

CYTEC TITLE V DRAFT PERMIT LANGUAGE

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June 6, 1997

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[If there any compliance issues, this section will be provided a later date]

PERMIT SHIELD

I. NONAPPLICABLE REQUIREMENTS

[This section will be provided a later date]

APPENDIX A AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR BATCH PROCESSES

APPENDIX B AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR REMEDIAL ACTIVITIES

LIST OF ACRONYMS

ACRONYM	DESCRIPTION
acfm	actual cubic feet per minute
ACT	Alternative Control Techniques
ASC	Actual Stack Concentration
BACT	Best Available Control Technology
cfm	cubic feet per minute
CFR	Code of Federal Regulations
CO	Carbon Monoxide
CTG	Control Techniques Guideline
DEP	Department of Environmental Protection
dscf	dry standard cubic feet
dscm	dry standard cubic meters
EPA	Environmental Protection Agency
FGR	Flue Gas Recirculation
gph	gallons per hour
gpm	gallons per minute
HAP	Hazardous Air Pollutant
HON	Hazardous Organic NESHAP
LAER	Lowest Achievable Emission Rate
MACT	Maximum Achievable Control Technology
MASC	Maximum Allowable Stack Concentration
MON	Miscellaneous Organic NESHAP
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	Nitrogen Oxides
NSR	New Source Review
OAQPS	Office of Air Quality Planning and Standards
P2	Pollution Prevention
PAL	Plantwide Applicability Limitation
PCD	Pollution Control Device
ppmv	parts per million, volumetric basis

LIST OF ACRONYMS (contd.)

ACRONYM	DESCRIPTION
ppmw	parts per million, weight basis
PTE	Potential to Emit
RACT	Reasonable Available Control Technology
RCSA	Regulations of Connecticut State Agencies
SIP	State Implementation Plan
SOCMI	Synthetic Organic Chemical Manufacturing Industry
TOC	Total Organic Carbon
tph	tons per hour
tpy	tons per year
TSP	Total Suspended Particulate
VOC	Volatile Organic Compound
VOL	Volatile Organic Liquid

CYTEC TITLE V PERMIT SITE DESCRIPTION

I. PURPOSE

The purpose of this section is to describe the manufacturing activities at the Cytec Wallingford site, and to present the potential and actual emissions inventory for all regulated air pollutants emitted.

II. BACKGROUND

Cytec is a research-based chemical company which develops and manufactures proprietary products and technology. Cytec develops, manufactures and markets specialty chemicals, specialty materials, and building block chemicals, serving a broad group of end users, including the water treatment, paper, mining, coatings, plastics, aerospace and automotive industries. Cytec operates sites in the United States, Great Britain, Netherlands, Canada and Mexico.

Approximately 600 people are employed at the Wallingford site. The site is located on 250 acres extending from the railroad main line on the east to the Quinnipiac River on the west. It comprises 32 buildings, two miles of streets and roads and totals 3.2 miles around its perimeter. The primary activities conducted at the site are classified under the Standard Industrial Classification (SIC) code of 2821. The Wallingford site, considered critical to Cytec's core business, manufactures three distinct types of products from three separate production departments.

The categories of products manufactured at the site are:

- Thermoset molding compounds
- Thermoplastic molding compounds
- Liquid and spray-dried resins

The Wallingford Plant opened in 1941 for the production of thermoset molding compounds and this function still involves the plant's greatest concentration of manpower. This business unit is called AC Molding Compounds. It is a joint venture between Carmel Chemical Company and Cytec Industries Inc. This product line consists of two types of molding compounds designated as BEETLE and CYMEL.

- BEETLE products are used in molding buttons, bottle caps, and such electrical fixtures as wallplates, sockets, plugs and circuit breakers.
- CYMEL products are used in decorated and undecorated dinnerware, sinks, ashtrays, and handles for kitchen utensils.

Thermoplastic operations began in 1956 and have grown steadily since. This business unit is called CYRO Industries. It is a joint venture between Rohm Industries and Cytec Industries Inc. A variety of everyday products are manufactured with CYRO's thermoplastic material, including

automobile taillights, instrument panel covers, battery cases and decorative trim for a wide variety of uses. It also is widely used in the food packaging industry for such things as plastic tubs for margarine, blister packs for crackers and cookies, crisper trays and butter compartments in refrigerators. Other uses include fishing tackle boxes and trays, artificial lures, piano keys and toys. Some material is manufactured as large sheets and then fabricated into signs, greenhouses, solar panel coverings and window and door glazing. In addition, a very high grade material is used in the medical field to produce various devices for transfer and purification of blood.

The Resins Department began operations in 1943 and today produces several product lines evident in daily life. Paper product resins add wet or dry strength properties and increase the absorbance of such paper items as bags, towels, tissues, maps, money and disposal diapers.

Cytec's laminated resins are used to produce beautiful hard surfaces for counter tops, cabinets and furniture, while textile resins give today's clothing its wrinkle and water resistance and its permanent press characteristics.

Methylated resins provide automotive and appliance manufacturers with more cost-effective coatings for finishing their products.

Besides the three manufacturing areas, Cytec operates a waste water treatment plant that treats effluent from the three manufacturing areas, and a boiler house that supplies steam to all parts of the site.

III. EMISSIONS INVENTORY

Cytec stipulates that it is a major source of the following air pollutants:

- Carbon Monoxide
- Hazardous Air Pollutants
- Nitrogen Oxides
- Particulate Matter/PM₁₀
- Sulfur Dioxide
- Volatile Organic Compounds

The following table presents the actual emissions from the Cytec Wallingford site for calendar year 1996.

[To be developed prior to permit issuance.]

CYTEC TITLE V PERMIT EMISSIONS UNITS SECTION

I. PURPOSE

The purpose of this section is to list the emissions units present at Cytec, and describe the applicable requirements, control equipment, monitoring equipment, and compliance status with respect to each emissions unit.

II. LIST OF EMISSIONS UNITS AND CONTROL EQUIPMENT

[Note: There are approximately 40 emission units currently present at Cytec. Only one of these is included below to serve as an example.]

The following table lists the emissions units present at the Cytec Wallingford site, including the control equipment associated with each emissions unit.

UNIT ID	UNIT NAME	UNIT DESCRIPTION	PERMIT/REGIST. NO.	CONTROL ID	CONTROL NAME	CONTROL DESCRIPTION
C06	Cyro Toluene Recovery System	This system recovers the toluene volatilized in the extruders and purifies the solvent in preparation for its reuse. Equipment includes decanters, recovered material storage vessels, condensers, seal pots, and the carbon adsorption unit.	R-0213, R-0233	10CA6046	Cyro Carbon Adsorption Unit	Carbon Adsorption (048). Two chamber unit, in which one activated carbon bed adsorbs while the other is regenerated using steam.

III. MONITORING EQUIPMENT

The following table describes the monitoring devices used to confirm proper control equipment operation at the Cytec Wallingford site.

CONTROL ID	CONTROL NAME	MONITOR ID	MONITOR NAME	PARAMETER MEASURED
10CA6046	Cyro Carbon Adsorption Unit	10CAT1	Carbon Adsorber Thermocouple	Temperature of gas vented into carbon adsorber
	Cyro Carbon Adsorption Unit	10CAT2	Carbon Adsorber Steam Regeneration Condenser Thermocouple	Temperature of cooling tower water fed to condenser
	Cyro Carbon Adsorption Unit	10CAF1	Carbon Adsorber Continuous Air Flow Meter	Volumetric air flow rate of gas vented into carbon adsorber

CYTEC TITLE V PERMIT EMISSIONS UNITS SECTION (contd.)

CONTROL ID	CONTROL NAME	MONITOR ID	MONITOR NAME	PARAMETER MEASURED
10CA6046 cont.	Cyro Carbon Adsorption Unit	10CASC1	Carbon Adsorber Strip Chart Recorder	Duration of bed adsorption cycles

IV. EMISSIONS UNIT APPLICABLE REQUIREMENTS AND COMPLIANCE STATUS

The following table describe the regulatory requirements associated with each emissions unit, and the method of determining compliance and compliance status with respect to each requirement.

UNIT ID	REGULATORY CITE	REGULATORY DESCRIPTION	REQUIREMENT	COMPLIANCE METHOD	COMPLIANCE STATUS
C06	RCSA 22a-174-2	Source Registration	Obtain registration number	Not applicable.	In compliance
	RCSA 22a-174-20(a)	Control of VOC from Liquid Storage Vessels	Maintain records of tank capacity and vapor pressure of organic material contents.	Not applicable.	Not applicable. Storage vessels are < 40,000 gal or vapor pressure is < 1.5 psi.
	RCSA 22a-174-20(c)	Control of VOC from Wastewater Separators	Maintain records of organic material vapor pressure and, if > 1.5 psi, organic material throughput.	Not applicable.	Not applicable. Wastewater decanters receive < 200 gpd organic material or vapor pressure < 1.5 psi.
	RCSA 22a-174-20(ee)	VOC RACT Order	Reduce uncontrolled VOC emissions vented to the carbon adsorber by at least 85 percent.	Stack test	In compliance. Stack test data indicates greater than 95 percent control.
	Batch Processes ACT	Batch Processes Alternative Control Techniques	Reduce vented uncontrolled VOC emissions by 90 percent if cost effective.	Calculate if cost effective (see Applicable Requirements Section) and evaluate control efficiency (see Emissions limitation Section)	In compliance.

CYTEC TITLE V PERMIT EMISSIONS UNITS SECTION (contd.)

UNIT ID	REGULATORY CITE	REGULATORY DESCRIPTION	REQUIREMENT	COMPLIANCE METHOD	COMPLIANCE STATUS
C06 cont.	RCSA 22a-174-29	Control of Hazardous Air Pollutants	Emissions of Table 29-1 compounds must not exceed MASC.	Emission calculations	In compliance.
	40 CFR 60 Subpart Kb	Standards of Performance for VOL Storage Vessels	Maintain records of tank capacity and contents vapor pressure.	Not applicable.	Not Applicable. Storage vessels are < 151 m ³ or vapor pressure < 15.0 kPa.

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION

[Note: If the Part 70 rule and Connecticut's Title V regulation are revised such that applicable requirements can be incorporated into this permit without the need for a significant permit modification, then this section may become largely unnecessary.]

I. PURPOSE

The purpose of this section is to describe the applicable requirements Cytec is or may reasonably be anticipated to be subject to, the options Cytec will employ to comply with these applicable requirements, and to provide alternative methods of compliance, such as a VOC RACT emissions averaging mechanism. Requirements identified in this section that become applicable as a result of modifications that occur at Cytec will be incorporated into this permit using the minor permit modification procedure. Requirements not identified in this section that become applicable during the first two years of a permit term will be incorporated into this permit using the appropriate permit modification procedure. If Connecticut does not amend RCSA 22a-174-33 to include a minor permit modification procedure, then prior to permit issuance all possible applicable requirements, including but not limited to those listed below, will be incorporated into this permit.

[Note that the time frames corresponding to submission of an application to modify the Title V operating permit, and attainment of compliance with the underlying applicable requirement, are in part dependent on the specific applicable requirement and will be developed prior to permit issuance.]

II. APPLICABLE REQUIREMENTS

The following table lists the State and Federal air regulations, indicating which apply and which do not apply. A brief explanation is provided for those regulations that do not apply.

[To be developed prior to permit issuance.]

III. 40 CFR 63 REQUIREMENTS

(a) 40 CFR 63 Subpart B (112(g) MACT determinations)

(i) Purpose

If Cytec constructs or reconstructs its operations in a way that triggers the requirement for review pursuant to regulations implementing the requirements of section 112(g) of the Clean Air Act, this subsection of the permit is designed to incorporate compliance terms that will implement MACT for the construction or reconstruction without requiring a significant permit revision if EPA has proposed a MACT standard that is applicable to the proposed change. All terms in this provision shall have the same meaning as in the regulations implementing the requirements of section 112(g) where applicable.

(ii) Applicability

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

This provision shall be available for any major new source or major reconstruction of HAPs for which compliance with the MACT determination can be determined using the quantification and monitoring sections of this permit or any replicable monitoring requirements in the proposed MACT standard.

(iii) MACT Determination

Cytec may use a MACT standard applicable to the construction or reconstruction that has been formally proposed in the Federal Register as the basis for the MACT determination, provided the proposed MACT standard does not require a case-by-case permit review to determine appropriate compliance conditions at subject facilities. Where the proposed standard includes both specific limits and compliance requirements and alternative compliance options based on a case-by-case review, Cytec shall comply with the specific limits and compliance requirements in the proposed MACT standard.

If there is no proposed MACT standard or if Cytec chooses to demonstrate a MACT level of control in some other manner, DEP or EPA will perform a case-by-case MACT determination for the modification. The MACT determination results shall be incorporated into the applicable requirements section of this permit using the appropriate Title V permit modification procedure.

(b) MACT Standards

(i) Currently Applicable

Cytec is not currently subject to any MACT standards.

(ii) Future Applicable

Cytec may reasonably be anticipated to become subject to the following MACT standards:

(A) 40 CFR 63 Subparts F through I (HON rule)

Should Cytec become subject to the hazardous organics NESHAP, as defined by the applicability criteria specified in 40 CFR 63.100 and 40 CFR 63.110, Cytec shall take the following compliance actions:

- (1) Cytec shall comply with the process vent provisions specified in §63.113 through 63.118;
- (2) Cytec shall comply with the storage vessel provisions specified in §63.119 through 63.123;
- (3) Cytec shall comply with the transfer operation provisions specified in §63.126 through 63.130;
- (4) Cytec shall comply with the wastewater provisions specified in §63.131 through 63.147;
- (5) Cytec shall comply with the leak inspection provisions specified in §63.148.

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

Should Cytec seek to use the emissions averaging provisions specified in §63.150 through 63.152, the resulting requirements will be incorporated into this permit using the significant modification or permit renewal procedures.

(B) 40 CFR 63 Subpart U - Polymers & Resins I

Should Cytec become subject to Subpart U, as defined by the applicability criteria specified in 40 CFR 63.480, Cytec shall take the following compliance actions:

- (1) Cytec shall comply with the storage vessel provisions specified in §63.484;
- (2) Cytec shall comply with the continuous front-end process vents provisions specified in §63.485;
- (3) Cytec shall comply with the batch front-end process vents provisions specified in §63.486;
- (4) Cytec shall comply with the back-end process operations provisions specified in §63.487;
- (5) Cytec shall comply with the wastewater provisions specified in §63.488;
- (6) Cytec shall comply with the equipment leaks provisions specified in §63.489;
- (7) Cytec shall comply with the additional test methods and procedures provisions specified in §63.491;
- (8) Cytec shall comply with the monitoring levels and excursions provisions specified in §63.492;
- (9) Cytec shall comply with the general reporting and recordkeeping requirements provisions specified in §63.493.

Should Cytec seek to use the emissions averaging provisions specified in §63.490, the resulting requirements will be incorporated into this permit using the significant modification or permit renewal procedures.

(C) 40 CFR 63 Subpart JJJ - Polymers & Resins IV

Should Cytec become subject to Subpart JJJ, as defined by the applicability criteria specified in 40 CFR 63.1310, Cytec shall take the following compliance actions:

- (1) Cytec shall comply with the storage vessel provisions specified in §63.1314;
- (2) Cytec shall comply with the continuous process vents provisions specified in §63.1315 through 63.1320;
- (3) Cytec shall comply with the batch process vents provisions specified in §63.1321;
- (4) Cytec shall comply with the heat exchange systems provisions specified in §63.1328;
- (5) Cytec shall comply with the process contact cooling towers provisions specified in §63.1329;

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

- (6) Cytec shall comply with the wastewater provisions specified in §63.1330;
- (7) Cytec shall comply with the equipment leaks provisions specified in §63.1331;
- (8) Cytec shall comply with the additional test methods and procedures provisions specified in §63.1333;
- (9) Cytec shall comply with the parameter monitoring levels and excursions provisions specified in §63.1334;
- (10) Cytec shall comply with the general reporting and recordkeeping requirements provisions specified in §63.1335.

Should Cytec seek to use the emissions averaging provisions specified in §63.1332, the resulting requirements will be incorporated into this permit using the significant modification or permit renewal procedures.

[The following MACT standards will be incorporated into this section if proposed or promulgated prior to permit issuance. Proposed MACT standards addressed in this section may be incorporated into the permit using a minor permit modification if the final MACT standard does not substantially change from the proposed MACT standard.]

- (D) 40 CFR 63 Subpart___ - Polymers & Resins III
- (E) 40 CFR 63 Subpart___ - MON rule
- (F) 40 CFR 63 Subpart___ - Stationary Internal Combustion Engines
- (G) 40 CFR 63 Subpart___ - Industrial Boilers
- (I) 40 CFR 63 Subpart___ - Site Remediation

IV. 40 CFR 60 REQUIREMENTS

(a) New Source Performance Standards

(i) Currently Applicable

Cytec is subject to the following new source performance standards:

- (A) 40 CFR 60 Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels

Refer to the emissions units and notification sections of this permit for a description of specific Subpart Kb requirements.

(ii) Future Applicable

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

Cytec may reasonably be anticipated to become subject to the following new source performance standards:

(A) Should Cytec become subject to Subpart Dc, as defined in the applicability criteria specified in 40 CFR 60.40c, Cytec shall take the following compliance actions:

40 CFR 60 Subpart A- General Provisions

- (1) Cytec shall comply with the notification provisions specified in §60.7(a)(1) through (4);
- (2) Cytec shall comply with the standards and maintenance requirements specified in §60.11(d).

40 CFR 60 Subpart Dc - Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

- (1) Cytec shall comply with the standard for sulfur dioxide provisions specified in §60.42c;
- (2) Cytec shall comply with the standard for particulate matter provisions specified in §60.43c;
- (3) Cytec shall comply with the compliance and performance test methods and procedures for sulfur dioxide provisions specified in §60.44c;
- (4) Cytec shall comply with the compliance and performance test methods and procedures for particulate matter provisions specified in §60.45c;
- (5) Cytec shall comply with the emission monitoring for sulfur dioxide provisions specified in §60.46c;
- (6) Cytec shall comply with the emission monitoring for particulate matter provisions specified in §60.47c;
- (7) Cytec shall comply with the reporting and recordkeeping requirements provisions specified in §63.48c;

(B) Should Cytec become subject to Subpart Kb, as defined by the applicability criteria specified in 40 CFR 60.110b, Cytec shall take the following compliance actions:

40 CFR 60 Subpart A- General Provisions

- (1) Cytec shall comply with the notification provisions specified in §60.7(a)(1) through (4);
- (2) Cytec shall comply with the standards and maintenance requirements specified in §60.11(d).

40 CFR 60 Subpart Kb - Standards of Performance for Volatile Organic Liquid Storage Vessels

- (1) Cytec shall comply with the emission standard provisions specified in §60.112b;

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

- (2) Cytec shall comply with the testing and procedures provisions specified in §60.113b;
- (3) Cytec shall comply with the reporting and recordkeeping provisions specified in §60.115b;
- (4) Cytec shall comply with the monitoring of operations provisions specified in §60.116b;

Should Cytec seek to use the alternative means of emission limitation provisions specified in §60.114b, the resulting requirements will be incorporated into this permit using the significant modification or permit renewal procedures.

- (C) 40 CFR 60 Subpart VV - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry

Should Cytec become subject to Subpart VV, as defined by the applicability criteria specified in 40 CFR 60.480, Cytec shall take the following compliance actions:

40 CFR 60 Subpart VV - Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry

- (1) Cytec shall comply with the pumps in light liquid service provisions specified in §60.482-2;
- (2) Cytec shall comply with the compressor provisions specified in §60.482-3;
- (3) Cytec shall comply with the pressure relief device in gas/vapor service provisions specified in §60.482-4;
- (4) Cytec shall comply with the sampling connection system provisions specified in §60.482-5;
- (5) Cytec shall comply with the open-ended valves or lines provisions specified in §60.482-6;
- (6) Cytec shall comply with the valves in gas/vapor service in light liquid service provisions specified in §60.482-7;
- (7) Cytec shall comply with the pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors provisions specified in §60.482-8;
- (8) Cytec shall comply with the delay of repair provisions specified in §60.482-9;
- (9) Cytec shall comply with the closed vent system and control device provisions specified in §60.482-10;
- (10) Cytec shall comply with the test methods and procedures provisions specified in §60.485;
- (11) Cytec shall comply with the reporting and recordkeeping provisions specified in §60.486 and 60.487;

Should Cytec seek to use the alternative standards for valves: allowable percentage of valves leaking provisions specified in §60.483-1, the alternative standards for

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

valves: skip period leak detection and repair provisions specified in §60.483-2, or the equivalence of means of emission limitation provisions specified in §60.484, the resulting requirements will be incorporated into this permit using the significant modification or permit renewal procedures.

- (D) 40 CFR 60 Subpart DDD - Standards of Performance for Volatile Organic Compound Emissions from the Polymer Manufacturing Industry

Should Cytec become subject to Subpart DDD, as defined by the applicability criteria specified in 40 CFR 60.560, Cytec shall take the following compliance actions:

40 CFR 60 Subpart DDD - Standards of Performance for Volatile Organic Compound Emissions

- (1) Cytec shall comply with the process emissions provisions specified in §60.562-1;
- (2) Cytec shall comply with the equipment leaks of VOC provisions specified in §60.562-2;
- (3) Cytec shall comply with the monitoring requirements provisions specified in §60.563;
- (4) Cytec shall comply with the test methods and procedures provisions specified in §60.564;
- (5) Cytec shall comply with the reporting and recordkeeping provisions specified in §60.565;

- (E) 40 CFR 60 Subpart NNN - Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry Distillation Operations

Should Cytec become subject to Subpart NNN, as defined by the applicability criteria specified in 40 CFR 60.660, Cytec shall take the following compliance actions:

40 CFR 60 Subpart A- General Provisions

- (1) Cytec shall comply with the notification provisions specified in §60.7(a)(1) through (4);
- (2) Cytec shall comply with the standards and maintenance requirements specified in §60.11(d).

40 CFR 60 Subpart NNN - Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry Distillation Operations

- (1) Cytec shall comply with the emission standard provisions specified in §60.662;
- (2) Cytec shall comply with the monitoring of emissions and operations provisions specified in §60.663;
- (3) Cytec shall comply with the test methods and procedures provisions specified in §60.664;

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

- (4) Cytec shall comply with the reporting and recordkeeping provisions specified in §60.665;

Should Cytec seek to use the optional emission standard provisions specified in §60.662(b) or (c), the resulting requirements will be incorporated into this permit using the significant modification or permit renewal procedures.

- (F) 40 CFR 60 Subpart RRR - Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry Reactor Processes

Should Cytec become subject to Subpart RRR, as defined by the applicability criteria specified in 40 CFR 60.700, Cytec shall take the following compliance actions:

40 CFR 60 Subpart A- General Provisions

- (1) Cytec shall comply with the notification provisions specified in §60.7(a)(1) through (4);
(2) Cytec shall comply with the standards and maintenance requirements specified in §60.11(d).

40 CFR 60 Subpart RRR - Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry Reactor Processes

- (1) Cytec shall comply with the emission standard provisions specified in §60.702;
(2) Cytec shall comply with the monitoring of emissions and operations provisions specified in §60.703;
(3) Cytec shall comply with the test methods and procedures provisions specified in §60.704;
(4) Cytec shall comply with the reporting and recordkeeping provisions specified in §60.705;

Should Cytec seek to use the optional emission standard provisions specified in §60.702(b) or (c), the resulting requirements will be incorporated into this permit using the significant modification or permit renewal procedures.

- (G) 40 CFR 60 Subpart YYY - Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry Wastewater

Should Cytec become subject to Subpart YYY, as defined by the applicability criteria specified in 40 CFR 60.770, Cytec shall take the following compliance actions:

40 CFR 60 Subpart A- General Provisions

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

- (1) Cytec shall comply with the notification provisions specified in §60.7(a)(1) through (4);
- (2) Cytec shall comply with the standards and maintenance requirements specified in §60.11(d).

40 CFR 60 Subpart YYY - Standards of Performance for Volatile Organic Compound Emissions from Synthetic Organic Chemical Manufacturing Industry Wastewater

- (1) Cytec shall comply with the general standard provisions specified in §60.773;
- (2) Cytec shall comply with the tank provisions specified in §60.774;
- (3) Cytec shall comply with the surface impoundments provisions specified in §60.775;
- (4) Cytec shall comply containers provisions specified in §60.776;
- (5) Cytec shall comply with the individual drains provisions specified in §60.777;
- (6) Cytec shall comply with the oil-water separators provisions specified in §60.778;
- (7) Cytec shall comply with the treatment processes provisions specified in §60.779;
- (8) Cytec shall comply with the control devices provisions specified in §60.780;
- (9) Cytec shall comply with the inspection and monitoring of operations provisions specified in §60.781;
- (10) Cytec shall comply with the testing methods and procedures to determine applicability provisions specified in §60.782;
- (11) Cytec shall comply with the testing methods and procedures to determine compliance provisions specified in §60.783;
- (12) Cytec shall comply with the reporting provisions specified in §60.784;
- (13) Cytec shall comply with the recordkeeping provisions specified in §60.785;
- (14) Cytec shall comply with the leak inspection provisions specified in §60.786;

V. VOC RACT REQUIREMENTS

(a) Purpose

The purpose of this section is to describe the VOC RACT requirements Cytec is subject to, and to provide a means of using emissions averaging as an alternative method of compliance.

(b) Definitions

For the purposes of this section of the permit the following definitions shall be used.

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

"Annual mass emissions total" means the sum of all VOC emissions, evaluated before control, from a vent. Annual mass emissions may be calculated from an individual process vent or groups of process vents by using emission estimation equations contained in the Batch Processes ACT and then multiplying by the expected duration and frequency of the emission or groups of emissions over the course of a year. For processes that have been permitted, the annual mass emissions total should be based on the permitted levels.

"Average flow rate" means the gaseous exhaust flow rate averaged over the amount of time that VOC's are emitted. For the evaluation of average flow rate from an aggregate of sources, the average flow rate is the time weighted average of the average flow rates evaluated.

"Batch" means a discontinuous process involving the bulk movement of material through sequential manufacturing steps.

"Emissions averaging plan" means a plan approved in a permit modification that includes all of the information required by the emissions averaging provisions contained in this section.

"Emission limit consuming" refers to a source that is part of an emissions averaging plan that emits VOC at a rate greater than the VOC emission rate associated with its applicable RACT requirement.

"Historical actual average" means the actual average for the five year period immediately preceding submission of the emissions averaging plan.

"Process" means any equipment within a contiguous area that are connected together during the course of a year, where connected is defined as a link between equipment, whether it is physical, such as a pipe, or whether it is next in a series of steps in which material is transferred from one unit operation to another.

"Vent" means a point of emission from a unit operation.

(c) VOC RACT Order

Cytec will continue to comply with the requirements of State Order No. 8012 (attached), with the exception of the emission limits for the batch process vents which are not required by the order to achieve 85 percent control. These emission limits are superseded with by the requirements specified in subsection IV(d) effective with the issuance of this permit. The following vents are required to achieve 85 percent control pursuant to State Order No. 8012:

EMISSION SOURCE ID	DESCRIPTION
01PS09	B-1 #1 Cd Scrubber Vent
01PS13	B-1 #3 Cd Scrubber Vent
05PS013	B-05/TR.102 Reactor/Surge
05PS016	B-05/TR.120-13 Condenser

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

EMISSION SOURCE ID	DESCRIPTION
05PS025	B-05/TR.120 H2O Scrubber
05PS054	B-05/TR.150 Blend Tank
06PS021	B-06/TR.65/68 TK 71 Cond.
06PS046	B-06/TR.65/68 K-65 Cond.
06PS066	B-06/TR.103 Condensers
06PS072	B-06/TR.104 Condensers
06PS117B	B-06/TR.65/68 K-68 Condensers
06PS143	B-06/TR.106 Condensers
06PS144	B-06/TR.107 Condensers
06PS158	B-06/TR.114-8 Scrubber
06PS160	B-06/TR.63/64 Scrubber
06PS161	B-06/TR.104-34 Venturi
10PS081	B-10 Carbon Adsorption

(d) Control of Batch Process Emissions units

(i) Subject Equipment

With the exception of the batch process vents required to be controlled by State Order No. 8012, all batch process vents will be controlled according to the criteria specified in the Batch Processes ACT information document. The Batch Processes ACT specifies control of VOC emissions from batch process vents in the organic chemicals industry.

The following emissions units include batch process vents as defined by the Batch Processes ACT:

EMISSIONS UNIT	PROCESS
C03	Blending
C02	Breaker Plate Oven - Polymer
C06	CY Products Decant System
A04	Day Filters 4, 5, 6, 7
A04	Day Filters 8, 9, 10

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

EMISSIONS UNIT	PROCESS
C07	Dye Preparation System
A04	ERPs
A04	Fume Filters 1, 2, 3
C05	Grafting Rubber System
A04	Kathabar Regen Vent
R13	Kettle 61/62 System
R14	Kettle 63/64 System
R11	MARS
R04	MFRS
A03	No.1 Mixer/Dryer System
A03	No.3 Mixer/Dryer System
C10	Pilot Plant
C08	Post Color Operations
C02	Process Combustion
C08	QC Lab
C08	Quality Control
C03	RE-100 System
C04	RE-300 System
C04	RE-400 System
C04	RE-500 System
R03	Reactor 101 System
R03	Reactor 102 System
R05	Reactor 103 System
R05	Reactor 103/4 System
R05	Reactor 103/4/6/7 System
R05	Reactor 104 System
R06	Reactor 104-34 System

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

EMISSIONS UNIT	PROCESS
R05	Reactor 106 System
R05	Reactor 106/7 System
R05	Reactor 107 System
R10	Reactor 114-1 System
R08	Reactor 150 System
R04	Reactor 65/68 System
R09	Reactor K-66 System
R03	Resins Bldg. 5
R05	Resins Bldg. 6
A02	RK#3 System
A02	RK#4 System
A04	Rolls
A04	Vacuum Vents
C01	XT Products Decant System

(ii) Equipment Required to Control VOC Emissions

(A) Applicability

The Batch Processes ACT recommends reduction of VOC emissions by 90 percent for individual vents, or for vent streams in aggregate, within a batch process, having an actual average flow rate below the maximum cost effective flow rate (FR) as calculated according to the following formulas:

$$\begin{aligned}
 \text{FR} &= 0.07(\text{AE}) - 1,821 && (\text{vapor pressure} \leq 75 \text{ mmHg}) \\
 &= 0.031(\text{AE}) - 494 && (75 \text{ mmHg} < \text{vapor pressure} < 150 \text{ mmHg}) \\
 &= 0.013(\text{AE}) - 301 && (\text{vapor pressure} \geq 150 \text{ mmHg})
 \end{aligned}$$

where: FR = the maximum flow rate at which control is cost effective (scfm)
 AE = annual mass emissions total (lb/yr)

The following emissions units have been determined to contain batch process vents that, in aggregate, meet the cost effectiveness criteria specified by the Batch Processes ACT and shall achieve 90 percent control:

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

[The list of subject sources will be developed and maintained based on records of emission rate and flow rate data]

(iii) Compliance

Cytec shall comply with the requirements of this section as soon as reasonably practical, and in no event shall Cytec attain compliance over a period longer than one year unless otherwise approved by DEP.

(iv) Monitoring

Any control device required to achieve 90 percent control shall be monitored consistent with the methods described in the monitoring section of this permit.

(v) Recordkeeping

Cytec shall keep records for each batch process vent for a minimum of five years. The records shall comply with the recordkeeping section of this permit.

(e) Emissions Averaging Provisions

(i) Purpose

The purpose of this subsection is to establish the requirements for using emissions averaging to meet the RACT level of reduction requirements for a group of emission sources at Cytec. In lieu of the requirements for individual VOC emission sources described in subsections IV(c) and IV(d), Cytec may achieve through emissions averaging an equivalent level of emission reduction for any group of emission sources, whether or not they are within the same CTG category, provided that the conditions described in IV(e) are met.

(ii) RACT Equivalent Emission Limitation

(A) Intra-CTG Category Averaging for Batch Operations

The allowable VOC emissions required by RACT for a group of batch process emission sources included in an intra-CTG category emissions averaging plan shall be equal to the sum of the allowable emissions of the individual sources. The allowable emissions of the individual sources shall be calculated based on the lesser of the following:

- (1) the emission rate required by RACT or;
- (2) the historical actual average emission rate.

The RACT equivalent emissions, $E_{\text{Allowable}}$, shall be a mass of VOC emissions, calculated for each averaging period as:

$$E_{\text{Allowable}} = \sum^n \sum^z (ER_{\text{Baseline},i,j} \times \text{Production}_{\text{Actual},i,j})$$

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

$$i=1 \quad j=1$$

where: $n =$ the number of emission sources included in the averaging plan
 $z =$ the number of products manufactured by emission source i
 $ER_{\text{Baseline},i,j} =$ the historical actual average emission rate or the emission rate required by RACT, in units of lb VOC/batch, whichever is lower, for the manufacture of product j by source i
 $\text{Production}_{\text{Actual},i,j} =$ the actual number of batches of product j manufactured in source i during the averaging period

The averaging period of the RACT equivalent emission limitation shall be consistent with the underlying RACT requirement, but in no case longer than 30 days.

The actual emissions, E_{Actual} , of the emission sources included in the averaging plan, shall be calculated for each averaging period as:

$$E_{\text{Actual}} = \sum_{i=1}^n \sum_{j=1}^z (ER_{\text{Actual},i,j} \times \text{Production}_{\text{Actual},i,j})$$

where: $n =$ the number of emission sources included in the averaging plan
 $z =$ the number of products manufactured by the emission sources included in the averaging plan
 $ER_{\text{Actual},i,j} =$ the actual emission rate, in units of lb VOC/batch, for the manufacture of product j by source i , during the averaging period
 $\text{Production}_{\text{Actual},i,j} =$ the actual number of batches of product j manufactured in source i during the averaging period

The actual emissions, E_{Actual} , shall be maintained below the allowable emissions, $E_{\text{Allowable}}$, for each averaging period during the life of the emissions averaging plan.

(B) Inter-CTG Category Averaging

The allowable VOC emissions per averaging period required by RACT for a group of batch process emission sources included in an inter-CTG category emissions averaging plan shall be equal to the sum of the emissions of the individual sources. The allowable emissions of the individual emission sources shall be calculated based on the lesser of the following:

- (1) the emission rate required by RACT or;
- (2) the historical actual average emission rate.

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

The RACT equivalent emissions, $E_{\text{Allowable}}$, shall be a mass of VOC emissions, calculated for each averaging period as:

$$E_{\text{Allowable}} = E_{\text{Allowable, Batch}} + E_{\text{Allowable, VOL}} + E_{\text{Allowable, WWTP}}$$

where:

- $E_{\text{Allowable, Batch}}$ = the RACT equivalent allowable emissions associated with the batch process emission sources included in the plan
- $E_{\text{Allowable, VOL}}$ = the RACT equivalent allowable emissions associated with the volatile organic liquid storage tanks included in the plan
- $E_{\text{Allowable, WWTP}}$ = the RACT equivalent allowable emissions associated with the wastewater treatment plant, if included in the plan

$$E_{\text{Allowable, Batch}} = \sum_{i=1}^n \sum_{j=1}^z (ER_{\text{Baseline, i, j}} \times \text{Production}_{\text{Actual, i, j}})$$

where:

- n = the number of batch process emission sources included in the averaging plan
- z = the number of products manufactured by batch process emission source i
- $ER_{\text{Baseline, i, j}}$ = the historical actual average emission rate from the batch process emission sources or the emission rate required by RACT, whichever is lower, in units of lb VOC/batch, for the manufacture of product j by source i
- $\text{Production}_{\text{Actual, i, j}}$ = the actual number of batches of product j manufactured in source i during the averaging period

$$E_{\text{Allowable, VOL}} = \sum_{i=1}^n (ER_{\text{Baseline, Working, i}} \times \text{Production}_{\text{Actual, i}}) + \sum_{i=1}^n E_{\text{Baseline, Breathing, i}}$$

where:

- n = the number of volatile organic liquid storage tanks included in the averaging plan
- $ER_{\text{Baseline, Working, i}}$ = the historical actual average emission rate or the emission rate required by RACT, whichever is lower, in units of lb VOC/gal throughput, due to working loss from storage tank i
- $\text{Production}_{\text{Actual, i}}$ = the actual throughput, in gal, into storage tank i , during the averaging period
- $E_{\text{Baseline, Breathing, i}}$ = the historical actual average emissions or the emissions required by RACT, whichever is lower, in units of lb VOC, due to breathing loss from storage tank i over the averaging period

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

$$E_{\text{Allowable,WWTP}} = ER_{\text{Baseline}} \times \text{Production}_{\text{Actual}}$$

where: ER_{Baseline} = the historical actual average emission rate from the wastewater treatment plant or the emission rate required by RACT, whichever is lower, in units of lb/gal of wastewater treated

$\text{Production}_{\text{Actual}}$ = the actual volume of wastewater treated by the wastewater treatment plant, in units of gal/month, during the averaging period

The averaging period of the RACT equivalent emission limitation shall be consistent with the underlying RACT requirement, but in no case longer than 30 days.

The actual emissions, E_{Actual} , of the emission sources included in the averaging plan, shall be calculated for each averaging period as:

$$E_{\text{Actual}} = E_{\text{Actual,Batch}} + E_{\text{Actual,VOL}} + E_{\text{Actual,WWTP}}$$

where: $E_{\text{Actual,Batch}}$ = the actual emissions from the batch process emission sources included in the plan

$E_{\text{Actual,VOL}}$ = the actual emissions from the volatile organic liquid storage tanks included in the plan

$E_{\text{Actual,WWTP}}$ = the actual emissions from the wastewater treatment plant, if included in the plan

$$E_{\text{Actual,Batch}} = \sum_{i=1}^n \sum_{j=1}^z (ER_{\text{Actual},i,j} \times \text{Production}_{\text{Actual},i,j})$$

where: n = the number of batch process emission sources included in the averaging plan

z = the number of products manufactured by batch process emission source i

$ER_{\text{Actual},i,j}$ = the actual emission rate, in units of lb VOC/batch, for the manufacture of product j by source i , during the averaging period

$\text{Production}_{\text{Actual},i,j}$ = the actual number of batches of product j manufactured in source i during the averaging period

$$E_{\text{Actual,VOL}} = \sum_{i=1}^n (ER_{\text{Actual},i} \times \text{Production}_{\text{Actual},i}) + \sum_{i=1}^n E_{\text{Actual,Breathing},i}$$

where: n = the number of volatile organic liquid storage tanks included in the averaging plan

$ER_{\text{Actual},i}$ = the actual emission rate from storage tank i , in units of lb VOC/gal throughput, due to working

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

		loss from storage tank i, during the averaging period
	$Production_{Actual,i}$	= the actual throughput, in gal, into storage tank i, during the averaging period
	$E_{Actual,Breathing,i}$	= the actual emissions due to breathing loss from storage tank i during the averaging period
$E_{Actual,WWTP}$	=	$ER_{Actual} \times Production_{Actual}$
where:	ER_{Actual}	= the actual emission rate from the wastewater treatment plant, in units of lb/gal of wastewater treated, during the averaging period
	$Production_{Actual}$	= the actual volume of wastewater treated by the wastewater treatment plant, in units of gal/month, during the averaging period

The actual emissions, E_{Actual} , shall be maintained below the allowable emissions, $E_{Allowable}$, for each averaging period during the life of the emissions averaging plan.

(iii) Regulated Hazardous Air Pollutants [STATE-ONLY]

(A) Additional Requirements for Intra-CTG Category Trading

If a regulated VOC hazardous air pollutant is emitted from any of the emission sources included in the emissions averaging plan, Cytec shall then demonstrate compliance with RCSA 22a-174-29, Tables 29- 1, 2, and 3 for each emission source included in the plan.

(B) Additional Requirements for Inter-CTG Category Trading

If a regulated VOC hazardous air pollutant is emitted from any of the emission sources included in the emissions averaging plan, then Cytec shall:

- (1) Quantify hazardous air pollutant emission rates consistent with the emissions quantification section of this permit, including performing emissions testing as necessary;
- (2) Demonstrate compliance with RCSA 22a-174-29, Tables 29- 1, 2, and 3;
- (3) Perform a limited assessment indicating the proposed emissions averaging will not create an unacceptable risk to human health.

[Note that DEP has not yet formalized its inter-CTG category trading policy]

(iv) Plan Implementation

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

(A) Incorporation Into Permit

Prior to initiation, an emissions averaging plan will be incorporated into this permit using the minor permit modification procedure.

(B) Plan Modifications

Any proposed changes to an emissions averaging plan will be incorporated into this permit using the minor permit modification procedure prior to implementation.

(v) Monitoring

Any emission sources contained in an emissions averaging plan registered under this subsection shall be monitored consistent with the methods described in the monitoring section of this permit.

VI. APPROVED CONNECTICUT SIP REQUIREMENTS

(a) Approved SIP Requirements

Cytec is subject to the following EPA approved CT SIP requirements:

(i) RCSA 22a-174-3(c) - Standards for granting a permit to construct

Cytec currently has construction permits for the following equipment:

SOURCE DESCRIPTION	DEP PERMIT NO.	DATE	REQUIREMENTS
WWTP Lime Silo	1890004	3/29/73	None listed.
B-05/TR.120 HOT WELL (102-28)	1890007	8/21/73	None listed.
B-05/TR.150 BLEND TANK (150-02)	1890008	9/10/73	None listed.
B-06 608 HOT OIL FURNACE #2	1890009	9/10/73	None listed.

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

SOURCE DESCRIPTION	DEP PERMIT NO.	DATE	REQUIREMENTS
B-99 WWTP SLUDGE INCINERATOR VENT <i>[Note: this permit is in the process of renewal and the requirements are expected to be changed]</i>	1890010	1/14/74	Firing rates: #2 oil = 30 gph. Annual emissions (tpy) TSP = 0.1 (98% control, scrubber), PM ₁₀ = 0.1 (98% control), SO _x = 1.9, NO _x = 14.4, VOC = 4.3, CO = 74.5 NOTE: these values are in the process of being reevaluated.
B-05/TR.102 REACTOR/SURGE	1890012	6/16/76	None listed.
B-06 MFRS METHANOL COLUMN	1890018	8/1/75	Annual emissions (tpy) VOC = 0.1 (99.9% control, condenser)
B-10 BLEND TANK BR-501	1890020	4/27/76	Annual emissions (tpy) VOC = 0.3 (90% control, condenser)
B-106/TR106 REACTOR (106-01)	1890026	6/23/76	Annual emissions (tpy) VOC = 2.6 (99% control, condenser, scrubber), Production Rate = 23,000 tpy
B-06/TR.107 REACTOR (107-01)	1890027		To be determined.
B-06/TR.106 BLEND TANK (106-08)	1890030		To be determined.
B-06/TR.107 BLEND TANK (107-08)	1890031		To be determined.
B-06/TR.106 BLEND TANK (106-11)	1890032		To be determined.
B-06/TR.107 BLEND TANK (107-11)	1890033		To be determined.
B-01/ #1 CONTINUOUS DRYER	1890041	5/8/78	Annual emissions (tpy) VOC = 10.6 (93% control, scrubber), Production Rate = 1 tph

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

[Cytec and DEP will review construction permit requirements prior to Title V permit issuance to determine which remain relevant to assure compliance with all applicable requirements.]

- (ii) RCSA 22a-174-4 - "Source" monitoring, record keeping, reporting and authorization of inspection of "air pollution" "sources."
- (iii) RCSA 22a-174-6 - "Air pollution" emergency episode procedures
- (iv) RCSA 22a-174-18(a)(1) - Visible Emission Limits
- (v) RCSA 22a-174-18(d) - Particulate Matter Standards - Fuel Burning Equipment
- (vi) RCSA 22a-174-18(e) - Particulate Matter Standards - Process Sources
- (vii) RCSA 22a-174-19(a) - Fuel Sulfur/Sulfur Oxides Emission Standards - Fuel Burning Equipment
- (viii) RCSA 22a-174-20(a) - Control of Volatile Organic Compounds - Storage Vessels
- (ix) RCSA 22a-174-20(d) - Control of Volatile Organic Compounds - Pumps and Compressors
- (x) RCSA 22a-174-22 - Control of Nitrogen Oxides Emissions

Cytec shall use a combination of emissions averaging and discrete emissions reductions (DERs) trading in accordance with DEP guidelines and the requirements set forth in Trading Agreement Order No. 8114, in order to comply with RCSA 22a-174-22.

[Note that revisions to RCSA 22a-174-22 have not yet been approved by EPA.]

For those requirements that are not generically applicable to the site, refer to the emissions units and notifications sections for the specific requirements and compliance methods employed for a given emission source.

Cytec may reasonably be anticipated to become subject to the following EPA approved CT state implementation plan requirements:

- (i) RCSA 22a-174-3(c) (Standards for granting a permit to construct) - Except new major sources or major modifications
- (ii) RCSA 22a-174-4 ("Source" monitoring, record keeping, reporting and authorization of inspection of "air pollution" "sources.")
- (iii) RCSA 22a-174-5 (Methods for sampling, emission testing, sample analysis, and reporting)

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

- (iv) RCSA 22a-174-7 (Malfunction of control equipment, reporting and required continuous emission monitoring equipment for stationary sources)
- (v) RCSA 22a-174-18(a)(1) (Visible Emission Limits)
- (vi) RCSA 22a-174-18(d) (Particulate Matter Standards - Fuel Burning Equipment)
- (vii) RCSA 22a-174-18(e) (Particulate Matter Standards - Process Sources)
- (viii) RCSA 22a-174-19(a) (Fuel Sulfur/Sulfur Oxides Emission Standards - Fuel Burning Equipment)
- (ix) RCSA 22a-174-20(a) (Control of Volatile Organic Compounds - Storage Vessels)
- (x) RCSA 22a-174-20(c) (Control of Volatile Organic Compounds - VOC/Water Separators)
- (xi) RCSA 22a-174-20(d) (Control of Volatile Organic Compounds - Pumps and Compressors)
- (xii) RCSA 22a-174-20(x) (Control of Volatile Organic Compounds - Leaks from Synthetic Organic Chemical & Polymer Manufacturing Equipment)
- (xiii) RCSA 22a-174-22 (Control of Nitrogen Oxides Emissions)
- (xiv) RCSA 22a-174-32 (Reasonably Available Control Technology for volatile organic compounds)

VII. NON-FEDERALLY ENFORCEABLE REQUIREMENTS [STATE-ONLY]

(a) Purpose

The purpose of this section is to describe the Connecticut air pollution regulatory requirements that are not enforceable by EPA that Cytec is or may reasonably be anticipated to be subject to.

(b) Requirements

Cytec is subject to the following state air pollution regulatory requirements that are not enforceable by EPA:

- (i) RCSA 22a-174-3(g) - Standards for granting a permit to operate and renewals of permits to operate (Except where changes are provided for under the PAL section of this permit.)

Cytec currently has operating permits for the following equipment:

CYTEC TITLE V PERMIT APPLICABLE REQUIREMENTS SECTION (contd.)

SOURCE DESCRIPTION	DEP PERMIT NO.	DATE	REQUIREMENTS
B-22 BREAKER PLATE OVEN	1890072	4/28/89	To be determined.
B-99 WWTP KEROSENE EM GENERATOR	1890075	5/27/92	To be determined.
B-10 DIESEL EMERGENCY GENERATOR	1890082		Annual operating hours = 500

(ii) RCSA 22a-174-23 - Control of odors

(iii) RCSA 22a-174-29 - Control of Hazardous Air Pollutants

For those requirements that are not generically applicable to the site, refer to the emissions units and notifications sections for the specific requirements and compliance methods employed for a given emission source.

Cytec may reasonably be anticipated to become subject to the following state air pollution regulatory requirements that are not enforceable by EPA:

(i) RCSA 22a-174-3(g) Standards for granting a permit to operate and renewals of permits to operate

(ii) RCSA 22a-174-29 (Control of Hazardous Air Pollutants)

CYTEC TITLE V PERMIT EMISSIONS LIMITATION SECTION

I. PURPOSE

The purpose of this section is to provide a mechanism which Cytec may use on an elective basis under this permit to make enforceable emission limits associated with air pollution control equipment, operational limitations, or other mechanisms defined below, including emission limits not otherwise required by an applicable requirement.

II. CONTROL DEVICES

(a) Applicability

(i) Covered Control Devices

This section applies to the control devices listed in II(c) of the emissions quantification section.

(ii) Eligibility

Notwithstanding (i) above, any control device installed and in use on or before the effective date of this permit that is used to comply with an applicable requirement shall not be eligible under this section.

(b) Registration

(i) Initial Notification

Control equipment shall be registered by notifying DEP in writing and obtaining agreement in accordance with the notification section of this permit.

(ii) Modifications

After initial registration of a control device under this permit, notification to DEP will be made prior to:

- (A) Adding or removing an emission source from the list of sources vented to the control device;
- (B) 30 days before performing emissions testing that will be used to determine the emissions reduction.

(c) Determination of Emissions limit

The emissions limit provided by any device registered under this section shall be determined consistent with the methods employed for similar equipment as described in the emissions units section of this permit. If no similar equipment is present at Cytec, then the emissions

CYTEC TITLE V PERMIT EMISSIONS LIMITATION SECTION (contd.)

limit shall be determined consistent with the methods described in the emissions quantification section of this permit.

(d) Operation and Maintenance

Any control equipment registered under this section shall be operated and maintained to prevent degradation of control equipment performance. An initial operating, inspection, and maintenance plan shall be submitted to DEP for review and approval within 30 days of registering a piece of control equipment under this section. The plan shall be updated and maintained current by Cytec. This plan shall include, but not be limited to, preventative maintenance, maintenance and inspection schedule, methodologies for demonstrating continuous compliance with applicable emission limitations, provisions for air pollution control equipment replacement and malfunction, training, and a division of responsibility for services to be provided by air pollution control equipment suppliers and subcontractors. Cytec shall maintain manufacturer's warranties, stipulations, and recommendations on-site for the operational life of the control equipment.

(e) Monitoring

Any control device registered under this permit shall be monitored consistent with the methods described in the emissions monitoring section of this permit.

III. OPERATIONAL LIMITATIONS

(a) Applicability

(i) Types of Operational Limitations

This section applies to operational limitations that can be directly related to quantification of emissions. Examples include:

- (A) Limiting hours of operation
- (B) Limiting use of a raw material or fuel
- (C) Not allowing concurrent operation of two or more emission sources

(ii) Eligibility

Any proposed operational limitation must be consistent with all applicable requirements. In addition, any operational limitation requiring creation of either a new emissions quantification method or a new emissions monitoring method for the emissions unit shall not be eligible under this section.

(b) Registration

(i) Initial Notification

CYTEC TITLE V PERMIT EMISSIONS LIMITATION SECTION (contd.)

Operational limitations shall be registered by notifying DEP in writing and obtaining agreement in accordance with the notification section of this permit.

(ii) Modifications

After initial registration of an operational limitation under this permit, notification to DEP will be made prior to:

- (A) Adding or removing an emission source from the list of sources covered by the operational limitation;
- (B) 30 days before performing emissions testing that will be used to determine the emissions reduction.

(c) Determination of Emissions Limit

The emissions limit provided by any operational limitation registered under this section shall be determined consistent with the methods employed for the equipment affected by the operational limitation as described in the emissions units section of this permit.

(d) Monitoring

Any emissions unit affected by an operational limitation registered under this permit shall be monitored consistent with the methods described in the emissions monitoring section of this permit.

IV. POLLUTION PREVENTION

(a) Applicability

(i) Types of Pollution Prevention

This section applies to pollution prevention that can be directly related to quantification of emissions. Examples include:

- (A) Operating practices that reduce air pollution generation
- (B) Raw material substitutions
- (C) Process and equipment design

(ii) Eligibility

Any proposed pollution prevention must be consistent with all applicable requirements. In addition, any pollution prevention technique requiring creation of either a new emissions quantification method or a new emissions monitoring method for the emissions unit shall not be eligible under this section.

CYTEC TITLE V PERMIT EMISSIONS LIMITATION SECTION (contd.)

(b) Registration

(i) Initial Notification

Pollution prevention used for emissions limiting purposes shall be registered by notifying DEP in writing and obtaining agreement in accordance with the notification section of this permit.

(ii) Modifications

After initial registration of an pollution prevention technique under this permit, notification to DEP will be made prior to:

- (A) Adding or removing an emission source from the list of sources covered by the pollution prevention;
- (B) 30 days before performing emissions testing that will be used to determine the emissions reduction.

(c) Determination of Emissions Limit

The emissions limit provided by any pollution prevention technique registered under this section shall be determined consistent with the methods employed for the equipment affected by the pollution prevention as described in the emissions units section of this permit.

(d) Monitoring

Any emissions unit affected by pollution prevention technique registered under this permit shall be monitored consistent with the methods described in the emissions monitoring section of this permit.

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION

I. PURPOSE

The purpose of this section is to describe the methods used to quantify air pollutant emission rates from emissions units that must meet an emission limit that is part of an applicable requirement, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable. Calculation of air pollutant emission rates from control devices as well as from emission sources is described.

II. QUANTIFICATION METHODS

(a) Categories of Emission Sources

The following is a list of the categories of emission sources present at Cytec, and a description of each category:

- | | |
|-----------------------------|--|
| (i) Batch Process | Equipment used in a discontinuous process involving the bulk movement of material through sequential manufacturing steps. Processes are comprised of linked equipment in which material moves from one unit operation to another. The unit operations include equipment to prepare reactants, facilitate reactions, separate and purify intermediates and products, and recycle materials. Examples include reactor kettles, distillate receivers, and centrifuges. Mass, temperature, concentration, and other properties of a system may vary with time. |
| (ii) Semi-Continuous | Equipment used in operations that are conducted on a steady-state basis, but only for finite durations during the course of a year. The unit operations include equipment to prepare reactants, facilitate reactions, separate and purify intermediates and products, and recycle materials. Examples include distillation columns, grinding mills, and extruders. |
| (iii) Combustion | Equipment used to burn fuel. Examples include boilers and internal combustion engines. |
| (iv) Direct Contact Cooling | Equipment within which the cooling medium, comes in direct contact with the fluid to be cooled. An example is a direct contact cooling tower. |
| (v) Equipment Leaks | Fugitive leaks from equipment components. Examples include valves, pumps, flanges, and sampling connections. |

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION (contd.)

- | | |
|--------------------------|--|
| (vi) Incineration | Equipment used in the thermal destruction of waste materials. A sludge incinerator is an example. |
| (vii) Landfill | A subsurface containment structure used to store waste. |
| (viii) Liquid Storage | Equipment, such as storage vessels, used to store volatile liquids. |
| (ix) Remediation | Projects involving the treatment of waste, contaminated groundwater/ soil or excavation and removal of contaminated soil. These projects are usually of a finite duration. |
| (x) Wastewater Treatment | Equipment used to treat wastewater. Examples include, but are not limited to, equalization basins, aeration basins, and clarifiers. |

At the time of permit renewal or reopening, a new category of emission source shall be established for any new emission source constructed during the previous term of the permit that cannot be represented by any of the above categories.

(b) Emission Source Quantification Methods

- (i) For emission sources subject to an applicable requirement which defines the emissions quantification method, Cytec shall quantify emissions consistent with the applicable requirement. If more than one applicable requirement defines the emissions quantification method from an emission source, Cytec shall quantify emissions using the method having the least uncertainty and which can be relied upon to determine whether Cytec complies with each applicable requirement as identified in the emissions units section of this permit. If an applicable requirement does not specify an emissions quantification method that can be relied upon to demonstrate compliance, then emissions shall be quantified consistent with II(b)(ii).
- (ii) For emission sources subject to an applicable requirement which does not specify an emissions quantification method that can be relied upon to determine compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, the following table lists the emissions quantification method for each class of pollutant emitted from a category.

CATEGORY	POLLUTANT TYPE	METHOD
Batch or Semi-Continuous Processes	Gaseous	Engineering calculations and/or test data and/or material balance

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION (contd.)

CATEGORY	POLLUTANT TYPE	METHOD
Batch or Semi-Continuous Processes	Liquid/solid	Engineering calculations and/or test data and/or material balance
Combustion	All	Test data and/or AP-42 version 5
Direct Contact Cooling	All	AP-42 version 5
Equipment Leak Fugitives	Gaseous	SOCMI leak factors and/or test data
Incineration	All	Test data and/or material balance
Landfill	All	EPA LANDFILL program version 2.0
Liquid Storage	Gaseous	AP-42/TANKS program version 3.0
Remediation	All	Air/Superfund Guidance ¹ and/or test data
Wastewater Treatment	Gaseous	TOXCHEM+ program version x.x

Where more than one method is listed, refer to the emissions units section and any notices attached to this permit for new emissions units for the specific quantification method employed for a given emission source. Cytec may replace emission factors with actual test or material balance data for an emissions unit using the minor permit modification process. All test data shall be based on tests conducted consistent with EPA approved methods as listed in II(d). At the time of permit renewal or reopening, the above table shall be updated to include any new category of emission source added to II(a).

A description of the batch/semi-continuous air pollutant emission engineering calculations that will be employed is attached as Appendix A. The actual product recipe information used to calculate emissions shall be made available to EPA and DEP for inspection, subject to confidential business information protection. A description of the remedial activity air pollutant emission methods that will be employed is attached as Appendix B.

(c) Categories of Control Equipment

¹ USEPA, [Air/Superfund National Technical Guidance Study Series: Models for Estimating Air Emission Rates from Superfund Remedial Actions](#), EPA-451/R-93-001

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION (contd.)

The following is a list of the categories of control equipment present at Cytec, and a description of each category:

- | | |
|----------------------------------|---|
| (i) baghouses | A chamber containing fabric filters through which exhaust passes. |
| (ii) filters | A substrate lattice which controls particulate matter through particle impaction, interception, or diffusion. |
| (iii) centrifugal separators | A device that separates particles from exhaust by imparting centrifugal force. |
| (iv) condensers | A device that removes pollutants by cooling the exhaust thereby causing condensation to occur. |
| (v) gaseous pollutants scrubbers | A device that provides intimate mixing of an absorbant and the exhaust. |
| (vi) solid pollutants scrubbers | A device that provides intimate mixing of a scrubbing agent and the exhaust. |
| (vii) adsorbers | A device containing material that adsorbs one or more components of the exhaust. |
| (viii) thermal destruction units | A device that uses heat to combust or destroy air pollutants. |
| (ix) vapor balance system | A system that returns displaced vapor from the receiving vessel to the charging vessel. |
| (x) conservation vents | A vent set to remain closed below a specific gauge pressure and vacuum pressure. |

The following is a list and description of the categories of control equipment that, in addition to the control equipment listed above, may reasonably be anticipated to be located at Cytec:

- | | |
|---------------------------------|--|
| (x) electrostatic precipitators | A device within which particles are separated from the exhaust by imparting an electrical field. |
| (xi) flue gas recirculation | Reduction of nitrogen oxides by returning a portion of the exhaust to the combustion zone. |

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION (contd.)

- | | |
|---|---|
| (xii) selective non-catalytic reduction | Injection of a reducing agent (such as ammonia) which reacts with and converts nitrogen oxides to molecular nitrogen over a specific temperature range. |
| (xiii) selective catalytic reduction | Injection of a reducing agent (such as ammonia) into the exhaust ahead of a catalyst which aids in the conversion of nitrogen oxides to molecular nitrogen over a specific temperature range. |
| (xiv) alkaline injection | Injection of an alkaline material that neutralizes acidic components of the exhaust. |

(d) Determination of Emission Rate

- (i) For control equipment subject to an applicable requirement which defines the emissions quantification method, Cytec shall quantify emissions consistent with the applicable requirement. If more than one applicable requirement defines the emissions quantification method from a control device, Cytec shall quantify emissions using the method having the least uncertainty and which can be relied upon to demonstrate whether Cytec complies with each applicable requirement as identified in the emissions units section of this permit. If an applicable requirement does not specify an emissions quantification method that can be relied upon to demonstrate compliance, then emissions shall be quantified consistent with II(d)(ii).
- (ii) For control equipment subject to an applicable requirement which does not specify an emissions quantification method that can be relied upon to demonstrate compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, emissions quantification will be performed as follows:

(A) Engineering Estimates

Control efficiency estimates based on engineering knowledge can be used to establish the control efficiency of any control device from which maximum actual emissions of any pollutant controlled by the equipment will not exceed 1 tpy. When possible, these estimates should employ information found in commonly available reference sources, such as "Compilation of Air Pollutant Emission Factors (AP-42)" published by EPA. Such estimates of control efficiency shall be based on reasonable engineering judgment and reasonably conservative assumptions. If actual emissions of a controlled pollutant exceed 1 tpy from a control device registered under this section for which actual emissions were not expected to exceed 1 tpy, then the control efficiency of shall be determined following the corresponding method described in II(d)(ii)(B) or II(d)(ii)(C).

(B) Manufacturer's Guarantee

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION (contd.)

A manufacturer's guarantee, derived from EPA-approved emissions testing of such unit or similar unit performed by the manufacturer, can be used to establish the control efficiency. If no guarantee is provided, and actual emissions are greater than 1 tpy, then the control efficiency shall be determined following the corresponding method described in II(d)(ii)(C) of this section.

(C) Test Methods

Where more than one test method is listed, refer to the emissions units section, or notice attached to this permit which was submitted pursuant to the emissions reduction section, for the specific test method employed for a given control device.

(1) Baghouses, Electrostatic Precipitators, Filters, Centrifugal Separators

The particulate matter control efficiency shall be determined using EPA Method 5 or Method 17. The sample volume shall be at least 1.70 dscm (60 dscf). For Method 5, if the gas stream being sampled is at ambient temperature, the sampling probe and filter may be operated without heating. If the gas stream is above ambient temperature, the sampling probe and filter may be operated at a temperature high enough, but no higher than 121°C (250°F), to prevent water condensation on the filter. Control efficiency shall be calculated as follows:

$$CE = [(PMER_i - PMER_o)/PMER_i] \times 100$$

where: CE = the particulate matter control efficiency (%)
PMER_i = the particulate matter mass emission rate measured at the inlet to the control device
PMER_o = the particulate matter mass emission rate measured at the outlet of the control device

(2) Scrubbers, Adsorbers, Thermal Destruction Units, Flue Gas Recirculation, Selective Non-Catalytic Reduction, Selective Catalytic Reduction, Alkaline Injection Systems

The control efficiency shall be determined by the emission measurement method defined for the pollutant in 40 CFR 51 Appendices M and P, 40 CFR 60 Appendices A and F, 40 CFR 61 Appendices B and C, or 40 CFR 63 Appendices A and C, or by an emission measurement method approved by the Administrator. Control efficiency shall be calculated as follows:

$$CE = [(PER_i - PER_o)/PER_i] \times 100$$

where: CE = the pollutant specific control efficiency (%)
PER_i = the pollutant specific mass emission rate measured at the inlet to the control device
PER_o = the pollutant specific mass emission rate measured at the outlet of the control device

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION (contd.)

(3) Condensers

The condenser control efficiency shall be determined based on the gas stream exit temperature of the condenser. The condenser gas stream exit temperature shall be measured using a thermometer calibrated to an accuracy of $\pm 2^\circ\text{F}$. The temperature measurement shall be conducted under a thermal load that is representative of the emission sources the condenser will control.

(4) Vapor Balance System

The control efficiency of a vapor balance system shall be determined by verification of system integrity and operation. A nominal control efficiency of 95 percent shall be assigned to all properly functioning vapor balance systems unless Cytec supplies measurement data sufficient to demonstrate a higher control efficiency. Method 27 of 40 CFR 60 Appendix A will be used to demonstrate vapor tightness. For the purposes of this section, a properly functioning vapor balance system shall be designed to operate such that a sealed line, showing no sign of leakage, is used to connect the receiving vessel to the charging vessel at all times during material transfer.

(5) Conservation Vent

The control efficiency of a conservation vent shall be determined based on verification of the pressure setting of the device. Pressure shall be measured with a gage having an accuracy of 10 percent of the pressure setting.

(e) New Emission Source Categories

- (i) For new emission sources subject to an applicable requirement which defines the emissions quantification method, Cytec shall quantify emissions consistent with the applicable requirement. If more than one applicable requirement defines the emissions quantification method for an emission source, Cytec shall quantify emissions using the method having the least uncertainty and which can be relied upon to demonstrate whether Cytec complies with each applicable requirement as identified in the emissions units section of this permit. Where this permit has not determined the method having the least uncertainty, the terms of each applicable requirement shall apply. If an applicable requirement does not specify an emissions quantification method that can be relied upon to demonstrate compliance, then emissions shall be quantified consistent with II(e)(ii) or (iii).
- (ii) For new emission sources or control equipment, subject to an applicable requirement which does not specify an emissions quantification method that can be relied upon to demonstrate compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, emissions shall be quantified using the methods provided in II (b) or (d) where applicable.

CYTEC TITLE V PERMIT EMISSIONS QUANTIFICATION SECTION (contd.)

- (iii) If the new source or control device cannot be represented by any of the categories contained in II(a) or II(c) of this section, emissions shall be quantified according to the following hierarchy:
- (A) If data is available, required, or warranted from continuous monitoring equipment which is installed, operated, and certified in accordance with a permit, order, or regulation issued or administered by the Commissioner or the Administrator, such data shall be used to determine the rate of emissions;
 - (B) If such continuous monitoring data is unavailable but stack testing data is available, required, or warranted such testing data shall be used to determine the rate of emissions, provided such testing was conducted in accordance with the procedures contained in 40 CFR 51 Appendices M and P, 40 CFR 60 Appendices A and F, 40 CFR 61 Appendices B and C, or 40 CFR 63 Appendices A and C, or approved by the Administrator; or
 - (C) If such stack testing is unavailable, the rate of emissions shall be calculated using data supplied by the manufacturer of the subject emissions unit, which data was derived from EPA approved emissions testing of such unit or similar unit performed by the manufacturer; or
 - (D) If such manufacturer's data is unavailable, the emissions rate shall be calculated using data derived from an analysis of pertinent material balances conducted by an individual with appropriate knowledge of the subject process where the emissions unit can be accurately monitored using a material balance; or
 - (E) If data from such a material balance analysis is unavailable, the emissions rate shall be calculated using data from "Compilation of Air Pollutant Emission Factors (AP-42)" published by EPA where there is an emission factor appropriate for the emission source; or
 - (F) If data from the above methods is unavailable or inappropriate, the emissions rate shall be calculated in accordance with a proposal submitted by Cytec and approved by the Commissioner in writing.

The permit shall be revised to define the emissions quantification method required for any new emission source covered under section II(e)(iii). Emissions quantification defined according to II(e)(iii)(A) through II(e)(iii)(E) shall be incorporated pursuant to the minor permit modification procedure. Emissions quantification defined according to II(e)(iii)(F) shall be incorporated pursuant to the significant modification procedure.

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION

I. PURPOSE

The purpose of this section is to describe the monitoring methods that will be employed and the monitoring data that will be recorded to demonstrate compliance with applicable requirements. Monitoring of air pollutant emissions from control devices as well as emission sources is described.

II. MONITORING METHODS

(a) Categories of Emission Sources

The categories of emission sources present at Cytec are described in the emissions quantification section.

(b) Emission Source Monitoring Methods

- (i) For any emission source subject to an applicable requirement which defines the monitoring requirements, Cytec shall perform monitoring consistent with the applicable requirement. If more than one applicable requirement defines the monitoring requirements for an emission source, Cytec shall perform that monitoring which is most precise, accurate, and continuous, and which can be relied upon to demonstrate whether Cytec complies with each applicable requirement as identified in the emissions units section of this permit. If an applicable requirement specifies monitoring not sufficient to yield data that can be relied upon to demonstrate compliance, then monitoring will be performed consistent with II(b)(ii).
- (ii) For any emission source subject to an applicable requirement which does not specify emissions monitoring sufficient to yield data that can be relied upon to determine compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, the following table lists the emissions monitoring parameters for each class of pollutant emitted from a source category.

SOURCE CATEGORY	POLLUTANT TYPE	PARAMETER	SENSITIVITY	MONITORING FREQUENCY
Batch or Semi-Continuous Processes	Gaseous	Number and type of batches processed	1 batch	Monthly
	Liquid/solid	Number and type of batches processed	1 batch	Monthly
Combustion	All	Type and volume of fuel burned	1 cf or 1 gal	Daily

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

SOURCE CATEGORY	POLLUTANT TYPE	PARAMETER	SENSITIVITY	MONITORING FREQUENCY
Direct Contact Cooling	All	Water volumetric flow	1 gal	Monthly
Equipment Leak Fugitives	Gaseous	Duration of pressurized service	1 hour	Monthly
Incineration	All	Mass of sludge treated	1 ton	Monthly
Landfill	All	Visual inspection		Periodic
Liquid Storage	Gaseous/ Vapor	Tanks contents, throughput	1 gal	Monthly
		Temperature if heated	1 °F	Monthly
Remediation	All	Mass of material processed	1 ton	Periodic
Wastewater Treatment	Gaseous	Volume of wastewater treated	1 gal	Daily
		TOC concentrations of influent and effluent	1 ppmw or 1 mg/l	Daily

Refer to the emissions units section and any notices attached to this permit for new emissions units for the specific monitoring method employed for a given emission source.

(c) Categories of Control Equipment

The categories of control equipment present at Cytec are described in the emissions quantification section.

(d) Control Equipment Monitoring Methods

Any control equipment that is needed to meet an emission limit that is part of an applicable requirement, or which is relied upon in demonstrating that a requirement is not applicable, or which is registered under the emissions limitation section of this permit shall be monitored in accordance with this subsection.

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

- (i) For any control device subject to an applicable requirement which defines the monitoring requirements, Cytec shall perform monitoring consistent with the applicable requirement. If more than one applicable requirement defines the monitoring requirements for a control device, Cytec shall perform that monitoring which is most precise, accurate, and continuous as identified in the emissions units section of this permit. If an applicable requirement specifies monitoring not sufficient to yield data that can be relied upon to determine compliance, then monitoring will be performed consistent with II(d)(ii) and II(d)(iii).

- (ii) For any control device subject to an applicable requirement which does not specify emissions monitoring sufficient to yield data that can be relied upon to determine compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, for which the control efficiency was determined in accordance with subsection II(d)(ii)(A) of the emissions quantification section of this permit, Cytec shall monitor those variables used to calculate control efficiency that most affect the emission rate as identified in the emissions units section of this permit.

- (iii) For any control device subject to an applicable requirement which does not specify emissions monitoring sufficient to yield data that can be relied upon to determine compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, for which the emission rate was established through testing in accordance with subsections II(d)(ii)(B) or II(d)(ii)(C) of the emissions quantification section of this permit, Cytec shall monitor each of the following parameters:

CONTROL DEVICE	OPERATING PARAMETER	MEASUREMENT SENSITIVITY	MEASUREMENT FREQUENCY
Baghouse	Pressure Drop	10 percent of design pressure drop	Recorded daily or trip alarm
Adsorber	Duration Between Bed Regeneration	10 percent of design cycle time	Periodic
	Duration Between Bed Replacement	Months	Periodic
Adsorber	Temperature of Inlet	2° F	Recorded every 6 minutes or trip alarm
	Volumetric Flow Rate	100 cfm or 1 percent of maximum flow rate	Recorded once per 4 hours
Condenser	Condenser Exit Temperature	2° F	Recorded once per minute or trip alarm

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

CONTROL DEVICE	OPERATING PARAMETER	MEASUREMENT SENSITIVITY	MEASUREMENT FREQUENCY
Electrostatic Precipitators	Power Supply	0.1 kW	Recorded once per minute
	Inlet Temperature	2° F	Recorded once per minute
Thermal Destruction Units	Operating Temperature	2° F	Recorded once per minute
	Exit Oxygen Concentration	0.1 percent	Recorded once per minute
Centrifugal Separators	Exhaust Flow Rate	100 cfm or 1 percent	Monthly
Scrubbers - Organic Vapor Pollutants	Scrubbing Liquid Feed Temperature	2° F	Recorded once per minute or trip alarm
Scrubbers - Gaseous Inorganic Pollutants	Scrubbing Liquid Feed pH	0.1 pH unit	Continuously indicated and trip alarm
Scrubbers - Solid Pollutants	Pressure Drop	10 percent of design pressure drop	Recorded once per minute or trip alarm

The value of each parameter that demonstrates compliance is specified in the emissions units section of this permit or on a notification submitted pursuant to the emissions limitation section of this permit.

- (iv) In the event of unexpected equipment failure or planned temporary maintenance, Cytec may monitor the following surrogate parameters in lieu of the parameters specified in II(d)(iii):

CONTROL DEVICE	OPERATING PARAMETER	MEASUREMENT SENSITIVITY	MEASUREMENT FREQUENCY
Baghouse	Visual Opacity	5 percent	Daily Method 9 observation
Adsorber	Hydrocarbon Concentration	5 ppmv	Recorded once per day
Electrostatic Precipitators	Visual Opacity	5 percent	Daily Method 9 observation

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

CONTROL DEVICE	OPERATING PARAMETER	MEASUREMENT SENSITIVITY	MEASUREMENT FREQUENCY
Thermal Destruction Units	Hydrocarbon Concentration	5 ppmv	Recorded once per day
Condenser	Condenser Liquid Feed Temperature	1° F	Recorded once per 6 minutes
Centrifugal Separators	Visual Opacity	5 percent	Monthly Method 9 observation
Scrubbers - Organic Vapor Pollutants	Scrubbing Liquid Source Temperature	1° F	Recorded hourly
Scrubbers - Gaseous Inorganic Pollutants	Liquid Feed Rate	10 percent of design feed rate	Recorded hourly
Scrubbers - Solid Pollutants	Liquid Feed Rate	10 percent of design feed rate	Recorded hourly

The value of each parameter that demonstrates compliance is specified in the emissions units section of this permit or on a notification issued pursuant to the emissions limitation section of this permit. In case of unexpected equipment failure, Cytec shall make reasonable effort to repair all affected equipment as soon as practical. In no case shall Cytec continue to operate equipment which is required to be monitored in accordance with II(d)(iii) while using surrogate parameters for more than 15 days, unless otherwise approved by DEP. Upon monitoring surrogate parameters in lieu of the parameters specified in II(d)(iii) Cytec shall notify DEP as soon as practical, but not later than seven business days.

(e) New Emission Source Categories

- (i) For a new emission source subject to an applicable requirement which defines the monitoring requirements, Cytec shall perform monitoring consistent with the applicable requirement. If more than one applicable requirement defines the monitoring requirements for an emission source, Cytec shall perform that monitoring which is most precise, accurate, and continuous, and which can be relied upon to demonstrate whether Cytec complies with all applicable requirements as identified in the emissions units section of this permit. If an applicable requirement specifies monitoring not sufficient to yield data that can be relied upon to determine compliance, then monitoring will be performed consistent with II(e)(ii).
- (ii) For a new emission source or control device, subject to an applicable requirement which does not specify emissions monitoring that can be relied upon to determine compliance, or for which an air pollutant emission rate is relied upon in demonstrating

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

that a requirement is not applicable, emissions shall be monitored using methods provided for in II (b) or (d) where applicable.

- (iii) If the new source or control device cannot be represented by any of the categories contained in II(a) or II(c) of this section, the emissions shall be monitored according to the following hierarchy:
- (A) If data is available, required, or warranted from continuous monitoring equipment installed, operated, and certified in accordance with a permit, order, or regulation issued or administered by the Commissioner or the Administrator, continuous monitoring shall be performed;
 - (B) If such continuous monitoring data is unavailable but stack testing data is available, required, or warranted, the emissions related parameters monitored during the stack test shall be measured to monitor emissions, provided such testing was conducted in accordance with the procedures contained in 40 CFR 51 Appendices M and P, 40 CFR 60 Appendices A and F, 40 CFR 61 Appendices B and C, or 40 CFR 63 Appendices A and C, or approved by the Administrator; or
 - (C) If such stack testing is unavailable, but the rate of emissions was determined using data supplied by the manufacturer of the subject emissions unit, which data was derived from EPA approved emissions testing of such unit or similar unit performed by the manufacturer, the emissions related parameters monitored during the stack test shall be measured to monitor emissions; or
 - (D) If such manufacturer's data is unavailable, but the emissions rate can be calculated using data derived from an analysis of pertinent material balances conducted by an individual with appropriate knowledge of the subject process where the emissions unit can be accurately monitored using a material balance, then the mass of materials involved in the balance shall be measured to monitor emissions;
 - (E) If data from such a material balance analysis is unavailable, but the emissions rate can be calculated using data from "Compilation of Air Pollutant Emission Factors (AP-42)" published by EPA where there is an emission factor appropriate for the emission source, then emissions shall be monitored by measuring the parameters included in the emission factor; or
 - (F) If data from the above methods is unavailable or inappropriate, emissions shall be monitored in accordance with a proposal submitted by Cytec and approved by the Commissioner in writing.

The permit shall be revised to define the monitoring required for any new emission source covered under section II(e)(iii). Monitoring defined according to II(e)(iii)(A) through II(e)(iii)(E) shall be incorporated pursuant to the minor permit modification procedure.

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

Monitoring defined according to II(e)(iii)(F) shall be incorporated pursuant to the significant permit modification procedure.

(f) Categories of Operational Limitations

The categories of operational limitations are described in the emissions limitation section.

(g) Operational Limitations Monitoring Methods

Any operational limitation that is needed to meet an emission limit that is part of an applicable requirement, or which is relied upon in demonstrating that a requirement is not applicable, or which is registered under the operational limitations section of this permit shall be monitored in accordance with this subsection.

- (i) For an operational limitation subject to an applicable requirement which defines the monitoring requirements, Cytec shall perform monitoring consistent with the applicable requirement. If more than one applicable requirement defines the monitoring requirements for an operational limitation, Cytec shall perform that monitoring which is most precise, accurate, and continuous as identified in the emissions units section of this permit. If an applicable requirement specifies monitoring not sufficient to yield data that can be relied upon to determine compliance, then monitoring will be performed consistent with II(d)(ii) and II(d)(iii).
- (ii) For an operational limitation subject to an applicable requirement which does not specify emissions monitoring sufficient to yield data that can be relied upon to determine compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, the following table lists the emissions monitoring parameters for the operational limitation:

OPERATIONAL LIMITATION	MONITORING METHOD	MEASUREMENT SENSITIVITY	MEASUREMENT FREQUENCY
Hours of Operation	Meter	Lesser of 1 hour or 1% of restriction	Continuous, as used
	Log Sheet	Lesser of 1 hour or 1% of restriction	Periodic, as used
Fuel or Raw Material Use	Meter	1% of restriction	Continuous, as used
	Log Sheet	1% of restriction	Periodic, as used
Concurrent Usage	Meter	As needed to show compliance	Continuous, as used
	Log Sheet	As needed to show compliance	Periodic, as used

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

The value of each parameter that demonstrates compliance is specified in the emissions units section of this permit or on a notification submitted pursuant to the emissions limitation section of this permit.

(h) Categories of Pollution Prevention Measures

The categories of pollution prevention measures are described in the emissions limitation section.

(i) Pollution Prevention Monitoring Methods

Any pollution prevention measure that is needed to meet an emission limit that is part of an applicable requirement, or which is relied upon in demonstrating that a requirement is not applicable, or which is registered under the pollution prevention measures section of this permit shall be monitored in accordance with this subsection.

- (i) For an pollution prevention measure subject to an applicable requirement which defines the monitoring requirements, Cytec shall perform monitoring consistent with the applicable requirement. If more than one applicable requirement defines the monitoring requirements for an pollution prevention measure, Cytec shall perform that monitoring which is most precise, accurate, and continuous as identified in the emissions units section of this permit. If an applicable requirement specifies monitoring not sufficient to yield data that can be relied upon to determine compliance, then monitoring will be performed consistent with II(d)(ii) and II(d)(iii).
- (ii) For an pollution prevention measure subject to an applicable requirement which does not specify emissions monitoring sufficient to yield data that can be relied upon to determine compliance, or for which an air pollutant emission rate is relied upon in demonstrating that a requirement is not applicable, the following table lists the emissions monitoring parameters for the pollution prevention measure:
 - (A) Operating practices that reduce air pollution generation
 - (B) Raw material substitutions
 - (C) Process and equipment design

POLLUTION PREVENTION MEASURE	MONITORING METHOD	MEASUREMENT SENSITIVITY	MEASUREMENT FREQUENCY
Operating Practice	Log of operating method	As needed to show compliance	Periodic, as used
Raw Material Substitution	Log of raw material used in process	As needed to show compliance	Periodic, as used

CYTEC TITLE V PERMIT EMISSIONS MONITORING SECTION (contd.)

The value of each parameter that demonstrates compliance is specified in the emissions units section of this permit or on a notification submitted pursuant to the emissions limitation section of this permit.

CYTEC TITLE V PERMIT PRE-APPROVED MODIFICATIONS SECTION

I. PURPOSE

This section describes the requirements for specific sources and categories of sources that Cytec may comply with in lieu of obtaining a NSR permit and Title V permit modification. Any new source or modification covered under this section must not be major as defined by RCSA 22a-174-1.

II. NSR GENERAL PERMITS

Cytec is allowed to construct and operate any emission source in compliance with a new source review general permit held by the DEP Commissioner after registering under such permit.

III. FUEL BURNING SOURCES

Cytec is allowed to construct and operate one boiler meeting the following operational parameters.

Fuel Type:	Natural Gas
Minimum stack height (ft):	_____
Minimum distance from stack to property line (ft):	70
Maximum fuel consumption over any consecutive 12 month period (mmft ³):	_____
Maximum gross heat input (MMBtu/hr):	99
Minimum exhaust gas flow rate (acfm):	_____
Design stack exit temperature used for dispersion modeling purposes (°F):	_____

If constructed, the boiler shall be subject to the following requirements:

(a) 40 CFR 60 Subpart Dc Requirements

The boiler shall be subject to the requirements of this Subpart, however, the only section to which the boiler will be subject is §60.48c (Reporting and recordkeeping requirements). Cytec shall fulfill the requirements of both §60.48c and the notification section of this permit.

(b) Minor source BACT requirement

A BACT analysis was performed for TSP, NO_x and CO. The following are the results of that analysis:

- (i) TSP emission limit: 0.0137 lb/MMBtu. Technique: Good combustion practices
- (ii) NO_x emission limit: 0.043 lb/MMBtu. Technique: FGR, Low NO_x burner.
- (iii) CO emission limit: 0.035 lb/MMBtu. Technique: Good combustion practices.

CYTEC TITLE V PERMIT PRE-APPROVED MODIFICATIONS SECTION (contd.)

[Note: the above values are under review and may be revised after further evaluation]

(c) Stack testing requirements

Cytec shall perform stack testing in accordance with the methods cited in RCSA 22a-174-5(b).

(d) Ambient Impact Analysis

A Stationary Source Stack Height Guideline Analysis was performed per RCSA 22a-174-3. The Good Engineering Practice (GEP) Stack Height was determined by the method described in 40 CFR 51.100(ii). The stack height shall be a minimum of ___ feet.

(e) HAP Emissions *[STATE-ONLY]*

The only HAP emitted by gas-fired boilers is formaldehyde. The boiler shall comply with the RCSA 22a-174-29 MASC of _____ $\mu\text{g}/\text{m}^3$.

IV. VOLATILE ORGANIC LIQUID STORAGE TANKS

Cytec is allowed to construct and operate any number of VOL storage tanks as described in this section subject to the following provisions and those set forth in the PAL section of this permit.

(a) 40 CFR 60 Subpart Kb Requirements

Tanks equal to or greater than 40 m^3 (10,567 gal) in size are subject to this Subpart as detailed below.

(i) §60.112b Standard for volatile organic compounds

Tanks meeting the following criteria are subject to this section:

CAPACITY, m^3 (gal)	VAPOR PRESSURE, kPa (psi)
≥ 151 (39,890)	≥ 5.2 (.75), < 76.6 (11.11)
≥ 75 (19813), < 151 (39,890)	≥ 27.6 (4.00), < 76.6 (11.11)

CYTEC TITLE V PERMIT PRE-APPROVED MODIFICATIONS SECTION (contd.)

These tanks shall install one of the following control schemes:

ID #	CONTROL SCHEME
1	Fixed roof with internal floating roof
2	External floating roof
3	Closed vent system with control device

(ii) §60.113b Testing and procedures

Tanks requiring control schemes shall be subject to the cited paragraphs of this section:

ID #	APPLICABLE PARAGRAPH
1	§60.113b(a)
2	§60.113b(b)
3	§60.113b(c)

(iii) §60.115b Reporting and recordkeeping requirements

Tanks requiring control schemes shall be subject to the cited paragraphs of this section:

ID #	APPLICABLE PARAGRAPH
1	§60.115b(a)
2	§60.115b(b)
3	§60.115b(c)

(iv) §60.116b Monitoring of operations

All tanks shall follow the monitoring requirements of both §60.116b and those set forth in the monitoring section of this permit.

CYTEC TITLE V PERMIT LIKE-KIND REPLACEMENT SECTION

I. PURPOSE

To establish a procedure that allows for the replacement of an emission source with identical equipment without the need for Cytec to obtain a RCSA 22a-174-3 NSR permit for the replacement.

II. APPLICABILITY

This section applies to all like-kind replacements of equipment not pre-approved elsewhere in this permit and not subject to a new applicable federally-enforceable requirement not addressed in the permit, so long as the following conditions are met. Any change that does not meet these conditions is subject to the requirements of RCSA 22a-174-3 and RCSA 22a-174-33, as applicable.

(a) Future Actual Emissions Test

The difference between the projected future actual emissions of the replacement and the current actual emissions of the replaced unit must be below state and federal preconstruction threshold levels. Emission increases at other emissions units resulting from the replacement shall be included in the projected future actual emissions of the replacement. Future actual emissions shall be calculated by multiplying the new emission rate by the current utilization rate or the projected utilization rate, whichever is greater.

(b) Emissions Determination and Monitoring

The emissions from the replacement unit can be quantified and monitored using methods provided for in the monitoring section of this permit.

III. FAILURE TO COMPLY

If over the life of the permit, it is determined that the like-kind replacement did not comply with the requirements of this section, the like-kind replacement would become subject to the requirements of RCSA 22a-174-3 as though construction had not commenced.

CYTEC TITLE V PERMIT PLANTWIDE APPLICABILITY LIMITATION (PAL) SECTION

I. PURPOSE

To establish a federal and state enforceable VOC emissions limitation for all VOC emitting activities at Cytec that complies with the requirements of Connecticut's SIP approved rules for PALs. Once established, subsequent physical or operational changes made consistent with the PAL will not be required to obtain a RCSA 22a-174-3 New Source Review (NSR) permit for VOC emission increases, but instead will be tracked as described below.

II. APPLICABILITY

Except for remediation activities treating contamination that was generated by a process not related to current or planned future activities, this section applies to all modifications to existing emissions units or the additions of new emissions units that would result in a change in the site's PTE for VOC, provided the following conditions are met. Any change that does not meet these conditions is subject to RCSA 22a-174-3 and the RCSA 22a-14-33 modification requirements, as applicable.

- (a) Emissions quantification methods for the new or modified emissions units are currently approved into the Title V permit as described in the quantification section of this permit.
- (b) Emissions monitoring requirements for the new or modified units are currently approved into the Title V permit as described in the monitoring section of this permit.
- (c) The following requirements shall apply to PCD's used for VOC control:
 - (i) Modifications Affecting PCD Performance

If a proposed modification would affect the performance of any PCD identified in this permit, other than a modification to the PCD itself, then Cytec shall determine the emission rate from the PCD that would result from the modification prior to implementing the modification. The determination of emission rate shall be conducted following the methods described in the emissions quantification section of this permit. Notwithstanding the aforementioned requirement, DEP may allow for a trial period of the modification for the purposes of emissions testing.

- (ii) Modifications to or Replacement of PCD Equipment

Cytec shall not modify or replace any PCD identified in this permit if the modification will increase anticipated actual VOC emissions from the site by more than the minor NSR permit modification threshold.

[The language of II(c)(ii) has been provided for illustration and is subject to refinement.]

- (iii) Operation of PCD Equipment

**CYTEC TITLE V PERMIT
PLANTWIDE APPLICABILITY LIMITATION (PAL) SECTION (contd.)**

Cytec shall operate any PCD identified in this permit in compliance with all applicable requirements, and in accordance with its operation and maintenance plan.

- (d) VOC emissions shall not exceed the PAL baseline as determined in condition III.
- (e) No new applicable federal requirement not addressed by the permit is triggered.

III. DETERMINATION OF PLANT-WIDE EMISSIONS LIMITATIONS BASELINE

- (a) The PAL baseline shall equal the total 1990 VOC emissions for the premise plus the major modification threshold level for VOC defined for the area (25 tpy).
- (b) The total 1990 VOC emissions shall equal the sum of the 1990 RACT emissions and the 1990 non-RACT emissions. The 1990 RACT emissions estimates shall be determined using 1990 RACT reported emissions adjusted to account for current emission estimation methods for each reported source type (CYRO, AC Molding, Resins and Central Services). The 1990 non-RACT emissions shall be determined by estimating 1994 non-RACT emissions and extrapolating those emissions to 1990 for each reported source type.

For 1990 RACT emissions:

1990 RACT emissions = 1990 VOC RACT order emissions * (1994 adjusted RACT emissions/1994 RACT order emissions)

For 1990 non-RACT emissions:

1990 non-RACT emissions = 1994 non-RACT VOC emissions * (1990 adjusted RACT emissions/1994 adjusted RACT emissions)

Total 1990 VOC emissions = 1990 RACT emissions + 1990 non-RACT emissions

- (c) If at any time during the life of this permit an additional requirement becomes applicable (e.g. Industrial Wastewater ACT), the PAL baseline shall be adjusted by determining the amount of emission reductions that the additional requirement would have achieved if applied during 1990 and subtracting the emission reductions from the PAL baseline. Any change in the PAL resulting from additional applicable requirements described in this permit shall be processed as a minor permit modification concurrent with incorporation of the additional requirements into this permit.
- (d) If at any time during the life of this permit the state approves the use of a revised quantification method for an emissions unit, the PAL baseline shall be adjusted by recalculating the 1990 baseline using the revised quantification method. Any change in the PAL resulting from quantification methods revised consistent with the emissions quantification section of this permit shall be processed as a minor permit modification concurrent with incorporation of the revised emission quantification procedure into this permit.

**CYTEC TITLE V PERMIT
PLANTWIDE APPLICABILITY LIMITATION (PAL) SECTION (contd.)**

- (e) The PAL baseline at the time of permit issuance is _____tpy. If during the permit life III(c) or III(d) is triggered, then the PAL baseline shall be recalculated using the procedure described in III(b). All future compliance requirements will be based on the most recent PAL baseline value.
- (f) If Cytec's actual emissions are less than the PAL, Cytec may not use or provide to any other party the difference as an emission offset or emission reduction credit.

IV. NOTIFICATION

Cytec shall notify DEP in writing of any activity under this section a minimum of 30 days before beginning the activity. The notification shall comply with the notification section of this permit.

V. COMPLIANCE

Actual VOC emissions for Cytec shall be calculated at the end of each month. The monthly emission total shall be added to the total aggregated actual emissions of the previous 11 months. The resultant 12 month actual emission total shall not exceed the PAL baseline.

VI. QUANTIFICATION

Cytec shall determine emissions under this section in accordance with the quantification section of this permit.

VII. MONITORING

Cytec shall conduct monitoring under this section in accordance with the monitoring section of this permit.

VIII. EMISSIONS ABOVE THE PAL

- (a) If Cytec applies pursuant to RCSA 22a-174-3 to increase the PAL baseline under III(e), the proposed increase shall be subject to the NSR requirements for a major modification.
- (b) If Cytec violates the PAL and cannot reduce its emissions to below PAL levels within three months, then each modification made pursuant to the PAL, beginning with the most recent, shall be subject to the NSR requirements for a major modification under RCSA 22a-174-3 until actual emissions decrease below the PAL baseline. If all modifications made pursuant to the PAL are subject to NSR and the emissions remain above the PAL baseline, then the remaining amount of emissions above the PAL baseline shall be offset at a ratio of 1.2 to

**CYTEC TITLE V PERMIT
PLANTWIDE APPLICABILITY LIMITATION (PAL) SECTION (contd.)**

1. If no modifications pursuant to the PAL occurred at the premise, then the amount of emissions above the PAL baseline shall be offset at a ratio of 1.2 to 1.
- (c) Notwithstanding the requirements of (a) and (b), any emissions above the PAL shall be a violation of this permit and the Clean Air Act.

CYTEC TITLE V PERMIT POLLUTION PREVENTION (P2) SECTION

I. P2 PLAN

(a) Conditions

Cytec shall develop and implement a pollution prevention plan in accordance with the conditions specified below:

- (i) Cytec shall submit a proposed pollution prevention plan to DEP within sixty (60) days of permit issuance.
- (ii) DEP will review and comment on the proposed plan within thirty (30) days with respect to program elements specified below.
- (iii) Cytec shall submit written response to DEP's comments and recommendations within thirty (30) days. Cytec shall incorporate DEP's recommendations or provide justification/explanation for rejecting the recommendations.
- (iv) DEP will notify Cytec within thirty (30) days as to the pollution prevention plan approval status.
- (v) The P2 Plan shall be contained outside of this permit. The requirement to have a plan containing the elements listed below shall be the only requirement of this permit. The details of the plan itself shall not be enforceable. Revisions to this plan will not trigger permit modifications and an inadequate plan will not cause a permit violation.
- (vii) Cytec shall make public its P2 efforts by conducting public outreach meetings annually.

(b) Elements

The P2 plan shall include, but not be limited to:

- (i) Corporate statement of commitment
- (ii) Pollution prevention definition
- (iii) Employee training and recognition program
- (iv) Existing and new process pollution prevention review procedures
- (v) Community outreach
- (vi) Product stewardship/customer and supplier outreach and recognition program
- (vii) Environmental reviews/audits
- (viii) Bench marking/plant key performance indicators

CYTEC TITLE V PERMIT POLLUTION PREVENTION (P2) SECTION (contd.)

- (ix) Pollution prevention metrics
- (x) Reporting/tracking procedures

II. P2 COMPONENT OF BACT DETERMINATIONS

(a) Purpose

To establish a procedure that allows the use of pollution prevention to meet a BACT limit. This section does not pre-approve a BACT level for Cytec.

(b) Applicability

Pollution prevention may be considered in all BACT reviews. Cytec shall perform the BACT analysis as described below.

(c) BACT Determination Approach

- (i) Cytec shall conduct a BACT analysis, if required by RCSA 22a-174-3, in the following manner:
 - (A) For sources being installed with potential emissions of less than minor new source review thresholds, BACT shall be satisfied when Cytec makes reference of a BACT determination for a similar or identical source made within the last five years, and which appears in the most recent RACT/BACT/LAER Clearinghouse.
 - (B) For sources being installed with potential emissions greater than minor new source review thresholds, a BACT review shall be conducted in accordance with the most recent DEP guidance.
 - (C) For sources being installed with potential emissions greater than major new source review thresholds, a BACT review shall be conducted in accordance with the most recent DEP and EPA guidance, incorporating the more stringent guidance if differing.
- (ii) Upon DEP review and approval, Cytec may satisfy the BACT requirements determined in (i) through implementation of any combination of the following measures:
 - (A) Pollution prevention at the proposed source
 - (B) Pollution prevention at a different source(s) (for minor new source review purposes only),
 - (C) Air pollution controls.

CYTEC TITLE V PERMIT POLLUTION PREVENTION (P2) SECTION (contd.)

- (iii) The emission reductions achieved through pollution prevention shall be permanent, real, and quantifiable. Only the offset of identical pollutants through pollution prevention shall be considered in BACT.

CYTEC TITLE V PERMIT REMEDIAL ACTIVITY SECTION

I. PURPOSE

This section describes the criteria for determining whether emissions from a remedial activity can be considered separate from emissions associated with other operations at the site with regard to significant modification determination, and if so how air pollutant emissions from the remedial activity will be addressed.

II. APPLICABILITY

Air pollutant emissions from remedial activities related to cleanup of material released from a process not included in the PAL baseline and not related to any current or anticipated operations at the site will ~~not~~ be considered independently from the primary site with regard to major modification determination. The determination described above will be based on the chemicals involved in the remediation, the location of the contaminated material, and operator knowledge of the source of the release. Cytec must perform emission calculations and an air pollutant evaluation for such remedial activities as are described in subsections III and IV. Emissions from all other remedial activities will be included with emissions from the rest of the site, including consideration under any PAL.

III. EMISSION CALCULATIONS

Cytec will estimate the maximum expected emissions associated with a remedial activity consistent with the emissions quantification section of this permit prior to commencing operation. If new information is obtained during the course of the remedial activity that could affect emissions, the maximum expected emissions will be reestimated.

IV. AIR POLLUTANT EVALUATION

- (a) Cytec will keep documentation needed to show compliance with the requirements to control hazardous air pollutants under RCSA 22a-174-29. If a MASC would be exceeded for a Table 1 compound, then Cytec shall obtain written approval from DEP prior to commencing the planned remedial activity, unless an imminent health hazard needs to be averted.
- (b) If the estimated air pollutant emissions associated with a planned remedial activity exceed the permit applicability levels established in RCSA 22a-174-3, Cytec shall perform all tasks that would be required for a new source review permit application, prior to commencing the planned remedial activity, unless an imminent health hazard needs to be averted.
- (c) If an imminent health hazard needs to be averted, the actions required under subsections (a) and (b) will be performed as soon as practical.

CYTEC TITLE V PERMIT NOTIFICATION SECTION

I. SEVEN DAY NOTIFICATION

(a) Cytec shall notify DEP in writing within seven days of the following:

- (i) Determining that an emissions unit meets the cost effectiveness criteria as set forth in the Batch Processes ACT as specified in the applicable requirements section of this permit.

(b) Cytec shall notify DEP in writing at least seven days prior to the following:

- (i) Installation of air pollution control devices for emissions units determined to meet the cost effectiveness criteria as set forth in the Batch Processes ACT as specified in the applicable requirements section of this permit.
- (ii) Addition or removal of an emission source vented to an air pollution control device registered under the emissions limitation section of this permit.
- (iii) Pre-approved new source review changes provided by this permit.
- (iv) Registration of air pollution control devices provided in the emissions limitation section of this permit.
- (v) Registration of on an operational limitation provided in the emissions limitation section of this permit.
- (vi) Registration of on a pollution prevention measure provided in the emissions limitation section of this permit.
- (vii) Initiation of an emissions averaging plan provided by this permit.
- (viii) Installation/modification of any emissions unit covered by the PAL provisions as specified in the PAL section of this permit.

Following notification, Cytec shall comply with the requirements specified in said notification. Each such notice shall be attached to this permit and be enforceable as an administrative amendment to this permit.

II. THIRTY DAY NOTIFICATION

At least thirty days prior to initiating the following actions, Cytec shall notify DEP in writing of such intended actions:

- (a) Initial startup of an affected facility which is subject to a New Source Performance Standard in 40 CFR 60, a National Emission Standard for Hazardous Air Pollutants in 40 CFR 61 or 63, or is a 112(g) source per 40 CFR 63 Subpart B, as specified in the applicable requirements section of this permit.

CYTEC TITLE V PERMIT NOTIFICATION SECTION (contd.)

- (b) Perform emission testing required to demonstrate compliance with an applicable requirement; or to demonstrate air pollution control efficiency pursuant to the quantification section of this permit.
- (c) Initial start-up of "like-kind" replacements as specified in the like-kind replacement section of this permit.
- (d) Creation of an operation and maintenance plan, and revisions to such plan, for air pollution control devices registered under the emissions limitation section of this permit.

Following notification, DEP will have thirty days to respond to the information contained in the notification and identify any objections. If an objection is raised by DEP, then Cytec shall revise and resubmit the notification to address the objection. Once notification has been submitted without objection, Cytec shall comply with the requirements as specified in said notification. Each such notice shall be attached to this permit and shall be enforceable as an administrative amendment to this permit.

III. INFORMATION

Notifications submitted to the DEP shall contain the following information, as applicable:

- (a) Equipment identification and description
- (b) Emissions unit identification and description
- (c) Location of the new/modified equipment/emissions unit
- (d) Anticipated date of completion of construction/modification
- (e) Anticipated date of commencement of operation
- (f) Compliance methodology provided in this permit
- (g) Quantification methodology provided in this permit
- (h) Monitoring methodology provided in this permit
- (i) Recordkeeping required by this permit
- (j) Reporting required by this permit
- (k) Anticipated emissions of each pollutant
- (l) Citations of the specific proposed MACT standards Cytec is using as the basis for the 112(g) MACT determination and with which Cytec shall comply.

CYTEC TITLE V PERMIT NOTIFICATION SECTION (contd.)

- (m) For like-kind replacements, current actual emissions of the replaced unit and the basis for the project future actual emissions.

IV. NEW APPLICABLE REQUIREMENTS

Cytec shall provide notification to DEP in accordance with all new applicable requirements to which Cytec becomes subject during the term of this permit. Cytec shall obtain all new source review permits and Title V modifications necessary to authorize operation under the new applicable requirements.

CYTEC TITLE V PERMIT RECORDKEEPING SECTION

Cytec shall record the total emissions of each pollutant emitted from an emissions unit that is needed to meet an emission limit that is part of an applicable requirement, or which is relied upon in demonstrating that a requirement is not applicable. The calculation of emissions shall be determined using the applicable quantification and monitoring methodology specified in this permit for each emission source and control equipment combination. For each requirement listed below the following records shall be made and kept at Cytec for at least five years from the date such data and information were obtained, and shall be made available to DEP upon request:

I. VOC RACT ORDER 8012

The recordkeeping requirements for the batch process vents which are not required by the order to achieve 85 percent control, are superseded with the Batch Processes ACT recordkeeping requirements described below. The following recordkeeping requirements supersede the requirements of State Order No. 8012.

(a) Carbon Adsorption Units

- (i) Actual life of each carbon bed
- (ii) Carbon adsorption air flow rate
- (iii) Inlet vapor stream temperature during the adsorption cycle
- (iv) Length of all desorption cycles
- (v) All monitoring data, test data, and calculations used to confirm 85 percent control

(b) Scrubbers

- (i) Operation and maintenance plan
- (ii) Preventive maintenance, breakdowns, and repairs shall be documented as to:
 - (A) Length of control equipment shutdown
 - (B) Amount of VOC emitted uncontrolled if any
 - (C) Description of the problem area
 - (D) Type of repairs performed
 - (E) A preventive maintenance schedule to avoid future failure
- (iii) All monitoring data, test data, and calculations used to confirm 85 percent control

CYTEC TITLE V PERMIT RECORDKEEPING SECTION (contd.)

(c) Emission Control Condensers

- (i) Automatically recorded temperatures, only during time of excursions, by a condenser vent monitoring system utilizing trip alarms
- (ii) All calculations used to confirm the alarm set points ensuring a minimum of 85 percent control

(d) Murray M64 Series Boiler (Boiler No. 4)

The following records shall be maintained if VOC liquid wastes are combusted in the boiler:

- (i) Two-hour interval stack temperatures
- (ii) Daily records of the amount of VOC consumed
- (iii) Annual records of total VOC's entering and destroyed in the boiler
- (iv) All monitoring data, test data, and calculations used to confirm a minimum 90 percent destruction efficiency

(e) VOC Fugitive Emission Control Program

- (i) Leak Definition
- (ii) Equipment to be inspected
- (iii) Inspection methods
- (iv) Inspection frequency
- (v) Corrective actions when leaks occur

II. BATCH PROCESSES ACT

- (a) Emission point identification
- (b) Emissions unit containing batch process from which emission point is vented
- (c) Annual mass emissions total in lb/yr, as defined by the Batch Processes ACT, and documentation verifying total
- (d) Annual average flow rate in scfm, as defined by the Batch Processes ACT, and documentation verifying average

CYTEC TITLE V PERMIT RECORDKEEPING SECTION (contd.)

- (e) For uncontrolled emission points, the maximum flow rate at which control would be cost effective as defined by the Batch Processes ACT
- (f) All monitoring data, test data, and calculations used to confirm 90 percent control

III. EMISSIONS AVERAGING

- (a) Identification and description of the emission sources that will comprise the emissions averaging plan
- (b) Emission calculations quantifying the RACT equivalent emission limitation, including the averaging period
- (c) Calculations of the total actual emission rate
- (d) Monitoring methods and data employed to determine the total actual emission rate, consistent with the monitoring section of this permit
- (e) Any calculations required to demonstrate compliance with RCSA 22a-174-29

IV. NO_x RACT ORDER 8114

- (a) Boilers

The following records shall be maintained on a monthly basis:

- (i) Heat input
- (ii) NO_x emissions
- (iii) Credits and debits generated for NO_x emissions averaging

- (b) Sludge Incinerator, Hot Oil Furnace, and Spray Dryer

The following records shall be maintained on a monthly basis:

- (i) Hours of operation
- (ii) NO_x emissions
- (iii) Credits and debits generated for NO_x emissions averaging

- (c) Other

CYTEC TITLE V PERMIT RECORDKEEPING SECTION (contd.)

- (i) Documentation regarding the number of discrete emission reductions (DER's) in Cytec's possession and used each month, as well as information to attest to the fact that DER's used during the ozone season were generated during the ozone season.
- (ii) Annual report on NO_x emissions for each unit included in the NO_x emissions averaging plan, and the quantity of fuel consumed, by type, during the previous calendar year. Each annual report shall include a demonstration that compliance with the conditions of the order was achieved for each month and with the annual emission limit in tons.

V. EMISSIONS LIMITATION REGISTRATION

- (a) Identification and description of the registered emissions limitation
- (b) Identification and description of all affected emission sources
- (c) Operation and maintenance plan for each affected control device
- (d) Information describing any process/equipment design selected that inherently reduces pollution formation

VI. EMISSIONS QUANTIFICATION

Unless otherwise required by this permit, Cytec shall maintain records of all required emissions quantification data and supporting information. Supporting information shall include as applicable:

- (a) the emission source ID and description
- (b) the emissions unit ID and description
- (c) the control device ID and description
- (d) the emissions quantification method used to determine emissions
- (e) the date, place, and time of sampling or measurements;
- (f) the date(s) analyses of such samples or measurements were performed;
- (g) the entity that performed the analyses;
- (h) the analytical techniques or methods used for such analyses;
- (i) the results of such analyses;

CYTEC TITLE V PERMIT RECORDKEEPING SECTION (contd.)

- (j) the operating conditions at the time of such sampling or measurement; and
- (k) all calibration and maintenance records relating to the instrumentation used in such sampling or measurements, all original strip-chart recordings or computer printouts generated by continuous monitoring instrumentation, and copies of all reports required.

VII. EMISSIONS MONITORING

Unless otherwise required by this permit, Cytec shall maintain records of all required monitoring data and supporting information. Supporting information shall include as applicable:

- (a) the emission source ID and description
- (b) the emissions unit ID and description
- (c) the control device ID and description
- (d) the type of monitoring, which may include recordkeeping, by which such data was obtained;
- (e) the date, place, and time of sampling or measurements;
- (f) the date(s) analyses of such samples or measurements were performed;
- (g) the entity that performed the analyses;
- (h) the analytical techniques or methods used for such analyses;
- (i) the results of such analyses;
- (j) the operating conditions at the time of such sampling or measurement; and
- (k) all calibration and maintenance records relating to the instrumentation used in such sampling or measurements, all original strip-chart recordings or computer printouts generated by continuous monitoring instrumentation, and copies of all reports required.

VIII. LIKE-KIND REPLACEMENT

- (a) Equipment identification and description
- (b) Emissions unit identification and description
- (c) Actual emissions of the replaced unit
- (d) Actual emissions of the replacement

CYTEC TITLE V PERMIT RECORDKEEPING SECTION (contd.)

IX. PAL

- (a) Emission source identification and description
- (b) Emissions unit identification and description
- (c) The 12 month rolling average emission rate of each VOC emitted
- (d) The cumulative 12 month rolling average emission rate of all VOC emitted from Cytec

X. OTHER REQUIREMENTS

All notices submitted pursuant to the notification section shall be attached to this permit during the entire permit term, including any extensions.

[This section will be further developed at a later date.]

CYTEC TITLE V PERMIT REPORTING REQUIREMENTS SECTION

I. MONITORING REPORTS

- (a) Cytec shall submit written monitoring reports to the Commissioner every six months. The monitoring report shall provide the following:
 - (i) the date and description of each deviation caused by upset or control equipment failures, each deviation from a permit requirement, and each violation of a permit requirement that has been monitored by the monitoring systems required under the Title V permit, which has occurred since the date of last monitoring report; and
 - (ii) the date and description of each occurrence of a failure of the monitoring system to provide reliable data.
- (b) Any monitoring report submitted to the Commissioner pursuant to this subsection shall be certified in accordance with RCSA 22a-174-33(b)(4).

II. PROGRESS REPORTS AND COMPLIANCE CERTIFICATIONS

- (a) As necessary, Cytec shall submit progress reports to the Commissioner every six months which are certified in accordance with subdivision RCSA 22a-174-33(b)(4) which report Cytec progress in achieving compliance under the compliance schedule in this permit. Such progress report shall:
 - (i) identify those obligations under the compliance schedule which the Cytec has met, and the dates by which they were met; and
 - (ii) identify those obligations under the compliance schedule which Cytec has not met in a timely manner, explain why they were not met, describe all measures taken or to be taken to meet such obligations and identify the date by which the Cytec expects to meet such obligations.
- (b) Cytec shall submit written compliance certifications to the Commissioner every 12 months which are certified in accordance with RCSA 22a-174-33 (b)(4) that identify the terms and conditions contained in this permit, including emission limitations. In addition, a compliance certification shall contain the following:
 - (i) a means for monitoring the compliance of the subject source with emissions limitations, standards, and work practices;
 - (ii) the identification of each permit term or condition with respect to which the certification is being made;
 - (iii) compliance status with respect to this permit;
 - (iv) whether compliance, with respect to this permit, was continuous or intermittent since the date of the previous compliance certification;

CYTEC TITLE V PERMIT REPORTING REQUIREMENTS SECTION (contd.)

- (v) the method(s) used for determining compliance status, currently and since the date of the previous compliance certification;
 - (vi) such other information as this permit may require to facilitate the Commissioner's determination of the compliance status of such source, and additional requirements specified pursuant to 40 CFR Part 70; and
 - (vii) whether the monitoring system, which may include recordkeeping, was functioning in accordance with this permit and RCSA 22a-174-33(q).
- (c) Any progress report pursuant to RCSA 22a-174-33(q)(1), or certification submitted pursuant to RCSA 22a-174-33(q)(2) to the Commissioner shall also be submitted to the Administrator.

III. DEVIATIONS

Within 7 days of becoming aware of a deviation from the terms and conditions of this permit, Cyttec shall report such occurrence to DEP.

APPENDIX A

AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR BATCH PROCESSES

Cytec estimates batch process air emissions using engineering calculations performed in a detailed and rigorous manner using equations shown in the attachment *[to be provided]*. As can be seen, the equations used are essentially identical to those detailed in OAQPS Guideline Series Control of Volatile Organic Emissions from Manufacture of Synthesized Pharmaceutical Products, EPA-450/2-78-029. Emissions from new products will be likewise estimated using the same fundamental equations and techniques.

Overall facility emissions, consisting of batch process models and other emission estimation techniques, reside in a software database. Batch process recipe steps are developed using the amount charged, temperatures, step durations, and equipment used from actual batch production sheets. Emissions from each step in each recipe are estimated using equations shown in the attachment. Vessel clean-ups, batch restrips, and tank throughputs are also included in the batch process model. Furthermore, the process equipment present at the Cytec Wallingford facility has been fully described and linked with associated pollution control devices and emission points in each model. Any new equipment which may be added in the future will be similarly described and linked.

In order to increase the estimation accuracy due to vapor-liquid equilibria of highly non-ideal mixtures, proprietary multi-component distillation process design software is utilized to predict vapor compositions above different liquid mixtures at different temperatures. This software uses well-recognized numerical techniques to accurately account for the interaction of end-groups of various chemical species present. Other sources of information for the batch process models include equipment manufacturers' design specifications and source testing previously performed for compliance assurance.

In order to calculate the emissions for a given time period or for a given number of batches of specified products, Cytec needs only to input the number of batches, clean-ups, restrips, and tank throughputs into the database. The database then calculates speciated pollutant discharge amounts for the emission points. As equipment changes are made or new recipes are formulated, the linkages are updated and/or new models are composed using the same fundamental equations and methodology employed for existing equipment and recipes.

APPENDIX B

AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR REMEDIAL ACTIVITIES

REMEDIAL ACTIVITY	DESCRIPTION	EMISSION ESTIMATION MODEL
IN-SITU GROUNDWATER TREATMENT		
Air Sparging	Extraction of contaminants by forced air injection.	1
Bioremediation	Inject nutrients/oxygen to enhance natural biodegradation of organics.	2
EX-SITU GROUNDWATER TREATMENT		
Air Stripping	Removal of volatiles by passing through air stream.	3
Bioremediation	Removal of organics in bio-reactor.	4
Carbon Adsorption	Removal of organics in carbon bed column.	Confirm no source of emissions
UV Treatment	UV light bombardment in transparent chamber.	Confirm no source of emissions
IN-SITU SOIL TREATMENT		
Air Sparging	Extraction of contaminants by forced air injection.	1
Bioremediation	Biodegradation of organic constituents by indigenous microorganisms aided by inducing air flow and adding nutrients.	2
Plasma Arc Injection	Passing high energy plasma arc through contaminated site.	Manufacturer's Data ¹
Soil Vapor Extraction	Extraction of soil vapor using pressure gradient.	5
EX-SITU SOIL TREATMENT		
Bioremediation	Extraction of soil with subsequent treatment in a bio-reactor.	6
Combustion	Combustion of extracted volatiles.	7
Composting	Excavation of soil and transfer onto piles within which microbial growth is stimulation by aeration and addition of minerals, nutrients, and moisture.	8
Removal/ Transport Off-Site	Extraction of soil with subsequent shipment off-site.	8
Solidification/ Stabilization	Extraction of soil with subsequent mixing with stabilizing chemicals to prevent pollutant migration.	8
Thermal Destruction	Destruction of contaminants in soil by exposure to temperatures typically within range of 1500° F to 2000° F.	7
Thermal Desorption	Volatilization of contaminants from soil by exposure to temperatures typically within range of 500° F to 900° F.	9

¹ Derived from testing performed in accordance EPA approved methods

AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR REMEDIAL ACTIVITIES (contd.)

DESCRIPTIONS OF MODELS

MODEL 1:

Description: Aqueous System with Off-Gassing Equation

$$ER = \frac{Q H C 1.0}{RT}$$

where: ER = emission rate [g/s]
Q = off-gas rate [m³/min]
H = Henry's Law constant [atm·m³/mole]
C = concentration of contaminant in water [mg/liter]
R = gas constant [8.206x10⁻⁵ atm·m³/mole·K]
T = absolute temperature [K]
1.0 = conversion factor [g/mg to liters/m³]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 4.4, March 1993.

Assumptions: None

MODEL 2:

Description: Bioventing Emissions Equation

$$ER_{AVG} = (M)(BE/100)/t = S_v C (BE/100) (1.0) \beta/t$$

where: ER_{AVG} = average emission rate of contaminant i [g/s]
M = total mass of contaminant i in soil [g]
BE = bioremoval efficiency [%], typically 80 to 90 percent
t = duration of remediation [s]
S_v = volume of contaminated soil to be treated [m³]
C = average concentration of contaminant i in soil [μg/g]
β = bulk density of soil [g/cm³]
1.0 = conversion factor [μg/cm³ to g/m³]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 3.2, March 1993.

Assumptions: Default bioremoval efficiency = 85 percent

AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR REMEDIAL ACTIVITIES (contd.)

MODEL 3:

Description: Air Stripper Mass Balance Equation

$$ER = C L (SE/100)(1.67 \times 10^{-5})$$

where: ER = emission rate of contaminant i [g/s]
C = concentration of contaminant i in water [mg/L]
L = influent flow rate [liters/m]
SE = stripping efficiency [%]
 1.67×10^{-5} = conversion factor from [mg/m] to [g/s]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 3.1, March 1993.

Assumptions: Stripping efficiency can be determined based on Henry's Law constants as described in the Industrial Waste Water ACT.

MODEL 4:

Description: Bioslurry Process Equation

$$ER = (Q/60)(C/1000)(V/100)$$

where: ER = emission rate of contaminant i [g/s]
Q = volume rate of treated slurry [liters/min]
C = concentration of contaminant i in slurry [mg/liter]
V = percentage of contaminant i volatilized [%]
60 = conversion factor [s/min]
1000 = conversion factor [mg/g]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 4.4, March 1993.

Assumptions: Percentage volatilized can be approximated based on Henry's Law constant as described in Section 4.4 of the cited source document. If no Henry's Law constant is available assume 80% is volatilized.

AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR REMEDIAL ACTIVITIES (contd.)

MODEL 5:

Description: Soil Vapor Extraction

$$ER_{AVG} = M/t = S_v C (1.0) \beta/t$$

where: ER_{AVG} = average emission rate of contaminant i [g/s]
M = total mass of contaminant i in soil [g]
t = duration of remediation [s]
 S_v = volume of contaminated soil to be treated [m³]
C = average concentration of contaminant i in soil [μg/g]
 β = bulk density of soil [g/cm³]
1.0 = conversion factor [μg/cm³ to g/m³]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 3.2, March 1993.

Assumptions: None

MODEL 6:

Description: Bioslurry Process Equation

$$ER = (Q/60)(C/1000)(V/100)$$

where: ER = emission rate of contaminant i [g/s]
Q = volume rate of treated slurry [liters/min]
C = concentration of contaminant i in slurry [mg/liter]
V = percentage of contaminant i volatilized [%]
60 = conversion factor [s/min]
1000 = conversion factor [mg/g]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 4.4, March 1993.

Assumptions: Percentage volatilized can be approximated based on Henry's Law constant as described in Section 4.4 of the cited source document. If no Henry's Law constant is available assume 80% is volatilized.

AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR REMEDIAL ACTIVITIES (contd.)

MODEL 7:

Description: Thermal Destruction Equation

$$ER = 0.278 \times 10^{-6} F_T C (1 - DRE/100)$$

where:

- ER = emission rate of contaminant i [g/s]
- F_T = total feed rate of material treated [kg/hr]
- C = concentration of contaminant i [$\mu\text{g/g}$]
- DRE = destruction and removal efficiency of contaminant [%]
- 0.278×10^{-6} = conversion factor [$\text{g}^2 \cdot \text{hr} / \text{kg} \cdot \mu\text{g} \cdot \text{s}$]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 3.3, March 1993.

Assumptions: Destruction and removal efficiency can be approximated as described in Section 3.3 of the cited source document.

MODEL 8:

Description: Excavation Equation

$$ER = ER_{\text{DIFF}} + ER_{\text{PS}}$$

$$ER_{\text{DIFF}} = \frac{(C_s)(10,000)(SA)}{1.22 \times 10^6 (C_s/P) + (1.79 \times 10^9 (C_s/P))^{1/2}}$$

$$ER_{\text{PS}} = \text{Minimum of: } \begin{matrix} 0.98 P Q & \text{or;} \\ 10^6 S_v C_s (0.33/t_{sv}) \end{matrix}$$

where:

- ER = total emission rate of contaminant i [g/s]
- ER_{DIFF} = diffusion emission rate of contaminant i [g/s]
- ER_{PS} = soil porosity emission rate [g/s]
- C_s = mass loading of contaminant i in soil [g/cm^3]
- SA = area of emitting surface [m^2]
- P = vapor pressure of contaminant i [mmHg]
- Q = excavation rate [m^3/s]
- S_v = volume of soil to be excavated [m^3]
- t_{sv} = time to excavate soil volume [s]
- 10,000 = conversion factor [cm^2/m^2]
- 1.22×10^6 = conversion factor [$\text{cm}^2 \cdot \text{s} \cdot \text{mmHg}/\text{g}$]
- 1.79×10^9 = conversion factor [$\text{s}^2 \cdot \text{cm} \cdot \text{mmHg}/\text{g}$]
- 0.98 = conversion factor [$\text{g}/\text{mmHg} \cdot \text{m}^3$]
- 10^6 = conversion factor [cm^3/m^3]

AIR POLLUTANT EMISSIONS ESTIMATION METHODS FOR REMEDIAL ACTIVITIES (contd.)

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 4.1, March 1993.

Assumptions: The soil pore space vapor pressure of contaminants can be approximated as described in Section 4.1 of the cited source document.

MODEL 9:

Description: Thermal Desorption Equation

$$ER = (C/1000)(F_T/1000)(V/100)$$

where: ER = emission rate of contaminant i [g/s]
C = concentration of contaminant i [$\mu\text{g/g}$]
 F_T = total feed rate of material treated [kg/hr]
V = percentage of contaminant i volatilized [%]
1000 = conversion factor [$\text{g}^2/\text{kg}\cdot\mu\text{g}$]
3600 = conversion factor [s/hr]

Source: USEPA, EPA-451/R-93-001, Air/Superfund National Technical Guidance Study Series - Models for Estimating Air Emission Rates from Superfund Remedial Actions, Section 3.4, March 1993.

Assumptions: Percentage volatilized can be approximated based on compound type and desorber temperature as described in Section 3.4 of the cited source document.