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ENGINEERING EVALUATION / FACT SHEET

BACKGROUND INFORMATION

Application No.:	R13-3149
Plant ID No.:	039-00642
Applicant:	Gestamp West Virginia, LLC
Facility Name:	South Charleston
Location:	South Charleston
NAICS Code:	336370
Application Type:	Construction
Received Date:	October 25, 2013
Engineer Assigned:	Edward S. Andrews, P.E.
Fee Amount:	$4500.00
Date Received:	November1, 2013
Completeness Date:	October 15, 2014
Due Date:	January 13, 2015
Newspaper:	Charleston Gazette
Applicant Ad Date:	October 28, 2013
UTMs:	Easting: 438.6 km Northing: 4,246.7 km Zone: 17
Description:	The South Charleston Plant is installing six Hot Stamping Lines.

DESCRIPTION OF PROCESS

Gestamp West Virginia, LLC (Gestamp) operates a manufacturing facility in South Charleston, West Virginia. Gestamp manufactures automotive structural components using hot press, which is the latest technology in auto part stamping. Gestamp is installing six hot stamping lines at the South Charleston Facility. The process also includes shot blasting and laser cutting (trimming) of the hot stamped components.

Hot stamping is an important process, which allows reductions in mass of automotive components. Hot stamping technology (also called press hardening) allows for the manufacture of light, strong parts with complex geometry. Hot Stamping is ideal for components requiring

dimensional accuracy, high strength, toughness, good weldability, and lightweight characteristics.

In the hot stamping process, special steels are cut into blanks, then heated up in continuous transfer furnaces. The blanks are hot formed and hardened in the tool in a one hit operation. Post form operations include (1) shot blasting for uncoated boron steel components, (2) die cutting or laser cutting for trimming out the component from the blank and holes, (3) welding for joining parts.

The facility will install six hot stamping lines for the hot stamping process. In the first stage of the process, blanks are positioned onto an entry table then are conveyed lengthwise through the furnace. Insulated doors close off the furnace entry and exit ends. The furnace is divided into several indirectly natural gas-fired heating zones, with forty (40) gas burners. The gas burners are installed horizontally on the side of the furnace. The burners bring the furnace temperature to 900 C.

The furnaces are operated under a protective atmosphere to prevent scaling of the steel blank during the heating process. The absence of oxygen inside the furnace prevents (minimizes) scaling. The protective atmosphere is created by feeding a small amount of natural gas (5%) and nitrogen into the furnace. The natural gas binds any residual oxygen content of the nitrogen fed into the furnace.

An exhaust hood is fitted above each furnace to evacuate the protective atmosphere (nitrogen) and hot air escaping the furnace. Each exhaust hood is fitted with two electric igniters to flare off any protective atmosphere that discharges through the doors.

The exhaust system of the furnace consists of a collecting pipe located on one side of the furnace. The burner exhaust gas is pulled by a fan through the individual exhaust pipes for each burner and form the exhaust hoods (i.e. induced draft fan). The exhaust collecting pipe is vented outside the building as an emission point.

After exiting the furnace, the heated blank is quickly placed into position on the lower die in the hydraulic press for the line. Once in position, the press is activated and compresses the upper die into the blank, which draws out the desired component. The press is resetting back to its original starting position and the component is removed from the die.

Components stamped out of uncoated steel have a small amount of scale that must be removed prior to being sent to the laser trimmers. Even though the furnace has the protective/control environment, the elevated temperatures of the Hot Stamping Lines will cause this scale to form. This small layer of scale is enough to affect the dimensional tolerance of the component when the laser trimmers are cutting out the desired component.

These components are placed on racks as part of the overhead rail conveyor system. Once on the racks, the components are moved continuously through an overhead rail shot blast machine. Gestamp uses steel shot to remove the scale from the component. Once the

component exits the machine, then it is removed from the rack and sent to one of the 54 laser trimmer booths.

The component is placed and mounted on a fixture, which moves the component inside of the completely enclosed laser booth. Once in the booth, a computer numerical control (CNC) laser cutting machine is activated to cut or trim out the desired component. After the program controlling the laser has completed its program, the machine moves the component outside of the booth for the operator to remove it from the fixture.

At this point of the manufacturing process, finished components can be shipped to their customers or be moved over to the assembly area for further processing. In the assembly area, operators weld pins or threaded studs on the component and or send to the robotic assembly line where components are assembled and welded together. Once assembled, the part or end-item is shipped to the customer.

SITE INSPECTION

On July 18, 2014, this writer conducted an announced site inspection of the South Charleston Stamping Plant. Ms. Marilyn Hall, Safety Administrator, and Mike Anderson of Gestamp accompanied the writer during this inspection. In the past, the primary manufacturing activity of the facility was stamping out automotive components using cold forming processes. Gestamp's business focus for the South Charleston Plant is to move from cold forming to hot stamping.

The layout of the facility was as described in the application and illustrated in the Plant Layout drawing included with the application. During this visit, the cold forming side of the operation was down for routine maintenance. The writer was able to locate the engine tag for the generator sets and recorded the Engine Family Number of the engine for the generator sets at the facility, which was CCEXB05.0GDA for the GM 5.0 Litter engine used on the proposed generator sets.

This proposed site is in the middle an existing manufacturing area of South Charleston, West Virginia. The site has been used in light manufacturing operations in the past and the proposed hot stamping should be considered to be very similar to the previous activities in the past. Thus, the writer considers the site appropriate for the proposed activities.

ESTIMATE OF EMISSIONS BY REVIEWING ENGINEER

Air emissions from the hot stamping lines are mainly from fuel combustion in the burners which natural gas fired. The applicant used the emission factor from Chapter 1.4 of AP-42 to quantify the combustion emissions from these three sources. Presented in the following table are the emissions from these sources.

Table #1 – Combustion Emissions from the Hot Stamping Lines				
Source		One Hot Stamping Line	Six Hot Stamping Lines	
Maximum Total Heat Input	MM Btu/hr	7.2	43.2	43.2
Pollutant	Emission Factor (lb/10^6 SCF of NG)	lbs./hour	lbs./hour	tpy
Particulate Matter ($PM/PM_{10}/PM_{2.5}$)	7.6	0.05	0.33	1.45
Sulfur Dioxide (SO_2)	0.6	0.00	0.03	0.13
Oxides of Nitrogen (NO_x)	100	0.72	4.32	18.92
Carbon Monoxide (CO)	84	0.6	3.63	15.90
Volatile Organic Compounds (VOCs)	5.5	0.04	0.24	1.05
Total HAPs	1.89	0.01	0.08	0.35
Carbon Dioxide Equivalent* (CO_2e)	117.098 lb/MMBtu	843.11	5,058.66	22,156.93

* Collection of the greenhouse gases pollutants standardized based on globe warming potential to carbon dioxide in accordance with 40 CFR 98.

The applicant conducted an evaluation of the shot blast machine to determine the potential PM emissions using a mass balance approach. Gestamp conducted this evaluation over a 24-hour operating period. The results of this mass balance approach yielded a loss of 2.5 pounds over at 24-hour period, which equates to a PM rate of 0.10 pounds per hour. On a continuous operating schedule, annual PM emission would be 0.46 tons per year. PM_{10} and $PM_{2.5}$ emissions are assumed to be the same as PM emissions.

Gestamp uses industrial laser trimmers to cut the desired part out of the stamped blank. These trimmers are Computer Numeric Control (CNC) machinery with lasers to remove the undesired metal. The applicant used the following parameters to estimate the particulate matter and metal HAP emissions from the trims.

Table #2 – Parameters for the Laser Trimmers		
Maximum Metal Density =	0.29	lbs./cu. Inch
Metal Thickness =	0.157	inches
Maximum Cut Width =	0.008	inches
Maximum Metal Cut Speed =	70,866	inches/hour
Metal Usage	89.01	Cu in./hr
Total Weight of Metal Removed	25.75	lbs./hr
Particulate Emission factor* =	0.12	Lbs. of PM/lb metal cut
Control Efficiency of the Filters =	99	%

* For plasma/laser arc cutting. Source test data, Appendix B, 4-24-90, P/C report, A/N 184446

The emissions were determined using the fastest speed of the laser head and thickest metal used at the facility. HAP emissions were based on the estimated PM rate multiplied by the percentage content of HAP metal in the blank.

Table #3 – Emissions from the Laser Trimmers						
	Single Laser Trimer				54 Lasers	
	Uncontrolled		Controlled		Controlled	
	Hourly Emissions	Annual Emissions	Hourly Emissions	Annual Emissions	Hourly Emissions	Annual Emissions
Pollutant	lbs./hr	TPY	lbs./hr	TPY	lbs./hr	TPY
PM	3.09	13.54	0.0309	0.135	1.67	7.3
$PM_{10}/PM_{2.5}$	1.55	6.77	0.0155	0.068	0.83	3.7
Chromium	0.01	0.02	0.0001	0.0002	0.004	0.02
Manganese	0.05	0.23	0.001	0.002	0.04	0.16
Nickel	0.001	0.003	0.00001	0.00003	0.0004	0.002
Total HAPs	**0.06**	**0.26**	**0.001**	**0.003**	**0.04**	**0.18**

Emissions from the engines for the emergency generator were estimated using manufacturer's data and maximum brake horsepower of the engine. Since these engines are specifically configured to operate only on natural gas, the sulfur dioxide emissions were based on the maximum fuel consumption rate and 20 grains of sulfur per 100 cubic feet of natural gas. Annual emissions estimates were conducted using an operating schedule of 500 hours per year.

Table #4 – Combustion Emissions from the Engines for the Emergency Generators				
Source		**One Engine**	**Six Engines**	
Power output bhp @1800 rpm		**72.5**	**Hourly**	**Annual**
Pollutant	**Emission Factor gm/hp-hr**	**lbs./hour**	**lbs./hour**	**tpy**
Sulfur Dioxide (SO_2)		0.00	0.03	0.13
Oxides of Nitrogen (NO_x)	6.9	1.10	6.60	1.65
Carbon Monoxide (CO)	34.5	5.51	33.06	8.27
Volatile Organic Compounds (VOCs)	2.0	0.32	1.92	0.48
Total HAPs		0.01	0.08	0.35
Carbon Dioxide Equivalent* (CO_2e)	561.0	89.59	537.54	22,156.93

The facility has eleven (11) natural gas fired furnaces with a heat input rating of 5 MMBtu/hr per unit that are used to condition the indoor air of the building during the heating season. The emissions from these heaters are presented in the following table.

Table #4 – Emissions from the Building Heaters				
	Each Heater		**Total Heaters**	
	Hourly	**Annual**	**Hourly**	**Annual**
	Emissions	**Emissions**	**Emissions**	**Emissions**
Pollutant	**(lb/hr)**	**(tons/yr)**	**(lb/hr)**	**(tons/yr)**
NO_x	0.5	2.1	5.4	23.6
CO	0.4	1.8	4.5	19.8
CO_2e	585.49	2,564.45	6,440.39	28,208.91
VOC	0.03	0.12	0.3	1.3
PM	0.04	0.16	0.4	1.8
PM_{10}	0.03	0.12	0.3	1.3
SO_2	0.003	0.013	0.0	0.1
Total HAPs	0.009	0.04	0.10	0.45

The facility wide annual emissions are summarized in the following table.

Table #5 – Facility Wide Emissions by Source						
Pollutant	Hot Stamp Presses (tpy)	Shot Blasting (tpy)	Trimmers (tpy)	Emergency Generators (tpy)	Building Heaters (tpy)	Total (tpy)
PM	1.45	0.46	9.3	0	1.8	13.01
PM_{10}	1.45	0.46	4.7	0	1.3	7.91
$PM_{2.5}$	1.45	0.46	4.7	0	1.3	7.91
SO_2	0.13	0	0	0.13	0.1	0.36
NO_x	18.92	0	0	1.65	23.6	44.17
CO	15.90	0	0	8.27	19.8	43.97
VOCs	1.05	0	0	0.48	1.3	2.83
Total HAPs	0.35	0	0.18	0.35	0.45	1.33
CO_2e	22,156.93	0	0	22,156.93	28,208.91	72,522.77

REGULATORY APPLICABILITY

The following state regulations apply.

45 CSR 2 To Prevent and Control Air Particulate Air Pollution From Combustion of Fuel In Indirect Heat Exchangers

The purpose of this rule is to prevent and control particulate matter emitted from indirect heat exchangers located in the State of West Virginia. The term indirect heat exchanger commonly refers to boilers or process heaters. The building heaters would be classified as indirect heat exchanger. However, the furnaces for the hot stamping process is heating a solid object up to its austenite temperature to maintain a desired grain structure of the metal to manufacture the desired component. Therefore, the furnaces for the hot stamping process are not subject to Rule 2 and are subject to Rule 7 as part of a manufacturing process.

The building heaters have a heat input of less than 10 MMBtu/hr and solely use natural gas. These heaters are exempt from the particulate standard, control requirements for fugitive dust, testing, monitoring and recordkeeping of this rule (45 CSR §2-11.1). The heaters are only subject to the visible emission standards of 45 CSR §2-3.1. Natural gas fired units typically exhibit zero visible emissions. The heaters should meet the visible emission standard of this rule.

45CSR7 To Prevent and Control Particulate Matter Air Pollution From Manufacturing Processes and Associated Operations

The purpose of this rule is to control particulate matter from manufacturing processes and associated operations located in West Virginia. The facility has three processes that meet the definition of manufacturing process under this rule. These are hot stamping, shot blasting, and trimming. The Rule 7 allowable for each hot stamping line would be 10 pounds of PM per hour based on a maximum processing rate of five tons of blanks per hour. The predicted PM rate for each stamping line is 0.05 pounds per hour, which is only a one-half of one percent of the allowable. Using the rated of the rail system capacity of 800 kg for the shot blast machine and assuming this is an hourly rate, the allowable for the shot blasting activity would be 0.88 pounds of PM per hour. Gestamp's has developed PM data on the shot blasting which predicts the PM rate for the continuous shot blast machine is 0.10 pounds per hour, which is 11% of the allowable under this rule.

This rule also establishes a visual emission standard for manufacturing processes, which is 20% opacity. The PM from stamping lines is generated from the combustion of natural gas, which generates very little or no visible emissions. The other two processes are controlled with fabric filter technology with nearly eliminates all of the PM and visible emissions. The proposed sources with the evaluated controls should meet all of the applicable requirements under Rule 7.

45CSR10 To Prevent and Control Air Pollutant From the Emission of Sulfur Oxides

The purpose of this rule is to prevent and control air pollution from the emissions of sulfur oxides. The proposed crematory will emit sulfur oxide emissions, therefore is subject to this rule as a manufacturing process.

This unit will be subject to the maximum allowable emission limit of 2,000 ppm from 45CSR§10-4.1. Using hourly SO_2 emission rate and the flue gas flow rate at standard conditions, this writer calculated the maximum SO_2 concentration to be 54.3 ppmvd. This unit should not exceed this limit.

45CSR13 - Permits for Construction, Modification, Relocation and Operation of Stationary sources of Air Pollutants, Notification Requirements, Administrative Updates, Temporary Permits, General Permits, and Procedures for Evaluation

The facility is required to obtain a permit as required in 45CSR§6-6.1. and 45CSR§13-2.24.a. The facility has met the applicable requirements of this rule by publishing a Class I Legal Advertisement in *The Charleston Gazette* on May 13, 2011, paid the $1,000.00 application fee, and submitted a complete permit application.

NSPS

New Source Performance Standards (NSPS) apply to certain new, modified, or reconstructed sources meeting criteria established in 40 CFR 60.

Subpart JJJJ

Subpart JJJJ (Standard of Performance for Stationary Spark Ignition Internal Combust Engines) applies to stationary spark ignition engines manufactured after July 1, 2007. These generator sets will be equipped with a compression ignition engine manufactured after July 1, 2007, which makes the engine affected sources subject to regulation.

To comply with this subpart, the VA has elected to purchase certified engines as allowed under 40 CFR §60.4243(b)(1) and operate such engines according to the manufacturer's emission-related written instructions as required in 40 CFR §60.4243(a)(1). The model engine proposed in this application are certified for the 2012 model year under the following Engine Family and Certificate Number that was issued by U.S. EPA:

Table #6 U.S. EPA Certificate Numbers for Part 60 Compliance		
Generate Set Model	Engine Manufacture	Certified Engine Family No.
50GGPC	GM*	CCEXB05.0GDA

* - GM is the engine manufacturer. Cummins Inc. had the engine certified as part of the generator set.

NESHAP

The South Charleston facility is classified as an area source of HAPs. The following will discuss the key potions of any NESHAP regulation that applies to the engine for the generator sets.

Subpart ZZZZ

The internal combustion engine for the emergency generator sets are classified as an affected source under the NESHAP for Stationary Reciprocating Internal Combustion Engines (Subpart ZZZZ). The proposed engines will have a power output rating of 324 bhp and be operated as emergency use engine. §§63.6590(c) and (c)(1) states that for engines located at an area source of HAPs, if the source meets the requirements of Subpart JJJJ no requirements of Subpart ZZZZ apply to the engine. Thus, the proposed engines are not subject to any requirements of this subpart.

The South Charleston facility will not be classified as a major source of hazardous air pollutants or Title V. The engines for the emergency generators unit are subject to the New Source Performance Standard. However, this particular subpart excludes affected sources from the obligation to obtain a Title V Permit by being subject to the subpart (40 CFR §60.4230(c). The facility is not subject to Title V and will not be required to obtain an operating permit under 45CSR30. Therefore, Gestamp will be classified as a "7G – Other Secondary Metals" source as defined in 45CSR22.

TOXICITY OF NON-CRITERIA REGULATED POLLUTANTS

Only trace amounts of non-criteria regulated pollutants will be emitted from this facility. These are acetaldehyde, arsenic, antimony, beryllium, cadmium, chromium, copper, formaldehyde, hydrogen chloride, lead, and mercury. Only the metals, (i.e. cadmium, chromium, etc.) expect for mercury would be controlled with the use of the fabric filters on the shot blast machine and laser trimers.

AIR QUALITY IMPACTS ANALYSIS

This writer deemed that an air dispersion modeling study or analysis was not necessary, because the proposed facility does not meet the definition of a major source as defined in 45CSR14.

MONITORING OF OPERATIONS

Monitoring of the facility should focus on natural gas usage of the facility and maintenance of the particulate matter control devices for the laser trimers on a monthly basis and shot blaster on a quarterly basis. The following table is a summary of the maximum natural gas usage at the facility.

Table #7 Maximum Consumption Rate of Natural Gas

Sources	**Annual Maximum Usage (Million cubic Feet/year)**
Hot Stamping Lines	371.0
Heaters	472.4
Emergency Generators*	1.94
Total	845.34

* - Emergency Generators are based on only 500 hours of operation.

RECOMMENDATION TO DIRECTOR

The information provided in the permit application and the conditions set forth in the draft permit indicates the facility should meet all applicable state rules and federal regulations when operated. Therefore, the writer recommends that Gestamp West Virginia, LLC should be granted a Rule 13 Construction permit for their proposed manufacturing facility in South Charleston, WV.

Edward S. Andrews, P.E.
Engineer

Date: January 21, 2015