

ADEQ OPERATING AIR PERMIT

Pursuant to the Regulations of the Arkansas Operating Air Permit Program, Regulation No. 26:

Permit No.: 873-AOP-R5

Renewal #1

IS ISSUED TO:

**Great Lakes Chemical Corporation
South Plant
El Dorado, AR 71730
Union County
AFIN: 70-00037**

**THIS PERMIT AUTHORIZES THE ABOVE REFERENCED PERMITTEE TO
INSTALL, OPERATE, AND MAINTAIN THE EQUIPMENT AND EMISSION
UNITS DESCRIBED IN THE PERMIT APPLICATION AND ON THE
FOLLOWING PAGES. THIS PERMIT IS VALID BETWEEN:**

Signed:

AND

IS SUBJECT TO ALL LIMITS AND CONDITIONS CONTAINED HEREIN.

Michael Bonds
Chief, Air Division

Date

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Table of Contents

SECTION I: FACILITY INFORMATION.....	7
SECTION II: INTRODUCTION	8
SUMMARY OF PERMIT ACTIVITY	8
PROCESS DESCRIPTION	9
REGULATIONS.....	17
SECTION III: PERMIT HISTORY	27
SECTION IV: SPECIFIC CONDITIONS.....	32
BOILERS.....	33
SN- 02 - BOILER #5.....	33
SN-03 - BOILER #6	33
SN-04 - BOILER #1	33
BROMINE PRODUCTION.....	35
SN-101 - BRINE RECEIVING TANK.....	35
SN-138 - BROMINE PRODUCTION VENT SCRUBBER.....	35
SN-199 - FUGITIVE EMISSIONS FROM EQUIPMENT LEAKS	35
FF-680, TBP, CN-1753, BE-51, AND PE-68 PRODUCTION	37
SN-401 – T-3 AND T-37 PHENOL TANKS	37
SN-403 – PROPYLENE GLYCOL STORAGE TANK.....	37
SN-404 – ISOPROPYL ALCOHOL STORAGE TANK	37
SN-412 – T-34 FEED TANK FOR PC-9.....	37
SN-413 – PC-1 SCRUBBER.....	37
SN-416 - PC-4 SCRUBBER	37
SN-417 - PC-6 SCRUBBER	37
SN-418 - PC-10 SCRUBBER	37
SN-419 – BAGHOUSE-BAGGING	37
SN-420 - BAGHOUSE-DRYING	37
SN-421 - PC-8 SCRUBBER	37
SN-427 - FLAKER SCRUBBER VENT.....	37
SN-428 – SPRAY DRYER BAGHOUSE	37
SN-429 - SILO BAGHOUSE	37
SN-430 - CN-1753 LOADOUT BAGHOUSE	37
SN-435 – THERMAL OXIDIZER FLARE	37
SN-436 – BAGHOUSE-BAGGING	37
SN-437 – 10% ISOPROPYL ALCOHOL TANK	37
SN-499 – FUGITIVE EMISSIONS FROM EQUIPMENT LEAKS.....	37
CD-75 PRODUCTION AND CHILSINATOR.....	43
SN-501 - BROMINE STORAGE TANK	43
SN-502 – EDC STORAGE TANK (T-902).....	43
SN-503 - VENT HEADER BLOWER EXHAUST	43
SN-504 - PACKAGING BAGHOUSE VENT.....	43
SN-505 – DUST COLLECTOR BLOWER	43
SN-507 – STORAGE BAGHOUSE VENT	43
SN-508 - BAGHOUSE VENT.....	43
SN-509 – ROTARY DRIER BAGHOUSE VENT.....	43
SN-510 – PACKAGING DRIER VENT.....	43
SN-511 – RECYCLE ETHANOL TANK (T-510)	43
SN-512 – RECYCLE EDC TANK (T-506).....	43
SN-513 –ETHANOL STORAGE TANK (T-904).....	43
SN-515 – EDC STRIPPER FEED TANK (T-500).....	43
SN-516 – EDC STRIPPER FEED TANK (T-516).....	43
SN-517 – WASTEWATER TANK (T-518)	43

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN-599 – FUGITIVE EMISSIONS FROM EQUIPMENT VENTS	43
PHT-4, PHT-4 DIOL AND PHT-4 DIOL BLEND, AND NaBr.....	47
SN-604 –PHTHALIC ANHYDRIDE STORAGE TANK.....	47
SN-605 – DRYER DUST COLLECTOR.....	47
SN-606 – VACUUM SYSTEM.....	47
SN-608 – MECHANICAL VACUUM PUMP	47
SN-609 – TOLUENE STORAGE TANK	47
SN-610 – DRYER CONDENSER.....	47
SN-611 – PHT-4 CAUSTIC VENT SCRUBBER	47
SN-612 - PHOSPHATE ESTER TANK #1.....	47
SN-613 – PHOSPHATE ESTER TANK #2.....	47
SN-614 – DIOL BLEND TANK	47
SN-699 - FUGITIVE EMISSIONS FROM EQUIPMENT VENTS	47
NESHAP SUBPARTS F, G, AND H.....	49
FM 200, FREON 32, FREON 23, HFC-143A, TFP, BFE, HFC236FA AND BDFE	60
SN-702 – C-731 ABSORBER SCRUBBER.....	60
SN-704 – FINAL PURIFICATION	60
SN-706 – HCL STORAGE TANKS (T-631A AND T-631B).....	60
SN-709 – MOLE SIEVE DRYER REGENERATION.....	60
SN-711 – METHYLENE CHLORIDE/CHLOROFORM STORAGE TANK	60
SN-712 – DISTILLATION COLUMN VENT	60
SN-715 – TFP SCRUBBER VENT B.....	60
SN-751 – MOLE SIEVE DRYER REGENERATION.....	60
SN-799 - FUGITIVE EMISSIONS FROM EQUIPMENT VENTS	60
SN-802 – ETHYLENE STORAGE TANK.....	60
SN- 803 – COMBINED PROCESS VENT	60
SN-807 –COMMON PROCESS VENT: CATALYST VENT.....	60
SN-808 – HCL SCRUBBER VENT	60
SN-809 – C-301T VENT SCRUBBER.....	60
SN-817 – LIQUID NITROGEN CONDENSERS	60
SN-818 –THERMAL OXIDIZER WITH SCRUBBER	60
SN-819 – CD-103 VENT CONDENSER.....	60
SN-899 - FUGITIVE EMISSIONS FROM EQUIPMENT VENTS	60
SN-1301 – COMBINED PROCESS VENT	60
SN-1302 – HCL SCRUBBER VENT	60
SN-1303 – PRESSURE VALVE CONTROL VALVE FROM DISTILLATION COLUMN.....	60
SN-1399 - FUGITIVE EMISSIONS FROM EQUIPMENT LEAKS	60
DBS, BCP, AND PHOSPHORUS TRIBROMIDE PRODUCTION	73
SN-901 – SCRUBBER VENT.....	73
SN-902 – STYRENE STORAGE TANK.....	73
SN-904 – CARBON BED ABSORBER FOR BEB TANKS.....	73
SN-908 – DBS STORAGE TANKS	73
SN-914 – HCL STORAGE TANK (T-201).....	73
SN-916 - BCP PERMANENT STORAGE TANK	73
SN-999 - FUGITIVE EMISSIONS FROM EQUIPMENT VENTS	73
BROMINE RECOVERY UNITS	78
SN-1001 – BROMINE RECOVERY UNIT (BRU-II)	78
SN-2001 - BROMINE RECOVERY UNIT (BRU-III).....	78
SN-2099 - FUGITIVE EMISSIONS FROM EQUIPMENT VENTS	78
PDBS PRODUCTION	83
SN-1101 – PRE-POLYMEIZER AND VACUUM PUMP VENT.....	83
SN-1104 – PROCESS DUST COLLECTOR.....	83
SN-1106 – VACUUM PELLET TRANSPORT SYSTEM.....	83
SN-1107 - PRE-POLYMEIZER AND VACUUM PUMP VENT (LINE 2)	83
SN-1199 – FUGITIVE EMISSIONS FROM EQUIPMENT LEAKS.....	83

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

PHARMACEUTICAL CHEMICALS UNIT 86
SN-102 - SOUR GAS FLARE 87
SN-1501 - TESTING AREA..... 89

SECTION I: COMPLIANCE PLAN AND SCHEDULE..... 91

SECTION II: PLANT WIDE CONDITIONS 92

TITLE VI PROVISIONS 92

SECTION III: INSIGNIFICANT ACTIVITIES 96

SECTION IV: GENERAL PROVISIONS 98

APPENDIX A 40 CFR PART 60, SUBPART DC - STANDARDS OF PERFORMANCE FOR SMALL INDUSTRIAL-COMMERCIAL-INSTITUTIONAL STEAM GENERATING UNITS

APPENDIX B PART 63, SUBPART F – NATIONAL EMISSION STANDARDS FOR ORGANIC HAZARDOUS AIR POLLUTANTS FROM THE ORGANIC CHEMICAL MANUFACTURING INDUSTRY

APPENDIX C PART 63, SUBPART G – NATIONAL EMISSION STANDARDS FOR ORGANIC HAZARDOUS AIR POLLUTANTS FROM THE ORGANIC CHEMICAL MANUFACTURING FOR PROCESS VENTS, STORAGE VESSELS, TRANSFER OPERATIONS, AND WASTEWATER

APPENDIX D PART 63, SUBPART H – NATIONAL EMISSION STANDARDS FOR ORGANIC HAZARDOUS AIR POLLUTANTS FOR EQUIPMENT LEAKS

APPENDIX E 40 CFR 60 SUBPART KB—STANDARDS OF PERFORMANCE FOR VOLATILE ORGANIC LIQUID STORAGE VESSELS (INCLUDING PETROLEUM LIQUID STORAGE VESSELS) FOR WHICH CONSTRUCTION, RECONSTRUCTION, OR MODIFICATION COMMENCED AFTER JULY 23, 1984

APPENDIX F DIRECTOR’S OPACITY WAIVER

APPENDIX G SUBPART FFFF--NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS: MISCELLANEOUS ORGANIC CHEMICAL MANUFACTURING

APPENDIX H..... SUBPART DDDDD--NATIONAL EMISSION STANDARDS FOR HAZARDOUS AIR POLLUTANTS FOR INDUSTRIAL, COMMERCIAL, AND INSTITUTIONAL BOILERS AND PROCESS HEATERS

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Table of Tables

Table 1 - List of Acronyms	6
Table 2 – Regulations	17
Table 4 – Boiler Maximum Criteria Emission Rates	33
Table 5 – Boiler PM Emissions	34
Table 6 – Bromine Production Emission Rates	35
Table 7 – Bromine Production Vent Scrubber Parameters	36
Table 8 - FF-680 Plant Criteria Emission Rates	38
Table 9 - FF-680 Plant Non-Criteria Emission Rates	39
Table 10 - FF-680 Plant Scrubbers Parameters	41
Table 11 - FF-680 Baghouse Pressure Drop	41
Table 12 – CD-75 Criteria Emissions	44
Table 13 – CD-75 Non-Criteria Emission Rate	44
Table 14 – CD-75 Scrubber Parameters.....	45
Table 15 – CD-75 Baghouse Pressure Drop	46
Table 16 - PHT-4 Plant Criteria Emissions.....	48
Table 17 - PHT-4 Plant Non-Criteria Emissions	48
Table 18 PHT-4 Plant Scrubber Parameters	57
Table 19 - PHT-4 Plant Baghouse Pressure Drop.....	57
Table 20 - PHT-4 Diol and PHT-4 Diol Blend Production Lots.....	58
Table 21 – FCU North Criteria Pollutants Emissions	63
Table 22 - FCU North Plant Non-Criteria Pollutants Emissions	63
Table 25 – FCU South Plant Criteria Pollutants Emissions.....	66
Table 26 - FCU South Plant Non- Criteria Pollutants Emissions	66
Table 27 - FCU South Plant Scrubber Parameters	68
Table 28 - FM 300 Criteria Emission Rates.....	70
Table 29 - FM 300 Criteria Emission Rates.....	71
Table 30 - FM 300 Equipment Parameters	72
Table 31 - DBS Plant Criteria Emissions.....	75
Table 32 - DBS Plant Criteria Emissions.....	75
Table 33 - DBS Plant Scrubber Parameters	77
Table 34 – Bromine Recovery Units Criteria Emissions	78
Table 35 - Bromine Recovery Units Non-Criteria Emission Rates	79
Table 36 - Bromine Recovery Units Waste Streams.....	79
Table 37 – Bromine Recovery Units Test Methods	80
Table 38 – Waste Streams for BRU-III.....	81
Table 39 – Bromine Recovery Units Test Methods	81
Table 40 - PDBS Plant Criteria Emissions	83
Table 41 - PDBS Plant Non-Criteria Emissions	84
Table 42 - PDBS Baghouse Pressure Drop.....	85
Table 43 – Flare Criteria Emissions.....	87
Table 44 - Flare Non-Criteria Emissions	87
Table 45 – Testing Area Criteria Emissions	89
Table 46 - Testing Area Non-Criteria Emissions.....	89
Table 47 – Testing Area Production Limits	89
Table 48 - Applicable Regulations.....	94
Table 49 - Inapplicable Regulations	94
Table 50 - INSIGNIFICANT ACTIVITIES	96

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Table 1 - List of Acronyms

A.C.A.	Arkansas Code Annotated
AFIN	ADEQ Facility Identification Number
CFR	Code of Federal Regulations
CO	Carbon Monoxide
HAP	Hazardous Air Pollutant
lb/hr	Pound per hour
MVAC	Motor Vehicle Air Conditioner
No.	Number
NO _x	Nitrogen Oxide
PM	Particulate matter
PM ₁₀	Particulate matter smaller than ten microns
SNAP	Significant New Alternatives Program (SNAP)
SO ₂	Sulfur dioxide
SSM	Startup, Shutdown, and Malfunction Plan
Tpy	Ton per year
UTM	Universal Transverse Mercator
VOC	Volatile Organic Compound

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section I: FACILITY INFORMATION

PERMITTEE: Great Lakes Chemical Corporation – South Plant

AFIN: 70-00037

PERMIT NUMBER: 873-AOP-R5

FACILITY ADDRESS: 324 Southfield Cutoff

El Dorado, AR 71730

MAILING ADDRESS: PO Box 7020

El Dorado, AR 71731-7020

COUNTY: Union County

CONTACT POSITION: Pete Howard, Environmental Manager

TELEPHONE NUMBER: 870-864-1543

REVIEWING ENGINEER: Phillip Murphy

UTM Zone: 15

UTM North - South (Y): 3663.6

UTM East - West (X): 530.2

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section II: INTRODUCTION

Summary of Permit Activity

Great Lakes Chemical Corporation (AFIN: 70-00037) operates a chemical manufacturing facility south of El Dorado. This Great Lakes Chemical Corporation facility (GLCC), known as the South Plant, consists of a number of process units. GLCC manufactures a wide variety of products at this plant. These products can be generally classified into one of three categories: bromine, brominated organics, and brominated inorganics.

This permit is a renewal with modifications. The modifications include:

Administrative Amendment Dated 2-10-2004

Allowed the use of ammonia to neutralize bromine, chlorine and hydrobromic acid during releases to the atmosphere.

Minor Modification Dated February 23, 2004

Permitted the manufacture of HFC236fa. The emission rates increased by 0.8 tpy for CO, 3.6 tpy for NO_x, 0.1 tpy SO₂, 0.1 tpy PM/PM₁₀, 10.6 tpy HFC-236fa and 3.1 tpy CFC-12.

Minor Modification Dated May 19, 2004

Installed new equipment for the production of BDFE. The BDFE production process has three emission points consisting of the existing thermal oxidizer (SN-818) with scrubber, wastewater storage tank (TT-715) and the CD-103 Vent Condenser (SN-819). VOC emissions increased by 0.9 tpy.

Renewal Application Dated 8-19-2004

Deleted the sources for the CN-1985 plant. This plant was never constructed.

Added CAM plan for VOC for SN-416, PC-4 Scrubber, in the FF-680 Plant. Added CAM plans for SO₂ for the SN-611, PHT-4 Caustic Vent Scrubber, in the PHT-4 Plant. Added CAM Plan for PM₁₀ for SN-1104, Fabric Filter, in the PDBS Plant. Added CAM plan for VOC for SN-1301, Thermal Oxidizer, and SN-1301, Combined Process Vent, for the FCU Plant.

Minor Modification Dated December 14, 2004

Added a new PDBS line. The VOC increase by 18 tpy and the toluene increased by 1.32 tpy.

Minor Modification Dated February 17, 2005

Increased production at the DBS plant. The modification added an additional carbon filter for control of VOC.

Modification Dated 4-27-2005

Updated the operating conditions for the Sour Gas Flare to reflect actual operating conditions. The permitted emissions reflect only what the pilot for the flare.

Changes Dated June 3, 2005

The submittal updated the insignificant activities list. The changes added sources SN-403, SN-404, SN-406, SN-437, SN-439, SN-502, SN-511, SN-512, SN-513, SN-515, SN-516, SN-517 and SN-914. The VOC emissions increased by 7.7 tpy, ethanol by 0.6 tpy, Ethylene Dichloride by 3.19 tpy, HCl by 0.64 tpy, and isopropyl alcohol by 2.70 tpy.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Process Description

Utilities

Great Lakes South has three boilers Boiler #5 (SN-02, 127.8 MMBtu/hr), Boiler #6 (SN 03, 95.0 MMBtu/hr), and Boiler #1 (SN-04, 96.7 MMBtu/hr). Currently, all boilers only burn natural gas. The burners in Boiler #5 are capable of burning fuel oil; however, the ancillary equipment (storage tanks, pumps, feed lines, etc.) necessary to burn fuel oil is not present.

Bromine Production

Bromine occurs naturally in brines found in specific areas of South Arkansas. The brines are chlorinated in towers to release the bromine which is steam stripped and condensed. Each bromine tower vent has its own scrubber. These scrubbers are vented to a final scrubber which discharges to the atmosphere (SN-138).

In addition to bromine, the brine also contains sour gas. This gas is separated at the well site and piped to the Central Plant. The remaining gas is transported to the South Plant along with the brine where it is stripped in a vacuum stripper. This gas is also sent to the Central Plant. When the vacuum stripper is down, the brine will be stripped if the outage is a short-term one (less than 48 hours). If the vacuum stripper is down for more than 48 hours, Great Lakes will either send the brine directly to the bromine towers or shut in the brine wells.

Sour Gas Flare

Great Lakes extracts feed brine from production wells throughout south/central Arkansas. Sour gas is separated from feed brine at each of the well locations and at each of the processing plants. The South and West Plant's sour gas is transported from the well locations and processing plants via pipeline to Great Lakes' Central Plant. From the Central Plant, Great Lakes routes the combined sour gas streams via pipeline to Lion Oil Company, a neighboring petroleum refinery. Great Lakes combined sour gas streams processed in Lion Oil's amine unit into a sweet gas. Sweet gas is returned to the Central Plant as fuel for the Central Plant's Boiler #2.

When Lion Oil's amine unit is not operating because of a planned, long-term outage, the combined sour gas streams are routed to the Central Plant's sodium hydrosulfide (NaHS) unit. NaHS is used as fuel in the Central Plant's Boiler #2. During unplanned and/or short-term outages of Lion Oil's amine unit, the Central Plant will flare the combined sour gas streams or each plant will flare its own sour gas stream.

In the event of a startup, shutdown, emergency condition or malfunction, or in the event of an unplanned outage of Lion Oil's amine unit or the Central Plant's NaHS unit, the South Plant's sour gas may be combusted at the South Plant's sour gas flare (SN-102) or sent to Great Lakes' Central Plant. The flare is equipped with a 0.125 MMBtu/hr natural gas pilot.

FF-680 Production

FF-680 is produced in three reaction steps. First, two reactants are reacted to form an intermediate. This intermediate is reacted with a reactant to form a second intermediate. The second intermediate is then reacted with a reactant to produce FF-680.

The crude FF-680 is washed and centrifuged. Emissions are controlled with condensers and a scrubber (SN-418). The wet product is initially dried. The dryer discharge is sent to a scrubber (SN-421). The product is next conveyed to another dryer and then to storage bins. The exhaust air from the dryer/storage bins is vented to a baghouse (SN-420). Dust emissions generated by the product handling and bagging system are also controlled by a baghouse (SN-419). The off gases from each reaction go to a scrubber (SN-413, SN-416, and SN-417).

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

TBP Production

Tribromophenol (TBP), an intermediate product when FF-680 is produced, can be sold as a product itself. This is done by running the first reaction described in the FF-680 section above. Instead of going to the next step, the liquid TBP is then sent to a flaker where it is solidified into flakes and bagged.

The flaker belt operation is vented to a packed scrubber (SN-427). The bagging operation is vented to a baghouse (SN-436). These sources are unique to TBP production; all other sources associated with the production of TBP (SN-413 and some storage tanks) will have the same allowable emission rates and be subject to the same conditions when producing TBP as when they are producing FF-680.

CN-1753 Production

The reactants produce a slurry of CN-1753. The CN-1753 slurry is transferred to a spray dryer. Dry powder is discharged from the spray dryer chamber. The dryer emissions pass through a baghouse (SN-428).

CN-1753 powder is conveyed to a storage silo, and the conveying air is passed through a baghouse prior to being vented to the atmosphere (SN-429). The stored product is then packaged at a loadout station prior to being transferred to the warehouse for shipment. This loadout process is controlled by a baghouse (SN-430).

BE-51 Production

In this process, the reactants are mixed and reacted to form BE-51. The BE-51 is separated from the slurry by centrifugation. The centrifuge cakes are washed with water and the wet cake is stored in tote bins or supersacs prior to drying. The wet cake is dried in a vacuum dryer. The BE-51 product is then bagged prior to shipment.

VOC emissions from the reactor are controlled with a scrubber (SN-416). VOC emissions from the belt filter are controlled with a scrubber (SN-421). VOC emissions from the solvent recovery operations are controlled with a scrubber (SN-418). Particulate matter emissions from the vacuum dryer are controlled with a baghouse (SN-420). Particulate emissions from the product bagging operations are controlled with a baghouse (SN-419).

PE-68 Production

In this process, three reactants are pre-mixed and reacted with bromine to produce PE-68. Two materials are used to neutralize residual bromine, and the product PE-68 is recovered by precipitation followed by centrifugation. The wet cake from the centrifugation is reslurried and pumped to a closed cycle spray dryer for final drying. The PE-68 product is then pneumatically conveyed to the product silo area and discharged from a dust collector into a product silo. The PE-68 product is then bagged prior to shipment. All systems including the dryer used in the PE-68 process (except the existing storage tanks) are connected to a central vent header which vents through a scrubber followed by a thermal oxidizer flare. The vent header is maintained under a slight vacuum by a fan that feeds the flare.

VOC emissions from the PE-68 process are controlled by a thermal oxidizer flare (SN-435). The scrubber is used to protect the flare from undo corrosion in the event of abnormal bromine in the reactor vent. Under normal conditions, bromine emissions are expected to be zero. Therefore, the scrubber is not classified as an emission control device. Some VOC emissions are uncontrolled. These VOC emissions are emitted to the atmosphere at the silo baghouse (SN-429). SN-407 and SN-413 are existing storage tank emissions. Particulate emissions from the PE-68 pneumatic transport system are controlled by the silo baghouse (SN-429). Particulate emissions from the product bagging operations are controlled with a baghouse.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

CD-75 Process

The CD-75 process is based on the bromination of cyclododecatriene. The reaction phase is operated in a solvent system. At the end of the reaction cycle, solids are separated from the mother liquor. The cake is washed, dried, and packaged.

The mother liquor is distilled for recovery of the solvent. Residues from distillation are piped to the adjacent Bromine Recovery Unit (BRU) for recovery of bromine. Reactors, centrifuge, dryer, solvent separation, intermediate tanks, and auxiliary tanks vent through a common manifold to a scrubber followed by an aqueous scrubber system. Scrubbed gas exits through a blower exhaust to the atmosphere (SN-503).

Solid product is transferred pneumatically from the dryer system to a hammer mill. A dust collector collects particulates prior to atmospheric discharge (SN-508). Milled product is transferred to intermediate storage which also has a dust collector vented to the atmosphere (SN-507). Final packaging operations vent to the atmosphere through a final dust collector (SN-504).

There are several storage tanks that vent to the atmosphere: a bromine storage tank equipped with a scrubber (SN-501), an ethylene dichloride storage tank (SN-502), a glycol storage tank (SN-506), a recycle ethanol tank (SN-511), a recycle ethylene dichloride tank (SN-512), an ethanol storage tank (SN-513), and a cyclododecatriene storage tank (SN-514).

Chilsinator

The Chilsinator process compresses powder products into granules. Powder is pneumatically lifted into the chilsinator feed silo. Vent from the pneumatic transport system is vented to a baghouse type dust collector that vents as SN-505. Collected dust is blended back into the product.

Product is pneumatically lifted into a bagger feed silo. Vent from the pneumatic transport system is vented to a baghouse type dust collector. The cleaned air is exhausted to the atmosphere (SN-510). Collected dust is blended back into the product.

Blending operations are carried out to blend the final product with stabilizer. Powder is pneumatically lifted into the blender feed silo. Vent from the pneumatic transport system is vented to a baghouse type dust collector. The cleaned air is exhausted to the atmosphere (SN-509). Collected dust is blended back into product.

Packaging operations vent through a dust collector to atmosphere (SN-510).

PHT-4 Production

The PHT-4 production process contains two similar production lines or trains: PHT-4-I and PHT-4-II (Train 1 and Train 2). Both trains share a reactant storage tank (SN-604). Since the two PHT -4 trains are nearly identical, the following description applies to both Train 1 and Train 2.

PHT-4 (tetrabromophthalic anhydride) is produced by the bromination of a reactant in an oleum system. During the reaction, vapors are vented off. One of the by-products is recovered and either sold as a product or converted to another by-product; the other by-products are recycled back to the reaction. The PHT-4 is formed as it is separated from the mother liquor by filtration. The cake is washed, dried, and packaged for sale.

The reaction, the by-product acid storage tanks, bulk-bromine storage tank, and all process vessels are vented to a water scrubber and caustic scrubber for control (SN-611 for both trains).

SN-605 is a bag house for PHT-4-I which controls dust emissions generated during solids packaging, handling, and drying. SN-610 is a shell and tube vent condenser used to control dust for PHT-4-II.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

PHT-4 Diol and PHT-4 Diol Blend Production

In this process, PHT-4 is reacted with two raw materials to form PHT-4 Diol. The reactant PHT4 is transferred to a hopper by a mechanical vacuum pump which vents to the atmosphere as SN-608. The reaction solvent tank is vented to the atmosphere as SN-609. Vapors generated during the reaction are controlled by a primary and secondary condensation system. Non-condensables are vented to the atmosphere through the vacuum system (SN-606). Additionally, the PHT-4 Diol can be used to produce a PHT-4 Diol Blend. The process includes two 3,000 gallon stainless steel storage tanks (SN-612 and SN-613) and a 3,000 gallon blend tank that is vented to the atmosphere (SN-614).

NaBr Production

Sodium bromide is produced by concentrating a sodium bromide solution. No pollutants are emitted from this process which emits only water vapor. Part of the year, it is necessary to use an alternate process.

The PHT-4 plant is subject to 40 CFR Part 63 (NESHAP) Subparts F, G, and H (HON). The PHT-4 plant is subject to these regulations because tetrabromophthalic anhydride (PHT-4) is the primary product of the unit (listed as Group III chemical in Table 1 to Subpart F), phthalic anhydride is listed in Table 2 to Subpart F, and the GLCC South facility is considered a HAP major source (see 40 CFR 63. 100(b)). The PHT-4 Diol and NaBr chemical manufacturing process units are not subject to the HON regulations due to the primary product qualifier.

FM 200 Production (FCU North Plant)

FM 200 can be produced at either of two production trains. Reactants are reacted to make heptafluoropropane (FM200). The natural gas fired Hot Oil System is used to heat the reactor. Emissions are vented as SN-707. The reacted gas is distilled. The fluorination reaction and distillation column are vented to the C-731 Absorber Scrubber. The scrubber is vented to the atmosphere as SN-702.

The intermediate product stream is sent to a dual molecular sieve bed dryer. Emissions from the dryers are vented to SN-709. The product stream is then separated by distillation. The overhead stream is routed to cylinder filling and cylinder evacuation.

Freon 32 Production (FCU North Plant)

Freon 32 (R32) can be produced at either of two production trains. The raw material is reacted in the presence of a catalyst to form R32. The raw material storage tank is vented at SN-711. The reaction is heated with a hot oil heater, which vents to SN-707.

Products for sale and recycle are recovered during a purification step. The first purification is vented through scrubbers to SN-702. R32 is dried, and periodic emissions are routed to the atmosphere through SN-751. A by-product is sent to storage (SN-706) for sales.

R32 is further purified prior to storage for sales. This purification vents through SN-704.

Freon 23 Production (FCU North Plant)

Freon 23 (R23) can be produced at either of two production trains. The raw material is reacted in the presence of a catalyst to form R23. The raw material storage tank is vented as SN-711. The reaction is heated with oil, which vents to SN-707.

Products for sale and recycle are recovered during a purification step. The first purification is vented through scrubbers to SN-702. R23 is dried, and periodic emissions are routed to the atmosphere through SN-751. A by-

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

product is sent to storage (SN-706) for sales. R23 is further purified prior to storage for sales. This purification vents through SN-704.

HFC-143a Production (FCU North Plant)

HFC-143a can be produced in the FCU-North Unit using the FM-200 production equipment.

HFC-143a (1, 1, 1-trifluoroethane) is produced in the FCU-North Unit in the FM-200 production equipment. Reactants are reacted in the R101D reactor. The natural gas fired Hot Oil System (SN-707, an Insignificant Activity) is used to heat the reactor. The reacted gas is distilled. The reactor and distillation equipment are vented to the C- 731 Absorber Scrubber (SN-702). The product stream is scrubbed, which is also vented to the atmosphere at SN-702. The product stream is sent to a dual molecular sieve bed dryer (SN-709). The product stream is then separated by distillation and the overhead stream is vented to the atmosphere as new emissions (SN-712).

TFP Production (FCU South Plant)

The production of trifluoropropene (TFP) is done in two steps. In the first step, an intermediate compound is produced and purified. The purified intermediate is then sent to the second reactor where it is mixed with acid and catalyst. This reaction produces TFP along with unreacted acid. The acid and TFP are separated using conventional distillation equipment. The acid is recycled while the crude TFP is further purified (SN-809). The finished TFP is loaded into shipping cylinders and prepared for transport.

Catalyst for the second reaction will be manufactured on-site. The mixing vessel will be vented through a scrubber and then to the atmosphere as SN-807. The catalyst must be activated before use. During activation the second reactor is vented to the TFP Scrubber Vent (SN-715).

Other emission sources include the combined process vent (SN-803), the acid scrubber vent (SN-808), a hot oil heater (SN-811), and five storage tank vents—the ethylene storage tank (SN-802), carbon tetrachloride storage tank (SN-815), TCP storage tank (SN-804) and the heavies storage tanks (SN-806, Sn-816).

FM-200 Production (FCU South Plant)

Heptafluoropropane (FM 200) is produced at the FCU-South Plant by reacting two reactants together. The crude product is purified and stored for sale

The reaction uses a hot oil system heated by a natural gas fired heater. The flue gas is vented to the atmosphere as SN-811. The purification equipment is vented to the atmosphere as SN-814. Purification equipment is regenerated at the Fm 200 complex and vented to the atmosphere as SN-814.

Cylinder filling emissions are designated as SN-812.

BFE Production (FCU South Plant)

2-Bromo-1-fluoroethane (BFE) is made by reacting two reactants together. The product is purified and stored for sale. Process vapors are vented through three nitrogen condensers. Emissions from the condensers are vented to the atmosphere as SN-817.

Freon 32 Production (FCU South Plant)

Two reactants are reacted together to form difluoromethane (Freon 32). Spent catalyst is disposed as a solid waste. The feed storage tank is vented to the atmosphere as SN-804. The Crude product is purified and collected in product storage tanks. The purification equipment vents to the atmosphere as SN-808.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Cylinder filling emissions are designated as SN-812. Emissions from catalyst conditioning are vented through a scrubber packed column as SN-807. Hot oil burners vent to the atmosphere as SN-811.

TFP Plant

The production of TFP (trifluoropropene) includes two reaction steps. The first reaction proceeds between two reactants in the presence of a catalyst to form an intermediate. The process stream is then transferred through a holding tank to a distillation train which is controlled by a scrubber and a condenser. Most process equipment is directly or indirectly vented to SN-1301 which is controlled by a condenser.

In the second reaction step the intermediate is reacted with a reactant to form TFP. The process stream is separated by distillation. The overhead stream is scrubbed with water to remove essentially all of the HCL. The unreacted hydrocarbons are separated using conventional distillation technology (SN-1303).

Catalyst must be activated after charging to the reactor.

A natural gas hot oil system supplies heat to the TFP vaporizers / reactors.

FM-200 Production

Two reactants are mixed in a reactor to make FM 200. The reactor uses a hot oil system which is heated by a natural gas fired heater. Emissions from this hot oil system are considered to be insignificant.

The reacted gas is distilled in a separator to remove heavy organics. The separator is vented through two scrubbers in series. Neither of these scrubbers vent to the atmosphere. The reactor only vents during catalyst regeneration or an emergency shutdown. Emissions from the reactor are vented to the TFP Scrubber at the FCU-South Plant. The TFP Scrubber is vented to the C-731 Absorber Scrubber at the FCU-North Plant. Emissions from the C-731 Scrubber are vented to the atmosphere as SN-702.

The Freon stream is then dried using a dual molecular sieve bed dryer. The molecular sieve is regenerated at the FCU-North Plant. The dry Freon is separated by a distillation column to a final product stream (FM 200) and sent to sales. The light organics from the distillation column are collected in cylinders.

HFC236fa Production

HFC236fa is produced in two steps. In the first step, an intermediate compound is produced from two reactants over a catalyst. The crude intermediate is purified and sent to a second reactor where the intermediate is mixed with a third reactant and catalyst. The reaction produces HFC236fa and acids. The acids are separated while the crude product is further purified (SN-809). Finished product is loaded into cylinders for transport.

BDFE Production

BDFE is produced by reacting two reagents in a reactor. The crude intermediate product is neutralized, dried, purified and sent to finished product storage before loading into totes. The thermal oxidizer is the emission control device for all new equipment except the purifier. The purifier vents to the CD-103 Vent Condenser (SN-819).

DBS Production

The dibromostyrene (DBS) process chemistry is based on three independent reactions. The process has been segmented into eight functional steps. The following is a listing and brief description of each step.

Step I Reaction: The Step I Reaction is conducted in a continuous pipe reactor. The feedstock is continuously fed to the Step I reactor, R-101, through a feed/recycle sparger. The vapor feed is introduced to the reactor in the gas section of the feed/recycle sparger. R-101 is vented to emission point SN-901.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Step I Distillation: The non-condensibles are routed from C-111 through two overhead condensers, a vapor/liquid separator (T-33), and emission point SN-901. The column bottoms are routed to an intermediate storage tank, T-06. T-06 is vented to emission point SN-901.

Pre-Bromination: Pre-bromination takes place in a reticulation loop on T-06. Bromine is added to the crude intermediate product. T-06 is vented to emission point SN-901.

Crude Intermediate Distillation: Crude intermediate product, stored in T-06, is continuously fed to C-112, a distillation column. Refined intermediate product is taken overhead as a distillate. C-112 vents through two overhead condensers and are then scrubbed. The scrubbed vapors are vented through emission point SN-910. Crude intermediate residue is removed as a bottom stream. The refined intermediate product is collected in the feed storage tank, T-10, while the intermediate residue is stored in the C-112 bottoms storage tank, T-12, prior to disposal in the bromine recovery unit. T-10 vents to emission point SN-904. T-12 is vented to emission point SN-901.

Step II Reaction, Quench, and NaOH Wash: Refined intermediate is brominated batch wise in the Step II reactor, R-103, to form Step II intermediate product. After complete conversion, the reaction mass is pumped to the Step II quench reactor, R-104.

The Step II intermediate product is quenched by washing residual bromine from the reaction mass in R-104. R-104 is vented to emission point SN-901. Water is added, and the mixture is agitated and recirculated. Agitation is stopped and the phases are allowed to separate. The organic layer is directed to the caustic wash receiver, T-36, for caustic wash. T-36 is vented to emission point SN-901. The aqueous layer from R-104 is transferred to extraction. Water and a caustic are added to T-36 prior to transfer of the organic layer from R-104. The mixture is agitated and recirculated. Agitation is stopped and the phases are allowed to separate. The organic layer is directed to the C-113 feed stock tank, T-14. T-14 vents to emission point SN-905. The aqueous layer from T-36 is transferred to extraction.

Step II Distillation: Step II intermediate product is collected as the bottoms from the column and fed to the falling film evaporator, H-10. Step II intermediate material is removed as a vapor from the falling film evaporator and is condensed in two heat exchangers prior to storage tank, T-16. T-16 vents to emission point SN-905. The residue from the falling film evaporator is stored in T-12 prior to disposal in the bromine recovery unit. T-12 is vented to emission point SN-901. The C-113 overhead vapors vent through a heat exchanger and are then scrubbed. The scrubbed vapors are vented through emission point SN-910.

Step III Reaction: Step II intermediate product is converted to Step III in a two stage continuous reaction system. Step II intermediate product is continuously added to the Step III reactor, R-105. R-105 vents to emission point SN-906. The two-phase reaction mass is transferred to D-01, a phase separator, where water is added to enhance the separation of the partially converted Step II intermediate product and the aqueous layer. D-01 vents to emission point SN-906. The organic layer underflows to R-106, the second stage reactor. R-106 vents to emission point SN-906. The aqueous phase from D-01 is directed to the T-35R scrubber, via T-51. T-35R vents to emission point SN-901. T-51 vents to emission point SN-906.

The level controlled discharge of R-106 is directed to D-02, a phase separator. D-02 vents to emission point SN-906. In D-02, water is added and the phases are allowed to separate. DBS underflows the phase separator and is routed to the Step III neutralizer, R-107. R-107 vents to emission point SN-906. The aqueous phase from D-02 is directed to T-35R, via D-04 and T-51.

Step III Reaction – Neutralization: The residual alkalinity in the DBS is neutralized in R-107. The level is maintained by discharging to D-03, a phase separator. D-03 vents to emission point SN-906. Water is added to

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

D-03 and the phases are allowed to separate. The organic phase underflows to intermediate product storage tanks for inhibitor addition. These intermediate product storage tanks vent to emission points SN-907 and SN-908. The aqueous phase overflows to D-05, a phase separator. D-05 vents to emission point SN-901.

The following tanks are used in the DBS Plant: the styrene storage tank (SN-902), two PEG storage tanks (SN-909 and SN-913), the HCl storage tank (SN-914), and three BCP permanent storage tanks (SN-916).

BCP Production

The BCP reaction is conducted in a continuous reactor which discharges into the R-101 vapor/liquid separation chamber. Reactant feed-stock is stored in the T-23 bulk tank (SN-911). Other reactants are introduced into the reactor in the gas section of the feed/recycle sparger. The off gas disengages from the liquid in the R-101 vapor/liquid separation chamber and is routed through the H-102 overhead condenser, the T-35R scrubber, and emission point SN-901.

The product is transferred to crude BCP storage tanks. The crude BCP is next pumped through the T-06 feed tank to a batch purification system to remove the light components and the heavy components. Heat for this purification system is supplied by a hot oil system (SN-912).

The purified product is collected in the T-10 receiver and stored in the T-02R bulk tank. Both T-10 and T-02R are vented through an activated carbon drum to SN-904. The final product is carbon treated, filtered, and then sold in bulk or drums.

Phosphorus Tribromide Production

Two reactants are reacted to form Phosphorus Tribromide (PBr₃) and a byproduct. The byproduct is passed through a scrubber and vented to the atmosphere as SN-901. PBr₃ product is drummed from the reactor.

The following tanks at the DBS Plant are subject to and shall comply with applicable provisions of 40 CFR Part 60 Subpart A – General Provisions and 40 CFR Part 60 Subpart Kb – VOL Storage Vessels: styrene storage tank (SN-902), two DBS storage tanks (SN-908), and two BCP storage tanks (SN-916).

Bromine Recovery Unit

The Bromine Recovery Unit consists of equipment to recover bromine and chlorine from feed streams. The Bromine Recovery Unit consists of two units: BRU-II and BRU-III.

During the operation of each BRU, natural gas, combustion air, and the feed streams are fed to the oxidation system. Here, the halogenated organic feed streams are converted to carbon monoxide, carbon dioxide, hydrogen bromide, hydrogen chloride, and water vapor.

Next, the off-gases go to the halogen recovery system. In this system, HBr and HCl are absorbed from the gases into an aqueous system which is then sent to the bromine plant for further processing. The gases leave the halogen recovery system and go to tertiary oxidation where any remaining organics are destroyed. The gases leaving the unit are vented to the atmosphere through SN-1001 (BRU-II) and SN-2001 (BRU-III).

The typical recycle streams sent to the BRU-II unit for bromine recovery may contain more than 0.1% non-organics (ash). The venturi scrubber reduces the solids (ash) entrained in the gas stream. MeBr has a negligible amount of ash content, thus, the venturi scrubber needlessly consumes power and water. A 40" pressure differential across the venturi scrubber need not be maintained at the BRU-II during periods when the unit is processing exclusively MeBr for Bromine recovery.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

PDBS Plant

The PDBS process contains two production lines. Each line has its own polymerizer and extruder. Other equipment is shared between the two lines.

Raw materials are fed into the reactor where the polymerization of PDBS occurs. In Line 1, the polymerizer vents toluene vapors, which are routed through condensers and a vacuum pump. The residual vapors from these two streams are combined and emitted through vent SN-1101.

Line 2 operates in the same fashion as Line 1, except the residual vapors are routed through an additional final carbon filter before being emitted through vent SN-1107.

The raw PDBS material exiting the extruders is fed to an underwater pelletizer, where solidified strings of product are cut into pellets. The dust emissions from the dryer are vented to a baghouse dust collector (SN-1104). Other miscellaneous dust emission sources are routed to SN-1104, such as the supersack unloader, the LIW feeder, and the mixer. The dried PDBS pellet product is conveyed to a product hopper and packaging operations. Dust emissions from the product hopper are controlled with a baghouse (SN-1106).

In the solids pelletizing process, the powder is unloaded into a supersack unloader, fed through an LIW feeder, fed through a mixer, then charged to the extruder. The extruded product proceeds through a chiller and then to a pelletizer. The pellets are next conveyed to a product screener before proceeding to the product hopper and packaging operations. The particulate emissions from the chiller, pelletizer, and screener are controlled with baghouse SN-1104. Particulate emissions from the product hopper are controlled with baghouse SN-1106.

Testing Area

The testing area has a burning pan with approximate dimensions of 10 ft x 10 ft. The pan is filled with the combustible materials [wood, liquid fuel (normally heptane), and plastics] then ignited. The fire extinguishing agents are then applied and the results analyzed.

Emissions from these operations include products of fuel combustion, vaporized fire extinguishing agent, and fire extinguishing agent decomposition products (hydrogen fluoride and carbonyl fluoride). The sources involved with this process are grouped together as SN-1501.

Regulations

The following table contains the regulations applicable to this permit.

Table 2 – Regulations

Source No.	Regulation Citations
Facility	Regulation No. 19 – Regulations of the Arkansas Plan of Implementation for Air Pollution Control effective December 19, 2004
Facility	Regulation No. 26 – Regulations of the Arkansas Operating Air Permit Program, effective September 26, 2002
SN-04	40 CFR 60 Subpart Dc – Standards Of Performance For Small Industrial-Commercial-Institutional Steam Generating Units–
SN-902, SN-	40 CFR 60 Subpart Kb—Standards Of Performance For Volatile Organic

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Source No.	Regulation Citations
908, SN-916	Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) For Which Construction, Reconstruction, Or Modification Commenced After July 23, 1984–
SN-604, SN-611	40 CFR Part 63, Subpart F – National Emission Standards For Organic Hazardous Air Pollutants From The Organic Chemical Manufacturing Industry–
SN-604, SN-611	PART 63, Subpart G – National Emission Standards For Organic Hazardous Air Pollutants From The Organic Chemical Manufacturing For Process Vents, Storage Vessels, Transfer Operations, And Wastewater–
SN-604, SN-611	40 CFR Part 63, Subpart H – National Emission Standards For Organic Hazardous Air Pollutants For Equipment Leaks–
SN-02 SN-03, SN-04	Subpart DDDDD--National Emission Standards For Hazardous Air Pollutants For Industrial, Commercial, And Institutional Boilers And Process Heaters
Facility	40 CFR Part 63, Subpart FFFF--National Emission Standards For Hazardous Air Pollutants: Miscellaneous Organic Chemical Manufacturing

The following table is a summary of emissions from the facility. The following table contains cross-references to the pages containing specific conditions and emissions for each source. This table, in itself, is not an enforceable condition of the permit.

Table 3 – Emission Summary

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
Total Allowable Emissions		PM	33	79.2	N/A
		PM ₁₀	113.9	77.5	
		SO ₂	5.2	23	
		VOC	503.9	243.7	
		CO	151.0	187.3	
		NO _x	49	188.4	

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
Total Allowable Emissions		**Ammonia	0.10	0.44	
		BCP	3.40	15.00	
		BEB	0.10	0.50	
		Bromine	0.80	3.42	
		Bromophenols	0.10	0.40	
		*Carbon Tetrachloride (HAP)	0.80	3.60	
		CFC-12	0.70	3.10	
		*Chloroform (HAP)	0.10	0.50	
		Cl ₂ (HAP)	0.10	0.50	
		COF ₂ (Non-HAP)	19.80	1.00	
		DBS	0.67	3.01	
		Ethanol	5.10	12.00	
		*Ethylene Dichloride (HAP)	17.87	18.59	
		Flourene	0.10	0.50	
		Freon 13 (non-VOC)	0.10	0.10	
		Freon 22	0.00	0.00	
		Freon 23 (non-VOC)	3.20	3.20	
		H ₂ SO ₄ Mist	0.05	0.25	
		HAP 161	0.00	0.00	
		HBr	11.10	48.90	
		HCL (HAP)	8.37	24.54	
		HF (HAP)	14.50	11.70	
		HFC 143a (non-VOC)	32.58	22.99	
		HFC 152a (non-VOC)	11.01	3.21	
		HFC 161	3.31	0.96	
		HFC-142b	0.10	0.10	
		HFC-236fa	2.40	10.60	
		*Hydrazine (HAP)	0.11	0.45	
		Hydrogen Sulfide (HAP)	10.60	2.00	
		Isopropyl Alcohol	15.10	5.10	
		*Methanol (HAP)	1.97	8.39	
		*Methyl Chloride (HAP)	0.10	0.10	
		Methylene Chloride (HAP) (Non-VOC)	1.90	8.40	
		non-VOC FRAP(includes Cl ₂ and H ₂ S)	4.27	18.21	
		PBr ₃	0.10	0.50	
		PCl ₃	0.30	1.30	
		*Phenol (HAP)	0.60	0.20	
		Phthalic Anhydride (HAP)	2.10	0.70	
		*Styrene (HAP)	0.20	0.90	
		*Toluene (HAP)	52.04	22.19	
		Tribromoethane	0.10	0.40	
		Tribromophenol	0.70	3.10	
		*Vinyl Bromide (HAP)	0.10	0.50	
02	Boiler #5	PM ₁₀	0.6	2.8	33
		PM	0.6	2.8	
		SO ₂	0.1	0.3	
		VOC	0.2	1.0	
		CO	5.1	22.4	
		NO _x	17.9	78.4	

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
03	Boiler #6	PM ₁₀	1.3	5.7	33
		PM	1.3	5.7	
		SO ₂	0.1	0.3	
		VOC	0.6	2.4	
		CO	3.3	14.6	
		NO _x	13.3	58.3	
04	Boiler #1	PM ₁₀	1.3	5.8	33
		PM	1.3	5.8	
		SO ₂	0.1	0.4	
		VOC	0.6	2.5	
		CO	18.2	79.7	
		NO _x	7.3	32.0	
101	Brine Receiving Tank	Emergency Venting of H ₂ S			35
138	Bromine Production Vent Scrubber	Bromine	0.2	0.9	35
199	Fugitive Emissions from Equipment Leaks in Bromine Area	non-VOC FRAP(includes Cl ₂ and H ₂ S)	0.9	3.9	35
		Cl ₂ (HAP)			
		H ₂ S (HAP)	Included w/FRAP Included w/FRAP	Included w/FRAP Included w/FRAP	
102	Flare	PM	0.1	0.1	87
		PM ₁₀	0.1	0.1	
		SO ₂	0.1	0.1	
		VOC	0.1	0.1	
		CO	0.1	0.1	
		NO _x	0.1	0.1	
401	T-3 and T-37 Phenol Tanks	VOC	0.1	0.1	37
		Phenol (HAP)	0.1	0.1	
403	Propylene Glycol Storage Tank	VOC	0.1	0.1	37
404	Isopropyl Alcohol Storage Tank	VOC	10.4	2.3	37
406	EDB Storage Tank (T-035)	VOC	5.3	1.2	
		Ethylene Dibromide	5.3	1.15	
412	T-34 - Isopropyl Alcohol Tank	VOC	1.0	1.0	37
		Isopropyl Alcohol	1.0	1.0	
413	PC-1 Scrubber	VOC	0.6	0.5	37
		Bromine	0.1	0.5	
		Bromophenols	0.1	0.4	
		HBr	0.1	0.5	
		*Phenol (HAP)	0.5	0.1	
416	PC-4 Scrubber	VOC	2.0	8.9	37
417	PC-6 Scrubber	VOC	0.1	0.40	37
		Bromine	0.10	0.50	
		*Vinyl Bromide (HAP)	0.10	0.50	

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
418	PC-10 Scrubber	VOC Isopropyl Alcohol	0.1 0.1	0.5 0.5	37
419	Baghouse-Bagging	PM ₁₀ PM	0.5 0.5	2.2 2.2	37
420	Baghouse-Drying	PM ₁₀ PM	0.7 0.7	3.1 3.1	37
421	PC-8 Scrubber	VOC Isopropyl Alcohol	0.2 0.2	0.9 0.9	37
427	Flaker Scrubber Vent	PM ₁₀ PM	0.7 0.7	3.1 3.1	37
428	Spray Dryer Baghouse	PM ₁₀ PM SO ₂ VOC CO NO _x *Hydrazine (HAP) **Ammonia (Non-VOC)	2.4 2.4 0.1 0.1 1.5 2.3 0.1 0.1	10.2 10.2 0.5 0.5 6.6 10.1 0.44 0.44	37
429	CN-1753 Silo Baghouse	PM ₁₀ PM VOC Methanol (HAP) Toluene (HAP)	0.3 0.3 1.6 1.60 0.10	1.2 1.2 7.0 6.70 0.30	37
430	CN-1753 Loadout Baghouse	PM ₁₀ PM	0.9 0.9	4.0 4.0	37
435	Thermal Oxidizer Flare	PM ₁₀ PM SO ₂ VOC CO NO _x *Methanol (HAP) *Toluene (HAP)	0.1 0.1 0.1 1.6 1.2 0.4 0.35 1.05	0.5 0.5 0.1 6.8 5.2 1.7 1.53 4.60	37
436	Baghouse- TPB Bagging	PM ₁₀ PM	0.9 0.9	4.0 4.0	37
437	Wastewater Tank (T-018)	VOC	0.2	0.1	37
438	Wastewater Tank (T-018)	VOC	0.2	0.1	
439	IPA Feed Tank (T-033)	VOC	3.3	0.8	
499	Fugitive Emissions from Equipment Leaks	non-VOC FRAP ⁽¹⁾	1.142e-5	0.0001	37
501	Bromine Storage Tank	Bromine	0.1	0.1	43
502	EDC Storage Tank (T-902)	VOC Ethylene Dichloride (HAP)	6.9 6.86	1.6 1.52	43

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
503	Vent Header Blower Exhaust	VOC	6.1	26.8	43
504	Packaging Baghouse Vent	PM ₁₀	0.1	0.5	43
		PM	0.1	0.5	
505	Dust Collector Blower	PM ₁₀	0.2	0.9	43
		PM	0.2	0.9	
507	Storage Baghouse Vent	PM ₁₀	0.1	0.5	43
		PM	0.1	0.5	
508	Baghouse Vent	PM ₁₀	0.2	0.9	43
		PM	0.2	0.9	
509	Rotary Dryer Baghouse Vent	PM ₁₀	0.2	0.9	43
		PM	0.2	0.9	
510	Packaging Dryer Vent	PM ₁₀	0.2	0.9	43
		PM	0.2	0.9	
511	Recycle Ethanol Tank (T-510)	VOC	0.7	0.2	43
		Ethanol	0.7	0.2	
512	Recycle EDC Tank (T-506)	VOC	1.9	0.5	43
		*Ethylene Dichloride (HAP)	1.83	0.42	
513	Ethanol Storage Tank (T-904)	VOC	2.5	0.6	43
		Ethanol	2.5	0.6	
515	EDC Stripper Feed Tank (T-500)	VOC	0.2	0.1	43
		Ethylene Dichloride (HAP)	0.19	0.05	
516	EDC Stripper Feed Tank (T-516)	VOC	0.2	0.1	43
		Ethylene Dichloride (HAP)	0.19	0.05	
517	Wastewater Tank (T-518)	VOC	0.2	0.1	43
599	Fugitive Emissions from Equipment Leaks	VOC	0.8	3.2	43
604	Phthalic Anhydride Storage Tank	VOC	2.1	0.7	47
		*Phthalic Anhydride (HAP)	2.1	0.7	
605	Dryer Dust Collector	PM ₁₀	1.1	4.9	47
		PM	1.1	4.9	
606	Vacuum System	VOC	44.8	10.0	47
		*Toluene (HAP)	44.8	10.0	
608	Mechanical Vacuum Pump	PM ₁₀	0.1	0.5	47
		PM	0.1	0.5	
609	Toluene Storage Tank	VOC	4.5	0.2	47
		*Toluene (HAP)	4.5	0.2	
610	Dryer Condenser	PM ₁₀	1.3	5.7	47
		PM	1.3	5.7	

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
611	Train II Process SO ₂ Scrubber Vent	PM ₁₀	0.1	0.3	47
		PM	0.1	0.3	
		SO ₂	0.3	18.9	
		H ₂ SO ₄	0.05	0.05	
		Bromine	0.10	0.44	
612	Phosphate Ester Tank #1	VOC	2.8	0.1	47
613	Phosphate Ester Tank #2	VOC	2.8	0.1	47
614	Diol Blend Tank	VOC	10.0	0.3	47
699	Fugitive Emissions from Equipment Leaks	VOC	0.7	3.1	47
		non-VOC FRAP	0.6	2.6	
702	C-731 Absorber Scrubber	VOC	1.1	4.9	60
		HF (HAP)	1.20	5.30	
		HCl (HAP)	0.30	1.40	
		Freon 23 (non-VOC)	1.10	4.90	
		HFC 143a (non-VOC)	1.1	4.90	
		HFC 152a (non-VOC)	0.20	0.60	
		HCFC 161	0.10	0.20	
704	Final Purification	VOC	4.0	17.6	60
		CO	2.0	8.8	
		Freon 23 (non-VOC)	1.0	4.40	
706	HCl Storage Tanks	HCl (HAP)	0.90	3.90	60
709	Mole Sieve Dryer Regeneration	VOC	1.1	4.4	60
		HFC-143a (non-VOC)	1.1	4.9	
711,	Methylene Chloride/Chloro form Storage Tank	VOC	0.1	0.5	60
		Methylene Chloride	0.1	0.5	
		Chloroform	0.1	0.5	
712	Distillation Column Vent	VOC	0.1	0.5	60
		*Methyl Chloride (HAP)	0.1	0.10	
		HFC 143a (non-VOC)	1.5	6.6	
		HFC 142b (non-VOC)	0.1	0.1	
		HFC 152a (non-VOC)	0.1	0.1	
		Freon 13 (non-VOC)	0.1	0.1	
		Freon 23 (non-VOC)	0.1	0.1	
751	Mole Sieve Dryer Regeneration	VOC	1.0	4.0	60
		Freon 23 (non-VOC)	1.0	4.5	
799	Fugitive Emissions from Equipment Leaks	non-VOC FRAP ⁽¹⁾	1.3	5.5	60
802	Ethylene Storage Tank Loading	VOC	158.1	2.1	60

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
803	Combined Process Vent	VOC Carbon Tetrachloride (HAP)	4.5 0.4	19.8 1.8	60
807	Combined Process Vent: Catalyst Vent	PM ₁₀ PM	0.1 0.1	0.5 0.5	60
808	HCl Scrubber Vent	VOC HCl (HAP) Methylene Chloride (HAP) (non-VOC)	1.0 0.3 0.4	4.4 1.4 1.8	60
809	C-301T Scrubber Vent	VOC	1.7	7.5	60
817	Liquid Nitrogen Condensers	VOC HBr Bromine	0.1 0.1 0.1	0.5 0.5 0.5	60
818	Thermal Oxidizer Scrubber	PM ₁₀ PM SO ₂ VOC CO NO _x HCl (HAP) *Methanol (HAP)	0.1 0.1 0.1 1.5 0.1 0.2 0.4 0.1	0.5 0.5 0.5 6.6 0.5 1.0 1.8 0.2	60
899	Fugitive Emissions from Equipment Leaks	non-VOC FRAP ⁽¹⁾	1.142e-5	0.0001	60
901	Scrubber Vent	VOC BCP HBr HCl (HAP) PCl ₃ PBr ₃	3.3 3.30 1.30 0.60 0.30 0.10	14.5 14.5 5.70 2.60 1.30 0.50	73
902	Styrene Storage Tank	VOC *Styrene (HAP)	0.2 0.2	0.9 0.9	73
904	Carbon Bed Adsorber for BEB Tanks	VOC BEB	0.1 0.1	0.5 0.5	73
908	DBS Storage Tanks (T-20A, T-20B)	VOC DBS	0.1 0.1	0.5 0.5	73
914	HCl Storage Tank (T-201)	HCl (HAP)	2.97	0.64	73
916	BCP Permanent Storage Tanks	VOC BCP	0.1 0.1	0.5 0.5	73
999	DBS Plant Fugitive Emissions from Equipment Leaks	VOC	1.5	6.3	73

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
1001	Bromine Recovery Unit (BRU-II)	PM	2.0	8.8	78
		PM ₁₀	2.0	8.8	
		SO ₂	0.1	0.5	
		VOC	0.1	0.5	
		CO	0.3	1.4	
		NO _x	2.6	11.4	
		HCl (HAP)	1.30	5.70	
		HBr	5.5	24.1	
2001	Bromine Recovery Unit (BRU-III)	PM	2.0	8.8	78
		PM ₁₀	2.0	8.8	
		SO ₂	0.1	0.5	
		VOC	0.1	0.5	
		CO	0.3	1.4	
		NO _x	2.6	11.4	
		HCl (HAP)	1.30	5.70	
		HBr	4.00	17.60	
2099	Fugitive Emissions from Equipment Leaks	VOC	0.3	1.0	78
1101	Pre-Polymerizer and Vacuum Pump Vent	VOC	1.5	6.6	83
		*Toluene (HAP)	1.32	5.78	
		DBS	0.17	0.75	
1104	Process Dust Collector	PM	0.6	2.7	83
		PM ₁₀	0.6	2.7	
1106	Vacuum Pellet Transport System	PM	0.1	0.5	83
		PM ₁₀	0.1	0.5	
1107	Pre-Polymerizer and Vacuum Pump Vent (Line 2)	VOC	0.4	1.8	83
		*Toluene (HAP)	0.3	1.32	
		DBS	0.4	1.76	
1199	Fugitive Emissions from Equipment Leaks	VOC	0.2	0.7	83
1201, 1202, 1204, 1299	Pharmaceutical Chemicals Unit	Sources Removed			
1301	Combined Process Vent	VOC	1.5	6.4	60
		Carbon Tetrachloride (HAP)	0.4	1.8	
1302	HCl Scrubber Vent	VOC	1.1	4.9	60
		HCl (HAP)	0.3	1.4	
		HFC 143a (non-VOC)	0.31	1.36	
		HFC 152a (non-VOC)	0.13	0.57	
		HFC 161	0.04	0.18	
1303	Pressure Control Valve from Distillation Column	VOC	19.1	3.5	60
		HFC 143a (non-VOC)	28.6	5.3	
		HFC 152a (non-VOC)	10.6	2.0	
		HFC 161	3.2	0.6	

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	Emissions lb/hr	Emissions tpy	Ref. Page
1399	Fugitive Emissions from Equipment Leaks	VOC	0.9	3.8	60
1501	Testing Area	PM ₁₀	16.0	0.4	89
		PM	16.0	0.4	
		CO	85.0	2.1	
		VOC	178.0	7.8	
		NO _x	6.0	0.2	
		COF ₂	19.8	1.0	
		HF	12.0	0.6	

*HAPs included in the VOC totals. Other HAPs are not included in any other totals unless specifically stated.

**Air Contaminants such as ammonia, acetone, and certain halogenated solvents are not VOCs or HAPs.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section III:PERMIT HISTORY

This facility was a joint venture between Michigan Chemical Corporation and Murphy Oil. Operations started in March of 1957. Over the years, ownership changed several times. The last change was in 1981 when Great Lakes Chemical Corporation (GLCC) purchased the plant.

On January 16, 1976, Permit #319-A issued to Michigan Chemical Corporation. The permit facility was for controls for reducing H₂S emissions, controls for reducing Br₂ emissions, controls for reducing emissions from existing brominated products area, expansion to produce brominated aromatic ethers, and bromine expansion.

On September 24, 1976, Permit #319-AR-1 was issued to permit Michigan Chemical Corporation to install and operate a sour gas collection and flaring system.

On July 22, 1977, Permit #412-A was issued to Velsicol Chemical Corporation. This permit allowed the facility to install and operate the semi-works plant.

On March 24, 1978, Permit #458-A was issued to permit Velsicol Chemical Corporation to install and operate a facility for the manufacturing of tetrabromophthalic anhydride.

On August 3, 1979, Permit #458-AR-1 was issued to permit Velsicol Chemical Corporation to manufacture PHT-4 Diol.

On May 22, 1981, by Permit #319-AR-2, Great Lakes Chemical Corporation was permitted to take ownership of Velsicol Chemical Corporation.

On November 20, 1981, Permit #319-AR-3 was issued to allow GLCC to install equipment to flake TBP.

On January 28, 1983, Permit #701-A was issued to allow GLCC to install a plant which will manufacture Halon 1301 and Halon 1211.

On November 19, 1984, Permit #746-A was issued to permit GLCC to install an H₂S stripper.

On September 10, 1985, Permit #767-A was issued to allow GLCC to produce sodium bromate.

On January 20, 1988, by Permit #873-A, GLCC was permitted to consolidate all previous permits under one plant wide permit, install a chilsonator, add a halon plant, and construct and operate a TFP facility.

On December 21, 1988, by Permit #873-AR-1, GLCC was permitted to install and operate the DBS unit.

On March 2, 1989, by Permit #873-AR-2, GLCC was permitted to install and operate a bromine recovery unit.

On November 21, 1989, Permit #873-AR-3 was issued to allow GLCC to install and operate a fluorosulfonic acid (FSA) facility.

On March 8, 1990, Permit #873-AR-4 was issued to allow GLCC to produce DE-79 at the semi-works plant.

On July 19, 1991, Permit #873-AR-5 was issued to allow GLCC to produce DBP, to modify the PHT-4 Plant, and to produce FM-100, FM-200, and BFE.

On June 29, 1992, by Permit #873-AR-6, GLCC was permitted to modify the BRU-II, to produce Geo-Brom at the semi-works plant, to produce PBr₃ and PDBS at the DBS plant, to construct and operate the PDBS plant, and to construct and operate a plant to recover Halon 1301, Halon 1211, and FM-100.

On September 15, 1993, by Permit #873-AR-7, GLCC was permitted to produce FM-200 and Freon 115, to modify the DBS process, and to remove processes no longer in operation.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

On December 2, 1993, by Permit #873-AR-8, GLCC was permitted to allow for BCP production at the DBS plant and to allow for the use of PE68 in the chilsonator at the semi-works plant.

On October 12, 1994, Permit #873-AR-9 was issued to allow GLCC to modify the BCP process at the DBS plant.

On December 5, 1994, Permit #873-AR-10 was issued to allow GLCC to modify the production of PDBS and to construct and operate a plant to produce isoflurane.

On June 27, 1995, Permit #873-AR-11 was issued to allow GLCC to produce Freon 32 at the TFP plant.

On August 11, 1995, by Permit #873-AR-12, GLCC was permitted to produce Freon 13 at the Halon 1301 plant.

On November 27, 1995, by Permit #873-AR-13, GLCC was permitted to install a second BRU unit (BRU-III).

On December 20, 1995, Permit #873-AR-14, GLCC was permitted to add a second PHT-4 train (Train II).

On January 29, 1996, Permit #873-AR-15 was issued to allow GLCC to pelletize ANOX PP18 and ANOX PP20 at the PDBS plant.

On March 12, 1996, Permit #873-AR-16 was issued to allow GLCC to use a reducing agent as an auxiliary fuel in BRU.

On July 11, 1996, Permit #873-AR-17 was issued to allow GLCC to install and operate a new boiler (SN-04).

On February 3, 1997, Permit #873-AR-18, GLCC was permitted to modify the FF-680 plant, the FCU North plant, and the FCU South plant.

On February 24, 2000, Permit #873-AOP-R0 was issued as the initial Title V permit for GLCC under Regulation #26. The following modifications were involved in this permitting action:

PHT-4 Plant (submitted as a part of the Title V application in January of 1997): GLCC proposed to install an additional scrubber on the PHT-4 II process line. In addition, GLCC proposed to increase the permitted production rates of PHT-4 and PHT-4 Diol.

FCU-North Plant (submitted as a part of the Title V application in January of 1997): GLCC proposed to increase the permitted emissions rates for SN-704.

Utilities (submitted as a part of the Title V application in January of 1997): GLCC proposed to increase the permitted emissions rates for Boiler #5 (SN-02).

FCU-South Plant (submitted as a part of the Title V application in January of 1997): First, GLCC proposed to increase the annual permitted emissions rates for SN 715 and SN-808 to the annual theoretical maximum for each source. Second, GLCC proposed to slightly increase the annual VOC emission rate from SN-802. Third, GLCC pointed out that a previously permitted source had been accidentally removed from the last permit. GLCC requested that the C-301T Vent Condenser (SN-809) be added to the Title V permit.

Archive Section (submitted as a part of the Title V application in January of 1997): GLCC proposed to delete the archive section contained in Permit #873 AR 18.

FF-680 Plant Minor Modification (submitted May of 1997): GLCC proposed to produce CN 1753 at the FF-680 Plant. New significant emission source will include a baghouse (SN 428) and a silo (SN-429). In addition, SN-418 was inadvertently left out of the last permit and needs to be added.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

FF-680 Plant Minor Modification (submitted November of 1997): Another baghouse (SN 430) will be included in the production of CN-1753. In addition, the dilute hydrazine tank will be the only new insignificant emission source.

FF-680 Plant Minor Modification (submitted July of 1998): GLCC proposed to produce BE 51 at the FF-680 Plant. The process will use equipment already existing at the FF-680 Plant.

PHT-4 Plant Minor Modification (submitted May of 1997): GLCC proposed to install a new source, known as the Train II Process SO₂ Scrubber Vent, to control emissions from the PHT-4 Plant. This source will not result in any increase in permitted emissions. The new scrubber (SN-611) will simply share the emissions control load that the present scrubber (SN-601) is now permitted for.

TFP Plant Minor Modification (submitted October of 1997): GLCC proposed to produce TFP at the new TFP plant. Significant emission sources that will result from the production of TFP include the following: combined process vent (SN-1301), HCl scrubber vent (SN 1302), pressure control valve from distillation column (SN-1303), and fugitive emissions from equipment leaks (SN 1399).

CN-1985 Plant Minor Modification (submitted December of 1997): GLCC proposed to construct a new unit which will manufacture CN-1985. Significant emission sources that will be present in the new CN-1985 plant include the following: scrubber vent (SN-1401), BPA conveying baghouse (SN-1402), BPA dryer baghouse (SN-1403), phenol storage tank scrubber (SN-1404), hot oil heater (SN-1405), and fugitive emissions from equipment leaks (SN-1499).

FCU South Plant Minor Modification (submitted October of 1998): GLCC proposed to use a new method of production for FM 200. The process will use equipment that already exists.

PHT-4 Plant De Minimis Change (submitted April of 1999): GLCC proposed to add a new a 4 MMBtu/hr natural gas fired hot oil unit as an insignificant activity, to increase the annual PHT-4 production for Train II, and to reduce the bromine emissions from SN-601 and SN 611.

FF-680 Plant De Minimis Change (submitted May of 1999): GLCC proposed to produce PE 68 at the FF-680 Plant, to add a new caustic scrubber tank as an insignificant activity, to modify an existing source B SN-429, and to add a new source B SN-435.

TFP Plant De Minimis Change (submitted May of 1999): GLCC proposed to produce FM 200 at the TFP Plant. The emissions from the reactor shall be vented to the TFP Scrubber at the FCU Plant (SN-702). There will be no increase in the emission rate of SN 702.

PDBS Plant De Minimis Change (submitted September of 1999): GLCC proposed to replace the existing 2,000 cfm blower on the dust collection system (SN-1104) with a 3,500 cfm blower. The proposed PM/PM₁₀ increase was 0.83 tons per year. The total PM/PM₁₀ emissions from this source are 2.63 tons per year.

Bromine Production (submitted September of 1999): GLCC proposed to replace the two existing bromine towers with a new bromine tower and to replace the existing brine heat exchanger with a new heat exchanger. Neither change affects permitted emissions.

FCU-North Plant De Minimis Change (submitted December of 1999): GLCC proposed to add additional process equipment which will result in two production lines instead of one. No new emissions points will be added. There will be no increase in permitted emissions. Two separate products may be produced simultaneously, or a single product may be produced in both trains simultaneously.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

On November 2, 2000, Permit #873-AOP-R1 was issued as the initial Title V permit for GLCC under Regulation #26. The following modifications were involved in this permitting action:

FCU-South Plant (Minor Modification submitted in February of 2000): GLCC proposed to introduce the production of a new product, HFC245fa, to the FCU-South Plant. A small thermal oxidizer with a scrubber (SN-818) will be installed to control organics generated in the process.

SN	Description	Pollutant	change (ton/yr)
818	Thermal Oxidizer with Scrubber	PM/PM ₁₀	0.5
		SO ₂	0.5
		VOC	6.6
		CO	0.5
		NO _x	1.0
		HCl	1.8

FCU-North Plant (Administrative Amendment submitted in March of 2000): GLCC submitted information concerning some typographical errors in permit 873-AOP-R0.

PHT-4 Plant (Minor Modification submitted in April of 2000): GLCC proposed that the vent scrubber for Train I (SN-601) will be removed and the Train I vent stream will be routed to the Train II vent header. The Train II vent header will be routed through a water scrubber and the caustic vent scrubber (SN-611). There are no emissions increases associated with this modification.

Bromine Recovery Unit (Modification submitted in April of 2000): Modification to reflect stack test results for BRU-II (SN-1001). The permitted PM/PM₁₀ emissions rate of 1.0 lb/hr was exceeded so emissions from SN-1001 and SN-2001 were increased to reflect the results.

Source Number	Description	Pollutant	change (ton/yr)
1001 and 2001	Bromine Recovery Unit (BRU-II)	PM/PM ₁₀	8.9

Pharmaceutical Chemicals Unit (PCU) (Minor Modification submitted in May of 2000): GLCC proposed this modification to reflect the production of a new product, Pharma 227ea, at the PCU. The Pharma 227ea manufacturing process is a closed process and no emissions are vented to the atmosphere.

On June 21, 2001, Permit #873-AOP-R2 was issued as the initial Title V permit for GLCC under Regulation #26. The following modifications were involved in this permitting action:

FF-680 Plant Minor Modification: installed a new baghouse (SN-436) to control bagging operation emissions during TPB production.

Permit #873-AOP-R3 was issued as the initial Title V permit for GLCC under Regulation #26. The following modifications were involved in this permitting action:

Proposed to install a flare (SN-102), equipped with a natural gas pilot flame that will only be used to flare sour gas during upset conditions.

On March 10, 2005, Permit #873-AOP-R4 was issued to GLCC. The following modification were included in this permitting action:

Added the production of FM-300. Permitted methanol emissions increased by 0.2 . The increased methanol emissions are exhausted from the oxidizer (SN-818).

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

Added an outdoor testing area (a burning pan with approximate dimensions of 10 ft x 10 ft). Emissions from the operation included products of combustion of the fuels, vaporized fire extinguishing agent, and fire extinguishing agent decomposition products (hydrogen fluoride and carbonyl fluoride). The source involved with this process is designated SN 1501. Plant production capacity did not increase.

Removed the requirement that a 40" pressure differential across the venturi scrubber be maintained at the BRU-II during periods when the unit is processing exclusively methyl bromide for bromine recovery. Plant capacity did not increase. This project did not change permitted emissions.

Added a new product and process (PHT -4 Diol Blend) to the PHT -4 Plant with two 3,000 gallon stainless steel storage tanks (SN-612 and SN-613) with an annual throughput of 225 Lots (The actual units for Lots is confidential per GLCC.) each and a 3,000 gallon blend tank (SN-614) with an annual throughput of 450 Lots. Each tank vented to the atmosphere.

Modified the vacuum and extruder system to allow increased production of PDBS. The permitted VOCs emissions from the Pre-Polymerizer and Vacuum Pump Vent (SN-1101) increased by 2.0 ton per year.

Added emission point SN-712 and permitted the production of HFC-143a in the FCU-North Unit using the FM-200 production equipment.

Removed Specific Condition #5 that required monthly records stating that only sweet natural gas was used for fuel in the boilers. Similarly, removed the previous Specific Condition #81 that required monthly records stating that only natural gas was used for fuel in the thermal oxidizer. The oxidizer can physically only utilize natural gas.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section IV: SPECIFIC CONDITIONS

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Boilers

SN- 02 - Boiler #5

SN-03 - Boiler #6

SN-04 - Boiler #1

Description

Great Lakes South has three boilers at the South Plant: Boiler #5 (SN-02, 127.8 MMBtu/hr), Boiler #6 (SN 03, 95.0 MMBtu/hr), and Boiler #1 (SN-04, 96.7 MMBtu/hr). Currently, all boilers only burn natural gas. The burners in Boiler #5 are capable of burning fuel oil; however, the ancillary equipment (storage tanks, pumps, feed lines, etc.) necessary to burn fuel oil is not present.

Boiler #1 was constructed in 1996. Boiler #1 is subject to and shall comply with applicable provisions of 40 CFR Part 60 Subpart A - General Provisions and 40 CFR Part 60 Subpart Dc -Small Steam Generating Units. Boiler #5 was installed in 1973 and therefore is not subject to NSPS Subpart Db. Boiler #6 was installed in 1985 and therefore is not subject to NSPS Subpart Dc.

Specific Conditions

1. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition demonstrated by compliance with Specific Condition #4. These sources have been permitted at maximum capacity. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 4 – Boiler Maximum Criteria Emission Rates

SN	Description	Pollutant	lb/hr	ton/yr
02	Boiler #5	PM ₁₀	1.0	4.4
		SO ₂	0.1	0.5
		VOC	0.7	3.1
		CO	10.6	46.5
		NO _x	17.6	77.1
03	Boiler #6	PM ₁₀	0.8	3.6
		SO ₂	0.1	0.5
		VOC	0.6	2.7
		CO	7.9	34.7
		NO _x	9.4	41.2
04	Boiler #1	PM ₁₀	0.8	3.6
		SO ₂	0.1	0.5
		VOC	0.6	2.7
		CO	17.9	78.5
		NO _x	7.2	31.6

2. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #4. These sources have been permitted at maximum capacity. [Regulation No. 18 §18.801, effective February 15, 1999, and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Table 5 – Boiler PM Emissions

SN	Description	Pollutant	lb/hr	ton/yr
02	Boiler #5	PM	1.0	4.4
03	Boiler #6	PM	0.8	3.6
04	Boiler #1	PM	0.8	3.6

3. The permittee shall not cause to be discharged to the atmosphere from Boiler #5, Boiler #6, or Boiler #1 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9 as found in 40 CFR Part 60 Appendix A. Compliance with the opacity limits shall be demonstrated by compliance with Specific Condition #4. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
4. Sweet natural gas shall be the only fuel used for Boiler #5, Boiler #6, and Boiler #1. [Regulation No. 19 §19.705, A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, and 40 CFR 70.6]

Testing

5. The permittee shall test the exhaust from the three boilers for CO every five years. Testing shall be performed in accordance with Plantwide Condition 3 and EPA Reference Method 10. During these tests, the boiler shall be operated within 10 percent of the rated throughout capacity. Failure to test at the rated throughput capacity shall limit the boiler to 10 percent above the tested throughput. [Regulation #19 §19.702 and 40 CFR Part 52 Subpart E]
6. The permittee shall test the exhaust from the three boilers for NO_x every five years. Testing shall be performed in accordance with Plantwide Condition 3 and EPA Reference Method 7E. During this test, the boiler shall be operated within 10 percent of the rated throughout capacity. Failure to test at the rated throughput capacity shall limit the boiler to 10 percent above the tested throughput. [Regulation #19 §19.702 and 40 CFR Part 52 Subpart E]

NSPS Subpart Dc

7. Boiler #1 (SN-04) is subject to and shall comply with applicable provisions of 40 CFR Part 60 Subpart Dc – Small Steam Generating Units. A copy of NSPS Subpart Dc is provided in Appendix A. [Regulation No. 19 §19.304 and 40 CFR Part 60 Subpart Dc]
8. The permittee shall record and maintain records of the amounts of each fuel combusted during each month in Boiler #1. The permittee will maintain the records for a period of two years. [Regulation No. 19 §19.304 and 40 CFR §60.48c(g)]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Bromine Production

SN-101 - Brine Receiving Tank

SN-138 - Bromine Production Vent Scrubber

SN-199 - Fugitive Emissions from Equipment Leaks

Bromine occurs naturally in brines found in specific areas of South Arkansas. The brines are chlorinated in towers to release the bromine which is steam stripped and condensed. Each bromine tower vent has its own scrubber. These scrubbers are vented to a final scrubber which discharges to the atmosphere (SN-138).

In addition to bromine, the brine also contains sour gas. This gas is separated at the well site and piped to the Central Plant. The remaining gas is transported to the South Plant along with the brine where it is stripped in a vacuum stripper. This gas is also sent to the Central Plant. When the vacuum stripper is down, the brine will be stripped if the outage is a short-term one (less than 48 hours). If the vacuum stripper is down for more than 48 hours, Great Lakes will either send the brine directly to the bromine towers or shut in the brine wells.

Specific Conditions

9. Except as provided in Specific Condition #12, the permittee shall not exceed the emission rates set forth in the following table. Continuous compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #16 and #17. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 6 – Bromine Production Emission Rates

SN	Pollutant	lb/hr	ton/yr
101	see Specific Condition #14		
138	Bromine	0.2	0.88
199	non-VOC FRAP(includes Cl ₂ and H ₂ S)	0.89	3.88

10. The permittee shall not cause to be discharged to the atmosphere from SN-138 gases that exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9. Compliance with the opacity limits shall be demonstrated by compliance with Specific Condition #16. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
11. When the vacuum stripper is down, the brine will be air stripped if the outage is a short-term one (less than 48 hours). If the vacuum stripper is down for more than 48 hours, either the operation of the brine wells is discontinued or stripping will cease and the brine is sent to the bromine towers. [Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
12. During periods when one or both bromine towers are in the start-up mode, the allowable bromine emission rate for SN-138 shall be 5.0 pounds of bromine per hour. Compliance shall be demonstrated by compliance with Specific Condition #13. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
13. To demonstrate compliance with Specific Condition #12, the permittee shall fully document each start-up detailing the number, duration, and time of each start-up and the estimated amount of bromine released. This documentation shall be retained onsite and made available to Department personnel upon request. [Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

14. The release of H₂S from the brine receiving tank (SN-101) shall be considered an upset condition and shall be documented and reported to the Department in accordance with General Provision #8. [Regulation No. 19 §19.601 and 40 CFR Part 52, Subpart E]
15. The fact that contingency plans have been established to deal with periods when the vacuum stripper is down shall in no way be construed as relieving the permittee from meeting the requirements of §19.601 of Regulation #19 or General Provision #8. [Regulation No. 19 §19.601 and 40 CFR Part 52, Subpart E]

Control Equipment Operating Parameters

16. The bromine tower scrubber (SN-138) shall be kept in good working condition at all times and shall meet the following conditions: [Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- a. The permittee will use a flow meter to measure the flow rate of the scrubbing liquor in the scrubber. The permittee will measure the scrubber liquor flow rate once per day. The permittee will maintain records of the liquid flow rate onsite and make the records available to Department personnel upon request.
- b. The permittee will test the caustic concentration once per day. The permittee will maintain records of the liquid flow rate onsite and make the records available to Department personnel upon request.
- c. Should the flow rate or caustic concentration drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation. Such actions shall be noted in the logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 7 – Bromine Production Vent Scrubber Parameters

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
138	scrubber	liquor flow rate	gal/min	24
		caustic concentration in scrubbing liquor	%	2.5

Testing

17. The permittee shall measure the bromine emissions from SN-138 every five years in accordance with an approved test procedure and the Plantwide Condition 3. If the permittee fails to comply with the emission limit, then the permittee shall measure the bromine emissions annually during the next four years. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
18. During the compliance test, the permittee shall measure the scrubber liquor flow rate and the caustic concentration of the scrubber liquid. During the test Great Lakes shall operate the plant within 10 percent of the rated throughput capacity. If 90 percent of the rated throughput capacity cannot be achieved, the permittee shall be limited to 10 percent above the actual tested throughput. [Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

FF-680, TBP, CN-1753, BE-51, and PE-68 Production

SN-401 – T-3 and T-37 Phenol Tanks
SN-403 – Propylene Glycol Storage Tank
SN-404 – Isopropyl Alcohol Storage Tank
SN-412 – T-34 Feed Tank for PC-9
SN-413 – PC-1 Scrubber
SN-416 - PC-4 Scrubber
SN-417 - PC-6 Scrubber
SN-418 - PC-10 Scrubber
SN-419 – Baghouse-Bagging
SN-420 - Baghouse-Drying
SN-421 - PC-8 Scrubber
SN-427 - Flaker Scrubber Vent
SN-428 – Spray Dryer Baghouse
SN-429 - Silo Baghouse
SN-430 - CN-1753 Loadout Baghouse
SN-435 – Thermal Oxidizer Flare
SN-436 – Baghouse-Bagging
SN-437 – 10% Isopropyl Alcohol Tank
SN-499 – Fugitive Emissions from Equipment Leaks

FF-680 Production

FF-680 is produced in three reaction steps. First, two reactants are reacted to form an intermediate. This intermediate is reacted with a reactant to form a second intermediate. The second intermediate is then reacted with a reactant to produce FF-680.

The crude FF-680 is washed and centrifuged. Emissions are controlled with condensers and a scrubber (SN-418). The wet product is initially dried. The dryer discharge is sent to a scrubber (SN-421). The product is next conveyed to another dryer and then to storage bins. The exhaust air from the dryer/storage bins is vented to a baghouse (SN-420). Dust emissions generated by the product handling and bagging system are also controlled by a baghouse (SN-419). The off gases from each reaction go to a scrubber (SN-413, SN-416, and SN-417).

TBP Production

Tribromophenol (TBP), an intermediate product when FF-680 is produced, can be sold as a product itself. This is done by running the first reaction described in the FF-680 section above. Instead of going to the next step, the liquid TBP is then sent to a flaker where it is solidified into flakes and bagged.

The flaker belt operation is vented to a packed scrubber (SN-427). The bagging operation is vented to a baghouse (SN-436). These sources are unique to TBP production; all other sources associated with the production of TBP (SN-413 and some storage tanks) will have the same allowable emission rates and be subject to the same conditions when producing TBP as when they are producing FF-680.

CN-1753 Production

The reactants produce a slurry of CN-1753. The CN-1753 slurry is transferred to a spray dryer. Dry powder is discharged from the spray dryer chamber. The dryer emissions pass through a baghouse (SN-428).

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

CN-1753 powder is conveyed to a storage silo, and the conveying air is passed through a baghouse prior to being vented to the atmosphere (SN-429). The stored product is then packaged at a loadout station prior to being transferred to the warehouse for shipment. This loadout process is controlled by a baghouse (SN-430).

BE-51 Production

In this process, the reactants are mixed and reacted to form BE-51. The BE-51 is separated from the slurry by centrifugation. The centrifuge cakes are washed with water and the wet cake is stored in tote bins or supersacs prior to drying. The wet cake is dried in a vacuum dryer. The BE-51 product is then bagged prior to shipment.

VOC emissions from the reactor are controlled with a scrubber (SN-416). VOC emissions from the belt filter are controlled with a scrubber (SN-421). VOC emissions from the solvent recovery operations are controlled with a scrubber (SN-418). Particulate matter emissions from the vacuum dryer are controlled with a baghouse (SN-420). Particulate emissions from the product bagging operations are controlled with a baghouse (SN-419).

PE-68 Production

In this process, three reactants are pre-mixed and reacted with bromine to produce PE-68. Two materials are used to neutralize residual bromine, and the product PE-68 is recovered by precipitation followed by centrifugation. The wet cake from the centrifugation is reslurried and pumped to a closed cycle spray dryer for final drying. The PE-68 product is then pneumatically conveyed to the product silo area and discharged from a dust collector into a product silo. The PE-68 product is then bagged prior to shipment. All systems including the dryer used in the PE-68 process (except the existing storage tanks) are connected to a central vent header which vents through a scrubber followed by a thermal oxidizer flare. The vent header is maintained under a slight vacuum by a fan that feeds the flare.

VOC emissions from the PE-68 process are controlled by a thermal oxidizer flare (SN-435). The scrubber is used to protect the flare from undo corrosion in the event of abnormal bromine in the reactor vent. Under normal conditions, bromine emissions are expected to be zero. Therefore, the scrubber is not classified as an emission control device. Some VOC emissions are uncontrolled. These VOC emissions are emitted to the atmosphere at the silo baghouse (SN-429). SN-407 and SN-413 are existing storage tank emissions. Particulate emissions from the PE-68 pneumatic transport system are controlled by the silo baghouse (SN-429). Particulate emissions from the product bagging operations are controlled with a baghouse.

Specific Conditions

19. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #23, #24, and #27. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 8 - FF-680 Plant Criteria Emission Rates

SN	Description	Pollutant	lb/hr	ton/yr
401	T-3 and T-37 Phenol Tanks	VOC	0.1	0.1
403	Propylene Glycol Storage Tank (T-031)	VOC	0.1	0.1
404	Isopropyl Alcohol Storage Tank (T-032)	VOC	10.4	2.3
406	EDB Storage Tank (T-035)	VOC	5.3	1.2
412	T-34 Feed Tank for PC-9	VOC	1.0	1.0
413	PC-1 Scrubber	VOC	0.6	0.5
416	PC-4 Scrubber	VOC	2.0	8.9
417	PC-6 Scrubber	VOC	0.1	0.4

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	lb/hr	ton/yr
418	PC-10 Scrubber	VOC	0.1	0.5
419	Baghouse – Bagging	PM ₁₀	0.5	2.2
420	Baghouse – Drying	PM ₁₀	0.7	3.1
421	PC-8 Scrubber	VOC	0.2	0.9
427	Flaker Scrubber Vent	PM ₁₀	0.7	3.1
428	Spray Dryer Baghouse	PM ₁₀	2.4	10.2
		SO ₂	0.1	0.5
		VOC	0.1	0.5
		CO	1.5	6.6
		NO _x	2.3	10.1
429	CN-1753 Silo Baghouse	PM ₁₀	0.3	1.2
		VOC	1.6	7.0
430	CN-1753 Loadout Baghouse	PM ₁₀	0.4	1.5
435	Thermal Oxidizer Flare	PM ₁₀	0.1	0.5
		SO ₂	0.1	0.5
		VOC	1.6	6.8
		CO	1.2	5.2
		NO _x	0.4	1.7
436	Baghouse – TPB Bagging	PM ₁₀	0.9	4.0
437	Wastewater Tank (T-018)	VOC	0.2	0.1
438	Wastewater Tank (T-019)	VOC	0.2	0.1
439	Isopropyl Alcohol Tank (T-033)	VOC	3.3	0.8
499	Fugitive Emissions from Equipment Leaks	VOC	0.7	2.9

20. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #23, #24, and #27. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 9 - FF-680 Plant Non-Criteria Emission Rates

SN	Description	Pollutant	lb/hr	ton/yr
401	T-3 and T-37 Phenol Tanks	Phenol (HAP)	0.10	0.10
404	Isopropyl Alcohol Storage Tank (T-032)	Isopropyl Alcohol	10.4	2.3
406	EDB Storage Tank (T-035)	Ethylene Dibromide (HAP)	5.3	1.2
412	T-34 Feed Tank for PC-9	Isopropyl Alcohol	1.00	1.00
413	PC-1 Scrubber	Bromine	0.10	0.50
		Bromophenols	0.10	0.40
		Phenol (HAP)	0.50	0.10
		HBr	0.10	0.50
417	PC-6 Scrubber	Bromine	0.10	0.50
		Vinyl Bromide (HAP)	0.10	0.50
418	PC-10 Scrubber	Isopropyl Alcohol	0.10	0.50
419	Baghouse – Bagging	PM	0.5	2.2
420	Baghouse – Drying	PM	0.7	3.1

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	lb/hr	ton/yr
421	PC-8 Scrubber	Isopropyl Alcohol	0.20	0.90
427	Flaker Scrubber Vent	PM	0.7	3.1
428	Spray Dryer Baghouse	PM	2.4	10.2
		Ammonia (non-VOC)	0.10	0.44
429	CN-1753 Silo Baghouse	PM	0.3	1.2
		Methanol (HAP)	1.52	6.66
		Toluene (HAP)	0.07	0.29
430	CN-1753 Loadout Baghouse	PM	0.4	1.5
435	Thermal Oxidizer Flare	PM	0.1	0.5
		Methanol (HAP)	0.35	1.53
		Toluene (HAP)	1.05	4.60
436	Baghouse – TPB Bagging	PM	0.9	4.0
439	Isopropyl Alcohol Tank (T-033)	Isopropyl Alcohol	3.3	0.8
499	Fugitive Emissions from Equipment Leaks	non-VOC FRAP(includes Hydrazine)	0.01	0.01

21. The permittee shall not cause to be discharged to the atmosphere from SN-413, SN-417, SN-419, SN-420, SN-427, SN-428, SN-429, SN-430 and SN-436 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9 as found in 40 CFR Part 60 Appendix A. Compliance with the opacity limits shall be demonstrated by compliance with Specific Conditions #23 and #24. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
22. The permittee may produce FF-680, TBP, CN-1753, BE-51, and PE-68 at the FF-680 Plant. Other products may be produced without a permit modification if: [Regulation No. 19 §19.705, Regulation No. 18 §18.1104, A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, and CFR Part 52, Subpart E]
 - a. No new equipment with air contaminant emissions will be installed, other than insignificant sources (insignificant sources may be permitted via the administrative amendment process);
 - b. The worst-case emissions limits contained in this permit will not be exceeded. In addition, no new pollutants will be emitted. The permittee shall produce written emissions calculations and submit them to the Department pursuant to paragraph (d) below;
 - c. No new air pollution control requirements are triggered, such as provisions of 40 CFR Part 52, Part 60, Part 61, or Part 63;
 - d. The permittee submits to the Department information concerning items in paragraph (a) thru (c) above at least 30-days prior to the production of the new product and the Department does not object during this 30-day period.

Control Equipment Operating Parameters

23. All scrubbers associated with FF-680 production shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, 40 CFR Part §64.6(c)(1), Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation**Permit No.: 873-AOP-R5****AFIN: 70-00037**

- a. The scrubber shall have a flow meter to measure the flow rate of the scrubbing liquor. The scrubber liquor flow rates shall be measured once per day. The permittee will keep the results onsite and make the results to Department personnel upon request.
- b. The permittee will measure the caustic concentration once per day. The permittee will keep the results onsite and make the results to Department personnel upon request.
- c. Should the scrubber liquor flow rate or caustic concentration drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document the duration of every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.
- d. Caustic concentrations and monitoring of caustic concentrations are not required for scrubbers which use only water as the scrubbing liquor.

Table 10 - FF-680 Plant Scrubbers Parameters

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
401	Scrubber	liquor flow rate	gal/min	5
413	Scrubber	liquor flow rate	gal/min	12
		caustic concentration in scrubbing liquor	%	2.5
416	Scrubber	liquor flow rate	gal/min	5
417	Scrubber	liquor flow rate	gal/min	5
		caustic concentration in scrubbing liquor	%	2.5
418	Scrubber	liquor flow rate	gal/min	2
421	Scrubber	liquor flow rate	gal/min	7
427	Scrubber	liquor flow rate	gal/min	10
		caustic concentration in scrubbing liquor	%	2.5

24. All baghouses associated with FF-680 production shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- a. Each baghouse shall have a pressure drop device to measure the pressure drop across the baghouse. The pressure drop for each baghouse shall be read once each day and shall be recorded in a logbook.
 - b. When the meter shows the pressure drop is below the parameters as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 11 - FF-680 Baghouse Pressure Drop

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
419	Fabric Filter	pressure drop across baghouse	in. H ₂ O	0.1
420	Fabric Filter	pressure drop across baghouse	in. H ₂ O	0.1
428	Fabric Filter	pressure drop across baghouse	in. H ₂ O	0.1

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
429	Fabric Filter	pressure drop across baghouse	in. H ₂ O	0.1
430	Fabric Filter	pressure drop across baghouse	in. H ₂ O	0.1
436	Fabric Filter	pressure drop across baghouse	in. H ₂ O	0.1

FF-680 Production - Testing

25. Bromine emissions from the PC-1 scrubber (SN-413) shall be measured every five years in accordance with an approved test procedure and Plantwide Condition 3. During the compliance test, the permittee shall measure the scrubber liquor flow rate and the caustic concentration of the scrubber liquid. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
26. VOC emissions from the PC-8 scrubber (SN-421) shall be measured every five years in accordance with an approved test procedure and Plantwide Condition 3. During the compliance test, the permittee shall measure the scrubber liquor flow rate and the caustic concentration of the scrubber liquid. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]

BE-51 Production

27. BE-51 production shall not exceed 1,000 lots during any twelve consecutive months. [Regulation No. 19 §19.705, Regulation No. 18 §18.1004, A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, and CFR Part 52, Subpart E]
28. The permittee shall maintain records which demonstrate compliance with the limits listed in Specific Condition #27. The permittee shall maintain both monthly records and a twelve-month total. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. [Regulation No. 19 §19.705, Regulation No. 18 §18.1004, 40 CFR Part 52, Subpart E and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

CD-75 Production and Chilsinator

SN-501 - Bromine Storage Tank
SN-502 – EDC Storage Tank (T-902)
SN-503 - Vent Header Blower Exhaust
SN-504 - Packaging Baghouse Vent
SN-505 – Dust Collector Blower
SN-507 – Storage Baghouse Vent
SN-508 - Baghouse Vent
SN-509 – Rotary Drier Baghouse Vent
SN-510 – Packaging Drier Vent
SN-511 – Recycle Ethanol Tank (T-510)
SN-512 – Recycle EDC Tank (T-506)
SN-513 –Ethanol Storage Tank (T-904)
SN-515 – EDC Stripper Feed Tank (T-500)
SN-516 – EDC Stripper Feed Tank (T-516)
SN-517 – Wastewater Tank (T-518)
SN-599 – Fugitive Emissions from Equipment Vents

The CD-75 process is based on the bromination of cyclododecatriene. The reaction phase is operated in a solvent system. At the end of the reaction cycle, solids are separated from the mother liquor. The cake is washed, dried, and packaged.

The mother liquor is distilled for recovery of the solvent. Residues from distillation are piped to the adjacent Bromine Recovery Unit (BRU) for recovery of bromine. Reactors, centrifuge, dryer, solvent separation, intermediate tanks, and auxiliary tanks vent through a common manifold to a scrubber followed by an aqueous scrubber system. Scrubbed gas exits through a blower exhaust to the atmosphere (SN-503).

Solid product is transferred pneumatically from the dryer system to a hammer mill. A dust collector collects particulates prior to atmospheric discharge (SN-508). Milled product is transferred to intermediate storage which also has a dust collector vented to the atmosphere (SN-507). Final packaging operations vent to the atmosphere through a final dust collector (SN-504).

There are several storage tanks that vent to the atmosphere: a bromine storage tank equipped with a scrubber (SN-501), an ethylene dichloride storage tank (SN-502), a glycol storage tank (SN-506), a recycle ethanol tank (SN-511), a recycle ethylene dichloride tank (SN-512), an ethanol storage tank (SN-513), and a cyclododecatriene storage tank (SN-514).

Chilsinator

The Chilsinator process compresses powder products into granules. Powder is pneumatically lifted into the chilsinator feed silo. Vent from the pneumatic transport system is vented to a baghouse type dust collector that vents as SN-505. Collected dust is blended back into the product.

Product is pneumatically lifted into a bagger feed silo. Vent from the pneumatic transport system is vented to a baghouse type dust collector. The cleaned air is exhausted to the atmosphere (SN-510). Collected dust is blended back into the product.

Blending operations are carried out to blend the final product with stabilizer. Powder is pneumatically lifted into the blender feed silo. Vent from the pneumatic transport system is vented to a baghouse type dust

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

collector. The cleaned air is exhausted to the atmosphere (SN-509). Collected dust is blended back into product.

Packaging operations vent through a dust collector to atmosphere (SN-510).

Specific Conditions

29. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #33 and #34. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 12 – CD-75 Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
502	EDC Storage Tank (T-902)	VOC	6.9	1.6
503	Vent Header Blower Exhaust	VOC	6.1	26.8
504	Packaging Baghouse Vent	PM ₁₀	0.1	0.5
505	Dust Collector Blower	PM ₁₀	0.2	0.9
507	Storage Baghouse Vent	PM ₁₀	0.1	0.5
508	Baghouse Vent	PM ₁₀	0.2	0.9
509	Rotary Dryer Baghouse Vent	PM ₁₀	0.2	0.9
510	Packaging Bagger Vent	PM ₁₀	0.2	0.9
511	Recycle Ethanol Tank (T-510)	VOC	0.7	0.2
512	Recycle EDC Tank (T-506)	VOC	1.9	0.5
513	Ethanol Storage Tank (T-904)	VOC	2.5	0.6
515	EDC Stripper Feed Tank (T-500)	VOC	0.2	0.1
516	EDC Stripper Feed Tank (T-516)	VOC	0.2	0.1
517	Wastewater Tank (T-518)	VOC	0.2	0.1
599	Fugitive Emissions From Equipment Leaks	VOC	0.8	3.2

30. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #33 and #34. [Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 13 – CD-75 Non-Criteria Emission Rate

SN	Description	Pollutant	lb/hr	ton/yr
501	Bromine Storage Tank	Bromine	0.1	0.1
502	EDC Storage Tank (T-902)	Ethylene Dichloride	6.86	1.52
503	Vent Header Blower Exhaust	Ethanol	2.6	11.4
		Ethylene Dichloride (HAP)	3.5	15.4
504	Packaging Baghouse Vent	PM	0.1	0.5
505	Dust Collector Blower	PM	0.2	0.9
507	Storage Baghouse Vent	PM	0.1	0.5
508	Baghouse Vent	PM	0.2	0.9
509	Rotary Dryer Baghouse Vent	PM	0.2	0.9
510	Packaging Bagger Vent	PM	0.2	0.9
511	Recycle Ethanol Tank (T-510)	Ethanol	0.7	0.2
512	Recycle EDC Tank (T-506)	Ethylene Dichloride (HAP)	1.83	0.42

Facility: Great Lakes Chemical Corporation**Permit No.: 873-AOP-R5****AFIN: 70-00037**

SN	Description	Pollutant	lb/hr	ton/yr
513	Ethanol Storage Tank (T-904)	Ethanol	2.5	0.6
515	EDC Stripper Feed Tank (T-500)	Ethylene Dichloride (HAP)	0.19	0.05
516	EDC Stripper Feed Tank (T-516)	Ethylene Dichloride (HAP)	0.19	0.05

31. The permittee shall not cause to be discharged to the atmosphere from SN-501, SN-504, SN-505, SN-507, SN-508, SN-509, and SN-510 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9 as found in 40 CFR Part 60 Appendix A. Compliance with the opacity limits shall be demonstrated by compliance with Specific Conditions #33 and #34. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
32. CD-75 and chilsonated products are allowed to be produced at this source. Other products may be produced without a permit modification if: [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- No new equipment with air contaminant emissions will be installed, other than insignificant sources (insignificant sources may be permitted via the administrative amendment process);
 - The worst-case emissions limits contained in this permit will not be exceeded. In addition, no new pollutants will be emitted. The permittee shall produce written emissions calculations and submit them to the Department pursuant to paragraph (d) below;
 - No new air pollution control requirements are triggered, such as provisions of 40 CFR Part 52, Part 60, Part 61, or Part 63;
 - The permittee submits to the Department information concerning items in paragraph (a) thru (c) above at least 30-days prior to the production of the new product and the Department does not object during this 30-day period.

Control Equipment Operating Parameters

33. All scrubbers associated with CD-75 production shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- The scrubber shall have a flow meter to measure the flow rate of the scrubbing liquor. The scrubber liquor flow rates shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
 - The caustic concentration shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
 - Should the scrubber liquor flow rate or caustic concentration drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document the duration of every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 14 – CD-75 Scrubber Parameters

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
501	Scrubber	liquor flow rate	gal/min	5

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
		caustic concentration in scrubbing liquor	%	2.5
503	Scrubber	liquor flow rate	gal/min	5
		ethanol concentration in scrubbing liquor	%	50

34. All baghouses associated with CD-75 production shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- Each baghouse shall have a pressure drop device to measure the pressure drop across the baghouse. The pressure drop for each baghouse shall be read once each day and shall be recorded in a logbook.
 - When the meter shows the pressure drop is below the parameters as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 15 – CD-75 Baghouse Pressure Drop

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
504	Baghouse	pressure drop across baghouse	in. H ₂ O	0.1
505	Baghouse	pressure drop across baghouse	in. H ₂ O	0.1
507	Baghouse	pressure drop across baghouse	in. H ₂ O	0.1
508	Baghouse	pressure drop across baghouse	in. H ₂ O	0.1
509	Baghouse	pressure drop across baghouse	in. H ₂ O	0.1
510	Baghouse	pressure drop across baghouse	in. H ₂ O	0.1

35. The permittee will test the emissions of SN-503 for VOC using Method 25A every five years pursuant to Plant Wide Condition #3. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]
36. The permittee will test the emissions of SN-503 for ethanol and ethylene dichloride using Method 18 every five years pursuant to Plant Wide Condition #3. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

PHT-4, PHT-4 Diol and PHT-4 Diol Blend, and NaBr

SN-604 –Phthalic Anhydride Storage Tank

SN-605 – Dryer Dust Collector

SN-606 – Vacuum System

SN-608 – Mechanical Vacuum Pump

SN-609 – Toluene Storage Tank

SN-610 – Dryer Condenser

SN-611 – PHT-4 Caustic Vent Scrubber

SN-612 - Phosphate Ester Tank #1

SN-613 – Phosphate Ester Tank #2

SN-614 – Diol Blend Tank

SN-699 - Fugitive Emissions from Equipment Vents

PHT-4 Plant

PHT-4 Production

The PHT-4 production process contains two similar production lines or trains: PHT-4-I and PHT-4-II (Train 1 and Train 2). Both trains share a reactant storage tank (SN-604). Since the two PHT -4 trains are nearly identical, the following description applies to both Train 1 and Train 2.

PHT-4 (tetrabromophthalic anhydride) is produced by the bromination of a reactant in an oleum system. During the reaction, vapors are vented off. One of the by-products is recovered and either sold as a product or converted to another by-product; the other by-products are recycled back to the reaction. The PHT-4 is formed as it is separated from the mother liquor by filtration. The cake is washed, dried, and packaged for sale.

The reaction, the by-product acid storage tanks, bulk-bromine storage tank, and all process vessels are vented to a water scrubber and caustic scrubber for control (SN-611 for both trains).

SN-605 is a bag house for PHT-4-I which controls dust emissions generated during solids packaging, handling, and drying. SN-610 is a shell and tube vent condenser used to control dust for PHT-4-II.

PHT-4 Diol and PHT-4 Diol Blend Production

In this process, PHT-4 is reacted with two raw materials to form PHT-4 Diol. The reactant PHT4 is transferred to a hopper by a mechanical vacuum pump which vents to the atmosphere as SN-608. The reaction solvent tank is vented to the atmosphere as SN-609. Vapors generated during the reaction are controlled by a primary and secondary condensation system. Non-condensables are vented to the atmosphere through the vacuum system (SN-606). Additionally, the PHT-4 Diol can be used to produce a PHT-4 Diol Blend. The process includes two 3,000 gallon stainless steel storage tanks (SN-612 and SN-613) and a 3,000 gallon blend tank that is vented to the atmosphere (SN-614).

NaBr Production

Sodium bromide is produced by concentrating a sodium bromide solution. No pollutants are emitted from this process which emits only water vapor. Part of the year, it is necessary to use an alternate process.

The PHT-4 plant is subject to 40 CFR Part 63 (NESHAP) Subparts F, G, and H (HON). The PHT-4 plant is subject to these regulations because tetrabromophthalic anhydride (PHT-4) is the primary product of the unit (listed as Group III chemical in Table 1 to Subpart F), phthalic anhydride is listed in Table 2 to Subpart F, and the GLCC South facility is considered a HAP major source (see 40 CFR 63. 100(b)). The PHT-4 Diol and NaBr

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

chemical manufacturing process units are not subject to the HON regulations due to the primary product qualifier.

Specific Conditions

37. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #49, #50, #51, #52, and #58. [Regulation No. 19 §19.501 et seq. effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 16 - PHT-4 Plant Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
604	Phthalic Anhydride Storage Tank	VOC	2.1	0.7
605	Dryer Dust Collector	PM ₁₀	1.1	4.9
606	Vacuum System	VOC	44.8	10.0
608	Mechanical Vacuum Pump	PM ₁₀	0.1	0.5
609	Toluene Storage Tank	VOC	4.5	0.2
610	Dryer Condenser	PM ₁₀	1.3	5.7
611	Train II Process SO ₂ Scrubber Vent	PM ₁₀	0.1	0.3
		SO ₂	4.3	18.9
612	Tank #1	VOC	2.8	0.1
613	Tank #2	VOC	2.8	0.1
614	Blend Tank	VOC	10.0	0.3
699	Fugitive Emissions from Equipment Leaks	VOC	0.7	3.1

38. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #49, #50, #51, #52, and #58. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 17 - PHT-4 Plant Non-Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
604	Phthalic Anhydride Storage Tank	Phthalic Anhydride (HAP)	2.1	0.7
605	Dryer Dust Collector	PM	1.1	4.9
606	Vacuum System	Toluene	44.8	10.0
608	Mechanical Vacuum Pump	PM	0.1	0.5
609	Toluene Storage Tank	Toluene	4.5	0.2
610	Dryer Condenser	PM	1.3	5.7
611	Train II Process SO ₂ Scrubber Vent	PM	0.1	0.3
		H ₂ SO ₄ Mist	0.05	0.25
		Br ₂	0.1	0.44
699	Fugitive Emissions from Equipment Leaks	non-VOC FRAP	0.6	2.6

39. The permittee shall not cause to be discharged to the atmosphere from SN-605, SN-608, SN-610, and SN-611 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9 as found in 40 CFR Part 60 Appendix A. Compliance with the opacity limits shall be demonstrated by compliance with Specific Conditions #49, #50, and #51. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

NESHAP Subparts F, G, and H

40. The PHT-4 Plant (PHT-4 production) is subject to and shall comply with applicable provisions of 40 CFR Part 63 Subpart A – General Provisions and 40 CFR Part 60 Subparts F, G, and H – Hazardous Organic NESHAP (HON). A copy of NESHAP Subparts F, G, and H is provided in Appendix B, Appendix C and Appendix D. Applicable provisions include, but are not limited to, the provisions in Specific Conditions #40 through #48 [Regulation No. 19 §19.304 and 40 CFR 63 Subpart F, G and H]
41. The permittee shall keep readily accessible records showing the dimensions of the 35,000 gallon phthalic anhydride tank (SN-604) and an analysis showing the capacity of the storage vessel. This record shall be kept as long as the storage vessel retains Group 2 status and is in operation. [Regulation No. 19 §19.304 and 40 CFR §63.123(a)]
42. The permittee is subject to and shall comply with applicable provisions of the General Standards. [Regulation No. 19 §19.304 and 40 CFR §63.162]
 - a. Each piece of equipment in PHT-4 Plant shall be identified such that it can be distinguished readily from equipment that is not subject to this subpart. Identification of the equipment does not require physical tagging of the equipment. For example, the equipment may be identified on a plant site plan, in log entries, or by designation of process unit boundaries by some form of weatherproof identification. [Regulation No. 19 §19.304 and 40 CFR §63.162(c)]
 - b. When each leak is detected as specified in §63.169, Specific Condition #44, the following requirements apply:
 - i. Clearly identify the leaking equipment.
 - ii. The identification on a valve may be removed after it has been monitored as specified in §§63.168(f)(3), and 63.175(e)(7)(i)(D), and no leak has been detected during the follow-up monitoring. If the owner or operator elects to comply using the provisions of §63.174(c)(1)(i), the identification on a connector may be removed after it is monitored as specified in §63.174(c)(1)(i) and no leak is detected during that monitoring.
 - iii. The identification which has been placed on equipment determined to have a leak may be removed after it is repaired.
 - c. Except as provided in 40 CFR §63.162(g)(1), all terms that define a period of time for completion of required tasks (e.g., weekly, monthly, quarterly, annual), refer to the standard calendar periods unless specified otherwise.
 - i. If the initial compliance date does not coincide with the beginning of the standard calendar period, the permittee may elect to utilize a period beginning on the compliance date, or may elect to comply in accordance with the provisions of 40 CFR §§63.162(g)(2) or (g)(3).
 - ii. Time periods specified in this subpart for completion of required tasks may be changed by mutual agreement between the owner or operator and the Administrator, as specified in subpart A of this part. For each time period that is changed by agreement, the revised period shall remain in effect until it is changed. A new request is not necessary for each recurring period.

- iii. Except as provided in 40 CFR §§63.162(g)(1) or (g)(2), where the period specified for compliance is a standard calendar period, if the initial compliance date does not coincide with the beginning of the calendar period, compliance shall be required according to the schedule specified in 40 CFR §§63.162(g)(3)(i) or (g)(3)(ii), as appropriate.
 - (1). Compliance shall be required before the end of the standard calendar period within which the compliance deadline occurs, if there remain at least 3 days for tasks that must be performed weekly, at least 2 weeks for tasks that must be performed monthly, at least 1 month for tasks that must be performed each quarter, or at least 3 months for tasks that must be performed annually; or
 - (2). In all other cases, compliance shall be required before the end of the first full standard calendar period after the period within which the initial compliance deadline occurs.
 - iv. In all instances where a provision of this subpart requires completion of a task during each of multiple successive periods, an owner or operator may perform the required task at any time during each period, provided the task is conducted at a reasonable interval after completion of the task during the previous period.
 - d. In all cases where the provisions of this subpart require the permittee to repair leaks by a specified time after the leak is detected, it is a violation of the permit to fail to take action to repair the leaks within the specified time. If action is taken to repair the leaks within the specified time, failure of that action to successfully repair the leak is not a violation of this permit. However, if the repairs are unsuccessful, a leak is detected and the permittee shall take further action as required by applicable provisions of 40 CFR §§63 Subpart H.
43. The permittee is subject to and shall comply with applicable provisions of the Standards: Open-ended valves or lines. [Regulation No. 19 §19.304 and 40 CFR §63.167]
- a. Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or a second valve, except as provided in §63.162(b), Specific Condition #43.b, §63.162(d), Specific Condition #43.d, and §63.162(e), Specific Condition #43.e of this section. [Regulation No. 19 §19.304 and 40 CFR §63.167(a)(1)]
 - i. The cap, blind flange, plug, or second valve shall seal the open end at all times except during operations requiring process fluid flow through the open-ended valve or line, or during maintenance or repair. [Regulation No. 19 §19.304 and 40 CFR §63.167(a)(2)]
 - b. Each open-ended valve or line equipped with a second valve shall be operated in a manner such that the valve on the process fluid end is closed before the second valve is closed. [Regulation No. 19 §19.304 and 40 CFR §63.167(b)]
 - c. When a double block and bleed system is being used, the bleed valve or line may remain open during operations that require venting the line between the block valves but shall comply with paragraph (a) of this section at all other times. [Regulation No. 19 §19.304 and 40 CFR §63.167(c)]
 - d. Open-ended valves or lines in an emergency shutdown system which are designed to open automatically in the event of a process upset are exempt from the requirements of 40 CFR §63.167(a), (b) and (c). [Regulation No. 19 §19.304 and 40 CFR §63.167(d)]

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

- e. Open-ended valves or lines containing materials which would autocatalytically polymerize or, would present an explosion, serious overpressure, or other safety hazard if capped or equipped with a double block and bleed system as specified in 40 CFR §63.167(a) through (c) are exempt from the requirements of 40 CFR §63.167(a) through (c).
44. The permittee is subject to and shall comply with applicable provisions of 40 CFR §63.169 (Standards: Pumps, valves, connectors, and agitators in heavy liquid service; instrumentation systems; and pressure relief devices in liquid service).
- a. Pumps, valves, connectors, and agitators in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and instrumentation systems shall be monitored within 5 calendar days by the method specified in §63.180(b) if evidence of a potential leak to the atmosphere is found by visual, audible, olfactory, or any other detection method. If such a potential leak is repaired as required in 40 CFR §63.169(c) and (d), it is not necessary to monitor the system for leaks by the method specified in §63.180(b) of this subpart.
 - b. If an instrument reading of 10,000 parts per million or greater for agitators, 5,000 parts per million or greater for pumps handling polymerizing monomers, 2,000 parts per million or greater for all other pumps (including pumps in food/medical service), or 500 parts per million or greater for valves, connectors, instrumentation systems, and pressure relief devices is measured, a leak is detected.
 - c. When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in 40 CFR §63.171.
 - i. The first attempt at repair shall be made no later than 5 calendar days after each leak is detected.
 - ii. For equipment identified in 40 CFR §63.169(a) that is not monitored by the method specified in §63.180(b), repaired shall mean that the visual, audible, olfactory, or other indications of a leak to the atmosphere have been eliminated; that no bubbles are observed at potential leak sites during a leak check using soap solution; or that the system will hold a test pressure.
 - d. First attempts at repair include, but are not limited to, the practices described under §§63.163(c)(2) and 63.168(g), for pumps and valves, respectively.
45. The permittee is subject to and shall comply with applicable provisions of 40 CFR §63.171 (Standards: Delay of repair).
- a. Delay of repair of equipment for which leaks have been detected is allowed if repair within 15 days is technically infeasible without a process unit shutdown. Repair of this equipment shall occur by the end of the next process unit shutdown.
 - b. Delay of repair of equipment for which leaks have been detected is allowed for equipment that is isolated from the process and that does not remain in organic HAP service.
 - c. Delay of repair for valves, connectors, and agitators is also allowed if:
 - i. The permittee determines that emissions of purged material resulting from immediate repair would be greater than the fugitive emissions likely to result from delay of repair, and

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

- ii. When repair procedures are effected, the purged material is collected and destroyed or recovered in a control device complying with 40 CFR §63.172.
 - d. Delay of repair for pumps is also allowed if:
 - i. Repair requires replacing the existing seal design with a new system that the permittee has determined under the provisions of 40 CFR §63.176(d) will provide better performance or:
 - (1). A dual mechanical seal system that meets the requirements of 40 CFR §63.163(e)t,
 - (2). A pump that meets the requirements of 40 CFR §63.163(f), or
 - (3). A closed-vent system and control device that meets the requirements of 40 CFR §63.163(g); and
 - ii. Repair is completed as soon as practicable, but not later than 6 months after the leak was detected.
 - e. Delay of repair beyond a process unit shutdown will be allowed for a valve if valve assembly replacement is necessary during the process unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the second process unit shutdown will not be allowed unless the third process unit shutdown occurs sooner than 6 months after the first process unit shutdown.
46. The permittee is subject to and shall comply with applicable provisions of 40 CFR §63.180 (Test methods and procedures). [Regulation No. 19 §19.304 and 40 CFR §63.180]
- a. Monitoring shall comply with the following requirements: [Regulation No. 19 §19.304 and 40 CFR §63.180(b)]
 - i. Monitoring shall comply with Method 21 of 40 CFR part 60, appendix A.
 - ii. Except as provided for in 40 CFR §63.180(b)(2)(ii), the detection instrument shall meet the performance criteria of Method 21 of 40 CFR part 60, appendix A, except the instrument response factor criteria in Section 3.1.2(a) of Method 21 shall be for the average composition of the process fluid not each individual VOC in the stream. For process streams that contain nitrogen, water, air, or other inerts which are not organic HAP's or VOC's, the average stream response factor may be calculated on an inert-free basis. The response factor may be determined at any concentration for which monitoring for leaks will be conducted.
 - (1). If no instrument is available at the plant site that will meet the performance criteria specified in paragraph 40 CFR 63.180(b)(2)(i), the instrument readings may be adjusted by multiplying by the average response factor of the process fluid, calculated on an inert-free basis as described in 40 CFR §63.180 (b)(2)(i) of this section.
 - iii. The instrument shall be calibrated before use on each day of its use by the procedures specified in Method 21 of 40 CFR part 60, appendix A.

- iv. Calibration gases shall be:
 - (1). Zero air (less than 10 parts per million of hydrocarbon in air); and
 - (2). Mixtures of methane in air at the concentrations specified in 40 CFR §63.180(b)(4)(ii)(A) through (b)(4)(ii)(C). A calibration gas other than methane in air may be used if the instrument does not respond to methane or if the instrument does not meet the performance criteria specified in 40 CFR §63.180(b)(2)(i). In such cases, the calibration gas may be a mixture of one or more of the compounds to be measured in air.
 - a. For Phase I, a mixture of methane or other compounds, as applicable, in air at a concentration of approximately, but less than, 10,000 parts per million.
 - b. For Phase II, a mixture of methane or other compounds, as applicable, and air at a concentration of approximately, but less than, 10,000 parts per million for agitators, 5,000 parts per million for pumps, and 500 parts per million for all other equipment, except as provided in 40 CFR §63.180(b)(4)(iii).
 - c. For Phase III, a mixture of methane or other compounds, as applicable, and air at a concentration of approximately, but less than, 10,000 parts per million methane for agitators; 2,000 parts per million for pumps in food/medical service; 5,000 parts per million for pumps in polymerizing monomer service; 1,000 parts per million for all other pumps; and 500 parts per million for all other equipment, except as provided in 40 CFR §63.180(b)(4)(iii).
 - (3). The instrument may be calibrated at a higher methane concentration than the concentration specified for that piece of equipment. The concentration of the calibration gas may exceed the concentration specified as a leak by no more than 2,000 parts per million. If the monitoring instrument's design allows for multiple calibration scales, then the lower scale shall be calibrated with a calibration gas that is no higher than 2,000 parts per million above the concentration specified as a leak and the highest scale shall be calibrated with a calibration gas that is approximately equal to 10,000 parts per million. If only one scale on an instrument will be used during monitoring, the owner or operator need not calibrate the scales that will not be used during that day's monitoring.
- v. Monitoring shall be performed when the equipment is in organic HAP service, in use with an acceptable surrogate volatile organic compound which is not an organic HAP, or is in use with any other detectable gas or vapor.
- vi. Monitoring data that do not meet the criteria specified in 40 CFR §§63.180(b)(1) through (b)(5) may be used to qualify for less frequent monitoring under the provisions in §63.168(d)(2) and (d)(3) or §63.174(b)(3)(ii) or (b)(3)(iii) provided the data meet the conditions specified in paragraphs §63.168(b)(6)(i) and (b)(6)(ii).
 - (1). The data were obtained before April 22, 1994.
 - (2). The departures from the criteria specified in §§63.168(b)(1) through (b)(5) or from the specified monitoring frequency of §63.168(c) are minor and do not significantly affect the quality of the data. Examples of minor departures are

monitoring at a slightly different frequency (such as every six weeks instead of monthly or quarterly), following the performance criteria of section 3.1.2(a) of Method 21 of appendix A of 40 CFR part 60 instead of paragraph §63.168(b)(2), or monitoring at a different leak definition if the data would indicate the presence or absence of a leak at the concentration specified in this subpart. Failure to use a calibrated instrument is not considered a minor departure.

- b. When equipment is monitored for compliance as required in §§63.165(a), and 63.172(f) or when equipment subject to a leak definition of 500 ppm is monitored for leaks as required by this subpart, the permittee may elect to adjust or not to adjust the instrument readings for background. If the permittee elects to not adjust instrument readings for background, the permittee shall monitor the equipment according to the procedures specified in 40 CFR 63.180(b)(1) through (b)(4). In such case, all instrument readings shall be compared directly to the applicable leak definition to determine whether there is a leak. If an owner or operator elects to adjust instrument readings for background, the owner or operator shall monitor the equipment according to the procedures specified in 40 CFR 63.180(c)(1) through (c)(4).
 - i. The requirements of 40 CFR 63.180(b) (1) through (4) shall apply.
 - ii. The background level shall be determined, using the same procedures that will be used to determine whether the equipment is leaking.
 - iii. The instrument probe shall be traversed around all potential leak interfaces as close to the interface as possible as described in Method 21 of 40 CFR part 60, appendix A.
 - iv. The arithmetic difference between the maximum concentration indicated by the instrument and the background level is compared with 500 parts per million for determining compliance.
- c. Each piece of equipment within a process unit that can reasonably be expected to contain equipment in organic HAP service is presumed to be in organic HAP service unless an owner or operator demonstrates that the piece of equipment is not in organic HAP service. For a piece of equipment to be considered not in organic HAP service, it must be determined that the percent organic HAP content can be reasonably expected not to exceed 5 percent by weight on an annual average basis. For purposes of determining the percent organic HAP content of the process fluid that is contained in or contacts equipment, Method 18 of 40 CFR part 60, appendix A shall be used.
 - i. An owner or operator may use good engineering judgment rather than the procedures in paragraph 40 CFR 63.180(d)(1) to determine that the percent organic HAP content does not exceed 5 percent by weight. When an owner or operator and the Administrator do not agree on whether a piece of equipment is not in organic HAP service, however, the procedures in 40 CFR 63.180(d)(1) shall be used to resolve the disagreement.
 - (1). Conversely, the owner or operator may determine that the organic HAP content of the process fluid does not exceed 5 percent by weight by, for example, accounting for 98 percent of the content and showing that organic HAP is less than 3 percent.
 - (2). If an owner or operator determines that a piece of equipment is in organic HAP service, the determination can be revised after following the procedures in 40

CFR 63.180(d)(1), or by documenting that a change in the process or raw materials no longer causes the equipment to be in organic HAP service.

- (3). Samples used in determining the percent organic HAP content shall be representative of the process fluid that is contained in or contacts the equipment.

47. The permittee is subject to and shall comply with applicable provisions of 40 CFR §63.181 (Recordkeeping requirements).
- a. The permittee may comply with the recordkeeping requirements for these process units in one recordkeeping system if the system identifies each record by process unit and the program being implemented (e.g., quarterly monitoring, quality improvement) for each type of equipment. All records and information required by this section shall be maintained in a manner that can be readily accessed at the plant site. This could include physically locating the records at the plant site or accessing the records from a central location by computer at the plant site. [Regulation No. 19 §19.304 and 40 CFR §63.181(a)]
- b. The following information pertaining to all equipment in each process unit subject to the requirements in §§63.162 through 63.174 shall be recorded:
- i. A list of identification numbers for equipment subject to the requirements of this subpart. Connectors need not be individually identified if all connectors in a designated area or length of pipe subject to the provisions of this subpart are identified as a group, and the number of connectors subject is indicated.
- ii. Physical tagging of the equipment to indicate that it is in organic HAP service is not required. Equipment subject to the provisions of this subpart may be identified on a plant site plan, in log entries, or by other appropriate methods.
- iii. For any leaks detected as specified in §63.169, a weatherproof and readily visible identification, marked with the equipment identification number, shall be attached to the leaking equipment.
- c. When each leak is detected as specified in §63.169, the following information shall be recorded and kept for 2 years:
- i. The instrument and the equipment identification number and the operator name, initials, or identification number.
- ii. The date the leak was detected and the date of first attempt to repair the leak.
- iii. The date of successful repair of the leak.
- iv. Maximum instrument reading measured by Method 21 of 40 CFR part 60, appendix A after it is successfully repaired or determined to be nonreparable.
- v. “Repair delayed” and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.
- (1). The owner or operator may develop a written procedure that identifies the conditions that justify a delay of repair. The written procedures may be included as part of the startup/shutdown/malfunction plan, required by §63.6(e)(3), for the source or may be part of a separate document that is maintained at the plant site.

In such cases, reasons for delay of repair may be documented by citing the relevant sections of the written procedure.

- (2). If delay of repair was caused by depletion of stocked parts, there must be documentation that the spare parts were sufficiently stocked on-site before depletion and the reason for depletion.
- vi. Dates of process unit shutdowns that occur while the equipment is unrepaired.
- vii. Copies of the periodic reports as specified in §63.182(d), if records are not maintained on a computerized database capable of generating summary reports from the records.
- d. The owner or operator of equipment in heavy liquid service shall comply with the following:
 - i. Retain information, data, and analyses used to determine that a piece of equipment is in heavy liquid service.
 - ii. When requested by the Administrator, demonstrate that the piece of equipment or process is in heavy liquid service.
 - iii. A determination or demonstration that a piece of equipment or process is in heavy liquid service shall include an analysis or demonstration that the process fluids do not meet the definition of “in light liquid service.” Examples of information that could document this include, but are not limited to, records of chemicals purchased for the process, analyses of process stream composition, engineering calculations, or process knowledge.
- 48. The permittee is subject to and shall comply with applicable provisions of 40 CFR §63.182 (Reporting requirements).[Regulation No. 19 §19.304 and 40 CFR §63.182]
 - a. The permittee will submit semiannual reports starting six months after the initial after the compliance date and every six months thereafter. The report containing:
 - i. The number of valves for which leaks were detected as described in §63.168(b), the percent leakers, and the total number of valves monitored;
 - ii. The number of valves for which leaks were not repaired as required in §63.168(f), identifying the number of those that are determined nonrepairable;
 - iii. The number of pumps for which leaks were detected as described in §63.163(b) of this subpart, the percent leakers, and the total number of pumps monitored;
 - iv. The number of pumps for which leaks were not repaired as required in §63.163(c) of this subpart;
 - v. The number of connectors for which leaks were detected as described in §63.174(a) of this subpart, the percent of connectors leaking, and the total number of connectors monitored;
 - vi. The number of connectors for which leaks were not repaired as required in §63.174(d) of this subpart, identifying the number of those that are determined nonrepairable;
 - vii. The facts that explain any delay of repairs and, where appropriate, why a process unit shutdown was technically infeasible.

- viii. The results of all monitoring to show compliance with §§63.164(i), 63.165(a), and 63.172(f) of this subpart conducted within the semiannual reporting period.

Control Equipment Operating Parameters

49. All scrubbers associated with the PHT-4 Plant shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, 40 CFR Part §64.6(c)(1), Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- The scrubber shall have a flow meter to measure the flow rate of the scrubbing liquor. The scrubber liquor flow rates shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
 - The caustic concentration shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
 - Should the scrubber liquor flow rate or caustic concentration drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document the duration of every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 18 PHT-4 Plant Scrubber Parameters

SN	Ctrl Equipment	Parameter	Units	Min. Limit
611	scrubber	liquor flow rate	gal/min	40
		caustic concentration in scrubbing liquor	%	2.5

50. All baghouses associated with the PHT-4 Plant shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- Each baghouse shall have a pressure drop device to measure the pressure drop across the baghouse. The pressure drop for each baghouse shall be read once each day and shall be recorded in a logbook.
 - When the meter shows the pressure drop is below the parameters as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 19 - PHT-4 Plant Baghouse Pressure Drop

SN	Ctrl Equipment	Parameter	Units	Min. Limit
605	baghouse	pressure drop across baghouse	in. H ₂ O	0.1
608	baghouse	pressure drop across baghouse	in. H ₂ O	0.1

PHT-4 Production

51. The permittee shall maintain a recirculation rate of 5 gallons per minute to the Condenser (SN-610). The recirculation rate shall be monitored and recorded at a minimum of once per week. Records of recirculation rate shall be maintained onsite and provided to Department personnel upon request. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

52. PHT-4 production shall not exceed 1370 PHT-4 lots per twelve consecutive months for each PHT-4 Train. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
53. The permittee shall maintain records of PHT-4 production which demonstrate compliance with the limits listed in Specific Condition #52. The permittee shall maintain both monthly records and a twelve month total. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General Condition #7. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
54. The permittee shall not change the compound being stored in storage tank J-901 (the phthalic anhydride storage tank, SN-604) without prior written approval from the Department. [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Testing

55. The permittee shall measure the bromine emissions from SN-611 every five years in accordance with an approved test procedure and Plantwide Condition 3. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
56. During the compliance test, the permittee shall measure the scrubber liquor flow rate to the scrubbers and caustic concentration of the scrubber liquids. During the test, the permittee shall operate the plant within 10 percent of the rated throughput capacity. If 90 percent of the rated throughput capacity cannot be achieved, the facility shall be limited to 10 percent above the actual tested throughput. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
57. The permittee shall measure the particulate matter emissions from SN-610 in accordance with EPA Reference Method 5 and Plantwide Condition 3 every five years. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]

PHT-4 Diol and PHT-4 Diol Blend Production

58. PHT-4 Diol production and tank throughput shall not exceed the limits indicated by the following table: [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 20 - PHT-4 Diol and PHT-4 Diol Blend Production Lots

	LOTS per Rolling 12 month Basis
PHT-4 Diol Production	1,200
Tank #1 Throughput	225
Tank #2 Throughput	225
Blend Tank Throughput	450

59. The permittee shall maintain records of PET-Diol production and tank throughput that demonstrates compliance with the limits listed in Specific Condition #58. The permittee shall maintain both monthly records and a twelve-month total. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Condition #7. [Regulation No. 19 §19.705 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

FM 200, Freon 32, Freon 23, HFC-143a, TFP, BFE, HFC236fa and BDFE

SN-702 – C-731 Absorber Scrubber
SN-704 – Final Purification
SN-706 – HCl Storage Tanks (T-631A and T-631B)
SN-709 – Mole Sieve Dryer Regeneration
SN-711 – Methylene Chloride/Chloroform Storage Tank
SN-712 – Distillation Column Vent
SN-715 – TFP Scrubber Vent B
SN-751 – Mole Sieve Dryer Regeneration
SN-799 - Fugitive Emissions from Equipment Vents
SN-802 – Ethylene Storage Tank
SN- 803 – Combined Process Vent
SN-807 –Common Process Vent: Catalyst Vent
SN-808 – HCl Scrubber Vent
SN-809 – C-301T Vent Scrubber
SN-817 – Liquid Nitrogen Condensers
SN-818 –Thermal Oxidizer with Scrubber
SN-819 – CD-103 Vent Condenser
SN-899 - Fugitive Emissions from Equipment Vents
SN-1301 – Combined Process Vent
SN-1302 – HCl Scrubber Vent
SN-1303 – Pressure Valve Control Valve from Distillation Column
SN-1399 - Fugitive Emissions from Equipment Leaks

FM 200 Production (FCU North Plant)

FM 200 can be produced at either of two production trains. Reactants are reacted to make heptafluoropropane (FM200). The natural gas fired Hot Oil System is used to heat the reactor. Emissions are vented as SN-707. The reacted gas is distilled. The fluorination reaction and distillation column are vented to the C-731 Absorber Scrubber. The scrubber is vented to the atmosphere as SN-702.

The intermediate product stream is sent to a dual molecular sieve bed dryer. Emissions from the dryers are vented to SN-709. The product stream is then separated by distillation. The overhead stream is routed to cylinder filling and cylinder evacuation.

Freon 32 Production (FCU North Plant)

Freon 32 (R32) can be produced at either of two production trains. The raw material is reacted in the presence of a catalyst to form R32. The raw material storage tank is vented at SN-711. The reaction is heated with a hot oil heater, which vents to SN-707.

Products for sale and recycle are recovered during a purification step. The first purification is vented through scrubbers to SN-702. R32 is dried, and periodic emissions are routed to the atmosphere through SN-751. A by-product is sent to storage (SN-706) for sales.

R32 is further purified prior to storage for sales. This purification vents through SN-704.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Freon 23 Production (FCU North Plant)

Freon 23 (R23) can be produced at either of two production trains. The raw material is reacted in the presence of a catalyst to form R23. The raw material storage tank is vented as SN-711. The reaction is heated with oil, which vents to SN-707.

Products for sale and recycle are recovered during a purification step. The first purification is vented through scrubbers to SN-702. R23 is dried, and periodic emissions are routed to the atmosphere through SN-751. A by-product is sent to storage (SN-706) for sales.

R23 is further purified prior to storage for sales. This purification vents through SN-704.

HFC-143a Production (FCU North Plant)

HFC-143a can be produced in the FCU-North Unit using the FM-200 production equipment

HFC-143a (1, 1, 1-trifluoroethane) is produced in the FCU-North Unit in the FM-200 production equipment. Reactants are reacted in the R101D reactor. The natural gas fired Hot Oil System (SN-707, an Insignificant Activity) is used to heat the reactor. The reacted gas is distilled. The reactor and distillation equipment are vented to the C- 731 Absorber Scrubber (SN-702). The product stream is scrubbed, which is also vented to the atmosphere at SN-702. The product stream is sent to a dual molecular sieve bed dryer (SN-709). The product stream is then separated by distillation and the overhead stream is vented to the atmosphere as new emissions (SN-712).

TFP Production (FCU South Plant)

The production of trifluoropropene (TFP) is done in two steps. In the first step, an intermediate compound is produced and purified. The purified intermediate is then sent to the second reactor where it is mixed with acid and catalyst. This reaction produces TFP along with unreacted acid. The acid and TFP are separated using conventional distillation equipment. The acid is recycled while the crude TFP is further purified (SN-809). The finished TFP is loaded into shipping cylinders and prepared for transport.

Catalyst for the second reaction will be manufactured on-site. The mixing vessel will be vented through a scrubber and then to the atmosphere as SN-807. The catalyst must be activated before use. During activation the second reactor is vented to the TFP Scrubber Vent (SN-715).

Other emission sources include the combined process vent (SN-803), the acid scrubber vent (SN-808), a hot oil heater (SN-811), and five storage tank vents—the ethylene storage tank (SN-802), carbon tetrachloride storage tank (SN-815), TCP storage tank (SN-804) and the heavies storage tanks (SN-806, Sn-816).

FM-200 Production (FCU South Plant)

Heptafluoropropane (FM 200) is produced at the FCU-South Plant by reacting two reactants together. The crude product is purified and stored for sale.

The reaction uses a hot oil system heated by a natural gas fired heater. The flue gas is vented to the atmosphere as SN-811. The purification equipment is vented to the atmosphere as SN-814. Purification equipment is regenerated at the Fm 200 complex and vented to the atmosphere as SN-814.

Cylinder filling emissions are designated as SN-812.

BFE Production (FCU South Plant)

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

2-Bromo-1-fluoroethane (BFE) is made by reacting two reactants together. The product is purified and stored for sale. Process vapors are vented through three nitrogen condensers. Emissions from the condensers are vented to the atmosphere as SN-817.

Freon 32 Production (FCU South Plant)

Two reactants are reacted together to form difluoromethane (Freon 32). Spent catalyst is disposed as a solid waste. The feed storage tank is vented to the atmosphere as SN-804. The Crude product is purified and collected in product storage tanks. The purification equipment vents to the atmosphere as SN-808.

Cylinder filling emissions are designated as SN-812. Emissions from catalyst conditioning are vented through a scrubber packed column as SN-807. Hot oil burners vent to the atmosphere as SN-811.

TFP Plant

The production of TFP (trifluoropropene) includes two reaction steps. The first reaction proceeds between two reactants in the presence of a catalyst to form an intermediate. The process stream is then transferred through a holding tank to a distillation train which is controlled by a scrubber and a condenser. Most process equipment is directly or indirectly vented to SN-1301 which is controlled by a condenser.

In the second reaction step the intermediate is reacted with a reactant to form TFP. The process stream is separated by distillation. The overhead stream is scrubbed with water to remove essentially all of the HCL. The unreacted hydrocarbons are separated using conventional distillation technology (SN-1303).

Catalyst must be activated after charging to the reactor.

A natural gas hot oil system supplies heat to the TFP vaporizers / reactors.

FM-200 Production

Two reactants are mixed in a reactor to make FM 200. The reactor uses a hot oil system which is heated by a natural gas fired heater. Emissions from this hot oil system are considered to be insignificant.

The reacted gas is distilled in a separator to remove heavy organics. The separator is vented through two scrubbers in series. Neither of these scrubbers vent to the atmosphere. The reactor only vents during catalyst regeneration or an emergency shutdown. Emissions from the reactor are vented to the TFP Scrubber at the FCU-South Plant. The TFP Scrubber is vented to the C-731 Absorber Scrubber at the FCU-North Plant. Emissions from the C-731 Scrubber are vented to the atmosphere as SN-702.

The Freon stream is then dried using a dual molecular sieve bed dryer. The molecular sieve is regenerated at the FCU-North Plant. The dry Freon is separated by a distillation column to a final product stream (FM 200) and sent to sales. The light organics from the distillation column are collected in cylinders.

HFC236fa Production

HFC236fa is produced in two steps. In the first step, an intermediate compound is produced from two reactants over a catalyst. The crude intermediate is purified and sent to a second reactor where the intermediate is mixed with a third reactant and catalyst. The reaction produces HFC236fa and acids. The acids are separated while the crude product is further purified (SN-809). Finished product is loaded into cylinders for transport.

BDFE Production

BDFE is produced by reacting two reagents in a reactor. The crude intermediate product is neutralized, dried, purified and sent to finished product storage before loading into totes. The thermal oxidizer is the emission

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

control device for all new equipment except the purifier. The purifier vents to the CD-103 Vent Condenser (SN-819).

Specific Conditions

60. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #63, #65, #66, and #70. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 21 – FCU North Criteria Pollutants Emissions

SN	Description	Pollutant	lb/hr	ton/yr
702	C-731 Absorber Scrubber	VOC	1.1	4.9
704	Final Purification	VOC	4.0	17.60
		CO	2.0	8.8
709	Mole Sieve Dryer Regeneration	VOC	1.1	4.4
711	Methylene Chloride/Chloroform Storage Tank	VOC	0.1	0.5
712	Distillation Column Vent	VOC	0.1	0.5
751	Mole Sieve Dryer Regeneration	VOC	1.0	4.5
799	Fugitive Emissions from Equipment Leaks	VOC	2.0	8.5

61. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #64, #65, #66, and #70. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 22 - FCU North Plant Non-Criteria Pollutants Emissions

SN	Description	Pollutant	lb/hr	Ton/yr
702	C-731 Absorber Scrubber	HF (HAP)	1.20	5.30
		HCl (HAP)	0.30	1.40
		Freon 23 (non-VOC)	1.10	4.90
		HFC 143a (non-VOC)	1.1	4.90
		HFC 152a (non-VOC)	0.20	0.60
		HCFC 161	0.10	0.20
704	Final Purification	Freon 23 (non-VOC)	1.00	4.40
706	HCl Storage Tanks(T-631A, T-631B)	HCl (HAP)	0.90	3.90
709	Mole Sieve Dryer Regenerator	HFC-143a	1.1	4.9
711	Methylene Chloride/Chloroform Tank	Methylene Chloride (HAP)	0.10	0.50
		Chloroform (HAP)	0.10	0.50
712	Distillation Column Vent	Methyl Chloride	0.10	0.10
		HFC-143a	1.5	6.6
		HFC-142b	0.1	0.1
		HFC-152a	0.1	0.1
		Freon 13	0.10	0.10
		Freon 23	0.10	0.10

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	lb/hr	Ton/y r
715	TFP Scrubber Vent B	HF	1.2	5.3
751	Mole Sieve Dryer Regeneration	Freon 23 (non-VOC)	1.0	4.5
799	Fugitive Emissions from Equipment Leaks	non-VOC FRAP	1.24	5.43

62. The FCU North Plant is permitted to produce HFC-143a, FM 200, Freon 32, and Freon 23. Other products may be produced without a permit modification if: [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- No new equipment with air contaminant emissions will be installed, other than insignificant sources (insignificant sources may be permitted via the administrative amendment process);
 - The worst-case emissions limits contained in this permit will not be exceeded. In addition, no new pollutants will be emitted. The permittee shall produce written emissions calculations and submit them to the Department pursuant to paragraph (d) below;
 - No new air pollution control requirements are triggered, such as provisions of 40 CFR Part 52, Part 60, Part 61, or Part 63;
 - The permittee submits to the Department information concerning items in paragraph (a) thru (c) above at least 30-days prior to the production of the new product and the Department does not object during this 30-day period.

Testing

63. The permittee will test the VOC with Method 25A emissions from C-731 Absorber Scrubber (SN-702) every five years in accordance with Plantwide Condition 3. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]
64. The permittee will test the HF emissions from the C-731 Absorber Scrubber (SN-702) every five years in accordance with Method 26 and Plantwide Condition 3. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Control Equipment Operating Parameters

65. All scrubbers associated with FCU North Plant shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- The scrubber shall have a flow meter to measure the flow rate of the scrubbing liquor. The scrubber liquor flow rates shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
 - The permittee will measure the caustic concentration once per day. The result shall be kept onsite and be available to Department personnel upon request.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

- c. Should the scrubber liquor flow rate or caustic concentration drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document the duration of every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.
- d. Caustic concentrations and monitoring of caustic concentrations are not required for scrubbers which use water as the scrubbing liquor.

Table 23 - FCU North Plant Scrubber Parameters

SN	Ctrl Equipment	Parameter	Units	Min. Limit
702	scrubber	liquor flow rate	gal/min	25.0
		caustic concentration in scrubbing liquor	%	2.5
703	scrubber	liquor flow rate	gal/min	15.0
		caustic concentration in scrubbing liquor	%	2.5
706	scrubber	liquor flow rate	gal/min	1.0

Production

- 66. Production at the FCU North Plant shall not exceed the values in the following table: [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 24 - FCU North Plant Production Lots

Product	Annual Rate	Units
HFC-143a	1241	Lots per twelve consecutive months
FM200	5256	
Freon 32	1752	
Freon 23	1752	

- 67. The permittee shall maintain records which demonstrate compliance with the limits listed in Specific Condition #66. The permittee shall maintain both monthly records and a twelve-month total. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General Condition #7. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- 68. During the first purification of Freon 32 and Freon 23, the permittee may emit to the atmosphere through the C-731 Column (SN-702) or the C-401 Column (SN-703). The permittee may use only one column at a time. [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- 69. The permittee shall maintain records of usage of the C-731 and C-401 columns to demonstrate compliance with Specific Condition #67. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

FM 200 Production - Testing

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

70. The permittee shall measure the VOC emissions from SN-709 or SN-751 with Method 25A every five years. The permittee must conduct three one hour tests during the first hours of regeneration. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]

South Plant

71. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Condition #72, #80, #84, #88, and #90. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 25 – FCU South Plant Criteria Pollutants Emissions

SN	Description	Pollutant	lb/hr	ton/yr
802	Ethylene Storage Tank Loading	VOC	158.1	2.1
803	Combined Process Vent	VOC	4.5	19.8
807	Common Process Vent: Catalyst Vent	PM ₁₀	0.1	0.5
		CO	24.0	1.2
808	HCl Scrubber Vent	VOC	1.0	4.4
809	C-301T Vent Scrubber	VOC	1.7	7.5
817	Liquid Nitrogen Condensers	VOC	0.1	0.5
818	Thermal Oxidizer with Scrubber	PM ₁₀	0.1	0.5
		VOC	1.7	7.5
		CO	0.2	0.8
		SO ₂	0.1	0.5
		NO _x	0.8	3.6
819	CD-103 Vent Condenser	VOC	0.1	0.5
899	Fugitive Emissions from Equipment Leaks	VOC	2.1	9.0

72. The emissions of carbon monoxide from SN-807 are limited to 100 hours per twelve consecutive months. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]
73. The permittee shall keep records which demonstrate compliance with Specific Condition #72. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General Condition #7. [Regulation No. 19 §19.705 and 40 CFR Part 52, Subpart E]
74. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Condition #80, #84, #88, and #90. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 26 - FCU South Plant Non- Criteria Pollutants Emissions

SN	Description	Pollutant	lb/hr	Ton/yr
803	Combined Process Vent	Carbon Tetrachloride (HAP)	0.4	1.8
807	Common Process Vent: Catalyst Vent	PM	0.1	0.5

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN	Description	Pollutant	lb/hr	Ton/yr
808	HCl Scrubber Vent	HCl (HAP) Methylene Chloride (HAP)	0.3 1.8	1.4 7.9
809	C-301T Vent Scrubber	HFC-236fa CFC-12	2.4 0.7	10.6 3.1
817	Liquid Nitrogen Condensers	HBr Br	0.1 0.1	0.5 0.5
818	Thermal Oxidizer with Scrubber	PM Cl ₂ F ₂ HBr HCl (HAP) HF Organic HAP	0.1 0.1 0.1 0.1 0.4 0.1 0.45	0.5 0.5 0.5 0.5 1.8 0.5 2.0
899	Fugitive Emissions from Equipment Leaks	non-VOC FRAP (includes HF, HCl, and Methylene Chloride)	0.01	0.01

75. The permittee shall not cause to be discharged to the atmosphere from SN-807, SN-817, and SN-818 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9 as found in 40 CFR Part 60 Appendix A. Compliance with the opacity limits shall be demonstrated by compliance with Specific Conditions #80 and #84. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
76. The FCU South Plant may only produce one product at a time. The FCU South Plant is permitted to produce TFP, BFE, FM 200, Freon 32, HFC245fa, FM 300, and FM 200 New Technology. Other products may be produced without a permit modification if: [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- No new equipment with air contaminant emissions will be installed, other than insignificant sources (insignificant sources may be permitted via the administrative amendment process);
 - The worst-case emissions limits contained in this permit will not be exceeded. In addition, no new pollutants will be emitted. The permittee shall produce written emissions calculations and submit them to the Department pursuant to paragraph (d) below;
 - No new air pollution control requirements are triggered, such as provisions of 40 CFR Part 52, Part 60, Part 61, or Part 63;
 - The permittee submits to the Department information concerning items in paragraph (a) thru (c) above at least 30-days prior to the production of the new product and the Department does not object during this 30-day period.
77. The permittee must comply with the specific conditions listed for each product while producing that respective product. [Regulation No. 19 §19.705, A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, and 40 CFR 70.6]

Testing

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

78. The permittee shall measure the emissions from SN-808 during the production of Trifluoropropane (TFP) and Difluoromethane (Freon 32). The permittee will test for VOC using Method 25A, HCl using Method 26 and Methylene Chloride using Method 25A.

The permittee shall test one of the above mentioned products which are produced during each calendar year at this unit. Each product, which has a production run at least 30-days long or is run at least 60 days in any twelve consecutive months, shall be tested at least every five years. The testing shall be conducted in accordance with Plantwide Condition 3. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

79. The permittee shall test each new product which is produced at the FCU South Plant for all permitted or any new pollutants which are / may be emitted from SN-808. This test shall occur within the initial production run of the new product. The testing shall be in accordance with a test procedure which has been specifically approved by the Department before the testing and in accordance with Plantwide Condition 3. [Regulation No. 19 §19.702, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- During the testing, the plant shall be operated within 10 percent of the rated throughput capacity. Failure to test at the rated throughput shall limit the production of the product to 10 percent above the tested throughput.
 - A production run of less than 30-days shall not exclude that product from being tested if it has not been tested within the last three years.

Control Equipment Operating Parameters

80. All scrubbers associated with the FCU South Plant shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- The scrubber shall have a flow meter to measure the flow rate of the scrubbing liquor. The scrubber liquor flow rates shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
 - Should the scrubber liquor flow rate drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document the duration of every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 27 - FCU South Plant Scrubber Parameters

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
807	scrubber	liquor flow rate	gal/min	1.5
808	scrubber	liquor flow rate	gal/min	0.25
818	oxidizer's scrubber	liquor flow rate	gal/min	2

81. The permittee will maintain a minimum temperature of 1750° F in the thermal oxidizer (SN-818). [Regulation No. 19 §19.303, 40 CFR Part §64.6(c)(1) and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
82. The permittee will install a temperature monitoring device to monitor the temperature of the thermal oxidizer (SN-818). The permittee will continuously monitor the temperature of the thermal oxidizer.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

The permittee will record the temperature once per day. [Regulation No. 19 §19.705 and 40 CFR Part 52, Subpart E]

TFP Production - Testing

83. The permittee shall measure the emissions from SN-803 every five years in accordance with Plantwide Condition 3. The Permittee will use Method 25A for VOC and approved method for methylene chloride. [Regulation No. 19 §19.702, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

BFE Production

84. The permittee shall install a device(s) to continuously measure, record, and maintain the liquid nitrogen condensers (SN-817) at or below -140°C while BFE is being produced. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
85. The permittee shall maintain records of liquid nitrogen condenser temperature to demonstrate compliance with Specific Condition #84. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

FM 200 Production and FM 200 New Technology Production

86. The permittee shall only vent through SN-803 or SN-814 once in two weeks for a time period not to exceed five hours. The permittee may use only one column at a time. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
87. The permittee shall maintain records of column usage to demonstrate compliance with Specific Condition #86. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
88. For the new technology FM 200 process, FM 200 production shall not exceed 140,160 lots per twelve consecutive months. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
89. The permittee shall maintain records which demonstrate compliance with the limits listed in Specific Condition #88. The permittee shall maintain both monthly records and a twelve month total. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General Condition #7. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Freon 32 Production

90. Methylene chloride usage at the FCU South Plant - Freon 32 production shall not exceed 88.8 g-lots per twelve consecutive months. [Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

91. The permittee shall maintain records which demonstrate compliance with Specific Condition #90. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General Condition #7. [Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

HFC245a Production

92. HFC245fa production shall not exceed 8,760 lots per twelve consecutive months. [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
93. The permittee shall maintain records which demonstrate compliance with the limits listed in Specific Condition #92. The permittee shall maintain both monthly records and a twelve month total. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General Condition #7. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
94. Natural gas shall be the only fuel used for the thermal oxidizer (SN-818). [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

FM 300 Production

95. FM 300 production shall not exceed 953.3 FM lots per twelve consecutive months. [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
96. The permittee shall maintain records which demonstrate compliance with the limits listed in Specific Condition #95. The permittee shall maintain both monthly records and a twelve-month total. The records shall be updated on a monthly basis. These records shall be kept onsite, provided to Department personnel upon request, and may be used by the Department for enforcement purposes. The permittee will submit the records to ADEQ as required by General Condition #7. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
97. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #95 and #101. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 28 - FM 300 Criteria Emission Rates

SN	Description	Pollutant	lb/hr	ton/yr
1301	Combined Process Vent	VOC	1.5	6.4
1302	HCl Scrubber Vent	VOC	1.1	4.9
1303	Pressure Control Valve from Distillation Column	VOC	19.1 *	3.5
1399	Fugitive Emissions from Equipment Leaks	VOC	0.9	3.8
*lb/24 hours				

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

98. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #95 and #101. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 29 - FM 300 Criteria Emission Rates

SN	Description	Pollutant	lb/hr	ton/yr
1301	Combined Process Vent	Carbon Tetrachloride (HAP)	0.4	1.8
1302	HCl Scrubber Vent	HCl	0.3	1.4
		HFC 143a (non-VOC)	0.31	1.36
		HFC 152a (non-VOC)	0.13	0.57
		HFC 161	0.04	0.18
1303	Pressure Control Valve from Distillation Column	HFC 143a (non-VOC)	28.57*	5.23
		HFC 152a (non-VOC)	10.58*	1.94
		HFC 161	3.17*	0.58
* lb/24 hours				

Testing

99. The permittee shall measure the VOC with Method 25A from SN-1301 in accordance with Plantwide Condition 3 every five years. During the compliance test, the permittee shall measure the scrubber liquor flow rate and the caustic concentration of the scrubber liquid. During the test the permittee shall operate the plant within 10 percent of the rated throughput capacity. If 90 percent of the rated throughput capacity cannot be achieved, the permittee shall be limited to 10 percent above the actual tested throughput. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]
100. The permittee shall measure the HCl with Method 26 from SN-1301 in accordance with Plantwide Condition 3 every five years. During the compliance test, the permittee shall measure the scrubber liquor flow rate and the caustic concentration of the scrubber liquid. During the test Great Lakes shall operate the plant within 10 percent of the rated throughput capacity. If 90 percent of the rated throughput capacity can not be achieved, the permittee shall be limited to 10 percent above the actual tested throughput. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Control Equipment Operating Parameters

101. All scrubbers associated with the TFP Plant shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- The scrubbers shall have a flow meter to measure the flow rate of the scrubbing liquor. The scrubber's liquor flow rates shall be measured once per day. The results shall be kept onsite and be available to Department personnel upon request.
 - The scrubber's caustic concentration, if applicable, shall be measured once per day. The results shall be kept onsite and be available to Department personnel upon request.
 - Should the scrubbers' liquor flow rate or caustic concentration drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

The permittee shall document the duration of every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

- d. Caustic concentrations and monitoring of caustic concentrations are not required for scrubbers which use water as the scrubbing liquor.

Table 30 - FM 300 Equipment Parameters

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
1301	distillation scrubber	liquor flow rate	gal/min	0.25
		caustic concentration in scrubbing liquor	%	30
1302	HCl scrubber	Water flow rate	gal/min	0.25

102. The permittee will maintain a maximum temperature of 0° F in the final vent condenser (SN-1301). [Regulation No. 19 §19.303, 40 CFR Part §64.6(c)(1) and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
103. The permittee will install a temperature monitoring device to monitor the temperature of the thermal oxidizer (SN-1301). The permittee will continuously monitor the temperature of the thermal oxidizer. The permittee will record the temperature once per day. [Regulation No. 19 §19.705, 40 CFR Part §64.6(c)(1) and 40 CFR Part 52, Subpart E]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

DBS, BCP, and Phosphorus Tribromide Production

SN-901 – Scrubber Vent
SN-902 – Styrene Storage Tank
SN-904 – Carbon Bed Absorber for BEB Tanks
SN-908 – DBS Storage Tanks
SN-914 – HCl Storage Tank (T-201)
SN-916 - BCP Permanent Storage Tank
SN-999 - Fugitive Emissions from Equipment Vents

DBS Plant

DBS Production

The dibromostyrene (DBS) process chemistry is based on three independent reactions. The process has been segmented into eight functional steps. The following is a listing and brief description of each step.

Step I Reaction: The Step I Reaction is conducted in a continuous pipe reactor. The feedstock is continuously fed to the Step I reactor, R-101, through a feed/recycle sparger. The vapor feed is introduced to the reactor in the gas section of the feed/recycle sparger. R-101 is vented to emission point SN-901.

Step I Distillation: The non-condensibles are routed from C-111 through two overhead condensers, a vapor/liquid separator (T-33), and emission point SN-901. The column bottoms are routed to an intermediate storage tank, T-06. T-06 is vented to emission point SN-901.

Pre-Bromination: Pre-bromination takes place in a reticulation loop on T-06. Bromine is added to the crude intermediate product. T-06 is vented to emission point SN-901.

Crude Intermediate Distillation: Crude intermediate product, stored in T-06, is continuously fed to C-112, a distillation column. Refined intermediate product is taken overhead as a distillate. C-112 vents through two overhead condensers and are then scrubbed. The scrubbed vapors are vented through emission point SN-910. Crude intermediate residue is removed as a bottom stream. The refined intermediate product is collected in the feed storage tank, T-10, while the intermediate residue is stored in the C-112 bottoms storage tank, T-12, prior to disposal in the bromine recovery unit. T-10 vents to emission point SN-904. T-12 is vented to emission point SN-901.

Step II Reaction, Quench, and NaOH Wash: Refined intermediate is brominated batch wise in the Step II reactor, R-103, to form Step II intermediate product. After complete conversion, the reaction mass is pumped to the Step II quench reactor, R-104.

The Step II intermediate product is quenched by washing residual bromine from the reaction mass in R-104. R-104 is vented to emission point SN-901. Water is added, and the mixture is agitated and recirculated. Agitation is stopped and the phases are allowed to separate. The organic layer is directed to the caustic wash receiver, T-36, for caustic wash. T-36 is vented to emission point SN-901. The aqueous layer from R-104 is transferred to extraction. Water and a caustic are added to T-36 prior to transfer of the organic layer from R-104. The mixture is agitated and recirculated. Agitation is stopped and the phases are allowed to separate. The organic layer is directed to the C-113 feed stock tank, T-14. T-14 vents to emission point SN-905. The aqueous layer from T-36 is transferred to extraction.

Step II Distillation: Step II intermediate product is collected as the bottoms from the column and fed to the falling film evaporator, H-10. Step II intermediate material is removed as a vapor from the falling film evaporator and is condensed in two heat exchangers prior to storage tank, T-16. T-16 vents to emission point

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN-905. The residue from the falling film evaporator is stored in T-12 prior to disposal in the bromine recovery unit. T-12 is vented to emission point SN-901. The C-113 overhead vapors vent through a heat exchanger and are then scrubbed. The scrubbed vapors are vented through emission point SN-910.

Step III Reaction: Step II intermediate product is converted to Step III in a two stage continuous reaction system. Step II intermediate product is continuously added to the Step III reactor, R-105. R-105 vents to emission point SN-906. The two-phase reaction mass is transferred to D-01, a phase separator, where water is added to enhance the separation of the partially converted Step II intermediate product and the aqueous layer. D-01 vents to emission point SN-906. The organic layer underflows to R-106, the second stage reactor. R-106 vents to emission point SN-906. The aqueous phase from D-01 is directed to the T-35R scrubber, via T-51. T-35R vents to emission point SN-901. T-51 vents to emission point SN-906.

The level controlled discharge of R-106 is directed to D-02, a phase separator. D-02 vents to emission point SN-906. In D-02, water is added and the phases are allowed to separate. DBS underflows the phase separator and is routed to the Step III neutralizer, R-107. R-107 vents to emission point SN-906. The aqueous phase from D-02 is directed to T-35R, via D-04 and T-51.

Step III Reaction – Neutralization: The residual alkalinity in the DBS is neutralized in R-107. The level is maintained by discharging to D-03, a phase separator. D-03 vents to emission point SN-906. Water is added to D-03 and the phases are allowed to separate. The organic phase underflows to intermediate product storage tanks for inhibitor addition. These intermediate product storage tanks vent to emission points SN-907 and SN-908. The aqueous phase overflows to D-05, a phase separator. D-05 vents to emission point SN-901.

The following tanks are used in the DBS Plant: the styrene storage tank (SN-902), two PEG storage tanks (SN-909 and SN-913), the HCl storage tank (SN-914), and three BCP permanent storage tanks (SN-916).

BCP Production

The BCP reaction is conducted in a continuous reactor which discharges into the R-101 vapor/liquid separation chamber. Reactant feed-stock is stored in the T-23 bulk tank (SN-911). Other reactants are introduced into the reactor in the gas section of the feed/recycle sparger. The off gas disengages from the liquid in the R-101 vapor/liquid separation chamber and is routed through the H-102 overhead condenser, the T-35R scrubber, and emission point SN-901.

The product is transferred to crude BCP storage tanks. The crude BCP is next pumped through the T-06 feed tank to a batch purification system to remove the light components and the heavy components. Heat for this purification system is supplied by a hot oil system (SN-912).

The purified product is collected in the T-10 receiver and stored in the T-02R bulk tank. Both T-10 and T-02R are vented through an activated carbon drum to SN-904. The final product is carbon treated, filtered, and then sold in bulk or drums.

Phosphorus Tribromide Production

Two reactants are reacted to form Phosphorus Tribromide (PBr₃) and a byproduct. The byproduct is passed through a scrubber and vented to the atmosphere as SN-901. PBr₃ product is drummed from the reactor.

The following tanks at the DBS Plant are subject to and shall comply with applicable provisions of 40 CFR Part 60 Subpart A – General Provisions and 40 CFR Part 60 Subpart Kb – VOL Storage Vessels: styrene storage tank (SN-902), two DBS storage tanks (SN-908), and two BCP storage tanks (SN-916).

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Specific Conditions

104. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Condition #110 and #112. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 31 - DBS Plant Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
901	Scrubber Vent	VOC	3.3	14.5
902	Styrene Storage Tank (T-24)	VOC	0.2	0.9
904	Carbon Bed Adsorber for BEB Tanks	VOC	0.1	0.5
908	DBS Storage Tanks (T-20A, T-20B)	VOC	0.1	0.5
916	BCP Permanent Storage Tanks	VOC	0.1	0.5
999	Fugitive Emissions from Equipment Leaks	VOC	1.5	6.3

105. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Condition #110 and #112. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 32 - DBS Plant Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
901	Scrubber Vent	BCP	3.30	14.50
		HBr	1.30	5.70
		HCl (HAP)	0.60	2.60
		PCl ₃	0.30	1.30
		PBr ₃	0.10	0.50
902	Styrene Storage Tank (T-24)	Styrene (HAP)	0.20	0.90
904	Carbon Bed Adsorber for BEB Tanks	BEB	0.10	0.50
908	DBS Storage Tanks (T-20A, T-20B)	DBS	0.10	0.50
914	HCl Storage Tank (T-201)	HCl	2.97	0.64
916	BCP Permanent Storage Tanks	BCP	0.10	0.50

106. The permittee is allowed to make three separate products at the DBS Plant: dibromostyrene (DBS), phosphorus tribromide (PBr₃), and 1-bromo-3-chloropropane (BCP). Other products may be produced without a permit modification if: [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- No new equipment with air contaminant emissions will be installed, other than insignificant sources (insignificant sources may be permitted via the administrative amendment process);
 - The worst-case emissions limits contained in this permit will not be exceeded. In addition, no new pollutants will be emitted. The permittee shall produce written emissions calculations and submit them to the Department pursuant to paragraph (d) below;
 - No new air pollution control requirements are triggered, such as provisions of 40 CFR Part 52, Part 60, Part 61, or Part 63;

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

- d. The permittee submits to the Department information concerning items in paragraph (a) thru (c) above at least 30-days prior to the production of the new product and the Department does not object during this 30-day period.

NSPS Subpart Kb

- 107. The Styrene Storage Tank (T-24, SN-902), the DBS Storage Tank (T-20A, SN-908), the DBS Storage Tank (T-20B, SN-908), the BCP Storage Tank (T-91, SN-916), and the BCP Storage Tank (T-92, SN-916) are all subject to and shall comply with applicable provisions 40 CFR Part 60 Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels for which Construction, Reconstruction, Or Modification Commenced After July 23, 1984. A copy of NSPS Subpart Kb is provided in Appendix E. [Regulation No. 19 §19.304 and 40 CFR 60, Subpart Kb]
- 108. The permittee shall keep readily accessible records showing the dimension of each storage vessel listed above and an analysis showing the capacity of each storage vessel listed above. [Regulation No. 19 §19.304 and 40 CFR 40 CFR §60.116b(b)]

Testing

- 109. The permittee shall measure the emissions from SN-901 during the production of the following products for the pollutants specified in Specific Conditions #104 and #105: Dibromostyrene (DBS), Phosphorus Tribromide (PBr₃), 1-Bromo-3-chloropropane (BCP) – during heavy removals, and PBr₃ and BCP simultaneous production. The permittee will test for VOC using Method 25A, and DBS, PBr₃, and BCP using the approved method. [Regulation No. 19 §19.702, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
 - a. The permittee shall test one of the above mentioned products which are produced every five years at this unit. The testing shall be conducted in accordance with an approved test method and Plantwide Condition 3.
 - b. If any product is not produced during any five year period, it shall be tested in accordance with Plantwide Condition 3 during the next production run lasting 30-days or more. During the testing, the plant shall be operated within 10 percent of the rated throughput capacity. Failure to test at the rated throughput capacity shall limit the production of the tested product to 10 percent above the tested throughput capacity.
 - c. A production run of less than 30-days shall not exclude that product from being tested if it has not been tested within the last five years.

Control Equipment Operating Parameters

- 110. The permittee shall replace the carbon canisters on SN-902 and SN-904 annually. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- 111. The permittee will keep records of the carbon canister replacement. The records will be kept onsite and made available to Department personnel upon request. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- 112. The HBr Vent (SN-901) shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

- a. The scrubber shall have a flow meter to measure the flow rate of the scrubbing liquor. The scrubber liquor flow rates shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
- b. The caustic concentration shall be measured once per day. The result shall be kept onsite and be available to Department personnel upon request.
- c. Should the scrubber liquor flow rate or caustic concentration drop below the minimum rate, as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document the duration of every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 33 - DBS Plant Scrubber Parameters

SN	Ctrl Equipment	Parameter	Units	Min. Limit
901	scrubber	liquor flow rate	gal/min	0.8
		caustic concentration in scrubbing liquor	%	2.5

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Bromine Recovery Units

SN-1001 – Bromine Recovery Unit (BRU-II)

SN-2001 - Bromine Recovery Unit (BRU-III)

SN-2099 - Fugitive Emissions from Equipment Vents

Bromine Recovery Unit

The Bromine Recovery Unit consists of equipment to recover bromine and chlorine from feed streams. The Bromine Recovery Unit consists of two units: BRU-II and BRU-III.

During the operation of each BRU, natural gas, combustion air, and the feed streams are fed to the oxidation system. Here, the halogenated organic feed streams are converted to carbon monoxide, carbon dioxide, hydrogen bromide, hydrogen chloride, and water vapor.

Next, the off-gases go to the halogen recovery system. In this system, HBr and HCl are absorbed from the gases into an aqueous system which is then sent to the bromine plant for further processing. The gases leave the halogen recovery system and go to tertiary oxidation where any remaining organics are destroyed. The gases leaving the unit are vented to the atmosphere through SN-1001 (BRU-II) and SN-2001 (BRU-III).

The typical recycle streams sent to the BRU-II unit for bromine recovery may contain more than 0.1% non-organics (ash). The venturi scrubber reduces the solids (ash) entrained in the gas stream. MeBr has a negligible amount of ash content, thus, the venturi scrubber needlessly consumes power and water. A 40" pressure differential across the venturi scrubber need not be maintained at the BRU-II during periods when the unit is processing exclusively MeBr for Bromine recovery.

Specific Conditions

113. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #115 thru #131. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 34 – Bromine Recovery Units Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
1001	Bromine Recovery Unit (BRU-II)	PM ₁₀	2.0	8.8
		SO ₂	0.1	0.5
		VOC	0.1	0.5
		CO	0.3	1.4
		NO _x	2.6	11.4
2001	Bromine Recovery Unit (BRU-III)	PM ₁₀	2.0	8.8
		SO ₂	0.1	0.5
		VOC	0.1	0.5
		CO	0.3	1.4
		NO _x	2.6	11.4
2099	Fugitive Emissions from Equipment Leaks	VOC	0.3	1.0

114. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #115 thru #131. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Table 35 - Bromine Recovery Units Non-Criteria Emission Rates

SN	Description	Pollutant	lb/hr	ton/yr
1001	Bromine Recovery Unit (BRU-II)	PM	2.0	8.8
		HCl (HAP)	1.30	5.70
		HBr	5.50	24.10
2001	Bromine Recovery Unit (BRU-III)	PM	2.0	8.8
		HCl (HAP)	1.30	5.70
		HBr	4.00	17.60

Bromine Recovery Unit II

115. The BRU-II (SN-1001) shall only burn natural gas or a reducing agent as the auxiliary fuel. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
116. The permittee shall not cause to be discharged to the atmosphere from SN-1001 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9. Compliance with the opacity limits shall be demonstrated by compliance with Specific Condition #122. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
117. The permittee is only allowed to burn the following waste streams in the BRU-II (SN-1001): [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 36 - Bromine Recovery Units Waste Streams

CD-75 still bottoms	DBS (from Project M)
PEG Extraction Oils (from DBS)	Terroicide
Off-specification materials (from DBS)	FF-680 TBE
FF-680 Decant Oils	Bromine tower bottoms
Lab materials	Polydibromostyrene recycle stream
Off-specification bromobenzene	Bromochloropropane recycle streams

The permittee shall obtain written permissions from the Department before burning other waste streams.

Control Equipment Operating Parameters

118. The pollution control system on the BRU-II (SN-1001) shall be operated so that it is able to achieve 99% HBr removal efficiency. [Regulation No. 19 §19.303, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
119. The permittee shall test SN-1001 for HBr removal efficiency in accordance with an approved test method and Plantwide Condition 3. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Testing

120. The permittee will test source SN-1001 every five years for particulate matter using EPA Reference Methods 5 and 202. The PM₁₀ test will use either EPA Reference Methods 201A and 202 or 5 and 202. By using Method 5 and 202 for PM₁₀, the facility will assume all collected particulate is PM₁₀. The permittee will conduct all tests in accordance with Plant Wide Condition #3. [§19.702 of Regulation 19, 40 CFR Part 52, Subpart E, §18.1002 of Regulation 18, and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
121. Every five years, the permittee shall test SN-1001 for NO_x, HCl, HBr, and CO in accordance with the methods specified in the following table and Plantwide Condition 3. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]

Table 37 – Bromine Recovery Units Test Methods

Method	Title
#7E	Determination of Nitrogen Oxide Emissions from Stationary Sources (Instrumental Analyzer Method)
#10B	CO from Stationary Sources
#26A	Determination Of Hydrogen Halide And Halogen Emissions From Stationary Sources
HBr sampling shall be consistent with Stack Sampling for Gaseous Pollutants from Texas Air Control Board's Sampling Procedures Manual or equal. HBr analysis shall follow NIOSH S175.	
The BRU-II procedure shall include three independent samplings, each of minimum one hour duration.	

122. During the compliance testing required by Specific Condition #120 and #121 at all times the BRU-II is operated thereafter, the permittee shall continuously monitor and record the venturi scrubber differential pressure and thermal oxidizer temperature. The venturi scrubber differential pressure shall not fall below 40" of water except when exclusively processing MeBr for Bromine recovery. The thermal oxidizer shall not fall below 1600° F. [Regulation No. 19 §19.303 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
123. The permittee shall maintain daily records of the dates and times that the BRU-II scrubber was dedicated exclusively to MeBr. The daily records shall be maintained onsite for a minimum of five years and be made available to Department personnel upon request. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Bromine Recovery Unit III

124. The BRU-III (SN-2001) shall only burn natural gas or a reducing agent as the auxiliary fuel. [Regulation No. 19 §19.705, A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, and CFR Part 52, Subpart E]
125. The permittee shall not cause to be discharged to the atmosphere from SN-2001 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9. Compliance with the opacity limits shall be demonstrated by compliance with Specific Condition #124. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

126. The permittee is only allowed to burn the following waste streams in the BRU-III (SN-2001):
 [Regulation No. 19 §19.705, CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 38 – Waste Streams for BRU-III

CD-75 still bottoms	DBS (from Project M)
PEG Extraction Oils (from DBS)	Terroicide
Off-specification materials (from DBS)	FF-680 TBE
FF-680 Decant Oils	Bromine tower bottoms
Lab materials	Polydibromostyrene recycle stream
Off-specification bromobenzene	Bromochloropropane recycle streams

The permittee shall obtain written permissions from the Department before burning other waste streams.

Control Equipment Operating Parameters

127. The pollution control system on the BRU-III (SN-2001) shall be operated so that it is able to achieve 99% HBr removal efficiency. [Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
128. The permittee shall test SN-2001 for HBr removal efficiency in accordance with an approved test method and Plantwide Condition 3. [Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Testing

129. The permittee will test source SN-2001 every five years for particulate matter using EPA Reference Methods 5 and 202. The PM₁₀ test will use either EPA Reference Methods 201A and 202 or 5 and 202. By using Method 5 and 202 for PM₁₀, the facility will assume all collected particulate is PM₁₀. The permittee will conduct all tests in accordance with Plant Wide Condition #3. [§19.702 of Regulation 19, 40 CFR Part 52, Subpart E, §18.1002 of Regulation 18, and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
130. Every five years, the permittee shall test SN-2001 for NO_x, HCl, HBr, and CO in accordance with the methods specified in the following table and Plantwide Condition 3. [Regulation No. 19 §19.702 and 40 CFR Part 52, Subpart E]

Table 39 – Bromine Recovery Units Test Methods

Method	Title
#7E	Determination of Nitrogen Oxide Emissions from Stationary Sources (Instrumental Analyzer Method)
#10B	CO from Stationary Sources
#26A	Determination Of Hydrogen Halide And Halogen Emissions From Stationary Sources
HBr sampling shall be consistent with Stack Sampling for Gaseous Pollutants from Texas Air Control Board's Sampling Procedures Manual or equal. HBr analysis shall follow NIOSH S175.	
The BRU-II procedure shall include three independent samplings, each of minimum one hour duration.	

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

131. During the compliance testing required by Specific Condition #129 and 130 and at all times the BRU-III is operated thereafter, the permittee shall continuously monitor and record the venturi scrubber differential pressure and thermal oxidizer temperature. The venturi scrubber differential pressure shall not fall below 40" of water and the thermal oxidizer temperature shall not fall below 1600°F. [Regulation No. 19 §19.303, Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
132. The permittee shall maintain daily records of the dates and times that the BRU-II scrubber was dedicated exclusively to MeBr. The daily records shall be maintained onsite for a minimum of five years and be made available to Department personnel upon request. [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

PDBS Production

SN-1101 – Pre-Polymerizer and Vacuum Pump Vent
SN-1104 – Process Dust Collector
SN-1106 – Vacuum Pellet Transport System
SN-1107 - Pre-Polymerizer and Vacuum Pump Vent (Line 2)
SN-1199 – Fugitive Emissions from Equipment Leaks

PDBS Plant

The PDBS process contains two production lines. Each line has its own polymerizer and extruder. Other equipment is shared between the two lines.

Raw materials are fed into the reactor where the polymerization of PDBS occurs. In Line 1, the polymerizer vents toluene vapors, which are routed through condensers and a vacuum pump. The residual vapors from these two streams are combined and emitted through vent SN-1101.

Line 2 operates in the same fashion as Line 1, except the residual vapors are routed through an additional final carbon filter before being emitted through vent SN-1107.

The raw PDBS material exiting the extruders is fed to an underwater pelletizer, where solidified strings of product are cut into pellets. The dust emissions from the dryer are vented to a baghouse dust collector (SN-1104). Other miscellaneous dust emission sources are routed to SN-1104, such as the supersack unloader, the LIW feeder, and the mixer. The dried PDBS pellet product is conveyed to a product hopper and packaging operations. Dust emissions from the product hopper are controlled with a baghouse (SN-1106).

In the solids pelletizing process, the powder is unloaded into a supersack unloader, fed through an LIW feeder, fed through a mixer, then charged to the extruder. The extruded product proceeds through a chiller and then to a pelletizer. The pellets are next conveyed to a product screener before proceeding to the product hopper and packaging operations. The particulate emissions from the chiller, pelletizer, and screener are controlled with baghouse SN-1104. Particulate emissions from the product hopper are controlled with baghouse SN-1106.

Specific Conditions

133. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #137 and #138. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 40 - PDBS Plant Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
1101	Pre-Polymerizer and Vacuum Pump Vent	VOC	1.5	6.6
1104	Process Dust Collector	PM ₁₀	0.6	2.7
1106	Vacuum Pellet Transport System	PM ₁₀	0.1	0.5
1107	Prepolymerizer and Vacuum Pump Vent	VOC	0.4	1.8
1199	Fugitive Emissions from Equipment Leaks	VOC	0.2	0.7

134. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this Specific Condition shall be demonstrated by compliance with Specific Conditions #137 and #138. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Table 41 - PDBS Plant Non-Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
1101	Pre-Polymerizer and Vacuum Pump Vent (Line 1)	Toluene (HAP) DBS	1.32 0.17	5.78 0.75
1104	Process Dust Collector	PM	0.6	2.7
1106	Vacuum Pellet Transport System	PM	0.1	0.5
1107	Prepolymerizer and Vacuum Pump Vent (Line 2)	Toluene DBS	0.3 0.4	1.32 1.76

135. The permittee shall not cause to be discharged to the atmosphere from SN-1104 and SN-1106 gases which exhibit opacity greater than 5%. The opacity shall be measured in accordance with EPA Reference Method 9. Compliance with the opacity limits shall be demonstrated by compliance with Specific Conditions #137 and #138. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
136. The permittee is allowed to produce PDBS derivatives, pellets from the Solids Pelletizing Process, and other products at the PDBS Plant without a permit modification if: [Regulation No. 19 §19.705, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- No new equipment with air contaminant emissions will be installed, other than insignificant sources (insignificant sources may be permitted via the administrative amendment process);
 - The worst-case emissions limits contained in this permit will not be exceeded. In addition, no new pollutants will be emitted. The permittee shall produce written emissions calculations and submit them to the Department pursuant to paragraph (d) below;
 - No new air pollution control requirements are triggered, such as provisions of 40 CFR Part 52, Part 60, Part 61, or Part 63;
 - The permittee submits to the Department information concerning items in paragraph (a) thru (c) above at least 30-days prior to the production of the new product and the Department does not object during this 30-day period.

Testing

137. The permittee shall measure the emissions from SN-1101 during production for VOC, PM/PM₁₀, Toluene and DBS. [Regulation No. 19 §19.702, 40 CFR Part 52, Subpart E, Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- The permittee shall test one or more of the products which are produced during each calendar year at the PDBS unit. Each product shall be tested at least once every five years.
 - If a product is not produced during any fiveyear period, it shall be considered a new product upon production. The permittee shall test each new product which is produced at the PDBS Plant for all permitted or any new pollutants which may be emitted from SN-1101. This test shall occur during the initial production run of the new product. The testing shall be in accordance with Plantwide Condition 3 and a test procedure which has been specifically approved by the Department prior to the testing.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

- c. During the testing, the plant shall be operated within 10 percent of the rated throughput. Failure to test at the rated throughput shall limit the production to 10 percent above the tested throughput.
- d. A production run of less than 30-days shall not exclude that product from being tested if it has not been tested within the last four years.

Control Equipment Operating Parameters

138. All baghouses associated with the PDBS Plant shall be kept in good working condition at all times and shall meet the conditions shown in the following table. [Regulation No. 19 §19.303, 40 CFR Part §64.6(c)(1), Regulation No. 18 §18.1104 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
- a. Each baghouse shall have a pressure drop device to measure the pressure drop across the baghouse. The pressure drop for each baghouse shall be read once each day and shall be recorded in a logbook. When the pressure drop is below 0.1 inches of H₂O, the permittee shall clean or replace the bag filters.
 - b. When the meter shows the pressure drop is below the parameters as specified in the following table, action shall be taken within 12 hours to remedy the situation. The permittee shall document every such situation in a logbook. The logbook shall be kept onsite and be available to Department personnel upon request.

Table 42 - PDBS Baghouse Pressure Drop

SN	Control Equipment	Parameter	Units	Minimum Operating Limits
1104	baghouse	pressure drop across baghouse	in. H ₂ O	0.1
1106	baghouse	pressure drop across baghouse	in. H ₂ O	0.1

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Pharmaceutical Chemicals Unit

Pharma 227ea is the only product produced at the unit. Pharma 227ea is produced in a unit that has no air emissions. The Pharma 227ea unit has insignificant sources listed in the insignificant source table.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN-102 - Sour Gas Flare

Great Lakes extracts feed brine from production wells throughout south/central Arkansas. Sour gas is separated from feed brine at each of the well locations and at each of the processing plants. The South and West Plant's sour gas is transported from the well locations and processing plants via pipeline to Great Lakes' Central Plant. From the Central Plant, Great Lakes routes the combined sour gas streams via pipeline to Lion Oil Company, a neighboring petroleum refinery. Great Lakes combined sour gas streams processed in Lion Oil's amine unit into a sweet gas. Sweet gas is returned to the Central Plant as fuel for the Central Plant's Boiler #2.

When Lion Oil's amine unit is not operating because of a planned, long-term outage, the combined sour gas streams are routed to the Central Plant's sodium hydrosulfide (NaHS) unit. NaHS is used as fuel in the Central Plant's Boiler #2. During unplanned and/or short-term outages of Lion Oil's amine unit, the Central Plant will flare the combined sour gas streams or each plant will flare its own sour gas stream.

In the event of a startup, shutdown, emergency condition or malfunction, or in the event of an unplanned outage of Lion Oil's amine unit or the Central Plant's NaHS unit, the South Plant's sour gas may be combusted at the South Plant's sour gas flare (SN-102) or sent to Great Lakes' Central Plant. The flare is equipped with a 0.125 MMBtu/hr natural gas pilot.

Specific Conditions

139. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this condition shall be demonstrated by compliance with Specific Conditions #141 and #143. [Regulation No. 19 §19.501 *et seq.* effective December 19, 2004, and 40 CFR Part 52, Subpart E]

Table 43 – Flare Criteria Emissions

SN	Description	Pollutant	lb/hr	ton/yr
102	Flare (pilot combustion)	PM ₁₀	0.1	0.5
		SO ₂	0.1	0.5
		VOC	0.1	0.5
		CO	0.1	0.5
		NO _x	0.1	0.5

140. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this condition shall be demonstrated by compliance with Specific Conditions #141 and #143. [Regulation No. 18 §18.801 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 44 - Flare Non-Criteria Emissions

SN	Description	Pollutant	lb/hr	Ton/yr
102	Flare (pilot combustion)	PM	0.1	0.1

141. The permittee shall burn only pipeline quality natural gas as a fuel for the pilot light. [Regulation No. 19 §19.705, A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, and CFR Part 52, Subpart E]
142. The permittee will maintain the opacity of the flare pilot below 5%. The permittee demonstrates compliance with Specific Condition #141 by burning natural gas. [Regulation No. 18 §18.501 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

143. The permittee may not flare sour gas (natural gas containing H₂S) unless a malfunction prevents the transfer of sour gas off site. The flare must be used exclusively for sour gas; no other process (gas or liquid) streams may be routed to the flare. [Regulation No. 19 §19.705, A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311, and CFR Part 52, Subpart E]
144. The permittee shall submit an upset condition report to ADEQ as required by Chapter 6 of Regulation 19 whenever gas is sent to the flare. [Regulation No. 18 §18.1004 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
145. The permittee shall maintain daily records of the amount of time that sour natural gas is routed to the flare. These records shall be kept onsite and shall be made available to Department personnel upon request. These records shall be submitted to the Department in accordance with General Provision #7. [Regulation No. 19 §19.705 and 40 CFR Part 52, Subpart E]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN-1501 - Testing Area

The testing area has a burning pan with approximate dimensions of 10 ft x 10 ft. The pan is filled with the combustible materials [wood, liquid fuel (normally heptane), and plastics] then ignited. The fire extinguishing agents are then applied and the results analyzed.

Emissions from these operations include products of fuel combustion, vaporized fire extinguishing agent, and fire extinguishing agent decomposition products (hydrogen fluoride and carbonyl fluoride). The sources involved with this process are grouped together as SN-1501.

Specific Conditions

146. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this condition shall be demonstrated by compliance with Specific Condition #148 and #150. [§19.501 of Regulation 19 and 40 CFR Part 52, Subpart E]

Table 45 – Testing Area Criteria Emissions

SN	Pollutant	lb/hr	
1501	PM ₁₀	16.0	0.4
	CO	85.0	2.1
	VOC	178.0	7.8
	NO _x	6.0	0.2

147. The permittee shall not exceed the emission rates set forth in the following table. Compliance with this condition shall be demonstrated by compliance with Specific Condition #148 and #150. [§18.801 of Regulation #18 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

Table 46 - Testing Area Non-Criteria Emissions

SN	Pollutant	lb/hr	lb/day	
1501	PM	16.0	NA	0.4
	Hydrogen Fluoride (HAP)	12.0	88.3*	0.6
	COF ₂ (Non-HAP)	19.8	146.4*	1.0

*Based on supplied modeling information

148. The permittee shall not exceed the consumption set forth in the following table: [§19.705 of Regulation 19 and 40 CFR Part 52, Subpart E]

Table 47 – Testing Area Production Limits

Material	lb/hr	Maximum lb/day	
Extinguishing Agent	150.0	1103	7.5
Fuel			48.0

149. The permittee shall maintain a copy of the Director's letter accepting the petition for open burning (Appendix F). [§19.705 of Regulation 19 and 40 CFR Part 52, Subpart E]
150. The permittee shall also maintain records of the amount of extinguishing agent used, the type of extinguishing agent used, the amount of fuel burned, and the type of fuel burned. The records shall be maintained on a daily, monthly, and running twelve month total basis. The daily records must be kept

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

current. Monthly records must be updated by the 15th day of the month following the month to which the records apply. The records shall be maintained onsite and made available to Department personnel upon request. A report of these values shall be submitted to the Department in accordance with General Provision #7. [§19.705 of Regulation 19 and 40 CFR Part 52, Subpart E]

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section I: COMPLIANCE PLAN AND SCHEDULE

Great Lakes Chemical Corporation will continue to operate in compliance with those identified regulatory provisions. The facility will examine and analyze future regulations that may apply and determine their applicability with any necessary action taken on a timely basis.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section II: PLANT WIDE CONDITIONS

1. The permittee will notify the Director in writing within thirty (30) days after commencing construction, completing construction, first placing the equipment and/or facility in operation, and reaching the equipment and/or facility target production rate. [Regulation No. 19 §19.704, 40 CFR Part 52, Subpart E, and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
2. If the permittee fails to start construction within eighteen months or suspends construction for eighteen months or more, the Director may cancel all or part of this permit. [Regulation No. 19 §19.410(B) and 40 CFR Part 52, Subpart E]
3. The permittee must test any equipment scheduled for testing, unless stated in the Specific Conditions of this permit or by any federally regulated requirements, within the following time frames: (1) New Equipment or newly modified equipment within sixty (60) days of achieving the maximum production rate, but no later than 180 days after initial start-up of the permitted source or (2) operating equipment according to the time frames set forth by the Department or within 180 days of permit issuance if no date is specified. The permittee must notify the Department of the scheduled date of compliance testing at least fifteen (15) days in advance of such test. The permittee will submit the compliance test results to the Department within thirty (30) days after completing the testing. [Regulation No.19 §19.702 and/or Regulation No.18 §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
4. The permittee must provide: [Regulation No. 19 §19.702 and/or Regulation No. 18 §18.1002 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
 - a. Sampling ports adequate for applicable test methods;
 - b. Safe sampling platforms;
 - c. Safe access to sampling platforms; and
 - d. Utilities for sampling and testing equipment.
5. The permittee must operate the equipment, control apparatus and emission monitoring equipment within the design limitations. The permittee will maintain the equipment in good condition at all times. [Regulation No. 19 §19.303 and A.C.A. §8-4-203 as referenced by A.C.A. §8-4-304 and §8-4-311]
6. This permit subsumes and incorporates all previously issued air permits for this facility. [Regulation No. 26 and A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]
7. The permittee must prepare and implement a Startup, Shutdown, and Malfunction Plan (SSM). If the Department requests a review of the SSM, the permittee will make the SSM available for review. The permittee must keep a copy of the SSM at the source's location and retain all previous versions of the SSM plan for five years. [Regulation No. 19 §19.304 and 40 CFR 63.6(e)(3)]

Title VI Provisions

8. The permittee must comply with the standards for labeling of products using ozone-depleting substances. [40 CFR Part 82, Subpart E]
 - a. All containers containing a class I or class II substance stored or transported, all products containing a class I substance, and all products directly manufactured with a class I substance must bear the required warning statement if it is being introduced to interstate commerce pursuant to §82.106.

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

- b. The placement of the required warning statement must comply with the requirements pursuant to §82.108.
 - c. The form of the label bearing the required warning must comply with the requirements pursuant to §82.110.
 - d. No person may modify, remove, or interfere with the required warning statement except as described in §82.112.
9. The permittee must comply with the standards for recycling and emissions reduction, except as provided for MVACs in Subpart B. [40 CFR Part 82, Subpart F]
- a. Persons opening appliances for maintenance, service, repair, or disposal must comply with the required practices pursuant to §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 §82.158.
 - c. Persons performing maintenance, service repair, or disposal of appliances must be certified by an approved technician certification program pursuant to §82.161.
 - d. Persons disposing of small appliances, MVACs, and MVAC-like appliances must comply with record keeping requirements pursuant to §82.166. ("MVAC-like appliance" as defined at §82.152.)
 - e. Persons owning commercial or industrial process refrigeration equipment must comply with leak repair requirements pursuant to §82.156.
 - f. Owners/operators of appliances normally containing 50 or more pounds of refrigerant must keep records of refrigerant purchased and added to such appliances pursuant to §82.166.
10. If the permittee manufactures, transforms, destroys, imports, or exports a class I or class II substance, the permittee is subject to all requirements as specified in 40 CFR Part 82, Subpart A, Production and Consumption Controls.
11. If the permittee performs a service on motor (fleet) vehicles when this service involves ozone-depleting substance refrigerant (or regulated substitute substance) in the motor vehicle air conditioner (MVAC), the permittee is subject to all the applicable requirements as specified in 40 CFR part 82, Subpart B, Servicing of Motor Vehicle Air Conditioners.
- The term "motor vehicle" as used in Subpart B does not include a vehicle in which final assembly of the vehicle has not been completed. The term "MVAC" as used in Subpart B does not include the air-tight sealed refrigeration system used as refrigerated cargo, or the system used on passenger buses using HCFC-22 refrigerant.
12. The permittee can switch from any ozone-depleting substance to any alternative listed in the Significant New Alternatives Program (SNAP) promulgated pursuant to 40 CFR Part 82, Subpart G, "Significant New Alternatives Policy Program".

Permit Shield

13. Compliance with the conditions of this permit shall be deemed compliance with all applicable requirements, as of the date of permit issuance, included in and specifically identified in Table 7 - Applicable Regulations of this condition.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

- a. The permit specifically identifies the following as applicable requirements based upon the information submitted by the permittee in an application dated .

Table 48 - Applicable Regulations

Source No.	Regulation	Description
Facility	Arkansas Regulation #19	Regulations of the Arkansas Plan of Implementation for Air Pollution Control (SIP)
Facility	Arkansas Regulation #26	Regulations of the Arkansas Operating Air Permit Program
Facility	40 CFR Part 61 (NESHAP)Subpart M	Asbestos
Facility	40 CFR Part 61 (NESHAP)Subpart FF	Benzene Waste Operations
Utilities		
07	40 CFR Part 60 (NSPS) Subpart Dc	Small Steam Generating Units
PHT-4 Plant		
PHT-4 Plant(PHT-4 Production)	40 CFR Part 63 (NESHAP) Subparts F, G, & H	Hazardous Organic NESHAP(HON)
DBS Plant		
902 (T-24)	40 CFR Part 60 (NSPS)Subpart Kb	VOL Storage Vessels
908 (T-20A)	40 CFR Part 60 (NSPS)Subpart Kb	VOL Storage Vessels
908 (T-20B)	40 CFR Part 60 (NSPS)Subpart Kb	VOL Storage Vessels
916 (T-91)	40 CFR Part 60 (NSPS)Subpart Kb	VOL Storage Vessels
916 (T-92)	40 CFR Part 60 (NSPS)Subpart Kb	VOL Storage Vessels

- b. The permit specifically identifies the following as inapplicable based upon information submitted by the permittee in an application dated .

Table 49 - Inapplicable Regulations

Source No.	Regulation	Description	Basis for Determination
Facility	40 CFR Part 60Subpart VV	SOCMI VOC Equipment Leaks	None of the chemicals listed in 40 CFR 60.489 are produced at this facility.
Facility	40 CFR Part 60Subpart III	SOCMI Air Oxidation Units	There are no air oxidation units at the facility.
Facility	40 CFR Part 60Subpart NNN	SOCMI Distillation Operations	None of the chemicals listed in 40 CFR 60.667 are produced at this facility.

Facility: Great Lakes Chemical Corporation**Permit No.: 873-AOP-R5****AFIN: 70-00037**

Source No.	Regulation	Description	Basis for Determination
Facility	40 CFR Part 60 Subpart RRR	SOCMI Reactor Units	None of the chemicals listed in 40 CFR 60.707 are produced at this facility.
Facility	40 CFR Part 61Subpart V	Equipment Leaks of VHAP	This facility does not use or produce benzene or vinyl chloride.
Utilities			
02	40 CFR Part 60 Subpart Db	Steam Generating Units	Installed in 1973
03	40 CFR Part 60 Subpart Dc	Small Steam Generating Units	Installed in 1985
PHT-4 Plant			
PHT-4 Plant (PHT-4 Diol & NaBr)	40 CFR Part 63 Subpart F, G, & H	Hazardous Organic NESHAP(HON)	"Primary Product" qualifier
SN-604	40 CFR Part 60 Subpart Kb	VOL Storage Vessels	Because this tank is subject to the HON, it is not subject to 40 CFR Part 60 Subpart Kb(see 40 CFR §63.110(b)).

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section III: INSIGNIFICANT ACTIVITIES

The following sources are insignificant activities. Any activity that has a state or federal applicable requirement is a significant activity even if this activity meets the criteria of §304 of Regulation 26 or listed in the table below. Insignificant activity determinations rely upon the information submitted by the permittee in an application dated **2/17/2005 and June 3, 2005**.

Table 50 - INSIGNIFICANT ACTIVITIES

Description	Category
Aerosol Can Crusher (Miscellaneous)	A-13
Laboratory Experimental Station (Miscellaneous)	A-5
SN-403, Propylene Glycol Storage Tank (T-31) (FF-680)	A-13
TBE Storage Tank (T-32) (FF-680)	A-3
Mother Liquor Tank (FF-680)	A-3
Hydrazine Make-up Tank (T-35) (FF-680)	A-3
SN-409, Phenol Charge Tank (T-13), (FF-680)	A-3
Mother Liquor Storage Tank, (FF-680)	A-3
Propylene Glycol Separator, (FF-680)	A-3
Propylene Glycol Blend Tank, (FF-680)	A-3
Phenol Charge Tank (FF-680)	A-2
SN-506, T-702 Storage Tank (T-702) (CD-75)	A-3
Glicol Tank, (CD-75)	A-3
SN-514, CDDT Storage Tank (T-905) (CD-75)	A-13
Wastewater Check Tank (T-514) (CD-75)	A-13
Hot Oil Unit, 4.0 MMBtu/hr (PHT-4)	A-1
TCP Heavies Tank (FCU)	A-13
Flash Evaporator Hold Tank (FCU)	A-3

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

SN-814, Process Drying and Regeneration (FCU)	A-13
Wastewater Tank (FCU)	A-13
Hot Oil Unit, 1.5 MMBtu/hr (FCU)	A-1
Hot Oil Unit, 0.712 MMBtu/hr (FCU)	A-1
Hot Oil Unit, 0.55 MMBtu/hr (FCU)	A-1
Hot Oil Unit, 0.5 MMBtu/hr (FCU)	A-1
Feed/Intermediate Storage Tank (DBS)	A-3
DBS Hot Oil System	A-1
Step 2 Intermediate Storage Tank (DBS)	A-3
Step 2 Intermediate Storage Tank (DBS)	A-3
Final Product Int Storage Tank (DBS)	A-3
Final Product Int Storage Tank (DBS)	A-3
Propylene Glycol Storage Tank (DBS)	A-3
Propylene Glycol Day Tank (DBS)	A-3
Step III Process Vent (DBS)	A-13
CL-112 Vacuum Jet (DBS)	A-13
Boiler (PCU)	A-1
SN-1102 DBS Feed/Storage Tank (PDBS)	A-3
SN-1103 Toluene Mix Tank (PDBS)	A-2

Pursuant to §26.304 of Regulation 26, the Department determined the emission units, operations, or activities contained in Regulation 19, Appendix A, Group B, to be insignificant activities. Activities included in this list are allowable under this permit and need not be specifically identified.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Section IV: GENERAL PROVISIONS

1. Any terms or conditions included in this permit which specify and reference Arkansas Pollution Control & Ecology Commission Regulation No. 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 *et seq.*) as the sole origin of and authority for the terms or conditions are not required under the Clean Air Act or any of its applicable requirements, and are not federally enforceable under the Clean Air Act. Arkansas Pollution Control & Ecology Commission Regulation 18 was adopted pursuant to the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 *et seq.*). Any terms or conditions included in this permit which specify and reference Arkansas Pollution Control & Ecology Commission Regulation 18 or the Arkansas Water and Air Pollution Control Act (A.C.A. §8-4-101 *et seq.*) as the origin of and authority for the terms or conditions are enforceable under this Arkansas statute.[40 CFR 70.6(b)(2)]
2. This permit shall be valid for a period of five (5) years beginning on the date this permit becomes effective and ending five (5) years later. [40 CFR 70.6(a)(2) and §26.701(B) of the Regulations of the Arkansas Operating Air Permit Program (Regulation 26), effective September 26, 2002]
3. The permittee must submit a complete application for permit renewal at least six (6) months before permit expiration. Permit expiration terminates the permittee's right to operate unless the permittee submitted a complete renewal application at least six (6) months before permit expiration. If the permittee submits a complete application, the existing permit will remain in effect until the Department takes final action on the renewal application. The Department will not necessarily notify the permittee when the permit renewal application is due. [Regulation No. 26 §26.406]
4. Where an applicable requirement of the Clean Air Act, as amended, 42 U.S.C. 7401, *et seq.* (Act) is more stringent than an applicable requirement of regulations promulgated under Title IV of the Act, the permit incorporates both provisions into the permit, and the Director or the Administrator can enforce both provisions. [40 CFR 70.6(a)(1)(ii) and Regulation No. 26 §26.701(A)(2)]
5. The permittee must maintain the following records of monitoring information as required by this permit. [40 CFR 70.6(a)(3)(ii)(A) and Regulation No. 26 §26.701(C)(2)]
 - a. The date, place as defined in this permit, and time of sampling or measurements;
 - b. The date(s) analyses performed;
 - c. The company or entity performing the analyses;
 - d. The analytical techniques or methods used;
 - e. The results of such analyses; and
 - f. The operating conditions existing at the time of sampling or measurement.
6. The permittee must retain the records of all required monitoring data and support information for at least five (5) years from the date of the monitoring sample, measurement, report, or application. Support information includes all calibration and maintenance records and all original strip-chart recordings for continuous monitoring instrumentation, and copies of all reports required by this permit. [40 CFR 70.6(a)(3)(ii)(B) and Regulation No. 26 §26.701(C)(2)(b)]
7. The permittee must submit reports of all required monitoring every six (6) months. If permit establishes no other reporting period, the reporting period shall end on the last day of the anniversary month of the initial Title V permit. The report is due within thirty (30) days of the end of the reporting period.

Facility: Great Lakes Chemical Corporation
Permit No.: 873-AOP-R5
AFIN: 70-00037

Although the reports are due every six months, each report shall contain a full year of data. The report must clearly identify all instances of deviations from permit requirements. A responsible official as defined in Regulation No. 26 §26.2 must certify all required reports. The permittee will send the reports to the address below: [40 CFR. 70.6(a)(3)(iii)(A) and §26.701(C)(3)(a) of Regulation #26]

Arkansas Department of Environmental Quality
Air Division
ATTN: Compliance Inspector Supervisor
Post Office Box 8913
Little Rock, AR 72219

8. The permittee will report to the Department all deviations from permit requirements, including those attributable to upset conditions as defined in the permit.
 - a. For all upset conditions (as defined in Regulation 19.601), the permittee will make an initial report to the Department by the next business day after the discovery of the occurrence. The initial report may be made by telephone and shall include:
 - i. The facility name and location,
 - ii. The process unit or emission source deviating from the permit limit,
 - iii. The permit limit, including the identification of pollutants, from which deviation occurs,
 - iv. The date and time the deviation started,
 - v. The duration of the deviation,
 - vi. The average emissions during the deviation,
 - vii. The probable cause of such deviations,
 - viii. Any corrective actions or preventive measures taken or being taken to prevent such deviations in the future, and
 - ix. The name of the person submitting the report.

The permittee will make a full report in writing to the Department within five (5) business days of discovery of the occurrence. The report must include, in addition to the information required by the initial report, a schedule of actions taken or planned to eliminate future occurrences and/or to minimize the amount the permit's limits were exceeded and to reduce the length of time the limits were exceeded. The permittee may submit a full report in writing (by facsimile, overnight courier, or other means) by the next business day after discovery of the occurrence, and the report will serve as both the initial report and full report.

- b. For all deviations, the permittee will report such events in semi-annual reporting and annual certifications required in this permit. This includes all upset conditions reported in 8a. above. The semi-annual report must include all the information as required in the initial and full report required in 8a. [40 CFR 70.6(a)(3)(iii)(B), Regulation No. 26 §26.701(C)(3)(b), Regulation No. 19 §19.601 and §19.602]
9. If any provision of the permit or the application thereof to any person or circumstance is held invalid, such invalidity will not affect other provisions or applications hereof which can be given effect without the invalid provision or application, and to this end, provisions of this Regulation are declared to be

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

separable and severable. [40 CFR 70.6(a)(5), §26.701(E) of Regulation No. 26, and A.C.A. §8-4-203, as referenced by §8-4-304 and §8-4-311]

10. The permittee must comply with all conditions of this Part 70 permit. Any permit noncompliance with applicable requirements as defined in Regulation No. 26 constitutes a violation of the Clean Air Act, as amended, 42 U.S.C. §7401, *et seq.* and is grounds for enforcement action; for permit termination, revocation and reissuance, for permit modification; or for denial of a permit renewal application. [40 CFR 70.6(a)(6)(i) and Regulation No. 26 §26.701(F)(1)]
11. It shall not be a defense for a permittee in an enforcement action that it would have been necessary to halt or reduce the permitted activity to maintain compliance with the conditions of this permit. [40 CFR 70.6(a)(6)(ii) and Regulation No. 26 §26.701(F)(2)]
12. The Department may modify, revoke, reopen and reissue the permit or terminate the permit for cause. The filing of a request by the permittee for a permit modification, revocation and reissuance, termination, or of a notification of planned changes or anticipated noncompliance does not stay any permit condition. [40 CFR 70.6(a)(6)(iii) and Regulation No. 26 §26.701(F)(3)]
13. This permit does not convey any property rights of any sort, or any exclusive privilege. [40 CFR 70.6(a)(6)(iv) and Regulation No. 26 §26.701(F)(4)]
14. The permittee must furnish to the Director, within the time specified by the Director, any information that the Director may request in writing to determine whether cause exists for modifying, revoking and reissuing, or terminating the permit or to determine compliance with the permit. Upon request, the permittee must also furnish to the Director copies of records required by the permit. For information the permittee claims confidentiality, the Department may require the permittee to furnish such records directly to the Director along with a claim of confidentiality. [40 CFR 70.6(a)(6)(v) and Regulation No. 26 §26.701(F)(5)]
15. The permittee must pay all permit fees in accordance with the procedures established in Regulation No. 9. [40 CFR 70.6(a)(7) and Regulation No. 26 §26.701(G)]
16. No permit revision shall be required, under any approved economic incentives, marketable permits, emissions trading and other similar programs or processes for changes provided for elsewhere in this permit. [40 CFR 70.6(a)(8) and Regulation No. 26 §26.701(H)]
17. If the permit allows different operating scenarios, the permittee will, contemporaneously with making a change from one operating scenario to another, record in a log at the permitted facility a record of the operational scenario. [40 CFR 70.6(a)(9)(i) and Regulation No. 26 §26.701(I)(1)]
18. The Administrator and citizens may enforce under the Act all terms and conditions in this permit, including any provisions designed to limit a source's potential to emit, unless the Department specifically designates terms and conditions of the permit as being federally unenforceable under the Act or under any of its applicable requirements. [40 CFR 70.6(b) and Regulation No. 26 §26.702(A) and (B)]
19. Any document (including reports) required by this permit must contain a certification by a responsible official as defined in Regulation No. 26 §26.2. [40 CFR 70.6(c)(1) and Regulation No. 26 §26.703(A)]
20. The permittee must allow an authorized representative of the Department, upon presentation of credentials, to perform the following: [40 CFR 70.6(c)(2) and Regulation No. 26 §26.703(B)]

Facility: Great Lakes Chemical Corporation

Permit No.: 873-AOP-R5

AFIN: 70-00037

- a. Enter upon the permittee's premises where the permitted source is located or emissions-related activity is conducted, or where records must be kept under the conditions of this permit;
 - b. Have access to and copy, at reasonable times, any records required under the conditions of this permit;
 - c. Inspect at reasonable times any facilities, equipment (including monitoring and air pollution control equipment), practices, or operations regulated or required under this permit; and
 - d. As authorized by the Act, sample or monitor at reasonable times substances or parameters for assuring compliance with this permit or applicable requirements.
21. The permittee will submit a compliance certification with the terms and conditions contained in the permit, including emission limitations, standards, or work practices. The permittee must submit the compliance certification annually within 30 days following the last day of the anniversary month of the initial Title V permit. The permittee must also submit the compliance certification to the Administrator as well as to the Department. All compliance certifications required by this permit must include the following: [40 CFR 70.6(c)(5) and Regulation No. 26 §26.703(E)(3)]
 - a. The identification of each term or condition of the permit that is the basis of the certification;
 - b. The compliance status;
 - c. Whether compliance was continuous or intermittent;
 - d. The method(s) used for determining the compliance status of the source, currently and over the reporting period established by the monitoring requirements of this permit; and
 - e. Such other facts as the Department may require elsewhere in this permit or by §114(a)(3) and §504(b) of the Act.
22. Nothing in this permit will alter or affect the following: [Regulation No. 26 §26.704(C)]
 - a. The provisions of Section 303 of the Act (emergency orders), including the authority of the Administrator under that section;
 - b. The liability of the permittee 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 §408(a) of the Act or,
 - d. The ability of EPA to obtain information from a source pursuant to §114 of the Act.
23. This permit authorizes only those pollutant-emitting activities addressed in this permit. [A.C.A. §8-4-203 as referenced by §8-4-304 and §8-4-311]

**Appendix A 40 CFR Part 60, Subpart Dc - Standards of Performance for Small
Industrial-Commercial-Institutional Steam Generating Units**

**Appendix B Part 63, Subpart F – National Emission Standards for Organic Hazardous
Air Pollutants from the Organic Chemical Manufacturing Industry**

**Appendix C Part 63, Subpart G – National Emission Standards for Organic Hazardous
Air Pollutants from the Organic Chemical Manufacturing for Process Vents,
Storage Vessels, Transfer Operations, and Wastewater**

**Appendix D Part 63, Subpart H – National Emission Standards for Organic Hazardous
Air Pollutants for Equipment Leaks**

**Appendix E 40 CFR 60 Subpart Kb—Standards of Performance for Volatile Organic
Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for
Which Construction, Reconstruction, or Modification Commenced After
July 23, 1984**

Appendix F Director's Opacity Waiver

**Appendix G Subpart FFFF--NATIONAL EMISSION STANDARDS FOR HAZARDOUS
AIR POLLUTANTS: MISCELLANEOUS ORGANIC CHEMICAL
MANUFACTURING**

**Appendix H Subpart DDDDD--NATIONAL EMISSION STANDARDS FOR
HAZARDOUS AIR POLLUTANTS FOR INDUSTRIAL, COMMERCIAL,
AND INSTITUTIONAL BOILERS AND PROCESS HEATERS**