DEPARTMENT OF
ECOLOGY
State of Washington

TECHNICAL SUPPORT DOCUMENT FOR PREVENTION OF SIGNIFICANT DETERIORATION (PSD) PERMIT

PERMIT NO: PSD-08-01 Amendment 2 and PSD-12-01

Boeing Renton 737 Max Project
Renton, Washington

Prepared by

Air Quality Program
Washington State Department of Ecology
Olympia, Washington

February 19, 2013

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY 1
2. INTRODUCTION 1
   2.1. The Permitting Process 1
   2.2. The Project 1
      2.2.1. The Site 1
      2.2.2. Airplane Fabrication 2
      2.2.3. The Project 3
   2.3. Existing Permits 6
   2.4. The PSD Application 6
   2.5. PSD Applicability 6
      2.5.1. Emissions and Emissions Control 7
      2.5.2. Operational Limitations 7
      2.5.3. Baseline Actual Emissions 7
      2.5.4. Projected Actual Emissions 8
      2.5.5. Emission Increases for New Emission Units 8
      2.5.6. Criteria Pollutant Emissions Increase 9
      2.5.7. GHG Analysis 10
      2.5.8. Mass-Based GHG Emissions 11
      2.5.9. Net Emissions Increase 14
   2.6. Emission Units 14
   2.7. New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants 16
3. DETERMINATION OF BACT 16
   3.1. Definition 16
   3.2. Regulatory Requirements 16
   3.3. Clearinghouse and Technology Evaluation 17
   3.4. Regenerative Thermal Oxidizer 18
   3.5. Carbon Adsorption 19
   3.6. Thermal Oxidizer 19
   3.7. Regenerative Thermal Oxidizer with Concentrator 20
   3.8. Low-VOC Coatings, HVLP Coating Gun, Best Management Practices 20
   3.9. BACT for the Project 20

4. AMBIENT AIR QUALITY IMPACTS ANALYSIS 21
4.1. Modeling Methodology 22
4.2. Impacts Assessment 23
4.3. NAAQS Analysis 23
4.4. Increment Consumption 24
4.5. Toxic Air Pollutants 24
5. AIR QUALITY RELATED VALUES 24
5.1. Construction and Growth Impacts 25
5.2. Impacts on Soils and Vegetation 26
6. ENDANGERED SPECIES ACT 26
7. STATE ENVIRONMENTAL POLICY ACT (SEPA) 26
8. CONCLUSION 27
ACRONYMS AND ABBREVIATIONS 28

LIST OF FIGURES

Figure 1. Boeing Renton map 2
Figure 2. Current Buildings 4-20, 4-21, 4-81, and 4-82 configuration 4
Figure 3. Current Building 4-86 configuration 5
Figure 4. Proposed configurations 5

LIST OF TABLES

Table 1. Criteria Pollutant BAE 8
Table 2. Criteria Pollutant PAE 8
Table 3. PAE New Emission Units 9
Table 4. Criteria Pollutant Emissions Increase 9
Table 5. Emission Increases Compared to SER 9
Table 6. BAE CO_2 Emissions 11
Table 7. BAE CH_4 Emissions 11
Table 8. BAE N_2O Emissions 11
Table 9. Mass BAE GHG Emissions 12
Table 10. GHG Mass Emission PAE Minus BAE 12
Table 11. CO_2e Multipliers 13
Table 12. CO_2e BAE 13
Table 13. CO_2e PAE Minus BAE w/SER Comparison 13
Table 14. Emission Unit Identification 15
Table 15. RBLC Clearinghouse Results 17
Table 16. Technology Ranking 18
Table 17. Cost-Effectiveness Regenerative Thermal Oxidizer 18
Table 18. Cost-Effectiveness Carbon Adsorption 19
Table 19. Cost-Effectiveness Thermal Oxidizer 19
Table 20. Cost-Effectiveness Thermal Oxidizer with Concentrator 20
Table 21. BACT Emission Limits 21
Table 22. Ozone Impacts 23
Table 23. Class I Areas 24
Table 24. Q/D Analysis 25

1. EXECUTIVE SUMMARY

The Washington State Department of Ecology (Ecology) has determined that the applicant, the Boeing Commercial Airplane Group Renton (Boeing Renton), has satisfied all of the requirements of Prevention of Significant Deterioration (PSD). An air quality analysis was performed to demonstrate that the construction and operation of the 737 MAX project would not cause or contribute to significant deterioration in any Class I area and will have no significant adverse impact on air quality. The technical analysis performed by Ecology is presented below.

2. INTRODUCTION

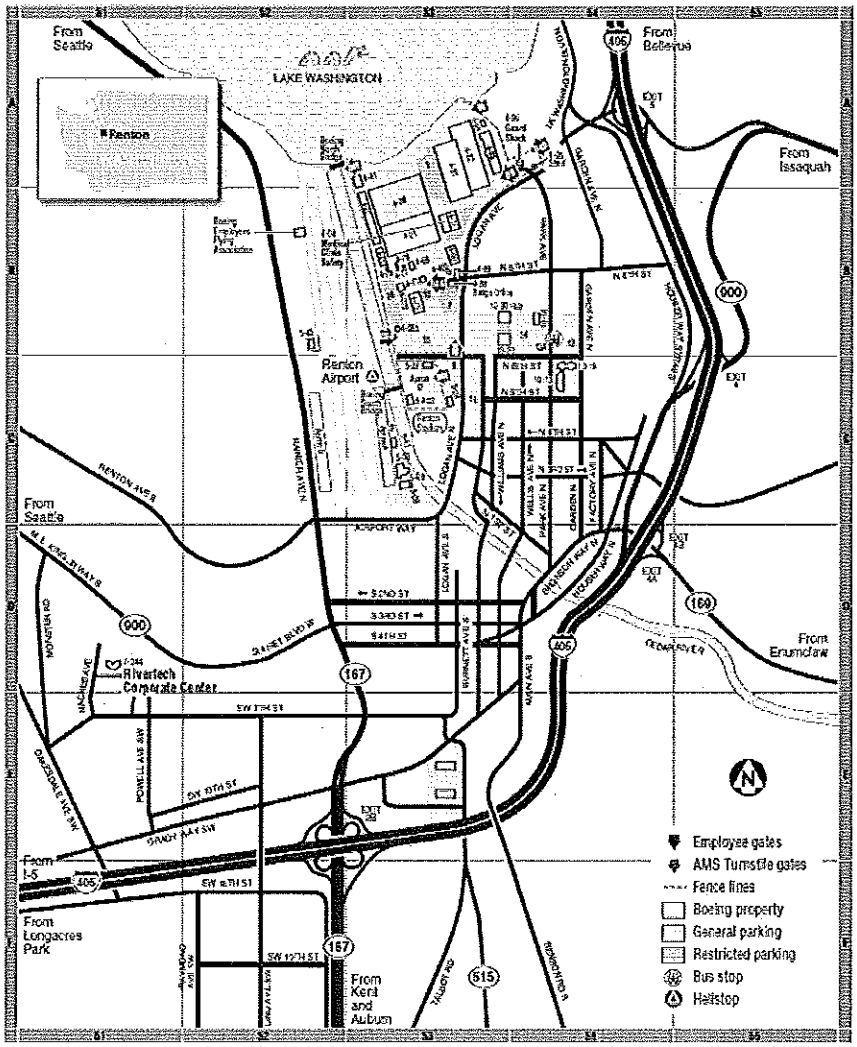
2.1. The Permitting Process

The PSD requirements are established in Title 40, Code of Federal Regulations (CFR), Part 52.21 and Washington Administrative Code (WAC) 173-400-700. Federal rules require PSD review of all new or modified stationary sources that meet certain overall size and pollution rate criteria. The objective of the PSD program is to prevent serious adverse environmental impact from emissions into the atmosphere by a new or modified stationary source. The program limits degradation of air quality to that which is not considered "significant" as defined by the federal regulations listed above. To meet the goal of limiting degradation of air quality, the PSD rules require that an applicant utilize the most effective air pollution control equipment and procedures after considering environmental, economic, and energy factors. The program sets up a mechanism for evaluating and controlling air emissions from a proposed source to minimize the impacts on air quality, visibility, soils, and vegetation.

2.2. The Project

2.2.1. The Site

The Boeing Renton facility is located in the city of Renton in King County, Washington, and began operation in 1942. It occupies 339 acres, and currently manufactures parts for and assembles the 737 series airplane model. The facility is located in the south half of Section 18, Township 23N, Range 5, Willamette Meridian. It is bounded to the north by Lake Washington, to the south by Airport Way, to the east by Logan Avenue, and to the west by the Renton Airport as shown in the following figure:



Copyright 2010 The Boeing Company. All rights reserved.

Figure 1. Boeing Renton map

2.2.2. Airplane Fabrication

Model 737 assembly operations primarily occur in Buildings 4-20, 4-21, 4-42, 4-81, 4-82, and 4-86 and can be grouped as follows:

- **Wing Assembly Operations** include assembling the upper and lower wing panels. These operations primarily occur in Buildings 4-20 and 4-21.

- **Wing Clean, Seal, Test, and Paint Operations** include cleaning the complete wing assemblies, sealing them including the interior surfaces of the fuel tank, applying corrosion inhibiting compounds, testing the fuel tank for leaks, correcting any leaks, and painting the exterior surfaces. These activities only occur in Building 4-86.

- **Final Assembly Operations** include joining the wings and tail assemblies to the fuselage and adding the necessary electrical systems, hydraulic systems, and interiors. These operations occur in Buildings 4-81 and 4-82.

- **Delivery Operations** include final painting, any necessary depainting, and preparing the airplane for delivery. These operations occur in Building 4-42 and the paint hangars. Some airplanes receive their final exterior coating in Building 4-41 paint hangar and some in the Building 5-50 paint hangar. Others are flown off-site because Renton does not have the capacity to apply the final exterior coating to all the airplanes produced in Renton.

- **Combustion Operations** include the boilers, heaters, and backup diesel generators. The boilers are located in Buildings 4-89 and 5-50.

2.2.3. The Project

Boeing Renton produces single-aisle 737 model airplanes in Renton and proposes to make changes to the facility that will enable it to produce "737 MAX airplanes" (the newest planned 737 derivative) and increase production capacity. The current production rate for 737 Next Generation models (Models 700, 800, and 900) is approximately 420 airplanes per year. Changes permitted under PSD-11-02 enabled production up to a maximum of about 504 737 Next Generation airplanes per year. The 737 MAX project will consist of two phases with the ultimate goal of producing approximately 60 airplanes per month (720 airplanes per year).

Phase 1 of the project consists of two components. The first component involves making the changes at the facility to develop the production technology and capability for the 737 MAX model while maintaining production of existing models at levels up to approximately 504 airplanes per year (reconfiguration and relocation of existing equipment) this includes the addition of a new assembly line. The second component of Phase 1 would be an increase in overall production, utilizing the increased production capacity created in the first component of Phase 1 for the production of salable 737 MAX airplanes, and related emission increases.

Part of the physical changes will include moving wing systems from Buildings 4-81 and 4-82 into Buildings 4-20 and 4-21. In addition, both Phase 1 and Phase 2 of this project include the installation of new wing panel assembly tools and non-emission unit equipment (e.g., riveters), new automated spar assembly tools (ASATs), and other assorted tooling and non-emission-unit equipment in Buildings 4-20 and 4-21. No new or modified spray booths are planned, and no other emission units would be added or modified in Buildings 4-20 and 4-21. The Phase 1 changes are physically and economically independent of the Phase 2 changes; the Phase 1 changes will be made regardless of whether or not the Phase 2 changes are made.

Phase 2, the second independent phase of this project, will be to make further changes to the facility with the intent of increasing overall 737 production capacity to about 720 airplanes per year. The changes necessary to achieve this production rate would include creating additional

wing assembly and painting capacity within the existing buildings, and increasing on-site final decorative coating capacity. Phase 2 will include an increase in the emissions from Buildings 4-20, 4-21, 4-81, and 4-82 from 118 tons per year (tpy) to about 165 tpy.

Although the exact timing for each of the phases will depend in part on Boeing corporate directives, Boeing anticipates that construction of Phase 1 will commence on approximately February 15, 2013; construction of Phase 2 will commence on or before July 15, 2016.

Boeing Renton has requested Ecology permit two options for Phase 2. In Phase 2 Option 1, Boeing Renton is proposing to construct one new vertical wing booth (PB #5) and three Corrosion Inhibitor Compound (CIC) booths (CB 1, CB 2, and CB 3) in the 4-86 building as well as modifying (fan replacement, etc.) three existing boots in the 4-86 Building (PB1, PB2, PB3. PB4. PB5, PB6, or PB7). Additionally, Option 1 will include the creation of a new two position decorative paint hangar (P-7 and P-8). Phase 2 Option 2, is similar to Option 1 except that Boeing Renton plans to install three vertical wing booths (PB 5, PB 6, and PB 7) instead of one in the 4-86 Building. Below are several diagrams with before and after configurations.

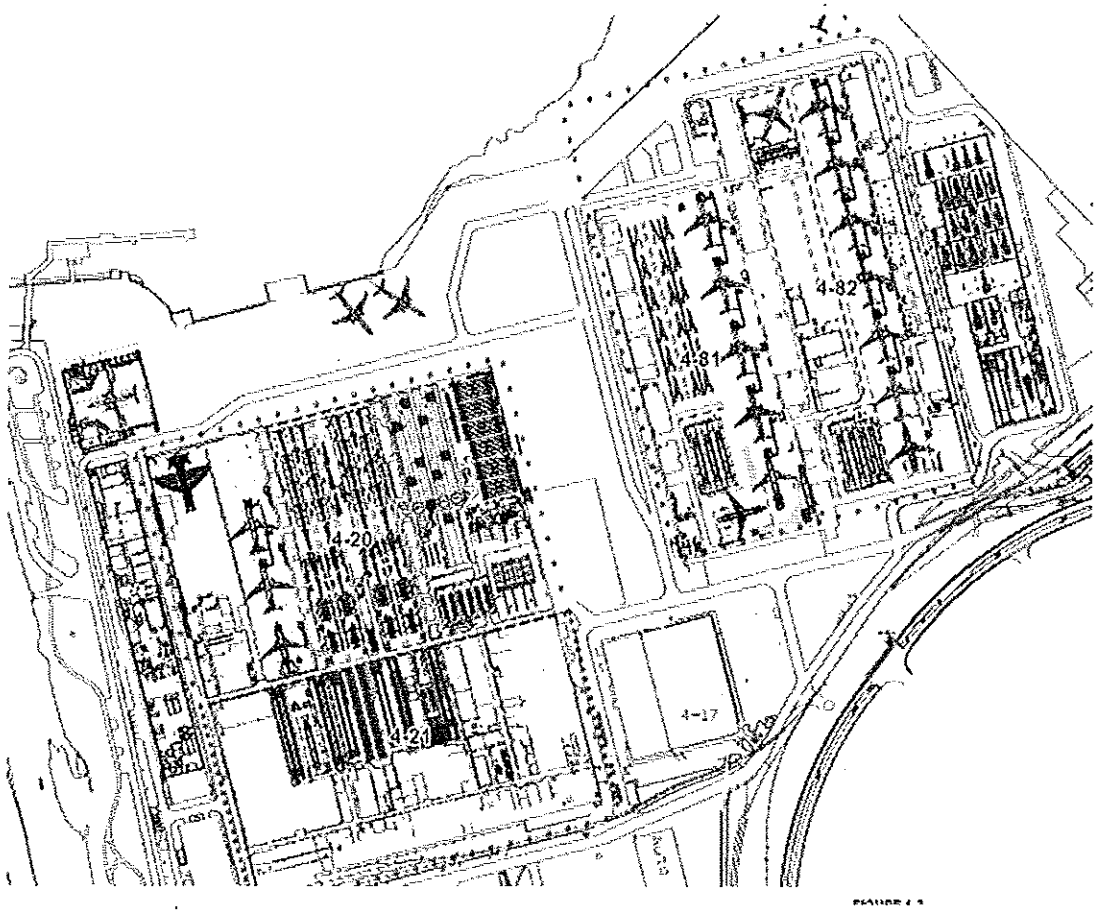


Figure 2. Current Buildings 4-20, 4-21, 4-81, and 4-82 configuration

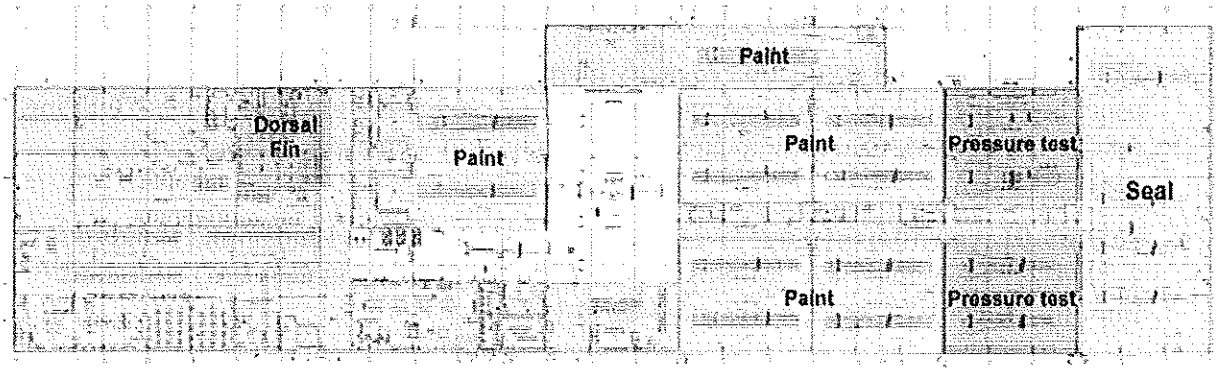


Figure 3. Current Building 4-86 configuration

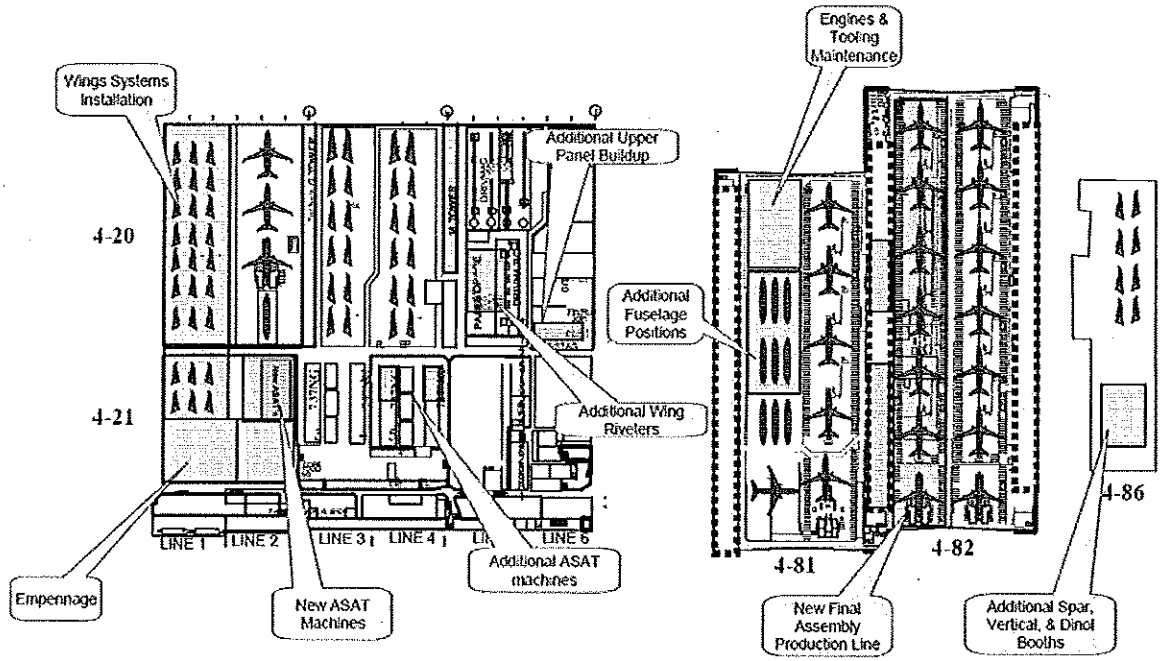


Figure 4. Proposed configurations

2.3. Existing Permits

Boeing Renton is currently operating under several PSD permits issued by Ecology. These include the following:

- **PSD-11-02** approved production capacity increases including four new replacement wing panel booths (Building 4-20) and one new and one modified wing paint booth (Building 4-86). These changes accommodated a 737 production increase to 504 airplanes per year.
- **PSD-08-01 Amendment 1** approved changes to the 5-50 Paint Hangar and Buildings 4-20, 4-21, 4-81, and 4-82. It limits the volatile organic compound (VOC) emissions from Buildings 4-20, 4-21, 4-81, and 4-82 to 118 tpy.
- **PSD-97-2** approved activities at Building 4-86. It includes a 242 tpy VOC limit for Building 4-86.
- **PSD-88-4** approved activities at the 4-41 Paint Hangar. It includes a 124 tpy VOC limit for Building 4-41.

It can be difficult to manage multiple PSD permits at a single facility. Therefore, Boeing has agreed to consider applying to consolidate the permits into one or two permits.

2.4. The PSD Application

The PSD application was received on July 25, 2012. Additional information was received on October 16, 2012, October 17, 2012 and November 27, 2012. The application was found to be complete on December 18, 2012.

2.5. PSD Applicability

This project is subject to PSD review for emissions of VOC for the following reasons:

- Boeing Renton is an existing major stationary source and has the potential to emit of VOC emissions in excess of 250 tpy.
- Boeing Renton is an existing major stationary source because it has four existing PSD permits (PSD-88-4 Amendment 1, PSD-97-2, PSD-08-01 Amendment 1, and PSD-11-02).
- The Significant Emissions Rate (SER) for VOCs is 40 tpy.
- The proposed emissions increase of VOC from the 737 MAX project exceeds 40 tpy.
- The site of the proposed project is in an area that has been designated as in attainment or unclassifiable with national and state ambient air quality standards.

It is important to point out that the only pollutant subject to PSD review is VOC. VOCs are different because there are no ambient standards for VOC emissions. VOCs are, however, a precursor of ozone. Ozone is formed over a period of hours to days, so the exact point of origin of the VOC emissions is not as crucial as it would be for criteria pollutants with direct ambient standards.

2.5.1. Emissions and Emissions Control

If the emission increases of a New Source Review (NSR) regulated pollutant at an existing major stationary source exceed the emission rates that the PSD program refers to as "significant," then those increases must undergo PSD review. When evaluating emission increases at a new source, potential or allowable emissions are used to determine applicability. Potential emissions, or a source's Potential to Emit (PTE), are based on the theoretical operation 24 hours a day, 365 days per year (8,760 hours). The PTE could also be adjusted downward for physical or operational limitations of the equipment, or limitations imposed by a regulation or permit.

When evaluating a modification at an existing emission unit, a baseline actual to projected actual applicability test is performed. Baseline actual emissions are the average rate, in tpy, at which the emission unit actually emitted the pollutant during any 24-month period within the last 10 years. Projected actual emissions are the maximum annual rate in tpy that a regulated pollutant is expected to be emitted for a 5-year period after the project. If a unit's design capacity is increased, then a 10-year period is used to estimate projected actual emissions.

The PSD rules allow a source to utilize the potential minus actual calculation for modified units. If this calculation is used, they will not be required to monitor and report as stringently as required under the baseline actual to projected actual test.

2.5.2. Operational Limitations

Fabricating airplanes is different than operating a boiler. When estimating the emissions from a boiler, the maximum hourly emissions are multiplied by the number of hours in a year. When fabricating an airplane, the emissions are estimated based upon historical product usage scaled up to equal the number of airplanes fabricated each year. Boeing Renton has elected to take a limitation on the total amount of VOCs emitted from the facility (750 tpy). This 750 ton per limit has been modeled and found not to cause or contribute to any ozone exceedance.

2.5.3. Baseline Actual Emissions

Boeing Renton elected to use 24-month period of January 2010 to December 2011 as the baseline period for criteria pollutants. For greenhouse gas (GHG) emissions, Boeing Renton has selected January 2006 through December 2007. Table 1 lists the baseline actual emissions for all pollutants except GHGs. GHGs are evaluated separately below.

Table 1. Criteria Pollutant BAE						
Building or Activity	CO	NO_X	PM	SO_X	Pb	VOC
4-20 & 4-21	---	---	---	---	---	54.0
4-86	---	---	---	---	---	94.0
4-81 & 4-82	---	---	---	---	---	20.0
Flight line	---	---	---	---	---	2.0
4-41 hangar	---	---	---	---	---	35.5
5-50 hangar	---	---	---	---	---	40.8
Combustion	13.3	34.2	1.3	0.1	0.00008	0.9
TOTAL	13.3	34.2	1.3	0.1	0.00008	247.2

2.5.4. Projected Actual Emissions

Table 2 presents the projected actual emissions for the debottlenecked emission units within the 737 MAX project.

Table 2. Criteria Pollutant PAE							
Building or Activity	CO	NO_X	PM	SO_X	Pb	VOC Option 1	VOC Option 2
4-20 & 4-21	---	---	---	---	---	103.7	103.7
4-86	---	---	---	---	---	217.6	194.0
4-81 & 4-82	---	---	---	---	---	38.4	38.4
Flight line	---	---	---	---	---	3.8	3.8
4-41 hangar	---	---	---	---	---	51.8	51.8
5-50 hangar	---	---	---	---	---	40.8	40.8
Combustion	25.2	64.9	2.4	0.3	0.00018	1.7	1.7
TOTAL	25.2	64.9	2.4	0.3	0.00018	457.8	434.2

2.5.5. Emission Increases for New Emission Units

For emission units that will be newly constructed as part of the project, baseline emissions are set to zero and post-project emissions are the emission units' PTE. The emission increase from these units resulting from the project is equal to their PTE. For the 737 MAX project, the new emission units would be the three new CIC booths in Building 4-86, up to three new vertical wing paint booths in Building 4-86, and the new, two-position paint hangar. The new and modified booths will be physically capable of operating three shifts per day. Therefore, the PTE for the new booths is based on operating three shifts per day, seven days per week. The potential emissions from all the new emission units are shown in Table 3 below.

Table 3. PAE New Emission Units							
Building or Activity	CO	NO_X	PM	SO_X	Pb	VOC Option 1 (tons)	VOC Option 2 (tons)
4-86 vertical wing booths (VWB #1, 2, and 3)	---	---	---	---	---	11.8 (1 booth)	35.4 (3 booths)
4-86 CIC (3 booths) (CICB #1, 2, and 3)	---	---	---	---	---	12.6	12.6
New hangar (P-7)	---	---	---	---	---	122.0	122.0
TOTAL	---	---	---	---	---	146.4	170

2.5.6. Criteria Pollutant Emissions Increase

The emissions increase is calculated by subtracting the baseline emissions from the increases associated with the new and modified units as shown in Table 4.

Table 4. Criteria Pollutant Emissions Increase				
Pollutant	New Emissions (tpy)	PAE (tpy)	BAE (tpy)	Emissions Increase (tpy)
CO	---	25.2	13.3	11.9
NO_X	---	64.9	34.2	30.7
PM	---	2.4	1.3	1.1
SO_X	---	0.3	0.1	0.2
Pb	---	0.00018	0.00008	0.0001
VOC Option 1	146.4	457.8	249.0	355.2
VOC Option 2	170	434.2	249.0	355.2

A comparison of the project's emissions to the PSD SER is shown in Table 5.

Table 5. Emission Increases Compared to SER			
Pollutant	Emissions Increases (tpy)	SER (tpy)	Emissions Above SER? Yes or No
CO	13.2	100	No
NO_X	34.0	40	No
PM	1.2	2.5/15/10	No
SO_X	0.2	40	No
Pb	0.0001	0.6	No
VOC Option 1	355.2	40	Yes
VOC Option 2	355.2	40	Yes

2.5.7. GHG Analysis

40 CFR 52.21(b)(40(v) defines the regulatory framework for GHGs at existing stationary sources. The first step is a determination of PSD applicability of the source based upon existing or proposed emissions. The second step is a comparison of the project's GHGs to the significant emission rates.

Step 1: Does the modified source have a PTE of GHG emissions in excess of 100,000 tpy? Or, is the source already undergoing PSD review for another pollutant?

Boeing Renton is an existing major stationary source with actual emissions of CO_2 equivalents (CO_2e) less than 100,000 tpy. It was not necessary for Boeing Renton to quantify their existing PTE of GHG emissions to satisfy Step 1 because this action is considered an "anyway modification." An anyway modification is one that is already undergoing PSD review for another pollutant. Therefore, Step 1 is satisfied and quantification of the change in GHG emissions is required for this project.

Step 2: Calculate the emissions increase and the net emissions increase of GHGs and CO_2e from the modification and compare them to the SER. The SER is 75,000 tpy on a CO_2e basis and zero tpy on a mass basis.

In order to correctly address the Step 2 requirements, Ecology reviewed the United States Environmental Protection Agency's (EPA) guidance. In March 2011, EPA published guidance on evaluating GHG emissions – "PSD and Title V Permitting Guidance for Greenhouse Gases."[1] The PSD permitting guidance presents a two-part applicability process that evaluates both:

- The net emissions increase of CO_2e, calculated as the sum of the six GHG pollutants on a CO_2e basis in order to determine whether the sources emissions are in excess of 75,000 tpy; and, if so,
- The net emissions of GHGs (on a mass basis) exceed zero tpy.

It is common to evaluate the second criterion first.[2] This is accomplished by evaluating the GHG emissions on a mass basis and comparing that result to the SER which is zero. Then the CO_2e are summed and compared to the SER of 75,000 tons. If both the net emissions increase and net mass emissions increase are greater than 75,000, the project is subject to PSD review for GHGs.

[1] http://www.epa.gov/nsr/ghgdocs/ghgpermittingguidance.pdf

[2] While technically the evaluation of the mass-based thresholds is the second step in the applicability analysis, from a practical standpoint most sources are likely to treat this as an initial screen, so that if they would not trigger PSD or title V on a mass basis, they would not proceed to evaluate emissions on a CO_2e basis, 75 FR 31522, June 3, 2010.

2.5.8. Mass-Based GHG Emissions

Most of the GHG emissions from Boeing Renton are a byproduct of combustion of natural gas and liquid fuels. In Table 6, the quantity of fuels (natural gas, #6 residual fuel, #2 diesel fuel, and propane) are used to develop mass emissions of CO_2.

Table 6. BAE CO_2 Emissions

Fuel	Natural Gas	#6 Residual Fuel	#2 Diesel Fuel	Propane
Quantity 06	365,021	12,000	9,561	0
07	341,976	16,312	28,107	7,981
Units	mmBtu	gallons	gallons	gallons
Emission factor CO_2[3]	53.02 kg CO_2/mmBtu	11.27 kg/gal	10.20 kg/gal	5.59 kg/gal
Mass in tons 06	21,337	149	108	0
07	19,990	203	316	49
Average mass CO_2 in tons	20,663	176	212	25

In Table 7, the quantity of fuels (natural gas, #6 residual fuel, #2 diesel fuel, and propane) are used to develop mass emissions of methane (CH_4).

Table 7. BAE CH_4 Emissions

Fuel	Natural Gas	#6 Residual Fuel	#2 Diesel Fuel	Propane
Quantity 06	365,021	12,000	9,561	0
07	341,976	16,312	28,107	7,981
Units	mmBtu	gallons	gallons	gallons
Emission factor[4]	0.001 kg CH_4/mmBtu	0.0005 kg CH_4/gal	0.0004 kg CH_4/gal	0.0003 kg CH_4/gal
Mass in tons 06	0.40	0.007	0.004	0
07	0.38	0.009	0.012	0.03
Average mass CH_4 in tons	0.39	0.008	0.008	0.01

In Table 8, the quantity of fuels (natural gas, #6 residual fuel, #2 diesel fuel, and propane) are used to develop mass emissions of nitrous oxide (N_2O).

Table 8. BAE N_2O Emissions

Fuel	Natural Gas	#6 Residual Fuel	#2 Diesel Fuel	Propane
Quantity 06	365,021	12,000	9,561	0
07	341,976	16,312	28,107	7,981
Units	mmBtu	gallons	gallons	gallons
Emission factor[5]	0.0001 kg	0.00009 kg	0.00008 kg	0.00005 kg

[3] 40 CFR Part 98 Subpart C, Table C-1.
[4] 40 CFR Part 98 Subpart C, Table C-2.
[5] Ibid.

Table 8. BAE N_2O Emissions				
Fuel	Natural Gas	#6 Residual Fuel	#2 Diesel Fuel	Propane
	N_2O/mmBtu	N_2O/gal	N_2O/gal	N_2O/gal
Mass in tons 06	0.04	0.001	0.001	0
07	0.04	0.007	0.02	0.000
Average mass N_2O in tons	0.04	0.01	0.002	0

Boeing Renton provided direct and fugitive emissions GHGs in the application but did not speciate them. Therefore, it is assumed that all baseline emissions were CO_2. The 2006/2007 baseline average was listed as 2,713 metric tons of GHG. Converting to English units yields 2,984 tons. Therefore, baseline mass emissions for the 2006/2007 operating period are shown in Table 9.

Table 9. Mass BAE GHG Emissions				
	CO_2	CH_4	N_2O	Total
Natural gas	20,663	0.39	0.04	20,663
#6 residual fuel	176	0.008	0.01	176
#2 diesel	212	0.008	0.002	212
Propane	25	0.01	0	25
Direct and fugitive emissions	2,984	0	0	2,984
Total (tons)	24,060	0	0	**24,060**

Boeing Renton used the 2006/2007 average GHG emissions per airplane to estimate PAE. The 2006/2007 PAE was 80.74 tons per airplane. Boeing's projected number of airplanes is 720 airplanes per year. Thus, the PAE is (720)*(80.74) = 58,133 tons CO_2.

The mass emissions are presented in Table 10.

Table 10. GHG Mass Emission PAE Minus BAE		
PAE (tons GHG)	BAE (tons GHG)	PAE-BAE (tons GHG)
58,133	24,060	34,073

Since the mass emissions are greater than zero, the CO_2e will be summed. Table 11 below shows the equivalent CO_2e multipliers.

Table 11. CO_2e Multipliers	
Pollutant	**CO_2e Multipliers**
Carbon dioxide (CO_2)	1
Methane (CH_4)	21
Nitrous oxide (N_2O)	310
Hydrofluorocarbons	650
Perfluorocarbons	6,500
Sulfur hexafluoride (SF_6)	23,900

The average mass emissions were used to calculate the CO_2e BAE as shown in Table 12.

Table 12. CO_2e BAE			
Pollutant	**Multiplier**	**Mass Emissions (tons)**	**CO_2e (tons)**
CO_2	1	24,060	24,060
CH_4	21	0.51	11
N_2O	310	0.06	19
TOTAL			24,090

Boeing Renton produced 250 airplanes in 2006 and 346 airplanes in 2007. The average number of airplanes produced during the baseline period was therefore (250 + 346)/2 = 298. This application is based on a desired production of 720 airplanes. In order to estimate the PAE CO_2e emissions, the BAE emissions will be ratioed by a factor of 720/298 or 2.42. Therefore, the PAE CO_2e is estimated to be (24,090)*(2.42) = 58,298tons of CO_2e. Table 13 compares the increase in CO_2e emissions to the PSD SER of 75,000 tpy.

Table 13. CO_2e PAE Minus BAE w/SER Comparison				
PAE (tons)	**BAE (tons)**	**PAE-BAE (tons)**	**SER (tons)**	**Emissions Above SER? Yes or No**
58,298	24,090	34,208	75,000	**No**

Emissions of CO_2e are below the PSD SER and no further GHG analysis is required.

2.5.9. Net Emissions Increase

In determining a projects net emissions increase EPA requires all contemporaneous increases and decreases be considered when evaluating a project at a facility provided they have not been relied on in issuing a PSD permit. The contemporaneous period is five years in duration. The period runs from the expected beginning construction date back five years. Boeing is proposing to begin construction in February 2013. Therefore, the contemporaneous period for the 737 MAX project is February 2008 to February 2013 or whenever construction commences.

The following activities occurred at Boeing between the contemporaneous dates of February 2008 and February 2013:

PSD-08-01 Amendment 1 issued on August 26, 2010, allowed the following:

- Reconfigure and refurbish Paint Hanger P1 in Building 5-50.
- Install automated spar assembly and metal shim wet milling machine in Building 4-21.
- Install automatic wing fastener insert system.
- Install assembly tooling and support equipment in Buildings 4-20, 4-21, 4-81, and 4-82.

PSD-11-02 issued on October 14, 2011, allowed the following:

- Install 4-wing panel booths in Building 4-20.
- Install horizontal wing line in Building 4-20.
- Install new vertical wing booth in Building 4-86.

Since each of these modifications was covered under PSD permitting actions, those emissions were relied on and no further analysis is required.

2.6. Emission Units

Ecology believes that the buildings are the emissions units for floor activities. Floor activities include but are not limited to spar, wing, and aircraft assembly. These buildings are very large, open-floor buildings. The VOC generating activities are performed by hand, such as the application of anticorrosion coatings and cleaning compounds. VOC emissions exit the buildings via the large doors, windows, access doors, and general building air handling systems. VOC emissions from flight line activities include hand application of cleaners and coatings outside.

Ecology has previously permitted increased emissions from open floor and flight line activities, including relocation or reconfiguration of these activities, as being debottlenecking emission increases. Those permits are PSD-05-02, PSD-11-01, and PSD-11-02. Existing unmodified booths, hangars, and combustion equipment that would experience an increase in emissions as a result of the project are considered debottlenecked emission units. Increases from the debottlenecked emission units were quantified and included in the ambient impacts analysis.

This project also includes the instillation of up to six (three CIC and three vertical wing) paint booths in Building 4-86 and a two position decorative paint hangar as well as modifying up to 3 paint booths.. The new paint booths and paint hangar are new emission units.

Table 14 presents the emission units for this project.

Table 14. Emission Unit Identification

Emission Unit	Increase (tpy)	Unit Subject to BACT? Yes or No
Building 4-20, 4-21, 4-81, and 4-82, floor activities and existing unmodified booths.	74.4	No, debottlenecked
Building 4-86, floor activities and unmodified booths.	99.2	No, debottlenecked
Flight line	1.8	No, debottlenecked
4-41 paint hangar, existing unmodified hangar	16.3	No, debottlenecked
5-50 paint hangar, existing unmodified hangar	0	No
Combustion	0.9	No, debottlenecked
Proposed Building 4-86 Vertical Wing Booth Phase 2 Option 1 (PB5)	11.8	Yes
Existing horizontal wing booths Phase 2 Option 1. Any 3 booths from the following list (PP1, PP2, PP3, PP4, PP5, PP6, or PP7)	7.87 each for a total of 23.6	Yes
Proposed Building 4-86 Vertical Wing Booths Phase 2 Option 2 (Booth 1) (PB5)	11.8	Yes
Proposed Building 4-86 Vertical Wing Booths Phase 2 Option 2 (Booth 2) (PB6)	11.8	Yes
Proposed Building 4-86 Vertical Wing Booths Phase 2 Option 2 (Booth 3) (PB7)	11.8	Yes
Proposed Building 4-86 CIC Booth Phase 2 (CB1)	4.2	Yes
Proposed Building 4-86 CIC Booth Phase 2 (CB2)	4.2	Yes
Proposed Building 4-86 CIC Booth Phase 2 (CB3)	4.2	Yes
New two position decorative paint hangar Phase 2 (P-7/ P-8)	122	Yes

Increases from floor activities in Buildings 4-20, 4-21, 4-81, 4-82, and 4-86; as well as increases from flightline activities, the 4-41 Paint Hangar, and combustion activities are attributed to debottlenecking from reconfiguration from increased utilization. The activities that generate the emissions (such as hand application of anticorrosion coatings and cleaning compounds) are not changing. What is changing is the configuration of the equipment that holds the spars, wings, and aircraft.

2.7. New Source Performance Standards and National Emission Standards for Hazardous Air Pollutants

40 CFR 63.741 through 63.753, otherwise known as Subpart GG, applies to facilities that are engaged in the manufacture or rework of commercial, civil, or military aerospace vehicles or components and that are major sources of hazardous air pollutants. The NESHAP applies to the following activities:

- Hand-wipe cleaning operations
- Spray-gun cleaning operations
- Flush cleaning operations
- Primer application operations
- Topcoat application operations
- Depainting operations
- Chemical milking maskant application operations
- Waste storage and handling operations

This NESHAP applies to most of the activities at the Boeing Renton facility.

3. DETERMINATION OF BACT

3.1. Definition

BACT is defined as an emission limitation based on the most stringent level of emission control that has been applied at an identical, or similar, source that is technically and economically feasible.

In a BACT analysis, the applicant must rank all control options from highest level of control to the lowest. If the applicant can show that the highest level of control is technically or economically infeasible for the source in question, then the next most stringent level of control is evaluated. Ultimately, the burden is on the applicant to prove why the most stringent level of control should not be used.

3.2. Regulatory Requirements

The PSD regulations require an applicant to use BACT for any pollutant that will have an emission increase at any PSD source provided the project is subject to PSD review and the

emissions unit has been modified. An applicant is required by Washington State regulations to use BACT for any pollutant that will have increased emissions, if the emission unit was physically modified.

If a project is proposed in an area that exceeds ambient air quality standards for a pollutant, the source facility must use a control technology that will result in the lowest achievable emission rate (LAER) for that pollutant. Additionally, the applicant would be required to reduce emissions from other sources in the area at least as much as the proposed source will increase emissions. This project is not required to install LAER level control technology because the area is currently in attainment for all state and federal ambient air quality standards.

3.3. Clearinghouse and Technology Evaluation

Part of a BACT analysis is a review of similar projects (paint spray booths) that have been permitted and/or have demonstrated BACT compliance. Table 15 contains the results from the Reasonably Available Control Technology (RACT)/BACT/LAER Clearinghouse review.

Table 15. RBLC Clearinghouse Results

Facility	BACT Determination	Control Efficiency	Emission Limit
Arcadia Inc.	Regenerative thermal oxidizer	99.3%	0.89 lb/hr
Lippert Components, Inc.	Carbon adsorption	99.3%	85.5% control
Watkins Manufacturing Corporation	Thermal oxidizer	98.9%	95% control
Douglas Production Division	Regenerative thermal oxidizer w/concentrator	93.2%	341 gal/day
Huck-International Deutsch Operations	Regenerative thermal oxidizer	90.6%	59 lb/day
Northrop-Grumman	Carbon adsorption	90%	414 lb/day
Kal-Gard Coating & Mfg, E/M Corp.	Regenerative thermal oxidizer w/concentrator	Not listed	2 tpy
Time Aviation Services Inc.	Low-VOC coatings, HVLP coating gun, Best Management Practices	Not listed	3 gal/day
California Air National Guard, Fresno	Low-VOC coatings, HVLP coating gun, Best Management Practices	Not listed	5.23 lb VOC per gallon coating
Toter	Low-VOC coatings, HVLP coating gun, enclosed gun cleaner	Not listed	1.09 lb VOC per gallon
Boeing Renton PSD-08-	Aerospace NESHAP	Not listed	Annual emission

Table 15. RBLC Clearinghouse Results			
Facility	BACT Determination	Control Efficiency	Emission Limit
01 Amendment 1	(40 CFR Part 63, Subpart GG)		limit of 118 tpy
Boeing Renton PSD-11-02	Aerospace NESHAP (40 CFR Part 63, Subpart GG)	Not listed	Wing panel spray booth limit of 8.3 tpy and inspar wing spray booth limit of 23.7 tpy

Those technologies are ranked in Table 16.

Table 16. Technology Ranking		
Control Technology	Control Efficiency	Ranking
Regenerative thermal oxidizer	99.3%	1
Carbon adsorption	99.3%	2
Thermal oxidizer	98.9%	3
Regenerative thermal oxidizer w/concentrator	93.2%	4
Low-VOC coatings, HVLP coating gun, Best Management Practices with compliance with the Aerospace NESHAP 40 CFR Part 63, Subpart GG	Baseline	5

3.4. Regenerative Thermal Oxidizer

A regenerative thermal oxidizer was ranked as one of the top control technologies available based on control efficiency. VOC emissions are burned inside an enclosed chamber. Heat from the exhaust gas is recovered in a heat exchanger, which allows for fuel efficiencies in sustaining the high burn temperature. Boeing Renton performed a cost analysis for the Building 4-86 Vertical Wing Booths Option 1, Option 2; for the Building 4-86 CIC Paint Booths #1, #2, and #3; and the new paint hangar. Table 17 presents the cost-effectiveness of the technologies presented above.

Table 17. Cost-Effectiveness Regenerative Thermal Oxidizer			
	Vertical Wing Booth	CIC Paint Booth	New Paint Hangar
Cost/ton of VOC removed	$62,965	$77,294	$22,964

Boeing Renton stated that the use of a Regenerative Thermal Oxidizer for controlling emissions of VOC from the Vertical Wing Booths in Building 4-86; the three CIC Paint Booths in Building

4-86; and the new paint hangar is cost prohibitive. Ecology agrees with Boeing Renton's analysis.

3.5. Carbon Adsorption

Carbon adsorption uses a filter bank of canisters that contain activated carbon, which adsorbs the VOC emissions as the air stream passes through before being released to the atmosphere. Vendor information for the carbon adsorption technology was obtained from Thermal Recovery Systems. Boeing Renton performed a cost analysis for the Building 4-86 Vertical Wing Booths Option 1, Option 2; for the Building 4-86 CIC Paint Booths #1, #2, and #3; and the new paint hangar. Table 18 presents the cost-effectiveness of the technologies presented above.

Table 18. Cost-Effectiveness Carbon Adsorption

	Vertical Wing Booth	CIC Paint Booth	New Paint Hangar
Cost/ton of VOC removed	$225,268	$128,056	$114,251

Boeing Renton stated that the use of Carbon Adsorption for controlling emissions of VOC from the Vertical Wing Booth in Building 4-86; the three CIC Paint Booths in Building 4-86; and the new paint hangar is cost prohibitive. Ecology agrees with Boeing Renton's analysis.

3.6. Thermal Oxidizer

A thermal oxidizer introduces the VOC emissions in an air stream to a burner that destroys those emissions prior to release to the atmosphere through a stack. This control technology has been improved upon over the years to also include preheating the incoming air stream to obtain additional fuel efficiencies. Vendor information from Callidus and John Zink for thermal oxidizers with and without preheaters was considered. Boeing Renton performed a cost analysis for the Building 4-86 Vertical Wing Booths Option 1, Option 2; for the Building 4-86 CIC Paint Booths #1, #2, and #3; and the new paint hangar. Table 19 presents the cost-effectiveness of the technologies presented above.

Table 19. Cost-Effectiveness Thermal Oxidizer

	Vertical Wing Booth	CIC Paint Booth	New Paint Hangar
Cost/ton of VOC removed	$316,005	$229,626	$168,374

Boeing Renton stated that the use of a Thermal Oxidizer to control emissions of VOC from the Vertical Wing Booth in Building 4-86; the three CIC Paint Booths in Building 4-86; and the new paint hangar is cost prohibitive. Ecology agrees with Boeing Renton's analysis.

3.7. Regenerative Thermal Oxidizer with Concentrator

This control technology augments the RTO methodology with the addition of a concentrator wheel. The wheel provides for a more concentrated VOC content in a smaller air stream for burning. Greater fuel efficiencies are obtained during operation. Vendor information for the RTO with concentrator control technology was obtained from Anguil. Boeing Renton performed a cost analysis for the Building 4-86 Vertical Wing Booths Option 1, Option 2; for the Building 4-86 CIC Paint Booths #1, #2, and #3; and the new paint hangar. Table 20 presents the cost-effectiveness of the technologies presented above.

Table 20. Cost-Effectiveness Thermal Oxidizer with Concentrator

	Vertical Wing Booth	CIC Paint Booth	New Paint Hangar
Cost/ton of VOC removed	$61,852	$58,514	$61,852

Boeing Renton stated that the use of a Thermal Oxidizer with a Concentrator to control emissions of VOC from the Vertical Wing Booths in Building 4-86; the three CIC Paint Booths in Building 4-86; and the new paint hangar is cost prohibitive. Ecology agrees with Boeing Renton's analysis.

3.8. Low-VOC Coatings, HVLP Coating Gun, Best Management Practices

Boeing Renton already uses low-VOC coatings that meet specifications required for airplane coating operations. Boeing Renton also uses high-transfer-efficiency coating techniques, such as HVLP spray guns, which provide high-transfer efficiency and reduce the overall amount of paint required to perform a job. In addition, Boeing Renton uses good work practices to minimize VOC emissions, including storing coatings and solvents in closed containers, bagging solvent handwipe cleaning rags when not in use, and capturing and containing solvent used for cleaning spray equipment. The VOC emission standards for uncontrolled use of cleaning solvents and coatings as defined in 40 CFR 63 Subpart GG, Aerospace NESHAP. Ecology has historically required Boeing to comply with the Aerospace NESHAP as BACT in PSD-08-01 Amendment 1 and more recently PSD-11-02. No cost analysis was performed because Boeing Renton considers this to be the base case for BACT. Ecology agrees with Boeing Renton's analysis because the other technologies were all cost prohibitive.

3.9. BACT for the Project

As identified in Table 14 above, there are 10 emission units that require a BACT analysis for emissions of VOC. BACT for those units has been determined to be numeric VOC limits, low-VOC coatings, high-transfer-efficiency coating techniques such as HVLP spray guns, best management practices cleaning, coating application, painting and depainting, and compliance with the Aerospace NESHAP 40 Part 63 Subpart GG as in effect on February 19, 2013. Limits will be placed on the allowed emissions from the Vertical Wing Booths, CIC Paint Booths, and the new paint hangar as shown in Table 21.

Table 21. BACT Emission Limits			
Emission Unit	**Aerospace NESHAP 40 CFR 63 Part GG Yes or No**	**Numerical Limit**	**Part of Site wide 750 TPY Limit**
Proposed Building 4-86 Vertical Wing Booth Phase 2 Option 1 (PB5)	Yes	65.0 lb/wing averaged over 12 consecutive months	Yes
Existing Horizontal Wing Booth Phase 2, Option 1, Any 3 Booths from the following list (PP1, PP2, PP3, PP4, PP5, PP6, or PP7)	Yes	65.0 lb/wing averaged over 12 consecutive months	Yes
Proposed Building 4-86 Vertical Wing Booth Phase 2 Option 2 (PB5)	Yes	65.0 lb/wing averaged over 12 consecutive months	Yes
Proposed Building 4-86 Vertical Wing Booth Phase 2 Option 2 (PB6)	Yes	65.0 lb/wing averaged over 12 consecutive months	Yes
Proposed Building 4-86 Vertical Wing Booths Phase 2 Option 2 (PB7)	Yes	65.0 lb/wing averaged over 12 consecutive months	Yes
Proposed Building 4-86 CIC Booth Phase 2 (CB1)	Yes	7.7 lb/wing averaged over 12 consecutive months	Yes
Proposed Building 4-86 CIC Booth Phase 2 (CB2)	Yes	7.7 lb/wing averaged over 12 consecutive months	Yes
Proposed Building 4-86 CIC Booth Phase 2(CB3)	Yes	7.7 lb/wing averaged over 12 consecutive months	Yes
New decorative paint hangar Phase 2 (P-7, P-8)	Yes	1,350 lb/plane averaged over 12 consecutive months	Yes

4. AMBIENT AIR QUALITY IMPACTS ANALYSIS

The PSD permitting program requires that an ambient Air Quality Impacts Analysis (AQIA) be performed for all pollutants emitted in significant quantities. For this project, the only pollutant subject to review is VOC which is a precursor for ozone.

An air quality analysis can include up to three parts: Significant Impact Analysis, National Ambient Air Quality Standards (NAAQS) analysis, and PSD Increment Analysis. The first step in the air quality analysis is to determine if emissions from the proposed project result in impacts greater than the Modeling Significant Impact Level (MSIL). Then, for those pollutants and

averaging periods that have impacts greater than the MSIL, a NAAQS analysis is used to determine if the proposed project will cause or contribute to an exceedance of a NAAQS. The PSD Increment analysis is used to determine if the change in the air quality since the applicable baseline dates is greater than the Class I and Class II PSD increment levels.

This section will discuss the AQIA of the nearby Class II area. The AQIA for the Class I areas will be discussed along with the Air Quality Related Values (AQRVs) in Section 5.

4.1. Modeling Methodology

The modeling was performed using the AIRPACT-3 model with two emission levels: the actual 2008 VOC emissions and a 950-tpy rate. The actual 2008 emission rates of 196 tpy for Boeing Renton and 100 tpy for North Boeing Field were selected because 2008 was the year with the highest measured ozone levels in the last five years. The 950 tpy rate includes 750 tpy rate for Boeing Renton and 200 tpy rate for North Boeing Field. Hence, the modeling results represent a conservative estimate of impacts on ozone concentrations in the Puget Sound of the maximum allowable VOC increase area related to the project.

The AIRPACT-3 model was used to simulate the two emissions cases for two different elevated ozone episodes in the Pacific Northwest: the week of June 24 through July 1, 2008, and the week of August 12 through 18, 2008. These two cases were handled differently in terms of emissions specifications in one significant way. The June 2008 case was set up to simulate a seven-days-per-week painting operation at the same daily rate as weekdays under the five-days-per-week painting schedule. The August 2008 case was set up as a five-days-per-week operation, which reflects the current Boeing Renton paint operations, with no emissions on the weekend. The five-days-per-week schedule reflects a greater daily emission rate.

The June 2008 ozone episode simulation shows very small increases in hourly concentrations of surface-level ozone with a Boeing Renton 750 tpy emission rate and a North Boeing Field 200 tpy emission rate. The maximum (high ozone day) difference (increase) in surface-level ozone from the actual 2008 emissions case to the Boeing Renton 750 tpy and North Boeing Field 200 tpy emissions case was 0.38 parts per billion (ppb) (380 parts per trillion) on Sunday, June 29, 2008, about 75 miles southeast of the plant. Due to the seven-days-per-week emissions profile that was applied for the June episode, emission rates for each day of the week were the same.

The August 2008 simulation also showed very small increases in hourly concentrations of surface-level ozone. The maximum (high ozone day) difference (increase) in surface-level ozone, from the actual 2008 emissions case to the future Boeing Renton 750 tpy and north Boeing Field 200 tpy emissions case, was 0.34 ppb (340 parts per trillion). The maximum differences in surface-level ozone were seen in results for Friday, August 15, 2008, about 75 miles southeast of the plant. Due to the five-days-per-week emissions profile that was applied for the August episode, the Saturday and Sunday concentrations returned to relative background rates.

The results for the simulations of both episodes indicated that the proposed changes in VOC emissions at the two Boeing Renton plants will have a negligible effect on ambient ozone levels within the Pacific Northwest region. These results are consistent with the extremely small change in VOC emissions as a portion of total VOCs (anthropogenic and biogenic) emitted within the urban region of Puget Sound, and they agree with the results of another study that Boeing Renton conducted for VOC emissions increases at Boeing Renton's Everett facility.

4.2. Impacts Assessment

Analysis of the AIRPACT-3 model results for the two cases for both episodes shows that the maximum hourly ozone increase for the most aggressive emissions case was only 0.38 ppb. This result was obtained for the June episode for the future emissions case. The results from both the June and August episodes agreed generally in showing that the maximum ozone differences between the current and future cases were less than 0.4 ppb (less than 0.5 percent of the NAAQS). The results for the simulation of both episodes indicate that the proposed changes in VOC emissions at the two Boeing plants will have a negligible effect upon ambient ozone levels within the western Washington region. These results are consistent with the extremely small change in VOC emissions as a portion of total VOCs (anthropogenic and biogenic) emitted within the urban region of Puget Sound. The PSCAA 2005 emission inventory concluded that 148,100 tpy of VOCs were emitted within the PSCAA's jurisdiction from anthropogenic (human caused) sources. The 737 MAX project VOC increase of 384 tpy of VOC is about 0.2 percent of the overall anthropogenic VOC emissions in the airshed. According to an EPA study, biogenic (natural emission) sources contribute about 46 percent of the VOCs in the Puget Sound airshed.[6] Thus, the 737 MAX project VOC increase is about 0.1 percent of overall anthropogenic and biogenic VOC emissions in the airshed. The analysis above demonstrates that the total VOC emissions for the 737 MAX project are not expected to cause or significantly contribute to an exceedance of the ozone NAAQS anywhere in the Pacific Northwest region, including the nearby Class I areas which are believed to be NO_X limited.

4.3. NAAQS Analysis

There are no ambient standards for VOCs an ozone precursor. However, ozone has a state and federal ambient standard. Table 22 presents the maximum 1-hr and 8-hr modeled concentrations.

Table 22. Ozone Impacts

Averaging Period	AAQS	Highest Modeled Ozone Impacts (ppm)	UTM East (m)	UTM North (m)	Area
1-hr (state limit)	0.12 ppm	0.00038	5719	5224926	Enumclaw/Buckley
8-hr (federal limit)	0.075 ppm	0.00038	same as above	same as above	same as above

[6] http://www.epa.gov/pugetsound/transboundary/emissions.html

Boeing Renton did not model the 8-hr federal ozone NAAQS. However, it is impossible for an 8-hr average concentration to be greater than a 1-hr average; therefore, the modeled 1-hr standard satisfied the modeling requirement.

4.4. Increment Consumption

As part of the Boeing Renton PSD application for changes related to 737 MAX production and capacity increase, no analysis of increment consumption was conducted. This is because there is no increment for ozone or VOC, the only pollutants for which the project is subject to PSD review.

4.5. Toxic Air Pollutants

PSD rules require the applicant to consider emissions of Toxic Air Pollutants (TAPs) during the course of BACT analysis. One reason for this requirement is to ensure that the source does not employ an emission control technique that controls the main pollutant of concern, but emits a new TAP in serious quantities. Ecology's regulations (Chapter 173-460 WAC) require an ambient air quality analysis of TAP emissions.

All new source review requirements pursuant to WAC 173-400-110 are addressed by the PSCAA under notice of construction approval. The PSCAA review also fulfills the PSD review requirement. Consequently, Ecology concludes no further consideration of TAP impacts is required under this PSD permit.

5. AIR QUALITY RELATED VALUES

The PSD regulations require an evaluation of the effects of the anticipated emissions from the proposed source on visibility, soils, and vegetation in Class I areas. The distances to the Class I areas are shown in Table 23.

Table 23. Class I Areas

Class I Area	Distance in Kilometers (km)
Alpine Lakes Wilderness Area	46
Mount Rainier National Park	59
Olympic National Park	72
Glacier Peak Wilderness Area	95
Goat Rocks Wilderness Area	104
North Cascades National Park	139
Mount Adams Wilderness Area	140

The Federal Land Managers' Air Quality Related Values Work Group (FLAG) 2010 report was followed concerning air quality related values. The FLAG guidance states that "current information indicates most FLM areas are NO_X limited" and "until there is enough information available for FLAG to determine whether ozone formation in each FLM area is primarily limited by NO_X or VOC emissions, we will assume all FLM areas are NO_X-limited and will focus on control of NO_X emissions." (FLAG Executive Summary & Section 3.4.5). Because there has not been a demonstration that ozone formation in the Puget Sound region's Class I areas is not NO_X limited and VOC is the only pollutant that is expected of have a significant increase as a result of this project, it can be presumed that the project would have no significant adverse impacts on Class I areas.

Boeing also used a FLAG screening tool called the Q/D Method. Where Q is the mass of certain pollutant that are known to have adverse impacts on air quality related values and D is the distance from the source to a Class 1 Area. If a Q/D were less than 10 "The Agencies would not request any further Class I AQRV impact analyses from such sources." Table 24 presents the Q/D values from the project's VOC emissions and the total facility's VOC emissions.

Table 24. Q/D Analysis

Class I Area	Distance to Class 1 Area (km)	Net Emissions Increase (qty) ÷ (Q/D) (tons VOC/km)	Increase in Allowed Emissions by Distance (Q/D) (tons VOC/km)
Alpine Lakes Wilderness Area	46	7.8	3.3
Mount Rainier National Park	59	6.1	2.6
Olympic National Park	72	5.0	2.1
Glacier Peak Wilderness Area	95	3.8	1.6
Goat Rocks Wilderness Area	104	3.4	1.5
North Cascades National Park	139	2.6	1.1
Mount Adams Wilderness Area	140	2.6	1.1

The results of the Q/D analysis were less than 10. A value below 10 confirms that the project is not expected to significantly impact air quality related values in the Class I area.

5.1. Construction and Growth Impacts

Employment at Boeing Renton is expected to increase by no more than 12 percent as a result of this project. Additionally, there will not be a significant increase in congestion on Washington's roads and highways as a result of the project. Therefore, the proposed project is not expected to cause adverse construction- and growth-related impacts.

5.2. Impacts on Soils and Vegetation

According to EPA guidance, for most types of soils and vegetation, ambient concentrations of criteria pollutants below the secondary NAAQS will not result in harmful effects. Only the VOC emissions from the 737 MAX project are subject to PSD review. VOC is regulated as a precursor to ozone; however, ozone has no secondary NAAQS. Additionally, the expected VOC emissions from the 737 MAX project do not trigger a detailed ambient air quality impact analysis for Class I area as discussed above and the modeling as described in Section 4.2 shows no significant expected ozone increase as a result of the project. Consequently, the impacts on local soils, vegetation, and animals attributable to the 737 MAX project will be negligible.

FLAG guidance does not provide a specific VOC impact on vegetation in the Pacific Northwest. The National Park Service has established monitors for ozone in three Class I areas in Washington State: Mount Rainer National Park, Olympic National Park, and North Cascades National Park. As discussed above, Boeing Renton estimated that the incremental increase in ozone concentrations directly attributable 737 MAX project would be less than 0.38 ppb on an hourly average, a very small fraction of the NAAQS of 75 ppb on an 8-hour average. Therefore, the increase in ozone from this project is not likely to harm vegetation or animals.

6. ENDANGERED SPECIES ACT

Pursuant to Section V.A. of the agreement for the delegation of the federal PSD regulations by EPA to Ecology, dated November 17, 2011, Ecology shall not issue a PSD permit until EPA has notified Ecology in writing that EPA has satisfied its obligations, if any, under Section 7 of the Endangered Species Act (ESA), 16 U.S.C. § 1531 et seq., and 50 C.F.R. Part 402, Subpart B (Consultation Procedures), and with Section 305(b)(2) of the Magnuson-Stevens Fishery and Conservation Act (Magnuson-Stevens Act, MSA), 16 U.S.C. § 1801 et seq., 50 C.F.R. Part 600, Subpart K (EFH Coordination, Consultation, and Recommendations), for federal PSD permits, regarding essential fish habitat. Therefore, the final PSD permit will not be issued for this project until EPA has notified Ecology that this consultation has been completed.

On January 10, 2013, the EPA notified Ecology that they have satisfied their obligations under the Endangered Species Act and the Magnuson-Stevens Act relative to this permitting action. The project will have no effect on listed threatened and endangered species at the Renton facility. No further ESA or MSA consultation was undertaken relative to this action.

7. STATE ENVIRONMENTAL POLICY ACT (SEPA)

Under Washington State rules, a final PSD permit shall not be issued for a project until the applicant has demonstrated that SEPA review has been completed for the project. The City of Renton is the lead agency for SEPA review.

On August 8, 2012, the City of Renton published a Determination of Non-Significance (DNS) under application number LUA12-051, ECF, for the 737 MAX project. The DNS became final on August

24, 2012. Ecology concludes that the applicant has adequately demonstrated compliance with SEPA requirements.

8. CONCLUSION

The project will have no significant adverse impact on air quality. Ecology finds that the applicant, Boeing Renton, has satisfied all requirements for PSD.

For additional information, please contact:

Richard B. Hibbard P.E.
Washington State Department of Ecology
Air Quality Program
P.O. Box 47600
Olympia, WA 98504-7600
(360) 407-6896
richard.hibbard@ecy.wa.gov

ACRONYMS AND ABBREVIATIONS

AQIA	Air Quality Impacts Analysis
AQRV	Air Quality Related Values
ASATS	Automatic Spar Assembly Tools
BACT	Best Available Control Technology
BAE	Baseline Actual Emissions
Boeing Renton	Boeing Commercial Airplane Renton
CFR	Code of Federal Regulations
CH_4	methane
CIC	Corrosion Inhibitor Compound
CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
GHG	Greenhouse Gas
LAER	Lowest Achievable Control Technology
MSIL	Modeling Significant Impact Level
N_2O	nitrous oxide
NAAQS	National Ambient Air Quality Analysis
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO_X	nitrogen oxides
NSR	New Source Review
PAE	Projective Actual Emissions
Pb	lead
PM	particulate matter
ppb	parts per billion
ppm	parts per million
PSCAA	Puget Sound Clean Air Agency
PSD	Prevention of Significant Deterioration

PTE	Potential to Emit
Q/D	Ratio of pollutants mass to distance in the FLAG document
RACT	Reasonably Availably Control Technology
SER	significant emission rate
SF_6	sulfur hexafluoride
SO_X	oxides of sulfur
TAP	Toxic Air Pollutant
tpy	tons per year
VOC	Volatile Organic Compound
WAC	Washington Administrative Code