N3246 — SAR — 20170223

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

N324639235

FACILITY: ERVIN PRODUCT DEVELOPMENT CENTER		**SRN / ID:** N3246
LOCATION: 200 INDUSTRIAL DRIVE, TECUMSEH		**DISTRICT:** Jackson
CITY: TECUMSEH		**COUNTY:** LENAWEE
CONTACT:		**ACTIVITY DATE:** 02/23/2017
STAFF: Mike Kovalchick	**COMPLIANCE STATUS:** Non Compliance	**SOURCE CLASS:**
SUBJECT: Inspecting a steel forming process facility.		
RESOLVED COMPLAINTS:		

Minor Source

Facility Contacts

Tim Bakewell: Office Services Manager

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Ryan Penterics: Plant Engineer

ph 517-423-5477

Website: http://www.ervinindustries.com/ervin-technologies

Purpose

On February 23, 2017, I conducted an unannounced compliance inspection of Ervin Technologies (Company) located in Tecumseh, Michigan in Lenawee County. The purpose of the inspection was to determine the facility's compliance status with the applicable federal and state air pollution regulations, particularly Michigan Act 451, Part 55, Air Pollution Control Act and administrative rules and their Permit to Install (PTI) # 954-91.

Facility Location

The facility is located in an industrial park in Tecumseh. There is a separate building that is contiguous with the main production plant that houses some additional industrial processes. See aerial photo dated October, 2016.

See attached aerial photo that is annotated by the Company showing the locations of the various exhaust stacks:

Facility Background

There is no file in the Jackson District office for this facility currently. A computer database marked this facility as permanently closed. It is unknown if this was a mistake or if the facility closed then reopened later.

Permit Section in Lansing forwarded me what they had in their files. See Attachment (1).

Permit Application 954-91 was received in August, 1991 for a "melting and shot forming process with a baghouse."

At that time, the Company was named Ervin Product Development Center-Division of Ervin Industries Inc.

From the permit application:

"Ervin proposes to install a proprietary melting and shot forming process at its Tecumseh facility. This unit will include state-of-the-art induction melting, shot forming, and dust collection equipment.

Since the process is currently in development, no emissions data is available, but the raw materials

used in the process contain only trace quantities of materials that might be considered hazardous (silica and manganese are most commonly associated with the process), therefore no significant quantities of toxic substance are anticipated in the process emissions."

"The melting furnaces (2) are the only source of air contaminants from this process. These units are identical, and are specified as follows:

Manufacturer: Inductotherm Size: 3 tons Operating Temperature: 3100 degrees F"

"Emissions will be captured by 360 degree collection rings surrounding the entire furnace roof and transported to the inlet of the collector. A 100 hp induced-draft fan will be installed downstream of the collector. The collector specifications are as follows:

Manufacturer: Jet air Technologies

Model No. DA-2126-4-5

**Surface area: 5,600 sq. ft.*

No. of bags: 240

**Design flow rate: 14,500 acfm*

Method of cleaning: Pulse Jet

Stack dimensions: Height=12 feet. Above grade I.D. =38 inches

Stack design: Vertical discharge (up), no rain guard

Exhaust conditions: Approx. 180 degrees F, 14,500 acfm

Removal efficiency (design): 99.7%

**NOTE: Per the furnace manufacturer specifications, the required design flow rate is 8,800 acfm. Typically, this style of furnace is served by dust collection units with air to cloth ratios in the 6.0 to 1 range. This would provide approximately 1,500 square feet of filter surface area. Ervin desires a margin of safety in performance, as the flexibility of adding future operations to this existing collection system without major equipment modifications, thus the unit was intentionally oversized. The equipment collection capacity and filter area are essentially more than double the minimum equipment manufacturer's requirements. "*

"Process Description

The shot forming process consists of four basic operations: charging, melting, forming, and screening. Raw materials, including both virgin and recycled steel, are charged from overhead into the melting pots, where induction coils elevate the temperature of the bath to (3100 degrees F). The molten steel is then poured in a thin stream onto an atomization device (proprietary) contained in nitrogen gas. Once formed, the steel shot is cooled and screened for proper size distribution. If required, annealing or other metallurgical processes are performed batchwise downstream.

Metal fumes and particulate which escape from the melting pots, are collected in the fume rings, and are transported to the dust collector. The fumes condense to form iron and iron oxide particles, which are removed, along with slag particles by the collector bags and accumulated for disposal. Particle size is expected to range from 1 to 100 microns, and the estimated temperature of the exhaust gases reaching the collector is 180 degrees F. There is no data currently available to estimate the particulate load, but the design efficiency of the collector, as specified by the manufacturer, is 99.7%."

"Operating schedule

When full implementation is achieved, the process will operate 5 days/week, 16 hours/day.

Process Weight

The nominal operating capacity of the shot forming system is 38.4 tons/day. (14,016 tons per year) It is anticipated that the system will normally be operated at 60% of capacity. "

From EPA Toxic Release Inventory:

https://www3.epa.gov/enviro/facts/tri/ef-facilities/#/Release/49286RVNPR200IN

Go to link to see what the Company reported to EPA regarding releases of chromium, nickel and manganese into the environment dating back to 1996. The methodology that the Company used to estimate the amount of the releases is unknown.

"Generally, foundries produce 10 kg of dust per ton of molten metal, with a range of 5–30 kg/t, depending on factors such as scrap quality. However, induction furnaces (with emissions of 3 kg/t of molten metal) and flame ovens tend to have lower air emissions than cupolas and electric arc furnaces (EAF)." **(Note: 3 kg/t works out to 46.3 tons of potential dust using the Companies yearly melt rate assuming no control.)**

"Hexavalent chromium can be formed when performing "hot work" such as welding on stainless steel or melting chromium metal. In these situations the chromium is not originally hexavalent, but the high temperatures involved in the process result in oxidation that converts the chromium to a hexavalent state."

"For iron and steel foundries that produce low alloy metal castings, metal HAP emitted are primarily lead and manganese with smaller amounts of cadmium, chromium, and nickel. For iron and steel foundries that produce high alloy metal or stainless steel castings, metal HAP emissions of chromium and nickel can be significant."

Regulatory Applicability

PTI 954-91 is applicable to the melting and shot forming process with a baghouse. This includes the two induction melt furnaces that each has a rated capacity of 3 tons. Related charging, melting, forming and screening operations are also covered by this permit. (The Company refers to them as RSR1 A Induction Furnace (South) and RSR1 B Induction Furnace (North)).

The 2 melt furnaces are probably not subject to Subpart ZZZZZ due to the definition of what EPA considers a foundry.... https://www.law.cornell.edu/cfr/text/40/63.10880 "Iron and steel foundry means a facility or portion of a facility that melts scrap, ingot, and/or other forms of iron and/or steel and pours the resulting molten metal into molds to produce final or near final shape products for introduction into commerce. Research and development facilities, operations that only produce non-commercial castings, and operations associated with nonferrous metal production are not included in this definition." No mold pouring is done at this facility.

RSR2 West Induction Furnace 1000 pound capacity. (When under vacuum....exhaust goes through 2 oil separators. When in Open mode...most exhaust goes into a wet collector exhausted inside besides casting atmosphere which vents outside.) Exempt from Permitting per Rule 282(2)(a)(iv).

RSR2 East Induction Furnace 1000 pound capacity. (When under vacuum....exhaust goes through 2 oil separator. When in Open mode...most exhaust goes into a wet collector exhausted inside besides casting atmosphere which vents outside.) Exempt from Permitting per Rule 282(2)(a)(iv).

[Note: During the inspection, some smoke and/or water vapor was seen coming from the oil separator but it wasn't clear which it was.]

RSR3 Induction Furnace 400 pound capacity. Vents outside via oil separator except in Open mode when exhausts outside. Exempt from Permitting per Rule 282 (2)(a)(iv).

RSR2 Processing-MQ Annealer(1.2M BTU gas fired) that exhaust outside. Exempt from Permitting per Rule 282(2)(a)(i).

The following processes exempt per Rule 285(2)(l)(vi)

1) **RSR2 Vessel controlled by 4000 SCFM TRI-MER Wet Dust Collector that discharges inside.**

2) RSR2 Processing-Sieve and Package ("Powder Line") controlled by same wet dust collector.
3) CW-Sieve (Soft shot Screeners, CW Classifiers) controlled by Torit 84 dust collector exhausted inside.
4) CW-Vibe Finish (CW Swing Grinder) controlled by Dayton 7c487 dust collector exhausted inside.
5) CW-West Grind (CW Grinder) controlled by mobile Torit 84 dust collector exhausted inside.
6) Bldg. 907 Bullet Presses East (1 & 2) controlled by Torit 84 dust collector exhausted inside.
7) Bldg. 907 Bullet Presses West (3 & V) controlled by Tori 84 dust collector exhausted inside.
8) Bldg. 907 400 screeners and blenders controlled by Torit VS1200 collector exhausted inside.

Bldg. 907 Bullet Dryer that exhausts outside (36KW). Exempt per Rule 281 (2)(e).

Bldg. 907 Sintering FCE. Exempt per Rule 282(2)(a)(i).

CW1 Annealer (1.2 M BTU) exhaust outside. Exempt per Rule 282(2)(a)(i).

CW2 Annealer (1.2 M BTU) exhaust outside. Exempt per Rule 282(2)(a)(i).

CW Dryer(1.0 M BTU) controlled by 4000 SCFM Wet Collector that exhausts outside. Exempt per Rule 281 (2)(e).

Heat Treat Furnaces FCE 0, 1, 2, 3, 4, 5, 6, 7 all rated at 1.2M BTU that exhaust outside via 2 stacks. Exempt per Rule 281 (2)(a)(i).

Arrival & Facility Contact

Visible emissions or odors were not observed upon my approach to the Company's facility. I arrived at 10:10 AM, proceeded to the facility office to request access for an inspection, provided my identification and spoke with Tim Bakewell (TB) who handles the environmental program at the facility. I informed him of my intent to conduct a facility inspection and to review the various records as necessary. I was also introduced to Ryan Penterics (RP) who is the plant engineer for the facility. Early on, TB had to leave for an appointment so RP took over for the rest of the inspection. Both TB and RP extended their full cooperation and fully addressed my questions.

Pre-Inspection Meeting

TB outlined that the Company has 48 full time employees and plant is operating 24 hours a day, 7 days a week. Business levels are very high. (Note: There is a 28,000 square foot addition currently being added to the plant expected to be completed in May.)

TB listed the following product lines at the facility:

1) 400 Series stainless steel powder
2) 300 Series stainless steel powder
3) CSGS cast steel shotgun shot
4) Cutwire(CW) shotgun shot
5) Magnetic powder (Uses rare earth metals)
6) Frangible bullets (Copper, iron, glass) http://www.ervinindustries.com/ervin-technologies/innovative-products/frangible-bullets (Produced at the 907 Industrial Warehouse building)

TB indicated that the scrap steel all comes from Omni Source in Adrian. He described the scrap as being fairly clean with some caveats. All the scrap is considered to be high alloy content.

400 Series stainless steel is described as having 11 to 18% chromium content but no nickel.

300 Series stainless steel is described as having 18 to 30% chromium content with a nickel content of 6 to 20%.

Onsite Inspection

RP then conducted a tour of the facility. Required safety equipment included a hard hat, safety shoes, safety glasses, and hearing protection.

There are numerous processes at the facility controlled by a variety of wet scrubbers and dust collectors that vent both indoors and outside the facility. All the various processes are considered exempt from permitting and listed in the Regulatory Applicability section.

The 2 melts furnaces that are located on the third floor of the facility were inspected. (See attached photos.) One of them is tilted as it is being poured while the adjacent one next to it sits level. Video that shows smoke being generated when the lid is open was taken.

Both furnaces were in operation during the inspection. They are used in an alternating fashion with one that melts scrap steel over an hour period while the other pours over an hour period with the process being repeating every 2 hours. During the inspection, one was being poured and one was melting. They operate 24 hours a day with cleaning done once a week. Stainless steel scrap (300 to 400 Series) is charged to the furnaces via an overhead conveyor system. (Charging was not witnessed.). (Note: They have what appears to be separate dust collector located adjacent to the furnace room on the room accessed via a door. It is used only when they are getting ready to clean the furnaces as way to quickly cool down the furnaces and exhaust any emissions that are being generated outside. It was not examined closely.) See attached picture. It is rather small and located on the wall in the background next to the door that is partially obscured by a stack.

As was described in the original permit application, emissions are being captured by 360 degree collection rings surrounding each of the furnace lids and then transported to the inlet of the collector.

"Metal fumes and particulate which escape from the melting pots, are collected in the fume rings surrounding the furnace lids, and transported to the dust collector. The fumes and particulate are removed by the collector bags and accumulated for disposal. Particle size is estimated to range from 1 to 100 micron and estimated exhaust gas temperature reaching the collector is 180 degrees F. Design efficiency of the collector, as specified by the manufacturer, is 99.7%.)

As is typically the case, the highest concentrations of furnace emissions occur when the furnace lids and doors are opened during charging, back charging, alloying, oxygen lancing, slag removal and tapping operations. Some smoke was observed being generated during the pouring and also with the lid was open while the operators were performing some type of operation. The smoke rises up and exits via several general ventilation fans.

The dust collector that controls the 2 furnaces appears to be the same dust collector as described in the permit application. (See discussion about it in the Background section.) It is located outside the building and sits on the ground so that the stack is actually lower than the building height. (See attached photos.)

The pressure differential gauge is located inside the building and was reading 2". Normally it should operate in the 3 to 4" range. RP indicated that they have to change out approximately 25 bags in the dust collector (of the 240 total) every week as the pressure in the dust collector becomes excessive. He says condensation on the bags is the problem. (Note: This problem is usually caused by baghouse temperature below the dew point. Since the dust collector is located outside the building, it probably needs to be better insulated. A very detailed discussion about it and what could be done to resolve the issue can be found here: http://www.ceramicindustry.com/articles/83699-online-exclusive-controlling-moisture-in-dust-collectors) The frequent change out of bags is concerning as the filter efficiency of the newly replaced bags is much less than ones that have a filter cake built up upon them. A discussion about this issue is as follows:

"A fabric filter bag is not intended to be a filter, but rather a porous surface on which to develop a dust cake. The developed dust cake becomes the actual filter. When a baghouse has had a new fabric filter bag changeout and is placed back into service, airflow through the baghouse is at its greatest volume and velocity.

The initial onrush of dust and airflow through the baghouse and new filter bags are at such volumes and velocity that the dust particulate can penetrate the fabric filter surfaces instead of forming a dust cake on the surfaces, and, thereby, partially "blind" the new fabric filters. This partial "blinding" resists airflow, slowing down the velocity and allowing the dust to begin developing a dust cake on the fabric surfaces. But, by the time the fabric is starting to develop the proper dust cake, partial blinding of the fabric surfaces has decreased the potential airflow through the baghouse and, in most cases, remains in this condition until a changeout of new fabric filters occurs."

The bags are sent to the Carlton Farms Landfill. On at least one occasion, the bags were rejected due to high levels of chromium. Attached picture shows a large white bag full of waste bags from the dust collector.

It appears that they are being handled separately than the other trash. (See attached picture of dumpster.)

After the melt, the molten metal goes into atomizier then either through a 300 sieve or a 400 seive/blending process before the shot is ready for packaging. The 400 seive is controlled by a Torit dust collector that is discharged inside.

Recordkeeping/Permit Requirements Review

The day following the inspection, I sent the following email to TB & RP:

Ryan,

Per our conversation/my inspection of your facility today, the following is a request for information:

1) Copy of the Toxic Release Inventory that was completed for each of the last 5 years.

2) List of the names of all the melt furnaces, their capacity, when installed, description of their control device (if any), if exhausted outside; description of associated stack.

3)The total monthly amount of material melted sorted by individual furnaces for the last 12 months ending January 31, 2017.

4)Identity/quantities of all the materials that are melted in each furnace by month for the last 12 months.

5) MSDS's for all the materials that are melted in melt furnaces.

6)Description of process that makes the magnetic powder, the MSDS's associated with it, the quantities processes etc., description of control devices/stacks.

7)SCFM rating of the main dust collector associated with the 2 large melt furnaces.

8) Complete description of the air emission capture system for the 2 large melt furnaces.

9) Identify all the dust collectors at the facility, and what each process they control, if exhausted outdoors or indoors... Identify if they have a pressure drop gauge and if so what the proper operating range is, and SCFM for all dust collectors that exhaust outside.

10) Identify all the "wet" dust collectors at the facility, and what they control. Identify the associated water flow rate and proper pressure drop range.

12) Identify all air emission exhaust stacks at the facility that either go out the roof or the side of the building and what process they are associated with (Include 902 building)

13) Provide process flow diagram of whole process(es).

14) MSDS for the powder "lube" that goes through the sintering furnace and how much of it that used on a monthly basis.

15) Names/descriptions/sizes of all the heat treat furnaces and dryers.

I understand that will take some time to put together. Please give me an update around Tuesday next week on where you are at and how long you think it will take to compile/email me the information. Note: My early read on federal regulations is that you are subject to this requirement:
https://www.law.cornell.edu/cfr/text/40/part-63/subpart-ZZZZZ

In the meantime, let me know if you have any questions. FYI...Thanks for your full corporation during today's inspection. Much appreciated!

I received the following reply:

"Mike,

We will be able to provide you with the information you have requested. Due to the amount of information it will take some time to assemble and organize. We are also considering bringing in some outside help to assist us with your request.

You will have all the information by 3/30/17, please let me know if this is acceptable.

Regards,

Ryan Penterics

Plant Engineer"

On March 29, 2017 received this:

Mike,

Attached are answers for the remainder of your questions. I sent this to your personal email as well as your DEQ address in hopes that the attachments are received on the first try. This will be one of several emails to include all the attachments.

One thing to note:

Our other building is the 907 building – not 902

Attachments:

ETech Control Devices Process Flows and Materials Melted rev 4 (should answer 2, 3, 4, 7, 8, 9, 10, 13, 15)

R1 Control Devices (Includes complete description of air emission capture system for the 2 large melt furnaces)

R1 Material melted (2 large furnaces)

R2 Control Devices

R1 Material melted (2 small furnaces - vacuum)

R3 Control Devices

R3 Material melted (R&D - 1 small furnaces - vacuum)

Processing Control Devices

CW Control Devices

907 (Bullets) Control Devices

Bullet Lube Used

Inside Discharge Control Devices

Building drawing 220000D emissions (question 12)

Question 6 is answered in the other sheet (R2 Control Devices, R2 Material melted (2 smaller furnaces – vacuum))

SDS information (question 5) (SDS information is not readily available for scrap that is melted)

Thanks,

Ryan Penterics"

Attachment (2) includes all the MSDS for the various compounds used at the facility. (Confidential)

Of the compounds listed in the MSDS's, ferrochromium, chromium, nickel, niobium and cobalt are potential air emission concerns.

Attachment (3) includes all the other attachments that RP included in his submittals. (Confidential)

Material reviewed was sufficient to show that all but the originally permitted melt furnaces are exempt from permitting.

Attachment (4) is the final submittal from RP that lab analysis of samples from several different induction furnace melts both before and after they added additional alloys to meet their specifications for a particular product. (Confidential).

In general, chromium levels in the melt were measured to be 18%, nickel at about 8%, manganese at around 1%, and other metals in trace amounts.

MAERS Review: A consultant for the Company just prepared their first MAERS submittal. They reported minimal emissions in 2016. Much of the processes at the facility are exempt from reporting.

Post-Inspection Meeting

I held a brief post-inspection meeting with RP. I indicated that I would be following up with email to him to request additional information. I indicated that I had concerns that changes have occurred since the original permit was issued that would require new permitting. I also indicated I would need to see if there are any federal regulations that are potentially applicable. I thanked RP for his time and cooperation, and I departed the facility at approximately 12:05 PM.

Compliance Summary

The Company is out of compliance with PTI 954-91 Special Condition #18 which reads as follows:

"Applicant shall not substitute any raw materials for those described in this permit application which would result in an appreciable change in the quality or any appreciable increase in the quantity of the emission of an air contaminant without prior notification to and approval by the Air Quality Division."

The original permit application stated the following:

"...the raw materials used in the process contain only trace quantities of materials that be considered hazardous (silica and manganese are most commonly associated with the process), therefore no significant quantities of toxic substance are anticipated in the process emissions...no Hazardous Air Pollutants would be reasonably expected in the process exhaust.".

The inspection confirmed that the Company now uses high alloy steel in their melt that was measured to contain up to 18% chromium and 8% nickel. The melt temperature exceeds 3000 degrees F which results in the emission of metal oxides that include nickel and chromium. Furthermore, chromium has been confirmed at significant levels in the bags in the baghouse dust collector that controls the process. It is noted that although the dust collector is rated at a very high efficiency at capturing metal oxides, visual observations suggest that capture of the emissions from the furnaces prior to the control device is no better than 90%. Chromium oxides, Hexavalent chrome, and nickel emissions all represent a meaningful change to emissions.

A Violation Notice (VN) will be sent to the Company that outlines this alleged violation.

There is also an area of concern that will be included in the VN. The Company indicated that they have to change out approximately 25 bags in the dust collector (of the 240 total) every week as the pressure in the dust collector becomes excessive due to plugging. This problem can reduce the efficiency of the collector. The Company will be asked to further investigate this issue and propose a solution.

Image 1(aerial photo) : aerial photo

Image 2(aerial photo-stacks) : Aerial photo that the Company has added the location of the stacks.

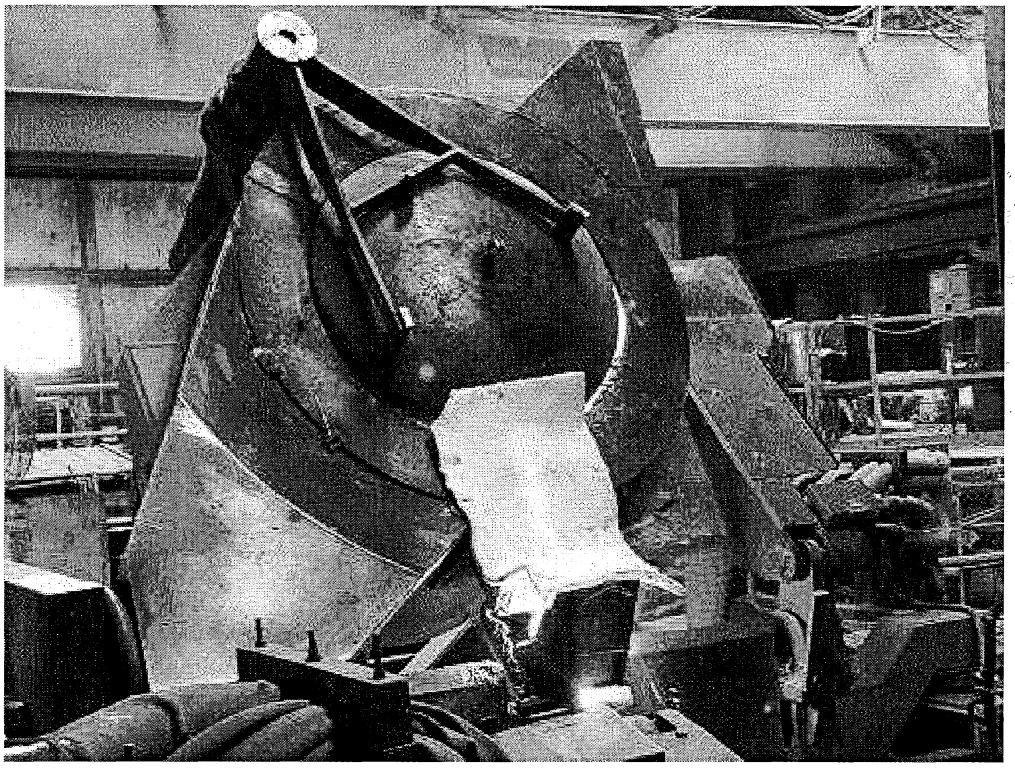

Image 3(furnace pouring) : Photo shows one of the induction melt furnaces pouring.

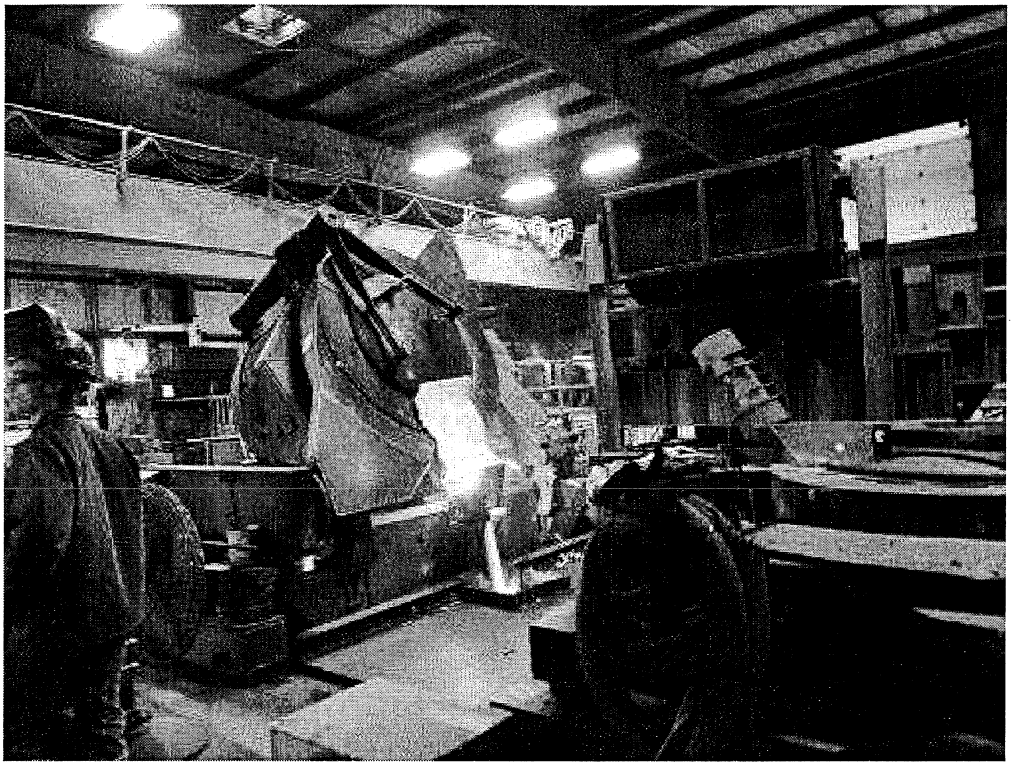

Image 4(furnace pouring) : Another furnace pouring photo

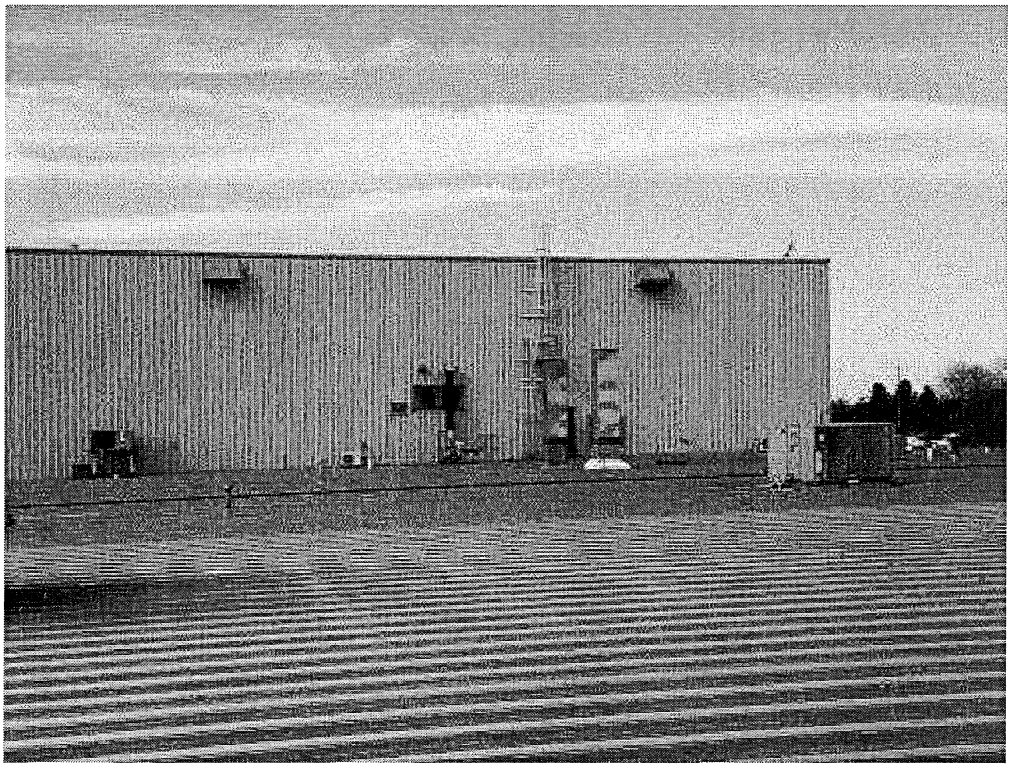

Image 5(Roof photo) : Roof photo looking towards building that houses the melt furnaces. A small bag house is located next to the door and is partially obscured.

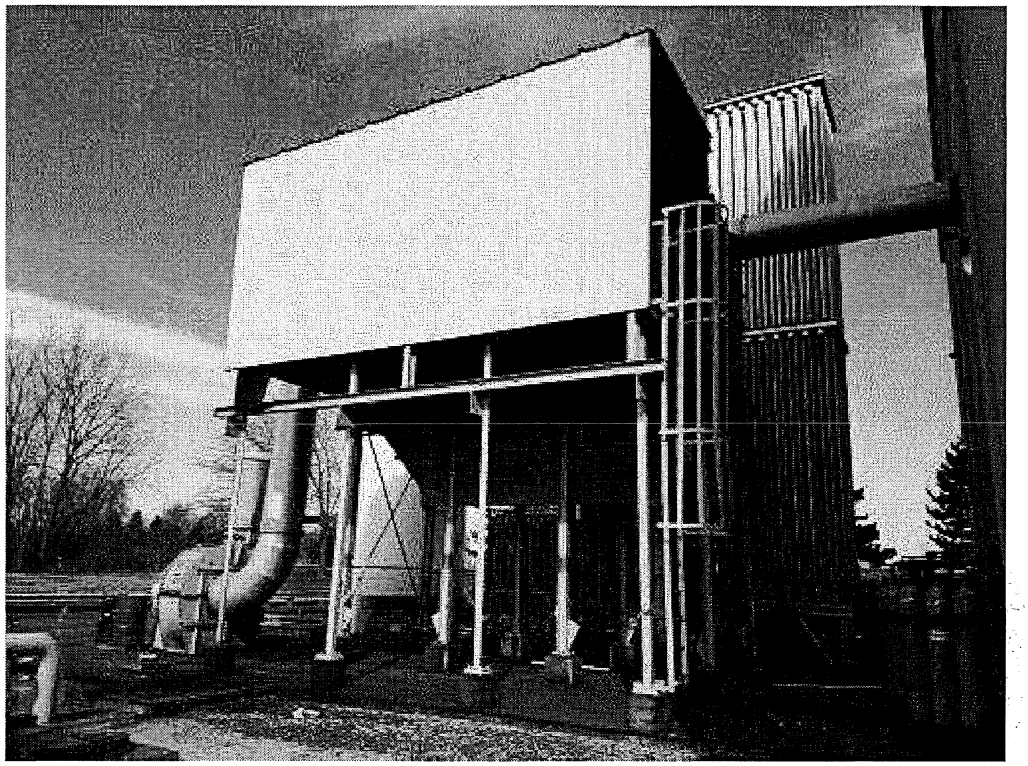

Image 6(main dust collector) : Main dust collector for furnaces. Stack exhaust can be seen on the ground to the left of the collector.

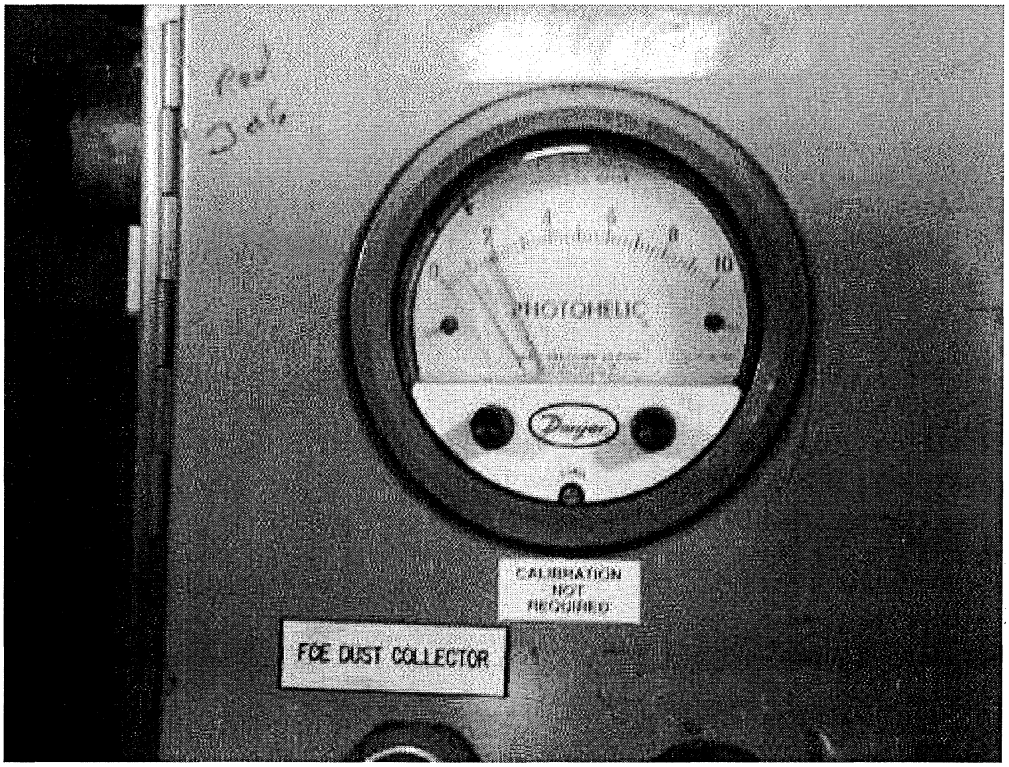

Image 7(pressure gauge) : Pressure gauge for main dust collector

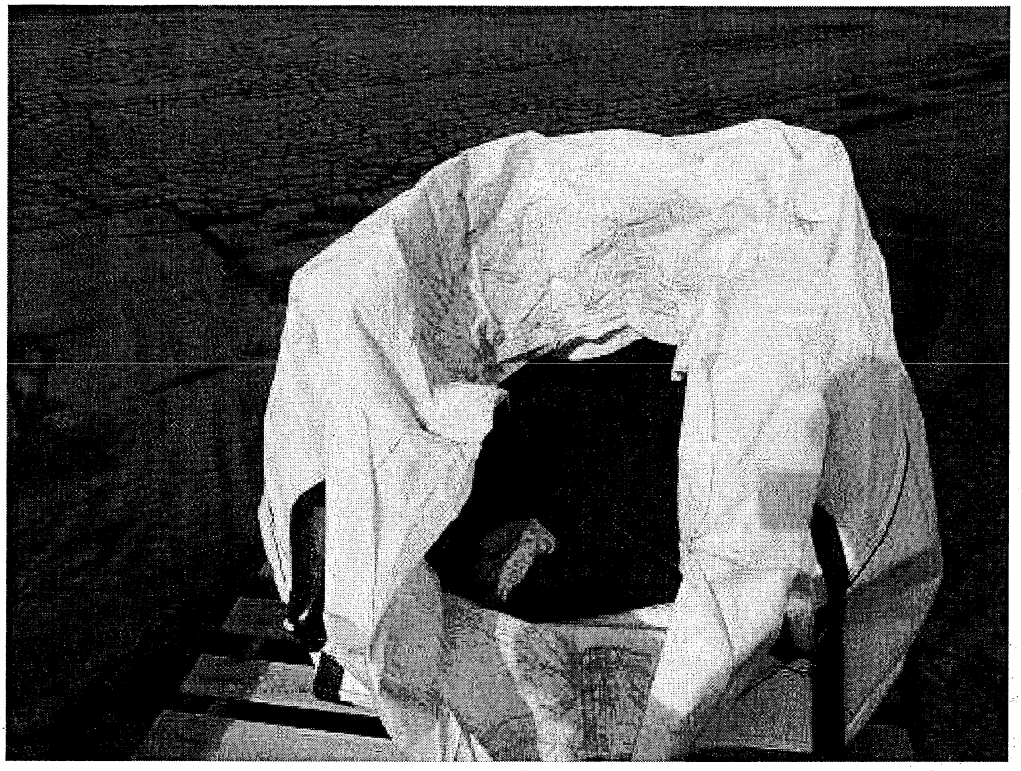

Image 8(waste bags) : Large bag containing used dust collector bags.

Image 9(dumpster) : Dumpster containing waste from the facility.

NAME M. Kowalchuk DATE 4/10/2017 SUPERVISOR