

FORREST COUNTY - HATTIESBURG MS
HERCULES INC
0800-00001
PERMIT APPLICATION 2003

AI 002022

**APPLICATION FOR AN AIR EMISSIONS PERMIT
TO OPERATE A TITLE V MAJOR SOURCE**

Prepared for:

HERCULES

**HERCULES INCORPORATED
HATTIESBURG PLANT
613 WEST SEVENTH STREET
HATTIESBURG, MISSISSIPPI 39401
FORREST COUNTY**

Prepared by:

ECS 
Environmental Compliance Services, Inc.

**ENVIRONMENTAL COMPLIANCE SERVICES, INC.
P.O. BOX 891
TUPELO, MISSISSIPPI 38802
(662) 840-5945**

April 29, 2003

HERCULES

November 17, 2003

Hercules Incorporated
613 West 7th Street
Hattiesburg, MS 39401
(601) 545-3450
Fax: (601) 584-3226
www.herc.com

CERTIFIED MAIL – RETURN RECEIPT REQUESTED
CERT. NO. 7001 2510 0008 8523 7076

Toby M. Cook, P. E., Chief
Chemical Manufacturing Branch
Environmental Permits Division
Mississippi Department of Environmental Quality
P. O. Box 10385
Jackson, Ms 39289-0289

Re: Hercules Incorporated
Forrest County
Title V Permit Renewal Application
Permit Ref. No. 0800-00001

Dear Mr. Cook:

Please find the enclosed revised/update pages as follows.

- 1) Page 20 in the application is revised accordingly for the Standards of Performance for Volatile Organic Liquid Storage Vessels, Final rule; amendments, published in the Federal Register/ Vol. 68, No. 199/ Wednesday, October 15, 2003.
- 2) Hercules Incorporated has agreed to permit burning Natural Gas only in the two existing boilers AM001 and AM002. Accordingly, the fuel burning equipment calculations in Appendix B have been revised.
- 3) The Emissions Summary on page 18 has been revised with signature.
- 4) Other applicable page updates are enclosed.

If I can provide any additional information, please contact Charles Jordan at 601-545-3450 extension 360.

Very truly yours,

HERCULES INCORPORATED


Walter D. Langhans
Plant Manager

cc: Carla Brown, Chemical Manufacturing Branch
Environmental Permits Division
Mississippi Department of Environmental Quality
P. O. Box 10385
Jackson, Ms 39289-0289



2022

DAN
COPY

April 29, 2003

Mr. Toby Cook, P.E., Chief
Chemical Manufacturing Branch
Environmental Permits Division
Mississippi Department of Environmental Quality
P.O. Box 10385
Jackson, MS39289-0385

Re: Hercules, Inc.
Air Ref. No. 0800-00001
Title V Permit Renewal Application

Dear Mr. Cook:

Hercules Incorporated retained the services of Environmental Compliance Services, Inc. to prepare the Title V Operating Permit (TVOP) renewal application for the above-referenced facility. Enclosed please find two (2) copies of an *Application for Title V Air Pollution Control Permit to Operate Air Emissions Equipment*.

If you have any questions concerning the enclosed information, please contact Charlie Jordan of Hercules at (601) 584-3360 or myself at (662) 840-5945.

Sincerely,
Environmental Compliance Services, Inc.

A handwritten signature in blue ink, appearing to read "Brian Ketchum".

Brian Ketchum, P.E.
Senior Engineer

Enclosures

**APPLICATION FOR AN AIR EMISSIONS PERMIT
TO OPERATE A TITLE V MAJOR SOURCE**

Prepared for:

HERCULES

**HERCULES INCORPORATED
HATTIESBURG PLANT
613 WEST SEVENTH STREET
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FORREST COUNTY**

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ECS 
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April 29, 2003



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- Figure 1: Site Location Map
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- Stack Testing Results
- Mass Balance Spreadsheets (Capacity and Actuals)

1.0 INTRODUCTION

Hercules Incorporated – Hattiesburg Plant (Hercules) is located at 613 West 7th Street in Hattiesburg, Mississippi (see Figure 1 - Site Location Map). Hercules retained the services of Environmental Compliance Services, Inc. (ECS) to prepare the facility's Title V Operating Permit (TVOP) renewal application. The facility's TVOP expires November 1, 2003, and a renewal application is required to be submitted 180 days prior to the permit expiration.

Hercules is a specialty chemical manufacturing facility, which produces various Rosin Derivatives and Paper Chemicals. The facility is divided into two (2) fundamental processing areas – Rosin Derivatives and Paper Chemicals (see Figure 2 - Facility Diagram). The Rosin Derivatives Areas include the Poly-Pale Process Area (AC-000), the Rosin Amine Derivatives (AF-000) and Ethylene Oxide Derivatives (AF-000(EO)) Process Area, the Hard Resins Process Area (AG-000), the Rosin Shed Process Area (AH-000), and the Rosin Distillation Process Area. The Paper Chemicals Areas include the Kymene Process Area (AA-000), the Paracol/AKD Process Area (AB-000), and the Neuphor Process Area (AD-000). Facility process operations generate air pollutant emissions primarily in the form of particulate matter (PM), volatile organic compounds (VOC) and hazardous air pollutants (HAPs), while PM, sulfur dioxide (SO₂), nitrogen oxides (NO_x), carbon monoxide (CO), and VOC are emitted from the facility fuel burning equipment.

This report includes a facility description in Section 2.0; a State and Federal (air) environmental regulatory review in Section 3.0; and an air pollutant emissions inventory, including the methodology used to calculate the emissions in Section 4.0. The State of Mississippi TVOP renewal application and emissions calculations are attached in Appendix A and Appendix B, respectively. For information or inquiries regarding the attached application or supporting documentation, the technical contacts are provided below:

Brian Ketchum, P.E.
Environmental Compliance Services, Inc.
P.O. Box 891
Tupelo, Mississippi 38802
(662) 840-5945

Charlie Jordan
Hercules Incorporated
613 West 7th Street
Hattiesburg, Mississippi 39401
(601) 584-3360

2.0 FACILITY DESCRIPTION

Hercules manufactures various Resin and Paper specialty chemicals, and facility operations fall under the Standard Industrial Classification (SIC) codes 2861, 2821, 2869, and 2899. The facility's current maximum production capacity is approximately 3,108,960 pounds per day. As discussed in Section 1.0, the facility is divided into two (2) fundamental chemical processing areas – Paper Chemicals and Rosin Derivatives.

2.1 PAPER CHEMICAL PROCESSES

2.1.1 Kymene Process Area

Kymene products are specialty chemicals used primarily as internal sizing agents in the manufacturing of paper. They are used in consumer paper products, personal care products, paper towels, tissues, and writing and publication paper. Kymenes are water-soluble, low molecular weight, cross-lined polyamine resins. The Kymene Process Area (AA-000) typically produces a variety of Kymene products. The Kymene products are produced in two (2) batch reactors – a 3,000 gallon Polymer reactor and a 5,000 gallon Kymene reactor, which are both vented to a water scrubber (AA-001). Numerous process tanks (raw material tanks, scale tanks, work tanks, and product tanks) associated with the area processes are listed in Section C - Insignificant Activities of the TVOP renewal application. The raw material tanks, scale tanks, and work tanks are used to supply the Kymene reactors. The materials in the reactors are allowed to polymerize at controlled temperatures and concentrations to form water-soluble amine polymers. The finished products are then filtered and pumped to product storage tanks prior to shipping.

Emissions associated with the Kymene process primarily include reactor losses from displacement and thermal expansion; tank losses from raw material and product storage; and fugitive losses from the process equipment. A water scrubber (AA-001) controls VOC and HAP emissions from the reactors, and a dust collector (AA-002) controls PM emissions from the loading of powdered adipic acid to the Polymer reactor.

2.1.2 Paracol/AKD Process Area

Alkyl Ketene Dimer (AKD) dispersions and Wax dispersions are manufactured in the Paracol/AKD Process Area (AB-000). These specialty chemicals are used primarily as internal and surface sizing agents in the manufacturing of paper. AKD and Wax dispersions can be processed continuously. Materials used for the process include both liquid and dry raw materials, and the finished products are stored in product storage tanks and tote bins prior to shipping.

The manufacturing scheme is similar for the production of both AKD and Wax dispersions. A water (soluble) phase is produced, and an organic phase is melted and held at elevated temperatures above the AKD and Wax melting point(s). The two phases are brought together under controlled flows, temperature, and pressure. The emulsion produced is cooled to produce the dispersion and is then transferred to work tanks. The AKD or Wax dispersion is treated with biocide and stabilizing chemicals and corrected to the final solids percentage. The on-grade resin dispersion is either packaged in tote bins or stored in bulk storage for shipping.

Emissions associated with the Paracol/AKD process include tank losses from raw material and product storage; fugitive losses from the equipment; and losses from the AKD melter. The numerous process tanks (raw material tanks, work tanks, and product tanks) associated with the area processes are listed in Section C - Insignificant Activities of the TVOP renewal application. A common vent system water scrubber (AB-001) controls PM and VOC emissions from the dry material loading areas, the melter, and the water phase make-up units.

2.1.3 Neuphor Process Area

The Neuphor Process Area (AD-000) can produce a variety of resin dispersions. Some of the dispersions are used primarily as internal sizing agents in the manufacturing of paper. For example they are used in bleached, unbleached, and recycled boxboard grades and printing and writing paper. Other resin dispersions manufactured in the Neuphor Process Area are used as adhesives, coatings, and binders in diverse industrial applications. The resin dispersions can be continuously produced using both dry and liquid materials. A water phase is produced, and an organic phase is adducted in a reactor and held at elevated temperatures (above the resin melting

point). The two phases are brought together under controlled flow(s), temperature, and pressure to produce an emulsion. The resin emulsion is cooled to produce a resin dispersion and transferred to work tanks to be treated with biocides, stabilizing chemicals, and corrected for final solids count. The on-grade product can be packaged in tote bins or stored in bulk storage tanks prior to shipping.

Emissions associated with the Neuphor Process Area include tank losses from raw material and product storage; fugitive losses from the process equipment; and losses from the Adduct Reactor. A water scrubber and activated carbon absorption system (formerly AD-001) is used to control odor and emissions from the Adduct Reactor. Using the Tanks 4.0 Program and the tank (or reactor) process conditions, pre-control VOC emissions are estimated at less than 1.0 pounds per hour. This information is detailed in a Title V permit modification request to the Mississippi Department of Environmental Quality dated January 22, 2001, which resulted in a TVOP modification on May 23, 2002.

2.2 ROSIN DERIVATIVE PROCESSES

2.2.1 Poly-Pale Process Area

Poly-Pale is manufactured in the Poly-Pale Process Area (AC-000). Poly-Pale can be produced continuously by the acid-catalyzed dimerization of blended resins in a solvent (Toluene) solution. By-products of the Poly-Pale process include Melhi, Pexoil (light ends), and weak acid (~40% H₂SO₄). The gum rosin is de-drummed, melted in the Rosin Melter (AC-004), and stored in a heated bulk storage tank. The gum rosin is blended with a higher grade resin, received by railcar, prior to being processed. The process consists of rosin-solvent mixing; polymerization; separation; hydrolysis; decomposition; washing (residual acidity removal); solvent evaporation; heat treatment (bleaching); and product storage and plant transfer. As a result of the evaporation process, the solvent is recaptured and reused in the process.

Emissions associated with the Poly-Pale Process Area include losses resulting from displacement and thermal expansion; tank losses from raw material and product storage; fugitive losses from the process equipment; and losses from the Rosin Melter. Two common vent systems with water scrubbers are used to control sulfur oxides (SO_x), VOC, and HAP (Toluene) emissions from the

process equipment. Approximately one-half of the process equipment is vented to the West water scrubber (AC-002), while other process equipment vents to the East water scrubber (AC-003).

2.2.2 Rosin Amine Derivatives (RAD) Process Area

The Rosin Amine Derivatives Process Area (AF-000) produces Rosin Amine Derivatives (RAD) and the Ethylene Oxide Derivatives Process Area (AF-000(EO)) produces Ethylene Oxide Derivatives (EOD). RAD includes the production of specialty chemicals such as Amines and Amine Acetates, while EOD specialty chemical production includes Polyrads and Surfactants. These specialty chemicals are used primarily as corrosion inhibitors for various industrial applications such as hydrochloric acid and petroleum refining equipment. The detergent properties of these products aid in loosening and dispersing scale.

RAD products are produced using the following manufacturing processes: rosin ammoniation in the presence of a metal catalyst to produce crude Nitrile; batch distillation of crude Nitrile to produce distilled Nitrile; hydrogenation of distilled Nitrile in the presence of a metal catalyst to produce Amine; and various blending operations to produce Amine Acetates. EOD are produced by reacting Ethylene Oxide (EO) with various feed resins and various blending operations.

Emissions associated with the Rosin Amine Derivative Process Area include reactor losses; tank losses from raw material and product storage; and fugitive losses from process equipment. A water scrubber (AF-002) is used to control ammonia emissions from the RAD ammoniation reactor vent for reasons of personnel safety. The EO reactor vent, storage tank, and process lines vent to the EO scrubber (AF-004(EO)), which uses sulfuric acid as a circulating media to convert EO to Ethylene Glycol. The numerous process tanks (raw material tanks, work tanks, and product tanks) associated with the area processes are listed in Section C - Insignificant Activities of the TVOP renewal application.

2.2.3 Hard Resins Process Area

Several resin derivatives are produced in the Hard Resins Process Area (AG-000). The area produces products, primarily simple esters, in five (5) batch kettle reactors. Hard Resins

products are used in many diverse and varied industrial and food-grade applications, such as adhesives and chewing gum. The esterification reaction is assisted by the use of a catalyst and the addition of antioxidants. The kettles allow feed resins and other essential materials, such as glycerine, to react under specified and controlled conditions to produce a variety of desired products. Feed resins and other raw materials are stored in bulk storage tanks, drums, or bags. The process tanks (raw material tanks, work tanks, and product tanks) associated with the area are listed in Section C - Insignificant Activities of the TVOP renewal application. The finished products are either shipped in bulk, drummed, or flaked and bagged on one of the three flaking belts. The flaking belts allow the molten product from the reactor to cool and harden prior to arriving at the flaking hopper and the bagging machines.

Emissions associated with the Hard Resins Process Area include kettle (reactor) losses from displacement and thermal expansion; tank losses from raw material and product storage; flaking and packaging; and fugitive losses from the process equipment. The kettles are vented to a water scrubber (AG-003) to control VOC emissions. The water scrubber is also used to control VOC emissions from the “hot” end of the flaking belts where the molten product is poured onto the belts. The “cold” end of the flaking belts, primarily the flaking hopper, is vented to a dust collector (AG-005) to control PM emissions.

2.2.4 Rosin Shed Process Area

The Rosin Shed Process Area (AH-000) is used to drum a variety of resins. The area contains a drumming station, bulk loading station, and bulk storage tanks (tanks listed in Section C – Insignificant Activities). The drumming occurs under a metal storage building. Raw material feed resins are stored in bulk for other facility process areas, and finished products can be drummed and bulk shipped from this process area.

Emissions associated with the Rosin Shed Process Area include tank losses from raw material and product storage and fugitive losses from the drumming and loading operations.

2.2.5 Rosin Distillation Process Area

The Rosin Distillation Process Area (AJ-000) contains a distillation column used to refine the feed resin into various grades of resin derivatives. The resin derivatives produced from the still can be distributed as final products or further processed in the Hard Resins Process Area. The still operates under vacuum with no direct stack emissions; however, the potential for fugitive emissions associated with the process do exist. Losses from raw material and product storage tanks (listed in Section C – Insignificant Activities) also occur in this process area.

2.3 POWER HOUSE AND EFFLUENT TREATMENT AREAS

The Power House produces steam, service water, air, and nitrogen for the entire facility. Steam is generated by two (2) package boilers. Boiler #5 (AM-001) has a rated capacity of 156 MMBTU/hr, and Boiler #6 (AM-002) has a rated capacity of 65 MMBTU/hr. The boilers currently combust natural gas; however, they have the potential to burn #2 fuel oil and #6 fuel oil. Emissions from the boilers include PM, SO₂, NO_x, CO, VOC, and HAP emissions associated with the combustion of natural gas and the potential combustion of fuel oil.

The facility's Effluent Treatment Area (AN-000) consists of wastewater equalization, solids removal, pH adjustment, and oils separation. Emissions associated with the area include fugitive VOC and HAP (e.g., toluene) losses from the facility's wastewater.

3.0 APPLICABLE AIR REGULATIONS

Hercules has the potential to emit criteria air pollutants (PM, SO₂, NO_x, CO, and VOC) in excess of 100 tons per year, any one HAP in excess of 10 tons per year, and total HAPs in excess of 25 tons per year. Therefore, the facility is subject to the Title V (Air) Major Source Program, and must submit an *Application for a Title V Air Pollution Control Permit to Operate Air Emissions Equipment* in accordance with the requirements of 40 CFR Part 70 and Mississippi Air Regulation APC-S-6.

Hercules was issued a Title V Operating Permit on November 13, 1998, and the permit expires on November 1, 2003. In accordance with Title V Operating Permit No. 0800-00001, Section 1.16, a renewal application must be submitted within 180 days prior to the permit expiration date. As a result of the above referenced information and in accordance with Mississippi Air Regulations, a complete TVOP Renewal Application is included in Appendix A.

3.1 Particulate Matter

No source is allowed to emit particulate matter (PM) such that the opacity exceeds forty percent (40%). However, during startup operations the source may exceed the 40% opacity requirement for up to 15 minutes per startup in any one hour, not to exceed three (3) per 24-hour period. (APC-S-1, Section 3.1 & 3.2).

Fuel burning equipment with a rated capacity less than 10 MMBTU/hr shall not exceed PM emissions of 0.6 lbs/10⁶ BTU (Section 3.4(a)(1)). Fuel burning equipment with a rated capacity of 10 MMBTU/hr to 10,000 MMBTU/hr shall not exceed PM emissions as determined by the relationship $E = 0.8808 * I^{0.1667}$, where E is the emission rate in lbs/10⁶ BTU and I is the heat input in MMBTU/hr (Section 3.4(a)(2)). The facility currently operates two (2) boilers, AM-001 and AM-002, with a rated capacity greater than 10 MMBTU/hr and six (6) units with a rated capacity less than 10 MMBTU/hr.

Manufacturing processes are subject to an hourly PM emission limitation equal to $E = 4.1 * p^{0.67}$, where p is the process throughput weight in tons per hour and E is the allowable PM emission rate in pounds per hour (Section 3.6(a)). Manufacturing processes at the facility subject to the standard include Emission Points AA-002, AB-001, AC-004, and AG-005 (see TVOP Application, Section N).

3.2 Sulfur Dioxides

Fuel burning equipment shall not exceed an SO₂ emission rate of 4.8 lbs/10⁶ BTU (APC-S-1, Section 4.1(a)). The facility operates eight (8) units, including AM-001 and AM-002, subject to the standard.

Manufacturing processes shall emit gases containing sulfur oxides (SO_x) at a rate in excess of 2000 parts per million (Section 4.2(a)). Manufacturing processes at the facility subject to the standard include Emission Points AC-002 and AC-003 (see TVOP Application, Section N).

3.3 Prevention of Significant Deterioration

In accordance with 40 CFR Part 52 and Mississippi Air Regulations APC-S-5, any facility with a potential to emit greater than or equal to 250 tons per year of any regulated air pollutant will be classified as a major air emissions source with respect to the Prevention of Significant Deterioration (PSD) regulations. The regulations also list 28 specific industrial categories where the PSD emission threshold is reduced to 100 tons per year for any regulated pollutant.

Hercules (Hattiesburg Plant) is a chemical processing plant and is listed as one of the 28 industrial categories. Since facility emissions are above the 100 tons per year threshold identified above, the facility is a major source with respect to PSD, and future “significant” facility modifications will require a more detailed permitting process known as New Source Review (NSR).

3.4 New Source Performance Standards

New Source Performance Standards (NSPS) were promulgated to govern the emissions of specific sources of air pollutants modified, constructed, or reconstructed after the applicability dates of the regulations. The NSPS regulations are documented in 40 CFR Part 60.

Volatile organic liquid storage vessels with a capacity greater than 10,560 gallons and installed or modified after July 23, 1984, are subject to the NSPS, 40 CFR 60, Subpart Kb – Standards of Performance for Volatile Organic Liquid Storage Vessels. The storage vessels subject to Subpart Kb are identified in Section C – Insignificant Activities (Tanks List) of the Title V permit renewal application. In order to comply with Subpart Kb, the facility maintains records of the applicable tank dimensions and tank capacities on-site.

Industrial steam generating units with a rated capacity equal to or greater than 10 MMBTU/hr, but less than 100 MMBTU/hr, and installed, modified, or reconstructed after June 9, 1989, are subject to NSPS, 40 CFR 60, Subpart Dc – Standards of Performance for Small Industrial, Commercial, and Institutional Steam Generating Units. Industrial steam generating units with a rated capacity equal to or greater than 100 MMBTU/hr and installed, modified, or reconstructed after June 19, 1984, are subject to NSPS, 40 CFR 60, Subpart Db – Standards of Performance for Industrial, Commercial, and Institutional Steam Generating Units. Two (2) units at the facility meet the sizing criteria; however, the 156 MMBTU/hr package boiler (AM-001) was constructed prior to 1977, and the 56 MMBTU/hr package boiler (AM-002) was constructed in 1986. Therefore, the units do not meet the NSPS applicability requirements for Subpart Db or Dc.

3.5 National Emissions Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants (NESHAP) are being promulgated to govern the emissions of certain hazardous air pollutants. The NESHAP regulations are documented in 40 CFR Part 61 and 63.

Based on the facility's current operations, Hercules is subject to NESHAP, 40 CFR 63, Subpart W – Standards for Epoxy Resins Production and Non-Nylon Polyamides Production and Subpart PPP – Standards for Polyether Polyols Production. The Kymene Process Area (AA-000) is subject to Subpart W, and the HAP of concern is Epichlorohydrin. The area complies with the standard by developing and implementing a Startup, Shutdown, and Malfunction (SSM) Plan and utilizing Leak Detection and Repair (LDAR) methodology as detailed in 40 CFR 63, Subpart H. The LDAR monitoring method, monitoring schedule, and defined leak definition concentrations are specified in the applicable regulation(s) and listed in Section N of the TVOP renewal application.

The EOD Process Area (AF-000(EO)) is subject to Subpart PPP, and the HAP of concern is Ethylene Oxide. Again, area complies with the standard by developing and implementing a Startup, Shutdown, and Malfunction (SSM) Plan and utilizing Leak Detection and Repair (LDAR) methodology as detailed in 40 CFR 63, Subpart H. The LDAR monitoring method, monitoring schedule, and defined leak definition concentrations are specified in the applicable regulation(s) and listed in Section N of the TVOP renewal application. In accordance with Subpart PPP, the facility will also achieve an aggregated 98% reduction of EO emissions and comply with specific monitoring, recordkeeping, and reporting requirements. The facility uses a

scrubber (with circulating sulfuric acid) to comply with the required EO reduction efficiency, and the scrubbing liquid flow rate and pH are monitored on a continuous basis to ensure compliance.

3.6 Nonattainment Provisions

Geographic areas determined to be non-compliant with the National Ambient Air Quality Standards (NAAQS) for any criteria air pollutant for which a standard has been set are classified as Nonattainment Areas. Hattiesburg, as well as Forrest County, are not currently located in an area identified as in nonattainment with any NAAQS. Therefore, the nonattainment provisions are not expected to have an impact on the Hattiesburg Plant.

4.0 EMISSION INVENTORY

An air emissions inventory has been compiled to quantify potential uncontrolled (and/or allowable) emissions and estimated actual emissions of regulated air pollutants at the Hercules facility. A summary of the facility emissions calculations are presented in Appendix B. The emissions calculations include a description of the pollutants emitted and the methodology used to quantify the emissions.

4.1 Fuel Burning Equipment

The facility operates eight (8) fuel burning units fired with natural gas, but some units have the capability to combust fuel oil. The fuel burning emission calculations are based on AP-42, Compilation of Air Pollutant Emission Factors (AP-42) in Section 1.3 and 1.4 to determine both potential uncontrolled and estimated actual emissions of PM, NO_x, SO₂, CO, VOC, and HAPs.

Fuel burning equipment is subject to Mississippi Air Regulations APC-S-1, Section 3.4(a)(1) & (2) for PM emissions and 4.1(a) for SO₂ emissions. Fuel burning equipment with a rated capacity of less than 10 MMBTU/hr shall not exceed PM emissions of 0.6 lbs/10⁶ BTU, and equipment with a capacity of 10 MMBTU/hr to 10,000 MMBTU/hr shall not exceed PM emissions as determined by $E = 0.8808 * I^{-0.1667}$. The maximum discharge of SO₂ emissions from fuel burning equipment is 4.8 lbs/10⁶ BTU.

4.2 Manufacturing Processes

The facility manufacturing processes are detailed in Section 2.0 of this report, and the corresponding emissions calculations are attached in Appendix B. The emissions inventory addresses both point source and fugitive air emissions. The process area point source emissions were estimated using stack test performance data, mass balance spreadsheets developed by the Hattiesburg Plant, applicable regulatory requirements, and AP-42 emissions factors. The fugitive emissions from the various process areas were calculated using Synthetic Organic Chemical Manufacturing Industry (SOCMI) emission factors, mass balance spreadsheets, applicable regulatory requirements, and engineering estimates. The supporting information used to develop the emissions inventory is attached in Appendix C, and the manufacturing process areas applicable regulatory requirements are discussed in Section 3.0.

4.3 Volatile Organic Liquid Storage Vessel Emissions

The facility storage vessels are listed in Section C (Tanks List) of the TVOP renewal application. The tanks list identifies the tank identification number; the contents of the tank; the tank material of construction; the date the tank was constructed, modified, or reconstructed; and an NSPS Subpart Kb applicability determination. The EPA Tanks 4.0 Program was utilized to determine air pollutant emissions from the breathing and working losses associated with the “worst case” storage vessels. Based on the results, no vessel at the facility that vents directly to the atmosphere has the potential to emit more than 1.0 pounds per hour of VOC emissions or 0.1 pounds per hour of a HAP. The insignificant air pollutant emissions generated from the facility tanks are estimated using calculation spreadsheets developed by the Hattiesburg Plant and based on the equations used in the Tanks 4.0 Program. The data is provided in Appendix C and summarized in the emissions inventory presented in Appendix B.

4.4 Insignificant Activities

A list of fuel burning equipment, manufacturing process equipment, storage tanks, and other facility equipment or processes that meet the requirements of an insignificant activity (APC-S-6, Section VII.A-D) are listed in Section C of the TVOP renewal application.

4.5 Emissions Summary

The Hattiesburg Plant's potential and/or regulatory allowable emissions and the estimated actual emissions are quantified below. The emissions inventory and supporting information is presented in Appendix B and C of this report, respectively.

Pollutant	Potential/Allowable Emissions (TPY)	Actual Emissions (TPY)
PM	266.90	12.68
SO ₂	2033.78	0.21
NO _x	331.54	58.90
CO	90.24	19.56
VOC	587.76	252.68
Total HAPs	366.56	169.91
Toluene	342.10	167.02
Epichlorohydrin	12.62	1.91
Ethylene Oxide	9.48	0.59
Chloride*	2.38	0.00
Hexane	1.71	0.39
Nickel	0.58	0.00
Formaldehyde	0.07	0.00

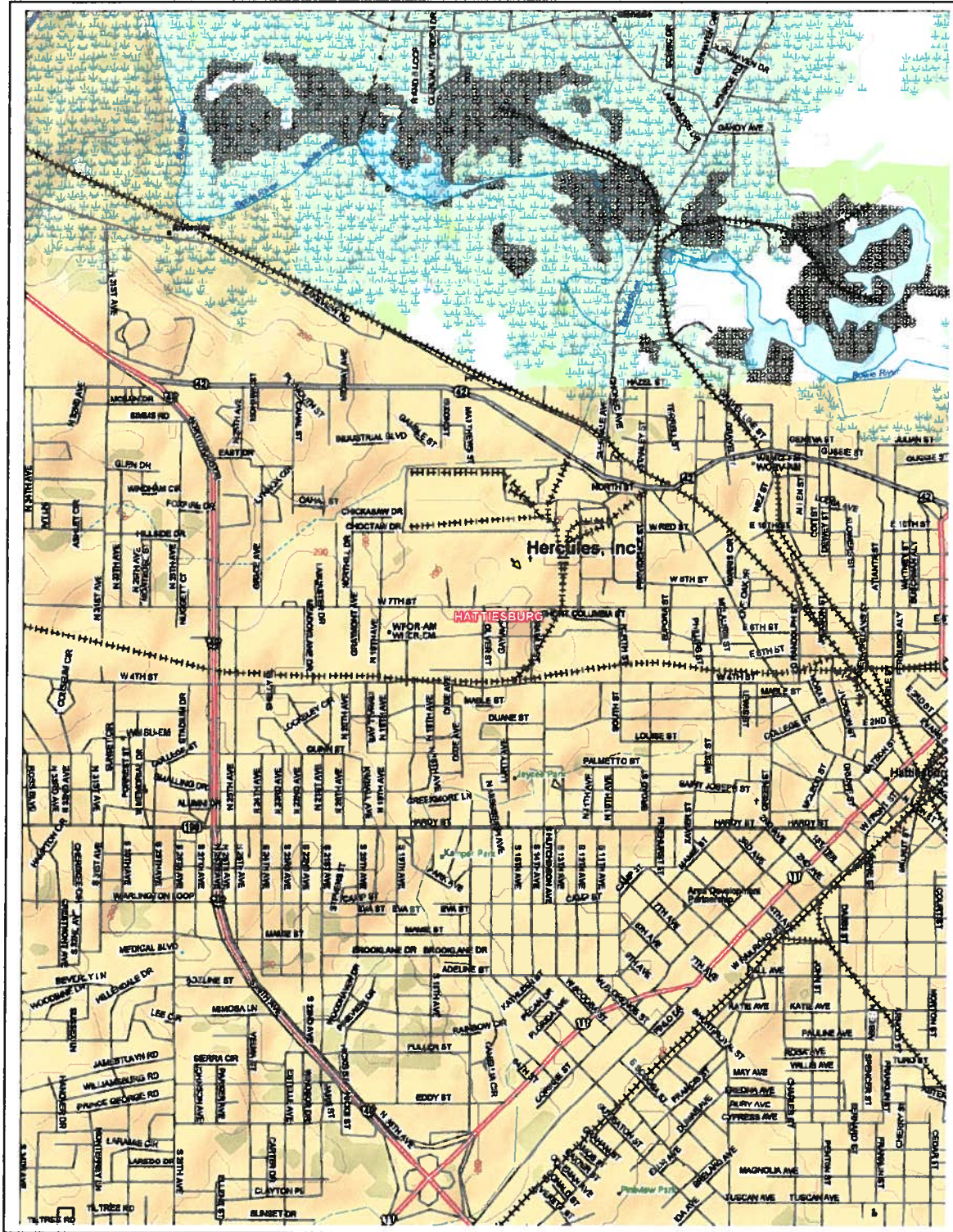
*Chloride is a metal compound that is not a listed HAP.





FIGURES

FIGURE 1
SITE LOCATION MAP



7.5' Topographical Map - Hattiesburg (MS) Quadrangle - 1982



Legend:

Hercules Incorporated – Hattiesburg Plant
 613 West 7th Street
 Hattiesburg, Mississippi 39401

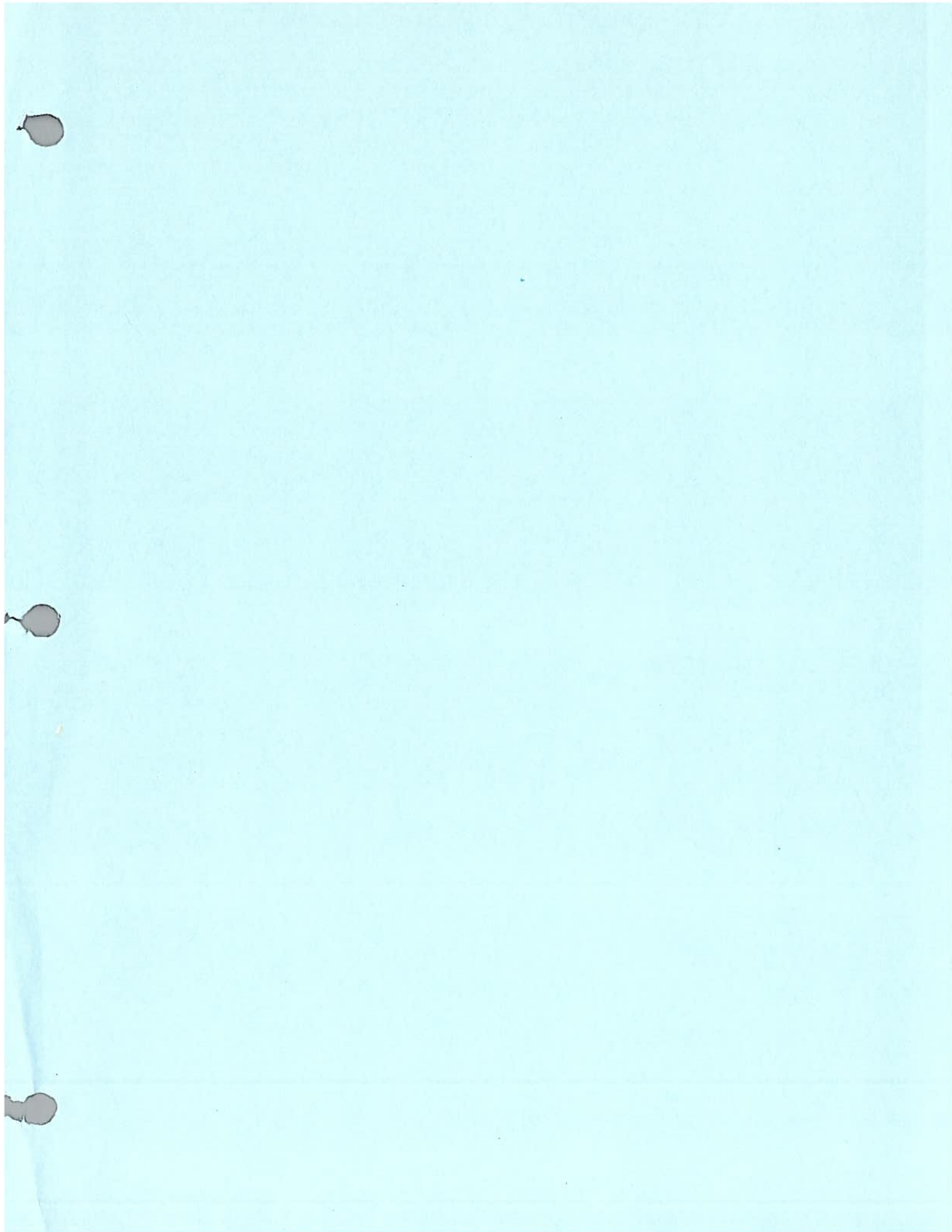
Figure 1 – Site Location Map

Date: 04/10/03

Project No.: HER.001



**FIGURE 2
FACILITY DIAGRAM**



APPENDICES

APPENDIX A
TITLE V OPERATING PERMIT APPLICATION

FOR OFFICIAL USE ONLY

APPLICATION RECEIPT
DATE: _____

APPLICATION NO.: _____

FOR MODIFICATION:
MINOR _____
SIGNIFICANT _____



**STATE OF MISSISSIPPI
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL
AIR DIVISION
P.O. BOX 10385
JACKSON, MS. 39289-0385
PHONE NO.: (601) 961 - 5171**

**APPLICATION FOR TITLE V
AIR POLLUTION CONTROL PERMIT
TO OPERATE AIR EMISSIONS EQUIPMENT**

PERMITTING ACTIVITY:

- _____ INITIAL APPLICATION
_____ MODIFICATION
 X RENEWAL OF OPERATING PERMIT

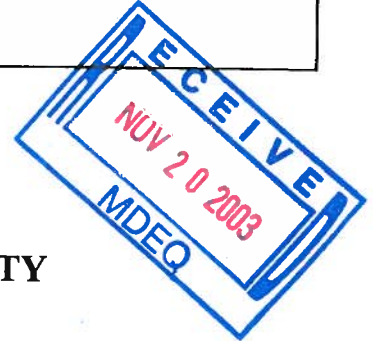
NAME: HERCULES, INC.

CITY: HATTIESBURG, MISSISSIPPI

COUNTY: FORREST

FACILITY No. (if known): 0800-00001

FOR OFFICIAL USE ONLY	
APPLICATION RECEIPT	
DATE:	_____
APPLICATION NO.:	_____
FOR MODIFICATION:	
MINOR	_____
SIGNIFICANT	_____



**STATE OF MISSISSIPPI
DEPARTMENT OF ENVIRONMENTAL QUALITY
OFFICE OF POLLUTION CONTROL
AIR DIVISION
P.O. BOX 10385
JACKSON, MS. 39289-0385
PHONE NO.: (601) 961 - 5171**

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NAME: HERCULES, INC.

CITY: HATTIESBURG, MISSISSIPPI

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**APPLICATION FOR TITLE V PERMIT TO
OPERATE AIR EMISSIONS EQUIPMENT**

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OPERATING PERMIT APPLICATION REQUIREMENTS

All applications must be submitted on the form supplied by the Permit Board. Trivial activities as listed in Attachment A are presumed to emit less than 1 pound per hour of a pollutant that is not a hazardous air pollutant and less than 0.1 pound per hour of any hazardous air pollutant; these activities need not be reported in the application. Insignificant activities which are specified in Section VII.A. of Regulation APC-S-6 and listed herein also need not be included. For insignificant activities which are specified in Section VII.B. of Regulation APC-S-6, a list must be included in the application. An application may not omit information needed to determine the applicability of, or to impose, any applicable requirement, or to evaluate the fee amount required under the schedule pursuant to Section VI. of Regulation APC-S-6. The forms and attachments shall include the elements specified as follows:

- A. Identifying information, including company name and address (or plant name and address if different from the company name), owner's name and agent, and telephone number and names of plant site manager/contact;
- B. A description of the source's process and products by Standard Industrial Classification Code including any associated with any alternate scenario identified by the source;
- C. Emission-related information as follows:
 1. A qualitative description of all emissions units, including those not subject to applicable requirements but not those omitted under trivial or insignificant activities provisions;
 2. A description of all emissions of pollutants for which the source is major and of all emissions of regulated air pollutants sufficient to determine or verify major source status, to determine or verify applicability of and compliance with applicable requirements, and to assess and collect permit fees, if the emissions basis for fees has not been previously determined. Fugitive emissions from individual components within a facility may be determined collectively based on their relationship to the associated process unless individual emission rates are needed to determine the applicability of an applicable requirement such as NSPS, NESHAPS, a MACT standard, etc. or to determine air quality impacts. Similarly, where individual components or units with a facility may be classified into a generic group due to the commonality of applicable requirements and /or the nature of operation, stack emissions may be determined collectively for the group unless individual emission rates are needed to determine applicability of an applicable requirement or to determine air quality impacts;
 3. For each pollutant and emissions unit which is regulated, emission rates in TPY and in such terms as are necessary to establish compliance consistent with the applicable standard reference test method, except that, for pollutants and units which have no applicable requirements expressed in emission rate terms, emission rate quantification may be omitted;
 4. To the extent it is needed to determine or regulate emissions, the information that follows: fuels, fuel use, raw materials, production rates, and operating schedules;
 5. Identification and description of air pollution control equipment and compliance monitoring devices or activities;
 6. Limitations on source operation affecting emissions or any work practice standards, where applicable, for all regulated pollutants at the Title V source;
 7. Other information required by any applicable requirement (including information related to stack height limitations developed pursuant to Section 123 of the Federal Act); and

8. Calculations on which the information requested in this section is based.
- D. Air pollution control requirements as follows:
1. Citation and description of all applicable requirements, and
 2. Description of or reference to any applicable test method for determining compliance with each applicable requirement;
- E. Other specific information that may be necessary to implement and enforce other applicable requirements of the Federal Act or of these regulations or to determine the applicability of such requirements;
- F. An explanation of any proposed exemptions from otherwise applicable requirements;
- G. Additional information as determined to be necessary by the Permit Board to define alternative operating scenarios identified by the source pursuant to Section III.A.9. of Regulation APC-S-6 or to define permit terms and conditions implementing 40 CFR 70.4(b)(12) or Section III.A.10. of Regulation APC-S-6;
- H. A compliance plan for all Title V sources that contains all of the following:
1. A description of the compliance status of the source with respect to all applicable requirements;
 2. A description as follows:
 - a. For applicable requirements with which the source is in compliance, a statement that the source will continue to comply with such requirements;
 - b. For applicable requirements that will become effective during the permit term, a statement that the source will meet such requirements on a timely basis;
 - c. For requirements for which the source is not in compliance at the time of permit issuance, a narrative description of how the source will achieve compliance with such requirements;
 3. A compliance schedule as follows:
 - a. For applicable requirements with which the source is in compliance, a statement that the source will continue to comply with such requirements;
 - b. For applicable requirements that will become effective during the permit term, a statement that the source will meet such requirements on a timely basis. A statement that the source will meet in a timely manner applicable requirements that become effective during the permit term shall satisfy this provision, unless a more detailed schedule is expressly required by the applicable requirements;
 - c. A schedule of compliance for sources that are not in compliance with all applicable requirements at the time of permit issuance. Such a schedule shall include a schedule or remedial measures, including an enforceable sequence of actions with milestones, leading to compliance with any applicable requirements for which the source will be in noncompliance at the time of permit issuance. This compliance schedule shall resemble and be at least as stringent as that contained in any judicial consent decree or administrative order to which the source is subject. Any such schedule of compliance shall be supplemental to,

and shall not sanction noncompliance with, the applicable requirements on which it is based;

4. A schedule for submission of certified progress reports, to be submitted no less frequently than every 6 months for sources required to have a schedule of compliance to remedy a violation;
 5. The compliance plan content requirements specified in this paragraph shall apply and be included in the acid rain portion of a compliance plan for an affected source, except as specifically superseded by regulations promulgated under Title IV of the Federal Act with regard to the schedule and method(s) the source will use to achieve compliance with the acid rain emissions limitations;
- I. Requirements for compliance certification, including the following:
1. A certification of compliance with all applicable requirements by a responsible official consistent with Section II.E of Regulation APC-S-6 and Section 114(a)(3) of the Federal Act;
 2. A statement of methods used for determining compliance, including a description of monitoring, recordkeeping, and reporting requirements and test methods;
 3. A schedule for submission of compliance certifications during the permit term, to be submitted no less frequently than annually, or more frequently if specified by the underlying applicable requirement or by the Permit Board;
 4. A statement indicating the sources compliance status with any applicable enhanced monitoring and compliance certification requirements of the Federal Act; and
- J. The use of nationally-standardized forms for acid rain portions of permit applications and compliance plans, as required by regulations promulgated under Title IV of the Federal Act.

INSIGNIFICANT ACTIVITIES AND EMISSIONS

- I. The following activities/emissions sources are not required to be included in a Title V permit application:
 - A. New or modified pilot plants, subject to temporary source regulations located in Section III.E. of regulation APC-S-6.
 - B. Maintenance and upkeep:
 1. Maintenance, structural changes, or repairs which do not change the capacity of such process, fuel-burning, refuse-burning, or control equipment, and do not involve any change in quality, nature, or quantity of potential emissions of any regulated air pollutants; and
 2. Housekeeping activities or building maintenance procedures;
 - C. Air conditioning or ventilation: comfort air conditioning or comfort ventilating systems which do not transport, remove, or exhaust regulated air pollutants to the atmosphere;
 - D. Laboratory equipment:
 1. Laboratory equipment used exclusively for chemical or physical analysis for quality control or environmental monitoring purposes; or
 2. Non-production laboratory equipment used at non-profit health or non-profit educational institutions for chemical or physical analyses, bench scale experimentation or training, or instruction;
 - E. Hot water heaters which are used for domestic purposes only and are not used to heat process water;
 - F. Fuel use related to food preparation by a restaurant, cafeteria, residential cooker or barbecue grill where the products are intended for human consumption;
 - G. Clerical activities such as operating copy machines and document printers, except operation of such units on a commercial basis;
 - H. Hand held equipment used for buffing, polishing, carving, cutting, drilling, machining, routing, sanding, sawing, surface grinding, or turning of ceramic art work, precision parts, leather, metals, plastics, fiber board, masonry, carbon, glass, or wood;
 - I. Equipment for washing or drying fabricated glass or metal products, if no VOCs are used in the process and no oil or solid fuel is burned;
 - J. Water cooling towers (except at nuclear power plants); water treatment systems for process cooling water or boiler feed water; and water tanks, reservoirs, or other water containers not used in direct contact with gaseous or liquid process streams containing carbon compounds, sulfur compounds, halogens or halogen compounds, cyanide compounds, inorganic acids, or acid gases;
 - K. Domestic sewage treatment facilities (excluding combustion or incineration equipment, land farms, storage silos for dry material, or grease trap waste handling or treatment facilities);
 - L. Stacks or vents to prevent escape of sewer gases through plumbing traps;

- M. Vacuum cleaning systems for housekeeping, except at a source with hazardous air pollutants;
 - N. Alkaline/phosphate washers and associated cleaners and burners;
 - O. Mobile sources;
 - P. Livestock and poultry feedlots and associated fuel burning equipment other than incinerators;
 - Q. Outdoor kerosene heaters;
 - R. Equipment used for hydraulic or hydrostatic testing;
 - S. Safety devices, excluding those with continuous emissions; and
 - T. Brazing, soldering, or welding equipment that is used intermittently or in a non-continuous mode.
- II. The following activities/emissions sources must be listed in the application but emissions from these activities do not have to be quantified.
- A. All gas fired, #2 oil fired, infrared, electric ovens with no emissions other than products of fuel combustion;
 - B. Combustion units with rated input capacity less than 10 million Btu/hr that are fueled by:
 - 1. Liquified petroleum gas or natural gas supplied by a public utility; or
 - 2. Commercial fuel oil #2 or lighter;
 - C. Equipment used for inspection of metal products;
 - D. Equipment used exclusively for forging, pressing, drawing, spinning, or extruding metals;
 - E. Equipment used exclusively to mill or grind coatings and molding compounds where all materials charged are in paste form;
 - F. Mixers, blenders, roll mills, or calendars for rubber or plastics for which no materials in powder form are added and in which no organic solvents, diluents, or thinners are used;
 - G. All storage tanks used exclusively to store fuel oils, kerosene, diesel, jet fuel, crude oil, natural gas, or liquified petroleum gas (the application must list the size of the tank, date constructed and/or modified, type tank, and material stored);
 - H. Space heaters utilizing natural or LPG gas and used exclusively for space heating;
 - I. Back-up or emergency use generators, boilers or other fuel burning equipment which is of equal or smaller capacity than normal main operating equipment, cannot be used in conjunction with normal main operating equipment, and does not emit, have or cause the potential to emit of any regulated air pollutant to increase;
 - J. Blast cleaning equipment using a suspension of abrasives in water;
 - K. Die casting machines;
 - L. Foundry sand mold forming equipment to which no heat is applied and from which no organics are emitted.

- M. Bark and wood - waste storage and handling;
- N. Log wetting areas;
- P. Log flumes;
- Q. Sodium hydrosulfide storage tank;
- R. Smelt dissolving tank view ports;
- S. Spout cooling water storage;
- T. Effluent drains;
- U. White water chest;
- V. Repupler vents;
- W. Clay storage tank;
- X. Alum storage tank;
- Y. Starch storage tank;
- Z. Steam vents and leaks;
- AA. Deaerator vents;
- AB. Mill air and instrument air system;
- AC. Demineralizer water storage tank;
- AD. Acid storage tank;
- AE. Process water tank;
- AF. Air purification system vents;
- AG. Effluent neutralizing tank/system;
- AH. Dregs washer;
- AI. Lime silo;
- AJ. Lime mud mix tank;
- AK. H₂O₂ storage tank;
- AL. Green liquor tank; and
- AM. Tall oil storage tank.

III. Notwithstanding I. and II. above, the applicant shall include all emissions sources and quantify emissions if needed to determine major source status, to determine compliance with an applicable requirement and/or the applicability of any applicable requirement such as NSPS, NESHAP, MACT standard, etc. as such term

is defined in Section I. of Regulation APC-S-6 or collect any permit fee owed under the approved fee scheduled.

- IV. Notwithstanding I. and II. above, the applicant shall include all emission sources with a potential to emit:
1. greater than 1 pound per hour of any regulated pollutant that is not a hazardous air pollutant;
 2. greater than 0.1 pound per hour of any hazardous air pollutant.
- V. The permittee does not have to report the addition of any insignificant activity listed in Section I. above unless the addition is a Title I modification or requires a permit to construct. If a Title I permit or a Permit to Construct is required, then the modification procedures outlined in Section IV.E. of Regulation APC-S-6 shall be followed.
- VI. The addition of any insignificant activity listed in Section II. above, shall be handled as an administrative amendment as defined in Section IV.D. of Regulation APC-S-6 unless the addition is a Title I modification or requires a Permit to Construct. If a Title I permit or Permit to Construct is required, then the modification procedures outlined in Section IV.E. of Regulation APC-S-6 shall be followed.

REGULATED AIR POLLUTANTS

Total suspended particulate matter	Hydrochlorofluorocarbon-21
PM ₁₀	Hydrochlorofluorocarbon-22
Sulfur dioxide	Hydrochlorofluorocarbon-31
Nitrogen oxides	Hydrochlorofluorocarbon-121
Carbon monoxide	Hydrochlorofluorocarbon-122
Volatile organic compounds(see note 1)	Hydrochlorofluorocarbon-123
Lead	Hydrochlorofluorocarbon-124
Dioxin/Furan	Hydrochlorofluorocarbon-131
Fluorides	Hydrochlorofluorocarbon-132
Hydrogen chloride	Hydrochlorofluorocarbon-133
Hydrogen sulfide	Hydrochlorofluorocarbon-141
Sulfuric acid mist	Hydrochlorofluorocarbon-142
Total reduced sulfur	Hydrochlorofluorocarbon-221
Reduced sulfur compounds	Hydrochlorofluorocarbon-222
Arsenic	Hydrochlorofluorocarbon-223
Asbestos	Hydrochlorofluorocarbon-224
Beryllium	Hydrochlorofluorocarbon-225
Benzene	Hydrochlorofluorocarbon-226
Mercury	Hydrochlorofluorocarbon-231
Radionuclides	Hydrochlorofluorocarbon-232
Vinyl chloride	Hydrochlorofluorocarbon-233
Carbon tetrachloride	Hydrochlorofluorocarbon-234
Chlorofluorocarbon-11	Hydrochlorofluorocarbon-235
Chlorofluorocarbon-12	Hydrochlorofluorocarbon-241
Chlorofluorocarbon-13	Hydrochlorofluorocarbon-242
Chlorofluorocarbon-111	Hydrochlorofluorocarbon-243
Chlorofluorocarbon-112	Hydrochlorofluorocarbon-244
Chlorofluorocarbon-113	Hydrochlorofluorocarbon-251
Chlorofluorocarbon-114	Hydrochlorofluorocarbon-252
Chlorofluorocarbon-115	Hydrochlorofluorocarbon-253
Chlorofluorocarbon-211	Hydrochlorofluorocarbon-261
Chlorofluorocarbon-212	Hydrochlorofluorocarbon-262
Chlorofluorocarbon-213	Hydrochlorofluorocarbon-271
Chlorofluorocarbon-214	Halon-1211
Chlorofluorocarbon-215	Halon-1301
Chlorofluorocarbon-216	Halon-2402
Chlorofluorocarbon-217	Methyl chloroform

Note 1 - Volatile organic compounds (VOC) includes any compound of carbon, excluding carbon monoxide, carbonic acid, metallic carbides or carbonates and ammonium carbonate, which participates in atmospheric photochemical reactions. This includes any such organic compound other than the following which have been determined to have negligible photochemical reactivity: Methane; ethane; methylene chloride; 1,1,1-trichloroethane; CFC-113; CFC-11; CFC-12; CFC-22; FC-23; CFC-114; CFC-115; HCFC-123; HFC-134a; HCFC-141b; HCFC-142b; HCFC-124; HFC-125; HFC-134; HFC-143a; HFC-153a; and perfluorocarbon compounds which fall into these classes: (i) Cyclic, branched, or linear, completely fluorinated alkanes; (ii) Cyclic, benched, or linear, completely fluorinated ethers with no unsaturations; (iii) Cyclic, branched, or linear completely fluorinated tertiary amines with no unsaturations; and (iv) Sulfur containing perfluorocarbons with no unsaturations and with sulfur bonds only to carbon and fluorine. **For the purposes of this application hazardous air pollutants that are volatile organic compounds should be included as VOCs for reflection of total VOCs from the facility but need to be identified separately as well.**

HAZARDOUS AIR POLLUTANTS

<u>CAS No.</u>	<u>CHEMICAL NAME</u>
75070	Acetaldehyde
60355	Acetamide
75058	Acetonitrile
98862	Acetophenone
53963	Acetylaminofluorene(2)
107028	Acrolein
79061	Acrylamide
79107	Acrylic Acid
107131	Acrylonitrile
107051	Allyl Chloride
92671	Aminodipheyl(4)
62533	Aniline
90040	Anisidine(o)
7440360	Antimony Compounds
7440382	Arsenic Compounds (inorganic including arsine)
1332214	Asbestos
71432	Benzene
92875	Benzidine
98077	Benzotrichloride
100447	Benzyl Chloride
7440417	Beryllium Compounds
192524	Biphenyl
117817	Bis(2-ethylhexyl)phthalate(DEHP) (Diocetyl Phthalate)
542881	Bis(chloromethyl)ether
75252	Bromoform
106990	Butadiene(1,3)
7440439	Cadmium Compounds
156627	Calcium Cyanamide
105602	Caprolactam
133062	Captan
63252	Carbaryl
75150	Carbon Disulfide
56235	Carbon Tetrachloride
463581	Carbonyl Sulfide
120809	Catechol
133904	Chloramben
57749	Chlordane
7782505	Chlorine
79118	Chloroacetic Acid
532274	Chloroacetophenone(2)
108907	Chlorobenzene
510156	Chlorobenzinate
67663	Chloroform
107302	Chloromethyl methyl ether
126998	Chloroprene (Neoprene; 2-Chloro-1,3-Butadiene)
7440473	Chromium Compounds (IV)
10210681	Cobalt Carbonyl (as Co)
7440484	Cobalt Compounds (metal, dust, and fumes as Co)
16842038	Cobalt Hydrocarbonyl (as Co)

HAZARDOUS AIR POLLUTANTS

<u>CAS No.</u>	<u>CHEMICAL NAME</u>
65996818A	Coke Oven Emissions
1319773	Cresols/Cresylic acid
108394	Cresol(m)
95487	Cresol(o)
106445	Cresol(p)
98828	Cumene (Isopropylbenzene)
---	Cyanide Compounds (NOTE # 1)
3547044	DDE
334883	Diazomethane
132649	Dibenzofurans
96128	Dibromo-3-chloropropane(1,2)
84742	Dibutylphthalate
106467	Dichlorobenzene(1,4)(p)
91941	Dichlorobenzidene(3,3)
111444	Dichloroethyl ether (Bis(2-chloroethyl)ether)
542756	Dichloropropene(1,3)
62737	Dichlorvos
111422	Diethanolamine
121697	Diethyl aniline (N,N) (dimethylaniline (N,N))
64675	Diethyl Sulfate
119904	Dimethoxybenzidine(3,3')
60117	4 - Dimethyl aminoazobenzene
119937	Dimethyl benzidine (3,3')
79447	Dimethyl carbamoyl chloride
68122	Dimethyl formamide
57147	Dimethyl hydrazine(1,1)
131113	Dimethyl phthalate
77781	Dimethyl sulfate
534521	Dinitro-o-cresol(4,6), and salts
51285	Dinitrophenol(2,4)
121142	Dinitrotoluene(2,4)
123911	Dioxane(1,4) (1,4-diethyleneoxide)
122667	Diphenylhydrazine(1,2)
94757	d(2,4), salts and esters
106898	Epichlorohydrin (Chloro-2,3-epoxypropane(1))
106887	Epoxybutane(1,2) (1,2-Butylene oxide)
140885	Ethyl acrylate
100414	Ethyl benzene
51796	Ethyl carbamate (Urethane)
75003	Ethyl chloride (Chloroethane)
106934	Ethylene dibromide (1,2-Dibromoethane)
107062	Ethylene dichloride (1,2-Dichloroethane)
107211	Ethylene glycol
151564	Ethylene imine (Azridine)
75218	Ethylene oxide
96457	Ethylene thiourea
75343	Ethylidene dichloride (1,1-Dichloroethane)
50000	Formaldehyde
---	Glycol ethers (NOTE #2)
76448	Heptachlor

HAZARDOUS AIR POLLUTANTS

<u>CAS No.</u>	<u>CHEMICAL NAME</u>
118741	Hexachlorobenzene
87683	Hexachlorocyclopentadiene
67721	Hexachloroethane
822060	Hexamethylene-1,6-diisocyanate
680319	Hexamethylphosphoramide
110543	Hexane
302012	Hydrazine
7647010	Hydrochloric acid
7664393	Hydrogen Fluoride (Hydrofluoric acid)
123319	Hydroquinone
78591	Isophorone
7439921	Lead Compounds
58899	Lindane (all isomers)
108316	Maleic anhydride
7439965	Manganese Compounds
7439976	Mercury Compounds
67561	Methanol
72435	Methoxychlor
74839	Methyl bromide (Bromomethane)
74873	Methyl chloride (Chloromethane)
71556	Methyl chloroform (1,1,1-Trichloroethane)
78933	Methyl ethyl ketone (2-Butanone) (MEK)
60344	Methyl hydrazine
74884	Methyl iodide (Iodomethane)
108101	Methyl isobutyl ketone (Hexone)
624839	Methyl isocyanate
80626	Methyl methacrylate
1634044	Methyl tert butyl ether
101144	Methylene bis(2-chloroaniline)(4,4) (MOCA)
75092	Methylene chloride (Dichloromethane)
101688	Methylene diphenyl diisocyanate (MDI)
101779	Methylenedianiline(4,4')
---	Mineral fibers (NOTE #3)
91203	Naphthalene
7440020	Nickel Compounds
7440020	Nickel, refinery dust
12035722	Nickel, subsulfide
98953	Nitrobenzene
92933	Nitrodiphenyl(4)
100027	Nitrophenol(4)
79469	Nitropropane(2)
62759	Nitrosodimethylamine(N) (Dimethylnitrosoamine)
59892	Nitrosomorpholine(N)
684935	Nitroso-N-methylurea(N)
56382	Parathion
82688	Pentachloronitrobenzene (Quintobenzene)
87865	Pentachlorophenol
108952	Phenol
106503	Phenylenediamine(p)
75445	Phosgene

HAZARDOUS AIR POLLUTANTS

<u>CAS No.</u>	<u>CHEMICAL NAME</u>
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polychlorinated biphenyls (Arochlors)
---	Polycyclic Organic Matter (NOTE #5)
1120714	Propane sultone(1,3)
57578	Propiolactone(beta)
123386	Propionaldehyde
114261	Propoxur (Baygon)
78875	Propylene dichloride (1,2 dichloropropane)
75558	Propylene imine(1,2) (2-methyl aziridine)
75569	Propylene oxide
91225	Quinoline
106514	Quinone (1,4-Cyclohexadienedione)
---	Radionuclides (including radon) (NOTE #4)
7782492	Selenium Compounds
100425	Styrene
96093	Styrene oxide
1746016	Tetrachlorodibenzo-p-dioxin(2,3,7,8) (TCDD) (Dioxin)
79345	Tetrachloroethane(1,1,2,2)
127184	Tetrachloroethylene (Perchloroethylene)
7550450	Titanium Tetrachloride
108883	Toluene
95807	Toluene diamine(2,4) (2,4-diaminotoluene)
584849	Toluene diisocyanate(2,4)
95534	Toluidine(o)
8001352	Toxaphene (Chlorinated camphene)
120821	Trichlorobenzene(1,2,4)
79005	Trichloroethane(1,1,2)
79016	Trichloroethylene
95954	Trichlorophenol(2,4,5)
88062	Trichlorophenol(2,4,6)
121448	Triethylamine
1582098	Trifluralin
540841	Trimethylpentane(2,2,4)
75014	Vinyl Chloride
108054	Vinyl Acetate
593602	Vinyl Bromide
75354	Vinylidene chloride (1,1-Dichloroethylene)
1330207	Xylenes (mixed)
108383	Xylene(m)
95476	Xylene(o)
106423	Xylene(p)

NOTE # 1: X'CN where X = H' or any other group where a formal dissociation may occur, for example: KCN or Ca(CN)₂.

NOTE # 2: Includes mono- and di- ethers of ethylene glycol, diethylene glycol and triethylene glycol R-(OCH₂CH₂)_n-OR' where:

n = 1,2,3
R = lkyl or arl groups
R' = R,H, or group which, when removed, yield glycol ethers with the structure:
R-(OCH₂CH₂)_n-OH. Polymers are excluded from the glycol category

NOTE # 3: Includes glass microfibers, glass wool fibers, rock wool fibers, and slag wool fibers, each characterized as "respirable" (fiber diameter less than 3.5 micrometers) and possessing an aspect ratio (fiber length divided by fiber diameter) greater than 3.

NOTE # 4: A type of atom which spontaneously undergoes radioactive decay.

NOTE # 5: Includes organic compounds with more than one benzene ring, and which have a boiling point greater than or equal to 100 Celsius.

Owners Information

Section B

1. Name, Address & Contact for the Owner/Applicant

A. Company Name: Hercules, Inc.

B. Mailing Address:

- 1. Street Address or P.O. Box: 613 West 7th Street
- 2. City: Hattiesburg 3. State: Mississippi
- 4. Zip Code: 39401
- 5. Telephone No.: (601) 545-3450

C. Contact:

- 1. Name: Walter D. Langhans
- 2. Title: Plant Manager

2. Name, Address, Location and Contact for the Facility:

A. Name: Hercules, Inc.

B. Mailing Address:

- 1. Street Address or P.O. Box: 613 West 7th Street
- 2. City: Hattiesburg 3. State: Mississippi
- 4. Zip Code: 39401
- 5. Telephone No.: (601) 545-3450

C. Site Location:

- 1. Street: 613 West 7th Street
- 2. City: Hattiesburg 3. State: Mississippi
- 4. County: Forrest 5. Zip Code: 39401
- 6. Telephone No.: (601) 545-3450

Note: If the facility is located outside of the City limits, please attach a sketch or description to this application showing the approximate location of the site.

D. Contact:

- 1. Name: Charlie Jordan
- 2. Title: Environmental Coordinator

3. SIC Code(s)(including any associated with alternate operating scenarios): 2861, 2821, 2869, & 2899

4. Number of Employees: 78
5. Principal Product(s): Rosin Derivatives and Paper Chemicals
6. Principal Raw Materials: Rosin and Paper Chemicals
7. Principal Process(es): Rosin Derivatives and Paper Chemicals Manufacturing
8. Maximum amount of principal product produced or raw material consumed per day:
3,108,960 pounds per day
9. Facility Operating Schedule (Optional):
- A. Specify maximum hours per day the operation will occur: 24
- B. Specify maximum days per week the operation will occur: 7
- C. Specify maximum weeks per year the operation will occur: 52
- D. Specify the months the operation will occur: January - December
10. Is this facility a small business as defined by the Small Business Act? (Optional) _____

11. **EACH APPLICATION MUST BE SIGNED BY THE APPLICANT.**

The application must be signed by a responsible official as defined in Regulation APC-S-6, Section I.A.26.

I certify that to the best of my knowledge and belief formed after reasonable inquiry, the statements and information in this application are true, complete, and accurate, and that, as a responsible official, my signature shall constitute an agreement that the applicant assumes the responsibility for any alteration, additions, or changes in operation that may be necessary to achieve and maintain compliance with all applicable Rules and Regulations.

Walter D. Langhans
Printed Name of Responsible Official

Plant Manager
Title

10/17/03
Date Application Signed


Signature of Applicants Responsible Official

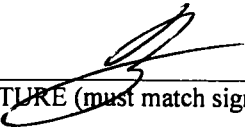
EMISSIONS SUMMARY for the ENTIRE FACILITY

List below the total emissions for each pollutant from the entire facility in accordance with Operating Permit Application Requirements, pp. 3-5. For stack emissions, use the maximum annual allowable (potential) emissions. For fugitive emissions, use the annual emissions calculated using the maximum operating conditions.

POLLUTANT Footnote 1	ANNUAL EMISSION RATE	
	lb/hr	tons/yr
PM/PM ₁₀		157.54
SO ₂		8.56
NO _x		239.06
CO		99.02
VOC		588.33
Total HAPs		365.91
Toluene		342.10
Epichlorohydrin		12.62
Ethylene Oxide		9.48
Hexane ²		1.71

1. All regulated air pollutants, including hazardous air pollutants emitted from the entire facility should be listed. A list of regulated air pollutants has been provided in Section A.
2. HAP emissions (Chloride is not a listed HAP) associated with fuel combustion of natural gas and fuel oil with calculated emissions greater than 0.1 lb/hr.

With the exception of the emissions resulting from insignificant activities and emissions as defined in Regulation APC-S-6, Section VII, the pollutants listed above are all regulated air pollutants reasonably expected to be emitted from the facility.


SIGNATURE (must match signature on page 17)

SECTION C

For the sections listed below indicate the number that have been completed for each section as part of this application.

Section B <u> 1 </u>	Section L1 <u> 2 </u>	Section M1 <u> </u>
Section C <u> 1 </u>	Section L2 <u> </u>	Section M2 <u> </u>
Section D <u> 3 </u>	Section L3 <u> </u>	Section M3 <u> </u>
Section E <u> 10 </u>	Section L4 <u> </u>	Section M4 <u> </u>
Section F <u> </u>	Section L5 <u> 7 </u>	Section M5 <u> </u>
Section G <u> </u>	Section L6 <u> </u>	Section M6 <u> </u>
Section H <u> </u>	Section L7 <u> </u>	Section M7 <u> 13 </u>
Section I <u> </u>		Section M8 <u> </u>
Section J <u> </u>		Section N <u> 1 </u>
Section K <u> </u>		Section O <u> 4 </u>

As a minimum, sections B, C, M, N and O must be completed for the application to be considered complete.

Please list below all insignificant activities required by APC-S-6, Section VII.B that apply to your facility.

1. Maintenance Areas (painting, welding, general maintenance, sandblasting) per Section VII.A.2, 8, 20 and B.4.
2. Laboratory Equipment and Analyses per Section VII.A.4.
3. Water Cooling (Refrigeration) Systems per Section VII.A.10.
4. Mobile Sources (trucks, cars, forklifts, portable air compressors) per Section VII.A.15.
5. Combustion Units with a rated capacity less than 10 MMBTUH per Section VII.B.2:
 - Three - 3.3 MMBTUH Dowtherm Boilers (formerly AC-001, AG-002, and AJ-001)
 - Two - 8.3 MMBTUH Dowtherm Boilers (formerly AG-001 and AF-001)
 - 2.2 MMBTUH Catalyst Regeneration Unit
6. Storage Vessels per Section VII.B.7 (see attached list).
7. Back-up or Emergency Generators and Pumps (firehouse) per Section VII.B.9.
8. Sandblasting Equipment per Section VII.B.10.
9. Effluent Treatment per Section VII.B.19 and 32.
10. Steam Vents and Leaks per Section VII.B.25.
11. Instrument Air System per Section VII.B.27.
12. Plant Nitrogen per Section VII.D.
13. Plant Hydrogen per Section VII.D.
14. Compressed Gas Cylinders per Section VII.D.
15. Adduct Reactor Process Vent (formerly AD-001).

SECTION C

KYMENE PROCESS AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
K-101	Water	Steel	2,100	Pre-1977	No
K-110	Epichlorohydrin (EPI)	Steel	17,000	1979	No
K-111	Epichlorohydrin (EPI)	Steel	324	Pre-1977	No
K-120	Hexamethylene diamine	Steel	6,000	Pre-1977	No
K-121	Diethylene triamine (DETA)	Steel	1,481	Pre-1977	No
K-122	Diethylene triamine (DETA)	Steel	12,300	Pre-1977	No
K-123**	Diethylene triamine (DETA)	Steel	12,338	2003	No
K-130	Polymer	Steel	14,900	Pre-1977	No
K-150	93% Sulfuric Acid	Steel	110	Pre-1977	No
K-151	93% Sulfuric Acid	Steel	5,000	1993	No
K-160	Kymene Wet Strength Resin	Steel	16,900	Pre-1977	No
K-161**	Kymene Wet Strength Resin	Fiberglass Reinforced Plastic (FRP)	16,900	2000	No
K-162**	Kymene Wet Strength Resin	FRP	16,900	1999	No
K-163	Kymene Wet Strength Resin	FRP	16,300	1979	No
K-164	Kymene Wet Strength Resin	FRP	16,300	1979	No
K-210	Polymer	Steel	16,900	Pre-1977	No
K-211	Water	Steel	2,660	Pre-1977	No
K-260**	Kymene Wet Strength Resin	FRP	16,900	2001	No
K-261**	Kymene Wet Strength Resin	FRP	16,900	1998	No
K-262**	Kymene Wet Strength Resin	FRP	16,900	1998	No
K-268	Kymene Wet Strength Resin	FRP	8,500	1981	No
K-269	Kymene Wet Strength Resin	FRP	16,300	1981	No
K-409	40% Glycol/Water	FRP	1,500	2003	No
K-411**	Kymene Wet Strength Resin	FRP	16,300	1991	No
K-412**	Kymene Wet Strength Resin	FRP	16,300	1991	No
K-501TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
K-502TT*	Material Loading/Unloading	Stainless Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

** Applicability to Kb changed per Volatile Organic Liquid Storage Vessels, Final Rule; amendments published in the Federal Register/Vol.68, No. 199/Wednesday, October 15, 2003.

SECTION C

PARACOL/AKD PROCESS AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
DP-6	Lignosol	Steel	5,230	Pre-1977	No
DP-9	Starch/Water	Steel	330	1992	No
DP-10	Starch Paste	Steel	180	1992	No
DP-11	AKD and Wax Dispersions	Steel	5,460	Pre-1977	No
DP-12	Water/Aquapel/Lignosol	Steel	5,300	Pre-1977	No
DP-13	Lignosol	Steel	5,300	Pre-1977	No
DP-14	AKD and Wax Dispersions	Steel	21	Pre-1977	No
DP-15	Alum/Water	Steel	240	Pre-1977	No
DP-23	Empty/To Be Removed	S. Steel	16,900	Pre-1977	No
DP-24	AKD and Wax Dispersions	Steel	16,900	Pre-1977	No
DP-25	AKD and Wax Dispersions	Steel	16,900	Pre-1977	No
DP-26	Wax	Steel	16,900	Pre-1977	No
DP-27	Wax/Empty	Steel	16,900	Pre-1977	No
DP-28	Wax/Empty	Steel	16,900	Pre-1977	No
DP-29	Wax/Empty	Steel	16,900	Pre-1977	No
DP-35	AKD and Wax Dispersions	Steel	51,800	Pre-1977	No
DP-36	50% Alum	Steel	5,880	Pre-1977	No
DP-37	AKD and Wax Dispersions	Steel	51,800	Pre-1977	No
DP-41	AKD and Wax Dispersions	Steel	12,260	Pre-1977	No
DP-42	AKD and Wax Dispersions	Steel	12,260	Pre-1977	No
DP-44	AKD and Wax Dispersions	Steel	11,840	Pre-1977	No
DP-45	AKD/Wax Dispersions/Empty	Steel	15,220	Pre-1977	No
DP-46	AKD and Wax Dispersions	Steel	11,840	1983	No
DP-47	AKD/Wax Dispersions/Empty	Steel	15,220	Pre-1977	No
DP-48	Empty	Steel	12,260	1979	No
DP-49	Chromoset/MgCl	FRP	13,500	2002	No
DP-50	Age Flocc	FRP	8,000	Pre-1977	No
DP-51	AKD/Wax Dispersions/Empty	FRP	12,260	1979	No
DP-52	AKD/Wax Dispersions/Empty	Steel	5,260	Pre-1977	No
DP-53	AKD/Wax Dispersions/Empty	Steel	11,890	Pre-1977	No
DP-54	AKD and Wax Dispersions	Steel	11,890	1981	No
DP-56	Release Agent	Steel	19,940	Pre-1977	No
DP-58	Naphthenic Oil	Steel	19,940	1981	No
DP-60	Glycol Ester	Steel	6,010	Pre-1977	No
DP-62	Propylene Glycol/Water	Steel	810	Pre-1977	No
DP-63	Propylene Glycol/Water	Steel	810	1984	No
DP-66	AKD and Wax Dispersions	Steel	11,890	1981	No
DP-68	AKD and Wax Dispersions	Steel	11,890	1981	No
DP-69	AKD and Wax Dispersions	Steel	3,120	1990	No
DP-70	Empty/To Be Removed	Steel	300	Pre-1977	No
DP-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
DP-102TT*	Material Loading/Unloading	S. Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

SECTION C

NEUPHOR PROCESS AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
NT-104	Rosin/Empty	Aluminum	158,500	Pre-1977	No
NT-105A	Rosin/Empty	Aluminum	110,500	Pre-1977	No
NT-105B	Rosin/Empty	Aluminum	110,500	Pre-1977	No
NT-R-106	Rosin Adduct	Aluminum	11,400	Pre-1977	No
NT-107	Rosin Adduct	S. Steel	37,500	Pre-1977	No
NT-108	Rosin Adduct	Aluminum	11,400	Pre-1977	No
NT-109	Rosin Adduct	Aluminum	13,500	Pre-1977	No
NT-113	Maleic Anhydride	S. Steel	6,200	Pre-1977	No
NT-123B	Resin Dispersions	Aluminum	158,500	Pre-1977	No
NT-131	Empty	Steel	110,500	Pre-1977	No
NT-141	Rosin	S. Steel	4,100	Pre-1977	No
NT-202	Caustic	Steel	110	Pre-1977	No
NT-205A	Water Phase	Fiberglass	700	Pre-1977	No
NT-205B	Water Phase	Fiberglass	700	Pre-1977	No
NT-206-1	Water	Steel	610	Pre-1977	No
NT-208A	Resin Dispersions	Aluminum	19,900	Pre-1977	No
NT-208B	Resin Dispersions	Aluminum	19,900	Pre-1977	No
NT-208C	Resin Dispersions/Empty	Aluminum	11,400	Pre-1977	No
NT-209	Resin Dispersions	Aluminum	158,500	Pre-1977	No
NT-210	Caustic and Water	Steel	900	Pre-1977	No
NT-300	Wet Strength Resin	S. Steel	20,300	Pre-1977	No
NT-302A	Water Phase	Fiberglass	10,600	Pre-1977	No
NT-302B	Water Phase	Fiberglass	10,600	Pre-1977	No
NT-309A	Resin Dispersions	Aluminum	27,100	Pre-1977	No
NT-309B	Resin Dispersions	Aluminum	27,100	Pre-1977	No
NT-310A	Resin Dispersions	Aluminum	158,500	Pre-1977	No
NT-310B	Resin Dispersions/Empty	Aluminum	147,300	Pre-1977	No
NT-311	Alum	Steel	10,100	Pre-1977	No
NT-312	Lignin Sulfonate	Steel	10,700	1997	No
NT-313	Age Floc	Steel	10,700	1997	No
NT-314	Empty/To Be Removed	Steel	10,700	Pre-1977	No
NT-315	25% Caustic	Steel	11,400	2003	No
NT-400	Empty	Steel	30,100	Pre-1977	No
NT-501TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
NT-502TT*	Material Loading/Unloading	S. Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

SECTION C

PASTE SIZE TANK AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
PS-2	Empty	Steel	12,400	Pre-1977	No
PS-3	Empty	Steel	11,750	Pre-1977	No
PS-4	Empty	Steel	11,750	Pre-1977	No
PS-5	Empty	Steel	11,750	Pre-1977	No
PS-6	Empty	Steel	13,536	Pre-1977	No
PS-7	Empty	Steel	13,536	Pre-1977	No
PS-11	Empty	Steel	12,269	Pre-1977	No
PS-21	Empty	Steel	12,269	Pre-1977	No
PS-22	Empty	Steel	12,269	Pre-1977	No
PS-23	Empty	Steel	12,269	Pre-1977	No
PS-24	Empty	Steel	12,269	Pre-1977	No
PS-29	Empty	Steel	11,750	Pre-1977	No
PS-30	Empty	Steel	11,750	Pre-1977	No
PS-33	Empty	Steel	5,182	Pre-1977	No
PS-34	Empty	Steel	5,182	Pre-1977	No
PS-35	Empty	Steel	25,831	Pre-1977	No
PS-43	Empty	Steel	51,819	Pre-1977	No
PS-45	Caustic	Steel	51,790	Pre-1977	No
PS-52	AKD/Wax Dispersions/Empty	Steel	51,819	Pre-1977	No
PS-55	Resin/Empty	Steel	51,819	Pre-1977	No
PS-56	Wastewater/Empty	Steel	51,819	Pre-1977	No
PS-58	Empty	Steel	51,819	Pre-1977	No
PS-61	Empty	Steel	51,819	Pre-1977	No
PS-62	Empty	Steel	51,819	Pre-1977	No
PS-63	Empty	Steel	926	Pre-1977	No
PS-65	50% Sodium Hydroxide	Steel	251,270	Pre-1977	No
PS-66	Empty	Steel	14,218	Pre-1977	No
PS-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
PS-102TT*	Material Loading/Unloading	S. Steel	6,000	Pre-1977	No

* TC - Railroad Tank Car TT - Tank Truck

SECTION C

POLY-PALE PROCESS AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
P-59	Rosin/Resin	Steel	10,278	Pre-1977	No
T-20	Rosin	Steel	17,167	Pre-1977	No
T-22	Toluene/Rosin/Acid	Steel	400	Pre-1977	No
T-71	Toluene/Rosin	Steel	2,700	Pre-1977	No
T-77	98% Sulfuric Acid	Steel	10,170	Pre-1977	No
T-78	98% Sulfuric Acid	Steel	12,750	Pre-1977	No
T-85	Fresh Toluene	Steel	13,600	Pre-1977	No
T-96	25% Caustic	Steel	9,395	1993	No
T-100	98% Sulfuric Acid	Steel	8,300	Pre-1977	No
T-101	Toluene/Rosin	Steel	1,050	Pre-1977	No
T-106	Rosin	Steel	10,310	Pre-1977	No
T-119	Rosin	Steel	21,000	Pre-1977	No
T-120	Resin	Steel	125,000	Pre-1977	No
T-130	Resin	Steel	32,200	Pre-1977	No
T-132	Resin	Steel	82,000	Pre-1977	No
T-133	Resin	Steel	31,200	Pre-1977	No
T-134	Heat Transfer Fluid	Steel	75	1989	No
T-135	Heat Transfer Fluid	Steel	350	1990	No
T-136	Heat Transfer Fluid	Steel	1,100	1990	No
T-137	Cooling Water	Steel	4,000	Pre-1977	No
T-138	Heat Transfer Fluid	Steel	1,100	1992	No
T-301TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
T-302TT*	Material Loading/Unloading	Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

ROSIN SHED AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
B-18	Resin	Steel	18,613	Pre-1977	No
B-19	Resin	Steel	12,796	Pre-1977	No
B-20	Resin	Steel	6,662	Pre-1977	No
B-21	Resin	Steel	5,264	Pre-1977	No
B-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
B-102TT*	Material Loading/Unloading	Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

SECTION C

ROSIN AMINE DERIVATIVES PROCESS AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
RA-1	Amine D	Steel	8,218	Pre-1977	No
RA-2	Amine D	Steel	4,512	Pre-1977	No
RA-3	Amine D	Steel	4,512	Pre-1977	No
RA-4	Ammonia Water (oil layer)	Steel	5,702	Pre-1977	No
RA-5	Distilled Nitrile	Steel	10,000	Pre-1977	No
RA-6	Amine D	Steel	5,207	Pre-1977	No
RA-7	Crude Nitrile/Empty	Steel	11,844	Pre-1977	No
RA-8	Empty	Steel	150	Pre-1977	No
RA-9	Distilled Nitrile	Steel	8,215	Pre-1977	No
RA-10	Distilled Nitrile	Steel	8,215	Pre-1977	No
RA-11	Crude Nitrile/Empty	Steel	14,100	Pre-1977	No
RA-12	731D/Resin	Steel	25,380	Pre-1977	No
RA-13	Empty	Steel	4,464	Pre-1977	No
RA-15	5% Caustic	Steel	10,400	Pre-1977	No
RA-16	PolyRad/Surfactant	Steel	2,406	Pre-1977	No
RA-17	PolyRad/Surfactant	Steel	3,065	Pre-1977	No
RA-18	PolyRad/Surfactant	Steel	3,065	Pre-1977	No
RA-19	PolyRad/Surfactant	Steel	488	Pre-1977	No
RA-20	PolyRad/Surfactant	Steel	488	Pre-1977	No
RA-23	Resin	Steel	4,510	Pre-1977	No
RA-24	5% Sodium Hydroxide	Steel	40	Pre-1977	No
RA-25	Pexoil (light ends)	Steel	4,464	Pre-1977	No
RA-26	Nitrile	Steel	2,840	Pre-1977	No
RA-27	Lime/Nitrile	Steel	225	Pre-1977	No
RA-28	Amine D Acetate	Aluminum	2,812	Pre-1977	No
RA-29	Amine D Acetate/Empty	Aluminum	2,924	Pre-1977	No
RA-30	Glacial Acetic Acid	Steel	1,902	Pre-1977	No
RA-37	Rosin	Steel	1,990	Pre-1977	No
RA-40	Wastewater	Steel	25,350	Pre-1977	No
RA-41	Wastewater	Steel	25,350	Pre-1977	No
RA-44	Wastewater/Empty	Steel	9,877	Pre-1977	No
RA-49	Waste Oils	Steel	17,230	Pre-1977	No
RA-50	Ethylene Oxide	Steel	17,550	Pre-1977	No
RA-51	Isopropyl Alcohol	Steel	17,550	Pre-1977	No
RA-52	Acetic Acid	Steel	11,280	Pre-1977	No
RA-53	Heat Transfer Fluid	Steel	1,176	Pre-1977	No
RA-54	Ammonia	Steel	12,113	Pre-1977	No
RA-55	Ammonia	Steel	12,113	Pre-1977	No
RA-56	Wastewater	Steel	12,750	Pre-1977	No
RA-57	Wastewater	Steel	12,750	Pre-1977	No
RA-63	Ammonia	Steel	25	1987	No
HP-40	Wastewater	Steel	20,000	Pre-1977	No
HP-43	Wastewater	Steel	10,000	Pre-1977	No
HP-44	Wastewater	Steel	10,000	Pre-1977	No
RA-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No

* TC - Railroad Tank Car

SECTION C

HARD RESINS PROCESS AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
H-23	Heat Transfer Fluid	Steel	8,812	Pre-1977	No
P-1	Rosin	Steel	27,970	Pre-1977	No
S-23	Resin	Steel	6,187	Pre-1977	No
S-40	Glycerine	Steel	18,320	Pre-1977	No
S-74	Resin	Steel	2,135	Pre-1977	No
S-75	Resin	Steel	8,804	Pre-1977	No
S-80	Heat Transfer Fluid	Steel	2,203	Pre-1977	No
S-84	Resin	Steel	8,000	Pre-1977	No
S-85	Resin	Steel	8,000	Pre-1977	No
S-86	Resin	Steel	8,000	Pre-1977	No
S-89	Pexoil (light ends)	Steel	11,840	Pre-1977	No
S-91	Resin	Steel	13,151	Pre-1977	No
S-94	Resin	Steel	8,804	Pre-1977	No
S-95	Resin	Steel	8,804	Pre-1977	No
S-97	Olefin	Aluminum	8,220	Pre-1977	No
S-98	Empty	Aluminum	8,220	Pre-1977	No
S-110	Resin – South Utility Tank	Steel	3,933	Pre-1977	No
S-111	Resin – North Utility Tank	Steel	3,933	Pre-1977	No
S-115	Pexoil (light ends)	Steel	2,730	Pre-1977	No
S-116	Pexoil (light ends)	Steel	1,222	Pre-1977	No
S-118	Heat Transfer Fluid	Steel	43	Pre-1977	No
S-119	Heat Transfer Fluid	Steel	43	Pre-1977	No
S-120	Heat Transfer Fluid	Steel	43	Pre-1977	No
S-122	Heat Transfer Fluid	Steel	43	Pre-1977	No
S-123	Rosin/Empty	Aluminum	16,061	Pre-1977	No
S-124	Resin	Aluminum	19,036	Pre-1977	No
S-125	Empty	Steel	19,000	Pre-1977	No
S-401TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
S-402TT*	Material Loading/Unloading	Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

SECTION C

ROSIN DISTILLATION PROCESS AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
FL-1	Light Ends	Steel	881	Pre-1977	No
FL-3	Empty	Steel	1,903	Pre-1977	No
FL-4	Pexoil (light ends)	Steel	71	Pre-1977	No
FL-10	Resin	Steel	14,210	Pre-1977	No
FL-11	Resin	Steel	14,210	Pre-1977	No
H-4	Empty	Steel	220	Pre-1977	No
H-6	Water	Steel	1,775	Pre-1977	No
H-9	Water	Steel	1,535	Pre-1977	No
H-10	Water	Steel	1,535	Pre-1977	No
H-11	Heat Transfer Fluid	Steel	660	Pre-1977	No
H-12	Heat Transfer Fluid	Steel	33	Pre-1977	No
H-16	Heat Transfer Fluid	Steel	188	Pre-1977	No
H-27	Empty	Steel	421	Pre-1977	No
H-28	Resin	Steel	31,724	Pre-1977	No
H-29	16% Sodium Hydroxide	Steel	734	Pre-1977	No
H-30	25% Sodium Hydroxide	Steel	734	Pre-1977	No
Spare	Empty	Steel	19,000	Pre-1977	No
Spare	Empty	Steel	19,000	Pre-1977	No
Spare	Empty	Steel	19,000	Pre-1977	No
Spare	Empty	Steel	2,000	Pre-1977	No
Spare	Empty	Steel	2,000	Pre-1977	No
Spare	Empty	Steel	6,000	Pre-1977	No
Spare	Empty	Steel	10,200	Pre-1977	No
SA-605	Hydrogen	Steel	6,925	Pre-1977	No
H-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
H-102TT*	Material Loading/Unloading	Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

SECTION C

EFFLUENT TREATMENT AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
ET-1	40% Sulfuric Acid/Toluene	FRP	3,300	Pre-1977	No
ET-2	40% Sulfuric Acid/Toluene	FRP	4,300	Pre-1977	No
ET-5	98% Sulfuric Acid/Empty	Steel	4,900	1978	No
ET-6	93% Sulfuric Acid/Empty	Steel	8,800	1978	No
ET-7	Out of Service	Steel	7,600	Pre-1977	No
ET-8	Out of Service	Steel	169,600	1978	No
ET-9	Out of Service	Steel	3,300	1978	No
ET-10	Wastewater	Steel	5,111,100	1982	No
ET-11	Out of Service	Steel	17,100	1981	No
ET-12	Out of Service	Steel	9,300	1985	No
ET-14	Out of Service	Steel	169,600	Pre-1977	No
ET-15	Out of Service	Steel	3,300	Pre-1977	No
ET-16	Out of Service	Steel	280	1978	No
ET-17	Out of Service	Steel	1,210	1978	No
V-1	Out of Service	Steel	46,900	1979	No
V-2	Out of Service	Steel	46,900	1979	No
V-3	Out of Service	Steel	46,900	1979	No
V-4	Out of Service	Steel	4,300	Pre-1977	No
V-5	Out of Service	Steel	4,300	Pre-1977	No
V-6	Out of Service	Steel	4,300	Pre-1977	No
V-7	Out of Service	Steel	2,200	Pre-1977	No
V-8	Out of Service	Steel	8,500	Pre-1977	No
V-10	Out of Service	Steel	160	Pre-1977	No
V-11	Out of Service	Steel	15,200	Pre-1977	No
V-12	Out of Service	Steel	4,300	Pre-1977	No
ET-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No

* TC – Railroad Tank Car

FACILITY FIRE WATER PROTECTION					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
FP-1	Water	Steel	444,500	Pre-1977	No
FP-2	Gasoline	Steel	280	Pre-1977	No
FP-3	Diesel	Steel	350	Pre-1977	No

SECTION C

LOADING SHED AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
L-7	Pine Oil/Empty	Steel	5,600	Pre-1977	No
L-8	Pine Oil/Empty	Steel	2,900	Pre-1977	No
L-9	Pine Oil/Empty	Steel	2,900	Pre-1977	No
L-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
L-102TT*	Material Loading/Unloading	Steel	6,000	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck

YARD TANKS					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
Y-25	Empty	Steel	317	Pre-1977	No
Y-37	Gasoline	Steel	17,615	Pre-1977	No
Y-45	Diesel	Steel	5,640	Pre-1977	No

SYNTHETIC RESINS TANKS					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
VN-1	Empty	Steel	47,049	Pre-1977	No
VN-3	Pamak TP	Steel	21,149	Pre-1977	No
TP-2	Empty	Steel	10,260	Pre-1977	No
TP-3	Empty	Steel	5,640	Pre-1977	No
TP-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No

* TC – Railroad Tank Car

RISK MANAGEMENT PLANS

If a risk management plan is required pursuant to the Mississippi Air Toxics Regulations, APC-S-8, and Section 112(r) of Title III of the Clean Air Act, the permit applicant need only clarify intentions to comply with the requirement to register such a plan. It will not be necessary to incorporate the content of the risk management plan as a permit term.

Please answer the following questions:

I. Are you required to develop and register a risk management plan pursuant to Section 112(r)?

X Yes No

Only if "yes", answer questions II., III., and/or IV.

II. Have you developed and submitted the risk management plan to EPA's RMP Reporting Center?

X Yes No

III. If yes, date submitted: June 16, 1999

IV. If no, provide a schedule below for the development and submittal of the risk management plan to the Reporting Center. Please notify the MDEQ's Air Division once the risk management plan has been submitted to the Reporting Center.

KYMENE PROCESS AREA

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

1. Emission Point No./ Name: AA-000, Kymene Process Area
2. Process Description: The Kymene Process Area produces specialty chemicals used primarily as wet strength additives in the manufacture of paper. Components in Epichlorohydrin service are subject to NESHAP 40 CFR 63, Subpart W for controlling HAP emissions. Equipment in the process area includes reactors, tanks, vents, piping, etc. Emissions occur from associated equipment and from fugitive losses.
3. Was this unit constructed or modified after August 7, 1977? X yes no
If yes please give date and explain. Modified in February 2003.
4. Capacity (in tons/hr): Wet Strength Resin- 6.96 tons/hr Polymer - 1.15 tons/hr
5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM**
Wet Strength Resins			
Epichlorohydrin	625 lbs	625 lbs	5,475,000 lbs
Pre-Polymer	2309 lbs	2309 lbs	20,226,840 lbs
Sulfuric Acid	68 lbs	68 lbs	595,680 lbs
Antifoam	1 lb	1 lb	8760 lbs
Potassium Sorbate	1 lb	1 lb	8760 lbs
Hexamethylenediamine	565 lbs	565 lbs	4,949,400 lbs
Water	10,917 lbs	10,917 lbs	95,632,920 lbs
Pre-Polymer			
Adipic Acid	804 lbs	804 lbs	7,043,040 lbs
Diethylenetriamine	565 lbs	565 lbs	4,949,400 lbs
Water	940 lbs	940 lbs	8,234,400 lbs

* Actual 2002 Kymene production (73,462,683 lbs).

** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.

6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
Wet Strength Resins	13,920 lbs	13,920 lbs	121,939,200 lbs
Pre-Polymer	2309 lbs	2309 lbs	20,226,840 lbs

7. Stack Data:

AA-001 Kymene Process Vent equipped with a packed bed scrubber.

A. Height: 30 ft C. Exit gas velocity: Variable
 B. Inside diameter: 0.5 ft D. Exit gas temperature: Ambient

AA-002 Kymene Adipic Acid Handling System equipped with a dust collector.

A. Height: 40 ft C. Exit gas velocity: 27.6 ft/s
 B. Inside diameter: 0.67 ft D. Exit gas temperature: Ambient

8. UTM Coordinates:

A. Zone 16 B. North 3469.40 C. East 280.60

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)			
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr
AA-000**	VOC	No				1.50			1.50
	Epichlorohydrin					1.50			1.50
AA-001	VOC	Yes	98%			0.41			11.12
	Epichlorohydrin					0.41			11.12
AA-002	PM/PM ₁₀	Yes	99%			0.212		21.20	92.86

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.
 ** Fugitive emissions and insignificant sources associated with the Kymene Process Area.

SCRUBBERS (Page 1 of 2)

SECTION L5

- 1. Emission Point No. / Name: AA-001
- 2. Manufacturers Name and Model No.: Croll Reynolds 18T-15H
- 3. Date of construction for existing sources or date of anticipated start-up for new sources:
April 1991

4. Scrubber Data:

- a) Scrubber type: Venturi Orifice
 Packed Tower Gravity Tower
 Cyclonic Condenser
 Mist Eliminator Impingement Plate
 Other: _____

- b) Liquid injection rate:
 - 1) Design maximum: 15 gpm @ 15 psia
 - 2) Expected average: 15 gpm @ 10 psia

- c) Pressure drop: 6 inches H₂O

- d) Scrubbing liquid: **Water**
 - 1) Once - through Recycled
 - 2) If recycled: _____ gpm make - up rate
 - 3) If water, describe settling basin: NA
 - 4) Solution / Reactant systems:
 - a) Chemical make - up: NA
 - b) How is discharge handled, treated? Impoundment Basin to POTW

- e) Gas flow: Counter current Concurrent
 - 1) Flow rate: 512 acfm
 - 2) Inlet Temperature: 100 °F

- f) Venturi Data: **NA**
 - 1) Inlet Area: _____ ft²
 - 2) Throat Area: _____ ft²
 - 3) Throat velocity: _____ ft / sec
 - 4) Fixed throat Variable throat

- g) Packed or Plate Tower Data:
 - 1) Surface Area: 1.5 ft diameter
 - 2) Packing depth: 15 ft
 - 3) Type of packing: Rings Saddles
Other: _____
 - 4) No. of plates: NA
 - 5) Type of plates: _____

- h) Demisting Data:
 - 1) Mist eliminator filter area: 1.5 ft diameter
 - 2) Type: Cyclone Vanes Pad
 Other: _____

- i) Efficiency: 98 %

j) Are extra nozzles readily available? _____ Yes X No
How many? _____

k) Pressure measurement devices installed? _____ Yes X No

5. Which process(es) does the scrubber control emissions from? Wet Strength Resin and Pre-Polymer Batch Reactors

BAGHOUSES**SECTION L1**

1. Emission Point No. / Name : AA-002
2. Manufacturers Name & Model No.: Unknown
3. Date of construction for existing sources or date of anticipated start-up for new sources:
Pre-1977
4. Baghouse Data:
 - a) Cloth area: 47 ft²
 - b) Air to cloth ratio: Unknown acfm/ft²
 - c) Type of bag: Woven Felted
 Membrane X Other: Nylon
 - d) Bag material: Nylon
 - e) No. of bags: 24
 - f) No. of compartments: 1
 - g) Bag length: 3 ft
 - h) Bag diameter: 0.21 ft
 - i) Pressure drop: Unknown inches H₂O
 - j) Pressure measurement device installed: Yes X No
 - k) Air flow: Unknown acfm @ 72 °F
 - l) Efficiency: 99 %
 - m) Dirty air on: inside X outside of bag
 - n) Time between bag cleaning: Continuous during batch operation
 - o) Method of bag cleaning: X Shaking Reverse Air
 Pulse Jet Other:
 - p) Are extra bags readily available: X Yes No How Many? 30 (re-order minimum)
 - q) How is the collected dust stored, handled, disposed of? Reused or disposed of properly
5. Which process(es) does the baghouse control emissions from? Loading of Adipic Acid (powder) into Pre-Polymer Batch Reactor.

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AA-000

2. Pollutant: VOC and HAP (Epichlorohydrin)

3. Material or parameter being monitored or recorded: Leak Detection and Repair (LDAR)

4. Method of monitoring and recordkeeping: The Kymene Process Area equipment (reactor, tanks, agitator, valves, relief valves, pumps, and connectors) that directly contacts epichlorohydrin are monitored for leaks and the data is recorded on a schedule determined by 40 CFR 63, Subpart H and Subpart W.

5. List any EPA methods used: EPA Reference Method 21

6. Compliance shall be demonstrated:
 Daily Weekly X Monthly X Quarterly X Yearly

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AA-001
2. Pollutant: VOC and HAPs
3. Material or parameter being monitored or recorded: Scrubber water flow rate
4. Method of monitoring and recordkeeping: The scrubber water flowrate (gal/min) is monitored and recorded on a weekly basis to ensure the scrubber operates at the designed efficiency.
5. List any EPA methods used: NA
6. Compliance shall be demonstrated:
 Daily X Weekly Monthly Quarterly

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AA-002

2. Pollutant: PM

3. Material or parameter being monitored or recorded: Blower (on/off) and visual inspection of baghouse

4. Method of monitoring and recordkeeping: The dust collector is monitored on a weekly basis during the loading of Adipic Acid to ensure the baghouse blower is on and the control equipment is operating as intended. Also, a visual inspection of the baghouse is conducted as part of a preventative maintenance program and comments are logged on a weekly basis.

5. List any EPA methods used: NA

6. Compliance shall be demonstrated:
 Daily X Weekly Monthly Quarterly

PARACOL/AKD PROCESS AREA

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

1. Emission Point No./ Name: AB-000, Paracol/AKD Process Area
2. Process Description: The Paracol/AKD Process Area produces AKD and Wax Dispersions (specialty chemicals) used primarily as internal and surface sizing agents in the manufacture of paper. Equipment in the process area includes reactors, tanks, vents, piping, etc. Emissions occur from associated equipment and from fugitive losses.
3. Was this unit constructed or modified after August 7, 1977? X yes no
If yes please give date and explain. Installed scrubber in 1987.
4. Capacity (in tons/hr): 6.20 tons/hr
5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM ^{*,**}
Kymene	503 lbs	503 lbs	4,406,280 lbs
Aquapel	1302 lbs	1302 lbs	11,405,520 lbs
Sulfonates	182 lbs	182 lbs	1,594,320 lbs
Starch	283 lbs	283 lbs	2,479,080 lbs
Water	9305 lbs	9305 lbs	81,511,800 lbs
Wax	673 lbs	673 lbs	5,895,480 lbs
Age Floc	61 lbs	61 lbs	534,360 lbs
Gum Ghatti	3 lbs	3 lbs	26,280 lbs
Triethanolamine	3 lbs	3 lbs	26,280 lbs
Stearic Acid	5 lbs	5 lbs	43,800 lbs
Sulfuric Acid	<1 lb	<1 lb	<8760 lbs
Biocide	6 lbs	6 lbs	52,560 lbs
Alum	75 lbs	75 lbs	657,000 lbs

* Actual 2002 Paracol production (29,614,451 lbs).

** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.

6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
AKD and Wax Dispersions	12,400 lbs	12,400 lbs	108,624,000 lbs

7. Stack Data:

AB-001 Paracol/AKD Processes are vented through a water scrubber.

A. Height: 15 ft C. Exit gas velocity: 50.9 ft/s
 B. Inside diameter: 0.83 ft D. Exit gas temperature: Ambient

8. UTM Coordinates:

A. Zone 16 B. North 3469.40 C. East 280.70

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)			
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr
AB-001	PM/PM ₁₀	Yes	75%	note 2	0.66	2.87	note 2	2.63	11.50

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.

SCRUBBERS (Page 1 of 2)

SECTION L5

1. Emission Point No. / Name: AB-001

2. Manufacturers Name and Model No.: Hercules, Inc.

3. Date of construction for existing sources or date of anticipated start-up for new sources:
1987

4. Scrubber Data:

a) Scrubber type: _____ Venturi _____ Orifice
_____ Packed Tower X Gravity Tower
_____ Cyclonic _____ Condenser
_____ Mist Eliminator _____ Impingement Plate
_____ Other: _____

b) Liquid injection rate:
1) Design maximum: 6.1 gpm @ 40 psia
2) Expected average: 6.1 gpm @ 40 psia

c) Pressure drop: 6 inches H₂O (estimated)

d) Scrubbing liquid: **Water**
1) X Once - through _____ Recycled
2) If recycled: _____ gpm make - up rate
3) If water, describe settling basin: NA
4) Solution / Reactant systems:
a) Chemical make - up: NA
b) How is discharge handled, treated? Impoundment Basin to POTW

e) Gas flow: X Counter current _____ Concurrent
1) Flow rate: 500 acfm
2) Inlet Temperature: Ambient °F

f) Venturi Data: **NA**
1) Inlet Area: _____ ft²
2) Throat Area: _____ ft²
3) Throat velocity: _____ ft / sec
4) _____ Fixed throat _____ Variable throat

g) Packed or Plate Tower Data: **NA**
1) Surface Area: _____ ft diameter
2) Packing depth: _____ ft
3) Type of packing: _____ Rings _____ Saddles
Other: _____
4) No. of plates: _____
5) Type of plates: _____

h) Demisting Data: **NA**
1) Mist eliminator filter area: _____ ft diameter
2) Type: _____ Cyclone _____ Vanes _____ Pad
Other: _____

i) Efficiency: 75 % (estimated)

j) Are extra nozzles readily available? _____ Yes X No
How many? _____

k) Pressure measurement devices installed? _____ Yes X No

5. Which process(es) does the scrubber control emissions from? Paracol/AKD Process Area Vents
and Melter.

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AB-001
2. Pollutant: PM
3. Material or parameter being monitored or recorded: Scrubber water flow rate
4. Method of monitoring and recordkeeping: The scrubber water flow rate (gal/min) is monitored and recorded on a weekly basis to ensure the scrubber operates at the designed efficiency.
5. List any EPA methods used: NA
6. Compliance shall be demonstrated:
 Daily X Weekly Monthly Quarterly

NEUPHOR PROCESS AREA

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

1. Emission Point No./ Name: AD-000, Neuphor Process Area
2. Process Description: The Neuphor Process Area produces various resin dispersions (specialty chemicals) used as internal sizing agents in the manufacture of paper and as adhesives, coatings, and binders in diverse industrial applications. Equipment in the process area includes reactors, tanks, vents, piping, etc. Emissions occur from associated equipment and fugitive losses.
3. Was this unit constructed or modified after August 7, 1977? X yes no
If yes please give date and explain. Neuphor Process was initiated in 1987.
4. Capacity (in tons/hr): Resin Dispersions – 11.1 tons/hr Rosin Adduct – 4.96 tons/hr
5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM* **
Resin Dispersions			
Resin	6751 lbs	6751 lbs	59,138,760 lbs
Casein	64 lbs	64 lbs	560,640 lbs
Kymene	1389 lbs	1389 lbs	12,167,640 lbs
Water	12,637 lbs	12,637 lbs	110,700,120 lbs
Aqueous Ammonia	14 lbs	14 lbs	122,640 lbs
Biocide	9 lbs	9 lbs	78,840 lbs
Caustic	36 lbs	36 lbs	315,360 lbs
Alum	1299 lbs	1299 lbs	11,379,240 lbs
Rosin Adduct			
Rosin	9450 lbs	9450 lbs	82,782,000 lbs
Fumaric Acid	640 lbs	640 lbs	5,606,400 lbs
Maleic Anhydride	640 lbs	640 lbs	5,606,400 lbs

* Actual 2002 Neuphor production (49,020,813 lbs).

** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.

6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
Resin Dispersions	22,200 lbs	22,200 lbs	194,472,000 lbs
Rosin Adduct	9920 lbs	9920 lbs	86,899,200 lbs

7. Stack Data:

AD-001 Adduct Reactor is vented through an activated carbon bed with scrubber (see insignificant activities, Section C).

A. Height: 20 ft C. Exit gas velocity: 0.39 ft/s
 B. Inside diameter: 0.5 ft D. Exit gas temperature: Ambient

8. UTM Coordinates:

A. Zone 16 B. North 3469.50 C. East 280.00

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)				
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr	
AD-001**	VOC									

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MIMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.
 ** Insignificant activities - Section C, per MDEQ submittal on January 22, 2002.

POLY-PALE PROCESS AREA

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

- 1. Emission Point No./ Name: AC-000, Poly-Pale Process Area
- 2. Process Description: The Poly-Pale Process Area produces polymerized resin used in adhesives and other resin derivatives. Equipment in the process area includes reactors, tanks, vents, piping, etc. Emissions occur from associated equipment and fugitive losses.
- 3. Was this unit constructed or modified after August 7, 1977? yes X no
If yes please give date and explain. _____
- 4. Capacity (in tons/hr): 3.60 tons/hr
- 5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM ^{*,**}
Rosin	7227 lbs	7227 lbs	63,308,520 lbs
Toluene ^{***}	7227 lbs	7227 lbs	63,308,520 lbs
Sulfuric Acid (catalyst)	760 lbs	760 lbs	6,657,600 lbs
Caustic	297 lbs	297 lbs	2,601,720 lbs

* Actual 2002 Poly-Pale production (Poly-Pale – 10,754,657 lbs and Melhi – 706,745 lbs).
 ** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.
 *** Toluene is stripped from the Toluene/Rosin solution and recycled into the process; therefore, the quantity used to produce product is not equal to the quantity consumed.

- 6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
Poly-Pale	6898 lbs	6898 lbs	60,426,480 lbs
Melhi	302 lbs	302 lbs	2,645,520 lbs

7. Stack Data:

AC-002 Poly-Pale Process is vented to one of two water scrubbers (Water Scrubber #1).

A.	Height:	<u>35 ft</u>	C.	Exit gas velocity:	<u>1.7 ft/s</u>
B.	Inside diameter:	<u>0.25 ft</u>	D.	Exit gas temperature:	<u>96°F</u>

AC-003 Poly-Pale Process is vented to one of two water scrubbers (Water Scrubber #2).

A.	Height:	<u>35 ft</u>	C.	Exit gas velocity:	<u>1.8 ft/s</u>
B.	Inside diameter:	<u>0.25 ft</u>	D.	Exit gas temperature:	<u>92°F</u>

8. UTM Coordinates:

A. Zone	<u>16</u>	B. North	<u>3469.40</u>	C. East	<u>280.40</u>
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MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)			
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr
AC-000**	VOC	No				163.89			321.17
	Toluene					163.89			321.17
AC-002	VOC	Yes	~90%		0.44	1.93		4.40	19.27
	SO ₂				0.003	0.01		0.031	0.14
	H ₂ SO ₄				0.00	0.00		0.00	0.00
	Toluene				0.17	0.74		1.71	7.49
AC-003	VOC	Yes	~90%		0.11	0.48		1.10	4.82
	SO ₂				0.013	0.06		0.13	0.57
	H ₂ SO ₄				0.002	0.01		0.02	0.11
	Toluene				0.013	0.06		0.13	0.57

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.

2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.

** Fugitive emissions and insignificant sources associated with the Poly-Pale Process Area.

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

1. Emission Point No./ Name: AC-004, Poly-Pale Process Rosin Melter
2. Process Description: The Rosin Melter is used to melt rosin for Poly-Pale Process operations. The open top melter melts rosin, which arrives at the process area in drums.
3. Was this unit constructed or modified after August 7, 1977? _____ yes X no
If yes please give date and explain. _____
4. Capacity (in tons/hr): 2.5 tons/hr
5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM* **
Rosin	5000 lbs	5000 lbs	43,800,000 lbs

* Actual 2002 rosin melted (4,313,790 lbs).

** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.

6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
Rosin	5000 lbs	5000 lbs	43,800,000 lbs

7. Stack Data:

AC-004 Poly-Pale Process Rosin Melter

- | | |
|-------------------------------|------------------------------------|
| A. Height: <u>NA</u> | C. Exit gas velocity: <u>NA</u> |
| B. Inside diameter: <u>NA</u> | D. Exit gas temperature: <u>NA</u> |

8. UTM Coordinates:

A. Zone 16 B. North 3469.40 C. East 280.40

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)				
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr	
AC-004	PM/PM ₁₀	No								12.52
	VOC									1.57

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.

SCRUBBERS (Page 1 of 2)

SECTION L5

1. Emission Point No. / Name: AC-002

2. Manufacturers Name and Model No.: Hercules, Inc.

3. Date of construction for existing sources or date of anticipated start-up for new sources:
Pre-1977

4. Scrubber Data:

a) Scrubber type: Venturi Orifice
 Packed Tower X Gravity Tower
 Cyclonic Condenser
 Mist Eliminator Impingement Plate
 Other:

b) Liquid injection rate:
 1) Design maximum: 6.1 gpm @ 40 psia
 2) Expected average: 6.1 gpm @ 40 psia

c) Pressure drop: 6 inches H₂O (estimated)

d) Scrubbing liquid: **Water**
 1) X Once - through Recycled
 2) If recycled: gpm make - up rate
 3) If water, describe settling basin: NA
 4) Solution / Reactant systems:
 a) Chemical make - up: NA
 b) How is discharge handled, treated? Impoundment Basin to POTW

e) Gas flow: X Counter current Concurrent
 1) Flow rate: Variable acfm
 2) Inlet Temperature: Ambient °F

f) Venturi Data: **NA**
 1) Inlet Area: ft²
 2) Throat Area: ft²
 3) Throat velocity: ft / sec
 4) Fixed throat Variable throat

g) Packed or Plate Tower Data: **NA**
 1) Surface Area: ft diameter
 2) Packing depth: ft
 3) Type of packing: Rings Saddles
 Other:
 4) No. of plates:
 5) Type of plates:

h) Demisting Data: **NA**
 1) Mist eliminator filter area: ft diameter
 2) Type: Cyclone Vanes Pad
 Other:

i) Efficiency: 90 % (estimated)

j) Are extra nozzles readily available? _____ Yes No
How many? _____

k) Pressure measurement devices installed? _____ Yes No

5. Which process(es) does the scrubber control emissions from? Approximately half (1/2) the Poly-Pale Process equipment is controlled by this scrubber.

SCRUBBERS (Page 1 of 2)

SECTION L5

1. Emission Point No. / Name: AC-003

2. Manufacturers Name and Model No.: Hercules, Inc.

3. Date of construction for existing sources or date of anticipated start-up for new sources:
Pre-1977

4. Scrubber Data:

a) Scrubber type: _____ Venturi _____ Orifice
_____ Packed Tower X Gravity Tower
_____ Cyclonic _____ Condenser
_____ Mist Eliminator _____ Impingement Plate
_____ Other: _____

b) Liquid injection rate:
1) Design maximum: 6.1 gpm @ 40 psia
2) Expected average: 6.1 gpm @ 40 psia

c) Pressure drop: 6 inches H₂O (estimated)

d) Scrubbing liquid: **Water**
1) X Once - through _____ Recycled
2) If recycled: _____ gpm make - up rate
3) If water, describe settling basin: NA
4) Solution / Reactant systems:
a) Chemical make - up: NA
b) How is discharge handled, treated? Impoundment Basin to POTW

e) Gas flow: X Counter current _____ Concurrent
1) Flow rate: Variable acfm
2) Inlet Temperature: Ambient °F

f) Venturi Data: **NA**
1) Inlet Area: _____ ft²
2) Throat Area: _____ ft²
3) Throat velocity: _____ ft / sec
4) _____ Fixed throat _____ Variable throat

g) Packed or Plate Tower Data: **NA**
1) Surface Area: _____ ft diameter
2) Packing depth: _____ ft
3) Type of packing: _____ Rings _____ Saddles
_____ Other: _____
4) No. of plates: _____
5) Type of plates: _____

h) Demisting Data: **NA**
1) Mist eliminator filter area: _____ ft diameter
2) Type: _____ Cyclone _____ Vanes _____ Pad
_____ Other: _____

i) Efficiency: 90 % (estimated)

j) Are extra nozzles readily available? _____ Yes X No
How many? _____

k) Pressure measurement devices installed? _____ Yes X No

5. Which process(es) does the scrubber control emissions from? Approximately half (1/2) the Poly-Pale
Process equipment is controlled by this
scrubber.

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AC-002 and AC-003

2. Pollutant: SO₂, VOC, HAP (Toluene), and Acid Mist (H₂SO₄)

3. Material or parameter being monitored or recorded: Scrubber water flow

4. Method of monitoring and recordkeeping: The scrubber water flow to the scrubbers is visually monitored through a sight glass and recorded on a weekly basis to ensure the scrubbers operate as intended.

5. List any EPA methods used: NA

6. Compliance shall be demonstrated:
 Daily X Weekly Monthly Quarterly

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AC-004

2. Pollutant: PM and VOC

3. Material or parameter being monitored or recorded: Raw material input

4. Method of monitoring and recordkeeping: The number of rosin drums opened and melted in the Rosin Melter are monitored and recorded on a daily basis.

5. List any EPA methods used: NA

6. Compliance shall be demonstrated:
 X Daily Weekly Monthly Quarterly

ROSIN AMINE DERIVATIVES PROCESS AREA

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

- 1. Emission Point No./ Name: AF-000, Rosin Amine Derivatives (RAD) Process Area and AF-000(EO), RAD Process Area in Ethylene Oxide service

- 2. Process Description: The RAD Process Area produces chemicals (Rosin Amine and Ethylene Oxide Derivatives) primarily used as corrosion inhibitors. The Polyether Polyol (in EO service) manufacturing components are subject to NESHAP 40 CFR 63, Subpart PPP for controlling HAP emissions. Equipment in the process area includes reactors, tanks, vents, piping, etc. Emissions occur from associated equipment and fugitive losses.

- 3. Was this unit constructed or modified after August 7, 1977? X yes no
If yes please give date and explain. Installed Ammonia Scrubber in 1997 and modified operation of EO scrubber in 2002.

- 4. Capacity (in tons/hr): Resin Nitrile – 0.51 tph, Distilled Nitrile – 0.51 tph, Resin Amine – 0.37 tph, Resin Amine Acetates – 0.01 tph, RADs – 0.10 tph, and EODs – 0.05 tph

- 5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM**
Resin Nitrile			
Resin	1342 lbs	1342 lbs	11,755,920 lbs
Ammonia	119 lbs	119 lbs	1,042,440 lbs
Distilled Nitrile			
Resin Nitrile	1020 lbs	1020 lbs	8,935,200 lbs
Resin Amine			
Distilled Nitrile	793 lbs	793 lbs	6,946,680 lbs
Hydrogen Gas	11 mcf	11 mcf	96,360 mcf
Resin Amine Acetates			
Resin Amine	8 lbs	8 lbs	70,080 lbs

Acetic Acid	6 lbs	6 lbs	52,560 lbs
Isopropyl Alcohol	3 lbs	3 lbs	26,280 lbs
Resin Amine Derivatives			
Resin Amine	76 lbs	76 lbs	665,760 lbs
Ethylene Oxide	86 lbs	86 lbs	753,360 lbs
Isopropyl Alcohol	47 lbs	47 lbs	411,720 lbs
Ethylene Oxide Derivatives			
Rosin	33 lbs	33 lbs	289,080 lbs
Ethylene Oxide	71 lbs	71 lbs	621,960 lbs

* Actual 2002 RAD production (Amine D - 384,615 lbs, Polyrads - 114,640 lbs, & Surfactants - 38,425 lbs).

** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.

6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
Resin Nitrile	1020 lbs	1020 lbs	8,935,200 lbs
Distilled Nitrile	1020 lbs	1020 lbs	8,935,200 lbs
Resin Amine	732 lbs	732 lbs	6,412,320 lbs
Resin Amine Acetates	18 lbs	18 lbs	157,680 lbs
RADs	194 lbs	194 lbs	1,699,440 lbs
EODs	89 lbs	89 lbs	779,640 lbs

7. Stack Data:

AF-002 RAD Process Ammoniation Vent, which is equipped with a water scrubber.

A. Height: 15 ft C. Exit gas velocity: 0-1 ft/s
 B. Inside diameter: 0.5 ft D. Exit gas temperature: Ambient

AF-004 Ethylene Oxide Packed Bed Scrubber (with Sulfuric Acid) to control EO emissions.

A. Height: 50 ft C. Exit gas velocity: 0-1 ft/s
 B. Inside diameter: 0.25 ft D. Exit gas temperature: Ambient

8. UTM Coordinates:

A. Zone 16 B. North 3469.40 C. East 280.40

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)				
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr	
AF-000**	VOC	No				0.56				8.68
	Ethylene Oxide					0.56				8.68
AF-002	Ammonia	Yes	95%							
AF-004	VOC	Yes	98%			0.03				0.80
	Ethylene Oxide					0.03				0.80

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.
 ** Fugitive emissions and insignificant sources associated with the RAD Process Area.

SCRUBBERS (Page 1 of 2)

SECTION L5

1. Emission Point No. / Name: AF-002

2. Manufacturers Name and Model No.: Hercules, Inc.

3. Date of construction for existing sources or date of anticipated start-up for new sources:
1997

4. Scrubber Data:

a) Scrubber type: X Venturi Orifice
 Packed Tower Gravity Tower
 Cyclonic Condenser
 Mist Eliminator Impingement Plate
 Other:

b) Liquid injection rate:
1) Design maximum: unknown gpm @ unknown psia
2) Expected average: 4-6 gpm @ unknown psia (estimated)

c) Pressure drop: unknown inches H₂O (estimated)

d) Scrubbing liquid: **Water**
1) X Once - through Recycled
2) If recycled: gpm make - up rate
3) If water, describe settling basin: NA
4) Solution / Reactant systems:
a) Chemical make - up: NA
b) How is discharge handled, treated? Impoundment Basin to POTW

e) Gas flow: X Counter current Concurrent
1) Flow rate: Variable acfm
2) Inlet Temperature: Ambient °F

f) Venturi Data: **NA**
1) Inlet Area: ft²
2) Throat Area: ft²
3) Throat velocity: ft / sec
4) Fixed throat Variable throat

g) Packed or Plate Tower Data:
1) Surface Area: 2 ft diameter
2) Packing depth: 6 ft
3) Type of packing: X Rings Saddles
 Other:
4) No. of plates:
5) Type of plates:

h) Demisting Data: **NA**
1) Mist eliminator filter area: ft diameter
2) Type: Cyclone Vanes Pad
 Other:

i) Efficiency: 95 % (estimated)

SCRUBBERS (Page 2 of 2)

SECTION L5

j) Are extra nozzles readily available? _____ Yes X No
How many? _____

k) Pressure measurement devices installed? _____ Yes X No

5. Which process(es) does the scrubber control emissions from? RAD Process Ammoniation Reactor

SCRUBBERS (Page 1 of 2)

SECTION L5

1. Emission Point No. / Name: AF-004
2. Manufacturers Name and Model No.: Anderson 2000 Inc. Serial No. S-4733-832
3. Date of construction for existing sources or date of anticipated start-up for new sources: 1988

4. Scrubber Data:

- a) Scrubber type:

<u> </u> Venturi	<u> </u> Orifice
<u> X </u> Packed Tower	<u> </u> Gravity Tower
<u> </u> Cyclonic	<u> </u> Condenser
<u> </u> Mist Eliminator	<u> </u> Impingement Plate
<u> </u> Other: _____	

- b) Liquid injection rate:

1) Design maximum:	<u> >0.5 </u> gpm @	<u> Unknown </u> psia
2) Expected average:	<u> 0.5 </u> gpm @	<u> Unknown </u> psia

- c) Pressure drop: Unknown inches H₂O (estimated)

- d) Scrubbing liquid:
 - 1) Once - through X Recycled
 - 2) If recycled: < 1.10 pH maintained
 - 3) If water, describe settling basin: NA
 - 4) Solution / Reactant systems:
 - a) Chemical make - up: Sulfuric Acid
 - b) How is discharge handled, treated? Impoundment Basin to POTW

- e) Gas flow:

1) Flow rate:	<u> X </u> Counter current	<u> </u> Concurrent
2) Inlet Temperature:	<u> Variable </u> acfm	<u> 200 </u> °F

- f) Venturi Data: NA
 - 1) Inlet Area: _____ ft²
 - 2) Throat Area: _____ ft²
 - 3) Throat velocity: _____ ft / sec
 - 4) Fixed throat Variable throat

- g) Packed or Plate Tower Data:
 - 1) Surface Area: 0.25 ft diameter
 - 2) Packing depth: unknown ft
 - 3) Type of packing: X Rings Saddles
 - Other: _____
 - 4) No. of plates: _____
 - 5) Type of plates: _____

- h) Demisting Data: NA
 - 1) Mist eliminator filter area: _____ ft diameter
 - 2) Type: Cyclone Vanes Pad
 - Other: _____

- i) Efficiency: 98 %

j) Are extra nozzles readily available? _____ Yes No
How many? _____

k) Pressure measurement devices installed? _____ Yes No

5. Which process(es) does the scrubber control emissions from? **RAD (EO) Process Area Vents**

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AF-000

2. Pollutant: VOC and HAP (Ethylene Oxide)

3. Material or parameter being monitored or recorded: Leak Detection and Repair (LDAR)

4. Method of monitoring and recordkeeping: The RAD (EO) Process Area equipment (reactor, tanks, piping, valves, relief valves, pumps, and connectors) that directly contacts Ethylene Oxide are monitored for leaks and the data is recorded on a schedule determined by 40 CFR 63, Subpart H and Subpart PPP.

5. List any EPA methods used: EPA Reference Method 21

6. Compliance shall be demonstrated:
 Daily Weekly X Monthly X Quarterly X Yearly

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AF-002

2. Pollutant: Ammonia

3. Material or parameter being monitored or recorded: Scrubber water flow

4. Method of monitoring and recordkeeping: The scrubber water flow to the scrubber is visually monitored through a sight glass and recorded on a weekly basis to ensure the scrubber is operating as intended.

5. List any EPA methods used: NA

6. Compliance shall be demonstrated:

 Daily X Weekly Monthly Quarterly

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AF-004

2. Pollutant: VOC and HAP (Ethylene Oxide)

3. Material or parameter being monitored or recorded: Scrubber water flow rate and pH

4. Method of monitoring and recordkeeping: The scrubber water flow rate (gal/min) and pH are monitored and recorded on a continuous basis (a minimum of every 15 minutes). A flow rate of greater than 0.5 gal/min and a pH of less than 1.1 are recommended for the scrubber to operate at the designed efficiency and regulatory requirements.

5. List any EPA methods used: NA

6. Compliance shall be demonstrated:
 X Daily Weekly Monthly Quarterly

HARD RESINS PROCESS AREA

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

1. Emission Point No./ Name: AG-000, Hard Resins Process Area
2. Process Description: The Hard Resins Process Area produces specialty chemicals used primarily in food grade products (i.e., chewing gum) and adhesives. Equipment in the process area includes reactors, tanks, vents, piping, etc. Emissions occur from associated equipment and from fugitive losses.
3. Was this unit constructed or modified after August 7, 1977? X yes no
If yes please give date and explain. Modified in January 1998.
4. Capacity (in tons/hr): Kettles – 3.2 tons/hr Flaking – 3.5 tons/hr
5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM ^{*,**}
Kettle Feed Materials			
Rosin	6024 lbs	6024 lbs	52,770,240 lbs
Glycerin	435 lbs	435 lbs	3,810,600 lbs
Pentaerithritol	249 lbs	249 lbs	2,181,240 lbs
Maleic Anhydride	41 lbs	41 lbs	359,160 lbs
Phthalic Anhydride	9 lbs	9 lbs	78,840 lbs
Ethylene Glycol	4 lbs	4 lbs	35,040 lbs
Oxalic Acid	<1 lb	<1 lb	<8760 lbs
Calcium Formate	3 lbs	3 lbs	26,280 lbs
Irgonox 1010	<1 lb	<1 lb	<8760 lbs
Weston 618	<1 lb	<1 lb	<8760 lbs
TNPP	1 lb	1 lb	8760 lbs
Abalyn	15 lbs	15 lbs	131,400 lbs
Abitol	32 lbs	32 lbs	280,320 lbs
Picco	148 lbs	148 lbs	1,296,480 lbs
Adipic Acid	3 lbs	3 lbs	26,280 lbs
Fumaric Acid	20 lbs	20 lbs	175,200 lbs

DSTDP	<1 lb	<1 lb	<8760 lbs
Ethanox 323	<1 lb	<1 lb	<8760 lbs
Lithium Carbonate	<1 lb	<1 lb	<8760 lbs
Magnesium Oxide	<1 lb	<1 lb	<8760 lbs
Zinc Oxide	<1 lb	<1 lb	<8760 lbs
Santonox	<1 lb	<1 lb	<8760 lbs
Toluene Sulfonic Acid	<1 lb	<1 lb	<8760 lbs
Calcium Hydroxide	<1 lb	<1 lb	<8760 lbs
Paraformaldehyde	8 lbs	8 lbs	70,080 lbs
Paratertiary Octyl Phenol	25 lbs	25 lbs	219,000 lbs
Flaking and Drumming			
Resin	7000 lbs	7000 lbs	61,320,000 lbs

* Actual 2002 Hard Resins production (Kettle – 5,371,917 lbs and Flaked 9,676,150 lbs).

** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.

6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
Kettle Resin Derivatives	6400 lbs	6400 lbs	56,064,000 lbs
Flaking and Drumming	7000 lbs	7000 lbs	61,320,000 lbs

7. Stack Data:

AG-003 Hard Resins Kettles and Flaking Belt (hot end – pouring) vented to a water scrubber.

A. Height: 35 ft C. Exit gas velocity: 2 ft/s
 B. Inside diameter: 4 ft D. Exit gas temperature: Ambient

AG-005 Hard Resins Flaking Belt (cold end – flaking) vented to a dust collector.

A. Height: 10 ft C. Exit gas velocity: 28.73 ft/s
 B. Inside diameter: 2.4 ft x 1.5 ft D. Exit gas temperature: Ambient

8. UTM Coordinates:

A. Zone 16 B. North 3469.20 C. East 280.70

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)	
		* yes/no	effic.	note 2 lb/hr	tn/yr	note 2 lb/hr	tn/yr
AG-003	VOC	Yes	60%	17.82	78.05	44.55	195.13
AG-005	PM/PM ₁₀	Yes	90%	0.72	3.16	7.22	31.62

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.

SCRUBBERS (Page 1 of 2)

SECTION L5

1. Emission Point No. / Name: AG-003

2. Manufacturers Name and Model No.: Hercules, Inc.

3. Date of construction for existing sources or date of anticipated start-up for new sources:
Constructed Pre-1977, and Modified in 1990

4. Scrubber Data:

a) Scrubber type: Venturi Orifice
 Packed Tower X Gravity Tower
 Cyclonic Condenser
 Mist Eliminator Impingement Plate
 Other:

b) Liquid injection rate:
1) Design maximum: 6 gpm @ 40 psia
2) Expected average: 6 gpm @ 20 psia

c) Pressure drop: 6 inches H₂O (estimated)

d) Scrubbing liquid: **Water**
1) X Once - through Recycled
2) If recycled: gpm make - up rate
3) If water, describe settling basin: NA
4) Solution / Reactant systems:
a) Chemical make - up: NA
b) How is discharge handled, treated? Impoundment Basin to POTW

e) Gas flow: X Counter current Concurrent
1) Flow rate: 8405 acfm
2) Inlet Temperature: 150 °F

f) Venturi Data: **NA**
1) Inlet Area: ft²
2) Throat Area: ft²
3) Throat velocity: ft / sec
4) Fixed throat Variable throat

g) Packed or Plate Tower Data: **NA**
1) Surface Area: ft diameter
2) Packing depth: ft
3) Type of packing: Rings Saddles
 Other:
4) No. of plates:
5) Type of plates:

h) Demisting Data: **NA**
1) Mist eliminator filter area: ft diameter
2) Type: Cyclone Vanes Pad
 Other:

i) Efficiency: 60 % (estimated)

j) Are extra nozzles readily available? Yes No
How many? _____

k) Pressure measurement devices installed? Yes No

5. Which process(es) does the scrubber control emissions from? Hard Resins Kettles and Hot End
(Pouring) of Flaking Belt.

BAGHOUSES

SECTION L1

1. Emission Point No. / Name : AG-005
2. Manufacturers Name & Model No.: Buell "Norblo" Mechanical Shaker Dust Collector
Model No. 396-14-20
3. Date of construction for existing sources or date of anticipated start-up for new sources:
1979
4. Baghouse Data:
 - a) Cloth area: 7344 ft²
 - b) Air to cloth ratio: 3.06:1 acfm/ft²
 - c) Type of bag: Woven Felted
Membrane Other: _____
 - d) Bag material: Polyester
 - e) No. of bags: 396
 - f) No. of compartments: 4
 - g) Bag length: 14.17 ft
 - h) Bag diameter: 0.42 ft
 - i) Pressure drop: 4-6 inches H₂O
 - j) Pressure measurement device installed: Yes No
 - k) Air flow: 22,500 acfm @ 72 °F
 - l) Efficiency: 90 % (estimated)
 - m) Dirty air on: inside outside of bag
 - n) Time between bag cleaning: 8 minutes
 - o) Method of bag cleaning: Shaking Reverse Air
 Pulse Jet Other: _____
 - p) Are extra bags readily available: Yes No How Many? 50 (re-order minimum)
 - q) How is the collected dust stored, handled, disposed of? Reused or disposed of properly
6. Which process(es) does the baghouse control emissions from? Cold End of Hard Resins Flaking Belt.

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AG-003

2. Pollutant: VOC

3. Material or parameter being monitored or recorded: Scrubber water flow

4. Method of monitoring and recordkeeping: The scrubber water flow to the scrubber is visually monitored and recorded on a weekly basis to ensure the scrubber is operated as intended. The kettle vent fan and the flaking belt "hot" end vent fan are also monitored on a weekly basis to ensure proper scrubber operation.

5. List any EPA methods used: NA

6. Compliance shall be demonstrated:
 Daily X Weekly Monthly Quarterly

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AG-005
2. Pollutant: PM
3. Material or parameter being monitored or recorded: Pressure drop
4. Method of monitoring and recordkeeping: The pressure drop across the baghouse is monitored and recorded on a weekly basis to ensure the baghouse operates at the designed efficiency.
5. List any EPA methods used: NA
6. Compliance shall be demonstrated:
 Daily X Weekly Monthly Quarterly

ROSIN SHED AREA

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)				
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr	
AH-000**	VOC									

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.

** No stack emissions, only fugitive and insignificant emissions associated with the Resin Shed Process Area (see Insignificant Activities- Section C).

ROSIN DISTILLATION PROCESS AREA

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

1. Emission Point No./ Name: AJ-000, Rosin Distillation Process Area
2. Process Description: The Rosin Distillation Process Area produces distilled rosin for various end uses. Equipment in the process area includes reactors, tanks, vents, piping, etc. Emissions occur from associated equipment and from fugitive losses.
3. Was this unit constructed or modified after August 7, 1977? _____ yes no
If yes please give date and explain. _____
4. Capacity (in tons/hr): 2.5 tons/hr
5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM ^{*,**}
Rosin	5000 lbs	5000 lbs	43,800,000 lbs

* Actual 2002 Rosin Distillation production (Dymerex – 2,436,871 lbs and Resin 861 – 2,257,331 lbs).
 ** Maximum quantity per year is based on maximum quantity per hour for 24 hrs/day and 365 days/yr.

6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
Rosin	5000 lbs	5000 lbs	43,800,000 lbs

7. Stack Data:

A. Height: NA C. Exit gas velocity: NA
 B. Inside diameter: NA D. Exit gas temperature: NA

8. UTM Coordinates:

A. Zone 16 B. North 3469.20 C. East 280.60

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)				
		* yes/no	effic.	note 2	lb/hr	tn/yr	note 2	lb/hr	tn/yr	
AJ-000**	VOC									

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
 2. Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.
- * If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.
 ** No stack emissions, only fugitive and insignificant emissions associated with the Rosin Distillation Area (see Insignificant Activities – Section C).

POWER HOUSE AND EFFLUENT TREATMENT AREAS

FUEL BURNING EQUIPMENT (page 1 of 2)

SECTION D

1. Emission Point No. / Name: AM-001, Package Boiler
2. Equipment Description: A steam generating boiler (Package Boiler No. 5), which produces steam for the facility.
3. Was this unit constructed or modified after August 7, 1977? Yes No
If yes please give date and explain. _____
4. Capacity: 156 MMBTU/hr 5. Type of burner: Multiple Port Gas
6. Usage Type (i.e. Space Heat, Process, etc.) : Process Steam (and Heat)
7. Complete the following table, identifying each type of fuel and the amount used. Specify the units for heat content, hourly usage, and yearly usage.

FUEL TYPE	HEAT CONTENT	% SULFUR	% ASH	MAXIMUM HOURLY USAGE	YEARLY USAGE
Natural Gas	1020 BTU/ft ³	NA	NA	152,941 ft ³ /hr	1340 MMft ³ /yr

8. Please list any fuel components that are hazardous air pollutants and the percentage in the fuel.
Hexane (natural gas) has potential emissions >0.1 lb/hr.
9. Operating Schedule: (Optional) 24 hours/day 7 days/week 52 weeks/year
10. Stack Data:

A. Height: <u>71 ft</u>	C. Exit gas velocity: <u>56 ft/s</u>
B. Inside diameter: <u>3 ft</u>	D. Exit gas temperature: <u>250 ° F</u>
11. UTM Coordinates:

A. Zone <u>16</u>	B. North <u>3469.30</u>	C. East <u>280.5</u>
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FUEL BURNING EQUIPMENT (page 1 of 2)

SECTION D

1. Emission Point No. / Name: AM-002, Package Boiler
2. Equipment Description: A steam generating boiler (Package Boiler No. 6), which produces steam for the facility.
3. Was this unit constructed or modified after August 7, 1977? Yes No
If yes please give date and explain. Installed in 1986.
4. Capacity: 65 MMBTU/hr 5. Type of burner: Multiple Port Gas
6. Usage Type (i.e. Space Heat, Process, etc.): Process Steam (and Heat)
7. Complete the following table, identifying each type of fuel and the amount used. Specify the units for heat content, hourly usage, and yearly usage.

FUEL TYPE	HEAT CONTENT	% SULFUR	% ASH	MAXIMUM HOURLY USAGE	YEARLY USAGE
Natural Gas	1020 BTU/ft ³	NA	NA	63,725 ft ³ /hr	558 MMft ³ /yr

8. Please list any fuel components that are hazardous air pollutants and the percentage in the fuel.
Hexane (natural gas) has potential emissions >0.1 lb/hr.
9. Operating Schedule: (Optional) 24 hours/day 7 days/week 52 weeks/year
10. Stack Data:
A. Height: 64 ft C. Exit gas velocity: Variable
B. Inside diameter: 4 ft D. Exit gas temperature: 250 ° F
11. UTM Coordinates:
A. Zone 16 B. North 3469.30 C. East 280.5

FUEL BURNING EQUIPMENT (page 1 of 2)

SECTION D

1. Emission Point No. / Name: AM-003, Johnston 600 Horsepower Package Boiler

2. Equipment Description: A steam generating boiler, which produces steam for the facility.

3. Was this unit constructed or modified after August 7, 1977? Yes No
 If yes please give date and explain. Planned installation in approximately October 2003.

4. Capacity: 24.345 MMBTU/hr 5. Type of burner: forced draft

6. Usage Type (i.e. Space Heat, Process, etc.): Process Steam (and Heat)

7. Complete the following table, identifying each type of fuel and the amount used. Specify the units for heat content, hourly usage, and yearly usage.

FUEL TYPE	HEAT CONTENT	% SULFUR	% ASH	MAXIMUM HOURLY USAGE	YEARLY USAGE
Natural Gas	1020 BTU/ft ³	NA	NA	63,725 ft ³ /hr	558 MMft ³ /yr

8. Please list any fuel components that are hazardous air pollutants and the percentage in the fuel.

9. Operating Schedule: (Optional) 24 hours/day 7 days/week 52 weeks/year

10. Stack Data:
 A. Height: 30 ft C. Exit gas velocity: 3375 ft/min
 B. Inside diameter: 1.83 ft D. Exit gas temperature: ~250 ° F

11. UTM Coordinates:
 A. Zone 16 B. North 3469.30 C. East 280.5

FUEL BURNING EQUIPMENT (page 2 of 2)

SECTION D

12. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)		
		* yes/no	effic.	note 2	lb/hr	note 2	lb/hr	tn/yr
AM-001	PM/PM ₁₀	No					1.16	5.09
	SO ₂	No					0.09	0.40
	NO _x	No					42.82	187.57
	CO	No					12.85	56.27
	VOC	No					0.84	3.68
	Total HAPs**	No					0.28	1.21
AM-002	PM/PM ₁₀	No					0.48	2.12
	SO ₂	No					0.04	0.17
	NO _x	No					6.37	27.91
	CO	No					5.35	23.45
	VOC	No					0.35	1.54
	Total HAPs**	No					0.11	0.50

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMBtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.

** Individual HAP emission calculations are attached in report appendix.

FUEL BURNING EQUIPMENT (page 2 of 2)

SECTION D

12. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)			
		* yes/no	effic.	note 2	lb/hr	note 2	lb/hr	note 2	tn/yr
AM-003	PM/PM ₁₀	No					0.18		0.79
	SO ₂	No					0.01		0.06
	NO _x	No					2.39		10.45
	CO	No					2.00		8.78
	VOC	No					0.13		0.57

1. All regulated air pollutants including hazardous air pollutants emitted from this source should be listed. A list of regulated air pollutants has been provided in Section A.
2. Provide emission rate in units of applicable emission standard, e.g. lb/MMBtu, gr/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.

* If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.
 ** Individual HAP emission calculations are attached in report appendix.

**COMPLIANCE DEMONSTRATION
BY RECORDKEEPING**

SECTION M7

1. Emission Point No./Name: AM-001 and AM-002

2. Pollutant: Fuel

3. Material or parameter being monitored or recorded: Fuel quality and quantity

4. Method of monitoring and recordkeeping: The fuel type and quantity is recorded on a monthly basis, and a fuel analysis is obtained on a semi-annual basis.

5. List any EPA methods used: NA

6. Compliance shall be demonstrated:
 Daily Weekly X Monthly Quarterly

MANUFACTURING PROCESSES (page 1 of 2)

SECTION E

- 1. Emission Point No./ Name: AN-000, Effluent Treatment Area
- 2. Process Description: The Effluent Treatment Area consists of equalization, solids removal, and pH adjustment prior to discharge to the local POTW. Emissions from the area occur from fugitive losses.
- 3. Was this unit constructed or modified after August 7, 1977? _____ yes X no
If yes please give date and explain. _____
- 4. Capacity (in tons/hr): NA
- 5. Raw Material Input:

MATERIAL	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR MAXIMUM
NA			

- 6. Product Output:

PRODUCT or BY-PRODUCT	QUANTITY/HR AVERAGE	QUANTITY/HR MAXIMUM	QUANTITY/YEAR
NA			

- 7. Stack Data:

A. Height: NA C. Exit gas velocity: NA
B. Inside diameter: NA D. Exit gas temperature: NA

- 8. UTM Coordinates:

A. Zone 16 B. North 3469.50 C. East 280.00

MANUFACTURING PROCESSES (page 2 of 2)

SECTION E

13. POLLUTANT EMISSIONS:

Example emission rate calculations, monitoring data, or stack test data must be attached in accordance with Operating Permit Application Requirements, pp. 3-5.

EMISSION POINT NO.	POLLUTANT (note 1)	CONTROL EQUIPMENT		ACTUAL EMISSION RATE (in accordance with Operating Permit Application Requirements, pp. 3-5)		PROPOSED ALLOWABLE EMISSION RATE (Optional)	
		* yes/no	effic.	note 2 lb/hr	tn/yr	note 2 lb/hr	tn/yr
AN-000**	VOC	No			2.33		12.86
	Toluene						

- All regulated air pollutants including hazardous air pollutants emitted from this source should be listed in accordance with Operating Permit Application Requirements, pp. 3-5. A list of regulated air pollutants has been provided in Section A.
 - Provide emission rate in units of applicable emission standard, e.g. lb/MMbtu, g/dscf, etc. This may not apply to every emission point or every pollutant from an emission point.
- * If yes, attach appropriate Air Pollution Control Data Sheet from Section L or manufacturers specifications if other.
 ** Fugitive emissions and insignificant sources associated with the Effluent Treatment Area.

SECTION N

Current Applicable Requirements and Status (page 1 of 5)

List applicable state and federal regulations and applicable test methods for determining compliance with each applicable requirement. Clearly identify federal regulations from state requirements. Provide the compliance status as of the day the application is signed.

Emission Point No.	Applicable Requirement	Pollutant	Test Method	Limits	Compliance Status IN / OUT
Facility-Wide	APC-S-1, Section 3.1(a) & 3.2 – General Opacity Standard	PM (Smoke)	EPA Ref. Method 9	≤ 40%	IN
Facility-Wide	APC-S-1, Section 3.1(b) – Startup Opacity Standard	PM (Smoke)	EPA Ref. Method 9	≥ 40%, up to 15 minutes per startup in any 1 hour, not to exceed 3 startups in any 24 hour period.	IN
Facility-Wide	APC-S-1, Section 3.1(c) – Soot Blowing Opacity Standard	PM (Smoke)	EPA Ref. Method 9	≤ 60%, providing aggregate duration during any 24 hour period does not exceed 10 minutes per 10 ⁹ BTU gross heating value in any 1 hour.	IN
Facility-Wide	APC-S-1, Section 3.3 – General Nuisance Standard	PM	NA	As specified in the regulations.	IN
Facility-Wide	APC-S-1, Section 3.7 – Open Burning Standard	PM	NA	As specified in the regulations.	IN
Facility-Wide	APC-S-1, Section 5.2 – Miscellaneous Chemical Emissions	HAPs (Toxics)	NA	As specified in the regulations.	IN
Insignificant Activities – Fuel Burning Equipment	Title V Operating Permit (TVOP) No. 0800-00001, Condition 3.C.1 APC-S-1, Section 3.4(a)(1)	PM	EPA Ref. Method 1-5	0.6 lbs/MMBTU	IN
Insignificant Activities – Fuel Burning Equipment	TVOP No. 0800-00001, 3.C.2 APC-S-1, Section 4.1(a)	SO ₂	EPA Ref. Method 6	4.8 lbs/MMBTU	IN
Insignificant Activities – Manufacturing Sources	TVOP No. 0800-00001, 3.C.3 APC-S-1, Section 3.6(a)	PM	NA	E = 4.1(p) ^{0.67}	IN
Insignificant Activities – Storage Vessels (Identified in Section C)	TVOP No. 0800-00001, 3.C.4 40 CFR 60, Subpart Kb (60.110b and 60.116b(a) & (b))	VOC	NA	Record tank capacity and dimensions.	IN

Current Applicable Requirements and Status (page 2 of 5) SECTION N

List applicable state and federal regulations and applicable test methods for determining compliance with each applicable requirement. Clearly identify federal regulations from state requirements. Provide the compliance status as of the day the application is signed.

Emission Point No.	Applicable Requirement	Pollutant	Test Method	Limits	Compliance Status IN / OUT
AA-001, AA-002, AB-001, AC-002, AC-003, AF-004(EO), AG-003, and AG-005	TVOP No. 0800-00001, 5.B.14 APC-S-6, Section III.A.3	PM, VOC, and HAP	NA	Weekly monitoring and recordkeeping requirements for control equipment maintenance.	IN
AA-000, AA-001, and AN-000	TVOP No. 0800-00001, 3.B.1 40 CFR 63, Subpart W (63.520) 40 CFR 63, Subpart H (63.160) APC-S-1, Section 8.1	HAP (Epi)	EPA Ref. Method 21	Leak Detection and Repair (LDAR) for components in HAP (Epi) service.	IN
AA-000, AA-001, and AN-000	TVOP No. 0800-00001, 3.D.1-3 40 CFR 63, Subpart A (63.6(e))	HAP (Epi)	NA	Startup, Shutdown, and Malfunction Plan	IN
AA-000, AA-001, and AN-000	TVOP No. 0800-00001, 5.B.2 40 CFR 63, Subpart W (63.525(i)) 40 CFR 63, Subpart H (63.162(a) & (b))	HAP (Epi)	EPA Ref. Method 21	Compliance demonstration.	IN
AA-000, AA-001, and AN-000	TVOP No. 0800-00001, 5.B.3 40 CFR 63, Subpart W (63.526(d)) 40 CFR, Subpart H	HAP (Epi)	EPA Ref. Method 21	Monitoring schedule and leak definition concentrations are as specified in the regulations (varies).	IN
AA-000, AA-001, and AN-000	TVOP No. 0800-00001, 5.B.4 40 CFR 63, Subpart W (63.527(d)) 40 CFR, Subpart H (63.181)	HAP (Epi)	EPA Ref. Method 21	Recordkeeping Requirements	IN
AA-000, AA-001, and AN-000	TVOP No. 0800-00001, 5.C.1(b) 40 CFR 63, Subpart W (63.528(b)) 40 CFR, Subpart H (63.182)	HAP (Epi)	EPA Ref. Method 21	Reporting Requirements	IN

SECTION N

Current Applicable Requirements and Status (page 3 of 5)

List applicable state and federal regulations and applicable test methods for determining compliance with each applicable requirement. Clearly identify federal regulations from state requirements. Provide the compliance status as of the day the application is signed.

Emission Point No.	Applicable Requirement	Pollutant	Test Method	Limits	Compliance Status IN / OUT
AA-002	TVOP No. 0800-00001, 3.B.2 & 5.B.8 APC-S-1, Section 3.6(a)	PM	NA	E = 4.1(p) ^{0.67} Monitor raw material processed (in lbs) and hours of operation daily.	IN
AB-001	TVOP No. 0800-00001, 3.B.2 & 5.B.9 APC-S-1, Section 3.6(a)	PM	NA	E = 4.1(p) ^{0.67} Monitor scrubber water flowrate weekly.	IN
AC-000 - Polypale Process Area	40 CFR 63, Subpart FFFF -- National Emission Standards for Hazardous Air Pollutants: Miscellaneous Chemical Manufacturing	HAPs	NA	≥ 98% HAP reduction, or ≤ 20 ppmv HAP or TOC concentration. Limits and requirements vary with operating conditions and process equipment. Compliance strategy is not determined at the time of this submittal.	Final regulation signed on 8/25/03. Compliance date is 3 years from promulgation.
AC-002 and AC-003	TVOP No. 0800-00001, 3.B.7 & 5.B.9 APC-S-1, Section 4.2(a)	SO ₂	NA	2000 ppm	IN
AC-004	TVOP No. 0800-00001, 3.B.2 & 5.B.13 APC-S-1, Section 3.6(a)	PM	NA	E = 4.1(p) ^{0.67} Monitor raw material processed (in lbs) and hours of operation daily.	IN
AF-000 (EO)	TVOP No. 0800-00001, 3.B.8, 3.B.11 & 5.B.31 40 CFR 63, Subpart PPP (63.1420 and 63.1434(a) and (h)) 40 CFR 63, Subpart H (63.160) APC-S-1, Section 8.1	HAP (EO)	EPA Ref. Method 21	Leak Detection and Repair (LDAR) for components in HAP (EO) service.	IN
AF-000 (EO)	TVOP No. 0800-00001, 3.D.4 & 3.D.5 40 CFR 63, Subpart PPP (63.1439(b)(1))	HAP (EO)	NA	Startup, Shutdown, and Malfunction Plan	IN

Current Applicable Requirements and Status (page 4 of 5) SECTION N

List applicable state and federal regulations and applicable test methods for determining compliance with each applicable requirement. Clearly identify federal regulations from state requirements. Provide the compliance status as of the day the application is signed.

Emission Point No.	Applicable Requirement	Pollutant	Test Method	Limits	Compliance Status IN / OUT
AF-000 (EO)	TVOP No. 0800-00001, 5.B.25 40 CFR 63, Subpart PPP (63.1438(f) & (g))	HAP (EO)	NA	Record monitoring excursions.	IN
AF-000 (EO)	TVOP No. 0800-00001, 5.B.28 40 CFR 63, Subpart PPP (63.1439(d)(1-8))	HAP (EO)	NA	Recordkeeping requirements.	IN
AF-000 (EO)	TVOP No. 0800-00001, 5.B.29 40 CFR 63, Subpart PPP (63.1439(g))	HAP (EO)	NA	Alternative monitoring and/or recordkeeping methods.	IN
AF-000 (EO)	TVOP No. 0800-00001, 5.B.30 40 CFR 63, Subpart PPP (63.1439(h))	HAP (EO)	NA	Reduced recordkeeping program.	IN
AF-000 (EO)	TVOP No. 0800-00001, 5.C.4 (b) & (c)	HAP (EO)	NA	Reporting requirements.	IN
AF-004(EO)	TVOP No. 0800-00001, 3.B.9 40 CFR 63, Subpart PPP (63.1425(b)(2)(ii))	HAP (EO)	NA	Aggregated 98% reduction of total epoxide emissions.	IN
AF-004(EO)	TVOP No. 0800-00001, 5.B.15-16 & 5.B.19 40 CFR 63, Subpart PPP (63.1426(c), (e) & 1430(b)(2)(i))	HAP (EO)	NA	Organic HAP concentration and control efficiency and determining HAP emission reduction.	IN
AF-004(EO)	TVOP No. 0800-00001, 5.B.17, 5.B.18 & 5.B.20 40 CFR 63, Subpart PPP (63.1429(a)(4), (d)(1-3) & 1430(c))	HAP (EO)	NA	Monitor scrubbing liquid flowrate and pH. Establish parameter monitoring levels for each.	IN
AF-004(EO)	TVOP No. 0800-00001, 5.B.21-23 40 CFR 63, Subpart PPP (63.1430(d)(1), (2)(i-ii) & (5))	HAP (EO)	NA	Continuous records of applicable equipment parameters, including daily averages, breakdowns, repairs, calibration checks, zero and high level adjustments.	IN
AF-004(EO)	TVOP No. 0800-00001, 5.B.24 40 CFR 63, Subpart PPP (63.1437(a)(1-4))	HAP (EO)	NA	Performance test requirements.	IN

Current Applicable Requirements and Status (page 5 of 5)

SECTION N

List applicable state and federal regulations and applicable test methods for determining compliance with each applicable requirement. Clearly identify federal regulations from state requirements. Provide the compliance status as of the day the application is signed.

Emission Point No.	Applicable Requirement	Pollutant	Test Method	Limits	Compliance Status IN / OUT
AF-005(EO)	40 CFR 63, Subpart PPP (63.1423(b))	HAP (EO)	NA	The EO storage tank (AF-005) does not meet the definition of a storage vessel under Subpart PPP. AF-005 is a pressure vessel designed to operate in excess of 204.9 kilopascals and without emissions to the atmosphere.	IN
AG-005	TVOP No. 0800-00001, 3.B.2 & 5.B.10 APC-S-1, Section 3.6(a)	PM	NA	$E = 4.1(p)^{0.67}$ Monitor pressure drop across baghouse weekly.	IN
AM-001	TVOP No. 0800-00001, 3.B.5 APC-S-1, Section 3.4(a)(2)	PM	EPA Ref. Method 1-5	$E = 0.8808 * I^{-0.1667}$	IN
AM-002	TVOP No. 0800-00001, 3.B.5 APC-S-1, Section 3.4(a)(2)	PM	EPA Ref. Method 1-5	$E = 0.8808 * I^{-0.1667}$	IN
AM-003	APC-S-1, Section 3.4(a)(2) 40 CFR 60, Subpart Dc	PM	EPA Ref. Method 1-5	$E = 0.8808 * I^{-0.1667}$, with monitoring and recording of fuel type and quantity on a daily basis.	NA
AM-001, AM-002, and AM-003	TVOP No. 0800-00001, 3.B.4 APC-S-1, Section 4.1(a)	SO ₂	EPA Ref. Method 6	4.8 lbs/MMBTU	IN
AM-001 and AM-002	TVOP No. 0800-00001, 5.B.6 and 5.B.7	Fuel	NA	Record fuel type and quantity monthly and a fuel analysis semi-annually.	IN
AM-001 and AM-002	TVOP No. 0800-00001, 5.B.12	PM, SO ₂	EPA Ref. Method 1-5 and 6	Biennial compliance monitoring requirements, if #6 Fuel Oil is burned for 5 consecutive days.	NA (fuel restriction - natural gas only)

Future Applicable Requirements and Status

SECTION N

List applicable state and federal regulations and applicable test methods for determining compliance with each applicable requirement. Clearly identify federal regulations from state requirements. Provide the compliance status as of the day the application is signed.

Emission Point No.	Applicable Requirement	Pollutant	Test Method	Limits	Compliance Status IN / OUT
AM-001 and AM-002 (existing units)	40 CFR 63, Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants: Industrial, Commercial and Institutional Boilers and Process Heaters	HAP	NA	NA	Regulation tentative final date - 2/28/04. Compliance date is 3 years from promulgation.
AM-003 (new unit)	40 CFR 63, Subpart DDDDD – National Emission Standards for Hazardous Air Pollutants: Industrial, Commercial and Institutional Boilers and Process Heaters	HAP, CO	NA	400 ppm of CO @ 3% O ₂	Regulation tentative final date - 2/28/04. Compliance date begins date regulation is promulgated.

COMPLIANCE CERTIFICATION

SECTION O

1. Emission Point No./Name: AM-001 and AM-002, Process Boilers

2. Indicate the source compliance status:

- A. Where this source(s) is currently in compliance, we will continue to operate and maintain this source to assure compliance for the duration of the permit.
- B. The Current Emissions Requirements and Status form (previous page) includes new requirements that apply or will apply to this source during the term of the permit. We will meet such requirements on a timely basis.
- C. This source is not in compliance. The following statement of corrective action is submitted to describe action, which we will take to achieve compliance.
 - 1. Attached is a brief description of the problem and the proposed solution.
 - 2. We will achieve compliance according to the following schedule.

Progress reports will be submitted: **NA**
 Starting date: _____ and every six (6) months thereafter

Problem	Action	Deadline

COMPLIANCE CERTIFICATION

SECTION O

1. Emission Point No./Name: AM-003, 24.345 MMBTU/hr Natural Gas Process Boiler

2. Indicate the source compliance status:

A. Where this source is currently in compliance, we will continue to operate and maintain this source to assure compliance for the duration of the permit.

B. The Current Emissions Requirements and Status form (previous page) includes new requirements that apply or will apply to this source during the term of the permit. We will meet such requirements on a timely basis (*upon construction and initial operation*).

C. This source is not in compliance. The following statement of corrective action is submitted to describe action, which we will take to achieve compliance.

1. Attached is a brief description of the problem and the proposed solution.

2. We will achieve compliance according to the following schedule.

Progress reports will be submitted:

Starting date: _____ and every six (6) months thereafter

Problem	Action	Deadline



APPENDIX B
EMISSION CALCULATIONS

FUEL BURNING EQUIPMENT

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF POTENTIAL UNCONTROLLED AND REGULATORY ALLOWABLE EMISSIONS FROM FUEL BURNING EQUIPMENT

Emission Point	Pollutant	APCS-1						AP-42						MOST STRINGENT**				
		Rated Capacity	Applicable Standard	lb/hr	tons/yr	Natural Gas	Fuel Oil #2	Fuel Oil #6	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr		
POWERHOUSE AREA																		
AH-001 Rated Capacity Natural Gas Fired																		
	156 MMBtu/hr																	
	152941 ft ³ /hr of Nat. gas																	
		PMPM ₁₀	0.3786 lb/MMBtu	59.22	259.37	7.6 lb/MMR ³	1.16	5.09										
		SO ₂	4.8 lb/MMBtu	748.80	3279.74	0.6 lb/MMR ³	0.09	0.40							1.16	5.09	1.16	5.09
		NO _x				290 lb/MMR ³	42.82	187.57							42.82	187.57	42.82	187.57
	CO				84 lb/MMR ³	12.85	56.27							12.85	56.27	12.85	56.27	
	VOC				5.5 lb/MMR ³	0.84	3.68							0.84	3.68	0.84	3.68	
	Chloride																	
	Nickel																	
	Formaldehyde							0.075 lb/MMR ³	0.01	0.05				0.01	0.05	0.01	0.05	
	Hexane							1.8 lb/MMR ³	0.28	1.21				0.28	1.21	0.28	1.21	
AH-002 Rated Capacity Natural Gas Fired																		
	65 MMBtu/hr																	
	63725 ft ³ /hr of Nat. gas																	
		PMPM ₁₀	0.4392 lb/MMBtu	28.55	125.04	7.6 lb/MMR ³	0.48	2.12							0.48	2.12	0.48	2.12
		SO ₂	4.8 lb/MMBtu	312.00	1366.56	0.6 lb/MMR ³	0.04	0.17							0.04	0.17	0.04	0.17
		NO _x				100 lb/MMR ³	6.37	27.91							6.37	27.91	6.37	27.91
	CO				84 lb/MMR ³	5.35	23.45							5.35	23.45	5.35	23.45	
	VOC				5.5 lb/MMR ³	0.35	1.54							0.35	1.54	0.35	1.54	
	Chloride																	
	Nickel																	
	Formaldehyde							0.075 lb/MMR ³	0.00	0.02				0.00	0.02	0.00	0.02	
	Hexane							1.8 lb/MMR ³	0.11	0.50				0.11	0.50	0.11	0.50	
AH-003 Rated Capacity Natural Gas Fired																		
	24,345 MMBtu/hr																	
	23967.6 ft ³ /hr of Nat. gas																	
		PMPM ₁₀	0.5173 lb/MMBtu	12.59	55.16	7.6 lb/MMR ³	0.18	0.79							0.18	0.79	0.18	0.79
		SO ₂	4.8 lb/MMBtu	116.86	511.83	0.6 lb/MMR ³	0.01	0.06							0.01	0.06	0.01	0.06
		NO _x				100 lb/MMR ³	2.39	10.45							2.39	10.45	2.39	10.45
	CO				84 lb/MMR ³	2.00	8.78							2.00	8.78	2.00	8.78	
	VOC				5.5 lb/MMR ³	0.13	0.57							0.13	0.57	0.13	0.57	

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF POTENTIAL UNCONTROLLED AND REGULATORY ALLOWABLE EMISSIONS FROM FUEL BURNING EQUIPMENT

Emission Point	Pollutant	Potential Uncontrolled and Regulatory Allowable Emissions													
		APC-S-1					AP-42								
		Applicable Standard	lb/hr	tons/yr	Natural Gas	lb/hr	tons/yr	Fuel Oil #2	lb/hr	tons/yr	Fuel Oil #6	lb/hr	tons/yr	Highest Factor	MOST STRINGENT**
POWERHOUSE AREA															
AM-001															
Rated Capacity															
Natural Gas Fired	PM ₁₀	0.3796 lb/MMBtu	59.22	259.37	7.6 lb/MMR ³	1.16	5.09	2 lb/10 ³ gal	2.21	9.69	21.6 lb/10 ³ gal	22.46	98.39	22.46	98.39
Fuel Oil #2 Fired	SO ₂	4.8 lb/MMBtu	749.80	3279.74	0.6 lb/MMR ³	0.09	0.40	78.5 lb/10 ³ gal	86.82	360.28	314 lb/10 ³ gal	326.56	1430.33	326.56	1430.33
Sulfur Content	NO _x				280 lb/MMR ³	42.82	187.57	24 lb/10 ³ gal	26.54	116.26	47 lb/10 ³ gal	48.88	214.09	48.88	214.09
Fuel Oil #6 Fired	CO				84 lb/MMR ³	12.85	56.27	5 lb/10 ³ gal	5.53	24.22	5 lb/10 ³ gal	5.20	22.78	12.85	56.27
Sulfur Content	VOC				5.5 lb/MMR ³	0.84	3.68	0.2 lb/10 ³ gal	0.22	0.97	0.28 lb/10 ³ gal	0.29	1.26	0.84	3.68
	Chloride							0.35 lb/10 ³ gal	0.38	1.68	0.347 lb/10 ³ gal	0.36	1.58	0.38	1.68
	Nickel							0.08 lb/10 ³ gal	0.09	0.41	0.085 lb/10 ³ gal	0.09	0.38	0.09	0.41
	Formaldehyde				0.075 lb/MMR ³	0.01	0.05							0.01	0.05
	Hexane				1.8 lb/MMR ³	0.28	1.21							0.28	1.21
AM-002															
Rated Capacity															
Natural Gas Fired	PM ₁₀	0.3796 lb/MMBtu	24.67	108.07	7.6 lb/MMR ³	0.48	2.12	2 lb/10 ³ gal	0.92	4.04	10 lb/10 ³ gal	4.33	18.97	4.33	18.97
Fuel Oil #2 Fired	SO ₂	4.8 lb/MMBtu	312.00	1366.56	0.6 lb/MMR ³	0.04	0.17	71 lb/10 ³ gal	32.73	143.36	314 lb/10 ³ gal	135.96	595.51	135.96	595.51
Sulfur Content	NO _x				100 lb/MMR ³	6.37	27.91	20 lb/10 ³ gal	9.22	40.38	55 lb/10 ³ gal	23.82	104.31	23.82	104.31
Fuel Oil #6 Fired	CO				84 lb/MMR ³	5.35	23.45	5 lb/10 ³ gal	2.31	10.10	5 lb/10 ³ gal	2.17	9.48	5.35	23.45
Sulfur Content	VOC				5.5 lb/MMR ³	0.35	1.54	0.2 lb/10 ³ gal	0.09	0.40	0.28 lb/10 ³ gal	0.12	0.53	0.35	1.54
	Chloride							0.35 lb/10 ³ gal	0.16	0.70	0.347 lb/10 ³ gal	0.15	0.66	0.16	0.70
	Nickel							0.08 lb/10 ³ gal	0.04	0.17	0.085 lb/10 ³ gal	0.04	0.16	0.04	0.17
	Formaldehyde				0.075 lb/MMR ³	0.00	0.02							0.00	0.02
	Hexane				1.8 lb/MMR ³	0.11	0.50							0.11	0.50
INSIGNIFICANT ACTIVITIES															
POLY-PALE PROCESS AREA															
Heat Transfer Fluid Boiler (formerly AC-001)															
Rated Capacity															
Natural Gas Fired	PM ₁₀	0.6 lb/MMBtu	1.92	8.41	7.6 lb/MMR ³	0.02	0.11	2 lb/10 ³ gal	0.05	0.20				0.05	0.20
Fuel Oil #2 Fired	SO ₂	4.8 lb/MMBtu	15.36	67.28	0.6 lb/MMR ³	0.00	0.01	71 lb/10 ³ gal	1.63	7.15				1.63	7.15
Sulfur Content	NO _x				100 lb/MMR ³	0.32	1.40	20 lb/10 ³ gal	0.46	2.01				0.46	2.01
	CO				84 lb/MMR ³	0.27	1.18	5 lb/10 ³ gal	0.12	0.50				0.27	1.18
	VOC				5.5 lb/MMR ³	0.02	0.08	0.2 lb/10 ³ gal	0.00	0.02				0.02	0.08
HARD RESINS PROCESS AREA															
Heat Transfer Fluid Boiler (formerly AG-001)															
Rated Capacity															
Natural Gas Fired Only	PM ₁₀	0.6 lb/MMBtu	4.98	21.81	7.6 lb/MMR ³	0.06	0.28							0.06	0.28
	SO ₂	4.8 lb/MMBtu	39.84	174.50	0.6 lb/MMR ³	0.00	0.02							0.00	0.02
	NO _x				100 lb/MMR ³	0.83	3.64							0.83	3.64
	CO				84 lb/MMR ³	0.70	3.05							0.70	3.05
	VOC				5.5 lb/MMR ³	0.05	0.20							0.05	0.20

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF POTENTIAL UNCONTROLLED AND REGULATORY ALLOWABLE EMISSIONS FROM FUEL BURNING EQUIPMENT

Emission Point	Pollutant	APCS-1										AP-42									
		Applicable Standard	lb/hr	tons/yr	Natural Gas	lb/hr	tons/yr	Fuel Oil #2	lb/hr	tons/yr	Fuel Oil #6	lb/hr	tons/yr	Highest Factor	lb/hr	tons/yr	MOST STRINGENT**	lb/hr	tons/yr		
POTENTIAL UNALLOWABLE FUEL BURNING EMISSIONS																					
Heat Transfer Fluid Boiler (formerly AG-002)																					
Rated Capacity	3.3 MMBtu/hr	PM ₁₀	1.98	8.67	7.6 lb/MMR ³	0.03	0.11							0.03	0.11	0.03	0.11	0.03	0.11		
Natural Gas Fired Only	3300 ft ³ /hr of Nat. gas	SO ₂	15.84	69.38	0.6 lb/MMR ³	0.00	0.01							0.00	0.01	0.00	0.01	0.00	0.01		
		NO _x			100 lb/MMR ³	0.33	1.45							0.33	1.45	0.33	1.45	0.33	1.45		
		CO			84 lb/MMR ³	0.28	1.21							0.28	1.21	0.28	1.21	0.28	1.21		
		VOC			5.5 lb/MMR ³	0.02	0.08							0.02	0.08	0.02	0.08	0.02	0.08		
RAD PROCESS AREA																					
Heat Transfer Fluid Boiler (formerly AF-001)																					
Rated Capacity	8.3 MMBtu/hr	PM ₁₀	4.98	21.81	7.6 lb/MMR ³	0.06	0.28							0.06	0.28	0.06	0.28	0.06	0.28		
Natural Gas Fired Only	8300 ft ³ /hr of Nat. gas	SO ₂	39.84	174.50	0.6 lb/MMR ³	0.00	0.02							0.00	0.02	0.00	0.02	0.00	0.02		
		NO _x			100 lb/MMR ³	0.83	3.64							0.83	3.64	0.83	3.64	0.83	3.64		
		CO			84 lb/MMR ³	0.70	3.05							0.70	3.05	0.70	3.05	0.70	3.05		
		VOC			5.5 lb/MMR ³	0.05	0.20							0.05	0.20	0.05	0.20	0.05	0.20		
ROSIN DISTILLATION PROCESS AREA																					
Heat Transfer Fluid Boiler (formerly AJ-001)																					
Rated Capacity	3.3 MMBtu/hr	PM ₁₀	1.98	8.67	7.6 lb/MMR ³	0.03	0.11							0.03	0.11	0.03	0.11	0.03	0.11		
Natural Gas Fired Only	3300 ft ³ /hr of Nat. gas	SO ₂	15.84	69.38	0.6 lb/MMR ³	0.00	0.01							0.00	0.01	0.00	0.01	0.00	0.01		
		NO _x			100 lb/MMR ³	0.33	1.45							0.33	1.45	0.33	1.45	0.33	1.45		
		CO			84 lb/MMR ³	0.28	1.21							0.28	1.21	0.28	1.21	0.28	1.21		
		VOC			5.5 lb/MMR ³	0.02	0.08							0.02	0.08	0.02	0.08	0.02	0.08		
Catalyst Regeneration Unit																					
Rated Capacity	2.2 MMBtu/hr	PM ₁₀	1.32	5.78	7.6 lb/MMR ³	0.02	0.07							0.02	0.07	0.02	0.07	0.02	0.07		
Natural Gas Fired Only	2200 ft ³ /hr of Nat. gas	SO ₂	10.56	46.25	0.6 lb/MMR ³	0.00	0.01							0.00	0.01	0.00	0.01	0.00	0.01		
		NO _x			100 lb/MMR ³	0.22	0.96							0.22	0.96	0.22	0.96	0.22	0.96		
		CO			84 lb/MMR ³	0.18	0.81							0.18	0.81	0.18	0.81	0.18	0.81		
		VOC			5.5 lb/MMR ³	0.01	0.05							0.01	0.05	0.01	0.05	0.01	0.05		

* Contains only HAPs with an emission rate greater than 0.1 lbs/hr.
 ** Most stringent of Allowable Emissions vs. Potential Uncontrolled Emissions.

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI
SUMMARY OF ACTUAL EMISSIONS FROM FUEL BURNING EQUIPMENT**

Emission Point	Pollutant	AP-42										Highest Factor lb/yr	MOST STRINGENT lb/yr	
		Natural Gas lb/yr	lb/yr	tons/yr	Fuel Oil #2 lb/yr	tons/yr	Fuel Oil #6 lb/yr	tons/yr	lb/yr	tons/yr	lb/yr			
POWERHOUSE AREA														
AM-001														
Related Capacity		156.0 MMBtu/hr												
Natural Gas Fired		395,726,000.0 ft ³ /yr of Nat. gas												
Fuel Oil #2 Fired		0.0 gal/yr of Fuel oil #2												
Sulfur Content		0.5 %												
Fuel Oil #6 Fired		0.0 gal/yr of Fuel oil #6												
Sulfur Content		2.0 %												
			PM ₁₀	3007.52	1.50	2 lb/10 ³ gal	0.00	0.00	21.6 lb/10 ³ gal	0.00	0.00	3007.52	1.50	3007.52
			SO ₂	237.44	0.12	78.5 lb/10 ³ gal	0.00	0.00	314 lb/10 ³ gal	0.00	0.00	237.44	0.12	237.44
			NO _x	110803.28	55.40	24 lb/10 ³ gal	0.00	0.00	47 lb/10 ³ gal	0.00	0.00	110803.28	55.40	110803.28
			CO	33240.98	16.62	5 lb/10 ³ gal	0.00	0.00	5 lb/10 ³ gal	0.00	0.00	33240.98	16.62	33240.98
			VOC	2176.49	1.09	0.2 lb/10 ³ gal	0.00	0.00	0.28 lb/10 ³ gal	0.00	0.00	2176.49	1.09	2176.49
			Hexane	712.31	0.36							712.31	0.36	712.31
AM-002														
Related Capacity		65.0 MMBtu/hr												
Natural Gas Fired		36,212,000.0 ft ³ /yr of Nat. gas												
Fuel Oil #2 Fired		0.0 gal/yr of Fuel oil #2												
Sulfur Content		0.5 %												
Fuel Oil #6 Fired		0.0 gal/yr of Fuel oil #6												
Sulfur Content		2.0 %												
			PM ₁₀	275.21	0.14	2 lb/10 ³ gal	0.00	0.00	10 lb/10 ³ gal	0.00	0.00	275.21	0.14	275.21
			SO ₂	21.73	0.01	71 lb/10 ³ gal	0.00	0.00	314 lb/10 ³ gal	0.00	0.00	21.73	0.01	21.73
			NO _x	3621.20	1.81	20 lb/10 ³ gal	0.00	0.00	55 lb/10 ³ gal	0.00	0.00	3621.20	1.81	3621.20
			CO	3041.81	1.52	5 lb/10 ³ gal	0.00	0.00	5 lb/10 ³ gal	0.00	0.00	3041.81	1.52	3041.81
			VOC	199.17	0.10	0.2 lb/10 ³ gal	0.00	0.00	0.28 lb/10 ³ gal	0.00	0.00	199.17	0.10	199.17
			Hexane	65.18	0.03							65.18	0.03	65.18
INSIGNIFICANT ACTIVITIES														
POLY-PALE PROCESS AREA														
Heat Transfer Fluid Boiler (formerly AC-001)														
Related Capacity		3.2 MMBtu/hr												
Natural Gas Fired		12,535,000.0 ft ³ /yr of Nat. gas												
Fuel Oil #2 Fired		0.0 gal/yr of Fuel oil #2												
Sulfur Content		0.5 %												
			PM ₁₀	95.27	0.05	2 lb/10 ³ gal	0.00	0.00				95.27	0.05	95.27
			SO ₂	7.52	0.00	71 lb/10 ³ gal	0.00	0.00				7.52	0.00	7.52
			NO _x	1253.50	0.63	20 lb/10 ³ gal	0.00	0.00				1253.50	0.63	1253.50
			CO	1052.94	0.53	5 lb/10 ³ gal	0.00	0.00				1052.94	0.53	1052.94
			VOC	68.94	0.03	0.2 lb/10 ³ gal	0.00	0.00				68.94	0.03	68.94
HARD RESINS PROCESS AREA														
Heat Transfer Fluid Boiler (formerly AG-001)														
Related Capacity		6.3 MMBtu/hr												
Natural Gas Fired Only		13,484,000.0 ft ³ /yr of Nat. gas												
			PM ₁₀	102.48	0.05							102.48	0.05	102.48
			SO ₂	8.09	0.00							8.09	0.00	8.09
			NO _x	1348.40	0.67							1348.40	0.67	1348.40
			CO	1132.66	0.57							1132.66	0.57	1132.66
			VOC	74.16	0.04							74.16	0.04	74.16
Heat Transfer Fluid Boiler (formerly AG-002)														
Related Capacity		3.3 MMBtu/hr												
Natural Gas Fired Only		0.0 ft ³ /yr of Nat. gas												
			PM ₁₀	0.00	0.00							0.00	0.00	0.00
			SO ₂	0.00	0.00							0.00	0.00	0.00
			NO _x	0.00	0.00							0.00	0.00	0.00
			CO	0.00	0.00							0.00	0.00	0.00
			VOC	0.00	0.00							0.00	0.00	0.00



MANUFACTURING PROCESSES

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF POTENTIAL UNCONTROLLED AND REGULATORY ALLOWABLE EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant	Capacity tons/hr	Emission Factor (3) lb/ton	Potential Uncontrolled/Allowable Emissions			Emissions tons/yr
				Point Source Emissions lb/hr	Stack Test Data lb/hr (1)	Point Source Emissions lb/yr (2)	
KYMENE PROCESS AREA							
AA-000 Kymene Process Area	Epichlorohydrin (Fugitive)					2998.46	1.50
AA-001 Kettle Vent Water Scrubber	Epichlorohydrin and VOC (2)					22238.00	11.12
AA-002 Adipic Acid Baghouse	Particulate Matter (PM/PM ₁₀)	1.15	0.1	11.50	100740.00	185712.00	92.86
PARACOL/AKD PROCESS AREA							
AB-001 Water Scrubber	Particulate Matter (PM/PM ₁₀)	0.875	3.0	2.63	22995.00		11.50
POLY-PALE PROCESS AREA							
AC-000 Poly-Pale Process Area	Toluene (LDAR Fugitives)						
	Toluene (Other (2) Fugitives)						40.06
						80122.46	281.11
AC-002 West Poly-Pale Scrubber #1	VOC						
	Toluene				0.440	38544.00	19.27
	Sulfur Dioxide (SO ₂)				0.171	14979.60	7.49
	Acid Mist (H ₂ SO ₄)				0.003	271.56	0.14
					0.000	8.76	0.00
AC-003 East Poly-Pale Scrubber #2	VOC						
	Toluene				0.110	9636.00	4.82
	Sulfur Dioxide (SO ₂)				0.013	1138.80	0.57
	Acid Mist (H ₂ SO ₄)				0.013	1138.80	0.57
AC-004 Poly-Pale Melter	Particulate Matter (PM/PM ₁₀)						
	VOC (Fugitive)						
						25039.00	12.52
						3139.00	1.57
NEUPHOR PROCESS AREA							
AD-001 Adduct Reactor w/ carbon absorption system	VOC (4)					274.00	0.14
RAD PROCESS AREA							
AF-000 Rosin Amine Derivatives Process Area	Ethylene Oxide (LDAR Fugitives)						
						17364.51	8.68
AF-004 Water Scrubber with Sulfuric Acid	Ethylene Oxide (5)					1590.20	0.80

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF POTENTIAL UNCONTROLLED AND REGULATORY ALLOWABLE EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant	Capacity tons/hr	Emission Factor (3) lb/ton	Potential Uncontrolled/Allowable Emissions			Fugitive Emissions lb/yr (2)	Emissions tons/yr
				Point Source Emissions lb/hr	Stack Test Data lb/hr (1)	Point Source Emissions lb/yr (2)		
HARD RESINS PROCESS AREA								
AG-003 Water Scrubber	VOC				17.820	44.55	390258.00	195.13
AG-005 Buell Norblo Dust Collector	Particulate Matter (PM/PM ₁₀)	3.5	3.0	10.50	0.722	7.22	63247.20	31.62
ROSIN SHED PROCESS AREA								
AH-000 Rosin Shed Process Area (6)	VOC							
ROSIN DISTILLATION PROCESS AREA								
AJ-000 Rosin Distillation Process Area (6)	VOC							
EFFLUENT TREATMENT AREA								
AN-000 Effluent Treatment Area	Toluene (Fugitive)							12.86
	Epichlorohydrin (Fugitive)							0.00
PAPER AREA AND RESIN AREA TANKS								
	VOC						9580.00	4.79
TOTAL EMISSIONS								
	PM/PM ₁₀							148.50
	SO ₂							0.71
	Acid Mist (H ₂ SO ₄)							0.11
	VOC							581.85
	Epichlorohydrin							12.62
	Toluene							342.10
	Ethylene Oxide							9.48

(1) Data taken from the attached 1988 and 2001 stack test data.

(2) Data taken from the attached 2002 mass balance sheets developed by C. Jordan and attached in Appendix C or the Summary of Fugitive Emissions calculation spreadsheets.

(3) AA-002, used AP-42, Section 6.2 emission factor. The emission factor 0.1 lb/ton takes into account controls (assume 99% baghouse efficiency).

AB-001 and AG-005, used AP-42, Section 11.13 emission factor. Based on similar operation with a unit melter - glass fiber manufacturing.

(4) Based on January 22, 2001, submittal to MDEQ.

(5) Data taken from the attached 2002 mass balance sheets developed by C. Jordan and attached in Appendix. Emissions include capacity calculations and regulatory allowable efficiency of 98%.

(6) No stack emissions associated with the process.

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF ACTUAL EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant	Potential Uncontrolled/Allowable Emissions									
		Capacity tons/hr	Emission Factor (3) lb/ton	Point Source Emissions		Stack Test Data lb/hr (1)	Point Source Emissions		Fugitive Emissions lb/yr (2)	Emissions tons/yr	
				lb/hr	lb/yr		lb/hr	lb/yr (2)			
KYMENE PROCESS AREA											
AA-000 Kymene Process Area	Epichlorohydrin (Fugitive)								2998.46	1.50	
AA-001 Kettle Vent Water Scrubber	Epichlorohydrin and VOC (2)						828.00			0.41	
AA-002 Adipic Acid Baghouse	Particulate Matter (PM/PM ₁₀)	1.15	0.1	11.50	100740.00	0.212	0.212	1857.12		0.93	
PARACOL/AKD PROCESS AREA											
AB-001 Water Scrubber	Particulate Matter (PM/PM ₁₀)	0.875	3.0	0.66	5748.75					2.87	
POLY-PALE PROCESS AREA											
AC-000 Poly-Pale Process Area	Toluene (LDAR Fugitives)								80122.46	40.06	
	Toluene (Other (2) Fugitives)								247653.92	123.83	
AC-002 West Poly-Pale Scrubber #1	VOC					0.440	0.44	3854.40		1.93	
	Toluene					0.171	0.17	1489.20		0.74	
	Sulfur Dioxide (SO ₂)					0.003	0.003	27.16		0.01	
	Acid Mist (H ₂ SO ₄)					0.000	0.000	0.88		0.00	
AC-003 East Poly-Pale Scrubber #2	VOC					0.110	0.11	963.60		0.48	
	Toluene					0.013	0.01	113.88		0.06	
	Sulfur Dioxide (SO ₂)					0.013	0.013	113.88		0.06	
	Acid Mist (H ₂ SO ₄)					0.002	0.002	21.02		0.01	
AC-004 Poly-Pale Melter	Particulate Matter (PM/PM ₁₀)								7889.00	3.94	
	VOC (Fugitive)								989.00	0.49	
NEUPHOR PROCESS AREA											
AD-001 Adduct Reactor w/ carbon absorption system	VOC (4)							274.00		0.14	
RAD PROCESS AREA											
AF-000 Rosin Amine Derivatives Process Area	Ethylene Oxide (LDAR Fugitives)								1127.00	0.56	
AF-004 Water Scrubber with Sulfuric Acid	Ethylene Oxide (5)							62.44		0.03	

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF ACTUAL EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant	Capacity tons/hr	Emission Factor (3) lb/ton	Point Source Emissions		Stack Test Data lb/hr (1)	Potential Uncontrolled/Allowable Emissions		Fugitive Emissions lb/yr (2)	Emissions tons/yr
				lb/hr	lb/yr		lb/hr	lb/yr (2)		
HARD RESINS PROCESS AREA										
AG-003 Water Scrubber	VOC					17.820	17.82	156103.20		78.05
AG-005 Buell Norblo Dust Collector	Particulate Matter (PM/PM ₁₀)	3.5	3.0	10.50	91980.00	0.722	0.72	6324.72		3.16
ROSIN SHED PROCESS AREA										
AH-000 Rosin Shed Process Area (6)	VOC									
ROSIN DISTILLATION PROCESS AREA										
AJ-000 Rosin Distillation Process Area (6)	VOC									
EFFLUENT TREATMENT AREA										
AN-000 Effluent Treatment Area	Toluene (Fugitive)								4660.00	2.33
	Epichlorohydrin (Fugitive)								0.00	0.00
PAPER AREA AND RESIN AREA TANKS										
	VOC								3160.00	1.58
TOTAL EMISSIONS										
	PM/PM ₁₀									10.91
	SO ₂									0.07
	Acid Mist (H ₂ SO ₄)									0.01
	VOC									251.40
	Epichlorohydrin									1.91
	Toluene									167.02
	Ethylene Oxide									0.59

(1) Data taken from the attached 1988 and 2001 stack test data.

(2) Data taken from the attached 2002 mass balance sheets developed by C. Jordan and attached in Appendix C or the Summary of Fugitive Emissions calculation spreadsheets.

(3) AA-002, used AP-42, Section 6.2 emission factor. The emission factor 0.1 lb/ton takes into account controls (assume 99% baghouse efficiency).

AB-001 and AG-005, used AP-42, Section 11.1.3 emission factor. Based on similar operation with a unit melter - glass fiber manufacturing.

(4) Based on January 22, 2001, submittal to MDEQ.

(5) Data taken from the attached 2002 mass balance sheets developed by C. Jordan and attached in Appendix. Emissions include capacity calculations and regulatory allowable efficiency of 98%.

(6) No stack emissions associated with the process.

FUGITIVE EMISSIONS

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF POTENTIAL UNCONTROLLED FUGITIVE EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant	Equipment Type	No. of Equipment	SOCMI Emission Factor (lb/hr)		Emissions	
				Non-Leaking	Average	lb/hr	tons/yr
AA-000 Kymene Process Area	Epichlorohydrin and VOC (Fugitive)	Pumps (3) and Agitator (1)	4.00	0.03		0.10	0.46
		Valves (liquid service)	49.00	0.00		0.19	0.82
		Valves (vapor service)	8.00	0.00		0.01	0.04
		Connectors	333.00	0.00		0.04	0.19
							1.50
AC-000 Poly-Pale Process Area	Toluene and VOC (Fugitive)	Pumps (17) and Agitator (8)	25.00		0.11	2.75	12.05
		Valves (total)	111.00		0.02	1.78	7.78
		Connectors	1,928.00		0.00	3.47	15.20
		Magnitrols	5.00		0.23	1.15	5.04
							40.06
AF-000 RAD Process Area	Ethylene Oxide and VOC (Fugitive)	Pumps	3.00	0.03		0.08	0.34
		Valves (liquid service)	73.00	0.00		0.28	1.22
		Valves (vapor service)	21.00	0.00		0.02	0.10
		Connectors	275.00	0.00		0.04	0.16
		Relief Valves	16.00	0.10		1.57	6.87
Emission Point/Process Area	Pollutant	Equipment Type/Process	Amount (lbs)	Emission Factor		Emissions	
						lbs/yr	tons/yr
Facility-Wide	Lead (Fugitive)*	Lead Welding	115.00	1.50	lb/ton	0.09	0.00
		Tyrex Suits	295.00	344.00	ppm	0.10	0.00
		Sandblasting	1,000.00	1,142.00	ppm	1.14	0.00
							0.00
AN-000 Effluent Treatment Area	Toluene and VOC (Fugitive)					25,726.00	12.86
						0.00	0.00
AC-004 Pol-Pale Melter (1)	Particulate Matter (PM/PM10)	Loading Melter/Melting	5,000.00	1.00	lb/ton	25,039.00	12.52
		Melting	3,139.00			3,139.00	1.57

(1) AC-004, used AP-42, Section 11.21 emission factor. Based on similar operation loading material - phosphate rock processing. PM emissions also include PM entrained with VOC emissions; therefore, it is assumed that each pound of VOC emissions calculated will also equal a pound of PM.

(2) Data taken from the attached 2002 mass balance sheets developed by C. Jordan and attached in Appendix C.

**HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI**

SUMMARY OF ACTUAL FUGITIVE EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant	Equipment Type	No. of Equipment	SOCMI Emission Factor (lb/hr)		Days Operated	Emissions	
				Non-Leaking	Average		lb/hr	tons/yr
AA-000 Kymene Process Area	Epichlorohydrin and VOC (Fugitive)	Pumps (3) and Agitator (1)	4	0.02600		365	0.10	0.46
		Valves (liquid service)	49	0.00380			0.19	0.82
		Valves (vapor service)	8	0.00110			0.01	0.04
		Connectors	333	0.00013			0.04	0.19
								1.50
AC-000 Poly-Pale Process Area	Toluene and VOC (Fugitive)	Pumps (17) and Agitator (8)	25		0.11000	115	2.75	3.80
		Valves (total)	111		0.01600		1.78	2.45
		Connectors	1928		0.00180		3.47	4.79
		Magnitrols	5		0.23000		1.15	1.59
								12.62
AF-000 RAD Process Area	Ethylene Oxide and VOC (Fugitive)	Pumps	3	0.02600		28	0.08	0.03
		Valves (liquid service)	73	0.00380			0.28	0.09
		Valves (vapor service)	21	0.00110			0.02	0.01
		Connectors	275	0.00013			0.04	0.01
								1.57
								0.67
Emission Point/Process Area	Pollutant	Equipment Type/Process	Amount (lbs)	Emission Factor			Emissions	
Facility-Wide	Lead (Fugitive)*	Lead Welding	115	1.50	lb/ton		0.09	0.00
		Tyrex Suits	295	344.00	ppm		0.10	0.00
		Sandblasting	1000	1142.00	ppm		1.14	0.00
								0.00
AN-000 Effluent Treatment Area	Toluene and VOC (Fugitive) Epichlorohydrin (Fugitive)						4660.00	2.33
							0.00	0.00
AC-004 Pol-Pale Melter (1)	Particulate Matter (PM/PM ₁₀) VOC (Fugitive) (2)	Loading Melter/Melting Melting	5000 3139	1.00	lb/ton	115.00	7889.00	3.94
							989.00	0.49

(1) AC-004, used AP-42, Section 11.21 emission factor. Based on similar operation loading material - phosphate rock processing. PM emissions also include PM entrained with VOC emissions; therefore, it is assumed that each pound of VOC emissions calculated will also equal a pound of PM.

(2) Data taken from the attached 2002 mass balance sheets developed by C. Jordan and attached in Appendix C.



APPENDIX C
SUPPORTING DATA

STACK TESTING RESULTS

AIR EMISSIONS TESTS

HERCULES, INC

EAST AND WEST POLY-PALE SCRUBBER.

FACILITY NO. 0800-00001

***Hattiesburg, Mississippi
July 2 and 3, 2001***

Hercules, Inc.
613 West 7th Street
Hattiesburg, MS 39401-2812

Performed by:

ENVIRONMENTAL MONITORING LABORATORIES, INC.

624 Ridgewood Road
P.O. Box 655
Ridgeland, Mississippi 39158

Phone: (601)856-3092

Fax: (601)853-2151

**REPORT OF
AIR EMISSIONS TESTS
FOR
HERCULES, INC.**

EAST AND WEST POLY-PALE SCRUBBER

**Hattiesburg, Mississippi
July 2 and 3, 2001**

FACILITY NO. 0800-00001

**Hercules, Inc.
613 West 7th Street
Hattiesburg, Mississippi 39401-2812**

**contact: Brian Ketchum
phone: 601/584-3264**

***Performed By:
Environmental Monitoring Laboratories
Ridgeland, Mississippi
<601/856-3092>***

ENVIRONMENTAL MONITORING LABORATORIES, INC.

P.O. Box 655 ☞ 624 Ridgewood Road
Ridgeland, Mississippi 39158

phone: 601/856-3092

fax : 601/853-3151

August 13, 2001

Subject: Hercules, Inc. Hattiesburg, Mississippi
FACILITY NO. 0800-00001

On July 2 and 3, 2001, Environmental Monitoring Laboratories performed air emissions testing for Hercules, Inc. in Hattiesburg, Mississippi. Testing was performed to measure total hydrocarbon (VOC), Toluene, sulfur dioxide and sulfuric acid emissions from the East and West Poly-Pale Scrubber at the request of Hercules. The East and West Poly-Pale Scrubbers both exhaust to the atmosphere through the same vent stack. Each was tested independently by blinding off the source not being tested.

Results of testing are summarized in the table below.

	VOC (as C)		Toluene		SO ₂		H ₂ SO ₄	
	ppm	#/hr.	ppm	#/hr.	ppm	#/hr.	ppm	#/hr.
EAST POLY-PALE	6399	0.07	83	0.007	136	0.009	9	0.0009
WEST POLY-PALE	51383	0.42	1990	0.124	24	0.0016	1	0.0001

Mr. Brian Ketchum of Hercules, Inc. coordinated the testing project. Danny Russell of EML was responsible for sample and data collection and for report preparation. Bag samples for toluene analysis were shipped to Bonner Analytical for analysis. Otherwise, sample custody was limited to Mr. Russell.

Following is a report of the test.

REPORT OF AIR EMISSIONS TESTS FOR
HERCULES, INC.
EAST AND WEST POLY-PALE SCRUBBER
HATTIESBURG, MISSISSIPPI
JULY 2 AND 3, 2001

CONTENTS

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	A. Field and Laboratory Data		
	B. Calibrations		
	C. Data Log		
	D. Toluene Analysis (Bonner)		

REPORT CERTIFICATION

I certify that I have examined the information submitted herein,
and based upon inquires of those responsible for obtaining the
data or upon my direct acquisition of data, I believe the
submitted information is true, accurate and complete.

Signed



Daniel G. Russell

1.0 Test Results:

The following tables are technical summaries of the measured flow parameters and test results for air emissions testing done on July 2 and 3, 2001, for the East and West Poly-Pale Scrubbers at Hercules in Hattiesburg, Mississippi.

1.2 West Poly-Pale Scrubber

Run No.		1	2	3	AVG.
Date		07/02/01	07/02/01	07/02/01	-----
Time Start		1334	1500	1618	----
Time End		1434	1600	1719	----
VOC EMISSIONS	#/hr as C	0.41	0.44	0.41	0.42
VOC EMISSIONS	ppm as C	49798	54723	49627	51383
TOLUENE EMISSIONS	#/hr	0.097	0.171	0.106	0.124
TOLUENE EMISSIONS	ppm	1550	2770	1650	1990.00
SO2 EMISSIONS	#/hr	0.0017	0.0031	0.0001	0.0016
SO2 EMISSIONS	ppm	39	32	1	24
H2SO4 EMISSIONS	#/hr	0.0001	0.0001	0.0001	0.0001
H2SO4 EMISSIONS	ppm	1	1	2	1
VOLUMETRIC FLOWRATE	acfm	6	6	6	6
VOLUMETRIC FLOWRATE	dscfm	4	4	4	4
VELOCITY	ft./sec.	1.7	1.7	1.7	1.7
STACK TEMPERATURE	°F	93	95	96	94
MOISTURE	%	21.8	23.3	19.4	21.5

1.2 East Poly-Pale Scrubber

Run No.		1	2	3	AVG.
Date		07/03/01	07/03/01	07/03/01	-----
Time Start		0919	1043	1202	---
Time End		1019	1144	1302	----
VOC EMISSIONS	#/hr as C	0.11	0.04	0.05	0.07
VOC EMISSIONS	ppm as C	10243	4241	4714	6399
TOLUENE EMISSIONS	#/hr	0.013	0.001	0.006	0.007
TOLUENE EMISSIONS	ppm	162	15	71	82.67
SO ₂ EMISSIONS	#/hr	0.013	0.007	0.007	0.009
SO ₂ EMISSIONS	ppm	231	88	90	136
H ₂ SO ₄ EMISSIONS	#/hr	0.0002	0.0001	0.0024	0.0009
H ₂ SO ₄ EMISSIONS	ppm	2	1	25	9
VOLUMETRIC FLOWRATE	acfm	6	6	6	6
VOLUMETRIC FLOWRATE	dscfm	6	6	6	6
VELOCITY	ft./sec.	1.8	1.8	1.8	1.8
STACK TEMPERATURE	F	92	91	89	90
MOISTURE	%	6.4	7.5	3.6	5.8



Interoffice Memo

cc: E. P. Trotter
D. W. Linde
G. Shelley
W. Langhans
D. Flanner

Hattiesburg, MS
July 25, 1989

To: P. W. Kirkendall

From: C. S. Jordan

AIR SAMPLING SUMMARY

The attachment is a summary of air sampling results for emission points as required in our permit to operate air emission equipment.

Test results are shown as the average of three-one hour samplings. The flowrates are in SCFH and the VOC in lbs/hr unless indicated otherwise. Analyses other than VOC are also indicated. The lbs/yr does not take into account actual operating hours.

Rather than going through a lengthy discussion of each sampling results please let me know if you have specific questions about any of the results.

CSJ:ml

SAMPLING PLAN

RESULTS

FLOW SHEET

V.O.C. (lbs/hr)

Emission Point	Definition	Sampling	FLOW SHEET			RESULTS						
			#1	#2	#3	AVG	#1	#2	#3	AVG	LBS/HR	
010	Rosin Process Area	Storage tank data forms	(Tanks E, L, P, R, W, Y, ZX)									
011	Mill Room Area	Area down.	(Down)									
012	Extractor, Refinery, and Still House	Area down.	(Down)									
	Combination Water and Oil Scrubber											
013	Pectite Plant Oil Scrubber	EPA Method 25 for VOC.	123	160	149	144	0.468	0.885	0.873	0.742	6,500	
020	Delnav Plant	Area permanently shut down by year's end.	(Down)									
021	Flare Tower	Calculation for sulfur dioxide for banking.	124,288 lbs. H ₂ S ----> 233,954 lbs. SO ₂ (CY-1987)									
022	Limestone Tank No. 1	See Emission Point 020.	(Down)									
023	Limestone Tank No. 2	See Emission Point 020.	(Down)									
024	Digestion Sump Vent	EPA Method 25 for VOC for banking.	(Down)									
030	Poly-Pale Plant	Storage tank data forms	(Tanks T)									
031	McKee Boiler	By calculation for natural gas	2,475 MCF/Yr. of Natural Gas									
032	McKee Boiler	By calculation for natural gas	2,475 MCF/Yr. of Natural Gas									
033	Water Scrubber (2 vents)	EPA Method 25 for VOC, plus sulfur dioxide impinger trap, plus toluene by G.C. for East and West vents.	4.14	0.009	0.01	1.39	6.48-4 2.4-3 6.84-4	1.12-5 1.56-5 5.29-5	4.21-6 6.18-5 4.31-6	2.21-4 8.25-4 2.47-4	1.9 (EPA) 7.2 (SO ₂) 2.2 (Toll)	

SAMPLING PLAN

RESULTS

V.O.C. (lbs/hr)

Emission Point	Definition	Sampling	FLOW SCOP				V.O.C. (lbs/hr)				
			#1	#2	#3	AVG	#1	#2	#3	AVG	
033	(Continued)		554	288	370	404	0.836	1.254	2.07	1.39	12,147 (C)
							1.093	0.691	0.924	0.903	7,907 (SC)
							0.834	0.766	1.220	0.94	8,234 (TO)
034	Heat Treatment	No vent									
040	Resin Shed	Storage tank data forms									
041	Drumming Operation	Per our discussion we propose not to sample.									
042	Flaking Belt Vapor Water Scrubber	EPA Method 25 for VOC	0	0	0	0	1,346 ppm	1,418 ppm	4,518 ppm	2,427 ppm	No flow
043	Flaking Belt Dust Water Scrubber	EPA Method 5 for particulate	23,108	21,981	23,998	23,029	0.374	0.40	0.470	0.415	3,634
050	Package Boiler No. 5	By calculation for natural gas	842,277	MCF/yr. of Natural Gas							
060	Vinsol Resin Process	Storage tank data forms									
061	Sealas Furnace No. 1	By calculation for natural gas	121	MCF/yr. of Natural Gas							
062	Sealas Furnace No. 2	Identical to Emission Point 061									
063	Water Scrubber Kettle No. 1	EPA Method 25 for VOC	219	240	212	224	0.217	0.416	0.294	0.309	2,707
064	Water Scrubber Kettle No. 2	Identical to Emission Point 063									
		(Only one scrubber - See 063)									

Emission Point

Definition

Sampling

#1

#2

#3

AVG

#1

#2

#3

AVG

IPS/C

SAMPLING PLAN

Emission Point	Definition	Sampling	TICW SCFH			Y.O.C. (lbs/hr)			LBS/CF			
			#1 (Tanks K)	#2	#3	AVG	#1	#2		#3	AVG	
160	Kymene Plant	Storage tank data forms										
161	Kettle Water Aspirator	EPA Method 25 for VOC, plus Epichlorohydrin by G.C.	0	0	0	0	18,595 ppm 0	8,320 ppm 137 ppm	3,134 ppm 16 ppm	10,016 ppm 51 ppm	0	0
162	Dust Collector	EPA Method 5 for particulates	36,251	35,071	33,635	34,985	0.307	0.266	0.0635	0.212	1,858	
170	Defoamer Plant	Storage tank data forms										
171	Silica Drier Furnace	By calculation for natural gas										
172	Dust Collector	EPA Method 5 for particulates	81,235	78,154	77,215	78,868	6.246	0.782	0.961	2.669	23,380	
180	Resin Amine D Plant	Storage tank data forms										
181	Struthers-Wells Boiler	By calculation for natural gas										
182	Ammoniation Water Scrubber	EPA Method 25 for VOC plus ammonia impinger trap	0	0	0	0	36.6% 2,534 ppm	41.7% 2,422 ppm	34.7% 2,489 ppm	37.7% 2,482 ppm	0	(NH ₃)
183	Amine Reactor Water Scrubber	EPA Method 25 for VOC	0	0	0	0	2.53%	1.96%	1.63%	2.04%	0	
190	Polyrad and Polylol Area	Storage tank data forms, plus EPA Method 25 for VOC, plus ethylene oxide by G.C.										
200	Para-methane Unit	Area down.										
210	Para-methane Hydroperoxide Unit	Area down.										

RESULTS

ml0011/6

SAMPLING PLAN

Emission

Point

220 Sulfate Turpentine Refining Unit

Sampling Area down.

RESULTS

FLOW SCFH

Y.O.C. (LBS/HR)

	FLOW SCFH			Y.O.C. (LBS/HR)					
	#1 (Down)	#2	#3	AVG	#1	#2	#3	AVG	LBS/Y
230 Carbon Regeneration Furnace Scrubber	101,962	101,499	103,826	102,429	13.62	3.24	5.15	7.34	64,26
240 Murry Boiler	By calculation for natural gas								
152 Stills and Dresinate Area	Storage tank data forms								
250 Para-cymene Unit	Storage tank data forms								
260 Synthetic Pine Oil Facility	Storage tank data forms								
270 Paracol Plant	Storage tank data forms								
038 Neuphor Plant	Storage tank data forms, plus VOC								
	269	260	289	273	8.54 ⁻³	1.7 ⁻²	3.88 ⁻³	0.01	86

MASS BALANCE SPREADSHEETS

CAPACITY

*** INPUT ***

CALANDER YEAR CAPACITY

*** = No input change

POLY-PALE (LBS) 60,426,480 LBS
 MELHI (LBS) 2,645,520 LBS
 TOTAL PRODUCTION **CALC** 63,072,000 LBS
 WASTEWATER FLOW (GPM) 52 GPM***
 TOLUENE SOLUBILITY (PPM) 570 PPM***
 DISPOSAL (LBS) 0 LBS
 DISP. SOLV. FRACTION 0.00 FRACTION
 TOLUENE USAGE (LBS) 794,243 LBS
 NITROGEN (MCF) * 37,809 MCF ***
 STEAM (MCF)* 149,032 MCF ***
 % STEAM, BLOWING LINES 10 %***
 MELHI (% TOLUENE) 4.0 %***
 PP HEAT TREAT (% TOLUENE) 1.5 %***
 POLY-PALE (% TOLUENE) 0.2 %***
 NITROGEN SWEEP EFFICIENCY 0.5 DECIMAL***
 COMMON VENT COND. TEMP. (I
 (1) PRODUCTION 63,072,000 LBS
 LAB SOLVENT DISPOSAL 16,200 LBS
 % TOLUENE 50 %***
 OLD PAINT DISPOSAL 0 LBS
 % TOLUENE 50 %***

TOLUENE SUMMARY FOR:
 POLY-PALE
 METAL RESINATES
 ZEON
 LAB

98% SULFURIC ACID 7,348,712 LBS (PP+WT)
 HISTORICAL NEUTRALIZATION 0.84 FACTOR***
 PPM SULFUR IN PPRODUCT 500 PPM***
 OTHER ALK. WASTEWATER 150,000 GPD***
 AVERAGE pH ~10.5 pH (>10 & <11)
 AVERAGE NORMALITY 0.005 eq/l (for ~ 10.5 pH)
 TYPICAL PRODUCTION RATE 120,000 LBS/DAY***
 DAYS OPERATION**CALC** 526 DAYS
 100% CAUSTIC 3,060,540 LBS (PP+WT)
 T/T WEAK ACID SOLD 0 NUMBER
 AVERAGE T/T WEIGHT 42,000 LBS
 AVERAGE % ACID STRENGTH 0.40 FRACTION***

LEAD USAGE
 LEAD BARS 1/4" 70 LBS
 LEAD BARS 3/16" 44 LBS
 TOTAL BURNING BARS 114 LBS >100 REPORT I
 SANDBLASTING SAND 1,000 LBS
 SAND TCLP LEAD 1,142 PPM
 TYVEX SUITS 295 LBS
 TYVEX TCLP LEAD 344 PPM
 LEAD EMISSION FACTOR 1.5 LB / TON
 LEAD SHEETS 1/8" 4,960 LBS
 LEAD SHEETS 1/4" 0 LBS
 TOTAL SHEETS 4,960 LBS
 SOLD TO SHERPER 0 LBS

E O USAGE IN POLYDAD 753,360 LBS
 E O USAGE IN E.O.D. 621,960 LBS
 TOTAL E.O. USAGE (CALC) 1,375,320 LBS
 POLYRAD 0515 0 LBS
 POLYRAD 0515A 424,860 LBS
 POLYRAD 1110 1,019,664 LBS
 POLYRAD 1110A 254,916 LBS

*** OUTPUT ***

	TOLUENE(LBS)	P.V.F / LDAR ADJUSTED
COST SHEET USAGE (LOSSES)	794,243	794,243
TANK BREATHING AND WORKING	150,198	150,198
NITROGEN VENTING/BLOWING	194,088	194,088
WASTEWATER TREATMENT VENTING	25,726	e 25,726
WWT PARTIONED TO SLUDGE	7,146	a 7,146
WWT ADSORPTION/INCINERATION	0	0
WWT DISCHARGE	0	0
POLY-PALE	121,095	b 121,095
MELHI	105,821	c 105,821
P.V.F (LDAR/ADJUSTED BY DIFF)	80,122	d 80,122
TOTAL CALCULATED	794,243	794,243
FUGITIVE BY DIFF = a + b + c + d =	314,184	339,506
DIFFERENCE(COST SHEET-CALC)	(0)	0
WWT DISCHARGE TO POTW =	110,048	110,048
QUANTITY ON-SITE IMPOUNDMENT	404	f 404

Point source	344,285	R(II / 5.2)
Discharge direct	0	R(II / 5.3.1)
WWT Ad/Inc	0	
Venting@WWT	25,726	
Fug(by diff)	313,780	
Total Fug (Fug + wwtVent)	339,506	R(II / 5.1)
Discharge to POTW	110,048	R(II / 6.1A.1)
Total(Pt.Dis,Inc,Vt,Fug)	794,243	
Total(less Inc)	794,243	
Quantity on-site impoundment	404	R(II / 5.5.3)
Quantity Released	684,195	R(II / 8.1)
Treated on-site	0	R(II / 8.6)
Treated off-site	118,148	R(II / 8.7)
activity index		1.00 R(II / 8.9)

	HISTORICAL	ACID BALANCE
FUGITIVE SO2 =	616,290 LBS	1,023,380 LBS
	48.86 LBS/HR	81.13 LBS/HR
	308.14 TONS/YEAR	511.69 TONS/YEAR
AT CAPACITY =	615,586 LBS	1,022,211 LBS
	70.27 LBS/HR	116.69 LBS/HR
	307.79 TONS/YEAR	511.11 TONS/YEAR
RECYCLED OFF-SITE =	0 LBS/YEAR	
RECYCLED ON-SITE =	6,405,018 LBS/YEAR	

FUGITIVE EMISSIONS =	0.09 LBS/YEAR	(R5.1, R8.1)
RELEASED ONSITE =	0.20 LBS/YEAR	(R5.5.4 R8.1)
TRANSFER OFFSITE =	1.24 LBS/YEAR	(R6.2 R8.1)
RECYCLED OFFSITE =	0.00 LBS/YEAR	(R8.5)
ACTIVITY INDEX =	1.00	

E.O. "LOSSES"(USAGE-THEORY)	96,875 LBS	
FUGITIVE EMISSIONS	17,365 LBS	R(II / 5.1)
POINT SOURCE EMISSIONS	1,590 LBS	R(II / 5.2)
E.O. TO ETHYLENE GLYCOL	77,920 LBS	R(II / 8.6)
ETHYLENE GLYCOL PRODUCED	109,797 LBS	>25,000LBS †
QUANTITY RELEASED	18,955 LBS	R(II / 8.1)

SURFACTANT AR150	779,640 LBS	ACTIVITY INDEX	1.00	R(II/8.9)
SURFACTANT AR160	0 LBS	FOR >25,000LBS :		
# DAYS OP. (CAN USE NA)	365 DAYS (manual input)	ETHYLENE GLYCOL DISCHARGED	0 LBS	R(II/5.3.1)
(1) E. O. USAGE	1,375,320 required in "F132")	ETHYLENE GLYCOL TREATED ON-SITE	0 LBS	R(II/8.6)
SCRUBBER EFFICIENCY	98.0 % ASSUME***	ETHYLENE GLYCOL TO POTW	109,797 LBS	R(II/6.1.A.1)

KYMENE 557H	0 LBS	FIGITIVE EMISSIONS	2,998 LBS/YEAR	R(II/5.1)
KYMENE 557LX	0 LBS	POINT SOURCE EMISSION	4,841 LBS/YEAR	R(II/5.2)
KYMENE 736	0 LBS	TO WWT	17,493 LBS/YEAR	
KYMENE 1022	0 LBS	WWT VENTING	0 LBS/YEAR	
KYMENE MXC	0			
KYMENE 621	0			
KYMENE 625LX	0			
TOTAL KYMENE **CALC**	121,939,200 LBS	WWT TO SLUDGE	350 LBS/YEAR	
EPI IN 557H	0 LBS	WWT BIOLOGICAL	2,274 LBS/YEAR	R(II/8.6)
EPI IN 557LX	0 LBS	WWT ADSORB / INCIN.	0 LBS/YEAR	
EPI IN 736	0 LBS	WWT EFF. DISCHARGE	0 LBS/YEAR	R(II/5.3.1)
EPI IN 1022	0 LBS	QUANTITY RELEASED	8,189 LBS/YEAR	R(II/8.1)
EPI IN MCX	0			
EPI IN 621	0			
EPI IN 625LX	0			
TOTAL EPI **CALC**	5,475,000 LBS	QUANTITY TREAT ON-SITE	2,274 LBS/YEAR	R(II/8.6)
NITROGEN USAGE	9,481 MCF	QUANTITY ON-SITE IMPOL	350 LBS/YEAR	R(II/5.5.3)
NITROGEN SWEEP EFFICIENCY	0.2	ACTIVITY INDEX	1.00	R(II/8.9)
(1) PRODUCTION	121,939,200 LBS	WWT DISCHARGE TO POT	14,869 LBS/YEAR	R(II/8.7)
SCRUBBER EFFICIENCY	98.0 % ASSUME			

MONTHS WWT FURN OP 0 MONTHS

HISTORICAL DATA ("SAME"?)

TOLUENE IN ZEON WWT	0 LBS/YR
TOLUENE IN I.B. SLUDGE	404 LBS/YR
AMMONIA IN I.B. SLUDGE	443 LBS/YR
I.B. SLUDGE GEN RATE	4 CU YDS/ DAY

ROBIN METLER @ POLY-PALE		SHEEN QUANTITY =	7 Gallons spilled
CHEMICAL NAME	PEXOIL / LIGHT ENDS	SHEEN QUANTITY =	56 Lbs spilled
MOLECULAR WEIGHT	302 lb/mole	EST. RECOVERY =	42 Lbs recovered
AREA OF SPILL	96 ft2	(SPILL-RECOVERY) =	14 LBS (NET RELEASE)
VAPOR PRESSURE	0.004450 psia	VAPOR GENERATION	0.000100 lbs/sec
TEMPERATURE	266 oF		0.0060 lbs/min
WIND SPEED	5 miles/hour		0.36 lbs/hr
SHEEN THICKNESS	0.125 inches		8.6 lbs/day
SP. GR.	0.89 decimal		3,139 lbs/year
EST. % RECOVERY	75 %		1.57 tpy

RESIN PRODUCTION	246,758,792 LBS	ROSIN PLANT-WIDE VOC =	3.68 TPY
PAPER PRODUCTION	425,035,200 LBS		
"ROSIN" HANDLING FACTOR(est)	2 (ie, "DOUBLE" HANDLING)	ROSIN PLANT-WIDE VOC =	11.13 TPY (@ CAI
NUMBER OF TANKS (est)	30 RESINS		
NUMBER OF TANKS (est)	10 PAPER		
AVERAGE TANK DIAMETER(est)	10 FT		
AVERAGE TANK HEIGHT(est)	20 FT		
AVG. VAPOR SPACE**CALC**	10 FT		
"ROSIN" MOL. WEIGHT	302		
TEMPERATURE	175 oC or = 347 oF (calc)		
VAPOR PRESSURE	0.200 mm Hg or = 0.003868 psi (calc)		
AMBIENT DELTA TEMP.	20 oF		

EPI (Form R-Air "only")	7,839	lbs/yr
Eth BZ (Form R-Air)	0	lbs/yr
Eth GLYCOL(Form R-Air)	0	lbs/yr
Eth OXIDE (Form R-Air)	18,955	lbs/yr
MALEIC ANH (Form R-Air)	0	lbs/yr
TOLUENE (Form R-Air)	683,791	lbs/yr
XLYENE (Form R-Air)	0	lbs/yr
Adpic acid - lbs	7,043,040	lbs/yr
Gum rosin/PP-lbs (melter)	43,800,000	lbs/yr
Resin flaked/HRA-lbs	61,320,000	lbs/yr
Nat Gas-(Poly-Pale)	12,535	mcf
(Power House)	431,938	mcf
(HRA)	13,484	mcf
(Rosin Dist)	2,891	mcf
(Hydrogen)	0	mcf
(RAD)	4,940	mcf
(Eff. Treatment)	0	mcf
CAPACITY Fee Rate =	25.00	\$/TON
Poly-pale prod	60,426,480	lbs
SO2 Fugitives @ Poly-Pale	511.69	TPY
HRA Kettle production	56,064,000	lbs/yr
HRA Flaked	61,320,000	lbs/yr
Pit fug est non-HAP VOC	3.68	TPY
Poly-Pale melter n-H- VOC	3,139	lbs/yr
Dowtherm-(Poly-Pale)	26,200	lbs/yr
Dowtherm-(HRA)	169,193	lbs/yr
Dowtherm-(Rosin Dist)	222,228	lbs/yr
Dowtherm-(RAD)	33,685	lbs/yr

	TPY	

PM	44.93	
SO2	522.96	
NOX	60.22	
CO	19.56	
VOC*	584.78	
TRS	0	
LEAD	0	
CFC/HCFC	0	
Other	0	
totHAP-voc	355.29	
TH non-voc	0	
SUM =	1232.46	TPY
CAPACITY FEE RATE=	25.00	\$/TON
TOTAL \$ =	30,811	
By quarters	7,702.85	

* = Reflects Total VOC from the facility including VOC,s that are HAP's

BIPHENYL LOSS = 27*TOTAL= 121,853 LBS (LESS THAN 10,000 LBS ?)
NO REPORT REQUIRED

EPICHLOROHYDRIN

(1999 LDAR UPDATE WITH NON-LEAKING FACTORS)

INPUT	CAPACITY	
KYLANDER YEAR		
KYMENE 557H	0	LBS
KYMENE 557LX	0	LBS
KYMENE 736	0	LBS
KYMENE 1022	0	LBS
KYMENE MXC	0	
KYMENE 621	0	
KYMENE 625LX	0	
TOTAL KYMENE **CALC**	121,939,200	LBS
EPI IN 557H	0	LBS
EPI IN 557LX	0	LBS
EPI IN 736	0	LBS
EPI IN 1022	0	LBS
EPI IN MCX	0	
EPI IN 621	0	
EPI IN 625LX	0	
TOTAL EPI **CALC**	5,475,000	LBS
NITROGEN USAGE	9.481	MCF
NITROGEN SWEEP EFFICIENCY	0.2	
(1) PRODUCTION	121,939,200	
PRODUCTION/ACTIVITY INDEX	1.00	
SCRUBBER EFFICIENCY	98.0	% ASSUME

OUTPUT		
FUGITIVE EMISSIONS	2,998 LBS/YEAR	R(II / 5.1)
POINT SOURCE EMISSIONS TO WWT	4,841 LBS/YEAR	R(II / 5.2)
WWT VENTING	17,493 LBS/YEAR	
WWT TO SLUDGE	0 LBS/YEAR	
WWT BIOLOGICAL	350 LBS/YEAR	
WWT ADSORB. / INCIN.	2,274 LBS/YEAR	R(II / 8.6)
WWT EFF. DISCHARGE	0 LBS/YEAR	
QUANTITY RELEASED	0 LBS/YEAR	R(II / 5.3.1)
QUANTITY TREAT ON-SITE	8,189 LBS/YEAR	R(II / 8.1)
QUANTITY ON-SITE IMPOUND	2,274 LBS/YEAR	R(II / 8.6)
	350 LBS/YEAR	R(II / 5.5.3)
WWT DISCHARGE TO POTW	14,869 LBS/YEAR	R(II / 8.7)

	WITH COMPLETION OF KYMENE PROJECT, EQUIPMENT UPDATE "DOUBLED"				SOCMI FACTORS (LBS/HR)	
	OLD(1987)	UPDATE1992	LDAR(1995)	LDAR(1999)	AVERAGE	NON-LEAKING
NUMBER PUMPS (+1 AGIT)	1	2	2	4	0.11	0.02600
NUMBER VALVES (LIQ)	13	26	34	49	0.016	0.00380
NUMBER VALVES (VAP)					8	0.00110
NUMBER FLANGES (+CONN)	56	112	222	333	0.0018	0.00013
LBS/HR =	0	1	1	0		
LBS/YEAR =	3,669	7,337	10,193	2,998		

FOR EPI, ASSUME WORST CASE FOR ALL EPI EXCEPT 557LX
SINCE THE EPI "DROPS IN"
ASSUME ALL VAPOR SPACE DISPLACEMENT IS EPI

DISPLACEMENT =	EPI* 1GAL/8.34*1.2 * 1FT/7.48GAL =	73,137 FT3
EPI TO SCRUBBER =	EPI* 1MOLE/379FT3 * 92.5LBS/MOLE =	17,850 LBS

FOR 557LX WHICH IS PUMPED IN UNDERNEATH THE LIQUID
EPI VAPOR PRESSURE = 40 mm Hg
EPI MOLE FRACTION IN VAPOR, VP/760 = 0.0526

LX DISPLACEMENT =	EPI* 1GAL/8.34*1.2 * 1FT/7.48/GAL =	0 FT3
EPI TO SCRUBBER =	EPI* 1MOLE/379FT3 * 92.5LBS/MOLE =	0 LBS

TOTAL EPI(FROM RX) TO SCRUBBER = 17,850 LBS

ASSUME 98.0 PERCENT SCRUBBER EFFICIENCY
EPI IN SCRUBBER WATER TO WWT = 17,493 LBS
EPI FROM SCRUBBER VENT = 357 LBS

BREATHING LOSSES FROM K-110, 11.5FT DIA, 22FT HT
BREATHING LOSSES (K-110) = 94 LBS/YR
BREATHING LOSSES (K-111) = 2 LBS/YR
BREATHING LOSSES TOTAL = 96

ASSUME NUMBER OF BATCHES IS (LBS PRODUCTION / 107,000 LBS/BATCH)

NUMBER BATCHES = 121,939,200 DIVIDED BY 107,000 = 1,140 BATCHES

FOR 30 SCFM NITROGEN PURGE FOR 30 MINUTES PER BATCH (30*30=900CFM/BATCH)
 TOTAL NITROGEN PURGE = 1,140 * 900 = 1,025,657 CF

NITROGEN LEFT FOR BLANKET OF EPICHLOROHYDRIN AND DETA & HMDA = 8,455,343 CF

ASSUME NITROGEN SPLIT BETWEEN THE TWO SERVICES

THEREFORE NITROGEN IN EPI SERVICE = 4,227,672 = 483 SCFM

Antoine vapor pressure equation for:

$$\text{LOG}(P) = A - (B/(t+C))$$

A =
 B =
 C = 22 oC

EPICHLOROHYDRIN

NOTE: V.P. for EPI @ 22 oC = 15 mmHg

Nitrogen = 483

SCFH = 1,344 #moles/Hr

	T1(Centigrade) 22	72 oF	=====	
	Vap Press. mm Hg	Par Press mm Hg	Vapor Mol. Fr.	Vapor #moles/Hr
Nitrogen		745	0.980	1.3443
EPI	15	15	0.020	0.0271
Total		760.00	1.000	1.3714

	T1(Centigrade) 22	72 oF	=====		
	Vap. Press. mm Hg	Vapor Mol. Fr.	Vapor #moles/Hr	Vapor #/Hr	Liq Cond. #/Hr
	745	0.980	1.3443	37.6625	
	15	0.020	0.0271	2.5045	0.0000
	760.00	1.000	1.3714	40.1670	0.0000

Epichlorohydrin (% Recovered) = 0.00

% Mol. Wt. (Epichlorohydrin) = 92.53
 Mol. Wt. (Nitrogen) = 28.016

Volume of 1 # mole of Nitrogen at Standard Conditions = 359 cuft

EMISSIONS (119 * 8,760 HRS/YR) =

21939 LBS/YEAR

FOR A NITROGEN SWEEP EFFICIENCY OF 0.2

EMISSIONS = 21,939 * 0.2

= 4,388 LBS/YEAR

FUGITIVE EMISSIONS =
 PT SOURCE =
 TO WWT =

2,998 LBS/YR
 4,841 LBS/YR
 17,493 LBS/YR

(FROM LDAR P,V,F "F1236")
 ("D1257" + "D1262" + "H1341")
 ("E1256")

TOTAL = 25,332 LBS/YEAR

POLY-PALE

INPUT

CALENDAR YEAR	CAPACITY
POLY-PALE (LBS)	60,426,480
MELHI (LBS)	2,645,520
TOTAL PRODUCTION **CALC**	63,072,000
WASTEWATER FLOW (GPM)	52
TOLUENE SOLUBILITY (PPM)	570
DISPOSAL (LBS)	0
DISP. SOLV. FRACTION	0.00
TOLUENE USAGE (LBS)	794,243
NITROGEN (MCF) *	37,809
STEAM (MCF) *	149,032
% STEAM, BLOWING LINES	10
MELHI (% TOLUENE)	4.0
PP HEAT TREAT (% TOLUENE)	1.5
POLY-PALE (% TOLUENE)	0.2
NITROGEN SWEEP EFFICIENCY	0.5
COMMON VENT COND. TEMP. (f)	75

*** OUTPUT ***	TOLUENE(LBS)		P,V,F / LDAR ADJUSTED
COST SHEET USAGE (LOSSES)	794,243		794,243
TANK BREATHING AND WORKING	150,198		150,198
NITROGEN VENTING/BLOWING	194,088		194,088
WASTEWATER TREATMENT VENTING	25,726	e	25,726
WWT PARTIONED TO SLUDGE	7,146	a	7,146
WWT ADSORPTION/INCINERATION	0		0
WWT DISCHARGE	0		0
POLY-PALE	121,095	b	121,095
MELHI	105,821	c	105,821
P,V,F (LDAR/ADJUSTED BY DIFF)	80,122	d	80,122
TOTAL CALCULATED	794,243		794,243
FUGITIVE BY DIFFERENCE = a+b+c+d+e-f =	314,184		339,506
DIFFERENCE(COST SHEET-CALC)	(0)		0
WWT DISCHARGED TO POTW =	110,048		110,048
QUANTITY ON-SITE IMPOUNDMENT	404	f	404
			R5.2
			R5.2
			R6.1 A1, R8.7
			R5.3
SOLVENT LOSSES =	12.6 LBS/ 1,000 LBS PRODUCTION (COST SHEET)		
SOLVENT LOSSES =	12.6 LBS/ 1,000 LBS PRODUCTION(CALCULATED)		
SOLVENT LOSSES =	0.8 % COST SHEET LOSSES/TOTAL USAGE		
SOLVENT LOSSES =	0.8 % CALCULATED USAGE/TOTAL USAGE		
SOLVENT RECYC	62,277,757 LBS/YEAR		
POINT SOURCE :	344,285 LBS/YEAR		

* NOTE: Must calculate each Antoine V P equation below
Must calc Kc and C for thruput and small tank dia

LBS TOLUENE IN MELHI FROM T-108 =	4 % *	2,645,520 =	105,821 LBS
LBS TOLUENE TO HEAT TREATMENT =	2 % *	61,346,680 =	920,200 LBS
LBS TOLUENE IN POLY-PALE =	0 % *	60,547,575 =	121,095 LBS

FOR: PUMPS, VALVES, FLANGES, ASSUME

	NUMBER	FACTOR	RATE
PUMPS	17	0.1100	1.8700
VALVES	111	0.0160	1.7760
FLANGES	1,928	0.0018	3.4704
AGITATORS	8	0.1100	0.8800
MAGNITROLS	5	0.2300	1.1500
TOTAL =			9.15 LBS/HOUR

FUGITIVE EMISSIONS (P,V,F) = 8,760 * 9.15 = 80,122 LBS/YEAR

FOR THE SUMP:

FOR SUMP ASSL 74,880 GALLONS/DAY WASTEWATER FLOWRATE
ASSUME 570 PPM TOLUENE SOLUBILITY
LBS/DAY = 74,880 * .00000834 * 570 PPM = 356.0 LBS/DAY
ASSUME (10% EXCESS) FOR SPILLS, UPSETS, FLOWS, ETC. = 391.6 LBS/DAY
ESTIMATE DAYS OPERATION = 63,072,000 % 100,000 LBS/DAY = 365 DAYS
LBS/YEAR = 392 LBS/DAY * 365 DAYS = 142,920 LBS/YEAR

WASTEWATER TREATMENT SOLVENT DISTRIBUTION

BIOLOGICAL STUDIES @ 20 DAY RETENTION FOR UNACCUMULATED ARE

VOLATILIZED TO ATMOSPHERE = 72 %
PARTIONED TO SLUDGE = 18 %

OUR HOLD-UP IS ONLY 1/4 TO 1/5 OF 20 DAY BIOLOGICAL, THEREFORE

EQUALIZATION VOLATILIZED = 72 * 1/4 = 18 %
PARTIONED TO SLUDGE = 18 * 1/4 = 5 %
AVAILABLE FOR TREATMENT = 100 - 23 = 77 %

FOR APPROXIMATELY 90 % TREATMENT
TREATED = 77 * .90 = 69 %
DISCHARGED = 77 * .10 = 8 %

FOR NO CARBON ADSORPTION, TREATED GOES TO ZERO BELOW

WASTEWATER TREATMENT (WWT) VENTING	142,920 LBS/YR =	25,726 LBS/YEAR
WWT PARTIONED TO SLUDGE = 05 *	142,920 LBS/YR =	7,146 LBS/YEAR
WWT ADSORPTION OR INCINERATION = 69 *	142,920 LBS/YR =	0 LBS/YEAR
WWT DISCHARGED DIRECT = .08 *	142,920 LBS/YR =	0 LBS/YEAR
WWT DISCHARGED TO POTW =		110,048 LBS/YEAR

VOC EMISSIONS - FIXED ROOF TANKS (TOLUENE)

TANK NO.	TOTAL LOSS LBS/YR	EQUAT1 BREATHING LOSS LBS/YR	EQUAT2 WORKING LOSS LBS/YR	MOL-WT Mv	EQUAT2 MULTIPLY FACTOR	TVP	EQUAT 2 Kn	EQUAT2 ANNUAL THRUPUT GAL/YR	EQUAT2 TANK CAPACITY GAL/YR	EQUAT2 TURNOVER PER YR N	EQUAT1 AVG VAPOR SPACE HT (FT)
T-3 FD SOLN	9,270	81	9,189	92.13	0.000024	1.025	0.250	16,218,514	2,055	7892	2.50
T-7 #1 SEP	2,192	0	2,192	92.13		0.440	0.250	9,010,286	52	173275	1.00
T-8 #1 POLYZ	2,192	1	2,192	92.13		0.440	0.250	9,010,286	130	69310	1.00
T-9 #2 SEP	0	0	0	92.13	OUT	0.000	1.000	0	52	0	1.00
T-10 #2 POLYZ	0	0	0	92.13	OUT	0.000	1.000	0	130	0	1.00
T-11 #3 SEP	2,192	0	2,192	92.13		0.440	0.250	9,010,286	52	173275	1.00
T-12 #3 POLYZ	2,192	1	2,192	92.13		0.440	0.250	9,010,286	130	69310	1.00
T-13 #5 SEP	2,192	0	2,192	92.13		0.440	0.250	9,010,286	52	173275	1.00
T-14 #5 POLYZ	2,192	1	2,192	92.13		0.440	0.250	9,010,286	130	69310	1.00
T-15 #6 SEP	2,192	0	2,192	92.13		0.440	0.250	9,010,286	52	173275	1.00
T-16 #6 POLYZ	2,192	1	2,192	92.13		0.440	0.250	9,010,286	130	69310	1.00
T-17 #4 SEP	2,192	0	2,192	92.13		0.440	0.250	9,010,286	52	173275	1.00
T-18 #4 POLYZ	2,192	1	2,192	92.13		0.440	0.250	9,010,286	130	69310	1.00
T-21 PZD SOLN	5,703	25	5,678	92.13		0.600	0.250	17,119,543	1,200	14266	2.50
T-22 PZD SEP	0	0	0	92.13	NO VENT	0.700	0.250	855,977	400	2140	1.20
T-23 PZD SURGE	5,408	14	5,394	92.13		0.600	0.250	16,263,566	700	23234	2.40
T-24 HYZ SOLN	47,174	46	47,127	92.13		3.320	0.250	25,679,314	1,175	21855	4.00
T-25 WASH TK	25,151	44	25,108	92.13		1.420	0.250	31,986,514	4,170	7671	0.50
T-26 WASHD SOI	14,631	81	14,550	92.13		1.025	0.250	25,679,314	2,060	12466	2.50
T-27 EVAP FD	14,631	81	14,550	92.13		1.025	0.250	25,679,314	2,060	12466	2.50
T-30 1ST PP EV	14,555	5	14,550	92.13		1.025	0.250	25,679,314	420	61141	2.00
T-31 2ND PP EV	5,365	5	5,360	92.13		1.025	0.250	9,460,800	420	22526	2.00
T-36 PEXOIL/TOL	0	0	0	92.13	NO VENT	14.697	0.700	40,772	190	215	1.00
T-40 PEX/TOL ST	192,437	189,041	3,397	92.13		14.697	1.000	104,519	9,050	12	10.00
T-48 1ST MEL EV	465	6	459	92.13		1.025	0.250	810,926	505	1606	3.00
T-71 MEL SOLN	1,062	51	1,011	92.13		1.025	0.550	810,926	2,700	300	4.00
T-80 40%ACD/TO	1,607	229	1,378	92.13	ATM VENT	1.025	1.000	608,194	20,000	30	10
T-81 40%ACD/TO	1,607	229	1,378	92.13	ATM VENT	1.025	1.000	608,194	20,000	30	10
T-83 DEC SEP	1,708	54	1,654	92.13		1.025	0.360	2,027,314	3,450	588	6.00
T-84 40% ACD/TOL	2,961	204	2,757	92.13	ATM VENT	1.025	1.000	1,216,389	17,000	72	8.00
T-85 FR TOL STC	859	247	613	92.13	ATM VENT	1.025	1.000	270,309	13,600	20	6.00
T-86 REC TOL	995	52	943	92.13		1.025	0.660	630,720	2,700	234	4.50
T-88 PP HYDRO	29,708	122	29,585	92.13		6.600	0.250	8,109,257	1,400	5792	2.00
T-93 SLG DEC	1,249	55	1,195	92.13		1.025	0.260	2,027,314	1,700	1193	3.00
T-99 H2O/TOL SE	4,931	81	4,850	92.13		1.025	0.250	8,559,771	2,065	4145	2.50
T-101 MEL ACCU	705	16	689	92.13		1.025	0.750	405,463	1,050	386	3.00
T-105 TOL FD Mx	4,931	81	4,850	92.13		1.025	0.250	8,559,771	2,065	4145	2.50
T-108 MEL BLND	34,199	28,007	6,192	92.13	ATM VENT	14.695	0.470	405,463	1,070	379	2.00
T-116 H2O/TOL S	13,378	105	13,274	92.13		1.025	0.250	23,426,743	3,500	6693	2.50
T-117 WASH FEE	47,247	119	47,127	92.13		3.320	0.250	25,679,314	2,400	10700	3.00
T-124 2ND MEL E	256	1	255	92.13		1.025	0.250	450,514	71	6345	1.00
T-131 PP HYDRO	29,708	122	29,585	92.13	NO VENT	6.600	0.250	8,109,257	1,400	5792	2.00
T-139 SUMP	28,363	412	27,951	92.13	ATM VENT	1.025	0.250	49,331,314	2,500	19733	4.30
T-201 RX #7	5,404	10	5,394	92.13		0.600	0.250	16,263,566	1,500	10842	1.00
T-202 RX #8	5,404	10	5,394	92.13		0.600	0.250	16,263,566	1,500	10842	1.00
T-203 RX #9	5,404	10	5,394	92.13		0.600	0.250	16,263,566	1,500	10842	1.00
TOTAL (LBS/YR)	578,397	219,648	358,749					475,708,171	128,668	3697	

(ROSIN)

P-59 ROSIN STG	34	34	0	302		0	1	626,340	10,278	61	4.00
T-20 ROSIN FEEL	58	58	0	302		0	0	7,446,000	17,167	434	4.50
T-33 ROSIN/DOV	1	1	0	604		0	0	7,884,000	730	10800	4.00
T-34 R SPG TANI	1	1	0	604		0	0	7,884,000	730	10800	4.00
T-106 MELHI STC	21	21	0	604		0	1	394,200	10,310	38	6.00
T-119 GUM STG	29	29	0	302		0	1	2,299,500	21,000	110	7.00
T-120 ROSIN STC	173	173	0	302		0	1	7,446,000	125,000	60	12.00
T-129 PP SURGE	0	0	0	604		0	0	7,008,000	240	29200	2.00
T-130 SCRAP RO	43	43	0	302		0	1	98,550	32,200	3	8.00
T-132 PP STG TK	232	232	0	604		0	1	7,008,000	82,000	85	10.00
T-133 GUM STG	41	41	0	302		0	1	2,299,500	31,200	74	10.00
TOTAL (LBS/YR)	634	634	0					50,394,090	330,855	152	

(OTHER)

T-77 98% H2SO4	5	5	0	98	0	1	144,540	10,170	14	6.00
T-78 98% H2SO4	7	7	0	98	0	1	144,540	12,750	11	6.00
T-96 25% NAOH	13	13	0	40	0	1	1,323,154	9,395	141	12.50
T-100 98% H2SO4	5	5	0	98	0	1	144,540	8,300	17	6.00
T-134 DOW CATC	0	0	0	166	0	0	8,760,000	75	116800	2.30
T-135 DOW FLAS	#NUM!	#NUM!	0	166	37	0	236,520,000	350	675771	4.70
T-136 DOW STOF	8	8	0	166	0	1	4,380	1,100	4	6.70
T-137 SER WATE	4	4	0	18	0	0	96,360,000	4,000	24090	1.00
T-138 DOW BLOV	#NUM!	#NUM!	0	166	37	1	0	1,100	0	2.50

T-3 FD SOLN	48.3	4,793								
T-7 #1 SEP	0.0	2,192								
T-8 #1 POLYZ	0.0	2,192								
T-9 #2 SEP	0.0	0	OUT							
T-10 #2 POLYZ	0.0	0	OUT							
T-11 #3 SEP	0.0	2,192								
T-12 #3 POLYZ	0.0	2,192								
T-13 #5 SEP	0.0	2,192								
T-14 #5 POLYZ	0.0	2,192								
T-15 #6 SEP	0.0	2,192								
T-16 #6 POLYZ	0.0	2,192								
T-17 #4 SEP	0.0	2,192								
T-18 #4 POLYZ	0.0	2,192								
T-21 PZD SOLN	8.5	5,218								
T-22 PZD SEP	100.0	0	NO VENT							
T-23 PZD SURGE	8.5	4,948								
T-24 HYZ SOLN	86.7	6,274								
T-25 WASH TK	65.8	8,602								
T-26 WASHD SOI	48.3	7,564								
T-27 EVAP FD	48.3	7,564								
T-30 1ST PP EV	48.3	7,525								
T-31 2ND PP EV	48.3	2,774								
T-36 PEXOIL/TOL	100.0	0	NO VENT							
T-40 PEX/TOL ST	99.4	1,155								
T-48 1ST MEL EV	48.3	241								
T-71 MEL SOLN	48.3	549								
T-80 40%ACD/TOL		1,607	ATM VENT							
T-81 40%ACD/TOL		1,607	ATM VENT							
T-83 DEC SEP	48.3	883								
T-84 40% AC/TOL		2,961	ATM VENT							
T-85 FR TOL STG		859	ATM VENT							
T-86 REC TOL	48.3	514								
T-88 PP HYDRO	100.0	0								
T-93 SLG DEC	48.3	646								
T-99 H2O/TOL SE	48.3	2,549								
T-101 MEL ACCU	48.3	364								
T-105 TOL FD M	48.3	2,549								
T-108 MEL BLND	100.0	0	ATM VENT *							
T-116 H2O/TOL S	48.3	6,917								
T-117 WASH FEE	86.7	6,284								
T-124 2ND MEL E	48.3	132								
T-131 PP HYDRO	100.0	0	NO VENT							
T-139 SUMP		28,363	ATM VENT							
T-201 RX #7	8.5	4,945								
T-202 RX #8	8.5	4,945								
T-203 RX #9	8.5	4,945								
TOTAL		150,198								

NOTE: FOR VOC CALCULATIONS, MUST MANUALLY INPUT Kc AND C FOR THE THRUPT TURNOVERS(Kc) AND SMALL TANK DIAMETER(C)

TURNOVER FACTOR TURNOVERS	Kc	SMALL TANK DIAMETER FACTOR	
		DIA(FT)	C
<35	1	1FT	0.05
40	1	2FT	0.10
45	1	3FT	0.15
50	1	5FT	0.25
60	1	7.5FT	0.40
75	1	10FT	0.50
100	0	12.5FT	0.65
150	0	15FT	0.75
200	0	17.5FT	0.85
250	0	20FT	0.90
300	0	25FT	0.95
400	0	30FT	1.00

NOTE: *EMISSIONS IN T-108 ARE SHOWN IN FINISHED PRODUCT MELHI.

TOTAL TANKAGE CAPACITY = 128,668 GALLONS
 TOTAL NITROGEN USAGE = 4,316 SCFH

FOR BREATHING DISPLACEMENT = $\frac{P1 V1}{T1} = \frac{P2 V2}{T2}$

AVERAGE DAY TEMPERATURE = 76.3 DEG F
 AVERAGE NIGHT TEMPERATURE = 52.9 DEG F

FOR NIGHT VOLUME(V2) = 128,668 GALLONS OR 17,202 CU FT
 THE DAY VOLUME(V1) = 134,538 GALLONS OR 17,986 CU FT

BREATHING DISPLACEMENT = 785 FT3/DAY
 = 286,447 FT3/YEAR OR 33 SCFH

FOR WORKING DISPLACEMENT = 475708171 GALLONS
 = 63,597,349 FT3/YEAR OR 7260 SCFH

TOTAL DISPLACEMENT = 286,447 FT3/YR + 63,597,349 FT3/YR
 = 63,883,797 FT3/YEAR
 = 7,293 SCFH

NITROGEN VENT 4,316 SCFH - 7,293 SCFH = (2,977) SCFH
 (MAX) = 4,293 SCFH (SEE NOTE BELOW)

NOTE::: FOR POLY-PALE, PRODUCTION IS CONTINUEOUS/"STEADY-STATE"/LEVEL CONTROL

THEREFORE, BATCH VOLUMETRIC DISPLACEMENT IS MINIMAL, (EMPTY TANKS EACH RUN)

ASSUME; TANKAGE VOLUMETRIC DISPLACEMENT (12 TIMES A YEAR) IS ACTUAL DISPLACEMENT

TANKAGE VOLUPL 128,668 GALLONS = 17,202 CU FT

VOLUME DISPLA 17,202 CU FT * 12 TIMES/YR % 8,760 HRS/YR = 24 SCFH

THEREFORE, MAXIMUM VENTIN 4,316 SCFH - 24 SCFH = 4,293 SCFH

FOR NITROGEN DISTRIBUTION BASED ON THRUPUT AND BREATHING VOLUME
 CONDENSER EXIT TEMPERATU 75.0 DEG F = 23.9 DEG C
 "cond. Exit temp. = cell C29

NOTE: MUST MANUALLY ADJUST "COND. TEMP." FOR TANKS THAT VENT TO ATMOSPHERE

ANTOINE EMISSI 445 SCFH AND 100.0 DEG F OR 37.8 DEG C
 EQUAL = 36,655 LBS/YEAR

TABLE BELOW BREAKS DOWN THE TOTAL ANTOINE EMISSIONS INTO INDIVIDUAL TANKS
 (IT HAS TO BE CALCULATED FOR EACH INDIVIDUAL TANK NITROGEN FLOW)

TANK NO.	ANNUAL THRUPUT GAL/YR	TANK BREATHING GAL/YR	TOTAL GALS/YR	NITROGEN SCFH	TEMP DEG F	ANTOINE EMISSIONS LBS/YEAR
T-3 FD SOLN	16,218,514	701	16,219,216	146	100	12,026
T-7 #1 SEP	9,010,286	18	9,010,303	81	70	6,672
T-8 #1 POLYZ	9,010,286	44	9,010,330	81	70	6,672
T-9 #2 SEP	0	18	18	0	MTY	0 OUT
T-10 #2 POLYZ	0	44	44	0	MTY	0 OUT
T-11 #3 SEP	9,010,286	18	9,010,303	81	70	6,672
T-12 #3 POLYZ	9,010,286	44	9,010,330	81	70	6,672
T-13 #5 SEP	9,010,286	18	9,010,303	81	70	6,672
T-14 #5 POLYZ	9,010,286	44	9,010,330	81	70	6,672
T-15 #6 SEP	9,010,286	18	9,010,303	81	70	6,672
T-16 #6 POLYZ	9,010,286	44	9,010,330	81	70	6,672
T-17 #4 SEP	9,010,286	18	9,010,303	81	70	6,672
T-18 #4 POLYZ	9,010,286	44	9,010,330	81	70	6,672
T-21 PZD SOLN	17,119,543	410	17,119,952	154	80	12,685
T-22 PZD SEP	855,977	137	856,114	8	85	0 NO VENT
T-23 PZD SURGE	16,263,566	239	16,263,805	147	80	12,109
T-24 HYZ SOLN	25,679,314	401	25,679,715	232	150	19,110
T-25 WASH TK	31,986,514	1,423	31,987,937	289	115	23,805
T-26 WASHD SOI	25,679,314	703	25,680,017	232	100	19,110
T-27 EVAP FD	25,679,314	703	25,680,017	232	100	19,110
T-30 1ST PP EV	25,679,314	143	25,679,458	232	100	19,110
T-31 2ND PP EV	9,460,800	143	9,460,943	85	100	7,002
T-36 PEXOIL/TOL	40,772	65	40,836	0	222	0 NO VENT
T-40 PEX/TOL ST	104,519	3,088	107,608	1	222	82
T-48 1ST MEL EV	810,926	172	811,098	7	100	577
T-71 MEL SOLN	810,926	921	811,847	7	100	577
T-80 40%ACD/TO	608,194	6,825	615,019	6	100	1,019 ATM VENT
T-81 40%ACD/TO	608,194	6,825	615,019	6	100	1,019 ATM VENT
T-83 DEC SEP	2,027,314	1,177	2,028,492	18	100	1,483
T-84 40% AC/TOL	1,216,389	5,801	1,222,190	11	100	1,868 ATM VENT
T-85 FR TOL STC	270,309	4,641	274,950	2	100	340 ATM VENT
T-86 REC TOL	630,720	921	631,641	6	100	494
T-88 PP HYDRO	8,109,257	478	8,109,735	73	185	6,013
T-93 SLG DEC	2,027,314	580	2,027,894	18	100	1,483
T-99 H2O/TOL SE	8,559,771	705	8,560,476	77	100	6,343
T-101 MEL ACCU	405,463	358	405,821	4	100	329
T-105 TOL FD Mx	8,559,771	705	8,560,476	77	100	6,343
T-108 MEL BLND	405,463	365	405,828	4	222	679 ATM VENT
T-116 H2O/TOL S	23,426,743	1,194	23,427,937	211	100	17,380
T-117 WASH FEE	25,679,314	819	25,680,133	232	150	19,110
T-124 2ND MEL E	450,514	24	450,539	4	100	329
T-131 PP HYDRO	8,109,257	478	8,109,735	73	185	0 NO VENT
T-139 SUMP	49,331,314	853	49,332,167	445	100	75,593 ATM VENT
T-201 RX #7	16,263,566	512	16,264,078	147	80	12,109
T-202 RX #8	16,263,566	512	16,264,078	147	80	12,109
T-203 RX #9	16,263,566	512	16,264,078	147	80	12,109

TOTAL (LBS/YR) 475,708,171 43,909 475,752,080 4293 388,175

FOR 0.5 % NITROGEN SWEEP EFFICIENCY = 194,088

Antoine vapor pressure equation for:

TOLUENE

$$\text{LOG}(P) = A - (B/(t+C))$$

A = 7
 B = 1,345
 C = 219 oC

Nitrogen = 445 SCFH = 1,240 #moles/Hr

T1(Centigrade)
37.8

100.0 oF

T1(Centigrade)
23.9

75.0 oF

	Vap.Press. mm Hg	Par.Press. mm Hg	Vapor Mol. Fr.	Vapor #moles/Hr	Vap.Press. mm Hg	Vapor Mol. Fr.	Vapor #moles/Hr	Vapor #/Hr	Liq. Cond. #/Hr
Nitrogen		707	0.930	1.2396	733	0.965	1.2396	34.7274	
Toluene	53	53	0.070	0.0937	27	0.035	0.0454	4.1844	4.4458
Total		760.00	1.000	1.3332	760.00	1.000	1.2850	38.9117	4.4458

Toluene (% Recovered) =

51.51 %

Mol. Wt. (Toluene) = 92.134

Mol. Wt. (Nitrogen) = 28.016

Volume of 1 # mole of Nitrogen at Standard Conditions = 359 cuft

EMISSIONS (11178 * 8,760 HRS/YR) =

36,655 LBS/YEAR

ETHYLENE OXIDE

With 1999 LDAR update for NON-LEAKING factors

INPUT	**INPUT**	
CALANDER YEAR	CAPACITY	
E.O. USAGE IN POLYDAD	753,360	LBS
E.O. USAGE IN E.O.D.	621,960	LBS
TOTAL E.O. USAGE (CALC)	1,375,320	LBS
POLYRAD 0515	0	LBS
POLYRAD 0515A	424,860	LBS
POLYRAD 1110	1,019,664	LBS
POLYRAD 1110A	254,916	LBS
SURFACTANT AR150	779,640	LBS
SURFACTANT AR160	0	LBS
# DAYS OPERATION (CAN USE NA)	365	DAYS (manual input required "F132")
SCRUBBER EFFICIENCY	98.0	% ASSUME

OUTPUT	*OUTPUT*	
E.O. "LOSSES"(USAGE-THEORY)	96,875	LBS
FUGITIVE EMISSIONS	17,365	LBS R(II / 5 1)
POINT SOURCE EMISSIONS	1,590	LBS R(II / 5 2)
E.O. TO ETHYLENE GLYCOL	77,920	LBS R(II / 8 6)
ETHYLENE GLYCOL PRODUCED	109,797	LBS
QUANTITY RELEASED	18,955	LBS R(II / 8 1)
FOR ETHYLENE GLYCOL :		
ETHYLENE GLYCOL DISCHARGED	0	LBS R(II / 5 3.1)
ETHYLENE GLYCOL TREATED ON-SITE	0	LBS R(II/8.6)
ETHYLENE GLYCOL TO POTW	109,797	LBS R(II/6.1A.1)
E.O. USAGE/ 1,000 LBS PRODUCT	555	LBS
E.O. "LOSSES"/ 1,000 LBS PRODUCT	39	LBS

FOR POLYRADS: ASSUME		
ROSIN AMINE MOL. WT.		285
ROSIN AMINE PURITY		94 %
ADJUSTED MOL. WT.		303
POLYRAD 0515	0 * 85 =	0
POLYRAD 0515A	424,860 * 7* 85=	252,792
POLYRAD 0500 =		252,792
POLYRAD 1110	1,019,664 * 90 =	917,698
POLYRAD 1110A	254,916 * 7* 9=	160,597
POLYRAD 1100 =		1,078,295

FOR 0500::	1 MOLE AMINE + 5 MOLES E.O. = 0500	
	303 + 5(44)	=523
	E.O = 5(44)/523 * LBS OF 0500 =	106,337 LBS

FOR 1100::	1 MOLE AMINE + 11 MOLES E.O. = 1100	
	303 + 11(44)	=787
	E.O = 11(44)/787 * LBS 1100 =	663,144 LBS

FOR SURFACTANTS: ASSUME		
WOOD ROSIN MOL. WT.		302
WOOD ROSIN ACID NO.		160
THEROETICAL ACID NO.		186
WOOD ROSIN PURITY		86 %
ADJUSTED MOL. WT.		351

SURFACTANT AR150	779,640 * 1.0 =	779,640
SURFACTANT AR160	0 * 1.0 =	0

FOR AR150::	1 MOLE ROSIN + 15 MOLES E.O. = AR150	
	351 + 15(44)	=1011
	E.O = 15(44) * LBS OF AR150 =	508,964 LBS

FOR AR160::	1 MOLE ROSIN + 16 MOLES E.O. = AR160	
	351 + 16(44)	= 1055
	E.O = 16(44) * LBS OF AR160 =	0 LBS

THEROETICAL E O			1,278,445 LBS
E O "LOSSES"(USAGE-THEORY)			96,875 LBS
E.O. USAGE = LBS OF E.O. / (8.34 * 85)			194,008 GALLONS
DAYS OF OPERATION, FROM LOG SHEETS =			365 DAYS
TOTAL E.O. ADDUCTS =			2,110,726 LBS
TYPICAL PRODUCTION = LBS % DAYS =			5,783 LBS/DAY
BASE YR 1993 TYP PROD = 5,470LBS/DAY			
DAYS OPERATION =			365 DAYS
FOR P,V,F			
Pumps/liq=	3 *	0.0260	0.08 LBS/HR
Valves/liq=	73 *	0.0038	0.28 LBS/HR
Valves/Vap=	21 *	0.0011	0.02 LBS/HR
Fig&con/liq=	231 *	0.0001	0.03 LBS/HR
Fig&con/Vap=	44 *	0.0001	0.01 LBS/HR
RELIEF =	16 *	0.0980	1.57 LBS/HR
			<hr/>
			1.98 LBS/HR
ON A CONTINUEOUS BASIS =			17,365 LBS/YR
SINCE WE BLOW THE LINES WE ONLY HAVE			
E O IN THE P,V,F SERVICE THE ACTUAL			
DAYS OF OPERATION =			365 DAYS
THEREFORE P,V,F FUGITIVE EMISSIONS =			17,365 LBS/YR
THEREFORE E O TO SCRUBBER =			79,510 LBS/YR
ASSUME SCRUBBER EFFICIENCY =	98.0		
E O TO ETHLYENE GLYCOL =			77,920 LBS/YR
E O VENTED FROM SCRUBBER STACK =			1,590 LBS/YR
ETHYLENE GLYCOL PRODUCED			
LBS E.O. * 62/44 =			109,797 LBS/YR



Fees.01ad#2 uses a different calculation method for scrubber efficiency based upon MACT standards for E.O. and E.P.I. The implied efficiency in both standards is 98.0 which is in this forms input data unless otherwise input differently.

FEES

*** INPUT ***

CALANDER YEAR 2002
*** = No input change

POLY-PALE (LBS) 10,754,657 LBS
MELHI (LBS) 706,745 LBS
TOTAL PRODUCTION **CALC** 11,461,402 LBS
WASTEWATER FLOW (GPM) 30 GPM***
TOLUENE SOLUBILITY (PPM) 570 PPM***
DISPOSAL (LBS) 0 LBS
DISP SOLV FRACTION 0.00 FRACTION
TOLUENE USAGE (LBS) 353,976 LBS
NITROGEN (MCF) * 25.012 MCF ***
STEAM (MCF)* 32,380 MCF ***
% STEAM, BLOWING LINES 10 %***
MELHI (% TOLUENE) 4.0 %***
PP HEAT TREAT (% TOLUENE) 1.5 %***
POLY-PALE (% TOLUENE) 0.2 %***
NITROGEN SWEEP EFFICIENCY 0.5 DECIMAL***
COMMON VENT COND TEMP (I) 75 deg F***
2001 PRODUCTION 9,461,508 LBS

LAB SOLVENT DISPOSAL 16,200 LBS
% TOLUENE 50 %***
OLD PAINT DISPOSAL 0 LBS
% TOLUENE 50 %***

*** OUTPUT ***

	TOLUENE(LBS)		P.V.F / LDAR ADJUSTED
COST SHEET USAGE (LOSSES)	353,976		353,976
TANK BREATHING AND WORKING	29,707		29,707
NITROGEN VENTING/BLOWING	142,554		142,554
WASTEWATER TREATMENT VENTING	4,660	e	4,660
WWT PARTIONED TO SLUDGE	1,295	a	1,295
WWT ADSORBTION/INCINERATION	0		0
WWT DISCHARGE	0		0
POLY-PALE	21,552	b	21,552
MELHI	28,270	c	28,270
P.V.F (LDAR/ADJUSTED BY DIFF)	80,122	d	106,002
TOTAL CALCULATED	328,097		353,976
FUGITIVE BY DIFF = a + b + c + d =	131,239		161,375
DIFFERENCE(COST SHEET-CALC)	25,879		0
WWT DISCHARGE TO POTW =	19,936		19,936
QUANTITY ON-SITE IMPOUNDMENT	404	f	404

TOLUENE SUMMARY FOR :

POLY-PALE
METAL RESINATES
ZEON
LAB

Point source		172,261	R(II / 5.2)
Discharge direct		0	R(II / 5.3.1)
WWT Ad/Inc		0	
Venting@WWT		4,660	
Fug(by diff)		156,714	
Total Fug (Fug + wwtVent)		161,375	R(II / 5.1)
Discharge to POTW		19,936	R(II / 6.1A1.)
Total(Pt,Dis,Inc,Vt,Fug)		353,976	
Total(less Inc)		353,976	
Quantity on-site impoundment		404	R(II / 5.5.3)
Quantity Released		334,040	R(II / 8.1)
Treated on-site		0	R(II / 8.6)
Treated off-site		28,036	R(II / 8.7)
activity index		1.21	R(II / 8.9)

98% SULFURIC ACID 1,441,747 LBS (PP+WT)
HISTORICAL NEUTRALIZATION 0.84 FACTOR***
PPM SULFUR IN PPRODUCT 500 PPM***
OTHER ALK WASTEWATER 150,000 GPD***
AVERAGE pH -10.5 pH (>10 & <11)
AVERAGE NORMALITY 0.005 eq/l (for ~ 10.5 pH)
TYPICAL PRODUCTION RATE 120,000 LBS/DAY***
DAYS OPERATION**CALC** 96 DAYS

	HISTORICAL		ACID BALANCE
FUGITIVE SO2 =	63,027 LBS		313,211 LBS
	27.50 LBS/HR		136.64 LBS/HR
	31.51 TONS/YEAR		156.61 TONS/YEAR
AT CAPACITY =	346,443 LBS		1,721,630 LBS
	39.55 LBS/HR		196.53 LBS/HR
	173.22 TONS/YEAR		860.82 TONS/YEAR
RECYCLED OFF-SITE =	0 LBS/YEAR		
RECYCLED ON-SITE =	1,345,236 LBS/YEAR		

100% CAUSTIC 544,713 LBS (PP+WT)
T/T WEAK ACID SOLD 0 NUMBER
AVERAGE T/T WEIGHT 42,000 LBS
AVERAGE % ACID STRENGTH 0.40 FRACTION***

LEAD USAGE
LEAD BARS 1/4" 70 LBS
LEAD BARS 3/16" 44 LBS
TOTAL BURNING BARS 114 LBS >100 REPORT I
SANDBLASTING SAND 1,000 LBS
SAND TCLP LEAD 1,142 PPM
TYVEX SUITS 295 LBS
TYVEX TCLP LEAD 344 PPM
LEAD EMISSION FACTOR 1.5 LB / TON
LEAD SHEETS 1/8" 4,960 LBS
LEAD SHEETS 1/4" 0 LBS
TOTAL SHEETS 4,960 LBS
SOLD TO SHERPER 0 LBS

FUGITIVE EMISSIONS =	0.09 LBS/YEAR	(R5.1 R8.1)
RELEASED ONSITE =	0.20 LBS/YEAR	(R5.4 R8.1)
TRANSFER OFFSITE =	1.24 LBS/YEAR	(R6.2 R8.1)
RECYCLED OFFSITE =	0.00 LBS/YEAR	(R8.5)
ACTIVITY INDEX =	1.21	

E O USAGE IN POLYDAD 51,884 LBS
 E O USAGE IN E O D 30,758 LBS
 TOTAL E O USAGE (CALC) 82,642 LBS
 POLYRAD 0515 0 LBS
 POLYRAD 0515A 23,650 LBS
 POLYRAD 1110 73,790 LBS
 POLYRAD 1110A 17,200 LBS
 SURFACTANT AR150 38,245 LBS
 SURFACTANT AR160 0 LBS
 # DAYS OP (CAN USE NA) 28 DAYS (manual input
 2001 E O USAGE 128,154 required in "F132")
 SCRUBBER EFFICIENCY 98.0 % ASSUME***

E O "LOSSES"(USAGE-THEORY) 4,249 LBS
 FUGITIVE EMISSIONS 1,127 LBS R(II/5.1)
 POINT SOURCE EMISSIONS 62 LBS R(II/5.2)
 E O TO ETHYLENE GLYCOL 3,060 LBS R(II/8.6)
 ETHYLENE GLYCOL PRODUCED 4,312 LBS >25,000LBS ;
 QUANTITY RELEASED 1,189 LBS R(II/8.1)
 ACTIVITY INDEX 0.64 R(II/8.9)
 FOR >25,000LBS :
 ETHYLENE GLYCOL DISCHARGED 0 LBS R(II/5.3.1)
 ETHYLENE GLYCOL TREATED ON-SITE 0 LBS R(II/8.6)
 ETHYLENE GLYCOL TO POTW 4,312 LBS R(II/6.1.A.1)

KYMENE 557H 46,648,810 LBS
 KYMENE 557LX 24,100,813 LBS
 KYMENE 736 1,868,409 LBS
 KYMENE 1022 344,421 LBS
 KYMENE MXC 101,480
 KYMENE 621 351,410
 KYMENE 625LX 47,340
 TOTAL KYMENE **CALC** 73,462,683 LBS
 EPI IN 557H 2,121,156 LBS
 EPI IN 557LX 760,599 LBS
 EPI IN 736 468,099 LBS
 EPI IN 1022 47,718 LBS
 EPI IN MCX 4,330
 EPI IN 621 25,645
 EPI IN 625LX 6,368
 TOTAL EPI **CALC** 3,433,915 LBS
 NITROGEN USAGE 1,688 MCF
 NITROGEN SWEEP EFFICIENCY 0.2
 2001 PRODUCTION 62,497,806 LBS
 SCRUBBER EFFICIENCY 98.0 % ASSUME

FIGITIVE EMISSIONS 2,998 LBS/YEAR R(II/5.1)
 POINT SOURCE EMISSION 828 LBS/YEAR R(II/5.2)
 TO WWT 8,669 LBS/YEAR
 WWT VENTING 0 LBS/YEAR
 WWT TO SLUDGE 173 LBS/YEAR
 WWT BIOLOGICAL 1,127 LBS/YEAR R(II/8.6)
 WWT ADSORB / INCIN 0 LBS/YEAR
 WWT EFF DISCHARGE 0 LBS/YEAR R(II/5.3.1)
 QUANTITY RELEASED 4,000 LBS/YEAR R(II/8.1)
 QUANTITY TREAT ON-SITE 1,127 LBS/YEAR R(II/8.6)
 QUANTITY ON-SITE IMPOL 173 LBS/YEAR R(II/5.5.3)
 ACTIVITY INDEX 1.18 R(II/8.9)
 WWT DISCHARGE TO POT 7,369 LBS/YEAR R(II/8.7)

MONTHS WWT FURN OP 0 MONTHS

HISTORICAL DATA ("SAME"?)
 TOLUENE IN ZEON WWT 0 LBS/YR
 TOLUENE IN I.B. SLUDGE 404 LBS/YR
 AMMONIA IN I.B. SLUDGE 443 LBS/YR
 I.B. SLUDGE GEN RATE 4 CU YDS/DAY

ROSLIN METLER @ POLY-PALE
 CHEMICAL NAME PEXOIL / LIGHT ENDS
 MOLECULAR WEIGHT 302 lb/mole
 AREA OF SPILL 96 ft²
 VAPOR PRESSURE 0.004450 psia
 TEMPERATURE 266 oF
 WIND SPEED 5 miles/hour
 SHEEN THICKNESS 0.125 inches
 SP GR 0.89 decimal
 EST. % RECOVERY 75 %

SHEEN QUANTITY = 7 Gallons spilled
 SHEEN QUANTITY = 56 Lbs spilled
 EST RECOVERY = 42 Lbs recovered
 (SPILL-RECOVERY) = 14 LBS (NET RELEASE)
 VAPOR GENERATION 0.000100 lbs/sec
 0.0060 lbs/min
 0.36 lbs/hr
 8.6 lbs/day
 3,139 lbs/year
 1.57 tpy

Just for tanks

RESIN PRODUCTION 23,458,712 LBS
 PAPER PRODUCTION 164,483,244 LBS
 "ROSIN" HANDLING FACTOR(est) 2 (ie. "DOUBLE" HANDLING)
 NUMBER OF TANKS (est) 30 RESINS
 NUMBER OF TANKS (est) 10 PAPER
 AVERAGE TANK DIAMETER(est) 10 FT
 AVERAGE TANK HEIGHT(est) 20 FT
 AVG VAPOR SPACE**CALC** 10 FT
 "ROSIN" MOL WEIGHT 302
 TEMPERATURE 175 oC or = 347 oF (calc)
 VAPOR PRESSURE 0.200 mm Hg or = 0.003868 psi (calc)
 AMBIENT DELTA TEMP. 20 oF

ROSIN PLANT-WIDE VOC = 1.58 TPY
 ROSIN PLANT-WIDE VOC = 4.79 TPY (@ CAI)

		TPY

EPI (Form R-Air "only")	3,827 lbs/yr	PM 7.86
Eth BZ (Form R-Air)	0 lbs/yr	SO2 158.72
Eth GLYCOL(Form R-Air)	0 lbs/yr	NOX 58.31
Eth OXIDE (Form R-Air)	1,189 lbs/yr	CO 18.97
MALEIC ANH (Form R-Air)	0 lbs/yr	VOC* 200.55
TOLUENE (Form R-Air)	333,636 lbs/yr	TRS 0
XLYENE (Form R-Air)	0 lbs/yr	LEAD 0
Adipic acid - lbs	4,417,347 lbs/yr	CFC/HCFC 0
Gum rosin/PP-lbs (melter)	4,313,790 lbs/yr	Other 0
Resin flaked/HRA-lbs	9,676,150 lbs/yr	totHAP-voc 169.33
Nat Gas-(Poly-Pale)	12,535 mcf	TH non-voc 0
(Power House)	417,857 mcf	
(HRA)	13,484 mcf	
(Rosin Dist.)	2,891 mcf	
(Hydrogen)	0 mcf	
(RAD)	4,940 mcf	
(Eff. Treatment)	0 mcf	
2002 Fee Rate =	25.00 \$/TON	
Poly-pale prod.	10,754,657 lbs	
SO2 Fugitives @ Poly-Pale	156.61 TPY	
HRA Kettle production	5,371,917 lbs/yr	
HRA Flaked	9,676,150 lbs/yr	
Plt. fug. est. non-HAP VOC	1.58 TPY	
Poly-Pale melter n-H- VOC	3,139 lbs/yr	
Dowtherm-(Poly-Pale)	4,663 lbs/yr	
Dowtherm-(HRA)	16,607 lbs/yr	
Dowtherm-(Rosin Dist.)	23,817 lbs/yr	
Dowtherm-(RAD)	2,037 lbs/yr	

		TPY

		PM 7.86
		SO2 158.72
		NOX 58.31
		CO 18.97
		VOC* 200.55
		TRS 0
		LEAD 0
		CFC/HCFC 0
		Other 0
		totHAP-voc 169.33
		TH non-voc 0
		SUM = 444.41 TPY
2002 FEE RATE=	25.00 \$/TON	
TOTAL \$ =	11,110	
By quarters	2,777.58	

* = Reflects Total VOC from the facility including VOC,s that are HAP's

BIPHENYL LOSS = 27*TOTAL= 12,723 LBS (LESS THAN 10,000 LBS ?)
NO REPORT REQUIRED

FROM FORM R CALCULATIONS=	"TPY"

EPICHLOROHYDRIN	1.91
ETHYL BENZENE	0.00
ETHYLENE GLYCOL	0.00
ETHYLENE OXIDE	0.59
MALEIC ANHYDRIDE	0.00
TOLUENE	166.82
XYLENE	0.00
total VOC (Form R)	169.33

AMMONIA USAGE @ RAD	107,972 LBS	NH3 "LOSSES"(USAGE-THEORY)	89,761 LBS	= 83.1%	
NITRILE PRODUCTION	429,814 LBS OF 731-D FEED	FUGITIVE EMISSIONS	2,667 LBS		R(II / 5.1)
WASTEWATER FLOW AVG.	95,268 GPD	POINT SOURCE EMISSIONS	885 LBS		R(II / 5.2)
AVERAGE WASTEWATER pH	10.0	NH3 TO (NH4)2SO4 @ 90% & 10% POTW	86,209 LBS		
pH NORMALITY	0.00100	AMMONIUM SULFATE PRODUCED	301,224 LBS	<?> 25,000LBS	
I.B. SLUDGE GENERATE RATE	4 CU YD/DAY	AMMONIA RECYCLE	462,727 LBS		R(II / 8.4)
AQ NH3 AT DRESINOL	0 LBS	NH3 "LOSSES"/1,000 LBS FEED	208.8 LBS/1,000 LBS FEED		
H2SO4 TOTES @40% =	0 NUMBER	QUANTITY RELEASED	12,616 LBS		R(II / 8.1)
		QUANTITY TO POTW	8,621 LBS		R(6 1A.1)(RB
		QUANTITY ON-SITE IMPOUNDMENT	443 LBS		(RII/ 5.5.3)

PARTICULATE MATTER

AC-002 (162) Dust collector @ Kymene

$$\frac{0.93 \text{ TPY in 1988(base data)}}{2,370,000 \text{ lbs used in 1988}} * 4,417,347 \text{ lbs} = 1.73 \text{ TPY (PM)}$$

AC-004 (-) Gum rosin melted @ Poly-Pale

Based on process weight equation, $E = 4.1 * P^{0.67}$
 E = Particulate emissions in lbs/hour
 P = Process input capacity in tons/hour
 Capacity = 80drs/8hr shift = 2.5 tons/hour

$$= 3.27 \text{ TPY (PM)}$$

AG-005 (101) Dust collector @ HRA

3.16 TPY in 1988(base data) * 9,676.150 lbs = 1.14 TPY (PM)
 26,840,510 lbs flaked in 1988

A-(Plant) Fuel burning @ PP,PH,HRA,Rosin dist H2,RAD,Eff

Poly-Pale - 3.2mmBTU/hr heat input
 PM =7.6lb/mmCUFT nat gas = 0.05 tpy 0.05 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.00 TPY(SO2)
 NOX = 100lb/mmCUFT nat gas = 0.63 TPY(NOX)
 CO = 84lb/mmCUFT nat gas = 0.53 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 0.03 TPY(VOC)

Power House - #5 Boiler = 156mmBTU/hr heat input
 Power House - #6 Boiler = 65mmBTU/hr heat input
 Assume 95% and 5% split of nat gas between #5 and #6 boilers

For #5 Boiler
 PM =7.6lb/mmCUFT nat gas = 1.51 tpy 1.51 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.12 TPY(SO2)
 NOX =280lb/mmCUFT nat gas = 55.57 TPY(NOX)
 CO = 84lb/mmCUFT nat gas = 16.67 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 1.09 TPY(VOC)

For #6 Boiler
 PM =7.6lb/mmCUFT nat gas = 0.08 tpy 0.08 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.01 TPY(SO2)
 NOX =100lb/mmCUFT nat gas = 1.04 TPY(NOX)
 CO = 84lb/mmCUFT nat gas = 0.88 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 0.06 TPY(VOC)

Hard Resins - 8.3mmBTU/hr heat input
 PM =7.6lb/mmCUFT nat gas = 0.05 tpy 0.05 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.00 TPY(SO2)
 NOX = 100lb/mmCUFT nat gas = 0.67 TPY(NOX)
 CO = 84lb/mmCUFT nat gas = 0.57 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 0.04 TPY(VOC)

Rosin Dist - 3.3mmBTU/hr heat input
 PM =7.6lb/mmCUFT nat gas = 0.01 tpy 0.01 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.00 TPY(SO2)
 NOX = 100lb/mmCUFT nat gas = 0.14 TPY(NOX)
 CO = 84lb/mmCUFT nat gas = 0.12 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 0.01 TPY(VOC)

Hydrogen - 21.0mmBTU/hr heat input
 PM =7.6lb/mmCUFT nat gas = 0.00 tpy 0.00 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.00 TPY(SO2)
 NOX = 100lb/mmCUFT nat gas = 0.00 TPY(NOX)
 CO = 84lb/mmCUFT nat gas = 0.00 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 0.00 TPY(VOC)

Rosin Amine D - 8.3mmBTU/hr heat input
 PM =7.6lb/mmCUFT nat gas = 0.02 tpy 0.02 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.00 TPY(SO2)
 NOX = 100lb/mmCUFT nat gas = 0.25 TPY(NOX)
 CO =84lb/mmCUFT nat gas = 0.21 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 0.01 TPY(VOC)

Eff Treatment - 2.95mmBTU/hr heat input
 PM =7.6lb/mmCUFT nat gas = 0.00 tpy 0.00 TPY(PM)
 PM(10)=0lb/mmCUFT nat gas = 0.00 tpy
 SO2 = 0.6lb/mmCUFT nat gas = 0.00 TPY(SO2)
 NOX = 100lb/mmCUFT nat gas = 0.00 TPY(NOX)
 CO = 84lb/mmCUFT nat gas = 0.00 TPY(CO)
 VOC = 5.5lb/mmCUFT nat gas = 0.00 TPY(VOC)

TOTAL PM 7.86 TPY
 TOT SO2 0.14 TPY
 TOT NOX 58.31 TPY
 TOT CO 18.97 TPY
 TOT VOC 1.24 TPY

SO2 FROM 1988 DATA

Poly-Pale east and west vents = 7.2 lbs/yr + 7,907 lbs/yr = 7,914 lbs/yr = 3.96 TPY

3.96 TPY (1988 Base data)	*	10,754,657 lbs	=	1.98 TPY(SO2)
21,495,048 lbs Poly-Pale (1988)				

VOC = VOC Assumed to be non-HAP

VOC FROM 1988 DATA

Poly-Pale east and west vents = 1.9 lb/hr + 12,147 lb/yr = 12,149 lb/yr = 6.07 TPY

6.07 TPY (1988 Base data)	*	10,754,657 lbs	=	3.04 TPY(VOC)
21,495,048 lbs Poly-Pale (1988)				

HRA Water scrubber - Kettles/Hot = 98,696 lbs/yr = 49.35 TPY

49.35 TPY (1988 Base data)	*	5,371,917 lbs	=	13.45 TPY(VOC)
19,713,604 lbs Production (1988)				

HRA Water scrubber - Flaking/Hot end = 57,378 lbs/yr = 28.69 TPY

28.69 TPY (1988 Base data)	*	9,676,150 lbs	=	10.34 TPY(VOC)
26,840,510 lbs flaked (1988)				

Carbon Furnace = 64,269 lbs/yr = 32.14 TPY

32.14 TPY (1988 Base data)	"ASSUME THE SAME"	=	32.14 TPY(VOC)
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'NOTE: Furnace only ran "X" months :: Therefore subtract (12 - "x") months -32.14

"Rosin" VOC and "Paper Chemicals" VOC "ESTIMATES"

From Plant-wide fugitive emission estimates spreadsheet =	1.58 TPY(VOC)
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Poly-Pale melter fugitives

1.57 TPY(VOC)

TOTAL VOC* = 29.98 TPY(VOC*)

EVAPORATION LOSSES

SOURCE :: Rosin Melter@ Poly-Pale (VP of Pexoil / Light Ends)

*** INPUT ***

CHEMICAL NAME	PEXOIL / LIGHT ENDS
MOLECULAR WEIGHT	302 lb/mole
AREA OF SPILL	96 ft2
VAPOR PRESSURE	0.004450 psia
TEMPERATURE	266 oF
WIND SPEED	5 miles/hour
SHEEN THICKNESS	0.125 inches
SP. GR.	0.89 decimal
EST. % RECOVERY	75 %

*** OUTPUT ***

SHEEN QUANTITY =	7 Gallons spilled
SHEEN QUANTITY =	56 Lbs spilled
EST. RECOVERY =	42 Lbs recovered
(SPILL-RECOVERY) =	14 LBS (NET RELEASE)
VAPOR GENERATION	0.000100 lbs/sec
	0.0060 lbs/min
	0.36 lbs/hr
	8.6 lbs/day
	3,139 lbs/year

1.57 tpy

$$W = \frac{MKAP}{RT}$$

W = VAPOR GENERATION RATE, lbs/second
M = MOLECULAR WEIGHT OF CHEMICAL
A = AREA OF SPILL, ft²
P = VAPOR PRESSURE, psia.
R = UNIVERSAL GAS CONSTANT, 10.73 psia-ft³/oR-lb mole
T = TEMPERATURE OF LIQUID, oR = oF + 460
K = GAS-PHASE MASS TRANSFER COEFFICIENT, ft/second

$$K = 0.00438 (U)^{0.78} (D / 3.1 \cdot 10^{-4})^{2/3}$$

D = DIFFUSION COEFFICIENT, ft/second

U = WINDSPEED miles/hour

IF "D" IS NOT AVAILABLE

$$K = 0.00438 (U)^{0.78} (18/M)^{1/3}$$

ROSIN - FUGITIVE EMISSIONS ESTIMATES-PLANT WIDE

INPUT

CALANDER YEAR	2,002		
RESIN PRODUCTION	23,458,712 LBS		
PAPER PRODUCTION	164,483,244 LBS		
"ROSIN" HANDLING FACTOR(est)	2	(ie," DOUBLE" HANDLING)	
NUMBER OF TANKS (est)	30	RESINS	
NUMBER OF TANKS (est)	10	PAPER	
AVERAGE TANK DIAMETER(est)	10	FT	
AVERAGE TANK HEIGHT(est)	20	FT	
AVG VAPOR SPACE**CALC**	10	FT	
"ROSIN" MOL WEIGHT	302		
TEMPERATURE	175 oC	or =	347 oF (calc)
VAPOR PRESSURE	0.200 mm Hg	or =	0.003868 psi (calc)
AMBIENT DELTA TEMP	20 oF		

* FOR CALCULATIONS: PAINT FACTOR, PRODUCT FACTOR, SMALLTANK FACTOR, TURNOVER FACTOR ARE IN EQUATIONS

OUTPUT

ROSIN PLANT-WIDE VOC = 1.58 TPY
ROSIN PLANT-WIDE VOC = 4.79 TPY (@ CAPACITY)

FOR ROSIN "VOC" ESTIMATES

ROSIN HANDLING FACTOR = 30 TANKS * 2 = 60
 $P / (P_a - P) = P / (14.7 - P) = 0$
PAINT FACTOR = 1
SMALL TK. FACTOR = 1
PRODUCT FACTOR = 1
TANK CAPACITY = 11,750 GALS
ANNUAL THRUPUT = 97,745 GALS/TANK
NO TURNOVERS = 8
TURNOVER FACTOR = 1

FOR BREATHING LOSSES, L(b),resins = 14 LBS/YR
FOR 60 "TANKS" L(b),resins = 813.94 LBS/YEAR
0.093 LBS/HR

0.41 TPY

FOR WORKING LOSSES, $L(w), \text{resins} = 3 \text{ LBS/YR}$

FOR 60 "TANKS" $L(w), \text{resins} = 164.44 \text{ LBS/YEAR}$
 0.019 LBS/HR
 0.08 TPY

FOR PAPER "VOC" ESTIMATES

KYMENE = 12.2 % TOTAL SOLIDS
 NEUPHOR = 31.0 % TOTAL SOLIDS
 PARACOL = 12.0 % TOTAL SOLIDS

ASSUME SIMILAR PRODUCTION RATES
 THEREFORE THE AVERAGE TOTAL SOLIDS = 18 %

ROSIN PRODUCTION FACTOR = 30,264,917 LBS (adjusted for %T.S.)

ROSIN HANDLING FACTOR = 10 TANKS * 2 = 20

ANNUAL THRUPUT = 2,056,041 GALS/TANK

NO. TURNOVERS = 175

TURNOVER FACTOR = 0

FOR BREATHING LOSSES, $L(b), \text{paper} = 14 \text{ LBS/YR}$

FOR 20 "TANKS" $L(b), \text{paper} = 271.31 \text{ LBS/YEAR}$
 0.03 LBS/HR
 0.14 TPY

FOR WORKING LOSSES, $L(w), \text{paper} = 17 \text{ LBS/YR}$

FOR 20 "TANKS" $L(w), \text{paper} = 334.36 \text{ LBS/YEAR}$
 0.04 LBS/HR
 0.17 TPY

PLANT-WIDE VOC FOR ROSIN $L(B)$ and $L(w)$

$$L(\text{total}) = L(b), \text{rosin} + L(w), \text{rosin} + L(b), \text{paper} + L(w), \text{paper}$$

$$= 0.41 + 0.08 + 0.14 + 0.17$$

$$L(\text{total}) = 0.79 \text{ TPY}$$

ASSUME PLANT-WIDE FUGITIVES (P,V,F) AND STEAM BLOWING SAME AS $L(\text{total})$

THEREFORE TOTAL ROSIN VOC = 1.58 TPY

FOR CAPACITY:

$$\text{RATIO FACTOR} = \frac{61.34 \text{ TPH (@ CAPACITY)}}{20.38 \text{ TPH (1994)}} = 3.02$$

TOLUENE TOTAL

CALANDER YEAR 2,002

FOR ZEON WASTEWATER:
Assume toluene in wastewater is = 0 Lbs

For WWT solvent distribution :
Biological studies @ 20 day retention for unaccumulated are:
 Volatilized to atmosphere = 72%
 Partioned to the sludge = 18%

Our hold-up is only 1/4 to 1/5 of 20 day biological, therefore

Equalization volatilized = $72 * 1/4 = 18\%$
Partioned to the sludge = $18 * 1/4 = 5\%$
Available for treatment = $100 - 18 - 5 = 77\%$

For approximately 90% treatment :
 Treated = $77 * .9 = 69\%$
 Discharged = $77 * .1 = 8\%$

Wastewater treatment (WWT) venting = .18 *	0 lbs =	0 lbs/year
WWT partioned to the sludge = .05 *	0 lbs =	0 lbs/year
WWT adsorbti on or incineration = 69 *	0 lbs =	0 lbs/year
WWT effluent discharge = .08 *	0 lbs =	0 lbs/year
WWT discharged to POTW =		0 lbs/year

TOLUENE SUMMARY (POLY-PALE & METAL RESINATES & ZEON)

	<u>Poly-Pale</u>	<u>Met Res</u>	<u>Zeon</u>	<u>TOTAL</u>	
Point source	172,261	0	0	172,261	R(II / 5.2)
Discharge direct	0	0	0	0	R(II / 5.3.1)
WWT Ad/Inc	0	0	0	0	
Venting@WWT	4,660	0	0	4,660	
Fug(by diff)	156,714	0	0	156,714	
Total Fug (Fug + wwtVent)	161,375	0	0	161,375	R(II / 5.1)
Discharge to POTW	19,936	0	0	19,936	
Total(Pt,Dis,Inc,Vt,Fug)	353,976	0	0	353,976	
Total(less Inc)	353,976	0	0	353,976	
Quantity on-site impoundment	404	0	0	404	R(II/ 5.5.3)
Quantity Released	334,040	0	0	334,040	R(II / 8.1)
Treated on-site	0	0	0	0	R(II / 8.6)
Treated off-site	28,036	0	0	28,036	R(II / 8.7)

	<u>Ethyl Benz</u>	<u>Xylene</u>	
Point source	0	R(II / 5.2)	0
Discharge	0	R(II / 5.3.1)	0
WWT Ad/Inc	0		0
Venting@WWT	0		0
Fug(by diff)	0		0
Total(Fug + Vent)	0	R(II / 5.1)	0
Total(Pt,Dis,Inc,Vt,Fug)	0		0
Total(less Inc)	0	R(II / 8.1)	0
Recycled on-site	0	R(II / 8.4)	0
Treated on-site	0	R(II / 8.6)	0
Treated off-site	0	R(II / 6.2.1)	0

INPUT

CALENDAR YEAR 2,002
 POLY-PALE (LBS) 10,754,657
 MELHI (LBS) 706,745
 TOTAL PRODUCTION **CALC** 11,461,402
 WASTEWATER FLOW (GPM) 30
 TOLUENE SOLUBILITY (PPM) 570
 DISPOSAL (LBS) 0
 DISP SOLV FRACTION 0.00
 TOLUENE USAGE (LBS) 353,976
 NITROGEN (MCF) * 25,012
 STEAM (MCF)* 32,380
 % STEAM BLOWING LINES 10
 MELHI (% TOLUENE) 4.0
 PP HEAT TREAT (% TOLUENE) 1.5
 POLY-PALE (% TOLUENE) 0.2
 NITROGEN SWEEP EFFICIENCY 0.5
 COMMON VENT COND. TEMP (I) 75

*** OUTPUT ***

	TOLUENE(LBS)		P.V.F / LDAR ADJUSTED	
COST SHEET USAGE (LOSSES)	353,976		353,976	
TANK BREATHING AND WORKING	29,707		29,707	R5 2
NITROGEN VENTING/BLOWING	142,554		142,554	R5 2
WASTEWATER TREATMENT VENTING	4,660	e	4,660	
WWT PARTIONED TO SLUDGE	1,295	a	1,295	
WWT ADSORPTION/INCINERATION	0		0	
WWT DISCHARGE	0		0	
POLY-PALE	21,552	b	21,552	
MELHI	28,270	c	28,270	
P.V.F (LDAR/ADJUSTED BY DIFF)	80,122	d	106,002	
TOTAL CALCULATED	328,097		353,976	
FUGITIVE BY DIFFERENCE = a+b+c+d+e-f =	131,239		161,375	
DIFFERENCE(COST SHEET-CALC)	25,879		0	
WWT DISCHARGED TO POTW =	19,936		19,936	R6.1 A1 , R8 7
QUANTITY ON-SITE IMPOUNDMENT	404	f	404	R5 5 3
SOLVENT LOSSES =	30.9 LBS/ 1,000 LBS PRODUCTION (COST SHEET)			
SOLVENT LOSSES =	28.6 LBS/ 1,000 LBS PRODUCTION(CALCULATED)			
SOLVENT LOSSES =	2.1 % COST SHEET LOSSES/TOTAL USAGE			
SOLVENT LOSSES =	1.9 % CALCULATED USAGE/TOTAL USAGE			

SOLVENT RECYC 11,107,426 LBS/YEAR
 POINT SOURCE 172,261 LBS/YEAR

* NOTE: Must calculate each Antoine V P equation below
 Must calc Kc and C for thrupt and small tank dia.

LBS TOLUENE IN MELHI FROM T-108 =	4 %	*	706,745	=	28,270 LBS
LBS TOLUENE TO HEAT TREATMENT =	2 %	*	10,918,434	=	163,777 LBS
LBS TOLUENE IN POLY-PALE =	0 %	*	10,776,209	=	21,552 LBS

FOR PUMPS, VALVES, FLANGES, ASSUME

	NUMBER	FACTOR	RATE
PUMPS	17	0.1100	1.8700
VALVES	111	0.0160	1.7760
FLANGES	1,928	0.0018	3.4704
AGITATORS	8	0.1100	0.8800
MAGNITROLS	5	0.2300	1.1500
TOTAL =			9.15 LBS/HOUR

FUGITIVE EMISSIONS (P,V,F) = 8,760 * 9.15 = 80,122 LBS/YEAR

FOR THE SUMP

FOR SUMP ASSL 43,200 GALLONS/DAY WASTEWATER FLOWRATE

ASSUME 570 PPM TOLUENE SOLUBILITY
 LBS/DAY = 43,200 * 00000834 * 570 PPM = 205.4 LBS/DAY
 ASSUME (10% EXCESS) FOR SPILLS, UPSETS, FLOWS, ETC. = 225.9 LBS/DAY

ESTIMATE DAYS OPERATION = 11,461,402 % 100,000 LBS/DAY = 115 DAYS
 LBS/YEAR = 226 LBS/DAY * 115 DAYS = 25,891 LBS/YEAR

WASTEWATER TREATMENT SOLVENT DISTRIBUTION

BIOLOGICAL STUDIES @ 20 DAY RETENTION FOR UNACCUMULATED ARE

VOLATILIZED TO ATMOSPHERE = 72 %
 PARTIONED TO SLUDGE = 18 %

OUR HOLD-UP IS ONLY 1/4 TO 1/5 OF 20 DAY BIOLOGICAL, THEREFORE

EQUALIZATION VOLATILIZED = .72 * 1/4 = 18 %
 PARTIONED TO SLUDGE = .18 * 1/4 = 5 %
 AVAILABLE FOR TREATMENT = 100 - 23 = 77 %

FOR APPROXIMATELY 90 % TREATMENT,
 TREATED = .77 * 90 = 69 %
 DISCHARGED = .77 * .10 = 8 %

FOR NO CARBON ADSORPTION, TREATED GOES TO ZERO BELOW

WASTEWATER TREATMENT (WWT) VENTING	25,891 LBS/YR =	4,660 LBS/YEAR
WWT PARTIONED TO SLUDGE = 05 *	25,891 LBS/YR =	1,295 LBS/YEAR
WWT ADSORPTION OR INCINERATION = 69 *	25,891 LBS/YR =	0 LBS/YEAR
WWT DISCHARGED DIRECT = 08 *	25,891 LBS/YR =	0 LBS/YEAR
WWT DISCHARGED TO POTW =		19,936 LBS/YEAR

VOC EMISSIONS - FIXED ROOF TANKS (TOLUENE)

TOTAL LOSS	EQUAT1 BREATHING LOSS	EQUAT2 WORKING LOSS	MOL-WT Mv	EQUAT2 MULTIPLY	TVP	EQUAT 2 Kn	EQUAT2 ANNUAL THRUPUT	EQUAT2 TANK CAPACITY	EQUAT2 TURNOVER PER YR	EQUAT1 AVG VAPOR SPACE
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TANK NO	LBS/YR	LBS/YR	LBS/YR	FACTOR	GAL/YR	GAL/YR	N	HT (FT)		
T-3 FD SOLN	1,751	81	1,670	92.13 0 000024	1 025	0 250	2,947,218	2,055	1434	2.50
T-7 #1 SEP	398	0	398	92.13	0.440	0.250	1,637,343	52	31487	1.00
T-8 #1 POLYZ	399	1	398	92.13	0.440	0.250	1,637,343	130	12595	1.00
T-9 #2 SEP	0	0	0	92.13 OUT	0 000	1 000	0	52	0	1.00
T-10 #2 POLYZ	0	0	0	92.13 OUT	0 000	1 000	0	130	0	1.00
T-11 #3 SEP	398	0	398	92.13	0.440	0.250	1,637,343	52	31487	1.00
T-12 #3 POLYZ	399	1	398	92.13	0.440	0.250	1,637,343	130	12595	1.00
T-13 #5 SEP	398	0	398	92.13	0.440	0.250	1,637,343	52	31487	1.00
T-14 #5 POLYZ	399	1	398	92.13	0.440	0.250	1,637,343	130	12595	1.00
T-15 #6 SEP	398	0	398	92.13	0.440	0.250	1,637,343	52	31487	1.00
T-16 #6 POLYZ	399	1	398	92.13	0.440	0.250	1,637,343	130	12595	1.00
T-17 #4 SEP	398	0	398	92.13	0.440	0.250	1,637,343	52	31487	1.00
T-18 #4 POLYZ	399	1	398	92.13	0.440	0.250	1,637,343	130	12595	1.00
T-21 PZD SOLN	1,057	25	1,032	92.13	0.600	0.250	3,110,952	1,200	2592	2.50
T-22 PZD SEP	0	0	0	92.13 NO VENT	0 700	0 250	155,548	400	389	1.20
T-23 PZD SURGE	994	14	980	92.13	0.600	0.250	2,955,404	700	4222	2.40
T-24 HYZ SOLN	8,610	46	8,564	92.13	3.320	0.250	4,666,428	1,175	3971	4.00
T-25 WASH TK	4,606	44	4,563	92.13	1.420	0.250	5,812,568	4,170	1394	0.50
T-26 WASHD SOI	2,725	81	2,644	92.13	1.025	0.250	4,666,428	2,060	2265	2.50
T-27 EVAP FD	2,725	81	2,644	92.13	1.025	0.250	4,666,428	420	11111	2.00
T-30 1ST PP EV	2,649	5	2,644	92.13	1.025	0.250	1,719,210	420	4093	2.00
T-31 2ND PP EV	979	5	974	92.13	1.025	0.250	1,719,210	420	4093	2.00
T-36 PEXOIL/TOL	0	0	0	92.13 NO VENT	14 697	0 700	7,409	190	39	1.00
T-40 PEX/TOL ST	189,658	189,041	617	92.13	14 697	1 000	18,993	9,050	2	10.00
T-48 1ST MEL EV	89	6	83	92.13	1.025	0.250	147,361	505	292	3.00
T-71 MEL SOLN	235	51	184	92.13	1.025	0.550	147,361	2,700	55	4.00
T-80 40%ACD/TO	479	229	250	92.13 ATM VENT	1 025	1 000	110,521	20,000	6	10
T-81 40%ACD/TO	479	229	250	92.13 ATM VENT	1 025	1 000	110,521	20,000	6	10
T-83 DEC SEP	354	54	301	92.13	1.025	0.360	368,402	3,450	107	6.00
T-84 40% AC/TOL	705	204	501	92.13 ATM VENT	1 025	1 000	221,041	17,000	13	8.00
T-85 FR TOL STC	358	247	111	92.13 ATM VENT	1 025	1 000	49,120	13,600	4	6.00
T-86 REC TOL	223	52	171	92.13	1 025	0 660	114,614	2,700	42	4.50
T-88 PP HYDRO	5,498	122	5,376	92.13	6 600	0 250	1,473,609	1,400	1053	2.00
T-93 SLG DEC	272	55	217	92.13	1 025	0 260	368,402	1,700	217	3.00
T-99 H2O/TOL SE	962	81	881	92.13	1 025	0 250	1,555,476	2,065	753	2.50
T-101 MEL ACCU	141	16	125	92.13	1 025	0 750	73,680	1,050	70	3.00
T-105 TOL FD Mx	962	81	881	92.13	1 025	0 250	1,555,476	2,065	753	2.50
T-108 MEL BLND	29,132	28,007	1,125	92.13 ATM VENT	14 695	0 470	73,680	1,070	69	2.00
T-116 H2O/TOL S	2,517	105	2,412	92.13	1 025	0 250	4,257,092	3,500	1216	2.50
T-117 WASH FEE	8,683	119	8,564	92.13	3 320	0 250	4,666,428	2,400	1944	3.00
T-124 2ND MEL E	47	1	46	92.13	1 025	0 250	81,867	71	1153	1.00
T-131 PP HYDRO	5,498	122	5,376	92.13 NO VENT	6 600	0 250	1,473,609	1,400	1053	2.00
T-139 SUMP	5,491	412	5,079	92.13 ATM VENT	1 025	0 250	8,964,454	2,500	3586	4.30
T-201 RX #7	990	10	980	92.13	0 600	0 250	2,955,404	1,500	1970	1.00
T-202 RX #8	990	10	980	92.13	0 600	0 250	2,955,404	1,500	1970	1.00
T-203 RX #9	990	10	980	92.13	0 600	0 250	2,955,404	1,500	1970	1.00
TOTAL (LBS/YR)	284,840	219,648	65,192				86,445,373	128,668	672	

(ROSIN)

P-59 ROSIN STG	34	34	0	302	0	1	98,835	10,278	10	4.00
T-20 ROSIN FEE	58	58	0	302	0	0	1,174,961	17,167	68	4.50
T-33 ROSIN/DOW	1	1	0	604	0	0	1,244,076	730	1704	4.00
T-34 R SPG TANH	1	1	0	604	0	0	1,244,076	730	1704	4.00
T-106 MELHI STC	21	21	0	604	0	1	62,204	10,310	6	6.00
T-119 GUM STG	29	29	0	302	0	1	362,856	21,000	17	7.00
T-120 ROSIN STC	173	173	0	302	0	1	1,174,961	125,000	9	12.00
T-129 PP SURGE	0	0	0	604	0	0	1,105,846	240	4608	2.00
T-130 SCRAP RO	43	43	0	302	0	1	15,551	32,200	0	8.00
T-132 PP STG TK	232	232	0	604	0	1	1,105,846	82,000	13	10.00
T-133 GUM STG	41	41	0	302	0	1	362,856	31,200	12	10.00
TOTAL (LBS/YR)	634	634	0				7,952,067	330,855	24	

(OTHER)

T-77 98% H2SO4	5	5	0	98	0	1	22,808	10,170	2	6.00
T-78 98% H2SO4	7	7	0	98	0	1	22,808	12,750	2	6.00
T-96 25% NAOH	13	13	0	40	0	1	208,791	9,395	22	12.50
T-100 98% H2SO4	5	5	0	98	0	1	22,808	8,300	3	6.00
T-134 DOW CATC	0	0	0	166	0	0	1,382,307	75	18431	2.30
T-135 DOW FLAS	#NUM!	#NUM!	0	166	37	0	37,322,293	350	106635	4.70
T-136 DOW STOF	8	8	0	166	0	1	691	1,100	1	6.70
T-137 SER WATE	4	4	0	18	0	0	15,205,379	4,000	3801	1.00
T-138 DOW BLOW	#NUM!	#NUM!	0	166	37	1	0	1,100	0	2.50

T-3 FD SOLN	48.3	905		NOTE	FOR VOC CALCULATIONS, MUST MANUALLY INPUT Kc AND C FOR THE THRUPT TURNOVERS(Kc) AND SMALL TANK DIAMETER(C)					
T-7 #1 SEP	0.0	398								
T-8 #1 POLYZ	0.0	399								
T-9 #2 SEP	0.0	0	OUT							
T-10 #2 POLYZ	0.0	0	OUT							
T-11 #3 SEP	0.0	398								
T-12 #3 POLYZ	0.0	399								
				TURNOVER FACTOR	SMALL TANK DIAMETER FACTOR					
				TURNOVERS	Kc	DIA(FT)	C			
				<35	1	1FT	0.05			

T-13 #5 SEP	0 0	398	40	1	2FT	0.10
T-14 #5 POLYZ	0 0	399	45	1	3FT	0.15
T-15 #6 SEP	0 0	398	50	1	5FT	0.25
T-16 #6 POLYZ	0 0	399	60	1	7.5FT	0.40
T-17 #4 SEP	0 0	398	75	1	10FT	0.50
T-18 #4 POLYZ	0 0	399	100	0	12.5FT	0.65
T-21 PZD SOLN	8.5	967	150	0	15FT	0.75
T-22 PZD SEP	100 0	0	NO VENT	0	17.5FT	0.85
T-23 PZD SURGE	8.5	910	250	0	20FT	0.90
T-24 HYZ SOLN	86.7	1,145	300	0	25FT	0.95
T-25 WASH TK	65.8	1,575	400	0	30FT	1.00
T-26 WASHD SOI	48.3	1,409				
T-27 EVAP FD	48.3	1,409				
T-30 1ST PP EV	48.3	1,369				
T-31 2ND PP EV	48.3	506				
T-36 PEXOIL/TOL	100 0	0	NO VENT			
T-40 PEX/TOL ST	99.4	1,138				
T-48 1ST MEL EV	48.3	46				
T-71 MEL SOLN	48.3	121				
T-80 40%ACD/TOL		479	ATM VENT			
T-81 40%ACD/TOL		479	ATM VENT			
T-83 DEC SEP	48.3	183				
T-84 40% AC/TOL		705	ATM VENT			
T-85 FR TOL STG		358	ATM VENT			
T-86 REC TOL	48.3	115				
T-88 PP HYDRO	100 0	0				
T-93 SLG DEC	48.3	141				
T-99 H2O/TOL SE	48.3	498				
T-101 MEL ACCU	48.3	73				
T-105 TOL FD MX	48.3	498				
T-108 MEL BLND	100 0	0	ATM VENT *			
T-116 H2O/TOL S	48.3	1,301				
T-117 WASH FEE	86.7	1,155				
T-124 2ND MEL E	48.3	24				
T-131 PP HYDRO	100 0	0	NO VENT			
T-139 SUMP		5,491	ATM VENT			
T-201 RX #7	8.5	906				
T-202 RX #8	8.5	906				
T-203 RX #9	8.5	906				
TOTAL		29,707				

NOTE: *EMISSIONS IN T-108 ARE SHOWN IN FINISHED PRODUCT MELHI.

TOTAL TANKAGE CAPACITY = 128,668 GALLONS
TOTAL NITROGEN USAGE = 2,855 SCFH

FOR BREATHING DISPLACEMENT $\frac{P1 V1}{T1} = \frac{P2 V2}{T2}$

AVERAGE DAY TEMPERATURE (T1) = 76.3 DEG F
AVERAGE NIGHT TEMPERATURE (T2) = 52.9 DEG F

FOR NIGHT VOLUME (V2) = 128,668 GALLONS OR 17,202 CU FT
THE DAY VOLUME (V1) = 134,538 GALLONS OR 17,986 CU FT

BREATHING DISPLACEMENT = 785 FT3/DAY
= 286,447 FT3/YEAR OR 33 SCFH

FOR WORKING DISPLACEMENT = 86445373 GALLONS
= 11,556,868 FT3/YEAR OR 1319 SCFH

TOTAL DISPLACEMENT = 286,447 FT3/YR + 11,556,868 FT3/YR
= 11,843,316 FT3/YEAR
= 1,352 SCFH

NITROGEN VENT (MAX) = 2,855 SCFH - 1,352 SCFH = 1,503 SCFH
(SEE NOTE BELOW)

NOTE: FOR POLY-PALE, PRODUCTION IS CONTINUOUS/STEADY-STATE/LEVEL CONTROL

THEREFORE, BATCH VOLUMETRIC DISPLACEMENT IS MINIMAL, (EMPTY TANKS EACH RUN)

ASSUME, TANKAGE VOLUMETRIC DISPLACEMENT (12 TIMES A YEAR) IS ACTUAL DISPLACEMENT

TANKAGE VOLUME = 128,668 GALLONS = 17,202 CU FT
VOLUME DISPLACEMENT = 17,202 CU FT * 12 TIMES/YR * 8.760 HRS/YR = 24 SCFH
THEREFORE, MAXIMUM VENTILATION = 2,855 SCFH - 24 SCFH = 2,832 SCFH

FOR NITROGEN DISTRIBUTION BASED ON THROUGHPUT AND BREATHING VOLUME
CONDENSER EXIT TEMPERATURE = 75.0 DEG F = 23.9 DEG C
"cond. Exit temp. = cell C29"

NOTE: MUST MANUALLY ADJUST "COND. TEMP." FOR TANKS THAT VENT TO ATMOSPHERE

ANTOINE EMISSIONS = 97 SCFH AND 100.0 DEG F OR 37.8 DEG C

EQUAL = 7,990 LBS/YEAR

TABLE BELOW BREAKS DOWN THE TOTAL ANTOINE EMISSIONS INTO INDIVIDUAL TANKS
(IT HAS TO BE CALCULATED FOR EACH INDIVIDUAL TANK NITROGEN FLOW)

TANK NO.	ANNUAL THURPUT GAL/YR	TANK BREATHING GAL/YR	TOTAL GALS/YR	NITROGEN SCFH	TEMP DEG F	ANTOINE EMISSIONS LBS/YEAR
T-3 FD SOLN	2,947,218	701	2,947,919	97	100	7,990
T-7 #1 SEP	1,637,343	18	1,637,361	54	70	4,448
T-8 #1 POLYZ	1,637,343	44	1,637,388	54	70	4,448
T-9 #2 SEP	0	18	18	0	MTY	0 OUT
T-10 #2 POLYZ	0	44	44	0	MTY	0 OUT
T-11 #3 SEP	1,637,343	18	1,637,361	54	70	4,448
T-12 #3 POLYZ	1,637,343	44	1,637,388	54	70	4,448
T-13 #5 SEP	1,637,343	18	1,637,361	54	70	4,448
T-14 #5 POLYZ	1,637,343	44	1,637,388	54	70	4,448
T-15 #6 SEP	1,637,343	18	1,637,361	54	70	4,448
T-16 #6 POLYZ	1,637,343	44	1,637,388	54	70	4,448
T-17 #4 SEP	1,637,343	18	1,637,361	54	70	4,448
T-18 #4 POLYZ	1,637,343	44	1,637,388	54	70	4,448
T-21 PZD SOLN	3,110,952	410	3,111,361	102	80	8,402
T-22 PZD SEP	155,548	137	155,684	5	85	0 NO VENT
T-23 PZD SURGE	2,955,404	239	2,955,643	97	80	7,990
T-24 HYZ SOLN	4,666,428	401	4,666,829	153	150	12,603
T-25 WASH TK	5,812,568	1,423	5,813,991	190	115	15,650
T-26 WASHD SOL	4,666,428	703	4,667,131	153	100	12,603
T-27 EVAP FD	4,666,428	703	4,667,131	153	100	12,603
T-30 1ST PP EV	4,666,428	143	4,666,571	153	100	12,603
T-31 2ND PP EV	1,719,210	143	1,719,354	56	100	4,613
T-36 PEXOIL/TOL	7,409	65	7,474	0	222	0 NO VENT
T-40 PEX/TOL ST	18,993	3,088	22,082	1	222	82
T-48 1ST MEL EV	147,361	172	147,533	5	100	412
T-71 MEL SOLN	147,361	921	148,282	5	100	412
T-80 40%ACD/TO	110,521	6,825	117,346	4	100	680 ATM VENT
T-81 40%ACD/TO	110,521	6,825	117,346	4	100	680 ATM VENT
T-83 DEC SEP	368,402	1,177	369,580	12	100	988
T-84 40% AC/TOL	221,041	5,801	226,843	7	100	1,189 ATM VENT
T-85 FR TOL STG	49,120	4,641	53,761	2	100	340 ATM VENT
T-86 REC TOL	114,614	921	115,535	4	100	329
T-88 PP HYDRO	1,473,609	478	1,474,087	48	185	3,954
T-93 SLG DEC	368,402	580	368,982	12	100	988
T-99 H2O/TOL SE	1,555,476	705	1,556,181	51	100	4,201
T-101 MEL ACCU	73,680	358	74,039	2	100	165
T-105 TOL FD M ^x	1,555,476	705	1,556,181	51	100	4,201
T-108 MEL BLND	73,680	365	74,046	2	222	28,733 ATM VENT
T-116 H2O/TOL S	4,257,092	1,194	4,258,287	139	100	11,450
T-117 WASH FEE	4,666,428	819	4,667,247	153	150	12,603
T-124 2ND MEL E	81,867	24	81,891	3	100	247
T-131 PP HYDRO	1,473,609	478	1,474,087	48	185	0 NO VENT
T-139 SUMP	8,964,454	853	8,965,307	294	100	49,947 ATM VENT
T-201 RX #7	2,955,404	512	2,955,916	97	80	7,990
T-202 RX #8	2,955,404	512	2,955,916	97	80	7,990
T-203 RX #9	2,955,404	512	2,955,916	97	80	7,990
TOTAL (LBS/YR)	86,445,373	43,909	86,489,282	2832		285,108
	FOR		0.5 % NITROGEN SWEEP EFFICIENCY =			142,554

Antoine vapor pressure equation for:

$$\text{LOG}(P) = A - (B/(t+C))$$

A = 7
B = 1,345
C = 219 °C

TOLUENE

Nitrogen = 97 SCFH = 0.270 #moles/Hr

T1(Centigrade)
37.8

100.0 °F

T1(Centigrade)
23.9

75.0 °F

	Vap Press mm Hg	Par. Press mm Hg	Vapor Mol. Fr.	Vapor #moles/Hr	Vap Press mm Hg	Vapor Mol. Fr.	Vapor #moles/Hr	Vapor #/Hr	Liq. Cond #/Hr
Nitrogen		707	0.930	0.2702	733	0.965	0.2702	7.5698	
Toluene	53	53	0.070	0.0204	27	0.035	0.0099	0.9121	0.9691
Total		760.00	1.000	0.2906	760.00	1.000	0.2801	8.4819	0.9691

Toluene (% Recovered) = 51.51 %
Mol. Wt (Toluene) = 92.134
Mol. Wt (Nitrogen) = 28.016
Volume of 1 # mole of Nitrogen at Standard Conditions = 359 cuft

EMISSIONS (11178 * 8,760 HRS/YR) = 7,990 LBS/YEAR

ASSUME HYDROLYSIS TOTAL SOLIDS IS 40 % AVERAGE (60% TOLUENE)

THEREFORE, TOLUENE USAGE 17,192,103 LBS

PERCENT SOLVENT LOSSES = 2.06 % (BASED ON COST SHEET LOSSES AND TOTAL USAGE)
PERCENT SOLVENT LOSSES = 1.91 % (BASED ON CALCULATED LOSSES AND TOTAL USAGE)

FOR SOLVENT RECYCLE ASSUME SOLUTION IS 50 % TOTAL SOLIDS

THEREFORE SOLVENT IN SOLU 11,461,402 LBS

SOLVENT RECYC 11,461,402 LBS LESS THE "LOSSES" (353,976 LBS) = 11,107,426 LBS/YEAR RECYCLED

164 MG/L * 3.785 L/GAL * 4 CUYD/DAY * 365 DAY/YR * 202 GAL/YD * 1 LB/454 G * 1 G/1000 MG = 404 LBS/YR

TOLUENE SURFACE IMPOUNDMENT (ON-SITE) = 404 LBS/YR

ETHYLENE OXIDE

With 1999 LDAR update for NON-LEAKING factors

INPUT

CALANDER YEAR
E O USAGE IN POLYDAD
E O USAGE IN E.O.D.
TOTAL E O USAGE (CALC)
POLYRAD 0515
POLYRAD 0515A

INPUT

2,002
51,884 LBS
30,758 LBS
82,642 LBS
0 LBS
23,650 LBS

POLYRAD 1110	73,790 LBS
POLYRAD 1110A	17,200 LBS
SURFACTANT AR150	38,245 LBS
SURFACTANT AR160	0 LBS
# DAYS OPERATION (CAN USE NA)	28 DAYS (manual input required "F132")
SCRUBBER EFFICIENCY	98.0 % ASSUME

OUTPUT	*OUTPUT*	
E.O. "LOSSES"(USAGE-THEORY)	4,249 LBS	
FUGITIVE EMISSIONS	1,127 LBS	R(11/51)
POINT SOURCE EMISSIONS	62 LBS	R(11/52)
E.O. TO ETHYLENE GLYCOL	3,060 LBS	R(11/86)
ETHYLENE GLYCOL PRODUCED	4,312 LBS	
QUANTITY RELEASED	1,189 LBS	R(11/81)
FOR ETHYLENE GLYCOL:		
ETHYLENE GLYCOL DISCHARGED	0 LBS	R(11/531)
ETHYLENE GLYCOL TREATED ON-SITE	0 LBS	R(11/86)
ETHYLENE GLYCOL TO POTW	4,312 LBS	R(11/61A.1)
E.O. USAGE/ 1,000 LBS PRODUCT	541 LBS	
E.O. "LOSSES"/ 1,000 LBS PRODUCT	28 LBS	

FOR POLYRADS: ASSUME		
ROSIN AMINE MOL. WT		285
ROSIN AMINE PURITY		94 %
ADJUSTED MOL. WT.		303
POLYRAD 0515	$0 * .85 =$	0
POLYRAD 0515A	$23,650 * .7 * .85 =$	14,072
POLYRAD 0500 =		14,072
POLYRAD 1110	$73,790 * .90 =$	66,411
POLYRAD 1110A	$17,200 * .7 * .9 =$	10,836
POLYRAD 1100 =		77,247

FOR 0500::	1 MOLE AMINE + 5 MOLES E.O. = 0500	
	303 + 5(44)	=523
	E.O. = $5(44)/523 * \text{LBS OF } 0500 =$	5,919 LBS
FOR 1100::	1 MOLE AMINE + 11 MOLES E.O. = 1100	
	303 + 11(44)	=787
	E.O. = $11(44)/787 * \text{LBS } 1100 =$	47,506 LBS

FOR SURFACTANTS: ASSUME		
WOOD ROSIN MOL. WT.		302
WOOD ROSIN ACID NO		160
THEROETICAL ACID NO		186
WOOD ROSIN PURITY		86 %
ADJUSTED MOL. WT.		351

SURFACTANT AR150	$38,245 * 1.0 =$	38,245
SURFACTANT AR160	$0 * 1.0 =$	0

FOR AR150::	1 MOLE ROSIN + 15 MOLES E.O. = AR150	
	351 + 15(44)	=1011
	E.O. = $15(44) * \text{LBS OF AR150} =$	24,967 LBS

FOR AR160::	1 MOLE ROSIN + 16 MOLES E.O. = AR160	
	351 + 16(44)	= 1055
	E.O. = $16(44) * \text{LBS OF AR160} =$	0 LBS

THEROETICAL E.O.	78,393 LBS
E.O. "LOSSES"(USAGE-THEORY)	4,249 LBS
E.O. USAGE = LBS OF E.O. / (8.34 * 85)	11,658 GALLONS
DAYS OF OPERATION FROM LOG SHEETS =	28 DAYS
TOTAL E.O. ADDUCTS =	129,564 LBS
TYPICAL PRODUCTION = LBS % DAYS =	4,627 LBS/DAY
BASE YR 1993 TYP PROD = 5.470LBS/DAY	
DAYS OPERATION =	24 DAYS

FOR P,V,F			
Pumps/1q=	3	0.0260	0.08 LBS/HR
Valves/1q=	73	0.0038	0.28 LBS/HR

Valves/Vap=	21	*	0.0011	0.02	LBS/HR
Flg&con/liq=	231	*	0.0001	0.03	LBS/HR
Flg&con/Vap=	44	*	0.0001	0.01	LBS/HR
RELIEF =	16	*	0.0980	1.57	LBS/HR
				1.98	LBS/HR
ON A CONTINUEOUS BASIS =				17,365	LBS/YR
SINCE WE BLOW THE LINES WE ONLY HAVE E.O. IN THE P.V.F SERVICE THE ACTUAL DAYS OF OPERATION =				24	DAYS
THEREFORE P.V.F FUGITIVE EMISSIONS =				1,127	LBS/YR
THEREFORE E.O. TO SCRUBBER =				3,122	LBS/YR
ASSUME SCRUBBER EFFICIENCY =			98.0		
E.O. TO ETHLYENE GLYCOL =				3,060	LBS/YR
E.O. VENTED FROM SCRUBBER STACK =				62	LBS/YR

ETHYLENE GLYCOL PRODUCED
LBS E.O. * 62/44 = 4,312 LBS/YR

FOR 98 % REMOVAL :

TREATED =	0.98	*	0	LBS =	0	LBS
DISCHARGE=	0	-	0	=	0	LBS
DISCHARGE TO POTW			4,312	LBS		

calander year	lbs NH3 usage	lbs 731-D feed	lbs NH3 / M lbs feed	lbs EO usage	lbs product	lbs E.O. / M lbs Prod
87	195,829	1,403,869	139	1,442,191	1,999,020	721
88	231,231	1,999,100	116	1,508,355	2,119,510	712
89	127,840	1,254,044	102	490,301	824,720	595
90	122,926	1,465,446	84	275,339	435,640	632
91	154,160	1,614,772	95	244,077	502,906	485
92	128,821	1,611,607	80	270,067	437,822	617
93	98,645	1,194,184	83	246,553	431,490	571
94	195,096	2,198,972	89	257,031	465,003	553
95	137,304	1,166,265	118	233,440	364,498	640
			#DIV/0!			#DIV/0!
			#DIV/0!			#DIV/0!
			#DIV/0!			#DIV/0!
			#DIV/0!			#DIV/0!
JAN-YTD	15,470	120,822	128	46,820	11,882	3940
FEB-YTD	35,982	198,483	181	65,161	135,082	482
MAR-YTD	35,982	258,169	139	69,076	135,082	511
APR-YTD	60,930	303,856	201	55,699	198,532	281
MAY-YTD	82,436	467,130	176	99,656	228,062	437
JUN-YTD	94,657	575,616	164	119,995	277,902	432
JUL-YTD	110,156	699,975	157	120,145	287,272	418
AUG-YTD	110,156	699,975	157	135,619	329,552	412
SEP-YTD	121,250	928,428	131	158,995	359,192	443
OCT-YTD			#DIV/0!			#DIV/0!
NOV-YTD			#DIV/0!			#DIV/0!
DECYTD			#DIV/0!			#DIV/0!

EPICHLOROHYDRIN

(1999 LDAR UPDATE WITH NON-LEAKING FACTORS)

INPUT

CALANDER YEAR
KYMENE 557H
KYMENE 557LX
KYMENE 736
KYMENE 1022
KYMENE MXC
KYMENE 621
KYMENE 625LX

INPUT

2002
46,648,810 LBS
24,100,813 LBS
1,868,409 LBS
344,421 LBS
101,480
351,410
47,340

TOTAL KYMENE **CALC**	73,462,683	LBS
EPI IN 557H	2,121,156	LBS
EPI IN 557LX	760,599	LBS
EPI IN 736	468,099	LBS
EPI IN 1022	47,718	LBS
EPI IN MCX	4,330	
EPI IN 621	25,645	
EPI IN 625LX	6,368	
TOTAL EPI **CALC**	3,433,915	LBS
NITROGEN USAGE	1,688	MCF
NITROGEN SWEEP EFFICIENCY	0.2	
2001 PRODUCTION	62,497,806	
PRODUCTION/ACTIVITY INDEX	1.18	
SCRUBBER EFFICIENCY	98.0	% ASSUME

OUTPUT

FIGITIVE EMISSIONS	2,998 LBS/YEAR	R(II / 5 1)
POINT SOURCE EMISSIONS	828 LBS/YEAR	R(II / 5 2)
TO WWT	8,669 LBS/YEAR	
WWT VENTING	0 LBS/YEAR	
WWT TO SLUDGE	173 LBS/YEAR	
WWT BIOLOGICAL	1,127 LBS/YEAR	R(II / 8 6)
WWT ADSORB / INCIN	0 LBS/YEAR	
WWT EFF. DISCHARGE	0 LBS/YEAR	R(II / 5 3 1)
QUANTITY RELEASED	4,000 LBS/YEAR	R(II / 8 1)
QUANTITY TREAT ON-SITE	1,127 LBS/YEAR	R(II / 8 6)
QUANTITY ON-SITE IMPOUND	173 LBS/YEAR	R(II/ 5 5 3)
WWT DISCHARGE TO POTW	7,369 LBS/YEAR	R(II/8 7)

WITH COMPLETION OF KYMENE PROJECT, EQUIPMENT UPDATE "DOUBLED"	SOCMI FACTORS (LBS/HR)					
	OLD(1987)	UPDATE1992	LDAR(1995)	LDAR(1999)	AVERAGE	NON-LEAKING
NUMBER PUMPS (+1 AGIT)	1	2	2	4	0.11	0.02600
NUMBER VALVES (LIQ)	13	26	34	49	0.016	0.00380
NUMBER VALVES (VAP)						0.00110
NUMBER FLANGES (+CONN)	56	112	222	333	0.0018	0.00013
LBS/HR =	0	1	1	0		
LBS/YEAR =	3,669	7,337	10,193	2,998		

FOR EPI, ASSUME WORST CASE FOR ALL EPI EXCEPT 557LX
 SINCE THE EPI "DROPS IN"
 ASSUME ALL VAPOR SPACE DISPLACEMENT IS EPI

DISPLACEMENT =	EPI* 1GAL/8 34*1.2 * 1FT/7.48GAL =	35,711 FT3
EPI TO SCRUBBER =	EPI* 1MOLE/379FT3 * 92.5LBS/MOLE =	8,716 LBS

FOR 557LX WHICH IS PUMPED IN UNDERNEATH THE LIQUID
 EPI VAPOR PRESSURE = 40 mm Hg
 EPI MOLE FRACTION IN VAPOR VP/760 = 0.0526

LX DISPLACEMENT=	EPI* 1GAL/8 34*1.2 * 1FT/7.48/GAL =	10,160 FT3
EPI TO SCRUBBER =	EPI* 1MOLE/379FT3 * 92.5LBS/MOLE =	131 LBS

TOTAL EPI(FROM RX) TO SCRUBBER = 8,846 LBS

ASSUME 98.0 PERCENT SCRUBBER EFFICIENCY
 EPI IN SCRUBBER WATER TO WWT = 8,669 LBS
 EPI FROM SCRUBBER VENT = 177 LBS

BREATHING LOSSES FROM K-110, 11.5FT DIA. 22FT HT
 BREATHING LOSSES (K-110) = 94 LBS/YR
 BREATHING LOSSES (K-111) = 2 LBS/YR
 BREATHING LOSSES TOTAL = 96

ASSUME NUMBER OF BATCHES IS (LBS PRODUCTION / 107,000 LBS/BATCH)

NUMBER BATCHES = 73,462,683 DIVIDED BY 107,000 = 687 BATCHES

FOR 30 SCFM NITROGEN PURGE FOR 30 MINUTES PER BATCH (30*30=900CFM/BATCH)
 TOTAL NITROGEN PURGE = 687 * 900 = 617,910 CF

NITROGEN LEFT FOR BLANKET OF EPICHLOROHYDRIN AND DETA & HMDA = 1,070,090 CF

ASSUME NITROGEN SPLIT BETWEEN THE TWO SERVICES

THEREFORE NITROGEN IN EPI SERVICE = 535,045 = 61 SCFM

Antoine vapor pressure equation for:

EPICHLOROHYDRIN

LOG(P)= A-(B/(t+C))

A =
B =
C = 22 oC

NOTE: V.P. for EPI @ 22 oC = 15 mmHg

Nitrogen = 61					SCFH = 0.170 #moles/Hr				
T1(Centigrade) 22 72 oF					T1(Centigrade) 22 72 oF				
Vap Press. mm Hg	Par Press. mm Hg	Vapor Mol. Fr	Vapor #moles/Hr		Vap Press. mm Hg	Vapor Mol. Fr.	Vapor #moles/Hr	Vapor #/Hr	Liq Cond #/Hr
Nitrogen		0.980	0.1701		745	0.980	0.1701	4.7665	
EPI	15	0.020	0.0034		15	0.020	0.0034	0.3170	0.0000
Total		1.000	0.1736		760.00	1.000	0.1736	5.0834	0.0000

Epichlorohydrin (% Recovered) = 0.00 %
Mol. Wt (Epichlorohydrin) = 92.53
Mol. Wt. (Nitrogen) = 28.016

Volume of 1 # mole of Nitrogen at Standard Conditions = 359 cuft

EMISSIONS (119 * 8.760 HRS/YR) = 2777 LBS/YEAR
FOR A NITROGEN SWEEP EFFICIENCY OF 0.2
EMISSIONS = 2.777 * 0.2 = 555 LBS/YEAR

FUGITIVE EMISSIONS = 2,998 LBS/YR (FROM LDAR P,V,F "F1236")
PT SOURCE = 828 LBS/YR ("D1257" + "D1262" + "H1341")
TO WWT = 8,669 LBS/YR ("E1256")

TOTAL = 12,496 LBS/YEAR

FOR WATERTREATMENT :

BIOLOGICAL STUDIES @ 20 DAY RETENTION FOR UNACCUMULATED ARE :
VOLATILIZED TO ATMOSPHERE = 0 %
PARTIONED TO THE SLUDGE = 6 %
BIOLOGICAL DEGRADED = 53 %

OUR HOLD-UP IS ONLY 1/4 TO 1/5 OF 20 DAY BIOLOGICAL, THEREFORE

VOLATILIZED TO THE AIR = 0 * 1/4 = 0 %
PARTIONED TO THE SLUDGE = 6 * 1/4 = 2 %
BIOLOGICAL DEGRADED = 53 * 1/4 = 13 %
THEREFORE AVAILABLE OF TREATMENT = 100 - 0 - 2 - 13 = 85 %

FOR APPROXIMATELY 90 % TREATMENT
TREATMENT = 85 * .90 = 77 %
DISCHARGED = 85 * .10 = 8 %

WASTEWATER TREATMENT (WWT) VENTING = 0 * 8669 LBS/YR = 0 LBS/YEAR
WWT PARTIONED TO THE SLUDGE = 02 * 8669 LBS/YR = 173 LBS/YEAR
WWT BIOLOGICAL TREATMENT = .13 * 8669 LBS/YR = 1127 LBS/YEAR
WWT ADSORPTION OR INCINERATION = 77 * 8669 LBS/YR = 0 LBS/YEAR
WWT EFFLUENT DISCHARGE = 08 * 8669 LBS/YR = 0 LBS/YEAR

WWT DISCHARGED TO POTW = 7,369 LBS/YEAR

AMMONIA

(WITHOUT LDAR COMPONENT UPDATE)

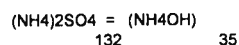
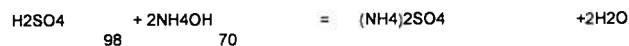
INPUT

INPUT

CALANDER YEAR	2002	pH	Normality
AMMONIA USAGE	107,972 LBS	9.00	0.00010
NITRILE PRODUCTION	429,814 LBS OF 731-D FEED	9.50	0.00050
WASTEWATER FLOW AVERAGE	95,268 GPD	10.00	0.00100
AVERAGE WASTEWATER pH	10.0	10.50	0.00500
pH NORMALITY	0.00100	11.00	0.01000
IB SLUDGE GENERATION RATE	4 CU YD/DAY	11.50	0.05000
		12.00	0.10000

			12 50	0 50000
OUTPUT	*OUTPUT*		13	1 00000
NH3 "LOSSES"(USAGE-THEORY)	89,761 LBS			
FUGITIVE EMISSIONS	2,667 LBS			R(II / 5 1)
POINT SOURCE EMISSIONS	885 LBS			R(II / 5 2)
NH3 TO (NH4)2SO4 @ 90% & 10% POTW	86,209 LBS			
AMMONIUM SULFATE PRODUCED	301,224 LBS	<?> 25,000LBS		
AMMONIA RECYCLE	462,727 LBS			R(II / 8 4)
NH3 "LOSSES"/ 1,000 LBS FEED	208.8 LBS/1,000 LBS FEED			
QUANTITY RELEASED	12,616 LBS			R(II / 8 1)
QUANTITY TO POTW	8,621 LBS			R(6 1A.1.)(R8.7)
QUANTITY ON-SITE IMPOUNDMENT	443 LBS			(RII/ 5 5 3)
731-D MOLECULAR WEIGHT	302			
731-D THEROETICAL ACID NUMBER	186			
731-D TYPICAL ACID NUMBER	150			
731-D % PURITY (A.N)	80.65			
AMMONIATION FINAL A N	10			
% CONVERSION (A.N. DROP)	93.33			
ADJUSTED MOL WT	401.23			
THEROETICAL AMMONIA	18,211			
AMMONIA LOSSES	89,761			
NH3 % EXCESS	492.89 %			
AVERAGE FUGITIVE EMISSION FACTORS, EPA-450/3-86-002				
NUMBER PUMPS	3.00	0.11	0.33	
NUMBER VALVES	68.00	0.01	0.82	
NUMBER FLANGES	145.00	0.00	0.26	
RELIEF	4.00	0.23	0.92	
		TOTAL =	2.33 LBS/HR	
		=	20,385 LBS/YEAR	
FUGITIVE EMISSIONS (P, V, F) =	2,667 LBS/YEAR			
WASTEWATER FLOW	95,268 GPD			
ASSUME pH OF	10.0	0.00100 N	=	0.01700 g/l
NH3 IN WASTEWATER	86,209 LBS			
AVG NH3 LOSS IN WASTEWATER =	1,805 LBS/DAY			
AMMONIUM SULFATE PRODUCED	301,224 LBS			
NH3 LIQ 300FT/2"LINE	245 LBS			
NH3 VAP 300FT/1"LINE	1 LBS			
LOSSES/TRUCK UNLOADING	246 LBS/TRUCK			
TOTAL BLEED DOWN	885 LBS			
AMMONIA FRESH USAGE	25 SCFM			
AMMONIA RECYCLE USAGE	150 SCFM			
TOTAL USE	175 SCFM			
DAILY USE	11,303 LBS/DAY			
TYPICAL 731-D FEED RATE	15,000 LBS/DAY			
DAYS OPERATION(FEED)	28.65			
DAYS OPERATION(NH3)	66.87			
AVERAGE DAYS OPERATION	47.76 DAYS			
LBS RECYCLE	462,727 LBS			

FOR
AQ AMMONIA AT DRESINOL



ASSUME 1 TOTE/YEAR OF 40% ACID USED IN EDUCATOR SCRUBBER

200GAL/TOTE * 1 TOTE/YR * 8.34LB/GAL * 1 4 SP GR * 40(%) * 70/98 = 6 672 LB/YR OF (NH4OH)

FROM FORM R, 10% OF (NH4OH) IS "REPORTABLE" = 10 * 6,672 = 667 LBS/YR

THEREFORE AMMONIA IS $17/35 * 667 = 324$ LB/YR AS AMMONIA PER TOTE OF 40% ACID

NUMBER OF TOTES = 0
AMMONIA TO POTW = 0 LBS/YR (R6.1.A.1.)

FOR
AMMONIUM SULFATE FORMED AT RAD

$86,209 \text{ LBS} * 10(\%) = 8,621 \text{ LBS/YR}$
AMMONIA TO POTW = 8,621 LBS/YR (R6.1.A.1.)

FOR
AMMONIA IN SLUDGE (BASIS = 4 CU YDS PER DAY OF SLUDGE GENERATION)

$180 \text{ MG/L} * 3.785 \text{ L/GAL} * 4 \text{ CUYD/DAY} * 365 \text{ DAY/YR} * 202 \text{ GAL/YD} * 1 \text{ LB/454G} * 1 \text{ G/1000MG} = 443 \text{ LBS/YR}$
AMMONIA SURFACE IMPOUNDMENT (ON-SITE) = 443 LBS/YR

SO2 (Sulfur Dioxide) FUGITIVES @ POLY-PALE

INPUT

CALANDER YEAR	2002
POLY-PALE PRODUCTION	10,754,657 LBS
MELHI PRODUCTION	706,745 LBS
TOTAL PRODUCTION**CALC**	11,461,402 LBS
98% SULFURIC ACID	1,441,747 LBS
HISTORICAL NEUTRALIZATION	0.84 FACTOR
PPM SULFUR IN PPRODUCT	500 PPM
OTHER ALKALINE WASTEWATER	150,000 GPD
AVERAGE pH	~10.5 pH (>10 & <11)
AVERAGE NORMALITY	0.0050 eq/l (for ~ 10.5 pH)
TYPICAL PRODUCTION RATE	120,000 LBS/DAY
DAYS OPERATION**CALC**	96 DAYS
100% CAUSTIC	544,713 LBS
T/T WEAK ACID SOLD	0 NUMBER
AVERAGE T/T WEIGHT	42,000 LBS
AVERAGE % ACID STRENGTH	0.40 FRACTION

OUTPUT

	HISTORICAL	ACID BALANCE
FUGITIVE SO2 =	63,027 LBS 27 LBS/HR 32 TONS/YEAR	313,211 LBS 136.64 LBS/HR 156.61 TONS/YEAR
AT CAPACITY =	346,443 LBS 40 LBS/HR 173 TONS/YEAR	1,721,630 LBS 196.53 LBS/HR 860.82 TONS/YEAR
RECYCLED OFF-SITE =	0 LBS/YEAR	
RECYCLED ON-SITE =	1,345,236 LBS/YEAR	

HISTORICAL DATA, ALONG WITH 1990 STUDY, SHOWS 84% OF ACID IS NEUTRALIZED

THEREFORE, 16% IS CONSUMED BY OTHER PLANT ALKALI SOURCES :

(HERCLOR & RAD WASTEWATERS, PRODUCT, SO2 GENERATION...SO2, SO3, H2SO4 MIST, ETC)

ACID (100%) BASIS =	1,412,912 LBS			
NEUTRALIZED =	0.84	*	1,412,912	= 1,186,846 LBS
THEREFORE REMAINDER =	1,412,912	-	1,186,846	= 226,066 LBS

"EXAMPLE"
 ASSUME WW's FOR HERCLOR, RAD, ECT, ARE :

10 pH
 0.001 eq/l
 150,000 gpd

THEREFORE, LBS NAOH EQUIVALENTS ARE

("example")
 $(0.040g / 2.2 lbs * 150,000gpd * 8.34 * 365days/yr) / 454g/lb = 18,287 lbs NaOH Eq.$

"ACTUAL"
 LBS NaOH EQ. (CALC)= 91,433 LBS NAOH EQ

THEREFORE, H2SO4 NEUTRALIZED = 98/80 * 91,433 LBS EQ = 112,005 LBS

ASSUME: 500 PPM SULFUR IN POLY-PALE AND MELHI @ 11,461,402 LBS PRODUCT

THEREFORE H2SO4= 98lb/32lb * 500 /1,000,000 * 11,461,402 = 17,550 LBS H2SO4

NUMBER OF TANK TRUCKS OF WEAK ACID SOLD = 0 TRUCKS

AVERAGE TANK TRUCK WEIGHT = 42,000 LBS

AVERAGE ACID CONCENTRATION = 0.40 % (FRACTION)

ACID = 0 * 42,000 * 0.40 = 0 LBS SOLD

THERE IS NO DATA FOR BREAKDOWN OF SO2 SO3, H2SO4 MIST, ETC..
 THEREFORE: ASSUME "ALL" GOES TO "SO2"

THEREFORE: SO2 = 64/98 * 96,511 = 63,027 LBS SO2
 27.50 LBS/HR
 31.51 TONS/YEAR

AT CAPACITY, SO2 = 346,443 LBS SO2
 39.55 LBS/HR
 173.22 TONS/YEAR

AMOUNT RECYCLED OFF-SITE = NUMBER OF TRUCKS SOLD TO G.P. = 0 LBS/YEAR

AMOUNT RECYCLED ON-SITE = USAGE - AMT SOLD - AMT TO SO2 = 1,345,236 LBS/YEAR

ACID / BASE BALANCE

POLY-PALE ACID (100% BASIS) = + 1,412,912 LBS

ACID NEUTRALIZED WITH CAUSTIC = - 667,273 LBS

ACID NEUTRALIZED WITH OTHER eq = - 248,484 LBS

ACID IN MELHI AND POLY-PALE = - 17,550 LBS

ACID SOLD = - 0 LBS

H2SO4 REACTING WITH NH3 LOSSES OF 86,209 LBS

REMAINING ACIDITY = 479,604 LBS

THEREFORE: SO2 = 64/98 * 479,604 = 313,211 LBS SO2
 136.64 LBS/HR
 156.61 TONS/YEAR

AT CAPACITY, SO2 = 1,721,630 LBS SO2
 196.53 LBS/HR
 860.82 TONS/YEAR

BIPHENYL ----- 2001

AREA	DOWTHERM(LBS)	NAT GAS(M CF)
AMINE	2,037	4,940
POLYRAD	0	0
DYMEREX	23,817	2,891
KETTLE	16,607	13,484
POLY-PALE	4,663	12,535
P-CYMENE	0	0

TOTAL 47,124 LBS 33,850 MCF

DOWTHERM IS 27 PERCENT BIPHENYL
BIPHENYL LOSS = 27 * TOTAL = 12,723 LBS (LESS THAN 10,000 LBS ?)
NO REPORT REQUIRED

NEW PP BOILER DESIGN = 2.0 MM BTU/HR VAPOR OUTPUT = 627
3.19 MM BTU/HR BURNER OUTPUT

OLDER BOILERS NOT AS EFFICIENT, USE AVERAGE PERCENT EFF. = 6

THEREFORE VAPOR OUTPUT = 6 * TOTAL (MCF) = 20,310 (MCF EQUIV.)

ASSUME 1.0 MM BTU/MCF
DOWTHERM ENTHALAPHY @ 620F = 381.5 BTU/LB
DOWTHERM RECYCLE = 1 MM BTU/MCF * 1 MCF / 381.5 BTU * NO MCF EQUIV.
= 53,237,221 LBS

BIPHENYL RECYCLE = 27 * DOWTHERM RECYCLE = 14,374,050 LBS

LEAD

LEAD BARS 1/4" 70 LBS
LEAD BARS 3/8" 44 LBS
TOTAL BURNING BARS 114 LBS > 100 REPORT I
SANDBLASTING SAND 1,000 LBS
SAND TCLP LEAD 1,142 PPM
TYVEX SUITS 295 LBS
TYVEX TCLP LEAD 344 PPM
LEAD EMISSION FACTOR 1.5 LB / TON
LEAD SHEETS 4,960 LBS
FUGITIVE EMISSIONS = 0.09 LBS/YEAR (R5 1, R8 1)
RELEASED ONSITE = 0.20 LBS/YEAR (R5 5.4 R8 1)
TRANSFER OFFSITE = 1.24 LBS/YEAR (R6 2 R8 1)
RECYCLED OFFSITE = 0.00 LBS/YEAR (R8 5)
ACTIVITY INDEX = 1.21

LEAD FUGITIVE EMISSIONS = 1.5 LBS/TON * 0.057 TONS = 0.09 LBS/YEAR

LEAD TYVEX SUITS = 344 PPM * 295 LBS = 0.10 LBS/YEAR

LEAD IN SANDBLAST = 1,142 PPM * 1,000 LBS = 1.14 LBS/YEAR

ASSUME: 1/16" THICKNESS SAW BLADE
1/8" THICKNESS FOR ALL CUTTINGS, SHEET, PIPE, GASKETS, ETC
1 LINEAR FOOT OF CUTTING FOR EVERY 10 LBS OF LEAD USED, COMPENSATES FOR THICKER PIPE/GASKETS/ETC.
(1/16 * 1/12) * (1/8 * 1/12) * 1 FT * 62.4 * 11.95 = 0.04 LB LEAD / LINEAR FT OF CUTTING

LEAD CUTTINGS, ON FLOOR = 4,960 LBS * 0.04 LB/10 LBS = 20.1 LBS/YEAR

ASSUME: VACUUM UP 99 PERCENT OF CUTTINGS
CUTTINGS LOST = 0.20 LBS/YEAR

LEAD RECYCLED = 0 LBS SOLD TO SHERPER

ACTIVITY INDEX = SAME AS POLY-PALE = 1.21