

**DEPARTMENT OF ENVIRONMENTAL QUALITY
AIR QUALITY DIVISION
ACTIVITY REPORT: Self Initiated Inspection**

P041325548

FACILITY: INVECAST CORPORATION		SRN / ID: P0413
LOCATION: 25737 SHERWOOD AVE, WARREN		DISTRICT: Southeast Michigan
CITY: WARREN		COUNTY: MACOMB
CONTACT: Tim Campbell , Foundry Manager		ACTIVITY DATE: 06/04/2014
STAFF: Samuel Liveson	COMPLIANCE STATUS: Compliance	SOURCE CLASS: Minor
SUBJECT:		
RESOLVED COMPLAINTS:		

On June 4, 2014 Air Quality Division (AQD) staff Rem Pinga and I conducted an unannounced, self-initiated level 2 inspection of InveCast Corporation (Invecast), located at 25737 Sherwood Avenue in Warren, MI. The purpose of the inspection was to determine the facility's compliance with the federal Clean Air Act, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and 40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.

We arrived on site around 9:50 am. We met with Mr. Tim Campbell, Foundry Manager and facility contact person, and Mr. Tim Finney, Project Engineer, who provided a site walkthrough while explaining equipment and operations. Mr. Pinga and I presented our credentials as well as provided Mr. Campbell and Mr. Finney with a copy of "DEQ Environmental Inspections: Rights and Responsibilities."

Invecast performs investment casting. The process creates final products of steel, stainless steel, and other ferrous alloys. The company has about 38 employees and operates two 8-10 hour shifts Monday through Saturday. The basic shift is 5:30 am to 2:00 pm. The evening shift is from either 7 or 9 pm until 5:30 am.

Address Change and Voided Permit

Invecast moved to their current location on Sherwood Avenue about two years ago, in 2012. Previously they were located at SRN N5999 along Maxwell Avenue in Warren for approximately 18 years. When Invecast moved to their new location, PTI 415-96 from Maxwell Avenue for an abrasive chop-stroke cut-off saw was voided since the cut-off saw is now exempt from R201 per R285(l)(vi)(C). AQD staff Mr. Pinga and I visited the previous Maxwell location earlier on June 4th to confirm that Invecast no longer occupies the building.

Site Walkthrough

Mr. Campbell and Mr. Finney lead us through the facility showing equipment in the order it is used for production. There was no odor in the facility or particulates observed during the process. Overall the facility was well-kept.

Electric Induction Molding Machines

Wax is heated in seven electric induction molding machines to a temperature of approximately 130°F. Sweating, distilling, and fluxing are not conducted, making the induction molding machines appear exempt from R201 per R282(a)(vi).

The heated wax is placed into molds made of aluminum to cool and harden. Aluminum naturally conducts heat away from the wax so that the wax cools quickly. The wax mold is released from aluminum using a silicon mold release that has no HAPs according to its MSDS. About 2/3 quarts of the mold release are used monthly, so that the mold release appears exempt from R201 per R287(c). Once wax is removed from the mold, wax patterns are cleaned with PC-205. PC-205 contains 77% noncarcinogenic volatiles and the total amount used is 250 lbs a month according to Mr. Finney so that wax pattern cleaning is exempt from R201 per R290(a)(i).

Slurry and Sand Mix

Hardened wax is dipped into four sets of slurry and sand containers in series. Invecast provided MSDSs of all components included in the slurry, as well as their average monthly material usage. In the first set of sand and slurry containers, zircon flour slurry and zircon sand are used because zircon has a fine particle size and is resistant to hot metal. Silica sand and zircon slurry are used in the next set of open tanks, followed by colloidal silica slurry and silica sand in the last two sets of tanks. Six to eight layers total are applied to the wax by hand, and the last layer is a silica slurry.

A portable Torit dust collector collects dust indoors from these containers. Filters are cleaned with a pulse jet of air whenever differential pressure across the filter reaches an amount specified by the manufacturer.

An electric ceramic dryer cools and dehumidifies the ceramics so that they harden onto the wax. This ceramic dryer appears to be exempt from R201 per R281(e).

Electric Autoclave/Boiler Clave

An electric autoclave, or boiler clave, removes the wax from the ceramic mold with high-pressure steam. The boiler creates steam that enters the chamber at a high heat and pressure to melt wax out of the ceramic mold. The autoclave was built in 2001, builds a pressure of 150 psi and a temperature of 400°F, uses 81 kW of energy, has two safety valves, and is inspected annually by the State of Michigan. Mr. Campbell explained that correct temperatures and pressures are critical to ensuring the wax melts out of the mold before the heat causes the wax to expand and potentially crack the ceramic mold.

Out of five waxes that are used by Invecast, two types, Cerita Casting Wax pellets and Virgin Wax Filled Pattern Wax billet shapes, both have the same MSDS but are different in shape. The MSDS shows these two waxes contain <0.2% styrene, which has an IRSL of 1.7 ug/m³. Styrene volatilizes around 293°F. Exemption R290(a)(ii)(D) from R201 requires less than 20 lbs of styrene emissions a month. Invecast provided records that on average, they emitted 11.2 lbs of styrene a month the last two years, assuming a conservative styrene concentration of 0.2%, but they were unable to provide records for each individual month. I used discretion to allow the R290(a)(ii)(D) exemption with average monthly emissions, and communicated that Invecast needs to keep monthly records of their usage from now on.

Electric boilers are exempt from 40 CFR 63 Subpart JJJJJJ: National Emission Standards for Hazardous Air Pollutants for Industrial, Commercial, and Institutional Boilers Area Sources.

Natural Gas-Fired Kiln

A natural gas-fired kiln prepares the ceramic molds to contact molten metal without cracking and removes excess wax from the ceramic mold. This kiln has a 2.05 MMBTU/hr heat capacity and heats ceramic molds to 1800°F in about two hours. An afterburner at 1445°F burns excess particulates before exhaustion to ambient air. The process appears to be exempt from R201 per R282(a)(iii).

The previous kiln used from 1992 at the Maxwell Avenue location is present at this facility, but is not used or connected to a natural gas source. At 1.5 MMBTU/hr, it appears to be exempt from R201 per R282(a)(iii), but because there is no afterburner, and because the kiln had a history of opacity issues (see Krista Reed's SAR N599903350 from 8/5/2009), it had a loading schedule to minimize opacity which we would want to follow if this kiln were reused.

Electric Induction Furnaces

Two electric induction furnaces melt the metal to pour it into the heated ceramics. Each induction furnace has a holding capacity of 110 lbs. Invecast can currently operate only one furnace at a time. The induction furnaces are 480 volts and draw 280 amps. Steel is inserted as bars, along with steel tungsten pellets or other materials to form a desired metal alloy, and heated to 3050°F. Slag is cleaned off the top of the molten steel, and workers pour the molten steel into the heated ceramic molds. The electric induction furnaces appear to be exempt from R201 per R282(a)(iv). Witnessing this process in operation, it generated no opacity but did create some sparks.

After the steel and ceramic combined molds have cooled, ceramic is separated from the steel manually with a hammer in a knockout area, and a steel blaster uses tiny pellets of steel to clean the steel product and remove excess ceramic. Both the knockout and blasting processes are controlled by a mechanical precleaner and Torit Dust Collector and appear exempt from R201 via R285(l)(vi)(C).

A Kolean Salt Bath solution of sodium hydroxide (NaOH) heated to a liquid at 950°F further removes ceramic from steel by dissolving ceramic off of the steel without harming the steel. Two water tanks then rinse the steel and remove the salt. Emissions are exhausted to ambient air. According to its MSDS, the salt contains no volatiles so that emissions don't appear to contain air contaminants that would make this process applicable to R201.

A chop-stroke cut-off saw, originally permitted by PTI No. 415-96 when Invecast was located on Maxwell Avenue because emissions were uncontrolled, now appears to be exempt from R201 per R285(l)(vi)(C) because emissions are controlled by a mechanical precleaner and Torit dust collector. The saw separates the steel sprue from the desired steel shapes surrounding the sprue.

Steel fabrication and finishing equipment includes another shot blaster, a sand blaster, hydraulic presses, an electric straightening oven, a Torit downdraft table, and a belt sander with indoor air cleaner, all of which vent indoors and are controlled with a movable Torit dust collector that exhausts indoors. The dust collector filters are cleaned with a jet pulse whenever differential pressure across the filter reaches an amount specified by the manufacturer.

Outdoor Controls

Stacks from the Koleen salt bath and kiln are approximately one and a half times the building height, and they exhaust vertically unobstructed. Stacks from dust collectors are in line with the building heights and displaced several feet from the building. I informed Mr. Campbell that a good rule of thumb is to have stack heights 1.5x the building height. No fallout or opacity was observed from any stacks.

Invecast inquired about replacing outdoor Torit controls, which Mr. Pinga and I supported so long as the new controls are as or more effective than the previous and include a mechanical precleaner and fabric filter collector as specified in R285(l)(vi)(C).

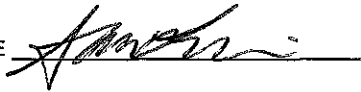
40 CFR 63 ZZZZ Compliance

As an area source iron and steel foundry, Invecast is subject to 40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources. Invecast submits semi-annual deviation reports. The most recent was received June 30th and reported no deviations back to January 1, 2014. Invecast is classified as a small foundry of less than 20,000 tons of metal melt production. Their metal melt production for the previous calendar year was 394 tons. Although Invecast moved to the Sherwood Avenue location two years ago, they did not invest greater than 50% in new capital to fit the definition of construction or reconstruction and so are an existing foundry according to correspondence from December of 2012 between Krista Reed and Erik Grinstern.

Compliance Determination

AQD staff Mr. Pinga and I departed offsite around 12:30 PM. Based on our inspection, it appears that Invecast is in compliance with the federal Clean Air Act, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and 40 CFR 63 Subpart ZZZZ – National Emission Standards for Hazardous Air Pollutants for Iron and Steel Foundries Area Sources.

NAME



DATE

7/8/14

SUPERVISOR

