

217/782-2113

"REVISED"
TITLE V - CLEAN AIR ACT PERMIT PROGRAM (CAAPP) PERMIT
and
TITLE I PERMIT¹

PERMITTEE

Akzo Nobel Surface Chemistry LLC
Attn: George Yanku, Environmental Manager
Post Office Box 310
South Tabler Road, South of U. S. Route 6
Morris, Illinois 60450

Application No.: 96030158 I.D. No.: 063800AAE
Applicant's Designation: Date Received: March 8, 1996
Operation of: Organic Chemical Processing Plant
Date Issued: August 11, 2000 Expiration Date²: August 11, 2005
Source Location: Tabler Rd., S. of U. S. Route 6, Morris, Grundy County
Responsible Official: John Taylor, Vice President

This permit is hereby granted to the above-designated Permittee to OPERATE an organic chemical processing plant, pursuant to the above referenced permit application. This permit is subject to the conditions contained herein.

Revision Date Received: March 4, 2002
Revision Date Issued: TO BE DETERMINED
Purpose of Revision: Significant Modification

This significant modification incorporates conditions from Permit 97090063, revised on November 27, 2002. In sections 7.6 and 7.7, the VOM emission factors for the Quaternary Ammonium Salt and Arquad Processes are revised based on stack test data, and production limits are revised based on the new factors. There is no increase in annual emission limits.

If you have any questions concerning this permit, please contact Jonathan Sperry at 217/782-2113.

Donald E. Sutton, P.E.
Manager, Permit Section
Division of Air Pollution Control

DES:JS:psj

cc: Illinois EPA, FOS, Region 1
CES
Lotus Notes

¹ This permit may contain terms and conditions which address the applicability, and compliance if determined applicable, of Title I of the CAA and regulations promulgated thereunder, including 40 CFR 52.21 - federal PSD and 35 IAC Part 203 - Major Stationary Sources Construction and Modification. Any such terms and conditions are identified within this permit.

² Except as provided in Condition 8.7 of this permit.

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1.0 SOURCE IDENTIFICATION

1.1 Source

Akzo Nobel Surface Chemistry LLC
South Tabler Road, South of U. S. Route 6
Morris, Illinois 60450
815/942-6200 (Ext. 250)

I.D. No.: 063800AAE
Standard Industrial Classification: SIC 2869, Industrial Organic
Chemicals Manufacturing

1.2 Owner/Parent Company

Akzo Nobel Chemicals Inc.
300 South Riverside Plaza
Chicago, Illinois 60606

1.3 Operator

Akzo Nobel Surface Chemistry LLC
South Tabler Road, South of U. S. Route 6
Morris, Illinois 60450

George Yanku, Environmental Manager
708/447-7990 (Ext. 237)

1.4 General Source Description

The Akzo Nobel Surface Chemistry LLC chemical plant is located on South Tabler Road, south of U.S. Route 6 in Aux Sable Township, Morris, Illinois. The source operates an industrial organic chemicals manufacturing plant. The source manufactures various organic chemicals, including surfactants and fabric softeners.

2.0 LIST OF ABBREVIATIONS/ACRONYMS USED IN THIS PERMIT

ACMA	Alternative Compliance Market Account
Act	Illinois Environmental Protection Act [415 ILCS 5/1 et seq.]
AP-42	Compilation of Air Pollutant Emission Factors, Volume 1, Stationary Point and Other Sources (and Supplements A through F), USEPA, Office of Air Quality Planning and Standards, Research Triangle Park, NC 27711
ATU	Allotment Trading Unit
BAT	Best Available Technology
Btu	British thermal unit
°C	degrees Celsius
CAA	Clean Air Act [42 U.S.C. Section 7401 et seq.]
CAAPP	Clean Air Act Permit Program
CFR	Code of Federal Regulations
CO	Carbon Monoxide
ERMS	Emissions Reduction Market System
°F	degrees Fahrenheit
ft ³	cubic feet
gal	gallon
HAP	Hazardous Air Pollutant
hr	hour
IAC	Illinois Administrative Code
ILCS	Illinois Compiled Statutes
I.D. No.	Identification Number of Source, assigned by Illinois EPA
Illinois EPA	Illinois Environmental Protection Agency
K	degrees Kelvin
kg	kilogram
kPa	kilopascals
kW	kilowatts
LAER	Lowest Achievable Emission Rate
lb	pound
lb-mol	pound mole
MACT	Maximum Achievable Control Technology
Mg	megagram
mmBtu	Million British thermal units
mmHg	millimeters of mercury
mo	month
MW	megawatt
MW-hr	megawatt hour
NESHAP	National Emission Standards for Hazardous Air Pollutants
NO _x	Nitrogen Oxides
NSPS	New Source Performance Standards
PM	Particulate Matter

PM ₁₀	Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 microns as measured by applicable test or monitoring methods
ppm	parts per million
ppmv	parts per million by volume
PSD	Prevention of Significant Deterioration
psia	pounds per square inch absolute
°R	degrees Rankin
RMP	Risk Management Plan
scf	standard cubic feet
SIC	Standard Industrial Code as defined in the 1987 edition of the Federal Standard Industrial Classification Manual
SO ₂	Sulfur Dioxide
T	ton
T1	Title I - identifies Title I conditions that have been carried over from an existing permit
T1N	Title I New - identifies Title I conditions that are being established in this permit
T1R	Title I Revised - identifies Title I conditions that have been carried over from an existing permit and subsequently revised in this permit
USEPA	United States Environmental Protection Agency
VOC	Volatile Organic Compound
VOL	Volatile Organic Liquid
VOM	Volatile Organic Material
yr	year

3.0 INSIGNIFICANT ACTIVITIES

3.1 Identification of Insignificant Activities

The following activities at the source constitute insignificant activities as specified in 35 IAC 201.210:

- 3.1.1 Activities determined by the Illinois EPA to be insignificant activities, pursuant to 35 IAC 201.210(a)(1) and 201.211, as follows:

Syltherm Hot Oil Heater (386-601)
800 Lb Steam Boiler (375-010)
400 Gallon Gasoline Storage Tank
Methyl Chloride Storage Tanks (309-201.1, 309-201.2)
Hot Oil Heater (390-601)

- 3.1.2 Activities that are insignificant activities based upon maximum emissions and that do not emit any hazardous air pollutants, pursuant to 35 IAC 201.210(a)(2) or (a)(3), as follows:

Ammonia Unloading Spot #2
Amines Loading Spot #3, 4, and 5
Methyl Chloride Unloading Spot
Arquad Products Loading Spot #7
MDEA Unloading Spot
Ethanol and Isopropyl Alcohol Unloading Spot
Quaternary Products Loading Spot #8
Raw Material Unloading Spots 1-A, 1-B, 1-C, 1-1, and 1-2
Half Crude Loading and Fatty Acid Loading and Unloading Spot
Batch Hydrogenation Products Loading Spot
Solar Salt Unloading Spot
Liquid Hydrogen Unloading Spot
Pitch and Catch Basin Unloading Spot
Brine Loading Spot
Diluent Storage Tank A-31 (309-203)
Sodium Hydroxide Storage Tank (309-202)
Diluent Storage Tank A-32 (309-207)
Arquad Storage Tanks A1-7 and A10-12 (309-204.1 through 204.3, 309-205, 309-222, 309-226 through 231)
Alkyl Acid Storage Tank R-9 (301-058)
Amine Storage Tank A-10 (309-225)
Diluent Storage Tank (309-221)
Nitrile Storage Tanks N1-7, N10, and N11
Chips Storage Tank N-9 (302-048)
Crude Nitrile Storage Tanks T1 and T2 (310-203.1 and 310-203.2)
Sulfuric Acid Storage Tanks
Product Storage Tanks F1-15, F17, F19-22, F25-27, and F33-39
Residue Tank W-3 (395-019)

Waste Fat Storage Tank W-5 (309-206)
 Amine Storage Tank H-10 (389-208)
 Waste Hydrogen Gas Surge Tank (387-301)
 Emergency Liquid Hydrogen Storage System
 Fat Storage Tanks R1, R2, R8, and R9
 Vacuum System (301-020, 301-021, and 301-026)
 Process Feed Water Tank R30 (301-024)
 Half Crude Settling Tanks R20-23
 Alkyl Amide or Acid Storage Tanks R3-5 and R10-12
 Amine Still Vacuum Systems (308-601 and 308-605)
 Amine Still Hotwell (308-303)
 Bio-Oxidation Surge Tank W-1 (395-012)
 Bio-Oxidation Tanks (395-033 and 395-033.2)
 Spray Irrigation Reservoir
 Sanitary Lift Station (395-011)
 Sanitary Feed Station (395-053)
 Sanitary Sewage Treatment (395-010)
 Contaminated Water Surge Tank
 Fat Skimming Tank
 Glycol Storage Finished Products
 Glycol Storage Tank (387-201) and Expansion Tank
 Glycol Storage Tank (309-206) and Expansion Tank
 Maintenance Building (#11) Vents
 South Ditch Environmental Area
 Brine Reclaim Tank
 Waste Brine Tank
 Brine Tank
 Quaternary Hypophosphorous Acid Drum
 Wastewater Tank A-30 (395-202)
 North Cooling Tower
 South Cooling Tower
 Safety-Kleen Parts Washer
 Maintenance Building Vent
 Warehouse Building Vent
 Bio-Oxidation Treatment Building Vent
 Fire Pump House Vent
 Boiler House Roof Vents
 Batch Hydrogenation Filter Building Vents and Spent
 Catalyst Drum Exhaust Fan (306-101)
 Laboratory Denatured Alcohol Storeroom Vent
 Arquad Waste Water Filter Building Vent
 Keene Filter Building Vent
 Warehouse Storage Building Vent
 Nitrogen Derivatives Treatment Building Vent/Exhaust
 Fans
 North Cooling Tower Chemical Addition Building Vent
 Raw Material Area Separator, Drip Pans, and Trenches
 Half Crude Loading Sump
 Raw Material Railcar Unloading Sump
 Nitrogen Derivatives Treatment Separator
 Amine/MDEA Unloading Sump
 Nitrile Area Separator
 Batch Hydrogenation Area Separators
 Finished Product Loading and Unloading Sump

Hydrogen Purification Pad Sump
Laboratory Waste Water Sump
Amine Separator
Arquad Area Separator and Process Trenches
Arquad Area Loading and Unloading Sump
Warehouse Sump
Unloading Waste Heat Boiler Bag House
Environmental Area Separator
Drum Melter Area Separator
Boiler Blowdown Neutralization Tank
65 Acre Field/Spray Irrigation
16 Acre Field Reservoir
16 Acre Field Return Sump
Outfall 001 Return Sump
Pitch Unloading Area Sump
Outside Lubrication Oil Storage Sump
Boiler Deaerator (374-301)
Nalco 7200 Boiler Feed Water Treatment Storage Tank
Boiler Blowdown Surge Tank
Vent Knockout Drum (to flare stack)
Pump Seal Oil Storage Tank
Ammonia Storage Tank (389-001)
Amine Product Storage Tank All (309-224)
Hydrogen Purification Process
Fat Splitter (301-033)
Fat Deaerator (301-019)
Vacuum System Precondenser (301-020)
Vacuum System Aftercondenser (301-021)
Alkyl Acid Dehydrator (301-034)
Glycerine Evaporators (301-044 and 301-048)
Evaporator Intercondenser (301-049)
Evaporator Ejector (301-051)
Aftercondenser (301-050)
Fat Filter (301-017)
Fire Water Pond
Syltherm Expansion and Relief Tanks
800 Lb Steam Boiler Feedwater Surge Tank (375-017)
Bicarbonate Slurry Tank (309-304)
Arquad Sludge Storage Tank (311-307)
Arquad Sludge Filter Press (311-512)
Arquad Clay Slurry Tank
Amine Still Flash Chamber (308-301)
Amine Still Condenser (308-402)
Amine Still Receiver (308-302)
Arquad Control Building Hood
Arquad Polish Filter (309-502)
Arquad Polish Filter Building Vent
Arquad Bag Filter (309-520 and 309-521)
Dowtherm Hot Oil Filter (388-005)
Dowtherm Expansion and Relief Tanks
Dowtherm Make-Up Drum (388-007)
Waste Heat Boiler
Combustible Vent Seal Pots (395-301 and 395-034.1)
Absorber Vent Seal Pot (395-034.2)

Waste Fat Bag Filter (396-103)
Enviro Polishing Filter (395-207)
Drum Unloading Pump Tank (395-208)
Drum Melter Building Fan (395-211)
Hose House Vent
North and South Boiler Feedwater Chemical Tanks
Laboratory Building Hoods
Lab Solvent Storage Locker Vent
Fatty Acid Storage Tank (301-203)
Steam Cleaner Tank (308-312)
Glycol Tank (308-315)
4 Amine Storage Tanks F-40, 41, 42, 43 (389-207.7, 8,
9, 10)
Tank F-22 (389-211)
Amine Still #2 Process Column (308-310)
Amine Still #2 Condenser (308-418)
Amine Still #2 Receiver (308-311)
Amine Still #2 Vacuum System (308-605)
Amine Still #2 Dehydrator (308-309)
Fatty Acid Still Glycol Storage Tank (315-230)
Fatty Acid Still Overhead Tank (315-303)
Fatty Acid Still Hotwell (315-322)
Cooling Towers
Precut Overhead Day Tank (315-303)
Tank (309-502)
Fire Water Pump (West)

3.1.3 Activities that are insignificant activities based upon their type or character, pursuant to 35 IAC 201.210(a) (4) through (18), as follows:

Direct combustion units designed and used for comfort heating purposes and fuel combustion emission units as follows: (A) Units with a rated heat input capacity of less than 2.5 mmBtu/hr that fire only natural gas, propane, or liquefied petroleum gas; (B) Units with a rated heat input capacity of less than 1.0 mmBtu/hr that fire only oil or oil in combination with only natural gas, propane, or liquefied petroleum gas; and (C) Units with a rated heat input capacity of less than 200,000 Btu/hr which never burn refuse, or treated or chemically contaminated wood [35 IAC 201.210(a) (4)].

Equipment used for filling drums, pails, or other packaging containers, excluding aerosol cans, with soaps, detergents, surfactants, lubricating oils, waxes, vegetable oils, greases, animal fats, glycerin, sweeteners, corn syrup, aqueous salt solutions, or aqueous caustic solutions [35 IAC 201.210(a) (8)].

Storage tanks of organic liquids with a capacity of less than 10,000 gallons and an annual throughput of

less than 100,000 gallons per year, provided the storage tank is not used for the storage of gasoline or any material listed as a HAP pursuant to Section 112(b) of the CAA [35 IAC 201.210(a)(10)].

Gas turbines and stationary reciprocating internal combustion engines of between 112 kW and 1,118 kW (150 and 1,500 horsepower) power output that are emergency or standby units [35 IAC 201.210(a)(16)].

Loading and unloading systems for railcars, tank trucks, or watercraft that handle only the following liquid materials, provided an organic solvent has not been mixed with such materials: soaps, detergents, surfactants, lubricating oils, waxes, glycerin, vegetable oils, greases, animal fats, sweetener, corn syrup, aqueous salt solutions, or aqueous caustic solutions [35 IAC 201.210(a)(18)].

3.1.4 Activities that are considered insignificant activities pursuant to 35 IAC 201.210(b).

3.2 Compliance with Applicable Requirements

Insignificant activities are subject to applicable requirements notwithstanding status as insignificant activities. In particular, in addition to regulations of general applicability, such as 35 IAC 212.301 and 212.123 (Condition 5.2.2), the Permittee shall comply with the following requirements, as applicable:

3.2.1 For each cold cleaning degreaser, the Permittee shall comply with the applicable equipment and operating requirements of 35 IAC 215.182, 218.182, or 219.182.

3.2.2 For each particulate matter process emission unit, the Permittee shall comply with the applicable particulate matter emission limit of 35 IAC 212.321 or 212.322. For example, the particulate matter emissions from a process emission unit shall not exceed 0.55 pounds per hour if the emission unit's process weight rate is 100 pounds per hour or less, pursuant to 35 IAC 266.110.

3.2.3 For each organic material emission unit that uses organic material, e.g., a mixer or printing line, the Permittee shall comply with the applicable VOM emission limit of 35 IAC 215.301, 218.301, or 219.301, which requires that organic material emissions not exceed 8.0 pounds per hour or do not qualify as photochemically reactive material as defined in 35 IAC 211.4690.

3.3 Addition of Insignificant Activities

- 3.3.1 The Permittee is not required to notify the Illinois EPA of additional insignificant activities present at the source of a type that is identified in Condition 3.1, until the renewal application for this permit is submitted, pursuant to 35 IAC 201.212(a).
- 3.3.2 The Permittee must notify the Illinois EPA of any proposed addition of a new insignificant activity of a type addressed by 35 IAC 201.210(a) and 201.211 other than those identified in Condition 3.1, pursuant to Section 39.5(12)(b) of the Act.
- 3.3.3 The Permittee is not required to notify the Illinois EPA of additional insignificant activities present at the source of a type identified in 35 IAC 201.210(b).

4.0 SIGNIFICANT EMISSION UNITS AT THIS SOURCE

Emission Unit	Description	Date Constructed	Emission Control Equipment
Nitrogen Derivative Treatment Unit			
310-301.1	Reactor/Treater	10/1/1983	Afterburner 396-003 (via vacuum separator, Mode A only)
310-301.2	Reactor/Treater	10/1/1983	Afterburner 39-003 (via vacuum separator, Mode A only)
310-602	Clay Storage Silo and Conveyor System	10/1/1983	Clay Silo Vent Filter 310-602j
310-904	Treater Vacuum System	10/1/1983	Afterburner 39-003 (Mode A Only)
310-303	Intermediate Slurry Tank	10/1/1983	Afterburner 396-003 (Mode A Only)
310-304.1	Clay Recycle Slurry Tank	10/1/1983	Afterburner 396-003 (Mode A Only)
310-304.2	Clay Recycle Slurry Tank	10/1/1983	Afterburner 396-003 (Mode A Only)
310-601	Rotary Vacuum Filter System	10/1/1983	Afterburner 396-003 (Via Vacuum Separator, Mode A Only)
310-603	Rotary Vacuum Filter System	10/1/1983	Afterburner 396-003 (Via Vacuum Separator, Mode A Only)
310-601a	Rotary Vacuum Separator	10/1/1983	Afterburner 396-003 (Mode A Only)
310-603a	Rotary Vacuum Separator	10/1/1983	Afterburner 396-003 (Mode A Only)
Nitrile Unit			
302-004	Nitrile Reactor	1973	None
302-002	Nitrile Reactor Condenser	1973	None
302-010	Nitrile Vent Stripper	1973	None
302-011	Vent Condenser	1973	None
302-012	Nitrile Rerun Tank N8	1973	Afterburner 396-003 (Mode A Only)
302-014	Vaporizer	1973	None
302-020	Nitrile Catalyst Chamber (Mode A Only)	1973	None
302-022	Nitrile Catalyst Chamber (Mode A Only)	1973	None
302-030	Nitrile Catalyst Chamber (Mode A Only)	1973	None
302-036	Nitrile Condensing Still	1973	None

Emission Unit	Description	Date Constructed	Emission Control Equipment
302-041	Ammonia Scrubber/Absorber	1973	Afterburner 396-003 or Flare (Mode A or B)
302-047	Ammonia Still	1973	None
302-050	Ammonia Still Reflux Condenser	1973	None
302-054	Carbon Dioxide Purge Flashpot	1973	None
302-068	Ammonia Knock-Out Drum	1973	None
302-078	Pitch Vent Stripper	1973	None
Continuous Hydrogenation Unit			
303-004.1	Hydrogenation Reactor	10/1973	None
303-004.2	Hydrogenation Reactor	10/1973	None
303-002.1	Recycle Gas Compressor	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
303-002.2	Recycle Gas Compressor	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
303-006	Knock-Out Drum	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
303-008	Recirculation Cooler	10/1973	None
303-009	Recirculation Cooler	10/1973	None
303-010	Flash Drum Preheater	10/1973	None
303-011	Ammonia Flash Drum	10/1973	None
303-012	Ammonia Condenser	10/1973	None
303-013	Ammonia Accumulator	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
303-016	Amine Surge Drum	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
303-019	Amine Cooler	10/1973	None
303-020	Dump Tank H-5	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
Batch Hydrogenation Unit			
307-004	Batch Hydrogenation Reactor R-1	10/1973	None
306-004	Batch Hydrogenation Reactor R-2	10/1973	None
306-001	North Catalyst Mix Tank (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only)
306-013	Steam Ejector (R-1 and R-2 Reactor Trains)	10/1973	None
306-012	North Schenk Filter (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only)
306-014	Surface Condenser (R-1 and R-2 Reactor Trains)	10/1973	None

Emission Unit	Description	Date Constructed	Emission Control Equipment
306-015	North Hotwell 306-015 (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-019	North Drop Tank H6 (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-029	North Polishing Filter (R-1 and R-2 Reactor Trains)	10/1973	None
306-301	Batch Hydrogenation Reactor R-3	10/1973	None
306-302	Batch Hydrogenation Reactor R-4	10/1973	None
306-303	South Catalyst Mix Tank (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only)
306-304	South Drop Tank H7 (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-305	South Hotwell (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-503	Steam Ejector 306-503 (R-3 and R-4 Reactor Trains)	10/1973	None
306-503C	Surface Condenser (R-3 and R-4 Reactor Trains)	10/1973	None
306-504	South Schenk Filter (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only)
306-505	South Polishing Filter (R-3 and R-4 Reactor Trains)	10/1973	None
313-301	Batch Hydrogenation Reactor R-6	3/1988	None
313-303	Drop Tank H-11 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A Only) and Flare 396-701
313-304	Catalyst Mix Tank R-6 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A Only)
313-305	Precoat Tank (R-6 Reactor Train)	3/1988	None
313-307	Knock-Out Drum R-6 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A Only) and Flare 396-701
313-310	Recycle Gas Scrubber (R-6 Reactor Train)	3/1988	None
313-401	Precondenser (R-6 Reactor Train)	3/1988	None
313-402	Surface Condenser (R-6 Reactor Train)	3/1988	None
313-503	Funda Filter R-6 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A Only)
313-504	Polishing Filter (R-6 Reactor Train)	3/1988	None

Emission Unit	Description	Date Constructed	Emission Control Equipment
313-506	Steam Ejector (R-6 Reactor Train)	3/1988	None
313-601	Recycle Gas System Compressor (R-6 Reactor Train)	3/1988	None
306-306	Reactor R-5	10/1985	None
306-307	Hotwell (R-5 Reactor Train)	10/1985	Afterburner 396-003 (Mode A Only)
306-601	Vacuum System (R-5 Reactor Train)	10/1985	None
306-021	Precoat Tank (R-1, R-2, R-3, and R-4 Reactor Trains)	10/1973	None
306-044	Aqueous Ammonia Surge Tank (R-1, R-2, and R-6 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-507	Funda Filter (R-1, R-2, R-3, and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only)
307-016	DM Settling Tank H-1 (R-1, R-2, R-3, and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A Only)
Ester Process			
309-326	Reactor	6/1994	Condenser (309-428)
309-428	Process Condenser	6/1994	Afterburner 396-003 (Via Vacuum System)
309-327	Condensate Receiver	6/1994	Afterburner 396-003 (Via Vacuum System)
309-603	Vacuum System	6/1994	Afterburner 396-003 (Mode A Only)
309-607	Vacuum System	6/1994	Afterburner 396-003 (Mode A Only)
309-604	Hopper/Filter	6/1994	None
Ester Process II			
316-304	Reactor	11/1998	Condenser 316-408
316-408	Process Condenser	11/1998	Afterburner 396-003 (Via Vacuum System)
316-305	Condensate Receiver	11/1998	Afterburner 396-003 (Via Vacuum System)
316-603	Vacuum System	11/1998	Afterburner 396-003 (Mode A Only)
316-604	Hopper/Filter	11/1998	None
Arquad Production Area (Quaternary Ammonium Salt Process)			
309-321	Reactor	6/1994	Methyl Chloride Adsorber System 309-325 (Via Drop Tank)
309-322	Drop Tank	6/1994	Methyl Chloride Absorber System 309-325
309-324	Recovery Tank	6/1994	(Equipment is a Part of 309-325)

Emission Unit	Description	Date Constructed	Emission Control Equipment
309-325	Methyl Chloride Absorber Column	6/1994	(Equipment is a Part of 309-325)
309-330	Process Tank	6/1994	None
309-423	Water-cooled Condenser	6/1994	(Equipment is a Part of 309-325)
309-424	Refrigerated Glycol-chilled Condenser	6/1994	(Equipment is a Part of 309-325)
309-323	Vent Separator	6/1994	(Equipment is a Part of 309-325)
309-601	Liquid Ring Pump Package	6/1994	(Equipment is a Part of 309-325)
Arquad Production Area (Quaternary Ammonium Salt Process II)			
316-300	Reactor	11/1998	Methyl Chloride Adsorber System 316-309 (Via Drop Tank)
316-301	Reactor	11/1998	Methyl Chloride Adsorber System 316-309 (Via Drop Tank)
316-302	Drop Tank	11/1998	Methyl Chloride Absorber System 316-309
316-313	Drop Tank	11/1998	Methyl Chloride Absorber System 316-309
316-308	Recovery Tank	11/1998	(Equipment is a Part of 316-309)
316-309	Methyl Chloride Absorber Column	11/1998	(Equipment is a Part of 316-309)
316-303	Process Tank	11/1998	None
316-402	Water-cooled Condenser	11/1998	(Equipment is a Part of 316-309)
316-409	Water-cooled Condenser	11/1998	(Equipment is a Part of 316-309)
316-403	Refrigerated Glycol-chilled Condenser	11/1998	(Equipment is a Part of 316-309)
316-410	Refrigerated Glycol-chilled Condenser	11/1998	(Equipment is a Part of 316-309)
316-307	Vent Separator	11/1998	(Equipment is a Part of 316-309)
316-311	Vent Separator	11/1998	(Equipment is a Part of 316-309)
316-601	Liquid Ring Pump Package	11/1998	(Equipment is a Part of 316-309)
Arquad Production Area (Arquad Process)			
309-301	Reactor	10/1973	Methyl Chloride Absorber System 309-313

Emission Unit	Description	Date Constructed	Emission Control Equipment
309-305	Drop Tank	10/1973	Methyl Chloride Absorber System 309-313
309-308.1	Bleach Tank A25	10/1973	Wash Tank Condenser 309-406 or 309-431
309-308.2	Bleach Tank A26	10/1973	Wash Tank Condenser 309-406 or 309-431
309-310	Vent Compressor Knock-Out Pot	10/1973	(Equipment is a Part of 309-313)
309-312	Wash Tank	10/1973	Wash Tank Condenser 309-406 or 309-431, Water Scrubber 309-332
309-317	Wash Tank	8/1999	Wash Tank Condenser 309-406 or 309-431, Water Scrubber 309-332
309-313	Methyl Chloride Absorber Column	10/1973	(Equipment is a Part of 309-313)
309-314	Diluent Tank	10/1973	(Equipment is a Part of 309-313)
309-315	Diluent Tank	10/1973	(Equipment is a Part of 309-313)
309-413	Diluent Tank	10/1973	(Equipment is a Part of 309-313)
309-401	Water-cooled Condenser	10/1973	(Equipment is a Part of 309-313)
309-409	Refrigerated Glycol-chilled Condenser	10/1973	(Equipment is a Part of 309-313)
309-501	Filter	10/1973	None
309-901	Methyl Chloride Recovery Vacuum/Compressor	10/1973	(Equipment is a Part of 309-313)
Storage Tanks			
W-2	Wastewater Surge Tank	10/1973	Afterburner 396-003
H-4	Formalin Tank	10/1973	Afterburner 396-003
H-2	Acrylonitrile Tank	10/1973	Afterburner 396-003
W-4	Waste Fat Storage	9/1978	Afterburner 396-003
H-3	Formcel Tank	10/1973	Afterburner 396-003
Fuel Combustion Equipment			
NB	Nebraska Steam Boiler Model #NS-C-37	6/1978	None
DB	Dowtherm Boiler 388-001	10/1973	None
KB	Keystone Steam Boiler	8/1982	None
PB-1	Natural Gas-Fired Boiler	9/2000	None
Fugitive VOM Emissions	Leaks from valves, flanges, seals etc.		None

5.0 OVERALL SOURCE CONDITIONS

5.1 Source Description

- 5.1.1 This permit is issued based on the source requiring a CAAPP permit as a major source of NO_x, SO₂, and VOM emissions.
- 5.1.2 This permit is issued based on the source being a major source of HAPs.

5.2 Applicable Regulations

- 5.2.1 Specific emission units at this source are subject to particular regulations as set forth in Section 7 (Unit-Specific Conditions) of this permit.
- 5.2.2 In addition, emission units at this source are subject to the following regulations of general applicability:

- a. No person shall cause or allow the emission of fugitive particulate matter from any process, including any material handling or storage activity, that is visible by an observer looking generally overhead at a point beyond the property line of the source unless the wind speed is greater than 40.2 kilometers per hour (25 miles per hour), pursuant to 35 IAC 212.301 and 212.314.

Compliance with this requirement is considered to be assured by the inherent nature of operations at this source, as demonstrated by historical operation.

- b. No person shall cause or allow the emission of smoke or other particulate matter, with an opacity greater than 30 percent, into the atmosphere from any emission unit other than those emission units subject to the requirements of 35 IAC 212.122, pursuant to 35 IAC 212.123(a), except as allowed by 35 IAC 212.123(b) and 212.124.

5.2.3 Ozone Depleting Substances

The Permittee shall comply with the standards for recycling and emissions reduction of ozone depleting substances pursuant to 40 CFR Part 82, Subpart F, except as provided for motor vehicle air conditioners in Subpart B of 40 CFR Part 82:

- a. Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to 40 CFR 82.156.

- b. Equipment used during the maintenance, service, repair, or disposal of appliances must comply with the standards for recycling and recovery equipment pursuant to 40 CFR 82.158.
- c. Persons performing maintenance, service, repair, or disposal of appliances must be certified by an approved technician certification program pursuant to 40 CFR 82.161.

5.2.4 Risk Management Plan

- a. This stationary source, as defined in 40 CFR Section 68.3, is subject to 40 CFR Part 68, the Accidental Release Prevention regulations [40 CFR 68.215(a)(1)].
- b. The owner or operator of a stationary source shall revise and update the RMP submitted, as specified in 40 CFR 68.190.

5.2.5 Future Emission Standards

- a. Should this stationary source become subject to a regulation under 40 CFR Parts 60, 61, or 63, or 35 IAC after the date issued of this permit, then the owner or operator shall, in accordance with the applicable regulation(s), comply with the applicable requirements by the date(s) specified and shall certify compliance with the applicable requirements of such regulation(s) as part of the annual compliance certification, as required by 40 CFR Part 70 or 71.
- b. No later than upon the submittal for renewal of this permit, the owner or operator shall submit, as part of an application, the necessary information to address either the non-applicability of, or demonstrate compliance with all applicable requirements of any potentially applicable regulation which was promulgated after the date issued of this permit.
- c. This stationary source is subject to 40 CFR Part, Subpart EEE, National Emission Standards for Hazardous Air Pollutants from Hazardous Waste Combustors General. The Permittee shall comply with the applicable requirements of such regulation by the date(s) specified in such regulation and shall certify compliance with the applicable requirements of such regulation as part of the annual compliance certification required by 40 CFR Part 70 or 71 beginning in the year that compliance is required under a final and effective rule.

5.2.6 Episode Action Plan

- a. Pursuant to 35 IAC 244.142, the Permittee shall maintain at the source and have on file with the Illinois EPA a written episode action plan (plan) for reducing the levels of emissions during yellow alerts, red alerts, and emergencies, consistent with safe operating procedures. The plan shall contain the information specified in 35 IAC 244.144.
- b. The Permittee shall immediately implement the appropriate steps described in this plan should an air pollution alert or emergency be declared.
- c. If a change occurs at the source which requires a revision of the plan (e.g., operational change, change in the source contact person), a copy of the revised plan shall be submitted to the Illinois EPA for review within 30 days of the change. Such plans shall be further revised if disapproved by the Illinois EPA.

5.2.7 Use of Sulfuric Acid

This source is subject to 35 IAC 214.303, which provides that no person using sulfuric acid shall cause or allow the emission of sulfuric acid and/or sulfur trioxide from all other similar sources at a plant or premises to exceed:

- a. 45.4 grams in any one hour period for sulfuric acid usage less than 1180 Mg/yr (100 percent acid basis) (0.10 lb/hr up to 1300 T/yr); or
- b. 250 grams per metric ton of acid used for sulfuric acid usage greater than or equal to 1180 Mg/yr (100 percent acid basis) (0.50 lb/T over 1300 T/yr).

5.3 Non-Applicability of Regulations of Concern

None

5.4 Source-Wide Operational and Production Limits and Work Practices

In addition to the source-wide requirements in the Standard Permit Conditions in Section 9, the Permittee shall fulfill the following source-wide operational and production limitations and/or work practice requirements:

- a. The Permittee is allowed to substitute raw materials as long as the substitution does not violate applicable regulation, any permit limitation or any other requirements of this permit.

- b. The afterburner (No. 396-003) shall be preheated to the manufacturer's recommended temperature, but not lower than 1400 °F, before the chemical manufacturing process controlled by this afterburner is begun. This temperature shall be maintained during the chemical manufacturing process, except as noted by the malfunction and breakdown provisions of this permit.
- c. The afterburner (No. 396-003) shall be equipped with a continuous temperature indicator and strip chart recorder or disk storage recorder for the combustion chamber temperature.

5.5 Source-Wide Emission Limitations

5.5.1 Permitted Emissions for Fees

The annual emissions from the source, not considering insignificant activities as addressed by Section 3.0 of this permit, shall not exceed the following limitations. The overall source emissions shall be determined by adding emissions from all emission units. Compliance with these limits shall be determined on a calendar year basis. These limitations (Condition 5.5.1) are set for the purpose of establishing fees and are not federally enforceable.

Permitted Emissions of Regulated Pollutants

Pollutant	Tons/Year
Volatile Organic Material (VOM)	189.20
Sulfur Dioxide (SO ₂)	211.20
Particulate Matter (PM)	12.80
Nitrogen Oxides (NO _x)	646.60
HAP, not included in VOM or PM	-
TOTAL	1,059.80

5.5.2 Emissions of Hazardous Air Pollutants

Source-wide emission limitations for HAPs as listed in Section 112(b) of the CAA are not set. This source is considered to be a major source of HAPs.

5.5.3 Other Source-Wide Emission Limitations

Other source-wide emission limitations are not set for this source pursuant to either the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21, Illinois EPA rules for Major Stationary Sources Construction and Modification, 35 IAC Part 203, or Section 502(b)(10) of the CAA. However, there may be unit

specific emission limitations set forth in Section 7 of this permit pursuant to these rules.

5.6 General Recordkeeping Requirements

5.6.1 Emission Records

The Permittee shall maintain records of the following items for the source to demonstrate compliance with Conditions 5.4 and 5.5.1, pursuant to Section 39.5(7)(b) of the Act:

- a. Total annual emissions on a calendar year basis for the emission units covered by Section 7 (Unit Specific Conditions) of this permit.
- b. All records of equipment operation and strip charts or disk storage for the afterburner (No. 396-003), including:
 - i. Afterburner combustion chamber monitoring data;
 - ii. A log of operating time for the capture system, afterburner, monitoring device, and the associated emission unit(s); and
 - iii. A maintenance log for the capture system, afterburner, and monitoring device detailing all routine and non-routine maintenance performed including dates and duration of outages.
- c. The Permittee shall keep records for any de minimis batch process train, as applicable, and documentation verifying these values or measurements. The documentation shall include the engineering calculations, any measurements made in accordance with 35 IAC 218.503, and the potential or permitted number of batch cycles per year or total production [35 IAC 218.505(a)].
- d. The Permittee shall keep records of VOM emissions from all emission units which are exempt from the requirements of 35 IAC 218, Subpart RR, as a result of 35 IAC 218.960(d).

5.6.2 Records for Operating Scenarios

N/A

5.6.3 Retention and Availability of Records

- a. All records and logs required by this permit shall be retained for at least five years from the date of entry (unless a longer retention period is specified by the particular recordkeeping provision herein), shall be kept at a location at the source that is readily accessible to the Illinois EPA or USEPA, and shall be made available for inspection and copying by the Illinois EPA or USEPA upon request.
- b. The Permittee shall retrieve and print, on paper during normal source office hours, any records retained in an electronic format (e.g., computer) in response to an Illinois EPA or USEPA request for records during the course of a source inspection.

5.7 General Reporting Requirements

5.7.1 General Source-Wide Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the source with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken.

5.7.2 Annual Emissions Report

The annual emissions report required pursuant to Condition 9.7 shall contain emissions information for the previous calendar year.

5.7.3 Exempt Emission Units

Upon request by the Illinois EPA, the owner or operator of an emission unit which is exempt from the requirements of 35 IAC 218, Subpart RR shall submit records to the Illinois EPA within 30 calendar days from the date of the request that document that the emission unit is exempt from those requirements [35 IAC 218.990].

5.8 General Operational Flexibility/Anticipated Operating Scenarios

N/A

5.9 General Compliance Procedures

5.9.1 General Procedures for Calculating Allowable Emissions

Compliance with the source-wide emission limits specified in Condition 5.5 shall be based on the recordkeeping and reporting requirements of Conditions 5.6 and 5.7, and

Compliance Procedures in Section 7 (Unit Specific Conditions) of this permit.

- a. For the purpose of estimating VOM emissions from the organic chemical manufacturing processes, the following methods, in addition to AP-42 emission factors, are acceptable:
 - i. For the purpose of estimating VOM emissions from the storage tanks, the current version of the USEPA TANKS is acceptable.
 - ii. For the purpose of estimating fugitive and non-fugitive VOM emissions from chemical manufacturing processes at the source, engineering estimates based on stack tests, process simulations, or mass balance is acceptable.
- b. For the purpose of estimating HAP emissions from equipment at the source, the vapor weight percent of each HAP for each product times the VOM emissions contributed by that product is acceptable.

6.0 EMISSIONS REDUCTION MARKET SYSTEM (ERMS)

6.1 Description of ERMS

The ERMS is a "cap and trade" market system for major stationary sources located in the Chicago ozone nonattainment area. It is designed to reduce VOM emissions from stationary sources to contribute to further reasonable progress toward attainment, as required by Section 182(c) of the CAA.

The ERMS addresses VOM emissions during a seasonal allotment period from May 1 through September 30. Participating sources must hold "allotment trading units" (ATUs) for their actual seasonal VOM emissions. Each year participating sources are issued ATUs based on allotments set in the sources' CAAPP permits. These allotments are established from historical VOM emissions or "baseline emissions" lowered to provide the emissions reductions from stationary sources required for further progress.

By December 31 of each year, the end of the reconciliation period following the seasonal allotment period, each source shall have sufficient ATUs in its transaction account to cover its actual VOM emissions during the preceding season. A transaction account's balance as of December 31 will include any valid ATU transfer agreements entered into as of December 31 of the given year, provided such agreements are promptly submitted to the Illinois EPA for entry into the transaction account database. The Illinois EPA will then retire ATUs in sources' transaction accounts in amounts equivalent to their seasonal emissions. When a source does not appear to have sufficient ATUs in its transaction account, the Illinois EPA will issue a notice to the source to begin the process for Emissions Excursion Compensation.

In addition to receiving ATUs pursuant to their allotments, participating sources may also obtain ATUs from the market, including ATUs bought from other participating sources and general participants in the ERMS that hold ATUs (35 IAC 205.630) and ATUs issued by the Illinois EPA as a consequence of VOM emission reductions from an Emission Reduction Generator or an Intersector Transaction (35 IAC 205.500 and 35 IAC 205.510). During the reconciliation period, sources may also buy ATUs from a secondary reserve of ATUs managed by the Illinois EPA, the "Alternative Compliance Market Account" (ACMA) (35 IAC 205.710). Sources may also transfer or sell the ATUs that they hold to other sources or participants (35 IAC 205.630).

6.2 Applicability

This source is considered a "participating source" for purposes of the ERMS, 35 IAC Part 205.

6.3 Obligation to Hold Allotment Trading Units (ATUs)

- a. Pursuant to 35 IAC 205.150(c)(1) and 35 IAC 205.720, and as further addressed by condition 6.8, as of December 31 of each year, this source shall hold ATUs in its account in an amount not less than the ATU equivalent of its VOM emissions during the preceding seasonal allotment period (May 1 - September 30), not including VOM emissions from the following, or the source shall be subject to "emissions excursion compensation," as described in Condition 6.5.
 - i. VOM emissions from insignificant emission units and activities as identified in Section 3 of this permit, in accordance with 35 IAC 205.220;
 - ii. Excess VOM emissions associated with startup, malfunction, or breakdown of an emission unit as authorized in Section 7.0 of this permit, in accordance with 35 IAC 205.225;
 - iii. Excess VOM emissions to the extent allowed by a Variance, Consent Order, or Compliance Schedule, in accordance with 35 IAC 205.320(e)(3);
 - iv. Excess VOM emissions that are a consequence of an emergency as approved by the Illinois EPA, pursuant to 35 IAC 205.750; and
 - v. VOM emissions from certain new and modified emission units as addressed by Condition 6.8(b), if applicable, in accordance with 35 IAC 205.320(f).
- b. Notwithstanding the above condition, in accordance with 35 IAC 205.150(c)(2), if a source commences operation of a major modification, pursuant to 35 IAC Part 203, the source shall hold ATUs in an amount not less than 1.3 times its seasonal VOM emissions attributable to such major modification during the seasonal allotment period, determined in accordance with the construction permit for such major modification or applicable provisions in Section 7.0 of this permit.

6.4 Market Transactions

- a. The source shall apply to the Illinois EPA for and obtain authorization for a Transaction Account prior to conducting any market transactions, as specified at 35 IAC 205.610(a).
- b. The Permittee shall promptly submit to the Illinois EPA any revisions to the information submitted for its Transaction Account, pursuant to 35 IAC 205.610(b).

- c. The source shall have at least one account officer designated for its Transaction Account, pursuant to 35 IAC 205.620(a).
- d. Any transfer of ATUs to or from the source from another source or general participant must be authorized by a qualified Account Officer designated by the source and approved by the Illinois EPA, in accordance with 35 IAC 205.620, and the transfer must be submitted to the Illinois EPA for entry into the Transaction Account database.

6.5 Emissions Excursion Compensation

Pursuant to 35 IAC 205.720, if the source fails to hold ATUs in accordance with Condition 6.3, it shall provide emissions excursion compensation in accordance with the following:

- a. Upon receipt of an Excursion Compensation Notice issued by the Illinois EPA, the source shall purchase ATUs from the ACMA in the amount specified by notice, as follows:
 - i. The purchase of ATUs shall be in an amount equivalent to 1.2 times the emissions excursion; or
 - ii. If the source had an emissions excursion for the seasonal allotment period immediately before the period for the present emissions excursion, the source shall purchase ATUs in an amount equivalent to 1.5 times the emissions excursion.
- b. If requested in accordance with paragraph (c) below or in the event that the ACMA balance is not adequate to cover the total emissions excursion amount, the Illinois EPA will deduct ATUs equivalent to the specified amount or any remaining portion thereof from the ATUs to be issued to the source for the next seasonal allotment period.
- c. Pursuant to 35 IAC 205.720(c), within 15 days after receipt of an Excursion Compensation Notice, the owner or operator may request that ATUs equivalent to the amount specified be deducted from the source's next seasonal allotment by the Illinois EPA, rather than purchased from the ACMA.

6.6 Quantification of Seasonal VOM Emissions

- a. The methods and procedures specified in Section 5 and 7 of this permit for determining VOM emissions and compliance with VOM emission limitations shall be used for determining seasonal VOM emissions for purposes of the ERMS, with the following exceptions [35 IAC 205.315(b)]:

No exceptions

- b. The Permittee shall report emergency conditions at the source to the Illinois EPA in accordance with 35 IAC 205.750, if the Permittee intends to deduct VOM emissions in excess of the technology-based emission rates normally achieved that are attributable to the emergency from the source's seasonal VOM emissions for purposes of the ERMS. These reports shall include the information specified by 35 IAC 205.750(a), and shall be submitted in accordance with the following:
 - i. An initial emergency conditions report within two days after the time when such excess emissions occurred due to the emergency; and
 - ii. A final emergency conditions report, if needed to supplement the initial report, within 10 days after the conclusion of the emergency.

6.7 Annual Account Reporting

- a. For each year in which the source is operational, the Permittee shall submit, as a component of its Annual Emissions Report, seasonal VOM emissions information to the Illinois EPA for the seasonal allotment period. This report shall include the following information [35 IAC 205.300]:
 - i. Actual seasonal emissions of VOM from the source;
 - ii. A description of the methods and practices used to determine VOM emissions, as required by this permit, including any supporting documentation and calculations;
 - iii. A detailed description of any monitoring methods that differ from the methods specified in this permit, as provided in 35 IAC 205.337;
 - iv. If a source has experienced an emergency, as provided in 35 IAC 205.750, the report shall reference the associated emergency conditions report that has been approved by the Illinois EPA;
 - v. If a source's baseline emissions have been adjusted due to a Variance, Consent Order or CAAPP permit Compliance Schedule, as provided for in 35 IAC 205.320(e)(3), the report shall provide documentation quantifying the excess VOM emissions during the season that were allowed by the Variance, Consent Order, or Compliance Schedule, in accordance with 35 IAC 205.320(e)(3); and

vi. If a source is operating a new or modified emission unit for which three years of operational data is not yet available, as specified in 35 IAC 205.320(f), the report shall specify seasonal VOM emissions attributable to the new emission unit or the modification of the emission unit.

b. This report shall be submitted by November 30 of each year, for the preceding seasonal allotment period.

6.8 Allotment of ATUs to the Source

a. i. The allotment of ATUs to this source is 794 ATUs per seasonal allotment period.

ii. This allotment of ATUs reflects the Illinois EPA's determination that the source's baseline emissions were 89.5803 tons per season.

A. This determination includes the use of 1994 and 1996 as baseline seasons.

B. This determination also includes adjustment to actual emissions to account for voluntary over-compliance at the source, e.g., Quaternary Ammonium Salt Process and Arquad Process, pursuant to 35 IAC 205.320(d), as further addressed in Section 7 of this permit.

iii. The source's allotment reflects 88% of the baseline emissions (12% reduction), except for the VOM emissions from specific emission unit excluded from such reduction, pursuant to 35 IAC 205.405, including units complying with MACT or using BAT, as identified in Condition 6.11 of this permit.

iv. ATUs will be issued to the source's Transaction Account by the Illinois EPA annually. These ATUs will be valid for the seasonal allotment period following issuance and, if not retired in this season, the next seasonal allotment period.

v. Condition 6.3(a) becomes effective beginning in the seasonal allotment period following the initial issuance of ATUs by the Illinois EPA into the Transaction Account for the source.

b. Contingent Allotments for New or Modified Emission Units

The source was issued a construction permit prior to January 1, 1998 for the following new or modified emission units for which three years of operational data is not yet available:

Emission Unit	Construction Permit #	Date Issued	Maximum Available Allotment	Explanation of Maximum Allotment
Ester Process II	97090018	12/3/1997	0.65 tons	monthly limit multiplied by 5
Quaternary Ammonium Salt Process (Modification II)	97090063	12/31/1997	13.75 tons	monthly limit multiplied by 5

In accordance with 35 IAC 205.310(h) and 35 IAC 205.320(f), the source shall submit a written request for, or an application for, a revised emissions baseline and allotment which address these emission units by December 1 of the year of the third complete seasonal allotment period in which each such newly constructed or modified emission unit is operational. Such submittal shall include information from the affected emission units on the seasonal emissions for these first three seasonal allotment periods.

- c. Notwithstanding the above, part or all of the above ATUs will not be issued to the source in circumstances as set forth in 35 IAC Part 205, including:
 - i. Transfer of ATUs by the source to another participant or the ACMA, in accordance with 35 IAC 205.630;
 - ii. Deduction of ATUs as a consequence of emissions excursion compensation, in accordance with 35 IAC 205.720; and
 - iii. Transfer of ATUs to the ACMA, as a consequence of shutdown of the source, in accordance with 35 IAC 205.410.

6.9 Recordkeeping for ERMS

The Permittee shall maintain copies of the following documents as its Compliance Master File for purposes of the ERMS [35 IAC 205.700(a)]:

- a. Seasonal component of the Annual Emissions Report;
- b. Information on actual VOM emissions, as specified in detail in Sections 5 and 7 of this permit and Condition 6.6(a); and
- c. Any transfer agreements for the purchase or sale of ATUs and other documentation associated with the transfer of ATUs.

6.10 Exclusions from Further Reduction

- a. VOM emissions from the following emission units shall be excluded from the VOM emissions reductions requirements specified in 35 IAC 205.400(c) and (e) as long as such emission units continue to satisfy subsection (a) (1), (a) (2), or (a) (3) [35 IAC 205.405(a)]:
- i. Emission units that comply with any NESHAP or MACT standard promulgated pursuant to the CAA;
 - ii. Direct combustion emission units designed and used for comfort heating purposes, fuel combustion emission units, and internal combustion engines; and
 - iii. An emission unit for which a LAER demonstration has been approved by the Illinois EPA on or after November 15, 1990.

The source has demonstrated in its ERMS application and the Illinois EPA has determined that the following emission units qualify for exclusion from further reductions because they meet the criteria as indicated above [35 IAC 205.405(a) and (c)]:

Dowtherm Boiler
Nebraska Boiler
Keystone Boiler
Afterburner Auxiliary Fuel

- b. VOM emissions from emission units using BAT for controlling VOM emissions shall not be subject to the VOM emissions reductions requirement specified in 35 IAC 205.400(c) or (e) as long as such emission unit continues to use such BAT [35 IAC 205.405(b)].

The source has demonstrated in its ERMS application and the Illinois EPA has determined that the following emission units qualify from further reductions because these emission units use BAT for controlling VOM emissions as indicated above [35 IAC 205.405(b) and (c)]:

Nitrogen Derivative Treatment (controlled emissions only)
Nitrile Unit
Continuous Hydrogenation Unit
Batch Hydrogenation Unit (controlled emissions only)
Ester Process
H-4 Formalin Tank
W-2 Wastewater Surge Tank
H-2 Acrylonitrile Tank
W-4 Waste Fat Storage
H-3 Formcel Tank

7.0 UNIT SPECIFIC CONDITIONS

7.1 Unit - Nitrogen Derivative Treatment Unit
Control - Afterburner 396-003

7.1.1 Description

The Nitrogen Derivative Treatment Unit is designed to treat nitrogen derivatives by removing certain impurities. Raw materials are treated with clay and the treated slurry is filtered to yield the desired product.

7.1.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
310-301.1	Reactor/Treater	Afterburner 396-003 (Via Vacuum Separator, Mode A Only)
310-301.2	Reactor/Treater	Afterburner 396-003 (Via Vacuum Separator, Mode A Only)
310-602	Clay Storage Silo and Conveyor System	Clay Silo Vent Filter 310-602j
310-904	Treater Vacuum System	Afterburner 396-003 (Mode A Only)
310-303	Intermediate Slurry Tank	Afterburner 396-003 (Mode A Only)
310-304.1	Clay Recycle Slurry Tank	Afterburner 396-003 (Mode A Only)
310-304.2	Clay Recycle Slurry Tank	Afterburner 396-003 (Mode A Only)
310-601	Rotary Vacuum Filter System	Afterburner 396-003 (Via Vacuum Separator, Mode A Only)
310-603	Rotary Vacuum Filter System	Afterburner 396-003 (Via Vacuum Separator, Mode A Only)
310-601a	Rotary Vacuum Separator	Afterburner 396-003 (Mode A Only)
310-603a	Rotary Vacuum Separator	Afterburner 396-003 (Mode A Only)

7.1.3 Applicability Provisions and Applicable Regulations

- a. The "affected reactor train" for the purpose of these unit-specific conditions, includes the collection of equipment, identified in Condition 7.1.2, configured to manufacture a product or intermediate.
- b. The affected reactor train is subject to 35 IAC 218 Subpart G, Use of Organic Material, which provides that:

- i. No person shall cause or allow the discharge of more than 3.6 kg/hr (8 lb/hr) of organic material into the atmosphere from any emission unit, except as provided in 35 IAC 218.302 (see also Condition 7.1.3(b) (ii)) and the following exception: If no odor nuisance exists the limitation of 35 IAC 218 Subpart G shall apply only to photochemically reactive material [35 IAC 218.301].
- ii. Emissions of organic material in excess of those permitted by 35 IAC 218.301 (see also Condition 7.1.3(b) (i)) are allowable if such emissions are controlled by a vapor recovery system which adsorbs and/or condenses at least 85 percent of the total uncontrolled organic material that would otherwise be emitted to the atmosphere [35 IAC 218.302(b)].
- c. The affected reactor train is subject to 35 IAC 212.321, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c) of 35 IAC 212.321 (See also Attachment 1) [35 IAC 212.321(a)].

7.1.4 Non-Applicability of Regulations of Concern

- a. This permit is issued based on the affected reactor train not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because these emission units do not manufacture as a primary product one or more of the chemicals listed in Table 1 of 40 CFR 63 Subpart F.
- b. This permit is issued based on the affected reactor train not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because these emission units do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.
- c. This permit is issued based on the affected reactor train not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical

and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because these emission units are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.

- d. This permit is issued based on the affected reactor train not being subject to the control requirements of 35 IAC 218.501, Control Requirements for Batch Operations, pursuant to 35 IAC 218.500(c), which excludes single unit operations and batch process trains that have uncontrolled VOM emissions below the de minimis level.
- e. This permit is issued based on the affected reactor train not being subject to 35 IAC 218 Subpart RR, Miscellaneous Organic Chemical Manufacturing Processes. Pursuant to 35 IAC 218.960(b)(2)(B), these requirements shall not apply to emission units which are included in the categories specified in Subpart V.

7.1.5 Operational and Production Limits and Work Practices

- a. The Permittee shall follow good operating practices for the afterburner and flare, including periodic inspection, routine maintenance and prompt repair of defects.

7.1.6 Emission Limitations

In addition to Condition 5.2.2 and the source wide emission limitations in Condition 5.5, the affected reactor trains are subject to the following:

- a. Emissions of VOM from the affected reactor trains shall not exceed 0.1 ton/yr while the off-gases are vented to Afterburner 396-003. This limit is based on the maximum emissions vented to the afterburner and a control efficiency of 99 percent.

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations were established in Permit 83080070, pursuant to 35 IAC Part 203. These limits ensure that the construction and/or modification addressed in the aforementioned permit does not constitute a new major source or major modification pursuant to 35 IAC Part 203 [T1].

- b. Emissions of PM from the affected reactor trains shall not exceed 0.53 ton/yr. This limit is based on

a maximum emission rate of 0.12 lb/hr from the clay silo vent filter and no limit on the hours of operation.

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations contain revisions to previously issued Permit 83080070. The source has requested that the Illinois EPA establish conditions in this permit that allow various refinements from the conditions of this permit, consistent with the information provided in the CAAPP application. The source has requested these revisions and has addressed the applicability and compliance of Title I of the CAA, specifically 35 IAC Part 203, Major Stationary Sources Construction and Modification and/or 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits continue to ensure that the construction and/or modification addressed in this permit does not constitute a new major source or major modification pursuant to these rules. These limits are the primary enforcement mechanism for the equipment and activities permitted in this permit and the information in the CAAPP application contains the most current and accurate information for the source. Specifically, the limit on operating hours are removed, which increases the potential emissions from 0.15 ton/year to 0.53 ton/year [T1R].

7.1.7 Testing Requirements

None

7.1.8 Monitoring Requirements

There are no monitoring requirements in addition to the monitoring required by Condition 5.4.

7.1.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for each affected reactor train to demonstrate compliance with Conditions 5.5.1, 7.1.3, 7.1.5, and 7.1.6, pursuant to Section 39.5(7)(b) of the Act:

- a. Records of the testing of the efficiency of each capture system and control device pursuant to Condition 7.1.7, which include the following [Section 39.5(7)(e) of the Act]:

- i. The date, place and time of sampling or measurements;
 - ii. The date(s) analyses were performed;
 - iii. The company or entity that performed the analyses;
 - iv. The analytical techniques or methods used;
 - v. The results of such analyses; and
 - vi. The operating conditions as existing at the time of sampling or measurement.
- b. Records addressing use of good operating practices for the afterburner and flare:
- i. Records for periodic inspection of the afterburner with date, individual performing the inspection, and nature of inspection; and
 - ii. Records for prompt repair of defects, with identification and description of defect, effect on emissions, date identified, date repaired, and nature of repair.
- c. Records of operation and emissions of each affected reactor train, including the following:
- i. Types and total amount of raw materials used, lb/batch, lb/mo, and ton/yr;
 - ii. Types and total amount of products produced, lb/batch, lb/mo, and ton/yr;
 - iii. The number of batches begun; and
 - iv. The aggregate monthly and annual VOM emissions from the affected reactor trains based on the material and solvent usage and afterburner efficiencies, with supporting calculations.

7.1.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of an affected reactor train with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. Emissions of VOM in excess of the limits in Conditions 7.1.3(b) and/or 7.1.6 based on the current

month's records plus the preceding 11 months within 30 days of such an occurrence.

- b. The owner or operator of a de minimis single unit operation or batch process train exempt from the control requirements of 35 IAC 218.500(c) shall notify the Illinois EPA in writing if the uncontrolled total annual mass emissions from such de minimis single unit operation or batch process train exceed the threshold in 35 IAC 218.500(c) (1) or (c) (2), respectively, within 60 days after the event occurs. Such notification shall include a copy of all records of such event [35 IAC 218.505(g)].

7.1.11 Operational Flexibility/Anticipated Operating Scenarios

The Permittee is authorized to make the following physical or operational change with respect to the affected reactor trains without prior notification to the Illinois EPA or revision of this permit. This condition does not affect the Permittee's obligation to properly obtain a construction permit in a timely manner for any activity constituting construction or modification of the source, as defined in 35 IAC 201.102:

- a. Operation of the affected reactor trains with the afterburner shut down (i.e., Mode B) is allowed for a maximum of 672 hours per calendar year. If the period of the shutdown is expected to exceed 168 hours, the Illinois EPA's Regional Office in Maywood shall be notified along with a schedule for expedited repair and restart of the afterburner. This schedule shall be submitted for Illinois EPA approval.

7.1.12 Compliance Procedures

Compliance with the emission limits shall be based on the recordkeeping requirements in Condition 7.1.9 and the emission factors and formulas listed below:

- a. Compliance with Condition 7.1.3(b) is assumed by proper operation of the afterburner, as addressed by Condition 7.1.5(a).
- b. Compliance with the control requirements for the affected reactor train shall be determined from the log of the control device monitoring data as required by this permit (see Condition 7.1.9) and from other recordkeeping, reporting, monitoring, and testing requirements of Section 7.1 of this permit.
- c. VOM emissions shall be determined by using the following equations. The Permittee may also use the emission unit-specific emission factor if that

emission factor was developed from the stack test data and based on the worst case scenario. Site-specific emission factors developed from stack test data shall be approved by the Illinois EPA, and the ERMS baseline shall be revised to reflect any new methods, pursuant to 35 IAC 205.337.

- i. Total combined uncontrolled VOM emissions = the sum of VOM emissions from vapor displacement during loading/charging of raw materials into a batching vessel, mixing/heating of raw materials in the batching vessel, transfer of batched mixture, purging evacuation/venting & stripping operation.
- ii. VOM emissions from vapor displacement losses during charging and transfer of materials to vessels:

$$\text{VOM Emissions} = \frac{\text{Volume (gal / day)}}{7.48 \text{ (gal / scf)}} \times \frac{P_i^* \text{ (mmHg)}}{P_T \text{ (760 mmHg)}} \times \frac{1 \text{ mole}}{387 \text{ scf}} \times \frac{\text{MW (lb)}}{\text{(mole)}} \times \frac{530^\circ \text{ R}}{T + 460^\circ \text{ R}}$$

Raoult's Law shall be used to determine mole fraction in vapor phase as presented below:

$$Y_i = \frac{X_i P_i^*}{P_T}$$

Y_i = Mole fraction of i in the vapor

X_i = Mole fraction of component i in the liquid

P_i^* = Vapor pressure of component i at temperature T

P_T = The total pressure in the vessel vapor space.

T = Temperature in degrees Fahrenheit

- iii. VOM Emissions from Vessel/Reactor Heating/Mixing Process:

$$n_s = \frac{\frac{\Sigma(P_i)_{T_1}}{760 - \Sigma(P_i)_{T_1}} + \frac{\Sigma(P_i)_{T_2}}{760 - \Sigma(P_i)_{T_2}}}{2} \times \Delta n$$

Where:

- n_s = Lb - moles of VOC vapor displaced from the vessel being heated up.
 P_i = Vapor pressure of each compound at specified temperature.
 Δ_n = Number of lb - moles of gas displaced.

and

$$\Delta_n = \frac{V}{R} \left[\left(\frac{Pa_1}{T_1} \right) - \left(\frac{Pa_2}{T_2} \right) \right]$$

Where:

- V = Volume of free space in the vessel in ft^3 .
 R = Gas law constant, 998.9 mmHg ft^3 /lb-mole K.
 Pa_1 = Initial gas pressure in the vessel, mmHg.
 Pa_2 = Final gas pressure, mmHg.
 T_1 = Initial temperature of vessel in K.
 T_2 = Final temperature of vessel in K.

- iv. VOM emissions from vessel/reactor purging operation:

$$E_R = \frac{(Y_i)(V_r)(P_T)(MW)}{(R)(T)}$$

Where:

- E_R = Mass emission rate.
 Y_i = Mole fraction in vapor phase.
 V_r = Volumetric gas displacement rate.
 R = Ideal gas law constant
 T = Temperature of the vessel vapor space, absolute.
 P_T = Pressure of the vessel vapor space.
 MW = Molecular weight of the VOM.

- d. Compliance with the PM emission limitations in Condition 7.1.3(c) is assured and achieved by the proper operation, maintenance, and work-practices inherent in operation of the affected reactor train and associated control equipment. PM emissions shall be determined by design parameters of the associated control equipment and appropriate emission factors or the manufacturer's estimated outlet PM concentration.

7.2 Unit - Nitrile Unit
Control - Afterburner 396-003

7.2.1 Description

The Nitrile Unit produces nitriles from reactions of hydrocarbons with ammonia.

7.2.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
302-004	Nitrile Reactor	None
302-002	Nitrile Reactor Condenser	None
302-010	Nitrile Vent Stripper	None
302-011	Vent Condenser	None
302-012	Nitrile Rerun Tank N8	Afterburner 396-003 (Mode A Only)
302-014	Vaporizer	None
302-020	Nitrile Catalyst Chamber (Mode A only)	None
302-022	Nitrile Catalyst Chamber (Mode A only)	None
302-030	Nitrile Catalyst Chamber (Mode A only)	None
302-036	Nitrile Condensing Still	None
302-041	Ammonia Scrubber/Absorber	Afterburner 396-003 or Flare (Mode A or B)
302-047	Ammonia Still	None
302-050	Ammonia Still Reflux Condenser	None
302-054	Carbon Dioxide Purge Flashpot	None
302-068	Ammonia Knock-Out Drum	None
302-078	Pitch Vent Stripper	None

7.2.3 Applicability Provisions and Applicable Regulations

- a. The "affected reactor train" for the purpose of these unit-specific conditions, includes the collection of equipment, identified in Condition 7.2.2, configured to manufacture a product or intermediate.
- b. The affected reactor train is subject to 35 IAC 218 Subpart G, Use of Organic Material, which provides that:
 - i. No person shall cause or allow the discharge of more than 3.6 kg/hr (8 lb/hr) of organic material into the atmosphere from any emission unit, except as provided in 35 IAC 218.302 (see also Condition 7.2.3(b) (ii)) and the following exception: If no odor nuisance

exists the limitation of 35 IAC 218 Subpart G shall apply only to photochemically reactive material [35 IAC 218.301].

- ii. Emissions of organic material in excess of those permitted by 35 IAC 218.301 (see also Condition 7.2.3(b)(i)) are allowable if such emissions are controlled by a vapor recovery system which adsorbs and/or condenses at least 85 percent of the total uncontrolled organic material that would otherwise be emitted to the atmosphere [35 IAC 218.302(b)].
- c. The affected reactor train is subject to 35 IAC 218 Subpart RR, Miscellaneous Organic Chemical Manufacturing Processes. Pursuant to 35 IAC 218.966(a), every owner or operator of a miscellaneous organic chemical manufacturing process emission unit subject to 35 IAC 218 Subpart RR shall employ emission capture and control techniques which achieve an overall reduction in uncontrolled VOM emissions of at least 81 percent from each emission unit.
- d. The affected reactor train is subject to 35 IAC 212.321, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c) of 35 IAC 212.321 (See also Attachment 1) [35 IAC 212.321(a)].
- e. Malfunction and Breakdown Provisions

In the event of a malfunction or breakdown of Afterburner 396-003 and Flare 396-701, the Permittee is authorized to continue operation of the affected reactor train (Mode A) in violation of the applicable requirement of 35 IAC 218, Subpart RR, as necessary to prevent risk of injury to personnel or severe damage to equipment. This authorization is subject to the following requirements:

- i. The Permittee shall repair the damaged feature(s) of the afterburner or remove the affected reactor train from service as soon as practicable. This shall be accomplished within 7 days unless the feature(s) can not be repaired within 7 days and the affected

reactor train can not be removed from service within 7 days, and the Permittee obtains an extension from the Illinois EPA. The request for such an extension must document that repair or replacement parts or maintenance service are unavailable and specify a schedule of actions the Permittee will take that will assure the feature(s) will be repaired or replaced as soon as possible.

- ii. The Permittee shall fulfill the applicable recordkeeping and reporting requirements of Conditions 7.2.9(g) and 7.2.10(c).

7.2.4 Non-Applicability of Regulations of Concern

- a. This permit is issued based on the affected reactor train not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because these emission units do not manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63 Subpart F.
- b. This permit is issued based on the affected reactor train not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because these emission units do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.
- c. This permit is issued based on the affected reactor train not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because these emission units are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.
- d. This permit is issued based on the affected reactor train not being subject to the control requirements of 35 IAC 218.501, Control Requirements for Batch Operations, pursuant to 35 IAC 218.500(a), which specifies that this Subpart only applies to process vents associated with batch operations.

7.2.5 Operational And Production Limits And Work Practices

- a. For any leaks from components subject to the control requirements of 35 IAC 218 Subpart RR, the owner or operator shall repair any component from which a leak of VOL can be observed. The repair shall be completed as soon as practicable but no later than 15

days after the leak is found, unless the leaking component cannot be repaired until the process unit is shut down, in which case the leaking component must be repaired before the unit is restarted [35 IAC 218.966(c)(1)].

- b. The Permittee shall follow good operating practices for the afterburner and flare, including periodic inspection, routine maintenance and prompt repair of defects.
- c. The afterburner (No. 396-003) shall be operated to achieve an overall reduction in uncontrolled VOM emissions of at least 81 percent from each affected reactor train.

7.2.6 Emission Limitations

There are no specific emission limitations for this unit, however, there are source wide emission limitations in Condition 5.5 that include this unit.

7.2.7 Testing Requirements

Pursuant to 35 IAC 218.968(a), when in the opinion of the Illinois EPA it is necessary to conduct testing to demonstrate compliance with 35 IAC 218.966 (see also Condition 7.2.3(c)), the owner or operator of a VOM emission unit subject to the requirements of 35 IAC 218 Subpart RR shall, at his own expense, conduct such tests in accordance with the applicable test methods and procedures specified in 35 IAC 218.105, as follows:

- a. For control device efficiency testing and monitoring, the control device efficiency shall be determined by simultaneously measuring the inlet and outlet gas phase VOM concentrations and gas volumetric flow rates in accordance with the gas phase test methods specified in 35 IAC 218.105(f) (see also Condition 7.2.7(c)) [35 IAC 218.105(d)(1)].
- b. The overall efficiency of the emission control system shall be determined as the product of the capture system efficiency and the control device efficiency or by the liquid/liquid test protocol as specified in 40 CFR 60.433 for each solvent recovery system. In those cases in which the overall efficiency is being determined for an entire line, the capture efficiency used to calculate the product of the capture and control efficiency is the total capture efficiency over the entire line [35 IAC 218.105(e)(1)].
- c. Volatile Organic Material Gas Phase Source Test Methods: The methods in 40 CFR Part 60, Appendix A,

delineated below shall be used to determine control device efficiencies:

- i. CFR Part 60, Appendix A, Method 18, 25 or 25A, as appropriate to the conditions at the site, shall be used to determine VOM concentration. Method selection shall be based on consideration of the diversity of organic species present and their total concentration and on consideration of the potential presence of interfering gases. The test shall consist of three separate runs, each lasting a minimum of 60 min, unless the Illinois EPA and the USEPA determine that process variables dictate shorter sampling times [35 IAC 218.105(e)(1)];
- ii. CFR Part 60, Appendix A, Method 1 or 1A, shall be used for sample and velocity traverses [35 IAC 218.105(e)(2)];
- iii. CFR Part 60, Appendix A, Method 2, 2A, 2C or 2D, shall be used for velocity and volumetric flow rates [35 IAC 218.105(e)(3)];
- iv. CFR Part 60, Appendix A, Method 3, shall be used for gas analysis [35 IAC 218.105(e)(4)];
- v. CFR Part 60, Appendix A, Method 4, shall be used for stack gas moisture [35 IAC 218.105(e)(5)];
- vi. CFR Part 60, Appendix A, Methods 2, 2A, 2C, 2D, 3 and 4, shall be performed, as applicable, at least twice during each test run [35 IAC 218.105(e)(6)]; and
- vii. Use of an adaptation to any of the test methods specified in 35 IAC 218.105(f)(1) through (6) (see also Conditions 7.2.7(c)(i) through (vi)) may not be used unless approved by the Illinois EPA and the USEPA on a case by case basis. An owner or operator must submit sufficient documentation for the Illinois EPA and the USEPA to find that the test methods specified in 35 IAC 218.105(f)(1) through (6) (see also Conditions 7.2.7(c)(i) through (vi)) will yield inaccurate results and that the proposed adaptation is appropriate [35 IAC 218.105(e)(7)].

7.2.8 Monitoring Requirements

The Permittee shall, at a minimum, perform quarterly visual inspections of the affected reactor train to detect any leaking components which may need repair in accordance with Condition 7.2.5(a) [Section 39.5(7) (d) of the Act].

7.2.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for the affected reactor train to demonstrate compliance with Conditions 5.5.1, 7.2.3, and 7.2.5, pursuant to Section 39.5(7) (b) of the Act:

- a. Records of the testing of the efficiency of each capture system and control device pursuant to Condition 7.2.7, which include the following [Section 39.5(7) (e) of the Act]:
 - i. The date, place and time of sampling or measurements;
 - ii. The date(s) analyses were performed;
 - iii. The company or entity that performed the analyses;
 - iv. The analytical techniques or methods used;
 - v. The results of such analyses; and
 - vi. The operating conditions as existing at the time of sampling or measurement.
- b. Pursuant to 35 IAC 218.991(a) (2), any owner or operator of a VOM emission unit which is subject to the requirements of 35 IAC 218 Subpart RR and complying by the use of emission capture and control equipment shall collect and record all of the following information each day and maintain the information at the source for a period of three years:
 - i. Control device monitoring data [35 IAC 218.991(a) (2) (A)];
 - ii. A log of operating time for the capture system, control device, monitoring equipment and the associated emission unit [35 IAC 218.991(a) (2) (B)]; and
 - iii. A maintenance log for the capture system, control device and monitoring equipment

detailing all routine and non-routine maintenance performed including dates and duration of any outages [35 IAC 218.991(a)(2)(C)].

- c. Records of the leak detection inspections pursuant to Condition 7.2.8, which include the following:
 - i. The date, place and time of visual inspections;
 - ii. The company or entity that performed the visual inspection;
 - iii. The results of such inspections; and
 - iv. The operating conditions as existing at the time of the inspections.
- d. Pursuant to 35 IAC 218.966(c)(2), for any leak which cannot be readily repaired within one hour after detection, the following records shall be kept. These records shall be maintained by the owner or operator for a minimum of two years after the date on which they are made. Copies of the records shall be made available to the Illinois EPA or USEPA upon verbal or written request.
 - i. The name and identification of the leaking component [35 IAC 218.966(c)(2)(A)];
 - ii. The date and time the leak is detected [35 IAC 218.966(c)(2)(B)];
 - iii. The action taken to repair the leak [35 IAC 218.966(c)(2)(C)]; and
 - iv. The date and time the leak is repaired [35 IAC 218.966(c)(2)(D)].
- e. Records addressing use of good operating practices for the afterburner and flare:
 - i. Records for periodic inspection of the afterburner and flare with date, individual performing the inspection, and nature of inspection; and
 - ii. Records for prompt repair of defects, with identification and description of defect, effect on emissions, date identified, date repaired, and nature of repair.

- f. Records of operation and emissions of each affected reactor train, including the following:
 - i. Types and total amount of raw materials used, lb/batch, lb/mo, and ton/yr;
 - ii. Types and total amount of products produced, lb/batch, lb/mo, and ton/yr;
 - iii. The number of batches begun; and
 - iv. The aggregate monthly and annual VOM emissions from the affected reactor trains based on the material and solvent usage and afterburner efficiencies, with supporting calculations.
- g. Records for Malfunctions and Breakdowns of the Afterburner

The Permittee shall maintain records, pursuant to 35 IAC 201.263, of continued operation of an affected reactor train subject to 35 IAC 218, Subpart RR, during malfunctions and breakdown of the control features of Afterburner 396-003 and Flare 396-701, which as a minimum, shall include:

- i. Date and duration of malfunction or breakdown;
- ii. A detailed explanation of the malfunction or breakdown;
- iii. An explanation why the damaged feature(s) could not be immediately repaired or the affected reactor train removed from service without risk of injury to personnel or severe damage to equipment;
- iv. The measures used to reduce the quantity of emissions and the duration of the event;
- v. The steps taken to prevent similar malfunctions or breakdowns or reduce their frequency and severity; and
- vi. The amount of release above allowable emissions during malfunction/breakdown.

7.2.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected reactor train with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe

the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. The owner or operator of a subject VOM emission unit shall notify the Illinois EPA of any violation of the requirements of 35 IAC 218 Subpart RR (see also Condition 7.2.3(c)) by sending a copy of any record showing a violation to the Illinois EPA within 30 days following the occurrence of the violation [35 IAC 218.991(a) (3) (A)].
- b. Emissions of VOM in excess of the limits in Conditions 7.2.3(b) based on the current month's records plus the preceding 11 months within 30 days of such an occurrence.
- c. Reporting of Malfunctions and Breakdowns for Control Equipment

The Permittee shall provide the following notification and reports to the Illinois EPA, Compliance Section and Regional Field Office, pursuant to 35 IAC 201.263, concerning continued operation of an affected reactor train subject to Condition 7.2.3(c) during malfunction or breakdown of the control features of Afterburner 396-003 and Flare 396-701.

- i. The Permittee shall notify the Illinois EPA's regional office by telephone as soon as possible during normal working hours, but no later than three (3) days, upon the occurrence of noncompliance due to malfunction, or breakdown.
- ii. Upon achievement of compliance, the Permittee shall give a written follow-up notice to the Illinois EPA, Compliance Section and Regional Field Office, providing a detailed explanation of the event, an explanation why continued operation of the affected reactor train was necessary, the length of time during which operation continued under such conditions, the measures taken by the Permittee to minimize and correct deficiencies with chronology, and when the repairs were completed or when the affected reactor train was taken out of service.
- iii. If compliance is not achieved within 7 working days of the occurrence, the Permittee shall submit interim status reports to the Illinois EPA, Compliance Section and Regional Field Office, within 7 days of the occurrence and

every 14 days thereafter, until compliance is achieved. These interim reports shall provide a brief explanation of the nature of the malfunction or breakdown, corrective actions accomplished to date, actions anticipated to occur with schedule, and the expected date on which repairs will be complete or the affected reactor train will be taken out of service.

7.2.11 Operational Flexibility/Anticipated Operating Scenarios

The Permittee is authorized to make the following physical or operational change with respect to an affected reactor train without prior notification to the Illinois EPA or revision of this permit. This condition does not affect the Permittee's obligation to properly obtain a construction permit in a timely manner for any activity constituting construction or modification of the source, as defined in 35 IAC 201.102:

- a. Operation of the affected reactor trains with the afterburner shut down and use of the flare as backup control (i.e., Mode B) is allowed for a maximum of 672 hours per calendar year. If the period of the shutdown is expected to exceed 168 hours, the Illinois EPA's Regional Office in Maywood shall be notified along with a schedule for expedited repair and restart of the afterburner. This schedule shall be submitted for Illinois EPA approval. Emissions during afterburner downtime which are not controlled at least 81% by the flare shall be included in the calculation of emissions exempt from the control requirements of 35 IAC 218, Subpart RR pursuant to 35 IAC 218.960(d) (see also Condition 5.6.1(d)).

7.2.12 Compliance Procedures

Compliance with the emission limits shall be based on the recordkeeping requirements in Condition 7.2.9 and the emission factors and formulas listed below:

- a. Compliance with Condition 7.2.3(b) is assumed by proper operation of the afterburner, as addressed by Condition 7.2.5(b).
- b. Compliance with the control requirements for the affected reactor train shall be determined from the log of the control device monitoring data as required by this permit (see Condition 7.2.9) and from other recordkeeping, reporting, monitoring, and testing requirements of Section 7.2 of this permit.
- c. VOM emissions shall be determined by using the following equations. The Permittee may also use the

emission unit-specific emission factor if that emission factor was developed from the stack test data and based on the worst case scenario. Site-specific emission factors developed from stack test data shall be approved by the Illinois EPA, and the ERMS baseline shall be revised to reflect any new methods, pursuant to 35 IAC 205.337.

- i. Total combined uncontrolled VOM emissions = the sum of VOM emissions from vapor displacement during loading/charging of raw materials into a batching vessel, mixing/heating of raw materials in the batching vessel, transfer of batched mixture, purging evacuation/venting & stripping operation.
- ii. VOM emissions from vapor displacement losses during charging and transfer of materials to vessels:

$$\text{VOM Emissions} = \frac{\text{Volume (gal / day)}}{7.48 \text{ (gal / scf)}} \times \frac{P_i^* \text{ (mmHg)}}{P_T \text{ (760 mmHg)}} \times \frac{1 \text{ mole}}{387 \text{ scf}} \times \frac{\text{MW (lb)}}{\text{(mole)}} \times \frac{530^\circ \text{ R}}{T + 460^\circ \text{ R}}$$

Raoult's Law shall be used to determine mole fraction in vapor phase as presented below:

$$Y_i = \frac{X_i P_i^*}{P_T}$$

- Y_i = Mole fraction of i in the vapor
- X_i = Mole fraction of component i in the liquid
- P_i^* = Vapor pressure of component i at temperature T
- P_T = The total pressure in the vessel vapor space.
- T = Temperature in degrees Fahrenheit

- iii. VOM Emissions from Vessel/Reactor Heating/Mixing Process:

$$n_s = \frac{\frac{\Sigma(P_i)_{T_1}}{760 - \Sigma(P_i)_{T_1}} + \frac{\Sigma(P_i)_{T_2}}{760 - \Sigma(P_i)_{T_2}}}{2} \times \Delta n$$

Where:

- n_s = Lb - moles of VOC vapor displaced from the vessel being heated up.
 P_i = Vapor pressure of each compound at specified temperature.
 Δ_n = Number of lb - moles of gas displaced.

and

$$\Delta_n = \frac{V}{R} \left[\left(\frac{Pa_1}{T_1} \right) - \left(\frac{Pa_2}{T_2} \right) \right]$$

Where:

- V = Volume of free space in the vessel in ft^3 .
 R = Gas law constant, 998.9 mmHg ft^3/lb -mole K.
 Pa_1 = Initial gas pressure in the vessel, mmHg.
 Pa_2 = Final gas pressure, mmHg.
 T_1 = Initial temperature of vessel in K.
 T_2 = Final temperature of vessel in K.

- iv. VOM emissions from vessel/reactor purging operation:

$$E_R = \frac{(Y_i)(V_r)(P_T)(MW)}{(R)(T)}$$

Where:

- E_R = Mass emission rate.
 Y_i = Mole fraction in vapor phase.
 V_r = Volumetric gas displacement rate.
 R = Ideal gas law constant
 T = Temperature of the vessel vapor space, absolute.
 P_T = Pressure of the vessel vapor space.

MW = Molecular weight of the VOM.

- d. Compliance with the PM emission limitations in Condition 7.2.3(d) is assured and achieved by the proper operation, maintenance, and work-practices inherent in operation of the affected reactor train and associated control equipment. PM emissions shall be determined by design parameters of the associated control equipment and appropriate emission factors or the manufacturer's estimated outlet PM concentration.

7.3 Unit - Continuous Hydrogenation Unit
Control - Afterburner 396-003 and Flare 396-701

7.3.1 Description

The Continuous Hydrogenation Unit reacts hydrocarbons derived from naturally occurring fats and oil with hydrogen and ammonia to produce amine compounds.

7.3.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
303-004.1	Hydrogenation Reactor	None
303-004.2	Hydrogenation Reactor	None
303-002.1	Recycle Gas Compressor	Afterburner 396-003 (Mode A) and Flare 396-701
303-002.2	Recycle Gas Compressor	Afterburner 396-003 (Mode A) and Flare 396-701
303-006	Knock-Out Drum	Afterburner 396-003 (Mode A) and Flare 396-701
303-008	Recirculation Cooler	None
303-009	Recirculation Cooler	None
303-010	Flash Drum Preheater	None
303-011	Ammonia Flash Drum	None
303-012	Ammonia Condenser	None
303-013	Ammonia Accumulator	Afterburner 396-003 (Mode A) and Flare 396-701
303-016	Amine Surge Drum	Afterburner 396-003 (Mode A) and Flare 396-701
303-019	Amine Cooler	None
303-020	Dump Tank H-5	Afterburner 396-003 (Mode A) and Flare 396-701

7.3.3 Applicability Provisions and Applicable Regulations

- a. The "affected reactor train" for the purpose of these unit-specific conditions, includes the collection of equipment, identified in Condition 7.3.2, configured to manufacture a product or intermediate.
- b. The affected reactor train is subject to 35 IAC 218 Subpart G, Use of Organic Material, which provides that:
 - i. No person shall cause or allow the discharge of more than 3.6 kg/hr (8 lb/hr) of organic

material into the atmosphere from any emission unit, except as provided in 35 IAC 218.302 (see also Condition 7.3.3(b)(ii)) and the following exception: If no odor nuisance exists the limitation of 35 IAC 218 Subpart G shall apply only to photochemically reactive material [35 IAC 218.301].

- ii. Emissions of organic material in excess of those permitted by 35 IAC 218.301 (see also Condition 7.3.3(b)(i)) are allowable if such emissions are controlled by a vapor recovery system which adsorbs and/or condenses at least 85 percent of the total uncontrolled organic material that would otherwise be emitted to the atmosphere [35 IAC 218.302(b)].
- c. The affected reactor train is subject to 35 IAC 218 Subpart RR, Miscellaneous Organic Chemical Manufacturing Processes. Pursuant to 35 IAC 218.966(a), every owner or operator of a miscellaneous organic chemical manufacturing process emission unit subject to 35 IAC 218 Subpart RR shall employ emission capture and control techniques which achieve an overall reduction in uncontrolled VOM emissions of at least 81 percent from each emission unit.
- d. The affected reactor train is subject to 35 IAC 212.321, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c) of 35 IAC 212.321 (See also Attachment 1) [35 IAC 212.321(a)].
- e. Malfunction and Breakdown Provisions

In the event of a malfunction or breakdown of Afterburner 396-003 and Flare 396-701, the Permittee is authorized to continue operation of the affected reactor train (Modes A and C) in violation of the applicable requirement of 35 IAC 218, Subpart RR, for up to 48 hours, as necessary to prevent risk of injury to personnel or severe damage to equipment. This authorization is subject to the following requirements:

- i. The Permittee shall repair the damaged feature(s) of the afterburner or remove the affected reactor train from service as soon as practicable. This shall be accomplished within 7 days unless the feature(s) can not be repaired within 7 days and the affected reactor train can not be removed from service within 7 days, and the Permittee obtains an extension from the Illinois EPA. The request for such an extension must document that repair or replacement parts or maintenance service are unavailable and specify a schedule of actions the Permittee will take that will assure the feature(s) will be repaired or replaced as soon as possible.
- ii. The Permittee shall fulfill the applicable recordkeeping and reporting requirements of Conditions 7.3.9(g) and 7.3.10(c).

7.3.4 Non-Applicability of Regulations of Concern

- a. This permit is issued based on the affected reactor train not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because these emission units do not manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63 Subpart F.
- b. This permit is issued based on the affected reactor train not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because these emission units do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.
- c. This permit is issued based on the affected reactor train not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because these emission units are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.
- d. This permit is issued based on the affected reactor train not being subject to the control requirements of 35 IAC 218.501, Control Requirements for Batch Operations, pursuant to 35 IAC 218.500(a), which specifies that this Subpart only applies to process vents associated with batch operations.

7.3.5 Operational And Production Limits And Work Practices

- a. For any leaks from components subject to the control requirements of 35 IAC 218 Subpart RR, the owner or operator shall repair any component from which a leak of VOL can be observed. The repair shall be completed as soon as practicable but no later than 15 days after the leak is found, unless the leaking component cannot be repaired until the process unit is shut down, in which case the leaking component must be repaired before the unit is restarted [35 IAC 218.966(c)(1)].
- b. The Permittee shall follow good operating practices for the afterburner and flare, including periodic inspection, routine maintenance and prompt repair of defects.
- c. The afterburner (No. 396-003) shall be operated to achieve an overall reduction in uncontrolled VOM emissions of at least 81 percent from each affected reactor train.

7.3.6 Emission Limitations

There are no specific emission limitations for this unit, however, there are source wide emission limitations in Condition 5.5 that include this unit.

7.3.7 Testing Requirements

Pursuant to 35 IAC 218.968(a), when in the opinion of the Illinois EPA it is necessary to conduct testing to demonstrate compliance with 35 IAC 218.966 (see also Condition 7.3.3(c)), the owner or operator of a VOM emission unit subject to the requirements of 35 IAC 218 Subpart RR shall, at his own expense, conduct such tests in accordance with the applicable test methods and procedures specified in 35 IAC 218.105, as follows:

- a. For control device efficiency testing and monitoring, the control device efficiency shall be determined by simultaneously measuring the inlet and outlet gas phase VOM concentrations and gas volumetric flow rates in accordance with the gas phase test methods specified in 35 IAC 218.105(f) (see also Condition 7.3.7(c)) [35 IAC 218.105(d)(1)].
- b. The overall efficiency of the emission control system shall be determined as the product of the capture system efficiency and the control device efficiency or by the liquid/liquid test protocol as specified in 40 CFR 60.433 for each solvent recovery system. In those cases in which the overall efficiency is being

determined for an entire line, the capture efficiency used to calculate the product of the capture and control efficiency is the total capture efficiency over the entire line [35 IAC 218.105(e)(1)].

- c. Volatile Organic Material Gas Phase Source Test Methods: The methods in 40 CFR Part 60, Appendix A, delineated below shall be used to determine control device efficiencies:
- i. CFR Part 60, Appendix A, Method 18, 25 or 25A, as appropriate to the conditions at the site, shall be used to determine VOM concentration. Method selection shall be based on consideration of the diversity of organic species present and their total concentration and on consideration of the potential presence of interfering gases. The test shall consist of three separate runs, each lasting a minimum of 60 min, unless the Illinois EPA and the USEPA determine that process variables dictate shorter sampling times [35 IAC 218.105(e)(1)];
 - ii. CFR Part 60, Appendix A, Method 1 or 1A, shall be used for sample and velocity traverses [35 IAC 218.105(e)(2)];
 - iii. CFR Part 60, Appendix A, Method 2, 2A, 2C or 2D, shall be used for velocity and volumetric flow rates [35 IAC 218.105(e)(3)];
 - iv. CFR Part 60, Appendix A, Method 3, shall be used for gas analysis [35 IAC 218.105(e)(4)];
 - v. CFR Part 60, Appendix A, Method 4, shall be used for stack gas moisture [35 IAC 218.105(e)(5)];
 - vi. CFR Part 60, Appendix A, Methods 2, 2A, 2C, 2D, 3 and 4, shall be performed, as applicable, at least twice during each test run [35 IAC 218.105(e)(6)]; and
 - vii. Use of an adaptation to any of the test methods specified in 35 IAC 218.105(f)(1) through (6) (see also Conditions 7.3.7(c)(i) through (vi)) may not be used unless approved by the Illinois EPA and the USEPA on a case by case basis. An owner or operator must submit sufficient documentation for the Illinois EPA and the USEPA to find that the test methods specified in 35 IAC 218.105(f)(1) through (6) (see also Conditions 7.3.7(c)(i) through (vi))

will yield inaccurate results and that the proposed adaptation is appropriate [35 IAC 218.105(e)(7)].

7.3.8 Monitoring Requirements

The Permittee shall, at a minimum, perform quarterly visual inspections of the affected reactor train to detect any leaking components which may need repair in accordance with Condition 7.3.5(a) [Section 39.5(7)(d) of the Act].

7.3.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for the affected reactor train to demonstrate compliance with Conditions 5.5.1, 7.3.3, and 7.3.5, pursuant to Section 39.5(7)(b) of the Act:

- a. Records of the testing of the efficiency of each capture system and control device pursuant to Condition 7.3.7, which include the following [Section 39.5(7)(e) of the Act]:
 - i. The date, place and time of sampling or measurements;
 - ii. The date(s) analyses were performed;
 - iii. The company or entity that performed the analyses;
 - iv. The analytical techniques or methods used;
 - v. The results of such analyses; and
 - vi. The operating conditions as existing at the time of sampling or measurement.
- b. Pursuant to 35 IAC 218.991(a)(2), any owner or operator of a VOM emission unit which is subject to the requirements of 35 IAC 218 Subpart RR and complying by the use of emission capture and control equipment shall collect and record all of the following information each day and maintain the information at the source for a period of three years:
 - i. Control device monitoring data [35 IAC 218.991(a)(2)(A)];
 - ii. A log of operating time for the capture system, control device, monitoring equipment

and the associated emission unit [35 IAC 218.991(a)(2)(B)]; and

- iii. A maintenance log for the capture system, control device and monitoring equipment detailing all routine and non-routine maintenance performed including dates and duration of any outages [35 IAC 218.991(a)(2)(C)].
- c. Records of the leak detection inspections pursuant to Condition 7.3.8, which include the following:
- i. The date, place and time of visual inspections;
 - ii. The company or entity that performed the visual inspection;
 - iii. The results of such inspections; and
 - iv. The operating conditions as existing at the time of the inspections.
- d. Pursuant to 35 IAC 218.966(c)(2), for any leak which cannot be readily repaired within one hour after detection, the following records shall be kept. These records shall be maintained by the owner or operator for a minimum of two years after the date on which they are made. Copies of the records shall be made available to the Illinois EPA or USEPA upon verbal or written request.
- i. The name and identification of the leaking component [35 IAC 218.966(c)(2)(A)];
 - ii. The date and time the leak is detected [35 IAC 218.966(c)(2)(B)];
 - iii. The action taken to repair the leak [35 IAC 218.966(c)(2)(C)]; and
 - iv. The date and time the leak is repaired [35 IAC 218.966(c)(2)(D)].
- e. Records addressing use of good operating practices for the afterburner and flare:
- i. Records for periodic inspection of the afterburner and flare with date, individual performing the inspection, and nature of inspection; and
 - ii. Records for prompt repair of defects, with identification and description of defect,

effect on emissions, date identified, date repaired, and nature of repair.

- f. Records of operation and emissions of each affected reactor train, including the following:
 - i. Types and total amount of raw materials used, lb/batch, lb/mo, and ton/yr;
 - ii. Types and total amount of products produced, lb/batch, lb/mo, and ton/yr;
 - iii. The number of batches begun; and
 - iv. The aggregate monthly and annual VOM emissions from the affected reactor trains based on the material and solvent usage and afterburner efficiencies, with supporting calculations.
- g. Records for Malfunctions and Breakdowns of the Afterburner

The Permittee shall maintain records, pursuant to 35 IAC 201.263, of continued operation of an affected reactor train subject to 35 IAC 218, Subpart RR, during malfunctions and breakdown of the control features of Afterburner 396-003 and Flare 396-701, which as a minimum, shall include:

- i. Date and duration of malfunction or breakdown;
- ii. A detailed explanation of the malfunction or breakdown;
- iii. An explanation why the damaged feature(s) could not be immediately repaired or the affected reactor train removed from service without risk of injury to personnel or severe damage to equipment;
- iv. The measures used to reduce the quantity of emissions and the duration of the event;
- v. The steps taken to prevent similar malfunctions or breakdowns or reduce their frequency and severity; and
- vi. The amount of release above allowable emissions during malfunction/breakdown.

7.3.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected reactor

train with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. The owner or operator of a subject VOM emission unit shall notify the Illinois EPA of any violation of the requirements of 35 IAC 218 Subpart RR (see also Condition 7.3.3(c)) by sending a copy of any record showing a violation to the Illinois EPA within 30 days following the occurrence of the violation [35 IAC 218.991(a)(3)(A)].
- b. Emissions of VOM in excess of the limits in Conditions 7.3.3(b) based on the current month's records plus the preceding 11 months within 30 days of such an occurrence.
- c. Reporting of Malfunctions and Breakdowns for Control Equipment

The Permittee shall provide the following notification and reports to the Illinois EPA, Compliance Section and Regional Field Office, pursuant to 35 IAC 201.263, concerning continued operation of an affected reactor train subject to Condition 7.3.3(c) during malfunction or breakdown of the control features of Afterburner 396-003 and Flare 396-701.

- i. The Permittee shall notify the Illinois EPA's regional office by telephone as soon as possible during normal working hours, but no later than three (3) days, upon the occurrence of noncompliance due to malfunction, or breakdown.
- ii. Upon achievement of compliance, the Permittee shall give a written follow-up notice to the Illinois EPA, Compliance Section and Regional Field Office, providing a detailed explanation of the event, an explanation why continued operation of the affected reactor train was necessary, the length of time during which operation continued under such conditions, the measures taken by the Permittee to minimize and correct deficiencies with chronology, and when the repairs were completed or when the affected reactor train was taken out of service.
- iii. If compliance is not achieved within 7 working days of the occurrence, the Permittee shall submit interim status reports to the Illinois

EPA, Compliance Section and Regional Field Office, within 7 days of the occurrence and every 14 days thereafter, until compliance is achieved. These interim reports shall provide a brief explanation of the nature of the malfunction or breakdown, corrective actions accomplished to date, actions anticipated to occur with schedule, and the expected date on which repairs will be complete or the affected reactor train will be taken out of service.

7.3.11 Operational Flexibility/Anticipated Operating Scenarios

The Permittee is authorized to make the following physical or operational change with respect to an affected reactor train without prior notification to the Illinois EPA or revision of this permit. This condition does not affect the Permittee's obligation to properly obtain a construction permit in a timely manner for any activity constituting construction or modification of the source, as defined in 35 IAC 201.102:

- a. Operation of the affected reactor trains with the afterburner shut down and use of the flare as backup control (i.e., Mode B) is allowed for a maximum of 672 hours per calendar year. If the period of the shutdown is expected to exceed 168 hours, the Illinois EPA's Regional Office in Maywood shall be notified along with a schedule for expedited repair and restart of the afterburner. This schedule shall be submitted for Illinois EPA approval. Emissions during afterburner downtime which are not controlled at least 81% by the flare shall be included in the calculation of emissions exempt from the control requirements of 35 IAC 218, Subpart RR pursuant to 35 IAC 218.960(d) (see also Condition 5.6.1(d)).

7.3.12 Compliance Procedures

Compliance with the emission limits shall be based on the recordkeeping requirements in Condition 7.3.9 and the emission factors and formulas listed below:

- a. Compliance with Condition 7.3.3(b) is assumed by proper operation of the afterburner, as addressed by Condition 7.3.5(b).
- b. Compliance with the control requirements for the affected reactor train shall be determined from the log of the control device monitoring data as required by this permit (see Condition 7.3.9) and from other recordkeeping, reporting, monitoring, and testing requirements of Section 7.3 of this permit.

c. VOM emissions shall be determined by using the following equations. The Permittee may also use the emission unit-specific emission factor if that emission factor was developed from the stack test data and based on the worst case scenario. Site-specific emission factors developed from stack test data shall be approved by the Illinois EPA, and the ERMS baseline shall be revised to reflect any new methods, pursuant to 35 IAC 205.337.

i. Total combined uncontrolled VOM emissions = the sum of VOM emissions from vapor displacement during loading/charging of raw materials into a batching vessel, mixing/heating of raw materials in the batching vessel, transfer of batched mixture, purging evacuation/venting & stripping operation.

ii. VOM emissions from vapor displacement losses during charging and transfer of materials to vessels:

$$\text{VOM Emissions} = \frac{\text{Volume (gal/day)}}{7.48 \text{ (gal/scf)}} \times \frac{P_i^* \text{ (mmHg)}}{P_T \text{ (760 mmHg)}} \times \frac{1 \text{ mole}}{387 \text{ scf}} \times \frac{\text{MW (lb)}}{\text{(mole)}} \times \frac{530^\circ \text{ R}}{T + 460^\circ \text{ R}}$$

Raoult's Law shall be used to determine mole fraction in vapor phase as presented below:

$$Y_i = \frac{X_i P_i^*}{P_T}$$

Y_i = Mole fraction of i in the vapor

X_i = Mole fraction of component i in the liquid

P_i^* = Vapor pressure of component i at temperature T

P_T = The total pressure in the vessel vapor space.

T = Temperature in degrees Fahrenheit

iii. VOM Emissions from Vessel/Reactor Heating/Mixing Process:

$$n_s = \frac{\frac{\Sigma(P_i)_{T_1}}{760 - \Sigma(P_i)_{T_1}} + \frac{\Sigma(P_i)_{T_2}}{760 - \Sigma(P_i)_{T_2}}}{2} \times \Delta n$$

Where:

- n_s = Lb - moles of VOC vapor displaced from the vessel being heated up.
- P_i = Vapor pressure of each compound at specified temperature.
- Δ_n = Number of lb - moles of gas displaced.

and

$$\Delta_n = \frac{V}{R} \left[\left(\frac{Pa_1}{T_1} \right) - \left(\frac{Pa_2}{T_2} \right) \right]$$

Where:

- V = Volume of free space in the vessel in ft^3 .
- R = Gas law constant, 998.9 mmHg ft^3/lb -mole K.
- Pa_1 = Initial gas pressure in the vessel, mmHg.
- Pa_2 = Final gas pressure, mmHg.
- T_1 = Initial temperature of vessel in K.
- T_2 = Final temperature of vessel in K.

- iv. VOM emissions from vessel/reactor purging operation:

$$E_R = \frac{(Y_i)(V_r)(P_T)(MW)}{(R)(T)}$$

Where:

- E_R = Mass emission rate.
- Y_i = Mole fraction in vapor phase.
- V_r = Volumetric gas displacement rate.
- R = Ideal gas law constant
- T = Temperature of the vessel vapor space, absolute.
- P_T = Pressure of the vessel vapor space.

MW = Molecular weight of the VOM.

- d. Compliance with the PM emission limitations in Condition 7.3.3(d) is assured and achieved by the proper operation, maintenance, and work-practices inherent in operation of the affected reactor train and associated control equipment. PM emissions shall be determined by design parameters of the associated control equipment and appropriate emission factors or the manufacturer's estimated outlet PM concentration.

7.4 Unit - Batch Hydrogenation Unit
Control - Afterburner 396-003 and Flare 396-701

7.4.1 Description

The Batch Hydrogenation Unit manufactures a large variety of compounds through catalyzed batch reactions with hydrocarbons and hydrogen.

7.4.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
307-004	Batch Hydrogenation Reactor R-1	None
306-004	Batch Hydrogenation Reactor R-2	None
306-001	North Catalyst Mix Tank (R-1 and R-2 Reactor Trains)	Afterburner 396-003 (Mode A Only)
306-013	Steam Ejector (R-1 and R-2 Reactor Trains)	None
306-012	North Schenk Filter (R-1 and R-2 Reactor Trains)	Afterburner 396-003 (Mode A Only)
306-014	Surface Condenser (R-1 and R-2 Reactor Trains)	None
306-015	North Hotwell 306-015 (R-1 and R-2 Reactor Trains)	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-019	North Drop Tank H6 (R-1 and R-2 Reactor Trains)	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-029	North Polishing Filter (R-1 and R-2 Reactor Trains)	None
306-301	Batch Hydrogenation Reactor R-3	None
306-302	Batch Hydrogenation Reactor R-4	None
306-303	South Catalyst Mix Tank (R-3 and R-4 Reactor Trains)	Afterburner 396-003 (Mode A Only)
306-304	South Drop Tank H7 (R-3 and R-4 Reactor Trains)	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-305	South Hotwell (R-3 and R-4 Reactor Trains)	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-503	Steam Ejector 306-503 (R-3 and R-4 Reactor Trains)	None

Emission Unit	Description	Emission Control Equipment
306-503C	Surface Condenser (R-3 and R-4 Reactor Trains)	None
306-504	South Schenk Filter (R-3 and R-4 Reactor Trains)	Afterburner 396-003 (Mode A Only)
306-505	South Polishing Filter (R-3 and R-4 Reactor Trains)	None
313-301	Batch Hydrogenation Reactor R-6	None
313-303	Drop Tank H-11 (R-6 Reactor Train)	Afterburner 396-003 (Mode A Only) and Flare 396-701
313-304	Catalyst Mix Tank R-6 (R-6 Reactor Train)	Afterburner 396-003 (Mode A Only)
313-305	Precoat Tank (R-6 Reactor Train)	None
313-307	Knock-Out Drum R-6 (R-6 Reactor Train)	Afterburner 396-003 (Mode A Only) and Flare 396-701
313-310	Recycle Gas Scrubber (R-6 Reactor Train)	None
313-401	Precondenser (R-6 Reactor Train)	None
313-402	Surface Condenser (R-6 Reactor Train)	None
313-503	Funda Filter R-6 (R-6 Reactor Train)	Afterburner 396-003 (Mode A Only)
313-504	Polishing Filter (R-6 Reactor Train)	None
313-506	Steam Ejector (R-6 Reactor Train)	None
313-601	Recycle Gas System Compressor (R-6 Reactor Train)	None
306-306	Reactor R-5	None
306-307	Hotwell (R-5 Reactor Train)	Afterburner 396-003 (Mode A Only)
306-601	Vacuum System (R-5 Reactor Train)	None
306-021	Precoat Tank (R-1, R-2, R-3, and R-4 Reactor Trains)	None
306-044	Aqueous Ammonia Surge Tank (R-1, R-2, and R-6 Reactor Trains)	Afterburner 396-003 (Mode A Only) and Flare 396-701
306-507	Funda Filter (R-1, R-2, R-3, and R-4 Reactor Trains)	Afterburner 396-003 (Mode A Only)

Emission Unit	Description	Emission Control Equipment
307-016	DM Settling Tank H-1 (R-1, R-2, R-3, and R-4 Reactor Trains)	Afterburner 396-003 (Mode A Only)

7.4.3 Applicability Provisions and Applicable Regulations

- a. The "affected reactor train" for the purpose of these unit-specific conditions, includes the collection of equipment, identified in Condition 7.4.2, configured to manufacture a product or intermediate.
- b. The affected reactor train is subject to 35 IAC 218 Subpart G, Use of Organic Material, which provides that:
 - i. No person shall cause or allow the discharge of more than 3.6 kg/hr (8 lb/hr) of organic material into the atmosphere from any emission unit, except as provided in 35 IAC 218.302 (see also Condition 7.4.3(b)(ii)) and the following exception: If no odor nuisance exists the limitation of 35 IAC 218 Subpart G shall apply only to photochemically reactive material [35 IAC 218.301].
 - ii. Emissions of organic material in excess of those permitted by 35 IAC 218.301 (see also Condition 7.4.3(b)(i)) are allowable if such emissions are controlled by a vapor recovery system which adsorbs and/or condenses at least 85 percent of the total uncontrolled organic material that would otherwise be emitted to the atmosphere [35 IAC 218.302(b)].
- c. The affected reactor train is subject to the control requirements of 35 IAC 218 Subpart V: Batch Operations and Air Oxidation Process because this source has SIC of 2821, 2833, 2834, 2861, 2865, 2869, or 2879, and each emission unit is included in category (i) or (ii) below.
 - i. Any single unit operation with uncontrolled total annual mass emissions that exceed 500 lb/yr and with a VOM concentration greater than 500 ppmv. In this individual determination, no applicability analysis shall be performed for any single unit operation with a VOM concentration of less than or equal to 500 ppmv [35 IAC 218.500(d)(1)]; and
 - ii. Any batch process train containing process vents which, in the aggregate, have

uncontrolled total annual mass emissions of 30,000 lb/yr or more of VOM from all products manufactured in the batch process train. Any single unit operation with uncontrolled total annual mass emissions exceeding 500 lb/yr, regardless of VOM concentration, shall be included in the aggregate applicability analysis [35 IAC 218.500(d)(2)].

iii. Applicability equations:

A. The applicability equations are specific to volatility [35 IAC 218.500(e)(1)].

B. For purposes of this subsection, the following abbreviations apply:

1. FR = Vent stream flow rate, scfm;
2. UTAME = Uncontrolled total annual mass emissions of VOM, expressed as lb/yr;
3. WAV = Weighted average volatility;
4. MVOM_i = Mass of VOM component i;
5. MWVOM_i = Molecular weight of VOM component i; and
6. VP_i = Vapor pressure of VOM component i.

[35 IAC 218.500(e)(2)]

C. Weighted average volatility shall be calculated as follows:

$$WAV = \frac{\sum_{i=1}^n (VP_i) x \frac{(MVOM_i)}{(MWVOM_i)}}{\sum_{i=1}^n \frac{(MVOM_i)}{(MWVOM_i)}}$$

[35 IAC 218.500(e)(3)]

D. For purposes of determining applicability, flow rate values shall be calculated as follows:

1. Low WAV has a vapor pressure less than or equal to 75 mmHg at 20°C

(68°F), and shall use the following equation:

$$FR = [0.07 (UTAME)] - 1,821$$

2. Moderate WAV has a vapor pressure greater than 75 mmHg but less than or equal to 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.031 (UTAME)] - 494$$

3. High WAV has a vapor pressure greater than 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.013 (UTAME)] - 301$$

[35 IAC 218.500(e) (4)]

- E. To determine the vapor pressure of VOM, the applicable methods and procedures in 35 IAC 218.111 shall apply [35 IAC 218.500(e) (5)].

- d. The affected reactor train is subject to 35 IAC 212.321, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c) of 35 IAC 212.321 (See also Attachment 1) [35 IAC 212.321(a)].

- e. Malfunction and Breakdown Provisions

In the event of a malfunction or breakdown of Afterburner 396-003 and Flare 396-701, the Permittee is authorized to continue operation of the affected reactor train (Mode A) in violation of the applicable requirement of 35 IAC 218, Subpart V, during completion of a batch in progress, as necessary to prevent risk of injury to personnel or severe damage to equipment. This authorization is subject to the following requirements:

- i. The Permittee shall repair the damaged feature(s) of the afterburner or remove the

affected reactor train from service as soon as practicable. This shall be accomplished within 7 days unless the feature(s) can not be repaired within 7 days and the affected reactor train can not be removed from service within 7 days, and the Permittee obtains an extension from the Illinois EPA. The request for such an extension must document that repair or replacement parts or maintenance service are unavailable and specify a schedule of actions the Permittee will take that will assure the feature(s) will be repaired or replaced as soon as possible.

- ii. The Permittee shall fulfill the applicable recordkeeping and reporting requirements of Conditions 7.4.9(e) and 7.4.10(b).

7.4.4 Non-Applicability of Regulations of Concern

- a. This permit is issued based on the affected reactor train not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because these emission units do not manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63 Subpart F.
- b. This permit is issued based on the affected reactor train not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because these emission units do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.
- c. This permit is issued based on the affected reactor train not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because these emission units are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.
- d. This permit is issued based on the affected reactor train not being subject to 35 IAC 218 Subpart RR, Miscellaneous Organic Chemical Manufacturing Processes. Pursuant to 35 IAC 218.960(b)(2)(B), these requirements shall not apply to emission units which are included in the categories specified in Subpart V.

7.4.5 Operational And Production Limits And Work Practices

- a. The Permittee shall follow good operating practices for the afterburner and flare, including periodic inspection, routine maintenance and prompt repair of defects.
- b. Except as provided for in 35 IAC 218.500(c), every owner or operator of a single unit operation with an average flow rate, as determined in accordance with 35 IAC 218.502(b), below the flow rate value calculated by the applicability equations contained in Section 7.4.3(c)(iii) (see 35 IAC 218.500(e)), shall reduce uncontrolled VOM emissions from such single unit operation by an overall efficiency, on average, of at least 90 percent, or 20 ppmv, per batch cycle [35 IAC 218.501(a)].
- c. Operation of the R-5 and R-6 reactor trains combined shall not exceed 232 batches/month and 1,978 batches/year.

7.4.6 Emission Limitations

In addition to Condition 5.2.2 and the source wide emission limitations in Condition 5.5, the affected reactor train is subject to the following:

- a. Emissions and operation from the R-5 and R-6 reactor trains combined shall not exceed the following limits:

VOM Emissions
(Ton/Year)

3.08

These limits are based on the maximum production rate indicated in Condition 7.4.5(c), maximum emissions based on material usage, and a 99 percent efficiency for the afterburner. This limit takes into account operation for 672 hours per year with the afterburner shut down, resulting in 0.97 ton/year of VOM emissions (see Condition 7.4.11).

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1N].

The above limitations are being established in this permit pursuant to Title I of the CAA, specifically 35 IAC Part 203, Major Stationary Sources Construction and Modification and/or 40 CFR 52.21,

Prevention of Significant Deterioration (PSD). The source has requested that the Illinois EPA establish emission limitations and other appropriate terms and conditions in this permit that limit the VOM emissions from the affected reactor trains below the levels that would trigger the applicability of these rules, consistent with the information provided in the CAAPP application [T1N].

7.4.7 Testing Requirements

- a. Upon the Illinois EPA's request, the owner or operator of a batch operation shall conduct testing to demonstrate compliance with 35 IAC 218.501, in accordance with the applicable test methods and procedures specified in 35 IAC 218.503(d), (e), and (f) [35 IAC 218.503(a)].
 - b. For the purpose of demonstrating compliance with the control requirements of 35 IAC 218.501, the batch operation shall be run at representative operating conditions and flow rates during any performance test [35 IAC 218.503(e)].
 - c. The following methods in 40 CFR 60, Appendix A, shall be used to demonstrate compliance with the reduction efficiency requirement set forth in 35 IAC 218.501 [35 IAC 218.503(f)]:
 - i. Method 1 or 1A, as appropriate, for selection of the sampling sites if the flow measuring device is not a rotometer. The control device inlet sampling site for determination of vent stream VOM composition reduction efficiency shall be prior to the control device and after the control device [35 IAC 218.503(f)(1)];
 - ii. Method 2, 2A, 2C, or 2D, as appropriate, for determination of gas stream volumetric flow rate flow measurements, which shall be taken continuously. No traverse is necessary when the flow measuring device is an ultrasonic probe [35 IAC 218.503(f)(2)];
 - iii. Method 25A or Method 18, if applicable, to determine the concentration of VOM in the control device inlet and outlet [35 IAC 218.503(f)(3)];
- A. The sampling time for each run shall be as follows:
 1. For batch cycles less than eight hours in length, readings shall be

taken continuously over the entire length of the batch cycle with a maximum of 15-minute intervals between measurements if using Method 25A. If using Method 18, readings shall be taken continuously with a maximum of 15-minute intervals between measurements throughout the batch cycle unless it becomes necessary to change the impinger train, in which case a 30-minute interval shall not be exceeded.

2. For batch cycles of eight hours and greater in length, the owner or operator may either test in accordance with the test procedures defined in 35 IAC 218.503(f)(3)(A)(i) (see also subsection (d)(iii)(A)(1) of this Condition) or the owner or operator may elect to perform tests, pursuant to either Method 25A or Method 18, only during those portions of each emission event which define the emission profile of each emission event occurring within the batch cycle. For each emission event of less than four hours in duration, the owner or operator shall test continuously over the entire emission event as set forth in subsection (d)(iii)(A)(1) of this Condition. For each emission event of greater than four hours in duration, the owner or operator shall elect either to perform a minimum of three one hour test runs during the emission event or shall test continuously over the entire emission event within each single unit operation in the batch process train. To demonstrate that the portion of the emission event to be tested defines the emission profile for the emission event, the owner or operator electing to rely on this option shall develop an emission profile for the entire emission event. Such emission profile shall be based upon either process knowledge or test data collected. Examples of information that could constitute process knowledge

include, but are not limited to, calculations based on material balances and process stoichiometry. Previous test results may be used provided such results are still relevant to the current process vent stream conditions.

3. For purposes of subsection (d) (iii) of this Condition, the term "emission event" shall be defined as a discrete period of venting that is associated with a single unit operation. For example, a displacement of vapor resulting from the charging of a single unit operation with VOM will result in a discrete emission event that will last through the duration of the charge and will have an average flow rate equal to the rate of the charge. The expulsion of expanded single unit operation vapor space when the vessel is heated is also an emission event. Both of these examples of emission events and others may occur in the same single unit operation during the course of the batch cycle. If the flow rate measurement for any emission event is zero, in accordance with 35 IAC 218.503(f) (2) (see also subsection (d) (ii) of this Condition), then such event is not an emission event for purposes of this Condition.

B. The mass emission rate from the process vent or inlet to the control device shall be determined by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f) (1) (see also subsection (d) (i) of this Condition) throughout the batch cycle;

C. The mass emission rate from the control device outlet shall be obtained by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f) (1) (see also subsection (d) (i) of this Condition) throughout the batch cycle; and

- D. The efficiency of the control device shall be determined by integrating the mass emission rates obtained in 35 IAC 218.503(f)(3)(B) and (f)(3)(C) (see also subsections (d)(iii)(B) and (d)(iii)(C) of this Condition), over the time of the batch cycle and dividing the difference in inlet and outlet mass flow totals by the inlet mass flow total.
- d. The owner or operator of a batch operation may propose an alternative test method or procedures to demonstrate compliance with the control requirements set forth in 35 IAC 218.501. Such method or procedures shall be approved by the Illinois EPA and USEPA as evidenced by federally enforceable permit conditions [35 IAC 218.503(h)].
- e. In the absence of a request by the Illinois EPA to conduct performance testing in accordance with the provisions of this 35 IAC 218.503, a source may demonstrate compliance by the use of engineering estimates or process stoichiometry [35 IAC 218.503(i)].

7.4.8 Monitoring Requirements

- a. Every owner or operator using an afterburner to comply with 35 IAC 218.501, shall install, calibrate, maintain, and operate, according to manufacturer's specifications, temperature monitoring devices with an accuracy of ± 1 percent of the temperature being measured expressed in degrees Celsius, equipped with continuous recorders. Where an afterburner other than a catalytic afterburner is used, a temperature monitoring device shall be installed in the combustion chamber.
- b. Every owner or operator using a flare to comply with 35 IAC 218.501, shall install, calibrate, maintain, and operate, according to manufacturer's specifications, a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to indicate continuous presence of a flame.
- c. The owner or operator of a process vent shall be permitted to monitor by an alternative method or may monitor parameters other than those listed in Conditions 7.4.8(a) or (b), if approved by the Illinois EPA and USEPA. Such alternative method or parameters shall be contained in this permit [35 IAC 218.504(g)].

7.4.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for the affected reactor train to demonstrate compliance with Conditions 5.5.1, 7.4.3, and 7.4.5, pursuant to Section 39.5(7) (b) of the Act:

- a. Records of the testing of the efficiency of each capture system and control device pursuant to Condition 7.4.7, which include the following [Section 39.5(7) (e) of the Act]:
 - i. The date, place and time of sampling or measurements;
 - ii. The date(s) analyses were performed;
 - iii. The company or entity that performed the analyses;
 - iv. The analytical techniques or methods used;
 - v. The results of such analyses; and
 - vi. The operating conditions as existing at the time of sampling or measurement.
- b. Every owner or operator of a batch operation subject to the control requirements of 35 IAC 218.501 shall keep records of the following parameters required to be monitored under 35 IAC 218.504 (see also Condition 7.4.8).
 - i. If using any of the following as a control device, the following records:
 - A. If using a thermal or catalytic afterburner to comply with 35 IAC 218.501, records indicating the average combustion chamber temperature of the afterburner (or the average temperature upstream and downstream of the catalyst bed for a catalytic afterburner), measured continuously and averaged over the same time period as the performance test [35 IAC 218.505(c) (1)];
 - B. If using a flare (i.e., steam-assisted, air-assisted or nonassisted) to comply with 35 IAC 218.501, continuous records of the flare pilot flame monitoring and records of all periods of operations

during which the pilot flame is absent
[35 IAC 218.505(c)(2)].

- ii. An owner or operator of a batch operation subject to the control requirements of Condition 7.4.5 may maintain alternative records other than those listed in Condition 7.4.9(b)(i). Any alternative recordkeeping shall be approved by the Illinois EPA and USEPA and shall be contained in this permit [35 IAC 218.505(e)].
- c. Records addressing use of good operating practices for the afterburner and flare:
 - i. Records for periodic inspection of the afterburner and flare with date, individual performing the inspection, and nature of inspection; and
 - ii. Records for prompt repair of defects, with identification and description of defect, effect on emissions, date identified, date repaired, and nature of repair.
- d. Records of operation and emissions of each affected reactor train, including the following:
 - i. Types and total amount of raw materials used, lb/batch, lb/mo, and ton/yr;
 - ii. Types and total amount of products produced, lb/batch, lb/mo, and ton/yr;
 - iii. The number of batches begun; and
 - iv. The aggregate monthly and annual VOM emissions from the affected reactor trains based on the material and solvent usage and afterburner efficiencies, with supporting calculations.
- e. Records for Malfunctions and Breakdowns of the Afterburner

The Permittee shall maintain records, pursuant to 35 IAC 201.263, of continued operation of an affected reactor train subject to 35 IAC 218, Subpart V, during malfunctions and breakdown of the control features of Afterburner 396-003 and Flare 396-701, which as a minimum, shall include:

- i. Date and duration of malfunction or breakdown;

- ii. A detailed explanation of the malfunction or breakdown;
- iii. An explanation why the damaged feature(s) could not be immediately repaired or the affected reactor train removed from service without risk of injury to personnel or severe damage to equipment;
- iv. The measures used to reduce the quantity of emissions and the duration of the event;
- v. The steps taken to prevent similar malfunctions or breakdowns or reduce their frequency and severity; and
- vi. The amount of release above allowable emissions during malfunction/breakdown.

7.4.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected reactor train with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. Emissions of VOM in excess of the limits in Conditions 7.4.3(b) based on the current month's records plus the preceding 11 months within 30 days of such an occurrence.
- b. Reporting of Malfunctions and Breakdowns for Control Equipment

The Permittee shall provide the following notification and reports to the Illinois EPA, Compliance Section and Regional Field Office, pursuant to 35 IAC 201.263, concerning continued operation of an affected reactor train subject to Condition 7.4.3(c) during malfunction or breakdown of the control features of Afterburner 396-003 and Flare 396-701.

- i. The Permittee shall notify the Illinois EPA's regional office by telephone as soon as possible during normal working hours, but no later than three (3) days, upon the occurrence of noncompliance due to malfunction, or breakdown.
- ii. Upon achievement of compliance, the Permittee shall give a written follow-up notice to the

Illinois EPA, Compliance Section and Regional Field Office, providing a detailed explanation of the event, an explanation why continued operation of the affected reactor train was necessary, the length of time during which operation continued under such conditions, the measures taken by the Permittee to minimize and correct deficiencies with chronology, and when the repairs were completed or when the affected reactor train was taken out of service.

- iii. If compliance is not achieved within 7 working days of the occurrence, the Permittee shall submit interim status reports to the Illinois EPA, Compliance Section and Regional Field Office, within 7 days of the occurrence and every 14 days thereafter, until compliance is achieved. These interim reports shall provide a brief explanation of the nature of the malfunction or breakdown, corrective actions accomplished to date, actions anticipated to occur with schedule, and the expected date on which repairs will be complete or the affected reactor train will be taken out of service.

7.4.11 Operational Flexibility/Anticipated Operating Scenarios

The Permittee is authorized to make the following physical or operational change with respect to an affected reactor train without prior notification to the Illinois EPA or revision of this permit. This condition does not affect the Permittee's obligation to properly obtain a construction permit in a timely manner for any activity constituting construction or modification of the source, as defined in 35 IAC 201.102:

- a. Operation of the affected reactor trains with the afterburner shut down and use of the flare as backup control (i.e., Mode B) is allowed for a maximum of 672 hours per calendar year. If the period of the shutdown is expected to exceed 168 hours, the Illinois EPA's Regional Office in Maywood shall be notified along with a schedule for expedited repair and restart of the afterburner. This schedule shall be submitted for Illinois EPA approval.

7.4.12 Compliance Procedures

- a. Compliance with Condition 7.4.3(b) is assumed by proper operation of the afterburner, as addressed by Condition 7.4.5(a).

- b. Compliance with the control requirements for the affected reactor train shall be determined from the log of the control device monitoring data as required by this permit (see Condition 7.4.9) and from other recordkeeping, reporting, monitoring, and testing requirements of Section 7.4 of this permit.
- c. VOM emissions shall be determined by using the following equations. The Permittee may also use the emission unit-specific emission factor if that emission factor was developed from the stack test data and based on the worst case scenario. Site-specific emission factors developed from stack test data shall be approved by the Illinois EPA, and the ERMS baseline shall be revised to reflect any new methods, pursuant to 35 IAC 205.337.
- i. Total combined uncontrolled VOM emissions = the sum of VOM emissions from vapor displacement during loading/charging of raw materials into a batching vessel, mixing/heating of raw materials in the batching vessel, transfer of batched mixture, purging evacuation/venting & stripping operation.
- ii. VOM emissions from vapor displacement losses during charging and transfer of materials to vessels:

$$\text{VOM Emissions} = \frac{\text{Volume (gal / day)}}{7.48 \text{ (gal / scf)}} \times \frac{P_i^* \text{ (mmHg)}}{P_T \text{ (760 mmHg)}} \times \frac{1 \text{ mole}}{387 \text{ scf}} \times \frac{\text{MW (lb)}}{\text{(mole)}} \times \frac{530^\circ \text{ R}}{T + 460^\circ \text{ R}}$$

Raoult's Law shall be used to determine mole fraction in vapor phase as presented below:

$$Y_i = \frac{X_i P_i^*}{P_T}$$

- Y_i = Mole fraction of i in the vapor
- X_i = Mole fraction of component i in the liquid
- P_i^* = Vapor pressure of component i at temperature T
- P_T = The total pressure in the vessel vapor space.
- T = Temperature in degrees Fahrenheit

- iii. VOM Emissions from Vessel/Reactor Heating/Mixing Process:

$$n_s = \frac{\frac{\Sigma(P_i)_{T_1}}{760 - \Sigma(P_i)_{T_1}} + \frac{\Sigma(P_i)_{T_2}}{760 - \Sigma(P_i)_{T_2}}}{2} x \Delta_n$$

Where:

- n_s = Lb - moles of VOC vapor displaced from the vessel being heated up.
- P_i = Vapor pressure of each compound at specified temperature.
- Δ_n = Number of lb - moles of gas displaced.

and

$$\Delta_n = \frac{V}{R} \left[\left(\frac{Pa_1}{T_1} \right) - \left(\frac{Pa_2}{T_2} \right) \right]$$

Where:

- V = Volume of free space in the vessel in ft^3 .
- R = Gas law constant, 998.9 mmHg ft^3/lb -mole K.
- Pa_1 = Initial gas pressure in the vessel, mmHg.
- Pa_2 = Final gas pressure, mmHg.
- T_1 = Initial temperature of vessel in K.
- T_2 = Final temperature of vessel in K.

- iv. VOM emissions from vessel/reactor purging operation:

$$E_R = \frac{(Y_i)(V_r)(P_r)(MW)}{(R)(T)}$$

Where:

- E_R = Mass emission rate.

Y_i = Mole fraction in vapor phase.
 V_r = Volumetric gas displacement rate.
 R = Ideal gas law constant
 T = Temperature of the vessel vapor space, absolute.
 P_T = Pressure of the vessel vapor space.
 MW = Molecular weight of the VOM.

- d. Compliance with the PM emission limitations in Condition 7.4.3(d) is assured and achieved by the proper operation, maintenance, and work-practices inherent in operation of the affected reactor train and associated control equipment. PM emissions shall be determined by design parameters of the associated control equipment and appropriate emission factors or the manufacturer's estimated outlet PM concentration.

7.5 Unit - Ester Process and Ester Process II
Control - Afterburner 396-003

7.5.1 Description

The Ester Process manufactures ester amine compounds from batch reactions with amine compounds and acids.

7.5.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
Ester Process		
309-326	Reactor	Condenser (309-428)
309-428	Process Condenser	Afterburner 396-003 (Via Vacuum System)
309-327	Condensate Receiver	Afterburner 396-003 (Via Vacuum System)
309-603	Vacuum System	Afterburner 396-003 (Mode A Only)
309-607	Vacuum System	Afterburner 396-003 (Mode A Only)
309-604	Hopper/Filter	None
Ester Process II		
316-304	Reactor	Condenser (316-408)
316-408	Process Condenser	Afterburner 396-003 (Via Vacuum System)
316-305	Condensate Receiver	Afterburner 396-003 (Via Vacuum System)
316-603	Vacuum System	Afterburner 396-003 (Mode A Only)
316-604	Hopper/Filter	Afterburner 396-003 (Mode A Only)
309-604	Hopper/Filter	None

7.5.3 Applicability Provisions and Applicable Regulations

- a. The "affected reactor trains" for the purpose of these unit-specific conditions, includes the collection of equipment, identified in Condition 7.5.2, configured to manufacture a product or intermediate.
- b. Each affected reactor train is subject to 35 IAC 218 Subpart G, Use of Organic Material, which provides that:
 - i. No person shall cause or allow the discharge of more than 3.6 kg/hr (8 lb/hr) of organic material into the atmosphere from any emission unit, except as provided in 35 IAC 218.302 (see also Condition 7.5.3(b)(ii)) and the following exception: If no odor nuisance

exists the limitation of 35 IAC 218 Subpart G shall apply only to photochemically reactive material [35 IAC 218.301].

- ii. Emissions of organic material in excess of those permitted by 35 IAC 218.301 (see also Condition 7.5.3(b) (i)) are allowable if such emissions are controlled by a vapor recovery system which adsorbs and/or condenses at least 85 percent of the total uncontrolled organic material that would otherwise be emitted to the atmosphere [35 IAC 218.302(b)].
- c. The affected reactor train is subject to the control requirements of 35 IAC 218 Subpart V: Batch Operations and Air Oxidation Process because this source has SIC of 2821, 2833, 2834, 2861, 2865, 2869, or 2879, and each emission unit is included in category (i) or (ii) below.
 - i. Any single unit operation with uncontrolled total annual mass emissions that exceed 500 lb/yr and with a VOM concentration greater than 500 ppmv. In this individual determination, no applicability analysis shall be performed for any single unit operation with a VOM concentration of less than or equal to 500 ppmv [35 IAC 218.500(d) (1)]; and
 - ii. Any batch process train containing process vents which, in the aggregate, have uncontrolled total annual mass emissions of 30,000 lb/yr or more of VOM from all products manufactured in the batch process train. Any single unit operation with uncontrolled total annual mass emissions exceeding 500 lb/yr, regardless of VOM concentration, shall be included in the aggregate applicability analysis [35 IAC 218.500(d) (2)].
 - iii. Applicability equations:
 - A. The applicability equations are specific to volatility [35 IAC 218.500(e) (1)].
 - B. For purposes of this subsection, the following abbreviations apply:
 - 1. FR = Vent stream flow rate, scfm;
 - 2. UTAME = Uncontrolled total annual mass emissions of VOM, expressed as lb/yr;

3. WAV = Weighted average volatility;
4. $MVOM_i$ = Mass of VOM component i ;
5. $MWVOM_i$ = Molecular weight of VOM component i ; and
6. VP_i = Vapor pressure of VOM component i .

[35 IAC 218.500(e) (2)]

- C. Weighted average volatility shall be calculated as follows:

$$WAV = \frac{\sum_{i=1}^n (VP_i) x \frac{(MVOM_i)}{(MWVOM_i)}}{\sum_{i=1}^n \frac{(MVOM_i)}{(MWVOM_i)}}$$

[35 IAC 218.500(e) (3)]

- D. For purposes of determining applicability, flow rate values shall be calculated as follows:

1. Low WAV has a vapor pressure less than or equal to 75 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.07 (UTAME)] - 1,821$$

2. Moderate WAV has a vapor pressure greater than 75 mmHg but less than or equal to 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.031 (UTAME)] - 494$$

3. High WAV has a vapor pressure greater than 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.013 (UTAME)] - 301$$

[35 IAC 218.500(e) (4)]

E. To determine the vapor pressure of VOM, the applicable methods and procedures in 35 IAC 218.111 shall apply [35 IAC 218.500(e) (5)].

d. Each affected reactor train is subject to 35 IAC 212.321, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c) of 35 IAC 212.321 (See also Attachment 1) [35 IAC 212.321(a)].

7.5.4 Non-Applicability of Regulations of Concern

a. This permit is issued based on each affected reactor train not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because these emission units do not manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63 Subpart F.

b. This permit is issued based on each affected reactor train not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because these emission units do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.

c. This permit is issued based on each affected reactor train not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because these emission units are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.

d. This permit is issued based on the affected reactor train not being subject to 35 IAC 218 Subpart RR, Miscellaneous Organic Chemical Manufacturing Processes. Pursuant to 35 IAC 218.960(b) (2) (B), these requirements shall not apply to emission units which are included in the categories specified in Subpart V.

7.5.5 Operational And Production Limits And Work Practices

- a. The Permittee shall follow good operating practices for the afterburner, including periodic inspection, routine maintenance and prompt repair of defects.
- b. Except as provided for in 35 IAC 218.500(c), every owner or operator of a single unit operation with an average flow rate, as determined in accordance with 35 IAC 218.502(b), below the flow rate value calculated by the applicability equations contained in Section 7.5.3(c)(iii) (see 35 IAC 218.500(e)), shall reduce uncontrolled VOM emissions from such single unit operation by an overall efficiency, on average, of at least 90 percent, or 20 ppmv, per batch cycle [35 IAC 218.501(a)].
- c. Operation of the affected reactor trains shall not exceed the following limits:
 - i. Ester Process: 83 batches/month and 707 batches/year; and
 - ii. Ester Process II: 91 batches/month and 772 batches/year.

7.5.6 Emission Limitations

In addition to Condition 5.2.2 and the source wide emission limitations in Condition 5.5, the affected reactor train is subject to the following:

- a. Emissions from the affected reactor train shall not exceed the following limits:

<u>Process</u>	<u>VOM Emissions (Ton/Year)</u>	<u>PM Emissions (Ton/Year)</u>
Ester Process	1.26	0.29

These limits are based on the maximum production rate indicated in Condition 7.5.5(c), maximum emissions based on material usage, and a 99 percent combined control efficiency for the afterburner and condenser. This limit takes into account operation for 672 hours per year with the afterburner shut down, resulting in 0.57 ton/year of VOM emissions (see Condition 7.5.11).

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations contain revisions to previously issued Permit 97070068. The source has requested that the Illinois EPA establish conditions in this permit that allow various refinements from the conditions of this permit, consistent with the information provided in the CAAPP application. The source has requested these revisions and has addressed the applicability and compliance of Title I of the CAA, specifically 35 IAC Part 203, Major Stationary Sources Construction and Modification and/or 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits continue to ensure that the construction and/or modification addressed in this permit does not constitute a new major source or major modification pursuant to these rules. These limits are the primary enforcement mechanism for the equipment and activities permitted in this permit and the information in the CAAPP application contains the most current and accurate information for the source. Specifically, the annual VOM emission limit was decreased from 2.00 ton/year to 1.26 ton/year to reflect lower controlled emissions and higher emissions during control equipment downtime [T1R].

- b. Emissions from the affected reactor train shall not exceed the following limits:

<u>Process</u>	<u>VOM Emissions</u>	
	<u>(Ton/Month)</u>	<u>(Ton/Year)</u>
Ester Process II	0.20	1.74

These limits are based on the maximum production rate indicated in Condition 7.5.5(c), maximum emissions based on a computer simulation using the USEPA Pharmaceutical Industry CTG, and a 99 percent combined control efficiency for the condenser, vacuum system, and afterburner. This limit takes into account operation for 672 hours per year with the afterburner shut down, resulting in 0.79 ton/year of VOM emissions (see Condition 7.5.11).

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations contain revisions to previously issued Permit 97090018. The source has requested that the Illinois EPA establish conditions in this permit that allow various refinements from the conditions of this permit, consistent with the information provided in the CAAPP application. The source has requested these revisions and has

addressed the applicability and compliance of Title I of the CAA, specifically 35 IAC Part 203, Major Stationary Sources Construction and Modification and/or 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits continue to ensure that the construction and/or modification addressed in this permit does not constitute a new major source or major modification pursuant to these rules. These limits are the primary enforcement mechanism for the equipment and activities permitted in this permit and the information in the CAAPP application contains the most current and accurate information for the source. Specifically, monthly emission limit was increased to allow flexibility and the annual emission limit was decreased from 2.62 ton/year to 1.74 ton/year to reflect lower controlled emissions and higher emissions during control equipment downtime [T1R].

7.5.7 Testing Requirements

- a. Upon the Illinois EPA's request, the owner or operator of a batch operation shall conduct testing to demonstrate compliance with 35 IAC 218.501, in accordance with the applicable test methods and procedures specified in 35 IAC 218.503(d), (e), and (f) [35 IAC 218.503(a)].
- b. For the purpose of demonstrating compliance with the control requirements of 35 IAC 218.501, the batch operation shall be run at representative operating conditions and flow rates during any performance test [35 IAC 218.503(e)].
- c. The following methods in 40 CFR 60, Appendix A, shall be used to demonstrate compliance with the reduction efficiency requirement set forth in 35 IAC 218.501 [35 IAC 218.503(f)]:
 - i. Method 1 or 1A, as appropriate, for selection of the sampling sites if the flow measuring device is not a rotometer. The control device inlet sampling site for determination of vent stream VOM composition reduction efficiency shall be prior to the control device and after the control device [35 IAC 218.503(f)(1)];
 - ii. Method 2, 2A, 2C, or 2D, as appropriate, for determination of gas stream volumetric flow rate flow measurements, which shall be taken continuously. No traverse is necessary when the flow measuring device is an ultrasonic probe [35 IAC 218.503(f)(2)];

- iii. Method 25A or Method 18, if applicable, to determine the concentration of VOM in the control device inlet and outlet [35 IAC 218.503(f)(3)];
 - A. The sampling time for each run shall be as follows:
 - 1. For batch cycles less than eight hours in length, readings shall be taken continuously over the entire length of the batch cycle with a maximum of 15-minute intervals between measurements if using Method 25A. If using Method 18, readings shall be taken continuously with a maximum of 15-minute intervals between measurements throughout the batch cycle unless it becomes necessary to change the impinger train, in which case a 30-minute interval shall not be exceeded.
 - 2. For batch cycles of eight hours and greater in length, the owner or operator may either test in accordance with the test procedures defined in 35 IAC 218.503(f)(3)(A)(i) (see also subsection (d)(iii)(A)(1) of this Condition) or the owner or operator may elect to perform tests, pursuant to either Method 25A or Method 18, only during those portions of each emission event which define the emission profile of each emission event occurring within the batch cycle. For each emission event of less than four hours in duration, the owner or operator shall test continuously over the entire emission event as set forth in subsection (d)(iii)(A)(1) of this Condition. For each emission event of greater than four hours in duration, the owner or operator shall elect either to perform a minimum of three one hour test runs during the emission event or shall test continuously over the entire emission event within each single unit operation in the batch process train. To demonstrate that the portion of the emission event to be

tested defines the emission profile for the emission event, the owner or operator electing to rely on this option shall develop an emission profile for the entire emission event. Such emission profile shall be based upon either process knowledge or test data collected. Examples of information that could constitute process knowledge include, but are not limited to, calculations based on material balances and process stoichiometry. Previous test results may be used provided such results are still relevant to the current process vent stream conditions.

3. For purposes of subsection (d) (iii) of this Condition, the term "emission event" shall be defined as a discrete period of venting that is associated with a single unit operation. For example, a displacement of vapor resulting from the charging of a single unit operation with VOM will result in a discrete emission event that will last through the duration of the charge and will have an average flow rate equal to the rate of the charge. The expulsion of expanded single unit operation vapor space when the vessel is heated is also an emission event. Both of these examples of emission events and others may occur in the same single unit operation during the course of the batch cycle. If the flow rate measurement for any emission event is zero, in accordance with 35 IAC 218.503(f) (2) (see also subsection (d) (ii) of this Condition), then such event is not an emission event for purposes of this Condition.

- B. The mass emission rate from the process vent or inlet to the control device shall be determined by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f) (1) (see also subsection (d) (i) of this Condition) throughout the batch cycle;

- C. The mass emission rate from the control device outlet shall be obtained by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f)(1) (see also subsection (d)(i) of this Condition) throughout the batch cycle; and
 - D. The efficiency of the control device shall be determined by integrating the mass emission rates obtained in 35 IAC 218.503(f)(3)(B) and (f)(3)(C) (see also subsections (d)(iii)(B) and (d)(iii)(C) of this Condition), over the time of the batch cycle and dividing the difference in inlet and outlet mass flow totals by the inlet mass flow total.
- d. The owner or operator of a batch operation may propose an alternative test method or procedures to demonstrate compliance with the control requirements set forth in 35 IAC 218.501. Such method or procedures shall be approved by the Illinois EPA and USEPA as evidenced by federally enforceable permit conditions [35 IAC 218.503(h)].
 - e. In the absence of a request by the Illinois EPA to conduct performance testing in accordance with the provisions of this 35 IAC 218.503, a source may demonstrate compliance by the use of engineering estimates or process stoichiometry [35 IAC 218.503(i)].

7.5.8 Monitoring Requirements

- a. Every owner or operator using an afterburner to comply with 35 IAC 218.501, shall install, calibrate, maintain, and operate, according to manufacturer's specifications, temperature monitoring devices with an accuracy of ± 1 percent of the temperature being measured expressed in degrees Celsius, equipped with continuous recorders. Where an afterburner other than a catalytic afterburner is used, a temperature monitoring device shall be installed in the combustion chamber.
- b. Every owner or operator using a flare to comply with 35 IAC 218.501, shall install, calibrate, maintain, and operate, according to manufacturer's specifications, a heat sensing device, such as an ultra-violet beam sensor or thermocouple, at the pilot light to indicate continuous presence of a flame.

- c. The owner or operator of a process vent shall be permitted to monitor by an alternative method or may monitor parameters other than those listed in Conditions 7.5.8(a) or (b), if approved by the Illinois EPA and USEPA. Such alternative method or parameters shall be contained in this permit [35 IAC 218.504(g)].

7.5.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for the affected reactor train to demonstrate compliance with Conditions 5.5.1, 7.5.3, and 7.5.5, pursuant to Section 39.5(7)(b) of the Act:

- a. Records of the testing of the efficiency of each capture system and control device pursuant to Condition 7.5.7, which include the following [Section 39.5(7)(e) of the Act]:
 - i. The date, place and time of sampling or measurements;
 - ii. The date(s) analyses were performed;
 - iii. The company or entity that performed the analyses;
 - iv. The analytical techniques or methods used;
 - v. The results of such analyses; and
 - vi. The operating conditions as existing at the time of sampling or measurement.
- b. Every owner or operator of a batch operation subject to the control requirements of 35 IAC 218.501 shall keep records of the following parameters required to be monitored under 35 IAC 218.504 (see also Condition 7.5.8).
 - i. If using any of the following as a control device, the following records:
 - A. If using a thermal or catalytic afterburner to comply with 35 IAC 218.501, records indicating the average combustion chamber temperature of the afterburner (or the average temperature upstream and downstream of the catalyst bed for a catalytic afterburner), measured continuously and averaged over the same

time period as the performance test [35 IAC 218.505(c) (1)];

- B. If using a flare (i.e., steam-assisted, air-assisted or nonassisted) to comply with 35 IAC 218.501, continuous records of the flare pilot flame monitoring and records of all periods of operations during which the pilot flame is absent [35 IAC 218.505(c) (2)].
- ii. An owner or operator of a batch operation subject to the control requirements of Condition 7.5.5 may maintain alternative records other than those listed in Condition 7.5.9(b) (i). Any alternative recordkeeping shall be approved by the Illinois EPA and USEPA and shall be contained in this permit [35 IAC 218.505(e)].
- c. Records addressing use of good operating practices for the afterburner:
 - i. Records for periodic inspection of the afterburner with date, individual performing the inspection, and nature of inspection; and
 - ii. Records for prompt repair of defects, with identification and description of defect, effect on emissions, date identified, date repaired, and nature of repair.
- d. Records of operation and emissions of each affected reactor train, including the following:
 - i. Types and total amount of raw materials used, lb/batch, lb/mo, and ton/yr;
 - ii. Types and total amount of products produced, lb/batch, lb/mo, and ton/yr;
 - iii. The number of batches begun per month and per year; and
 - iv. The aggregate monthly and annual VOM emissions from the affected reactor trains based on the material and solvent usage and afterburner efficiencies, with supporting calculations.

7.5.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected reactor train with the permit requirements as follows, pursuant to

Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. Emissions of VOM in excess of the limits in Conditions 7.5.3(b) and/or 7.5.6 based on the current month's records plus the preceding 11 months within 30 days of such an occurrence.

7.5.11 Operational Flexibility/Anticipated Operating Scenarios

The Permittee is authorized to make the following physical or operational change with respect to an affected reactor train without prior notification to the Illinois EPA or revision of this permit. This condition does not affect the Permittee's obligation to properly obtain a construction permit in a timely manner for any activity constituting construction or modification of the source, as defined in 35 IAC 201.102:

- a. Operation of the affected reactor trains with the afterburner shut down (i.e., Mode B) is allowed for a maximum of 672 hours per calendar year. If the period of the shutdown is expected to exceed 168 hours, the Illinois EPA's Regional Office in Maywood shall be notified along with a schedule for expedited repair and restart of the afterburner. This schedule shall be submitted for Illinois EPA approval.

7.5.12 Compliance Procedures

Compliance with the emission limits shall be based on the recordkeeping requirements in Condition 7.5.9 and the emission factors and formulas listed below:

- a. Compliance with Condition 7.5.3(b) is assumed by proper operation of the afterburner, as addressed by Condition 7.5.5(a).
- b. Compliance with the control requirements for the affected reactor train shall be determined from the log of the control device monitoring data as required by this permit (see Condition 7.5.9) and from other recordkeeping, reporting, monitoring, and testing requirements of Section 7.5 of this permit.
- c. VOM emissions shall be determined by using the following equations. The Permittee may also use the emission unit-specific emission factor if that emission factor was developed from the stack test data and based on the worst case scenario. Site-specific emission factors developed from stack test data shall be approved by the Illinois EPA, and the ERMS

baseline shall be revised to reflect any new methods, pursuant to 35 IAC 205.337.

- i. Total combined uncontrolled VOM emissions = the sum of VOM emissions from vapor displacement during loading/charging of raw materials into a batching vessel, mixing/heating of raw materials in the batching vessel, transfer of batched mixture, purging evacuation/venting & stripping operation.
- ii. VOM emissions from vapor displacement losses during charging and transfer of materials to vessels:

$$\text{VOM Emissions} = \frac{\text{Volume (gal/day)}}{7.48 \text{ (gal/scf)}} \times \frac{P_i^* \text{ (mmHg)}}{P_T \text{ (760 mmHg)}} \times \frac{1 \text{ mole}}{387 \text{ scf}} \times \frac{\text{MW (lb)}}{\text{(mole)}} \times \frac{530^\circ \text{ R}}{T + 460^\circ \text{ R}}$$

Raoult's Law shall be used to determine mole fraction in vapor phase as presented below:

$$Y_i = \frac{X_i P_i^*}{P_T}$$

Y_i = Mole fraction of i in the vapor

X_i = Mole fraction of component i in the liquid

P_i^* = Vapor pressure of component i at temperature T

P_T = The total pressure in the vessel vapor space.

T = Temperature in degrees Fahrenheit

- iii. VOM Emissions from Vessel/Reactor Heating/Mixing Process:

$$n_s = \frac{\frac{\Sigma(P_i)_{T_1}}{760 - \Sigma(P_i)_{T_1}} + \frac{\Sigma(P_i)_{T_2}}{760 - \Sigma(P_i)_{T_2}}}{2} \times \Delta n$$

Where:

n_s = Lb - moles of VOC vapor displaced from the vessel being heated up.

P_i = Vapor pressure of each compound at specified temperature.

Δ_n = Number of lb - moles of gas displaced.

and

$$\Delta_n = \frac{V}{R} \left[\left(\frac{Pa_1}{T_1} \right) - \left(\frac{Pa_2}{T_2} \right) \right]$$

Where:

V = Volume of free space in the vessel in ft³.

R = Gas law constant, 998.9 mmHg ft³/lb-mole K.

Pa₁ = Initial gas pressure in the vessel, mmHg.

Pa₂ = Final gas pressure, mmHg.

T₁ = Initial temperature of vessel in K.

T₂ = Final temperature of vessel in K.

iv. VOM emissions from vessel/reactor purging operation:

$$E_R = \frac{(Y_i)(V_r)(P_T)(MW)}{(R)(T)}$$

Where:

E_R = Mass emission rate.

Y_i = Mole fraction in vapor phase.

V_r = Volumetric gas displacement rate.

R = Ideal gas law constant

T = Temperature of the vessel vapor space, absolute.

P_T = Pressure of the vessel vapor space.

MW = Molecular weight of the VOM.

d. Compliance with the PM emission limitations in Condition 7.5.3(d) is assured and achieved by the proper operation, maintenance, and work-practices

inherent in operation of the affected reactor train and associated control equipment. PM emissions shall be determined by design parameters of the associated control equipment and appropriate emission factors or the manufacturer's estimated outlet PM concentration.

7.6 Unit - Arquad Production Area (Quaternary Ammonium Salt Process and Quaternary Ammonium Salt Process II)
Control - Methyl Chloride Absorber Systems 309-325 and 316-309

7.6.1 Description

The Quaternary Ammonium Salt Process manufactures compounds which are used as surfactants and fabric softeners.

7.6.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
Quaternary Ammonium Salt Process		
309-321	Reactor	Methyl Chloride Absorber System 309-325 (Via Drop Tank)
309-322	Drop Tank	Methyl Chloride Absorber System 309-325
309-324	Recovery Tank	(Equipment is a Part of 309-325)
309-325	Methyl Chloride Absorber Column	(Equipment is a Part of 309-325)
309-330	Process Tank	None
309-423	Water-cooled Condenser	(Equipment is a Part of 309-325)
309-424	Refrigerated Glycol-chilled Condenser	(Equipment is a Part of 309-325)
309-323	Vent Separator	(Equipment is a Part of 309-325)
309-601	Liquid Ring Pump Package	(Equipment is a Part of 309-325)
Quaternary Ammonium Salt Process II		
316-300	Reactor	Methyl Chloride Absorber System 316-309 (Via Drop Tank)
316-301	Reactor	Methyl Chloride Absorber System 316-309 (Via Drop Tank)
316-302	Drop Tank	Methyl Chloride Absorber System 316-309
316-313	Drop Tank	Methyl Chloride Absorber System 316-309
316-308	Recovery Tank	(Equipment is a Part of 316-309)

Emission Unit	Description	Emission Control Equipment
316-309	Methyl Chloride Absorber Column	(Equipment is a Part of 316-309)
316-303	Process Tank	None
316-402	Water-cooled Condenser	(Equipment is a Part of 316-309)
316-409	Water-cooled Condenser	(Equipment is a Part of 316-309)
316-403	Refrigerated Glycol-chilled Condenser	(Equipment is a Part of 316-309)
316-410	Refrigerated Glycol-chilled Condenser	(Equipment is a Part of 316-309)
316-307	Vent Separator	(Equipment is a Part of 316-309)
316-311	Vent Separator	(Equipment is a Part of 316-309)
316-601	Liquid Ring Pump Package	(Equipment is a Part of 316-309)

7.6.3 Applicability Provisions and Applicable Regulations

- a. The "affected reactor train" for the purpose of these unit-specific conditions, includes the collection of equipment, identified in Condition 7.6.2, configured to manufacture a product or intermediate.
- b. The affected reactor train is subject to 35 IAC 218 Subpart G, Use of Organic Material, which provides that:
 - i. No person shall cause or allow the discharge of more than 3.6 kg/hr (8 lb/hr) of organic material into the atmosphere from any emission unit, except as provided in 35 IAC 218.302 (see also Condition 7.6.3(b) (ii)) and the following exception: If no odor nuisance exists the limitation of 35 IAC 218 Subpart G shall apply only to photochemically reactive material [35 IAC 218.301].
 - ii. Emissions of organic material in excess of those permitted by 35 IAC 218.301 (see also Condition 7.6.3(b) (i)) are allowable if such emissions are controlled by a vapor recovery system which adsorbs and/or condenses at least 85 percent of the total uncontrolled organic material that would otherwise be emitted to the atmosphere [35 IAC 218.302(b)].
- c. The affected reactor train is subject to the control requirements of 35 IAC 218 Subpart V: Batch Operations and Air Oxidation Process because this

source has SIC of 2821, 2833, 2834, 2861, 2865, 2869, or 2879, and each emission unit is included in category (i) or (ii) below.

- i. Any single unit operation with uncontrolled total annual mass emissions that exceed 500 lb/yr and with a VOM concentration greater than 500 ppmv. In this individual determination, no applicability analysis shall be performed for any single unit operation with a VOM concentration of less than or equal to 500 ppmv [35 IAC 218.500(d)(1)]; and
- ii. Any batch process train containing process vents which, in the aggregate, have uncontrolled total annual mass emissions of 30,000 lb/yr or more of VOM from all products manufactured in the batch process train. Any single unit operation with uncontrolled total annual mass emissions exceeding 500 lb/yr, regardless of VOM concentration, shall be included in the aggregate applicability analysis [35 IAC 218.500(d)(2)].
- iii. Applicability equations:
 - A. The applicability equations are specific to volatility [35 IAC 218.500(e)(1)].
 - B. For purposes of this subsection, the following abbreviations apply:
 1. FR = Vent stream flow rate, scfm;
 2. UTAME = Uncontrolled total annual mass emissions of VOM, expressed as lb/yr;
 3. WAV = Weighted average volatility;
 4. $MVOM_i$ = Mass of VOM component i;
 5. $MWVOM_i$ = Molecular weight of VOM component i; and
 6. VP_i = Vapor pressure of VOM component i.

[35 IAC 218.500(e)(2)]
 - C. Weighted average volatility shall be calculated as follows:

$$WAV = \frac{\sum_{i=1}^n (VP_i) x \frac{(MVOM_i)}{(MWWOM_i)}}{\sum_{i=1}^n \frac{(MVOM_i)}{(MWWOM_i)}}$$

[35 IAC 218.500(e) (3)]

D. For purposes of determining applicability, flow rate values shall be calculated as follows:

1. Low WAV has a vapor pressure less than or equal to 75 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.07 (UTAME)] - 1,821$$

2. Moderate WAV has a vapor pressure greater than 75 mmHg but less than or equal to 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.031 (UTAME)] - 494$$

3. High WAV has a vapor pressure greater than 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.013 (UTAME)] - 301$$

[35 IAC 218.500(e) (4)]

E. To determine the vapor pressure of VOM, the applicable methods and procedures in 35 IAC 218.111 shall apply [35 IAC 218.500(e) (5)].

- d. The affected reactor train is subject to 35 IAC 212.321, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c)

of 35 IAC 212.321 (See also Attachment 1) [35 IAC 212.321(a)].

7.6.4 Non-Applicability of Regulations of Concern

- a. This permit is issued based on the affected reactor train not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because these emission units do not manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63 Subpart F.
- b. This permit is issued based on the affected reactor train not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because these emission units do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.
- c. This permit is issued based on the affected reactor train not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because these emission units are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.
- d. This permit is issued based on the affected reactor train not being subject to 35 IAC 218 Subpart RR, Miscellaneous Organic Chemical Manufacturing Processes. Pursuant to 35 IAC 218.960(b)(2)(B), these requirements shall not apply to emission units which are included in the categories specified in Subpart V.

7.6.5 Operational And Production Limits And Work Practices

- a. The Permittee shall follow good operating practices for the Methyl Chloride Absorber Systems, including periodic inspection, routine maintenance and prompt repair of defects.
- b. Except as provided for in 35 IAC 218.500(c), every owner or operator of a single unit operation with an average flow rate, as determined in accordance with 35 IAC 218.502(b), below the flow rate value calculated by the applicability equations contained in Section 7.6.3(c)(iii) (see 35 IAC 218.500(e)), shall reduce uncontrolled VOM emissions from such single unit operation by an overall efficiency, on average, of at least 90 percent, or 20 ppmv, per batch cycle [35 IAC 218.501(a)].

- c. The temperature of the absorbing fluid at the bottom of the Methyl Chloride Absorber System (No. 309-325) shall be not exceed 41°F.
- d. The operation of number of batches manufactured in the affected reactor trains shall not the following:
 - i. Quaternary Ammonium Salt Process: 1,034 batches per year. This limit contains revisions to previously issued Permit 963060024. Specifically, the operating limit was increased from 922 batches [T1R]; and
 - ii. Quaternary Ammonium Salt Process II: 274 batches per month and 2,629 batches per year. These limits were established in Permit 97090063 [T1].
- e. Upon approval by the USEPA of the alternative monitoring requirements in Condition 7.6.8(b), the following requirements shall be followed at all times during the operation of the affected reactor train if specific gravity monitors are not used, in order to demonstrate compliance with the 90 percent reduction requirement for affected new and existing emission units. This is to satisfy the alternative monitoring parameter and limitation, pursuant to 35 IAC 218.504(g). These requirements do not apply during periods when the control equipment receives emissions only from emission units exempt from the control requirements of 35 IAC 218.501 pursuant to 35 IAC 218.500(c).
 - i. For the Methyl Chloride Absorber System (309-325), the scrubbing system shall be charged with fresh solvent (alcohol) for each batch produced. The amount of fresh solvent charged shall be at least twice the amount needed to reach the solubility limit of the excess methyl chloride for each batch.
 - ii. For the Methyl Chloride Absorber System (316-309), the scrubbing system shall be charged with fresh solvent (alcohol) for each batch produced. The amount of fresh solvent charged shall be at least twice the amount needed to reach the solubility limit of the excess methyl chloride for that batch.

7.6.6 Emission Limitations

In addition to Condition 5.2.2 and the source wide emission limitations in Condition 5.5, the affected reactor train is subject to the following:

- a. Emissions from the affected reactor train, specifically, the methyl chloride absorber system (309-325) for Quaternary Ammonium Salt Process, shall not exceed the following limits:

VOM Emissions	
<u>(Lb/Batch)</u>	<u>(Ton/Year)</u>
32.8	14.58

These limits are based on the maximum production rate indicated in Condition 7.6.5(d) and an average controlled emission rate of 28.2 lb/batch. VOM includes both the methyl chloride being absorbed and the absorbing fluid, which are then used as feed to the reactor.

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations contain revisions to previously issued Permit 93060024. The source has requested that the Illinois EPA establish conditions in this permit that allow various refinements from the conditions of this aforementioned permit, consistent with the information provided in the CAAPP application. The source has requested these revisions and has addressed the applicability and compliance of Title I of the CAA, specifically 35 IAC Part 203, Major Stationary Sources Construction and Modification and/or 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits continue to ensure that the construction and/or modification addressed in this permit does not constitute a new major source or major modification pursuant to these rules. These limits are the primary enforcement mechanism for the equipment and activities permitted in this permit and the information in the CAAPP application contains the most current and accurate information for the source. Specifically, the annual emission limit was increased from 13.0 tons per year to 14.58 tons per year based on the production increase from 922 batches per year to 1,034 batches per year [T1R].

- b. Emissions from the affected reactor train, specifically, the methyl chloride absorber system (316-309) for Quaternary Ammonium Salt Process II, shall not exceed the following limits:

VOM Emissions	
<u>(Ton/Month)</u>	<u>(Ton/Year)</u>
2.53	23.53

These limits are based on the maximum production rate indicated in Condition 7.6.5(c), a maximum emission factor of 17.9 lb VOM/batch as determined by a stack test conducted in July 2000, and a 99 percent control efficiency for the absorption system. VOM includes both the methyl chloride being absorbed and the absorbing fluid, which are then used as feed to the reactor.

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations contain revisions to previously issued Permit 97090063. The source has requested that the Illinois EPA establish conditions in this permit that allow various refinements from the conditions of this permit, consistent with the information provided in the CAAPP application. The source has requested these revisions and has addressed the applicability and compliance of Title I of the CAA, specifically 35 IAC Part 203, Major Stationary Sources Construction and Modification and/or 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits continue to ensure that the construction and/or modification addressed in this permit does not constitute a new major source or major modification pursuant to these rules. These limits are the primary enforcement mechanism for the equipment and activities permitted in this permit and the information in the CAAPP application contains the most current and accurate information for the source. Specifically, the monthly emission limit was increased to allow for short term flexibility [T1R].

7.6.7 Testing Requirements

- a. Upon the Illinois EPA's request, the owner or operator of a batch operation shall conduct testing to demonstrate compliance with 35 IAC 218.501, in accordance with the applicable test methods and procedures specified in 35 IAC 218.503(d), (e), and (f) [35 IAC 218.503(a)].

- b. For the purpose of demonstrating compliance with the control requirements of 35 IAC 218.501, the batch operation shall be run at representative operating conditions and flow rates during any performance test [35 IAC 218.503(e)].
- c. The following methods in 40 CFR 60, Appendix A, shall be used to demonstrate compliance with the reduction efficiency requirement set forth in 35 IAC 218.501 [35 IAC 218.503(f)]:
 - i. Method 1 or 1A, as appropriate, for selection of the sampling sites if the flow measuring device is not a rotometer. The control device inlet sampling site for determination of vent stream VOM composition reduction efficiency shall be prior to the control device and after the control device [35 IAC 218.503(f)(1)];
 - ii. Method 2, 2A, 2C, or 2D, as appropriate, for determination of gas stream volumetric flow rate flow measurements, which shall be taken continuously. No traverse is necessary when the flow measuring device is an ultrasonic probe [35 IAC 218.503(f)(2)];
 - iii. Method 25A or Method 18, if applicable, to determine the concentration of VOM in the control device inlet and outlet [35 IAC 218.503(f)(3)];
- A. The sampling time for each run shall be as follows:
 - 1. For batch cycles less than eight hours in length, readings shall be taken continuously over the entire length of the batch cycle with a maximum of 15-minute intervals between measurements if using Method 25A. If using Method 18, readings shall be taken continuously with a maximum of 15-minute intervals between measurements throughout the batch cycle unless it becomes necessary to change the impinger train, in which case a 30-minute interval shall not be exceeded.
 - 2. For batch cycles of eight hours and greater in length, the owner or operator may either test in accordance with the test procedures

defined in 35 IAC
218.503(f)(3)(A)(i) (see also
subsection (d)(iii)(A)(1) of this
Condition) or the owner or operator
may elect to perform tests, pursuant
to either Method 25A or Method 18,
only during those portions of each
emission event which define the
emission profile of each emission
event occurring within the batch
cycle. For each emission event of
less than four hours in duration,
the owner or operator shall test
continuously over the entire
emission event as set forth in
subsection (d)(iii)(A)(1) of this
Condition. For each emission event
of greater than four hours in
duration, the owner or operator
shall elect either to perform a
minimum of three one hour test runs
during the emission event or shall
test continuously over the entire
emission event within each single
unit operation in the batch process
train. To demonstrate that the
portion of the emission event to be
tested defines the emission profile
for the emission event, the owner or
operator electing to rely on this
option shall develop an emission
profile for the entire emission
event. Such emission profile shall
be based upon either process
knowledge or test data collected.
Examples of information that could
constitute process knowledge
include, but are not limited to,
calculations based on material
balances and process stoichiometry.
Previous test results may be used
provided such results are still
relevant to the current process vent
stream conditions.

3. For purposes of subsection (d)(iii)
of this Condition, the term
"emission event" shall be defined as
a discrete period of venting that is
associated with a single unit
operation. For example, a
displacement of vapor resulting from
the charging of a single unit
operation with VOM will result in a

discrete emission event that will last through the duration of the charge and will have an average flow rate equal to the rate of the charge. The expulsion of expanded single unit operation vapor space when the vessel is heated is also an emission event. Both of these examples of emission events and others may occur in the same single unit operation during the course of the batch cycle. If the flow rate measurement for any emission event is zero, in accordance with 35 IAC 218.503(f)(2) (see also subsection (d)(ii) of this Condition), then such event is not an emission event for purposes of this Condition.

- B. The mass emission rate from the process vent or inlet to the control device shall be determined by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f)(1) (see also subsection (d)(i) of this Condition) throughout the batch cycle;
 - C. The mass emission rate from the control device outlet shall be obtained by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f)(1) (see also subsection (d)(i) of this Condition) throughout the batch cycle; and
 - D. The efficiency of the control device shall be determined by integrating the mass emission rates obtained in 35 IAC 218.503(f)(3)(B) and (f)(3)(C) (see also subsections (d)(iii)(B) and (d)(iii)(C) of this Condition), over the time of the batch cycle and dividing the difference in inlet and outlet mass flow totals by the inlet mass flow total.
- d. The owner or operator of a batch operation may propose an alternative test method or procedures to demonstrate compliance with the control requirements set forth in 35 IAC 218.501. Such method or procedures shall be approved by the Illinois EPA and USEPA as evidenced by federally enforceable permit conditions [35 IAC 218.503(h)].

- e. In the absence of a request by the Illinois EPA to conduct performance testing in accordance with the provisions of this 35 IAC 218.503, a source may demonstrate compliance by the use of engineering estimates or process stoichiometry [35 IAC 218.503(i)].

7.6.8 Monitoring Requirements

- a. Every owner or operator using a scrubber to comply with 35 IAC 218.501, shall install, calibrate, maintain, and operate, according to manufacturer's specifications, the following:
 - i. A temperature monitoring device for scrubbant liquid having an accuracy of ± 1 percent of the temperature being monitored expressed in degrees Celsius and a specific gravity device for scrubbant liquid, each equipped with a continuous recorder [35 IAC 218.504(c)(1)]; or
 - ii. A VOM monitoring device used to indicate the concentration of VOM exiting the control device based on a detection principle such as infra-red photoionization, or thermal conductivity, each equipped with a continuous recorder [35 IAC 218.504(c)(2)].
- b. Upon approval by the USEPA, the owner or operator of a process vent shall be permitted to monitor by an alternative method or may monitor parameters other than those listed in Condition 7.6.8(a). Such alternative method or parameters shall be contained in this permit [35 IAC 218.504(g)]. For the affected reactor train complying with the control requirements of 35 IAC 218.501 by the use of the alternative methods listed in Condition 7.6.5(e), the owner or operator shall install, calibrate, maintain, and operate, according to manufacturer's specifications, the following:
 - i. A temperature monitoring device for scrubbant liquid having an accuracy of ± 1 percent of the temperature being monitored expressed in degrees Celsius, equipped with a continuous recorder; and
 - ii. A device to measure the quantity of solvent charged to the scrubber having an accuracy of ± 1 percent.

7.6.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for the affected reactor train to demonstrate compliance with Conditions 5.5.1, 7.6.3, and 7.6.5, pursuant to Section 39.5(7) (b) of the Act:

- a. Records of the testing of the efficiency of each capture system and control device pursuant to Condition 7.6.7, which include the following [Section 39.5(7) (e) of the Act]:
 - i. The date, place and time of sampling or measurements;
 - ii. The date(s) analyses were performed;
 - iii. The company or entity that performed the analyses;
 - iv. The analytical techniques or methods used;
 - v. The results of such analyses; and
 - vi. The operating conditions as existing at the time of sampling or measurement.
- b. Every owner or operator of a batch operation subject to the control requirements of 35 IAC 218.501 shall keep records of the following parameters required to be monitored under 35 IAC 218.504 (see also Condition 7.6.8).
 - i. If using any of the following as a control device, the following records:
 - A. Where a scrubber is used, the exit specific gravity (or alternative parameter which is a measure of the degree of absorbing liquid saturation, if approved by the Illinois EPA) and the average exit temperature of the absorbing liquid, measured continuously and averaged over the same time period as the performance test (both measured while the vent stream is routed normally) [35 IAC 218.505(c) (3) (A)];
 - B. As an alternative to Condition 7.6.9(b) (i) (A), at a minimum, records indicating the concentration level or reading indicated by the VOM monitoring device at the outlet of the scrubber,

condenser, or carbon absorber, measured continuously and averaged over the same time period as the performance test (while the vent stream is routed normally) [35 IAC 218.505(c) (3) (E)].

- ii. An owner or operator of a batch operation subject to the control requirements of Condition 7.6.5 may maintain alternative records other than those listed in Condition 7.6.9(b) (i). Any alternative recordkeeping shall be approved by the Illinois EPA and USEPA and shall be contained in this permit [35 IAC 218.505(e)]. For the affected reactor train complying with the control requirements of 35 IAC 218.501 by the use of the alternative methods listed in Condition 7.6.5(c), the owner or operator shall keep the following records:
 - A. The average exit temperature of the absorbing liquid, measured continuously and averaged over the same time period as the performance test (measured while the vent stream is routed normally); and
 - B. The quantity of fresh solvent charged for each batch and the amount of fresh solvent needed to reach the solubility limit of excess methyl chloride for each batch.
- c. Records addressing use of good operating practices for the Methyl Chloride Absorber System:
 - i. Records for periodic inspection of the absorber with date, individual performing the inspection, and nature of inspection; and
 - ii. Records for prompt repair of defects, with identification and description of defect, effect on emissions, date identified, date repaired, and nature of repair.
- d. Records of operation and emissions of each affected reactor train, including the following:
 - i. Types and total amount of raw materials used, lb/batch, lb/mo, and ton/yr;
 - ii. Types and total amount of products produced, lb/batch, lb/mo, and ton/yr;
 - iii. The number of batches begun per year; and

- iv. The aggregate monthly and annual VOM emissions from the affected reactor trains based on the material and solvent usage and afterburner efficiencies, with supporting calculations.

7.6.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected reactor train with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. Emissions of VOM in excess of the limits in Conditions 7.6.3(b) and/or 7.6.6 based on the current month's records plus the preceding 11 months within 30 days of such an occurrence.

7.6.11 Operational Flexibility/Anticipated Operating Scenarios

N/A

7.6.12 Compliance Procedures

Compliance with the emission limits shall be based on the recordkeeping requirements in Condition 7.6.9 and the emission factors and formulas listed below:

- a. Compliance with Condition 7.6.3(b) is assumed by proper operation of the Methyl Chloride Absorber System, as addressed by Condition 7.6.5(a).
- b. Compliance with the control requirements for the affected reactor train shall be determined from the log of the control device monitoring data as required by this permit (see Condition 7.6.9) and from other recordkeeping, reporting, monitoring, and testing requirements of Section 7.6 of this permit.
- c. VOM emissions shall be determined by using the following equations. The Permittee may also use the emission unit-specific emission factor if that emission factor was developed from the stack test data and based on the worst case scenario. Site-specific emission factors developed from stack test data shall be approved by the Illinois EPA, and the ERMS baseline shall be revised to reflect any new methods, pursuant to 35 IAC 205.337.
 - i. Total combined uncontrolled VOM emissions = the sum of VOM emissions from vapor displacement during loading/charging of raw materials into a batching vessel,

mixing/heating of raw materials in the batching vessel, transfer of batched mixture, purging evacuation/venting & stripping operation.

- ii. VOM emissions from vapor displacement losses during charging and transfer of materials to vessels:

$$\text{VOM Emissions} = \frac{\text{Volume (gal/day)}}{7.48 \text{ (gal/scf)}} \times \frac{P_i^* \text{ (mmHg)}}{P_T \text{ (760 mmHg)}} \times \frac{1 \text{ mole}}{387 \text{ scf}} \times \frac{\text{MW (lb)}}{\text{(mole)}} \times \frac{530^\circ \text{ R}}{T + 460^\circ \text{ R}}$$

Raoult's Law shall be used to determine mole fraction in vapor phase as presented below:

$$Y_i = \frac{X_i P_i^*}{P_T}$$

Y_i = Mole fraction of i in the vapor

X_i = Mole fraction of component i in the liquid

P_i^* = Vapor pressure of component i at temperature T

P_T = The total pressure in the vessel vapor space.

T = Temperature in degrees Fahrenheit

- iii. VOM Emissions from Vessel/Reactor Heating/Mixing Process:

$$n_s = \frac{\frac{\Sigma(P_i)_{T_1}}{760 - \Sigma(P_i)_{T_1}} + \frac{\Sigma(P_i)_{T_2}}{760 - \Sigma(P_i)_{T_2}}}{2} \times \Delta n$$

Where:

n_s = Lb - moles of VOC vapor displaced from the vessel being heated up.

P_i = Vapor pressure of each compound at specified temperature.

Δn = Number of lb - moles of gas displaced.

and

$$\Delta_n = \frac{V}{R} \left[\left(\frac{Pa_1}{T_1} \right) - \left(\frac{Pa_2}{T_2} \right) \right]$$

Where:

- V = Volume of free space in the vessel in ft³.
- R = Gas law constant, 998.9 mmHg ft³/lb-mole K.
- Pa₁ = Initial gas pressure in the vessel, mmHg.
- Pa₂ = Final gas pressure, mmHg.
- T₁ = Initial temperature of vessel in K.
- T₂ = Final temperature of vessel in K.

- iv. VOM emissions from vessel/reactor purging operation:

$$E_R = \frac{(Y_i)(V_r)(P_T)(MW)}{(R)(T)}$$

Where:

- E_R = Mass emission rate.
- Y_i = Mole fraction in vapor phase.
- V_r = Volumetric gas displacement rate.
- R = Ideal gas law constant
- T = Temperature of the vessel vapor space, absolute.
- P_T = Pressure of the vessel vapor space.
- MW = Molecular weight of the VOM.

- d. Compliance with the PM emission limitations in Condition 7.6.3(d) is assured and achieved by the proper operation, maintenance, and work-practices inherent in operation of the affected reactor train and associated control equipment. PM emissions shall be determined by design parameters of the associated control equipment and appropriate emission factors or the manufacturer's estimated outlet PM concentration.

7.7 Unit - Arquad Production Area (Arquad Process)
Control - Methyl Chloride Absorber System 309-313

7.7.1 Description

The Arquad Process manufactures compounds which are used as surfactants and fabric softeners.

7.7.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
309-301	Reactor	Methyl Chloride Absorber System 309-313
309-305	Drop Tank	Methyl Chloride Absorber System 309-313
309-308.1	Bleach Tanks A25	Wash Tank Condenser 309-406 or 309-431
309-308.2	Bleach Tanks A26	Wash Tank Condenser 309-406 or 309-431
309-310	Vent Compressor Knock-Out Pot	(Equipment is a Part of 309-313)
309-312	Wash Tank	Wash Tank Condenser 309-406 or 309-431, Water Scrubber 309-332
309-317	Wash Tank	Wash Tank Condenser 309-406 or 309-431, Water Scrubber 309-332
309-313	Methyl Chloride Absorber Column	(Equipment is a Part of 309-313)
309-314	Diluent Tank	(Equipment is a Part of 309-313)
309-315	Diluent Tank	(Equipment is a Part of 309-313)
309-413	Diluent Tank	(Equipment is a Part of 309-313)
309-401	Water-Cooled Condenser	(Equipment is a Part of 309-313)
309-409	Refrigerated Glycol-Chilled Condenser	(Equipment is a Part of 309-313)
309-501	Filter	None
309-901	Methyl Chloride Recovery Vacuum/Compressor	(Equipment is a Part of 309-313)

7.7.3 Applicability Provisions and Applicable Regulations

- a. The "affected reactor train" for the purpose of these unit-specific conditions, includes the collection of equipment, identified in Condition 7.7.2, configured to manufacture a product or intermediate.

- b. The affected reactor train is subject to 35 IAC 218 Subpart G, Use of Organic Material, which provides that:
 - i. No person shall cause or allow the discharge of more than 3.6 kg/hr (8 lb/hr) of organic material into the atmosphere from any emission unit, except as provided in 35 IAC 218.302 (see also Condition 7.7.3(b) (ii)) and the following exception: If no odor nuisance exists the limitation of 35 IAC 218 Subpart G shall apply only to photochemically reactive material [35 IAC 218.301].
 - ii. Emissions of organic material in excess of those permitted by 35 IAC 218.301 (see also Condition 7.7.3(b) (i)) are allowable if such emissions are controlled by a vapor recovery system which adsorbs and/or condenses at least 85 percent of the total uncontrolled organic material that would otherwise be emitted to the atmosphere [35 IAC 218.302(b)].
- c. The affected reactor train is subject to the control requirements of 35 IAC 218 Subpart V: Batch Operations and Air Oxidation Process because this source has SIC of 2821, 2833, 2834, 2861, 2865, 2869, or 2879, and each emission unit is included in category (i) or (ii) below.
 - i. Any single unit operation with uncontrolled total annual mass emissions that exceed 500 lb/yr and with a VOM concentration greater than 500 ppmv. In this individual determination, no applicability analysis shall be performed for any single unit operation with a VOM concentration of less than or equal to 500 ppmv [35 IAC 218.500(d) (1)]; and
 - ii. Any batch process train containing process vents which, in the aggregate, have uncontrolled total annual mass emissions of 30,000 lb/yr or more of VOM from all products manufactured in the batch process train. Any single unit operation with uncontrolled total annual mass emissions exceeding 500 lb/yr, regardless of VOM concentration, shall be included in the aggregate applicability analysis [35 IAC 218.500(d) (2)].
 - iii. Applicability equations:
 - A. The applicability equations are specific to volatility [35 IAC 218.500(e) (1)].

B. For purposes of this subsection, the following abbreviations apply:

1. FR = Vent stream flow rate, scfm;
2. UTAME = Uncontrolled total annual mass emissions of VOM, expressed as lb/yr;
3. WAV = Weighted average volatility;
4. $MVOM_i$ = Mass of VOM component i;
5. $MWVOM_i$ = Molecular weight of VOM component i; and
6. VP_i = Vapor pressure of VOM component i.

[35 IAC 218.500(e) (2)]

C. Weighted average volatility shall be calculated as follows:

$$WAV = \frac{\sum_{i=1}^n (VP_i) x \frac{(MVOM_i)}{(MWVOM_i)}}{\sum_{i=1}^n \frac{(MVOM_i)}{(MWVOM_i)}}$$

[35 IAC 218.500(e) (3)]

D. For purposes of determining applicability, flow rate values shall be calculated as follows:

1. Low WAV has a vapor pressure less than or equal to 75 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.07 (UTAME)] - 1,821$$

2. Moderate WAV has a vapor pressure greater than 75 mmHg but less than or equal to 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.031 (UTAME)] - 494$$

3. High WAV has a vapor pressure greater than 150 mmHg at 20°C (68°F), and shall use the following equation:

$$FR = [0.013 (UTAME)] - 301$$

[35 IAC 218.500(e) (4)]

- E. To determine the vapor pressure of VOM, the applicable methods and procedures in 35 IAC 218.111 shall apply [35 IAC 218.500(e) (5)].
- d. The affected reactor train is subject to 35 IAC 212.321, which provides that no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c) of 35 IAC 212.321 (See also Attachment 1) [35 IAC 212.321(a)].

7.7.4 Non-Applicability of Regulations of Concern

- a. This permit is issued based on the affected reactor train not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because these emission units do not manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63 Subpart F.
- b. This permit is issued based on the affected reactor train not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because these emission units do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.
- c. This permit is issued based on the affected reactor train not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because these emission units are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.

- d. This permit is issued based on the affected reactor train not being subject to 35 IAC 218 Subpart RR, Miscellaneous Organic Chemical Manufacturing Processes. Pursuant to 35 IAC 218.960(b)(2)(B), these requirements shall not apply to emission units which are included in the categories specified in Subpart V.

7.7.5 Operational And Production Limits And Work Practices

- a. The Permittee shall follow good operating practices for the Methyl Chloride Absorber System, including periodic inspection, routine maintenance and prompt repair of defects.
- b. Except as provided for in 35 IAC 218.500(c), every owner or operator of a single unit operation with an average flow rate, as determined in accordance with 35 IAC 218.502(b), below the flow rate value calculated by the applicability equations contained in Section 7.7.3(c)(iii) (see 35 IAC 218.500(e)), shall reduce uncontrolled VOM emissions from such single unit operation by an overall efficiency, on average, of at least 90 percent, or 20 ppmv, per batch cycle [35 IAC 218.501(a)].
- c. The coolant to the two wash tank condensers shall be a chilled material with an inlet temperature not to exceed 40°F.
- d. Operation of the Arquad Process shall not exceed 500 batches per month and 4,096 batches per year. These limits contain revisions to previously issued Permit 97090063. Specifically, the monthly operating limit was increased from 140 batches to allow more operation at the lower-emitting scenario (absorber temperature less than or equal to -6.2°C), since the annual operating limit was previously increased for this reason [T1R].
- e. Upon approval by the USEPA of the alternative monitoring requirements in Condition 7.7.8(b), the following requirements shall be followed at all times during the operation of the affected reactor train if specific gravity monitors are not used, in order to demonstrate compliance with the 90 percent reduction requirement for affected new and existing emission units. This is to satisfy the alternative monitoring parameter and limitation, pursuant to 35 IAC 218.504(g). These requirements do not apply during periods when the control equipment receives emissions only from emission units exempt from the control requirements of 35 IAC 218.501 pursuant to 35 IAC 218.500(c).

- i. For the Methyl Chloride Absorber System (309-313), the scrubbing system shall be charged with fresh solvent (alcohol) for each batch produced. The amount of fresh solvent charged shall be at least twice the amount needed to reach the solubility limit of the excess methyl chloride for each batch; and
- ii. For the Wash Tank Water Scrubber (309-332), the water scrubbing system shall maintain a continuous make-up scrubbant liquid flow rate of at least 3 gal/min, when venting to the scrubber occurs.

7.7.6 Emission Limitations

In addition to Condition 5.2.2 and the source wide emission limitations in Condition 5.5, the affected reactor train is subject to the following:

- a. Emissions from the affected reactor train shall not exceed the following limits:

<u>VOM Emissions</u> <u>(Ton/Month)</u>	<u>(Ton/Year)</u>	<u>PM Emissions</u> <u>(Ton/Year)</u>
10.71	80.9	13.8

These limits are based on the maximum production rate indicated in Condition 7.7.5(d), a controlled emission rate of 194.9 lb/batch for average absorber temperatures greater than -6.2°C, a controlled emission rate of 39.5 lb/batch for average absorber temperatures less than or equal to than -6.2°C as determined by a stack test conducted in December 2001, and a 92 percent control efficiency for the absorption system.

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations were established in Permits 85020008 (for PM emission limit) and 97090063 (for VOM emission limits), pursuant to 35 IAC Part 203. These limits ensure that the construction and/or modification addressed in the aforementioned permit does not constitute a new major source or major modification pursuant to Title I of the CAA, specifically 35 IAC Part 203 [T1].

7.7.7 Testing Requirements

- a. Upon the Illinois EPA's request, the owner or operator of a batch operation shall conduct testing to demonstrate compliance with 35 IAC 218.501, in accordance with the applicable test methods and procedures specified in 35 IAC 218.503(d), (e), and (f) [35 IAC 218.503(a)].
 - b. For the purpose of demonstrating compliance with the control requirements of 35 IAC 218.501, the batch operation shall be run at representative operating conditions and flow rates during any performance test [35 IAC 218.503(e)].
 - c. The following methods in 40 CFR 60, Appendix A, shall be used to demonstrate compliance with the reduction efficiency requirement set forth in 35 IAC 218.501 [35 IAC 218.503(f)]:
 - i. Method 1 or 1A, as appropriate, for selection of the sampling sites if the flow measuring device is not a rotometer. The control device inlet sampling site for determination of vent stream VOM composition reduction efficiency shall be prior to the control device and after the control device [35 IAC 218.503(f)(1)];
 - ii. Method 2, 2A, 2C, or 2D, as appropriate, for determination of gas stream volumetric flow rate flow measurements, which shall be taken continuously. No traverse is necessary when the flow measuring device is an ultrasonic probe [35 IAC 218.503(f)(2)];
 - iii. Method 25A or Method 18, if applicable, to determine the concentration of VOM in the control device inlet and outlet [35 IAC 218.503(f)(3)];
- A. The sampling time for each run shall be as follows:
1. For batch cycles less than eight hours in length, readings shall be taken continuously over the entire length of the batch cycle with a maximum of 15-minute intervals between measurements if using Method 25A. If using Method 18, readings shall be taken continuously with a maximum of 15-minute intervals between measurements throughout the batch cycle unless it becomes

necessary to change the impinger train, in which case a 30-minute interval shall not be exceeded.

2. For batch cycles of eight hours and greater in length, the owner or operator may either test in accordance with the test procedures defined in 35 IAC 218.503(f)(3)(A)(i) (see also subsection (d)(iii)(A)(1) of this Condition) or the owner or operator may elect to perform tests, pursuant to either Method 25A or Method 18, only during those portions of each emission event which define the emission profile of each emission event occurring within the batch cycle. For each emission event of less than four hours in duration, the owner or operator shall test continuously over the entire emission event as set forth in subsection (d)(iii)(A)(1) of this Condition. For each emission event of greater than four hours in duration, the owner or operator shall elect either to perform a minimum of three one hour test runs during the emission event or shall test continuously over the entire emission event within each single unit operation in the batch process train. To demonstrate that the portion of the emission event to be tested defines the emission profile for the emission event, the owner or operator electing to rely on this option shall develop an emission profile for the entire emission event. Such emission profile shall be based upon either process knowledge or test data collected. Examples of information that could constitute process knowledge include, but are not limited to, calculations based on material balances and process stoichiometry. Previous test results may be used provided such results are still relevant to the current process vent stream conditions.

3. For purposes of subsection (d) (iii) of this Condition, the term "emission event" shall be defined as a discrete period of venting that is associated with a single unit operation. For example, a displacement of vapor resulting from the charging of a single unit operation with VOM will result in a discrete emission event that will last through the duration of the charge and will have an average flow rate equal to the rate of the charge. The expulsion of expanded single unit operation vapor space when the vessel is heated is also an emission event. Both of these examples of emission events and others may occur in the same single unit operation during the course of the batch cycle. If the flow rate measurement for any emission event is zero, in accordance with 35 IAC 218.503(f) (2) (see also subsection (d) (ii) of this Condition), then such event is not an emission event for purposes of this Condition.

- B. The mass emission rate from the process vent or inlet to the control device shall be determined by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f) (1) (see also subsection (d) (i) of this Condition) throughout the batch cycle;
- C. The mass emission rate from the control device outlet shall be obtained by combining concentration and flow rate measurements taken simultaneously at sampling sites selected in accordance with 35 IAC 218.503(f) (1) (see also subsection (d) (i) of this Condition) throughout the batch cycle; and
- D. The efficiency of the control device shall be determined by integrating the mass emission rates obtained in 35 IAC 218.503(f) (3) (B) and (f) (3) (C) (see also subsections (d) (iii) (B) and (d) (iii) (C) of this Condition), over the time of the batch cycle and dividing the difference in

inlet and outlet mass flow totals by the inlet mass flow total.

- d. The owner or operator of a batch operation may propose an alternative test method or procedures to demonstrate compliance with the control requirements set forth in 35 IAC 218.501. Such method or procedures shall be approved by the Illinois EPA and USEPA as evidenced by federally enforceable permit conditions [35 IAC 218.503(h)].
- e. In the absence of a request by the Illinois EPA to conduct performance testing in accordance with the provisions of this 35 IAC 218.503, a source may demonstrate compliance by the use of engineering estimates or process stoichiometry [35 IAC 218.503(i)].

7.7.8 Monitoring Requirements

- a. Every owner or operator using a scrubber to comply with 35 IAC 218.501, shall install, calibrate, maintain, and operate, according to manufacturer's specifications, the following:
 - i. A temperature monitoring device for scrubbant liquid having an accuracy of ± 1 percent of the temperature being monitored expressed in degrees Celsius and a specific gravity device for scrubbant liquid, each equipped with a continuous recorder [35 IAC 218.504(c)(1)]; or
 - ii. A VOM monitoring device used to indicate the concentration of VOM exiting the control device based on a detection principle such as infra-red photoionization, or thermal conductivity, each equipped with a continuous recorder [35 IAC 218.504(c)(2)].
- b. Upon approval by the USEPA, the owner or operator of a process vent shall be permitted to monitor by an alternative method or may monitor parameters other than those listed in Condition 7.7.8(a). Such alternative method or parameters shall be contained in this permit [35 IAC 218.504(g)]. For the affected reactor train complying with the control requirements of 35 IAC 218.501 by the use of the alternative methods listed in Condition 7.7.5(e), the owner or operator shall install, calibrate, maintain, and operate, according to manufacturer's specifications, the following:
 - i. A temperature monitoring device for scrubbant liquid having an accuracy of ± 1 percent of the

temperature being monitored expressed in degrees Celsius, equipped with a continuous recorder;

- ii. For the Methyl Chloride Absorber System (309-313), a device to measure the quantity of solvent charged to the scrubber having an accuracy of ± 1 percent; and
- iii. For the Wash Tank Water Scrubber (309-332), a flow rate monitoring device for scrubbant liquid having an accuracy of ± 10 percent, equipped with a continuous recorder.

7.7.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for the affected reactor train to demonstrate compliance with Conditions 5.5.1, 7.7.3, and 7.7.5, pursuant to Section 39.5(7)(b) of the Act:

- a. Records of the testing of the efficiency of each capture system and control device pursuant to Condition 7.7.7, which include the following [Section 39.5(7)(e) of the Act]:
 - i. The date, place and time of sampling or measurements;
 - ii. The date(s) analyses were performed;
 - iii. The company or entity that performed the analyses;
 - iv. The analytical techniques or methods used;
 - v. The results of such analyses; and
 - vi. The operating conditions as existing at the time of sampling or measurement.
- b. Every owner or operator of a batch operation subject to the control requirements of 35 IAC 218.501 shall keep records of the following parameters required to be monitored under 35 IAC 218.504 (see also Condition 7.7.8).
 - i. If using any of the following as a control device, the following records:
 - A. Where a scrubber is used, the exit specific gravity (or alternative parameter which is a measure of the degree of

absorbing liquid saturation, if approved by the Illinois EPA) and the average exit temperature of the absorbing liquid, measured continuously and averaged over the same time period as the performance test (both measured while the vent stream is routed normally) [35 IAC 218.505(c) (3) (A)];

B. As an alternative to Condition 7.7.9(b) (i) (A), at a minimum, records indicating the concentration level or reading indicated by the VOM monitoring device at the outlet of the scrubber, condenser, or carbon absorber, measured continuously and averaged over the same time period as the performance test (while the vent stream is routed normally) [35 IAC 218.505(c) (3) (E)].

ii. An owner or operator of a batch operation subject to the control requirements of Condition 7.7.5 may maintain alternative records other than those listed in Condition 7.7.9(b) (i). Any alternative recordkeeping shall be approved by the Illinois EPA and USEPA and shall be contained in this permit [35 IAC 218.505(e)]. For the affected reactor train complying with the control requirements of 35 IAC 218.501 by the use of the alternative methods listed in Condition 7.7.5(c), the owner or operator shall keep the following records:

A. The average exit temperature of the absorbing liquid, measured continuously and averaged over the same time period as the performance test (measured while the vent stream is routed normally);

B. For the Methyl Chloride Absorber System (309-313), the quantity of fresh solvent charged for each batch and the amount of fresh solvent needed to reach the solubility limit of excess methyl chloride for each batch; and

C. For the Wash Tank Water Scrubber (309-332), records from the continuous flow rate monitoring device.

c. Records addressing use of good operating practices for the Methyl Chloride Absorber System:

- i. Records for periodic inspection of the absorber with date, individual performing the inspection, and nature of inspection; and
 - ii. Records for prompt repair of defects, with identification and description of defect, effect on emissions, date identified, date repaired, and nature of repair.
- d. Records of operation and emissions of each affected reactor train, including the following:
 - i. Types and total amount of raw materials used, lb/batch, lb/mo, and ton/yr;
 - ii. Types and total amount of products produced, lb/batch, lb/mo, and ton/yr;
 - iii. The number of batches begun per month and per year for batches operated above an absorber temperature of -6.2°C , and the number of batches begun per month and per year for batches operated at or below an absorber temperature of -6.2°C ;
 - iv. The aggregate monthly and annual VOM emissions from the affected reactor trains based on the material and solvent usage and afterburner efficiencies, with supporting calculations; and
 - vi. The coolant temperature for the wash tank condensers.

7.7.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected reactor train with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. Emissions of VOM in excess of the limits in Conditions 7.7.3(b) and/or 7.7.6 based on the current month's records plus the preceding 11 months within 30 days of such an occurrence.

7.7.11 Operational Flexibility/Anticipated Operating Scenarios

N/A

7.7.12 Compliance Procedures

Compliance with the emission limits shall be based on the recordkeeping requirements in Condition 7.7.9 and the emission factors and formulas listed below:

- a. Compliance with Condition 7.7.3(b) is assumed by proper operation of the Methyl Chloride Absorber System, as addressed by Condition 7.7.5(a).
- b. Compliance with the control requirements for the affected reactor train shall be determined from the log of the control device monitoring data as required by this permit (see Condition 7.7.9) and from other recordkeeping, reporting, monitoring, and testing requirements of Section 7.7 of this permit.
- c. VOM emissions shall be determined by using the following equations. The Permittee may also use the emission unit-specific emission factor if that emission factor was developed from the stack test data and based on the worst case scenario. Site-specific emission factors developed from stack test data shall be approved by the Illinois EPA, and the ERMS baseline shall be revised to reflect any new methods, pursuant to 35 IAC 205.337.
 - i. Total combined uncontrolled VOM emissions = the sum of VOM emissions from vapor displacement during loading/charging of raw materials into a batching vessel, mixing/heating of raw materials in the batching vessel, transfer of batched mixture, purging evacuation/venting & stripping operation.
 - ii. VOM emissions from vapor displacement losses during charging and transfer of materials to vessels:

$$\text{VOM Emissions} = \frac{\text{Volume (gal / day)}}{7.48 \text{ (gal / scf)}} \times \frac{P_i^* \text{ (mmHg)}}{P_r \text{ (760 mmHg)}} \times \frac{1 \text{ mole}}{387 \text{ scf}} \times \frac{\text{MW (lb)}}{\text{(mole)}} \times \frac{530^\circ \text{ R}}{T + 460^\circ \text{ R}}$$

Raoult's Law shall be used to determine mole fraction in vapor phase as presented below:

$$Y_i = \frac{X_i P_i^*}{P_T}$$

Y_i = Mole fraction of i in the vapor

X_i = Mole fraction of component i in the liquid

- P_i^* = Vapor pressure of component i at temperature T
- P_T = The total pressure in the vessel vapor space.
- T = Temperature in degrees Fahrenheit

iii. VOM Emissions from Vessel/Reactor Heating/Mixing Process:

$$n_s = \frac{\frac{\Sigma(P_i)_{T_1}}{760 - \Sigma(P_i)_{T_1}} + \frac{\Sigma(P_i)_{T_2}}{760 - \Sigma(P_i)_{T_2}}}{2} \times \Delta_n$$

Where:

- n_s = Lb - moles of VOC vapor displaced from the vessel being heated up.
- P_i = Vapor pressure of each compound at specified temperature.
- Δ_n = Number of lb - moles of gas displaced.

and

$$\Delta_n = \frac{V}{R} \left[\left(\frac{Pa_1}{T_1} \right) - \left(\frac{Pa_2}{T_2} \right) \right]$$

Where:

- V = Volume of free space in the vessel in ft³.
- R = Gas law constant, 998.9 mmHg ft³/lb-mole K.
- Pa₁ = Initial gas pressure in the vessel, mmHg.
- Pa₂ = Final gas pressure, mmHg.
- T₁ = Initial temperature of vessel in K.
- T₂ = Final temperature of vessel in K.

iv. VOM emissions from vessel/reactor purging operation:

$$E_R = \frac{(Y_i)(V_r)(P_T)(MW)}{(R)(T)}$$

Where:

E_R = Mass emission rate.

Y_i = Mole fraction in vapor phase.

V_r = Volumetric gas displacement rate.

R = Ideal gas law constant

T = Temperature of the vessel vapor space, absolute.

P_T = Pressure of the vessel vapor space.

MW = Molecular weight of the VOM.

- d. Compliance with the PM emission limitations in Condition 7.7.3(d) is assured and achieved by the proper operation, maintenance, and work-practices inherent in operation of the affected reactor train and associated control equipment. PM emissions shall be determined by design parameters of the associated control equipment and appropriate emission factors or the manufacturer's estimated outlet PM concentration.

7.8 Unit - Storage Tanks
Control - None

7.8.1 Description

The Storage Tanks are used to store hazardous and non-hazardous process wastes and reactants. All of the storage tanks have a storage capacity less than 40,000 gallons.

7.8.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Emission Control Equipment
W-2	Wastewater Surge Tank	Afterburner 396-003
H-4	Formalin Tank	Afterburner 396-003
H-2	Acrylonitrile Tank	Afterburner 396-003
W-4	Waste Fat Storage	Afterburner 396-003
H-3	Formcel Tank	Afterburner 396-003

7.8.3 Applicability Provisions and Applicable Regulations

- a. An "affected storage tank" for the purpose of these unit-specific conditions is a storage tank that is listed in Condition 7.8.2.
- b. Each affected storage tank is subject to 35 IAC 218.129, which requires that storage vessels with a design capacity less than 40,000 gallons shall maintain readily accessible records of the dimensions of the storage vessel and analysis of the capacity of the storage vessel. Such records shall be kept for the life of the source.

7.8.4 Non-Applicability of Regulations of Concern

- a. The affected storage tanks are not subject to the New Source Performance Standards (NSPS) for Volatile Organic Liquid Storage Vessels, 40 CFR 60, Subpart Kb, because the affected storage tanks were constructed prior to July 23, 1984.
- b. The affected storage tanks are not subject to the requirements of 35 IAC 218.122, Loading Operations, because pursuant to 35 IAC 218.122(c), if no odor nuisance exists, the limitations of 35 IAC 218.122 shall only apply to the loading of VOL with a vapor pressure of 17.24 kPa (2.5 psia) or greater at 294.3 K (70°F).
- c. This permit is issued based on the affected storage tanks not being subject to the NESHAP for Organic Hazardous Air Pollutants from the Synthetic Organic

Chemical Manufacturing Industry, 40 CFR 63, Subpart F, because the associated reactor trains do not manufacture as a primary product one or more of the chemicals listed in table 1 of 40 CFR 63 Subpart F.

- d. This permit is issued based on the affected storage tanks not being subject to the New Source Performance Standards (NSPS) for Equipment Leaks of VOC in the Synthetic Organic Chemical Manufacturing Industry, 40 CFR 60, Subpart VV, because the tanks do not manufacture, as intermediates or final products, one or more of the chemicals listed 40 CFR 60.489.
- e. This permit is issued based on the affected storage tanks not being subject to the requirements of 35 IAC 218 Subpart Q, Leaks from Synthetic Organic Chemical and Polymer Manufacturing Plants, pursuant to 35 IAC 218.421, because the associated reactor trains are not used to manufacture the synthetic organic chemicals or polymers listed in Appendix A of 35 IAC 218.

7.8.5 Operational and Production Limits and Work Practices

- a. Each affected storage tank which is loaded with a volatile organic liquid with a vapor pressure of 17.24 kPa (2.5 psia) or greater at 294.3 K (70°F) shall be equipped and operated with a permanent submerged loading pipe, pursuant to 35 IAC 215.122(b). (The Illinois EPA has not approved use of other equivalent equipment in lieu of a permanent submerged loading pipe.)

7.8.6 Emission Limitations

There are no specific emission limitations for this unit, however, there are source wide emission limitations in Condition 5.5 that include this unit.

7.8.7 Testing Requirements

None

7.8.8 Monitoring Requirements

None

7.8.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for each affected storage tank to demonstrate compliance

with Conditions 5.5.1 and 7.8.5, pursuant to Section 39.5(7)(b) of the Act:

- a. A list of the types and amounts of volatile petroleum liquid stored on a monthly basis (gallons);
- b. The maximum true vapor pressure (at 70°F) of each type of liquid as stored (psia); and
- c. Records of the dimensions of the each affected storage tank and analysis of the capacity of each affected storage tank.

7.8.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected storage tanks with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. Any storage of VOL in an affected storage tank that is not in compliance with the control requirements due to absence of the features required by Condition 7.8.5(a), e.g., no "permanent submerged loading pipe," within five days of becoming aware of the non-compliance status. This notification shall include a description of the event, the cause for the non-compliance, actions taken to correct the non-compliance, and the steps taken to avoid future non-compliance.

7.8.11 Operational Flexibility/Anticipated Operating Scenarios

The Permittee is authorized to make the following physical or operational change with respect to the affected storage tanks without prior notification to the Illinois EPA or revision of this permit. This condition does not affect the Permittee's obligation to properly obtain a construction permit in a timely manner for any activity constituting construction or modification of the source, as defined in 35 IAC 201.102:

- a. Changes in the material stored in a tank, provided the tank continues to comply with the Condition 7.8.5 of this permit.

7.8.12 Compliance Procedures

- a. For the purpose of estimating VOM emissions from each affected storage tank, the current version of the USEPA TANKS program is acceptable.

7.9 Units - Fuel Combustion Equipment
Control - None

7.9.1 Description

The Boilers produce steam for the various processes at this source. The Nebraska and Dowtherm Boilers have the ability to combust natural gas, fuel oil, fatty acid pitch, amine pitch, or a combination thereof. The Keystone Boiler and the PB-1 Boiler combust only natural gas. The PB-1 Boiler was constructed in 2000, while the other boilers were constructed prior to 1983.

7.9.2 List of Emission Units and Pollution Control Equipment

Emission Unit	Description	Rated Capacity (mmBtu/hr)
NB	Nebraska Steam Boiler Model #NS-C-37	31.78
DB	Dowtherm Boiler 388-001	23.4
KB	Keystone Steam Boiler	49.9
PB-1	Natural Gas-Fired Boiler	40.2

7.9.3 Applicability Provisions and Applicable Regulations

- a. An "affected boiler" for the purpose of these unit specific conditions is a steam generating unit that is listed in Condition 7.9.2. An "affected NSPS boiler" for the purpose of these unit specific conditions is a steam generating unit with a maximum heat input capacity of 100 mmBtu/hr or less, but greater than or equal to 10 mmBtu/hr, and constructed, modified, or reconstructed after June 9, 1989.
- b. The emissions of particulate matter (PM) into the atmosphere in any one hour period shall not exceed 0.15 kg/MW-hr (0.10 lb/mmBtu) of actual heat input from each affected boiler using liquid fuel exclusively [35 IAC 212.206].
- c. The emission of carbon monoxide (CO) into the atmosphere from each affected boiler with actual heat input greater than 2.9 MW (10 mmBtu/hr) shall not exceed 200 ppm, corrected to 50 percent excess air [35 IAC 216.121].
- d. The emissions of SO₂ into the atmosphere in any one hour period from each affected boiler burning simultaneously any combination of solid, liquid and gaseous fuels to exceed the allowable emission rate determined by the following equation:

$$E = A*X + B*Y + C*Z$$

Where:

E = allowable SO₂ emission rate (lb/hr);

A = solid fuel SO₂ emission standard (2.79 kg/MW-hr or 1.8 lb/mmBtu);

B = distillate oil SO₂ emission standard (0.46 kg/MW-hr or 0.3 lb/mmBtu);

C = residual fuel oil SO₂ emission standard (1.55 kg/MW-hr or 1.0 lb/mmBtu);

X = actual heat input from solid fuels;

Y = actual heat input from distillate fuel oil;

Z = actual heat input from residual oil.

[35 IAC 214.162]

- e. Each affected boiler is also subject to the opacity limits identified in Condition 5.2.2(b).
- f. The affected NSPS boiler is subject to the Standards of Performance for Small-Industrial-Commercial-Institutional Steam Generating Units, 40 CFR 60 Subpart Dc.

7.9.4 Non-Applicability of Regulations of Concern

- a. Each affected boiler is not subject to 35 IAC 217.141, because the actual heat input of each affected boiler is less than 73.2 MW (250 mmBtu/hr).
- b. Pursuant to 35 IAC 218.303, each affected boiler, i.e., fuel combustion emission unit, is not subject to 35 IAC 218.301, Use of Organic Material.

7.9.5 Operational And Production Limits And Work Practices

- a. Operation of the Nebraska Steam Boiler (Emission Unit NB) is allowed with natural gas, #6 fuel oil, and fatty acid pitch generated at this source or a combination thereof provided the emission limits of Condition 7.9.6 are not exceeded. Fuel usage for the Nebraska Steam Boiler shall not exceed the following limits:
 - i. Natural Gas: 0.032 million scf/hr and 275 million scf/yr;

- ii. #6 Fuel Oil: 600 lb/hr and 2,628 ton/yr; and
 - iii. Fatty Acid/Amine Pitch: 600 lb/hr and 1,539 ton/yr.
- b. The affected NSPS boiler shall only be fired by natural gas as the fuel.

7.9.6 Emission Limitations

In addition to Condition 5.2.2 and the source wide emission limitations in Condition 5.5, the affected boilers are subject to the following:

- a. Emissions from the Nebraska Boiler (Emission Unit NB) shall not exceed the following limits:

<u>Pollutant</u>	<u>Ton/Yr</u>
NO _x	49.0
SO ₂	99.0
PM	10.5
CO	11.52
VOM	0.9

These limits are based on the maximum firing rate, maximum operating hours (8,760 hr/yr), and the use of the worst case fuel (natural gas, #6 fuel oil, fatty acid pitch, amine pitch, or nitrile pitch). Calculations for pitch combustion used an average nitrogen content of 2.5%.

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The annual limits on nitrogen oxides and sulfur dioxide were established in Permit 78060001, pursuant to 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits ensure that the construction and/or modification addressed in the aforementioned permit does not constitute a new major source or major modification pursuant to Title I of the CAA, specifically the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21 [T1].

- b. Emissions from the Keystone Boiler (Emission Unit KB) shall not exceed the following limits:

<u>Pollutant</u>	<u>Ton/Yr</u>
NO _x	21.5
SO ₂	0.1
PM	2.1
CO	18.1
VOM	1.2

These limits are based on the maximum firing rate, maximum operating hours (8,760 hr/yr), and the use of the worst case fuel (natural gas). Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations contain revisions to previously issued permit 82080014. The source has requested that the Illinois EPA establish conditions in this permit that allow various refinements from the conditions of this permit, consistent with the information provided in the CAAPP application. The source has requested these revisions and has addressed the applicability and compliance of Title I of the CAA, specifically 35 IAC Part 203, Major Stationary Sources Construction and Modification and/or 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits continue to ensure that the construction and/or modification addressed in this permit does not constitute a new major source or major modification pursuant to these rules. These limits are the primary enforcement mechanism for the equipment and activities permitted in this permit and the information in the CAAPP application contains the most current and accurate information for the source. Specifically, the CO and VOM emission limits were increased and the NO_x emission limit was decreased due to changes in the fuel combustion emission factors [T1R].

- c. Emissions and operation of each affected NSPS boiler shall not exceed the following limits:

<u>Pollutant</u>	<u>Emissions</u>	
	<u>(Lb/Hr)</u>	<u>(Ton/Yr)</u>
NO _x	3.13	13.72
CO	2.63	11.52
SO ₂	0.02	0.08
VOM	0.24	1.04
PM	0.17	0.75

These limits are based on the maximum firing rate, standard emission factors, and maximum operating hours (8,760 hr/yr).

Compliance with annual limits shall be determined on a monthly basis from the sum of the data for the current month plus the preceding 11 months (running 12 month total) [T1].

The above limitations were established in Permit 00090048, pursuant to 40 CFR 52.21, Prevention of Significant Deterioration (PSD). These limits ensure that the construction and/or modification addressed in the aforementioned permit does not constitute a new major source or major modification pursuant to Title I of the CAA, specifically the federal rules for Prevention of Significant Deterioration (PSD), 40 CFR 52.21 [T1].

7.9.7 Testing Requirements

The Permittee shall analyze the fatty acid pitch fired in each affected boiler for sulfur, nitrogen, and moisture contents and heating value. If the pitch analysis shows no sulfur and moisture content, the Illinois EPA may waive the analysis of the pitch for sulfur and moisture contents.

7.9.8 Monitoring Requirements

None

7.9.9 Recordkeeping Requirements

In addition to the records required by Condition 5.6, the Permittee shall maintain records of the following items for each affected boiler to demonstrate compliance with Conditions 5.5.1 and 7.9.6, pursuant to Section 39.5(7)(b) of the Act:

- a. Hours of operation of the affected boilers (hr/yr);
- b. Total natural gas usage in the affected boilers (ft³/month and ft³/year);
- c. Total distillate fuel oil, residual fuel oil, and fatty acid pitch usage in the affected boilers (gallon/month and gallon/year);
- d. Analysis of the fatty acid pitch used in the affected boilers, for sulfur, nitrogen, moisture content, and Btu value;

- e. Sulfur content (weight percent) and gross heating value (mmBtu/lb) of fuel oil used in the affected boilers;
- f. Total natural gas usage for the affected NSPS boiler (ft³/day) [40 CFR 60.48c(g)]; and
- g. Annual aggregate NO_x, PM, SO₂, CO, and VOM emissions from the affected boilers, based on fuel consumption and the applicable emission factors, with supporting calculations.

7.9.10 Reporting Requirements

The Permittee shall promptly notify the Illinois EPA, Compliance Section of deviations of the affected boilers with the permit requirements as follows, pursuant to Section 39.5(7)(f)(ii) of the Act. Reports shall describe the probable cause of such deviations, and any corrective actions or preventive measures taken:

- a. The analysis of the fatty acid pitch required by Condition 7.9.7 shall be included with the Annual Emission Report.
- b. Notification within 60 days of operation of an affected boiler that may not have been in compliance with the opacity limitations in Condition 1.1.3(c), with a copy of such record for each incident.
- c. The Permittee shall fulfill applicable notification and reporting requirements of the NSPS 40 CFR 60.7 and 60.4(c).

7.9.11 Operational Flexibility/Anticipated Operating Scenarios

The Permittee is authorized to make the following physical or operational change with respect to each affected boiler without prior notification to the Illinois EPA or revision of this permit. This condition does not affect the Permittee's obligation to properly obtain a construction permit in a timely manner for any activity constituting construction or modification of the source, as defined in 35 IAC 201.102:

- a. Changes in the type of fuel used in the Nebraska and Dowtherm Boilers, as long as the emission limits in Condition 7.9.6 are not exceeded.

7.9.12 Compliance Procedures

- a. Compliance with Condition 7.9.3(b) and (c) is demonstrated under inherent operating conditions of

an affected boiler, so that no compliance procedures are set in this permit addressing this requirement.

- b. Compliance with Condition 7.9.3(d) shall be based on the recordkeeping requirements in Condition 7.9.9 and the following equation:

$$EF = (2 \text{ SO}_2/S) * (S/100) / HV$$

Where:

EF = SO₂ emission factor (lb/mmBtu),

S = weight percent of sulfur in the fuel oil, and

HV = gross heating value of the fuel oil (mmBtu/lb).

The sulfur dioxide emission factor calculated by the above equation shall be less than the applicable values listed in Condition 7.9.3(d) (i.e., 1.0 lb/mmBtu for residual oil and 0.3 lb/mmBtu for distillate oil).

- c. Compliance with the emission limits in Conditions 5.5.1 and 5.5.3 shall be based on the recordkeeping requirements in Condition 7.9.9 and the emission factors and formulas listed below:

- i. Emissions from the boilers burning natural gas shall be calculated based on emission factors from the latest stack test on the affected boilers or the following emission factors:

<u>Pollutant</u>	<u>Emission Factor</u> <u>(lb/10⁶ ft³)</u>
PM	7.6
SO ₂	0.6
VOM	5.5
NO _x	100.0
CO	84.0

These are the emission factors for uncontrolled natural gas combustion in small boilers (< 100 mmBtu/hr), Tables 1.4-1 and 1.4-2, AP-42, Volume I, Supplement D, March, 1998.

Boiler Emissions (lb) = natural gas consumed (ft³) multiplied by the appropriate emission factor.

- ii. Emissions from the affected boilers burning fuel oil shall be calculated based on emission

factors from the latest stack test on the affected boilers or the following emission factors:

<u>Pollutant</u>	<u>Distillate Emission Factor (lb/10³ gallon)</u>	<u>Residual Emission Factor (lb/10³ gallon)</u>
PM	3.3	9.19 * S + 4.72
SO ₂	142*S	157*S
VOM	0.2	0.28
NO _x	20.0	55.0
CO	5.0	5.0

These are the emission factors for uncontrolled fuel oil combustion in small (< 100 mmBtu/hr) industrial boilers, Tables 1.3-1, 1.3-2, and 1.3-3, AP-42, Volume I, Supplement E, September, 1998. "S" indicates that the weight % of sulfur in the oil should be multiplied by the value given. For example, if the fuel is 1% sulfur, then S=1. Actual emissions of SO₂ and PM will vary depending on the actual fuel oil sulfur content during the period covered by the emission calculations.

Boiler Emissions (lb) = fuel oil consumed (gallons) multiplied by the appropriate emission factor.

- iii. Emissions from the affected boilers burning pitch shall be calculated based on emission factors from the latest stack test on the affected boilers or the following emission factors:

<u>Pollutant</u>	<u>Emission Factor (lb/ton)</u>
PM	3.4
SO ₂	0.2
VOM	0.064
NO _x	25.49*N
CO	1.429

These are the emission factors for pitch combustion, derived from source emission tests. "N" indicates that the weight % of nitrogen in the pitch and should be multiplied by the value given. For example, if the nitrogen content is 2.5%, then N=2.5. Actual emissions of NO_x will vary depending on the

actual pitch nitrogen content during the period covered by the emission calculations.

Boiler Emissions (lb) = pitch consumed (tons) multiplied by the appropriate emission factor.

- iv. Total emissions for each pollutant are to be determined by combining the results of Conditions 7.9.12(c) (i), (ii), and (iii) for all affected boilers.

8.0 GENERAL PERMIT CONDITIONS

8.1 Permit Shield

Pursuant to Section 39.5(7)(j) of the Act, the Permittee has requested and has been granted a permit shield. This permit shield provides that compliance with the conditions of this permit shall be deemed compliance with applicable requirements which were applicable as of the date the proposed permit for this source was issued, provided that either the applicable requirements are specifically identified within this permit, or the Illinois EPA, in acting on this permit application, has determined that other requirements specifically identified are not applicable to this source and this determination (or a concise summary thereof) is included in this permit.

This permit shield does not extend to applicable requirements which are promulgated after February 25, 2000 (the date of issuance of the draft permit) unless this permit has been modified to reflect such new requirements.

8.2 Applicability of Title IV Requirements (Acid Deposition Control)

This source is not an affected source under Title IV of the CAA and is not subject to requirements pursuant to Title IV of the CAA.

8.3 Emissions Trading Programs

No permit revision shall be required for increases in emissions allowed under any USEPA approved economic incentives, marketable permits, emissions trading, and other similar programs or processes for changes that are provided for elsewhere in this permit and that are authorized by the applicable requirement [Section 39.5(7)(o)(vii) of the Act].

8.4 Operational Flexibility/Anticipated Operating Scenarios

8.4.1 Changes Specifically Addressed by Permit

Physical or operational changes specifically addressed by the Conditions of this permit that have been identified as not requiring Illinois EPA notification may be implemented without prior notice to the Illinois EPA.

8.4.2 Changes Requiring Prior Notification

The Permittee is authorized to make physical or operational changes that contravene express permit terms without applying for or obtaining an amendment to this permit, provided that [Section 39.5(12)(a)(i) of the Act]:

- a. The changes do not violate applicable requirements;

- b. The changes do not contravene federally enforceable permit terms or conditions that are monitoring (including test methods), recordkeeping, reporting, or compliance certification requirements;
- c. The changes do not constitute a modification under Title I of the CAA;
- d. Emissions will not exceed the emissions allowed under this permit following implementation of the physical or operational change; and
- e. The Permittee provides written notice to the Illinois EPA, Division of Air Pollution Control, Permit Section, at least 7 days before commencement of the change. This notice shall:
 - i. Describe the physical or operational change;
 - ii. Identify the schedule for implementing the physical or operational change;
 - iii. Provide a statement of whether or not any New Source Performance Standard (NSPS) is applicable to the physical or operational change and the reason why the NSPS does or does not apply;
 - iv. Provide emission calculations which demonstrate that the physical or operational change will not result in a modification; and
 - v. Provide a certification that the physical or operational change will not result in emissions greater than authorized under the Conditions of this permit.

8.5 Testing Procedures

Tests conducted to measure composition of materials, efficiency of pollution control devices, emissions from process or control equipment, or other parameters shall be conducted using standard test methods. Documentation of the test date, conditions, methodologies, calculations, and test results shall be retained pursuant to the recordkeeping procedures of this permit. Reports of any tests conducted as required by this permit or as the result of a request by the Illinois EPA shall be submitted as specified in Condition 8.6.

8.6 Reporting Requirements

8.6.1 Monitoring Reports

If monitoring is required by any applicable requirements or conditions of this permit, a report summarizing required monitoring, as specified in the conditions of this permit, shall be submitted to the Air Compliance Section of the Illinois EPA every six months as follows [Section 39.5(7)(f) of the Act]:

<u>Monitoring Period</u>	<u>Report Due Date</u>
January - June	September 1
July - December	March 1

All instances of deviations from permit requirements must be clearly identified in such reports. All such reports shall be certified in accordance with Condition 9.9.

8.6.2 Test Notifications

Unless otherwise specified elsewhere in this permit, a written test plan for any test required by this permit shall be submitted to the Illinois EPA for review at least 60 days prior to the testing pursuant to Section 39.5(7)(a) of the Act. The notification shall include at a minimum:

- a. The name and identification of the affected unit(s);
- b. The person(s) who will be performing sampling and analysis and their experience with similar tests;
- c. The specific conditions under which testing will be performed, including a discussion of why these conditions will be representative of maximum emissions and the means by which the operating parameters for the source and any control equipment will be determined;
- d. The specific determination of emissions and operation which are intended to be made, including sampling and monitoring locations;
- e. The test method(s) which will be used, with the specific analysis method, if the method can be used with different analysis methods;
- f. Any minor changes in standard methodology proposed to accommodate the specific circumstances of testing, with justification; and

- g. Any proposed use of an alternative test method, with detailed justification.

8.6.3 Test Reports

Unless otherwise specified elsewhere in this permit, the results of any test required by this permit shall be submitted to the Illinois EPA within 60 days of completion of the testing. The test report shall include at a minimum [Section 39.5(7)(e)(i) of the Act]:

- a. The name and identification of the affected unit(s);
- b. The date and time of the sampling or measurements;
- c. The date any analyses were performed;
- d. The name of the company that performed the tests and/or analyses;
- e. The test and analytical methodologies used;
- f. The results of the tests including raw data, and/or analyses including sample calculations;
- g. The operating conditions at the time of the sampling or measurements; and
- h. The name of any relevant observers present including the testing company's representatives, any Illinois EPA or USEPA representatives, and the representatives of the source.

8.6.4 Reporting Addresses

- a. The following addresses should be utilized for the submittal of reports, notifications, and renewals:
 - i. Illinois EPA - Air Compliance Section
Illinois Environmental Protection Agency
Bureau of Air
Compliance Section (MC 40)
P.O. Box 19276
Springfield, Illinois 62794-9276
 - ii. Illinois EPA - Air Regional Field Office
Illinois Environmental Protection Agency
Division of Air Pollution Control
9511 West Harrison
Des Plaines, Illinois 60016

iii. Illinois EPA - Air Permit Section

Illinois Environmental Protection Agency
Division of Air Pollution Control
Permit Section (MC 11)
P.O. Box 19506
Springfield, Illinois 62794-9506

iv. USEPA Region 5 - Air Branch

USEPA (AE - 17J)
Air & Radiation Division
77 West Jackson Boulevard
Chicago, Illinois 60604

- b. Unless otherwise specified in the particular provision of this permit, reports shall be sent to the Illinois EPA - Air Compliance Section with a copy sent to the Illinois EPA - Air Regional Field Office.

8.7 Obligation to Comply with Title I Requirements

Any term, condition, or requirement identified in this permit by T1, T1R, or T1N is established or revised pursuant to 35 IAC Part 203 or 40 CFR 52.21 ("Title I provisions") and incorporated into this permit pursuant to both Section 39.5 and Title I provisions. Notwithstanding the expiration date on the first page of this permit, the Title I conditions remain in effect pursuant to Title I provisions until the Illinois EPA deletes or revises them in accordance with Title I procedures.

9.0 STANDARD PERMIT CONDITIONS

9.1 Effect of Permit

9.1.1 The issuance of this permit does not release the Permittee from compliance with State and Federal regulations which are part of the Illinois State Implementation Plan, as well as with other applicable statutes and regulations of the United States or the State of Illinois or applicable ordinances, except as specifically stated in this permit and as allowed by law and rule [Section 39.5(7)(j)(iv) of the Act].

9.1.2 In particular, this permit does not alter or affect the following:

- a. The provisions of Section 303 (emergency powers) of the CAA, including USEPA's authority under that Section;
- b. The liability of an owner or operator of a source for any violation of applicable requirements prior to or at the time of permit issuance;
- c. The applicable requirements of the acid rain program consistent with Section 408(a) of the CAA; and
- d. The ability of USEPA to obtain information from a source pursuant to Section 114 (inspections, monitoring, and entry) of the CAA.

9.1.3 Notwithstanding the conditions of this permit specifying compliance practices for applicable requirements, any person (including the Permittee) may also use other credible evidence to establish compliance or noncompliance with applicable requirements.

9.2 General Obligations of Permittee

9.2.1 Duty to Comply

The Permittee must comply with all terms and conditions of this permit. Any permit noncompliance constitutes a violation of the CAA and the Act, and is grounds for any or all of the following: enforcement action, permit termination, revocation and reissuance, modification, or denial of a permit renewal application [Section 39.5(7)(o)(i) of the Act].

The Permittee shall meet applicable requirements that become effective during the permit term in a timely manner unless an alternate schedule for compliance with the applicable requirement is established.

9.2.2 Duty to Maintain Equipment

The Permittee shall maintain all equipment covered under this permit in such a manner that the performance or operation of such equipment shall not cause a violation of applicable requirements.

9.2.3 Duty to Cease Operation

No person shall cause, threaten or allow the continued operation of any emission unit during malfunction or breakdown of the emission unit or related air pollution control equipment if such operation would cause a violation of an applicable emission standard, regulatory requirement, ambient air quality standard or permit limitation unless such malfunction or breakdown is allowed by a permit condition [Section 39.5(6) (c) of the Act].

9.2.4 Disposal Operations

The source shall be operated in such a manner that the disposal of air contaminants collected by the equipment operations, or activities shall not cause a violation of the Act or regulations promulgated thereunder.

9.2.5 Duty to Pay Fees

The Permittee must pay fees to the Illinois EPA consistent with the fee schedule approved pursuant to Section 39.5(18) of the Act, and submit any information relevant thereto [Section 39.5(7) (o) (vi) of the Act]. The check should be payable to "Treasurer, State of Illinois" and sent to: Fiscal Services Section, Illinois Environmental Protection Agency, P.O. Box 19276, Springfield, Illinois 62794-9276.

9.3 Obligation to Allow Illinois EPA Surveillance

Upon presentation of proper credentials and other documents, the Permittee shall allow the Illinois EPA, or an authorized representative to perform the following [Section 39.5(7) (a) and (p) (ii) of the Act and 415 ILCS 5/4]:

- a. Enter upon the Permittee's premises where an actual or potential emission unit is located; where any regulated equipment, operation, or activity is located or where records must be kept under the conditions of this permit;
- b. Have access to and copy, at reasonable times, any records that must be kept under the conditions of this permit;
- c. Inspect during hours of operation any sources, equipment (including monitoring and air pollution control

equipment), practices, or operations regulated or required under this permit;

- d. Sample or monitor any substances or parameters at any location:
 - i. At reasonable times, for the purposes of assuring permit compliance; or
 - ii. As otherwise authorized by the CAA, or the Act.
- e. Obtain and remove samples of any discharge or emission of pollutants authorized by this permit; and
- f. Enter and utilize any photographic, recording, testing, monitoring, or other equipment for the purposes of preserving, testing, monitoring, or recording any activity, discharge or emission at the source authorized by this permit.

9.4 Obligation to Comply With Other Requirements

The issuance of this permit does not release the Permittee from applicable State and Federal laws and regulations, and applicable local ordinances addressing subjects other than air pollution control.

9.5 Liability

9.5.1 Title

This permit shall not be considered as in any manner affecting the title of the premises upon which the permitted source is located.

9.5.2 Liability of Permittee

This permit does not release the Permittee from any liability for damage to person or property caused by or resulting from the construction, maintenance, or operation of the sources.

9.5.3 Structural Stability

This permit does not take into consideration or attest to the structural stability of any unit or part of the source.

9.5.4 Illinois EPA Liability

This permit in no manner implies or suggests that the Illinois EPA (or its officers, agents or employees) assumes any liability, directly or indirectly, for any

loss due to damage, installation, maintenance, or operation of the source.

9.5.5 Property Rights

This permit does not convey any property rights of any sort, or any exclusive privilege [Section 39.5(7) (o) (iv) of the Act].

9.6 Recordkeeping

9.6.1 Control Equipment Maintenance Records

A maintenance record shall be kept on the premises for each item of air pollution control equipment. As a minimum, this record shall show the dates of performance and nature of preventative maintenance activities.

9.6.2 Records of Changes in Operation

A record shall be kept describing changes made at the source that result in emissions of a regulated air pollutant subject to an applicable requirement, but not otherwise regulated under this permit, and the emissions resulting from those changes [Section 39.5(12) (b) (iv) of the Act].

9.6.3 Retention of Records

- a. Records of all monitoring data and support information shall be retained for a period of at least 5 years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records, original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit [Section 39.5(7) (e) (ii) of the Act].
- b. Other records required by this permit shall be retained for a period of at least 5 years from the date of entry unless a longer period is specified by a particular permit provision.

9.7 Annual Emissions Report

The Permittee shall submit an annual emissions report to the Illinois EPA, Compliance Section no later than May 1 of the following year, as required by 35 IAC Part 254.

9.8 Requirements for Compliance Certification

Pursuant to Section 39.5(7) (p) (v) of the Act, the Permittee shall submit annual compliance certifications. The compliance

certifications shall be submitted no later than May 1 or more frequently as specified in the applicable requirements or by permit condition. The compliance certifications shall be submitted to the Air Compliance Section, Air Regional Field Office, and USEPA Region 5 - Air Branch. The addresses for the submittal of the compliance certifications are provided in Condition 8.6.4 of this permit.

- a. The certification shall include the identification of each term or condition of this permit that is the basis of the certification; the compliance status; whether compliance was continuous or intermittent; the method(s) used for determining the compliance status of the source, both currently and over the reporting period consistent with the conditions of this permit.
- b. All compliance certifications shall be submitted to USEPA Region 5 in Chicago as well as to the Illinois EPA.
- c. All compliance reports required to be submitted shall include a certification in accordance with Condition 9.9.

9.9 Certification

Any document (including reports) required to be submitted by this permit shall contain a certification by a responsible official of the Permittee that meets the requirements of Section 39.5(5) of the Act [Section 39.5(7)(p)(i) of the Act]. An example Certification by a Responsible Official is included as an attachment to this permit.

9.10 Defense to Enforcement Actions

9.10.1 Need to Halt or Reduce Activity Not a Defense

It shall not be a defense for the Permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity in order to maintain compliance with the conditions of this permit [Section 39.5(7)(o)(ii) of the Act].

9.10.2 Emergency Provision

- a. An emergency shall be an affirmative defense to an action brought for noncompliance with the technology-based emission limitations under this permit if the following conditions are met through properly signed, contemporaneous operating logs, or other relevant evidence:
 - i. An emergency occurred as provided in Section 39.5(7)(k) of the Act and the Permittee can identify the cause(s) of the emergency.

Normally, an act of God such as lightning or flood is considered an emergency;

- ii. The permitted source was at the time being properly operated;
 - iii. The Permittee submitted notice of the emergency to the Illinois EPA within two working days of the time when emission limitations were exceeded due to the emergency. This notice must contain a detailed description of the emergency, any steps taken to mitigate emissions, and corrective actions taken; and
 - iv. During the period of the emergency the Permittee took all reasonable steps to minimize levels of emissions that exceeded the emission limitations, standards, or regulations in this permit.
- b. This provision is in addition to any emergency or upset provision contained in any applicable requirement. This provision does not relieve a Permittee of any reporting obligations under existing federal or state laws or regulations.

9.11 Permanent Shutdown

This permit only covers emission units and control equipment while physically present at the indicated source location(s). Unless this permit specifically provides for equipment relocation, this permit is void for the operation or activity of any item of equipment on the date it is removed from the permitted location(s) or permanently shut down. This permit expires if all equipment is removed from the permitted location(s), notwithstanding the expiration date specified on this permit.

9.12 Reopening and Reissuing Permit for Cause

9.12.1 Permit Actions

This permit may be modified, reopened, and reissued, for cause pursuant to Section 39.5(15) of the Act. The filing of a request by the Permittee for a permit modification, revocation, and reissuance, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition [Section 39.5(7)(o)(iii) of the Act].

9.12.2 Reopening and Revision

This permit must be reopened and revised if any of the following occur [Section 39.5(15) (a) of the Act]:

- a. Additional requirements become applicable to the equipment covered by this permit and three or more years remain before expiration of this permit;
- b. Additional requirements become applicable to an affected source for acid deposition under the acid rain program;
- c. The Illinois EPA or USEPA determines that this permit contains a material mistake or inaccurate statement when establishing the emission standards or limitations, or other terms or conditions of this permit; and
- d. The Illinois EPA or USEPA determines that this permit must be revised to ensure compliance with the applicable requirements of the Act.

9.12.3 Inaccurate Application

The Illinois EPA has issued this permit based upon the information submitted by the Permittee in the permit application. Any misinformation, false statement or misrepresentation in the application shall be grounds for revocation under Section 39.5(15) (b) of the Act.

9.12.4 Duty to Provide Information

The Permittee shall furnish to the Illinois EPA, within a reasonable time specified by the Illinois EPA any information that the Illinois EPA may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating this permit, or to determine compliance with this permit. Upon request, the Permittee shall also furnish to the Illinois EPA copies of records required to be kept by this permit, or for information claimed to be confidential, the Permittee may furnish such records directly to USEPA along with a claim of confidentiality [Section 39.5(7) (o) (v) of the Act].

9.13 Severability Clause

The provisions of this permit are severable, and should any one or more be determined to be illegal or unenforceable, the validity of the other provisions shall not be affected. The rights and obligations of the Permittee shall be construed and enforced as if this permit did not contain the particular provisions held to be invalid and the applicable requirements

underlying these provisions shall remain in force [Section 39.5(7) (i) of the Act].

9.14 Permit Expiration and Renewal

The right to operate terminates on the expiration date unless the Permittee has submitted a timely and complete renewal application. For a renewal to be timely it must be submitted no later than 9 and no sooner than 12 months prior to expiration. The equipment may continue to operate during the renewal period until final action is taken by the Illinois EPA, in accordance with the original permit conditions [Section 39.5(5) (1), (n), and (o) of the Act].

10.0 ATTACHMENTS

10.1 Attachment 1 - Particulate Matter Emissions from Process Emission Units

10.1.1 35 IAC 212.321 Process Emission Units For Which Construction or Modification Commenced On or After April 14, 1972

- a. Except as further provided in 35 IAC Part 212, no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any new process emission unit which, either alone or in combination with the emission of particulate matter from all other similar process emission units for which construction or modification commenced on or after April 14, 1972, at a source or premises, exceeds the allowable emission rates specified in subsection (c) of this Section.
- b. Interpolated and extrapolated values of the data in subsection (c) of this Section shall be determined by using the equation:

$$E = A(P)^B$$

where

P = Process weight rate; and
 E = Allowable emission rate; and,

- i. Up to process weight rates of 408 Mg/hr (450 Ton/hr):

	Metric	English
P	Mg/hr	Ton/hr
E	kg/hr	lbs/hr
A	1.214	2.54
B	0.534	0.534

- ii. For process weight rate greater than or equal to 408 Mg/hr (450 Ton/hr):

	Metric	English
P	Mg/hr	Ton/hr
E	kg/hr	lbs/hr
A	11.42	24.8
B	0.16	0.16

- c. Limits for Process Emission Units For Which Construction of Modification Commenced On or After April 14, 1972

Metric		English	
P Mg/hr	E kg/hr	P Ton/hr	E lbs/hr
0.05	0.25	0.05	0.55
0.1	0.29	0.10	0.77
0.2	0.42	0.20	1.10
0.3	0.64	0.30	1.35
0.4	0.74	0.40	1.58
0.5	0.84	0.50	1.75
0.7	1.00	0.75	2.40
0.9	1.15	1.00	2.60
1.8	1.66	2.00	3.70
2.7	2.1	3.00	4.60
3.6	2.4	4.00	5.35
4.5	2.7	5.00	6.00
9.	3.9	10.00	8.70
13.	4.8	15.00	10.80
18.	5.7	20.00	12.50
23.	6.5	25.00	14.00
27.	7.1	30.00	15.60
32.	7.7	35.00	17.00
36.	8.2	40.00	18.20
41.	8.8	45.00	19.20
45.	9.3	50.00	20.50
90.	13.4	100.00	29.50
140.	17.0	150.00	37.00
180.	19.4	200.00	43.00
230.	22.	250.00	48.50
270.	24.	300.00	53.00
320.	26.	350.00	58.00
360.	28.	400.00	62.00
408.	30.1	450.00	66.00
454.	30.4	500.00	67.00

where:

P = Process weight rate in Mg/hr or Ton/hr, and
E = Allowable emission rate in kg/hr or lbs/hr.

10.1.2 35 IAC 212.322 Process Emission Units For Which Construction or Modification Commenced Prior to April 14, 1972.

- a. Except as further provided in 35 IAC Part 212, no person shall cause or allow the emission of particulate matter into the atmosphere in any one hour period from any process emission unit for which construction or modification commenced prior to April 14, 1972, which, either alone or in combination with the emission of particulate matter from all other similar process emission units at a source or premises, exceeds the allowable emission rates specified in subsection (c) of this Section.

- b. Interpolated and extrapolated values of the data in subsection (c) of this Section shall be determined by using the equation:

$$E = C + A(P)^B$$

Where:

P = Process weight rate; and,
E = Allowable emission rate; and,

- i. For process weight rates up to 27.2 Mg/hr (30 Ton/hr):

	Metric	English
P	Mg/hr	Ton/hr
E	kg/hr	lbs/hr
A	1.985	4.10
B	0.67	0.67
C	0	0

- ii. For process weight rates in excess of 27.2 Mg/hr (30 Ton/hr):

	Metric	English
P	Mg/hr	Ton/hr
E	kg/hr	lbs/hr
A	25.21	55.0
B	0.11	0.11
C	-18.4	-40.0

- c. Limits for Process Emission Units For Which Construction or Modification Commenced Prior to April 14, 1972

Metric		English	
P Mg/hr	E kg/hr	P Ton/hr	E lbs/hr
0.05	0.27	0.05	0.55
0.1	0.42	0.10	0.87
0.2	0.68	0.20	1.40
0.3	0.89	0.30	1.83
0.4	1.07	0.40	2.22
0.5	1.25	0.50	2.58
0.7	1.56	0.75	3.38
0.9	1.85	1.00	4.10
1.8	2.9	2.00	6.52
2.7	3.9	3.00	8.56
3.6	4.7	4.00	10.40
4.5	5.4	5.00	12.00
9.	8.7	10.00	19.20
13.	11.1	15.00	25.20
18.	13.8	20.00	30.50
23.	16.2	25.00	35.40

Metric		English	
P	E	P	E
Mg/hr	kg/hr	Ton/hr	lbs/hr
27.2	18.15	30.00	40.00
32.0	18.8	35.00	41.30
36.0	19.3	40.00	42.50
41.0	19.8	45.00	43.60
45.0	20.2	50.00	44.60
90.0	23.2	100.00	51.20
140.0	25.3	150.00	55.40
180.0	26.5	200.00	58.60
230.0	27.7	250.00	61.00
270.0	28.5	300.00	63.10
320.0	29.4	350.00	64.90
360.0	30.0	400.00	66.20
400.0	30.6	450.00	67.70
454.0	31.3	500.00	69.00

where:

P = Process weight rate in Mg/hr or Ton/hr, and
E = Allowable emission rate in kg/hr or lbs/hr.

10.2 Attachment 2 - Example Certification by a Responsible Official

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: _____

Name: _____

Official Title: _____

Telephone No.: _____

Date Signed: _____

JS:psj

I. INTRODUCTION

This source has applied for a significant modification to its Clean Air Act Permit Program (CAAPP) operating permit for its existing operation. The CAAPP is the program established in Illinois for the operating permits for significant stationary sources required by the federal Clean Air Act, as amended in 1990. The conditions in a CAAPP permit are enforceable by both the Illinois Environmental Protection Agency (Illinois EPA) and the USEPA.

The Akzo Nobel Surface Chemistry LLC chemical plant is located on South Tabler Road, south of U.S. Route 6 in Aux Sable Township, Morris, Illinois. The source operates an industrial organic chemicals manufacturing plant. The source manufactures various organic chemicals, including surfactants and fabric softeners.

This significant modification to the source's CAAPP permit incorporates conditions from Permit 97090063, revised on November 27, 2002. In Sections 7.6 and 7.7 of the CAAPP permit, the VOM emission factors for the Quaternary Ammonium Salt and Arquad Processes are revised based on stack test data, and production limits are revised based on the new factors. There is no increase in annual emission limits.

II. EMISSION UNITS

Significant emission units at this source are as follows:

Emission Unit	Description	Date Constructed	Emission Control Equipment
Nitrogen Derivative Treatment Unit			
310-301.1	Reactor/Treater	10/1/1983	Afterburner 396-003 (via vacuum separator, Mode A only)
310-301.2	Reactor/Treater	10/1/1983	Afterburner 396-003 (via vacuum separator, Mode A only)
310-602	Clay Storage Silo and Conveyor System	10/1/1983	Clay Silo Vent Filter 310-602j
310-904	Treater Vacuum System	10/1/1983	Afterburner 396-003 (Mode A only)
310-303	Intermediate Slurry Tank	10/1/1983	Afterburner 396-003 (Mode A only)
310-304.1	Clay Recycle Slurry Tank	10/1/1983	Afterburner 396-003 (Mode A only)
310-304.2	Clay Recycle Slurry Tank	10/1/1983	Afterburner 396-003 (Mode A only)
310-601	Rotary Vacuum Filter System	10/1/1983	Afterburner 396-003 (via vacuum separator, Mode A only)

Emission Unit	Description	Date Constructed	Emission Control Equipment
310-603	Rotary Vacuum Filter System	10/1/1983	Afterburner 396-003 (via vacuum separator, Mode A only)
310-601a	Rotary Vacuum Separator	10/1/1983	Afterburner 396-003 (Mode A only)
310-603a	Rotary Vacuum Separator	10/1/1983	Afterburner 396-003 (Mode A only)
Nitrile Unit			
302-004	Nitrile Reactor	1973	None
302-002	Nitrile Reactor Condenser	1973	None
302-010	Nitrile Vent Stripper	1973	None
302-011	Vent Condenser	1973	None
302-012	Nitrile Rerun Tank N8	1973	Afterburner 396-003 (Mode A only)
302-014	Vaporizer	1973	None
302-020	Nitrile Catalyst Chamber (Mode A only)	1973	None
302-022	Nitrile Catalyst Chamber (Mode A only)	1973	None
302-030	Nitrile Catalyst Chamber (Mode A only)	1973	None
302-036	Nitrile Condensing Still	1973	None
302-041	Ammonia Scrubber/Absorber	1973	Afterburner 396-003 or Flare (Mode A or B)
302-047	Ammonia Still	1973	None
302-050	Ammonia Still Reflux Condenser	1973	None
302-054	Carbon Dioxide Purge Flashpot	1973	None
302-068	Ammonia Knock-Out Drum	1973	None
302-078	Pitch Vent Stripper	1973	None
Continuous Hydrogenation Unit			
303-004.1	Hydrogenation Reactor	10/1973	None
303-004.2	Hydrogenation Reactor	10/1973	None
303-002.1	Recycle Gas Compressor	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
303-002.2	Recycle Gas Compressor	10/1973	Afterburner 396-003 (Mode A) and Flare 396-701
303-006	Knock-Out Drum	10/1973	Afterburner 396-003 (Modes A and C) and Flare 396-701
303-008	Recirculation Cooler	10/1973	None
303-009	Recirculation Cooler	10/1973	None
303-010	Flash Drum Preheater	10/1973	None

Emission Unit	Description	Date Constructed	Emission Control Equipment
303-011	Ammonia Flash Drum	10/1973	None
303-012	Ammonia Condenser	10/1973	None
303-013	Ammonia Accumulator	10/1973	Afterburner 396-003 (Modes A and C) and Flare 396-701
303-016	Amine Surge Drum	10/1973	Afterburner 396-003 (Modes A and C) and Flare 396-701
303-019	Amine Cooler	10/1973	None
303-020	Dump Tank H-5	10/1973	Afterburner 396-003 (Modes A and C) and Flare 396-701
Batch Hydrogenation Unit			
307-004	Batch Hydrogenation Reactor R-1	10/1973	None
306-004	Batch Hydrogenation Reactor R-2	10/1973	None
306-001	North Catalyst Mix Tank (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only)
306-013	Steam Ejector (R-1 and R-2 Reactor Trains)	10/1973	None
306-012	North Schenk Filter (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only)
306-014	Surface Condenser (R-1 and R-2 Reactor Trains)	10/1973	None
306-015	North Hotwell 306-015 (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only) and Flare 396-701
306-019	North Drop Tank H6 (R-1 and R-2 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only) and Flare 396-701
306-029	North Polishing Filter (R-1 and R-2 Reactor Trains)	10/1973	None
306-301	Batch Hydrogenation Reactor R-3	10/1973	None
306-302	Batch Hydrogenation Reactor R-4	10/1973	None
306-303	South Catalyst Mix Tank (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only)
306-304	South Drop Tank H7 (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only) and Flare 396-701
306-305	South Hotwell (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only) and Flare 396-701

Emission Unit	Description	Date Constructed	Emission Control Equipment
306-503	Steam Ejector 306-503 (R-3 and R-4 Reactor Trains)	10/1973	None
306-503C	Surface Condenser (R-3 and R-4 Reactor Trains)	10/1973	None
306-504	South Schenk Filter (R-3 and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only)
306-505	South Polishing Filter (R-3 and R-4 Reactor Trains)	10/1973	None
313-301	Batch Hydrogenation Reactor R-6	3/1988	None
313-303	Drop Tank H-11 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A only) and Flare 396-701
313-304	Catalyst Mix Tank R-6 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A only)
313-305	Precoat Tank (R-6 Reactor Train)	3/1988	None
313-307	Knock-Out Drum R-6 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A only) and Flare 396-701
313-310	Recycle Gas Scrubber (R-6 Reactor Train)	3/1988	None
313-401	Precondenser (R-6 Reactor Train)	3/1988	None
313-402	Surface Condenser (R-6 Reactor Train)	3/1988	None
313-503	Funda Filter R-6 (R-6 Reactor Train)	3/1988	Afterburner 396-003 (Mode A only)
313-504	Polishing Filter (R-6 Reactor Train)	3/1988	None
313-506	Steam Ejector (R-6 Reactor Train)	3/1988	None
313-601	Recycle Gas System Compressor (R-6 Reactor Train)	3/1988	None
306-306	Reactor R-5	10/1985	None
306-307	Hotwell (R-5 Reactor Train)	10/1985	Afterburner 396-003 (Mode A only)
306-601	Vacuum System (R-5 Reactor Train)	10/1985	None
306-021	Precoat Tank (R-1, R-2, R-3, and R-4 Reactor Trains)	10/1973	None
306-044	Aqueous Ammonia Surge Tank (R-1, R-2, and R-6 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only) and Flare 396-701
306-507	Funda Filter (R-1, R-2, R-3, and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only)
307-016	DM Settling Tank H-1 (R-1, R-2, R-3, and R-4 Reactor Trains)	10/1973	Afterburner 396-003 (Mode A only)

Emission Unit	Description	Date Constructed	Emission Control Equipment
Ester Process			
309-326	Reactor	6/1994	None
309-428	Process Condenser	6/1994	None
309-327	Condensate Receiver	6/1994	None
309-603	Vacuum System	6/1994	Afterburner 396-003 (Mode A only)
309-607	Vacuum System	6/1994	Afterburner 396-003 (Mode A only)
309-604	Hopper/Filter	6/1994	None
Ester Process II			
316-304	Reactor	11/1998	None
316-408	Process Condenser	11/1998	None
316-305	Condensate Receiver	11/1998	None
316-603	Vacuum System	11/1998	Afterburner 396-003 (Mode A only)
316-604	Hopper/Filter	11/1998	None
Arquad Production Area (Quaternary Ammonium Salt Process)			
309-321	Reactor	6/1994	None
309-322	Drop Tank	6/1994	Methyl Chloride Absorber System 309-325
309-324	Recovery Tank	6/1994	(equipment is a part of 309-325)
309-325	Methyl Chloride Absorber Column	6/1994	(equipment is a part of 309-325)
309-330	Process Tank	6/1994	None
309-423	Water-cooled Condenser	6/1994	(equipment is a part of 309-325)
309-424	Refrigerated Glycol-chilled Condenser	6/1994	(equipment is a part of 309-325)
309-323	Vent Separator	6/1994	(equipment is a part of 309-325)
309-601	Liquid Ring Pump Package	6/1994	(equipment is a part of 309-325)
Arquad Production Area (Quaternary Ammonium Salt Process II)			
316-300	Reactor	11/1998	None
316-301	Reactor	11/1998	None
316-302	Drop Tank	11/1998	Methyl Chloride Absorber System 316-309
316-313	Drop Tank	11/1998	Methyl Chloride Absorber System 316-309
316-308	Recovery Tank	11/1998	(equipment is a part of 316-309)
316-309	Methyl Chloride Absorber Column	11/1998	(equipment is a part of 316-309)
316-303	Process Tank	11/1998	None

Emission Unit	Description	Date Constructed	Emission Control Equipment
316-402	Water-cooled Condenser	11/1998	(equipment is a part of 316-309)
316-409	Water-cooled Condenser	11/1998	(equipment is a part of 316-309)
316-403	Refrigerated Glycol-chilled Condenser	11/1998	(equipment is a part of 316-309)
316-410	Refrigerated Glycol-chilled Condenser	11/1998	(equipment is a part of 316-309)
316-307	Vent Separator	11/1998	(equipment is a part of 316-309)
316-311	Vent Separator	11/1998	(equipment is a part of 316-309)
316-601	Liquid Ring Pump Package	11/1998	(equipment is a part of 316-309)
Arquad Production Area (Arquad Process)			
309-301	Reactor	10/1973	Methyl Chloride Absorber System 309-313
309-305	Drop Tank	10/1973	Methyl Chloride Absorber System 309-313
309-308.1	Bleach Tank A25	10/1973	Wash Tank Condenser 309-406 or 309-431
309-308.2	Bleach Tank A26	10/1973	Wash Tank Condenser 309-406 or 309-431
309-310	Vent Compressor Knock-Out Pot	10/1973	(equipment is a part of 309-313)
309-312	Wash Tank	10/1973	Wash Tank Condenser 309-406 or 309-431
309-317	Wash Tank	8/1999	Wash Tank Condenser 309-406 or 309-431
309-313	Methyl Chloride Absorber Column	10/1973	(equipment is a part of 309-313)
309-314	Diluent Tank	10/1973	(equipment is a part of 309-313)
309-315	Diluent Tank	10/1973	(equipment is a part of 309-313)
309-413	Diluent Tank	10/1973	(equipment is a part of 309-313)
309-401	Water-cooled Condenser	10/1973	(equipment is a part of 309-313)
309-409	Refrigerated Glycol-chilled Condenser	10/1973	(equipment is a part of 309-313)
309-501	Filter	10/1973	None
309-901	Methyl Chloride Recovery Vacuum/Compressor	10/1973	(equipment is a part of 309-313)

Emission Unit	Description	Date Constructed	Emission Control Equipment
309-332	Water Scrubber	8/1999	None
309-406	Wash Tank Condenser	8/1999	None
309-431	Wash Tank Condenser	8/1999	None
Storage Tanks			
W-2	Wastewater Surge Tank	10/1973	None
H-4	Formalin Tank	10/1973	None
H-2	Acrylonitrile Tank	10/1973	None
W-4	Waste Fat Storage	9/1978	None
H-3	Formcel Tank	10/1973	None
Fuel Combustion Equipment			
NB	Nebraska Steam Boiler Model #NS-C-37	6/1978	None
DB	Dowtherm Boiler 388-001	10/1973	None
KB	Keystone Steam Boiler	8/1982	None
Fugitive VOM Emissions	Leaks from valves, flanges, seals etc.		None

III. EMISSIONS

This source is required to have a CAAPP permit since it is a major source of emissions.

For purposes of fees, the source is allowed the following emissions:

Permitted Emissions of Regulated Pollutants

Pollutant	Tons/Year
Volatile Organic Material (VOM)	189.20
Sulfur Dioxide (SO ₂)	211.20
Particulate Matter (PM)	12.80
Nitrogen Oxides (NO _x)	646.60
HAP, not included in VOM or PM	----
TOTAL	1,059.80

This permit is a combined Title I/CAAPP permit that may contain terms and conditions which address the applicability, and compliance if determined applicable, of Title I of the Clean Air Act and regulations promulgated thereunder, including 40 CFR 52.21 - federal Prevention of Significant Deterioration (PSD) and 35 IAC Part 203 - Major Stationary Sources Construction and Modification. Any such terms and conditions are identified within the permit by T1, T1R, or T1N. The source has requested that the Illinois EPA establish or revise such conditions in a Title I permit, consistent with the information provided in the CAAPP application. Any conditions established in a construction permit pursuant to Title I and not revised or deleted in this permit, remain in effect pursuant to Title I provisions until such time that the Illinois EPA revises or deletes them.

IV. APPLICABLE EMISSION STANDARDS

All emission sources in Illinois must comply with the Illinois Pollution Control Board's emission standards. The Board's emission standards represent the basic requirements for sources in Illinois.

All emission sources in Illinois must comply with the federal New Source Performance Standards (NSPS). The Illinois EPA is administering NSPS in Illinois on behalf of the United States EPA under a delegation agreement.

All emission sources in Illinois must comply with the federal National Emission Standards for Hazardous Air Pollutants (NESHAP). The Illinois EPA is administering NESHAP in Illinois on behalf of the United States EPA under a delegation agreement.

V. PROPOSED PERMIT

CAAPP

A CAAPP permit contains all conditions that apply to a source and a listing of the applicable state and federal air pollution control regulations that are the origin of the conditions. The permit also contains emission limits and appropriate compliance procedures. The appropriate compliance procedures may include inspections, work practices, monitoring, record keeping, and reporting to show compliance with these requirements. The Permittee must carry out these procedures on an on-going basis.

Title I

A combined Title I/CAAPP permit contains terms and conditions established by the Illinois EPA pursuant to authority found in Title I provisions, e.g., 40 CFR 52.21 - federal Prevention of Significant Deterioration (PSD) and 35 IAC Part 203 - Major Stationary Sources Construction and Modification. Notwithstanding the expiration date on the first page of the permit, the Title I conditions remain in effect pursuant to Title I provisions until the Illinois EPA deletes or revises them in accordance with Title I procedures.

Because this source is located in the Chicago ozone non-attainment area and emits volatile organic material (VOM), the permit includes conditions to implement the Emissions Reduction Market System (ERMS). The ERMS is a market-based program designed to reduce VOM emissions from stationary sources to contribute to reasonable further progress toward attainment, as further described in Section 6.0 of the permit. The permit contains the Illinois EPA's determination of the source's baseline emissions and allotment of trading units under the ERMS, and identifies units not subject to further reductions.

VI. REQUEST FOR COMMENTS

It is the Illinois EPA's preliminary determination that this source's permit application meets the standards for issuance of a CAAPP permit. The Illinois EPA is therefore proposing to issue a CAAPP permit, subject to the conditions proposed in the draft permit.

Comments are requested on this proposed action by the Illinois EPA and the proposed conditions on the draft permit. If substantial public interest is shown in this matter, the Illinois EPA will consider holding a public hearing in accordance with 35 Ill. Adm. Code Part 166.

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