



Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection

Central Regional Office • 627 Main Street, Worcester MA 01608 • 508-792-7650

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January 22, 2014

Ms. Katie Grasso
CoorsTek, Inc.
5 Norton Drive
Worcester, MA 01606

RE: Worcester
Transmittal No.: X256900
Application No.: CE-13-021
Class: *NM25*
FMF No.: 519060
AIR QUALITY PLAN APPROVAL

Dear Ms. Grasso:

The Massachusetts Department of Environmental Protection (“MassDEP”), Bureau of Waste Prevention, has reviewed your Non-major Comprehensive Plan Application (“Application”) listed above. This Application concerns the proposed installation and operation of CVD reactors at your manufacturing facility located at 5 Norton Drive in Worcester, Massachusetts (“Facility”). The Application bears the seal and signature of Eugene A. Brackbill, Massachusetts Registered Professional Engineer Number 32948.

This Application was submitted in accordance with 310 CMR 7.02 Plan Approval and Emission Limitations as contained in 310 CMR 7.00 “Air Pollution Control” regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-N, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6. MassDEP’s review of your Application has been limited to air pollution control regulation compliance and does not relieve you of the obligation to comply with any other regulatory requirements.

MassDEP has determined that the Application is administratively and technically complete and that the Application is in conformance with the Air Pollution Control regulations and current air pollution control engineering practice, and hereby grants this **Plan Approval** for said Application, as submitted, subject to the conditions listed below.

Please review the entire Plan Approval, as it stipulates the conditions with which the Facility owner/operator (“Permittee”) must comply in order for the Facility to be operated in compliance with this Plan Approval.

1. DESCRIPTION OF FACILITY AND APPLICATION

The Facility was formerly known as the Crystar facility, Building 108, of Saint-Gobain Ceramic Materials, with the address of 1 New Bond Street. Effective December 31, 2010, the Facility became part of CoorsTek, Inc. (“the Permittee”), with the new address of 5 Norton Drive, Worcester, Massachusetts.

A. EQUIPMENT DESCRIPTION

The Facility is used to manufacture parts from silicon carbide and other ceramic materials. The current manufacturing processes include the following:

1. Acid Washing: Parts are cleaned with acids to remove impurities. Nitric, hydrochloric and hydrofluoric acids are used in two different acid wash stations, designated Emission Units (“EUs”) #1 & 2. Fugitive acid emissions from the acid wash stations are controlled by two scrubbers. Hydrogen chloride and hydrogen fluoride emitted are listed Hazardous Air Pollutants (“HAPs”). Synonyms for hydrogen chloride and hydrogen fluoride are hydrochloric acid and hydrofluoric acid.

2. Chemical Vapor Deposition (“CVD”) Reactors: Parts are placed inside the reactors and methyltrichlorosilane (“MTS”) is introduced at elevated temperatures. The MTS reacts to form solid silicon carbide (deposited on the parts) and hydrogen chloride gas.

a) Atmospheric CVD Reactors: The existing previously approved 24 atmospheric-pressure CVD reactors are grouped as EU #3. These reactors are arranged in groupings called Side A, Side B, Side D and Side E. Each side of reactors is fed MTS from a single dedicated MTS vaporizer such that only one reactor per side can be reacting at a time. All reactors in a side vent to a single common scrubber. The scrubbers are designated Scrubbers A, B, D, and E.

b) Vacuum CVD reactor (EU #6). This is an existing approved single reactor that operates under a vacuum and vents to its own dedicated scrubber.

The CVD reactors vent to wet scrubbers to control emissions of hydrogen chloride (HCl) and any unreacted MTS. The after-control HCl emissions are a listed HAP. The raw material MTS may contain up to 0.5% trace Volatile Organic Compounds (“VOC”) as a byproduct of manufacturing. It is assumed that this trace VOC will pass through the reactor and be emitted as VOC.

3. Plasma Ceramic Coating: This operation is done in a small dedicated spray booth designated EU #5. Particulate matter (“PM”) emissions generated from the coating are controlled by a baghouse.

4. Sandblast Worktable: Parts are shaped by sandblasting at a worktable designated EU #7. PM emissions are controlled by a baghouse.

B. PERMITTING HISTORY

1) Previously Approved Equipment

While the Facility was part of Saint-Gobain, MassDEP issued six different Limited Plan Approvals (“LPAs”) for the Facility.

LPA Transmittal #	Date Issued	Previous Emission Unit #	New Emission Unit # (This Plan Approval)	Approved Equipment	Emissions
P24960	9/15/98	108-11, 108-12	1 & 2	1. Two acid wash stations	Acid Vapors/HAP
		108-13, 17, 34, 35	3	2. Four sets of atmospheric CVD reactors—Side A, Side B, Side D, & Side E, total of 24	
P24961	9/15/98	108-33	not applicable	22 space heaters	Products of Combustion of Natural Gas
W070541	12/22/05	108-40	5	Plasma ceramic coating	PM
W131032	5/30/07	108-41	5	Planned plasma ceramic coating (not installed yet)	PM
W221664	7/15/08	108-44	6	Vacuum CVD reactor	Acid Vapors/VOC
X005553	9/4/08	108-64	7	Sandblast worktable	PM

2) Additional Fuel Utilization Equipment

Besides the 22 space heaters that were listed in LPA P24961, the Permittee has listed two additional fuel utilization emission units in its annual Emission Statement. They are EU 108-33B (11 additional space heaters) and EU 108-26 (emergency generator). These two emission units were exempt from approval under 310 CMR 7.02 pursuant to 310 CMR 7.02(2)(b)1. and 7.03(10), respectively. The fuel utilization equipment are listed here for completeness but are not the subject of this Plan Approval.

3) Present Plan Application

The purpose of the present Comprehensive Plan Application (“CPA”) Transmittal No. X256900 is:

1. Consolidation—All of the previous five non-fuel LPAs (all of the above listed LPAs except Transmittal #P24961) will be consolidated into, and **superseded** by, this CPA.
2. New Construction—Up to ten (10) new vacuum CVD reactors with associated wet scrubbers will be installed. Each reactor will have a scrubber to handle the exhaust from the reactor, and in addition there will be an additional scrubber available for every two reactors so that the exhaust can continue to be treated if there is an operational failure of the primary scrubber. The new vacuum CVD reactors will be grouped as EU #8. These reactors will produce emissions of HCl (HAP) and trace VOC similar to the existing CVD reactors.
3. Equipment to be removed—To make room for the new vacuum CVD reactors, Side D and Side E of the existing atmospheric CVD reactors and scrubbers will be removed. Side A (6 reactors and one scrubber) and Side B (5 reactors and one scrubber) will remain.

C. REGULATORY REQUIREMENTS

The Facility is subject to the requirement for Best Available Control Technology (“BACT”) under 310 CMR 7.02 for construction of the new vacuum CVD reactors (EU #8). MassDEP has determined that BACT for EU #8 consists of the following:

1. The use of the three-stage wet scrubbers rated at 99.9% efficiency to control hydrogen chloride emissions from the new CVD reactors (Top Case BACT).
2. A maximum after control emission rate of 0.0093 pounds hydrogen chloride per hour per reactor.
3. A sales agreement to limit the VOC content of raw material MTS to less than 0.5% by weight.

The Facility’s approved facility-wide potential emissions will not exceed 25% of the major source threshold for any air contaminant, and therefore the Facility air quality classification will be SM25 under the current classification system.

The Facility is not subject to Federal 40 CFR Part 60 New Source Performance Standards (“NSPS”) or 40 CFR Part 63 National Emission Standards for Hazardous Air Pollutants (“NESHAPS”) or Maximum Achievable Control Technology (“MACT”) for the hydrogen chloride HAP emissions. The hydrogen chloride emissions do not exceed the case by case MACT thresholds. The Facility is an area source of HAP. It is subject to 40 CFR Part 63, Subpart ZZZZ for the emergency generator.

The Permittee has indicated that the Facility is subject to requirements for Occupational Safety & Health Administration Process Safety Management, USEPA Risk Management Plan, and 527 CMR 33, due to the nature and quantities of MTS being stored and processed. MassDEP does not enforce those requirements.

2. EMISSION UNIT (EU) IDENTIFICATION

Each Emission Unit (EU) identified in Table 1 is subject to and regulated by this Plan Approval:

Table 1			
EU#	Description	Design Capacity of Control Device	Pollution Control Device (PCD)
1	Large acid wash station	3525 SCFM	Scrubber
2	Small acid wash station	1200 SCFM	Scrubber
3	Atmospheric CVD reactors-A, B, D, E Sides	250-270 SCFM	Scrubber
5	Two—Plasma ceramic coating devices	6000 SCFM	Separate Dust collector with HEPA filters for each device
6	Vacuum CVD reactor	21 SCFM	Scrubber
7	Sandblast worktable	8000 SCFM	Dust collector
8	Ten—Vacuum CVD reactors	35 SCFM	Scrubbers

Table 1 Key:

EU# = Emission Unit Number
 CVD = Chemical Vapor Deposition

PCD = Pollution Control Device
 SCFM = Standard Cubic Feet per Minute

3. APPLICABLE REQUIREMENTS

A. OPERATIONAL, PRODUCTION and EMISSION LIMITS

The Permittee is subject to, and shall not exceed the Operational, Production, and Emission Limits as contained in Table 2:

Table 2			
EU#	Operational / Production Limit	Air Contaminant	Emission Limit (Note 1)
1	None	HNO ₃	0.0057 lb/hr, 0.025 TPY
		HF	0.0029 lb/hr, 0.013 TPY
		HCl	0.0018 lb/hr, 0.008 TPY
2	None	HF	0.0008 lb/hr, 0.003 TPY
		HCl	0.0005 lb/hr, 0.002 TPY
3	None	HCl	1.5 lb/hr, 0.275 TPY (total for all reactors)
5	None	Particulate Matter (PM)	0.03 lb/hr, 0.15 TPY
6	None	HCl	0.205 lb/hr, 0.9 TPY
		Volatile Organic Compounds (VOC)	0.075 lb/hr, 0.33 TPY
7	None	PM	0.004 lb/hr, 0.018 TPY
8	None	HCl	0.00933 lb/hr (per reactor) or 99.9% removal efficiency in scrubber; 0.378 TPY (total for all reactors)
		VOC	0.075 lb/hr (per reactor), 3.30 TPY (total for all reactors)
Facility-Wide Process EU's (Note 2)	None	PM	0.168 TPY
		HCl	1.563 TPY
		HNO ₃	0.025 TPY
		HF	0.016 TPY
		HAPs (HCl + HF)	1.579 TPY
		VOC	3.37 TPY

Table 2 Notes:

Note 1: The tons per year (TPY) of air contaminants shall be calculated by the following method:

- A. Calculate the emissions in each calendar month.
- B. Adding the most recent 12 calendar months to derive the tons per consecutive 12-month period.
- C. Monthly emissions for EU #1, 2, 5, and 7 shall be calculated by multiplying the hours of operation of each EU times the air contaminant emission limit in lb/hr.
- D. Monthly emissions for EU #3, 6, and 8 shall be calculated from raw material MTS usage, using the equations outlined in the Plan Application for HCl and VOC.

Note 2: These totals include only EU1, 2, 3, 5, 6, 7, and 8. Total emissions from the fuel utilization equipment described in sections 1.B. 1) and 2) are less than 1 TPY for PM, VOC and HAP.

Table 2 Key:

EU# = Emission Unit Number
 PM = Total Particulate Matter

lb/hr = pounds per hour
 TPY = tons per consecutive 12-month period

HAPs = Hazardous Air Pollutants
 HNO₃ = Nitric Acid
 HCl = Hydrogen Chloride

VOC = Volatile Organic Compounds
 HF = Hydrogen Fluoride

B. COMPLIANCE DEMONSTRATION

The Permittee is subject to, and shall comply with, the monitoring, testing, record keeping, and reporting requirements as contained in Tables 3, 4, and 5:

Table 3	
EU#	Monitoring and Testing Requirements
1, 2, 3, 6, & 8	1. The scrubbers shall be monitored to demonstrate compliance with the conditions specified in Table 6 for each emission unit. EU #8 shall have the water level, water flow rate and recirculated water flow continuously monitored.
5 & 7	2. The baghouses shall be monitored to demonstrate compliance with the conditions specified in Table 6 for each emission unit. The pressure drop across the baghouses shall be manually recorded every shift when running.
8	3. Within 60 days after achieving the maximum production rate at which EU #8 will be operated, but not later than 150 days after initial startup of EU #8, and then once every five years thereafter, the Permittee shall conduct emissions compliance testing on a single reactor of EU #8 to demonstrate compliance with the emission limits contained in Table 2. Testing shall be conducted in accordance with the requirements and procedures set forth by appropriate EPA Reference Test Methods, 40 CFR 60 Appendix A and 310 CMR 7.13.
Facility-wide	4. The Permittee shall monitor all operations to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration and the emission limits contained in Table 2.
	5. If and when MassDEP requires it, the Permittee shall conduct emission testing in accordance with USEPA Reference Test Methods and Regulation 310 CMR 7.13

Table 3 Key:

EU# = Emission Unit Number

Table 4	
EU#	Record Keeping Requirements
Facility-wide	<ol style="list-style-type: none"> 1. The Permittee shall maintain adequate records on-site to demonstrate compliance with all operational, production, and emission limits contained in Table 2 above. Records shall also include the actual emissions of air contaminant(s) emitted for each calendar month and for each consecutive twelve-month period (current month plus prior eleven months). These records shall be compiled no later than the 15th day following each month. An electronic version of the MassDEP approved record keeping form, in Microsoft Excel format, can be downloaded at http://www.mass.gov/eea/agencies/massdep/air/approvals/limited-emissions-record-keeping-and-reporting.html#WorkbookforReportingOn-SiteRecordKeeping. 2. The Permittee shall maintain records of monitoring and testing as required by Table 3. 3. The Permittee shall maintain a copy of this Plan Approval, underlying Application and the most up-to-date SOMP for the EU(s) and PCDs approved herein on-site. 4. The Permittee shall maintain a record of routine maintenance activities performed on the approved EU(s), PCD(s) and monitoring equipment. The records shall include, at a minimum, the type or a description of the maintenance performed and the date and time the work was completed. 5. The Permittee shall maintain a record of all malfunctions affecting air contaminant emission rates on the approved EU(s) and PCDs and monitoring equipment. At a minimum, the records shall include: date and time the malfunction occurred; description of the malfunction; corrective actions taken; the date and time corrective actions were initiated and completed; and the date and time emission rates and monitoring equipment returned to compliant operation. 6. The Permittee shall maintain records to ensure sufficient information is available to comply with 310 CMR 7.12 Source Registration. 7. The Permittee shall maintain records required by this Plan Approval on-site for a minimum of five (5) years. 8. The Permittee shall make records required by this Plan Approval available to MassDEP and USEPA personnel upon request.

Table 4 Key:

EU# = Emission Unit Number
 SOMP = Standard Operating and Maintenance Procedure

PCD = Pollution Control Device
 USEPA = United States Environmental Protection Agency

Table 5	
EU#	Reporting Requirements
8	<p>1. The Permittee shall submit to MassDEP for approval a stack emission pretest protocol at least 30 days prior to emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.</p> <p>2. The Permittee shall submit to MassDEP a final stack emission test results report within 60 days after emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.</p>
Facility-wide	<p>3. The Permittee shall submit to MassDEP all information required by this Plan Approval over the signature of a “Responsible Official” as defined in 310 CMR 7.00 and shall include the Certification statement as provided in 310 CMR 7.01(2)(c).</p> <p>4. 4. The Permittee shall notify the Central Regional Office of MassDEP, BWP Permit Chief by telephone: 508-767-2845, email: CERO.Air@massmail.state.ma.us, or fax : 508-792-7621, as soon as possible, but no later than one (1) business day after discovery of an exceedance(s) of Table 2 requirements. A written report shall be submitted to Permit Chief at MassDEP within three (3) business days thereafter and shall include: identification of exceedance(s), duration of exceedance(s), reason for the exceedance(s), corrective actions taken, and action plan to prevent future exceedance(s).</p> <p>5. The Permittee shall report every three years to MassDEP, in accordance with 310 CMR 7.12, all information as required by the Source Registration/Emission Statement Form. The Permittee shall note therein any minor changes (under 310 CMR 7.02(2)(e), 7.03, 7.26, etc.), which did not require Plan Approval.</p> <p>6. The Permittee shall provide a copy to MassDEP of any record required to be maintained by this Plan Approval within 30 days from MassDEP’s request.</p> <p>7. The Permittee shall submit to MassDEP for approval a stack emission pretest protocol, at least 30 days prior to emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.</p> <p>8. The Permittee shall submit to MassDEP a final stack emission test results report, within 45 days after emission testing, for emission testing as defined in Table 3 Monitoring and Testing Requirements.</p>

Table 5 Key:

EU# = Emission Unit Number

4. SPECIAL TERMS AND CONDITIONS

A. The Permittee is subject to, and shall comply with, the Special Terms and Conditions as contained in Table 6 below:

Table 6	
EU#	Special Terms and Conditions
1 & 2	1. The scrubbing liquid pH shall be maintained between 8-11 for each scrubber.
3	2. The scrubbing liquid pH shall be maintained at no less than 12.5.
6	3. The scrubber water recirculation flow shall be maintained at no less than 10 gpm, and the scrubber differential gas pressure between 8 and 15 inches of water (pressure differential across the scrubber from inlet to outlet).
8	4. The makeup water flow shall be maintained at no less than 2 gpm, and the recirculation flow shall be maintained at no less than 10 gpm, for each scrubber.
6 & 8	5. The scrubbers shall have automatic controls to assure proper functioning and alarms to signal upset conditions to the operators. Scrubber failure or upset shall trigger automatic shutdown of the reactors. The CVD reactor/MTS vaporizer shall be interlocked with the scrubber so that the scrubber will be properly operating before MTS can be introduced to the reactor.
5	6. The pressure drop across the baghouse shall be maintained between 0.5 and 5 inches water.
7	7. The pressure drop across the baghouse shall be maintained between 1 and 4 inches water.
8	8. The stainless steel exhaust stack shall have emission test ports added for emission testing as required by Table 3.

Table 6 Key:

CVD = Chemical vapor deposition
 gpm = gallons per minute

MTS = Methyl trichlorosilane

- B. The Permittee shall install and use an exhaust stack, as required in Table 7, on each of the Emission Units that is consistent with good air pollution control engineering practice and that discharges so as to not cause or contribute to a condition of air pollution. Each exhaust stack (except for EU #5 and #7) shall be configured to discharge the gases vertically and shall not be equipped with any part or device that restricts the vertical exhaust flow of the emitted gases, including but not limited to rain protection devices known as “shanty caps” and “egg beaters.” EU #5 and #7 may continue to use the existing non-vertical exhaust exits that are intended to protect the HEPA filters located near the exits.
- C. The Permittee shall install and utilize exhaust stacks with the following parameters, as contained in Table 7, for the Emission Units that are regulated by this Plan Approval:

Table 7				
EU#	Stack Height Above Ground (feet)	Stack Inside Exit Dimensions Feet	Stack Gas Exit Velocity Range (feet per second)	Stack Gas Exit Temperature Range (°F)
1	37	2	30-40	70-100
2	44	0.8	30-40	70-100
3 (2 Scrubber Stacks for 2 Sides)	46.5	0.7	5-10	70-80
5	13	5 x 2	7-11	70-75
6	45	0.17	5-10	70-80
7	32	3.5 x 3.5	8-11	70-75
8 (Up to 15 Scrubber Stacks for 10 New Reactors)	48	0.17	3 to 7	70 to 75

Table 7 Key:

EU# = Emission Unit Number

°F = Degree Fahrenheit

5. GENERAL CONDITIONS

The Permittee is subject to, and shall comply with, the following general conditions:

- A. Pursuant to 310 CMR 7.01, 7.02, 7.09 and 7.10, should any nuisance condition(s), including but not limited to smoke, dust, odor or noise, occur as the result of the operation of the Facility, then the Permittee shall immediately take appropriate steps including shutdown, if necessary, to abate said nuisance condition(s).
- B. If asbestos remediation/removal will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that all removal/remediation of asbestos shall be done in accordance with 310 CMR 7.15 in its entirety and 310 CMR 4.00.
- C. If construction or demolition of an industrial, commercial or institutional building will occur as a result of the approved construction, reconstruction, or alteration of this Facility, the Permittee shall ensure that said construction or demolition shall be done in accordance with 310 CMR 7.09(2) and 310 CMR 4.00.

- D. Pursuant to 310 CMR 7.01(2)(b) and 7.02(7)(b), the Permittee shall allow MassDEP and / or USEPA personnel access to the Facility, buildings, and all pertinent records for the purpose of making inspections and surveys, collecting samples, obtaining data, and reviewing records.
- E. This Plan Approval does not negate the responsibility of the Permittee to comply with any other applicable Federal, State, or local regulations now or in the future.
- F. Should there be any differences between the Application and this Plan Approval, the Plan Approval shall govern.
- G. Pursuant to 310 CMR 7.02(3)(k), MassDEP may revoke this Plan Approval if the construction work is not commenced within two years from the date of issuance of this Plan Approval, or if the construction work is suspended for one year or more.
- H. This Plan Approval may be suspended, modified, or revoked by MassDEP if MassDEP determines that any condition or part of this Plan Approval is being violated.
- I. This Plan Approval may be modified or amended when in the opinion of MassDEP such is necessary or appropriate to clarify the Plan Approval conditions or after consideration of a written request by the Permittee to amend the Plan Approval conditions.
- J. Pursuant to 310 CMR 7.01(3) and 7.02(3)(f), the Permittee shall comply with all conditions contained in this Plan Approval. Should there be any differences between provisions contained in the General Conditions and provisions contained elsewhere in the Plan Approval, the latter shall govern.

6. MASSACHUSETTS ENVIRONMENTAL POLICY ACT

MassDEP has determined that the filing of an Environmental Notification Form (ENF) with the Secretary of Energy & Environmental Affairs, for air quality control purposes, was not required prior to this action by MassDEP. Notwithstanding this determination, the Massachusetts Environmental Policy Act (MEPA) and 301 CMR 11.00, Section 11.04, provide certain “Fail-Safe Provisions,” which allow the Secretary to require the filing of an ENF and/or an Environmental Impact Report (EIR) at a later time.

7. APPEAL PROCESS

This Plan Approval is an action of MassDEP. If you are aggrieved by this action, you may request an adjudicatory hearing. A request for a hearing must be made in writing and postmarked within twenty-one (21) days of the date of issuance of this Plan Approval.

Under 310 CMR 1.01(6)(b), the request must state clearly and concisely the facts, which are the grounds for the request, and the relief sought. Additionally, the request must state why the Plan Approval is not consistent with applicable laws and regulations.

The hearing request along with a valid check payable to the Commonwealth of Massachusetts in the amount of one hundred dollars (\$100.00) must be mailed to:

Commonwealth of Massachusetts
Department of Environmental Protection
P.O. Box 4062
Boston, MA 02211

This request will be dismissed if the filing fee is not paid, unless the appellant is exempt or granted a waiver as described below. The filing fee is not required if the appellant is a city or town (or municipal agency), county, or district of the Commonwealth of Massachusetts, or a municipal housing authority.

MassDEP may waive the adjudicatory hearing-filing fee for a person who shows that paying the fee will create an undue financial hardship. A person seeking a waiver must file, together with the hearing request as provided above, an affidavit setting forth the facts believed to support the claim of undue financial hardship.

Enclosed is a stamped approved copy of the application submittal.

Should you have any questions concerning this Plan Approval, please contact Paul Dwiggins by telephone at 508-767-2760, or in writing at the letterhead address.

This final document copy is being provided to you electronically by the Department of Environmental Protection. A signed copy of this document is on file at the DEP office listed on the letterhead.

Roseanna E. Stanley
Acting Permit Chief
Bureau of Waste Prevention

Enclosure

ecc: Worcester Dept. of Inspectional Services
Worcester Fire Department
MassDEP/Boston - Yi Tian