west virginia department of environmental protection

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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-1364G
Plant ID No.:	033-00034
Applicant:	Aurora Flight Sciences
Facility Name:	Aurora Flight Sciences of West Virginia
Location:	Bridgeport, West Virginia
SIC Code:	3728
Application Type:	Class II Administrative
Received Date:	May 21, 2015
Engineer Assigned:	Thornton E. Martin Jr.
Fee Amount:	$300.00
Date Received:	June 01, 2015
Complete Date:	June 22, 2015
Applicant Ad Date:	May 26, 2015
Newspaper:	*THE EXPONENT-TELEGRAM*
UTM's:	Easting:567.069 km Northing:4351.0 km Zone: 17
Description:	The applicant proposes to replace spray paint booths and spray gun cleaning stations with new equipment. In addition, two of the existing spray booths will be converted into a sanding booth.

DESCRIPTION OF PROCESS

Aurora Flight Sciences is a manufacturer of various aircraft parts. Aurora's primary customers are Northrop Grumman and Sikorski. However, other customers can be companies such as Boeing, Bell, U.S. Air Force, U.S. Navy, NASA and other aircraft manufacturers. As such, Aurora manufactures a highly diversified product line on an ever changing basis. The surface coatings which are applied to these parts also vary greatly.

Aurora currently has approximately 160 various bases, activators and thinners that are or could potentially be used to coat the various parts that Aurora manufactures. These bases, activators and thinners are mixed and applied on a per ounce basis, not a per gallon basis, in accordance with very stringent customer specifications. Because of the ever changing product line and variety surface

coatings for these lines, it becomes very difficult to predict the exact amounts and types of surface coatings which will be applied to the ever changing product lines as specified by Aurora's customers.

The approximate 160 bases, accelerators/activators and thinners that can be or have been applied also vary greatly. The product weights of these items vary from 6.71 pounds per gallon to 14.3 pounds per gallon. The VOC content of these bases, accelerators and thinners also vary greatly from 1.7 pounds per gallon to 8.33 pounds per gallon. The Hazardous Air Pollutants (HAP) contained in these bases, accelerators and thinners are highly diversified. Some of them contain no HAPs while others contain up to five HAPs. The percentage of HAPs in these items ranges from zero (0) percent to approximately 50 percent (thinners/accelerators/activators). Tracking the paint usage, potential VOC and aggregate HAP emissions is a time consuming process.

Aurora proposes to replace the existing large paint and strip booth and small paint booth (B1PB1) with two new downdraft spray paint booths (SB1 and SB2). The third permitted booth (B2PB2) was never installed. Aurora proposes to install a third booth (SB3) in the future. A new spray paint gun cleaning station (GC1) will replace the existing station (B1PGC1) and the second gun cleaning station (B2PGC2) that was never installed. Emissions of VOCs and HAPs will not increase as a result of replacing the existing permitted equipment with new, more efficient equipment. A slight increase in CO and NOx is anticipated with three (3) natural gas fired heating units. The net potential increase in CO emissions is 0.12 pounds per hour (lb/hr) and 0.53 tons per year (TPY). The net potential increase in NOx emissions is 0.14 lb/hr and 0.63 TPY.

Aurora does not anticipate the need to increase the hourly or annual allowable limits for either VOCs or HAPs. The hourly and annual limits contained in the existing air quality permit (R13-1364F) will provide Aurora with operational flexibility and the ability to grow and expand its' West Virginia business.

Per the requirements of the existing air quality permit, Aurora has developed two *Excel* spreadsheets to track the various surface coatings that are applied each day and the potential VOC and aggregate HAP emissions from these coatings on a daily, monthly and rolling 12-month total. In 2014, Aurora calculated actual emissions of 293.5 pounds (0.147 tons) of VOCs and 80.62 pounds (0.0403 tons) of HAPs. This represents less than one percent of the annual allowable limit of Aurora's existing permit.

Aurora's current *Excel* spreadsheets only track aggregate HAP emissions. Because of the large variety of surface coatings used, the small quantities applied, the relatively small quantities of VOC and HAP emissions, among all the other variables it would be very difficult to estimate or calculate the individual HAP emissions. Aurora respectfully requests that because of the many variables in the coating process that the aggregate HAP calculation will continue to be acceptable for this Class II Administrative Update to their Air Quality Permit and future monitoring requirements.

The existing large paint and strip booth and small paint booth (EPB1PB1) will be converted to a sanding booth (Emission Unit ID SaB1 and Emission Point ID: EP005). Emissions of particulate matter (PM) and chromium compounds are expected to be less than six (6) lb/hr (pph)

and ten (10) TPY and two (2) pph or five (5) TPY of aggregated HAP.

The applicant proposes to replace spray paint booths and spray gun cleaning stations with new equipment. In addition, two of the existing spray booths will be converted into a sanding booth. The Emission Unit ID's and Emission Point ID's have been simplified and previous equipment /emission points will no longer exist as a result of this modification through a Class II Administrative Update. The previous equipment list (R13-1364F) and the proposed equipment list (R13-1364G) are as follows:

PREVIOUS EQUIPMENT LIST

Emission Unit ID	Emission Point ID	Emission Unit Description	Year Installed	Design Capacity	Control Device
B1PB1	EPB1PB1	Large paint & strip booth and small paint booth	1991	1.44mmcf/hr	Dry Filter
B2PB2	EPB2PB2	Spray Paint Booth with air make-up unit	2006 Never Installed	1.30mmcf/hr 2.1 mmbtu/hr	Dry Filter
B1PGC1	EP1PGC1	Gun Cleaning	1991	0.07mmcf/hr	None
B2PGC2	EPB2PB2	Gun Cleaning (new)	2006 Never Installed	1.30mmcf/hr	None

PROPOSED EQUIPMENT LIST

Emission Unit ID	Emission Unit Description	Emission Point ID	Year Installed / Modified	Type of Change
SB1[1]	Spray Paint Booth 1	EP001	2015	New
SB2[1]	Spray Paint Booth 2	EP002	2015	New
SB3	Spray Paint Booth 3	EP003	2017 or 2018	New
GC1[2]	Spray Gun Cleaning Station	EP004	2015	New
SaB1[3]	Sanding Booth 1	EP005	2015	New

1 Replaces B1PB1 - Large paint & strip booth and small paint booth, originally permitted in 1991
2 Replaces B1PGC1 - Gun Cleaning, originally permitted in 1991; Replaces B2PGC2 - Gun Cleaning, originally permitted in 2006 but, never installed
3 Sanding Booth 1 will be created by modifying B1PB1 - Large paint & strip booth and small paint booth, originally permitted in 1991

SITE INSPECTION

The last targeted, full, on-site inspection was conducted by John Moneypenny of the Compliance and Enforcement Section on November 21, 2011. The facility was given a score of 30 - In compliance. Based on the scope of the modification proposed and since the facility is regularly inspected, the writer deemed that a site visit would be unnecessary at this time.

Directions: From interstate 79 take exit #119. Turn right onto US-50. Go approximately 4 miles on US 50 and turn left onto East Benedum Industrial Drive. Travel ½ mile and veer right at the fork. Travel ½ mile to security gate.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Aurora Flight Sciences will have five emission sources. The three spray paint booths will each employ Direct-Fire Aluminum Burners with a proposed maximum design heat input of 1.433 X 10^6 BTU/hr utilizing Natural gas as the fuel source. Aurora does not anticipate the need to increase the hourly or annual allowable limits for either VOCs or HAPs.

The hourly and annual limits contained in the existing air quality permit (R13-1364F) will provide Aurora with operational flexibility and the ability to grow and expand its' West Virginia business. Therefore, the proposed emissions increase will be from the heating units of the three (3) spray booths and reconstruction of B1PB1 and is estimated to be 0.53 TPY of CO, 0.63 TPY of NOx, 0.44 TPYof PM and 0.136 TPY of Chromium compounds.

The previous estimated emissions and the proposed estimated emissions are as follows:

Existing Emissions Estimate (R13-1364F):

<table>
<tr><th rowspan="2">Emission Point ID</th><th rowspan="2">Source Description</th><th colspan="2">VOCs</th><th colspan="2">HAPs</th></tr>
<tr><th>Hourly (pounds/hour)</th><th>Annual (tons/year)</th><th>Hourly (pounds/hour)</th><th>Annual (tons/year)</th></tr>
<tr><td>EPB1PB1</td><td>Large paint and strip booth Small paint booth (B1PB1)</td><td rowspan="2">6.75</td><td rowspan="3">19.71</td><td rowspan="3">5.37</td><td rowspan="3">7.84</td></tr>
<tr><td>EPB1PGC1</td><td>Gun Cleaning (B1PGC1)</td></tr>
<tr><td>EPB2PB2</td><td>New paint booth & gun cleaning</td><td>6.75</td></tr>
</table>

Air Emissions from Natural Gas Fired Make-up Air (B2PB2-Never Installed) 2,100,000 Btu/hr Design Heat Input				
Pollutant	AP-42 Emission Factor	Maximum Estimated Emissions		
	($lb/10^6ft^3$)	(lb/hr)	(lb/day)	(tons/yr)
CO	84	0.1764	4.2336	0.772632
NOx	100	0.21	5.04	0.9198
SO_2	0.6	0.00126	0.03024	0.0055188
PM	7.6	0.01596	0.38304	0.0699048
VOC	5.5	0.01155	0.2772	0.050589

Proposed Emissions (R13-1364G):

Emission Point ID	Source Description	VOCs		HAPs	
		Hourly (lbs/hour)	Annual (tons/year)	Hourly (lbs/hour)	Annual (tons/year)
EP001	Downdraft Booth #1	6.75	19.71	5.37	7.84
EP002	Downdraft Booth #2	6.75			
EP003	Downdraft Booth #3	6.75			
EP004	Gun Cleaning	6.75			

Air Emissions from Each Natural Gas Fired Heater Three - 1,433,000 Btu/hr Design Heat Input				
Pollutant	AP-42 Emission Factor	Maximum Estimated Emissions		
	($lb/10^6ft^3$)	(lb/hr)	(lb/day)	(tons/yr)
CO	84	0.12	2.89	0.53
NOx	100	0.14	3.44	0.63
SO_2	0.6	0.00086	0.02	0.0038
PM	7.6	0.011	0.26	0.048
VOC	5.5	0.0079	0.19	0.035

Air Emissions from Each Natural Gas Fired Heater Three - 1,433,000 Btu/hr Design Heat Input				
Pollutant	AP-42 Emission Factor	Maximum Estimated Emissions		
	($lb/10^6 ft^3$)	(lb/hr)	(lb/day)	(tons/yr)
CO_2	120000	172	4127	753
N_2O	2.2	0.0032	0.076	0.014
Methane	2.3	0.0033	0.079	0.014

Total and Change in Emissions:

Pollutant	Total		Change	
	(lb/hr)	(tons/yr)	(lb/hr)	(tons/yr)
HAP	5.37_1	7.976_2	0.031_3	0.136_3
VOC	6.75_1	19.71_2	0	0
CO	0.36	1.57	0.18	0.80
NOx	0.42	1.84	0.21	0.92
SO_2	0.00258	0.06	0.00132	0.006
PM	0.10	0.44	0.10_3	0.44_3

1 The facility will continue to monitor and record each coating applied to ensure the hourly emissions are not exceeded.

2 Tons/year limits were previously determined based on a maximum usage of 8848 gallons of paint annually with an average per gallon of 4.5 VOC's and 3.58 HAP's

3 Emissions estimate from SaB1 (Sanding Booth, re-construction of B1PB1)

In 2014, Aurora calculated actual emissions of 293.5 pounds (0.147 tons) of VOCs and 80.62 pounds (0.0403 tons) of HAPs. This represents less than one percent of the annual allowable limit of Aurora's existing permit. Aurora does not anticipate the need to increase the hourly or annual allowable limits for either VOCs or HAPs.

WELDING

Welding operations exist at the Aurora facility, however, the application for modification dated February 22, 2006 (R13-1364E) requested the removal of Record Keeping Requirements and Emission

Limits for the Welding Booths. Information regarding the welding activities included in Evaluation (R13-1364E) will be included here:

Actual Emissions:
AP[1]42 Factor: 0.62 lbs/hour
Busiest Month(Jan 2005): 0.815 lbs
lbs of PM per hour: 1.132E-03 or 0.001132
Tons of PM per year: 4.957E-03 or 0.004957

The original PM_{10} emission limit of 0.62 lbs/hr was based on the addition of the Argon, Helium, and CO_2 emission limits. Permit R13-1364B first used this limit when the Argon, Helium and CO_2 limits were discontinued.

Aurora Flight Sciences would need to increase welding activity by more than eight times before the welding activity could be considered a significant source of activity. The facility is increasingly fabricating composite aircraft parts and does not anticipate an increase in welding activity. Aurora has asked that the record keeping and emission limits be removed.

HAZARDOUS AIR POLLUTANTS

On April 4, 2006, Aurora Flight Sciences Corporation submitted a letter to request that clerical errors under section 4.1.3 of permit R13-1364E be corrected. The requested corrections were as follows:

- Correct the CAS# for Cumene (98828);
- Remove Ethyl Glycol Monobutyl Ether from the permit;
- Remove Cyclohexanone and Ethyl Glycol Monobutyl Ether Acetate.

CURRENT KNOWN HAP's

CAS No.	Name	CAS No.	Name
71-43-2	Benzene	68-12-2	Dimethyl Formamide
584-84-9	Toluene-2,4-disocyanate	822-06-0	Hexamethylene-1,6-disocyanate
108-10-1	Methyl Isobutyl Ketone	91-20-3	Naphthalene
108-88-3	Toluene	84-74-2	Dibutylphthalate
1330-20-7	Xylene	98-82-8	Cumene
100-41-4	Ethylbenzene	67-56-1	Methanol

Benzene:

Benzene is found in the air from emissions from burning coal and oil, gasoline service stations, and motor vehicle exhaust. Acute (short-term) inhalation exposure of humans to benzene may cause drowsiness, dizziness, headaches, as well as eye, skin, and respiratory tract irritation, and, at high levels, unconsciousness. Chronic (long-term) inhalation exposure has caused various disorders in the blood, including reduced numbers of red blood cells and aplastic anemia, in occupational settings. Reproductive effects have been reported for women exposed by inhalation to high levels, and adverse effects on the developing fetus have been observed in animal tests. Increased incidence of leukemia (cancer of the tissues that form white blood cells) have been observed in humans occupationally exposed to benzene. EPA has classified benzene as a Group A, human carcinogen.

Ethylbenzene:

Ethylbenzene is mainly used in the manufacture of styrene. Acute (short-term) exposure to ethylbenzene in humans results in respiratory effects, such as throat irritation and chest constriction, irritation of the eyes, and neurological effects such as dizziness. Chronic (long-term) exposure to ethylbenzene by inhalation in humans has shown conflicting results regarding its effects on the blood. Animal studies have reported effects on the blood, liver, and kidneys from chronic inhalation exposure to ethylbenzene. Limited information is available on the carcinogenic effects of ethylbenzene in humans. In a study by the National Toxicology Program (NTP), exposure to ethylbenzene by inhalation resulted in an increased incidence of kidney and testicular tumors in rats, and lung and liver tumors in mice. EPA has classified ethylbenzene as a Group D, not classifiable as to human carcinogenicity.

Formaldehyde:

Formaldehyde is used mainly to produce resins used in particleboard products and as an intermediate in the synthesis of other chemicals. Exposure to formaldehyde may occur by breathing contaminated indoor air, tobacco smoke, or ambient urban air. Acute (short-term) and chronic (long-term) inhalation exposure to formaldehyde in humans can result in respiratory symptoms, and eye, nose, and throat irritation. Limited human studies have reported an association between formaldehyde exposure and lung and nasopharyngeal cancer. Animal inhalation studies have reported an increased incidence of nasal squamous cell cancer. EPA considers formaldehyde a probable human carcinogen (Group B1).

Dimethly Formamide:

Dimethylformamide is used as an industrial solvent and in the production of fibers, films, and surface coatings. Acute (short-term) exposure to dimethylformamide has been observed to damage the liver in animals and in humans. Symptoms of acute exposure in humans include abdominal pain, nausea, vomiting, jaundice, alcohol intolerance, and rashes. Chronic (long-term) occupational exposure to dimethylformamide by inhalation has resulted in effects on the liver and digestive disturbances in workers. Human studies suggested a possible association between dimethylformamide exposure and testicular cancer, but further studies failed to confirm this relationship. EPA has not classified dimethylformamide with respect to its carcinogenicity.

Cumene:

Cumene is used in a variety of petroleum products. Acute (short-term) inhalation exposure to cumene may cause headaches, dizziness, drowsiness, slight incoordination, and unconsciousness in humans. Cumene has a potent central nervous system (CNS) depressant action characterized by a slow induction period and long duration of narcotic effects in animals. Cumene is a skin and eye irritant. No information is available on the chronic (long-term), reproductive, developmental, or carcinogenic effects of cumene in humans. Animal studies have reported increased liver, kidney, and adrenal weights from inhalation exposure to cumene. EPA has classified cumene as a Group D, not classifiable as to human carcinogenicity.

Dimethyl Phthalate:

Dimethyl phthalate has many uses, including in solid rocket propellants, plastics, and insect repellants. Acute (short-term) exposure to dimethyl phthalate, via inhalation in humans and animals, results in irritation of the eyes, nose, and throat. No information is available on the chronic (long-term), reproductive, developmental, or carcinogenic effects of dimethyl phthalate in humans. Animal studies have reported slight effects on growth and on the kidney from chronic oral exposure to the chemical. EPA has classified dimethyl phthalate as a Group D, not classifiable as to human carcinogencity.

Methyl Isobutyl Ketone:

Methyl isobutyl ketone is used as a solvent for gums, resins, paints, varnishes, lacquers, and nitrocellulose. Acute (short-term) exposure to methyl isobutyl ketone may irritate the eyes and mucous membranes, and cause weakness, headache, nausea, lightheadedness, vomiting, dizziness, incoordination, narcosis in humans. Chronic (long-term) occupational exposure to methyl isobutyl ketone has been observed to cause nausea, headache, burning in the eyes, weakness, insomnia, intestinal pain, and slight enlargement of the liver in humans. Lethargy and kidney and liver effects have been observed in rats and mice chronically exposed by gavage (experimentally placing the chemical in the stomach), ingestion, and inhalation. EPA has classified methyl isobutyl ketone as a Group D, not classifiable as to human carcinogenicity.

Methanol:

Methanol is released to the environment during industrial uses and naturally from volcanic gases, vegetation, and microbes. Exposure may occur from ambient air and during the use of solvents. Acute (short-term) or chronic (long-term) exposure of humans to methanol by inhalation or ingestion may result in blurred vision, headache, dizziness, and nausea. No information is available on the reproductive, developmental, or carcinogenic effects of methanol in humans. Birth defects have been observed in the offspring of rats and mice exposed to methanol by inhalation. EPA has not classified methanol with respect to carcinogenicity.

Styrene:

Styrene is primarily used in the production of polystyrene plastics and resins. Acute (short-term) exposure to styrene in humans results in mucous membrane and eye irritation, and gastrointestinal effects. Chronic (long-term) exposure to styrene in humans results in

effects on the central nervous system (CNS), such as headache, fatigue, weakness, and depression, CSN dysfunction, hearing loss, and peripheral neuropathy. Human studies are inconclusive on the reproductive and developmental effects of styrene; several studies did not report an increase in developmental effects in women who worked in the plastics industry, while an increased frequency of spontaneous abortions and decreased frequency of births were reported in another study. Several epidemiologic studies suggest there may be an association between styrene exposure and an increased risk of leukemia and lymphoma. However, the evidence is inconclusive due to confounding factors. EPA's Office of Research and Development has updated previous assessments on the carcinogenic potential of styrene and concluded that styrene is appropriately classified in Group C, "possible human carcinogen." However, EPA has not yet given a formal carcinogen classification to styrene.

Toluene:

Toluene is added to gasoline, used to produce benzene, and used as a solvent. Exposed to toluene may occur from breathing ambient or indoor air. The central nervous system (CNS) is the primary target organ for toluene toxicity in both humans and animals for acute (short-term) and chronic (long-term) exposures. CNS dysfunction and narcosis have been frequently observed in humans acutely exposed to toluene by inhalation; symptoms include fatigue, sleepiness, headaches, and nausea. CNS depression has been reported to occur in chronic abusers exposed to high levels of toluene. Chronic inhalation exposure of humans to toluene also causes irritation of the upper respiratory tract and eyes, sore throat, dizziness, and headache. Human studies have reported developmental effects, such as CNS dysfunction, attention deficits, and minor craniofacial and limb anomalies, in the children of pregnant women exposed to toluene or mixed solvents by inhalation. Reproductive effects, including an association between exposure to toluene and an increased incidence of spontaneous abortions, have also been noted. However, these studies are not conclusive due to many confounding variables. EPA has classified toluene as a Group D, not classifiable as to human carcinogenicity.

Toluene-2,4-disocyanate:

2,4-Toluene diisocyanate is primarily used as a chemical intermediate in the production of polyurenthane products. 2,4-Toluene diisocyanate is extremely toxic from acute (short-term) and chronic (long-term) exposures. Acute exposure to high levels of 2,4-toluene diisocyanate in humans, via inhalation, results in severe irritation of the skin and eyes and affects the respiratory, gastrointestinal, and central nervous systems (CNS). Chronic inhalation exposure to 2,4-toluene diisocyanate in humans has resulted in significant decreases in lung function in workers, an asthma-like reaction characterized by wheezing, dyspnea, and bronchial constriction. Animal studies have reported significantly increased incidences of tumors of the pancreas, liver, and mammary glands from exposure to 2,4-toluene diisocyanate via gavage (experimentally placing the chemical in the stomach). The International Agency for Research on Cancer (IARC) has classified 2,4-toluene diisocyanate as a Group 2B, possible human carcinogen.

Xylene:

Commercial or mixed xylene usually contains about 40-65% *m*-xylene and up to 20% each of *o*-xylene and *p*-xylene and ethylbenzene. Xylenes are released into the atmosphere as fugitive emissions from industrial sources, from auto exhaust, and through volatilization from their use as solvents. Acute (short-term) inhalation exposure to mixed xylenes in humans results in irritation of the eyes, nose, and throat, gastrointestinal effects, eye irritation, and neurological effects. Chronic (long-term) inhalation exposure of humans to mixed xylenes results primarily in central nervous system (CNS) effects, such as headache, dizziness, fatigue, tremors, and incoordination; respiratory, cardiovascular, and kidney effects have also been reported. EPA has classified mixed xylenes as a Group D, not classifiable as to human carcinogenicity.

AIR QUALITY IMPACT ANALYSIS

Air dispersion modeling was not performed due to the size and location of this facility and extent of the modification. This facility is located in Harrison County, WV, which is currently an attainment area for all of the pollutants proposed to be emitted.

MONITORING OF OPERATIONS

The facility will continue to record the type of coating used, the time applied, and the date of each coating applied. An aggregate total of HAP and VOC emissions will be determined on a daily, monthly, and rolling 12 month totals. The facility will record the operation times of all booths/emission points and maintain the mass of CO, NOX, SO_2, PM, and VOC on a monthly and 12 month rolling totals.

RECOMMENDATION TO DIRECTOR

Permit application, R13-1364G, submitted by Aurora Flight Sciences to replace spray paint booths and spray gun cleaning stations with new equipment. In addition, two of the existing spray booths will be converted into a sanding booth. The application has been reviewed and determined to meet all applicable requirements and therefore, recommended for approval.

Thornton E. Martin Jr.
Permit Engineer

June 22, 2015
Date