Asheville-Buncombe Air Quality Agency
APPLICATION REVIEW SUMMARY

SECTION A: FACILITY INFORMATION			
Company Name:	RTX Corporation, Pratt and Whitney Division		
Site Name:	Asheville Plant		
Mailing Address:	330 Pratt and Whitney Blvd., Asheville NC 28806		
Site Address:	330 Pratt and Whitney Blvd., Asheville NC 28806		
General Description of Business:	Airplane Parts Manufacturer		
Facility Classification:	Small	**Site Status:**	Existing

SECTION B: APPLICATION INFORMATION			
Date of Application:	December 14, 2023	**Application Tracking No.:**	NA
Date Complete Application Received:	January 2, 2024	**Board Meeting Date:**	March 14, 2024
Confidentiality Requested?	NA	**Board Agenda Type:**	Modification
Application Results:	The purpose of this review is to lend approval to RTX Corporation, Pratt and Whitney Division to modify their permit.		
Permit No. Issued by Application:	11-920-21B / March 14, 2024		
Permit No. Voided by Application:	11-920-21A / January 25, 2024		

SECTION C: REGULATORY INFORMATION	
AB Air Quality Regulations:	4.0515, 4.0516, 4.0521, 4.0524, 4.1104, 4.1111, 4.1806, 17.0704

SECTION D: FACILITY-WIDE EMISSIONS INFORMATION

Pollutants Reviewed as a Result of this Application or AB Air Quality Action:	Projected Actual Emissions (TONS/YR)	Prior Potential Emissions (TONS/YR)	Current Potential Emissions (TONS/YR)
CO	3.9	20.2	15.0
NO_X	3.0	12.4	9.8
PM	0.8	1.7	1.9
PM_{10}	0.8	1.7	1.9
$PM_{2.5}$	1.1	1.7	1.9
SO_2	0.002	0.01	0.01
VOC	22.4	46.3	45.0
Greenhouse Gases, CO_{2e}	2,323.1	6196.2	5337.9
Total HAPs	0.9	3.2	2.3
List all HAPs >10 TPY	None.		

***Emission numbers denoted with an (*) reflect "controlled" emissions (i.e. emissions reduced by a pollution control device).**

IN COMPLIANCE WITH EMISSION STANDARDS / RECOMMEND APPROVAL			
Prepared By:	James C. Raiford /	**Date Completed:**	3/4/24
Reviewed By:	Betsy Brown / Betsy Brown	**Date Reviewed:**	3/5/24
Director:	Ashley J. Featherstone /	**Date Reviewed:**	3/5/2024

SECTION A DETAILS

FACILITY INFORMATION

[Detailed discussion of any items in Section A]

RTX Corporation, Pratt and Whitney Division (Pratt and Whitney) is a manufacturer of aircraft engines and is headquartered in East Hartford, CT. Pratt and Whitney is proposing to construct and operate a new turbine airfoil production facility in Asheville, North Carolina in Buncombe County.

The purpose of this modification is to update various processes that were changed from what was submitted in the application during the construction of the facility. When the original application was submitted, they were based on pre-construction designs, and as such, some sources have changed during the construction process. The changes that will be made to the permit for this modification are as follows:

- Grain Etch Lines – The tanks sizes for the grain etch lines have increased, but in addition a wet scrubber was installed. With the wet scrubber, emissions of Hydrogen Chloride and Nitric Acid will decrease.
- VDP1 – VDP23 – Particulate emissions from the vapor deposition process are vented indoors and therefore are exempt from permitting. These sources will be removed from the permit.
- VSP1 – VSP6 – Particulate emissions from the VPS coating process are vented indoors. Since the sources are subject to 40 CFR Part 63 Subpart WWWWWW, the sources will remain in the permit.
- EGEN1 – EGEN8 – The original permit application included three 2,100 hp, two 670 hp, and one 120 hp natural gas fired emergency generators. This modification will reflect that four 1,118 hp and four 229 hp engines were installed at the facility. Emissions from the new generators will be lower than the previous permit application.
- EBPVD1 – EBPVD5 – There was a change to the expected design of the EPVD coaters that will no longer include a HEPA filter. Potential particulate matter emissions will increase from 0.15 to 0.52 tons per year.
- One 120 hp natural gas-fired emergency fire water pump was not installed and is being removed from the insignificant activity list.
- Condition 5, requested by Pratt and Whitney in the original application, had a reference updated, and Condition 6 was updated to include the Emergency Generators since they have always been subject to AB Air Quality Code 4.0516 but were not included in the previous permit.

Below is a description of the facility with the newly updated information from this permit application:

The facility will manufacture metal parts, which include casting operations, where the body of the parts are made through metal casting, and then go through grinding, coating and quality inspections before being shipped to customers.

Part casting uses a method of casting known as lost wax investment casting, which forms the general part that will be ready for final finishing. Wax is first injected into a die, and once cooled, the wax patterns removed. The wax pattern is dipped into a ceramic slurry to build a shell around the wax. Once the shell dries, the part is moved to an electric steam autoclave to melt out the wax. The autoclave chamber is depressurized and the steam vents outdoors. A small percentage of wax is volatilized as VOC emissions. The hollow shells are then moved to a natural gas furnace to remove any remaining wax residue. The furnace exhaust is processed through an afterburner which combusts VOC from the wax then vents to atmosphere. Emissions from the furnace will include nitrogen oxides (NOx), carbon monoxide (CO) and particulates from the combustion of natural gas.

The hollow ceramic shells then move to casting, where in an electric metal induction vacuum furnace, ingots are melted down and poured into the ceramic shell's cavity while a vacuum pump runs to remove the air. The vacuum pump for the furnaces vents outdoors. The furnaces are expected to emit minimal PM emissions after passing through an in-line particulate filter. Also, expected is a minimal amount of NOx and VOC that are thermally generated within the furnace chamber.

The parts are then heat treated in an electric vacuum furnace, after which they are cooled before the ceramic shell is removed from the metal. The vacuum pump for the furnace vents outdoors. PM emissions from the shell removal process are captured in a hood controlled by filters that do not vent outdoors. The parts go to the Post-cast area where parts are machined and finished. Shell removal and machining activities in the Post-cast area are vented to dust collectors to control PM emissions. These dust collectors will vent indoors. The part then enters a vacuum sealed liquid caustic autoclave where the internal ceramic structure is removed. The parts are then inspected for quality using a series of tests including grain etching and a Florescent Penetrant Inspection (FPI) process. The ventilation hood over the grain etch lines will vent to the outside and be controlled by a wet scrubber.

After the parts exit the casting process, the parts are baked in an electric oven to remove any de minimis oils including oils from fingerprints. The parts then move to ceramic and/or metal solids coating processes that are connected to an in-line particulate air filter. The metallic thermal spray operations occur under vacuum and will vent outdoors. The atmospheric ceramic and/or metal spray applications are collected in a dust collector and vented indoors. The parts are heat treated in an electric oven to seal the coating. These electric ovens have a vacuum pump that vent outdoors.

The parts are then sent to enclosed oil-filled grinding machines where they are ground to their final shape. The grinding machines utilize a mist collector that will vent indoors.

The next step includes drilling holes into the parts with a laser. Prior to drilling, some parts are filled with wax. The laser drilling machines are enclosed and vent to a dust collector that vents indoors. Once the drilling is complete a natural gas fired furnace burns off the wax. The parts then move to a metal solids coating process that occurs in a vacuum chamber connected to a dust collector that will vent outdoors. The parts are then cleaned and inspected and prepared for shipment.

To support the proposed operations, eight natural gas fired emergency engines will be installed should the facility lose power. There will be four 2,100-brake horsepower engines, and four 229-brake horsepower engines. Each of these engines will meet the appropriate NSPS and NESHAP emission standards, respectively. The engines are only expected to run in non-emergency mode during testing and maintenance of the engines.

SECTION B DETAILS

APPLICATION INFORMATION

[List all emission sources (permitted and exempt) reviewed as a result of this application, their associated control devices and pollutants. Provide a detailed discussion of any other items in Section B at bottom under "Application Notes"]

Emission Source ID	Emission Source Description 1. Type, manufacturer, capacity 2. Control device with ID (if any)	Pollutant(s) Emitted	Miscellaneous Notes
WIP	One (1) Wax Injection Process (WIP) consisting of Ten (10) Wax Injection Machines (WAX1 – WAX10)	VOCs	
SBP	One (1) Shell Build Process (SBP) consisting of two (2) Wax Mold Etch Baths (WAXETCH1 and WAXETCH2), two (2) Steam Dewax Autoclaves (WAXMELT1 and WAXMELT2) and seven (7) Natural Gas Fired Shell Kilns (SHELL1 – SHELL7) controlled by natural gas-fired after burners total heat input rated at 1.1 MMBtu/hr each (C-1 through C-7).	CO, NO_X, PM, PM_{10}, $PM_{2.5}$, SO_2, VOCs, HAPs/TAPs, GHGs	
PCP	One (1) Part Casting Process (PCP) consisting of ten (10) Electric Vacuum Furnaces (FURNACE1 – FURNACE10)	NO_X, PM, PM_{10}, $PM_{2.5}$, VOCs, HAPs/TAPs	
POCP	One (1) Post Casting Process (POCP) consisting of two (2) Grain Etching Lines (GRAINETCH1 and GRAINETCH2), one FPI Spray Application Line (FPI1), and three (3) Post Cast Electric Vacuum Furnaces (VACFURN1 – VACFURN3)	VOCs	
CP	One (1) Coating Process (CP) consisting of thirteen (13) Electric Ovens (OVEN1-OVEN13), six (6) Thermal Spray Processes under vacuum (VPS1 – VPS6) controlled by in-line particulate filters (C-8 through C-13), five (5) APPS Ceramic Coating Process (APPS1 – APPS5) controlled by dust collectors (C-37 through C-41), and one (1) Aluminide Coating Process (ALUM1)	PM, PM_{10}, $PM_{2.5}$, VOCs, HAPs/TAPs	VPD1 – VPD23 which were listed in the previous permit were removed since they are vented indoors. VSP1 – VSP6 are also vented indoors, but remain on the permit since they are subject to 40 CFR Part 63, Subpart WWWWWW.
MP	One (1) Machining Process (MP) consisting of one FPI Spray Application Line (FPI2), one (1) Wax Injection Machine (WAX11), two (2) Natural Gas Fired Wax Burnout Furnaces (WAXFURN1 and WAXFURN2) controlled by natural gas-fired after burners total heat input rated at 0.5 MMBtu/hr each (C-42 through C-43)	CO, NO_X, PM, PM_{10}, $PM_{2.5}$, SO_2, VOCs, HAPs/TAPs, GHGs	Page 23 of 120 lists total heat input for WAXFURN1 and WAXFURN2 as 0.46 MMBtu/hour each.

EBPVD	One (1) Electron-beam Physical Vapor Deposition Process (EBPVD) consisting of thirteen (13) Electric Ovens (OVEN14-OVEN26) and five (5) Thermal Spray Processes under vacuum (EBPVD 1 – EBPVD5)	PM, PM_{10}, $PM_{2.5}$, VOCs	The HEPA filters previously associated with EBPVD1 – EBPVD5 were removed with this modification.
EGEN1, EGEN2, EGEN3, EGEN4	Four (4) 1,118 hp natural gas-fired emergency generators	CO, NO_X, PM, PM_{10}, $PM_{2.5}$, SO_2, VOCs, HAPs/TAPs, GHGs	The engines listed have been updated with this modification.
EGEN5, EGEN6, EGEN7, EGEN8	Four (4) 229 hp natural gas-fired emergency generators	CO, NO_X, PM, PM_{10}, $PM_{2.5}$, SO_2, VOCs, HAPs/TAPs, GHGs	The engine currently is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(2)(B)(v)(I).
FWP	One (1) 120 hp natural gas-fired emergency fire water pump	CO, NO_X, PM, PM_{10}, $PM_{2.5}$, SO_2, VOCs, HAPs/TAPs, GHGs	The engine currently is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(2)(B)(v)(I). The engine was not installed and is being removed from the insignificant activity list.
NA	A grit blast and laser parts cleaning process with emissions captured by dust collector and vented indoors.	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(ix).
NA	A shot and dot peen process with emissions captured by dust collector and vented indoors	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(ix).
NA	Machining, grinding, and EDM of metal parts using lubricating oil process with emissions captured by mist eliminators and a HEPA filter and vented indoors	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(ix).
NA	A laser machining process with emissions captured by dust collector and vented indoors	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(ix).
NA	One (1) electric brazing oven	NA	This oven is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(x).
NA	One (1) electric oven for heat treatment of casted parts	NA	This oven is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(x).
NA	A shell building process with emissions captured by dust collector vented indoors	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(ix).
NA	A shell removal process with emissions captured by dust collector vented indoors	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(ix).
NA	A grinding, cutting and polishing process with emissions captured by dust collector vented indoors	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(ix).

NA	A ceramic core removal process	NA	This process is exempt from permitting requirements per the AB Air Quality Code 17.0102 (c)(1)(L)(x).

APPLICATION NOTES

The original application had an error for the emissions associated with EBPVD1 – EBPVD5. Corrected emissions calculations can be found in the permit file in an email dated February 15, 2024.

SECTION C DETAILS

REGULATORY INFORMATION

(Identify the AB Air Quality Regulations reviewed because of this application. At a minimum, the regulations already listed should be reviewed and reason given for applicability or non-applicability. If a regulation has a standard, list the standard and indicate how the source is in compliance.)

AB Air Quality Regulation Number / Title	Emission Source ID No(s). Subject	Notes On Regulation (Compliance demonstration, applicability, etc.)
17.0500 – Title V Procedures	NA	The facility does not have potential emissions above the applicability threshold of 100 tons per year for any criteria pollutant, 25 tons per year for any combination of hazardous air pollutants, or 10 tons per year for any individual hazardous air pollutant.
17.0700 – Toxic Air Pollutant Procedures and 4.1104 – Toxic Air Pollutant Guidelines	Entire Facility	The facility conducted a NC Air Toxics review. TAPs were found to be below the TAP permitting emission rates (TPERs), except for chromium. An initial dispersion modeling analysis was performed using AERMOD that determined that the facility would be below the acceptable ambient levels (AALs) for chromium. The emergency generators were exempt from toxics modeling, but a toxics analysis was still required to be conducted by the agency, so the facility modeled for acrolein, benzene, and formaldehyde. The resulting air toxics modeling indicated that the facility would be below the AALs for these pollutants. The associated stack parameters will be included in their permit. The exempt sources which are subject to GACT standards were included for informational purposes only. For further information, please see the modeling memo dated December 23, 2020.
4.0524 – New Source Performance Standards (40 CFR 60, Subpart JJJJ)	EGEN1 – EGEN8	These engines are subject to 40 CFR Part 60, Subpart JJJJ – Standards of Performance for Stationary Spark Ignition Internal Combustion Engines, which requires the manufacturer to certify that the generators meet the emission limits listed in the subpart. The generators must be equipped with non-resettable hour meters, and nonemergency use (e.g., testing) is limited to 100 hours per year.
4.0530 – Prevention of Significant Deterioration	NA	The facility does not have potential emissions above the threshold of 250 tons/year for any criteria pollutant.
4.1111 – MACT (40 CFR 63, Subpart ZZZZ)	EGEN1 – EGEN8	Because these generators commenced construction after June 12, 2006, they are considered new sources (located at an area source of HAP emissions), making them subject to 40 CFR Part 63, Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Reciprocating Internal Combustion Engines. Compliance with NESHAP Subpart ZZZZ is achieved by compliance with NSPS Subpart JJJJ.
4.1111 – MACT (40 CFR 63, Subpart WWWWWW)	VPS1-VPS6	The process is subject 40 CFR Part 63, Subpart WWWWWW – National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Plating and Polishing Standards. The applicable part of the rule applies to the thermal spraying operation. The rule requires the facility to operate a capture system that collects PM emissions from the thermal spraying process and transports the emissions to a fabric, cartridge, or HEPA filter . There are also recordkeeping and recording requirements.

4.1111 – MACT (40 CFR 63, Subpart ZZZZZZ)	FURNACE1-FURNACE10	This process is subject to 40 CFR Part 63, Subpart ZZZZZZ – National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Aluminum, Copper, and Other Nonferrous Foundries. The process is defined as being a nonferrous foundry that uses material containing chrome, lead, or nickel in amounts greater than or equal to 0.1 percent by weight. The metal ingots used in this process contain chrome and nickel at amounts greater than 0.1%. The rule requires certain management practices including covering or enclosing the melting operation and metal purchasing requirements. There are also recordkeeping and recording requirements.
4.0515 – Particulates from Miscellaneous Industrial Processes	FURNACE1-FURNACE10, APPS1-APPS5, ALUM1, EBPVD1 – EBPVD5	The allowable emission rate is a function of the process weight rate and shall be determined by the following equation, where P is the process throughput rate in tons per hour (tons/hr) and E is the allowable emission rate in pounds per hour (lbs/hr): $E = 4.10 * (P)^{0.67}$ for P < 30 tons/hr All the processes that have particulate matter emissions were evaluated and emissions were below the allowable emission rate for each process. See the regulatory notes below.
4.0516 – Sulfur Dioxide Emissions from Combustion Sources	SHELL1-SHELL7, WAXFURN1-WAXFURN2, EGEN1 – EGEN5, FWP	This regulation limits SO_2 emissions from these sources to 2.3 lb/MMBtu. The AP-42 SO_2 emission factor for natural gas combustion for small boilers (SHELL1-SHELL7 and WAXFURN1-WAXFURN2) is 0.00006 lb/MMBtu. The AP-42 SO_2 emission factor for natural gas internal combustion engines (emergency generators EGEN1-EGEN5, FWP) is 0.006 lb/MMBtu. Thus, the facility is in compliance.
4.0521 – Control of Visible Emissions	FURNACE1-FURNACE10, APPS1-APPS5, ALUM1, EBPVD1 – EBPVD5	This regulation limits visible emissions from each of these sources to no more than 20% opacity due to their post-1971 manufacture date. Compliance with this regulation will be determined through Agency inspections.
4.0605 – General Recordkeeping and Reporting Requirements	Entire facility	The facility is required to submit reports with production data that will facilitate annual emissions calculations by the agency.
4.1806 – Control and Prohibition of Odorous Emissions	Entire Facility	This regulation requires that the facility prevent odorous emissions from causing or contributing to objectionable odors beyond their property line. Compliance with this regulation will be determined through Agency inspections.

REGULATORY NOTES

4.0515. The table below shows the calculated allowable emission rates based on the equation E = 4.10 *(P)0.67 for P < 30 tons/hr, where where P is the process throughput rate in tons per hour (tons/hr) and E is the allowable emission rate in pounds per hour (lbs/hr). This is compared to the actual emission rate for each process.

Process	Allowable Emission Rate (E)	Actual Emission Rate	Lower than Allowable Rate?
FURNACE1-FURNACE10	2.18E-01	3.00E-06	Yes
EBPVD1-EBPVD10	8.83E-02	2.40E-02	Yes
APPS1-APPS5	8.36E-02	1.50E-02	Yes
ALUM1	9.95E-03	7.50E-02	Yes

4.1111. The facility is subject to 40 CFR Part 63, Subpart ZZZZZZ – National Emission Standards for Hazardous Air Pollutants: Area Source Standards for Aluminum, Copper, and Other Nonferrous Foundries. The process at the facility is defined as "other nonferrous foundry" due to the amount of HAP in the metal it is melting. This rule has is applicable when the annual melt capacity equals or exceeds 600 tons per year. The facility has a maximum process rate of 1,095 tons per year. If the facility were to exceed 6,000 tons per year, additional requirements would apply.

17.0700. The facility submitted air dispersion modeling for chromium with their original permit application because they exceed the TPER for this pollutant. The modeling demonstrated that the facility emissions would be below the AAL for chromium. The facility also exceeded the TPERs for acrolein, benzene, and formaldehyde, but the facility cited the toxics exemption for the emergency engines based on Chapter 17.01029(a)(25) which states "natural gas and propane fired combustions sources with an aggregate allowable heat input less than 450 million Btu per hour that are the only source of benzene at the facility" could be exempted. While this exemption appeared to apply, further investigation into the NCDEQ rule showed that they added "external" to the combustion sources in the rule, thus eliminating internal combustion sources from this rule, and this exemption could no longer apply.

The emergency engines were still exempt from toxics due to Chapter 17.0702(a)(27)(B), however State Session Law SL-2012-91, which requires the Agency to "review the application to determine if the emission of toxic air pollutants from the source or facility would present an unacceptable risk to human health". For this application, the toxics review requires air dispersion modeling, and the facility voluntarily submitted modeling for acrolein, benzene, and formaldehyde and included the emergency engines and other natural gas combustion sources.

With this permit modification, the size of the original engines that were included in the modeling demonstration have changed. The total emissions from the new engines are lower than what was previously modeled. Additionally, the engines are now located on the roof which is further from the fence line than the previous engines and will result in better dispersion due to the height of the new stacks. Therefore, no additional modeling is required. The permit will be updated with the stack parameters of the new engines. The facility submitted updated parameters on page 8 of their application, and mistakenly used hourly emission rates for benzene when they should have used pounds per year averaged over 8760 hours. The agency used the corrected version in the permit.

SECTION D DETAILS				
EMISSION INFORMATION				
Calculation Method Codes (List all that apply)	1 = Stack test result 2 = Material (mass) balance 3 = EPA approved information (AP-42, CTG, etc.) 4 = Other (specify in table below)			
Calculation Rejection Codes (List all that apply)	1 = Calculation error 2 = Wrong emission factor(s) used 3 = Control efficiency(ies) not accepted 4 = Other (specify in table below)			
Emission Source (ID No.)	**Calculation Method Code**	**Accept or Reject?**	**Calculation Rejection Code**	**AB Air Quality Calculations Attached?**
Facility	2, 3, Engineering Estimates	Accept	NA	Yes

EMISSION NOTES

Calculations of potential emissions were performed by the facility and reviewed by the Agency. As stated above in the application notes, an error for the emissions associated with EBPVD1 – EBPVD5 was found. Corrected emissions calculations were sent to the Agency via email and were included in the updated emission calculations. Further information regarding these emissions calculations can be found in the email saved to the folder for this permit.

Emissions for FURNACE1 – FURNACE10 were updated by the facility and those calculations were included in the agency calculations. Additionally, emissions for FPI2 were calculated by the agency more conservatively than the estimates provided by Pratt and Whitney. The Agency assumed calculated emissions based on parts per hour for 8760 hours instead of total annual parts. This resulted in a slight increase in VOC emissions.

Estimated actual emissions were provided for this review since the facility has not operated for an entire year. Estimates are based on the facility operating 4160 hours and the emergency engines operating 100 hours.

SECTION E

SUPPORTING DOCUMENTATION

(Provide brief description of any attachments)

1. Permit Application
2. Emissions Calculations
3. Draft Permit
4. Draft Permit Cover Letter