GEORGIA
DEPARTMENT OF NATURAL RESOURCES
ENVIRONMENTAL PROTECTION DIVISION

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NARRATIVE

TO: Jeng-Hon Su

FROM: Ginger Payment

DATE: May 12, 2025

Facility Name:	**GF Casting Solutions – Augusta, LLC**
AIRS No.:	245-00211
Location:	Augusta, GA (Richmond County)
Application #:	29657
Date of Application:	March 11, 2025

Background Information

GF Casting Solutions – Augusta, LLC (hereinafter "facility") is a proposed aluminum High-Pressure Die-Casting facility which will be located at 430 Valencia Way in Augusta (Richmond County). The facility will produce aluminum structural parts for automotive customers. Main process steps are melting, high pressure die casting with trimming and marking, heat treatment in two steps (solution annealing and aging) with air quench, mechanical straightening, grinding, machining, assembly, passivation and shipping.

The facility will receive virgin aluminum alloy ingots from suppliers. They are stored in a designated, clean and dry area inside the building close to melting furnaces to keep them dry, prevent contamination, and ensure accessibility for the melting process. The melting process is expected to use roughly 50% virgin ingots, delivered from outside suppliers and 50% gating system and scrap parts, coming back from casting and subsequent in-house processes. Ingots, gating systems and scrap parts will be loaded into an elevator by forklifts, which brings the material into a shaft. In the melting shaft, natural gas fired burners will melt the material down, which flows into the holding chamber. Natural gas fired burners in the holding chamber will keep the molten aluminum at a constant temperature. Each of the two (2) furnaces (F01 and F02) will have a holding capacity of 10,000 kg (22,046 lbs) and 5,000 kg/hr (11,023 lbs/hr) melting capacity. Each furnace will be equipped with four (4) melting burners and two (2) holding burners, with a total rating of 13.91 MMBtu/hr. Flux (ARSAL 2125 Flakes) will be added to the furnaces and holding chambers to facilitate the removal of impurities from the aluminum and could potentially emit hydrogen fluoride/hydrofluoric acid (HF).

Four (4) ladles (L01, L02, L03 and L04) with 0.25 MMBtu/hr natural gas fired burners, each, will transfer molten aluminum from the furnaces to the next steps in the operation. The ladles are preheated at stationary pre-heating stations prior to being filled with the molten aluminum, which ensures that it is free from moisture and thermally stable before it meets molten aluminum in a high-pressure die-casting facility. This process helps prevent thermal shock and contamination of the aluminum. The molten aluminum will be poured from the furnace holding chamber into one the transfer ladles. The ladle is then transported, by forklift, to a degassing and alloying area. Degassing and alloying is required to remove hydrogen and other contaminants from the molten aluminum and to achieve the desired mechanical properties. A forklift will place ladles with liquid aluminum under the arm of the degassing unit. The unit automatically adds flux

(Pyroflux N16S), and then a rotating tube is lowered into the aluminum and nitrogen is injected while the tube is rotating. The flux and nitrogen clean the liquid aluminum. The flux contains sodium silicofluoride, potassium chloride, and sodium aluminum fluoride. Off-gassing of chloride and fluoride compounds from this process may occur. If necessary, alloying elements (magnesium and strontium) are added to achieve the desired mechanical properties.

The ladles will then be transported from the degassing unit to the casting cells area. Structural aluminum parts will be produced in a high-pressure diecasting process, using horizontal cold-chamber machines. One diecasting cell contains holding/dosing furnace, diecasting machine, release agent spraying system, fumes suction hood with filter, tool heating and cooling system, extraction and further handling robots, cooling pond with water, trimming press to remove gating, marking station, visual control station. The facility will operate four (4) diecasting cells (DC01, DC02, DC03 and DC04). Four (4) robotic release agent spraying systems, with spraying liquid preparation and spraying head, will be used which prevents the molten aluminum from sticking on the metal tool. Each die-casting machine will be equipped with an electrostatic filter to capture evaporated release agent after the spraying process (ESP1, ESP2, ESP3 and ESP4).

After the parts leave die-casting cells, they will have a heat treatment and straightening process (HT01). This process involves several steps designed to enhance mechanical properties, such as strength and dimensional stability. This system will be electrically driven and will not use any oils or other chemicals; therefore, there are no emissions generated.

Four (4) grinding cells (GC01, GC02, GC03 and GC04) will be used to remove burrs and sharp edges on trimmed surfaces of the part as well as fire cracks in fully automized grinding cells. Each cell includes four (4) robotic grinding units. The robots will take parts out of boxes and press them against grinding belts. Lubrication liquids are needed for the grinding belt units. The emissions from the grinding cells will be controlled by two (2) wet scrubbers with Venturi nozzle system (GCD1 and GCD2).

The facility will operate three (3) fully automated machining lines for three (3) types of parts. Two lines will include three (3) machining centers and the third line will include four (4) machining centers, for a total of ten (10) machining centers (MC01 – MC10). Parts are machined in the automated machining centers using minimal lubrication, often called “dry-machining”. Holes and threads are added and surfaces are machined. Each of the three lines will be equipped with its own dust collector (MCD1, MCD2, MCD3).

A passivation system (P01) enhances corrosion resistance and improves the surface finish of the components. The process steps include prewash, degreasing, rinsing, pickling, rinsing, passivation and rinsing. Parts are placed in baskets and dipped in subsequent basins with different chemicals. Water in some of the basins is heated. Basins will be covered and equipped with a suction hood above basins. Water from those basins will be cleaned and replaced automatically during the process. The passivation system will be equipped with an absorption system (scrubber; PC01) which uses sodium hydroxide to control sulfuric acid and hydrofluoric acid emissions.

The facility will also include a 750-kW emergency diesel generator (EG01) for back-up power. The emergency generator is exempt from permitting and is therefore not included in the permit.

Welding (W01) will be used for the maintenance of tools and equipment, and a weld fume extractor with filter (WCD1) will be used to control emissions.

Purpose of Application

Application No. 29657 was signed on March 11, 2025 and submitted; however, the application was not deemed complete until April 9, 2025 with an updated Toxic Impact Assessment and approved for the expedited program. The application requested the construction and operation of an aluminum die-casting facility. A public notice (PA0425-2) was issued on April 9, 2025 and expired on May 9, 2025.

Proposed Equipment List

Emission Units			Associated Control Devices	
Source Code	**Description**	**Installation Date**	**Source Code**	**Description**
F01	Molten aluminum melting/holding furnace No. 1 (13.91 MMBtu/hr natural gas burner / direct-fired)	2025*	--	--
F02	Molten aluminum melting/holding furnace No. 2 (13.91 MMBtu/hr natural gas burner / direct-fired)	2025*	--	--
L01	Transfer Ladle No. 1 with 0.25 MMBtu/hr natural-gas fired preheater / direct-fired	2025*	--	--
L02	Transfer Ladle No. 2with 0.25 MMBtu/hr natural-gas fired preheater / direct-fired	2025*	--	--
L03	Transfer Ladle No. 3 with 0.25 MMBtu/hr natural-gas fired preheater / direct-fired	2025*	--	--
L04	Transfer Ladle No. 4 with 0.25 MMBtu/hr natural-gas fired preheater / direct-fired	2025*	--	--
DC01	Die-casting No. 1	2025*	ESP1	Electrostatic precipitator No. 1
DC02	Die-casting No. 2	2025*	ESP2	Electrostatic precipitator No. 2
DC03	Die-casting No. 3	2025*	ESP3	Electrostatic precipitator No. 3
DC04	Die-casting No. 4	2025*	ESP4	Electrostatic precipitator No. 4
HT01	Heat-treatment system	2025*	--	--
GC01	Grinding Cell No. 1	2025*	GCD1 GCD2	Wet Scrubbers
GC02	Grinding Cell No. 2	2025*	GCD1 GCD2	Wet Scrubbers
GC03	Grinding Cell No. 3	2025*	GCD1 GCD2	Wet Scrubbers
GC04	Grinding Cell No. 4	2025*	GCD1 GCD2	Wet Scrubbers
MC01	Machining Centers No. 1	2025*	MCD1	Dust Collector No. 1
MC02	Machining Centers No. 2	2025*	MCD1	Dust Collector No. 1
MC03	Machining Centers No. 3	2025*	MCD1	Dust Collector No. 1
MC04	Machining Centers No. 4	2025*	MCD2	Dust Collector No. 2
MC05	Machining Centers No. 5	2025*	MCD2	Dust Collector No. 2
MC06	Machining Centers No. 6	2025*	MCD2	Dust Collector No. 2

Emission Units			Associated Control Devices	
Source Code	**Description**	**Installation Date**	**Source Code**	**Description**
MC07	Machining Centers No. 7	2025*	MCD3	Dust Collector No. 3
MC08	Machining Centers No. 8	2025*	MCD3	Dust Collector No. 3
MC09	Machining Centers No. 9	2025*	MCD3	Dust Collector No. 3
MC10	Machining Centers No. 10	2025*	MCD3	Dust Collector No. 3
P01	Passivation Unit (dip tanks) with 1.0 MMBtu/hr natural gas-fired heating system (indirect-fired)	2025*	PC01	Scrubber (absorption system)
EG01	Emergency Generator (750 kW diesel-fired)	2025*	--	--
W01	Welding	2025*	WCD1	Portable welding fume extractor

*all equipment and control devices are proposed within current application

Emissions Summary

Potential emissions from the furnaces (F01 and F02) use the maximum heat capacity for the two furnaces and emissions factors from AP-42 Section 1.4 for natural gas combustion. Particulate matter (PM) that is generated during melting and holding was estimated using the manufacturer's PM emission factor and the throughput for the furnaces. There are no controls for the two furnaces and the PM emissions are estimated to be approximately 2.82 tpy.

Potential emissions from the ladles (L01 – L04) use the maximum heat capacity for the four ladles and emissions factors from AP-42 Section 1.4 for natural gas combustion. Flux that is added is based on an estimated usage of 7,500 kg/year in the melting furnaces and 1,000 kg/year in the holding furnaces. The creation of HCl or HF emissions from flux is primarily linked to the amount of moisture present in the air space above the molten aluminum. Since this process involves molten aluminum, the moisture content would be expected to be extremely low and the temperature of the air space above the molten aluminum results in very dry air. Therefore, the 45% conversion rate is very conservative, though in actual operation, it could be much lower.

Some possible chemical reactions are:
$2\ AlF_3 + 3\ H_2O \leftrightarrow Al_2O_3 + 6HF$
$Al_2O_3 + 6HCl \leftrightarrow 2AlCl_3 + 3H_2O$

The estimation of hydrogen chloride (HCl) from the use of flux is based on the assumption that 45% of Cl in the flux is emitted as HCl. The estimation of hydrogen fluoride (HF) from the use of flux is based on the assumed emission rate of 2.20 mg-HF/g-flux at a conservative moisture content of 1.5 mol%. Potential emissions from the ladles use the maximum heat capacity for the four ladles and emissions factors from AP-42 Section 1.4 for natural gas combustion. Flux that is added is based on an estimated usage of 7,500 kg/year in the melting furnaces and 1,000 kg/year in the holding furnaces.

Potential emissions from die-casting (DC01 – DC04) are based on an estimated usage of 36,000 liters per year of release agent and the Safety Data Sheet (SDS) of the release agent which consists of 20% solids and 5% VOC. Though the release agent has an estimated evaporation rate of 30%, the Division used 100% evaporation rate to estimate potential emissions in the following table. Die-casting is controlled by

electrostatic precipitators (ESP) (ESP1 – ESP4) which have an estimated 90% control efficiency. The controlled PM control emissions from die-casting operations are approximately 0.79 tpy.

Potential emissions from grinding (GC01 – GC04) were estimated using the SDS for the aluminum ingot and the grinding abrasive material with an estimated usage of 2.08 tons of aluminum per hour and 8,760 hours of operation. A control efficiency of 98% was included for the associated wet scrubbers with Venturi nozzle system (GCD1 and GCD2). Potential emissions from machining (MC01 – MC10) were also estimated using the SDS for the aluminum ingot with an estimated usage of 2.08 tons of aluminum per hour and 8,760 hours of operation. Due to the use of dust collectors (MCD1, MCD2 and MCD3), a 1.0 mg/m^3 was the estimated PM emission rate. The controlled PM emissions were estimated to be 1.74 tpy. The Division used the data to calculate the uncontrolled PM emissions.

Emissions from the generator (EG01) use the 750-kw engine rating with emissions factors from AP-42 Table 3.4-1: Large Stationary Diesel and All Stationary Dual-fuel Engines and a usage of 200 hours per year.

Potential emissions from passivation (P01) were estimated using the SDS for the products used in the dip tanks and projected product usage. The absorption system (scrubber; PC01) was assumed to have a 90% capture efficiency, and a 98% control efficiency. Combustion emissions from passivation were estimated using the maximum heat capacity for natural gas-fired heating system and emissions factors from AP-42 Section 1.4 for natural gas combustion. The Division used the data to calculate the uncontrolled PM emissions.

Emissions from welding (W01) are based on the projected electrode annual usage and the content of the electrode. Welding is only for maintenance of the equipment and is not used in manufacturing.

Facility-Wide Emissions
(in tons per year)

Pollutant	Uncontrolled Potential Emissions	After-control Potential Emissions
$PM/PM_{10}/PM_{2.5}$	106.23 / 106.23 / 106.23	6.54 / 6.51 / 6.51
NOx	15.07	15.07
SO_2	0.48	0.48
CO	11.19	11.19
VOC	2.75	2.75
Max. Individual HAP	4.47	4.47
Total HAP	5.29	5.29
Total GHG (if applicable)	15,574.32	15,574.32

The facility will use multiple control devices to control PM emissions. As shown above, the potential PM emissions without these control devices would be greater than 100 tpy. The facility will rely on PM control devices to limit the potential PM emissions below 100 tpy.

Regulatory Applicability

The facility is subject to Georgia Rule (b) – *Visible Emissions,* Georgia Rule (e) – *Particulate Emissions from Manufacturing Processes* and Georgia Rule (n) – *Fugitive Emissions*. All of the equipment will be able to comply with these rules. The projected feed rate is 36,000 tons of aluminum per year which is 4.11 tons of aluminum per hour. Using the Georgia Rule (e) formula of $E = 4.1*p^{0.67}$, the PM emission rate for compliance with Georgia Rule (e) is 10.57 pounds of particulate matter per hour. Die-casting operations, machining, passivation and welding can comply with Georgia Rule (e) prior to the use of control devices. Grinding operations can comply with Georgia Rule (e) with the use of the wet scrubbers. Due to the use of Scrubbers GCD1 and GCD2 for compliance, a performance test will be required for these scrubbers.

The fuel burning equipment at the facility will be limited to natural gas for all combustion sources in order to satisfy Georgia Rule (g) – *Sulfur Dioxide*.

Passivation Unit P01 contains a 1.0 MMBtu/hr natural gas-fired heating system which is indirect-fired. The heating system for the passivation unit will be subject to Georgia Rule (d) – *Fuel-Burning Equipment.* Because the furnaces and ladles are direct-fired, they will not subject to Georgia Rule (d) – *Fuel-Burning Equipment*.

Georgia Rule (ii) - *VOC Emissions from Surface Coating of Miscellaneous Metal Parts and Products* is not applicable because the potential VOC emissions from all surface coating do not exceed 100 tpy which is the applicability threshold for Richmond County.

Georgia Rule (lll) - *NOx Emissions from Fuel-Burning Equipment* and Georgia Rule (rrr) - *NOx Emissions from Small Fuel-Burning Equipment* are not applicable because the facility is located in Richmond County which is not one of the targeted counties for these rules.

Emergency Generator EG01 will be subject to 40 CFR 60 Subpart IIII - *Standards of Performance for Stationary Compression Ignition Internal Combustion Engines* and 40 CFR 63 Subpart ZZZZ – *NESHAP for Stationary Reciprocating Internal Combustion Engines*.

The facility will avoid the requirements of 40 CFR 63 Subpart RRR - *National Emission Standards for Hazardous Air Pollutants for Secondary Aluminum Production* by limiting the aluminum and aluminum alloys treated at the facility to only clean charge.

The facility is not subject to 40 CFR 63 Subpart XXXXXX – *National Emission Standards for Hazardous Air Pollutants Area Source Standards* for Nine Metal Fabrication and Finishing Source Categories because the facility will not conduct one of the nine source categories for applicability.

The Facility is not subject to 40 CFR 63 Subpart ZZZZZZ – *National Emission Standards for Hazardous Air Pollutants Area Source Standards for Aluminum, Copper, and Other Nonferrous Foundries* because die-casting is excluded from the definition of Aluminum Foundry in 40 CFR Part 63.11556.

Permit Conditions

- Condition 2.1 requires the facility to use control devices while operating the associated emission units because controlled potential emissions were used to evaluate the Toxic Impact Assessment. The use of the control devices for the die-casting operations, machining, grinding and welding also ensure that the PM emissions will be below the major source threshold.
- Condition 2.2 subjects the facility to Georgia Rule (b).
- Condition 2.3 subjects Passivation Unit P01 because the burner is indirect fired. The other burners are not subject because they are direct fired.
- Condition 2.4 subjects the facility to Georgia Rule (e).
- Condition 2.5 limits the fuel fired in the fuel burning sources (except engines) to natural gas only. This subsumes the GA Rule (g) fuel sulfur content limit. Also, the toxic impact assessment was conducted based on the fuel assumption.
- Condition 2.6 limits the aluminum and aluminum alloys treated at the facility to only clean charge in order to avoid the requirements of 40 CFR 63 Subpart RRR.
- Condition 4.1 requires maintenance for the control devices.
- Condition 4.2 requires the facility to maintain the total secondary power for the electrostatic precipitators at or above the minimum secondary power established provided by the manufacturer.
- Condition 4.3 requires the facility to maintain the scrubbant flow rate and pH on Scrubber PC01. The pH is being monitored because sodium hydroxide is being used to control sulfuric acid and hydrofluoric acid emissions.
- Condition 4.4 requires the facility to maintain the scrubbant flow rate on Scrubbers GCD1 and GCD2. The monitored parameter must stay in the proper operating range determined in the initial performance test.
- Condition 4.5 requires filter changes for the dust collectors for the machining centers when the pressure drop reading(s) is outside the pressure drop range.
- Condition 4.6 requires spare parts for the control devices including spare filters for the dust collectors.
- Condition 5.1 requires monitoring of the secondary current and secondary voltage for each field of each electrostatic precipitator, the pressure drop across the dust collectors, the scrubbing liquid flow rate of the scrubbers, and the pH for Scrubber PC01. The frequency of the monitoring is also specified.
- Condition 5.2 requires the facility to develop and submit a Scrap Metal Inspection Program. This will ensure that all metal processed at the facility is clean charge to avoid the requirements of NESHAP RRR.
- Condition 6.2 requires a performance test for Scrubbers GCD1 and GCD2 to ensure compliance of the PM emission limits and to establish the scrubbant flow rate.
- Condition 7.1 requires the facility to notify the Division concerning the startup.
- Condition 7.2 includes the formula to calculate the daily average secondary power for each ESP field.
- Condition 7.3 requires the facility to maintain a log of the monitoring parameters and for filter changes for the dust collectors. Deviations, maintenance and corrective actions are also required to be recorded in the log.
- Condition 7.4 requires the facility to maintain all records for the Scrap Metal Inspection Program including any revisions.
- Condition 8.2 requires annual synthetic minor permit fees.

Toxic Impact Assessment

The facility performed a toxic impact assessment (TIA) in order to demonstrate compliance with Georgia Air Toxic Guideline. TAP emissions from all sources at the facility were assessed. A comparison of the potential emission rates of the pollutants were compared to the 20% of the minimum emission rate (MER) list in Appendix A of the guidelines as a screening tool because the emissions were not vented through vertical unobstructed stacks. Controlled potential emissions were used to evaluate the TIA. Because the chromium VI emissions primarily came from natural gas combustion, the specific MER used for evaluating this pollutant was chromium VI particulate.

STACK PARAMETERS

Stack ID	Emission Units	Stack Height (m)	Stack Diameter (m)	Adjusted stack diameter (m) (capped stacks)	Flow Rate (m^3/s)	Exit Velocity (m/s)	Exit Temperature (K)
Stack 1	F01 & F02	21.2	0.965	71.45	4.015	5.490	573.15
Stack 2	P01	21.2	0.92	97.65	7.500	11.282	293
Stack 3	GC01 - C04	17	0.7	79.73	5.000	12.992	293
Stack 4	MC01 - C10	17	0.355	42.85	1.444	14.593	293
Stack 5	L01 - L04	16.5	1.2	104.54	9.056	7.600	293
Stack 6	EG01	3.302	0.254	53.49	2.250	44.404	785.15
Stack 7	W01	16.5	1.2	104.54	9.056	7.600	293

COMPARISON OF EMISSION RATE TO MINIMUM EMISSION RATE

Pollutant	CAS	Emission Rate (lb/yr)	20% of MER (lb/yr)	Modeling Required?
Benzene	71432	1.62	6.33	No
Toluene	108883	1.26	243,330.00	No
Xylene (o-, m-, p-isomers)	1330207	0.27	4,866.60	No
Formaldehyde	50000	19.10	4.42	**Yes**
Acetaldehyde	75070	0.035	221.43	No
Acrolein	107028	0.011	0.97	No
Naphthalene	91203	0.34	146.00	No
Hydrogen fluoride	7664393	260.07	56.85	**Yes**
Sulfuric acid	7664939	6.17	23.36	No
Titanium dioxide (total dust)	13463677	9.74E-03	347.50	No
Hydrogen chloride	7647010	2,400.40	973.32	**Yes**
Silicon	7440213	377.76	231.76	**Yes**
Copper	7440508	6.61	23.36	No
Manganese	7439965	14.12	2.43	**Yes**
Nickel	7440020	4.31	7.73	No
Calcium carbonate (total dust)	1317653	486.69	347.50	**Yes**

Pollutant	CAS	Emission Rate (lb/yr)	20% of MER (lb/yr)	Modeling Required?
Alumina	1344281	625.73	347.64	**Yes**
Lead	7439921	2.96	1.17	**Yes**
Chromium (VI), particulate	7440473	0.383	4.87	No
Molybdenum	7439987	8.01E-03	347.64	No
Stoddard solvent	8052413	0.063	531.00	No
Cyclohexane	110827	0.013	291,996.00	No
Graphite, natural respirable dust	7782425	1.91E-03	57.94	No

The potential emissions for formaldehyde, hydrogen fluoride, hydrogen chloride, silicon, manganese, calcium carbonate, alumina and lead exceeded 20% of the MER; therefore, a modeling analysis was needed for these pollutants. SCREEN3 was used to model the emissions from these pollutants. The following table shows the SCREEN3 results. The maximum ground level concentrations of formaldehyde, hydrogen fluoride, hydrogen chloride, silicon, manganese, calcium carbonate, alumina and lead were below the associated acceptable ambient concentrations (AAC); therefore, the TIA passed the evaluation.

Pollutant	CAS	Averaging Period	AAC ($\mu g/m^3$)	MGLC ($\mu g/m^3$)
Formaldehyde	50000	15-min	245	2.96E-05
		Annual	0.0909	1.62E-06
Hydrogen fluoride	7664393	15-min	245	0.05
		24-hour	5.84	0.02
Hydrogen chloride	7647010	15-min	700	1.61E-06
		Annual	20	4.86E-04
Silicon	7440213	15-min	Not Available	--
		24-hour	23.81	0.08
Manganese	7439965	15-min	500	3.51E-04
		Annual	0.05	2.13E-05
Calcium carbonate	1317653	15-min	Not Available	--
		24-hour	35.7	0.15
Alumina	1344281	15-min	Not Available	--
		24-hour	35.71	0.24
Lead	7439921	15-min	Not Available	--
		24-hour	0.12	4.26E-06

Summary & Recommendations

I recommend issuance of Permit No. 3363-245-0211-S-01-0 to GF Casting Solutions – Augusta, LLC for the construction and operation of an aluminum die-casting facility. The facility will be located at 430 Valencia Way in Augusta (Richmond County). The facility will be permitted with a synthetic minor permit and will be required to use control devices because controlled emissions were used for the Toxic Impact Assessment. The Public Advisory for this application expired on May 9, 2025. No comments were received.

Addendum to Narrative

The 30-day public review started on month day, year and ended on month day, year. Comments were/were not received by the Division.

//If comments were received, state the commenter, the date the comments were received in the above paragraph. All explanations of any changes should be addressed below.//