# Title V Operating Permit Renewal Application

## AVX Corporation
## Myrtle Beach, South Carolina

AVX CORPORATION

**September 2010**

RESOLUTE ENVIRONMENTAL LLC

# Table of Contents

## List of Appendices

# 1. Permit Renewal Application Summary

AVX Corporation (AVX) owns and operates an electronic capacitor manufacturing facility in Myrtle Beach, South Carolina. In the past, the facility was a major source of volatile organic compounds (VOC) with respect to the Part 70 (Title V) Operating Permit Program because potential emissions exceed the applicable major source threshold of 100 tons per year (tpy). The facility was also a major hazardous air pollutant (HAP) source having emissions greater than10 and 25 tons per year for a single and aggregate HAP, respectively. More recently, due to raw material changes, reduced production, and regulatory changes, the facility is no longer major based on VOC or HAP emission levels. However, with the USEPA's May 16, 1995 interpretation guidance of the general provisions of 40 CFR 63 and Section 112 of the Clean Air Act, a facility that was once a major source of HAP emissions, will always be considered major and must continue to comply with applicable requirements. This guidance is more commonly referred to as the "once in, always in" policy. On December 21, 2006, the USEPA proposed, in essence, a reversal of this policy, however, this proposal has not been finalized. As a result, AVX remains classified as a major source and is therefore submitting this Title V renewal application to the South Carolina Department of Health and Environmental Control (DHEC).

As detailed in Section 4.3, AVX is hereby formally requesting removal of the 39.5 ton per year VOC emission limit on the new manufacturing building and replacing it with a facility-wide PSD avoidance limit of less than 250 tons per year. This request is based on AVX's position that the facility is a true minor source with respect to Prevention of Significant Deterioration (PSD) applicability. Removal of the limit will provide needed flexibility in the building that will contain the facility's consolidated manufacturing.

This revision to the initial renewal application includes an updated equipment inventory, unit identification streamlining, an emissions inventory using current materials and throughputs, regulatory analysis, and revised permit application forms.

### 1.1 Facility Location

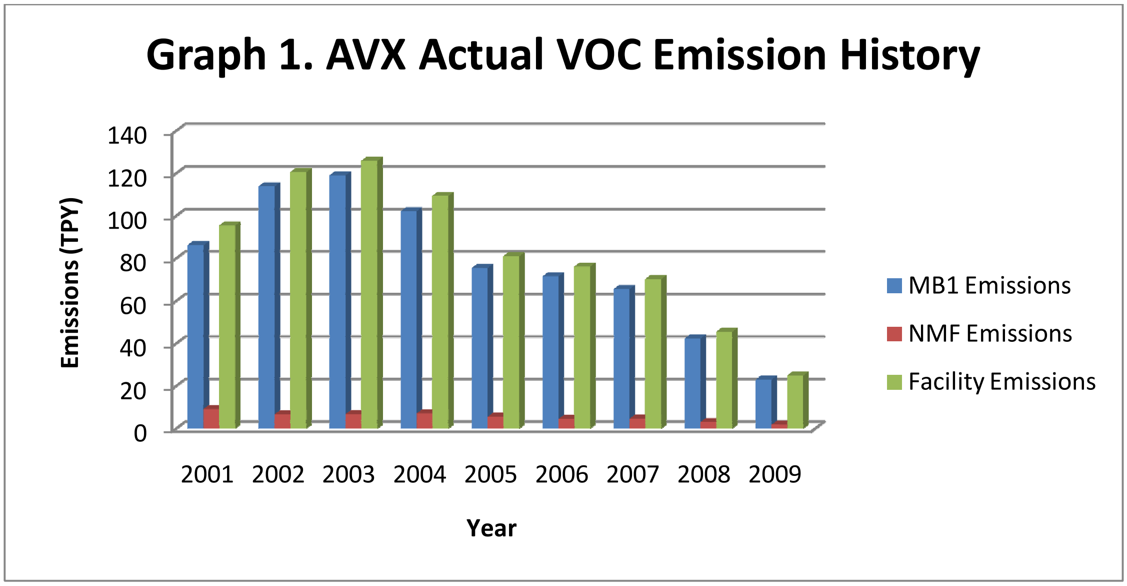
The Myrtle Beach facility is located in Horry County in northeastern South Carolina. The facility is located approximately two kilometers inland of the Atlantic Ocean at U.S. Highway 17 and 17th Avenue South. This site is bordered by the South Carolina National Guard and the Myrtle Beach Jetport. Appendix B, Figure 1 shows the location of the plant. Figure 2 in Appendix B is a facility plot plan showing the location of the facility on the property.

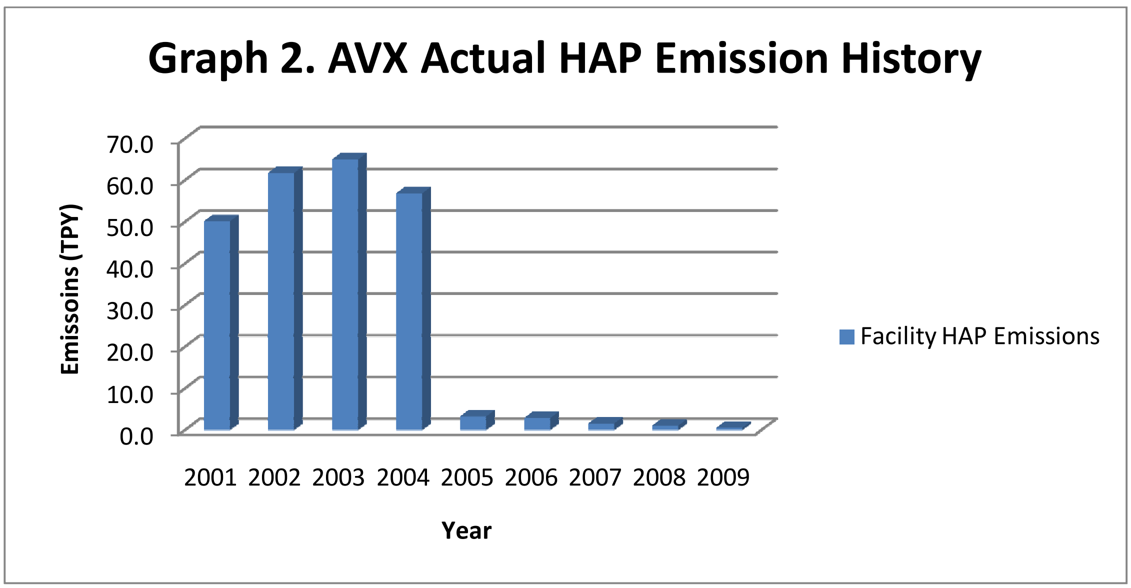
### 1.2 Facility Historical and Current Operations

The AVX facility produces electronic capacitors used in aerospace, data processing, telecommunications, and military applications. There have been two manufacturing areas at the facility: a main production building (MB1) on the northeast portion of the property and a newer manufacturing building (MB2 or NMF) on the southwest portion of the property. MB1 was originally constructed in 1949 and the main facility, as it exists today, commenced construction in 1985. Construction for MB2 commenced in 1998. The following timeline presents the history of AVX, including the Myrtle Beach, SC facility:

1948 - Electrical Reactance Corporation started capacitor operation in Myrtle Beach, SC
1952 - Electrical Reactance becomes the "Hi-Q" Division of Aerovox in Myrtle Beach, SC
1961 - Aerovox established multilayer ceramic capacitor manufacturing
1972 - Aerovox separates into two separate corporations, Aerovox Corp. and AVX Corp.
1975 - AVX becomes the world's leading capacitor manufacturer
1990 - AVX merged with KyoceraCorp. And became a wholly owned separate operating subsidiary of Kyocera
2000 - AVX is currently owned 70% by Kyocera, and 30% general public

Since 2003, emissions from AVX processes have trended downward. Bar graphs 1 and 2 below show actual VOC and organic HAP emissions, respectively.




A few factors can be attributed to this trend in emission rates.

1. Since the mid-1990s, AVX has been developing more efficient manufacturing processes as a result of facing stiffer competition. Increased efficiency results in less raw material usage and therefore lower emissions.
2. AVX has taken steps to eliminate hazardous materials previously used in their manufacturing. Materials containing hazardous compounds such as trichloroethylene, methylene chloride and xylene, once used in large quantities, have been either phased

out completely or used in much smaller quantities. Also, the U.S. EPA's decision to remove ethylene glycol monobutyl ether (2-butoxyethanol; 111-76-2) from the federal HAP list (Federal Register, November 29, 2004) significantly reduced reportable HAP emissions from the facility (See Graph 2). 2-Butoxyethanol is one of the main components in electrode ink and ceramic slip.

3. Due to some losses to competition, some production tools have been shipped offsite. For comparison, the 2004 Title V operating permit contains 806 listed equipment items (permitted and insignificant). This Title V renewal application contains 341 equipment items (permitted and insignificant). It should be noted however, the original AVX Title V application included production and support equipment that was never installed. The application included equipment needed to meet future production levels. However, theses production levels were never realized. Potential VOC emissions based on the original Title V equipment inventory was 283 tons per year. In 2006, revised calculations indicated a facility-wide VOC potential emission rate of 94 tons per year. This Title V renewal application shows a 60 ton per year VOC emission rate potential.

AVX is currently in the process of relocating MB1 chip manufacturing and finishing to MB2 to continue improving efficiency and reducing environmental impacts. Once the relocation is completed, MB1 will be decommissioned. Decommissioning does not include the RMM, Metals, and Slip departments located next to MB1.

This renewal application serves to revise the AVX permit to reflect new manufacturing arrangement as well as update raw material usages and emission rates. The delineation between MB1 and MB2 will no longer be used, as there will no longer be process description redundancy. Therefore, what was MB2 will be referred to as CMAP Build Up, Thin Film, CMAP Support, and Metallization. What was MB1 will be referred to by the separate RMM, Slip, and Metals departments.

## 1.3 Title V Applicability

As stated previously, although AVX Myrtle Beach does not currently emit regulated compounds above major source thresholds, the facility is classified as a major stationary source per USEPA's "once in, always in" guidance for sources subject to 40 CFR Part 63. At one time, the facility's potential emissions exceeded the major source thresholds of 10 and 25 tons per year for emissions of individual and the aggregate total hazardous air pollutants (HAP), respectively. Therefore AVX is required to operate under a major source operating permit.

## 1.4 Request for Application Shield

Section 503(d) of the CAAA provides that once a timely and complete application for an operating permit has been filed, the applicant is shielded from enforcement action for operating without a permit until the permit has been issued or other action has been taken on the application. S.C. Regulation 62.70.7 (b) incorporates into state law the concept of an application shield for sources required to obtain a major source-operating permit.

The Myrtle Beach facility submitted the original Title V operating permit application in April 1998 and renewal application in April 2004. It is AVX's understanding that an application shield is in place as a result of the complete and timely application submitted in 2004. Therefore, the Myrtle Beach facility cannot be subject to enforcement action for operating without a permit during the period of time that the permit application has been under review by DHEC. This current submittal constitutes a revision to the original application, and AVX requests the continuation of the existing application shield.

## 1.5 Request for Permit Shield

Section 504(f) of the CAA defines the permit shield provision whereby the permitting authority is empowered to provide that compliance with a Part 70 permit shall be considered compliance with all other applicable provisions of the Act. S.C. Regulation 62.70.6 (f) incorporates into state law the concept of a permit shield. A provision stating that compliance with the conditions of the Part 70 permit shall be deemed as compliant with any applicable requirements (as of the date of permit issuance) provided that the following S.C. Regulation 62.70.6 conditions are met:

- Such applicable requirements are identified and included in the permit; or
- DHEC determines that other requirements are not applicable to the source, and the permit includes the determination or listed provisions.

AVX requests inclusion of the permit shield recognizing any requirements with which the facility must comply, as well as any provisions not applicable to AVX.

### 1.6 Application Elements

This application for a Title V operating permit application contains the following elements:

- Section 2 contains the facility process description
- Section 3 discusses emission calculations
- Section 4 details the regulatory applicability analysis
- Appendix A includes site location and facility plot plan figures
- Appendix B contains the process flow diagrams
- Appendix C  includes revised Emission Unit ID and equipment description descriptions
- Appendix D contains DHEC Title V operating permit application forms
- Appendix E details the emission estimates
- Appendix F includes a facility-wide air pollutant dispersion modeling analysis
- Appendix G presents the Compliance Assurance Monitoring Plan
- Appendix H provides supporting documentation

# 2. Process Description

Operations in the Myrtle Beach complex include Raw Materials Manufacturing (RMM), Slip Manufacturing, Metals Department, CMAP Buildup, CMAP Support Department, Kiln Room, Metallization Department and other supporting processes. Detailed descriptions of the processes are given in the following sections. Process descriptions emphasize material flow, as AVX uses a material mass balance approach to track emissions. Please refer to the process flow diagrams in Appendix C and the equipment inventory entered on DHEC "Section D" forms in Appendix E.

## 2.1 Raw Materials Manufacturing (Unit ID 14)

The chip manufacturing process at AVX begins with the Raw Materials Manufacturing department (RMM). Individual metal salt are blended together with water and dispersants in a batch process to produce a formulated ceramic compound. The ceramic material is then ground and milled to reduce particle size. Ceramic powder is prilled to reduce water content by placing the material on a belt moving through a heater. The material is then either fired to physically react the constituents or further dried to remove excess moisture and dispersant.

Emissions from this portion of the RMM are primarily particulate matter (PM) emissions from grinding and milling operations. These emissions are controlled by three baghouses.

It should be noted that the chemical barium titrate process, and associated equipment, is no longer in operation in the RMM Department.

## 2.2 Slip Manufacturing (Unit ID 15)

Ceramic powders from RMM are transferred to the Slip Manufacturing department building. The powders are blended with organic solvents such as butyl cellosolve (BC) and propylene glycol monomethyl ether (PGME) to produce a flow able ceramic slurry, also known as slip.

Mixing takes place in various sized, mixing vessels, and holding tanks as appropriate to prepare a particular slurry batch. The slurry is mixed and milled to achieve the necessary particle size distribution. Mixing and milling occurs primarily in sealed or covered containers to maintain specific product viscosity specifications. This limits the VOC and HAP emissions generated from the mixing of solvents with the powder and equipment cleaning. The emissions are vented to the atmosphere through a single room vent and as fugitive emissions through windows and door openings.

Emission estimations are based on 100% loss or a percentage loss depending on the material used (manufacturing or equipment cleaning). From process engineering knowledge required to meet viscosity specifications when manufacturing slip, material rework, and waste recovery, solvent losses are less than 1%. In communications between AVX and DHEC, it has been agreed to estimate emissions through conservative loss factors of 10% or 20%, depending on the uses of the organic material.

**2.3 Metals Department (Unit ID 16)**

In the metals department, conductive metal inks (electrode inks) and pastes (termination pastes) are produced. The process is similar to slip manufacturing where solvents and fillers (organic binders) are added to powders, blended, and then milled to achieve the proper particle size distribution. VOC and HAP are emitted during mixing and milling through air conditioning vents and exhaust vents that have no pollution abatement.

Similar to slip manufacturing, emission estimations are based on percentage losses depending on the material used (manufacturing or equipment cleaning). From process engineering knowledge required to meet viscosity specifications when manufacturing slip, material rework, and waste recovery, solvent losses are less than 1%. In communications between AVX and DHEC, it has been agreed to estimate emissions through conservative loss factors of 10% or 20%, depending on the uses of the organic material.

**2.4 CMAP Buildup (Unit ID 17)**

In the Chip Manufacturing Automated Process (CMAP) operations, capacitors are produced in a "build-up" process in which the ceramic slip is laid down with alternating layers of electrode ink on glass plates. A conservative rate of 70 kg of slip is processed per CMAP machine per day has been used for emission estimation purposes. Approximately 15% of this amount is collected for material reclaim.

VOC in slip and ink are emitted during application of the materials when manufacturing the capacitors. The CMAP machines are designed with enclosures for capture and control of emissions. Exhausts are vented to a VOC abatement control system consisting of three (one 14,500 acfm and two 5,000 acfm) parallel adsorber/ desorber units in series with one thermal oxidizer. On February 26, 2009 a destruction test was performed on one 5,000 acfm adsorber/desorber unit and thermal oxidizer. Results demonstrated a thermal destruction efficiency of 99.99% and an overall VOC removal efficiency of 99.5%. However, AVX will use an achievable 98.5% control efficiency in emission rate calculations for conservatism.

Prior to moving capacitor tools, qualification procedures must take place between AVX and its customers. As a result, two CMAP machines will remain at the original manufacturing location through the majority of 2010 for qualification. The total number of CMAP machines (new and old location) is 24.

A small amount of HAPs are present in denatured alcohol used for machine cleaning. Until recently, xylene has been is also used for cleaning; however, AVX has replaced xylene with n-butyl acetate in the CMAP Department.

## 2.5 CMAP Support Department (Unit ID 18)

CMAP Support consists of a number of processes that support the CMAP buildup activities.

- Glass buildup plate preparation
- Dicing operations
- Chip removal
- Green chip corner rounding
- Chip drying (moisture removal)
- Formation of cured ceramic chip body (burnout and firing)

The glass plates used in the CMAP buildup process are prepared in CMAP Support by water washing, drying, and applying a release paper or plastic film to the plate. This is the surface onto which the buildup of ceramic slip and electrode ink occurs in CMAP buildup process and allows for easy removal of the individual chips after dicing.

Once the ceramic and electrode ink layers have been created on the glass plates, the ceramic buildup is cut or "diced" into predetermined shapes and sizes to form individual capacitor chips. The majority of dicing is accomplished using a wet process where there are now emissions. For certain product lines, dicing is completed using a dry process that results in a small amount of PM.

Emissions from CMAP Support include VOC from cleaning solvents and PM from the dry dicing operations. Spent cleaning solvent waste is collected and removed from CMAP Support. Baghouses are used to control PM emissions from dry dicing.

The individual capacitors created from dicing are known as "green" chips prior to the burn out and sintering steps. In the green chip area, chips are sorted, washed, dried at low temperatures, and corner rounded. The average time chips spend in this area is 5.5 days. AVX contends that no volatile organic compounds (HAP/TAP) are present in the chips after this process step when entering the Kiln Room. A small amount organic material is present in the binder removed from the chips during the burn out ovens.

CMAP Support includes the Kiln Room, which contains electric burn out ovens and firing kiln ovens. The green chips enter burnout ovens to remove electrode ink binder material prior to ceramic firing. The burnout cycle time ranges from about 24 hours to as high as 30 hours with temperatures peaking at around 500 degrees F in inert and oxidizing atmospheres. After the binder material is evacuated from the chips, they enter the kilns to fire and cure (sinter) the ceramic. Average firing cycle time is 33 hours reaching a maximum temperature of 2300 degrees F.

On June 25, 2009, AVX conducted carbon sampling from an exhaust of one of the burn out ovens. The test indicated a small amount of VOC (as carbon) emissions during this processing step. Based on these results, AVX contends that all organic material is vacated from the chips during burn out and, therefore, the kilns are sources of heat emissions only.

To simplify the revised permit, the burnout ovens will be considered as part of the CMAP Support department. Therefore, the Kiln Room will no longer be a separate emission unit.

### 2.6 Metallization Department (Unit 19)

Metallization Department operations include the chip termination and plating processes. Previously, Termination and Plating Departments were separate emission units. To streamline the AVX Title V permit, these departments have been combined.

#### 2.6.1 Termination

The termination process is the application of metal paste to capacitor chips to make the connection to the internal electrode layers. After application of the termination paste, the chips are fired on a time-temperature profile to bond the paste material to the electrode end of the capacitor. VOC in the termination paste are emitted during the application and curing and exhausted through room exhausts. VOC and HAP emissions also result from solvents used to clean the equipment. Xyxlene is one of the solvents used for cleaning. AVX is in the process of replacing xylene used for cleaning in the termination area with propylpionate, a non-HAP organic.

### 2.6.1 Plating

Following termination, the electrode layer connections are then plated to provide a surface suited for solder application for product quality. This department is currently permitted to operate five Autoline Barrel platers, a gold plating line, and three RFT batch plating processes. There is currently only one 6-position Autoline in operation, which is scheduled for decommissioning some time in 2011. The RFT platers are no longer in operation. Spouted Bed Electrode (SBE), Fine Copper Termination (FCT), and BCB coating processes will remain in their present location for the foreseeable future. Small amounts of particulate matter, nickel, and lead are potentially emitted from the plating solutions in two of the SBE lines and the Autoline.

## 2.7 Supporting Processes (Unit ID 21)

In addition to the processes listed above there are a number of other activities at AVX that support the manufacturing processes. Equipment such a boiler, soldering pots, and ground water air stripping emit small amounts of criteria pollutants and HAP and are included in the Miscellaneous Support source group.

## 2.8 Trivial and Insignificant Activities

In addition to the equipment described above, there are several processes which are categorized as insignificant per classification in the Title V regulations. This includes emergency generators, small boilers, a fire water pump, laboratory equipment, and R&D.

# 3. Emission Calculations

Several different emission calculation methodologies were utilized to estimate potential emissions from AVX processes. These procedures include: material mass balance, engineering estimates, AP-42 emission factors, and permit limits. The following sections provide a brief description of emission calculations. Complete documentation is contained in Appendix C.

### 3.1 Material Mass Balance Calculations

A number of emissions, especially VOC from solvent use, were estimated using mass balance calculations. For emission calculations based on actual solvent usage data, potential emissions were calculated from 2006 usages plus 15 percent. Calendar year 2006 is representative of current material usage.

As discussed previously, emissions from solvent usage vary from 100% loss to either 10% or 20% loss, depending on the material. The emission factors are based on material usage to meet product specifications, rework, and waste recovery. Manufacturing to viscosity specifications (when including rework and waste), less than 1% by weight of many solvents is lost from the balance (See Appendix G). For this renewal application, AVX is electing to continue to use the more conservative 10% and 20% loss factors previously established between AVX and DHEC for the Slip, Metals, and Metallization departments.

Solvent emissions from CMAP have been calculated based on a maximum amount of slip and metal paste used per machine based on a conservative application rate of 70 kg/day/machine. AVX estimates that 70% of the slip used in the buildup process is applied to the chips since and 15% returns back as material reclaim. Of the 70% applied to the chips, 1% is emitted at the machines fugitive and 0.05% is emitted as a fugitive after production (green chip area). The average VOC content of slip is 30.32%, as determined from a sampling of typical slip formulations. A February 26, 2009 source test demonstrated that a 5,000 acfm adsorber/desorber and thermal oxidizer control system achieves an overall control efficiency of

99.5%. It is estimated that 85% of the organic material in the slip, successfully applied to the plates, enters the control system. However, the CMAP machines cannot operate 24 hours per day, 7 days per week. CMAP is a batch process and not continuous. Between batches, the machines are cleaned, doctor blades calibrated, screens changed and aligned, plates loaded/unloaded, raw material changed out, etc. Also, the facility runs multiple job orders within a batch. The job orders typically do not fill up a machine. For example, January through July of 2010, the fill percentage ran approximately 80%. In other words, 20% of a machine was empty. Therefore, a maximum worse-case operation ratio of 32/48 hours has been used to estimate potential emissions.

Once the move of capacitor manufacturing from the original manufacturing location (old MB1) to the new manufacturing building is complete, AVX will have 24 CMAP machines in operation. For 2010, two CMAP machines will remain in MB1 until the medical qualification process is complete, which will allow the relocation of these machines. In anticipation of this application, sufficient inventory was produced that these machines should be idle through the 2010 qualification process. The machines need to remain online in the event that inventory is depleted before the qualification process is complete. AVX has requested an operating limit of 864 hours per year to limit emissions from these two machines. This is based on a conservative need with 2 machines operating 24 hours per day, 3 days per month, for 6 months.

Solvent emissions from the termination department were calculated based on the amount of termination paste used, its solvent content, minus the amount collected for reclaim or as waste. A worst case termination paste was used to estimate the maximum amount of VOC emitted. A 20% emission factor was used for the cleaning solvent emissions.

Lastly, the dicer emissions were calculated on a mass balance basis. The amount of material collected in the baghouse was measured and the amount emitted is back calculated from the amount of material collected in the baghouse and the control efficiency.

### 3.2 AP-42 Emission Factors

The USEPA AP-42, Volume I, Fifth Edition was used as a source of emission factors where material balance or other emission estimation methodologies were not applicable or available. Particulate matter emissions were determined using AP-42, Chapter 11 Mineral Products Industry emission factors for cement bin loading. It was assumed that the particle size of cement is similar to that of the ceramic materials processed in Raw Materials. Emissions from the boiler and emergency generators were estimated from the maximum firing rate, annual fuel use and emission factors from AP-42, for Natural Gas-Fired Small Boilers and for Uncontrolled Gasoline and Diesel Industrial Engines, respectively. Similarly, electroplating emissions were calculated based on emission factors and guidance provided in AP-42, Chapter 12 Metallurgical Industry Electroplating.

### 3.3 Other Emission Sources

Potential emissions for the groundwater air stripping tower were provided by Arcadis. Emissions were estimated using a modeling system as part of a design to install a like-for-like replacement of the larger stripping tower.

# 4. Regulatory Applicability Analysis

A key objective of a Title V operating permit application is to compile all applicable Clean Air Act derived requirements into one document. Conceptually, these requirements can be categorized as (1) emission limits and work practice standards, or (2) testing, monitoring, recordkeeping, or reporting requirements. To compile a list of all the requirements for which a facility must comply, it is first necessary to determine which federal and state air regulations apply to the facility as a whole or to individual emission units. Details for several regulations are presented below.

## 4.1 Federal Regulatory Applicability

Federal air quality regulations reviewed included New Source Performance Standards (NSPS, codified at 40 CFR 60), National Emission Standards for Hazardous Air Pollutants (NESHAP, codified at 40 CFR 63), Compliance Assurance Monitoring (CAM, codified at 40 CFR Part 64), and stratospheric ozone protection regulations (codified at 40 CFR 82). Applicable regulations are summarized in this section.

### 4.1.1 NSPS Subpart A, General Provisions

The General Provisions of 40 CFR Part 60, New Source Performance Standards, apply to any source subject to Subpart of the regulation. As described in more detail in the following section, AVX Boiler B201 is subject to NSPS Subpart A, Subpart Dc. The general provisions require written notification regarding construction, startup, and any physical or operational change resulting in an emissions increase. AVX complied with these notification requirements on March 16, 1999. NSPS also requires record keeping of any startups, shutdowns, or malfunctions of the boiler. The amount of fuel combusted monthly must be recorded and maintained onsite for two years. However, per S.C. Regulation 61-62.70.6 Title V sources must keep records for a period of at least five years. Compliance is shown with performance tests required by 40 CFR 60.8. Finally, AVX must operate the unit in a manner consistent with good air pollution control practices. AVX complies with this regulation through maintaining fuel combustion records and recording startups, shutdowns, or malfunctions of the boiler.

### 4.1.2 NSPS Subpart Dc, Small Industrial-Commercial-Institutional Steam Generating Units

NSPS Subpart Dc applies to steam generating units with design heat input rates between 10 and 100 MMBtu/hr installed after June 9, 1989. Since B201 is a natural-gas fired boiler with a design heat input of 16.7 MMBtu/hr and was installed in 1999, Subpart Dc applies in addition to the General Provisions of NSPS. Since B201 only fires natural gas, compliance with Subpart Dc only requires monthly fuel consumption records, which must be maintained for a minimum of two years.

### 4.1.3 Part 63 NESHAP Applicability (Subparts A & B)

National Emissions Standards for Hazardous Air Pollutants (NESHAP) are applicable to facilities that are in a regulated source category or are a major and areas source of HAP. Major source status is defined as having potential emissions in excess of 25 tons per year for total HAP and/or potential emissions in excess of 10 tons per year for any individual HAP. Area sources are HAP emission sources that are not major. AVX had HAP emissions above the major source thresholds. May 2000, AVX submitted a NESHAP 112(g) Case-by-Case Maximum Achievable Control Technology (MACT) determination for emissions from chip manufacturing at the New Manufacturing Facility. More recently, with production decreases, material replacement changes, and removal of 2-butoxyethanol from the federal HAP list, AVX is no longer a major source of HAP. However, with the USEPA's May 16, 1995 interpretation guidance of the general provisions of 40 CFR 63 and Section 112 of the Clean Air Act, a facility that was once a major source of HAP emissions, will always be considered major and must continue to comply with applicable requirements. This guidance is more commonly referred to as the "once in, always in" policy. On December 21, 2006, the USEPA proposed, in essence, a reversal of this policy, however, this proposal has not been finalized. As a result, AVX currently remains classified as a major source.

The USEPA published the final 40 CFR Part 63, Subpart ZZZZ, NESHAP for Reciprocating Internal Combustion Engines (RICE MACT) on March 3, 2010. The rule applies to both major and area sources of HAP. This rule is applicable to AVX's four diesel-fired emergency generators. They are defined as affected, existing source with compliance required by May 3, 2013.

4.1.4 Part 64 Compliance Assurance Monitoring

Compliance assurance monitoring (CAM) applies to pollutant specific emission units (PSEU) located at major sources that meet the following criteria:

a. The PSEU is subject to an emission limit or standard, and
b. The PSEU uses a control device to achieve compliance, and
c. Potential pre-control emissions from the PSEU are equal to or exceed 100% of the major source threshold.

CMAP (Unit ID 17) utilizes a control device to limit VOC emission from the process and has a potential to emit 116.5 of VOC pre-control, which exceeds 100% of the major source threshold (applicability item c). The manufacturing building that includes the CMAP process currently has a Prevention of Significant Deterioration (PSD) Synthetic Minor VOC emission limit of 39.5 tons per year. As discussed in more detail in Section 4.3, AVX is formally requesting removal of this limit from the operating permit for flexibility purposes. However, as discussed in Section 4.1.3, AVX is a major source under the "once in, always in" policy. Therefore the CMAP control system, as part of the 112(g) Case-by-Case determination, is required to remain and operate as originally applied. Therefore, AVX has included with this application a CAM Plan as required by the CAM Rule for major source operating permit renewal applications.

The only other control devices at AVX are fabric filters. The potential to emit pre-control emissions for the associated units are below Title V trigger levels, and are therefore not subject to CAM.

### 4.1.5 Part 82, Subpart F Stratospheric Ozone Protection Regulations

40 CFR 82, Stratospheric Ozone Protection, applies to the maintenance of refrigeration equipment at this facility that contains ozone-depleting substances. AVX's personnel responsible for air condition maintenance have been properly trained and certified as required by this regulation.

## 4.2 South Carolina Regulations

South Carolina air quality regulations fall under two main categories: those regulations that are generally applicable (e.g., permitting requirements), and those that are specifically applicable to an emission unit (e.g., PM standards for manufacturing equipment). The generally applicable requirements are straightforward (e.g., filing of emission statements) and, as such, are not discussed in further detail. The specific requirements associated with several regulations are discussed following.

### 4.2.1 62.5 Standard 1, Emissions From Fuel Burning Operations

This regulation applies to fuel burning devices such as furnaces and boilers, and sets limits on opacity, PM emissions, and $SO_2$ emissions. All fuel burning equipment at the facility is subject to the opacity requirements in Section I - visible emissions, except for the VOC control equipment (see section 4.2.3). Boiler B201 is subject to pollutant specific regulations as well. Because the boiler is natural gas-fired, AVX expects to comply with all requirements, namely visible emissions (Section I), PM emissions (Section II), and emissions of sulfur dioxide ($SO_2$) (Section III, Number 3). Opacity monitoring requirements detailed in Section IV, periodic testing requirements under Section VI, and source testing requirements under Section VII do not apply because all fuel burning equipment at the facility fire natural gas only. AVX is required to observe for visible emissions (opacity) and record in a Daily Inspection Log.

#### 4.2.2 62.5 Standard 2, Ambient Air Quality Standards

Standard 2 establishes ambient air quality standards for all criteria pollutants. AVX is required to demonstrate compliance with this regulation when a physical modification is being proposed that would lead to an increase in emissions. AVX is consolidating CMAP, CMAP Support, and Termination. Plating will remain at its current location in MB1, however, the Autoline will be decommissioned some time in 2011. At that point, all plating will be accomplished using the SBE and FCT plating processes. With the AVX consolidation, criteria pollutant emissions will decrease, however, some changes in physical emission points will result. Therefore, worse case emissions of criteria pollutants are included in the air dispersion modeling analysis attached to this Title V renewal application (Appendix F).

#### 4.2.3 62.5 Standard 3, Waste Combustion and Reduction

This standard limits PM emissions and opacity and applies to combustion of material other than virgin fuels. This standard applies to the VOC control system, which incinerates the VOC stream from CMAP operations. The PM limit is 0.5 lb/MMBtu of heat input and the opacity limit is 20%. Because the thermal oxidizer runs on natural gas, a clean burning fuel, it is not anticipated that these limits will be exceeded during normal operations of this equipment. With proper operation the combustion of VOC will not contribute substantially to PM emissions or opacity. Proper operation is ensured through daily continuous monitoring of the thermal oxidizer temperature.

#### 4.2.4 62.5 Standard 4, Emissions From Process Industries

This standard limits PM emissions and opacity and applies to process industries. All equipment groups at AVX not subject to Standard 1 or Standard 3 are subject to Section VIII (Other Manufacturing) of this regulation. Equipment groups at AVX subject to this standard include the dicers, metals mixer, RMM grinders and mills, RMM mixers, and the slip manufacturing mixers.

Standard 4 limit units in the applicable groups to the PM emissions calculated using the process weight rule. The supporting emission rate calculations included in this application compare AVX emissions to Standard 4 limits. All calculated emissions are below these limits. Additionally, any of the units constructed or modified after December 31, 1995 are subject to a 20% opacity limit. All other units constructed before December 3 1, 1995 are subject to a 40% opacity limit.

### 4.2.5 62.5 Standards 5.1, VOC Emissions Control and LAER

Standard No. 5.1, Lowest Achievable Emission Rate Applicable to Volatile Organic Compounds (LAER), will apply if AVX's net VOC emissions increase due to any future modification, exceeds 100 tons per year. A net VOC emissions increase refers to the actual increase in the potential to emit of a source due to a modification plus any other creditable increases and decreases that have occurred at the plant since July 1, 1979.

As presented in this Title V renewal application, AVX's VOC emissions have been declining significantly at the Myrtle Beach facility due to production decreases, improved efficiency, and material substitution changes. The facility has eliminated the uses of materials such as trichloroethylene (TCE) and significantly reduced usage of xylene. In addition, with the consolidation of the manufacturing, more organic emissions will be destroyed by the adsorber/desorber/thermal oxidizer air pollution control system. Therefore, no units at AVX are currently subject to LAER. The current permitted potential to emit is 285 tons per year, based on a 2001 Title V renewal application. This renewal application revises the potential to emit to 61 tons per year.

### 4.2.5 62.5 Standard 8, Toxic Air Pollutants

This standard regulates ambient impacts associated with emissions of toxic air pollutants (TAP). AVX is required to demonstrate compliance with this regulation when a physical modification is being proposed that would lead to an increase in emissions or change the physical parameters which previous modeled concentrations were based. The consolidation will change the distribution of emissions of TAPs at AVX. Therefore, a facility-wide TAP modeling analysis is included with this Title V renewal application.

**4.3 State Operating Permit Conditions**

In addition to state and federal regulations, AVX is subject to existing state permit conditions. Most conditions reflect state or federal regulations discussed above. One condition in the current operating permit is a PSD Synthetic Minor limit of 39.5 tons per year of VOC emissions on the New Manufacturing Facility. This building will soon contain the consolidated manufacturing equipment, which includes the chip manufacturing VOC abatement system. The 39.5 ton per year limit was established to permit the construction of the new building while avoiding PSD review (construction permit #1340-0002-CS and CT). At the time of permitting the building, the original Tile V permit documented AVX's VOC potential to emit greater than the PSD major applicability threshold of 250 tons per year [52.21(1)(b)]. The 2004 Title V operating permit indicates a potential facility-wide VOC emission rate of 282.88 tons per year. As stated previously, the potential emission rates presented in the earlier Title V applications were based on anticipated (future) equipment needs required for expected production levels. AVX never installed the quantity of equipment permitted as product demand did not reach such anticipated levels. There are no records indicating that actual VOC emissions from the facility have ever exceeded the 250 ton per year major source level. Therefore, AVX can be classified as a "true" PSD minor source. This Title V renewal application reflects the actual number of equipment at AVX and emissions are based on current materials and throughputs. As presented, the current potential, uncontrolled VOC emission rate is 172 tons per year. The potential controlled VOC emission rate is 60 tons per year. In an effort to consolidate, streamline, and introduce flexibility into the AVX operating permit, AVX is formally requesting that the SCDHEC remove of the 39.5 ton per year emission limit. Instead, AVX is proposing facility-wide PSD Synthetic Minor emission limit of less than 250 tons per year of VOC for any 12-month period. In retrospect, this facility-wide PSD avoidance limit should have been requested at the time of permitting the New Manufacturing Facility instead of the 39.5 ton per year limit.

FIGURE 1


ADAPTED FROM: MYRTLE BEACH QUADRANGLE, SC U.S.G.S. 7.5 MIN. QUAD

AVX CORPORATION

MYRTLE BEACH, SC

SITE LOCATION MAP


QUADRANGLE LOCATION

1 ½ 0 1 MILE

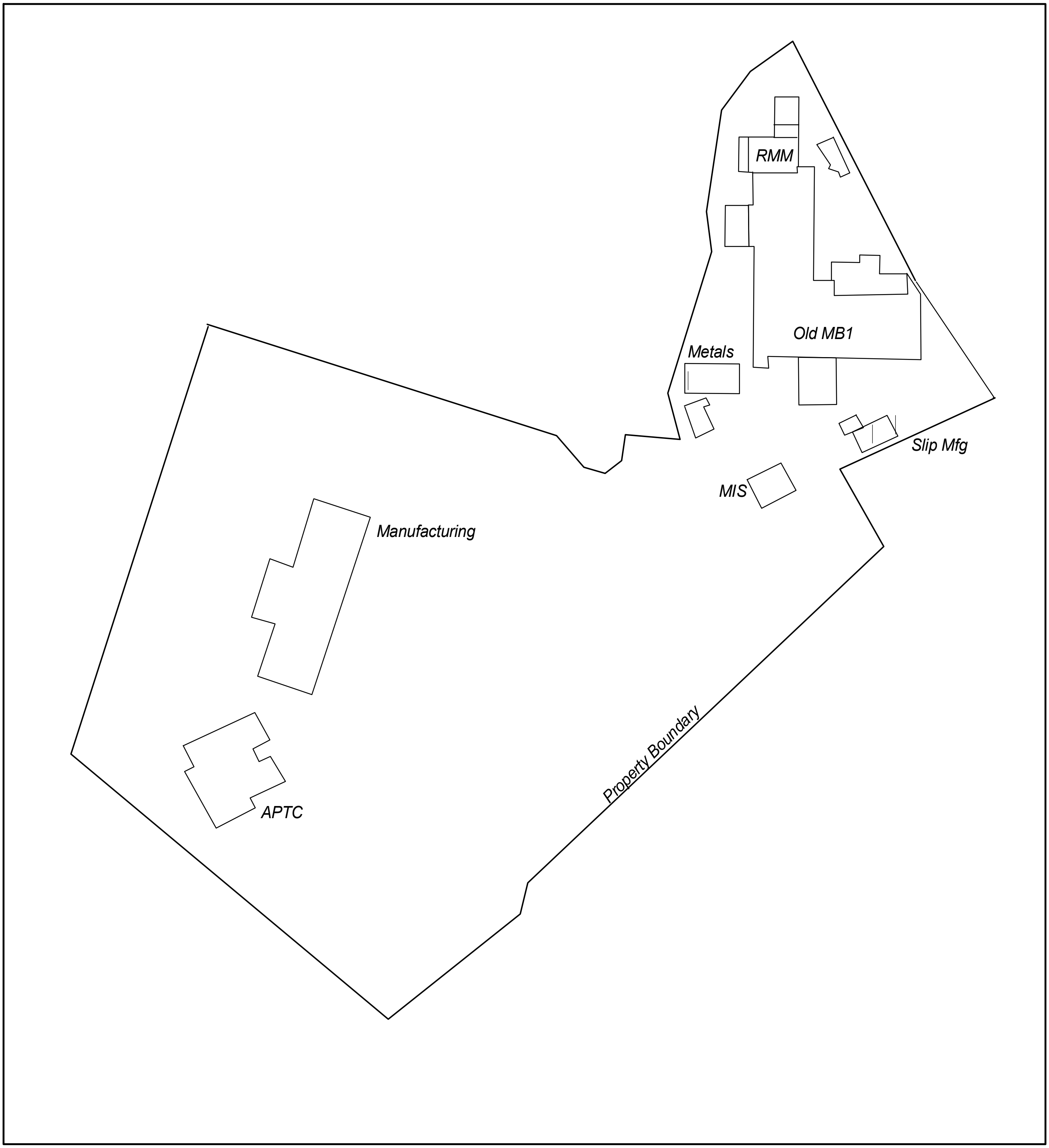
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

SCALE: 1:24000

FILE NO. 42369-001.001
JULY 2008

FIGURE 2




AVX CORPORATION
MYRTLE BEACH, SC

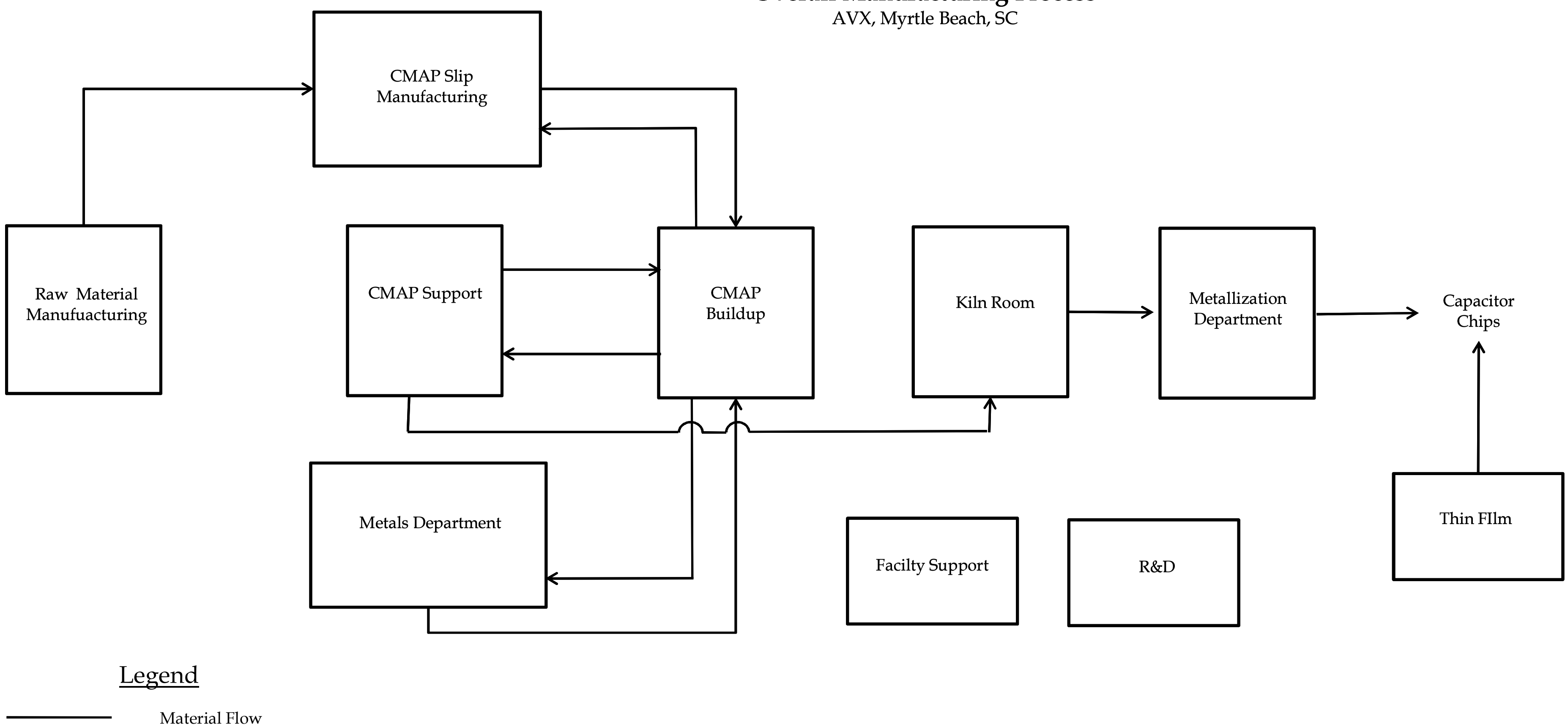
# FACILITY PLOT PLAN

# APPENDIX B

Process Flow Diagrams

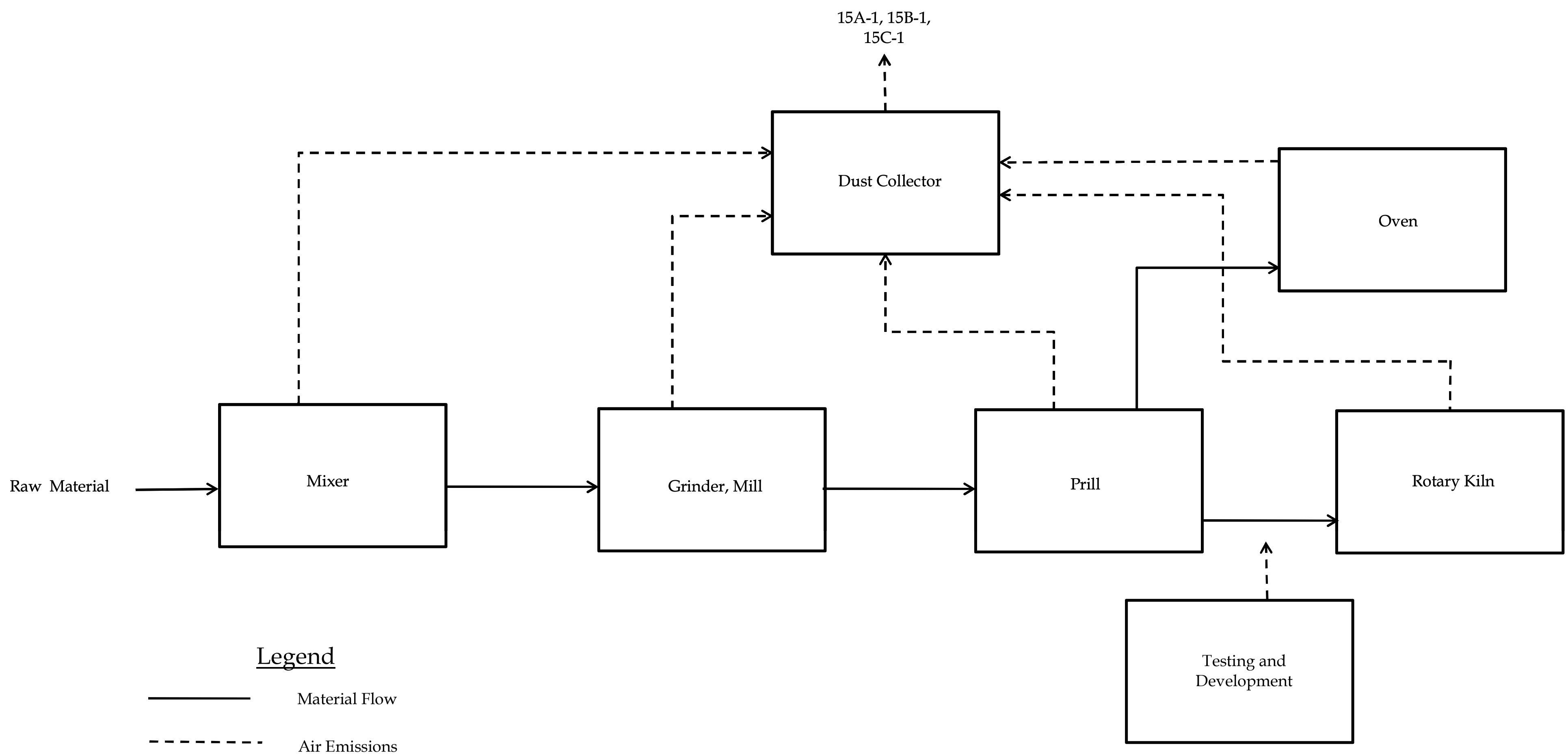
# Overall Manufacturing Process

AVX, Myrtle Beach, SC



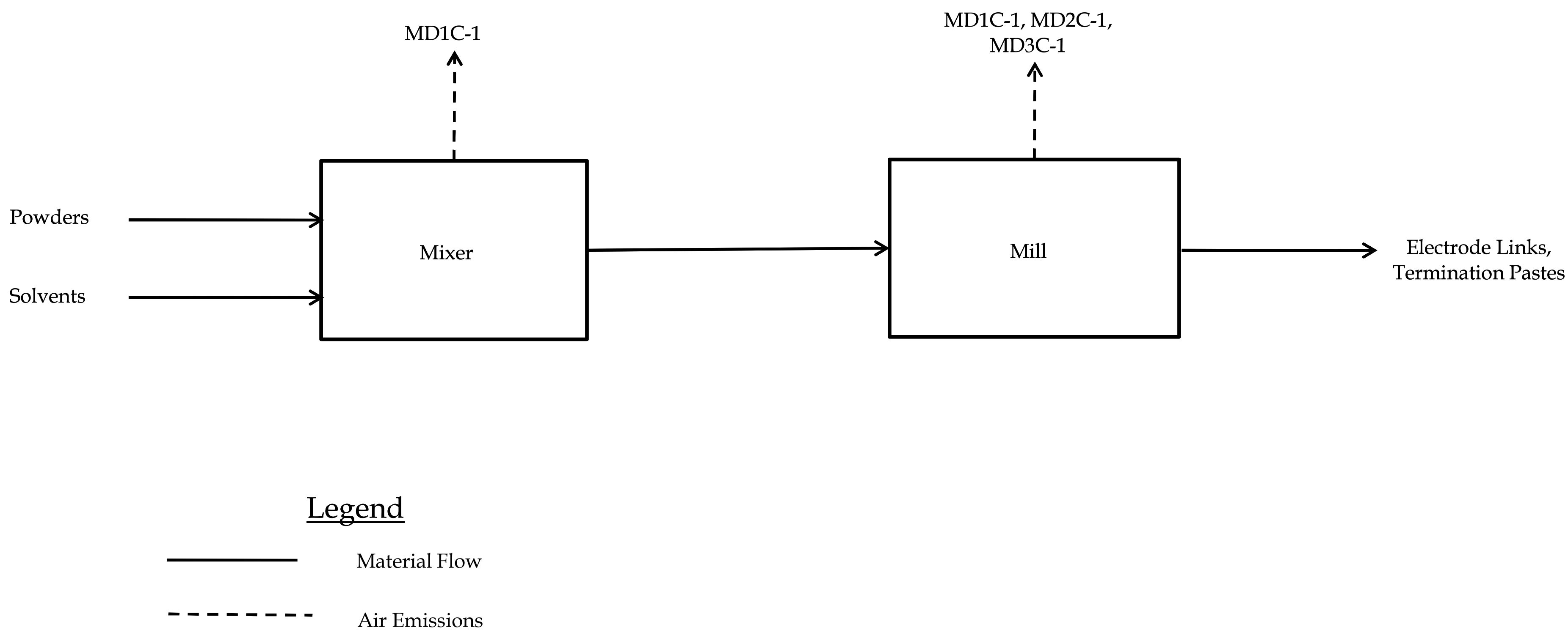
# Raw  Material Manufuacturing - General Process

AVX, Myrtle Beach, SC

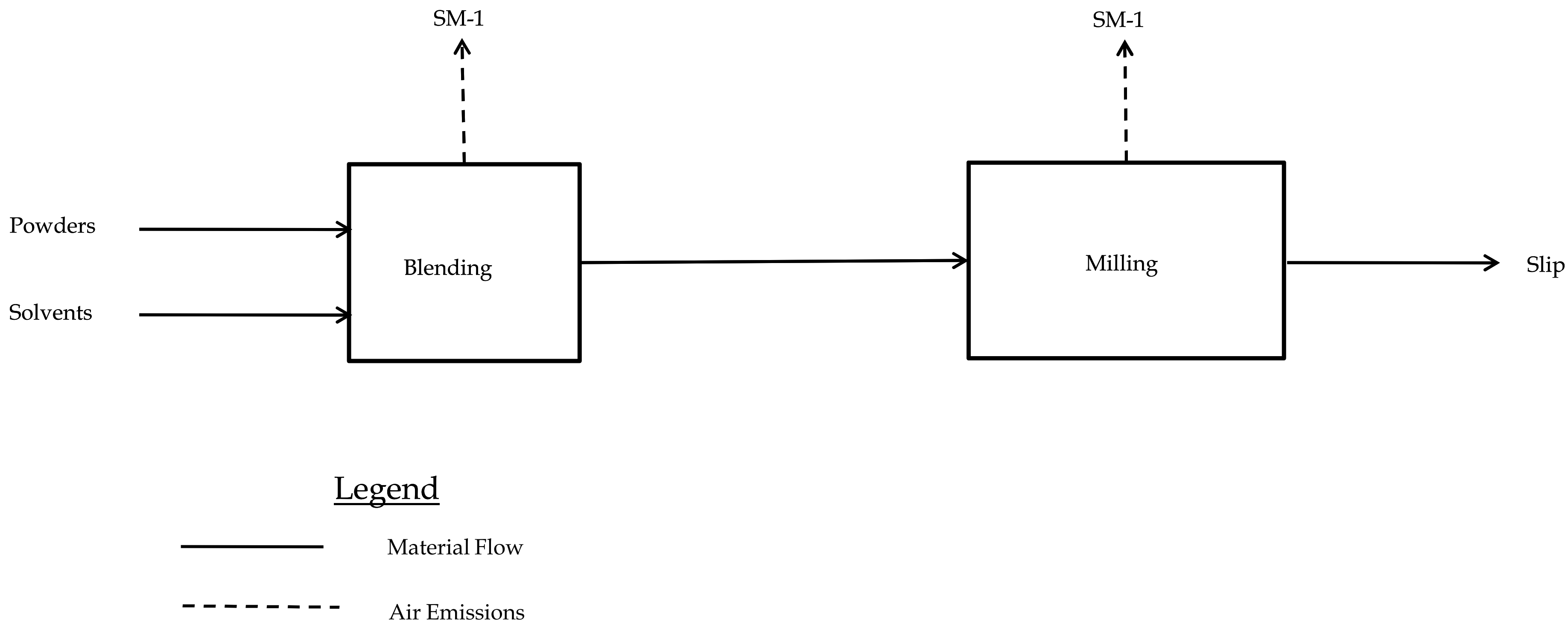


**Metals Department**

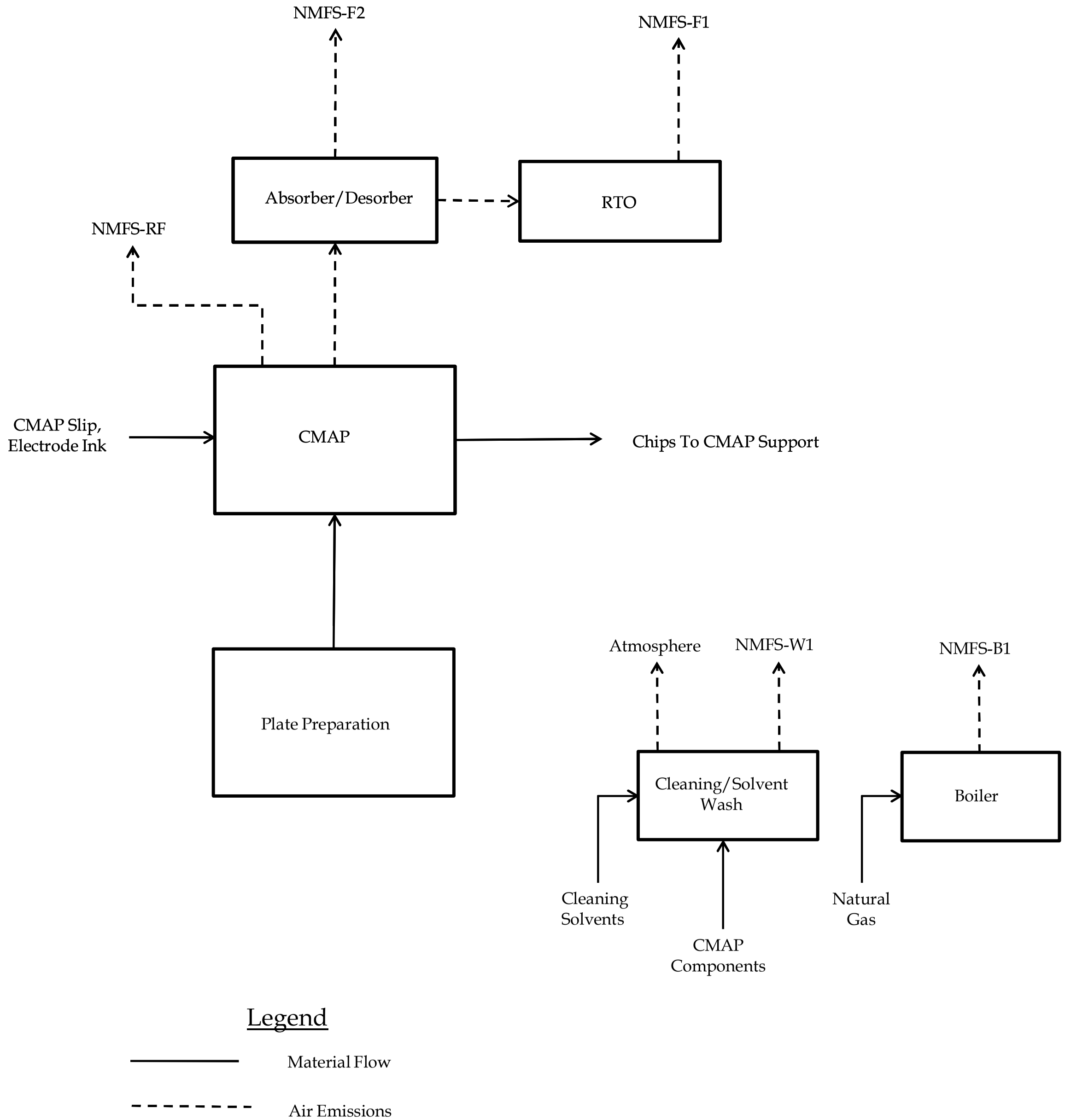
AVX, Myrtle Beach, SC



**Slip Manufacturing**
AVX, Myrtle Beach, SC

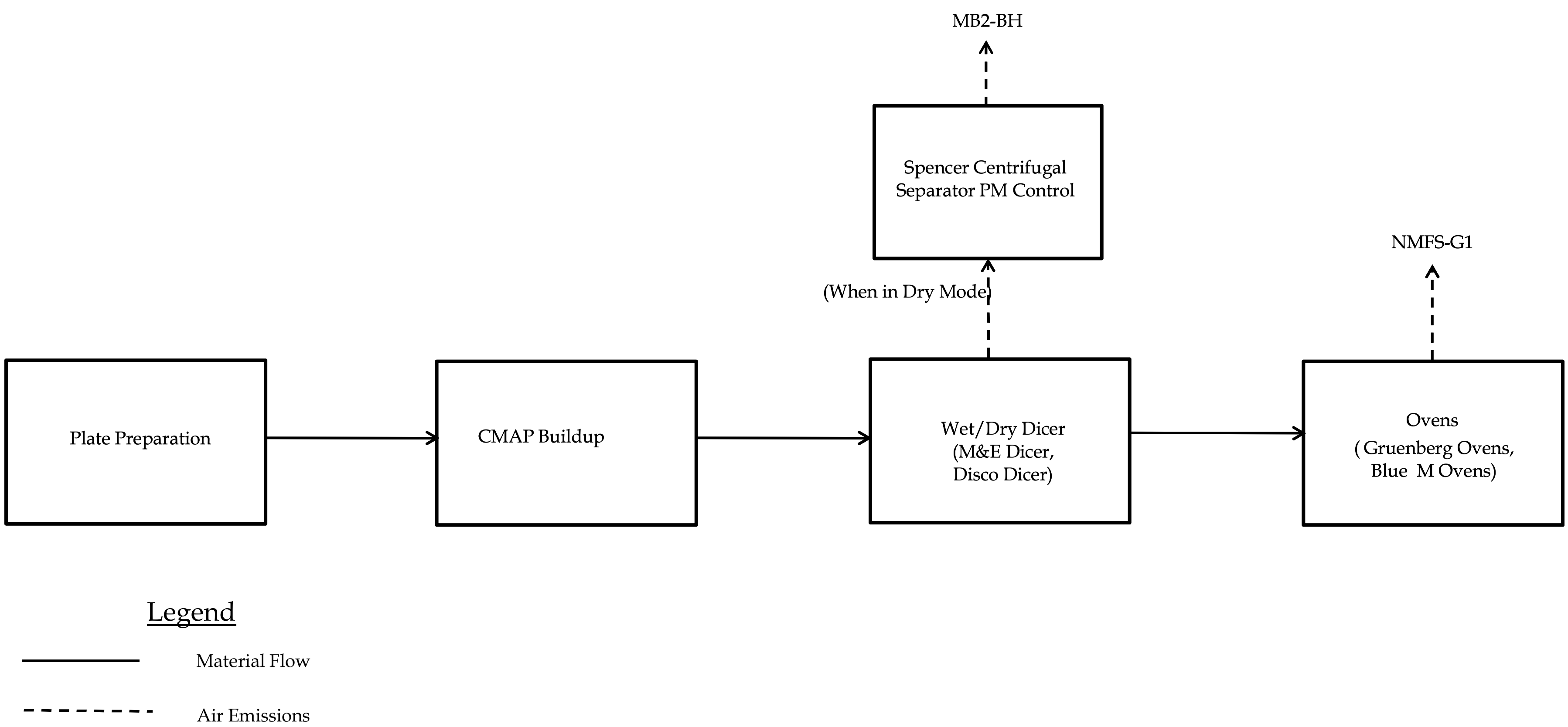


**CMAP**
AVX, Myrtle Beach, SC



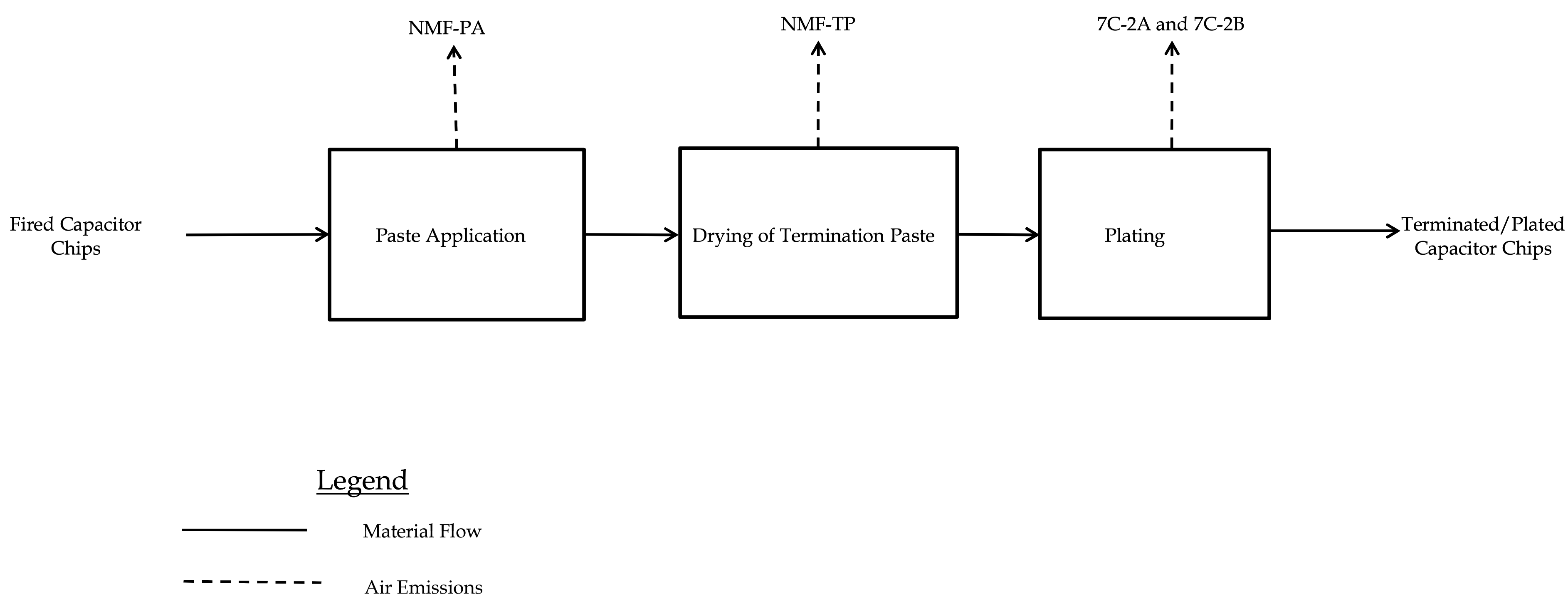
## CMAP Support

AVX, Myrtle Beach, SC

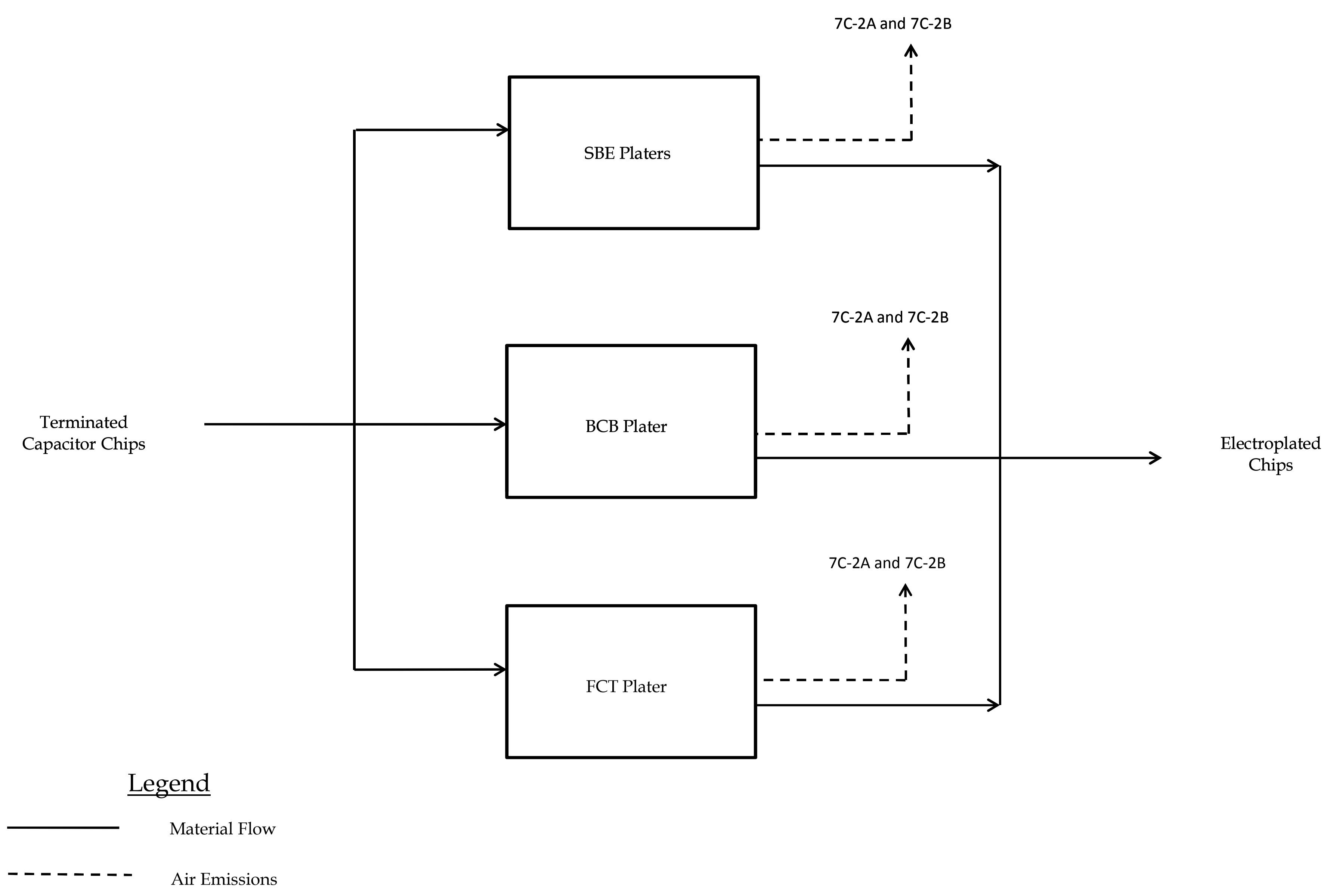


# Metallization Department

AVX, Myrtle Beach, SC



**Plating Department**
AVX, Myrtle Beach, SC



## APPENDIX C

Equipment Identification

**TABLE 1**

Revised Title V Unit ID Cross Reference

AVX, Myrtle Beach, SC

| Revised Title V Unit IDs | Department | Former Unit ID |
|---|---|---|
| UNIT 14 | RMM | Unit 06 |
| UNIT 15 | Slip Mfg | Unit 04 |
| UNIT 16 | Metals | Unit 01 |
| UNIT 17 | CMAP Buildup | Unit 10 |
| UNIT 18 | CMAP Support | Unit 11 |
| UNIT 19 | Metallization | Unit 05 |
| UNIT 20 | Thin Film | Unit 13 |
| UNIT 21 | Misc Support | Unit 03 |
| DELETE | Plating Department[1] | Unit 02 |
| DELETE | MB1 CMAP Buildup[2] | Unit 07 |
| DELETE | MB1 CMAP Support[2] | Unit 08 |
| DELETE | MB1 Kiln Room[2] | Unit 09 |
| DELETE | MB2 Kiln Room[3] | Unit 12 |

Note:

1. 5 of 8 plating lines are insignificant. Moved into Unit 19
2. Manufacturing consolidation
3. CMAP Support now includes all burnout ovens

**TABLE 2**

Equipment Cross Reference - RMM

AVX Corporation, Myrtle Beach, SC

| CURRENT TITLE V PERMIT | | | | | | |
|---|---|---|---|---|---|---|
| Unit No. | Unit Desc. | ID | Equip. Desc. | Additional Info. | No. Units | Notes |
| 6 | RMM | SG3 | VOID - Roller Hearth Kiln | | 1 | Removed |
| | | SG5 | VOID - Barium Chloride Tank | | 1 | Removed |
| | | SG7 & SG8 | VOID - Mixing Tanks #1 & #2 | | 2 | Removed |
| | | SG9 | VOID - Mixing Tank #3 | | 1 | Removed |
| | | SG10 | VOID - Q320 Centrifuge | | 1 | Removed |
| | | SG13 | VOID - Barium Chloride Tank | | 1 | Removed |
| | | DOA - DOK | Drying Ovens | exhausting heat | 11 | In operation. Move to insignificant |
| | | BL1 | Blender | Prep of ceramic | 1 | In operation |
| | | B4 | Blender | Prep of ceramic | 1 | In operation |
| | | B5 | Blender | Prep of ceramic | 1 | In operation |
| | | CSB1 | Cone Screw Blender | 1,000,000 lb/yr | 1 | In operation. Not exhausted. Enclosed |
| | | B6 | Dynamic Air Mixer | 1,000,000 lb/yr | 1 | Removed |
| | | RMMPS1 - RMMPS3 | Pre-Slurry Carts | to slurry mixes. | 3 | (2) pre-slurry carts |
| | | V1 | Vat for BaCO3 | weighing/batching | 1 | Removed |
| | | V3 | Vat for BaCO3 | weighing/batching | 1 | Removed |
| | | V8 | Vat for Bismuth Titanate | weighing/batching | 1 | Removed |
| | | V5 | Vat for lead bismuth titanate | weighing/batching | 1 | Removed |
| | | V7 | Vat for lead niobate | weighing/batching | 1 | Removed |
| | | V2 | Vat for lead | weighing/batching | 1 | Removed |
| | | V4 | Vat for TiO2 | weighing/batching | 1 | Removed |
| | | V6 | Vat for Y832 | 1,100,000 lb/yr | 1 | Removed |
| | | PR1 | Ceramic priller (3 pump) | 300,000 lb/yr | 1 | In operation |
| | | PR2 | Ceramic priller (3 pump) | 300,000 lb/yr | 1 | In operation |
| | | PR3 | Ceramic priller (1 pump) | 100,000 lb/yr | 1 | In operation |
| | | PR4 | Ceramic priller (3 pump) | 300,000 lb/yr | 1 | In operation |
| | | PR5 | Ceramic priller (3 pump) | 300,000 lb/yr | 1 | In operation |
| | | PR6 - PR9 | Ceramic prillers (4 pump) | 400,000 lb/yr ea. | 4 | 2 In operation |
| | | RTF-1 | Rapid temp furnace | calcining/recalcining | 1 | In operation. Insignificant T&D furnace |
| | | RTF-2 | Rapid temp furnace | calcining/recalcining | 1 | In operation. Insignificant T&D furnace |
| | | RTF-3 | Rapid temp furnace | calcining/recalcining | 1 | In operation. Insignificant T&D furnace |
| | | G1 & G3 | Prill Grinders | 700,000 lb/yr ea. | 2 | In operation. 350,000 lb/yr |
| | | G4 & G5 | Prill Grinders | 700,000 lb/yr ea. | 2 | In operation. 350,000 lb/yr |
| | | M1 - M3 | Sweco Mills | PSD rated at 800 | 2 | Removed |
| | | M7 - M12 | Sweco Mills | PSD rated at 800 | 6 | Removed |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | CM-1 & CM-2 | 5 Chamber mill T&D | | 2 | In operation. No exhaust. |
| | | BMO-1 | Blue M oven T&D | | 1 | In operation. T&D |
| | | RMMLAB | Lead blower | | 1 | Removed |
| | | RMM1 - 2 | Blue M ovens | | 2 | In operation. |
| | | RMMA - L | Blue M ovens | | 12 | 6 In operation. 6 Removed |
| | | M45-6 - M45-9 | M18 Sweco Mill T&D | | 4 | In operation. Wet process. No emissions |
| | | PLB | Ceramic priller | | 1 | In operation. T&D |
| | | RK1 - RK4 | Rotary kiln - tape reclaim | | 4 | In operation |
| | | SMM1 - SMM3 | Spex mixer mill T&D | | 3 | In operation |
| | | VK1 - VK16 | Vertical kilns | | 16 | In operation |
| | | AG1 | Storage tank T&D | | 1 | In operation. No exhaust. |

| REVISED TITLE V PERMIT | | | | | |
|---|---|---|---|---|---|
| Unit No. | Desc. | Equip. ID | No. Units | Equip. Desc. | Includes/Notes |
| 14 | RMM | RMMPSC | 6 | 6 Prep devices for adding dry materials to slurry | (3) Blenders, (3) Pre-slurry carts |
| | | RMMPG | 4 | 4 Machines for grinding ceramic prills | (4) Prill grinders |
| | | RMMPRILL | 7 | 7 Machines for making ceramic prills | (8) Ceramic prillers |
| | | INSIGNIFICANT EQUIPMENT | | | |
| | | RMMDO | 11 | 11 Ovens to remove detergent/dispersant from material | Drying ovens |
| | | RMMRTF | 3 | 3 Rapid temperature furnaces in T&D | Rapid Temperature Furnaces |
| | | RMMTS | 2 | 2 Tape shredders | Tape shredders |
| | | RMMOV | 9 | 9 Ovens for moisture remove in testing and development | Blue M |
| | | RMMTDP | 1 | Testing and development priller | Small prillers |
| | | RMMKILN | 4 | 4 Small rotary kilns | Rotary kilns |
| | | RMMSPEX | 3 | 3 Mixers in testing and development | Spex mixers |
| | | RMMVK | 16 | 16 Calcining kilns | Vertical kilns |
| | | RMMTG | 1 | Transguard | Transguard |

**TABLE 3**

Equipment Cross Reference - Slip

AVX Corporation, Myrtle Beach, SC

| CURRENT TITLE V PERMIT | | | | | | |
|---|---|---|---|---|---|---|
| **Unit No.** | **Unit Desc.** | **ID** | **Equip. Desc.** | **Additional Info.** | **No. Units** | **Notes** |
| 4 | Slip Mfg. | KMS1 - KMS3 | Kady Zolvers#1 - #3 | PSD 600 kg/day ea. | 3 | Removed |
| | | MCD1 - MCD5 | MC Dispersers #1 - #5 | PSD 800 kg/day ea. | 5 | 2 Removed |
| | | NM1 | Netzsch Mill #1 | PSD 2400 kg/day | 1 | In Operation |
| | | NM2 | Netzsch Mill #2 | PSD 2400 kg/day | 1 | Removed |
| | | NM3 | Netzsch Mill #3 | PSD 2400 kg/day | 1 | Removed |
| | | S1 | Sweco M18 Mill #1 | PSD 800 kg/day | 1 | In Operation |
| | | S2 | Sweco M18 Mill #2 | PSD 800 kg/day | 1 | In Operation |
| | | S3 | Sweco M18 Mill #3 | PSD 800 kg/day | 1 | In Operation |
| | | S4 - S6 | Sweco M18 Mills #4 - #6 | PSD 800 kg/day ea. | 3 | (4) In operation |
| | | SG1 - SG11 | Sweco M45 Mills #1 - #11 | PSD 800 kg/day ea. | 11 | In Operation |
| | | KM1 | Kady Mill #1 | Blend 2,400 kg/day | 1 | Removed |
| | | KM2 | Kady Mill #2 | Blending 2,400 | 1 | Removed |
| | | KM3 | Kady Mill #3 | Blending 2,400 | 1 | Removed |
| | | MC1 - MC7 | MC Mixers #1 - #7 | PSD 800 kg/day ea. | 7 | In Operation |
| | | AVM1 | Armenco Vacuum Mixer | Blending 240 kg/day | 1 | In Operation |
| | | SPM1 | Stock pot mixers | adds solvent | 1 | 27 Tanks |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | BA1 | Bioact 113 ultrasonic cleaner | | 1 | In Operation |
| | | DU1 | Distillation Unit: Bioact | | 1 | In Operation |
| | | FG-3 | Fume hood | testing and dev | 1 | In Operation |
| | | FU-1 | Small furnace fume hood | testing and dev | 1 | In Operation |
| | | SM5 | Support maintenance: cleaning | | 1 | In Operation. Emissions captured in dept. |

| REVISED TITLE V PERMIT | | | | | |
|---|---|---|---|---|---|
| **Unit No.** | **Unit Desc.** | **Equip. ID** | **No. Units** | **Equip. Desc.** | **Includes/Notes** |
| 15 | Slip Mfg. | SMILL | 19 | 19 Machines to mill ceramic material | (1) Netzsch, (17) Sweco |
| | | SMIX | 35 | 35 Machines to mix ceramic material components | (7) MC, (1) Armenco, (27) pot mixers |
| | | INSIGNIFICANT EQUIPMENT | | | |
| | | BIOACT | 1 | Bioact cleaning system | Bioact ultrasonic cleaner & distiller |
| | | SFH | 1 | Fume hood | Fume hood |
| | | SO | 1 | Lab oven and fume hood | Lab oven fume hood |

**TABLE 4**

Summary Of Potential Emissions

AVX Corporation, Myrtle Beach, SC

**CURRENT TITLE V PERMIT**

| Unit No. | Unit Desc. | ID | Equip. Desc. | Additional Info. | No. Units | Notes |
|---|---|---|---|---|---|---|
| 1 | Metals | BM-4 | Bead Mill (small) | | 1 | Removed |
| | | BM-5 | Bead Mill (large) | | 1 | Removed |
| | | BM-6 | Bead Mill (large) | | 1 | Removed |
| | | BM-7 | Bead Mill (large) | | 1 | Removed |
| | | BM-8 | Bead Mill (large) | | 1 | Removed |
| | | BM-9 | Bead Mill (large) | | 1 | Removed |
| | | BM-10 | Bead Mill (large) | | 1 | Removed |
| | | BRM-1 | Buhler Roll Mill #1 | | 3 | In Operation |
| | | BRM-2 | Buhler Roll Mill #2 | | | In Operation |
| | | BRM-3 | Buhler Roll Mill #3 | | | In Operation |
| | | DM-1 | Dyno Mill | | 1 | Removed |
| | | KMS-1 | Kady Zolver #1 | | 3 | In Operation |
| | | KMS-2 | Kady Zolver #2 | | | In Operation |
| | | KMS-3 | Kady Zolver #3 | | | In Operation |
| | | TRM-1 | Three Roll Mill (large) | | 1 | In Operation |
| | | TRM-2 | Three Roll Mill (small) | | 1 | In Operation |
| | | TRM-3 | Three Roll Mill (large) | | 1 | Removed |
| | | TRM-4 | Three Roll Mill (small) | | 1 | Removed |
| | | AM-1 | Air Mixer #1 | | 6 | In Operation |
| | | AM-2 | Air Mixer #2 | | | In Operation |
| | | AM-3 | Air Mixer #3 | | | In Operation |
| | | AM-4 | Air Mixer #4 | | | In Operation |
| | | AM-5 | Air Mixer #5 | | | In Operation |
| | | AM-6 | Air Mixer #6 | | | In Operation |
| | | AVM1 | Armenco Vacuum Mixer | | 1 | In Operation |
| | | H-1 - H-7 | Hockmeyer Mixers #1 - #7 | | 12 | In Operation |
| | | H-8 - H-12 | Hockmeyer Mixers #8 - #12 | | | In Operation |
| | | MM-1 | Meyers Mixer #1 | | 2 | In Operation |
| | | MM-2 | Meyers Mixer #2 | | | In Operation |
| | | PD-2 | PD2 Mixer | | 1 | In Operation |
| | | HDM1 - HDM5 | Planetary Mixers #1 - #5 | | 5 | In Operation |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | FP-1 & FP-2 | (2) Filter presses | 500 kg/day ea. | 2 | In Operation |
| | | CT-1 & CT-2 | (2) Centrifuges | 200 kg/day ea. | 2 | Removed |
| | | FH-1 & FH-2 | (2) Fume hoods | | 2 | In Operation |
| | | FP-3 | Kyocera filter press | 500 kg/day | 3 | Removed |
| | | BA2 | Metals maintenance | | 1 | Removed |
| | | SW4 & SW5 | (2) Solvent wash sinks | | 2 | In Operation |
| | | SM4 | Support maintenance | | 1 | Removed |

**REVISED TITLE V PERMIT**

| Unit No. | Unit Desc. | Equip. ID | No. Units | Equip. Desc. | Includes/Notes |
|---|---|---|---|---|---|
| 16 | Metals | MMILL | 8 | 8 Machines to mill electrode ink | (3) Buhler Roll, (3) Kady Zolver, (2) Three Roll |
| | | MMIX | 27 | 27 Machines to mix electrode inke components | (6) Air, (1) Armenco Vacuum, (12) Kockmeyer, (2) Meyers, (1) PD, (5) Planetary |
| | | INSIGNIFICANT EQUIPMENT | | | |
| | | MFP | 2 | 2 Filter presses | Filter presses |
| | | MPS | 1 | 1 Pot storage room exhaust | Pot room exhaust |
| | | MFH | 2 | 2 Lab fume hoods | Lab fume hoods |
| | | MSW | 2 | 2 Solvent wash sinks | Solvent wash sinks |
| | | MO | 1 | 1 Lab oven | Lab oven |

**TABLE 5**

Equipment Cross Reference - CMAP

AVX Corporation, Myrtle Beach, SC

**CURRENT TITLE V PERMIT**

| Unit No. | Unit Desc. | ID | Equip. Desc. | Additional Info. | No. Units | Notes |
|---|---|---|---|---|---|---|
| 7 | Slip Mfg. MB1 | C0 - C4 | CMAP machine | 1.8 million pcs/day | 5 | Linear SSBU & JH |
| | | C5 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C6 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C7 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C8 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C9 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C10 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C11 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C12 - C18 | CMAP machine | 1.8 million pcs/day | 7 | |
| | | C19 - C27 | CMAP machine | 1.8 million pcs/day | 9 | |
| | | C28 - C32 | CMAP machine | 1.8 million pcs/day | 5 | |
| | | C33 - C36 | CMAP machine | 1.8 million pcs/day | 4 | |
| | | C37 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | C38 - C40 | CMAP machine | 1.8 million pcs/day | 3 | |
| | | C41 - C53 | CMAP machine | 1.8 million pcs/day | 13 | |
| | | C54 | CMAP machine | 1.8 million pcs/day | 1 | |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | SRT1 - STR4 | Screen Room Tables | | 4 | In Operation |
| | | SRW1 | Screen Wash station w/ acetone | | 1 | In Operation. Remove: acetone |
| | | SW1 - SW3 | Solvent wash sink | | 3 | In Operation |
| 10 | Slip Mfg. MB2 | C200 - C207 | CMAP Machine | 1.8 million pcs/day | 8 | |
| | | C208 - C215 | CMAP Machine | 1.8 million pcs/day | 8 | |
| | | C216 - C223 | CMAP Machine | 1.8 million pcs/day | 8 | |
| | | C224 - C231 | CMAP Machine | 1.8 million pcs/day | 8 | |
| | | C232 - C239 | VOID CMAP Machine | | 8 | Remove |
| | | C240 - C247 | VOID CMAP Machine | | 8 | Remove |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | JHC1 | JHCMAP for chip fab. | | 1 | Remove |
| | | SC1 | SCMAP for chip fab. | | 1 | Remove |

**REVISED TITLE V PERMIT**

| Unit No. | Unit Desc. | Equip. ID | No. Units | Equip. Desc. | Includes/Notes |
|---|---|---|---|---|---|
| 17 | CMAP Buildup | CMAP | 24 | 24 Machines to manufacture capacitor chips | (24) CMAP machines |
| | | CMAPT | 2 | 2 Temporary CMAP machines | (2) CMAP machines |
| | | INSIGNIFICANT EQUIPMENT | | | |
| | | CSR | 1 | Screen Room | |
| | | CSWS | 3 | (3) Screen Wash station w/ acetone | 1 w/ acetone |

**TABLE 6**

Equipment Cross Reference - CMAP Support

AVX Corporation, Myrtle Beach, SC

**CURRENT TITLE V PERMIT**

| Unit No. | Unit Desc. | ID | Equip. Desc. | Additional Info. | No. Units | Notes |
|---|---|---|---|---|---|---|
| 8 | CMAP Supp. MB1 | D1 | Blue M Oven POM-7-336G-3 | drying. 341 BTU/min | 1 | Removed |
| | | D2 | Blue M Oven POM-7-336G-3 | drying. 341 BTU/min | 1 | In operation. Move to insig |
| | | CD1 - CD22 | Chip Dryers | moisture removal | 22 | Removed |
| | | GPBO-1 - GPBO-7 | Gruenberg Post Bake Oven | moisture removal. | 7 | In operation Move to insig |
| | | GPBO-11 - GPBO-12 | Gruenberg Post Bake Oven | moisture removal. | 2 | Removed |
| | | GPBO-13 - GPBO-16 | Gruenberg Post Bake Oven | moisture removal. | 4 | Removed |
| | | MTO1 & MTO2 | Microtech Oven 1 | Thermal release oven | 2 | MTO1 in operation. Move to insig |
| | | MTO3 & MTO4 | Microtech Oven 3 | Thermal release oven | 2 | Removed |
| | | DD-1 | Disco Dicer | 9.2 million pcs/day | 1 | In operation |
| | | DD-2 | Disco Dicer | 9.2 million pcs/day | 1 | In operation |
| | | DD-3 | Disco Dicer | 9.2 million pcs/day | 1 | In operation |
| | | DD-4 | Disco Dicer | 9.2 million pcs/day | 1 | In operation |
| | | DD-5 | Disco Dicer | 9.2 million pcs/day | 1 | In operation |
| | | DD-6 | Disco Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-1 | M&E Dicer | 9.2 million pcs/day | 1 | In operation |
| | | GS-2 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-4 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-5 & GS-6 | M&E Dicer | 9.2 million pcs/day | 2 | Removed |
| | | GS-7 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-8 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-9 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-10 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-11 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | GS-12 | M&E Dicer | 9.2 million pcs/day | 1 | Removed |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | BC1 | Blade cleaning with acetone | | | Remove. |
| | | KPA1 | Kraft paper applicator | | | Removed |
| | | NA1 | Nitto paper applicator | | | In Operation |
| | | SM1 | Support maint. alcohol cleaning | | | Removed |
| | | TA1 | Teslin paper applicator | | | In Operation |
| 11 | CMAP Supp. MB2 | BM-202 - BM-205 | Blue M Oven TA662G-1 | | 4 | In operation. Move to insig |
| | | DD-7 - DD-10 | Disco Dicer | | 4 | |
| | | GB232 - GB235 | Gruenberg Ovens | | 4 | In operation. Move to insig |
| | | LD1 - LD3 | Linear Dryers | | 3 | LD1 In operation. Move to insig. |
| | | LD4 | Linear Dryers | | 1 | In operation. Move to insig. |
| | | MTI-201 & MTI-202 | MTI Dicer | | 2 | |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | BC2 | Blade Cleaning w/ acetone | | | In operation. |
| | | NA2 | Nitto Paper Applicator | | | In Operation |
| 9 | Kiln Room MB1 | RA8 - RA13, RA29 & RA33 | Blue M Ovens CW-88OG | 512 BTU/min ea. | 8 | Removed |
| | | RA34 & RA37 | Blue M Ovens CW-88OG | 512 BTU/min ea. | 2 | Removed |
| | | BM27 | Blue M Oven POM-7-336F | 341 BTU/min | 1 | Removed |
| | | BM28 | Blue M Oven POM-7-336F | 342 BTU/min | 1 | Removed |
| | | BM64 | Blue M Oven POM-7-336F | 343 BTU/min | 1 | Removed |
| | | BM65 & BM66 | Blue M Oven POM-7-336F | 344 BTU/min ea | 2 | Removed |
| | | CL01 & CL02 | Cladan Kiln 315 | 682 BTU/min ea. | 2 | In operation, moving to MB2 |
| | | CL03 - CL07 | Cladan Kiln 316 | 682 BTU/min ea. | 3 | In operation, moving to MB2 |
| | | GB-1 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB2 & GB3 | Gruenberg Oven C135H1M | 1,366 BTU/min | 2 | Removed |
| | | GB4, GB5 & GB14 - GB20 | Gruenberg Oven C135H1M | 1,366 BTU/min | 9 | Removed |
| | | GB36 & GB38 | Gruenberg Oven C135H1M | 1,366 BTU/min | 2 | Removed |
| | | GB39, GB40, GB42, GB43 & GB46 | Gruenberg Oven C135H1M | 1,366 BTU/min | 5 | Removed |
| | | GB47 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB48 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB59 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |

**REVISED TITLE V PERMIT**

| Unit No. | Unit Desc. | Equip. ID | No. Units | Equip. Desc. | Includes/Notes |
|---|---|---|---|---|---|
| 18 | CMAP Support | DD | 5 | 5 Machines for dry dicing chips | Disco, M&E gang saw |
| | | INSIGNIFICANT EQUIPMENT | | | |
| | | BO | 36 | 36 Ovens for chip binder burnout | (30) Gruenberg, (2) Sierra Therm, (1) Nitrogen |
| | | FK | 24 | Firing Kilns | (9) Cladan, (6) Harper, (9) Tokai |
| | | CSO | 16 | 16 Low temperature moisture removal ovens | Gruenberg (Blue M) and pre-dice |
| | | CSCS | 1 | Blade cleaning station | Cleaning station |
| | | CSPA | 2 | 2 Machines for adding paper to plates | (1) Nitto, (1) Bilco |
| | | CSCD | 2 | 2 Chip dryers | (1) green corner rounding, (1) post fire |
| | | CSTR | 1 | 1 Thermal release ovens | Microtech |

**TABLE 6**

Equipment Cross Reference - CMAP Support

AVX Corporation, Myrtle Beach, SC

| CURRENT TITLE V PERMIT | | | | | | |
|---|---|---|---|---|---|---|
| **Unit No.** | **Unit Desc.** | **ID** | **Equip. Desc.** | **Additional Info.** | **No. Units** | **Notes** |
| 9 | Kiln Room MB1 | GB60 - G62 | Gruenberg Oven C135H1M | 1,366 BTU/min | 3 | Removed |
| | | GB63, GB65 - GB79 | Gruenberg Oven C135H1M | 1,366 BTU/min | 16 | Removed |
| | | GB81 - GB99 | Gruenberg Oven C135H1M | 1,366 BTU/min | 20 | Removed |
| | | GB100 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB101 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB102 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB111 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB112 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB113 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB114 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB115 & GB116 | Gruenberg Oven C135H1M | 1,366 BTU/min | 2 | Removed |
| | | GB117 & GB120 | Gruenberg Oven C135H1M | 1,366 BTU/min | 2 | Removed |
| | | GB126 - GB129 | Gruenberg Oven C135H1M | 1,366 BTU/min | 4 | Removed |
| | | GB130 | Gruenberg Oven C135H1M | 1,366 BTU/min | 1 | Removed |
| | | GB131 - GB180 | Gruenberg Oven C135H1M | 1,366 BTU/min | 50 | Removed |
| | | GB182 - GB184 | Gruenberg Oven C135H1M | 1,366 BTU/min | 3 | Removed |
| | | HA9 | Harper Double Hearth Kiln | 13,298 BTU/min | 1 | Removed |
| | | HA10 & HA11 | Harper Double Hearth Kiln | 13,298 BTU/min | 2 | Removed |
| | | HA12 | Harper Double Hearth Kiln | 13,298 BTU/min | 1 | Removed |
| | | HA15 & HA16 | Harper Double Hearth Kiln | 13,298 BTU/min | 2 | Removed |
| | | HA17 & HA18 | Harper Double Hearth Kiln | 13,298 BTU/min | 2 | Removed |
| | | HA1 - HA7 | Harper Double Hearth Kiln | 13,298 BTU/min | 7 | HA1 - 6 in operation. HA7 Removed |
| | | HA14 | Harper Double Hearth Kiln | 13,298 BTU/min | 1 | Removed |
| | | N13 & N14 | Sierra Therm oven 2k26-91C69-7AI | 3,182 BTU/min ea. | 2 | N14 in operation. N13 Removed. |
| | | N15 | Sierra Therm oven 2k26-91C69-7AI | 3,182 BTU/min | 1 | In operation |
| | | TK1 - TK5 & TK9 | Tokai Continuous Kiln | 10,415 BTU/min ea. | 6 | TK1 - 3 in operation. |
| | | TK6 & TK7 | Tokai Continuous Kiln | 10,415 BTU/min ea. | 2 | Removed |
| | | NNE1 - NNE4 | Tokai Non-Noble Kiln | 63 KVA ea. | 4 | In operation |
| | | NNE5 - NNE9 | Tokai Non-Noble Kiln | 63 KVA ea. | 5 | NNE5 and 6 in operation. |
| | | N5 | WJ Oven 12CA-87 | 2,557 BTU/min | 1 | Removed |
| | | N7 - N10 | WJ Oven 12CA-87 | 2,557 BTU/min | 4 | Removed |
| | | N12 | WJ Oven 12CA-87 | 2,557 BTU/min | 1 | Removed |
| 12 | Kiln Room MB2 | B201 | MB2 Boiler | 13.4 MMBtu/hr, Subpart Dc | | In operation. Add to Unit ID 21 |
| | | SM2 | Support Maintenance | cleaning | 1 | Remove - No cleaning tracked. |
| | | BM-201 | Blue M Oven TA662G-1 | 325 BTU/min | 1 | Removed |
| | | GB201 - GB207 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 7 | In operation |
| | | GB208 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 1 | In operation |
| | | GB209 - GB215 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 7 | In operation |
| | | GB216 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 1 | In operation |
| | | GB217 - GB223 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 7 | In operation |
| | | GB224 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 1 | In operation |
| | | GB225 - GB231 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 7 | In operation |
| | | GB236 - GB284 | Gruenberg Ovens C135H11M | 1,366 BTU/min | 49 | Removed |
| | | TK1 | Tokai Continuous Kiln | 10,415 BTU/min | 1 | Removed |
| | | TK2 & TK3 | Tokai Continuous Kiln | 10,415 BTU/min | 2 | Removed |
| | | TK8 - TK12 | Tokai Continuous Kiln | 10,415 BTU/min | 2 | Removed |
| | | NNE20 - NNE25 | Tokai Non-Noble Kiln | 65 KVA | 6 | Removed |
| | | NNE26 - NNE31 | Tokai Non-Noble Kiln | 66 KVA | 6 | Removed |

**TABLE 7**

Equipment Cross Reference - Metallization

AVX Corporation, Myrtle Beach, SC

**CURRENT TITLE V PERMIT**

| Unit No. | Unit Desc. | ID | Equip. Desc. | Additional Info. | No. Units | Notes |
|---|---|---|---|---|---|---|
| 5 | Termination | CS1 - CS5 | Chipstar CS-325 Ovens #1 - #5 | Ink drying 313 Btu/min ea. | 5 | In operation |
| | | CS6 - CS15 | Chipstar CS-325 Ovens #6 - #15 | Ink drying 313 Btu/min ea. | 10 | In operation |
| | | CS16 | Chipstar CS-325 Oven #16 | Ink drying 313 Btu/min | 1 | In operation |
| | | CS17 - CS24 | Chipstar CS-325 Oven #17 - #24 | Ink drying 313 Btu/min ea. | 8 | Remove |
| | | CS30 | Chipstar CS-325 (Modified) Oven #30 | Ink drying 313 Btu/min ea. | 1 | Remove |
| | | MGB | Gruenberg Oven L3-1H506 | K/day | 1 | Remove |
| | | LK-1 - KL-4 | Koyo-Lindburg Ovens #1 - #4 | Copper term. 51.6 KVA ea. | 4 | Remove |
| | | KL-5 | Koyo-Lindburg Ovens #5 | Copper term. 51.6 KVA | 1 | Remove |
| | | KL-6 | Koyo-Lindburg Ovens #6 | Copper term. 51.6 KVA | 1 | In operation |
| | | KL-7 - KL-12 | Koyo-Lindburg Ovens #7 - #12 | Copper term. 51.6 KVA ea. | 5 | In operation |
| | | P20 - P24 | Palomar 2007 Ovens | Ink drying 313 Btu/min ea. | 5 | Remove |
| | | P25 - P31 | Palomar 2009 Ovens | Ink drying 313 Btu/min ea. | 7 | Remove |
| | | ST-8 - ST-10 | Sierra Therm Ovens | silver term 56 KVA | 3 | Remove |
| | | ST-11 | Sierra Therm Oven | silver term 56 KVA | 1 | Remove |
| | | ST-12 - ST-16 | Sierra Therm Ovens | silver term 56 KVA | 5 | In operation |
| | | WJO | WJ Oven | Moisture/organic removal 260 | 1 | In operation |
| | | WJ-7 | WJ Oven 24CA-87 | silver term 45 KVA | 1 | In operation |
| | | PO1 | Palomar 2001 Modified Oven | Ink drying 313 Btu/min | 1 | In operation |
| | | PO2 | Palomar 2009 Modified Oven | Ink drying 313 Btu/min | 1 | In operation |
| | | P1 | Palomar 246 System | Ink drying 313 Btu/min | 1 | In operation |
| | | P2 | Palomar 246 System | Ink drying 313 Btu/min | 1 | In operation |
| | | P3 & P4 | Palomar 246 System | Ink drying 313 Btu/min | 2 | In operation |
| | | P5 & P6 | Palomar 246 System | Ink drying 313 Btu/min | 2 | In operation |
| | | P7 - P9 | Palomar 246 System | Ink drying 313 Btu/min | 3 | In operation |
| | | P10 - P16 | Palomar 246 System | Ink drying 313 Btu/min | 7 | Remove |
| | | P17 | Palomar 246 System | Ink drying 313 Btu/min | 1 | In operation |
| | | P18 | Palomar 246 System | Ink drying 313 Btu/min | 1 | Remove |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | L1 - L5 | Lasers | 260 kg/day | 5 | In operation |
| | | SW6 & SW7 | Solvent wash stations | | 2 | 1 in operation |
| 2 | Plating | A1 | Autoline Barrel #1 | Ni, Sn/Pb 276 barrel/day | 1 | Temporarily in operation |
| | | A2 | Autoline Barrel #2 | Ni, Sn/Pb 276 barrel/day | 1 | Remove |
| | | A3 | Autoline Barrel #3 | Ni, Sn/Pb 276 barrel/day | 1 | Remove |
| | | A4 | Autoline Barrel #4 | Ni, Sn/Pb 276 barrel/day | 1 | Remove |
| | | A5 | Autoline Barrel #5 | Ni, Sn/Pb 276 barrel/day | 1 | Remove |
| | | GP-1 | Gold Plating | 200 barrel/mo | 1 | Changing to SBE process |
| | | RF-1 | RFT Plater #1 | 15 KVA | 1 | Remove |
| | | RF-2 RF-3 | RFT Platers #2 & #3 | 15 KVA | 2 | Remove |
| | | RF-4 | RFT Plater #4 | 15 KVA | 1 | Remove |
| | | INSIGNIFICANT EQUIPMENT | | | | |
| | | PL-1 - PL-6 | Blue M ovens for moisture removal | Various btu/min | 6 | 4 In operation |
| | | SS1 & SS2 | Solder stations | 260 kg/day | 2 | In operation |

**REVISED TITLE V PERMIT**

| Unit No. | Unit Desc. | Equip. ID | No. Units | Equip. Desc. | Includes/Notes |
|---|---|---|---|---|---|
| 19 | Metallization | TTOOL | 20 | 20 Systems that apply termination paste to chips | (6) Palomar, (8) Chipstar, (6) Quicksilver |
| | | TOVEN | 9 | 9 Ovens to cure terminated chips | (6) Koyo-Lindburg, (3) Sierra Therm |
| | | PBSBE | 2 | 2 Ni/Sn/Pb SBE plating lines | (2) 95 L lines and (1) 130 L line |
| | | AUTO | 1 | Autoline Barrel #1 | Remain in operation through 2010 |
| | | INSIGNIFICANT EQUIPMENT | | | |
| | | SBE | 3 | 3 SBE Plating lines | 3 SBE Plating (Ni/Sn and Cu) |
| | | BCB | 2 | 2 BCB plating lines | BCB Plating |
| | | FCT | 1 | 1 FCT plating line | FCT Plating |
| | | GPL | 1 | 1 Manual gold plating line | Gold plating |
| | | PDD | 11 | 11 Plating dyers for moisture removal | Drying ovens |
| | | PDO | 1 | 1 plate drying oven for moisture removal | Oven for drying cleaned build up plates |
| | | CO | 1 | 1 Copper coupon oven | Oven for drying quality control coupon paste |
| | | TL | 5 | 5 Labeling lasers | Labeling lasers |
| | | TSW | 2 | 1 Solvent wash stations | 1 Solvent wash stations |

**Table 8**

Equipment Cross Reference - Thin Film Process

AVX Corporation, Myrtle Beach, SC

| CURRENT TITLE V PERMIT | | | | | | |
|---|---|---|---|---|---|---|
| **Unit No.** | **Unit Desc.** | **ID** | **Equip. Desc.** | **Additional Info.** | **No. Units** | **Notes** |
| 13 | Thin Film | TFP | Thin Film Process | | 1 | |

| REVISED TITLE V PERMIT | | | | | |
|---|---|---|---|---|---|
| **Unit No.** | **Unit Desc.** | **Equip. ID** | **No. Units** | **Equip. Desc.** | **Includes/Notes** |
| 20 | Thin Film | TFP | 1 | Thin Film Process | |

**TABLE 9**

Equipment Cross Reference - Miscellaneous Support

AVX Corporation, Myrtle Beach, SC

| ID | Equip. Desc. | Additional Info. | No. Units | Notes |
|---|---|---|---|---|
| E4 | EG (MIS) | 245 kW | 1 | Removed |
| E5 | EG (MIS) | 260 kW | 1 | In operation |
| E6 | EG (RMM & Calcining) | 600kW | 1 | In operation. |
| E7 | EG (Sol Gel) | 565 kW | 1 | In operation |
| STR1 | Stripping Tower #1 | 100 gpm | 1 | In operation |
| STR2 | Stripping Tower #2 | 10 gpm | 1 | Removed |
| SM3 | Support Maintenance for MB1 | Cleaning | 1 | Removed. Captured by dept. |
| B201 | 13.4 MMBtu/hr Boiler | | 1 | In operation |
| INSIGNIFICANT EQUIPMENT | | | | |
| E1 | EG (CMAP) | 100 kW | 1 | In operation. Moved to Kiln Rm |
| B1 | Plating boiler | 0.392 MMBtu/hr | 1 | In operation |
| B2 | Plating boiler | 0.392 MMBtu/hr | 1 | In operation |
| B3 | Plating boiler | 0776 MMBtu/hr | 1 | In operation |
| CT1 | Cooling Tower 1 | | 1 | In operation |
| CTA | Cooling Tower 2A | | 1 | In operation |
| CTC | Cooling Tower 2C | | 1 | In operation |
| WL-90 | Boiler for in MB1: CMAP | 0.998 MMBtu/hr | 1 | Removed |
| PDG | Product Development Group | R&D | 1 | Removed |
| E3 | EG (Kiln Room) | 75 kW | 1 | Removed |
| DFP | Diesel Fire Pump | 87 bHp | 1 | In operation |

| Unit No. | Unit Desc. | Equip. ID | No. Units | Equip. Desc. | Includes/Notes |
|---|---|---|---|---|---|
| 21 | Misc Support | ST | 1 | 100 gpm Groundwater stripping tower | |
| | | B201 | 1 | 16.4 MMBtu/hr natural gas-fired boiler | |
| | | SS | 4 | 4 Soldering Stations (Lot Quality, Plating, and QC) | 8 total. 3 pots with hoods, wave solder. 4 not vented |
| | | INSIGNIFICANT EQUIPMENT | | | |
| | | E1 | 1 | 100 kW EG (Kiln Room) | |
| | | E5 | 1 | 260 kW EG (MIS) | |
| | | E6 | 1 | 600 kW EG (RMM) | |
| | | E7 | 1 | 565 kW EG (Sol Gel) | |
| | | DFP | 1 | Diesel Fire Pump | |
| | | B1 | 1 | 0.392 MMBtu/hr Plating boiler | |
| | | B2 | 1 | 0.392 MMBtu/hr Plating boiler | |
| | | B3 | 1 | 0.776 MMBtu/hr Plating boiler | |
| | | CT1 | 1 | Cooling Tower 1 | |
| | | CTA | 1 | Cooling Tower 2A | |
| | | CTC | 1 | Cooling Tower 2C | |
| | | DPA | 1 | Lot quality DPA hood | |
| | | LQO | 5 | Lot quality drying ovens | (5) Blue M ovens |

# APPENDIX D

Application Forms

# Title V Permit Application
# Facility Profile – Form A
# Bureau of Air Quality


South Carolina Department of Health and Environmental Control — PROMOTE PROTECT PROSPER

**Please Refer to Instruction Pages Before Completing This Form**
**When filling out forms on the computer, use only the tab key to move your cursor - do not use the return key.**

## FACILITY INFORMATION

| | | |
|---|---|---|
| 1. Company Name for Permit: AVX Corporation | | 2. Existing State Air Permit Number: 1340-0002 |
| 3. Business Mailing Address: PO Box 867 | 4. City: Myrtle Beach | 5. State: SC 6. Zip Code: 29578-0867 |
| 7. Plant Location (Street or Highway): 801 17th Avenue South | 8. City: Myrtle Beach | 9. State: SC 10. Zip Code: 29578-0867 |
| 11. County: Horry | 12. Primary SIC Code: 3675 | 13. NAICS Code: 334414 |
| 14. EPA (AIRS) Facility Identification No.: 4505100002 | 15. Latitude: 33-40-42N | 16. Longitude: 78-54-35W |
| 17. Date Facility Was Built: Originally constructed 1949; Modifications in 1985 and 1998 | | |

## CONTACT INFORMATION

**RESPONSIBLE OFFICIAL AUTHORIZED REPRESENTATIVE:**

18. Last:
Sarvis
19. First:
John

20. Title:
Vice President, SMD

21. Mailing Address Line 1:
801 17th Avenue South

22. Mailing Address Line 2:
PO Box 867

23. City:
Myrtle Beach
24. State:
SC
25. Zip Code:
29578-0867

26. Phone No.:
(843) 448-9411 ext.
27. Fax No.:
(843) 444-0424

28. E-mail Address:
jsarvis@avxus.com

**ENVIRONMENTAL / TECHNICAL CONTACT:**

29. Last:
Bryant
30. First:
Ralph

31. Title:
Safety & Environ Manager

32. Mailing Address Line 1:
801 17th Avenue South

33. Mailing Address Line 2:
PO Box 867

34. City:
Myrtle Beach
35. State:
SC
36.Zip Code:
29578-0867

37. Phone No.:
(843) 946-0326 ext.
38. Fax No.:
(843) 444-2883

39. E-mail Address:
rbryant@avxus.com

## PURPOSE OF APPLICATION

40. Facility Type: ☐ Conditional Major ☒ Title V
☐ Co-Located Facility (co-located facility if yes, name and permit # of co-located facility):

41. Permit Action: ☐ New ☒ Renewal
Modification: ☐ Administrative Amendment (Submit Form AA) ☐ Minor Modification (Submit Form MM) ☐ Significant Modification (Submit Form SM) ☐ Operational Flexibility (Submit Form OF)

42. Attainment Area Designation: Is the source located within a non-attainment area for any of the criteria air pollutants? ☒ No ☐ Yes
If "Yes", Indicate Non-attainment Pollutant(s): ☐ $PM_{2.5}$ ☐ $O_3$ (Precursor pollutants to Ozone are NOx and VOC)

## SIGNATURES

I certify, to the best of my knowledge and belief, that no applicable standards and/or regulations will be contravened or violated. I certify that any application form, report, or compliance certification submitted in this permit application is true, accurate, and complete based on information and belief formed after reasonable inquiry. I understand that any statements and/or descriptions which are found to be incorrect may result in the immediate revocation of any permit issued for this application.

43. Responsible Official Signature/Authorized Representative Title/Position Vice President Ceramics Date

**Note* For change or addition of responsible official(s) submit Responsible Official (RO) Notification Form (see attachment E)**

South Carolina Department of Health and Environmental Control

# Title V Permit Application
# Facility Profile – Form A
# Bureau of Air Quality


| CONSULTING FIRM INFORMATION | | | | | |
|---|---|---|---|---|---|
| 44. Consulting Firm: | Resolute Environmental | | | | |
| Preparer Name: | 45. Last Yoder | | | 46. First | Gary |
| 47. Mailing Address Line 1: | 114 Oak Fern Lane | | | | |
| 48. Mailing Address Line 2: | | | | | |
| 49. City: | Willow Spring | 50. State: | NC | 51. Zip Code: | 27592- |
| 52. Phone No.: | (919) 701-0009 ext. | 53. Fax No.: ( ) - | | 54. E-mail Address: | gyoder@nc.rr.com |

## **INCOMPLETE APPLICATIONS WILL BE RETURNED**

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Application Checklist - Form B
## Bureau of Air Quality


| SUMMARY OF APPLICATION CONTENTS | |
|---|---|
| **GENERAL APPLICATION CONTENTS - DOES THE APPLICATION PACKAGE INCLUDE…** | |
| 1. A Table of Contents? | ☒ Yes ☐ No ☐ N/A |
| 2. A list of all items for which a permit is being sought (Form C Information)? | ☒ Yes ☐ No ☐ N/A |
| 3. A plot plan or map? | ☒ Yes ☐ No ☐ N/A |
| 4. A detailed drawing of the layout of the facility showing exhaust points and dimensions of each structure, including height, width, and length? | ☒ Yes ☐ No ☐ N/A |
| 5. A detailed facility-wide process description and flow diagram showing the relationship between each emission unit at the facility? | ☒ Yes ☐ No ☐ N/A |
| 6. A detailed process description and diagram for each emission unit at the facility? | ☒ Yes ☐ No ☐ N/A |
| 7. All reasonably anticipated operating scenarios? | ☒ Yes ☐ No ☐ N/A |
| 8. Are fugitive emissions included in Forms D, and F? | ☒ Yes ☐ No ☐ N/A |
| 9. Detailed calculations showing: (1) Uncontrolled emissions; (2) Control equipment efficiency; (3) Controlled emissions in pounds per hour and other applicable units, e. g. ppm or grains per cubic foot, if necessary, etc.; and (4) Allowable emissions, in the same terms as above? | ☒ Yes ☐ No ☐ N/A |
| 10. A request to utilize the operational flexibility provisions and include the information required for such use? (if applicable) | ☒ Yes ☐ No ☐ N/A |
| 11. A request for a permit shield? (Complete Form K) | ☒ Yes ☐ No ☐ N/A |
| 12. A completed listing of insignificant emission units, if applicable? (Complete Form G) | ☒ Yes ☐ No ☐ N/A |
| 13a. Modeling results for NAAQS, PSD Class II Increment and/or Air Toxics if this facility has not already demonstrated compliance with these Standards as applicable (S.C. Regulation 61-62.5, Standards 2, 7 and 8)? | ☒ Yes ☐ No ☐ N/A |
| 13b. If #13a is yes, does the plot plan required by item #3 show stack locations and dimensions (length, width, and height) of buildings/structure? | ☒ Yes ☐ No ☐ N/A |
| 14. A completed compliance plan/schedule of compliance as requested in Form I? | ☐ Yes ☐ No ☒ N/A |
| 15. A completed compliance plan/schedule of compliance addendum for each of the non-complying emission units for which issuance of a Part 70 permit is requested? | ☐ Yes ☐ No ☒ N/A |
| 16. A completed compliance certification form? Complete Forms A and I. | ☒ Yes ☐ No ☐ N/A |
| 17. Acid rain portions of permit application and compliance plans, as required by regulations promulgated under Title IV of the Act (if applicable). (See EPA forms on EPA's web site http://www.epa.gov/airmarkets/forms/index.html#permits). | ☐ Yes ☐ No ☒ N/A |
| **COPIES OF APPLICATION** | |
| 18a. Does the application contain confidential information? If yes, all confidential information should be submitted under separate cover. | ☐ Yes ☒ No ☐ N/A |
| 18b. Have **two copies** of the application suitable for public inspection and one copy with confidential information properly marked (if applicable) been submitted, in accordance with applicable regulations? | ☒ Yes ☐ No ☐ N/A |
| 19. Has the application been submitted to any other government agency (not required)? If so, who? | ☐ Yes ☒ No ☐ N/A |
| 20. Does the application include an electronic copy of the application? (Mandatory) | ☒ Yes ☐ No ☐ N/A |
| 21. Is the facility submitting a draft Title V permit with this application (optional)? | ☐ Yes ☒ No ☐ N/A |
| 22. For any non-permitted emission sources or activities a separate construction permit application should not be included in this application. Please submit construction permit applications under a separate cover. | |
| **REGULATORY INFORMATION REQUESTED** | |
| 23. Does the application include a proposed determination of maximum achievable control technology (MACT) for hazardous air pollutants pursuant to sections 112(g) and 112(j) of the Clean Air Act Amendments of 1990? (if applicable) | ☒ Yes ☐ No ☐ N/A |
| 24. Does the application include sufficient information regarding accidental releases pursuant to section 112(r) of the Clean Air Act Amendments of 1990? (if applicable) | ☐ Yes ☐ No ☒ N/A |
| 25. Does the application identify all applicable requirements including section 111 (NSPS) and/or Section 112 (NESHAP) of the Clean Air Act? (Form K) | ☒ Yes ☐ No ☐ N/A |
| 26. If applicable, is a Compliance Assurance Monitoring (CAM) Plan submitted with this Title V permit application (Form I and/or CAM Plan Supplemental Form)? | ☒ Yes ☐ No ☐ N/A |
| 27. Does the application include an applicability determination for all sources subject to CAM (Form I)? | ☐ Yes ☐ No ☒ N/A |
| 28. Is a Lowest Achievable Emission Rate (LAER)/ Best Available Control Technology (BACT) baseline and analysis included? | ☐ Yes ☐ No ☒ N/A |
| 28a. Is the facility subject to the NOx SIP call? | ☐ Yes ☐ No ☒ N/A |
| **WHY APPLICANT IS APPLYING FOR A TITLE V PERMIT? (CHECK ALL THAT APPLY)** | |
| 29a. The "potential to emit" of the facility is 100 tons/year or more for an individual regulated pollutant. | ☐ Yes ☒ No ☐ N/A |

# Title V Permit Application
## Application Checklist - Form B
## Bureau of Air Quality


| | |
|---|---|
| 29b. The facility is an affected facility for acid rain deposition. | ☐ Yes ☐ No ☒ N/A |
| 29c. The "potential to emit" for any one hazardous air pollutant is 10 tons/year or more, or the total of all hazardous air pollutants is 25 tons/year or more, or the facility meets an other applicable lower threshold required by a MACT Standard. | ☒ Yes ☐ No ☐ N/A |
| 29d. Other reason –(e.g. co-location) Please list: | ☐ Yes ☐ No ☒ N/A |
| **CONDITIONAL MAJOR REQUEST OR REGULATORY AVOIDANCE** | |
| 30. Are all controlled emissions of the facility below the applicability levels for Part 70 permit? | ☒ Yes ☐ No ☐ N/A |
| 31. Does the application propose limitations that will constrain the operation of the facility such that potential emissions of the facility will fall below applicability levels for Part 70 permits or MACT applicability? | ☐ Yes ☐ No ☒ N/A |
| 32. Is the facility requesting a MACT avoidance limit? | ☐ Yes ☐ No ☒ N/A |
| 33. Is the facility requesting a PSD/NSR avoidance (facility-wide)? | ☐ Yes ☐ No ☒ N/A |
| 34. Is the facility requesting a BACT/LAER, SC Regulation 61-62.5, Standard 5.1 avoidance? | ☐ Yes ☐ No ☒ N/A |

**Title V Permit Application**
**Emission Unit & Equipment Information – Form C**
**Bureau of Air Quality**


## Please Refer to Instruction / Definitions Pages Before Completing This Form

**EMISSION UNIT DESCRIPTION**
(Table is a description of emission units located at this facility)

| **1. Emission Unit ID** (If the emission unit is on the Insignificant Activity List proceed to Forms G & F) | **2. Emission Unit Description/Purpose** | **3. Control Device** |
|---|---|---|
| 14 | Raw Materials Manufacturing: grinding, mixing and milling of ceramic powder | DC-A (baghouse); DC-B (baghouse); DC-C (baghouse) |
| 15 | Slip Manufacturing - mixing and milling of ceramic powders and solvents to form slip slurry | None |
| 16 | Metals Department - Production of conductive metal inks and termination pastes | None |
| 17 | CMAP Buildup: layer slip and metal paste to build up capacitor chips | AD1, AD-2, AD-3, TO-1 |
| 18 | CMAP Support: Cutting of capacitors into predetermined shapes | MB2-BH |
| 19 | Metallization Department - application of paste or inks to connect internal electrodes | None |
| 20 | Thin Film Process: Manufacture of integrated passive devices and components | TFS |
| 21 | Miscellaneous support | None |

**EMISSION UNIT PROCESS DESCRIPTION**
(For each emission unit listed above, provide the following emission unit process description information)

| **1. Emission Unit ID** | **4. Process Weight Rate (tons/hr)** | **5. Production Rate (units per time period)** | **6. Product** | **7. SIC/NAICS Code** | **8. Comments (Special permit limits, etc.)** |
|---|---|---|---|---|---|
| 14 | 4.94 | 30,000,000 lb/yr | Ceramic and metal powders | 3675/334414 | None |
| 15 | 7.6 | 13,797,000 kg/yr | Ceramic slip and slurry | 3675/334414 | None |
| 16 | 1.26 | 10,106,120 kg/yr | Metal pastes, solvents, metal powders | 3675/334414 | None |
| 17 | N/A | 100,000,000 chips/day | Capacitor chips | 3675/334414 | None |
| 18 | 2.95 | 100,000,000 chips/day | Capacitor chips | 3675/334414 | None |
| 19 | N/A | 100,000,000 chips/day | Capacitor chips | 3675/334414 | None |
| 20 | N/A | 500 wafers/yr | Capacitor wafers | 3675/334414 | None |

| **EMISSION UNIT PROCESS DESCRIPTION** (For each emission unit listed above, provide the following emission unit process description information) | | | | | |
|---|---|---|---|---|---|
| **1. Emission Unit ID** | **4. Process Weight Rate (tons/hr)** | **5. Production Rate (units per time period)** | **6. Product** | **7. SIC/NAICS Code** | **8. Comments (Special permit limits, etc.)** |
| 21 | 25.0 | N/A | N/A | 3675/334414 | None |

| **CONTROL DEVICE INFORMATION** (Table is a description of control devices located at this facility) | | | |
|---|---|---|---|
| **3. Control Device ID** | **9. Control Device Description (Manufacturer, Name, Model #, etc.)** | **10. Installation Date** | **11. Pollutant(s) Controlled** |
| DC-A (Unit 14) | Baghouse (Farr Tenkay Dust Collector 60L) | 1987 | PM, PM10, PM2.5 |
| DC-B (Unit 14) | Baghouse (Farr Tenkay Dust Collector 60L) | 1987 | PM, PM10, PM2.5 |
| DC-C (Unit 14) | Baghouse (American Air Filter Pulse Pak II) | 1985 | PM, PM10, PM2.5 |
| AD-1, AD-2 (Unit 17) | FluiSorb adsorber/desorber system (EC&C) | 1998,2000 | VOC |
| AD-3 (Unit 17) | FluiSorb adsorber/desorber system (EC&C) | 2001 | VOC |
| TO-1 (Unit 17) | Thermal oxidizer (EC&C) | 1999 | VOC |
| MB2-BH (Unit 18) | Baghouse (Spencer Vacuum Dust Collector) | 1998 | PM,PM10,PM2.5 |
| TFS (Unit 20) | Two fluidized bed scrubbers | 2002 | VOC, OTAP, Lead, Acid Mist |

| **CONTROL DEVICE INFORMATION (CONTINUED)** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **3. Control Device ID** | **12. Capture System** | **13. Capture (%)** | **14. Removal/ Destruction (%)** | **15. Removal/ Destruction (Method Used to Determine)** | **16. Parameter Monitored** | **17. Exhaust ID** | **18. Comments (special permit limitations, Fuel info., different capture systems, etc.)** |
| DC-A (Unit 14) | N/A | 100 | 99.97 | Vendor | Delta P | 15A-1 | None |
| DC-B (Unit 14) | N/A | 100 | 99.97 | Vendor | Delta P | 15B-1 | None |
| DC-C (Unit 14) | N/A | 100 | 99.97 | Vendor | Delta P | 15C-1 | None |
| AD-1, AD-2 (Unit 17) | Enclosure | 98.5 est. | 98.5 (system) | Source test | Differential pressure, mid-bed temperature | MB2-F1, MB2-F2 | Provides concentrated exhaust stream to TO-1. |

**CONTROL DEVICE INFORMATION (CONTINUED)**

| 3. Control Device ID | 12. Capture System | 13. Capture (%) | 14. Removal/ Destruction (%) | 15. Removal/ Destruction (Method Used to Determine) | 16. Parameter Monitored | 17. Exhaust ID | 18. Comments (special permit limitations, Fuel info., different capture systems, etc.) |
|---|---|---|---|---|---|---|---|
| AD-3 (Unit 17) | Enclosure | 98.5 est. | 98.5 (system) | Source test | Differential pressure, mid-bed temperature | MB2-F1, MB2-F2 | Provides concentrated exhaust stream to TO-1. |
| TO-1 (Unit 17) | Enclosure | 100 | 98.5 (system) | Source test | Differential pressure, mid-bed temperature | MB2-F1, MB2-F2 | None |
| MB2-BH (Unit 18) | N/A | 100 | 99.5 | Vendor | Delta P | NMFS-S1 | None |
| TFS (Unit 20) | N/A | 90 est. | 99 (acid mist and lead); 50 (soluble organic species) | Vendor | Pressure drop, pH | MB2-TFS | None |

**EQUIPMENT DESCRIPTION**
(For each emission unit please provide a description of the all equipment located at this facility)

| 1. Emission Unit ID | 19. Equipment ID | 20. Equipment Description | 21. Installation Date (Manufacturer Date and Original and Modification Date) | 22. Modification Description | 3. Control Device ID | 17. Exhaust ID | 23. Design Capacity (units) |
|---|---|---|---|---|---|---|---|
| 14 | RMMPSC | 3 Prep devices for adding dry material to slurry | 1993-1997 | None | DC-A, DC-B, DC-C | 15A-1, 15B-1, 15C-1 | 4,000,000 lb/yr (total) |
| 14 | RMMPG | 4 Machines for grinding ceramic prills | 1983-1989 | None | DC-A, DC-B, DC-C | 15A-1, 15B-1, 15C-1 | 2,800,000 lb/yr (total) |
| 14 | RMMRPILL | 8 Machines for making ceramic prills | 1983-1989 | None | DC-A, DC-B, DC-C | 15A-1, 15B-1, 15C-1 | 2,400,000 lb/yr (total) |
| 15 | SMILL | 19 Machines to mill ceramic material | 1997 | None | N/A | Fug | 9,709.000 kg/yr (total, combined with 04-B) |
| 15 | SMIX | 35 Machines to mix ceramic slurry | 1980-1997 | None | N/A | Fug | 9,709.000 kg/yr (total, combined with 04-A) |

**EQUIPMENT DESCRIPTION**
(For each emission unit please provide a description of the all equipment located at this facility)

| 1. Emission Unit ID | 19. Equipment ID | 20. Equipment Description | 21. Installation Date (Manufacturer Date and Original and Modification Date) | 22. Modification Description | 3. Control Device ID | 17. Exhaust ID | 23. Design Capacity (units) |
|---|---|---|---|---|---|---|---|
| 16 | MMILL | 8 Machines to mill electrode inks and termination pastes | 1980-1999 | None | N/A | MD1C-1, MD2C-1, MD3C-1 | 2,080,500 kg/yr (total) |
| 16 | MMIX | 27 Machines to mix electrode inks and termination pastes | 1980-2000 | None | N/A | MD3C-1 | 2,080,500 kg/yr (total |
| 17 | CMAP | 24 CMAP machines | 1998-2001 | None | AD-1, AD-2, AD-3, TO-1 | MB2-F1, MB2-F2 | 100,000,000 chip/day |
| 17 | CMAPT | 2 Temporary CMAP machines | 1998-2001 | None | N/A | 5L-1 | 100,000,000 chip/day |
| 18 | DD | 7 Dry dicing machines | 2000 | None | MB2-BH | NMFS-S1 | 100,000,000 chip/day |
| 19 | TTOOL | 20 Machines that apply termination paste to capacitor chips | 1981-2000 | None | None | To be determined | 100,000,000 chip/day |
| 19 | TOVEN | 9 Termination ovens to cure termination paste | 1993-2000 | None | None | To be determined | 100,000,000 chip/day |
| 19 | PBSBE | 2 Ni/Sn/Pb SBE plating lines | 2007-2008 | None | None | To be determined | 100,000,000 chip/day |
| 20 | TFP | Thin film process | 2002 | None | TFS | MB2-TFS | 500 wafers/yr |
| 21 | ST | Groundwater air stripping tower | 2009 | None | None | ST-1 | 100 gpm |
| 21 | SS | 4 Soldering stations | 2010 | None | None | To be determined | N/A |
| 21 | B201 | 13.4 MMBtu/hr natural gas-fired boiler | 1999 | None | None | MB2-B1 | 13.4 MMBtu/hr |

**EQUIPMENT DESCRIPTION (CONTINUED)**

| 19. Equipment ID | 24. Primary Fuel Combusted (If Applicable) | 25. Secondary Fuel Combusted (If Applicable) | 26. Construction Permit ID or Exemption Date (if applicable) | 27. Comments (list special permit limitations, fuel info, etc.) |
|---|---|---|---|---|
| RMMPSC (Unit 14) | N/A | N/A | N/A | None |
| RMMPG (Unit 14) | N/A | N/A | 1340-0002-CR | None |

| EQUIPMENT DESCRIPTION (CONTINUED) | | | | |
|---|---|---|---|---|
| 19. Equipment ID | 24. Primary Fuel Combusted (If Applicable) | 25. Secondary Fuel Combusted (If Applicable) | 26. Construction Permit ID or Exemption Date (if applicable) | 27. Comments (list special permit limitations, fuel info, etc.) |
| RMMRPILL (Unit 14) | N/A | N/A | N/A | None |
| SMILL (Unit 15) | N/A | N/A | N/A | None |
| SMIX (Unit 15) | N/A | N/A | N/A | None |
| MMILL (Unit 16) | N/A | N/A | N/A | None |
| MMIX (Unit 16) | N/A | N/A | N/A | None |
| CMAP (Unit 17) | N/A | N/A | 1340-0002-CS and CT | None |
| CMAPT (Unit 17) | N/A | N/A | N/A | None |
| DD (Unit 18) | N/A | N/A | 1340-0002-CO, R1 & CU | None |
| TTOOL (Unit 19) | N/A | N/A | 12/17/199 | None |
| TOVEN (Unit 19) | N/A | N/A | 12/17/199 | None |
| PBSBE (Unit 19) | N/A | N/A | 12/17/2007 | None |
| TFP (Unit 20) | N/A | N/A | 1340-0002-CV | None |
| ST | N/A | N/A | 1340-0002-CJ | None |
| SS | N/A | N/A | N/A | None |
| B201 | Natural gas | N/A | 1340-0002-CQ | None |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Emission Data for Regulated Pollutants – Form D
## Bureau of Air Quality


**Please Refer to Instruction / Definitions Pages Before Completing This Form**

| 1. Emission Unit ID: (If the emission unit is on the Insignificant Activity List proceed to Forms G & F) | 2. Exhaust Point ID (if applicable) | 3. Pollutant: | 4. CAS Number (if applicable): | 5. Type of Pollutant: | 6. Maximum Uncontrolled | | 7. Maximum Controlled | |
|---|---|---|---|---|---|---|---|---|
| | | | | | (lb/hr) | (TPY) | (lb/hr) | (TPY) |
| 14 | 15A-1. 15B-1, 15C-1 | PM/PM10 | N/A | Criteria | 0.11 | 0.50 | 1.49E-4 | 3.39E-05 |
| 15 | SM1 | VOC | N/A | Criteria | 5.58 | 24.46 | 5.58 | 24.46 |
| 15 | SM1 | Methyl Isobutyl Ketone | 108-10-1 | Volatile HAP, TAP | 9.27E-4 | 4.06E-3 | 9.27E-4 | 4.06E-3 |
| 15 | SM1 | Methyl alcohol | 67-56-1 | Volatile HAP, TAP | 1.76E-03 | 7.70E-3 | 1.76E-03 | 7.70E-3 |
| 15 | SM1 | Bis(2-ethylhexyl) phthalate | 117-81-7 | Volatile HAP, TAP | 0.030 | 0.13 | 0.030 | 0.13 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | VOC | N/A | Criteria | 1.41 | 6.16 | 1.41 | 6.16 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | PM/PM10 | N/A | Criteria | 0.27 | 1.17 | 0.27 | 1.17 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | Xylene | 1330-20-7 | Volatile HAP, TAP | 0.01 | 0.05 | 0.01 | 0.05 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | Bis(2-ethylhexyl) phthalate | 117-81-7 | Volatile HAP, TAP | 0.001 | 4.88E-03 | 0.001 | 4.88E-03 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | Toluene | 108-88-3 | Volatile HAP, TAP | 1.32E-04 | 5.76E-04 | 1.32E-04 | 5.76E-04 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | Ethyl benzene | 100-41-4 | Volatile HAP, TAP | 6.58E-05 | 2.88E-04 | 6.58E-05 | 2.88E-04 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | Methyl alcohol | 67-56-1 | Volatile HAP, TAP | 3.24E-04 | 1.42E-03 | 3.24E-04 | 1.42E-03 |
| 16 | MD1C-1, MD2C-1, MD3C-1 | Methyl Isobutyl Ketone | 108-10-1 | Volatile HAP, TAP | 1.71E-4 | 7.49E-04 | 1.71E-4 | 7.49E-04 |
| 17 | 5L-1 | VOC | N/A | Criteria | 0.26 | 0.11 | 0.26 | 0.11 |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Emission Data for Regulated Pollutants – Form D
## Bureau of Air Quality


| 1. Emission Unit ID: (If the emission unit is on the Insignificant Activity List proceed to Forms G & F) | 2. Exhaust Point ID (if applicable) | 3. Pollutant: | 4. CAS Number (if applicable): | 5. Type of Pollutant: | 6. Maximum Uncontrolled | | 7. Maximum Controlled | |
|---|---|---|---|---|---|---|---|---|
| | | | | | (lb/hr) | (TPY) | (lb/hr) | (TPY) |
| 17 | MB2-F1 | VOC | N/A | Criteria | 29.15 | 128.72 | 3.82 | 17.85 |
| 17 | MB2-F1 | PM/PM10 | N/A | Criteria | 0.01 | 0.03 | 0.01 | 0.03 |
| 17 | MB2-F1 | SO2 | N/A | Criteria | 0.001 | 0.003 | 0.001 | 0.003 |
| 17 | MB2-F1 | NOx | N/A | Criteria | 0.10 | 0.44 | 0.10 | 0.44 |
| 17 | MB2-F1 | CO | N/A | Criteria | 0.08 | 0.37 | 0.08 | 0.37 |
| 17 | Fug. | Methyl Isobutyl Ketone | 108-10-1 | Volatile HAP, TAP | 0.03 | 0.12 | 0.03 | 0.12 |
| 17 | Fug. | Methyl Alcohol | 67-17-5 | Volatile HAP, TAP | 0.06 | 0.24 | 0.06 | 0.24 |
| 17 | Fug. | Toluene | 108-88-3 | Volatile HAP, TAP | 6.85E-03 | 0.03 | 6.85E-03 | 0.03 |
| 17 | Fug. | Ethylbenzene | 100-41-4 | Volatile HAP, TAP | 6.85E-03 | 0.03 | 6.85E-03 | 0.03 |
| 17 | Fug. | Bis(2-ethylhexyl) phthalate | 117-81-7 | Volatile HAP, TAP | 6.85E-03 | 0.03 | 6.85E-03 | 0.03 |
| 17 | Fug. | Xylene | 1330-20-7 | Volatile HAP, TAP | 6.85E-03 | 0.03 | 6.85E-03 | 0.03 |
| 18 | MB2-BH | PM/PM10 | N/A | Criteria | 3.48 | 15.26 | 0.05 | 0.23 |
| 18 | MB2-BH | VOC | N/A | Criteria | 0.27 | 1.19 | 0.27 | 1.19 |
| 19 | NMF-PA / TP | VOC | N/A | Criteria | 1.18 | 5.17 | 1.18 | 5.17 |
| 19 | NMF-PA / TP | Methyl Isobutyl Ketone | 108-10-1 | Volatile HAP, TAP | 0.01 | 0.04 | 0.01 | 0.04 |
| 19 | NMF-PA / TP | Methyl Alcohol | 67-56-1 | Volatile HAP, TAP | 0.017 | 0.07 | 0.017 | 0.07 |
| 19 | 7C-2A&7C-2B | PM/PM10 | N/A | Criteria | 5.55E-04 | 2.43E-03 | 5.55E-04 | 2.43E-03 |
| 19 | 7C-2A&7C-2B | Nickel | N/A | HAP, TAP | 4.45E-04 | 1.95E-03 | 4.45E-04 | 1.95E-03 |
| 19 | 7C-2A&7C-2B | Lead | N/A | Criteria | 1.23E-05 | 5.42E-05 | 1.23E-05 | 5.42E-05 |
| 20 | MB2-TFS | VOC | N/A | Criteria | 0.47 | 2.07 | 0.24 | 1.05 |
| 20 | MB2-TFS | PM/PM10 | N/A | Criteria | 0.75 | 3.26 | 0.03 | 0.01 |

South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Emission Data for Regulated Pollutants – Form D
## Bureau of Air Quality


| 1. Emission Unit ID: (If the emission unit is on the Insignificant Activity List proceed to Forms G & F) | 2. Exhaust Point ID (if applicable) | 3. Pollutant: | 4. CAS Number (if applicable): | 5. Type of Pollutant: | 6. Maximum Uncontrolled | | 7. Maximum Controlled | |
|---|---|---|---|---|---|---|---|---|
| | | | | | (lb/hr) | (TPY) | (lb/hr) | (TPY) |
| 20 | MB2-TFS | Lead compounds | N/A | Particulate HAP | 0.01 | 0.03 | 6.67E-05 | 2.92E-04 |
| 20 | MB2-TFS | Hydrochloric Acid | 7647-01-0 | HAP, TAP | 0.09 | 0.40 | 9.18E-04 | 4.02E-03 |
| 20 | MB2-TFS | Sulfuric Acid | 7664-93-9 | TAP | 0.07 | 0.32 | 7.21E-04 | 3.16E-03 |
| 20 | MB2-TFS | Nitric Acid | 7697-37-2 | TAP | 0.39 | 1.70 | 3.88E-03 | 1.70E-02 |
| 20 | MB2-TFS | Phosphoric Acid | 7664-38-2 | TAP | 0.16 | 0.70 | 1.59E-03 | 6.98E-03 |
| 20 | MB2-TFS | 2-ethanolamine | 141-43-5 | TAP | 0.10 | 0.45 | 5.19E-02 | 2.27E-01 |
| 20 | MB2-TFS | Hydrofluoric acid | 7664-39-3 | HAP, TAP | 0.02 | 0.08 | 1.75E-04 | 7.67E-04 |
| 21 | N/A | VOC | N/A | Criteria | 0.05 | 0.22 | 0.05 | 0.22 |
| 21 | N/A | NOx | N/A | Criteria | 1.61 | 7.04 | 1.61 | 7.04 |
| 21 | N/A | CO | N/A | Criteria | 1.35 | 5.92 | 1.35 | 5.92 |
| 21 | N/A | SO2 | N/A | Criteria | 0.01 | 0.04 | 0.01 | 0.04 |
| 21 | N/A | PM | N/A | Criteria | 0.12 | 0.54 | 0.12 | 0.54 |
| 21 | TOWER | 1,1-Dichloroethane | 75-34-3 | Volatile HAP, TAP | 0.11 | 0.48 | 0.11 | 0.48 |
| 21 | MB2-B1 | Benzene | 71-43-2 | Volatile HAP, TAP | 3.38E-05 | 1.48E-04 | 3.38E-05 | 1.48E-04 |
| 21 | NMF-S | Chromium | N/A | PM, HAP | 1.71E-06 | 7.48E-6 | 1.71E-06 | 7.48E-6 |
| 21 | MB2-B1 | Formaldehyde | 50-00-0 | Volatile HAP, TAP | 1.50E-03 | 5.28E-03 | 1.50E-03 | 5.28E-03 |
| 21 | MB2-B1 | Hexane | 110-54-3 | Volatile HAP, TAP | 0.036 | 0.13 | 0.036 | 0.13 |
| 21 | MB2-B2,TBD | Lead | N/A | PM, HAP | 2.83E-05 | 1.24E-04 | 2.83E-05 | 1.24E-04 |
| 21 | NMF-S | Manganese | N/A | PM, HAP | 1.11E-07 | 4.86E-04 | 1.11E-07 | 4.86E-04 |
| 21 | MB2-B1 | Polycyclic Organic Matter | N/A | Volatile HAP, TAP | 1.76E-06 | 6.21E-06 | 1.76E-06 | 6.21E-06 |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Emission Data for Regulated Pollutants – Form D
## Bureau of Air Quality


| 1. Emission Unit ID: (If the emission unit is on the Insignificant Activity List proceed to Forms G & F) | 2. Exhaust Point ID (if applicable) | 3. Pollutant: | 4. CAS Number (if applicable): | 5. Type of Pollutant: | 6. Maximum Uncontrolled | | 7. Maximum Controlled | |
|---|---|---|---|---|---|---|---|---|
| | | | | | (lb/hr) | (TPY) | (lb/hr) | (TPY) |
| 21 | MB2-B1 | Naphthalene | 91-20-3 | Volatile HAP, TAP | 1.22-05 | 1.48E-05 | 1.22E-05 | 1.48E-05 |
| 21 | MB2-B1 | Toluene | 108-88-3 | Volatile HAP, TAP | 6.8E-05 | 2.93E-04 | 6.8E-05 | 2.93E-04 |
| 21 | TOWER | Trichloroethylene | 79-01-6 | Volatile HAP, TAP | 0.30 | 1.32 | 0.30 | 1.32 |
| 21 | TOWER | Vinyl chloride | 75-01-4 | Volatile HAP, TAP | 0.09 | 0.39 | 0.09 | 0.39 |

| 1. Emission Unit ID: | 2. Exhaust Point ID (if applicable) | 3. Pollutant: | 8. Estimation Method: | 9. Comments: |
|---|---|---|---|---|
| 14 | 15A-1. 15B-1, 15C-1 | All | Engineering calculations through mass balance and EPA factors | PM emissions from vat loading are accounted for in grinders, mills and mixers |
| 15 | SM1 | All | Engineering calculations through mass balance | None |
| 16 | MD1C-1, MD2C-1, MD3C-1 | All | Engineering calculations through mass balance and engineering knowledge | None |
| 17 | MB2-F1 and Fug. | All | Engineering calculations through mass balance | |
| 18 | MB2-BH | All | Engineering calculations through engineering estimates and mass balances | None |
| 19 | NMF-PA / TP | All | Engineering calculations through mass balance and process knowledge. AP-42, Section 12.20 | None |
| 20 | MB2-TFS | All | Engineering calculations through mass balance | PM/PM10 assumed to equal acid mist and lead compounds |
| 21 | MB2-B1, TBD | All | Engineering calculations (modeling) and EPA Factors | None |
| | | | | |
| | | | | |

# Title V Permit Application
# Facility Wide Information – Form E
# Bureau of Air Quality


**Please Refer to Instruction / Definitions Pages Before Completing This Form**

| FACILITY WIDE RAW MATERIALS AND PRODUCTS | | | | |
|---|---|---|---|---|
| 1. Raw Materials | 2. Quantity | 3. Products (List Products in order of major to minor) | 4. SIC/NAICS Code | 5. Production Rate |
| Terpineol | 8745 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Mineral Spirits | 18,370 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Denatured Ethyl Alcohol | 7370 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Glycol Ethers-PCPM | 85310 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Bio-Act 113 | 2200 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Butyl Cellosolve | 2860 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Acetone | 1375 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Isopropyl Alcohol | 945 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Axarel | 1800 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Xylene | 5525 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Iso Spirits | 20,570 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Southpar K | 55 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| DiOctylPhthalate | 275 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| PGME | 385 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Dipentene | 220 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Mineral Spirits Type 66 | 385 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Diethylene Glycol Dibutyl Ether | 440 gal/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Barium Compounds | 1.930260 Lbs/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Nickel Compounds | 133990 Lbs/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Silver Compounds | 44450 Lbs/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| Copper Compounds | 43350 Lbs/yr | Capacitor Chips | 3675/334414 | 8.76 Billion Chips/year |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

# Title V Permit Application
# Facility Wide Total Emissions – Form F
# Bureau of Air Quality


**Please Refer to Instruction / Definitions Pages Before Completing This Form**
**(Include Insignificant Activity Emissions in Facility Wide Totals)**

| FACILITY WIDE TOTAL EMISSIONS | | | |
|---|---|---|---|
| 1. Pollutant | 2. CAS No. (If Applicable) | 3. Uncontrolled Emissions (TPY) | 4. Controlled Emissions (TPY) |
| PM/PM10 | N/A | 18.68 | 2.42 |
| SO2 | N/A | 0.44 | 0.44 |
| NOx | N/A | 13.53 | 13.53 |
| CO | N/A | 7.59 | 7.59 |
| VOC | N/A | 171.91 | 59.91 |
| Bis(2-ethylhexyl) phthalate (HAP, TAP) | 117-81-7 | 0.17 | 0.17 |
| Ethylidiene dichloride (HAP, TAP) | 75-34-3 | 0.48 | 0.48 |
| Hydrochloric acid (HAP, TAP) | 7647-01-0 | 0.40 | 0.004 |
| Methyl alcohol (HAP, TAP) | 67-56-1 | 0.32 | 0.32 |
| Methyl isobutyl ketone (HAP, TAP) | 108-10-1 | 0.16 | 0.16 |
| Nickel compounds (HAP, TAP) | N/A | 1.95E-03 | 1.95E-03 |
| Lead compounds (HAP) | N/A | 4.39E-04 | 4.39E-04 |
| Vinyl chloride (HAP, TAP) | 75-01-4 | 0.40 | 0.40 |
| Xylene (HAP, TAP) | 1330-20-7 | 0.08 | 0.08 |
| Ethyl benzene (HAP, TAP) | 100-41-4 | 0.03 | 0.03 |
| Toluene (HAP, TAP) | 108-88-3 | 0.03 | 0.03 |
| Sulfuric acid (TAP) | 7664-93-9 | 0.32 | 3.16E-03 |
| Nitric acid (TAP) | 7697-37-2 | 1.70 | 1.70E-02 |
| Phosphoric acid (TAP) | 7664-38-2 | 0.70 | 6.98E-03 |
| 2-ethanolamine (TAP) | 141-43-5 | 0.45 | 0.28 |
| Polycyclic Organic Matter (HAP, TAP) | POM | 6.21E-06 | 6.21E-06 |
| Trichloroethylene (HAP, TAP) | 79-01-6 | 1.32 | 1.32 |
| Hydrofluoric acid (HAP, TAP) | 7664-39-3 | 0.08 | 7.67E-04 |
| Ethylene dichloride (HAP, TAP) | 107-06-2 | 0.48 | 0.48 |
| Benzene (HAP, TAP) | 71-43-2 | 1.48E-04 | 1.48E-04 |
| Naphthalene (HAP, TAP) | 91-20-3 | 4.30E-05 | 4.30E-05 |
| Total HAP | N/A | 3.95 | 3.48 |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
# Insignificant Activity Equipment– Form G
## Bureau of Air Quality


**Please Refer to Instruction / Definitions Pages Before Completing This Form**

| 1. Insignificant Activity(IA) Unit ID: | 2. Insignificant Activity Unit ID Description | 3. Construction Permit ID or Approval Date (if applicable): | 4. On SC Insignificant Activity List (Yes or No) | 5. Pollutant(s) | 6. Emission Rate (Uncontrolled) | 7. Deminimis Rate |
|---|---|---|---|---|---|---|
| RMMDO | 11 drying ovens to remove moisture and detergent/dispersant (Unit 14) | | No | PM/PM10/PM2.5 | Less than 5 tpy | < 5 tpy criteria pollutants |
| RMMTS | 2 tape shredders (Unit 14) | | No | PM/PM10/PM2.5 | Less than 5 tpy | < 5 tpy criteria pollutants |
| RMMOV | 9 Ovens for moisture removal in test & dev. (Unit 14) | | Yes | N/A | N/A | Sec. A, 13 |
| RMMRTF | 3 rapid temperature furnaces in T&D | | No | N/A | N/A | Sec. A, 13 |
| RMMTDP | Testing & dev. Priller (Unit 14) | | Yes | N/A | N/A | Sec. A, 13 |
| RMMKILN | 4 Small rotary kilns (Unit 14) | | No | PM/PM10/PM2.5 | Less than 5 tpy | < 5 tpy criteria pollutants |
| RMMSPEX | 3 Mixers in test & dev. (Unit 14) | | No | N/A | N/A | Sec. A, 13 |
| RMMVK | 16 Vertical calcining kilns | | No | PM/PM10/PM2.5 | Less than 5 tpy | < 5 tpy criteria pollutants |
| RMMTG | Transguard process (Unit 14) | 2007 | No | PM/PM10/PM2.5 | Less than 5 tpy | < 5 tpy criteria pollutants |
| BOACT | Bioact cleaning system (Unit 15) | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| SFH | Fume Hood (laboratory hoods) (Unit15) | | Yes | N/A | N/A | Sec. A, 13 |
| SO | QC lab oven (Unit 15) | | Yes | N/A | N/A | Sec. A, 13 |
| MFP | 2 Filter Presses (Unit 16) | | No | VOC | Less than 5 lpy | < 5 tpy criteria pollutants |
| MPS | Pot storage room exhaust (Unit 16) | | No | VOC | Less than 5 lpy | < 5 tpy criteria pollutants |
| MFH | 2 Fume Hoods (laboratory hoods) (Unit 16) | | Yes | N/A | N/A | Sec. A, 13 |
| MSW | 2 Solvent wash sinks (Unit 16) | | No | VOC | Accounted for in process | < 5 tpy criteria pollutants |
| MO | Lab oven (Unit 16) | | Yes | N/A | N/A | Sec. A, 13 |
| CSR | Screen Room (Unit 17) | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| CSWS | 3 Solvent wash stations (Unit17) | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Insignificant Activity Equipment– Form G
## Bureau of Air Quality


| 1. Insignificant Activity(IA) Unit ID: | 2. Insignificant Activity Unit ID Description | 3. Construction Permit ID or Approval Date (if applicable): | 4. On SC Insignificant Activity List (Yes or No) | 5. Pollutant(s) | 6. Emission Rate (Uncontrolled) | 7. Deminimis Rate |
|---|---|---|---|---|---|---|
| BO | 33 Ovens for chip binder burnout | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| CSO | 16 Low temperature ovens for moisture removal (Unit 18) | | No | PM/VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| CSTR | 1 Thermal release oven for paper removal (Unit 18) | | No | PM/VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| CSPA | 2 Paper applicator machines (Unit 18) | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| CSCD | 2 Low temperature chip dryers (Unit 18) | | No | PM/VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| CSCS | Blade cleaning station (Unit 18) | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| FK | Firing Kilns (Unit 18) | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| TL | 5 Labeling lasers (Unit19) | | No | PM/VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| TSW | 1 Solvent wash station (Unit 19) | | No | VOC | Less than 5 tpy | < 5 tpy criteria pollutants |
| SBE | 3 Non-lead SBE plating lines (Unit 19) | October 2007 | No | PM/VOC | Less than 5 lpy | < 5 tpy criteria pollutants |
| BCB | BCB coating process (Unit 19) | September 2007 | No | PM/VOC | Less than 5 lpy | < 5 tpy criteria pollutants |
| FCT | Fine Copper Termination (Unit 19) | | No | PM/VOC | Less than 5 lpy | < 5 tpy criteria pollutants |
| GPL | 1 Manual gold plating line (Unit 19) | | No | PM | Less than 5 lpy | < 5 tpy criteria pollutants |
| PDD | 11 Plating dryers for moisture removal (Unit 19) | | No | PM/VOC | Less than 5 lpy | < 5 tpy criteria pollutants |
| PDO | 1 Plate drying oven for moisture removal (Unit 19) | | No | PM | Less than 5 lpy | < 5 tpy criteria pollutants |
| CO | 1 Copper coupon oven (Unit 19) | | No | PM/VOC | Less than 5 lpy | < 5 tpy criteria pollutants |
| DFP | 87 BHp Diesel Fire Pump (Unit 21) | | Yes | N/A | N/A | Sec. B, 4 |
| E1 | 100 kW emergency generator | | Yes | N/A | N/A | Sec. B, 2a |
| E5 | 260 kW emergency generator | | Yes | N/A | N/A | Sec. B, 2b |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Insignificant Activity Equipment– Form G
## Bureau of Air Quality


| 1. Insignificant Activity(IA) Unit ID: | 2. Insignificant Activity Unit ID Description | 3. Construction Permit ID or Approval Date (if applicable): | 4. On SC Insignificant Activity List (Yes or No) | 5. Pollutant(s) | 6. Emission Rate (Uncontrolled) | 7. Deminimis Rate |
|---|---|---|---|---|---|---|
| E6 | 600 kW emergency generator | | Yes | N/A | N/A | Sec. B, 2b |
| E7 | 565 kW emergency generator | | Yes | N/A | N/A | Sec. B, 2b |
| B1 | 0.392 MMBtu/hr Plating Bath Boiler (Unit 21) | | Yes | N/A | NA | Sec. B, 1.b |
| B2 | 0.392 MMBtu/hr Plating Bath Boiler (Unit 21) | | Yes | N/A | NA | Sec. B, 1.b |
| B3 | 0.779 MMBtuhr Plating Bath Boiler (Unit 21) | | Yes | N/A | NA | Sec. B, 1.b |
| CT1 | Cooling tower 1 | | Yes | N/A | NA | Sec. A, 20 |
| CTA | Cooling tower 2A | | Yes | N/A | NA | Sec. A, 20 |
| CTC | Cooling tower 2C | | Yes | N/A | NA | Sec. A, 20 |
| DPA | Lot quality DPA hood | | Yes | N/A | N/A | Sec. A, 13 |
| LQO | Lot quality drying ovens | | Yes | N/A | N/A | Sec. A, 13 |

PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Stack/Vent Information – Form H
## Bureau of Air Quality


**Please Refer to Instruction / Definitions Pages Before Completing This Form**

| STACK/VENT INFORMATION | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 1. Exhaust Point ID | 2. Emission/ Equipment ID | 3. Pollutant | 4. CAS No. (if applicable) | 5. Date last modeled (if Applicable) | 6. Modeled Emission Rates (lb/hr) (if applicable) | 7. Stack Gas Exit Temp (degrees F) | 8. Stack Gas Exhaust Velocity (ft/sec) | 9. Non-Vertical Discharge (H) or Raincap (R) |
| 15A-1 | 14 – RMM | PM/PM10/PM2.5 | N/A | July 2007 | 9.4E-05 | 70 | 14.4 | V |
| 15B-1 | 14 – RMM | PM/PM10/PM2.5 | N/A | July 2007 | 9.4E-05 | 70 | 49.5 | V |
| 15C-1 | 14 – RMM | PM/PM10/PM2.5 | N/A | July 2007 | 9.4E-05 | 70 | 47.7 | V |
| MD1C-1 | 16 – MMILL MMIX | Xylene, Bis(2-ehtylhexyl)phthalate, Toluene, Ethyl Benzene | 1330-20-7, 117-81-7, 108-88-3, 100-41-4 | July 2007 | 7.0E-3, 3.7E-3, 6.1E-6, 3.0E-6 | 70 | 57 | V |
| MD2C-1 | 16 – MMILL | Xylene, Bis(2-ehtylhexyl)phthalate, Toluene, Ethyl Benzene | 1330-20-7, 117-81-7, 108-88-3, 100-41-4 | July 2007 | 7.0E-3, 3.7E-3, 6.1E-6, 3.0E-6 | 70 | 4.1 | H |
| MD3C-1 | 16 – MMILL | Xylene, Bis(2-ehtylhexyl)phthalate, Toluene, Ethyl Benzene | 1330-20-7, 117-81-7, 108-88-3, 100-41-4 | July 2007 | 7.0E-3, 3.7E-3, 6.1E-6, 3.0E-6 | 70 | 26.5 | V |
| NMFS-S1 | 18 - DD | PM/PM10/PM2.5 | N/A | July 2007 | 0.062 | 70 | 0.03 | R |
| 7C-2A | 19 - AUTO | PM/PM10/PM2.5, Nickel, Lead | N/A | July 2007 | 0.012,9.9E-3, 5.3E-4 | 70 | 1.04 | V |
| 7C-2B | 19 - AUTO | PM/PM10/PM2.5, Nickel, Lead | N/A | July 2007 | 0.012,9.9E-3, 5.3E-4 | 70 | 1.04 | V |
| MB2-TFS | 20 - TFP | PM/PM10/PM2.5, Lead | N/A | July 2007 | 0.03,6.7E-5 | 70 | 54 | V |
| MB2-TFS | 20 - TFP | Sulfuric acid, Nitric acid, 2-ethanolamine, Hydrochloric acid, Phosphoric acid | 7664-93-9, 7697-37-2, 141-43-5,7647-01-0, 7664-38-2 | July 2007 | 7.2E-4,3.9E-3,5.2E-2,9.2E-4,1.6E-3 | 70 | 54 | V |
| SOLDER[A] | 21 - SOLDER | PM/PM10/PM2.5, Lead, Chrome, Manganese | N/A | N/A | 2.4E-3,2.2E-5,1.1E-6,1.1E-4 | 70 | 0.03 | R |
| MB2-B1 | 21 - Boiler | PM/PM10, SO2, NOx, CO, Lead | N/A | April 2006 | 0.1,739E-3,1.3,1.1, 6.7E-6 | 600 | 15.29 | V |
| MB2-B1 | 21 - Boiler | Benzene, Formaldehyde, Hexane, Naphthalene, Toluene | 71-43-2, 50-00-0, 110-54-3, 91-20-3, 108-88-3 | April 2006 | 2.8E-5,9.7E-4,2.4E-2,8E-6,4.5E-5 | 600 | 15.29 | V |
| TOWER | 21 – ST | 111-Trichloroethane, 11-Dichloroethane,11-Dichloroethylene, 124-Trichlorobenzene | 71-55-6,75-34-3,75-35-4,120-82-1 | N/A | 0.016, 0.016, 0.016,0.013 | 70 | 0.03 | R |
| TOWER | 21 – ST | 12-Dichloroethane, 2-Butanone, Benzene, Carbon disulfide | 107-06-2,78-93-3,71-43-2,75-15-0 | N/A | 0.014, 0.023, 0.016, 0.016 | 70 | 0.03 | R |
| TOWER | 21 – ST | Chlorobenzene, Chloroethane, Chloroform, Ethylbenzene | 108-90-7,75-00-3,67-66-3,100-41-4 | N/A | 0.016,0.016, 0.016,0.016 | 70 | 0.03 | R |

PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
# Stack/Vent Information – Form H
# Bureau of Air Quality


## STACK/VENT INFORMATION

| 1. Exhaust Point ID | 2. Emission/ Equipment ID | 3. Pollutant | 4. CAS No. (if applicable) | 5. Date last modeled (if Applicable) | 6. Modeled Emission Rates (lb/hr) (if applicable) | 7. Stack Gas Exit Temp (degrees F) | 8. Stack Gas Exhaust Velocity (ft/sec) | 9. Non-Vertical Discharge (H) or Raincap (R) |
|---|---|---|---|---|---|---|---|---|
| TOWER | 21 – ST | Methylene chloride, Naphthalene, Xylene, Styrene, Tetrachloroethylene, | 75-09-2,91-20-3,1330-20-7,100-42-5,127-18-4 | N/A | 0.08,0.01,4E-3,0.016,0.016 | 70 | 0.03 | R |
| TOWER | 21 – ST | Toluene, Trichloroethylene, Vinyl chloride | 108-88-3,79-01-6,75-01-4 | N/A | 0.016,0.3,0.09 | 70 | 0.03 | R |

## STACK/VENT INFORMATION (CONTINUED)

| 1. Exhaust Point ID | 10. Vertical component of Stack Exhaust Velocity (ft/sec) | 11. UTM East | 12. UTM North | 13. Distance to Plant Boundary (ft) | 14. Dimensions of Plume Obstructing Structure (ft) | | | 15. Stack Height (ft) | 16. Stack Diameter (ft) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | Height | Length | Width | | |
| 15A-1 | 14.4 | 693764 | 3728334 | 133 | 45 | 228 | 182 | 33 | 1.33 |
| 15B-1 | 49.5 | 693770 | 3728334 | 118 | 45 | 228 | 182 | 35 | 2.5 |
| 15C-1 | 47.7 | 693758 | 3728335 | 98 | 45 | 228 | 182 | 35 | 2.5 |
| MD1C-1 | 57 | 693700 | 3728106 | 65 | 36 | 600 | 480 | 37 | 1.67 x 1.67 |
| MD2C-1 | 4.1 | 693716 | 3728101 | 145 | 36 | 600 | 480 | 22 | 0.667 |
| MD3C-1 | 26.5 | 693720 | 3728101 | 155 | 36 | 600 | 480 | 25 | 1.0 |
| NMFS-S1 | 19.4 | 693330 | 3727951 | 450 | 24 | 560 | 257 | 6 | 0.08 |
| 7C-2A | 1.04 | 693773 | 3728208 | 179 | 29 | 128 | 68 | 32 | 3.45 |
| 7C-2B | 1.04 | 693773 | 3728206 | 179 | 29 | 128 | 68 | 32 | 3.45 |
| MB2-TFS | 54.0 | 693300 | 3727880 | 427 | 24 | 560 | 257 | 35 | 2.5 |
| SOLDER | N/A | 693305 | 3727844 | 427 | 24 | 560 | 257 | 15 | 0.25 |
| MB2-B1 | 15.29 | 693322 | 3727939 | 432 | 24 | 560 | 257 | 35.5 | 0.833 |
| TOWER | 5.23 | 693890 | 3728065 | 66 | 23.5 | 141 | 108 | 20 | 2.25 |

South Carolina Department of Health and Environmental Control

# Title V Permit Application
# Regulatory Information – Form I
# Bureau of Air Quality


**Please Refer to Instruction / Definitions Pages Before Completing This Form**

| **EMISSION LIMITS AND STANDARDS** (This section summarizes the emission unit emission limits and standards) | | | | | |
|---|---|---|---|---|---|
| **1. Emission Unit** | **2. Unit ID** | **3. Pollutant/Standard** | **4. Limit** | **5. Reference Method** | **6. Applicable Regulation (Regulation Citation/Condition)** |
| Facility-wide | 14 - 21 | Opacity | 20% | 9 (upon request) | SC Regulation 61-62.5, Standard 4, Section IX |
| Metallization, TFP | 19, 20 | Acid Mist Emissions | 0.25 lb/hr | N/A | SC Regulation 61-62.5, Standard 4, Section VIII |
| Facility-wide | 14 - 21 | Aggregate VOC emissions | 249.9 tpy (total); None | N/A | SC Regulation 61-62.70 |
| CMAP Buildup (TO-1) | 17 | PM | 0.5 lb/MMBtu | N/A | SC Regulation 61-62.5, Standard 3, Section I |
| Boiler | 21 | PM | 0.6 lb/MMBtu | N/A | SC Regulation, 61-62.5, Standard 1, Section II |
| Boiler | 21 | SO2 | 3.5 lb/MMBtu | N/A | SC Regulation 61-62.5, Standard I, Section III |
| Boiler | 21 | Natural gas usage | None | N/A | TV-1340-0002, Table 6.1; 40 CFR Part 60, Subpart Dc [60.48c(g)(2)] |
| Raw Materials Manufacturing | 14 | Dust Collectors A through C pressure drop | 1.0” – 5.0” $H_2O$ | N/A | SC Regulation 61-62.5, Standard 2 |
| Facility-wide | 14 - 21 | Visible emissions (from processes without control devices) | N/A | N/A | SC Regulation 61-62.5, Standard 4, Section IX |
| CMAP | 17 | Adsorption units (AD-2, AD-3 & AD-4) pressure drop | 2.0” – 5.0” $H_2O$ | N/A | SC Regulation 61-62.5, 63.53 |
| CMAP | 17 | Desorption units (AD-2, AD-3 & AD-4) temperature | 350 deg F – 500 deg F | N/A | SC Regulation 61-62.5, 63.53 |
| CMAP | 17 | Thermal oxidizer (TO-1) temperature | 1400 deg F – 1800 deg F | N/A | SC Regulation 61-62.5, 63.53 |
| Thin Film Process | 20 | Scrubber pH | As specified | N/A | SC Regulation 61-62.5, Standard 8, Section III |
| Thin Film Process | 20 | Scrubber pressure drop | As specified | N/A | SC Regulation 61-62.5, Standard 8, Section III |
| Termination | 19 | PM | 25.04 lb/hr | N/A | SC Regulation 61-62.5, Standard 4, Section VIII |
| Miscellaneous Support | 21 | PM | 37.8 lb/hr | N/A | SC Regulation 61-62.5, Standard 4, Section VIII |
| Misc. Support E6 and E7 | 21 | HAP | 23 PPMvd CO or 70% reduction | N/A | SC Regulation 61-62.5 62.63 by reference, 40 CFR Part 63, Subpart ZZZZ |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
# Regulatory Information – Form I
# Bureau of Air Quality



## COMPLIANCE AND PERMIT REQUIREMENTS
(This section summarizes the emission unit compliance requirements)

| 2. Unit ID | 6. Applicable Regulation (Regulation Citation/Condition) | 7. In Compliance (Y/N) | 8. Compliance Statement* | 9. Compliance Date | 10. First Submittal |
|---|---|---|---|---|---|
| 14-21 | SC Regulation 61-62.5, Standard 4, Section IX | Y | | Already complying | N/A |
| 19, 20 | SC Regulation 61-62.5, Standard 4, Section VIII | Y | | Already complying | N/A |
| 14 - 21 | SC Regulation 61-62.70 | Y | | Already complying | N/A |
| 17 | SC Regulation 61-62.5, Standard 3, Section I | Y | | Already complying | N/A |
| 21 | SC Regulation, 61-62.5, Standard 1, Section II | Y | | Already complying | N/A |
| 21 | SC Regulation 61-62.5, Standard I, Section III | Y | | Already complying | N/A |
| 14 | TV-1340-0002, Table 6.1 | Y | | Already complying | N/A |
| 14 - 21 | TV-1340-0002, Table 6.1 | Y | | Already complying | N/A |
| 17 | TV-1340-0002, Table 6.1 | Y | | Already complying | N/A |
| 17 | TV-1340-0002, Table 6.1 | Y | | Already complying | N/A |
| 17 | TV-1340-0002, Table 6.1 | Y | | Already complying | N/A |
| 21 | TV-1340-0002, Table 6.1; 40 CFR Part 60, Subpart Dc [60.48c(g)(2)] | Y | | Already complying | N/A |
| 20 | TV-1340-0002, Table 6.1 | Y | | Already complying | N/A |
| 20 | TV-1340-0002, Table 6.1 | Y | | Already complying | N/A |
| 19 | SC Regulation 61-62.5, Standard 4, Section VIII | Y | | Already complying | N/A |
| 21 | SC Regulation 61-62.5 62.63 by reference, 40 CFR Part 63, Subpart ZZZZ | N | | May 3, 2013 | December 31, 2013 |

*By initialing here, the Responsible Official certifies that this emission unit is in compliance with current applicable requirements and that during the permit term the source will continue to comply with such requirements. Further, for applicable requirements that will become effective during the permit term, that the source will meet such requirements on a timely basis, unless a more detailed schedule is expressly required by the applicable requirement.

## MONITORING/APPLICABLE REGULATION AND PERMIT/RULE REQUIREMENTS-PART I
(This section summarizes the monitoring and reporting requirements. Parts I, II, III, and IV must be completed for each emission unit).

| 2. Unit ID | 11. Pollutant/Parameter | 4. Limit | 12. Required Monitoring | 13. Monitoring Frequency | 14. Reporting Frequency |
|---|---|---|---|---|---|
| 14 -21 | Opacity | 20% | Visual inspection | Upon request | Upon occurrence of test |
| 19, 20 | Acid Mist Emissions | 0.25 lb/hr | Calculation of acid mist emissions | Upon request | Upon occurrence of test |

# Title V Permit Application
# Regulatory Information – Form I
# Bureau of Air Quality



## MONITORING/APPLICABLE REGULATION AND PERMIT/RULE REQUIREMENTS-PART I

(This section summarizes the monitoring and reporting requirements. Parts I, II, III, and IV must be completed for each emission unit).

| 2. Unit ID | 11. Pollutant/Parameter | 4. Limit | 12. Required Monitoring | 13. Monitoring Frequency | 14. Reporting Frequency |
|---|---|---|---|---|---|
| 14 - 21 | Aggregate VOC emissions | 249.9 tpy (total) | Calculation of VOC emissions | Monthly | Semiannual |
| 17 | PM | 0.5 lb/MMBtu | Calculation of PM emissions | One-time | None required |
| 17 | VOC (for temporary CMAP machines) | 864 hr/yr | Track hours | Monthly | None required |
| 21 | PM | 0.6 lb/MMBtu | Calculation of PM emissions | One-time | None required |
| 21 | SO2 | 3.5 lb/MMBtu | Calculation of SO2 emissions | One-time | None required |
| 14 | Dust Collectors A through C pressure drop | 1.0" – 5.0" $H_2O$ | Gauge, recordkeeping | Daily, when operating | None required |
| 14 - 21 | Visible emissions (from processes without control devices) | N/A | Visual inspection | Daily | None required |
| 17 | Adsorption units (AD-2, AD-3 & AD-4) pressure drop | 2.0" – 5.0" $H_2O$ | Gauge, recordkeeping | Daily, when operating | None required |
| 17 | Desorption units (AD-2, AD-3 & AD-4) temperature | 350 deg F – 500 deg F | Thermocouple, recordkeeping | Daily, when operating | None required |
| 17 | Thermal oxidizer (TO-1) temperature | 1400 deg F – 1800 deg F | Thermocouple, recordkeeping | Daily, when operating | None required |
| 21 | Natural gas usage | None | Fuel meter; recordkeeping | Monthly | None required |
| 20 | Scrubber pH | As specified | Probe, recordkeeping | Daily, when operating | None required |
| 20 | Scrubber pressure drop | As specified | Gauge, recordkeeping | Daily, when operating | None required |
| 19 | PM | 25.04 lb/hr | Calculation of PM emissions | One-time | None required |
| 21 | PM | 37.8 lb/hr | Calculation of PM emissions | One-time | None required |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Regulatory Information – Form I
## Bureau of Air Quality


### MONITORING/APPLICABLE REGULATION AND PERMIT/RULE REQUIREMENTS-PART II
(This section summarizes the monitoring and reporting requirements)

| 2. Unit ID | 3. or 11. Pollutant/Standard or Pollutant/Parameter | 4. Limit | 15. Recordkeeping Frequency | 16. Averaging Time | 17.Stack Test | |
|---|---|---|---|---|---|---|
| | | | | | Y/N | Frequency |
| 14 - 21 | Opacity | 20% | Upon occurrence of test | 6 minutes | N | N/A |
| 19, 20 | Acid Mist Emissions | 0.25 lb/hr | Upon occurrence of test | 1 hour | Y | Upon request |
| 17,18,20 | Aggregate VOC emissions | 39.5 tpy (total) | Monthly | N/A | N | N/A |
| 17 | PM | 0.5 lb/MMBtu | One-time | N/A | N | N/A |
| 17 | Hours of Operation (2 temporary units) | 864 hr/yr | Monthly | N/A | N | N/A |
| 21 | PM | 0.6 lb/MMBtu | One-time | N/A | N | N/A |
| 21 | SO2 | 3.5 lb/MMBtu | One-time | N/A | N | N/A |
| 06 | Dust Collectors A through C pressure drop | 1.0" – 5.0" $H_2O$ | Daily, when operating | N/A | N | N/A |
| 14 - 21 | Visible emissions (from processes without control devices) | N/A | Daily | N/A | N | N/A |
| 17 | Adsorption units (AD-2, AD-3 & AD-4) pressure drop | 2.0" – 5.0" $H_2O$ | Daily, when operating | N/A | N | N/A |
| 17 | Desorption units (AD-2, AD-3 & AD-4) temperature | 350 deg F – 500 deg F | Daily, when operating | N/A | N | N/A |
| 17 | Thermal oxidizer (TO-1) temperature | 1400 deg F – 1800 deg F | Daily, when operating | N/A | N | N/A |
| 21 | Natural gas usage | None | Monthly | N/A | N | N/A |
| 20 | Scrubber pH | As specified | Daily, when operating | N/A | N | N/A |
| 20 | Scrubber pressure drop | As specified | Daily, when operating | N/A | N | N/A |
| 19 | PM | 25.04 lb/hr | One-time | N/A | N | N/A |
| 21 | PM | 37.8 lb/hr | One-time | N/A | N | N/A |

### MONITORING/APPLICABLE REGULATION AND PERMIT/RULE REQUIREMENTS-PART III
(This section summarizes the monitoring and reporting requirements not described in Parts I & II. Also summarizes applicable regulations that no Monitoring and Reporting is needed.)

| 2. Unit ID | 11. Pollutant/Parameter | 4. Limit | 18. If no monitoring required, why? | 19. List any monitoring requirements not listed above |
|---|---|---|---|---|
| 14 - 21 | Opacity | 20% | Required only upon request of DHEC | N/A |
| 19, 20 | Acid Mist Emisions | 0.25 lb/hr | Required only upon request of DHEC | N/A |
| 17,18,20 | Aggregate VOC emissions | 39.5 tpy (total) | Monthly calculations | N/A |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Regulatory Information – Form I
## Bureau of Air Quality


### MONITORING/APPLICABLE REGULATION AND PERMIT/RULE REQUIREMENTS-PART III

(This section summarizes the monitoring and reporting requirements not described in Parts I & II. Also summarizes applicable regulations that no Monitoring and Reporting is needed.)

| 2. Unit ID | 11. Pollutant/Parameter | 4. Limit | 18. If no monitoring required, why? | 19. List any monitoring requirements not listed above |
|---|---|---|---|---|
| 17 | PM | 0.5 lb/MMBtu | N/A | N/A |
| 17 | Hours of Operation (2 temporary units) | 864 hr/yr | Monthly log | N/A |
| 21 | PM | 0.6 lb/MMBtu | N/A | N/A |
| 21 | SO2 | 3.5 lb/MMBtu | N/A | N/A |
| 14 | Dust Collectors A through C pressure drop | 1.0" – 5.0" $H_2O$ | N/A | N/A |
| 14 - 21 | Visible emissions (from processes without control devices) | N/A | N/A | N/A |
| 17 | Adsorption units (AD-2, AD-3 & AD-4) pressure drop | 2.0" – 5.0" $H_2O$ | N/A | N/A |
| 17 | Desorption units (AD-2, AD-3 & AD-4) temperature | 350 deg F – 500 deg F | Daily recording | N/A |
| 17 | Thermal oxidizer (TO-1) temperature | 1400 deg F – 1800 deg F | Daily recording | N/A |
| 21 | Natural gas usage | None | Daily recording | N/A |
| 20 | Scrubber pH | As specified | N/A | N/A |
| 20 | Scrubber pressure drop | As specified | N/A | N/A |
| 19 | PM | 25.04 lb/hr | N/A | N/A |
| 21 | PM | 37.8 lb/hr | N/A | N/A |

### MONITORING/APPLICABLE REGULATION AND PERMIT/RULE REQUIREMENTS-PART IV

(This section summarizes the monitoring and reporting requirements)

| 2. Unit ID | 20. Description (include equip/process ID) | 21. Potential Uncontrolled Emissions | | 22. Control Equip ID | 23. Potential Controlled Emissions | 24. Subject to CAM Rule (40 CFR 64)? | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Pollutant | Tons/Year | | Tons/Year | Yes* | No | Exempt | 25. Reason Exempt? |
| 14 - 21 | Facility-wide emission points (Various) | N/A | N/A | N/A | N/A | | X | | |
| 19, 20 | Plating lines (02-A, 02-B) | N/A | N/A | N/A | N/A | | X | | |
| 17,18,21 | CMAP, CMAP Support, and TFP emission points (Various) | VOC | Facility < PSD major source thresholds | AD-1, AD-2, AD-3, TO-1, TFS | 39.5 | X | | | |

South Carolina Department of Health and Environmental Control



**MONITORING/APPLICABLE REGULATION AND PERMIT/RULE REQUIREMENTS-PART IV**
(This section summarizes the monitoring and reporting requirements)

| 2. Unit ID | 20. Description (include equip/process ID) | 21. Potential Uncontrolled Emissions | | 22. Control Equip ID | 23. Potential Controlled Emissions | 24. Subject to CAM Rule (40 CFR 64)? | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Pollutant | Tons/Year | | Tons/Year | Yes* | No | Exempt | 25. Reason Exempt? |
| 17 | Thermal oxidizer natural gas fired startup burners | N/A | N/A | N/A | N/A | | X | | |
| 21 | Natural gas fired boiler (B201) | N/A | N/A | N/A | N/A | | X | | |
| 21 | Natural gas fired boiler (B201) | N/A | N/A | N/A | N/A | | X | | |
| 14 | Raw Material Manufacturing (06-A through 06-D) | All | Each < major source thresholds | DC-A, DC-B, DC-C | N/A | | | X | Pre control < threshold |
| 14 - 21 | Various process without control devices (Various) | N/A | N/A | N/A | N/A | | X | | |
| 17 | CMAP Buildup | VOC; other emissions | 127 VOC | AD-1, AD-2, AD-3 & TO-1 | 14 VOC | X | | | |
| 21 | Boiler (B201) | N/A | N/A | N/A | N/A | | X | | |
| 20 | Thin Film Process Scrubbers | All | Each < major source thresholds | TFS | N/A | | X | | |
| 20 | Thin Film Process Scrubbers | All | Each < major source thresholds | TFS | N/A | | | X | No limit, Pre control < threshold |
| 19 | Plating (SBE, BCB, FCT) | N/A | N/A | N/A | N/A | | X | | |
| 21 | Air stripper, Support maintenance, soldering equipment, EGs | N/A | N/A | N/A | N/A | | X | | |

**NOTE*** **If yes, the applicant must submit additional information in the form of a CAM plan as required under 40 CFR 64**

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Regulatory Information – Form I
## Bureau of Air Quality


### FACILITY-WIDE LIMITS FOR REGULATORY AVOIDANCE-PART V
(This section summarizes emission unit(s) covered under a limit to avoid an applicable regulation)

| 2. Unit ID (emission unit covered under the limit) | 11. Pollutant/Parameter | 4. Limit (Facility-Wide) | 26. Parameter to Monitor | 27. Applicable Regulation Avoidance |
|---|---|---|---|---|
| | | | | |
| | | | | |
| 17, 18, 20 | Aggregate VOC emissions | 39.5 tpy (total) at NMF | VOC emissions | SC Regulation 61-62.5, Section H |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |

### ADDITIONAL INFORMATION FOR MACT SOURCES-PART VI
(This section allows for additional information or requirements for sources subject to a MACT Standard)

| 2. Unit ID | 28. New or Existing Equipment | 29. Control Equip ID | 30. List any unit/equipment which is specifically exempt from MACT standards and state why. |
|---|---|---|---|
| 14 - 20 | N/A | N/A | N/A |
| | | | |

### ADDITIONAL INFORMATION FOR MACT SOURCES-PART VII
(This section allows for additional requirements for sources subject to a MACT Standard)

| 2. Unit ID | 31. List Other MACT Requirements: Operation examples, such as, maintenance and monitoring, operational/maintenance & malfunction (OM &M) plan, startup, shutdown, and malfunction (SSM) Plan, leak detection and repair (LDAR), wastewater unit requirements, etc. |
|---|---|
| 14 - 20 | N/A |
| 21 | 40 CFR Part 62, Subpart ZZZZ. SSM Plan |
| | |

DHEC
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control

# Title V Permit Application
## Permit Shield – Form K
## Bureau of Air Quality


**Please Refer to Instruction / Definitions Pages Before Completing This Form**

| PERMIT SHIELD | | | | |
|---|---|---|---|---|
| 1.Citation | 2. Regulation | 3. Applicable (Y/N) | 4. Standard Reason Indicator | 5. Comments (Use when choosing Indicator "J") |
| SCDHEC 62.1 | Definitions, Permit Requirements, and Emissions Inventory | Y | D | Section contains general information applicable to this facility |
| SCDHEC 62.1 | Prohibition of Open Burning | Y | D | Generally applicable to all facilities |
| SCDHEC 62.3 | Air Pollution Episodes | N | A,H | Facility not a major source in a non-attainment area |
| SCDHEC 62.4 | Hazardous Air Pollution Conditions - General | Y | D | Generally applicable to all facilities |
| SCDHEC 62.4 | Hazardous Air Pollution Conditions | Y | D | Generally applicable to all facilities |
| SCDHEC 62.5 Std 1, Sec 1A | Emissions from Fuel Burning Operations – Visible Emissions Existing Sources | N | J | Units installed after February 11, 1971 |
| SCDHEC 62.3, Std 1, Secs 1B – 1D | Emissions from Fuel Burning Operations – New Sources, Special Provisions, Test Methods | Y | I | |
| SCDHEC 62.5 Std 1, Sec IIA | Emissions From Fuel Burning Operations – PM Emissions Allowable Discharge | Y | I | |
| SCDHEC 62.5 Std 1, Sec IIB | Emissions From Fuel Burning Operations – PM Emissions Special Provisions | N | J | Units installed after February 11, 1971 |
| SCDHEC 62.5 Std 1, Sec IIC | Emissions From Fuel Burning Operations – SO2 Emissions Allowable Discharge | Y | I | |
| SCDHEC 62.5, Std 1, Sec IV | Emissions From Fuel Burning Operations – Opacity Monitoring Requirements | N | G | |
| SCDHEC 62.5, Std 1, Sec V | Emissions From Fuel Burning Operations – Exemptions | N | B | |
| SCDHEC 62.5, Std 1, Sec VI | Emissions From Fuel Burning Operations – Periodic Testing | N | B | |
| SCDHEC 62.5, Std 2 | Ambient Air Quality Standards | Y | D | |
| SCDHEC 62.5, Std 3, Sec I | Waste Combustion & Reduction – Applicability | Y | I | |
| SCDHEC 62.5, Std 3, Sec II | Waste Combustion & Reduction - General | N | J | Does not supersede any other State or Federal requirement, unless the limit is more restrictive. |
| SCDHEC 62.5, Std 3, Sec III | Waste Combustion & Reduction – Emission Limitations and Operating Requirements | Y | I | |
| SCDHEC 62.5, Std 3, Sec IV | Waste Combustion & Reduction – Notification Requirements and Compliance Schedules | Y | I | |
| SCDHEC 62.5, Std 3, Sec V | Waste Combustion & Reduction – Waste Analysis | N | J | Meets exemption via air dispersion modeling |
| SCDHEC 62.5, Std 3, Secs VI and VII | Waste Combustion & Reduction – Continuous Monitoring Requirements | N | A | |
| SCDHEC 62.5, Std 3, Sec VIII | Waste Combustion & Reduction – Periodic Testing | Y | I | |
| SCDHEC 62.5, Std 3, Sec IX | Waste Combustion & Reduction – Operator Periodic Training Requirements | N | J | Exempt per the operating permit |
| SCDHEC 62.5, Std 3.1 | Medical Waste Incinerator | N | B | |
| SCDHEC 62.5 Std 4, Sec I | Emissions From Process Industries | Y | I | |
| SCDHEC 62.5 Std 4, Secs II – VII & XI - XII | Emissions From Process Industries | N | B | |

| PERMIT SHIELD | | | | |
|---|---|---|---|---|
| 1.Citation | 2. Regulation | 3. Applicable (Y/N) | 4. Standard Reason Indicator | 5. Comments (Use when choosing Indicator "J") |
| SCDHEC 62.5 Std 4, Secs VII - X | Emissions From Process Industries – Other Manufacturing, Visible Emissions, Non-Enclosed Operations | Y | I | |
| SCDHEC 62.5 Std 5 | Volatile Organic Compounds | N | B | |
| SCDHEC 62.5 Std 5.1 | LAER Applicable to Volatile Organic Compounds | N | J | Net VOC emission increases not greater than 100 tpy since July 1, 1979 |
| SCDHEC 62.5 Std 6 | Alternative Emission Limitations | N | J | Did not apply for alternative emission limits |
| SCDHEC 62.5 Std 7 | Prevention of Significant Deterioration | N | J | With modifications, facility requests removing PSD Synthetic Minor limit as they are now a true PSD minor source. PSD will only apply if future modifications are above PSD significance emission levels. |
| SCDHEC 62.5 Std 8, Secs I & II | Toxic Air Pollutants – General Applicability & Toxic Air Emissions | Y | I | |
| SCDHEC 62.5 Std 8, Sec III | Toxic Air Pollutants – Controls | N | J | Air dispersion modeling indicates controls not required |
| SCDHEC 62.5 Std 8, Sec IV | Toxic Air Pollutants – Source Test Requirements | N | J | Required only if requested by SCDHEC |
| SCDHEC 62.5 Std 8, Sec V | Toxic Air Pollutants – Recordkeeping | Y | I | |
| SCDHEC 62.6, Secs I & II | Control of Fugitive Particulate Matter – Control in Non-Attainment Areas & Control in Problem Areas | N | H | |
| SCDHEC 62.6, Sec III | Control of Fugitive Particulate Matter – Control Statewide | Y | D | |
| SCDHEC 62.7 | Good Engineering Practice Stack Height | Y | D | |
| SCDHEC 62.63 | National Emission Standards For Hazardous Air Pollutants (NESHAP) | Y | F | Facility previously major HAP source. Emissions currently below threshold, however, still defined as a major source facility |
| SCDHEC 62.70 | Title V Operating Permit Program | Y | I | |
| SCDHEC 62.72 | Acid Rain | N | B | |
| 40 CFR Part 60, Subpart A | NSPS General Provisions | Y | I | |
| 40 CFR Part 60, Subparts B – KKK (except Dc) | Adoption and Submittal of State Plans for Designated Facilities, Emission Guidelines and Compliance Times for specific sources | N | B | |
| 40 CFR Part 60, Subpart Dc | NSPS for Small Industrial-Commercial-Institutional Steam Generating Units | Y | I | |
| 40 CFR Part 61, Subpart A | NESHAP General Provisions | Y | F | Potentially applicable if Subpart M applies |
| 40 CFR Part 61, Subpart B – FF (except M) | NESHAP for Specific compounds and processes | N | B | |
| 40 CFR Part 61, Subpart M | NESHAP for Asbestos (including work practices) | Y | J | Only when work at the facility involves asbestos |
| 40 CFR Part 63, *et. seq* | NESHAPs for specific processes | Y | I | Applicable to emergency generators, Subpart ZZZZ |
| 40 CFR Part 63, Subparts A and B | NESHAP General Provisions and 112(g) control technology requirments | Y | I | CMAP |
| 40 CFR Part 64 | Compliance Assurance Monitoring | Y | I | |

| PERMIT SHIELD | | | | |
|---|---|---|---|---|
| **1.Citation** | **2. Regulation** | **3. Applicable (Y/N)** | **4. Standard Reason Indicator** | **5. Comments (Use when choosing Indicator "J")** |
| 40 CFR Part 68 | Chemical Accident Provisions | N | I | Regulated substances are below threshold planning quantities; General Duty Clause does apply however |
| 40 CFR Part 70 | State Operating Permit Program | Y | I | |
| 40 CFR Part 72 | Acid Rain Program | N | B | |
| 40 CFR Part 73 | Sulfur Dioxide Allowance System | N | B | |
| 40 CFR Part 74 | Sulfur Dioxide Opt-Ins | N | B | |
| 40 CFR Part 75 | Continuous Emission Monitoring | N | B | |
| 40 CFR Part 76 | Acid Rain Nitrogen Oxides Emission Reduction Program | N | B | |
| 40 CFR Part 77 | Excess Emissions | N | B | |
| 40 CFR Part 78 | Appeal Procedures for Acid Rain Program | N | B | |
| 40 CFR Part 79 | Registration of Fuels and Fuel Additives | N | B | |
| 40 CFR Part 80 | Regulation of Fuels and Fuel Additives | N | B | |
| 40 CFR Part 81 | Designation of Areas for Air Quality Control Regions | N | J | Facility located in an attainment area |
| 40 CFR Part 82, Subparts A – G (except Subpart F) | Stratospheric Ozone – Production, Motor Vehicles, etc. | N | B | |
| 40 CFR Part 82, Subparts F | Stratospheric Ozone – Recycling and Emissions Reductions | Y | J | AVX personnel service plant air conditioners and cooling equipment |

| STANDARD REASONS | |
|---|---|
| **Indicator** | **Standard Reason** |
| A | The facility is not in the applicable source category |
| B | The specified source/process is not present at the facility |
| C | The facility/unit was constructed or last modified prior to the effective date of the rule |
| D | Applies to all facilities |
| E | Rule/Standard proposed, but not final/effective |
| F | The facility/unit emits pollutants at a level less than established by the rule |
| G | The facility/unit design capacity or production capacity is less than established by the rule. |
| H | The facility is not in a special control/non-attainment area. |
| I | Applicable to facility; requirements are listed in permit application and facility has certified compliance. |
| J | Other (explain) |

# APPENDIX E

Supporting Emission Calculations

**TABLE 10**

Summary Of Potential Criteria and Greenhouse Gas Emissions

AVX Corporation, Myrtle Beach, SC

| Emission Unit ID No. | Department | Uncontrolled Emissions | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PM | | $SO_2$ | | NOx | | CO | | VOC | | $CO_2$ | | $N_2O$ | | Methane | |
| | | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| 14 | RMM | 0.50 | 0.11 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 15 | Slip Mfg | - | - | - | - | - | - | - | - | 24.46 | 5.58 | - | - | - | - | - | - |
| 16 | Metals | 1.17 | 0.27 | - | - | - | | - | | 6.16 | 1.41 | - | - | - | - | - | - |
| 17 | CMAP Buildup (perm & temp) | 0.03 | 0.01 | 0.003 | 0.001 | 0.44 | 0.10 | 0.37 | 0.08 | 128.83 | 29.41 | 0.53 | 0.12 | - | - | - | - |
| 18 | CMAP Support | 15.26 | 3.48 | - | - | - | - | - | - | 1.19 | 0.27 | - | - | - | - | - | - |
| 19 | Metallization | - | - | - | - | - | - | - | - | 5.17 | 1.18 | - | - | - | - | - | - |
| 19 | Metallization - Electroplating | 2.43E-03 | 5.55E-04 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 20 | Thin Film | 0.75 | 3.26 | - | - | - | - | - | - | 2.07 | 0.47 | - | - | - | - | - | - |
| 21 | Misc Support - APTC (Insig) | - | - | - | - | - | - | - | - | 0.98 | 0.22 | - | - | - | - | - | - |
| 21 | Misc Support - Boiler | 0.54 | 0.12 | 0.04 | 0.01 | 7.04 | 1.61 | 5.92 | 1.35 | 0.39 | 0.09 | 8.45 | 2.40 | 0.15 | 0.04 | 0.16 | 0.05 |
| 21 | Misc Support - Emergency Gens. | 0.43 | 1.70 | 0.40 | 1.59 | 6.05 | 24.19 | 1.30 | 5.21 | 0.48 | 1.92 | 224.89 | 81.88 | - | - | - | - |
| 21 | Misc Support - Soldering | 0.01 | 0.002 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 21 | Misc Support - Stripping Tower (Insig) | - | - | - | - | - | - | - | - | 2.19 | 0.50 | - | - | - | - | - | - |
| | **TOTALS** | **18.68** | **8.96** | **0.44** | **1.60** | **13.53** | **25.90** | **7.59** | **6.65** | **171.91** | **41.06** | **233.87** | **84.41** | **0.15** | **0.04** | **0.16** | **0.05** |

| Emission Unit ID No. | Department | Controlled Emissions | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PM | | $SO_2$ | | NOx | | CO | | VOC | | $CO_2$ | | $N_2O$ | | Methane | |
| | | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) |
| 14 | RMM | 1.49E-04 | 3.39E-05 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 15 | Slip Mfg | - | - | - | - | - | - | - | - | 24.46 | 5.58 | - | - | - | - | - | - |
| 16 | Metals | 1.17 | 0.27 | - | - | - | - | - | - | 6.16 | 1.41 | - | - | - | - | - | - |
| 17 | CMAP Buildup (perm & temp) | 0.03 | 0.01 | 0.003 | 0.001 | 0.44 | 0.10 | 0.37 | 0.09 | 17.85 | 4.08 | 0.53 | 0.12 | - | - | - | - |
| 18 | CMAP Support | 0.23 | 0.05 | - | - | - | - | - | - | 1.19 | 0.27 | - | - | - | - | - | - |
| 19 | Metallization | - | - | - | - | - | - | - | - | 5.17 | 1.18 | - | - | - | - | - | - |
| 19 | Metallization - Electroplating | 2.43E-03 | 5.55E-04 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 20 | Thin Film | 0.01 | 0.03 | - | - | - | - | - | - | 1.05 | 0.24 | - | - | - | - | - | - |
| 21 | Misc Support - APTC (Insig) | - | - | - | - | - | - | - | - | 0.98 | 0.22 | - | - | - | - | - | - |
| 21 | Misc Support - Boiler | 0.54 | 0.12 | 0.04 | 0.01 | 7.04 | 1.61 | 5.92 | 1.35 | 0.39 | 0.09 | 8.45 | 2.40 | 0.15 | 0.04 | 0.16 | 0.05 |
| 21 | Misc Support - Emergency Gens. (Insig) | 0.43 | 1.70 | 0.40 | 1.59 | 6.05 | 24.19 | 1.30 | 5.21 | 0.48 | 1.92 | 224.89 | 81.88 | - | - | - | - |
| 21 | Misc Support - Soldering | 0.01 | 1.70 | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| 21 | Misc Support - Stripping Tower | - | - | - | - | - | - | - | - | 2.19 | 0.50 | - | - | - | - | - | - |
| | **TOTALS** | **2.42** | **3.88** | **0.44** | **1.60** | **13.53** | **25.90** | **7.59** | **6.65** | **59.91** | **15.49** | **233.87** | **84.41** | **0.15** | **0.04** | **0.16** | **0.05** |

**TABLE 11**

Potential HAP/TAP Emission Summary - Non-Exempt Sources Manufacturing Emissions

AVX Corporation, Myrtle Beach, SC

| HAP/TAP | Emission Unit | | | | | | | Individual Totals | Aggregate Total |
|---|---|---|---|---|---|---|---|---|---|
| | **15** | **16** | **17** | **19** | **20** | **21** | **21** | | |
| | **Slip Mfg** | **Metals** | **CMAP Buildup** | **Metallization** | **Thin Film** | **Strip. Twr/Solder** | **Boiler** | | |
| | **Emissions (ton/yr)** | | | | | | | | |
| 2-Ethanolamine | - | - | - | - | 2.27E-01 | - | - | **2.27E-01** | |
| Bis (2-ethylehexyl) Phthalate | 1.30E-01 | 4.88E-03 | 0.03 | - | - | - | - | **1.65E-01** | |
| Benzene | - | - | - | - | - | - | 1.48E-04 | **1.48E-04** | |
| Ethyl Benzene | - | 2.88E-04 | 0.03 | - | - | - | - | **3.04E-02** | |
| Ethylidene Dichloride | - | - | - | - | - | 0.48 | - | **4.82E-01** | |
| Formaldehyde | - | - | - | - | - | - | 5.28E-03 | **5.28E-03** | |
| Hexane | - | - | - | - | - | - | 1.27E-01 | **1.27E-01** | |
| Hydrochloric Acid | - | - | - | - | 4.02E-03 | - | - | **4.02E-03** | |
| Hydrofluoric Acid | - | - | - | - | 7.67E-04 | - | - | **7.67E-04** | |
| Lead | - | - | - | 5.42E-05 | 2.92E-04 | 9.32E-05 | - | **4.39E-04** | |
| Methyl Alcohol | 7.70E-03 | 1.42E-03 | 0.24 | 0.07 | - | - | - | **3.21E-01** | |
| Methyl Isobutyl Ketone | 4.06E-03 | 7.49E-04 | 0.12 | 0.04 | - | - | - | **1.59E-01** | |
| Naphthalene | - | - | - | - | - | - | 4.30E-05 | **4.30E-05** | |
| Nickel | - | - | - | 1.95E-03 | - | - | - | **1.95E-03** | |
| Nitric Acid | - | - | - | - | 1.70E-02 | - | - | **1.70E-02** | |
| Phosphoric Acid | - | - | - | - | 6.98E-03 | - | - | **6.98E-03** | |
| Polycyclic Organic Matter | - | - | - | - | - | - | 6.21E-06 | **6.21E-06** | |
| Sulfuric Acid | - | - | - | - | 3.16E-03 | - | - | **3.16E-03** | |
| Toluene | - | 5.76E-04 | 0.03 | - | - | - | 2.39E-04 | **3.09E-02** | |
| Trichloroethylene (TCE) | - | - | - | - | - | 1.32 | - | **1.32E+00** | |
| Vinyl Chloride (Chloroethylene) | - | - | - | - | - | 0.39 | - | **3.95E-01** | |
| Xylene | - | 0.05 | 0.03 | - | - | - | - | **7.68E-02** | |
| | | | | | | | | | **3.37** |

Note: The highest emitted single HAP is xylene.

**TABLE 12**

Emission Unit 14

Raw Materials Manufacturing Emissions

AVX Corporation, Myrtle Beach, SC

UNIT 14 - Particulate Matter Emissions from RMM Processing

| Process | Amount Processed 2006 (tpy) | Potential Usage (tpy) | Emission Factor (lb/ton)[1] | Uncontrolled Emissions (lb/yr) | Uncontrolled Emissions (tpy) | Controlled Emissions[2] (lb/hr) | Controlled Emissions[2] (tpy) | Std. 4 Process Weight Rule (lb/hr) |
|---|---|---|---|---|---|---|---|---|
| Grinders, Mills, and Prillers | 277 | 318 | 0.72 | 199.3 | 0.10 | 6.83E-06 | 2.99E-05 | 8.86 |
| Mixers | 1,100 | 1,265 | 0.72 | 792.0 | 0.40 | 2.71E-05 | 1.19E-04 | 15.90 |

Notes:

[1] Use AP-42 Emission Factor from cement bin loading Section 11.12

[2] Three baghouses control emissions from RMM, the lowest efficiency is 99.97%.

[3] All PM emissions from the Vat loading are accounted for in the Grinders, Mills and Mixers.

**TABLE 13**

Unit 15

Slip Manufacturing Emissions

AVX Corporation, Myrtle Beach, SC

UNIT 15 -VOC Emission from Slip Manufacturing (Slip Manufacturing Mills and Slip Manufacturing Mixers)

| Solvents Used in Slip Dept. | Use Type | Actual Slip Department Use (2006)[1] (gal) | Potential Slip Department Use (gal)[2] | % of Usage Emitted[3] | lb/gal (VOC) | Total VOC Emissions (lb/yr) | Total VOC Emissions (tpy) |
|---|---|---|---|---|---|---|---|
| PGME | Process | 55 | 63.25 | 10% | 7.7 | 49 | 0.02 |
| Butyl Cellusolve | Process | 770 | 886 | 10% | 7.5 | 664 | 0.33 |
| BC/PM | Process | 43,010 | 49,462 | 10% | 7.57 | 37,442 | 18.72 |
| DiOctylPhthalate | Process | 275 | 316 | 10% | 8.22 | 260 | 0.13 |
| Iso Spirits[4] | Cleaning | 55 | 63.25 | 20% | 6.23 | 78.8095 | 0.04 |
| Bio-Act113 | Cleaning | 1210 | 1,392 | 100% | 7.18 | 9,991 | 5.00 |
| Denatured Alcohol | Cleaning | 275 | 316 | 20% | 6.76 | 428 | 0.21 |
| Totals | | | | | | 48,912 | 24.46 |

Notes:

1. Based on actual 2006 usage data from AVX.
2. Potential emissions based on 2006 usage + 15%
3. 10% or 20% losses are primarily fugitive and are conservative estimates established from communications between AVX and DHEC. The balance remains in the electrode ink, termination paste, or waste.
4. Iso Spirits was not used in Slip in 2006. 55 gallons used in each of 2004 and 2005 and is included to capture the potential material use.

UNIT 15 - HAP/TAP Emissions From Slip Department

| Constituent | HAP/TAP | Maximum % wt in Solvents Used (Worst Case) | lbs of HAP (Worst Case) | tpy of HAP (Worst Case) |
|---|---|---|---|---|
| Bis (2-ethylehexyl) Phthalate[1] | HAP/TAP | 100 | 260.0 | 1.30E-01 |
| Methyl Alcohol[2] | HAP/TAP | 3.6 | 15.4 | 7.70E-03 |
| Methyl Isobutyl Ketone[2] | HAP/TAP | 1.9 | 8.12 | 4.06E-03 |

Notes:

1. Contained in DiOctylPhthalate
2. Contained in Denatured Alcohol

**TABLE 14**
Unit 16
Metals Manufacturing Emissions - VOC/HAP
AVX Corporation, Myrtle Beach, SC

UNIT 16 - VOC Emissions from Metals Department (Metal Mills and Metal Mixers)

| Solvents Used in Metals | Use Type | Actual Metal Department Use (2006)[1] (gal) | Potential Metal Department Use (gal)[2] | % of Usage Emitted[3] | lb/gal (VOC) | Total VOC Emissions (lb/yr) | Total VOC Emissions (tpy) |
|---|---|---|---|---|---|---|---|
| Terpineol | Process | 8,690 | 9,994 | 10% | 7.79 | 7,785 | 3.89 |
| Dipentene | Process | 55 | 63 | 100% | 7.21 | 456 | 0.23 |
| Iso Spirits | Cleaning | 2,365 | 2,720 | 20% | 6.23 | 3,389 | 1.69 |
| Denatured Alcohol | Cleaning | 55 | 63 | 20% | 6.23 | 79 | 0.04 |
| Xylene | Process | 110 | 127 | 10% | 7.26 | 92 | 0.05 |
| Butyl Cellusolve | Process | 0 | 15 | 10% | 7.5 | 11 | 0.006 |
| Southpart K Solvent | Process | 0 | 15 | 100% | 6.5 | 98 | 0.05 |
| Diethylene Glycol Dibutyl Ether | Process | 0 | 15 | 100% | 7.38 | 111 | 0.06 |
| DiOctylPhthalate | Process | 0 | 15 | 10% | 6.5 | 10 | 0.005 |
| Mineral Spirits Type 66 | Process | 385 | 443 | 10% | 6.51 | 288 | 0.14 |
| Total | | 11,660.00 | 13,469 | | 69.11 | 12,318 | 6.16 |

Notes:
1. Based on actual peak usage in 2006 data from AVX.
2. Potential emissions based on 2006 usage + 15%. Butyl cellusove, Southpart K, DGDE, and DOP were not used in 2006. Since they were used in the past, 15 gal future usage was assumed.
3. 10% or 20% losses are primarily fugitive and are conservative estimates established from communications between AVX and DHEC. The balance remains in the electrode ink, termination paste, or waste.

UNIT 16 - HAP/TAP Emissions From Metals Department

| Constituent | HAP / TAP | Maximum % wt in Solvents Used (Worst Case) | lbs of HAP (Worst Case) | tpy of HAP (Worst Case) |
|---|---|---|---|---|
| Xylene, Mixed Isomers[1] | HAP/TAP | 100 | *91.8* | *0.05* |
| Xylene, Mixed Isomers[2] | HAP/TAP | 0.5 | *1.44* | *7.21E-04* |
| Total Xylene | | | 93.28 | 0.05 |
| Toluene[2] | HAP/TAP | 0.4 | 1.15 | 5.76E-04 |
| Ethyl Benzene[2] | HAP/TAP | 0.2 | 0.58 | 2.88E-04 |
| Bis (2-ethylehexyl) Phthalate[3] | HAP/TAP | 100 | 9.75 | 0.005 |
| Methyl Alcohol[4] | HAP/TAP | 3.6 | 2.84 | 0.001 |
| Methyl Isobutyl Ketone[4] | HAP/TAP | 1.9 | 1.50 | 0.001 |
| Total | | | | 0.05 |

Notes:
1. Used as process solvent and contained in Mineral Spirits Type 66
2. Contained in Mineral Spirits Type 66
3. Contained in DiOctylPhtalate
4. Contained in Denatured Alcohol

**June 25, 2009 Metals Source Test Results**
**Ink Milling**

| Consolidated Process Ink Formulation | % by wt. |
|---|---|
| Ni Powder | 43.21 |
| Barium Titanate Powder | 9.79 |
| Ethyl Cellulose Binder | 2.30 |
| Terpineol | 44.47 |
| DOP | 0.23 |

| | | |
|---|---|---|
| Total Ink processed (g) | 49240.5 | |
| Total Solvent processed in ink (g) | 21894.9 | |
| Total Solvent processed in ink (lb) | 48.3 | |
| Source test time (minutes) | 90 | (Three 30 minute runs) |
| Solvent processed during test (lb/hr) | 32.2 | |
| Ave. Measured Emission Rate (lb/hr as carbon) | 0.036 | |
| Milled ink emission factor (lb VOC/lb solvent) | 0.0011 | |

Note: Percentage loss factors are more conservative than source test results.
Percentage loss factors are used in the facility emission estimates.

**TABLE 15**

Unit 16

Metals Manufacturing Emissions - PM

AVX Corporation, Myrtle Beach, SC

UNIT 16 - PM Emissions from Metals Department (Metal Mills and Metal Mixers)

| Process | Amount Processed (tpy) | Loss Rate[1] (lb/ton) | Uncontrolled Emissions[2] (lb/hr) | Uncontrolled Emissions[2] (tpy) | Process Weight Rule (lb/hr) |
|---|---|---|---|---|---|
| Mills/Mixers | 3,257.00 | 0.72 | 0.27 | 1.17 | 1.53 |

Notes:

1. Loss rate for mixers is based on AP-42 5th edition 11.12-1 for loading of cement into bins of 0.72 lb/ton. PM emissions only occur during loading. Solvent is added during mixing so no PM is produced.
2. There is no PM control in Metals

**TABLE 16**
UNIT 17
CMAP Emissions
AVX, Myrtle Beach, SC

UNIT 17 - VOC Emissions from CMAP Manufacturing

*Mass balance and control information:*

| | |
|---|---|
| 0.85 | Fraction slip actually applied to chip (the remaining 15% is collected for reclaim) |
| 0.3032 | Fraction of VOC in slip (from the MSDS sheets) |
| 0.01 | Fraction of VOC emitted as room fugitives (engineering estimate) |
| 0.005 | Fraction of VOC emitted as fugitive post chip manufacturing (engineering estimate) |
| 0.985 | Adsorber/Desorber/Thermal oxidizer System destruction efficiency (February 26, 2009 Source Test)[1] |
| 70 | Slip usage rate (kg slip/machine/day) |
| 24 | Number of CMAP machines[2] |
| 0.67 | Potential operating hours factor (32 hrs/48 hrs)[3] |

| | | |
|---|---|---|
| Total VOC prior to thermal oxidizer in the CMAP process: | **116.15** | **TPY** |
| Manufacturing fugitive VOC emissions: | **1.16** | **TPY** |
| Post manufacturing fugitive VOC emissions[4]: | **0.58** | **TPY** |
| Total VOC evolved during the CMAP process (after Thermal Oxidizer, less fugitives): | **1.72** | **TPY** |
| Total Process VOC Emissions from CMAP process | **3.46** | **TPY** |

Note:
1. The February 2006 source test resulted in an overall 99.5% control efficiency. AVX will use 98.5% in emission rate calculations for conservatism.
2. 24 machines includes two medical machines that will remain in the original MB1 location through the majority of 2010 for qualification product purposes (See Table 16).
3. AVX/DHEC communications. CMAP equipment cannot operate 24/7.
4. An estimate of residual VOC emissions after chip manufacturing emitted in green chip step prior to the kiln room.

UNIT 17 - HAP/TAP Emissions from CMAP Manufacturing

| HAP/TAP | Max % HAP by wt. in Slip/Ink | CMAP Fugitive Uncontrolled Emissions (TPY) | CMAP Controlled Point Source Emissions (TPY) | CMAP Total Emissions |
|---|---|---|---|---|
| Toluene | 0.5 | 0.01 | 0.01 | 0.02 |
| Ethyl Benzene | 0.5 | 0.01 | 0.01 | 0.02 |
| Bis (2-ethylehexyl) Phthalate | 0.5 | 0.01 | 0.01 | 0.02 |
| Xylene | 0.5 | 0.01 | 0.01 | 0.02 |
| Methyl Alcohol | 3.60 | 0.10 | 0.06 | 0.17 |
| Methyl Isobutyl Ketone | 1.90 | 0.05 | 0.02 | 0.08 |
| **Total** | | **0.22** | **0.12** | **0.33** |

UNIT 17 - Fugitive VOC Emissions from CMAP Manufacturing Cleaning

| Cleaning Materials Used | Actual 2006 Department Use (gal) | Potential Department Use (gal)[2] | % of Usage Emitted | lb/gal (VOC) | Total VOC Emissions (lb/yr) | Total VOC Emissions (tpy) |
|---|---|---|---|---|---|---|
| Iso Spirits | 11,220 | 12,903 | 20% | 6.23 | 16,077 | 8.0 |
| n-Butyl Acetate[1] | 165 | 190 | 20% | 7.34 | 279 | 0.1 |
| BC/PM | 2,695 | 3,099 | 20% | 7.57 | 4,692 | 2.3 |
| Denatured Ethyl Alcohol | 770 | 886 | 20% | 6.59 | 1,167 | 0.6 |
| Total | 14,850.00 | 17,078 | | 27.73 | 22,215 | 11.1 |

Notes:
1. N-butyl acetate recently replaced xylene as a CMAP cleaning solvent. Since xylene was not used in 2006, an average of previous year usages was assumed.

UNIT 17 - HAP/TAP Emissions from CMAP Manufacturing Cleaning

| Constituent | HAP / TAP | Maximum % wt in Solvents Used (Worst Case) | lbs of HAP (Worst Case) | tpy of HAP (Worst Case) |
|---|---|---|---|---|
| Methyl Alcohol[1] | HAP/TAP | 3.6 | 42.02 | 0.02 |
| Methyl Isobutyl Ketone[1] | HAP/TAP | 1.9 | 22.17 | 0.01 |
| **Total** | | | | **0.03** |

Notes:
1. Contained in Denatured Alcohol

**TABLE 17**

UNIT 17

Temporary CMAP Emissions

AVX, Myrtle Beach, SC

UNIT 17 - VOC Emissions from Temporary CMAP Manufacturing

*Mass balance and control information:*

| | |
|---|---|
| 0.85 | Fraction slip actually applied to chip (the remaining 15% is collected for reclaim) |
| 0.3032 | Fraction of VOC in slip (from the MSDS sheets) |
| 70 | Slip usage rate (kg slip/machine/day) |
| 2 | Number of CMAP machines[1] |
| 0.10 | Potential operating hours factor (864 hr/yr limit) |

Total VOC emitted from temporary medical CMAP process: **1.43 TPY**

Note:

1. Two CMAP machines will remain at the original MB1 location through the majority of 2010 for qualification purposes. Sufficient product inventory was produced prior to the submittal of this application. These machines should remain idle during this qualification. The machines will be needed in their present location in event the inventory is depleted prior to qualification approval to relocate them.

UNIT 17 - Fugitive VOC Emissions from CMAP Manufacturing Cleaning

| Cleaning Materials Used | Potential Department Use (gal)[1] | % of Usage Emitted | lb/gal (VOC) | Total VOC Emissions (lb/yr) | Total VOC Emissions (tpy) |
|---|---|---|---|---|---|
| Iso Spirits | 129 | 20% | 6.23 | 161 | 0.1 |
| n-Butyl Acetate | 2 | 20% | 7.34 | 3 | 0.001 |
| BC/PM | 31 | 20% | 7.57 | 47 | 0.02 |
| Denatured Ethyl Alcohol | 9 | 20% | 6.59 | 12 | 0.01 |
| Total | 171 | | 27.73 | 222 | 0.11 |

Notes:

1. Assumed 1% of main CMAP manufacturing potential material usage.

UNIT 17 - HAP/TAP Emissions from CMAP Manufacturing

| HAP/TAP | Max % HAP by wt. in Slip/Ink | CMAP Fugitive Uncontrolled Emissions (TPY) |
|---|---|---|
| Toluene | 0.5 | 7.16E-03 |
| Ethyl Benzene | 0.5 | 7.16E-03 |
| Bis (2-ethylehexyl) Phthalate | 0.5 | 7.16E-03 |
| Xylene | 0.5 | 7.16E-03 |
| Methyl Alcohol | 3.60 | 5.16E-02 |
| Methyl Isobutyl Ketone | 1.90 | 2.72E-02 |
| **Total** | | **0.11** |

UNIT 17 - HAP/TAP Emissions from CMAP Manufacturing Cleaning

| Constituent | HAP / TAP | Maximum % wt in Solvents Used (Worst Case) | lbs of HAP (Worst Case) | tpy of HAP (Worst Case) |
|---|---|---|---|---|
| Methyl Alcohol[1] | HAP/TAP | 3.6 | 0.42 | 2.10E-04 |
| Methyl Isobutyl Ketone[1] | HAP/TAP | 1.9 | 0.22 | 1.11E-04 |
| **Total** | | | | **3.21E-04** |

Notes:

1. Contained in Denatured Alcohol

**TABLE 18**

UNIT 17

CMAP Emissions

AVX, Myrtle Beach, SC

UNIT 17 - Emission from Ancillary VOC Control Startup Burner

| | | |
|---|---|---|
| Fuel Combustion: | FluiSorb Startup Burner | |
| Unit Designation: | NMF-FB1 | |
| <u>Burner Information:</u> | | |
| Average Firing Rate: | 1 | MMBtu/hr |
| Maximum Firing Rate: | 1 | MMBtu/hr |
| Fuel Heat Content: | 1,020 | Btu/scf |
| Maximum Fuel Usage: | 1,020 | scf/hour |
| Maximum Fuel Usage: | 8.8 | MMscf/yr |
| Maximum Operating Schedule: | Assumed continuous | |
| | Not supplemented by process VOC | |

| **Pollutant** | **Emission Factors**[1] | **Potential Emissions (Unc.)** | |
|---|---|---|---|
| | **(lb/MMscf)** | **(lb/hr)** | **(tpy)** |
| PM | 7.6 | 0.01 | 0.03 |
| $SO_2$ | 0.6 | 0.00 | 0.003 |
| NOx | 100 | 0.10 | 0.44 |
| CO | 84 | 0.09 | 0.37 |
| VOC | 5.5 | 0.01 | 0.02 |
| $CO_2$ | 120 | 0.12 | 0.53 |
| $N_2O$ | 2.2 | 0.002 | 0.01 |
| Methane | 2.3 | 0.002 | 0.01 |

Note:

1. AP-42, Section 1.4, Tables 1.4-1 and 1.4-2

**TABLE 19**
UNIT 18
CMAP Support Emissions
AVX, Myrtle Beach, SC

UNIT 18 - Particulate Matter Emission from Dry Dicing

***Assumed mass balance and control information:***

| | | | |
|---|---|---|---|
| Dust Recovered: | 575.0 | kg/month/dicer | Estimated baghouse material recovery + 15% |
| Control efficiency: | 99.5% | | April 1, 1998 Title V permit application |
| PM generated: | 577.9 | kg PM/month/dicer | |
| PM Uncontrolled | 15.26 | TPY | |
| Controlled PM Emissions: | 2.89 | kg PM/month/dicer | |
| Number of Dry Dicers: | 6 | | |
| Processing Rate: | 106 | lbs/day/machine (48 kg/day/machine) | |
| Total Processing Rate: | 0.0133 | tons per hour | |

***Summary of Potential Process Emissions***

| Emission Source | PM Emissions (lb/hr) | PM Emissions (tpy) |
|---|---|---|
| Dicing Baghouse | 0.05 | 0.23 |

***Process Weight Rule Computation***

| Parameter | Value | Units |
|---|---|---|
| Material per Hour (P) | 0.002 | tons/hour |
| Process Weight Rate, $4.10(P)^{0.67}$ | 0.07 | lb PM/hr |
| Potential PM Emissions[a] | 0.05 | lb PM/hr |

# TABLE 20
## UNIT 18
## CMAP Support Emissions Continued
AVX, Myrtle Beach, SC

UNIT 18 - VOC Emissions from Kiln Room

Burnout oven emissions based on source testing

| | |
|---|---|
| Source Test Date: | June 25, 2009 |
| Burnout Oven: | GB201 |
| No. of pans in charge: | 19 |
| No. of chips in pans: | 1,010,960 |
| Chips/pan: | 53,208 |
| Oven pan capacity: | 30 |
| Max. No. of chips.: | 1,596,253 |
| Actual to Potential Linear Factor: | 1.58 |

Test Results Summary

| | **Test 1**<br>**lb/hr (as carbon)** | **Test 2**<br>**lb/hr (as carbon)** |
|---|---|---|
| Run 1 | 0.0009 | 0.016 |
| Run 2 | 0.0009 | 0.013 |
| Run 3 | 0.0011 | 0.013 |
| Test Average | 0.0010 | 0.0140 |
| Linear Adj. (Potential) | 0.0015 | 0.0221 |

Burnout Batch Cycle Emissions

| **Temperature Curve Points** | **Oven Cycle Temp. ($^oF$)** | **Emission Rate (lb/hr)** |
|---|---|---|
| Point 1 (start) | 230 | 0 |
| Point 2 (Test 1) | 409[1] | 0.0015 |
| Point 3 (Test 2) | 496[1] | 0.0221 |
| Point 4 (end) | 100 | 0 |
| Cycle Average | | 0.006 |

Note:
1. Averages of oven temperatures during Test 1 and Test 2 testing times.

Worse Case Cycle Emissions

| | |
|---|---|
| Cycle Average lb/hr per oven | 0.006 |
| Total No. of Burnout Ovens | 46 |
| **Potential Department (lb/hr)** | **0.27** |
| **Potential Department (lb/yr)** | **2,381** |
| **Potential Department (ton/yr)** | **1.19** |

**Table 21**

UNIT 19

Termination Department Emissions

AVX, Myrtle Beach, SC

Unit 19 - VOC Emissions from Termination Paste

| Data | 2006 Usage[1] (lb/yr) | Potential Usage[2] (lb/yr) |
|---|---|---|
| Termination Department Paste Delivered (lb/yr) | 34,149 | 39,271 |
| VOC Content Silver Paste (percent) | 22% | 22% |
| Termination Reclaim & Waste (lb/year)[3] | 18,444 | 18,444 |
| VOC (Terpineol) Emissions (tpy) | 1.73 | 2.29 |

Notes:

1. 2006 Production data provided by AVX
2. 2006 data plus 15%
3. The potential reclaim amount was not increased by 15% as a conservative approach.

Unit 19 - VOC Emissions From Termination Department Cleaning

| Cleaning Solvents Used in Termination | 2006 Department Use[1] (gal) | Potential Department Use[2] (gal) | % of Usage Emitted[3] | lb/gal (VOC) | Total VOC Emissions (lb/yr) | Total VOC Emissions (tpy) |
|---|---|---|---|---|---|---|
| Propyl Propionate | 3,685 | 4,238 | 20% | 7.35 | 6,229 | 3.1 |
| Denatured Alcohol | 2,640 | 3,036 | 20% | 6.76 | 4,105 | 2.1 |
| Total | | | | | 10,334 | 5.2 |

Notes:

1. Production data provided by AVX
2. 2006 data plus 15%
3. 20% loss factor is fugitive emissions based on conservative estimates from knowledge of material use. The balance is waste.
4. Propyl propionate recently replaced xylene as a Termination cleaning solvent. The amount of xylene used in 2006 was assumed equal to propyl propionate usage.

Unit 19 - HAP/TAP Emissions From Termination Department Cleaning

| Constituent | HAP/TAP | Maximum % wt in Solvents Used (Worst Case) | lbs of HAP (Worst Case) | tpy of HAP (Worst Case) |
|---|---|---|---|---|
| Methyl Alcohol[1] | HAP/TAP | 3.6 | 147.8 | 0.07 |
| Methyl Isobutyl Ketone[1] | HAP/TAP | 1.9 | 77.99 | 0.04 |

Notes:

1. Contained in Denatured Alcohol

**TABLE 22**
UNIT 19
Termination Emissions - Electroplating
AVX, Myrtle Beach, SC

Unit 19 - Miscellaneous Emissions From Electroplating Operations

| | *AUTOLINE* | | | | *SBE* | | | |
|---|---|---|---|---|---|---|---|---|
| | **Target Metal Concentration[2] (oz/gal)** | **Cr Emission Factor (Con.) (gr/dscf)** | **Original Control Eff.** | **Other Metal Factor (Unc.)[3] (gr/dscf)** | **Target Metal Concentration[2] (oz/gal)** | **Cr Emission Factor (Con.) (gr/dscf)** | **Original Control Eff.** | **Other Metal Factor (Unc.)[3] (gr/dscf)** |
| Nickel Electroplating[1] | 11.2 | 2.62E-06 | 98.0% | 4.11E-05 | 12.7 | 2.62E-06 | 98.0% | 4.66E-05 |
| Lead Electroplating[1] | 0.60 | 2.62E-06 | 98.0% | 2.20E-06 | 0.16 | 2.62E-06 | 98.0% | 5.87E-07 |
| Gold Electroplating[1] | - | - | - | - | 1.00 | 2.62E-06 | 98.0% | 3.67E-06 |
| Tin Electroplating[1] | 1.7 | 2.62E-06 | 98.0% | 6.24E-06 | 2.4 | 2.62E-06 | 98.0% | 8.80E-06 |

Notes:
1. Emission factors for all metals are calculated using AP-42, Section 12.20 (7/96).
AVX removed their scrubber in 2002, therefore the emission rates are back calculated using the original control efficiency.
2. Target bath concentrations provided by AVX.
3. Other metal emission factor = 0.028*Metal concentration (oz/gal)*Cr Emission Factor

**Flow Rate Information:[1]**

| | **95 liter SBE** | **95 & 130 liter SBEs** | **1 Autoline** |
|---|---|---|---|
| Stack Diameter (ft) | 0.5 | 0.5 | 36 |
| Velocity (fps) | 5.44 | 18.43 | 39.4 |
| Temperature (F) | 68 | 68 | 68 |
| Flow Rate (acfm) | 64.0 | 217.0 | 575.00 |
| Flow Rate (scfm) | 63.7 | 212.6 | 563.30 |

**SBE Line Information:**

| **Lines** | **Size (liter)** | **Metals** |
|---|---|---|
| SBE-1 and 5 | 95 | Ni/Sn/Pb |
| SBE-4 | 95 | Ni/Sn |
| SBE-2 and 3 | 130 | Ni/Sn |

Note:
1. Until all qualification processes are completed, the last Autoline will remain in operation through 2010 before it also will be decommissioned.
The Autoline and SBE flow rates based on February 2, 2010 measurement by AVX.

**Electroplating Emissions**

| **Pollutant** | **Emission Factor[1]** (mg/dscm) | **Autoline[2]** (lb/hr) | (tpy) |
|---|---|---|---|
| PM | 1.13E-01 | 2.39E-04 | 1.05E-03 |
| Nickel | 9.41E-02 | 1.99E-04 | 8.70E-04 |
| Lead | 5.05E-03 | 1.07E-05 | 4.67E-05 |
| Tin | 1.43E-02 | 3.01E-05 | 1.32E-04 |

| **Pollutant** | **Emission Factor[1]** | **Total Process Emissions** | | **95 l SBE[2]** | | **130 l SBE[2]** | |
|---|---|---|---|---|---|---|---|
| | (mg/dscm) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) |
| PM | 1.37E-01 | 3.15E-04 | 1.38E-03 | 9.78E-05 | 4.28E-04 | 2.18E-04 | 9.53E-04 |
| Nickel | 1.07E-01 | 2.46E-04 | 1.08E-03 | 7.64E-05 | 3.34E-04 | 1.70E-04 | 7.44E-04 |
| Lead | 1.34E-03 | 1.71E-06 | 7.50E-06 | 6.41E-07 | 2.81E-06 | 1.07E-06 | 4.69E-06 |
| Gold | 8.40E-03 | 2.00E-06 | 8.78E-06 | 2.00E-06 | 8.78E-06 | - | - |
| Tin | 2.02E-02 | 4.65E-05 | 2.04E-04 | 1.44E-05 | 6.32E-05 | 3.21E-05 | 1.41E-04 |

| **Pollutant** | **Total Emissions** (lb/hr) | (tpy) |
|---|---|---|
| PM | 5.55E-04 | 2.43E-03 |
| Nickel | 4.45E-04 | 1.95E-03 |
| Lead | 1.24E-05 | 5.42E-05 |
| Gold | 3.21E-05 | 1.41E-04 |
| Tin | 4.65E-05 | 2.04E-04 |

Notes:
1. Emission factor conversion from grains/dscf to mg/dscm from AP-42, Section 12.20.
2. Emission calculated from emission factor times air flow rate multiplied by the number of respective line sizes.

**TABLE 23**
UNIT 20
Thin Film Emissions
AVX, Myrtle Beach, SC

Unit 20 - VOC Emissions from Thin Film Process

| | Uncontrolled Emissions[1] | | Controlled Emissions[2] | |
|---|---|---|---|---|
| **Chemical** | **lb/hr** | **tpy** | **lb/hr** | **tpy** |
| Acetic Acid | 4.17E-02 | 1.83E-01 | 2.08E-02 | 9.13E-02 |
| Tetramethylammonium hydroxide | 5.21E-03 | 2.28E-02 | 2.60E-03 | 1.14E-02 |
| 2-ethanolamine | 1.04E-01 | 4.54E-01 | 5.19E-02 | 2.27E-01 |
| N-methylpyrolidone | 2.03E-01 | 8.91E-01 | 1.02E-01 | 4.45E-01 |
| 1,2-Propenediol | 6.71E-02 | 2.94E-01 | 3.35E-02 | 1.47E-01 |
| 2,4 Pentandione | 1.00E-03 | 4.38E-03 | 5.00E-04 | 2.19E-03 |
| Hexamethyldislazane | 1.67E-03 | 7.30E-03 | 8.33E-04 | 3.65E-03 |
| Isopropyl alcohol | 2.00E-02 | 8.76E-02 | 1.00E-02 | 4.38E-02 |
| Mesitylene | 2.83E-03 | 1.24E-02 | 2.83E-03 | 1.24E-02 |
| Dipropylene glycol dimethyl ether | 2.17E-03 | 9.49E-03 | 1.08E-03 | 4.75E-03 |
| Naphtha | 4.42E-03 | 1.93E-02 | 4.42E-03 | 1.93E-02 |
| 1-Methoxy-2-propanol acetate | 1.60E-02 | 7.01E-02 | 8.00E-03 | 3.50E-02 |
| 1-Methoxy-2-propanol | 2.38E-03 | 1.04E-02 | 1.19E-03 | 5.29E-03 |
| **Total VOCs** | **0.47** | **2.07** | **0.24** | **1.05** |

Notes:
1. Uncontrolled emissions are assumed to be a 10% loss from the daily material usage.
2. Controlled emission for VOC are based on a control efficiency of 50% based on conservative industry standards for soluble compounds. No control is assumed for mesitylene and naphtha since since they are insoluble.

Unit 20 - HAP/TAP Emissions from Thin Film Process

| | Uncontrolled Emissions[1] | | Controlled Emissions[2] | | |
|---|---|---|---|---|---|
| **Chemical** | **lb/hr** | **tpy** | **lb/hr** | **tpy** | **lb/day** |
| Sulfuric Acid | 0.07 | 0.32 | 7.21E-04 | 3.16E-03 | 0.017 |
| Nitric Acid | 0.39 | 1.70 | 3.88E-03 | 1.70E-02 | 0.093 |
| 2-ethanolamine | 0.10 | 0.45 | 5.19E-02 | 2.27E-01 | 1.245 |
| Hydrochloric Acid | 0.09 | 0.40 | 9.18E-04 | 4.02E-03 | 0.022 |
| Phosphoric Acid | 0.16 | 0.70 | 1.59E-03 | 6.98E-03 | 0.038 |
| **Total TAPs** | **0.81** | **3.57** | **0.06** | **0.26** | **1.42** |

Notes:
1. Uncontrolled emissions are assumed to be a 10% loss from the daily material usage.
2. Conservative control efficiency of 99% based on system design for acids. 50% for soluble VOC 2-ethanolamine.

Unit 20 - Fluorine and Lead Emissions from Thin Film Process

| | Uncontrolled Emissions[1] | | Controlled Emissions[2] | |
|---|---|---|---|---|
| **Chemical** | **lb/hr** | **tpy** | **lb/hr** | **tpy** |
| Hydrofluoric Acid | 0.02 | 0.08 | 1.75E-04 | 7.67E-04 |
| Lead | 0.01 | 0.03 | 6.67E-05 | 2.92E-04 |
| Lead zirconate titanate | 0.01 | 0.03 | 6.04E-05 | 2.65E-04 |

Notes:
1. Uncontrolled emissions are assumed to be a 10% loss from the daily material usage.
2. Conservative control efficiency of 99% based on system design for hydrofluoric acids. Industry standard, conservative 99% efficiency for particulate matter.

**TABLE 24**
UNIT 21
Miscellaneous Support Emissions - APTC
AVX, Myrtle Beach, SC

Unit 21 - APTC (Product Testing Process)

-

| Material | HAP Constituents | HAP/TAP/VOC | 2006 Cleaning Solvent Use[1] (gal) | Potential Cleaning Solvent Use[2] (gal) | VOC Content (lb/gal) | HAP Content (lb/gal) | Amount Reclaimed[3] (%) | VOC Emissions (tpy) | HAP Emissions (tpy) |
|---|---|---|---|---|---|---|---|---|---|
| Iso Sprits | - | VOC | 1,028 | 1182 | 6.23 | 0 | 93 | 0.26 | - |
| Isopropyl Alcohol | - | VOC | 343 | 394 | 6.51 | 0 | 93 | 0.09 | - |
| BC-PM | - | VOC | 2082 | 2394 | 7.57 | 0 | 93 | 0.63 | - |
| Denatured Alcohol | MeOH, MIBK | HAP/TAP/VOC | 0 | 0 | 6.59 | 0.21 | 93 | 0.00 | 0.00E+00 |
| | | **TOTAL** | **3,453** | **3,971** | | | | **0.98** | **0.00E+00** |

[1]Per 2006 facility provided data.

[2]Potential is estimated using the 2006 data plus 15%

[3]Reclaim of cleaning solvent based on volume used and volume collected in waste bins.

**TABLE 25**

UNIT 21

Miscellaneous Support Boiler Emissions

AVX, Myrtle Beach, SC

Unit 21 - Emissions from Boilers (Miscellaneous Support)

*Boiler Information*

| | | |
|---|---|---|
| Fuel Combustion Unit: | Boiler B201 | |
| Fuel Fired: | Natural Gas | |
| Process Designation: | MB2 Boiler | |
| Stack Designation: | NMFS-B1 | |
| Maximum Rated Capacity: | 16.4 | MMBtu/hr |
| Average Fuel Heat Content: | 1,020 | Btu/scf |
| Maximum Annual Operation: | 8760 | hours/year |
| Hourly Fuel Usage: | 0.02 | $10^6$ scf/hr |
| Potential Annual Fuel Usage: | 175.2 | $10^6$ scf/hr |

Unit 21 - Criteria Pollutant Emissions

| | Emission Factors[1] | Potential to Emit | |
|---|---|---|---|
| **Pollutant** | **(lb/$10^6$ scf)** | **(lbs/hr)** | **(tpy)** |
| PM, $PM_{10}$, $PM_{2.5}$ | 7.6 | 0.15 | 0.54 |
| SOx | 0.6 | 0.01 | 0.04 |
| NOx | 100 | 2.00 | 7.04 |
| CO | 84 | 1.68 | 5.92 |
| VOC | 5.5 | 0.11 | 0.39 |
| Lead | 0.0005 | 1.00E-05 | 3.52E-05 |

[1]Source: EPA AP-42, Section 1.4, Tables 1.4-1 and 1.4-2.

Unit 21 - HAP/TAP Emissions

| | Emission Factors[1] | Potential to Emit | |
|---|---|---|---|
| **Pollutant** | **(lb/$10^6$ scf)** | **(lbs/hr)** | **(tpy)** |
| Benzene | 2.10E-03 | 4.20E-05 | 1.48E-04 |
| Formaldehyde | 7.50E-02 | 1.50E-03 | 5.28E-03 |
| Hexane | 1.8 | 3.60E-02 | 1.27E-01 |
| Naphthalene | 6.10E-04 | 1.22E-05 | 4.30E-05 |
| Polycyclic Organic Matter | 8.82E-05 | 1.76E-06 | 6.21E-06 |
| Toluene | 3.40E-03 | 6.80E-05 | 2.39E-04 |

[1]Source: EPA AP-42, Section 1.4, Table 1.4-3.

Unit 21 - GHG Emissions

| | Emission Factors[1] | Potential to Emit | |
|---|---|---|---|
| **Pollutant** | **(lb/$10^6$ scf)** | **(lbs/hr)** | **(tpy)** |
| $CO_2$ | 120 | 2.40 | 8.45 |
| $N_2O$ | 2.2 | 0.04 | 0.15 |
| Methane | 2.3 | 0.05 | 0.16 |

**TABLE 26**

UNIT 21

Miscellaneous Support Emissions - New Stripper Tower

AVX, Myrtle Beach, SC

Unit 21 - New Stripping Tower Emissions (Miscellaneous Support)

| Contaminant | CAS No. | HAP/TAP | QED Model (6-tray) | | | |
|---|---|---|---|---|---|---|
| | | | (lb/hr) | (lb/day) | (lb/yr) | (ton/yr) |
| Trichloroethylene (TCE) | 79-01-6 | H,T | 0.300 | 7.21 | 2631.6 | 1.32 |
| Vinyl chloride (chloroethylene) | 75-01-4 | H,T | 0.090 | 2.16 | 789.5 | 0.39 |
| Ethylidine dichloride | 75-34-3 | H,T | 0.110 | 2.64 | 963.6 | 0.48 |
| Total HAP/VOC | | | 0.50 | 12.01 | 4384.73 | 2.19 |

Notes:

**TABLE 27**
UNIT 21
Miscellaneous Support Emissions - Soldering
AVX, Myrtle Beach, SC

Unit 21 - Soldering Emissions (Miscellaneous Support)

*Assumptions:*

| | | |
|---|---|---|
| Number of machines (1 wave solder, 3 solder pots with hoods) | 4 | |
| Potential soldering usage | 1,000 | lbs/yr |

| HAPs | Manufacturers Product ID Number | Emission Factor | Potential Quantity Used | Potential Emissions | |
|---|---|---|---|---|---|
| | | (lb) | (lb/yr)[1] | (lb/yr) | (ton/yr) |
| Lead (Pb)[3] | SN/60 Electrolytic Grade Solder | 0.000162 | 1150 | 0.19 | 9.32E-05 |
| Cr (HAP) | SN/60 Electrolytic Grade Solder | 0.000013 | 1150 | 0.01 | 7.48E-06 |
| Mn (HAP) | SN/60 Electrolytic Grade Solder | 0.000846 | 1150 | 0.97 | 4.86E-04 |

| Criteria Pollutants | Manufacturers Product ID Number | Emission Factor | Potential Quantity Used | Potential Emissions | |
|---|---|---|---|---|---|
| | | (lb) | (lb/yr)[1] | (lb/yr) | (ton/yr) |
| PM | SN/60 Electrolytic Grade Solder | 0.018 | 1150 | 20.70 | 0.010 |
| PM-10 | SN/60 Electrolytic Grade Solder | 0.018 | 1150 | 20.70 | 0.010 |

[1]Potential is estimated using the 2006 data plus 15%. 2006 was the most recent, maximum year data was available.

[2]Per the MSDS, the emissions using the MSDS were more conservative for Pb there that number was used in the facility summary.

[3]Using AP-42 12.19 Emission Factors for SMAW Welding Process

**TABLE 28**

UNIT 21

Miscellaneous Support Emissions (Insignificant Emergency Generators)

AVX, Myrtle Beach, SC

Unit 21 - Emissions from Emergency Generators E1, E4 -E7 (Miscellaneous Support)

| Data | E1 | E5 | E6 | E7 |
|---|---|---|---|---|
| | Kiln Room[1] | MIS | RMM | Sol Gel |
| Fuel Fired: | Diesel | Diesel | Diesel | Diesel |
| Power Output (kW): | 100 | 260 | 600 | 565 |
| Max. Firing Rate (MMBtu/hr): | 0.5 | 0.89 | 2.05 | 2.05 |
| Ave. Fuel Heat Content (Btu/gal): | 140,000 | 140,000 | 140,000 | 140,000 |
| Fuel Sulfur Content (%): | 0.05 | 0.05 | 0.05 | 0.05 |
| Hourly Fuel Usage (gal/hr): | 3.56 | 6.34 | 14.64 | 14.64 |
| Annual Fuel Usage (gal/yr based on 500 hrs): | 1780 | 3170 | 7320 | 7320 |

Note:

1. Formerly located at CMAP. Moved to Kiln Room.
2. E3 has been decommissioned and E4 has been moved off site.

| Pollutant | Emission Factors[1] |
|---|---|
| | (lb/MMBtu) |
| PM | 0.31 |
| $SO_2$ | 0.29 |
| NOx | 4.41 |
| CO | 0.95 |
| $CO_2$ | 164 |
| VOC | 0.35 |
| Benzene | 9.33E-04 |
| Toluene | 4.09E-04 |
| Xylene | 2.85E-04 |
| 1,3 Butadiene | 3.91E-04 |
| Formaldehyde | 1.18E-03 |
| Acetaldehyde | 7.67E-04 |
| Acrolein | 9.25E-05 |

Note:

1. Source: AP-42, Tables 3.3-1 and 3.3-2, October 1996.

| Pollutant | Potential Emissions | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | E1 | | E5 | | E6 | | E7 | |
| | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) | (lb/hr) | (tpy) |
| PM | 0.15 | 0.04 | 0.28 | 0.07 | 0.64 | 0.16 | 0.64 | 0.16 |
| $SO_2$ | 0.14 | 0.04 | 0.26 | 0.06 | 0.59 | 0.15 | 0.59 | 0.15 |
| NOx | 2.20 | 0.55 | 3.91 | 0.98 | 9.04 | 2.26 | 9.04 | 2.26 |
| CO | 0.47 | 0.12 | 0.84 | 0.21 | 1.95 | 0.49 | 1.95 | 0.49 |
| $CO_2$ | 81.74 | 20.43 | 0.03 | 36.39 | 0.06 | 84.03 | 0.06 | 84.03 |
| VOC | 0.17 | 0.04 | 0.31 | 0.08 | 0.72 | 0.18 | 0.72 | 0.18 |
| Benzene | 4.65E-04 | 1.16E-04 | 1.48E-07 | 2.07E-04 | 3.41E-07 | 4.78E-04 | 3.41E-07 | 4.78E-04 |
| Toluene | 2.04E-04 | 5.10E-05 | 6.48E-08 | 9.08E-05 | 1.50E-07 | 2.10E-04 | 1.50E-07 | 2.10E-04 |
| Xylene | 1.42E-04 | 3.55E-05 | 4.52E-08 | 6.32E-05 | 1.04E-07 | 1.46E-04 | 1.04E-07 | 1.46E-04 |
| 1,3 Butadiene | 1.95E-04 | 4.87E-05 | 6.20E-08 | 8.68E-05 | 1.43E-07 | 2.00E-04 | 1.43E-07 | 2.00E-04 |
| Formaldehyde | 5.88E-04 | 1.47E-04 | 1.87E-07 | 2.62E-04 | 4.32E-07 | 6.05E-04 | 4.32E-07 | 6.05E-04 |
| Acetaldehyde | 3.82E-04 | 9.56E-05 | 1.22E-07 | 1.70E-04 | 2.81E-07 | 3.93E-04 | 2.81E-07 | 3.93E-04 |
| Acrolein | 4.61E-05 | 1.15E-05 | 1.47E-08 | 2.05E-05 | 3.39E-08 | 4.74E-05 | 3.39E-08 | 4.74E-05 |

**Summary of Generator Potential Emissions**

| Pollutant | Potential Emissions (lb/hr) | (tpy) |
|---|---|---|
| PM | 1.70 | 0.43 |
| $SO_2$ | 1.59 | 0.40 |
| NOx | 24.19 | 6.05 |
| CO | 5.21 | 1.30 |
| $CO_2$ | 81.88 | 224.89 |
| VOC | 1.92 | 0.48 |
| Benzene | 4.66E-04 | 1.28E-03 |
| Toluene | 2.04E-04 | 5.61E-04 |
| Xylene | 1.42E-04 | 3.91E-04 |
| 1,3 Butadiene | 1.95E-04 | 5.36E-04 |
| Formaldehyde | 5.89E-04 | 1.62E-03 |
| Acetaldehyde | 3.83E-04 | 1.05E-03 |
| Acrolein | 4.62E-05 | 1.27E-04 |

# APPENDIX F

Air Pollutant Dispersion Modeling Analysis

# Modeling Report

Toxic Air Pollutant and Criteria
Refined Air Dispersion Modeling Report

AVX Corporation
Myrtle Beach, South Carolina

September 2010

RESOLUTE
ENVIRONMENTAL LLC

# REPORT

## Refined Air Dispersion Modeling Report

***AVX Corporation***
***Myrtle Beach, South Carolina***


Gary Yoder
Resolute Environmental, LLC


September 2010

RESOLUTE
ENVIRONMENTAL LLC

# TABLE OF CONTENTS



## List of Tables



## List of Figures

# Executive Summary

AVX Corporation (AVX) operates a ceramic capacitor manufacturing facility in Myrtle Beach, South Carolina. This refined air dispersion modeling analysis accompanies the facility's June 2010 federal Title V operating permit renewal application. Air dispersion modeling was used to estimate ambient concentrations from facility process emissions of regulated criteria and toxic air pollutants (TAP). This analysis uses the U.S. EPA AERMOD dispersion modeling system to determine receptor grid concentrations and at discrete sensitive receptors. Potential emission rates were modeled and all estimated concentrations were well below the South Carolina Air Pollution Control Regulation 62.5, Standard No. 8 Maximum Allowable Ambient Concentrations and Standard No. 2 National Ambient Air Quality Standards.

# 1. Introduction

AVX Corporation (AVX) operates a ceramic capacitor manufacturing facility in Myrtle Beach, South Carolina. The facility is renewing their federal Tile V operating permit, and therefore submitting a comprehensive, refined air dispersion modeling analysis for emissions of regulated compounds.

This report documents the technical approach for conducting a refined air dispersion modeling analysis using the USEPA's AERMOD modeling system. The analysis follows the modeling methodologies contained in the South Carolina Department of Health and Environmental Control July 2001 *Air Quality Modeling Guidelines* and provides a summary of the dispersion model input variables and modeling output.

# 2. Background

### 2.1. Site Location and Description

The location of the AVX site is shown in Figure 1. The site is located west of 17$^{th}$ Ave South, east of the Myrtle Beach International Airport and within the City of Myrtle Beach, South Carolina. The facility site plan, including building heights and stack locations, is shown in Figures 2 and 3. The facility is comprised of many buildings for administration and various process and other support equipment necessary for the manufacturing of ceramic capacitors and resistors. The source parameters for the emission sources that are to be included in the modeling analysis are summarized in Tables 1 and 2. All of the sources in this analysis, except for fugitive sources, will be modeled as point sources (Table 1). Fugitive emission sources were modeled as a volume point source (Table 2).

### 2.2 Emissions

Tables 3 is a summary of emission rate modeling input for this analysis. AVX's criteria and TAP emissions result from:

1. Cleaning solutions used in the CMAP, Slip, and Metallization departments
2. Constituents of solvents used to manufacture electronic ink and ceramic slip
3. Dry dicing in the Metallization department,
4. Electroplating,
5. Remediation stripping tower, and
6. Fuel combustion
7. Soldering, and
8. Dry material handling.

Details on the emission rate calculations can be found in the 2010 Title V renewal application.

Cleaning

Typical of the electronics industry, denatured ethyl alcohol (DEA) and 100% xylene are used to clean process components. DEA contains small amounts of methanol and MIBK and is used in the slip, termination, and chip build-up processes. Xylene is used for cleaning in the CMAP and in Metallization departments, however, the use of this solvent for cleaning is being phased out.

Process

Process emissions of organic TAPs and particulate matter result from solvent usage, dry dicing, and dry material handling. The RMM department prepares ceramic materials prior to entering the Slip Department. Some particulate matter emissions result, but are controlled by three fabric filters. Dry dicing is the removal of chips from plates following the build-up process. Most dicing occurs in a wet environment, however, a smaller percentage are removed dry resulting in some particulate matter emissions. Dry dicing is also controlled by a fabric filter.

Plating

Nickel (TAP) and lead (criteria) are emitted from the SBE and Autoline plating operations. Although AVX is consolidating manufacturing (formerly known as MB2) into the new manufacturing building, plating will remain in its present location. This relocation includes the back-end support processes such as plating. The Autoline plating process will soon be decommissioned and not included in the move. In the near future, all plating will be completed using the SBE (active) or FCT (passive) processes. All plating emissions were modeled from their current location in MB1.

Miscellaneous Support - Remediation

AVX operates a groundwater remediation system, located near the Slip Manufacturing building. This is a new (like-for-like) replacement of an older stripping system. Arcadis designed the system and provided the emission rates for multiple organic TAP compounds potentially emitted from the groundwater. It should be noted that a smaller stripping system near MB1 has been decommissioned.

Miscellaneous Support - Soldering

AVX utilizes small soldering pots and a wave solder machine for product QA/QC. Although most solder pots do not have exhausts, a few solder pots and the wave solder machine do have exhausts primarily to evacuate solder flux. A small amount of lead emissions may be emitted from the facility from these units. These stations will also be consolidated to the new manufacturing building. However, similar to the SBE plating stacks, their locations and heights are not currently known. Therefore, all soldering emissions were assumed emitted and modeled from a conservative stack location on the building closest point to the property boundary (SE corner). A height of only 15 feet was modeled.

# 3. Modeling Methodology

A refined level modeling analysis was performed in accordance with SC DHEC modeling guidance, as specified in the *Air Quality Modeling Guidelines*, and the United States Environmental Protection Agency (USEPA) *Guidelines on Air Quality Models* (USEPA, 2005).

### 3.1. Model Selection and Use

The current version of the AERMOD (Version 09292) dispersion model was used to predict maximum concentrations. The AERMOD model was selected primarily for the following reasons:

- USEPA and SC DHEC have approved the general use of the model for air quality dispersion analysis as a result of the model assumptions and methods being consistent with those referenced in the Guideline on Air Quality Models.

- The AERMOD model is capable of predicting the impacts from point (stack) and volume sources in rural areas that comprise simple terrain.

- The AERMOD model can predict 24-hr averaging period impacts at each receptor.
- The AERMOD model has several options and features that enable it to be adapted to a wide range of specific applications. A complete listing of model option "switches" to be used for this exercise is included as Table 4.

### 3.2. Surrounding Terrain

Terrain surrounding the facility is simple, however, there is terrain above stack base. Therefore, AERMOD was run with the receptor specific elevations, i.e., the non-default FLAT option was not utilized.

### 3.3. Urban/Rural Classification

A land use review was performed to evaluate whether rural or urban dispersion parameters should be used in the analysis. This procedure involved evaluating the presence of various industrial, commercial, residential and agricultural/natural areas within a three-kilometer radius centered on the proposed site (Auer Scheme). If more than fifty percent of the area within this circle were designated industrial, commercial and compact residential, urban dispersion parameters would be used; otherwise, the modeling would use rural dispersion parameters.

A review of the topographic map and aerial photos of the area surrounding the site revealed that the area within three kilometers of the site is predominately rural. Thus, based on this analysis, rural dispersion curves will be used in the AERMOD model.

### 3.4. Good Engineering Practice Stack Height Analysis

The USEPA provides specific guidance for calculating Good Engineering Practice (GEP) stack height and for evaluating whether building downwash will occur (USEPA, 1985). GEP stack height is defined as the height of the structure plus 1.5 times the lesser of the structure height or projected width. If the stack height for a source is less than the height identified using GEP guidelines, based on the dimensions of nearby buildings, then the potential for building downwash to occur exists and is to be considered in the modeling analysis.

Since all of the stacks in this analysis are less than GEP, BPIP-PRIME was used to obtain the building dimensions required for AERMOD to calculate downwash. Figure 2 depicts the structures that were included in the BPIP analysis.

It should be noted that the PDG building (SEBUILDING in previous modeling) has been decommissioned. The original Tower #2 stripping tower was located next to the PDG building. With the building decommissioning, the stripping tower has been moved slightly west next to the Slip building.

### 3.5. Meteorological Data

The air quality modeling analysis used National Weather Service (NWS) surface meteorological data from Wilmington, North Carolina and concurrent twice-daily upper air soundings from Charleston, South Carolina for the years 1987-1991. The AERMET processed hourly meteorological data files for each year of record to be used in the analysis were obtained from the SC DHEC website.

### 3.6. Receptor Locations

A Cartesian grid of receptors was used with a spacing of 100 meters extending to a distance of 1.5 kilometers from the property line. Property line receptors were placed at a spacing of 50 meters. In addition, discrete receptors were placed as locations specified by SC DHEC (See Table 6).

Each receptor was processed through AERMAP (Version 09040), the terrain preprocessor for the AERMOD model. Thirty meter resolution Digital Elevation Models (DEMs) from the USGS were utilized in AERMAP for this analysis.

### 3.7. Cavity Impacts

Because the stack heights are less than GEP, the potential for impacts in near-building cavity regions must be evaluated. Since the AERMOD model calculates impacts within the cavity, an additional cavity analysis was not performed.

### 3.8. Coordinate System

The locations for the buildings, stacks, receptors and DEMs for this analysis are in the UTM coordinate system, zone 17, NAD27.

## 4. Modeling Results

Tables 7 and 8 summarize the results of the modeling for each criteria and TAP compound identified in the AVX processes, respectively. Predicted maximum concentrations are well below all applicable NAAQS and MAACs.

Electronic copies of the BEEST, AERMOD, BPIP-PRIME and DEM files are on the enclosed CD.

## 5. References

Auer, A.H. 1978. *Correlation of Land Use and Cover with Meteorological Anomalies*. Journal of Applied Meteorology, 17:636-643.

SC DHEC, 2001. South Carolina Department of Health & Environmental Control, *Air Quality Modeling Guidelines,* Columbia, SC.

USEPA, 1985. *Guideline for Determination of Good Engineering Practice Stack Height (Technical Support Document of the Stack Height Regulations) (Revised)*. U.S. Environmental Protection Agency. EPA-450/4-80/023R. Washington, DC: USEPA.

USEPA, 2004. *User's Guide for the AMS/EPA Regulatory Model AERMOD*. EPA-454-B-03-001. Research Triangle Park, NC: EPA, Office of Air Quality Planning and Standards.

USEPA, 2005. *Guideline on Air Quality Models*, Appendix W to 40 CFR Part 51.

# TABLES

## Table 1

*AVX Corporation*
*Myrtle Beach, South Carolina*

### Summary of Stack Parameters - Point Sources

| Source | Description | Stack ID | UTM Easting (m)[A] | UTM Northing (m)[A] | Base Elevation (ft) | Stack Height (ft) | Temperature (F) | Velocity (fps) | Diameter (ft) |
|---|---|---|---|---|---|---|---|---|---|
| RMM | Grinding, mixing, milling, and prilling | 15A-1 | 693764 | 3728334 | 23 | 33 | 70 | 14.4 | 1.3 |
| | | 15B-1 | 693770 | 3728334 | 23 | 35 | 70 | 49.5 | 2.5 |
| | | 15C-1 | 693758 | 3728335 | 23 | 35 | 70 | 47.7 | 2.9 |
| Metals Mfg. | Metals Mill & Mixing | MD1C-1 | 693700 | 3728106 | 23 | 37 | 70 | 57.0 | 1.67 |
| | Metals Mill | MD2C-1 | 693716 | 3728101 | 23 | 22 | 70 | NA[B] | 0.67 |
| | Metals Mill | MD3C-1 | 693720 | 3728101 | 23 | 25 | 70 | 26.5 | 1.00 |
| CMAP Support | Dry dicing | NMFS-S1 | 693330 | 3727951 | 23 | 6 | 70 | NA[B] | 0.08 |
| Metallization | Autoline Plater & SBE | 7C-2A | 693773 | 3728208 | 23 | 32 | 70 | 1.0 | 3.43 |
| | Autoline Plater & SBE | 7C-2B | 693773 | 3728206 | 23 | 32 | 70 | 1.0 | 3.43 |
| Thin Film Process | Thin Film Process | MB2-TFS | 693300 | 3727880 | 23 | 35 | 70 | 54.0 | 2.50 |
| Miscellaneous Sup. | Soldering | Solder1[C] | 693305 | 3727844 | 23 | 15 | 70 | 0.03 | 0.25 |
| | Boiler | MB2-B1 | 693322 | 3727939 | 23 | 35.5 | 600 | 15.3 | 0.83 |
| | Stripping Tower | TOWER | 693890 | 3728065 | 23 | 20 | 70 | NA[B] | 2.25 |

Notes:
A. UTM, Zone 17, NAD27.
B. MB2-F2, NMFS-S1, and the stripping Tower have rain caps, so the velocity was set at 0.01 m/s, per the SC DHEC *Air Quality Modeling Guidelines*.
C. The new soldering stack IDs and locations have yet to be determined. For conservatism, a stack was located at the nearest point to property boundary on builing with a 15 foot height with no exit velocity assumed.

## Table 2

*AVX Corporation*
*Myrtle Beach, South Carolina*

### Summary of Stack Parameters - Volume Sources

| Source | Description | Stack ID | UTM Easting (m)[A] | UTM Northing (m)[A] | Base Elevation (ft) | Release Height (ft) | Horizontal Dimension (ft) | Vertical Dimension (ft) |
|---|---|---|---|---|---|---|---|---|
| Slip Manufacturing | Ceramic Slip | SLIP | 693869 | 3728057 | 23 | 15.0 | 38.1 | 14.7 |
| Manufacturing | Department cleaning | MFG | 693344 | 3727899 | 23 | 12.0 | 53.5 | 11.3 |

Notes:
A. UTM, Zone 17, NAD27.

## Table 3

*AVX Corporation*
*Myrtle Beach, South Carolina*

### Standards No. 8 and No. 2 Modeled Emission Rates

| Department | Emission Unit ID | Constituent | CAS | Material/Process | Potential Emissions[A] (lb/yr) | Potential Emissions[A] (g/s) |
|---|---|---|---|---|---|---|
| RMM | 14 | PM/PM-10/PM-2.5 | N/A | Grinding, mixing, milling, prilling | 0.30 | 4.28E-06 |
| Slip Mfg. | 15 | Methanol | 67-56-1 | Denatured alcohol - Cleaning | 15.40 | 2.22E-04 |
| | 15 | MIBK | 108-10-1 | Denatured alcohol - Cleaning | 8.12 | 1.17E-04 |
| | 15 | Bis (2-ethylehexyl) phthalate | 117-81-7 | DiOctylPhthalate process solvent | 260.0 | 3.74E-03 |
| Metals Mfg. | 16 | PM/PM-10/PM-2.5 | N/A | Mixing and milling | 2340.00 | 3.37E-02 |
| | 16 | Xylene | 1330-20-7 | Process solvent and contained in Mineral Spirits Type 66 | 100.00 | 1.44E-03 |
| | 16 | Toluene | 108-88-3 | Mineral Spirits Type 66 | 1.15 | 1.66E-05 |
| | 16 | Bis (2-ethylehexyl) phthalate | 117-81-7 | DiOctylPhthalate process solvent | 9.76 | 1.40E-04 |
| | 16 | Ethylbenzene | 100-41-4 | Mineral Spirits Type 66 | 0.58 | 8.28E-06 |
| | 16 | Methanol | 67-56-1 | Denatured alcohol - Cleaning | 2.84 | 4.08E-05 |
| Manufacturing (CMAP & Metallization cleaning) | 17 | Methanol | 67-56-1 | Denatured alcohol - Cleaning | 48.0 | 6.90E-04 |
| | 17 | MIBK | 108-10-1 | Denatured alcohol - Cleaning | 24.0 | 3.45E-04 |
| | 17 | Bis (2-ethylehexyl) phthalate | 117-81-7 | DiOctylPhthalate process solvent | 60.0 | 8.63E-04 |
| | 17 | Ethylbenzene | 100-41-4 | Mineral Spirits Type 66 | 60.0 | 8.63E-04 |
| | 17 | Toluene | 108-88-3 | Mineral Spirits Type 66 | 60.0 | 8.63E-04 |
| | 17 | Xylene | 1330-20-7 | Process solvent and contained in Mineral Spirits Type 66 | 60.0 | 8.63E-04 |
| | 19 | Methanol | 67-56-1 | Denatured alcohol | 140 | 2.01E-03 |
| | 19 | MIBK | 108-10-1 | Denatured alcohol | 80.00 | 1.15E-03 |
| CMAP Support | 18 | PM/PM-10/PM-2.5 | N/A | Dry dicing | 460 | 6.62E-03 |
| Metallization | 19 | PM/PM-10/PM-2.5 | N/A | Electroplating - Autoline & SBE | 4.86 | 6.99E-05 |
| | 19 | Lead | N/A | Electroplating - Autoline & SBE | 0.11 | 1.56E-06 |
| | 19 | Nickel | N/A | Electroplating - Autoline & SBE | 3.90 | 5.61E-05 |
| Thin Film Process | 20 | PM/PM-10/PM-2.5 | N/A | Process | 20.00 | 2.88E-04 |
| | 20 | Lead | N/A | Process | 0.59 | 8.46E-06 |
| | 20 | Sulfuric acid | 7664-93-9 | Process | 6.32 | 9.09E-05 |
| | 20 | Nitric acid | 7697-37-2 | Process | 34.00 | 4.89E-04 |
| | 20 | 2-ethanolamine | 141-43-5 | Process | 454.00 | 6.53E-03 |
| | 20 | Hydrochloric acid | 7647-01-0 | Process | 8.04 | 1.16E-04 |
| | 20 | Phosphoric acid | 7664-38-2 | Process | 14.0 | 2.01E-04 |
| Miscellaneous Support | 21 | PM/PM-10/PM-2.5 | N/A | Soldering | 20 | 2.88E-04 |
| | 21 | PM/PM-10/PM-2.5 | N/A | Boiler | 880 | 1.27E-02 |
| | 21 | $SO_2$ | N/A | Boiler | 69 | 9.93E-04 |
| | 21 | NOx | N/A | Boiler | 11508 | 1.66E-01 |
| | 21 | CO | N/A | Boiler | 9667 | 1.39E-01 |
| | 21 | Lead | N/A | Boiler | 6.E-02 | 8.28E-07 |
| | 21 | Lead | N/A | Soldering | 0.1864 | 2.68E-06 |
| | 21 | 1,1,1-trichloroethane | 71-55-6 | Stripping tower | 2631.6 | 3.79E-02 |
| | 21 | 1,1-dichloroethane | 75-34-3 | Stripping tower | 963.6 | 1.39E-02 |
| | 21 | Benzene | 71-43-2 | Boiler | 0.2 | 3.48E-06 |
| | 21 | Chriomium (assumed +6) | N/A | Soldering | 1.5E-02 | 2.15E-07 |
| | 21 | Formaldehyde | 50-00-0 | Boiler | 8.5 | 1.22E-04 |
| | 21 | Hexane | 110-54-3 | Boiler | 208.0 | 2.99E-03 |
| | 21 | Manganese | N/A | Soldering | 0.97 | 1.40E-05 |
| | 21 | Naphthalene | 91-20-3 | Boiler | 0.1 | 1.01E-06 |
| | 21 | Toluene | 108-88-3 | Boiler | 0.4 | 5.64E-06 |
| | 21 | Vinyl chloride | 75-01-4 | Stripping tower | 789.5 | 1.14E-02 |

Notes
A. Refer to the 2010 Title V renewal application for emission rate calculations.

## Table 4

*AVX Corporation*
*Myrtle Beach, South Carolina*

## Summary of AERMOD Model Options

| Option | Selected Parameter |
|---|---|
| Calculations | Refined Analysis, 24-hr Averages |
| Receptor Orientation | Cartesian - 100 meter Spacing to 1.5 km Downwind |
| Dispersion Coefficients | Rural |
| Stack Tip Downwash | Yes, as Appropriate |
| Building Downwash Effect | Yes |
| Direction Dependant Building Dimensions | Yes |
| Meteorology | 2002-2006 Unkown Surface<br>2002-2006 Charleston, South Carolina (Upper-Air) |
| Calm Hours | Omitted from Calculations (Regulatory Default) |

## Table 5

*AVX Corporation*
*Myrtle Beach, South Carolina*

## Summary of SC DHEC Specified Receptors

| Location[A] | UTM Easting (m)[B] | UTM Northing (m)[B] |
|---|---|---|
| Pinner Place | 693913 | 3729018 |
| 610 13th Avenue South | 694402 | 3728316 |
| 1036 Pinnacle Lane | 693635 | 3729141 |
| 1210E Benna Drive | 694108 | 3728608 |
| 717 11th Avenue South | 694427 | 3728514 |

Notes:

A. All locations are in Myrtle Beach, South Carolina.

B. UTM, Zone 17, NAD27.

## Table 6

*AVX Corporation*
*Myrtle Beach, South Carolina*

## Summary of AERMOD Modeling Results - Standard No. 2

| ***Contaminant*** | ***Ave. Period*** | ***Predicted Maximum Ambient Concentration ($\mu g/m^3$)*** | ***Background Conc. ($\mu g/m^3$)*** | ***Total Impact ($\mu g/m^3$)*** | ***NAAQS ($\mu g/m^3$)*** | ***Percent of NAAQS (%)*** |
|---|---|---|---|---|---|---|
| TSP | Annual | 0.81 | 30.4 | 31 | 75 | 41.6% |
| PM-10 | 24-Hr | 4.1 | 34 | 38 | 150 | 25.4% |
| | Annual | 0.81 | 17.9 | 19 | 50 | 37.4% |
| PM-2.5 | 24-Hr | 4.1 | 21 | 25 | 35 | 71.8% |
| | Annual | 0.81 | 10.5 | 11 | 15 | 75.4% |
| $SO_2$ | 3-Hr | 0.2 | 110 | 110 | 1,300 | 8.5% |
| | 24-Hr | 0.12 | 22.7 | 23 | 365 | 6.3% |
| | Annual | 0.01 | 3.7 | 4 | 80 | 4.6% |
| NOx | Annual | 2.4 | 3.8 | 6 | 100 | 6.2% |
| CO | 1-Hr | 43.1 | 878 | 921 | 40,000 | 2.3% |
| | 8-Hr | 24.6 | 458 | 483 | 10,000 | 4.8% |
| Lead | 3-Month (Rolling)[A] | 0.00049 | 0.005 | 0.005 | 0.15 | 3.7% |

Notes:
A. Modeled lead concentration based on maximum monthly averaging period.

## Table 7

*AVX Corporation*
*Myrtle Beach, South Carolina*

### Summary of AERMOD Modeling Results - Standard No. 8

| *Contaminant* | *CAS Number* | *Predicted Maximum Ambient Concentration[a] (ug/$m^3$)* | *MAAC[A] (ug/$m^3$)* | *Percent of MAAC (%)* |
|---|---|---|---|---|
| 1,1,1-Trichloroethane | 71-55-6 | 88.8 | 9550 | <1 |
| 2-Ethanolamine | 141-43-5 | 0.5 | 200 | <1 |
| Benzene | 71-43-2 | 4.7 | 150 | 3 |
| Bis (2-ethylehexyl) phthalate | 117-81-7 | 6.4 | 25 | 26 |
| Chriomium (assumed +6) | Chrome | 0.00006 | 2.5 | <1 |
| Ethyl Benzene | 100-41-4 | 0.1 | 4,350 | <1 |
| Formaldehyde | 50-00-0 | 0.015 | 15 | <1 |
| Hexane | 110-54-3 | 0.37 | 900 | <1 |
| Hydrochloric acid | 7647-01-0 | 0.008 | 175 | <1 |
| Manganese | Mang | 0.004 | 25 | <1 |
| Methanol | 67-56-1 | 1.6 | 1,310 | <1 |
| Methyl Isobutyl Ketone | 108-10-1 | 0.9 | 2,050 | <1 |
| Naphthalene | 91-20-3 | 2.8 | 1,250 | <1 |
| Nickel | 7440-02-0 | 0.036 | 0.500 | 7 |
| Nitric Acid | 7697-37-2 | 0.03 | 125 | <1 |
| Phosphoric Acid | 7664-38-2 | 0.01 | 25 | <1 |
| Sulfuric Acid | 7664-93-9 | 0.007 | 10 | <1 |
| Toluene | 108-88-3 | 0.5 | 2,000 | <1 |
| Vinylidene Chloride | 75-35-4 | 35.6 | 99.0 | 36 |
| Xylene | 1330-20-7 | 1.6 | 4,350 | <1 |

Notes:
A. Based on a 24-hour averaging period.

# FIGURES

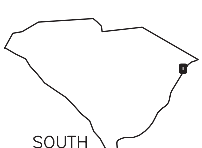
FIGURE 1


ADAPTED FROM: MYRTLE BEACH QUADRANGLE, SC U.S.G.S. 7.5 MIN. QUAD

AVX CORPORATION

MYRTLE BEACH, SC

SITE LOCATION MAP




QUADRANGLE LOCATION

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

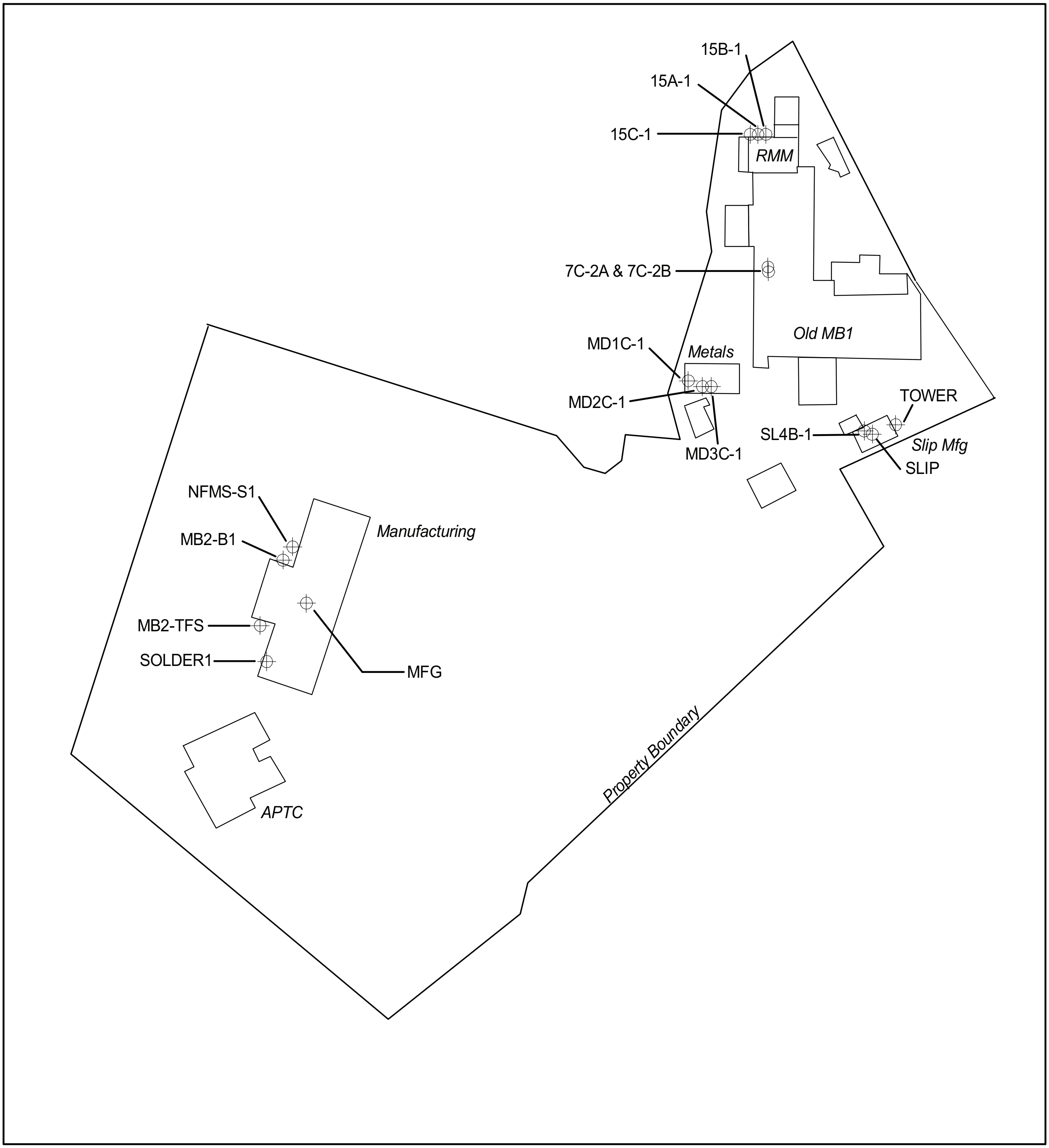
1 .5 0 1 KILOMETER

SCALE: 1:24000

FILE NO. 42369-001.001
JULY 2008

O'BRIEN & GERE ENGINEERS INC.

# FIGURE 2




AVX CORPORATION
MYRTLE BEACH, SC

# FACILITY PLOT PLAN

N

# APPENDIX G

Compliance Assurance Monitoring Plan

# Compliance Assurance Monitoring Plan

# Control by Adosrber/Desorber and Thermal Oxidizer for VOC Emissions from 24 CMAP Machines

# AVX Corporation
# Myrtle Beach, South Carolina

AVX CORPORATION

**September 2010**

RESOLUTE
ENVIRONMENTAL LLC

# Compliance Assurance Monitoring Plan

## VOC Control by Adsorber/Desorber and Thermal Oxidizer for 24 CMAP Build Up Machines

## AVX Corporation
## Myrtle Beach, South Carolina

Air Permit No. TV-1340-0002

*Prepared For:*

**AVX Corporation**
801 17th Avenue South
Myrtle Beach, South Carolina 29578

*Prepared By:*

**Resolute Environmental, LLC**
114 Oak Fern Lane
Willow Spring, North Carolina 27592

**September 2010**

# Table of Contents

# 1. INTRODUCTION

The AVX Corporation (AVX) owns and operates an electronic capacitor manufacturing facility in Myrtle Beach, South Carolina. Operations at AVX include Raw Materials Manufacturing (RMM), Slip Manufacturing, Metals Department, CMAP Buildup, CMAP Support, Kiln Room, Metallization Department and other supporting processes.

AVX currently operates all emission sources under Title V Permit No. TV-1340-0002 issued by the South Carolina Department of Health and Environmental Control (DHEC) and is in the process of renewing this operating permit. Under USEPA regulations promulgated at 40 CFR 64, a facility must submit a Compliance Assurance Monitoring Plan (CAM Plan) for all affected sources at the time of renewal of its initial Title V permit. The regulations under 40 CFR 64 are commonly referred to as the CAM Rule. This CAM Plan is being submitted in compliance with the requirements specified in 40 CFR 64.

# II. CAM Rule

The CAM rule applies to pollutant specific emission units (PSEU) located at a major source that meet all of the following criteria:

a. The PSEU is subject to an emission limit or standard, and
b. The PSEU uses a control device to achieve compliance, and
c. Potential pre-control emissions from the PSEU are equal to or exceed 100% of the major source threshold.

The major source thresholds are 100 tons/yr of criteria pollutants (including PM and $SO_2$), 25 tons/yr of total hazardous air pollutants (HAPs), and 10 tons/yr of a single HAP.

The CAM rule requires facilities to design and implement CAM Plans for affected PSEU to assure that control devises are maintained and operated at levels that will result in compliance with the emission limits. Owners are required to:

- select representative parameters upon which compliance can be assured,
- establish indicator ranges (or procedures for setting indicator ranges) for the parameters,
- use performance testing or other information to verify the parameters and ranges, and
- correct control device performance problems as expeditiously as practicable.

The CAM Plan must:

a. Describe the indicators to be monitored and how they are to be measured;
b. Describe the indicator ranges or the process by which the indicators are to be established;
c. Describe the performance criteria for the monitoring approach, including
    - specifications for obtaining representative data
    - quality assurance and control procedures
    - monitoring frequency
    - data collection procedures
    - data averaging period;
d. Provide a justification for the proposed elements of the monitoring;
e. Provide historical monitoring data, emissions test data and control device operating data recorded during performance tests, if necessary;

Provide an implementation plan, if monitoring requires installation, testing, or other activities prior to installation.

## III. Affected Units

The CMAP build up process is the only source at AVX with potential CAM Rule applicability. It has an uncontrolled, potential volatile organic compound (VOC) emission rate of 116 ton/yr, which is greater than the major source threshold and uses three adsorber/desorbers and thermal oxidizer abatement system to control VOC emissions. The current Title V permit limits VOC emissions from the building that includes CMAP build up to 39.5 ton/yr to avoid Prevention of Significant Deterioration applicability (S.C. Regulation 61-62.5, Section H – Synthetic Minor Plant

Permits). With significant operational and emission reduction changes at AVX, removal of this emission limitation has been requested in the Title V renewal application. The only other emission limitation applicable to CMAP build up equipment is S.C. Regulation 61-62.5, Standard 4, Section IX requiring 20% or less opacity. S.C. 61-62.5, Standard 3, Section III (Waste Combustion and Reduction) limits the thermal oxidizer particulate matter emissions to 0.5 lb/MMBtu and opacity to 20%, except during periods of startup and shut down (Item I, Industrial Incinerators). Operating the source and control equipment consistent with good air pollution control practices will result in meeting the requirements of Standard 3. To summarize, with removal of 39.5 ton/yr VOC emission limit, CAM Rule applicability items a. and b. above do not apply to CMAP build up, and therefore a CAM Plan is not required. However, with AVX's continued commitment to reducing environmental impacts, the VOC abatement system will continue to be operated by AVX. This Plan is submitted as part of that commitment to demonstrate that the adsorber/desorbers and thermal oxidizer will be operated in accordance with the parametric monitoring requirements of the operating permit.

# IV. COMPLIANCE ASSURANCE MONITORING PLAN CMAP BUILD UP VOC EMISISONS CONTROLLED BY AN ADORBER/DESORBER AND THERMAL OXIDIZER

## 1. Background

CMAP machines are tools used by AVX to manufacture capacitor chips of varying sizes using ceramic and electrode ink raw materials. The raw materials emit VOCs which are captured by 24 CMAP machines that deliver the compounds to the emission abatement system. The control system includes three adsorber/desorbers that are connected in parallel to concentrate the organics in the air stream, which is delivered to a 1 MMBtu/hr thermal oxidizer (TO-1) for destruction. A set of eight (8) CMAP machines are connected to one 5,000 cfm adsorber/desorber (AD-1). Another set of 4 CMAP machines are connected to a separate 5,000 cfm adsorber/desorber (AD-2) and 12 machines are connected to a 14,000 cfm adsorber/desorber (AD-3).

## 2. Process Design

Process air from the CMAP machines enters the bottom of the adsorber and is directed upward through a series of sieve trays fluidizing beaded activated carbon (BAC) on the trays. The counter-current contact of process gas and carbon removes solvent vapors from the air stream. Spent carbon from the last tray collects in the adsorption bottom before it is pneumatically transported to the top of the desorber. The BAC flows down through the desorber as a moving bed. It passes through a ceramic heated zone in which the concentrated solvent is desorbed from the BAC. The highly concentrated VOC stream is then delivered to the thermal oxidizer to be burned.

## 3. Applicable Emission Limits and Standards

The CMAP build up process is the only source at AVX with potential CAM Rule applicability. It has an uncontrolled, potential volatile organic compound (VOC) emission rate of 116 ton/yr, which is greater than the major source threshold and uses three adsorber/desorbers and thermal oxidizer abatement system to control VOC emissions. The current Title V permit limits VOC emissions from the building that includes CMAP build up to 39.5 ton/yr to avoid Prevention of Significant Deterioration applicability (S.C. Regulation 61-62.5, Section H – Synthetic Minor Plant Permits). With significant operational and emission reduction changes at AVX, removal of this emission limitation has been requested in the Title V renewal application. With removal of 39.5 ton/yr VOC emission limit, the CAM Rule does not apply because the air pollution control system will not be used to meet an applicable standard. However, with AVX's continued commitment to reducing environmental impacts, the VOC abatement system will continue to be operated by AVX. This Plan is submitted as part of that commitment to demonstrate that the adsorber/desorbers and thermal oxidizer will be operated in accordance with the parametric monitoring requirements of the operating permit.

**4. Rationale for Selection of Performance Indicator**

S.C. Regulation 61-62.5, Standard 3, Section III, Item I is applicable to the thermal oxidizer and limits emissions from the unit to 20% opacity (except during periods of start up and shutdown) and particulate matter emissions to 0.5 lb/MMBtu. Similarly, S.C. Regulation 61-62.5, Standard 4, Section IX limits the CMAP build up equipment to 20% opacity. Each of these limitations are based on the control of particulate matter emissions. Since CMAP build up emits little to no particulate matter, and the thermal oxidizer burns concentrated VOCs or natural gas, it is highly improbable that any violation of the applicable Rules limiting particulate matter and opacity would occur. Further, the uncontrolled particulate matter emission rate associated with firing natural gas would be well below the 100 ton/yr major source CAM Rule applicability threshold.

As indicated previously, the removal of the 39.5 ton/yr VOC limit from the CMAP production building eliminates the requirement of a CAM Plan for the CMAP build up air pollution abatement system building because the system will no longer be used to meet an emission limit. However, AVX will continue to operate the unit as required by the operating permit and use the CAM Rule as guidance for operation. In 40 CFR 64.4, the CAM Rule establishes the concept of presumptively acceptable monitoring approaches. This concept presumes that existing monitoring requirements specified by USEPA or permitting authorities for specific emission sources establishes acceptable monitoring approaches for other similar sources. Based on the system design, the AVX operating permit requires monitoring pressure drop across the adsorbers, temperature in the desorbers, and temperature in the thermal oxidizer to demonstrate effective VOC destruction.

## 5. Rationale for Selection of Indicator Ranges

On February 26, 2009, AVX conducted a performance test on the CMAP build up abatement system at the request of the South Carolina Department of Health and Environmental Quality. The potential VOC emission rate from eleven CMAP machines was simulated to challenge one adsorber/desorber and the thermal oxidizer. The operating permit requires that AVX monitor the following parameters and ranges:

| Required Parameter | Required Range |
|---|---|
| Adsorption pressure drop | 2.0 – 5.0″ $H_2O$ |
| Desorption temperature | 350 – 500 deg F |
| Thermal oxidizer temperature | 1400 – 1800 deg F |

During the source test, the average pressure drop was 3.2″ water, average desorption temperature was 420$^{o}$ F, and average thermal oxidizer temperature was 1500$^{o}$ F. All parameters were within their respective range requirement and the subsequent resulting control efficiency was greater than 99%. Based on these results, AVX proposes the permitted parameters and indicator range for proper operation of the CMAP build up abatement system.

## 6. Performance Criteria

**Representative Data** – Acquisition of representative data is assured by the system's existing Data Acquisition and Handling System (DAHS).

**Quality Assurance and Control Procedures** – Current procedures include daily inspections of:

- Adsorber inlet pressure
- Airlift blower pressure
- Adsorber hopper BAC level
- Fluidization appearance on trays
- Check all site glasses for BAC (adsorber, desorber, overflow)
- Desorber temperature profile
- Desorber electrical profile

Any maintenance performed (periodic or repair) on the system devices is documented and maintained onsite. The system is also equipped with parametric alarms at the unit and at the control room CPU.

**Monitoring Frequency** – As specified in the operating permit, the thermal oxidizer shall be equipped with continuous temperature gauge, requiring daily recording. The control system is equipped to continuously monitor all parameters (pressure and temperature), with daily recordings of each.

**Data Collection Procedure** – The parametric data is recorded in the DAHS.
**Data Averaging Period** – The averaging period is every 5-mintes.

## 7. Performance Test Data

As previously indicated, a source test was conducted on the CMAP build up VOC control system on February 26, 2009. The system successfully met the operating permit requirements. The air permit does not require regularly scheduled stack emissions testing for compliance demonstrations.

## 8. Implementation Plan

The parametric monitoring system are already installed and in operation and in compliance with the operating permit.

## TABLE 1

## Compliance Assurance Monitoring Plan Summary
## VOC Emissions From Adsorber/Desorber/Thermal Oxidizer
## CMAP Build Up

I. Background

A. Emissions Unit

| | |
|---|---|
| Description: | 24 CMAP Build Up Machines |
| Control: | 2 – 5,000 cfm adsorber/desorbers<br>1 – 14,000 cfm adsorber/desorber<br>1 – 1.0 MMBtu/hr thermal oxidizer |
| Facility: | AVX Corporation<br>Myrtle Beach, South Carolina |

B. Applicable Regulation

| | |
|---|---|
| Regulation No.: | N/A |
| Regulated Pollutant: | VOC |
| Emission Limit: | N/A |

II. Monitoring Approach

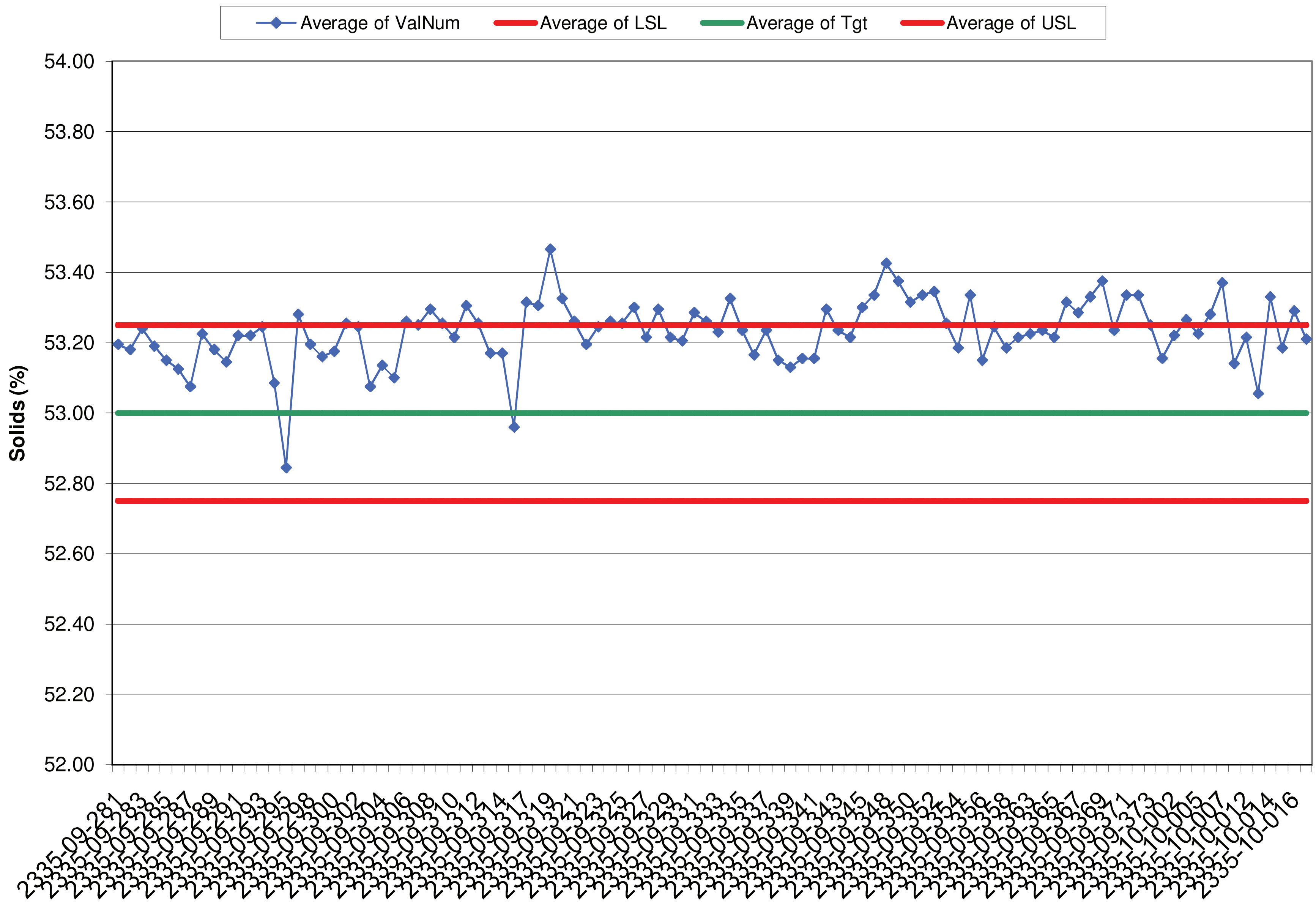
The key elements of the monitoring approach for PM compliance, including indicators to be monitored, indicator ranges, and performance criteria are presented below:

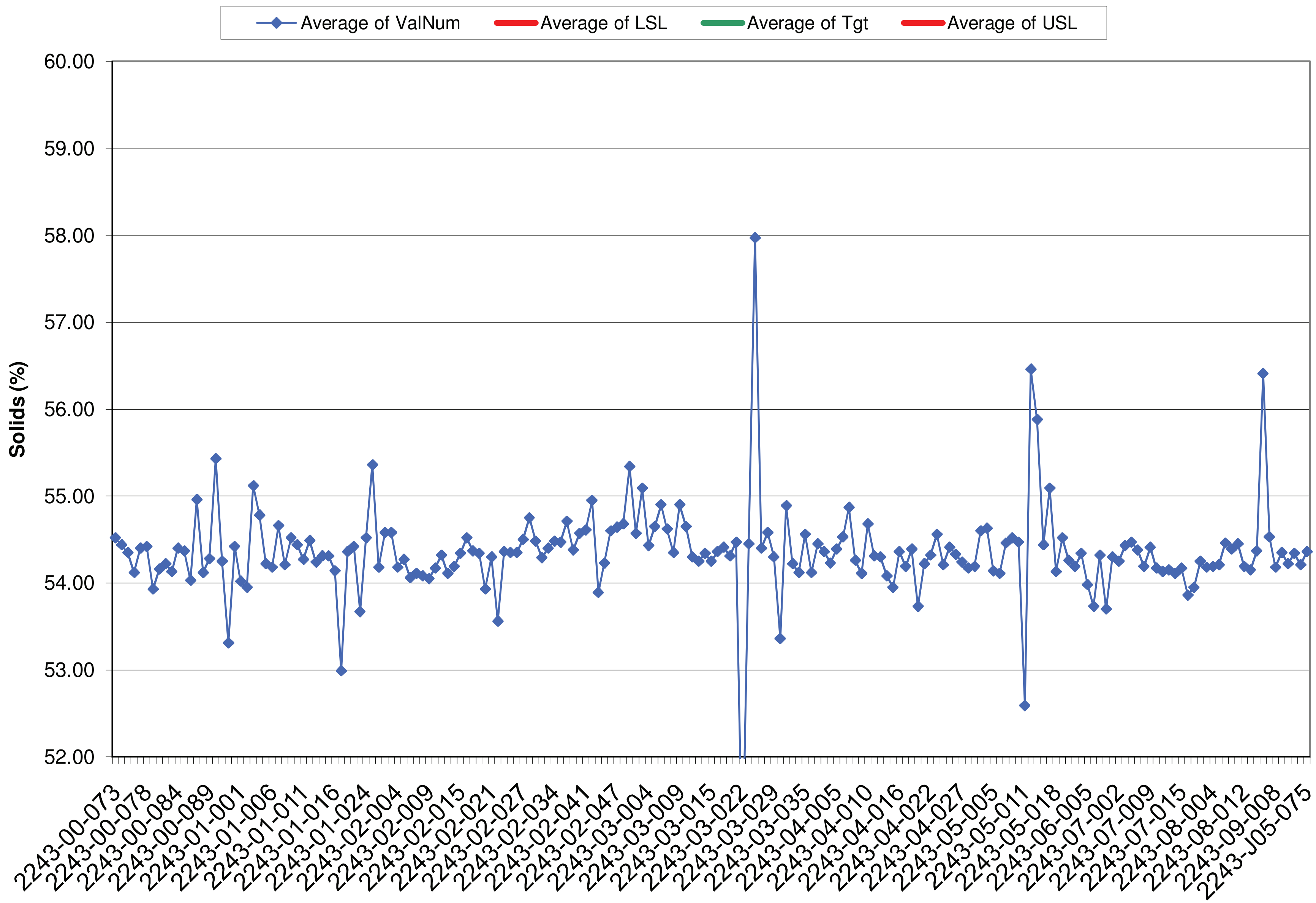
| Item | Description |
|---|---|
| 1. Indicator | 1. Adsorber ΔP<br>2. Desorber Temperature<br>3. Thermal Oxidizer Temperature |
| 2. Indicator Range | 1. 2" – 5" $H_2O$<br>2. 350 – 500 degrees F<br>3. 1400 – 1800 degrees F |
| 3. Performance Criteria | |
| a. Representative Data | 40 CFR 60, Appendix B, PS-1 |
| b. Verification of Operational Status | DAHS |
| c. Quality Assurance and Control Practices | Routine inspection and repair |
| d. Monitoring Frequency | Every 10-seconds |
| e. Averaging Period | Every 6-minutes |
| e. Data Collection Procedure | Continuously recorded in DAHS |
| f. Recordkeeping | Records are maintained on file (hard copy or electronic) for a period of 5 years |
| g. Reporting | Quarterly Emissions Reports<br>Semi-annual Compliance Reports<br>Annual Compliance Certification |
| h. Frequency of Reporting | Quarterly, Semi-annually, Annually |

# APPENDIX H

Supporting Documentation

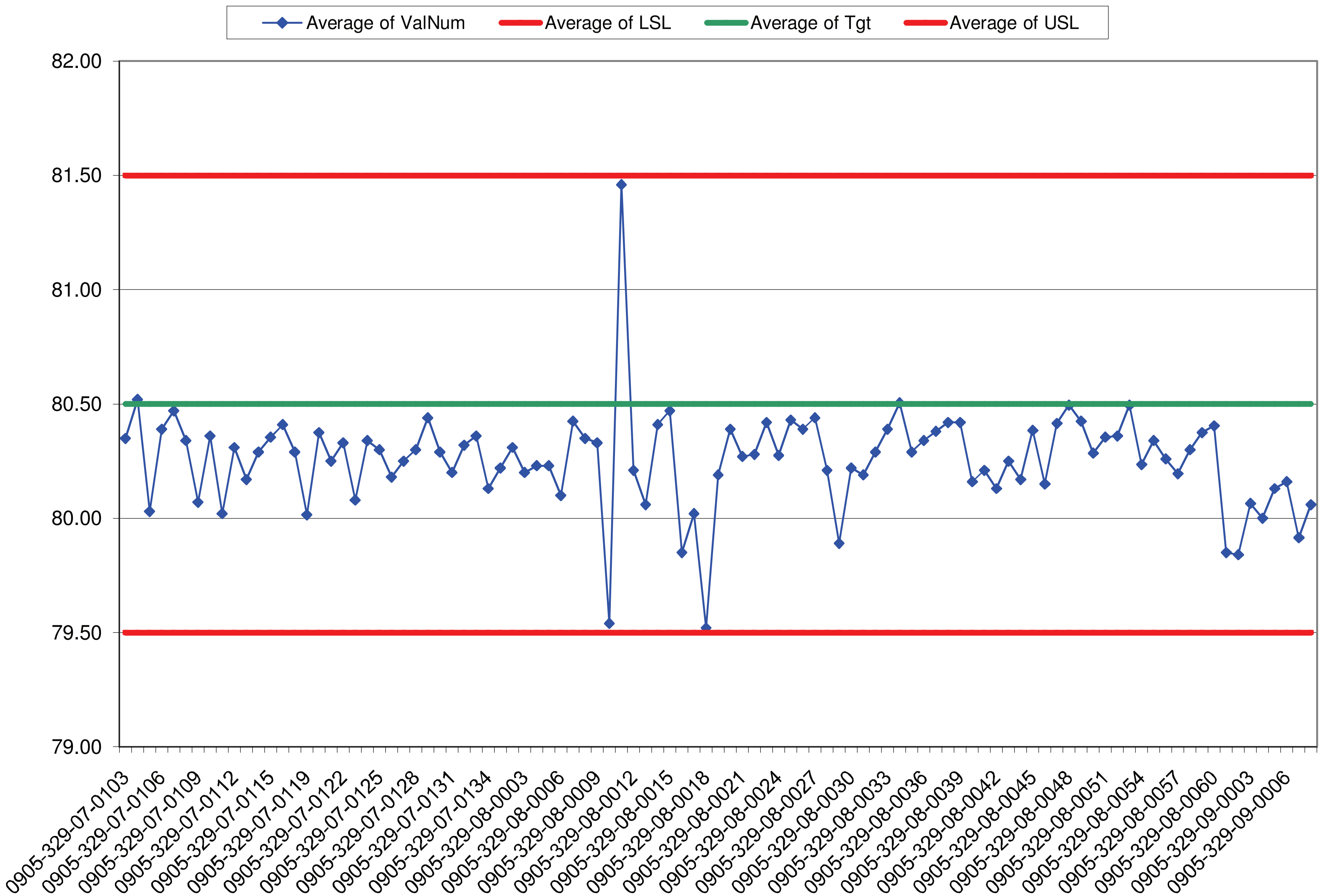
Electrode Ink Target Variance

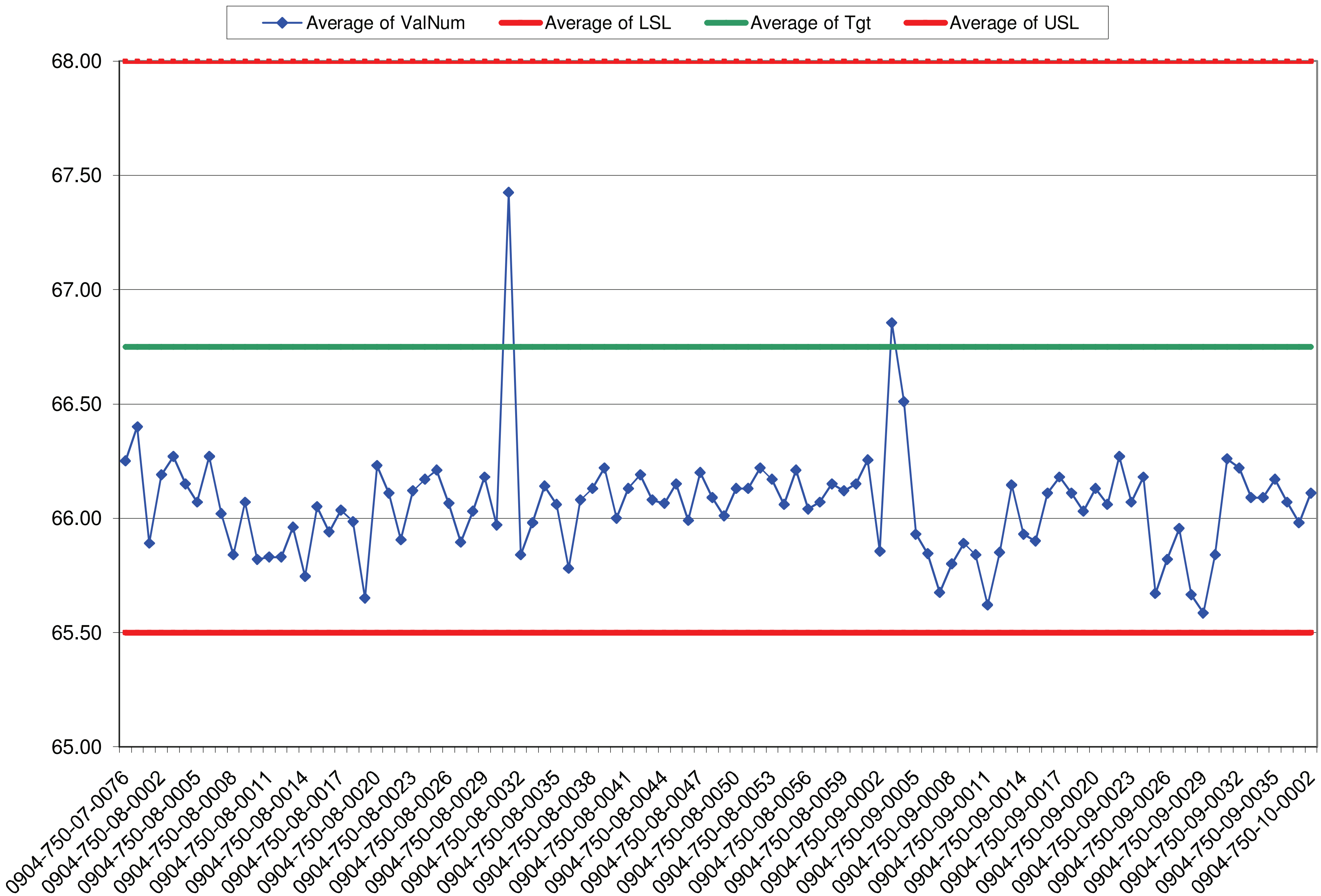

Average of ValNum
Average of LSL
Average of Tgt
Average of USL
Solids (%)
54.00
53.80
53.60
53.40
53.20
53.00
52.80
52.60
52.40
52.20
52.00



Average of ValNum
Average of LSL
Average of Tgt
Average of USL
Solids (%)
60.00
59.00
58.00
57.00
56.00
55.00
54.00
53.00
52.00
2243-00-073
2243-00-078
2243-00-084
2243-00-089
2243-01-001
2243-01-006
2243-01-011
2243-01-016
2243-01-024
2243-02-004
2243-02-009
2243-02-015
2243-02-021
2243-02-027
2243-02-034
2243-02-041
2243-02-047
2243-03-004
2243-03-009
2243-03-015
2243-03-022
2243-03-029
2243-03-035
2243-04-005
2243-04-010
2243-04-016
2243-04-022
2243-04-027
2243-05-005
2243-05-011
2243-05-018
2243-06-005
2243-07-002
2243-07-009
2243-07-015
2243-08-004
2243-08-012
2243-09-008
2243-J05-075

Slip Target Variance


Average of ValNum
Average of LSL
Average of Tgt
Average of USL
82.00
81.50
81.00
80.50
80.00
79.50
79.00
0905-329-07-0103
0905-329-07-0106
0905-329-07-0109
0905-329-07-0112
0905-329-07-0115
0905-329-07-0119
0905-329-07-0122
0905-329-07-0125
0905-329-07-0128
0905-329-07-0131
0905-329-07-0134
0905-329-08-0003
0905-329-08-0006
0905-329-08-0009
0905-329-08-0012
0905-329-08-0015
0905-329-08-0018
0905-329-08-0021
0905-329-08-0024
0905-329-08-0027
0905-329-08-0030
0905-329-08-0033
0905-329-08-0036
0905-329-08-0039
0905-329-08-0042
0905-329-08-0045
0905-329-08-0048
0905-329-08-0051
0905-329-08-0054
0905-329-08-0057
0905-329-08-0060
0905-329-09-0003
0905-329-09-0006



Average of ValNum
Average of LSL
Average of Tgt
Average of USL
68.00
67.50
67.00
66.50
66.00
65.50
65.00
0904-750-07-0076
0904-750-08-0002
0904-750-08-0005
0904-750-08-0008
0904-750-08-0011
0904-750-08-0014
0904-750-08-0017
0904-750-08-0020
0904-750-08-0023
0904-750-08-0026
0904-750-08-0029
0904-750-08-0032
0904-750-08-0035
0904-750-08-0038
0904-750-08-0041
0904-750-08-0044
0904-750-08-0047
0904-750-08-0050
0904-750-08-0053
0904-750-08-0056
0904-750-08-0059
0904-750-09-0002
0904-750-09-0005
0904-750-09-0008
0904-750-09-0011
0904-750-09-0014
0904-750-09-0017
0904-750-09-0020
0904-750-09-0023
0904-750-09-0026
0904-750-09-0029
0904-750-09-0032
0904-750-09-0035
0904-750-10-0002

Source Testing

INTEGRITY

AIR MONITORING, INC.

*9548-D Mt. Holly Huntersville Road • Huntersville, NC 28078*
*www.integrityair.net*

# *STATIONARY SOURCE SAMPLING REPORT*

# *FOR*

# *AVX CORPORATION*

# *MYRTLE BEACH, SOUTH CAROLINA*

## *Adsorber Inlet*
## *Adsorber Exhaust*
## *Thermal Oxidizer Exhaust*
## *VOC Sampling*

**Integrity Project No. 09-005** **Performed: February 26, 2009**

*Certified By:*

Date 04/07/09

James A. Lewis, QSTI
Vice President
Intgerity Air Monitoring, Inc.

Date 4/7/09

For

J.A. Tony Blanton, QSTI
President
Integrity Air Monitoring, Inc.

# TABLE OF CONTENTS

# 1.0 INTRODUCTION

This test program was performed at the AVX Corporation facility in Myrtle Beach, South Carolina on the volatile organic compound (VOC) control system for the Passive Electronic Part Build Up Machines. This section of the report describes the test purpose and provides a brief outline of the test activities and the personnel involved in the test program.

## 1.1 Purpose

The AVX Corporation facility is covered by Title V Air Quality Permit No. TV-1340-0002; however, the testing was performed at the request of SC DHEC.

## 1.2 Outline of Test Program

Integrity Air Monitoring, Inc. (Integrity) performed stationary source sampling simultaneously at the Adsorber Common Inlet, the Adsorber Exhaust and the Thermal Oxidizer Exhaust on February 26, 2009. The sampling included three 1-hour sampling runs for VOC emissions using EPA Reference Method 25A at each location. In addition to the sampling performed for VOCs, Integrity also performed US EPA Reference Methods 1 through 4 to determine the location of the sampling points, the volumetric flow rate, the molecular weight of the stack gas and the moisture content, respectively.

Due to current economic conditions, AVX is not operating the build up process at maximum capacity. In order to simulate maximum VOC loading to the adsorber during emissions testing, simultaneous spiking was performed at three build up machines. AVX identified 2-butoxyethanol 70%, PGME 30 % (BCPM) as the majority VOC used in the build up process. A known quantity of BCPM was atomized and injected into each machine during each sampling run. O'Brien & Gere personnel assisted AVX with the spiking procedure.

Representatives of the South Carolina Department of Health and Environmental Control (SC DHEC) requested that AVX quantify the "as measured" loading rate of BCPM to the adsorber to verify the measured injection rate recorded during sampling. AVX provided Integrity with a sample of the BCPM used for spiking. Integrity utilized an organics laboratory to develop gaseous VOC standards from the BCPM that were subsequently analyzed by the same VOC analyzer used for sampling at the adsorber inlet. The analyzer responses were used to develop a response factor for BCPM relative to carbon. The response factor was then applied to the adsorber inlet sampling results to determine the "as measured" BCPM loading rates to the adsorber inlet.

## 2.0 RESULTS

This section presents the mean sampling results. Detailed sampling results for each sampling run and example calculations are presented in Appendix 1. Field data sheets and system bias and drift checks are presented in Appendix 2. Data acquisition system uncorrected values and values corrected for system bias are presented in Appendix 3.

### 2.1 Summary of Results

The following tables present the mean results from the sampling performed at the VOC control system serving the Build up Machines on February 26, 2009.

**Table 2 – Summary of VOC Sampling Results**

| Source | Concentration, ppm as carbon dry | Loading/Emission Rate, lbs/hr as carbon | Control Efficiency, % |
|---|---|---|---|
| Adsorber Inlet | 873.4 | 10.17 | NA |
| Adsorber Exhaust | 3.6 | 0.05 | 99.51† |
| Oxidizer Exhaust | 1.7 | 0.0008 | 99.99‡ |
| VOC Control System | NA | NA | 99.50 |

† Adsorber control efficiency, % = ((adsorber inlet lb/hr – adsorber exhaust lb/hr) / adsorber inlet lb/hr) X 100

‡ Oxidizer control efficiency, % = (((adsorber inlet lb/hr – adsorber exhaust lb/hr) – oxidizer exhaust, lb/hr) / (adsorber inlet lb/hr – adsorber exhaust lb/hr)) X 100

**Table 3 – Summary BCPM Loading Rate Results – Adsorber Inlet**

| Run | Loading Rate As Carbon, Adjusted for Response Factor† | Spiking Rate, Gravimetric Determination |
|---|---|---|
| 1 | 22.57 | 21.21 |
| 2 | 25.91 | 22.20 |
| 3 | 25.31 | 22.20 |
| Average | 24.59 | 21.87 |

† Calculations are provided in Appendix 1.

## 2.2 Discussion

The results of the sampling indicate that the VOC control system had an overall VOC control efficiency of 99.50%. Furthermore, the results of the adsorber inlet VOC sampling adjusted for the response factor confirm that the measured spiking rates were accurate and that AVX properly challenged the VOC control system under maximum process operation.

## 3.0 PROCESS DESCRIPTION

This section contains a brief description of the process and related control equipment.

The AVX Corporation facility located in Myrtle Beach, South Carolina produces electronic capacitors. There are two 'cells' each comprised of eight passive electronic parts build up machines which operate independently. Solvent VOC emissions from the ceramic slip material for the build up processes are captured at each machine and manifolded to a single common duct at each cell. The raw solvent constituents (2-butoxyethanol 70%, PGME 30%) are known as BC/PM or AVX Blend. BC/PM was injected directly into the fume hoods of three machines using six high pressure paint guns designed to atomize the solvent. A single paint pot was used to provide the solvent to all of the paint guns. The solvent pot weight was recorded at regular intervals during the testing as well as the beginning and end of each test run. This information was used to calculate the pounds per hour of solvent used on a mass-basis.

### 3.1 Air Pollution Control Equipment

Emissions from the cells were vented to an emissions control system consisting of a carbon concentrator manufactured by FluiSorb and a common attendant thermal oxidizer

### 3.2 Demonstration of Operating Rate

Process and control device operating parameters corresponding with the sampling were recorded once every 15 minutes by AVX Corporation personnel. The parameters recorded included adsorption unit $\Delta P$, desorption temperature and thermal oxidizer combustion chamber temperature. This documentation is included in Appendix 5.

When the wet bulb temperature has stabilized, record both the wet bulb and dry bulb thermometer temperatures.

The flue gas moisture content (PMV) was then calculated using saturated vapor and moisture equations.

The moisture content at the thermal oxidizer exhaust (>140 °F) was performed using the following sampling system and procedures:

- A heated (248°F ±25°F) probe;
- A moisture condensing train consisting of four sequential impingers. Impingers one and two contained 100 ml each of deionized water followed by an empty impinger and a final impinger containing 200 grams of silica gel; and
- A Method 5 type metering system capable of maintaining a constant sampling rate.

At the end of the test run, the liquid in the first three impingers was measured to the nearest milliliter. The moisture collected by the silica gel was determined to the nearest 0.1 gram. These measurements were recorded on the Method 4 data form. The moisture content of the emission source was calculated according to the equations in Method 4, Section 12.

### 4.2.5 VOC Analyzer Procedures

Total gaseous organic(s) or total hydrocarbon(s) concentrations and emission rates were determined according to EPA Method 25A. Method 25A applies to the measurement of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate calibration gas) or in terms of carbon.

Sampling for total gaseous organic(s) was performed using a VIG Industries Model 210 (dual channel) analyzer and one VIG Industries Model 20 analyzer. The principal components of each sampling systems were sequentially:

- A heated stainless steel sample probe;
- A heated system calibration assembly and filter;
- A heated sample line;
- An FIA analyzer;
- Calibration gases; and
- A data acquisition system that continuously logs 1-minute concentrations.

Prior to the test series, the heated sample lines were heated to 360°F and the hydrocarbon analyzers were heated above 200°C to prevent condensation. After temperatures were stabilized the hydrocarbon analyzers were ignited using a 40% hydrogen balance helium fuel and hydrocarbon free air. Calibration procedures commenced with the introduction of zero and high-level calibration gas into the sampling system. The necessary adjustments were made and the responses for low-level and mid-level gases were recorded. The predicted values for the calibration gases and the actual responses were recorded on the field data sheet and by the data acquisition system. High-level and zero gas concentrations were introduced into the measurement system and the response time was recorded on the field data sheet. Sampling was initiated immediately following instrument calibration. At the conclusion of the first hour, the zero and mid-level calibration gases were reintroduced and their respective responses recorded on the field data sheet. Integrity utilized a STEC 710-C gas divider according to Method 205 to create multi-level calibration gases from a single upscale standard. A certificate of calibration for the gas divider is provided in Appendix 5.

The zero and calibration drift checks were performed immediately following completion of the test run and at the conclusion of the test program. The data collected during the test program was archived on a data acquisition system and is attached to this test report as Appendix 3. The DAS used by Integrity Air Monitoring, Inc. for this project was an IBM computer with hard disk storage and a Superlogics data shuttle recorder.

### 4.2.6 Response Factor Development Procedures

The response factor was established using a product designated as *Blend AVX 70/30* (*Blend*) manufactured by Brenntag Southeast, Inc. Three separate concentrations of the *Blend* were generated volumetrically using the following procedures:

- Three 12 liter glass canisters were evacuated using a vacuum pump;
- These canisters were heated and maintained at a constant temperature of ~150°F and allowed to thermally stabilize;
- Each canister was then injected with a known amount of the *Blend*, the product was allowed to vaporize and then the canister was pressurized to ~1400 mm mercury gauge pressure with zero air;
- A constant gas stream from the pressurized canisters was delivered to via a heated umbilical line to the VIG Model 20 Flame Ionization Analyzer were the response to the standard was measured as parts per million by volume (ppmv) propane.

The ppmv concentration of the *Blend* was calculated using the molecular weight and purity furnished by the vendor, canister temperature, pressure and the amount of the product injected into each canister. The three concentrations of the product generated for this project were: low = 135 ppmv, medium = 269 ppmv and high = 402 ppmv. The calculation used to determine the concentrations was as follows:

$$\text{Concentration (ppmv)} = \frac{\text{(Mass of Blend AVX 70/30) (24.056)}}{\text{(Molecular Weight of Blend AVX 70/30) (Volume of gas in pressurized glass canister)}}$$

The response factor Method 25A FIA instrumentation operational parameters, reference standard calculations and laboratory report and supporting documentation can be found in Appendix 1.

### 4.2.7 Sampling Ports and Points

The dimensions of the sampling locations and the location of the sampling ports and points are detailed in Figures 1, 2 and 3. The drawings provided are not to scale. For the VOC sampling at the Adsorber Exhaust, a stratification check was performed prior to sampling and the source was unstratified. All other VOC sampling was performed at single point near the center of each stack.

# APPENDIX 1

# SUMMARY OF RESULTS AND EXAMPLE CALCULATIONS

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics
AVX Corporation
Myrtle Beach, SC
Adsorber Inlet

INTEGRITY AIR MONITORING, INC.

| Run Number | | 1 | 2 | 3 | Avg |
|---|---|---|---|---|---|
| Date: | | 02/26/09 | 02/26/09 | 02/26/09 | --- |
| θ | Net Time of Test, minutes | 60 | 60 | 60 | --- |
| Ts | Test Start Time | 1350 | 1505 | 1615 | --- |
| Te | Test End Time | 1449 | 1604 | 1714 | --- |
| $P_{bar}$ | Barometric Pressure, in. Hg | 29.74 | 29.71 | 29.71 | 29.72 |
| $P_g$ | Static Pressure, in. Hg | -0.140 | -0.140 | -0.140 | -0.140 |
| $P_S$ | Stack Pressure, Absolute, in. Hg | 29.600 | 29.570 | 29.570 | 29.580 |
| WB | Wet Bulb Temp., Deg. F † | 66.1 | 66.3 | 66.5 | 66.3 |
| DB | Dry Bulb Temp., Deg. F † | 84.6 | 84.6 | 84.9 | 84.7 |
| $S_{VP}$ | Vapor Pressure of Water at Saturation, in. Hg | 0.647 | 0.651 | 0.656 | 0.651 |
| $B_{WS}$ | Moisture Content of Gas Stream | 0.015 | 0.015 | 0.015 | 0.015 |
| $P_{MV}$ | Percent Moisture in Stack | 1.49 | 1.52 | 1.53 | 1.51 |
| $M_{FD}$ | Mole Fraction of Dry Gas | 0.985 | 0.985 | 0.985 | 0.985 |
| $\%O_2$ | Percent Oxygen, Dry | 21.0 | 21.0 | 21.0 | 21.0 |
| $\%CO_2$ | Percent Carbon Dioxide, Dry | 0.0 | 0.0 | 0.0 | 0.0 |
| %CO | Percent Carbon Monoxide, Dry | 0.0 | 0.0 | 0.0 | 0.0 |
| $M_d$ | Mole. Wt. Stack Gas, Dry Basis, lb/lb mole | 28.840 | 28.840 | 28.840 | 28.840 |
| $M_S$ | Mole. Wt. Stack Gas, Wet Basis, lb/lb mole | 28.678 | 28.676 | 28.674 | 28.676 |
| Cp | Pitot Tube Constant | 0.84 | 0.84 | 0.84 | 0.84 |
| ΔPS | Avg. Sqrt. Delta P, in. H20 | 0.598 | 0.615 | 0.607 | 0.607 |
| $T_S$ | Avg. Stack Temp., Deg. F | 82.8 | 82.7 | 82.63 | 82.7 |
| $V_S$ | Avg. Stack Velocity, ft/sec | 34.3 | 35.3 | 34.9 | 34.9 |
| A | Area Stack, $ft^2$ | 3.14 | 3.14 | 3.14 | 3.14 |

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics
AVX Corporation
Myrtle Beach, SC
Adsorber Inlet

INTEGRITY AIR MONITORING, INC.

| Run Number | | 1 | 2 | 3 | Avg |
|---|---|---|---|---|---|
| Date: | | 02/26/09 | 02/26/09 | 02/26/09 | --- |
| $Q_{SD}$ | Gas Volume Flow, Dry Std. Cond. CFM | 6,136 | 6,307 | 6,228 | 6,224 |
| $Q_A$ | Actual Gas Volume Flow, CFM | 6,473 | 6,661 | 6,577 | 6,570 |
| $Q_{SW}$ | Gas Volume Flow, Wet Std. Cond., CFM | 6,229 | 6,404 | 6,325 | 6,320 |
| **Total Gaseous Organics As Carbon** | | | | | |
| $M_{WC}$ | Mole Weight of Carbon, g/mole | 12.01 | 12.01 | 12.01 | 12.01 |
| $C_{meas}$ | Organic Concentration, ppm as propane (wet) | 267.1 | 298.2 | 295.0 | 286.7 |
| $C_c$ | Organic Concentration, ppm as carbon (wet) | 801.2 | 894.5 | 884.9 | 860.2 |
| $C_d$ | Organic Concentration, ppm as carbon (dry) | 813.3 | 908.2 | 898.6 | 873.4 |
| $C_{ON}$ | Organic Concentration, mg/dscm as carbon | 406.1 | 453.5 | 448.7 | 436.1 |
| $C_{AN}$ | Organic Concentration, gr/dscf as carbon | 0.18 | 0.20 | 0.20 | 0.19 |
| $C_{AW}$ | Organic Loading Rate, lbs/hr as carbon | 9.34 | 10.72 | 10.47 | 10.17 |
| **Total Gaseous Organics as BCPM** | | | | | |
| $M_{WC}$ | Mole Weight of BCPM, g/mole | 109.76 | 109.76 | 109.76 | 109.76 |
| Rf | BCPM Response Factor | 1.26 | 1.26 | 1.26 | 1.26 |
| $C_d$ | Organic Concentration, ppm as propane (dry) | 271.1 | 302.7 | 299.5 | 291.1 |
| $C_{c\ as\ BCPM}$ | Organic Concentration, ppm as BCPM | 215.2 | 240.3 | 237.7 | 231.1 |
| $C_{ON}$ | Organic Concentration, mg/dscm as BCPM | 981.8 | 1096.4 | 1084.7 | 1054.3 |
| $C_{AN}$ | Organic Concentration, gr/dscf as BCPM | 0.43 | 0.48 | 0.47 | 0.46 |
| $C_{AW}$ | Organic Loading Rate, lbs/hr as BCPM | 22.57 | 25.91 | 25.31 | 24.59 |

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics
AVX Corporation
Myrtle Beach, SC
Adsorber Exhaust

| | | | | | |
|---|---|---|---|---|---|
| Run Number | | 1 | 2 | 3 | Avg |
| Date: | | 02/26/09 | 02/26/09 | 02/26/09 | --- |
| θ | Net Time of Test, minutes | 60 | 60 | 60 | --- |
| Ts | Test Start Time | 1350 | 1505 | 1615 | --- |
| Te | Test End Time | 1449 | 1604 | 1714 | --- |
| $P_{bar}$ | Barometric Pressure, in. Hg | 29.74 | 29.71 | 29.71 | 29.72 |
| $P_g$ | Static Pressure, in. Hg | 0.001 | 0.001 | 0.001 | 0.001 |
| $P_S$ | Stack Pressure, Absolute, in. Hg | 29.741 | 29.711 | 29.711 | 29.721 |
| WB | Wet Bulb Temp., Deg. F † | 67.0 | 69.0 | 66.0 | 67.3 |
| DB | Dry Bulb Temp., Deg. F † | 90.0 | 91.0 | 91.0 | 90.7 |
| $S_{VP}$ | Vapor Pressure of Water at Saturation, in. Hg | 0.667 | 0.715 | 0.645 | 0.676 |
| $B_{WS}$ | Moisture Content of Gas Stream | 0.014 | 0.016 | 0.012 | 0.014 |
| $P_{MV}$ | Percent Moisture in Stack | 1.38 | 1.58 | 1.23 | 1.40 |
| $M_{FD}$ | Mole Fraction of Dry Gas | 0.986 | 0.984 | 0.988 | 0.986 |
| $\%O_2$ | Percent Oxygen, Dry | 21.0 | 21.0 | 21.0 | 21.0 |
| $\%CO_2$ | Percent Carbon Dioxide, Dry | 0.0 | 0.0 | 0.0 | 0.0 |
| %CO | Percent Carbon Monoxide, Dry | 0.0 | 0.0 | 0.0 | 0.0 |
| $M_d$ | Mole. Wt. Stack Gas, Dry Basis, lb/lb mole | 28.840 | 28.840 | 28.840 | 28.840 |
| $M_S$ | Mole. Wt. Stack Gas, Wet Basis, lb/lb mole | 28.690 | 28.669 | 28.706 | 28.688 |
| Cp | Pitot Tube Constant | 0.84 | 0.84 | 0.84 | 0.84 |
| ΔPS | Avg. Sqrt. Delta P, in. H20 | 0.321 | 0.335 | 0.323 | 0.327 |
| $T_S$ | Avg. Stack Temp., Deg. F | 86.0 | 86.8 | 86.1 | 86.3 |
| $V_S$ | Avg. Stack Velocity, ft/sec | 18.4 | 19.3 | 18.6 | 18.8 |
| A | Area Stack, $ft^2$ | 6.25 | 6.25 | 6.25 | 6.25 |

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics
AVX Corporation
Myrtle Beach, SC
Adsorber Exhaust

| Run Number | | 1 | 2 | 3 | Avg |
|---|---|---|---|---|---|
| Date: | | 02/26/09 | 02/26/09 | 02/26/09 | --- |
| $Q_{SD}$ | Gas Volume Flow, Dry Std. Cond. CFM | 6,556 | 6,827 | 6,608 | 6,664 |
| $Q_A$ | Actual Gas Volume Flow, CFM | 6,916 | 7,234 | 6,969 | 7,039 |
| $Q_{SW}$ | Gas Volume Flow, Wet Std. Cond., CFM | 6,648 | 6,937 | 6,691 | 6,758 |
| **Total Gaseous Organics As Carbon** | | | | | |
| $M_{WC}$ | Mole Weight of Carbon, g/mole | 12.01 | 12.01 | 12.01 | 12.01 |
| $C_{meas}$ | Organic Concentration, ppm as propane (wet) | 1.1 | 1.2 | 1.3 | 1.2 |
| $C_c$ | Organic Concentration, ppm as carbon (wet) | 3.2 | 3.5 | 4.0 | 3.6 |
| $C_d$ | Organic Concentration, ppm as carbon (dry) | 3.2 | 3.6 | 4.1 | 3.6 |
| $C_{ON}$ | Organic Concentration, mg/dscm as carbon | 1.6 | 1.8 | 2.0 | 1.8 |
| $C_{AN}$ | Organic Concentration, gr/dscf as carbon | 0.0007 | 0.0008 | 0.0009 | 0.0008 |
| $C_{AW}$ | Organic Emission Rate, lbs/hr as carbon | 0.039 | 0.046 | 0.050 | 0.045 |

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics
AVX Corporation
Myrtle Beach, SC
Thermal Oxidizer Exhaust

| Run Number | | 1 | 2 | 3 | Avg |
|---|---|---|---|---|---|
| Date: | | 02/26/09 | 02/26/09 | 02/26/09 | --- |
| Tstart | Test Start Time | 1350 | 1505 | 1615 | --- |
| Tend | Test End Time | 1449 | 1604 | 1714 | --- |
| $\theta$ | Net Time of Test, minutes | 60 | 60 | 60 | --- |
| $P_{bar}$ | Barometric Pressure, in. Hg | 29.74 | 29.71 | 29.71 | 29.72 |
| $P_g$ | Static Pressure, in. Hg | -0.001 | -0.001 | -0.001 | -0.001 |
| $P_S$ | Stack Pressure, Absolute, in. Hg | 29.739 | 29.709 | 29.709 | 29.719 |
| $V_M$ | Actual Meter Volume Sampled, cu. ft. | 21.686 | 22.593 | 22.625 | 22.301 |
| $\Delta H$ | Avg. Delta H, in. $H_20$ | 1.70 | 1.70 | 1.70 | 1.70 |
| $T_M$ | Avg. Gas Meter Temp., Deg. F | 81.5 | 84.2 | 85.2 | 83.6 |
| $\gamma$ | Dry Gas Meter Correction Factor | 0.975 | 0.975 | 0.975 | 0.975 |
| $V_{STD}$ | Volume Sampled at Stand. Cond., cu. ft. | 20.579 | 21.312 | 21.304 | 21.065 |
| $V_C$ | Volume of Water Collected, ml | 41.9 | 37.0 | 35.5 | 38.1 |
| $V_{WC}$ | Volume of Water Vapor at Std. Cond.,SCF | 1.97 | 1.74 | 1.67 | 1.80 |
| $B_{WS}$ | Moisture Content of Gas Stream | 0.087 | 0.076 | 0.073 | 0.079 |
| $P_{MV}$ | Percent Moisture in Stack | 8.7 | 7.6 | 7.3 | 7.9 |
| $M_{FD}$ | Mole Fraction of Dry Gas | 0.913 | 0.924 | 0.927 | 0.921 |
| $\%O_2$ | Percent Oxygen, Dry | 20.9 | 20.9 | 20.9 | 20.9 |
| $\%CO_2$ | Percent Carbon Dioxide, Dry | 0.0 | 0.0 | 0.0 | 0.0 |
| $M_d$ | Mole. Wt. Stack Gas, Dry Basis, lb/lb mole | 28.836 | 28.836 | 28.836 | 28.836 |
| $M_S$ | Mole. Wt. Stack Gas, Wet Basis, lb/lb mole | 27.888 | 28.017 | 28.048 | 27.984 |
| Cp | Pitot Tube Constant | 0.84 | 0.84 | 0.84 | 0.84 |
| $\Delta PS$ | Avg. Sqrt. Delta P, in. H20 | 0.134 | 0.136 | 0.137 | 0.136 |

SUMMARY OF RESULTS
EPA METHOD 25A
Determination of Total Gaseous Organics
AVX Corporation
Myrtle Beach, SC
Thermal Oxidizer Exhaust

INTEGRITY AIR MONITORING, INC.

| | | | | | |
|---|---|---|---|---|---|
| $T_S$ | Avg. Stack Temp., Deg. F | 1019.7 | 1027.6 | 1025.7 | 1024.3 |
| $V_S$ | Avg. Stack Velocity, ft/sec | 12.9 | 13.1 | 13.1 | 13.0 |
| A | Area Stack, $ft^2$ | 0.994 | 0.994 | 0.994 | 0.994 |
| $Q_{SD}$ | Gas Volume Flow, Dry Std. Cond. CFM | 248 | 254 | 256 | 253 |
| $Q_A$ | Actual Gas Volume Flow, CFM | 767 | 780 | 783 | 777 |
| $Q_{SW}$ | Gas Volume Flow, Wet Std. Cond., CFM | 272 | 275 | 276 | 274 |
| **Total Gaseous Organics As Carbon** | | | | | |
| $M_{WC}$ | Mole Weight of Carbon, g/mole | 12.01 | 12.01 | 12.01 | 12.01 |
| $C_{meas}$ | Organic Concentration, ppm as propane (wet) | 0.6 | 0.6 | 0.2 | 0.5 |
| $C_c$ | Organic Concentration, ppm as carbon (wet) | 1.9 | 1.9 | 0.7 | 1.5 |
| $C_d$ | Organic Concentration, ppm as carbon (dry) | 2.1 | 2.1 | 0.8 | 1.7 |
| $C_{ON}$ | Organic Concentration, mg/dscm as carbon | 1.1 | 1.0 | 0.4 | 0.8 |
| $C_{AN}$ | Organic Concentration, gr/dscf as carbon | 0.0005 | 0.0005 | 0.0002 | 0.0004 |
| $C_{AW}$ | Organic Emission Rate, lbs/hr | 0.0010 | 0.0010 | 0.0004 | 0.0008 |

## APPENDIX 3

## DATA ACQUISITION SYSTEM VALUES

AVX Corporation
Myrtle Beach, SC
Adsorber & Thermal Oxidizer
VOC Raw Data
02/26/09

| Time | Adsorber Inlet ppm C3 | Adsorber Outlet ppm C3 | Thermal Oxidizer ppm C3 |
|---|---|---|---|
| 1350 | 264.70 | 1.06 | 0.46 |
| 1351 | 261.6 | 1.07 | 0.65 |
| 1352 | 262.5 | 1.06 | 0.6 |
| 1353 | 261.5 | 1.06 | 0.58 |
| 1354 | 259.5 | 1.05 | 0.56 |
| 1355 | 254.9 | 0.97 | 0.67 |
| 1356 | 254.9 | 0.97 | 0.54 |
| 1357 | 253.3 | 1.02 | 0.5 |
| 1358 | 255.3 | 1.0 | 0.5 |
| 1359 | 253.2 | 1.0 | 0.6 |
| 1400 | 252.5 | 1.0 | 0.6 |
| 1401 | 251.2 | 1.0 | 0.5 |
| 1402 | 251.8 | 1.0 | 0.5 |
| 1403 | 249.6 | 1.0 | 0.6 |
| 1404 | 249.2 | 1.0 | 0.6 |
| 1405 | 249.2 | 1.0 | 0.6 |
| 1406 | 249.7 | 1.0 | 0.6 |
| 1407 | 248.4 | 1.0 | 0.6 |
| 1408 | 248.6 | 1.0 | 0.5 |
| 1409 | 246.4 | 1.0 | 0.7 |
| 1410 | 246.4 | 1.0 | 0.6 |
| 1411 | 245.5 | 1.0 | 0.9 |
| 1412 | 244.7 | 1.0 | 0.6 |
| 1413 | 245.4 | 1.0 | 0.8 |
| 1414 | 246.0 | 1.0 | 0.8 |
| 1415 | 243.5 | 1.1 | 1.0 |
| 1416 | 243.6 | 1.1 | 0.8 |
| 1417 | 243.3 | 1.1 | 0.9 |
| 1418 | 242.4 | 1.1 | 0.8 |
| 1419 | 241.7 | 1.1 | 1.3 |
| 1420 | 242.3 | 1.1 | 1.1 |
| 1421 | 279.9 | 1.1 | 0.7 |
| 1422 | 278.6 | 1.1 | 0.9 |
| 1423 | 283.1 | 1.0 | 0.7 |
| 1424 | 284.4 | 1.1 | 1.1 |
| 1425 | 276.0 | 1.1 | 0.7 |
| 1426 | 277.2 | 1.1 | 0.7 |
| 1427 | 275.3 | 1.1 | 0.6 |
| 1428 | 275.5 | 1.1 | 0.7 |
| 1429 | 273.6 | 1.1 | 0.4 |
| 1430 | 273.5 | 1.1 | 0.6 |
| 1431 | 271.4 | 1.0 | 0.5 |
| 1432 | 272.7 | 1.1 | 0.6 |
| 1433 | 275.3 | 1.1 | 0.5 |
| 1434 | 275.0 | 1.1 | 0.5 |
| 1435 | 279.7 | 1.1 | 0.7 |
| 1436 | 280.9 | 1.1 | 0.6 |
| 1437 | 292.6 | 1.1 | 0.6 |
| 1438 | 296.1 | 1.1 | 0.6 |
| 1439 | 298.1 | 1.1 | 0.6 |
| 1440 | 297.4 | 1.1 | 0.6 |
| 1441 | 294.8 | 1.1 | 0.7 |
| 1442 | 293.0 | 1.1 | 0.7 |
| 1443 | 296.7 | 1.2 | 0.6 |
| 1444 | 295.5 | 1.2 | 0.5 |
| 1445 | 294.3 | 1.1 | 0.6 |
| 1446 | 294.7 | 1.1 | 0.6 |
| 1447 | 291.7 | 1.1 | 0.5 |
| 1448 | 291.6 | 1.1 | 0.4 |
| 1449 | 292.2 | 1.1 | 0.6 |
| Average | 267.1 | 1.1 | 0.6 |

| Time | Adsorber Inlet ppm C3 | Adsorber Outlet ppm C3 | Thermal Oxidizer ppm C3 |
|---|---|---|---|
| 1505 | 288.9 | 1.1 | 0.7 |
| 1506 | 287.7 | 1.1 | 0.7 |
| 1507 | 288.1 | 1.1 | 0.7 |
| 1508 | 287.7 | 1.1 | 0.8 |
| 1509 | 288.7 | 1.2 | 0.7 |
| 1510 | 292.2 | 1.2 | 0.9 |
| 1511 | 286.6 | 1.2 | 0.7 |
| 1512 | 286.6 | 1.2 | 0.9 |
| 1513 | 286.9 | 1.1 | 0.7 |
| 1514 | 284.2 | 1.1 | 0.8 |
| 1515 | 285.3 | 1.1 | 0.6 |
| 1516 | 286.5 | 1.1 | 0.8 |
| 1517 | 283.7 | 1.1 | 0.6 |
| 1518 | 283.4 | 1.1 | 0.9 |
| 1519 | 284.2 | 1.1 | 0.5 |
| 1520 | 282.0 | 1.1 | 0.9 |
| 1521 | 279.7 | 1.1 | 0.6 |
| 1522 | 279.5 | 1.1 | 0.7 |
| 1523 | 280.3 | 1.1 | 0.7 |
| 1524 | 277.7 | 1.1 | 0.7 |
| 1525 | 278.8 | 1.1 | 0.6 |
| 1526 | 280.2 | 1.1 | 0.5 |
| 1527 | 277.4 | 1.1 | 0.7 |
| 1528 | 278.8 | 1.1 | 0.6 |
| 1529 | 279.5 | 1.1 | 0.6 |
| 1530 | 277.2 | 1.1 | 0.6 |
| 1531 | 305.6 | 1.1 | 0.7 |
| 1532 | 315.0 | 1.2 | 0.5 |
| 1533 | 314.3 | 1.2 | 0.7 |
| 1534 | 312.8 | 1.2 | 0.6 |
| 1535 | 314.3 | 1.2 | 0.6 |
| 1536 | 315.7 | 1.2 | 0.6 |
| 1537 | 312.5 | 1.2 | 1.0 |
| 1538 | 313.4 | 1.3 | 0.5 |
| 1539 | 312.2 | 1.2 | 0.7 |
| 1540 | 311.2 | 1.2 | 0.4 |
| 1541 | 311.4 | 1.2 | 1.0 |
| 1542 | 311.5 | 1.2 | 0.5 |
| 1543 | 309.0 | 1.2 | 0.8 |
| 1544 | 309.6 | 1.2 | 0.4 |
| 1545 | 309.5 | 1.2 | 0.6 |
| 1546 | 311.9 | 1.3 | 0.5 |
| 1547 | 308.9 | 1.2 | 0.6 |
| 1548 | 310.8 | 1.3 | 0.5 |
| 1549 | 317.5 | 1.2 | 0.5 |
| 1550 | 307.8 | 1.2 | 0.5 |
| 1551 | 308.7 | 1.2 | 0.3 |
| 1552 | 307.5 | 1.2 | 0.5 |
| 1553 | 305.5 | 1.2 | 0.2 |
| 1554 | 307.7 | 1.2 | 0.5 |
| 1555 | 307.0 | 1.2 | 0.4 |
| 1556 | 306.2 | 1.2 | 0.4 |
| 1557 | 306.4 | 1.2 | 0.5 |
| 1558 | 305.1 | 1.2 | 0.5 |
| 1559 | 306.7 | 1.2 | 0.2 |
| 1600 | 304.4 | 1.2 | 0.9 |
| 1601 | 306.5 | 1.3 | 0.1 |
| 1602 | 304.5 | 1.3 | 3.5 |
| 1603 | 302.4 | 1.3 | 0.3 |
| 1604 | 303.8 | 1.3 | 0.4 |
| Average | 298.2 | 1.2 | 0.6 |

| Time | Adsorber Inlet ppm C3 | Adsorber Outlet ppm C3 |
|---|---|---|
| 1615 | 300.2 | 1.24 |
| 1616 | 299.1 | 1.21 |
| 1617 | 298.9 | 1.28 |
| 1618 | 300 | 1.22 |
| 1619 | 299.5 | 1.26 |
| 1620 | 301.6 | 1.25 |
| 1621 | 301.1 | 1.29 |
| 1622 | 301.5 | 1.28 |
| 1623 | 299.5 | 1.26 |
| 1624 | 299.7 | 1.3 |
| 1625 | 301.6 | 1.27 |
| 1626 | 298.2 | 1.34 |
| 1627 | 300.1 | 1.31 |
| 1628 | 299.8 | 1.3 |
| 1629 | 298.6 | 1.31 |
| 1630 | 299.8 | 1.32 |
| 1631 | 300.3 | 1.33 |
| 1632 | 297.9 | 1.32 |
| 1633 | 297.5 | 1.34 |
| 1634 | 296.6 | 1.29 |
| 1635 | 296.7 | 1.35 |
| 1636 | 296.2 | 1.36 |
| 1637 | 296.8 | 1.32 |
| 1638 | 298.2 | 1.35 |
| 1639 | 297 | 1.36 |
| 1640 | 295.8 | 1.33 |
| 1641 | 295 | 1.3 |
| 1642 | 293 | 1.3 |
| 1643 | 293.9 | 1.33 |
| 1644 | 293.3 | 1.31 |
| 1645 | 294.1 | 1.31 |
| 1646 | 295.3 | 1.3 |
| 1647 | 296.5 | 1.37 |
| 1648 | 297.5 | 1.32 |
| 1649 | 295.6 | 1.32 |
| 1650 | 296.7 | 1.27 |
| 1651 | 297 | 1.32 |
| 1652 | 294.4 | 1.3 |
| 1653 | 296.1 | 1.3 |
| 1654 | 296.3 | 1.31 |
| 1655 | 293.3 | 1.37 |
| 1656 | 293.7 | 1.37 |
| 1657 | 293.1 | 1.35 |
| 1658 | 290.8 | 1.35 |
| 1659 | 290.5 | 1.38 |
| 1700 | 290.8 | 1.4 |
| 1701 | 291.7 | 1.36 |
| 1702 | 289.3 | 1.44 |
| 1703 | 290.2 | 1.4 |
| 1704 | 291 | 1.38 |
| 1705 | 290.1 | 1.41 |
| 1706 | 290.2 | 1.41 |
| 1707 | 289.7 | 1.39 |
| 1708 | 286.5 | 1.43 |
| 1709 | 286.5 | 1.42 |
| 1710 | 286.8 | 1.45 |
| 1711 | 287 | 1.46 |
| 1712 | 286.2 | 1.43 |
| 1713 | 285.9 | 1.47 |
| 1714 | 286.9 | 1.47 |
| Average | 295.0 | 1.3 |

# APPENDIX 5

# FACILITY PRODUCTION DOCUMENTATION

2/26/2009 AVX Corporation 05:56 PM

Trend Interval Report : MB2.Adsorber 3 DHEC Report

Selection: MB2.ADS: MB2.ADS: MB2.ADS: MB2.STACK

| Key | Name:Suffix | Trend Definitions Used |
|---|---|---|
| Point_1: | MB2.ADS3.BT | Point COV 5 Min |
| Point_2: | MB2.ADS3.DP | Point COV 1 Min |
| Point_3: | MB2.ADS3.MT | Point COV 5 Min |
| Point_4: | MB2.ADS3.TT | Point COV 5 Min |
| Point_5: | MB2.STACK | Trend COV (25.0000) 5 Min |

Time Interval: 5 Minutes

Date Range: 2/26/2009 00:00:00 - 2/26/2009 23:59:59

Report Timings: All Hours

| <>Date Time | Point_1 | Point_2 | Point_3 | Point_4 | Point_5 |
|---|---|---|---|---|---|
| 2/26/2009 13:35:00 | 482.31 | 3.07 | 434.62 | 97.65 | 1470.96 |
| 2/26/2009 13:40:00 | 482.31 | 3.05 | 430.38 | 96.59 | 1521.82 |
| 2/26/2009 13:45:00 | 481.25 | 3.09 | 425.09 | 96.59 | 1496.39 |
| 2/26/2009 13:50:00 | 480.19 | 3.10 | 422.97 | 96.59 | 1470.96 |
| 2/26/2009 13:55:00 | 487.60 | 3.13 | 420.85 | 96.59 | 1521.82 |
| 2/26/2009 14:00:00 | 498.20 | 3.12 | 421.91 | 97.65 | 1496.39 |
| 2/26/2009 14:05:00 | 496.08 | 3.12 | 425.09 | 97.65 | 1496.39 |
| 2/26/2009 14:10:00 | 487.60 | 3.17 | 430.38 | 98.71 | 1496.39 |
| 2/26/2009 14:15:00 | 487.60 | 3.12 | 432.50 | 99.77 | 1470.96 |
| 2/26/2009 14:20:00 | 482.31 | 3.15 | 435.68 | 99.77 | 1520.76 |
| 2/26/2009 14:25:00 | 482.31 | 3.17 | 436.74 | 99.77 | 1470.96 |
| 2/26/2009 14:30:00 | 487.60 | 3.16 | 435.68 | 101.89 | 1521.82 |
| 2/26/2009 14:35:00 | 489.72 | 3.21 | 434.62 | 102.95 | 1496.39 |
| 2/26/2009 14:40:00 | 486.55 | 3.16 | 433.56 | 102.95 | 1470.96 |
| 2/26/2009 14:45:00 | 482.31 | 3.22 | 432.50 | 104.01 | 1521.82 |
| 2/26/2009 14:50:00 | 481.25 | 3.22 | 430.38 | 105.07 | 1496.39 |
| 2/26/2009 14:55:00 | 485.49 | 3.21 | 430.38 | 106.13 | 1496.39 |
| 2/26/2009 15:00:00 | 482.31 | 3.21 | 427.20 | 108.25 | 1530.30 |
| 2/26/2009 15:05:00 | 479.13 | 3.20 | 427.20 | 108.25 | 1470.96 |
| 2/26/2009 15:10:00 | 482.31 | 3.24 | 426.15 | 109.31 | 1521.82 |
| 2/26/2009 15:15:00 | 487.60 | 3.23 | 425.09 | 110.37 | 1496.39 |
| 2/26/2009 15:20:00 | 365.75 | 3.23 | 424.03 | 110.37 | 1496.39 |
| 2/26/2009 15:25:00 | 286.27 | 3.25 | 421.91 | 111.43 | 1534.54 |
| 2/26/2009 15:30:00 | 286.27 | 3.23 | 420.85 | 111.43 | 1470.96 |
| 2/26/2009 15:35:00 | 280.97 | 3.26 | 420.85 | 111.43 | 1521.82 |
| 2/26/2009 15:40:00 | 275.67 | 3.23 | 420.85 | 111.43 | 1496.39 |
| 2/26/2009 15:45:00 | 259.78 | 3.21 | 421.91 | 111.43 | 1521.82 |
| 2/26/2009 15:50:00 | 265.08 | 3.25 | 422.97 | 113.55 | 1531.36 |
| 2/26/2009 15:55:00 | 265.08 | 3.22 | 422.97 | 113.55 | 1470.96 |
| 2/26/2009 16:00:00 | 265.08 | 3.21 | 424.03 | 113.55 | 1521.82 |
| 2/26/2009 16:05:00 | 259.78 | 3.21 | 425.09 | 134.74 | 1534.54 |
| 2/26/2009 16:10:00 | 250.24 | 3.22 | 422.97 | 177.13 | 1470.96 |
| 2/26/2009 16:15:00 | 271.44 | 3.23 | 418.73 | 211.04 | 1521.82 |

| | | | | | |
|---|---|---|---|---|---|
| 2/26/2009 16:20:00 | 266.14 | 3.26 | 414.49 | 237.53 | 1496.39 |
| 2/26/2009 16:25:00 | 269.32 | 3.24 | 412.37 | 256.60 | 1496.39 |
| 2/26/2009 16:30:00 | 274.62 | 3.26 | 411.31 | 267.20 | 1530.30 |
| 2/26/2009 16:35:00 | 258.72 | 3.24 | 409.19 | 272.50 | 1470.96 |
| 2/26/2009 16:40:00 | 269.32 | 3.24 | 408.13 | 272.50 | 1521.82 |
| 2/26/2009 16:45:00 | 253.42 | 3.24 | 408.13 | 273.56 | 1496.39 |
| 2/26/2009 16:50:00 | 264.02 | 3.26 | 408.13 | 273.56 | 1470.96 |
| 2/26/2009 16:55:00 | 269.32 | 3.26 | 410.25 | 272.50 | 1521.82 |
| 2/26/2009 17:00:00 | 264.02 | 3.27 | 410.25 | 272.50 | 1496.39 |
| 2/26/2009 17:05:00 | 264.02 | 3.26 | 412.37 | 270.38 | 1496.39 |
| 2/26/2009 17:10:00 | 258.72 | 3.25 | 414.49 | 268.26 | 1521.82 |
| 2/26/2009 17:15:00 | 257.66 | 3.28 | 419.79 | 265.08 | 1496.39 |
| 2/26/2009 17:20:00 | 258.72 | 3.29 | 419.79 | 261.90 | 1470.96 |
| 2/26/2009 17:25:00 | 258.72 | 3.24 | 418.73 | 259.78 | 1521.82 |
| 2/26/2009 17:30:00 | 253.42 | 3.26 | 415.55 | 258.72 | 1496.39 |
| 2/26/2009 17:35:00 | 253.42 | 3.27 | 409.19 | 260.84 | 1470.96 |
| 2/26/2009 17:40:00 | 255.54 | 3.27 | 403.89 | 261.90 | 1521.82 |
| 2/26/2009 17:45:00 | 255.54 | 3.26 | 398.59 | 264.02 | 1496.39 |
| 2/26/2009 17:50:00 | 255.54 | 3.28 | 388.00 | 261.90 | 1479.44 |

********************************* End of Report *********************************

| Key | Name:Suffix | Trend Definitions Used |
|---|---|---|
| Point_1: | MB2.CMAP.JHMAP.FI | Trend COV (100.0000) 1 Min |
| Time Interv | 5 Minutes | |
| Date Rang | 2/26/2009 00:00:00 - 2/26/2009 23:59:59 | |
| Report Tim | All Hours | |

| <>Date | Time | Point_1 |
|---|---|---|
| 2/26/2009 | 13:30:00 | 4978 |
| 2/26/2009 | 13:35:00 | 5007 |
| 2/26/2009 | 13:40:00 | 5012 |
| 2/26/2009 | 13:45:00 | 4847 |
| 2/26/2009 | 13:50:00 | 5022 |
| 2/26/2009 | 13:55:00 | 5007 |
| 2/26/2009 | 14:00:00 | 5011 |
| 2/26/2009 | 14:05:00 | 4784 |
| 2/26/2009 | 14:10:00 | 5017 |
| 2/26/2009 | 14:15:00 | 4971 |
| 2/26/2009 | 14:20:00 | 5042 |
| 2/26/2009 | 14:25:00 | 4967 |
| 2/26/2009 | 14:30:00 | 5004 |
| 2/26/2009 | 14:35:00 | 5002 |
| 2/26/2009 | 14:40:00 | 4990 |
| 2/26/2009 | 14:45:00 | 4777 |
| 2/26/2009 | 14:50:00 | 4974 |
| 2/26/2009 | 14:55:00 | 4790 |
| 2/26/2009 | 15:00:00 | 4988 |
| 2/26/2009 | 15:05:00 | 4978 |
| 2/26/2009 | 15:10:00 | 4973 |
| 2/26/2009 | 15:15:00 | 4965 |
| 2/26/2009 | 15:20:00 | 5005 |
| 2/26/2009 | 15:25:00 | 4985 |
| 2/26/2009 | 15:30:00 | 5000 |
| 2/26/2009 | 15:35:00 | 4772 |
| 2/26/2009 | 15:40:00 | 4979 |
| 2/26/2009 | 15:45:00 | 4974 |
| 2/26/2009 | 15:50:00 | 4970 |
| 2/26/2009 | 15:55:00 | 4808 |
| 2/26/2009 | 16:00:00 | 4980 |
| 2/26/2009 | 16:05:00 | 4970 |
| 2/26/2009 | 16:10:00 | 4971 |
| 2/26/2009 | 16:15:00 | 4997 |
| 2/26/2009 | 16:20:00 | 4781 |
| 2/26/2009 | 16:25:00 | 4781 |
| 2/26/2009 | 16:30:00 | 4959 |
| 2/26/2009 | 16:35:00 | 4923 |
| 2/26/2009 | 16:40:00 | 4961 |
| 2/26/2009 | 16:45:00 | 4978 |
| 2/26/2009 | 16:50:00 | 4776 |
| 2/26/2009 | 16:55:00 | 4982 |
| 2/26/2009 | 17:00:00 | 4774 |
| 2/26/2009 | 17:05:00 | 4996 |
| 2/26/2009 | 17:10:00 | 4781 |

| | | |
|---|---|---|
| 2/26/2009 | 17:15:00 | 4960 |
| 2/26/2009 | 17:20:00 | 4972 |
| 2/26/2009 | 17:25:00 | 4984 |
| 2/26/2009 | 17:30:00 | 4955 |
| 2/26/2009 | 17:35:00 | 4776 |
| 2/26/2009 | 17:40:00 | 5009 |
| 2/26/2009 | 17:45:00 | 5007 |
| 2/26/2009 | 17:50:00 | 4982 |

******************************** End of Report *********************************

AVX
Application Rate

Binks Tank Wt. (lb)

| Initial | Final | Time | Rate (lb/hr) | Actual Time |
|---|---|---|---|---|
| 250.8 | | | | |
| | 250 | 2:00:00 | | |
| | 248.8 | 5:20:00 | | |
| | 246.8 | 11:11:00 | | 13:50 Start Run 1 |
| | 245.4 | 15:36:00 | | |
| | 243.4 | 22:00:00 | | |
| | 241.4 | 28:30:00 | | |
| | 238.2 | 39:10:00 | | |
| | 235.6 | 46:40:00 | | |
| | 232.4 | 56:00:00 | | 14:41 |
| | 229.6 | 63:30:00 | | |
| | 227.2 | 70:00:00 | | 14:55 |
| | | | 21.21 | |
| 221 | | | | |
| | 218.8 | 6:15:00 | | |
| | 216.6 | 12:30:00 | | 15:05 Start Run 2 |
| | 213.4 | 21:45:00 | | |
| | 210 | 30:40:00 | | |
| | 206.2 | 40:30:00 | | |
| | 200.8 | 54:30:00 | | |
| | 198.8 | 60:00:00 | | 16:05 |
| | | | 22.2 | |
| 195.4 | | | | |
| | 193 | 6:20:00 | | 16:15 Start Run 3 |
| | 190.2 | 13:50:00 | | |
| | 187.4 | 21:18:00 | | |
| | 184.2 | 30:00:00 | | |
| | 180.6 | 39:40:00 | | |
| | 177.4 | 48:30:00 | | |
| | 173.2 | 60:00:00 | | 17:15 |
| | | | 22.2 | |

1004226
regulator1

AIR MONITORING, INC.

*P.O. Box 559 • Huntersville, NC 28070-0559*
*www.integrityair.net*

# STATIONARY SOURCE SAMPLING REPORT

# FOR

# AVX CORPORATION

# MYRTLE BEACH, SOUTH CAROLINA

## *Burnout Oven Exhaust and Metals Exhaust VOC Sampling*

**Integrity Project No. 09-043 Performed: June 25, 2009**

*Certified By:*

Date 08/17/09

James A. Lewis, QSTI
Vice President
Intgerity Air Monitoring, Inc.

FOR Date 08/17/09

J.A. Tony Blanton, QSTI
President
Integrity Air Monitoring, Inc.

# TABLE OF CONTENTS

# 1.0 INTRODUCTION

This test program was performed at the AVX Corporation facility in Myrtle Beach, South Carolina on one Burnout Oven exhaust (Unit ID 12 – MB2 Kiln Room) and the Metals Department exhaust (Unit ID – 01 Metals Department). This section of the report describes the test purpose and provides a brief outline of the test activities and the personnel involved in the test program.

## 1.1 Purpose

The AVX Corporation facility is covered by Title V Air Quality Permit No. TV-1340-0002; however, the testing was performed at the request of SC DHEC.

## 1.2 Outline of Test Program

Integrity Air Monitoring, Inc. (Integrity) performed stationary source sampling at one Burnout Oven exhaust (during two separate operating scenarios) and at the Metals Department exhaust on June 25, 2009. The sampling included six 30-minute sampling runs at the Burnout Oven exhaust and three 30-minute sampling runs at the Metals Department exhaust for total hydrocarbon (THC) emissions as carbon using EPA Reference Method 25A. In addition to the sampling performed for THC, Integrity also performed US EPA Reference Methods 1 through 4 to determine the location of the sampling points, the volumetric flow rate, the molecular weight of the stack gas and the moisture content, respectively.

The original scope of the project included only three sampling runs at the burnout oven exhaust; however, SC DHEC representatives present to witness the testing requested three additional sampling runs at the burnout oven exhaust during a later phase of the burnout cycle (higher temperature).

## 1.3 Test Participants

The following table provides contact information for the test participants.

**Table 1 – Test Participants**

| Name | Title | Affiliation | Contact Info |
|---|---|---|---|
| J.A. "Tony" Blanton | President | Integrity Air Monitoring, Inc. | Telephone: (704) 398-1119<br>Facsimile: (704) 398-1113<br>tony@integrityair.net |
| James A. Lewis | Vice President | Integrity Air Monitoring, Inc. | Telephone: (704) 398-1119<br>Facsimile: (704) 398-1113<br>jim@integrityair.net |
| Boyd Holt | Safety & Environmental Manager | AVX Corporation | Telephone: (843) 946-0377<br>Facsimile: (843) 444-2833<br>bholt@avxus.com |
| Gary Yoder | President | Resolute Environmental, LLC | Telephone: (919) 701-0009<br>gyoder@nc.rr.com |
| Nathan T. Wagner | Environmental Health Manager | SC DHEC | Telephone: (803) 898-4054<br>Facsimile: (803) 898-4117<br>wagnert@dhec.gov |
| Mallory S. Sparks | Environmental Health Manager | SC DHEC | Telephone: (803) 898-4335<br>Facsimile: (803) 8984117-<br>sparksmslj@dhec.sc.gov |

# 2.0 RESULTS

This section presents the mean sampling results. Detailed sampling results for each sampling run and example calculations are presented in Appendix 1. Field data sheets and system bias and drift checks are presented in Appendix 2. Data acquisition system uncorrected values and values corrected for system bias are presented in Appendix 3.

## 2.1 Summary of Results

The following tables present the mean results from the sampling performed at the Burnout Oven exhaust and the Metals Department exhaust on June 25, 2009.

Table 2 – Summary of THC Sampling Results

| Source | Concentration, ppmvd as carbon | Loading/Emission Rate, lbs/hr as carbon |
|---|---|---|
| Burnout Oven Exhaust (Condition 1) | 21.6 | 0.0010 |
| Burnout Oven Exhaust (Condition 2) | 381.2 | 0.014 |
| Metals Exhaust | 17.2 | 0.036 |

## 2.2 Discussion

The results of the test indicate that both electrode ink processing and burnout have low THC emissions. These test results will be used to develop emission factors used in future emission inventories and air permit applications for the AVX Myrtle Beach facility.

## 3.0 PROCESS DESCRIPTION

Total hydrocarbon emissions from both electrode ink processing and burnout are from the organic (carbon) materials terpineol and ethyl cellulose. Both materials are part of the electrode ink mixture. Terpineol is manufactured from terpintine with other uses in the manufacturing of fragrances, disinfectants, polishes, and household products. It is a heavy liquid with a flash point of 100°C (212°F) and is added to the ink for its solvent properties. Ethyl cellulose is a dry material added to the electrode ink for its binding properties potentially producing hydrocarbon emissions during the burnout process.

The Metals Department prepares conductive metal inks (electrode inks) and pastes (termination pastes) used with ceramic slip to manufacturer capacitors in the build-up process. The electrode ink is primarily made up of metals (nickel, copper, gold, etc.), dry binder (ethyl cellulose), and terpineol. The mixture is added to milling tools where it may go through several passes depending on the desired particle size specification. Emissions are vented out a room exhaust.

The burnout ovens are located in the MB2 Kiln Room. Green chips enter the burnout ovens where they go through varying temperature profiles to remove the terpineol and ethyl cellulose in the capacitor chips. The temperature profile and cycle time for this test ranged from room temperature to 500°F for 25 hours. This is the most common profile and cycle time used by AVX. Temperature profiles and cycle times can range from room temperature to 550°F for up to 32 hours. The temperature profiles are necessary to remove the binder and terpineol while maintaining the structural integrity of the chips.

### 3.1 Air Pollution Control Equipment

Emissions from the burnout ovens and Metals Department are vented uncontrolled to the atmosphere.

### 3.2 Demonstration of Operating Rate

As communicated to SC DHEC during the development of the testing protocol, testing at the Metals Department could only measure emissions from the electrode ink processed the day of the test. The difference in electrode inks mixtures is primarily the type of metals used (nickel, copper, gold, platinum, etc.). The organic materials (terpineol and ethyl cellulose) do not vary much between the mixtures. During this test, AVX prepared a nickel ink, which is the most common ink used in chip production at the facility. After the mixture is prepared, it goes through a series of passes in the department milling tools. The tested ink mixture contained 44% by weight terpineol, 2.3% ethyl cellulose, 53.7% non-organic solids and went through three milling passes in the largest of 3 tools.

The burnout oven tested was GB 201. It contained 19 pans holding 1,010,960 Style 036 capacitor chips. As shown in the temperature profile in Figure 1, Test 1 was conducted from 8:30 to 9:38. During Test 1, The SC DHEC requested a second test at the oven's peak temperature, which was conducted from 15:00 to 16:08. The test results show a higher organic emission rate of 0.014 lb/hr at the Test 2 peak temperature. The oven was not completely charged and can hold up to 30 pans. Assuming a linear relationship, the oven charged with 30 pans would result in an organic emission rate of 0.022 lb/hr.

Production documentation corresponding with the sampling is included in Appendix 5.

# Burnout Oven GB 201 Temperature Profile

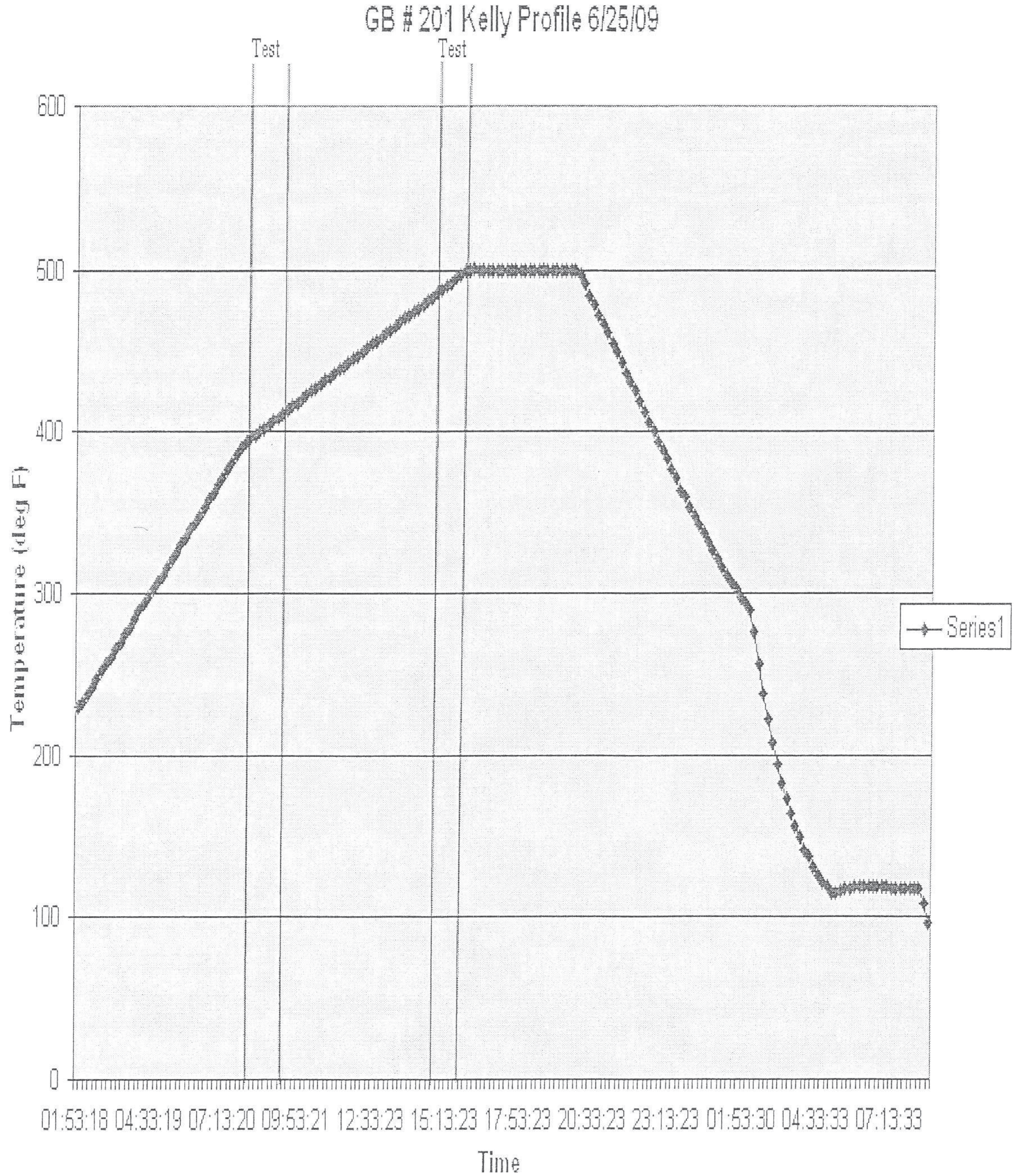



**Figure 1**

# 4.0 SAMPLING METHODS

This section describes the sampling strategy, sampling and analytical methods, and the quality assurance/quality control procedures implemented during this project.

## 4.1 Sampling Strategy

The sampling and analytical procedures used during this test program were those established by the US EPA and SC DHEC. A Site-Specific Test Plan (SSTP) was submitted to the SC DHEC detailing the sampling procedures and process parameters to be followed during this test program.

## 4.2 Sampling and Analytical Procedures

The following table provides the US EPA reference methods used in this sampling program.

| Table 4 – Sampling and Analytical Procedures | |
|---|---|
| **Reference Method** | **Parameter** |
| 1 | Location of Sampling Points |
| 2 | Volumetric Flow Rate |
| 3 | Molecular Weight |
| 4 | Moisture Content |
| 25A | THC |

A sampling and analysis synopsis for each of these methods is discussed briefly in the following subsections. These test methods are available in the Code of Federal Regulations Volume 40, Part 60 or by request from Integrity.

### 4.2.1 Sampling Ports, Traverse Points and Cyclonic Flow Determination

The sampling locations were prepared according to the criteria in Method 1. The duct diameters upstream and downstream from the sampling ports were measured and documented prior to sampling. The number of traverse points was chosen with respect to sampling port location. The amount of cyclonic flow was determined according to the criteria detailed in Method 1.

### 4.2.2 Stack Gas Velocity and Volumetric Flow Rate Determination

Method 2 is used to determine the average gas velocity in a stack using the average temperature and average velocity head. The temperature is measured with a calibrated thermocouple and the velocity determined with a Type S (Stausscheibe) pitot tube. This method is further used to calculate to volumetric flow rate.

Measurements of velocity head and temperature at the sampling location were performed at the traverse points specified by Method 1. An inclined oil manometer or calibrated magnehelic gauge was used to measure the differential pressure.

The apparatus was set-up according to manufacturer and reference method recommendations. Pre-test and post-test leak checks were conducted for each sampling run. The atmospheric and static pressure of the stack was also determined for each set of velocity head readings. The volumetric flow rate calculations used were those specified in Method 2.

### 4.2.3 Dry Molecular Weight Determination

Method 3 is applicable for determining carbon dioxide and oxygen concentrations and dry molecular weight of a sample from a gas stream of a fossil-fuel combustion process. This method may also be applicable to other processes where it has been determined that compounds other than carbon dioxide, oxygen, carbon monoxide, and nitrogen are not present in concentrations sufficient to affect the results.

Since the sources were emitting essentially air, a dry molecular weight of 29.0 was used according to Method 2, Section 8.6.

### 4.2.4 Moisture Determination

Method 4 was used to determine the stack gas moisture content. The moisture content is used to correct the concentration or mass emission rate to a dry basis. Moisture determinations for this sampling project were determined using one of two methods described below dependant on the sample stream temperature. Sources above 140 degrees F require the use of a Method 4 sample train.

The flue gas moisture content at the Metals Department exhaust (< 140 °) was determined using wet bulb/dry bulb thermometers and partial pressure, vapor and saturated vapor pressure equations. This technique is described in Method 4 and is summarized below:

- Moisten the wet bulb thermometer wick with deionized water;
- Insert both thermometers into the flue gas stream and monitor the wet bulb temperature;

When the wet bulb temperature has stabilized, record both the wet bulb and dry bulb thermometer temperatures.

The flue gas moisture content (PMV) was then calculated using saturated vapor and moisture equations.

The moisture content at the burnout oven exhaust (>140 °F) was performed using the following sampling system and procedures:

- A heated (248°F ±25°F) probe;
- A moisture condensing train consisting of four sequential impingers. Impingers one and two contained 100 ml each of deionized water followed by an empty impinger and a final impinger containing 200 grams of silica gel; and
- A Method 5 type metering system capable of maintaining a constant sampling rate.

At the end of the test run, the liquid in the first three impingers was measured to the nearest milliliter. The moisture collected by the silica gel was determined to the nearest 0.1 gram. These measurements were recorded on the Method 4 data form. The moisture content of the emission source was calculated according to the equations in Method 4, Section 12. At the direction of SC DHEC, since the process is steady state, only one moisture sample was conducted and the moisture result was used for all runs.

### 4.2.5 THC Analyzer Procedures

Total gaseous organics or total hydrocarbons concentrations and emission rates were determined according to EPA Method 25A. Method 25A applies to the measurement of total gaseous organic concentration of vapors consisting primarily of alkanes, alkenes, and/or arenes (aromatic hydrocarbons). The concentration is expressed in terms of propane (or other appropriate calibration gas) or in terms of carbon.

Sampling for total gaseous organics was performed using a VIG Industries Model 20 analyzer. The principal components of each sampling systems were sequentially:

- A heated stainless steel sample probe;
- A heated system calibration assembly and filter;
- A heated sample line;
- An FIA analyzer;
- Calibration gases; and
- A data acquisition system that continuously logs 1-minute concentrations.

Prior to the test series, the heated sample lines were heated to 360°F and the hydrocarbon analyzer was heated above 200°C to prevent condensation. After temperatures were stabilized the hydrocarbon analyzer was ignited using a 40% hydrogen balance helium fuel and hydrocarbon free air. Calibration procedures commenced with the introduction of zero and high-level calibration gas into the sampling system. The necessary adjustments were made and the responses for low-level and mid-level gases were recorded. The predicted values for the calibration gases and the actual responses were recorded on the field data sheet and by the data acquisition system. High-level and zero gas concentrations were introduced into the measurement system and the response time was recorded on the field data sheet. Sampling was initiated immediately following instrument calibration. At the conclusion of the first hour, the zero and mid-level calibration gases were reintroduced and their respective responses recorded on the field data sheet. Integrity utilized a STEC 710-C gas divider according to Method 205 to create multi-level calibration gases from a single upscale standard. A certificate of calibration for the gas divider is provided in Appendix 5.

The zero and calibration drift checks were performed immediately following completion of the test run and at the conclusion of the test program. The data collected during the test program was archived on a data acquisition system and is attached to this test report as Appendix 3. The DAS used by Integrity Air Monitoring, Inc. for this project was an IBM computer with hard disk storage and a Superlogics data shuttle recorder.

### 4.2.6 Sampling Ports and Points

The dimensions of the sampling locations and the location of the sampling ports and points are detailed in Figures 2 and 3. The drawings provided are not to scale. The THC sampling was performed at single point near the center of each stack.

# Burnout Oven Exhaust

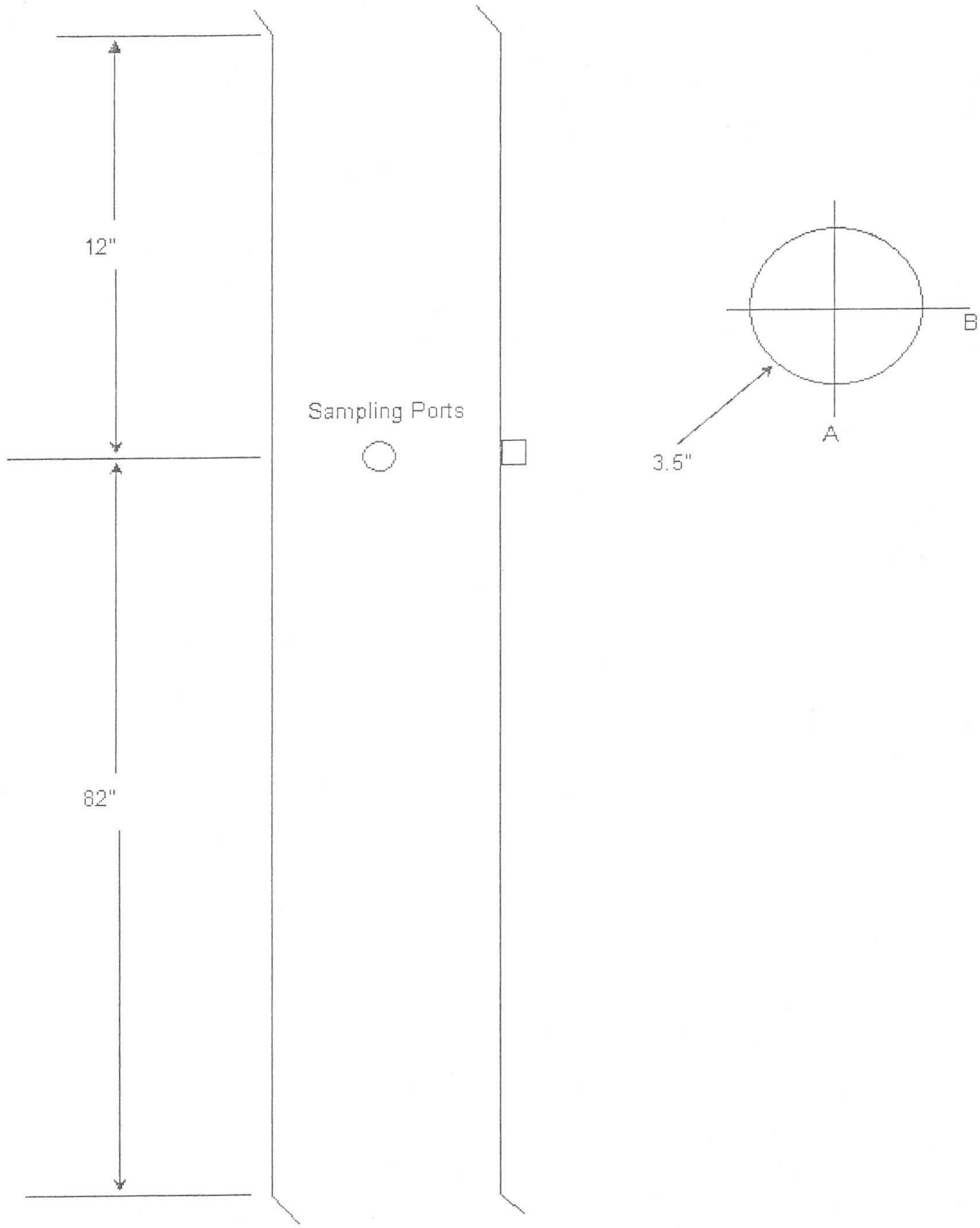



**Figure 2**

**Location of Sampling Ports**

# Metals Exhaust

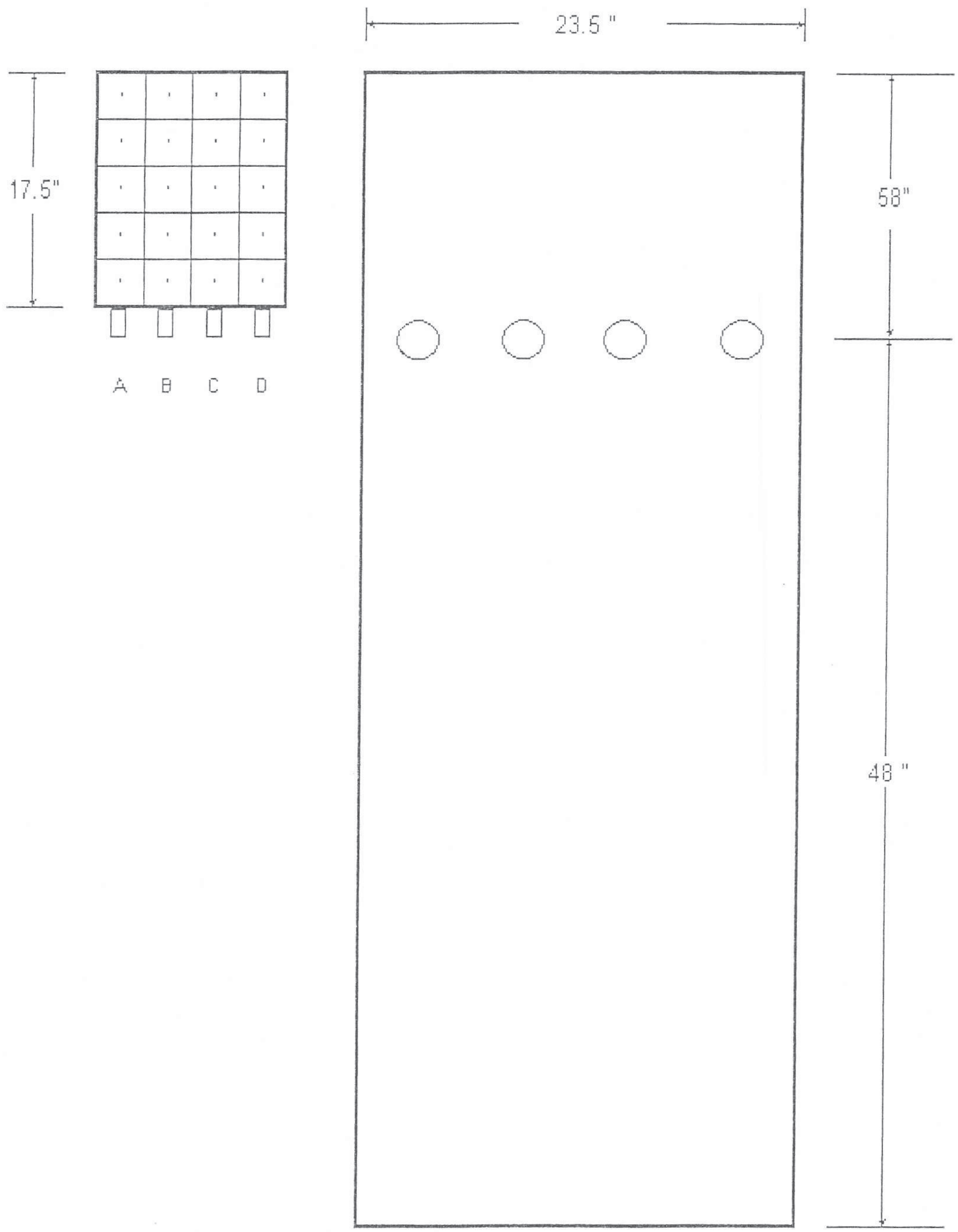



Figure 3

Location of Sampling Ports

## 4.3 Quality Assurance and Quality Control

Integrity Air has established quality assurance and quality control (QA/QC) guidelines to ensure the highest quality sampling and analytical data from source tests.

Data quality objectives were maintained throughout this project. The following table provides the QA activities followed during this sampling project and the results.

| Table 5 – Project QA Activities and Results | | |
|---|---|---|
| **Parameter** | **Criteria** | **Within Limits?** |
| Sampling Train Leak Check | < 0.02 cfm | yes |
| Pitot Tube Leak Check | < 0.1 in. $H_2O$ in 15 sec. | yes |
| Console Calibration | $\gamma$ +/- 0.02 | yes |
| Thermocouples | +/- 2% of ref. temp. | yes |
| 25A Analyzer Calibration | +/- 5% of gas | yes |
| 25A Drift Check | +/- 3% of span | yes |

Quality control procedures for the gaseous pollutant sampling has included the use of EPA Protocol I calibration gases. Protocol gas certificates of analysis are included in Appendix 4. US EPA Approved Alternate Method ALT-009 was used for the console post-test calibration and can be found in Appendix 1. The pre-test and post-test thermocouple system calibrations were performed using the procedures found in US EPA Approved Alternate Method ALT-011 and can be found in Appendix 4.

Field data and final laboratory results were independently audited and reviewed for verification of data. The Emission Test Report is audited for completeness and reasonableness of data. The report requires the signature of the project manager and Vice President or President before release to the client. Data and final reports are archived in a secured area for a minimum period of three years.

Integrity's field and laboratory test equipment has been maintained and calibrated in accordance with quality assurance procedures established by the US EPA in the Quality Assurance Handbook for Air Pollution Measurement Systems: Volume III. Equipment calibrations including pre-test and post-test calibration data are presented in Appendix 4.

Adsorber/Desorber and Thermal Oxidizer

# MONITORING PLAN FOR REECO FLUISORB SYSTEM

This plan is prepared to comply with Section II.C. of Construction Permit number 1340-0002-CK issued August 11, 1998, for the Chip Manufacturing Automated Process (CMAP) machines at AVX Corporation in Myrtle Beach, South Carolina. The monitoring and recordkeeping requirements in this plan include the monitoring parameters, calibration, and inspection schedules.

Listed below are a description of the control device, AVX's proposed alternative monitoring method, and monitoring procedures and inspection schedule.

## CONTROL DEVICE DESCRIPTION

AVX uses a Reeco FluiSorb system (a combination of an adsorber, desorber, and thermal oxidizer) to reduce the emissions of volatile organic compounds (VOC) into the atmosphere. The device controls emissions from the CMAP machines in the NMF. The air first passes through the adsorption vessel. The high surface area of the carbonaceous media removes the majority of the VOC, leaving a cleaned exhaust gas. Organics collected on the porous media are removed via steam in the desorption unit, creating a concentrated VOC air stream. This air stream is then sent to a thermal oxidizer. Because the first stage of adsorption significantly decreases the flowrate needing treatment by the thermal oxidizer, the size of the thermal oxidizer is greatly reduced. Upon entering the thermal oxidizer, the air stream is combusted with auxiliary fuel, such as natural gas, to convert VOC into carbon dioxide and water vapor.

A copy of the FluiSorb vendor brochure is included with this Monitoring Plan.

## ALTERNATIVE MONITORING METHOD

Construction Permit number 1340-0002-CK lists monitoring parameters for the adsorber/desorber unit and for the thermal oxidizer. The permit also includes clauses for alternative monitoring methods, as follows:

> *Any alternative method for monitoring scrubber performance must be approved by the Bureau and shall be incorporated into a Monitoring Plan...*
>
> *Any alternative method for monitoring afterburner performance must be approved by the Bureau and may be incorporated into a Monitoring Plan...*

Although the specific condition refers to a scrubber (a scrubber is not a part of the CMAP control equipment), a more appropriate monitoring condition is proposed for the adsorber/desorber unit. This monitoring condition involves a monitoring of pressure drop across the adsorber inlet/outlet and a monitoring of the desorber temperature.

## MONITORING PROCEDURES

To ensure the control device is operating properly and efficiently, AVX will follow the monitoring and recordkeeping procedures below.

### Adsorber/Desorber Unit

The pressure drop across the adsorber inlet/outlet and the desorber temperature will be monitored. Measuring the pressure drop across the adsorber is an excellent means of determining whether the unit is operating correctly. Any pressure drop increases above the desired range would indicate the unit is not operating at peak efficiency. The pressure drop will be recorded continuously on a data logger while the adsorber/desorber unit is operating.

Monitoring the desorber temperature ensures that the maximum amount of VOC is desorbed from the carbon media; significant decreases in desorber temperature would result in a decrease in the amount of organics removed from the carbonaceous material. Temperature measurements will be recorded continuously on a data logger while the adsorber/desorber unit is operating.

Pressure drop and temperature readings will be relayed from the data logger to a display. Records containing these readings will be maintained in a form suitable for inspection for five (5) years from the date the information is recorded.

### Thermal Oxidizer

To monitor the destruction of VOC at the thermal oxidizer, the combustion temperature will be recorded on a data logger. Because the unit relies on combustion at a specific range of temperatures, monitoring this parameter ensures the control of VOC. A thermocouple located near the combustion chamber will measure the temperature and relay this information to a display. Temperature measurements will be recorded when the oxidizer is treating exhaust from the adsorption/desorption unit. When the adsorption/desorption unit is not operating, the thermal oxidizer is shut down, and the combustion temperature is not recorded. Records containing the temperature readings will be maintained in a form suitable for inspection for five (5) years from the date the information is recorded.

Table 1 summarizes the monitoring methods AVX will employ to ensure compliance with Construction Permit number 1340-0002-CK.

**TABLE 1. MONITORING PLAN SUMMARY.**

| Unit | Monitoring Method | Range | Duration | Frequency | Recordkeeping | Record Kept in Form Suitable for Inspection |
|---|---|---|---|---|---|---|
| Adsorption Unit | Pressure drop | 2"w.c. - 5" w.c. | Continuous | Continuous | Electronic records | 5 years |
| Desorption Unit | Thermocouple at heat source | 400°F – 500°F | Continuous | Continuous | Electronic records | 5 years |
| Thermal Oxidizer | Thermocouple at combustion chamber | 1400°F-1800°F | Continuous | When adsorption/desorption unit is operating | Electronic records | 5 years |

## INSPECTION AND MALFUNCTION SCHEDULE

The adsorber/desorber system and the thermal oxidizer will be inspected quarterly. Preventive maintenance will be completed quarterly, per vendor specifications. If the monitoring parameters reveal a departure from the proposed ranges, then the unit in question (i.e., the adsorber/desorber or the oxidizer) will be inspected. If the parameters continue to show consecutive readings outside the ranges for more than a 24-hour period following the initial observation, then the unit will be shut down, the problem corrected, and startup will resume once the unit can be operated within the acceptable ranges. In instances where a shutdown of the unit results in a significant production interruption, AVX will request prior approval from the DHEC to continue to operate the CMAP machines.

# FluiSorb™

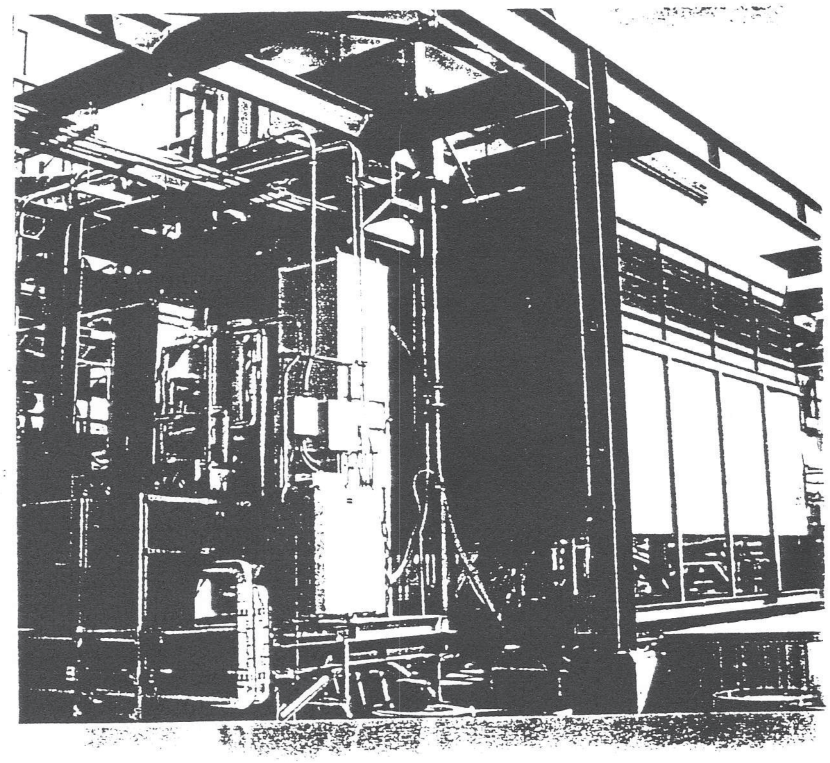
## Fluidized Bed Concentrator

### Superior Concentration of VOCs and Air Toxics

Concentrations of 1000:1 or Greater

Exceptionally Low Operating Costs

Destruction/Recovery Rates of 95%–99%

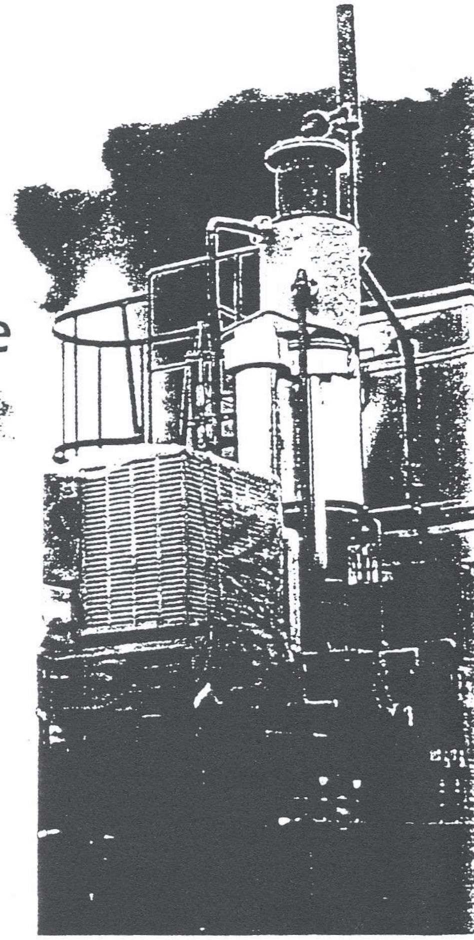


REECO

A Research-Cottrell Company

# FluiSorb™

## When You Need To Really Concentrate On VOCs.



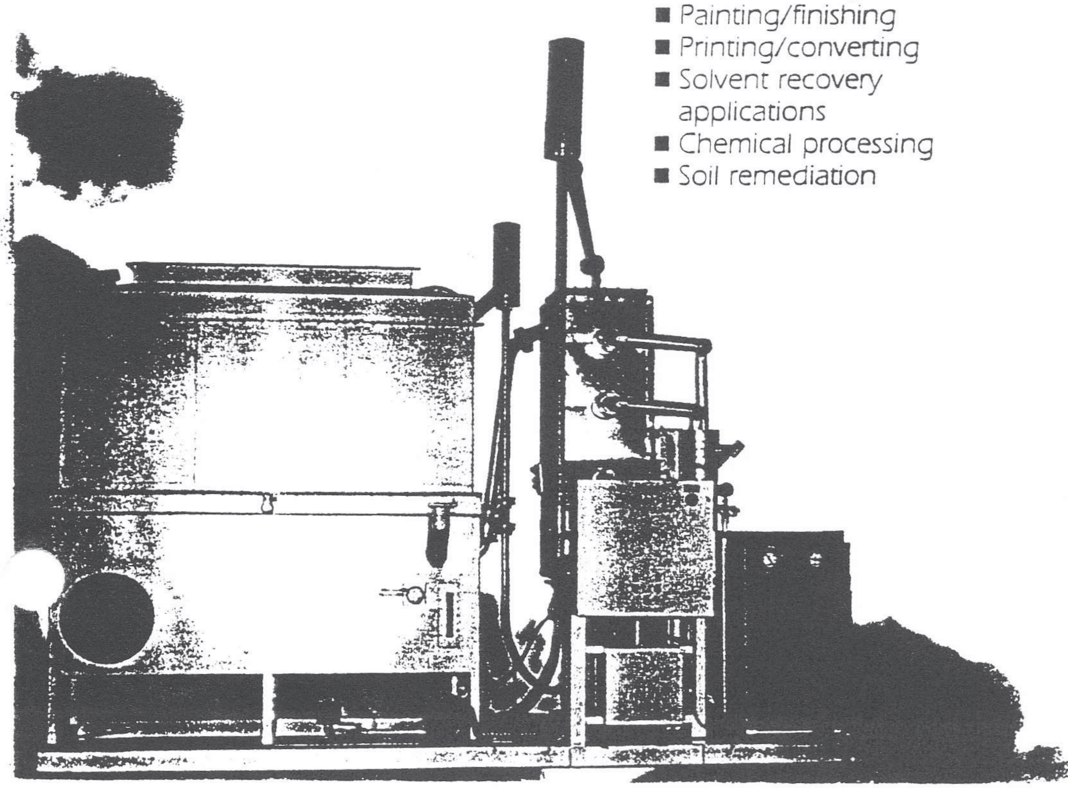
With the ability to achieve VOC concentration ratios of 1000:1 to as high as 10,000:1, REECO's FluiSorb™ fluidized bed adsorber/desorber concentrator offers the highest turndown ratio of any VOC concentrator available. No other system even comes close. (Gas volume reduction ratios in other concentrators are normally in the range of just 10:1.)

The FluiSorb system's high turndown ratios translate into even more important numbers for you: exceptionally low capital and operating costs.

Using a synthetic beaded carbonaceous adsorbent media, FluiSorb treats industrial process exhaust streams containing volatile organic compounds and toxic air emissions. This proven system takes high volume gas streams with low concentrations of VOCs and increases VOC concentration before destruction through oxidation or solvent recovery.

Hundreds of systems are operating throughout the world in such applications as:

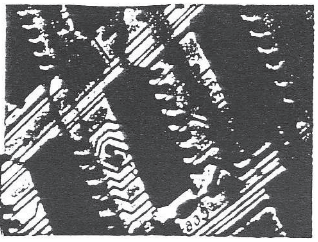
- Semiconductor manufacturing
- Painting/finishing
- Printing/converting
- Solvent recovery applications
- Chemical processing
- Soil remediation

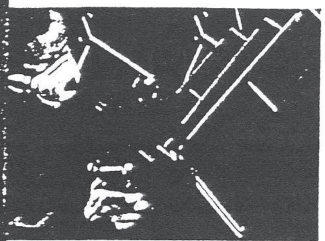


## High Concentrations. Low Costs.

With the FluiSorb's ability to highly concentrate VOC-laden streams, "Back-End" systems such as afterburners and thermal oxidizers for destruction, and cooler/condensers for solvent recovery, are smaller and less costly than those required by other concentrator systems. The result is higher performance and lower capital and operating costs.

FluiSorb systems can handle exhaust streams ranging from 200 cfm to over 500,000 cfm. Destruction or recovery efficiencies of 95% to 99% are readily achievable, providing proven regulatory compliance and effective product recovery performance.





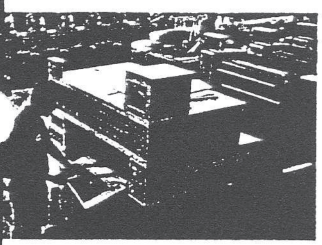
## Semiconductor Manufacturing

FluiSorb systems are operating in semiconductor manufacturing facilities throughout the world, and with up-time reliability critical for the "around-the-clock" operations typical in this industry, FluiSorb is the technology of choice. In addition to high turndown ratios for better solvent recovery and reuse, the fluid bed technology virtually eliminates pressure swings, keeping sensitive process conditions unaffected by its operation. FluiSorb also is unaffected by HMDS, which can cause problems in alternative technologies.

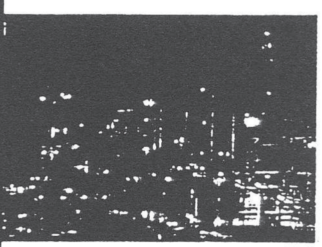
## Painting/Finishing

Painting and surface finishing operations in the automotive, aerospace, auto parts, shipbuilding, and furniture manufacturing industries require a low-cost solution to their air pollution control and product recovery requirements. With its proven ability to handle HVLC gas streams, FluiSorb is ideally suited to these applications. Depending on the level of particulate present, REECO can supply a pre-filter to handle organic or inorganic particulate upstream of the FluiSorb system.

# Demonstrated Experience In A Wide Range of Industries



FluiSorb is a proven technology in applications where high-volume, low-concentration (HVLC) process streams benefit from concentration for destruction through thermal oxidation or recovery via a cooler/condenser component. Hundreds of systems are operating in a wide range of industries.



## Printing/Converting

Characterized by higher VOC levels than those found in many other processes, industries such as coating, laminating, and printing can benefit from FluiSorb's high volume reduction ratios. FluiSorb can concentrate these gas streams to stay under the 25% Lower Explosive Limit (LEL) required for economical operation with an oxidizer. Solvent recovery of a more concentrated stream through a cooler/condenser stage can be effective if the solvents can be recycled back into the process.

## Chemical Processing

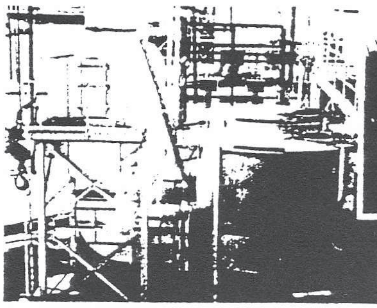
FluiSorb has proved to be an exceptional technology for the wide ranging process conditions found in the chemical processing industry. FluiSorb is flexible enough to handle both continuc or batch processing. With its extremely high VOC reduction ratios, the FluiSorb system can c set capital and operating costs b recovering valuable solvents.

## Soil Remediation/ Groundwater Air Stripping

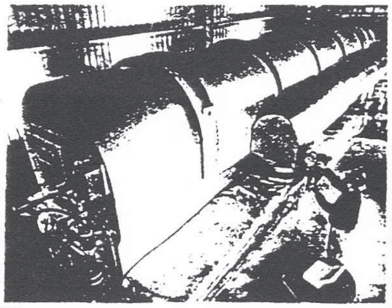
Process flexibility is a necessity in soil remediation and groundwater air stripping applications, which typically encounter low concentrations of a wide variety of air toxics, including halogenated VOCs. High humic conditions are also typical, and th hydrophobic nature of the FluiSor carbon adsorption media, allows it to operate in high humidity situations. FluiSorb has the flexibility to adapt to wide swings in process conditions.

# REECO

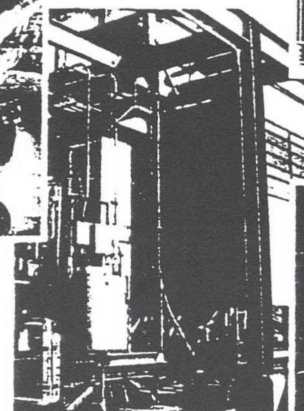
## Over Two Decades of Leadership in VOC and Air Toxics Control



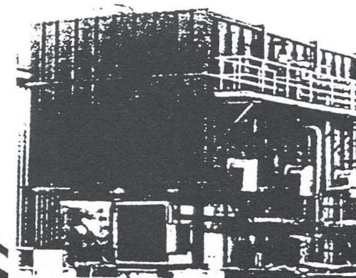
*Rotary Bed Protector™ (Particulate Control)*



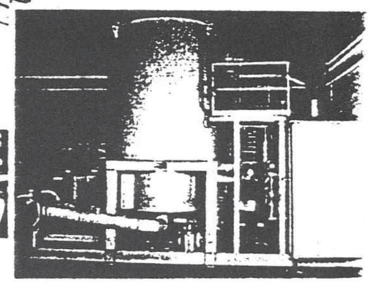
*UNITHERM™*



*FluiSorb™ Concentrator*



*RE-THERM™*



*RE-THERM*

REECO was the first to develop regenerative thermal oxidizers for air pollution control. After nearly a quarter century, we continue to be the industry pacesetter, offering concentrator systems and regenerative, recuperative, and catalytic oxidizers to suit specific industry applications, process conditions, and budget considerations for air pollution control and product recovery.

More than 250 highly-efficient RE-THERM systems have been installed in industries such as:

- Semiconductor manufacturing
- Printing/converting
- Spray painting
- Metal decorating
- Wood products
- Chemical processing
- Soil and water remediation
- Coating
- Laminating
- Coil coating
- Food/pharmaceutical manufacturing
- Odor control applications

Our full range of capabilities include: applications engineering, engineering studies, full system design/installation, process modifications, construction/construction management, start-up services, inspections, service & maintenance, parts, and training.

REECO benefits from its partnering agreement with Environmental C&C, Inc. (EC&C). FluiSorb was developed by EC&C as an improvement over existing technologies in solvent recovery. EC&C has been involved with environmental testing and the development of air pollution control systems for more than 15 years. The company has developed novel VOC control and solvent recovery systems as well as innovative VOC concentrator technologies.

**REECO**
A Research-Cottrell Company
Route 22 West
Branchburg, NJ 08876
(908) 685-4000
Fax: (908) 685-4181

Environmental C&C, Inc.
*Solvent Recovery & VOC Abatement Systems*



Recycled Paper

REE9708 5M 2/97