

TECHNICAL SUPPORT DOCUMENT (TSD)

APRIL 2015

I. GENERAL COMMENTS:

A. Company Information

Business Name: Materion Ceramics Inc.

Facility Address: 6100 S. Tucson Blvd, Tucson, Arizona 85706

Mailing Address Same as Facility Address

B. Background

Materion Ceramics Inc. (MCI) submitted an application for renewal of the air quality permit on May 2, 2011. The permit was deemed administratively complete on May 25, 2011. The MCI beryllium fabrication plant processes beryllium oxide powder in producing ceramic components used in the integrated circuit electronics industry. The facility is required to obtain an air quality permit due to being subject to the National Emission Standard for Hazardous Air Pollutants (NESHAPS) for Beryllium (40 CFR 61, Subparts A and C) which prohibits the emission of more than 10 grams of beryllium over a 24 hour period. It is important to note that the 10 - gram limit includes both fugitive and non-fugitive emissions. This TSD supports the permit written as a result of the renewal application and subsequent significant revision submitted in July 2014 to include a qualitative monitoring system for the pollution control equipment in operation.

Solvents, acids, and bleaches are used at the facility as cleaning agents and binders but none in sufficient quantities to trigger permitting thresholds. Several pieces of fossil fueled fired equipment are used at the facility for purposes of material prep, heating water and temperature control for the facility.

The permit was previously revised on July 22, 2010 to add an Aqua Regia Cleaning Station which is unrelated to Beryllium emissions. The cleaning station is subject to local standards only under Standards of Performance for Unclassified Sources. There are no emission limits that this station is subject to and there are no other NSPS or MACT standards applicable to any operations at the facility. There are applicable Pima County SIP rules (primarily for fugitive dust control) and applicable county rules (fugitive dust and fossil fuel fired commercial and industrial equipment). The Control Officer has determined that the SIP rule governing the 40% opacity limit will be incorporated within the permit even though operations at the MCI facility are not of the nature for which an opacity limit is meaningful. The opacity limit in rule is so high that any violation of the opacity limit would have been preceded by a violation of the NESHAP standard.

Materion is evaluating other products and markets. One such product currently under R&D is a cadmium metal matrix used in the manufacture of solar equipment.

Materion has received approval from the Administrator (see EPA Letter to PDEQ dated September 3, 1992) to modify EPA Test Method 103 or 104 to include the use of an in-stack filter as described in EPA Test Method 17. This approved testing change allows the filter to be sealed immediately after the test and shipped to the laboratory for analysis. It eliminates the testing site cleaning of the probe which may be more conducive to errors. The letter from EPA to PDEQ is dated September 3, 1992 and is attached as Appendix I at the end of the technical support document.

II. FACILITY DESCRIPTION

A. Process Description

Beryllium process

The process begins in the material preparation area. The UOX powder received goes through various steps which include introducing additives and binders in preparation for the forming process. After the powder is placed in containers, it is transported to three forming production areas. Dry Pressing is used in the Pressing area, Extrusion in the Extrusion area and iso-pressing in the Lasers area.

Pressing Area

Using a variety of mechanical or hydraulic presses, parts are formed in the pressing area after which they are placed in kilns for firing. If required, any final machining to reach customer specifications is performed and the parts cleaned, inspected and packaged for stock or shipping.

Extrusion Area

An extrusion press is used to form varying rod products. Similar to the pressing area process, parts are placed in kilns for firing upon which any required final machining to customer specifications is performed. Parts are then cleaned, inspected and packaged for stock or shipping.

Lasers Area

This area uses an ISO Static press (Iso-press) to form cylindrical, square or rectangular shapes. The next step termed “green machining”, is a rough machining of unfired cylindrical parts after the forming process. The parts are then placed in kilns for firing. Required final machining to customer specifications is performed following firing. Other shapes that are Iso-pressed are typically fired first and then sent for final machining operations. The parts are finally cleaned, inspected and sent for either metallizing or packaged for stock or shipping.

Metallization can include roll-coating, spraying or screen printing of a moly manganese base coat onto the parts. Parts are then fired in hydrogen atmosphere furnaces. Parts that require nickel plating are then taken through an electrolytic process. The final step for these parts is cleaning, inspection and packaging in preparation for delivery to the customer.

Cadmium/ Tin Process

In the Cadmium/ Tin process, powder is formed and machined for the purposes of delivery to the customer. This process is in the new product development stage and is therefore still under Research & Development (R&D).

B. Air Pollution Control Equipment

All manufacturing or support operations with the potential to generate airborne beryllium containing particulate are included in a facility-wide dust collection system. This system includes four separate subsystems identified as air pollution control equipment at the facility and includes:

- a 15K cfm dust collecting system consisting of a 60 Cartridge filter unit and a High Efficiency Particulate Air (HEPA) triple stage final filter house;
- a 40K cfm dust collecting system consisting of two Farr 80 filter units and a HEPA double stage final filter house;
- a Torit 7K cfm triple stage HEPA filtered dust collecting system and;
- a 6.5K EF-1 Air (HEPA) filtration system.

All four subsystems combine and are routed to a single stack to be exhausted. Production operations that would involve the potential emissions of beryllium either utilize wet methods and are completely enclosed (hooded) or use a high vacuum pick-up sweep at the point of operation for capture of beryllium containing particulate material. Airflow from the four subsystems is routed to one of the air pollution control units for removal by filtration. There are several cleaning air showers at the facility. The exhausted air from these units is either HEPA filtered outside the building or have self-contained HEPA filters within the unit. In either case, exhaust air ultimately is vented through the control systems before being released to the ambient air.

1. Vents and Exhaust Fans Emission Control

Materion has identified several "building penetrations" (i.e., exhaust or intake vents that are not routed to any control system) that exist at the facility. These exhaust/intake vents fall into seven main categories:

- Powered Exhaust Fans in Production Areas
- Powered Exhaust Fans in Non-Production Areas
- Relief Vents in Production Areas
- Relief Vents in Non-Production Areas
- Gas Vents from Area Heaters in Production Areas
- Gas Vents from Area Heaters in Non-Production Areas
- Make-Up Air Intakes

Of these seven main categories of "building penetrations", the category of most concern is the powered exhaust fans in production areas. The powered exhaust fans in the production areas, which are all mounted in or near the building roof, have the greatest potential to contribute to fugitive emissions. Twelve of these vents were identified in the MCI letter dated February 28, 2001.

The facility operates a qualitative monitoring system for the pollution control equipment in operation. MCI has installed particle probes to provide continuous monitoring for particulates that may be present in the exhaust air that passes in between the primary filters and the final filters on the four (4) systems. The particle probes monitor the combined exhaust air from all systems prior to being discharged to the ambient air.

A base station has been installed with capabilities of monitoring pre-set alarms for notification and response purposes. The alarm levels have been established to be indicative of a primary filter failure. A diagram of the pollution control equipment and the location of the particle detector probes is provided in Attachment 3 of this permit

III. REGULATORY HISTORY

A. Testing & Inspections

Testing and inspections have occurred regularly and there have been no reports of exceedances or violations recorded in the last permit term. Since the four subsystems are routed to a single stack, it allows the use of standard stack testing methods using EPA Method 103. Materion obtained EPA approval to modify the test to include an in-stack filter in order to provide more efficient sample collection. The last inspection was conducted on 8/22/11 and the facility was found in compliance.

Vent & Exhaust Testing

Historical records show that when the plant was originally built in 1979 and 1980, some vents were tested. The Control Officer required Materion to test for beryllium emissions from other vents as they were located in the production area. Of the twelve vents, five were selected to be tested based upon stack configuration, production area vented, and potential for emissions. Such tests, using EPA Test Methods 1 through 4 and 104, were conducted on May 23, 2001 and on May 29, 2001. Test results showed non-detect levels of beryllium using the analytical method, effectively zero emissions from the vents.

In the previous TSD, a hypothetical number using the detection limit of 0.145 grams of beryllium per 24-hour period from tested vents was used to estimate the potential to emit (PTE) from all the vents (tested and untested). This led to a number of 0.4 grams of beryllium per 24-hour period. This methodology was revisited following public comment during the renewal permit process. Upon further review, the Control Officer has determined that this methodology is erroneous and misleading. Testing of the vents completed by reputable testing companies in 2001 and 2010 has shown non-detect levels of beryllium emissions and these are the actual results from the vents and not the hypothetical number of 0.4 grams of beryllium per 24-hr period.

Concurrent with the 2001 testing of the exterior vents, indoor sampling was conducted in the production areas using NIOSH Methods 7102 and 7300 in an attempt to determine a relationship between concentrations of beryllium in the production areas and the amount of beryllium exhausted through the uncontrolled vents, even though no powered exhaust vents are located in rooms where beryllium powder is used. Indoor sampling results (nine samples taken at normal production levels, or 4 to 6 feet above floor level) yielded beryllium concentration values that ranged from 0.0502 μg per m^3 of sampled air at the low end to 0.0573 μg per m^3 of sampled air at the high end. Although no exact quantitative relationship between indoor beryllium concentrations and outdoor beryllium vent exhaust amounts could be derived because of differences in the test methods, a qualitative appraisal suggests that the indoor and outdoor results are reasonably consistent. This qualitative relationship is important because indoor sampling is conducted and recorded much more frequently than the exterior testing. Thus if indoor sampling conducted on a more frequent basis consistently shows minute beryllium concentrations, there will consistently be non-detect emissions at all vents based on non-detect vent testing results.

It is unlikely for beryllium to be emitted from the powered exhaust vents (as demonstrated by the testing in 2001 and 2010) as there are no powered exhaust vents located in rooms where beryllium powder is used. However, the Control Officer believes it is appropriate for MCI to maintain internal operating procedures that would require MCI staff shutting down the powered exhaust fans in affected production areas as one of the first actions taken in the event of a beryllium powder spill in any of these rooms. The permit contains permit conditions requiring the Permittee to follow these procedures.

PDEQ does not require periodic testing of the powered exhaust vents in these areas since there are no beryllium forming or machining processes in these areas. The firing rooms where vents 1-7 are located contain kilns where products are already formed and no beryllium oxide powder is used. The room where lapping is performed is a self-contained room in firing room #2 with its own air intake and air handler that is HEPA filtered and does not affect vents 2 and 3.

The lapping room designation is used to identify the approximate location of these two vents and not the rooms they draw air from. The affected room contains electric furnaces that do not affect the lapping room itself. Lapping is performed in a self-contained room within the room containing the kiln(s). This was verified by PDEQ permitting staff during a physical inspection completed on September 17, 2012.

Based on the above, it is highly unlikely that there will be any beryllium emissions found in these exhaust vents. The powered exhaust vents are in place to reduce the heat loading from the electric furnaces in these areas. Materion is required to perform weekly inspections of the powered vents, as well as doorways, outside duct work, and pollution control devices for any maintenance needs or evidence of beryllium emissions.

In addition to the monitoring requirements, should a powder spill occur Materion is also required, by the permit, to immediately activate a beryllium oxide spill response plan and isolate the area, turn off any powered exhaust vents that may be located in adjacent rooms, thoroughly clean the affected area, follow thorough decontamination procedures and document the spill in the facility Incident Management System.

These and other internal procedures not highlighted in the permit all ensure that no emissions of beryllium will occur at the vents and have been followed for numerous years now.

B. Permit Deviation Reports

There has been one report of a deviation submitted in the last permit term by Materion. The deviation was as a result of a communication error in failing to record photohelic gauge readings for pollution control systems as required by the permit. Materion reported that all systems were operating normally on that day.

IV. EMISSION ESTIMATES

A. Facility Wide Estimates

Source information for the Potential to Emit Summary tables is taken from the Materion application submitted for the renewal. Applications submitted February 21, 1995, and the Materion letter to PDEQ dated January 4, 1996 have also been reviewed for completeness and any changes to the summary tables has been reviewed and approved by PDEQ.

1. Beryllium oxide operations - Character of Emissions: Controlled Non-Fugitive.

Materion operations include pressing, firing, drilling, grinding, milling, abrading, and otherwise shaping of BeO material. There are no emission factors in AP-42, the EPA's FIRE database, or in any other document researched by PDEQ. The PTE for beryllium operations will default to the federal standard for beryllium (40 CFR Part 61, Subpart C). That standard is set at no more than 10 grams of beryllium over a 24-hour period (0.004 Tons per Year) and does not distinguish between fugitive and non-fugitive emissions.

2. Natural Gas Fuel Fired Equipment - Character of Emissions: Uncontrolled Non-Fugitive.

Materion has several pieces of natural gas burning equipment on site. The two largest are the Ajax boiler (rated at 3,000,000 BTU per hour) and the Bryan boiler (rated at 1,500,000 Btu per hour). Other equipment is individually rated at well below 1,000,000 Btu per hour each and is not required to be permitted pursuant to PCC 17.12.140.B.3.c. Emission estimates are based on the emission factors in AP-42 Tables 1.4-1 through 1.4-4 (7/98 version). Estimates are based on uncontrolled, continuous firing for 8760 hours per year for the current equipment list in the permit for the facility.

Natural Gas Fuel Fired Equipment	
Pollutant	Tons per Year
Nitrogen Oxides	1.9
Carbon Monoxide	1.6
Sulfur Dioxide	0.012
Particulate Matter*	0.15
Volatile Organic Compounds	0.11
Lead	0.00001
Hazardous Air Pollutants	0.04

*Assumes all particulate emissions are PM₁₀

3. Solvent Operations - Character of Emissions: Controlled and uncontrolled non-fugitive.

Materion uses different types of solvents in its operations as both cleaning and binding agents. The VOC emissions worksheet in the application lists total VOC emissions rate of 2.5 lb per hour for solvent-using operations. Not all of the operations have identical annual operating hours. For potential to emit (PTE) estimates, all operations are assumed to operate the maximum 8760 hours per year.

$$PTE_{VOC} = 2.5 \text{ lb/hr} \times 8760 \text{ hr/yr} \times 1 \text{ ton}/2000 \text{ lb} = 10.95 \text{ tpy.}$$

4. Hazardous Air Pollutants - Character of Emissions: Generally controlled non-fugitive.

There are three processes where hazardous air pollutants are emitted during facility operations. Beryllium is emitted during numerous operations involving the production of the ceramic components, the natural gas fuel fired equipment contains negligible HAPs in its combustion flue gases. Some Nickel is emitted in the nickel plating operation, and a small amount of HCL is emitted in the plating and cleaning processes. HAP emissions from the beryllium and combustion flue gas are accounted for in IV.A.1 & 2 of the TSD.

$$PTE_{\text{xylene}} = 0.011 \text{ lb/hr} \times 8760 \text{ hr/yr} \times 1 \text{ ton}/2000 \text{ lb} = 0.05 \text{ tpy}$$

$$PTE_{Ni} = 2.07 \times 10^{-7} \text{ lb/hr} \times 8760 \text{ hr/yr} \times 1 \text{ ton}/2000 \text{ lb} = 9.1 \text{ E-7 tpy}$$

$$PTE_{HCl} = 0.0093 \text{ lb/hr} \times 8760 \text{ hr/yr} \times 1 \text{ ton}/2000 \text{ lb} = 0.04 \text{ tpy}$$

B. Potential-to-Emit Summary

The following table of emission estimates represents Materion’s potential to emit for the facility.

Table I – Potential to Emit

POTENTIAL TO EMIT SUMMARY (TONS PER YEAR)	
Beryllium	0.004
Nitrogen Oxides (NOx)	1.9
Carbon Monoxide (CO)	1.6
Sulfur Dioxide (SOx)	0.012
Particulate Matter (as PM ₁₀ and not including HAPs)	0.15
Volatile Organic Compounds (VOC including HAPs)	11.1
Lead	0.00001
Xylene	0.05
Nickel	9.1E-7
Hydrogen Chloride	0.04
Total HAPs	0.13

Based on the potential to emit estimates in the above table and the control equipment required to maintain the 10-gram beryllium standard, Materion is a Class II synthetic minor source of both PM₁₀ and HAP emissions and a true minor source of all other pollutants. The facility is a Class II facility due to being subject to 40 CFR Part 61 – Subpart C National Emission Standard for Beryllium.

V. APPLICABLE REQUIREMENTS

A. Code of Federal Regulations (CFR):

40 CFR 61 Subpart C National Emission Standard for Beryllium

B. Pima County Code (PCC) Title 17, Chapter 17.12 & 17.16:

Materion is also subject to local (Pima County) air pollution emission standards. The specific Pima County conditions applicable to Materion are identified below:

- 17.12.185.A.2 Local Rules and Standards – Applicability of More than One Standard
- 17.16.010 Local Rules and Standards – Applicability of More than One Standard
- 17.16.020 Noncompliance with Applicable Standards
- 17.16.040 Visible Emission Standards: Standards and applicability (Include NESHAP)
- 17.16.050.D Visibility Limiting Standards
- 17.16.060 Fugitive Dust Producing Activities
- 17.16.090 Roads and Streets
- 17.16.100 Particulate Materials
- 17.16.110 Storage Piles
- 17.16.165 Standards of Performance for Fossil-Fuel Fired Industrial and Commercial Equipment
- 17.16.360 Standards of Performance for Nonferrous Metals Industry Sources
- 17.16.430 Standards of Performance for Unclassified Sources
- 17.16.530 National Emission Standards for Hazardous Air Pollutants

C. Pima County State Implementation Plan – SIP Rule:

SIP Rule 343 Fugitive Dust Producing Activities

VI. PERMIT CONTENTS

The following section of the TSD refers to the specific conditions of the permit and explains in detail why the permit was written as presented.

PART B: BERYLLIUM PROCESSING SPECIFIC CONDITIONS

A. Applicability:

Materion is subject to federal National Emission Standard for Hazardous Air Pollutant (NESHAP) under 40 CFR Subpart 61 National Emission Standard for Beryllium. The standard limits beryllium emissions from the stack to 10 grams per 24 hour period. The subpart lists ceramic plants and machine shops processing beryllium and beryllium oxide as subject to the standard. Since Materion operates both a ceramic plant and a machine shop that performs cutting, grinding, turning, milling and lapping.

The federal standard does not require that sources direct all emissions to the stack. PDEQ has required that Materion direct emissions from all operations that have the slightest potential for beryllium release to the stack. The 10 grams per 24 hour period is measured at the stack to include all emissions from all processes. It is important to note that Materion has had non-detect test results for beryllium emissions throughout the last permit term. This means that Materion’s beryllium emissions are so low that the monitors used for measurement cannot pick up any emissions at the lowest measurable level of the instrument.

B. Emission Limitations, Standards and Operational Requirements:

II.A & II.B of Part B

Federal emission limit for beryllium emissions. The 10 grams limit over a 24-hour period. II.B is a federal requirement for Materion to install, operate and maintain air pollution control equipment (APC and the qualitative beryllium monitoring system) listed in II.B 1 – 6.

II.C of Part B

Condition ensures that Permittee only emits beryllium emissions from any operations using methods allowed by the permit. The only method allowed by the permit is directing all emissions to the stack through the air pollution control equipment. As additional preventative measures, the Permittee is required to follow approved emissions prevention plans approved by the Control Officer.

II.D of Part B

The Permittee is prohibited from allowing any beryllium emissions when changing the filters or collector drums on any APC identified in the permit. Approved operation and maintenance procedures are required to be followed during these change-outs. A requirement to obtain approval for any changes to these procedures is included in II.F of Part B.

II.E of Part B

The Permittee is required to set the max alarm level that is below the applicable emission standard in II.A of the permit. This alarm level has been set to no greater than 75% of the standard.

II.F. of Part B

A requirement to obtain approval for any changes to these procedures is included in II.F of Part B.

II.G of Part B

Whenever there is a potential that Beryllium or beryllium containing compounds will be emitted from any operation, the Permittee is required to operate APC and PMS at all times. In the event of PMS failure, the Permittee may continue to operate the facility while repairs to the PMS are made.

II.H of Part B

Standard Pima County SIP Rule and Pima County Code regulation that prohibits Materion from having any type of visible emissions, whether point or fugitive dust beyond the property boundary line. The Permittee is required to use all reasonably necessary and feasible precautions in order to achieve this.

II.I of Part B

This federal condition requires Materion to maintain and operate the facility and all associated equipment in a manner that demonstrates good air pollution control practices to minimize emissions. The Permittee needs to keep records and information that demonstrates to the Control Officer that acceptable operating and maintenance procedures were used to minimize emissions.

II.J of Part B

Federal requirement prohibits the Permittee from using any methods, equipment or gaseous, to conceal or dilute emissions that would cause a violation of a standard. The Permittee is also prohibited from operating in a manner that would avoid coverage by a standard that would apply to larger operations.

II.K of Part B

A general local requirement that specifies the authority, if necessary, for the Control Officer to require the Permittee install abatement equipment or alteration of the stack or any outlet such that discharge to adjoining property is eliminated or reduced to prevent a violation of any standards.

II.L, M, N & V.D of Part B

This formula sets a limit for the allowable emissions of particulate matter allowed by Pima County Code for any fuel burning equipment such as boilers and heaters at the facility. Even when operating at maximum capacity, the Permittee is always in compliance with this standard and will never emit quantities allowed by this formula. This is because potential emissions using manufacturer or AP-42 emission factors are more than ten times lower than the allowable emissions in this standard. Based on this fact, the Permittee is not required to show compliance with this standard. The following chart demonstrates this fact. Condition M prevents the Permittee from using any fuel in this equipment other than natural gas. As the graph shows, with the allowable emissions much higher than the most conservative emission factors, there is no requirement for Materion to perform any testing to show compliance with the particulate matter standard

Figure 2

Comparison of Emissions of PM-10 for Boilers: PCC Allowable vs AP-42 Estimated

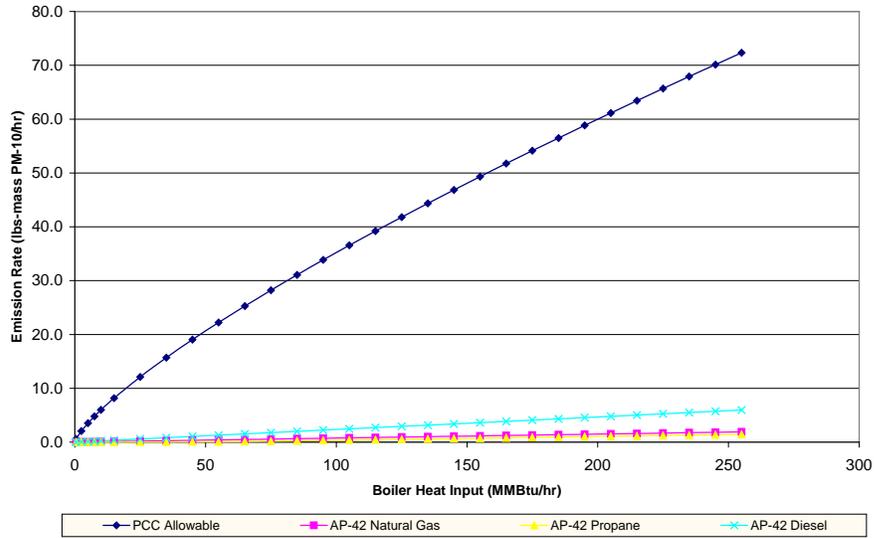


Figure 2) Comparative Chart of Allowable Particulate Emissions Under Pima County Code, Title 17, and Estimated Potential Emissions based on EPA AP-42 Estimates for External Combustion Sources. Allowable emissions are consistently over ten times estimated potential emissions. Therefore, it is not necessary to include the standard in the permit explicitly, but by reference in Attachment 1.

II.O & P of Part B

Federal and local opacity standards. Since the local requirement is more stringent than the Pima County SIP requirement, the Permittee is always in compliance with Condition II.N when in compliance with Condition II.P of Part B

II.Q of Part B

Local requirement for the Permittee to store and transport or VOC containing materials in a manner that controls any releases to the atmosphere.

C. Monitoring & Recordkeeping Requirements:

III.A of Part B

A requirement for the Permittee to monitor and record each time APC device identified in II.B of Section I is activated. The Permittee is required to record the date, start and stop time the APC is activated and the name of the person making the record. This condition enables the Permittee to demonstrate to the Control Officer when the APC is running should that information be required in the future.

III.B of Part B

A requirement for the Permittee to record all instances when the alarm level on any particle detector probe registers 100 pico amps sustained for a period of five minutes or longer.

III.C of Part B

Weekly monitoring checks of the powered exhaust vents listed in Table 3 of Section I. The weekly checks include doorways, outside duct work as well as all collection and filtering systems with a potential for carrying beryllium containing compounds. The Permittee is required to keep records that show the date, system checked, the identification of the person making the check and results of the check. Any corrective action is required to be noted. These weekly checks are a way to assure the Control Officer that all possible methods are used to prevent any emissions of beryllium or beryllium containing compounds from outlets not authorized by the permit.

III.D of Part B

This condition required the Permittee to implement the Emissions Prevention Plan procedures approved by the Control Officer and a requirement to follow approved procedures for any changes to the plan.

III.E of Part B

A requirement to continuously operate the photohelic gauges in order to monitor pressure drops across the filters. An anomalous pressure drop/ rise would either indicate that there is not enough airflow/ excessive airflow across the filters such that collection efficiency is inadequate. To show that the gauges are operating as required with adequate airflow, the Permittee is required to maintain the air pollution control systems to operate within the operating ranges specified in Table 2 of the Section I. These operating ranges were set after the Permittee performed testing while the facility was operating under optimum conditions. Lastly, the photohelic gauges identified in this condition must be interlocked to the fans powering the APC systems to provide an automatic shutdown should the pressure drop reach the preset failure levels listed in Table 2.

III.F of Part B

The Permittee is required to operate the monitoring and automatic shutdown system at all times that the facility is operating beryllium or beryllium containing compound operations. Recordkeeping commensurate with PDEQ approved levels to show compliance is required.

III.G & H of Part B

A requirement to maintain required records each time the filters in any of the APCs are replaced and each time the dust collector drum is changed out..

III.I, J & K of Part B

In III.J, the Permittee is required to post signs in production areas listed in Table 3 of the permit that process beryllium or beryllium containing products. These signs shall show the power switch for the powered exhaust vents and describe when the fan(s) or vent(s) shall immediately be shut-off in the event of a beryllium powder spill. Based on testing conducted in 2001 and 2010, III.J prohibits any emissions of beryllium from any of the powered exhaust vents located in areas identified in Table 3 of the permit. Should a spill occur, III.K requires that the Permittee record each instance that a powered exhaust fan listed in Table 3 is shut down.

III.L of of Part B

Since the fuel-fired equipment use natural gas as a fuel, required monitoring for abnormal emissions is not required. The option remains for the Control Officer to require calendar quarterly checks should it be deemed necessary. When checks are required, Materion shall maintain records as required by the permit.

D. Reporting Requirements:

IV.A of Part B

This section contains general reporting for the following requirements; initial startup which was reported on June 2, 1980, excess emissions, deviations reporting, beryllium spill reporting, emissions inventory reporting when requested by the Control Officer and an Annual Beryllium Technology Assessment. The technology assessment requires Materion to report to the Control Officer any improvements in continuous emissions monitoring for beryllium and any other technology improvements in the industry. The viability of any new improvements and a cost analysis by Materion is required to be presented to the Control Officer.

IV.B of Part B

Requirement for the Permittee to submit an annual emissions inventory when requested by the Control Officer.

E. Testing Requirements:

V.A of Part B

A federal requirement for initial testing. This initial testing was completed on October 28, 1980. This section also prescribes procedures to be followed whenever testing is planned or conducted.

V.B of Part B

The federal regulation governing Beryllium processing plants does not prescribe any further testing after the initial testing is completed. The Control Officer requires periodic testing and procedures as prescribed in these conditions of the permit. This testing is required to assure the Control Officer that Materion is operating the plant as applied for in the permit application and assures the public that the plant is operated to levels that meet the federal regulation. Testing has consistently shown that Materion's releases through the stack are at levels that are not detectable and therefore orders of magnitude below the federally required level of 10 grams per day.

PART C: AQUA REGIA ACID CLEANING SPECIFIC CONDITIONS

A. Applicability:

In the last permit term, Materion revised the permit to include a cleaning station. The Aqua Regia acid cleaning process removes surface contamination such as metal marks from the fired beryllium oxide. This process is not subject to any federal standard and is only subject to local Pima County Code (PCC) requirements under PCC 17.16.430 – Standards of Performance for Unclassified Sources. It is important to note that since this standard encompasses all sources that are not classified elsewhere, not all sections under PCC 17.16.430 are applicable to the Aqua Regia cleaning process.

B. Emission Limitations, Standards and Other Requirements:

II.A & B of Part C

The Permittee is required to install, operate and maintain listed air pollution control (APC) equipment associated with the cleaning process. Materion is required to use good air pollution control and operational practices in order to minimize emissions. Use of acceptable practices and maintenance of commensurate acceptable records will be reviewed by the Control Officer to determine whether these practices meet acceptable standards to comply or meet the county performance standards.

II.C, D & E Part C

This is a Pima County Code requirement to control gaseous or odorous materials from the cleaning process and prevent air pollution. This control can range from APC equipment, methods of storage, use and transportation of solvents when cleaning. II.E is a general requirement under the unclassified sources that gives the Control Officer authority to require installation of equipment or alteration of stack if used to reduce or eliminate air pollution to adjoining property.

II.F Part C

Materion is required to establish procedures for inspection and maintenance of the acid cleaning process and associated equipment. All records and procedures are to be kept onsite and the Control Officer will review these during facility inspections.

III Part C

Appropriate monitoring and recordkeeping commensurate with good engineering practices are required to be established and followed. These should primarily be found in the schedule and procedures for inspection and maintenance discussed in this section.

VIII. IMPACTS TO AMBIENT AIR QUALITY

None required as the source is not subject to PSD or NSR as it is not a major source.

X. CONTROL TECHNOLOGY DETERMINATION

No control technologies needed to be determined. This facility is in an area of attainment and is not a new source or source triggering a BACT analysis.

XI. PREVIOUS PERMIT CONDITIONS

III.E of permit issued 2006

The excerpt below was deleted from the above conditions as Materion has now installed the monitoring and automatic shutdown system. The deleted language is as follows:

Prior to installation of this system, the Permittee shall monitor and record the photohelic gauge readings at least daily whenever there is the potential to emit beryllium or beryllium containing compounds. At a minimum, the record shall include the date, the time the readings were made, the specific segment of the collection system to which the pressure drop applies, the value of the pressure drop noted on the gauge, and the name of the person making the check.

Historical Notes

Some historical notes from the previous permit term's technical support document have been retained in order to show the historical development of some pertinent permit conditions. Other notes provide clarification of the last draft permit process.

1. *The Tape Room was closed during the previous application process. Therefore the use and potential emissions of Toluene are no longer pertinent to the permit. Should the Permittee resume manufacture of Tape products, a permit revision shall be required. ***No reference to Tape Room in this renewal permit.***

2. A draft permit during the last permit draft was sent to EPA for Courtesy review on December 30, 2003. Response was received in February 2004. At several meetings with Materion staff, the EPA comments were addressed. A follow up letter dated January 30, 2003 summarized the changes in the permit that were agreed to. The final issue was monitoring the powered exhaust vents. EEMC was scheduled to visit the plant in mid February to assess the monitoring requirements and report their findings for an inspection program protocol. ***Note for clarification purposes only. Not pertinent to this renewal***
3. Materion requested that the word "daily" in the first sentence in III.B of Part B, Section I (Monitoring and Recordkeeping) should be changed to "weekly". It was suggested that the inspections required would be done much more efficiently and thoroughly if one section of the Ducting System was checked for flaws or leaks each inspection day, on a rotating basis such that each section was inspected at least once per week. ***Included for historical notes purposes only. Not pertinent to this renewal***
4. Materion proposed that the Ducting System be defined as four separate sections each to be inspected once per week. The entire System would be subject to inspection on a weekly basis. This inspection, done on four different days, would be more thorough and efficient than if the entire System were inspected on one day. ***Included for historical notes purposes only. Not pertinent to this renewal***
5. Materion changed the intake to the 40,000 cfm Farr Final Filters in order to facilitate more efficient fan operation. PDEQ was notified in a letter dated December 17, 2003 that this might change the pressure differentials across the filter, but in fact, no change in standards was required after the installation was completed and tested. ***Included for historical notes purposes only. Not pertinent to this renewal***
6. In a letter dated July 28, 2003, Materion informed PDEQ that an improved version of the final HEPA filters would be used in all air pollution control systems as listed in II.B of Part B, Section I. These filters lowered the static pressure and the pressure drop across the filters. This lower pressure drop required the minimum values of the final filters prescribed in III.D Table 1 of Part B, Section I of the draft permit to be changed from "0.5" to "0.4". This change to the draft permit was accepted by PDEQ.
Retained to show establishment of operating ranges.
7. In discussions with EPA, it was recommended that the source perform an additional modified stack test on the powered vents during the life of the permit. In view of the non-detect results from the previous testing, it is difficult to justify the expenditure in manpower and resources to repeat the testing on a frequent schedule, especially when the vents exhaust from areas in the plant where there is no reasonable likelihood of BeO powder to be present. There is no beryllium powder processed in these areas.

In the permit issued in 2007, the Permittee agreed to terminology that would require the powered exhaust vents to be tested during the penultimate year of the term of this permit. ***This testing was completed in 2010 and results have shown non-detect levels, similar to the 2001 test results. Based on this, the condition was modified to only test when the Control Officer makes a written request that testing shall be conducted.***

8. The permit summary on page 3 of the permit and language in the applicability for Beryllium processing conditions in I of Part B, Section I was revised to refer to Materion operations according the definition in 40 CFR 61 Subpart C. This clarifies any discrepancies that may arise from processes defined by equipment used onsite. ***Retained for clarification purposes only.***
9. Emissions have been further defined in II.A of Part B, Section I. to include total emissions from any kind of activity at the facility. ***Retained for clarification purposes only.***

10. A requirement to install listed pollution control equipment in Attachment 2 of the permit was added in II.B of Part B, Section I. The pollution control equipment will have the components shown in II.B of Part B, Section I. ***Retained to show original development of permit condition.***
11. In previous drafts there was no requirement to direct all beryllium containing emissions from any operation to the air pollution control equipment and stack. This requirement has been added in II.C of Part B, Section I and Materion shall direct any kind of beryllium emissions to the air pollution control equipment and eventually the stack. ***Retained to show original development of permit condition.***
12. A requirement was added to not allow any kind of beryllium emissions from any vents, doorways or other openings except through air pollution control equipment listed/ identified in II.B of Part B and the stack. Materion is also required to implement an emissions prevention plan which shall be submitted as required in III.C of Part B. The emissions and detection plan shall be submitted for approval to the Control Officer within 90 days of issuance of the final permit. ***Retained to show original development of permit condition.***
13. Materion shall follow the four change-out procedures dated 10/12/06 in II.B.D when changing filters or collector drums on any pollution control equipment. These O & M plans assure that Materion minimizes the possibility of Beryllium emissions. ***Retained to show original development of permit condition.***
14. Requirements in III.A and B of Part B for monitoring and recordkeeping of the pollution controls and powered exhaust vents were added to ensure that Beryllium emissions are minimized. ***Retained to show original development of permit condition.***
15. Recordkeeping as required in III.F, of each instance when the filters in any of the four air pollution control devices are replaced. ***Retained to show original development of permit condition.***
16. References to the particulate detection devices have been removed from the permit. Data from these systems are primarily used by Materion maintenance personnel as a qualitative measure for overall trends in the systems operations. The particle detectors are not useful as a leading measure of system functionality. They are highly variable and are dependent on many conditions, e.g. temperature, humidity, weather, particulate build up and age. Differential pressure which is monitored and outlined in Part B of the permit, operations and maintenance procedures provide much more concrete measures of collector functionality and emissions prevention strategies which again are all better measures of system condition. ***Retained for clarification purposes only.***
17. Materion is required to install photohelic gauges that continuously monitor and show the operating ranges and failure ranges of the air pollution control device collection system. This system shall be operated at all times and maintained according to an O & M plan either developed by the manufacturer or Materion. The ranges for the photohelic gauges are shown in Table 2 of Part B. ***The photohelic gauges were installed during the last permit term. An O&M Plan was developed by Materion.***
18. Initial testing was completed by Materion before October 28, 1980. Materion is required to perform annual emission testing to assure compliance with the 10 grams per 24 hour period federal standard. Materion shall follow testing procedures and notification requirements outlined in the permit and Title 17 of Pima County Code. ***Retained for clarification purposes only to show that compliance with the federal standard has been achieved.***
19. On February 12, 2009, Materion submitted a facility change notification in which Materion informed PDEQ of an R&D project in which a mixture of cadmium and tin were going to be utilized in the project to produce targets for a solar panel manufacturing company. The metal powder is isostatically pressed into a specific shape and then dry machined on a lathe. After machining, the targets are sent to the customer.

20. On June 26, 2009, Materion submitted a notification of an increase in volume of cadmium-tin powder to be processed. *Added for clarification purposes only.*
21. On July 8, 2009, Materion submitted a minor revision application to add this process as part of its main operations. This additional operation triggered the applicability of 40 CFR 63 Subpart XXXXXX, National Emission Standards for Hazardous Air Pollutants – Area Source Standards for Nine Metal Fabrication and Finishing Source Categories. The subpart addresses sources that use materials that contain the potential to emit metal fabrication or finishing metal HAP (MFHAP) as outlined in the subpart. The permit was revised in June 2010. During the recent renewal of the permit, Materion noted that they are not subject to 40 CFR 63 Subpart XXXXXX and conditions should not be included in the renewal.

PDEQ reviewed this request and verified that the NESHAP states that a facility has to be primarily engaged in the subject source categories and is not relevant to the Materion facility. The definition of primarily engaged is given below:

Primarily engaged means the manufacturing, fabricating, or forging of one or more products listed in one of the nine metal fabrication and finishing source category descriptions in Table 1, “Description of Source Categories Affected by this Subpart,” where this production represents at least 50 percent of the production at a facility, and where production quantities are established by the volume, linear foot, square foot, or other value suited to the specific industry. The period used to determine production should be the previous continuous 12 months of operation. Facilities must document and retain their rationale for the determination that their facility is not “primarily engaged” pursuant to 40 CFR 63.10(b)(3) of the General Provisions.

Added for clarification purposes to show that PDEQ has evaluated the process and determined it is not required to be included as a permitted process.

22. On December 07, 2009, Materion submitted another minor revision to add an aqua regia cleaning system and scrubber to replace an existing like equipment. The new system was necessary to allow the scrubber to remain on during shutdown periods when facility equipment and dust collector systems are shut off. Previously, the acid had to be neutralized and discharged to Materion’s industrial wastewater collection system for treatment. The purchase of the new cleaning system was a cost saving measure for Materion to enable the source to keep the acid longer, decrease waste and potential accidents in handling. This process triggered a local requirement in PCC 17.16.430.F & G that addresses processing and handling of acids. The permit was revised in June 2010. *Added for clarification purposes to show development of conditions.*
23. Following public comments submitted during the hearing on July 12, 2012, the following changes were made:

PDEQ has provided more clarification to the statement in VI, Part B.A of the Technical Support Document that... “Materion direct emissions from all operations that have the slightest potential for beryllium release to the stack...” A new permit condition has been added in III.I of the permit that states:

- a. **The Permittee shall not allow any emissions of beryllium powder from any of the powered exhaust vents located in the areas listed in Table 3 of III.H above.**

Beryllium is not expected in the powered exhaust vents and the above condition prevents that from occurring.

- b. The previous permit condition addressing testing of vents designated as 1, 3 & 7 has been revised. Should there ever be a requirement to test the vents, PDEQ has revised previous permit condition III.J (now III.K) to now read as follows:

“...the Permittee shall perform testing on any of the powered exhaust vents listed in Table 3...”

A facility layout with the approximate location of the seven vents can be found on page 18.

XII. INSIGNIFICANT ACTIVITIES

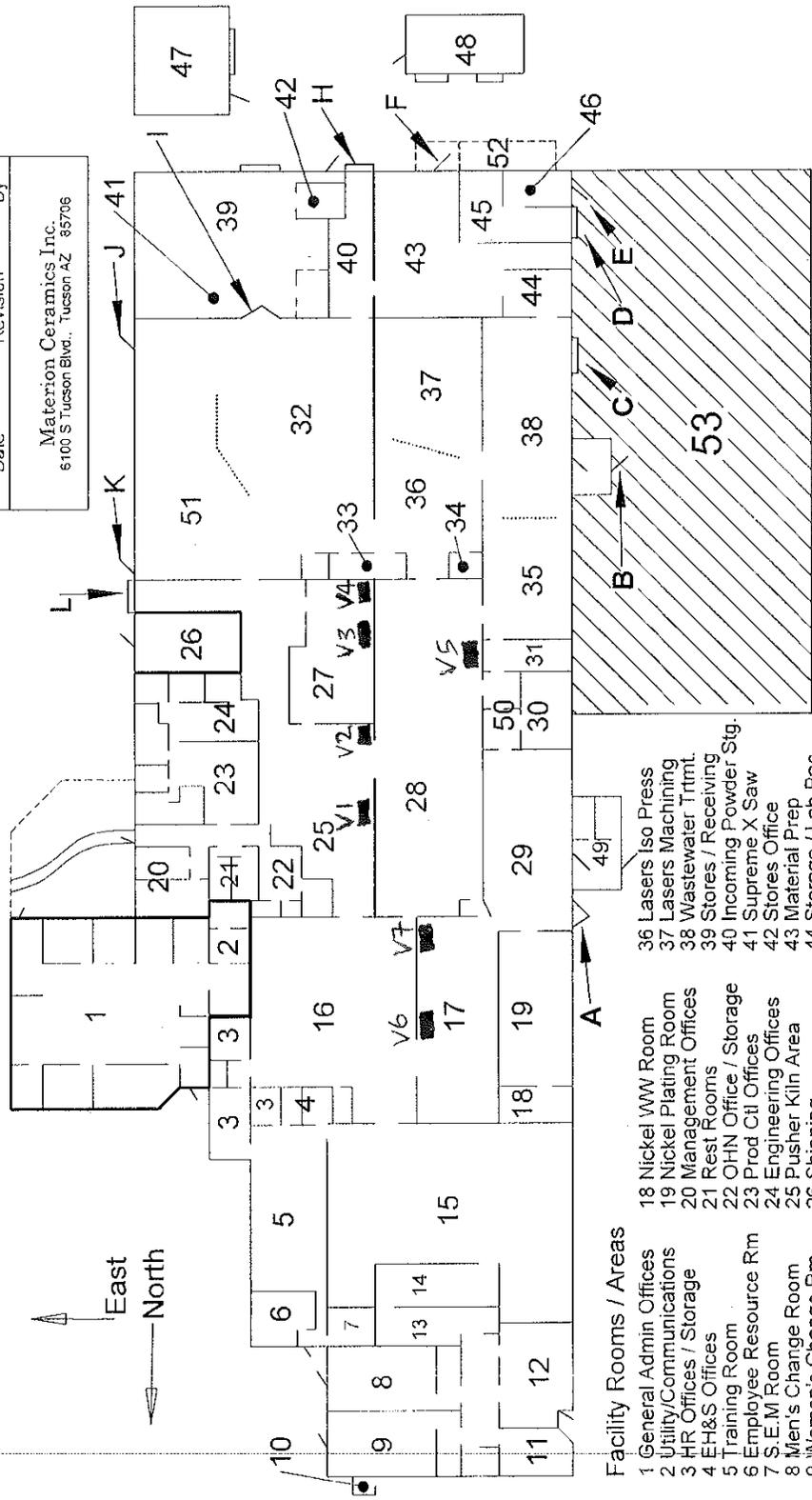
None

Materion Ceramics Inc. Facility Layout

Drawing for Illustration Purposes Only
Sections May Not be to Scale

Date	Current Layout	RN

Materion Ceramics Inc.
6100 S Tucson Blvd., Tucson AZ 85706



Facility Rooms / Areas

- 1 General Admin Offices
- 2 Utility/Communications
- 3 HR Offices / Storage
- 4 EH&S Offices
- 5 Training Room
- 6 Employee Resource Rm
- 7 S.E.M Room
- 8 Men's Change Room
- 9 Women's Change Rm
- 10 N Boiler Room
- 11 Laundry Room
- 12 Lunch Room
- 13 Respirator Storage
- 14 AS / Wk Boot Storage
- 15 Complex Machining
- 16 Extrusion
- 17 Small Kiln Room
- 18 Nickel WW Room
- 19 Nickel Plating Room
- 20 Management Offices
- 21 Rest Rooms
- 22 OHN Office / Storage
- 23 Prod Ctl Offices
- 24 Engineering Offices
- 25 Pusher Kiln Area
- 26 Shipping
- 27 Lapping
- 28 Large Kiln Room
- 29 Metalizing Firing
- 30 Met. Clean Room
- 31 Met. Office / Lab
- 32 Dry Pressing (all)
- 33 Tool Room
- 34 Metrology Room
- 35 Machine Services
- 36 Lasers Iso Press
- 37 Lasers Machining
- 38 Wastewater Trtmt.
- 39 Stores / Receiving
- 40 Incoming Powder Stg.
- 41 Supreme X Saw
- 42 Stores Office
- 43 Material Prep
- 44 Storage / Lab Pac
- 45 Mechanical Room
- 46 S Boiler Room
- 47 Maintenance Bldg.
- 48 Chemical Storage
- 49 Met. Rest Rooms
- 50 Metalizing Prep Rm
- 51 Inspection / Parts Cing
- 52 Compressors / Srm Blrs
- 53 Fenced Yard Area

Production Area Exit Doors

- A. Metalizing Firing*
- B. Wastewater Trtmt**
- C. Wastewater Trtmt**
- D. Mechanical Room**
- E. Boiler Room
- F. Material Prep
- H. Material Prep Rec**
- I. Press Room*
- J. Press Rm - S
- K. Press Rm - N
- L. East Service**

* Double Door ** Roll-Up Door

■ Vent Locations

Appendix I



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION IX
75 Hawthorne Street
San Francisco, Ca. 94105-3301

September 3, 1992

Mr. Bill Maxwell
Environmental Specialist
Department of Environmental Quality
130 West Congress Street
Tucson, Arizona 85701-1317

Dear Mr. Maxwell:

I have reviewed your request concerning the proposed changes for the annual testing for beryllium at the Brush-Wellman plant. Provided this facility has not triggered the requirement for meeting 40 C.F.R. 61.32.(b) and is eligible to use Method 103, I see no reason to prohibit the in-stack filter placement for the annual testing at this facility.

If the testing indicates that the facility ever exceeds the 10 gram of beryllium per day limit in 40 C.F.R. § 61.32(a), EPA would expect you to require the facility to use Method 104 and to implement the requirements of 40 C.F.R. § 61.32(b) for ambient sampling.

If you have any questions concerning this matter, please give me a call at (415) 744-1140.

Sincerely,

A handwritten signature in cursive script, appearing to read "Steven J. Frey".

Steven J. Frey
Environmental Engineer

cc: Peter Westlin, EMB

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