

AIR DISPERSION MODELING SUMMARY SHEET

COMPANY/FACILITY: AVX Corporation
LOCATION (COUNTY): Myrtle Beach (Horry County)
PERMIT NUMBER: 1340-0002

DATE: 12/22/2011
REVIEWED BY: GSQ

REQUEST:

<input type="checkbox"/> CONSTRUCTION PERMIT <input type="checkbox"/> OPERATING PERMIT – NEW <input checked="" type="checkbox"/> OPERATING PERMIT – RENEWAL <input type="checkbox"/> PERMIT - MODIFICATION <input type="checkbox"/> AIR COMPLIANCE DEMO	<input type="checkbox"/> STATE PERMIT <input type="checkbox"/> CONDITIONAL MAJOR <input type="checkbox"/> GENERAL CM <input checked="" type="checkbox"/> TITLE V PERMIT <input type="checkbox"/> PSD MAJOR
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MODELED FOR:

<input checked="" type="checkbox"/> AAQS <input checked="" type="checkbox"/> AIR TOXICS	<input type="checkbox"/> PSD INCREMENT <input type="checkbox"/> DE MINIMIS
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OTHER:

<input checked="" type="checkbox"/> EXEMPTION <input type="checkbox"/> EXPEDITED	<input type="checkbox"/> DEFERRAL <input type="checkbox"/> COLLOCATED (Y or N)
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PROJECT DESCRIPTION: AVX Corporation owns and operates an electronic capacitor manufacturing facility in Myrtle Beach. The facility wishes to renew their Title V permit.

SUMMARY OF MODELING ANALYSIS & RESULTS: The facility modeled air toxics using AERMOD to reflect current operation. If operated in accordance with the submitted Title V application (May 2011) and revisions (9/8/2011 submittal and email correspondence on 12/12/2011), the facility will pass Standard 8 for all air toxics. With the exception of NO₂ emissions from the boiler, all other Standard 2 criteria emissions are exempt from modeling on the basis that emissions are less than the applicable exemption thresholds for each pollutant. Thus, the previous NO₂ SCREEN3 modeling analysis from the boiler is carried through to this summary with no change, and all other criteria emissions are placed in the exempt table. This facility is not subject to Standard 7. All sources listed in the Insignificant Activity list within the application and revisions are exempt from modeling. This is a complete and entirely revised modeling summary.

STANDARD NO. 2 - AMBIENT AIR QUALITY STANDARDS MODELING ANALYSIS							
Pollutant	Averaging Time	Model Used	Maximum Modeled Concentration (µg/m ³) ⁽¹⁾	Background Concentration (µg/m ³)	Total (µg/m ³)	Standard (µg/m ³)	% of Standard
NO ₂	Annual	SCREEN3	6.045	15.2	21	100	21

1) The highest-first-high modeled concentration was used.

BACKGROUND MONITORING DATA (µg/m ³)									
Pollutant	Site Name	County	Year	1-Hr	3-Hr	8-Hr	24-Hr	3-Mo	Annual
NO ₂	Jenkins Avenue FS	Charleston	08-10						15.2

Annual is the average of the annual averages over the three year period.

STANDARD NO. 8 - TOXIC AIR POLLUTANTS MODELING ANALYSIS					
POLLUTANT	CAS NUMBER	MODEL USED	MAXIMUM MODELED CONCENTRATION ($\mu\text{g}/\text{m}^3$)	STANDARD ($\mu\text{g}/\text{m}^3$)	% OF STANDARD
Benzene	71-43-2	AERMOD	0.00	150.00	0
Bis (2-ethylehexyl) phthalate	117-81-7	AERMOD	6.42	25.00	26
Chromium Compounds	+	AERMOD	0.00	2.50	0
Ethanolamine	141-43-5	AERMOD	0.46	200.00	0
Ethyl Benzene	100-41-4	AERMOD	0.25	4350.00	0
Ethylidene Dichloride (1,1-Dichloroethane)	75-34-3	AERMOD	34.66	2025.00	2
Formaldehyde	50-00-0	AERMOD	0.02	15.00	0
Hexane	110-54-3	AERMOD	0.45	900.00	0
Hydrochloric Acid	7647-01-0	AERMOD	0.01	175.00	0
Manganese Compounds	+	AERMOD	0.00	25.00	0
Methanol	67-56-1	AERMOD	4.85	1310.00	0
Methyl Chloroform (1,1,1-Trichloroethane)	71-55-6	AERMOD	94.51	9550.00	1
Methyl Isobutyl Ketone	108-10-1	AERMOD	2.49	2050.00	0
Naphthalene	91-20-3	AERMOD	0.00	1250.00	0
Nickel	7440-02-0	AERMOD	0.26	0.50	52
Nitric Acid	7697-37-2	AERMOD	0.03	125.00	0
Phosphoric Acid	7664-38-2	AERMOD	0.01	25.00	0
Sulfuric Acid	7664-93-9	AERMOD	0.01	10.00	0
Toluene	108-88-3	AERMOD	0.250	2000.00	0
Vinyl Chloride	75-01-4	AERMOD	28.43	50.00	57
Xylene	1330-20-7	AERMOD	1.62	4350.00	0

STANDARD NO. 2 - MODELED AAQS EMISSION RATES (LBS/HR)							
STACK ID	PM₁₀	PM_{2.5}	SO₂	NO_x	CO	Lead	HF
NMFS_B1 (formerly Equip ID 03-C)	Exempt	Exempt	Exempt	1.674	Exempt	Exempt	--
FACILITY TOTAL	Exempt	Exempt	Exempt	1.674	Exempt	Exempt	--

STANDARD NO. 2 [and 7] - EXEMPTED AAQS EMISSION RATES (LBS/HR)							
STACK ID	PM₁₀	PM_{2.5}	SO₂	NO_x	CO	Lead	HF
15A-1, 15B-1, 15C-1	2.6E-5 ⁽¹⁾	2.6E-5 ⁽¹⁾	--	--	--	--	--
7C-2A, 7C-2B	3.55E-3	3.55E-3	--	--	--	1.02E-3	--
MB2F1, MB2F2	0.01	0.01	0.001	0.10	0.09	--	--
MB2_TFS	0.03 ⁽¹⁾	0.03 ⁽¹⁾	--	--	--	1.27E-4 ⁽¹⁾	1.75E-4 ⁽¹⁾
MD1C-1, MD2C-1, MD3C-1	0.17	0.17	--	--	--	--	--
NMFS-B1	0.1247	0.1247	0.01	modeled	1.3784	8.2E-6	--
NMFS-BH	0.04 ⁽¹⁾	0.04 ⁽¹⁾	--	--	--	--	--
SOLDER1	2.28E-3	2.28E-3	--	--	--	2.13E-5	--
FACILITY TOTAL	0.381	0.381	0.011	0.1	1.4684	1.18E-03	1.75E-04

⁽¹⁾ Emission rates shown are the controlled rates.

STANDARD NO. 8 - MODELED AIR TOXIC EMISSION RATES (LBS/HR) TABLE 1				
STACK ID	Benzene	Bis (2-ethylehexyl) phthalate	Chromium Compounds	Ethanolamine
	71-43-2	117-81-7	+	141-43-5
CMAFUG	--	2.98E-3	--	--
MB2F1 ⁽¹⁾	--	1.47E-3	--	--
MB2F2 ⁽¹⁾	--	1.47E-3	--	--
MB2_TFS ⁽¹⁾	--	--	--	5.18E-2
MD1C_1	--	3.71E-4	--	--
MD2C_1	--	3.71E-4	--	--
MD3C_1	--	3.71E-4	--	--
NMFS_B1	3.44E-5	--	--	--
SLIP	--	0.03	--	--
SOLDER1	--	--	1.71E-6	--
FACILITY TOTAL	3.44E-5	3.70E-2	1.71E-6	5.18E-2

⁽¹⁾ Emission rates shown are the controlled rates.

STANDARD NO. 8 - MODELED AIR TOXIC EMISSION RATES (LBS/HR) TABLE 2				
STACK ID	Ethyl Benzene	Ethylidene Dichloride	Formaldehyde	Hexane
	100-41-4	75-34-3	50-00-0	110-54-3
CMAPFUG	2.98E-3	--	--	--
MB2F1 ⁽¹⁾	1.47E-3	--	--	--
MB2F2 ⁽¹⁾	1.47E-3	--	--	--
MD1C_1	2.19E-05	--	--	--
MD2C_1	2.19E-05	--	--	--
MD3C_1	2.19E-05	--	--	--
NMFS_B1	--	--	1.23E-3	2.94E-2
TOWER	--	0.11	--	--
FACILITY TOTAL	5.99E-3	0.11	1.23E-3	2.94E-2
⁽¹⁾ Emission rates shown are the controlled rates.				

STANDARD NO. 8 - MODELED AIR TOXIC EMISSION RATES (LBS/HR) TABLE 3				
STACK ID	Hydrochloric Acid	Manganese Compounds	Methanol	Methyl Chloroform
	7647-01-0	+	67-56-1	71-55-6
CMAPFUG	--	--	4.70E-2	--
MB2F1 ⁽¹⁾	--	--	1.06E-2	--
MB2F2 ⁽¹⁾	--	--	1.06E-2	--
MB2_TFS ⁽¹⁾	9.21E-4	--	--	--
MD1C_1	--	--	1.08E-4	--
MD2C_1	--	--	1.08E-4	--
MD3C_1	--	--	1.08E-4	--
MFGMB1	--	--	1.69E-2	--
MFGNEW	--	--	1.69E-2	--
SLIP	--	--	1.76E-3	--
SOLDER1	--	1.11E-4	--	--
TOWER	--	--	--	0.30
FACILITY TOTAL	9.21E-4	1.11E-4	0.104	0.30
⁽¹⁾ Emission rates shown are the controlled rates.				

STANDARD NO. 8 - MODELED AIR TOXIC EMISSION RATES (LBS/HR) TABLE 4				
STACK ID	Methyl Isobutyl Ketone	Naphthalene	Nickel	Nitric Acid
	108-10-1	91-20-3	7440-02-0	7697-37-2
7C_2A	--	--	1.59E-3	--
7C_2B	--	--	1.59E-3	--
CMAPFUG	2.40E-2	--	--	--
MB2F1 ⁽¹⁾	5.58E-3	--	--	--
MB2F2 ⁽¹⁾	5.58E-3	--	--	--
MB2_TFS ⁽¹⁾	--	--	--	3.88E-3
MD1C_1	5.70E-05	--	--	--
MD2C_1	5.70E-05	--	--	--
MD3C_1	5.70E-05	--	--	--
MFGNEW	8.89E-3	--	--	--
MFGMB1	8.89E-3	--	--	--
NMFS_B1	--	1.00E-05	--	--
SLIP	9.29E-04	--	--	--
FACILITY TOTAL	5.40E-2	1.00E-05	3.18E-3	3.88E-3
⁽¹⁾ Emission rates shown are the controlled rates.				

STANDARD NO. 8 - MODELED AIR TOXIC EMISSION RATES (LBS/HR) TABLE 5				
STACK ID	Phosphoric Acid	Sulfuric Acid	Toluene	Vinyl Chloride
	7664-38-2	7664-93-9	108-88-3	75-01-4
CMAPFUG	--	--	2.98E-3	--
MB2F1 ⁽¹⁾	--	--	1.47E-3	--
MB2F2 ⁽¹⁾	--	--	1.47E-3	--
MB2_TFS ⁽¹⁾	1.595E-3	7.21E-4	--	--
MD1C_1	--	--	4.38E-05	--
MD2C_1	--	--	4.38E-05	--
MD3C_1	--	--	4.38E-05	--
NMFS_B1	--	--	5.57E-05	--
TOWER	--	--	--	0.09
FACILITY TOTAL	1.595E-3	7.21E-4	6.11E-3	0.09
⁽¹⁾ Emission rates shown are the controlled rates.				

STANDARD NO. 8 - MODELED AIR TOXIC EMISSION RATES (LBS/HR) TABLE 6				
STACK ID	Xylene	N/A	N/A	N/A
	1330-20-7	--	--	--
CMAPFUG	2.98E-3	--	--	--
MB2F1 ⁽¹⁾	1.47E-3	--	--	--
MB2F2 ⁽¹⁾	1.47E-3	--	--	--
MD1C_1	3.80E-3	--	--	--
MD2C_1	3.80E-3	--	--	--
MD3C_1	3.80E-3	--	--	--
SLIP	5.28E-3	--	--	--
FACILITY TOTAL	2.26E-2	--	--	--
⁽¹⁾ Emission rates shown are the controlled rates.				

STACK ID DESCRIPTIVE INFORMATION					
STACK ID	SOURCE DESCRIPTION	DATE INSTALLED (MODIFIED)	Emission Unit ID	Permit Equipment ID	
15A-1 15B-1 15C-1	Raw Materials Manufacturing (Grinding, Mixing, Milling, Prilling of Ceramic Powder)	1983-1997	14	RMPSC RMMPG RMMRPILL	
7C_2A 7C_2B	Electroplating – Autoline & SBE	2007-2008	19	PBSBE	
CMAFUG	Slip/Ink Solvents	1998-2001	17	CMAFUG	
MB2F1	CMAF Manufacturing and Thermal Oxidizer	1998-2001	17	CMAF	
MB2F2	CMAF Manufacturing	1998-2001	17	CMAF	
MB2_TFS	Thin Film Process	2002	20	TFP	
MD1C_1 MD2C_1 MD3C_1	Metals Manufacturing (Production of conductive metal inks and termination paste)	1980-2000	16	MMILL MMIX	
MFGMB1	CMAF Manufacturing Cleaning (Old Building)	1998-2001	17	All Sources (Cleaning)	
MFGNEW	CMAF Manufacturing Cleaning (New Building)	1998-2001	17	All Sources (Cleaning)	
NMFS_B1	16.738 MMBTU/hr Natural Gas Fired Boiler	1999	21	B201	
NMFS-BH	Dry Dicing	2000	18	DD	
SLIP	Slip Manufacturing (Mixing and Milling of Ceramic Powders and Solvents to form slip slurry)	1997	15	SMILL SMIX	
SOLDER1	Soldering Process	2010	21	SS	
TOWER	Stripping Tower	2009	21	ST	

POINT SOURCE PARAMETERS

STACK ID	DATE LAST MODELED	LOCATION (UTM)		STACK HEIGHT (FT)	EXIT TEMP. (°F)	EXIT VELOCITY (FT/SEC)	STACK DIAMETER (FT)	DISCHARGE ORIENTATION	RAIN CAP?	BUILDING PARAMETERS			DIST TO PROPERTY LINE (FT)
		EAST (M)	NORTH (M)							HEIGHT (FT)	LENGTH (FT)	WIDTH (FT)	
7C_2A	12/22/11	693773	3728208	32	70	3.40	3.43	Vertical	No				175
7C_2B	12/22/11	693773	3728206	32	70	3.40	3.43	Vertical	No				175
MB2F1	12/22/11	693341	3727899	30	1030	64	2.5	Vertical	No				
MB2F2	12/22/11	693344	3727899	28	90	6.8	2	Vertical	No				
MB2_TFS	12/22/11	693300	3727880	35	70	54.0	2.50	Vertical	No				
MD1C_1	12/22/11	693700	3728106	37	70	57.0	1.67	Vertical	No				
MD2C_1	12/22/11	693716	3728101	22	70	0.00328	0.67	Vertical	Yes				
MD3C_1	12/22/11	693720	3728101	25	70	26.5	1.00	Vertical	No				
NMFS_B1	12/22/11	693322	3727939	35.5	600	15.3	0.83	Vertical	No				
SOLDER1 ⁽¹⁾	12/22/11	693305	3727844	15	70	0.00328	0.25	Vertical	Yes				
TOWER	12/22/11	693890	3728065	20	70	0.00328	2.25	Vertical	Yes				

⁽¹⁾ The new soldering stack ID and locations have yet to be determined. For conservatism, a stack was located at the nearest point to the property boundary on the building with a 15 ft height and no exit velocity.

VOLUME SOURCE PARAMETERS

STACK ID	DATE LAST MODELED	LOCATION (UTM)		SOURCE RELEASE HEIGHT (FT)	HORIZONTAL DIMENSION σ_y (FT)	VERTICAL DIMENSION σ_z (FT)	DIST TO PROPERTY LINE (FT)
		EAST (M)	NORTH (M)				
CMAFUG	12/22/11	693341	3727893	12.0	53.5	11.3	
MFGMB1	12/22/11	693796	3728250	8.0	46.6	7.5	
MFGNEW	12/22/11	693344	3727899	12.0	53.5	11.3	
SLIP	12/22/11	693869	3728057	15.0	38.1	14.7	

AERMOD / AERMAP SPECIFICATIONS TABLE

MET DATA	CRE-CHS 2002-2006 [Surface Air = North Myrtle Beach, SC; Upper Air = Charleston, SC; 46 ft MSL]					
NED TERRAIN FILES	Horry County					
PROJECTION DATUM	NAD27 <input type="checkbox"/>	NAD83 <input checked="" type="checkbox"/>	WGS-84 <input type="checkbox"/>	NWS-84 <input type="checkbox"/>		
RURAL or URBAN?	Rural <input checked="" type="checkbox"/>	Urban <input type="checkbox"/>				
ELEVATIONS EXTRACTED	Buildings <input checked="" type="checkbox"/>	Sources <input checked="" type="checkbox"/>	Tanks <input type="checkbox"/>	Receptors <input checked="" type="checkbox"/>		

MODELING EXEMPTIONS/DEFERRALS

SOURCE IDENTIFICATION	EXEMPTION/DEFERRAL BASIS
15A-1, 15B-1, 15C-1 7C-2A, 7C-2B MB2F1, MB2F2 MB2_TFS MD1C-1, MD2C-1, MD3C-1 NMFS-B1 (except NO ₂) NMFS-BH SOLDER1	Standards 2 and 7 – Sources with controlled or uncontrolled emission rates as shown below: <ul style="list-style-type: none"> • PM10 - Less than one (1) pound per hour • PM2.5 - Less than one (1) pound per hour • SO2 - Less than one (1) pound per hour • NO2 - Less than one (1) pound per hour • CO - Less than ten (10) pounds per hour
7C-2A, 7C-2B MB2_TFS NMFS-B1 SOLDER1	Standards 2 or 7 – Facilities with facility-wide emissions, controlled or uncontrolled, totaling less than the amounts below: <ul style="list-style-type: none"> • Lead - Less than 0.114 pounds per hour or 250 pounds in any 3 month period • HF - Less than 0.0035 pounds per hour

HISTORY

DATE	BY	REASON	DESCRIPTION
12/22/11	GSQ	Title V Renewal	The facility modeled air toxics using AERMOD to reflect current operation. Previous NO2 modeling from the boiler is carried forward to this summary, and all other criteria emissions are exempt from a modeling compliance demonstration.
7/17/09	JPG	Compliance Demo	Facility is requesting permission to replace the two old air strippers with a new air stripper located away from demolition operations. SCREEN3 modeling was submitted by Resolute Env., Inc. that added previous vinyl chloride results to results for the new stripper. This modeling passed for vinyl chloride. All other Std. 8 emissions are de minimis.
1/23/08	MRH	Conditional Major OP	AERMOD modeling completed for PM10 emissions for worst-case stacks. Other Facility-wide pollutants modeled using SCREEN3 for OP.
11/30/07	MRH	C/P	De minimis for Standard No. 8 pollutants, Methyl Alcohol and MIBK.
12/18/07	MRH	C/P	De minimis for Standard No. 8 pollutant, Catechol, Formaldehyde and NaOH.
3/20/07	JPG	Exemption	The installation of a Transguard process line emits less than 1.0 lb/hr of PM and is exempt.
5/28/03	DHH	C/P	This project is to obtain construction permits that reflect the current process and control equipment configurations in the chip manufacturing automated process (CMAP) area.
6/21/02	CHA	Air Compliance Demonstration	This project will modify the Nickel Plating System (Stack 7C-2) at the facility by removing the nickel scrubber. SCREEN3 air dispersion modeling analysis was submitted by General Engineering for air toxic pollutants to demonstrate compliance with Standard No. 8.
4/6/01	ALC	Air Demo	Review by the permit engineer revealed discrepancies in emission rates in the Title V application. SCREEN3 Modeling by Trinity Consultants for Nickel, Vinylidene Chloride, Dibutyl Phthalate, and Dioctyl Phthalate. Also, the de minimis table was updated. Sources were modeled using SCREEN3 starting at 1m for the receptor distance. However, the Autoline Plater, the source of Nickel, was modeled starting at 70m (229.6ft) for the receptor distance.
3/6/00	ALC	C/P	Added new equipment.
7/15/98	DGH	C/P	Construction of a new manufacturing facility.
7/15/98	DGH	C/P	Title V (something is obviously wrong with one of these dates, but not sure which one is correct)
4/23/97	CMB	C/P	Construction of two air strippers.
3/8/96	FRD	C/P	Relocation of the Screener/Stacker Process
7/28/95	CKD	C/P	Original modeling.