FY2015 Insp-

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

U6310018630885

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|---|---|---|
| FACILITY: IPG Photonics Corporation | | SRN / ID: U63100186 |
| LOCATION: 46695 Magellan Drive, Novi | | DISTRICT: Southeast Michigan |
| CITY: Novi | | COUNTY: OAKLAND |
| CONTACT: | | ACTIVITY DATE: 08/26/2015 |
| STAFF: Iranna Konanahalli | COMPLIANCE STATUS: Compliance | SOURCE CLASS: |
| SUBJECT: FY 2015 inspection of IPG Photonics | | |
| RESOLVED COMPLAINTS: | | |

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**IPG Photonics (U-63-10-0186)**
**46695 Magellan Dr.**
**Novi, Michigan 48377-2442**

**Rule 336.1285(l) particulate source with settling baffles**

On August 26, 2015, I conducted a level-2 self-initiated inspection of IPG Photonics ("Photonics"), laser equipment testing, sales, demonstration, service, etc. company for its manufacturing facility in Oxford, Massachusetts, 46695 Magellan Dr., Novi, Michigan 48377-2442. The inspection was conducted to determine compliance with the Federal Clean Air Act; Article II, Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act, 1994 (PA 451); and Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) administrative rules.

During the FY2015 inspection, Mr. Kevin Canali (Phone: 248-863-5001; Fax: 248-863-5003; Cell: 248-807-4814; E-mail: kCanali@ipgPhotonics.com), Laser Applications Engineer, and Mr. Mike Klos (Phone: 248-863-5001 Cell: 248-660-5131; Fax: 248-863-5003; E-mail: mKlos@ipgPhotonics.com), General Manager, Midwest Operations, assisted me.

Photonics, founded in 1990 in Oxford, Massachusetts, is provider of high power fiber lasers and fiber amplifiers. The lasers are used in materials processing, micromachining, telecommunications, medical, industrial, military, aerospace, etc. applications. Photonics deals in broad variety of fiber lasers: fiber lasers, fiber amplifiers, diode lasers, etc.

Most laser systems are rated 4 kW. At Photonics, 100 kW lasers are produced as well. Industrial lasers are used for cutting, welding, marking, ablation (removing surface materials), heat-treating, etc. purposes. High power fiber laser increases welding, cutting, etc. speeds.

**Abrasive-cutting**

One traditional abrasive-cutting equipment (not laser based) is present. It is totally enclosed and the particulate emissions are captured and removed by water based cooling liquid. All emissions are released to in-plant environment.

The machine is exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(l).

**Remote and fixed robotic welding rooms (2)**

Two (2) remote (1) and fixed (1) robotic welding rooms are present. Two rooms are equipped with one common baffled (Stoke's law gravity settling) particulate control device. The emissions after control are released to ambient air. All welding is on demonstration / testing scale.

The robotic welding (remote and fixed head) machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(l).

**Hybrid head robotic welding and laser cutting rooms (2)**

Hybrid head robotic welding (1) and laser cutting (1) rooms (2) are equipped with one common baffled (Stoke's law gravity settling) particulate control device. The emissions after control are released to ambient air. All welding and cutting is on demonstration scale.

The machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(l).

**Laser engraver room**

One laser engraver room is present. The laser engraver room is equipped with baffled (Stoke's law gravity settling) particulate control device. The emissions after control are released to ambient air. All engraving is on demonstration / testing scale.

The machines are exempt from Rule 336.1201 (Permit-to-Install) pursuant to Rule 336.1285(l).

Stoke's law gravity settling, involving gravitational forces, buoyancy, drag forces in laminar fluid (Reynolds number, drag coefficient), viscosity, etc. in a baffled chambers is significantly less effective than cyclone to collect particulate matter. It may be considered that emissions are from non-production (testing, demo, etc.) process. A cyclone depends upon induced centrifugal forces on particles for collection when dust laden gas enters tangentially at the top. While centripetal forces are acting in the direction of center along the radius, centrifugal forces are inertial forces which a cyclone depends upon. At high tangential velocities, outward forces on a particle are many times the force of gravity; hence cyclone is much effective device than just gravity settling. However, both are less effective as particle size decreases (fine particles).

**Pleated filters for each room**

In addition, all rooms are equipped with pleated (increases surface area and hence reducing pressure drop for a given flow rate) filter particulate control system. Each system is equipped with an inclined manometer to determine pressure drop (ΔP) across filters. Each filter system provides additional worker protection from fine metallic particles. I explained to Messrs. Canali and Klos that ΔP can be used as a guide for filter change.

One chemical handling hood is present. Small quantity, lab-scale solvents are handled using this hood. Emissions are released to outside ambient air. Beside this hood, one chemical storage compartment is present for solvents and reagents: toluene, acetone, IPA, etc.

**Conclusion**

Photonics is particulate emissions source due to laser welding, cutting, ablation on non-production scale.

NAME I S Ilenanahall. DATE 08/31/2015 SUPERVISOR CJE