539 / 1036 / 1125 / 1151 / 1152 / 1367 / 1821 / 1825 / 1837 / 1838 / 1839 / 1847 / 1929 / 1930 / 1932 / 1934 / 1935 / 1936 / 1937 / 1938 / 1939 / 1940 / 1942 / 1944 / 1945 / 1946 / 1947 / 1948 / 1949 / 1950 / 1951 / 1952 / 1953 / 1954 / 1956 / 1957 / 1958 / 1959 / 1960 / 1961 / 1962 / 1963 / 1965 / 1966 / 1967 / 1968 / 1969 / 1970 / 1972 / 1973 / 2062 / 2078 / 2116 / 2171 / 2217 / 2225 / 4467 / 4472 / 4513 / 4536 / 4546 / 4682 / 4717 / 4727 / 4729 / 4731 / 4736 / 4737 / 4738 / 4739 / 4741 / 4795 / 4855 / 4871 / 4889 / 4892 / 4903 / 4922 / 4925 / 4945 / 4953 / 4955 / 4963 / 4965 / 4966 / 4971 / 4982 / 4985 / 4986 / 4989 / 4995 / 4996 / 5005 / 5006 / 5007 / 5009 / 5014 / 5015 / 5016 / 5073 / 5097 / 5125 / 5132 / 6162 / 6209 / 6219 / 6230 / 6256 / 6267 / 6275 / 6277 / 6357 / 6625 / 6626 / 6633 / 6634 / 6637 / 6639 / 6641 / 6642 / 6652 / 6661 / 6662 / 6663 / 6664 / 6665 / 6666 / 6667 / 6668 / 6716 / 6759 / 6760 / 6767 / 6806 / 6807 / 6948 / 6966 / 6967 / 7241 / 7450 / 7451 / 7708 / 7875 / 7993 / 8045 / 8096 / 8140 / 8226 / 8227 / 8315 / 8316 / 8324 / 8327 / 8334 / 9418 / 9424 / 9515

* [Group 4]
  - InsignificantActivityID: 26
  - Name: Industrial Operations
  - RefCode:
  - Description: Any of the following processes or process equipment which are electrically heated or which fire natural gas, LPG or distillate fuel oil at a maximum total heat input rate of not more than 5 million BTU's per hour:
  - Quantity: 18
  - Comment: (Surface Coating Ovens) SHEA ID# 0250 / 1157 / 1334 / 1335 / 1484 / 1689 / 1759 / 2010 / 4501 / 4502 / 4673 / 4678 / 4679 / 6342 / 8138 / 8333 / 9408 / 9409

* [Group 5]

InsignificantActivityID:	20
Name:	Laboratories and Testing
RefCode:	
Description:	Research and development facilities, quality control testing facilities and/or small pilot projects, where combined daily emissions from all operations are not individually major or are support facilities not making significant contributions to the product of a collocated major manufacturing facility.
Quantity:	65
Comment:	SHEA ID# 0086 / 0222 / 0377 / 0388 / 0404 / 0609 / 0610 / 0783 / 0785 / 1042 / 1043 / 1044 / 1046 / 1047 / 1048 / 1049 / 1051 / 1052 / 1053 / 1055 / 1209 / 1325 / 1429 / 1515 / 1675 / 1676 / 1677 / 1738 / 1981 / 1982 / 1983 / 1984 / 1985 / 1987 / 1988 / 1990 / 1991 / 1992 / 1994 / 1995 / 1997 / 1998 / 2000 / 2008 / 2040 / 2042 / 2143 / 2144 / 2149 / 4506 / 4509 / 4510 / 4511 / 4670 / 6231 / 6254 / 6290 / 6478 / 6479 / 6535 / 6768 / 7128 / 7937 / 8213 / 9425

* [Group 6]

InsignificantActivityID:	16
Name:	Maintenance, Cleaning, and Housekeeping
RefCode:	
Description:	Non-routine clean out of tanks and equipment for the purposes of worker entry or in preparation for maintenance or decommissioning.
Quantity:	1
Comment:	

* [Group 7]

InsignificantActivityID:	1
Name:	Mobile Sources
RefCode:	
Description:	Cleaning and sweeping of streets and paved surfaces
Quantity:	1
Comment:	

* [Group 8]

InsignificantActivityID:	22
Name:	Pollution Control
RefCode:	
Description:	On site soil or groundwater decontamination unit.
Quantity:	1
Comment:	

* [Group 9]

InsignificantActivityID:	50
Name:	Storage Tanks and Equipment
RefCode:	
Description:	All chemical storage tanks used to store a chemical with a true vapor pressure of less than or equal to 10 millimeters of mercury (0.19 psia).
Quantity:	32

Comment: SHEA ID# 1300 / 1302 / 1320 / 4858 / 4859 / 6348 / 6349 / 6358 / 6362 / 6364 / 6365 / 6366 / 6367 / 6368 / 6369 / 6370 / 6371 / 6380 / 6381 / 6382 / 6383 / 6384 / 6410 / 6411 / 6423 / 6424 / 6425 / 6426 / 6436 / 6438 / 7196 / 9429

* [Group 10]
  - InsignificantActivityID: 49
  - Name: Storage Tanks and Equipment
  - RefCode:
  - Description: Portable drums, barrels and totes provided that the volume of each container does not exceed 550 gallons.
  - Quantity: 150
  - Comment: Approximately 150 drums/totes

* [Group 11]
  - InsignificantActivityID: 47
  - Name: Storage Tanks and Equipment
  - RefCode:
  - Description: Pressurized vessels designed to operate in excess of 30 psig storing a petroleum fuel.
  - Quantity: 3
  - Comment: SHEA ID# 6315 / 6316 / 8023

* [Group 12]
  - InsignificantActivityID: 46
  - Name: Storage Tanks and Equipment
  - RefCode:
  - Description: All petroleum liquid storage tanks with a capacity of less than 10,000 gallons storing a petroleum liquid.
  - Quantity: 50
  - Comment: SHEA ID# 1497 / 2161 / 2166 / 4979 / 5890 / 5893 / 5936 / 5938 / 6240 / 6241 / 6266 / 6276 / 6376 / 6385 / 6390 / 6391 / 6395 / 6396 / 6399 / 6400 / 6401 / 6402 / 6404 / 6405 / 6406 / 6407 / 6408 / 6409 / 6429 / 6431 / 6432 / 6433 / 6434 / 6437 / 6444 / 6942 / 7008 / 8214 / 9683 / 9699 / 9700 / 9701 / 9702 / 9703 / 9704 / 9705 / 9706 / 9716 / 9717 / 9928

* [Group 13]
  - InsignificantActivityID: 45
  - Name: Storage Tanks and Equipment
  - RefCode:
  - Description: All petroleum liquid storage tanks with a capacity of less than 40,000 gallons storing a liquid with a true vapor pressure of equal to or less than 2.0 psia as stored.
  - Quantity: 5
  - Comment: SHEA ID# 1496 / 1602 / 6397 / 6398 / 6444

* [Group 14]
  - InsignificantActivityID: 44
  - Name: Storage Tanks and Equipment
  - RefCode:
  - Description: All petroleum liquid storage tanks storing a liquid with a true vapor pressure of equal to or less than 0.50 psia as stored.

Quantity:	4
Comment:	SHEA ID# 2054 / 2055 / 5894 / 5895

* [Group 15]

InsignificantActivityID:	11
Name:	Trade Operations
RefCode:	
Description:	Brazing, soldering, and welding equipment, and cutting torches related to manufacturing and construction activities whose emissions of hazardous air pollutants (HAPs) fall below 1,000 pounds per year.
Quantity:	46
Comment:	SHEA ID# 0329 / 1826 / 1846 / 1900 / 1902 / 1903 / 1904 / 1905 / 1906 / 1907 / 1909 / 1911 / 1913 / 1914 / 1916 / 1917 / 1918 / 1919 / 1921 / 1922 / 1923 / 1926 / 1978 / 2124 / 4668 / 4677 / 4681 / 4718 / 4728 / 4730 / 4740 / 4854 / 4856 / 4893 / 4904 / 4921 / 4923 / 4946 / 4952 / 4987 / 4988 / 4990 / 4998 / 5002 / 5013 / 6220

General Comment

Section D General Comment

Title V Application

App ID: 44147 **Date Submited: 02/21/2017**

Current Status: Complete Submittal

Today is Feb 21, 2017

General Comment

Section E General Comment

ReleasePoint

* [Group 1]

ReleasePointID:	STACKTC5
ReleasePointName:	TC5-1
ReleasePointType:	Vertical
Height:	78.00
Diameter:	54.17
ExitGasVelocity:	2621
ExitGasFlowRate:	6040000
ExitGasTemperature:	121.01
FenceLineDistance:	180.446
FugitiveHeight:	
FugitiveWidth:	
FugitiveLength:	
FugitiveAngle:	
Latitude:	33.642752
Longitude:	-84.406694
Elevation:	
HorizontalAccuracyMeasure:	
HorizontalCollectionMethod:	
HorizontalReferenceDatum:	
GeographicComment:	
Comment:	
-- Detail --:	

Release Point ID: STACKTC5
Release Point Name: TC5-1
Release Point Type: Vertical
Stack Height (ft): 78.00
Stack Diameter (ft): 54.17
Exit Gas Velocity (ft/min): 2621
Exit Gas Flow Rate (ACFM): 6040000
Exit Gas Temperature (Fahrenheit): 121.01
Fence Line Distance (ft): 180.446
Latitude Measure: 33.642752
Longitude Measure: -84.406694

* [Group 2]

ReleasePointID:	STACKTC5-FC
ReleasePointName:	FC at TC5-1
ReleasePointType:	Vertical
Height:	78.00

Diameter:	54.17
ExitGasVelocity:	150
ExitGasFlowRate:	440158
ExitGasTemperature:	75
FenceLineDistance:	
FugitiveHeight:	
FugitiveWidth:	
FugitiveLength:	
FugitiveAngle:	
Latitude:	33.642752
Longitude:	-84.406694
Elevation:	
HorizontalAccuracyMeasure:	
HorizontalCollectionMethod:	
HorizontalReferenceDatum:	
GeographicComment:	
Comment:	This release point represents the fugitive emissions from flush cleaning operations associated with the Jet Engine Test Cell No. 5.

-- Detail --:

Release Point ID: STACKTC5-FC

Release Point Name: FC at TC5-1

Release Point Type: Vertical

Stack Height (ft): 78.00

Stack Diameter (ft): 54.17

Exit Gas Velocity (ft/min): 150

Exit Gas Flow Rate (ACFM): 440158

Exit Gas Temperature (Fahrenheit): 75

Latitude Measure: 33.642752

Longitude Measure: -84.406694

Comments: This release point represents the fugitive emissions from flush cleaning operations associated with the Jet Engine Test Cell No. 5.

Title V Application

App ID: 44147 **Date Submited: 02/21/2017**

Current Status: Complete Submittal

Today is Feb 21, 2017

General Comment

Section F General Comment

EmissionUnit

* [Group 1]

EUID: Test Cell No. 5
EUType: Miscellaneous
InstallationDate:
Description:
-- Detail --:

Emission Unit Type: 10
Emission Source Identifier: Test Cell No. 5
Emission Source Name: Test Cell No. 5
Description: Jet engine test cell
InputOutput: Input
Material: Jet Engine Fuel
MaterialType: Jet Engine Fuel
ReleasePointID: STACKTC5
ReleasePointType: Vertical
Latitude: 33.642752
Longitude: -84.406694
Height: 78.00
RuleID: 67
RefType: SIP
RefCode: .02(2)(yy)
Description: Emissions of Nitrogen Oxides from Major Sources
RuleID: 20
RefType: SIP
RefCode: .02(2)(g)
Description: Sulfur Dioxide
RuleID: 6
RefType: SIP
RefCode: .02(2)(b)
Description: Visible Emissions
RuleID: 58
RefType: SIP
RefCode: .02(2)(tt)
Description: VOC Emissions from Major Sources

* [Group 2]

EUID: SHEA5901
EUType: Miscellaneous
InstallationDate:
Description:

-- Detail --:

Emission Unit Type: 10

Emission Source Identifier: SHEA5901

Emission Source Name: SHEA5901

Description: 40-gallon pneumatic pressure pot with spray gun for flush cleaning operations

InputOutput: Input

Material: Aqueous Cleaning Solvent

MaterialType: Aqueous Cleaning Solvent

ReleasePointID: STACKTC5-FC

ReleasePointType: Vertical

Latitude: 33.642752

Longitude: -84.406694

Height: 78.00

RuleID: 34

RefType: SIP

RefCode: .02(2)(kkk)

Description: VOC Emissions from Aerospace Manufacturing and Rework Facilities

RuleID: 174

RefType: MACT(Part 63)

RefCode: GG

Description: National Emission Standards for Aerospace Manufacturing and Rework Facilities

Title V Application

App ID: 44147 **Date Submited: 02/21/2017** **Current Status: Complete Submittal**

Today is Feb 21, 2017

General Comment

Section G General Comment

EmissionGroup

* [Group 1]

EGID:	ET01/NSR14
EGType:	Common Regulations (CReg) Group
NoSpecificMonitoring:	No
NoSpecificTesting:	Yes
Description:	Jet Engine and APU Test Cells
EmissionSource:	Test Cell No. 5(Type: Miscellaneous)
-- Detail --:	

Emission Path Group Type: Common Regulations (CReg) Group
Emission Path Group Identifier: ET01/NSR14
Check here if no specific monitoring needed: false
Check here if no specific testing needed: true
Description: Jet Engine and APU Test Cells
EUID: Test Cell No. 5
EUType: Miscellaneous

Detail

Emission Unit Type: 10
Emission Source Identifier: Test Cell No. 5
Emission Source Name: Test Cell No. 5
Description: Jet engine test cell
InputOutput: Input
Material: Jet Engine Fuel
MaterialType: Jet Engine Fuel
ReleasePointID: STACKTC5
ReleasePointType: Vertical
Latitude: 33.642752
Longitude: -84.406694
Height: 78.00
RuleID: 67
RefType: SIP
RefCode: .02(2)(yy)
Description: Emissions of Nitrogen Oxides from Major Sources
RuleID: 20
RefType: SIP
RefCode: .02(2)(g)
Description: Sulfur Dioxide
RuleID: 6
RefType: SIP
RefCode: .02(2)(b)

Description: Visible Emissions
RuleID: 58
RefType: SIP
RefCode: .02(2)(tt)
Description: VOC Emissions from Major Sources

* [Group 2]

EGID:	FC01
EGType:	Common Regulations (CReg) Group
NoSpecificMonitoring:	No
NoSpecificTesting:	Yes
Description:	Aerospace Flush Cleaning
EmissionSource:	SHEA5901(Type: Miscellaneous)
-- Detail --:	

Emission Path Group Type: Common Regulations (CReg) Group
Emission Path Group Identifier: FC01
Check here if no specific monitoring needed: false
Check here if no specific testing needed: true
Description: Aerospace Flush Cleaning
EUID: SHEA5901
EUType: Miscellaneous

Detail

Emission Unit Type: 10
Emission Source Identifier: SHEA5901
Emission Source Name: SHEA5901
Description: 40-gallon pneumatic pressure pot with spray gun for flush clean operations

Title V Application

Current Status: Complete Submittal

App ID: 44147 **Date Submited: 02/21/2017**

Today is Feb 21, 2017

General Comment

Section H General Comment

ActivityEmission

* [Group 1]

EGID:	ET01/NSR14
EGType:	Common Regulations (CReg) Group
NoSpecificMonitoring:	Yes
NoSpecificTesting:	Yes
EmissionDataFilled:	Yes
Description:	Jet Engine and APU Test Cells
-- Detail --:	

Emission Path Group Type: Common Regulations (CReg) Group
Emission Path Group Identifier: ET01/NSR14
Check here if no specific monitoring needed: true
Check here if no specific testing needed: true
Description: Jet Engine and APU Test Cells
EUID: Test Cell No. 5
EUType: Miscellaneous

Detail

PollutantName: Nitrogen Oxides
PollutantID: 599
PollutantCd: NOX
SubDescription: Nitrogen Oxides
SubstanceChemName: CAP1
EmissionLimit: 39.5
PotentialEmissions: 39.5
CalculationMethod: Engineering estimate
Voluntarylimit: Y
ComplianceStatus: Yes
PollutantName: Carbon Monoxide
PollutantID: 592
PollutantCd: CO
SubDescription: Carbon Monoxide
SubstanceChemName: CAP1
EmissionLimit: 16
PotentialEmissions: 16
CalculationMethod: Engineering estimate
Voluntarylimit: N
ComplianceStatus: Yes
PollutantName: Particulate Matter (TSP)
PollutantID: 604
PollutantCd: PM

SubDescription: Particulate Matter (TSP)
SubstanceChemName: CAP1
EmissionLimit: 1.6
PotentialEmissions: 1.6
CalculationMethod: Engineering estimate
Voluntarylimit: N
ComplianceStatus: Yes
PollutantName: PM10 (Filt + Cond)
PollutantID: 606
PollutantCd: PM-PRI
SubDescription: PM Primary (Filt + Cond)
SubstanceChemName: CAP1
EmissionLimit: 1.6
PotentialEmissions: 1.6
CalculationMethod: Engineering estimate
Voluntarylimit: N
ComplianceStatus: Yes
PollutantName: PM2.5 (Filt + Cond)
PollutantID: 612
PollutantCd: PM25-PRI
SubDescription: PM2.5 Primary (Filt + Cond)
SubstanceChemName: CAP1
EmissionLimit: 1.6
PotentialEmissions: 1.6
CalculationMethod: Engineering estimate
Voluntarylimit: N
ComplianceStatus: Yes
PollutantName: Sulfur Dioxide
PollutantID: 614
PollutantCd: SO2
SubDescription: Sulfur Dioxide
SubstanceChemName: CAP1
EmissionLimit: 9.7
PotentialEmissions: 9.7
CalculationMethod: Engineering estimate
Voluntarylimit: N
ComplianceStatus: Yes
PollutantName: Volatile Organic Compounds
PollutantID: 617
PollutantCd: VOC
SubDescription: Volatile Organic Compounds
SubstanceChemName: CAP1
EmissionLimit: 1.6
PotentialEmissions: 1.6
CalculationMethod: Engineering estimate
Voluntarylimit: N

ComplianceStatus: Yes
PollutantName: Formaldehyde
PollutantID: 335
PollutantCd: 50000
SubDescription: Formaldehyde
SubstanceChemName: HAP
EmissionLimit: 0.2
PotentialEmissions: 0.2
CalculationMethod: Engineering estimate
Voluntarylimit: N
ComplianceStatus: Yes
PollutantName: Total HAP
PollutantID: 620
PollutantCd: TOTAL-HAP
SubDescription: Total HAP pollutant
SubstanceChemName: CAP1
EmissionLimit: 0.5
PotentialEmissions: 0.5
CalculationMethod: Engineering calculations
Voluntarylimit: N
ComplianceStatus: Yes
Emission Unit Type: 10
Emission Source Identifier: Test Cell No. 5
Emission Source Name: Test Cell No. 5
Description: Jet engine test cell
InputOutput: Input
Material: Jet Engine Fuel
MaterialType: Jet Engine Fuel
ReleasePointID: STACKTC5
ReleasePointType: Vertical
Latitude: 33.642752
Longitude: -84.406694
Height: 78.00
RuleID: 67
RefType: SIP
RefCode: .02(2)(yy)
Description: Emissions of Nitrogen Oxides from Major Sources
RuleID: 20
RefType: SIP
RefCode: .02(2)(g)
Description: Sulfur Dioxide
RuleID: 6
RefType: SIP
RefCode: .02(2)(b)
Description: Visible Emissions
RuleID: 58

RefType: SIP
RefCode: .02(2)(tt)
Description: VOC Emissions from Major Sources

* [Group 2]

EGID: FC01
EGType: Common Regulations (CReg) Group
NoSpecificMonitoring: Yes
NoSpecificTesting: Yes
EmissionDataFilled: Yes
Description: Aerospace Flush Cleaning
-- Detail --:

Emission Path Group Type: Common Regulations (CReg) Group
Emission Path Group Identifier: FC01
Check here if no specific monitoring needed: true
Check here if no specific testing needed: true
Description: Aerospace Flush Cleaning
EUID: SHEA5901
EUType: Miscellaneous

Detail

PollutantName: Volatile Organic Compounds
PollutantID: 617
PollutantCd: VOC
SubDescription: Volatile Organic Compounds
SubstanceChemName: CAP1
EmissionLimit: 0.09
CalculationMethod: Engineering estimate
Voluntarylimit: N
ComplianceStatus: Yes

Emission Unit Type: 10
Emission Source Identifier: SHEA5901
Emission Source Name: SHEA5901
Description: 40-gallon pneumatic pressure pot with spray gun for flush clean operations

Title V Application

App ID: 44147 **Date Submited: 02/21/2017**

Current Status: Complete Submittal

Today is Feb 21, 2017

General Comment

Section I General Comment

MonitoringTesting

* [Group 1]

EGID:	ET01/NSR14
EGType:	Common Regulations (CReg) Group
NoSpecificMonitoring:	No
NoSpecificTesting:	Yes
MonitoringDataFilled:	Yes
TestingDataFilled:	No

-- Detail --:

Emission Path Group Type: Common Regulations (CReg) Group
Emission Path Group Identifier: ET01/NSR14
Check here if no specific monitoring needed: false
Check here if no specific testing needed: true
Description: Jet Engine and APU Test Cells
EUID: Test Cell No. 5
EUType: Miscellaneous

Detail

MonitoringLocation: Facility records
PollutantName: Nitrogen Oxides
PollutantID: 599
PollutantCd: NOX
SubstanceChemName: CAP1
SubDescription: Nitrogen Oxides
MonitoringMethod: Recordkeeping
RecordType: Fuel consumption & types of engines tested
ReportingFrequency: Monthly
ApplicableEU: Test Cell No. 5
MonitoringLocation: Facility records
PollutantName: Nitrogen Oxides
PollutantID: 599
PollutantCd: NOX
SubstanceChemName: CAP1
SubDescription: Nitrogen Oxides
MonitoringMethod: Recordkeeping
RecordType: Monthly and 12-month rolling NOx emissions calculations from proposed NSR Avoidance Group NSR14
ReportingFrequency: Monthly
ApplicableEU: Test Cell No. 5
Emission Unit Type: 10
Emission Source Identifier: Test Cell No. 5

Emission Source Name: Test Cell No. 5
Description: Jet engine test cell
InputOutput: Input
Material: Jet Engine Fuel
MaterialType: Jet Engine Fuel
ReleasePointID: STACKTC5
ReleasePointType: Vertical
Latitude: 33.642752
Longitude: -84.406694
Height: 78.00
RuleID: 67
RefType: SIP
RefCode: .02(2)(yy)
Description: Emissions of Nitrogen Oxides from Major Sources
RuleID: 20
RefType: SIP
RefCode: .02(2)(g)
Description: Sulfur Dioxide
RuleID: 6
RefType: SIP
RefCode: .02(2)(b)
Description: Visible Emissions
RuleID: 58
RefType: SIP
RefCode: .02(2)(tt)
Description: VOC Emissions from Major Sources

Description: Jet Engine and APU Test Cells

* [Group 2]

EGID: FC01
EGType: Common Regulations (CReg) Group
NoSpecificMonitoring: No
NoSpecificTesting: Yes
MonitoringDataFilled: Yes
TestingDataFilled: No
-- Detail --:

Emission Path Group Type: Common Regulations (CReg) Group
Emission Path Group Identifier: FC01
Check here if no specific monitoring needed: false
Check here if no specific testing needed: true
Description: Aerospace Flush Cleaning
EUID: SHEA5901
EUType: Miscellaneous

Detail

MonitoringLocation: Facility records
PollutantName: Total HAP
PollutantID: 620

PollutantCd: TOTAL-HAP
SubstanceChemName: CAP1
SubDescription: Total HAP pollutant
MonitoringMethod: Recordkeeping
RecordType: Composition and vapor pressure data for flush cleaning solvents, based on MSDS, other manufacturer's data, standard engineering reference texts, or gas chromatographic analysis
ReportingFrequency: N/A
ApplicableRegulation: 297
ApplicableEU: SHEA5901
MonitoringLocation: Facility records
PollutantName: Volatile Organic Compounds
PollutantID: 617
PollutantCd: VOC
SubstanceChemName: CAP1
SubDescription: Volatile Organic Compounds
MonitoringMethod: Recordkeeping
RecordType: Annual amount of each flush cleaning solvent used
ReportingFrequency: Annually
ApplicableRegulation: 297
ApplicableEU: SHEA5901
Emission Unit Type: 10
Emission Source Identifier: SHEA5901
Emission Source Name: SHEA5901
Description: 40-gallon pneumatic pressure pot with spray gun for flush clean operations

Description: Aerospace Flush Cleaning

General Comment

Section J General Comment

Figure 2 - Site Layout

NO	DESCRIPTION	DATE	BY	REFERENCE DRAWINGS
A	SCHEMATIC DESIGN RELEASE	6/15/2016	RDJ	

NOT FOR CONSTRUCTION

SCHEMATIC DESIGN

PROPRIETARY STATEMENT

THE INFORMATION DISCLOSED HEREIN IS PROPRIETARY AND SHALL NOT BE REPRODUCED, USED OR DISCLOSED TO THIRD PARTIES WITHOUT THE EXPRESS WRITTEN CONSENT OF AERO SYSTEMS ENGINEERING, INC.

OWNER: DELTA

Hartfields-Jackson Atlanta International Airport
1775 M H Jackson Service Rd, Atlanta, GA 30354

ARCHITECT/ENGINEER OF RECORD: hargrove engineers+constructors

Hargrove and Associates
6470 East Johns Crossing, Suite 300, Johns Creek, GA 30097
678.477.7450 - hargrove-epc.com

		DATE
DRAWN BY	R. JOHNSON	06/01/16
CHECKED BY	D. BROWN	06/02/16
APPROVED BY	B. THORNTON	06/03/16
RELEASED BY		

P/N: 900218-001 DOC CLASS B

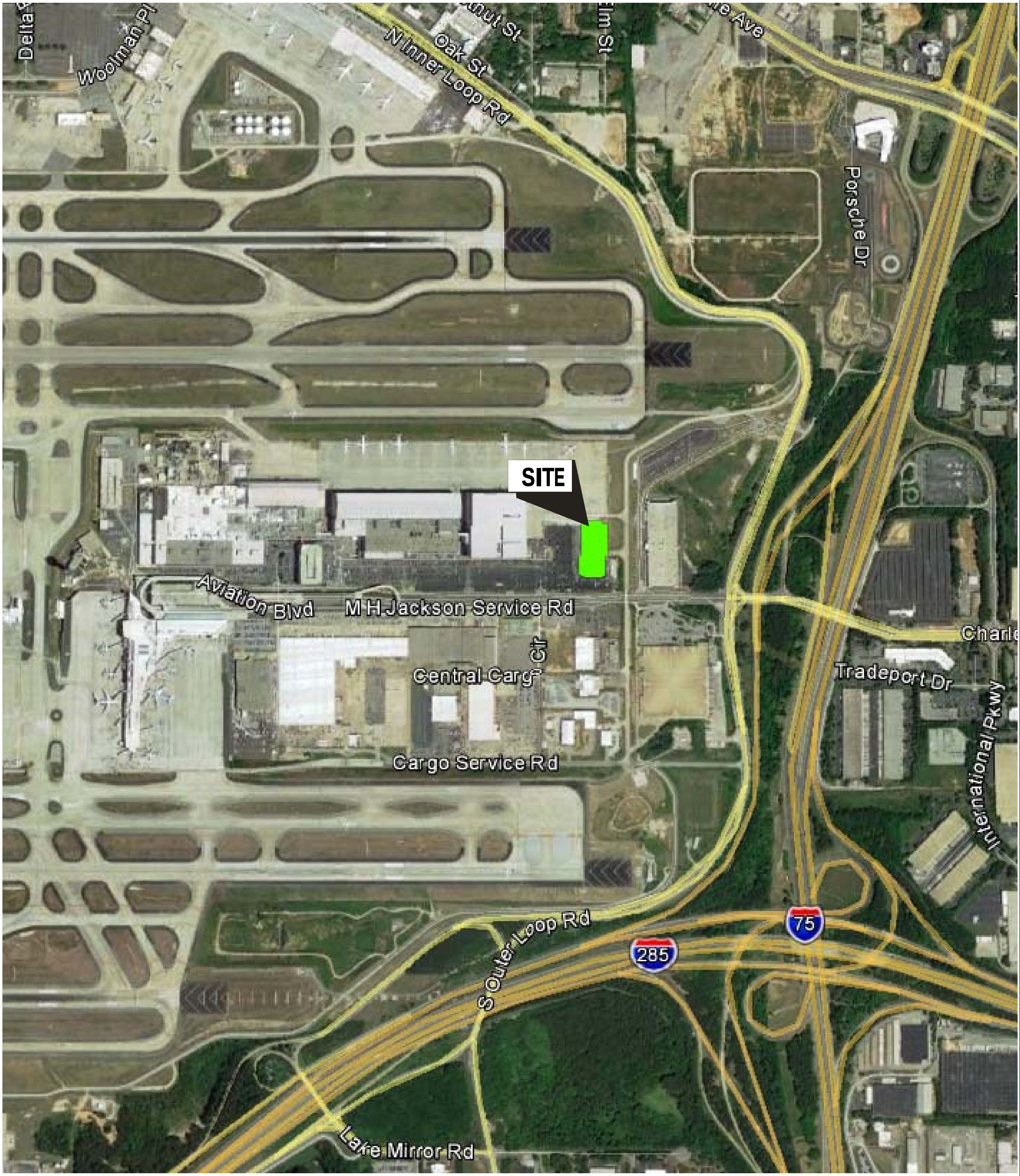
FluiDyne | AeroSystems
358 East Fillmore Avenue · St. Paul, MN 55107 · USA

SIZE	FSCM NO	DRAWING NO	PROJECT NO
ARCH 'E1'	54933	T15017-C-003	T15017

DRAWING/SHEET TITLE: ENGINE TEST FACILITY, 48 FT, DELTA AIR LINES
PRELIMINARY LAYOUT PLAN

OWNER NO: -
ARCHITECT/ENGINEER NO: 1142.151191.20
SHEET NUMBER: C-003
REV: A
SCALE: 1" = 30' As indicated
SHEET 1 OF 1

A360://T15017 Delta/T15017_03_Delta_ARCH.rvt

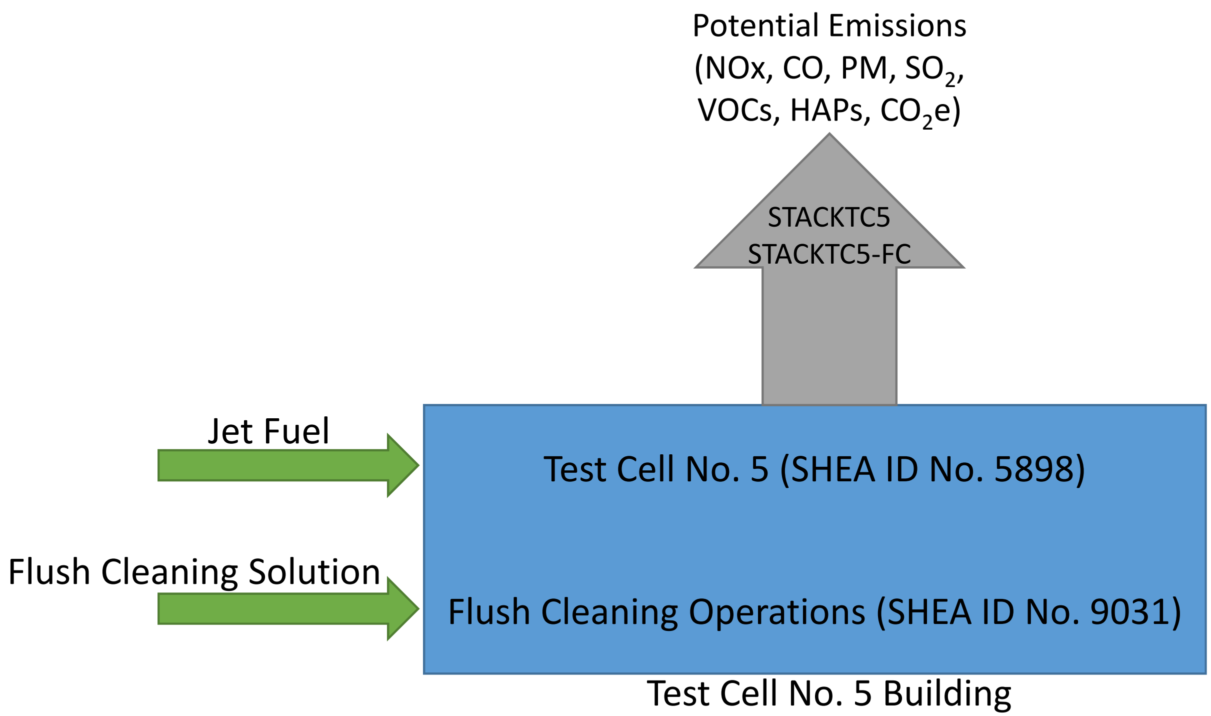


EPS

N

Delta Air Lines, Inc. Technical Operations Center
1775 MH Jackson Service Road
Atlanta, Georgia 30354

NONATTAINMENT NEW SOURCE REVIEW PERMIT APPLICATION
FOR JET ENGINE TEST CELL NO. 5
FIGURE 1 - GENERAL AREA MAP


Potential Emissions
(NOx, CO, PM, SO_2,
VOCs, HAPs, CO_2e)
STACKTC5
STACKTC5-FC
Jet Fuel
Test Cell No. 5 (SHEA ID No. 5898)
Flush Cleaning Solution
Flush Cleaning Operations (SHEA ID No. 9031)
Test Cell No. 5 Building

CONFIRMATION OF SUBMITTAL

1. Your application has been received and will be reviewed shortly.
2. Check your account, email and text message for system notification at various mile stones.

Thank you for using the GEOS system.

Please click Here to print your receipt.

Print

Submittal Summary

Submittal ID:	**44147**	Submittal Name:	**Title V Application**
Submitted Date:	**2/21/2017 11:10:25 AM**	Submitted by:	**Don Mitacek 1775 Aviation Boulevard Atlanta GA 30354 404-714-3362 don.mitacek@delta.com**
Status:	**Engineering Review**	Submission Method:	**On-line submission**
Facility / Property Name:	**DELTA AIR LINES INC. - TECHNICAL OPERATIONS CENTER**		

Submittal Form List

- A. General Information
- B. Contact Information
- C. Miscellaneous Application Details
- D. Control Device
- E. Release Point
- F. Emission Source
- G. Emission Group
- H. Emission & Activity
- I. Monitoring & Testing
- J. CAM Plan

Attachment List

Building Layout (Overhead View) (Required) -- Online

- Figure 2 - Site Layout (C-003 - RevA).pdf

General Area Map (Required) -- Online

- Figure 1 - General Area Map.pdf

Other (Optional) -- Online

- Delta Test Cell 5 Permit Application 2017 02 20.pdf

Plan Site Map (Required) -- Online

- Figure 1 - General Area Map.pdf

Process Flow Diagram (Required) -- Online

- Process Flow Diagram.pdf

Certification Receipt

Certification Statement:	**I hereby certify that I am the owner or authorized agent of the owner, of the described property. Further, I consent to the inspection to be done as described.**
Certification Question:	**What is your birthday?**
Certification	*******

Question Answer:	
PIN Number:	************************
Responsible Officer:	**Don Mitacek**
Sender IP Address:	**172.168.168.254**

Print

(Last modified Time: 2016-12-29 12:04 PM)

APPENDIX E

Toxic Impact Assessment

AIR TOXICS MODELING & IMPACT ASSESSMENT
DELTA AIR LINES, INC. – TECHNICAL OPERATIONS CENTER
TEST CELL No. 5
ATLANTA, GEORGIA

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

1.1 Overview

In January 2017, an Air Toxics Modeling & Impact Assessment, herein referred to as the "Assessment," was conducted for the Jet Engine Test Cell No. 5 (Test Cell No. 5) at the Delta Air Lines, Inc. – Technical Operations Center facility (TechOps) in Atlanta, Georgia. The purpose of the Assessment was to estimate the environmental impact of potential sources of toxic air pollutants from Test Cell No. 5. A toxic air pollutant is defined as any substance which may have an adverse effect on public health, excluding any specific substance that is covered by a State or Federal ambient air quality standard.

The Assessment involved the calculation of the Acceptable Ambient Concentration (AAC) of all toxic air pollutants generated from Test Cell No. 5, modeling of the predicted ambient impact, and comparing the modeled results with the toxic air pollutant AAC. The impact of toxic air pollutants is assessed by comparing the Maximum Ground Level Concentration (MGLC) to their respective AAC. Toxic emissions from the test cell fuel storage tanks are negligible. Therefore, they are not included in this assessment as their impacts are expected to be well below the respective AACs.

The Assessment was performed in accordance with the Georgia Environmental Protection Division (EPD) Air Protection Branch approved protocol for conducting an Air Toxics Modeling & Impact Assessment *(i.e., Georgia EPD Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*, *revised June 21, 1998*). The SCREEN3 Plume Dispersion Model version 13043 was used to predict the MGLC of each toxic air pollutant. SCREEN3 is a model developed by the U.S. EPA which provides conservative estimates of the MGLC for point, area, and volume sources. SCREEN3 is a screening version of a U.S EPA's complex model referred to as the ISC3 model.

1.2 Summary of Results

The modeling results were compared to the AAC for each toxic air pollutant to assess their impact. The concentrations of all modeled toxic air pollutants were below their respective AACs, and accordingly, Test Cell No. 5 passed the Assessment.

2 ASSESSMENT PROTOCOL

2.1 Toxic Impact Assessment

Toxic air pollutants and their respective emission rates are presented in Attachment 1 of this document. Attachment 1 also presents the summary of the AACs from recommended reference documents. The emission rate for each pollutant was estimated for the purposes of this analysis using VOC emissions from test cell performance data and published emission factors.

2.2 Modeling Guidelines

The modeling and impact assessment were performed according to the *Division's Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions* (revised June 21, 1998). The process of modeling and impact assessment was divided into several steps as described below:

- Development of an Acceptable Ambient Concentration (AAC).
- Screening-level assessment using the SCREEN3 computer model to predict the Maximum Ground Level Concentration (MGLC). The screening was performed according to the SCREEN3 Model User's Guide (EPA publication number 454/B-95-004). The most recent version (v. 13043) of the SCREEN3 model was used.
- Comparison of the predicted MGLC's to the AAC's.

2.3 Acceptable Ambient Pollutant Concentrations

An AAC must be developed for each toxic air pollutant and applicable averaging time. The AAC is based on current pollutant toxicity data adjusted for operating hours and risk factors, and is expressed as a milligram per cubic meter (mg/m^3) limit. For acute sensory irritants, an assessment must be made for both the 24 hour exposures and the short-term, 15-minute exposures.

EPD has an established priority schedule for pollutant toxicity data for the determination of AAC's as follows:

- EPA Integrated Risk Information System (IRIS) reference concentration
- Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits (PEL's) - 29 CFR Part 1910 Subpart Z
- American Congress of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLV's)

- National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limits (REL's)
- Lethal Dose – 50% (LD50) Toxicity Data
- Other Methods

The toxicity data for each pollutant and the calculated AAC's are shown in Attachment 1. All of the annual AAC's are based on IRIS, while the 15-minute AAC's are based on the ceiling limits and short term exposure limits presented in the OSHA Standards, ACGIH Recommendations, or NIOSH Recommendations. Please note that according to the EPD's *Guideline for Ambient Impact Assessment of Toxic Air Pollutant Emissions*, if annual and ceiling limits are applicable, only those two limits are included in the analysis (i.e., no 24-hour AAC applies).

3 SCREEN3 MODELING

The latest version of the SCREEN model, SCREEN3 Version 13043 was used.

3.1 Modeling Protocol

The SCREEN3 modeling parameters were selected based on the proposed design of the Test Cell No. 5 stack. The modeling parameters are listed in Table 1 below.

Table 1. - SCREEN3 Modeling Parameters

Parameter	Value
Source	TC5-1
Source Type	Point
Emission Rate (g/s)	0.126
Stack Height (m)	23.77
Stack Diameter (m)	16.51
Exhaust Flow Rate (acfm)	6,040,000
Stack Temp (K)	322.6
Ambient Air Temp (K)	293
Urban/Rural Option	Urban
Building Downwash	No
Minimum Distance to Fence (m)	55

3.2 MGLC Calculations and Compliance Evaluation

First, the one-hour MGLC was determined using SCREEN3. At a 0.126 grams per second (g/s), or 1 pound per hour (lb/hr) emission rate, the maximum one hour concentration was determined to be 0.1867 micrograms per cubic meter (μg/m^3). The one-hour-averaging-period MGLC for all modeled pollutants could then be determined by multiplying the emission rate for each given pollutant by the MGLC predicted by the model. As recommended by the EPD guideline, the one-hour averaging period can be translated to other averaging periods using the following factors:

- To obtain a 15-minute averaging period, multiply the 1-hour MGLC by 1.32;
- To obtain a 24-hour averaging period, multiply the 1-hour MGLC by 0.40;
- To obtain an annual averaging period, multiply the 1-hour MGLC by 0.08

The calculated MGLC's were then compared to the AAC's for determining acceptability. The results indicate that the MGLC's of the modeled air pollutants are below their respective AAC's. A comparison of the MGLC's to the respective AAC's along with a compliance analysis is included in Attachment 1. A copy of the SCREEN3 model results is included as Attachment 2.

ATTACHMENT 1

SUMMARY OF TOXIC IMPACT ASSESSEMENT

Delta Air Lines, Inc.
Summary of Ambient Impact Assessment of Toxic Air Pollutant Emissions

Facility:	Delta Air Lines, Inc - Technical Operations Center (Test Cell No. 5)		AIRS No. :	04-13-063-00105	Permit Log No.:		Prepared On: 01-Feb-17
Distance To Nearest Property Line:	180 ft	Source Type: Point	Unit MGLC:	1.8670E-04 mg/m3 at	5227 meters from the source.		Prepared By: S. Chandru
Stack Height:	78 ft	Inside Dia. 54 ft					
	23.77 meters	16.51 meters					

		A	B			C		D			E				F			G					
Compound Name	CAS No.	Emission Rate	RfC	"C" or STEL	TWA	Safety Factor		AAC, mg/m3			SCREEN3 Modeling Results/MGLC, mg/m3				Acceptability of the Predicted MGLC/Ambient Impact			Notes	Percent of AAC			HAP	Requires Refined Analysis
		lb./hr.	mg/m3	mg/m3	mg/m3	STEL/"C"	TWA	15 Minutes	24 Hours	Annual	1 hour	15 minutes	24 Hours	Annual	15-minute Impact	24-hour Impact	Annual Impact		15-minute	24-hour	Annual	(Yes/No)	(Yes/No)
1,3-Butadiene	106-99-0	2.60E-01	3.00E-05	11.06	na	10	300	1.11E+00	na	3.00E-05	4.85E-05	6.40E-05	na	3.88E-06	Acceptable	na	Acceptable		< 0.01%	na	12.93%	Yes	No
Acetaldehyde	75-07-0	6.58E-01	5.00E-03	45.04	na	10	100	4.50E+00	na	5.00E-03	1.23E-04	1.62E-04	na	9.82E-06	Acceptable	na	Acceptable		< 0.01%	na	0.20%	Yes	No
Acrolein	107-02-8	3.77E-01	2.00E-05	0.23	na	10	100	2.30E-02	na	2.00E-05	7.04E-05	9.29E-05	na	5.63E-06	Acceptable	na	Acceptable		0.40%	na	28.15%	Yes	No
Benzene	71-43-2	2.59E-01	1.30E-04	15.97	na	10	300	1.60E+00	na	1.30E-04	4.83E-05	6.38E-05	na	3.86E-06	Acceptable	na	Acceptable		< 0.01%	na	2.97%	Yes	No
Ethylbenzene	100-41-4	2.68E-02	1.00E+00	545.00	na	10	100	5.45E+01	na	1.00E+00	5.00E-06	6.60E-06	na	4.00E-07	Acceptable	na	Acceptable		< 0.01%	na	< 0.01%	Yes	No
Formaldehyde	50-00-0	1.89E+00	8.00E-04	2.46	na	10	300	2.46E-01	na	8.00E-04	3.54E-04	4.67E-04	na	2.83E-05	Acceptable	na	Acceptable		0.19%	na	3.54%	Yes	No
Isopropylbenzene	98-82-8	4.62E-04	4.00E-01	na	245.00	na	100	na	5.83E-01	4.00E-01	8.62E-08	na	3.45E-08	6.90E-09	na	Acceptable	Acceptable		na	< 0.01%	< 0.01%	Yes	No
Methanol	67-56-1	2.78E-01	2.00E+01	327.61	na	10	100	3.28E+01	na	2.00E+01	5.19E-05	6.85E-05	na	4.15E-06	Acceptable	na	Acceptable		< 0.01%	na	< 0.01%	Yes	No
Naphthalene	91-20-3	8.33E-02	3.00E-03	75.00	na	10	100	7.50E+00	na	3.00E-03	1.55E-05	2.05E-05	na	1.24E-06	Acceptable	na	Acceptable		< 0.01%	na	0.04%	Yes	No
o-xylene	95-47-6	2.56E-02	1.00E-01	651.29	na	10	100	6.51E+01	na	1.00E-01	4.77E-06	6.30E-06	na	3.82E-07	Acceptable	na	Acceptable		< 0.01%	na	< 0.01%	Yes	No
Phenol	108-95-2	1.12E-01	na	60.00	19.00	10	100	6.00E+00	4.52E-02	na	2.09E-05	2.75E-05	8.35E-06	na	Acceptable	Acceptable	na		< 0.01%	0.02%	na	Yes	No
Propionaldehyde	123-38-6	1.12E-01	8.00E-03	na	47.53	na	100	na	1.13E-01	8.00E-03	2.09E-05	na	8.36E-06	1.67E-06	na	Acceptable	Acceptable		na	< 0.01%	0.02%	Yes	No
Styrene	100-42-5	4.76E-02	1.00E+00	852.35	na	10	100	8.52E+01	na	1.00E+00	8.88E-06	1.17E-05	na	7.10E-07	Acceptable	na	Acceptable		< 0.01%	na	< 0.01%	Yes	No
Toluene	108-88-3	9.88E-02	5.00E+00	1130.55	na	10	100	1.13E+02	na	5.00E+00	1.85E-05	2.44E-05	na	1.48E-06	Acceptable	na	Acceptable		< 0.01%	na	< 0.01%	Yes	No
Xylenes (m- & p-)	108-38-3/ 106-42-3	4.34E-02	1.00E-01	651.29	na	10	100	6.51E+01	na	1.00E-01	8.10E-06	1.07E-05	na	6.48E-07	Acceptable	na	Acceptable		< 0.01%	na	< 0.01%	Yes	No
2-Methylnaphthalene	91-57-6	3.17E-02	na	na	0.20	na	300	na	1.59E-04	na	5.92E-06	na	2.37E-06	na	na	Acceptable	na		na	1.49%	na	No	No
benzaldehyde	100-52-7	7.23E-02	na	na	na	na	100	na	na	na	1.35E-05	na	na	na	na	na	na		na	na	na	No	No
1,2,3-trimethylbenzene	526-73-8	1.63E-02	6.00E-02	na	122.89	na	100	na	2.93E-01	6.00E-02	3.05E-06	na	1.22E-06	2.44E-07	na	Acceptable	Acceptable		na	< 0.01%	< 0.01%	No	No
1,2,4-trimethylbenzene	95-63-6	5.39E-02	6.00E-02	na	122.89	na	100	na	2.93E-01	6.00E-02	1.01E-05	na	4.02E-06	8.05E-07	na	Acceptable	Acceptable		na	< 0.01%	< 0.01%	No	No
1,3,5-trimethylbenzene	108-67-8	8.31E-03	6.00E-02	na	122.89	na	100	na	2.93E-01	6.00E-02	1.55E-06	na	6.21E-07	1.24E-07	na	Acceptable	Acceptable		na	< 0.01%	< 0.01%	No	No
1-decene	872-05-9	2.85E-02	na	na	na	na	100	na	na	na	5.32E-06	na	na	na	na	na	na		na	na	na	No	No
1-heptene	25339-56-4	6.74E-02	na	na	na	na	100	na	na	na	1.26E-05	na	na	na	na	na	na		na	na	na	No	No
1-hexene	592-41-6	1.13E-01	na	na	na	na	100	na	na	na	2.12E-05	na	na	na	na	na	na		na	na	na	No	No
1-methyl naphthalene	90-12-0	3.80E-02	na	na	2.91	na	100	na	6.93E-03	na	7.10E-06	na	2.84E-06	na	na	Acceptable	na		na	0.04%	na	No	No
1-nonene	124-11-8	3.79E-02	na	na	na	na	100	na	na	na	7.07E-06	na	na	na	na	na	na		na	na	na	No	No
1-octene	25377-83-7	4.25E-02	na	na	na	na	100	na	na	na	7.93E-06	na	na	na	na	na	na		na	na	na	No	No
1-pentene	109-67-1	1.19E-01	na	na	na	na	100	na	na	na	2.23E-05	na	na	na	na	na	na		na	na	na	No	No
2-methyl-1-butene	563-46-2	2.16E-02	na	na	na	na	100	na	na	na	4.02E-06	na	na	na	na	na	na		na	na	na	No	No
2-methyl-1-pentene	763-29-1	5.23E-03	na	na	na	na	100	na	na	na	9.77E-07	na	na	na	na	na	na		na	na	na	No	No
2-methyl-2-butene	513-35-9	2.85E-02	na	na	na	na	100	na	na	na	5.32E-06	na	na	na	na	na	na		na	na	na	No	No
2-methylpentane	107-83-5	6.28E-02	na	3524.34	1762.17	10	100	3.52E+02	4.20E+00	na	1.17E-05	1.55E-05	4.69E-06	na	Acceptable	Acceptable	na		< 0.01%	< 0.01%	na	No	No
3-methyl-1-butene	563-45-1	1.72E-02	na	na	na	na	100	na	na	na	3.22E-06	na	na	na	na	na	na		na	na	na	No	No
4-methyl-1-pentene	691-37-2	1.06E-02	na	na	na	na	100	na	na	na	1.98E-06	na	na	na	na	na	na		na	na	na	No	No
acetone	67-64-1	5.68E-02	na	1187.12	2400.00	10	100	1.19E+02	5.71E+00	na	1.06E-05	1.40E-05	4.24E-06	na	Acceptable	Acceptable	na		< 0.01%	< 0.01%	na	No	No
acetylene	74-86-2	6.06E-01	na	2662.00	na	10	100	2.66E+02	na	na	1.13E-04	1.49E-04	na	na	Acceptable	na	na		< 0.01%	na	na	No	No
butyraldehyde	123-72-8	1.83E-02	na	na	na	na	100	na	na	na	3.42E-06	na	na	na	na	na	na		na	na	na	No	No
c14-alkane	No CAS	2.86E-02	na	na	na	na	100	na	na	na	5.35E-06	na	na	na	na	na	na		na	na	na	No	No
c15-alkane	No CAS	2.72E-02	na	na	na	na	100	na	na	na	5.09E-06	na	na	na	na	na	na		na	na	na	No	No
c16-alkane	No CAS	2.25E-02	na	na	na	na	100	na	na	na	4.20E-06	na	na	na	na	na	na		na	na	na	No	No
c18-alkane	No CAS	3.08E-04	na	na	na	na	100	na	na	na	5.75E-08	na	na	na	na	na	na		na	na	na	No	No
c4-benzene + c3-aroald	No CAS	1.01E-01	na	na	na	na	100	na	na	na	1.89E-05	na	na	na	na	na	na		na	na	na	No	No
c5-benzene + c4-aroald	No CAS	4.99E-02	na	na	na	na	100	na	na	na	9.31E-06	na	na	na	na	na	na		na	na	na	No	No
cis-2-butene	590-18-1	3.23E-02	na	na	573.72	na	100	na	1.37E+00	na	6.04E-06	na	2.41E-06	na	na	Acceptable	na		na	< 0.01%	na	No	No
cis-2-pentene	627-20-3	4.25E-02	na	na	na	na	100	na	na	na	7.93E-06	na	na	na	na	na	na		na	na	na	No	No
crotonaldehyde	4170-30-3	1.59E-01	na	0.86	6.00	10	100	8.60E-02	1.43E-02	na	2.97E-05	3.92E-05	1.19E-05	na	Acceptable	Acceptable	na		0.05%	0.08%	na	No	No
dimethylnapthalenes	28804-88-8	1.39E-02	na	na	na	na	100	na	na	na	2.59E-06	na	na	na	na	na	na		na	na	na	No	No
ethane	74-84-0	8.02E-02	na	na	na	na	100	na	na	na	1.50E-05	na	na	na	na	na	na		na	na	na	No	No
ethylene	74-85-1	2.38E+00	na	na	229.45	na	100	na	5.46E-01	na	4.44E-04	na	1.78E-04	na	na	Acceptable	na		na	0.03%	na	No	No
glyoxal	107-22-2	2.80E-01	na	na	0.10	na	100	na	2.38E-04	na	5.22E-05	na	2.09E-05	na	na	Acceptable	na		na	8.77%	na	No	No
isobutene/1-butene	106-98-9	2.70E-01	na	na	573.72	na	100	na	1.37E+00	na	5.04E-05	na	2.02E-05	na	na	Acceptable	na		na	< 0.01%	na	No	No
isovaleraldehyde	590-86-3	4.93E-03	na	na	na	na	100	na	na	na	9.20E-07	na	na	na	na	na	na		na	na	na	No	No
methacrolein	78-85-3	6.60E-02	na	na	na	na	100	na	na	na	1.23E-05	na	na	na	na	na	na		na	na	na	No	No
methylglyoxal	78-98-8	2.31E-01	na	na	na	na	100	na	na	na	4.32E-05	na	na	na	na	na	na		na	na	na	No	No
m-ethyltoluene	620-14-4	2.37E-02	na	na	na	na	100	na	na	na	4.43E-06	na	na	na	na	na	na		na	na	na	No	No
m-tolualdehyde	620-23-5	4.28E-02	na	na	na	na	100	na	na	na	7.99E-06	na	na	na	na	na	na		na	na	na	No	No
n-decane	124-18-5	4.93E-02	na	na	na	na	100	na	na	na	9.20E-06	na	na	na	na	na	na		na	na	na	No	No

Delta Air Lines, Inc.
Summary of Ambient Impact Assessment of Toxic Air Pollutant Emissions

Facility:	Delta Air Lines, Inc - Technical Operations Center (Test Cell No. 5)	AIRS No. :	04-13-063-00105	Permit Log No.:		Prepared On: 01-Feb-17
Distance To Nearest Property Line:	180 ft	Source Type: Point	Unit MGLC: **1.8670E-04** mg/m3 at 5227 meters from the source.			Prepared By: S. Chandru
Stack Height:	78 ft	Inside Dia. 54 ft				
	23.77 meters	16.51 meters				

		A	B			C		D			E				F			G					
Compound Name	**CAS No.**	**Emission Rate**	**RfC**	**"C" or STEL**	**TWA**	**Safety Factor**		**AAC, mg/m3**			**SCREEN3 Modeling Results/MGLC, mg/m3**				**Acceptability of the Predicted MGLC/Ambient Impact**			**Notes**	**Percent of AAC**			**HAP**	**Requires Refined Analysis**
		lb./hr.	**mg/m3**	**mg/m3**	**mg/m3**	**STEL/"C"**	**TWA**	**15 Minutes**	**24 Hours**	**Annual**	**1 hour**	**15 minutes**	**24 Hours**	**Annual**	**15-minute Impact**	**24-hour Impact**	**Annual Impact**		**15-minute**	**24-hour**	**Annual**	**(Yes/No)**	**(Yes/No)**
n-dodecane	112-40-3	7.11E-02	na	na	na	na	100	na	na	na	1.33E-05	na	na	na	na	na	na		na	na	na	No	No
n-heptadecane	629-78-7	1.39E-03	na	na	na	na	100	na	na	na	2.59E-07	na	na	na	na	na	na		na	na	na	No	No
n-heptane	142-82-5	9.85E-03	na	2049.08	2000.00	10	100	2.05E+02	4.76E+00	na	1.84E-06	2.43E-06	7.36E-07	na	Acceptable	Acceptable	na		< 0.01%	< 0.01%	na	No	No
n-hexadecane	544-76-3	7.54E-03	na	na	na	na	100	na	na	na	1.41E-06	na	na	na	na	na	na		na	na	na	No	No
n-nonane	111-84-2	9.54E-03	na	na	1050.00	na	100	na	2.50E+00	na	1.78E-06	na	7.13E-07	na	na	Acceptable	na		na	< 0.01%	na	No	No
n-octane	111-65-9	9.54E-03	na	1800.00	2350.00	10	100	1.80E+02	5.60E+00	na	1.78E-06	2.35E-06	7.13E-07	na	Acceptable	Acceptable	na		< 0.01%	< 0.01%	na	No	No
n-pentadecane	629-62-9	2.66E-02	na	na	na	na	100	na	na	na	4.97E-06	na	na	na	na	na	na		na	na	na	No	No
n-pentane	109-66-0	3.05E-02	na	1800.00	2950.00	10	100	1.80E+02	7.02E+00	na	5.69E-06	7.51E-06	2.28E-06	na	Acceptable	Acceptable	na		< 0.01%	< 0.01%	na	No	No
n-propylbenzene	103-65-1	8.16E-03	na	na	na	na	100	na	na	na	1.52E-06	na	na	na	na	na	na		na	na	na	No	No
n-tetradecane	629-59-4	6.40E-02	na	na	na	na	100	na	na	na	1.20E-05	na	na	na	na	na	na		na	na	na	No	No
n-tridecane	629-50-5	8.24E-02	na	na	na	na	100	na	na	na	1.54E-05	na	na	na	na	na	na		na	na	na	No	No
n-undecane	1120-21-4	6.83E-02	na	na	na	na	100	na	na	na	1.28E-05	na	na	na	na	na	na		na	na	na	No	No
o-ethyltoluene	611-14-3	1.00E-02	na	na	na	na	100	na	na	na	1.87E-06	na	na	na	na	na	na		na	na	na	No	No
o-tolualdehyde	529-20-4	3.54E-02	na	na	na	na	100	na	na	na	6.61E-06	na	na	na	na	na	na		na	na	na	No	No
p-ethyltoluene	622-96-8	9.85E-03	na	na	na	na	100	na	na	na	1.84E-06	na	na	na	na	na	na		na	na	na	No	No
p-tolualdehyde	104-87-0	7.39E-03	na	na	na	na	100	na	na	na	1.38E-06	na	na	na	na	na	na		na	na	na	No	No
propane	74-98-6	1.20E-02	na	na	1800.00	na	100	na	4.29E+00	na	2.24E-06	na	8.97E-07	na	na	Acceptable	na		na	< 0.01%	na	No	No
propylene	115-07-1	6.98E-01	na	na	860.53	na	100	na	2.05E+00	na	1.30E-04	na	5.21E-05	na	na	Acceptable	na		na	< 0.01%	na	No	No
trans-2-hexene	4050-45-7	4.62E-03	na	na	na	na	100	na	na	na	8.62E-07	na	na	na	na	na	na		na	na	na	No	No
trans-2-pentene	646-04-8	5.53E-02	na	na	na	na	100	na	na	na	1.03E-05	na	na	na	na	na	na		na	na	na	No	No
valeraldehyde	110-62-3	3.77E-02	na	na	176.28	na	100	na	4.20E-01	na	7.04E-06	na	2.82E-06	na	na	Acceptable	na		na	< 0.01%	na	No	No

1. To obtain the worst emission scenario, an annual emission time of 8,760 hours is used in the SCREEN3 modeling as public exposure time, i.e., weekly emission occurs more than 40 hours. As the result, there is no operating time limit while the TWAs are lowered by a ratio of 40/168 to account for the longest public pollutant exposure according to Ta = To(40/X).

2. A unit emission rate, i.e. 1.0 pound per hour should be used in the SCREEN3 modeling to obtain a unit MGLC. The MGLCs of the toxic compounds involved are obtained by scaling up or down from the unit MGLC using the ratios between the emission rates of those compounds and the unit emission rate.

3. Input appropriate data only in the colored area. When such data are unavailable or unnecessary, input either "na" or "NA" instead to allow the spreadsheet to carry out correct calculations and logic judgements.

4. The spreadsheet is protected from any accidental erase or change of the formulas or logic statements. To remove the protection, open "Tools" manual, chose "Protection", then "Unprotect sheet ..." (no password will be asked).

Delta Air Lines, Inc.
SCREEN3 Modeling Parameters

Parameter	Value[1]
Source	TC5-1
Source Type	Point
Emission Rate (g/s)	0.126
Stack Ht (m)	23.77
Stack Diameter[2] (m)	16.51
Exhaust Flow Rate (acfm)	6,040,000
Stack Temp (K)	322.6
Ambient Air Temp (K)	293
Urban/Rural Option	Urban
Building Downwash	No
Minimum Distance to Fence (m)	55

Notes:

1. Exhaust parameters provided by Dustin Thames at Delta Air Lines, Inc. Worst case flow parameters assumed based on data provided for several engines that are planned to be tested at Test Cell No. 5.

2. The exhaust stack is a square (dimensions: 48 ft * 48 ft). Therefore, equivalent stack diameter is calculated using the following equation: D_{eq} = 2 * sqrt (Length * Width ÷ 3.14)

Type	Pollutant	CAS Number	IRIS (mg/m3)	IRIS Method	OSHA (PEL)	ACGIH (TLV)	NIOSH	Known Human Carcinogen?	IRIS Rfc or RBAC (mg/m3)	Reference method	"C" or STEL (mg/m3)	TWA (mg/m3)	STEL Safety Factor	TWA Safety Factor
VHAP	1,3 - Butadiene	106-99-0	**3.00E-05**	RBAC	1 ppm (TWA), **5 ppm (STEL), 11.06 mg/m3 (STEL)**	2 ppm (TWA), 4.42 mg/m3 (TWA)	None	Yes	3.00E-05	RBAC	11.06	na	10	300
VHAP	Acetaldehyde	75-07-0	**5.00E-03**	RBAC	200 ppm (TWA), 360 mg/m3 (TWA)	**25 ppm (c), 45.04 mg/m3 (c)**	None	No	5.00E-03	RBAC	45.04	na	10	100
VHAP	Acrolein	107-02-8	**2.00E-05**	RfC	0.1 ppm (TWA), 0.25 mg/m3 (TWA)	**0.1 ppm (c), 0.23 mg/m3 (c)**	0.1 ppm (TWA), 0.25 mg/m3 (TWA), 0.3 ppm (STEL) 0.8 mg/m3 (STEL)	No	2.00E-05	RfC	0.23	na	10	100
VHAP	Benzene	71-43-2	**1.30E-04**	RBAC	1 ppm (TWA), **5 ppm (STEL), 15.97 mg/m3 (STEL)**	0.5 ppm (TWA), 2.5 ppm (STEL)	0.1 ppm (TWA), 1 ppm (STEL)	Yes	1.30E-04	RBAC	15.97	na	10	300
VHAP	Ethylbenzene	100-41-4	**1.00E+00**	RfC	100 ppm (TWA), 435 mg/m3 (TWA)	20 ppm (TWA)	435 mg/m3 (TWA) , **545 mg/m3 (STEL)**	No	1.00E+00	RfC	545.00	na	10	100
VHAP	Formaldehyde	50-00-0	**8.00E-04**	RBAC	0.75 ppm (TWA), **2 ppm (STEL), 2.46 mg/m3 (STEL)**	0.3 ppm (c)	0.016 ppm (TWA), 0.1 ppm (c)	Yes	8.00E-04	RBAC	2.46	na	10	300
VHAP	Isopropylbenzene (Cumene)	98-82-8	**4.00E-01**	RfC	**50 ppm (TWA) , 245 mg/m3 (TWA)**	50 ppm (TWA)	245 mg/m3 (TWA)	No	4.00E-01	RfC	na	245.00	na	100
VHAP	Methanol	67-56-1	**20.00**	RfC	200 ppm (TWA), 260 mg/m3 (TWA)	200 ppm (TWA),**250 ppm (STEL), 327.61 mg/m3 (STEL)**	260 mg/m3 (TWA), 325 mg/m3 (STEL)	No	2.00E+01	RfC	327.61	na	10	100
VHAP	Naphthalene	91-20-3	**3.00E-03**	RfC	10 ppm (TWA), 50 mg/m3 (TWA)	10 ppm (TWA)	50 mg/m3 (TWA), **75 mg/m3 (STEL)**	No	3.00E-03	RfC	75.00	na	10	100
VHAP	o-Xylene (As mixed isomers CAS 1330-20-7 in IRIS, OSHA, and ACGIH)	95-47-6	**1.00E-01**	RfC	100 ppm (TWA), 435 mg/m3 (TWA)	100 ppm (TWA), **150 ppm (STEL), 651.29 mg/m3 (STEL)**	100 ppm (TWA), 435 mg/m3 (TWA), 150 ppm (STEL), 655 mg/m3 (STEL)	No	1.00E-01	RfC	651.29	na	10	100
VHAP	Phenol	108-95-2	None		**5 ppm (TWA), 19 mg/m3 (TWA)**	5 ppm (TWA)	5 ppm (TWA), 19 mg/m3 (TWA), **15.6 ppm (c), 60 mg/m3 (c)**	No	na	na	60.00	19.00	10	100
VHAP	Propionaldehyde	123-38-6	**8.00E-03**	RfC	None	**20 ppm (TWA), 47.53 mg/m3 (TWA)**	None	No	8.00E-03	RfC	na	47.53	na	100
VHAP	Styrene	100-42-5	**1.00E+00**	RfC	100 ppm (TWA), **200 ppm (c), 852.35 mg/m3 (c)**	20 ppm (TWA), 40 ppm (STEL)	215 mg/m3 (TWA), 425 mg/m3 (STEL)	No	1.00E+00	RfC	852.35	na	10	100
VHAP	Toluene	108-88-3	**5.00E+00**	RfC	200 ppm (TWA), **300 ppm (c), 1130.55 mg/m3 (c)**	20 ppm (TWA)	375 mg/m3 (TWA), 560 mg/m3 (STEL)	No	5.00E+00	RfC	1130.55	na	10	100
VHAP	m-Xylene & p-Xylene (As mixed isomers CAS 1330-20-7 in IRIS, OSHA, and ACGIH)	108-38-3/ 106-42-3	**1.00E-01**	RfC	100 ppm (TWA), 435 mg/m3 (TWA)	100 ppm (TWA), **150 ppm (STEL), 651.29 mg/m3 (STEL)**	100 ppm (TWA), 435 mg/m3 (TWA), 150 ppm (STEL), 655 mg/m3 (STEL)	No	1.00E-01	RfC	651.29	na	10	100
VHAP (POM)	2-Methylnaphthalene	91-57-6	None		**0.2 mg/m3 (TWA)**	0.5 ppm (TWA), 2.91 mg/m3 (TWA)	None	Yes	na	na	na	0.20	na	300
TAP	Benzaldehyde	100-52-7	None		None	None	None	No	na	na	na	na	na	100
TAP	1,2,3-Trimethylbenzene	526-73-8	**6.00E-02**	RfC	None	**25 ppm (TWA), 122.89 mg/m3 (TWA)** Referenced as Trimethylbenzene mixed isomers (CAS 25551-13-7)	25 ppm (TWA), 125 mg/m3 (TWA)	No	6.00E-02	RfC	na	122.89	na	100
TAP	1,2,4-Trimethylbenzene	95-63-6	**6.00E-02**	RfC	None	**25 ppm (TWA), 122.89 mg/m3 (TWA)** Referenced as Trimethylbenzene mixed isomers (CAS 25551-13-7)	25 ppm (TWA), 125 mg/m3 (TWA)	No	6.00E-02	RfC	na	122.89	na	100
TAP	1,3,5-Trimethylbenzene	108-67-8	**6.00E-02**	RfC	None	**25 ppm (TWA), 122.89 mg/m3 (TWA)** Referenced as Trimethylbenzene mixed isomers (CAS 25551-13-7)	25 ppm (TWA), 125 mg/m3 (TWA)	No	6.00E-02	RfC	na	122.89	na	100
TAP	1-decene	872-05-9	None		None	None	None	No	na	na	na	na	na	100
TAP	1-heptene	25339-56-4	None		None	None	None	No	na	na	na	na	na	100
TAP	1-hexene	592-41-6	None		None	None	None	No	na	na	na	na	na	100
TAP	1-methyl naphthalene	90-12-0	None		None	**0.5 ppm (TWA), 2.91 mg/m3 (TWA)**	None	No	na	na	na	2.91	na	100
TAP	1-nonene	124-11-8	None		None	None	None	No	na	na	na	na	na	100
TAP	1-octene	25377-83-7	None		None	None	None	No	na	na	na	na	na	100
TAP	1-pentene	109-67-1	None		None	None	None	No	na	na	na	na	na	100
TAP	2-methyl-1-butene	563-46-2	None		None	None	None	No	na	na	na	na	na	100
TAP	2-methyl-1-pentene	763-29-1	None		None	None	None	No	na	na	na	na	na	100
TAP	2-methyl-2-butene	513-35-9	None		None	None	None	No	na	na	na	na	na	100
TAP	2-methylpentane	107-83-5	None		None	**500 ppm (TWA), 1762.17 mg/m3 (TWA), 1000 ppm (STEL), 3524.34 mg/m3 (STEL)**	100 ppm (TWA), 350 mg/m3 (TWA), 510 ppm (c), 1800 mg/m3 (c)	No	na	na	3524.34	1762.17	10	100
TAP	3-methyl-1-butene	563-45-1	None		None	None	None	No	na	na	na	na	na	100
TAP	4-methyl-1-pentene	691-37-2	None		None	None	None	No	na	na	na	na	na	100
TAP	Acetone	67-64-1	None		**1000 ppm, 2400 mg/m3 (TWA)**	250 ppm (TWA), **500 ppm (STEL), 1187.12 mg/m3 (STEL)**	250 ppm (TWA), 590 mg/m3 (TWA)	No	na	na	1187.12	2400.00	10	100
TAP	acetylene	74-86-2	None		None	None	**2500 ppm (c), 2662 mg/m3 (c)**	No	na	na	2662.00	na	10	100
TAP	n-butyraldehyde	123-72-8	None		None	None	None	No	na	na	na	na	na	100
TAP	c14-alkane	No CAS	None		None	None	None	No	na	na	na	na	na	100
TAP	c15-alkane	No CAS	None		None	None	None	No	na	na	na	na	na	100
TAP	c16-alkane	No CAS	None		None	None	None	No	na	na	na	na	na	100
TAP	c18-alkane	No CAS	None		None	None	None	No	na	na	na	na	na	100
TAP	c4-benzene + c3-aroald	No CAS	None		None	None	None	No	na	na	na	na	na	100
TAP	c5-benzene + c4-aroald	No CAS	None		None	None	None	No	na	na	na	na	na	100
TAP	cis-2-butene	590-18-1	None		None	**250 ppm (TWA), 573.72 mg/m3 (TWA)**	None	No	na	na	na	573.72	na	100

Type	Pollutant	CAS Number	IRIS (mg/m3)	IRIS Method	OSHA (PEL)	ACGIH (TLV)	NIOSH	Known Human Carcinogen?	IRIS Rfc or RBAC (mg/m3)	Reference method	"C" or STEL (mg/m3)	TWA (mg/m3)	STEL Safety Factor	TWA Safety Factor
TAP	cis-2-pentene	627-20-3	None		None	None	None	No	na	na	na	na	na	100
TAP	Crotonaldehyde	123-73-9 4170-30-3	None		**2 ppm (TWA), 6 mg/m3 (TWA)**	**0.3 ppm (c), 0.86 mg/m3 (c)**	2 ppm (TWA), 6 mg/m3 (TWA)	No	na	na	0.86	6.00	10	100
TAP	Dimethylnapthalenes	28804-88-8	None		None	None	None	No	na	na	na	na	na	100
TAP	Ethane	74-84-0	None		None	None	None	No	na	na	na	na	na	100
TAP	Ethylene	74-85-1	None		None	**200 ppm (TWA), 229.45 mg/m3 (TWA)**	None	No	na	na	na	229.45	na	100
TAP	Glyoxal	107-22-2	None		None	**0.1 mg/m3 (TWA)**	None	No	na	na	na	0.10	na	100
TAP	Isobutene/1-butene	106-98-9	None		None	**250 ppm (TWA), 573.72 mg/m3 (TWA)**	None	No	na	na	na	573.72	na	100
TAP	Isovaleraldehyde	590-86-3	None		None	None	None	No	na	na	na	na	na	100
TAP	Methacrolein	78-85-3	None		None	None	None	No	na	na	na	na	na	100
TAP	Methylglyoxal	78-98-8	None		None	None	None	No	na	na	na	na	na	100
TAP	m-ethyltoluene	620-14-4	None		None	None	None	No	na	na	na	na	na	100
TAP	m-tolualdehyde	620-23-5	None		None	None	None	No	na	na	na	na	na	100
TAP	n-decane	124-18-5	None		None	None	None	No	na	na	na	na	na	100
TAP	n-dodecane	112-40-3	None		None	None	None	No	na	na	na	na	na	100
TAP	n-heptadecane	629-78-7	None		None	None	None	No	na	na	na	na	na	100
TAP	n-heptane	142-82-5	None		**500 ppm (TWA), 2000 mg/m3 (TWA)**	400 ppm (TWA), **500 ppm (STEL), 2049.08 mg/m3 (STEL)**	85 ppm (TWA), 350 mg/m3 (TWA), 440 ppm (c), 1800 mg/m3 (c)	No	na	na	2049.08	2000.00	10	100
TAP	n-hexadecane	544-76-3	None		None	None	None	No	na	na	na	na	na	100
TAP	n-nonane	111-84-2	None		None	**200 ppm (TWA), 1050 mg/m3 (TWA)**	200 ppm (TWA), 1050 mg/m3 (TWA)	No	na	na	na	1050.00	na	100
TAP	n-octane	111-65-9	None		**500 ppm (TWA), 2350 mg/m3 (TWA)**	300 ppm (TWA), 1401.47 mg/m3 (TWA)	75 ppm (TWA), 350 mg/m3 (TWA), **385 ppm (c), 1800 mg/m3 (c)**	No	na	na	1800.00	2350.00	10	100
TAP	n-pentadecane	629-62-9	None		None	None	None	No	na	na	na	na	na	100
TAP	Pentane	109-66-0	None		**1000 ppm (TWA), 2950 mg/m3 (TWA)**	1000 ppm (TWA), 2950 mg/m3 (TWA)	120 ppm (TWA), 350 mg/m3 (TWA), **610 ppm (c), 1800 mg/m3 (c)**	No	na	na	1800.00	2950.00	10	100
TAP	n-propylbenzene	103-65-1	None		None	None	None	No	na	na	na	na	na	100
TAP	n-tetradecane	629-59-4	None		None	None	None	No	na	na	na	na	na	100
TAP	n-tridecane	629-50-5	None		None	None	None	No	na	na	na	na	na	100
TAP	n-undecane	1120-21-4	None		None	None	None	No	na	na	na	na	na	100
TAP	o-ethyltoluene	611-14-3	None		None	None	None	No	na	na	na	na	na	100
TAP	o-Tolualdehyde	529-20-4	None		None	None	None	No	na	na	na	na	na	100
TAP	p-ethyltoluene	622-96-8	None		None	None	None	No	na	na	na	na	na	100
TAP	p-Tolualdehyde	104-87-0	None		None	None	None	No	na	na	na	na	na	100
TAP	Propane	74-98-6	None		**1000 ppm (TWA), 1800 mg/m3 (TWA)**	None	1000 ppm (TWA), 1800 mg/m3 (TWA)	No	na	na	na	1800.00	na	100
TAP	propylene	115-07-1	None		None	**500 ppm (TWA), 860.53 mg/m3 (TWA)**	None	No	na	na	na	860.53	na	100
TAP	Trans-2-hexene	4050-45-7	None		None	None	None	No	na	na	na	na	na	100
TAP	Trans-2-pentene	646-04-8	None		None	None	None	No	na	na	na	na	na	100
TAP	Valeraldehyde	110-62-3	None		None	**50 ppm (TWA), 176.28 mg/m3 (TWA)**	50 ppm (175 mg/m^3) (TWA)	No	na	na	na	176.28	na	100

APPENDIX F

LAER Tables

LAER Analysis
Table 1 - Summary of RBLC Determinations

RBLC ID No.	Facility Name	Facility County	Facility State	Permit Date	Facility Description	Process Type (RBLC Code)	Process Description	NOx Limit 1	units	NOx Limit 2	units	NOx Control Determination
TX-0699	Turbine Overhaul Center	Dallas	TX	12/16/2014	Solar Turbines Inc. (Solar) owns and operates the Solar Turbines Dallas Overhaul Center. Solar is requesting to construct Turbine Test Cell No. 6 to accommodate the testing of the larger Titan series turbines. The new construction includes, in addition to the test cell, an underground collection system for process fugitives, an oil/water separator, and a cooling tower.	15.190	Turbine test cell					Good Combustion Practices
OH-0355	General Electric Aviation, Evendale Plant	Hamilton	OH	41401	Manufacturer of Aircraft engines	17.110	Test Cell 2 for Aircraft Engines and Turbines	4.4	lb/MMBtu	80	tons/yr	No Control
						17.110	Test Cell 1 for Aircraft Engines and Turbines	1.7	lb/MMBtu	92	tons/yr	No Control
PA-0282	Johnson Matthey Inc/Catalytic	Chester	PA	6/1/2012	This Plan Approval has been issued to Johnson Matthey, Inc. to establish a plant-wide applicability limit (PAL) for NOx emissions from the facility.	19.900	ENGINE TEST CELLS (6)	11	tons/yr			No Control
MA-0038	General Electric Aviation	Essex	MA	3/13/2008	ENGINE TEST CELL FACILITY	16.100	ENGINE TEST CELL	67.2	tons/month	157	tons/yr	No Control
OK-0121	Midwest City Air Depot	Oklahoma	OK	4/25/2007		19.900	JET ENGINE TEST CELLS	323.13	tons/yr			No Control
VA-0303	Stihl Incorporate	City of Virginia Beach	VA	1/10/2007	OUTDOOR POWER EQUIPMENT MANUFACTURING FACILITY	15.190	ENGINE TEST CELLS	4.7	tons/yr			Good Combustion Practices
IA-0076	John Deere Product Engineering	Black Hawk	IA	3/23/2005	RESEARCH AND DEVELOPMENT FACILITY THAT DEVELOPS SPECIFICATIONS FOR OFF-ROAD VEHICLES AND COMPONENTS.	17.110	TEST CELL	1.52	lb/MMBtu	0.86	lb/hr	Good Combustion Practices
MI-0367	GM Powertrain Division	Oakland	MI	5/19/2004	AUTOMOTIVE ENGINE TESTING OPERATIONS. SRN: B4032	17.210	ENGINE TEST CELLS/DYNAMOMETERS	1.38	lb/MMBtu (gasoline)	2.2	lb/MMBtu (diesel)	No Control
PA-0233	NSWCCD-SSES	Philadelphia	PA	12/18/2003	INSTALLATION OF A MARINE GAS TURBINE TEST CELL IN BUILDING 633	19.700	MARINE GAS TURBINE TEST CELL	341	lb/hr			No Control
MI-0360	Daimler Chrystler Corporation	Oakland	MI	11/19/2002	Car engine dynamometer test cells	17.220	DYNAMOMETER TEST CELLS, UNCONTROLLED	0.1049	lb/gal of gasoline			THERMAL OXIDIZERS REDUCE NOX EMISSIONS AS WELL AS VOC.
TN-0103	Arnold Engineering Development	Coffee/Franklin	TN	4/28/2000	JET ENGINE TEST FACILITY LOCATED AT AN AIR FORCE BASE	19.800	JET ENGINE TEST CELLS	1038	tons/yr	1.087	g/b-hp-h	No Control
MI-0306	Schenck Pegasus	Oakland	MI	4/15/1998	MFG. ENGINE TESTING EQUIPMENT.	19.900	ENGINE TEST CELLS, DYNAMOMETERS	5.76	lb/hr	25.2	tons/yr	No Control
IL-0065	General Motors - Electromotive Division	Cook	IL	3/24/1997		99.999	LOCOMOTIVE ENGINE,(MU1,2,5					TURBO- CHARGING & AFTERCOOLING, OR COMPARABLE TECHNOLOGY.
PA-0154	General Electric Transportation Systems	Mercer	PA	8/21/1996		17.110	ENGINE, DIESEL, TEST CELLS NO. 1 THROUGH 5	492.2	tons/yr			ENGINE RETARD, SPLIT COOLING, ELECTRONIC FUEL INJECTION, DEPENDING ON ENGINE
MA-0030	GE Aircraft Engines	Essex	MA	2/19/1993	JET ENGINE TESTING	99.100	JET ENGINE TEST CELL	0.0229	grams/second			RESTRICTION ON THE NUMBER OF HOURS AN ENGINE MAY OPERATE.
OH-0299	GE Aircraft Engines Peebles	Adams	OH	9/27/2005	BUILD AND TESTING OF AIRCRAFT ENGINES	19.700	JET ENGINE TEST STAND 7	3113.4	lb/hr	797.2	tons/yr	No Control
OH-0306	GE Aircraft Engines-Peebles Test	Adams	OH	2/15/2007	GE AIRCRAFTS IS INSTALLING A SINGLE NEW JET ENGINE TEST STAND. POTENTIAL EMISSIONS FROM THE PROPOSED ADDITION EXCEEDS 40 TONS PER YEAR NOX AND 100 TONS PER YEAR CO, PSD POLLUTANTS	15.190	JET ENGINE TEST STAND	3113.4	lb/hr	797.2	tons/yr	Modeling used to meet PSD requirements. Designed emission levels used to determine "no control."
TX-0462	Perkinelmer Automotive Researching Inc	Bexar	TX	37985	AUTOMOTIVE TEST FACILITY - ENGINE TESTING OPERATION	19.800	GASOLINE ENGINE TESTING	3.3	lb/hr	14.3	tons/yr	LIMTIED OPERATIONS
						19.800	DIESEL ENGINE TESTING-CAT STANDS	12.2	lb/hr	53.8	tons/yr	LIMTIED OPERATIONS
						19.800	DIESEL ENGINE TESTING MCD STANDS	11.3	lb/hr	49.3	tons/yr	LIMTIED OPERATIONS

Table 2 - Summary of Potential Jet Engine Test Cell Facility Air Permits

Facility Name	Facility Location	Permitting Authority	Permit ID No.	Permit Date	Process	NOx Limit 1	units	NOx Limit 2	units	Control Technology
Aerothrust Holding, LLC	2495 NW 65 Avenue Bldg. 703, Miami, FL 33122	Miami-Dade County Dept. of Regulatory & Economic Resources (RER), Div. of Env. Resources Mgmt	0251186-004-AO	March 31, 2015	EU001: One Test Cell - Jet Engines	100	tons per 12-month period			None
American Airlines, Inc. Tulsa Maintenance and Engineering Center	3800 N. Mingo Road, P.O. Box 582809, Tulsa, OK	Oklahoma Dept. of Environmental Quality	2008-008-TVR	September 2, 2009	EUG 6 (EPs 68, 69, and 70): 3 Engine Test Cells	716	lb/hr	93	tpy	None.
CALIFORNIA AIR NATIONAL GUARD	5323 E MCKINLEY, Fresno, CA	San Joaquin Valley APCD	C-216-1-0	2004	C-216-1-1: Jet Engine Test Cell 1-2	0.2055	lbs/gal JP-8	Operational Restrictions (test time, fuel usage)		None.
CARTER FIELD FACILITY (GE Engine Services)	15225 FAA BLVD, Fort Worth, TX	Texas Commission on Environmental Quality (TCEQ)	O1640	March 19, 2014	2P: Test Cell No. 5 & 3P: Test Cell No. 6	No limits listed		No limits listed		None.
Textron Aviation - Pawnee Facility (Cessna Aircraft Company)	5800 E. Pawnee, Wichita, Sedgwick County, Kansas	Kansas Dept. of Health & Environment, Bureau of Air	Source ID #: 1730075	September 21, 2016	EU-14007: Propeller Testing Engine 2 & EU-14006: Propeller Testing Engine 1	No limits listed		No limits listed		None.
Dallas Airmotive Inc - Forest Park	6114 Forest Park Road, Dallas, TX 75235-6498	Texas Commission on Environmental Quality (TCEQ), Office of Air, Air Permits Division	RN102963162 - Registration Number 108410	Withdrawn as of 2/8/2006	Test Cell 1	0.81	tpy	11.6	lb/hr	None.
					Test Cell 2	1.23	tpy	8.68	lb/hr	None.
					Test Cell 3	1.15	tpy	35.2	lb/hr	None.
					Test Cell 4	0.51	tpy	8.72	lb/hr	None.
					Test Cell 5	0.2	tpy	1.92	lb/hr	None.
					Test Cell 6	6.8	tpy	73.5	lb/hr	None.
Dallas Airmotive Inc - DFW Center	2988 W. Walnut Hill Lane, DFW Airport, TX 75261	Texas Commission on Environmental Quality (TCEQ), Office of Air, Air Permits Division	RN107705923 - PBR Registration #: 137857	February 8, 2016	N/A	N/A		N/A		N/A
Dallas Airmotive Inc - Heritage Park	900 Nolen Drive, Suite 100, Grapevine, TX 76051	Texas Commission on Environmental Quality (TCEQ), Office of Air, Air Permits Division	RN104511233 - PBR 107749	February 5, 2013	N/A	N/A		N/A		N/A
Dassault Falcon Jet - Wilmington Corp.	191 North DuPont Highway, New Castle, Delaware 19720	Delaware Department of Natural Resources and Environmental Control (DNREC), Division of Air Quality	AQM-003/00365	June 10, 2016	None	N/A		N/A		N/A
FEDERAL AVIATION ADMINISTRATION TECHNICAL CTR	WILLIAM J HUGHES TECHNICAL CTR ANG-E332 ATLANTIC CITY INT'L AIRPORT, NJ 08405	New Jersey Dept. of Environmental Protection (NJDEP)	BOP120003	February 6, 2015	U3 (E3 & E4): Two Pratt & Whitney JP-8 fueled jet turbine engines	89.4	lb/hr	8.94	tpy	None.
General Electric Aircraft Engines: Peebles Facility	1200 Jaybird Road Peebles, OH 45660	Ohio EPA	P0118763	September 9, 2016	B002, Engine Test Stand 3B	Combust only jet fuel				None.
					B003, Engine Test Stand 3C	Combust only jet fuel				None.
					B008, Engine Test Stand 5A	Combust only jet fuel				None.
					B009, Engine Test Stand 5B	Combust only jet fuel				None.
					F007, Engine Test Stand 4D	5900	lb/hr	389	tons per 12-month period	None.
					F010, Engine Test Stand 3D	5900	lb/hr	389	tons per 12-month period	None.
					F012, Engine Test Stand 3E	5900	lb/hr	320	tons per 12-month period	None.
					F013, Engine Test Stand 6A	5900	lb/hr	350	tons per 12-month period	None.
					F014, Engine Test Site 7	3113.4	lb/hr	797.2	tons per 12-month period	None.
					F015, Test Engine Stand 5C	3113.4	lb/hr	797.2	tons per 12-month period	None.
					P002, Engine Test Site 5D	2255.9	lb/hr	431.6	tons per 12-month period	None.
General Electric Aviation, Evendale Plant	One Neumann Way, Cincinnati, OH 45215	Ohio EPA			P291, Test Cell 1	1.7	lb/MMBtu	92	tons per 12-month period	None.
					P292, Test Cell A20	4.4	lb/MMBtu	80	tons per 12-month period	None.
			P0099305	February 8, 2012	F009, EA-015-G - Test Cell 46	951	lb/hr	52.3	tons per 12-month period	None.
					F021, EA-373 - Test Cell A-11	1.24	lb/MMBtu	3.82	tons per 12-month period	None.
					Engine and component test cells: F019, F020	5	lb/MMBtu	39.9	tons per 12-month period	None.
					Engine and component test cells: F014, F015	5	lb/MMBtu	44.27	tons per 12-month period	None.
					Engine and component test cells: F003, F004, F005, F006, F007, F008, F010, F013, F016, F017, F018, P014, P017, P018, P020, P075	N/A		N/A		None.
GE Aviation (GEA)	1000 Western Ave, Lynn, MA 01910	Massachusetts Dept. of Environmental Protection	X237950	August 17, 2011	Test Cells: EU2 and EU5	99.2	lb/hr			None.
Honeywell - Engines, Inc	111 South 34th Street, Phoenix, AZ	Maricopa County Air Quality Dept.	V97-008	November 23, 2016	Test Cells #: C-917/817, 930, 931, 941-944, 671	0.88	lb/MMBtu			None identified.
Lockheed Martin Aeronatics Company - Plant 10	1011 LOCKHEED WY, Palmdale, CA	Antelope Valley Air Quality Management District (AQMD)	097001754	July 20, 2015	Jet Engine Test Stand	14	hrs of operation/day	4	lbs NOx/day	None.
Lockheed Martin Aeronautical Systems	86 South Cobb Drive, Marietta, GA 30063	Georgia Environmental Protection Department (EPD)	3721-067-0027-V-08-0	March 24, 2015	HH01 - F-22 Hush House used for engine testing	80,000	gallons jet fuel/12-months	7.1	tons/yr	None identified.
Lockheed Martin Aeronautical Systems - Air Force Plant 4	1 lockhead Blvd, Fort Worth, TX	Texas Commission on Environmental Quality (TCEQ)	O1294	December 2, 2014	None identified	N/A		N/A		N/A
Logan International Airport	One Harborside Drive, East Boston, MA 02128	Massachusetts Dept. of Environmental Protection (MassDEP)	X263142	July 9, 2015	None identified	N/A		N/A		N/A
NAS Lemoore	BUILDING 750 CODE 50800, Lemoore, CA 93245	San Joaquin Valley APCD	C-2106-23-4 C-2106-70-4 C-2106-74-3	October 16, 2014	Test Cell #3, Test Cell #4, T-14/T-1	0.192	lb NOx/gal	13,080	gallons fuel/day	None.
Montana Air National Guard, 120 ALW	2800 Airport Ave. B, Great Falls, MT	Montana Dept. of Environmental Quality, Permitting and Compliance Division	2930-06	April 11, 2014	Engine test cell	16.87	tons/yr	600	hours of operation/12-months	None identified.
Northrop Grumman Systems Corporation	3520 E. AVENUE M LPA11/4G, Palmdale, CA	Antelope Valley AQMD	102301816	October 17, 2016	None identified	N/A		N/A		N/A
NORTHROP GRUMMAN CORP, AIRCRAFT DIV	ONE HORNET WAY M/S PA12/W5, El Segundo, CA 90245	South Coast AQMD	Title V - 018294	August 27, 2015	No jet engine test cells listed	N/A		N/A		N/A

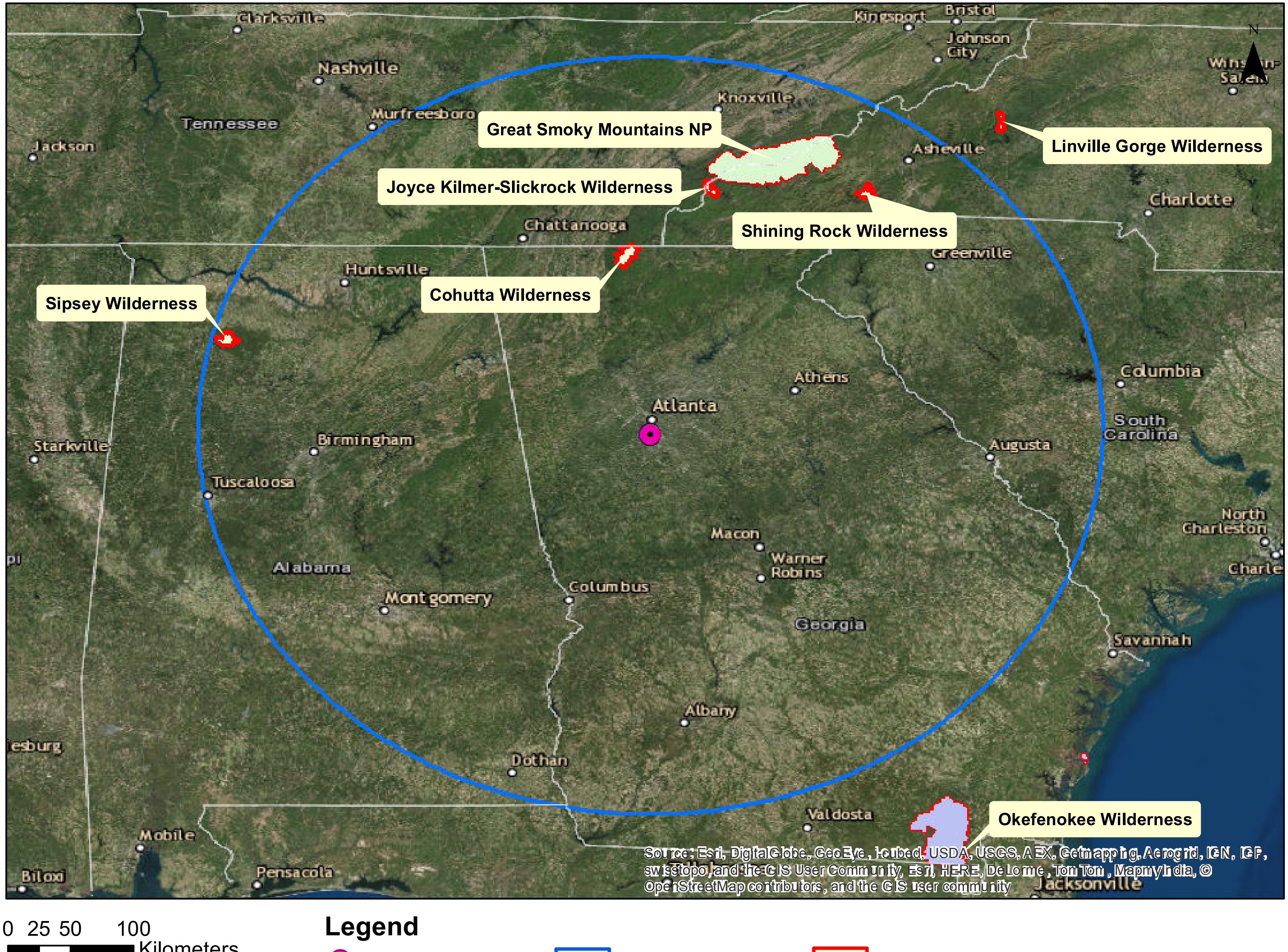
Facility Name	Facility Location	Permitting Authority	Permit ID No.	Permit Date	Process	NOx Limit 1	units	NOx Limit 2	units	Control Technology
NORTHROP GRUMMAN SYSTEMS CORPORATION	1 SPACE PARK BLDGS. D1,3,4,M3,R1, Redondo Beach, CA	South Coast AQMD	Title V - 800409	September 30, 2015	No jet engine test cells listed	N/A		N/A		N/A
Pratt & Whitney	Aircraft Road, Middletown, CT	Connecticut Dept. of Energy & Environmental Protection	104 - 0103 - TV	September 10, 2013	GEU-10: Test Cells 1-8	No limits listed		No limits listed		None identified.
United Technologies Corporation	17900 Beeline Highway (SR 710), Jupiter, FL 3347	Florida Dept. of Health Palm Beach County	0990021-047-AV	March 29, 2016	EU069: 10 jet engine test stands	No limits listed		No limits listed		None.
PRATT & WHITNEY AMERCON DIV UNITED TECH CORP/MIDDLETOWN	181 FULLING MILL RD, Middletown, PA	Pennsylvania Department of Environmental Protection (PADEP)	General Plan Approval - 1056012 & 855905	December 16, 2014 November 8, 2010	None identified	N/A		N/A		N/A
PRATT & WHITNEY ENGINE SERVICES, INC	1525 MIDWAY PARK RD., Bridgeport, WV 26330	West Virginia Dept. of Environmental Protection	R13-2679F	July 11, 2016	TC1: Test Cell #1, TC3: Test Cell #3, TC5: Test Cell #5, TC 6: Test Cell #6	730	engine tests/yr/cell	3.07 (TC1 & TC3) 34.02 (TC5 & TC6)	tons/yr	None identified.
PREMIER TURBINES-NEOSHO PLANT	3551 DONIPHAN DRIVE, Neosho, MO	Missouri Dept. of Natural Resources	OP2010-015, Project #: 2010-02-005	February 3, 2010, June 11, 2010	Test Cell No. 3, Test Cell 1, Test Cell 2, Test 5, Test Cell 6	0.023 40	tons/yr (Test Cell 3) tons/yr (Test Cell 5 & 6)	80	tests/yr	None.
ROHR, INC.	8200 ARLINGTON AVE, Riverside, CA	South Coast AQMD	Title V - 800113	July 7, 2016	None identified	N/A		N/A		N/A
ROLLS ROYCE CROSSPOINTE FACILITY	8800 WELLS STATION RD, Prince George, VA 23875	Virginia Dept. of Environmental Quality	Registration # 52248	June 25, 2013	None identified	N/A		N/A		N/A
Rolls Royce Stennis	John C Stennis Space Center, Stennis, MS	Mississippi Dept. of Environmental Quality	1000-00050	June 27, 2012	EQPT1: Jet Engine Test Stand No. 1 EQPT12: Jet Engine Test Stand No. 2	6,500,000	gallons jet fuel/yr (EQPT12)			None identified.
Rolls-Royce Corporation	2001 & 2355 S. Tibbs Ave, Indianapolis, IN 46241	Indiana Dept. of Environmental Management (IDEM)	097 - 36661 - 00311	September 16, 2016	Test Cells: 111, 113, 114, 121, 132, 140, 142, 143, 144, 145, 146, 147, 148, 149, 133, 135,821, 822, 823, 826, 843, 861, 862, 871, 872, 873, 875, 881, 882, 883, 884, 885, 886, 893, 8137, 8126, 8128	0.1409 62	lbs Nox/gallon fuel (Test Cell 111) lb/hr (Test Cell 111)	40 567,779	tons/yr (Test Cell 111) gallons of fuel (Test Cell 111)	None identified.
Roush Industries	36630 Commerce, Livonia, Michigan MI 48150	Michigan Dept. of Environmental Quality	MI-ROP-M4780-2016	January 8, 2016	No jet engine test cells listed	N/A		N/A		N/A
Texas Aero Engines Services Ltd (TAESL)	2180 Eagle Parkway MD 8006, Fort Worth, TX	Texas Commission on Environmental Quality (TCEQ)	O1468	September 15, 2006	EPN 153502000: Engine Test Cell F	No limits listed		No limits listed		None identified.
THE BOEING COMPANY	AIRPORT RD & MCDONNELL BLVD, Saint Louis County, MO	Missouri Dept. of Natural Resources	OP2010-042A	May 7, 2012	EU0230: Jet Engine Test Stand	70,000	gallons fuel/12 months			None identified.
THE BOEING COMPANY - C17 PROGRAM	2401 E WARDLOW RD, Long Beach, CA 90807	South Coast AQMD	Title V - 800038	January 20, 2013	No jet engine test cells listed	N/A		N/A		N/A
The Stratford School of Aviation	200 Great Meadow Road, Stratford, CT	Connecticut Dept. of Energy & Environmental Protection	178 - 0125 - TV	October 19, 2011	EU-1: Test Cell 1 EU-2: Test Cell 2	2.843	lb/hr	1000	gallons/tested engine	None identified.
United Airlines - San Francisco Maintenance Center Facility #A0051	800 S. Airport Blvd - SFOMP/Bldg 49-2, San Francisco, CA 94128	Bay Area Air Quality Management District	#A0051	April 2, 2015	S89: Engine Test Cell #6 S90: Engine Test Cell #5	90.9	tons/yr (S90)	764,000	gallons/12 months (S90)	None.
United Technologies Corp. – Pratt and Whitney	8801 Macon Road, Columbus, GA 31908	Georgia Environmental Protection Division (GAEPD)	3724-215-0013-S-02-1 3724-215-0013-S-02-0	November 3, 2016 May 16, 2016	Jet Engine Test Cell Stack (702)	None Listed		None Listed		None identified.
Tinker Air Force Base	3001 S Douglas Blvd, Oklahoma City, OK 73130	Oklahoma Dept. of Environmental Quality	2009-394-C (M-4) PSD	November 17, 2015	EngTest-1: EU4403 & EU4404 -	JP-5/8 or Jet A/A-1 fuel only				None identified.
US Army - Joint Base Langley-Eustis	1407 Washington Boulevard, Fort Eustis, Virginia 23604-5306	Virginia Dept. of Environmental Quality	Registration # 60333	December 17, 2010	No jet engine testing, only helicopter engine testing	N/A		N/A		N/A
U.S. Naval Station, Roosevelt Road	Roosevelt Roads, Ceiba, PR	Puerto Rico Environmental Quality Board	PFE-TV-9711-19-0397-0012	September 30, 2006	EU-5 Engine Testing	None Listed		None Listed		None identified.
Joint Expeditionary Base Little Creek - US Navy	1450 Gator Boulevard, Virginia Beach, Virginia	Virginia Dept. of Environmental Quality	TRO-60033	March 22, 2016	No jet engine test cells/stands in operation	N/A		N/A		N/A
WV AIR NATIONAL GUARD, MARTINSBURG/167TH TAG	222 SABRE JET BLVD, Martinsburg, WV 24505	West Virginia Dept. of Environmental Protection	R13-1227C	June 4, 2015	No jet engine test cells/stands in operation	N/A		N/A		N/A
Atec, Inc.	10450 Corporate Drive, Sugar Land, Fort Bend County	Texas Commission on Environmental Quality (TCEQ), Office of Air, Air Permits Division	Exempt from Permitting		N/A	N/A		N/A		N/A
CTS Engines, LLC	3060 S.W. 2nd Avenue, Fort Lauderdale, Florida 33315, Broward County	Florida DEP	No Active Permits		N/A	N/A		N/A		N/A
G & N Aircraft	1701 E Main St, Griffith, IN 46319	Indiana Dept. of Environmental Management (IDEM)	No Active Permits Found		N/A	N/A		N/A		N/A
General Electric Engine Services Corporate Aviation, Inc.	2 North Airport Drive, Springfield, IL	Illinois Environmental Protection Agency	No Active Permits Found		N/A	N/A		N/A		N/A
General Electric Services Corporate Aviation, Inc.	2221 Smithtown Ave., Ronkonkoma, NY	New York State Department of Environmental Conservation (NYSDEC)	No Test Cell Permits Found		N/A	N/A		N/A		N/A
General Engine Services Corporate Aviation Inc.	6201 W. Imperial Highway, Los Angeles, CA	South Coast AQMD	No Test Cell Permits Found		N/A	N/A		N/A		N/A
KLUNE INDUSTRIES INC	7327-B Coldwater Canyon Ave, North Hollywood, CA	South Coast AQMD	No Active Permits Found		N/A	N/A		N/A		N/A
Lockheed Martin Commercial Engine Solutions	661 Duncan Drive, Bldg 360, Kelly AFB, Texas 78226	Texas Commission on Environmental Quality (TCEQ)	No Test Cell Permits Found		N/A	N/A		N/A		N/A
National Guard	197 Granville Ave. Box 46, Otis ANG Base, MA	Massachusetts Dept. of Environmental Protection (MassDEP)	No Test Cell Permits Found		N/A	N/A		N/A		N/A
RAM Aircraft	7505 Karl May Drive, Waco Regional Airport, Waco, TX 76708	Texas Commission on Environmental Quality (TCEQ)	No Active Permits Found		N/A	N/A		N/A		N/A
THE BOEING COMPANY	5301 Bolsa Ave, Huntington Beach, CA	South Coast AQMD	No Active Permits Found		N/A	N/A		N/A		N/A
U.S. Airways	Pittsburgh International Airport, Pittsburgh, PA 15231	Pennsylvania Department of Environmental Protection (PADEP)	No Active Permits Found		N/A	N/A		N/A		N/A
United Airlines	1200 East Algonquin Road Elk Grove, Illinois 60007	Illinois Environmental Protection Agency	No Test Cell Permits Found		N/A	N/A		N/A		N/A
US Navy - Naval Base Kitsap at Bangor	7001 Finback Circle Silverdale, WA 98315	Puget Sound Clean Air Agency	No Active Permits Found		N/A	N/A		N/A		N/A

EPS

APPENDIX G

Class I Visibility Impact Assessment Figures and Tables

Delta Air Lines, Inc.
Test Cell 5
Class I Areas within 300 km Radius



Legend

Delta Test Cell 5 | 300 km Buffer Area | Class I Areas

Delta Air Lines, Inc.
Technical Operations Center
Test Cell No. 5 - Class I Area Analysis

Table 1. Summary of Visibility-Impairing Pollutant Emissions

Visibility-Impairing Pollutants[1]	Maximum Emissions per 8-hr Test[2] (lbs per 8 hrs)	Number of Tests Possible in 24 hrs[3]	Engine Model	Project Maximum 24-hr Avg Emissions[4] (lbs/hr)	Annual Emissions for Class I Q/D Analysis[5]	Potential Annual Emissions for PSD Assessment (tons/yr)
NOx	1,426	2	Trent 800	119	520	39.5
SO_2	173	2	Trent 800	14	63	9.7
PM_{10}	18	2	Trent XWB	1	6	1.6
$PM_{2.5}$	18	2	Trent XWB	1	6	1.6
H_2SO_4	N/A	2	None	N/A	N/A	N/A
				Q, Flag 2010 Approach Sum of Annual Emissions[6]	**596**	

Notes:

1. Visibility-impairing pollutants from FLAG 2010 report. "Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010)"
2. Maximum emissions per 8-hr test obtained by comparing the maximum emissions of each engine type from test data.
H2SO4 emissions are not expected from the project.
3. Each test cycle lasts 8 hours. There is a minimum 4 hour downtime required between the end of one cycle and the start of the next cycle. Therefore, a maximum of two tests can be conducted in a 24-hr period.
4. Project maximum 24-hr avg emissions (lbs/hr) = Maximum emissions per 8-hr test (lbs per 8 hrs) * Maximum number of tests possible in 24 hrs ÷ 24 hrs
5. Annual emissions for Class I Q/D Analysis (tons/yr) = Facility-wide maximum 24-hr avg emissions (lbs/hr) * 8,760 hrs/yr ÷ 2,000 lbs/ton
6. Q, Flag 2010 sum of annual emissions in tons/yr = Combined annual emissions in tons/yr for NOx, SO_2, PM_{10}, $PM_{2.5}$, and H_2SO_4.

Table 2. Summary of Class I Areas within 300 km from Delta Test Cell No. 5

Class I Area	State	Federal Land Manager[1]	Q Sum of Annual Emissions from Visibility-Impairing Pollutants (tons/yr)	D Distance from TC5 (km)	Q/D FLAG 2010 Initial Screening	Is TC5 Q/D ≤ 10? (Yes/No)
Sipsey Wilderness	AL	USFS	596	282	2.1	Yes
Cohutta Wilderness	TN-GA	USFS		134	4.5	Yes
Joyce Kilmer-Slickrock Wilderness	TN-NC	USFS		194	3.1	Yes
Great Smoky Mountain National Park	TN	NPS		207	2.9	Yes
Shining Rock Wilderness	TN	USFS		233	2.6	Yes

Notes:

1. USFS - United States Forest Service; NPS - National Park Service

APPENDIX H

Federal Land Manager Letters

EPS

1050 Crown Pointe Parkway
Suite 550
Atlanta, Georgia 30338

(404) 315-9113 *Telephone*
(404) 315-8509 *Fax*

Thomas P. Sweat, P.E.
Senior Principal

(678) 336-8530 *Direct Line*
tsweat@envplanning.com

February 17, 2017

Ms. Susan Johnson
Air Resources Division
National Park Service
P.O. Box 25287
Denver, CO 80225

Re: **Delta Air Lines, Inc. - Technical Operations Center: Test Cell No. 5 Construction Notification of NSR Project in Reference to National Park Class I Areas (Great Smoky Mountain National Park)**

Dear Ms. Johnson,

EPS is submitting this letter to your attention on behalf of Delta Air Lines, Inc. – Technical Operations Center (Delta TechOps) located at 1775 M H Jackson Service Road, Atlanta, GA 30354. Delta TechOps plans to add a new jet engine test cell facility (Test Cell No. 5) near the existing TechOps TOC3 building. The Test Cell No. 5 project is a minor source with respect to Prevention of Significant Deterioration (PSD) regulations. However, the project is located in Fulton and Clayton Counties which are designated as non-attainment areas for the 2008 8-hr ozone standards. Therefore, the major source threshold for ozone precursors - nitrogen oxides (NOx) and volatile organic compounds (VOC) is reduced to 25 tons/yr each. Based on the project emissions, the project is a major New Source Review (NSR) source for NOx and minor NSR source for all other regulated pollutants. A Class I area quantitative impact analysis was performed as part of the NSR application process.

An "Initial Screening Test" as recommended by the FLAG 2010[1] report was conducted for the project. The initial screening test consists of the following three steps:

Step 1: Class I areas within 300 km from the project were identified (see Figure 1 in the Attachments section). All the Class I areas are located greater than 50 km from the project site. The distance in kilometers from the project to each Class I area was measured and assigned the value D. There are five Class I areas located within 300 km of the project: the Cohutta Wilderness, Joyce Kilmer-Slickrock Wilderness, Great Smoky Mountains National Park, Shining Rock Wilderness, and Sipsey Wilderness.

Step 2: Jet fuel combustion in the engine test cell is the primary source of emissions from the project. The combined annual emissions increase from the project for the visibility impacting

[1] Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010) https://www.nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf

pollutants was calculated in tons per year (Q). This annual emissions increase was calculated based on the maximum 24-hr average emission rate in pounds per hour. The visibility impacting pollutants from the project are NOx, sulfur dioxide (SO_2), particulate matter less than 10 µm aerodynamic diameter (PM_{10}), and particulate matter less than 2.5 µm aerodynamic diameter ($PM_{2.5}$). Note that there are no sulfuric acid mist (H_2SO_4) emissions from the project.

Each test cycle lasts 8 hours. There is a minimum 4 hour downtime required between the end of one cycle and the start of the next cycle. Therefore, a maximum of two tests can be conducted in a 24 hour period. The maximum 24-hr average emission rate was calculated based on the highest emitting engine model for each pollutant. These calculations are shown in Table 1 inside the Attachments section.

Step 3: A Q/D analysis was conducted for each Class I area. Per the FLAG 2010 report guidelines, if the Q/D values from the project are less than or equal to 10 (i.e., $Q/D \leq 10$) then the project is expected to have negligible impact on Class I Air Quality Related Values (AQRV's) and no further AQRV analysis is expected to be requested by the Federal Land Mangers (FLMs). As shown in Table 2 of the Attachments section, the maximum Q/D value was 4.5. Therefore, Class I AQRV impacts from the project are expected to be negligible and no further AQRV analysis is proposed for the project.

Similar letters are being submitted concurrently to the respective Class I area contacts at the Sipsey Wilderness, Cohutta Wilderness, Joyce Kilmer-Slickrock Wilderness, and Shining Rock Wilderness areas.

We request a written feedback letter from your office upon concurring that there are no adverse impacts on Class I areas from the proposed project.

Please feel free to contact me in case of any questions.

Sincerely,

Thomas P. Sweat

Thomas P. Sweat, P.E.
Senior Principal

cc: Eric Cornwell, Stationary Source Permitting Manager, Georgia EPD
Cheryl Meyers, Program Manager, Delta Air Lines, Inc.

Attachments: 1) Map of Class I Areas within 300 km Radius
2) Class I Area Q/D Analysis

Delta Air Lines, Inc.
Test Cell 5
Class I Areas within 300 km Radius

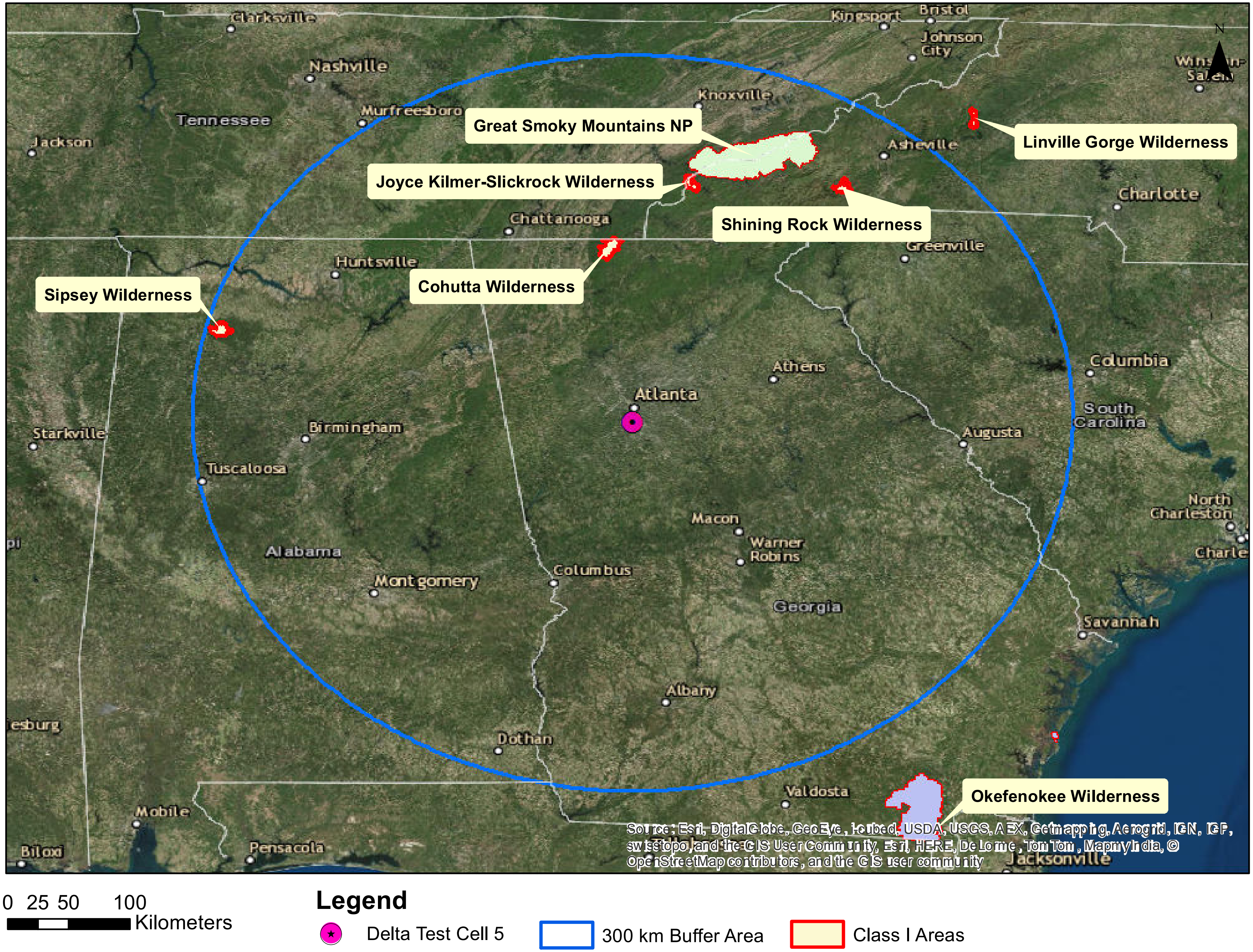


Figure 1

Delta Air Lines, Inc.
Technical Operations Center
Test Cell No. 5 - Class I Area Analysis

Table 1. Summary of Visibility-Impairing Pollutant Emissions

Visibility-Impairing Pollutants[1]	Maximum Emissions per 8-hr Test[2] (lbs per 8 hrs)	Number of Tests Possible in 24 hrs[3]	Engine Model	Project Maximum 24-hr Avg Emissions[4] (lbs/hr)	Annual Emissions for Class I Q/D Analysis[5]	Potential Annual Emissions for PSD Assessment (tons/yr)
NOx	1,426	2	Trent 800	119	520	39.5
SO_2	173	2	Trent 800	14	63	9.7
PM_{10}	18	2	Trent XWB	1	6	1.6
$PM_{2.5}$	18	2	Trent XWB	1	6	1.6
H_2SO_4	N/A	2	None	N/A	N/A	N/A
Q, Flag 2010 Approach Sum of Annual Emissions[6]					596	

Notes:

1. Visibility-impairing pollutants from FLAG 2010 report. "Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010)"
2. Maximum emissions per 8-hr test obtained by comparing the maximum emissions of each engine type from test data.
H2SO4 emissions are not expected from the project.
3. Each test cycle lasts 8 hours. There is a minimum 4 hour downtime required between the end of one cycle and the start of the next cycle. Therefore, a maximum of two tests can be conducted in a 24-hr period.
4. Project maximum 24-hr avg emissions (lbs/hr) = Maximum emissions per 8-hr test (lbs per 8 hrs) * Maximum number of tests possible in 24 hrs ÷ 24 hrs
5. Annual emissions for Class I Q/D Analysis (tons/yr) = Facility-wide maximum 24-hr avg emissions (lbs/hr) * 8,760 hrs/yr ÷ 2,000 lbs/ton
6. Q, Flag 2010 sum of annual emissions in tons/yr = Combined annual emissions in tons/yr for NOx, SO_2, PM_{10}, $PM_{2.5}$, and H_2SO_4.

Table 2. Summary of Class I Areas within 300 km from Delta Test Cell No. 5

Class I Area	State	Federal Land Manager[1]	Q Sum of Annual Emissions from Visibility-Impairing Pollutants (tons/yr)	D Distance from TC5 (km)	Q/D FLAG 2010 Initial Screening	Is TC5 Q/D ≤ 10? (Yes/No)
Sipsey Wilderness	AL	USFS	596	282	2.1	Yes
Cohutta Wilderness	TN-GA	USFS		134	4.5	Yes
Joyce Kilmer-Slickrock Wilderness	TN-NC	USFS		194	3.1	Yes
Great Smoky Mountain National Park	TN	NPS		207	2.9	Yes
Shining Rock Wilderness	TN	USFS		233	2.6	Yes

Notes:

1. USFS - United States Forest Service; NPS - National Park Service

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February 17, 2017

Mr. Bill Jackson
USDA Forest Service
160A Zillicoa Drive
Asheville, NC 28801

Re: **Delta Air Lines, Inc. - Technical Operations Center: Test Cell No. 5 Construction Notification of NSR Project in Reference to Forest Service Class I Areas (Cohutta, Joyce Kilmer-Slickrock, and Shining Rock Wilderness Areas)**

Dear Mr. Jackson,

EPS is submitting this letter to your attention on behalf of Delta Air Lines, Inc. – Technical Operations Center (Delta TechOps) located at 1775 M H Jackson Service Road, Atlanta, GA 30354. Delta TechOps plans to add a new jet engine test cell facility (Test Cell No. 5) near the existing TechOps TOC3 building. The Test Cell No. 5 project is a minor source with respect to Prevention of Significant Deterioration (PSD) regulations. However, the project is located in Fulton and Clayton Counties which are designated as non-attainment areas for the 2008 8-hr ozone standards. Therefore, the major source threshold for ozone precursors - nitrogen oxides (NOx) and volatile organic compounds (VOC) is reduced to 25 tons/yr each. Based on the project emissions, the project is a major New Source Review (NSR) source for NOx and minor NSR source for all other regulated pollutants. A Class I area quantitative impact analysis was performed as part of the NSR application process.

An "Initial Screening Test" as recommended by the FLAG 2010[1] report was conducted for the project. The initial screening test consists of the following three steps:

Step 1: Class I areas within 300 km from the project were identified (see Figure 1 in the Attachments section). All the Class I areas are located greater than 50 km from the project site. The distance in kilometers from the project to each Class I area was measured and assigned the value D. There are five Class I areas located within 300 km of the project: the Cohutta Wilderness, Joyce Kilmer-Slickrock Wilderness, Great Smoky Mountains National Park, Shining Rock Wilderness, and Sipsey Wilderness.

Step 2: Jet fuel combustion in the engine test cell is the primary source of emissions from the project. The combined annual emissions increase from the project for the visibility impacting pollutants was calculated in tons per year (Q). This annual emissions increase was calculated

[1] Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010) https://www.nature.nps.gov/air/Pubs/pdf/flag/FLAG_2010.pdf

based on the maximum 24-hr average emission rate in pounds per hour. The visibility impacting pollutants from the project are NOx, sulfur dioxide (SO_2), particulate matter less than 10 µm aerodynamic diameter (PM_{10}), and particulate matter less than 2.5 µm aerodynamic diameter ($PM_{2.5}$). Note that there are no sulfuric acid mist (H_2SO_4) emissions from the project.

Each test cycle lasts 8 hours. There is a minimum 4 hour downtime required between the end of one cycle and the start of the next cycle. Therefore, a maximum of two tests can be conducted in a 24 hour period. The maximum 24-hr average emission rate was calculated based on the highest emitting engine model for each pollutant. These calculations are shown in Table 1 inside the Attachments section.

Step 3: A Q/D analysis was conducted for each Class I area. Per the FLAG 2010 report guidelines, if the Q/D values from the project are less than or equal to 10 (i.e., $Q/D \leq 10$) then the project is expected to have negligible impact on Class I Air Quality Related Values (AQRV's) and no further AQRV analysis is expected to be requested by the Federal Land Mangers (FLMs). As shown in Table 2 of the Attachments section, the maximum Q/D value was 4.5. Therefore, Class I AQRV impacts from the project are expected to be negligible and no further AQRV analysis is proposed for the project.

Similar letters are being submitted concurrently to the respective Class I area contacts at the Great Smoky Mountains National Park and Sipsey Wilderness areas.

We request a written feedback letter from your office upon concurring that there are no adverse impacts on Class I areas from the proposed project.

Please feel free to contact me in case of any questions.

Sincerely,

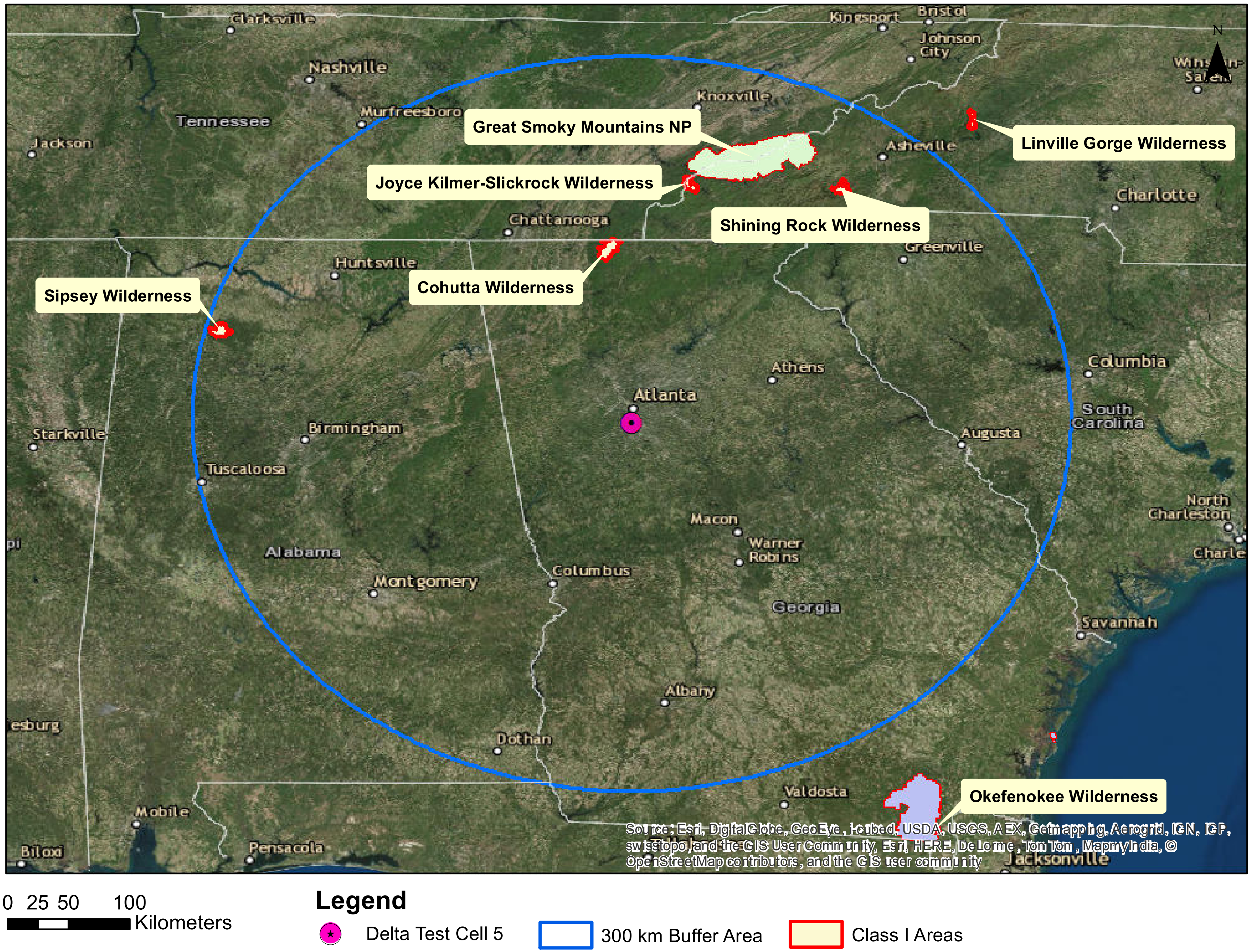
Thomas P. Sweat

Thomas P. Sweat, P.E.
Senior Principal

cc: Eric Cornwell, Stationary Source Permitting Manager, Georgia EPD
Cheryl Meyers, Program Manager, Delta Air Lines, Inc.

Attachments: 1) Map of Class I Areas within 300 km Radius
2) Class I Area Q/D Analysis

Delta Air Lines, Inc.
Test Cell 5
Class I Areas within 300 km Radius



EPS

Figure 1

Delta Air Lines, Inc.
Technical Operations Center
Test Cell No. 5 - Class I Area Analysis

Table 1. Summary of Visibility-Impairing Pollutant Emissions

Visibility-Impairing Pollutants[1]	Maximum Emissions per 8-hr Test[2] (lbs per 8 hrs)	Number of Tests Possible in 24 hrs[3]	Engine Model	Project Maximum 24-hr Avg Emissions[4] (lbs/hr)	Annual Emissions for Class I Q/D Analysis[5]	Potential Annual Emissions for PSD Assessment (tons/yr)
NOx	1,426	2	Trent 800	119	520	39.5
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$PM_{2.5}$	18	2	Trent XWB	1	6	1.6
H_2SO_4	N/A	2	None	N/A	N/A	N/A
Q, Flag 2010 Approach Sum of Annual Emissions[6]					**596**	

Notes:

1. Visibility-impairing pollutants from FLAG 2010 report. "Federal Land Managers' Air Quality Related Values Work Group (FLAG) Phase I Report – Revised (2010)"
2. Maximum emissions per 8-hr test obtained by comparing the maximum emissions of each engine type from test data.
H2SO4 emissions are not expected from the project.
3. Each test cycle lasts 8 hours. There is a minimum 4 hour downtime required between the end of one cycle and the start of the next cycle. Therefore, a maximum of two tests can be conducted in a 24-hr period.
4. Project maximum 24-hr avg emissions (lbs/hr) = Maximum emissions per 8-hr test (lbs per 8 hrs) * Maximum number of tests possible in 24 hrs ÷ 24 hrs
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Class I Area	State	Federal Land Manager[1]	Q Sum of Annual Emissions from Visibility-Impairing Pollutants (tons/yr)	D Distance from TC5 (km)	Q/D FLAG 2010 Initial Screening	Is TC5 Q/D ≤ 10? (Yes/No)
Sipsey Wilderness	AL	USFS	596	282	2.1	Yes
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Shining Rock Wilderness	TN	USFS		233	2.6	Yes

Notes:

1. USFS - United States Forest Service; NPS - National Park Service

EPS

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Thomas P. Sweat, P.E.
Senior Principal

(678) 336-8530 *Direct Line*
tsweat@envplanning.com

February 17, 2017

Ms. Shannon Reed
USDA Forest Service
2946 Chestnut Street
Montgomery, Al 36107

Re: **Delta Air Lines, Inc. - Technical Operations Center: Test Cell No. 5 Construction Notification of NSR Project in Reference to Forest Service Class I Areas (Sipsey Wilderness Area)**

Dear Ms. Reed,

EPS is submitting this letter to your attention on behalf of Delta Air Lines, Inc. – Technical Operations Center (Delta TechOps) located at 1775 M H Jackson Service Road, Atlanta, GA 30354. Delta TechOps plans to add a new jet engine test cell facility (Test Cell No. 5) near the existing TechOps TOC3 building. The Test Cell No. 5 project is a minor source with respect to Prevention of Significant Deterioration (PSD) regulations. However, the project is located in Fulton and Clayton Counties which are designated as non-attainment areas for the 2008 8-hr ozone standards. Therefore, the major source threshold for ozone precursors - nitrogen oxides (NOx) and volatile organic compounds (VOC) is reduced to 25 tons/yr each. Based on the project emissions, the project is a major New Source Review (NSR) source for NOx and minor NSR source for all other regulated pollutants. A Class I area quantitative impact analysis was performed as part of the NSR application process.

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based on the maximum 24-hr average emission rate in pounds per hour. The visibility impacting pollutants from the project are NOx, sulfur dioxide (SO_2), particulate matter less than 10 µm aerodynamic diameter (PM_{10}), and particulate matter less than 2.5 µm aerodynamic diameter ($PM_{2.5}$). Note that there are no sulfuric acid mist (H_2SO_4) emissions from the project.

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Sincerely,

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Thomas P. Sweat, P.E.
Senior Principal

cc: Eric Cornwell, Stationary Source Permitting Manager, Georgia EPD
Cheryl Meyers, Program Manager, Delta Air Lines, Inc.

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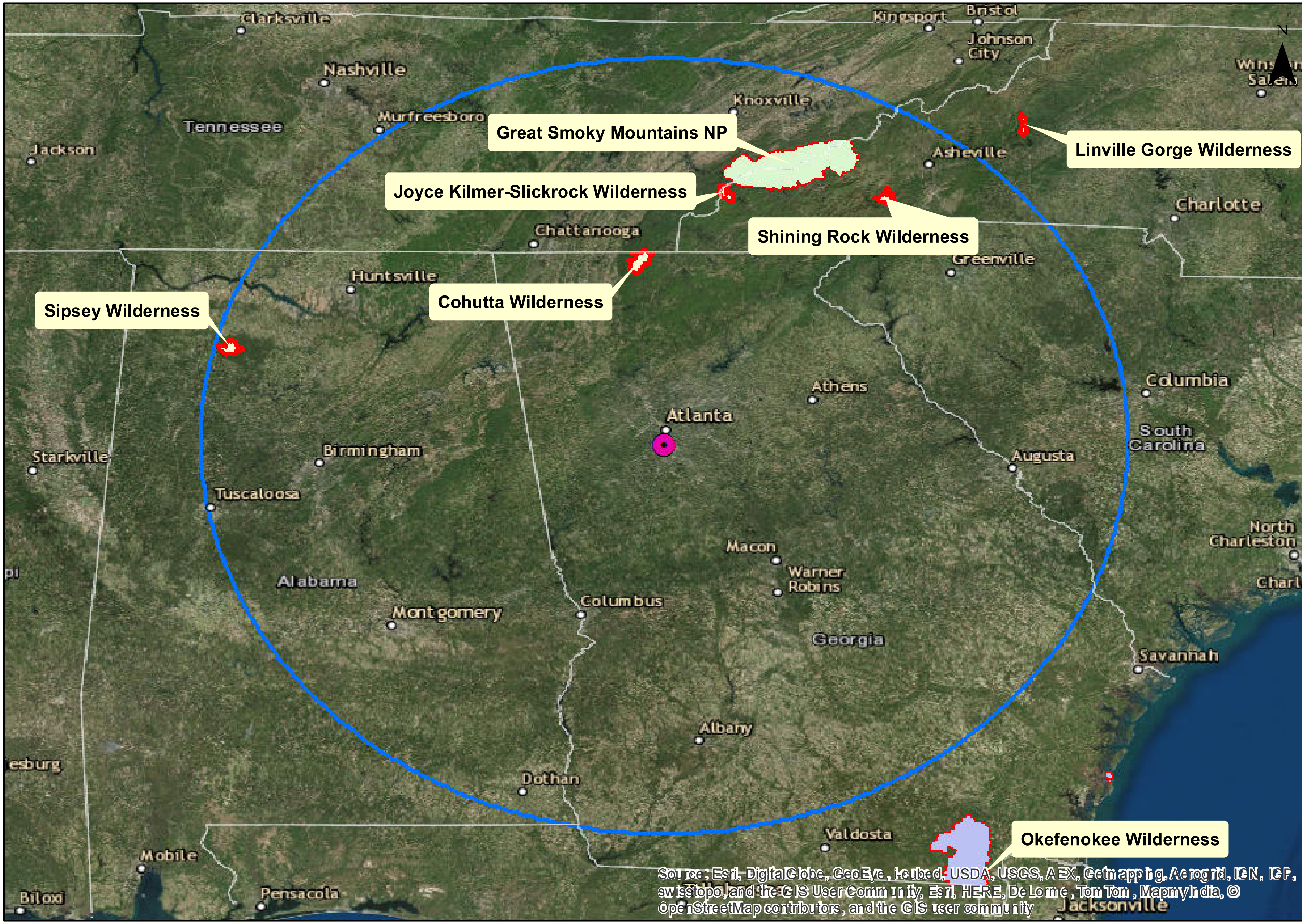
Delta Air Lines, Inc.
Test Cell 5
Class I Areas within 300 km Radius



0 25 50 100
Kilometers

Legend

Delta Test Cell 5
300 km Buffer Area
Class I Areas

Delta Air Lines, Inc.
Technical Operations Center
Test Cell No. 5 - Class I Area Analysis

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1. USFS - United States Forest Service; NPS - National Park Service