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INTRODUCTION

The Hercules Incorporated, Hattiesburg Mississippi Plant, is located at 613 West 7th Street. The previous Title V Operating Permit Renewal Application was submitted in April, 2003. Since then, two modifications and several 502(b)10 notifications have been submitted, mainly due to the downsizing of existing facilities. One modification requested a change to reduce and limit hazardous air pollutants (HAPs) below the Title V major source threshold limits of 25 tons per year for total HAPs and 10 tons per year for any individual HAP.

Only two manufacturing processes remain. The plant manufactures specialty Paper Chemicals in both the Kymene process area (emission point AA-000) and the Paracol/AKD process area (emission point AB-000). Process operations generate emissions of particulate matter (PM), volatile organic compounds (VOC), and HAPs.

The fuel burning equipment (emission point AM-003), is a natural gas fired boiler, and generates (PM), (VOC), sulfur dioxide (SO_2), nitrogen oxides (NOx), and carbon monoxide (CO).

The plants Effluent Treatment area, which discharges to the City POTW, consists of wastewater equalization, solids removal, and pH adjustment. Emissions from the area include possible fugitive VOC and may include HAP losses from the plants wastewater.

APPENDICES

APPENDIX A
TITLE V OPERATING PERMIT RENEWAL 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**

_____ **SIGNIFICANT MODIFICATION**

__X__ **RENEWAL OF OPERATING PERMIT**

NAME: HERCULES, INC.

CITY: HATTIESBURG, MISSISSIPPI

COUNTY: FORREST

FACILITY No. (if known): 0800-00001

APPLICATION FOR TITLE V PERMIT TO OPERATE AIR EMISSIONS EQUIPMENT

CONTENTS

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. H_2O_2 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
PM_{10}
Sulfur dioxide
Nitrogen oxides
Carbon monoxide
Volatile organic compounds(see note 1)
Lead
Dioxin/Furan
Fluorides
Hydrogen chloride
Hydrogen sulfide
Sulfuric acid mist
Total reduced sulfur
Reduced sulfur compounds
Arsenic
Asbestos
Beryllium
Benzene
Mercury
Radionuclides
Vinyl chloride
Carbon tetrachloride
Chlorofluorocarbon-11
Chlorofluorocarbon-12
Chlorofluorocarbon-13
Chlorofluorocarbon-111
Chlorofluorocarbon-112
Chlorofluorocarbon-113
Chlorofluorocarbon-114
Chlorofluorocarbon-115
Chlorofluorocarbon-211
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Hydrochlorofluorocarbon-261
Hydrochlorofluorocarbon-262
Hydrochlorofluorocarbon-271
Halon-1211
Halon-1301
Halon-2402
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

CAS No.	CHEMICAL NAME
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-ethhylhexyl)phthalate(DEHP) (Dioctyl 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

CAS No.	CHEMICAL NAME
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-chloroehtyl)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

CAS No.	CHEMICAL NAME
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 ehtyl 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 diisocynate (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

CAS No.	CHEMICAL NAME
7803512	Phosphine
7723140	Phosphorus
85449	Phthalic anhydride
1336363	Polychlorinated biphenyls (Arochlors)
---	Polycylic 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, dietheylene glycol and triethylene glycol R-(OCH_2CH_2)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-(OCH_2CH_2)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 then 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: **Rodney S. Bolton**
      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: **Rodney S Bolton**
      2. Title: **Plant Manager**

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

4. Number of Employees: **22**

5. Principal Product(s): **Paper Chemicals**

6. Principal Raw Materials: **Paper Chemicals**

7. Principal Process(es): **Chemicals Manufacturing**

8. Maximum amount of principal product produced or raw material consumed per day: **14.31 tons per hour**

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.

Rodney S. Bolrton
Printed Name of Responsible Official

Plant Manager
Title

10/21/08
Date Application Signed

RS Bolton
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}		**105.14**
SO_2		**0.06**
NO_X		**10.45**
CO		**8.78**
VOC		**11.67**
Total HAPs		**9.9**
Epichlorohydrin		**9.9**

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.

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.

RS Bolton

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 1	Section L1 1	Section M1
Section C 1	Section L2	Section M2
Section D 1	Section L3	Section M3
Section E 3	Section L4	Section M4
Section F	Section L5 1	Section M5
Section G	Section L6	Section M6
Section H	Section L7	Section M7 5
Section I		Section M8
Section J		Section N 1
Section K		Section O 2

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. General Maintenance Area; painting, welding,, sandblasting, etc, 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. Storage Vessels per Section VII.B.7 (see attached list).
6. Back-up or Emergency Generators and Pumps (Fire Protection System) per Section VII.B.9.
7. Sandblasting Equipment per Section VII.B.10.
8. Effluent Treatment per Section VII.B.19 and B32.
9. Steam Vents and Leaks per Section VII.B.25.
10. Instrument Air System per Section VII.B.27.
11. Plant Nitrogen per Section VII.D.
12. Compressed Gas Cylinders per Section VII.D.

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-120	Hexamethylene diamine (HMDA)	Steel	6,000	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	2004	No
K-161	Kymene Wet Strength Resin	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		20,000		
K-502TT*	Material Loading/Unloading		6,000		

* TC – Railroad Tank Car TT – Tank Truck

** FRP= Fiberglass Reinforced Plastic

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-19	Caustic/Empty	Steel	317	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 Floc	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-65	Propylene Glycol/Water	Steel	1400	2003	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	H2SO4/Empty	Steel	300	Pre-1977	No
DP-101TC*	Material Loading/Unloading	Steel	20,000	Pre-1977	No
DP-102TT*	Material Loading/Unloading	Steel	6,000	Pre-1977	No
PS-45	Dispersions/Empty	Steel	51790	Pre-1977	No

* TC – Railroad Tank Car TT – Tank Truck FRP= Fiberglass Reinforced Plastic

EFFLUENT TREATMENT AREA					
Emission Point No.	Material/Product Stored	Tank Material	Capacity (gallons)	Construction Date	NSPS - Subpart Kb
ET-10	Wastewater	Steel	5,111,100	1982	No
ET-18	Out of Service	Steel	17,100	1981	No
ET-19	Out of Service	Steel	9,300	1985	No

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

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
VN-3	Pamak TP	Steel	21,149	Pre-1977	No

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**
B. Inside diameter: **0.5 ft**
C. Exit gas velocity: **Variable**
D. Exit gas temperature: **Ambient**

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

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

8. UTM Coordinates:
A. Zone **16** B. North **3469.40** C. East **280.60**

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**			**8.4**
	Epichlorohydrin					**0.41**			**8.4**
AA-002	**PM/PM_{10}**	**Yes**	**99%**		**0.212**	**0.93**		**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
X	Packed Tower	____	Gravity Tower
____	Cyclonic	____	Condenser
X	Mist Eliminator	____	Impingement Plate
____	Other:		

b) Liquid injection rate:

1) Design maximum: **15** gpm @ **15** psia
2) Expected average: **15** gpm @ **10** pisa

c) Pressure drop: **6** inches H_2O

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: **512** acfm
2) Inlet Temperature: **100** °F

f) Venturi Data: **NA**

1) Inlet Area: ____ ft^2
2) Throat Area: ____ ft^2
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: **X** 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
   X 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** ft^2
   b) Air to cloth ratio: **Unknown** $acfm/ft^2$
   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 H_2O
   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	Monthly	Quarterly	Yearly
		X	X	X

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-001**

2. Pollutant: **HAPs (Epichlorohydrin)**

3. Material or parameter being monitored or recorded: **Epichlorohydrin**

4. Method of monitoring and recordkeeping: **The total Epichlorohydrin emitted will be calculated on a monthly basis and a 12-month emissions total. The calculations will be based on Kymene production and industry knowledge.**

5. List any EPA methods used: **NA**

6. Compliance shall be demonstrated:

_____ Daily _____ Weekly **X** 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**
B. Inside diameter: **0.83 ft**
C. Exit gas velocity: **50.9 ft/s**
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%**		**0.66**	**2.87**		**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
- ____ Packed Tower
- ____ Cyclonic
- ____ Mist Eliminator
- ____ Other:
- ____ Orifice
- **X** Gravity Tower
- ____ Condenser
- ____ Impingement Plate

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

c) Pressure drop: **6** inches H_2O (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: ____ ft^2
2) Throat Area: ____ ft^2
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

POWER HOUSE AND EFFLUENT TREATMENT AREAS

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? **X** Yes _____ No
If yes please give date and explain. **Actual date construction commenced was January 27, 2004**

Actual date of initial start-up occurred on May 17, 2004.

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	tn/yr	note 2	lb/hr	tn/yr
AM-003**	**PM/PM_{10}**	**No**				**0.79**		**0.18**	**0.79**
	SO_2	**No**				**0.06**		**0.01**	**0.06**
	NO_X	**No**				**10.45**		**2.39**	**10.45**
	CO	**No**				**8.78**		**2.00**	**8.78**
	VOC	**No**				**0.57**		**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.

** AM-003 has not been constructed to date; therefore, actual emissions are estimated as potential emissions.

COMPLIANCE DEMONSTRATION BY RECORDKEEPING

SECTION M7

1. Emission Point No./Name: **AM-003**

2. Pollutant: **Fuel**

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

4. Method of monitoring and recordkeeping: **The fuel type and quantity will be monitored and recorded on a daily basis as required by NSPS, 40 CFR 60, Subpart Dc.**

5. List any EPA methods used: **NA**

6. Compliance shall be demonstrated:

X Daily _____ Weekly _____ 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**

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**				**0.00**			**0.00**

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 Effluent Treatment Area.

Current Applicable Requirements and Status (page 1 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
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**
AA-001, AA-002, AB-001	**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**

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-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**

Current Applicable Requirements and Status (page 3 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-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**

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
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-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**

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

COMPLIANCE CERTIFICATION SECTION O

1. Emission Point No./Name: **Process Areas AA-000, AB-000, and AN-000.**
Includes all permitted emission points associated with each process area.

2. Indicate the source compliance status:

A. **X** 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. **X** 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	Potential Uncontrolled and Regulatory Allowable Emissions									
10/17/08			APC-S-1			AP-42			Potential Emissions		Actual Emissions	
			Applicable Standard	lb/hr	tons/yr	Natural Gas	lb/hr	tons/yr	lb/hr	tons/yr	lb/hr	tons/yr
POWERHOUSE AREA												
AM-003												
Rated Capacity	24.345 MMBtu/hr	PM/PM_{10}	0.5173 lb/MMBtu	12.59	55.16	7.6 lb/MMft³	0.18	0.79	0.18	0.79	0.18	0.79
Natural Gas Fired	23867.6 ft³/hr of Nat. gas	SO_2	4.8 lb/MMBtu	116.86	511.83	0.6 lb/MMft³	0.01	0.06	0.01	0.06	0.01	0.06
		NO_X				100 lb/MMft³	2.39	10.45	2.39	10.45	2.39	10.45
		CO				84 lb/MMft³	2.00	8.78	2.00	8.78	2.00	8.78
		VOC				5.5 lb/MMft³	0.13	0.57	0.13	0.57	0.13	0.57
INSIGNIFICANT ACTIVITIES												
NONE												

POTENTIAL/ACTUAL FUEL BURNING EMISSIONS	
POLLUTANT	TONS/YEAR
PM/PM_{10}	0.79
SO_2	0.06
NO_X	10.45
CO	8.78
VOC	0.57

MANUFACTURING PROCESSES

HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI
SUMMARY OF POTENTIAL UNCONTROLLED AND REGULATORY ALLOWABLE EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant		Potential Uncontrolled/Allowable Emissions							
10/17/2008		Capacity	Emission Factor (3)	Point Source Emissions		Stack Test Data	Point Source Emissions		Fugitive Emissions	Emissions
		tons/hr	lb/ton	lb/hr	lb/yr	lb/hr (1)	lb/hr	lb/yr (2)	lb/yr (2)	tons/yr
KYMENE PROCESS AREA										
AA-000 Kymene Process Area	Epichlorohydrin (Fugitive)								2998.46	1.50
AA-001 Kettle Vent Water Scrubber	Epichlorohydrin and VOC (2)							16800.00		8.40
AA-002 Adipic Acid Baghouse	Particulate Matter (PM/PM_{10})	1.15	0.1	11.50	100740.00	0.212	21.20	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
EFFLUENT TREATMENT AREA										
AN-000 Effluent Treatment Area	Epichlorohydrin (Fugitive)								0.00	0.00
PAPER AREA TANKS	VOC (from 40 Tks to 10 Tks*)								2395.00	1.20
TOTAL EMISSIONS	**PM/PM_{10}**									**104.36**
	VOC									**11.10**
	Epichlorohydrin									**9.90**

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

(2) Data taken from the attached 2002/2007 mass balance sheets 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 used AP-42, Section 11.13 emission factor. Based on similar operation with a unit melter - glass fiber manufacturing.

(5) Data taken from the attached 2002/2007 mass balance sheets attached in Appendix. Emissions include capacity calculations and regulatory allowable efficiency of 98%.

HERCULES, INCORPORATED
HATTIESBURG, MISSISSIPPI
SUMMARY OF ACTUAL EMISSIONS FROM MANUFACTURING PROCESSES

Emission Point/Process Area	Pollutant		Actual Emissions							
10/17/2008		Capacity	Emission Factor (3)	Point Source Emissions		Stack Test Data	Point Source Emissions		Fugitive Emissions	Emissions
		tons/hr	lb/ton	lb/hr	lb/yr	lb/hr (1)	lb/hr	lb/yr (2)	lb/yr (2)	tons/yr
KYMENE PROCESS AREA										
AA-000 Kymene Process Area	Epichlorohydrin (Fugitive)								2998.46	1.50
AA-001 Kettle Vent Water Scrubber	Epichlorohydrin and VOC (2)							2096.00		1.05
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
EFFLUENT TREATMENT AREA										
AN-000 Effluent Treatment Area	Epichlorohydrin (Fugitive)								0.00	0.00
PAPER AREA TANKS	VOC (from 40 Tks to 10 Tks*)								790.00	0.40
TOTAL EMISSIONS	**PM/PM_{10}**									**3.80**
	VOC									**2.94**
	Epichlorohydrin									**2.55**

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

(2) Data taken from the attached 2002/2007 mass balance sheets 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 used AP-42, Section 11.13 emission factor. Based on similar operation with a unit melter - glass fiber manufacturing.

(5) Data taken from the attached 2002/2007 mass balance sheets attached in Appendix. Emissions include capacity calculations and regulatory allowable efficiency of 98%.

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	
10/17/2008				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
Emission Point/Process Area	Pollutant	Equipment Type/Process	Amount (lbs)	Emission Factor		Emissions	
AN-000 Effluent Treatment Area	Epichlorohydrin (Fugitive)					0.00	0.00

Data taken from the attached 2002/2007 mass balance sheets 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	
10/17/2008				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
Emission Point/Process Area	Pollutant	Equipment Type/Process	Amount (lbs)	Emission Factor			Emissions	
AN-000 Effluent Treatment Area	Epichlorohydrin (Fugitive)						0.00	0.00

(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 2002/2007 mass balance sheets attached in Appendix C.

APPENDIX C
SUPPORTING DATA

STACK TESTING RESULTS

HERCULES

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

ml0011/-

SAMPLING PLAN

Emission Point	Definition	Sampling
010	Rosin Process Area	Storage tank data forms
011	Mill Room Area	Area down.
012	Extractor, Refinery, and Still House Combination Water and Oil Scrubber	Area down.
013	Pexite Plant Oil Scrubber	EPA Method 25 for VOC.
020	Delnav Plant	Area permanently shut down by year's end.
021	Flare Tower	Calculation for sulfur dioxide for banking.
022	Limestone Tank No. 1	See Emission Point 020.
023	Limestone Tank No. 2	See Emission Point 020.
024	Digestion Sump Vent	EPA Method 25 for VOC for banking.
030	Poly-Pale Plant	Storage tank data forms
031	McKee Boiler	By calculation for natural gas
032	McKee Boiler	By calculation for 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.

RESULTS

FLOW SCFH				V.O.C. (lbs/hr)				
#1	#2	#3	AVG	#1	#2	#3	AVG	LBS
(Tanks E,L,P,R,W,Y,TX)								
(Down)								
(Down)								
123	160	149	144	0.468	0.885	0.873	0.742	6,500
(Down)								
124,288 lbs. H_2S ——> 233,954 lbs. SO_2 (CY-1987)								
(Down)								
(Down)								
(Down)								
(Tanks T)								
2,475 MCF/Yr. of Natural Gas								
2,475 MCF/Yr. of Natural Gas								
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 (7.2 (2.2(T

ml001h/.

SAMPLING PLAN

Emission Point	Definition	Sampling	RESULTS: FLOW SCFH #1	#2	#3	AVG	V.O.C. (lbs/hr) #1	#2	#3	AVG	LBS
033	(Continued)		554	288	370	404	0.836 1.093 0.834	1.254 0.691 0.766	2.07 0.924 1.220	1.39 0.903 0.94	12,147 7,907 8,234
034	Heat Treatment	No vent									
040	Rosin Shed	Storage tank data forms	(Tanks B)								
041	Drumming Operation	Per our discussion we propose not to sample.	(Did not 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 fl
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	(Tanks VN)								
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	(Spare)								
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)								

ml0011/3

SAMPLING PLAN

Emission Point	Definition	Sampling
070	Truline Flaking and Packaging Area	Storage tank data forms
071	Flaking Belt Vapor Water Scrubber	EPA Method 25 for VOC
072	Dracco Baghouse Model 20-S	EPA Method 5 for particulates
073	Pangborn Baghouse Model 600	EPA Method 5 for particulates
080	Hard Resins Area	Storage tank data forms
081	Struthers-Wells Boiler	By calculation for natural gas
082	Water Scrubber Kettles	EPA Method 25 for VOC, plus Maleic Anhydride by G.C.
090	Continuous Esterification Area	Storage tank data forms
091	Foster Wheeler Boiler	By calculation for natural gas
092	Continuous Esterification Unit	EPA Method 25 for VOC
100	Hard Resins Flaking House	Storage tank data forms

RESULTS

FLOW SCFH				V.O.C. (lbs/hr)				
#1	#2	#3	AVG	#1	#2	#3	AVG	LB
(Tanks VN)								
143	142	138	141	1.65^{-3}	6.71^{-3}	4.19^{-3}	4.18^{-3}	
85,224	92,547	92,082	89,951	0.154	0.184	0.127	0.155	1
(Removed)								
(Tanks S)								
35,146 MCF/Yr. of Natural Gas								
86,258	86,258	82,059	84,858	9.14	8.12	16.54	11.27	98
(Tanks S)								
11,715 MCF/Yr. of Natural Gas								
(Awaiting Data)								
(Tanks S)								

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SAMPLING PLAN

Emission Point	Definition	Sampling	RESULTS								
			FLOW SCFH				V.O.C. (lbs/hr)				
			#1	#2	#3	AVG	#1	#2	#3	AVG	LB
101	Bvall Norbo Dust Collector	EPA Method 5 for particulates	487,959	50,510	465,287	467,918	0.651	0.673	0.842	0.722	6,325
102	Flaking Belt Vapor Water Scrubber	EPA Method 25 for VOC	406,603	425,254	426,495	419,450	10.14	3.40	6.11	6.55	57,37
110	Foral and Staybelite Plant	Storage tank data forms	(Tanks FL,H)								
111	Struthers-Wells Boiler	By calculation for natural gas	10,462 MCF/Yr. of Natural Gas								
112	Hydrogen Process	EPA Method 25 for VOC	1,677	1,859	2,006	1,847	0.147	0.484	0.352	0.328	2,870
120	Hydrogen Furnace	Storage tank data forms	(Tanks S)								
130	Pilot Plant Area	Storage tank data forms	(Tanks LB)								
131	Struthers-Wells Boiler	By calculation for natural gas	232 MCF/Yr. of Natural Gas								
132	Vent No. 1	Area down.	(Down)								
133	Vent No. 2	Area down.	(Down)								
140	Resin 731 Area	Storage tank data forms	(Tanks D)								
150	Stills and Dresinate Area	Storage tank data forms	(Tanks D, PS)								
151	Foster-Wheeler Boiler	By calculation for natural gas	8,160 MCF/Yr. of Natural Gas								

ml0011/5

SAMPLING PLAN

Emission Point	Definition	Sampling
160	Kymene Plant	Storage tank data forms
161	Kettle Water Aspirator	EPA Method 25 for VOC, plus Epichlorohydrin by G.C.
162	Dust Collector	EPA Method 5 for particulates
170	Defoamer Plant	Storage tank data forms
171	Silica Drier Furnace	By calculation for natural gas
172	Dust Collector	EPA Method 5 for particulates
180	Rosin 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
183	Amine Reactor Water Scrubber	EPA Method 25 for VOC
190	Polyrad and Polyol Area	Storage tank data forms, plus EPA Method 25 for VOC, plus ethylene oxide by G.C.
200	Para-menthane Unit	Area down.
210	Para-menthane Hydro-peroxide Unit	Area down.

RESULTS

FLOW SCFH				V.O.C. (lbs/hr)				
#1	#2	#3	AVG	#1	#2	#3	AVG	LB
(Tanks K)								
0	0	0	0	18,595ppm 0	8,320 ppm 137 ppm	3,134ppm 16 ppm	10,016 ppm 51 ppm	0 0
36,251	35,071	33,635	34,985	0.307	0.266	0.0635	0.212	1,85
(Tanks DP)								
1,918 MCF/Yr. of Natural Gas								
81,235	78,154	77,215	78,868	6.246	0.782	0.961	2.669	23,38
(Tanks RA)								
24,515 MCF/Yr. of Natural Gas								
0	0	0	0	36.6% 2,534 ppm	41.7% 2,422 ppm	34.7% 2,489 ppm	37.7% 2,482 ppm	(NH_3)
0	0	0	0	2.53%	1.96%	1.63%	2.04%	
(Tanks RA)								
0	0	0	0	2.23% 6,056 ppm	2.96% 8,457 ppm	2.32% 5,666 ppm	2.50% 6,726 ppm	0 0(
(Down)								
(Down)								

ml0011/6

SAMPLING PLAN

Emission Point	Definition	Sampling
220	Sulfate Turpentine Refining Unit	Area down.
230	Carbon Regeneration Furnace Scrubber	EPA Method 25 for VOC
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

RESULTS

FLOW SCFH				V.O.C. (lbs/hr)				
#1	#2	#3	AVG	#1	#2	#3	AVG	I
(Down)								
101,962	101,499	103,826	102,429	13.62	3.24	5.15	7.34	6
267,443 MCF/Yr. of Natural Gas								
(Tanks D,PS)								
(Tanks HP)								
(Tanks TC)								
(Tanks DP)								
(Tanks T)								
269	260	289	273	8.54^{-3}	1.7^{-2}	3.88^{-3}	0.01	

MASS BALANCE SPREADSHEETS

CAPACITY

01/27/04
FEES 01adj#2.xls

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

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	75	deg F ***
(1) PRODUCTION	63,072,000	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)	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 ADSORBTION/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

TOLUENE SUMMARY FOR :
POLY-PALE
METAL RESINATES
ZEON
LAB

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 / 6.1A1.)
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)

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 ***

	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		

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 SHEMPER	0	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 =	1.00		

E O USAGE IN POLYDAD	753,360	LBS	E O "LOSSES"(USAGE-THEORY)	96,875	LBS	
E O USAGE IN E O D	621,960	LBS	FUGITIVE EMISSIONS	17,365	LBS	R(II / 5.1)
TOTAL E.O. USAGE (CALC)	1,375,320	LBS	POINT SOURCE EMISSIONS	1,590	LBS	R(II / 5.2)
POLYRAD 0515	0	LBS	E.O. TO ETHYLENE GLYCOL	77,920	LBS	R(II / 8.6)
POLYRAD 0515A	424,860	LBS	ETHYLENE GLYCOL PRODUCED	109,797	LBS	**>25,000LBS ?**
POLYRAD 1110	1,019,664	LBS	QUANTITY RELEASED	18,955	LBS	R(II / 8.1)
POLYRAD 1110A	254,916	LBS				
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 IMPOU	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(II8.7)
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

ROSIN 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					

					TPY	
				PM	44.93	
EPI (Form R-Air "only")	7,839	lbs/yr		SO2	522.96	
Eth BZ (Form R-Air)	0	lbs/yr		NOX	60.22	
Eth GLYCOL(Form R-Air)	0	lbs/yr		CO	19.56	
Eth OXIDE (Form R-Air)	18,955	lbs/yr		VOC*	584.78	
MALEIC ANH (Form R-Air)	0	lbs/yr		TRS	0	
TOLUENE (Form R-Air)	683,791	lbs/yr		LEAD	0	
XLYENE (Form R-Air)	0	lbs/yr		CFC/HCFC	0	
Adipic acid - lbs	7,043,040	lbs/yr		Other	0	
Gum rosin/PP-lbs (melter)	43,800,000	lbs/yr		totHAP-voc	355.29	
Resin flaked/HRA-lbs	61,320,000	lbs/yr		TH non-voc	0	
Nat Gas-(Poly-Pale)	12,535	mcf				
(Power House)	431,938	mcf		SUM =	1232.46	TPY
(HRA)	13,484	mcf	CAPACITY	FEE RATE=	25.00	$/TON
(Rosin Dist.)	2,891	mcf		TOTAL $ =	30,811	
(Hydrogen)	0	mcf				
(RAD)	4,940	mcf		By quarters	7,702.85	
(Eff. Treatment)	0	mcf				
CAPACITY Fee Rate =	25.00	$/TON				
Poly-pale prod.	60,426,480	lbs		* = Reflects Total VOC from the facility		
SO2 Fugitives @ Poly-Pale	511.69	TPY		including VOC,s that are HAP's		
HRA Kettle production	56,064,000	lbs/yr				
HRA Flaked	61,320,000	lbs/yr				
Plt. 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	BIPHENYL LOSS = .27*TOTAL=		121,853	LBS
Dowtherm-(HRA)	169,193	lbs/yr				
Dowtherm-(Rosin Dist.)	222,228	lbs/yr				
Dowtherm-(RAD)	33,685	lbs/yr				

(LESS THAN 10,000 LBS ?)
NO REPORT REQUIRED

FROM FORM R CALCULATIONS=	"TPY"
EPICHLOROHYDRIN	3.92
ETHYL BENZENE	0.00
ETHYLENE GLYCOL	0.00
ETHYLENE OXIDE	9.48
MALEIC ANHYDRIDE	0.00
TOLUENE	341.90
XYLENE	0.00
total VOC (Form R)	355.29

AMMONIA USAGE @ RAD	1,042,440	LBS		NH3 "LOSSES"(USAGE-THEORY)	663,857	LBS	= 63.7%	
NITRILE PRODUCTION	8,935,200	LBS OF 731-D FEED		FUGITIVE EMISSIONS	34,660	LBS		R(II / 5.1)
WASTEWATER FLOW AVG.	95,268	GPD		POINT SOURCE EMISSIONS	8,541	LBS		R(II / 5.2)
AVERAGE WASTEWATER pH	10.0			NH3 TO (NH4)2SO4 @ 90%, & 10% POTW	620,655	LBS		
pH NORMALITY	0.00100			AMMONIUM SULFATE PRODUCED	2,168,642	LBS	<?> 25,000LBS	
I.B. SLUDGE GENERATE RATE	4	CU YD/DAY		AMMONIA RECYCLE	6,012,989	LBS		R(II / 8.4)
				NH3 "LOSSES"/ 1,000 LBS FEED	74.3	LBS/1,000 LBS FEED		
AQ NH3 AT DRESINOL	0	LBS		QUANTITY RELEASED	105,710	LBS		R(II / 8.1)
H2SO4 TOTES @40% =	0	NUMBER		QUANTITY TO POTW	62,066	LBS		R(6.1A.1.)(R8
				QUANTITY ON-SITE IMPOUNDMENT	443	LBS		(RII/ 5.5.3)

PARTICULATE MATTER

AC-002 (162) Dust collector @ Kymene

$$\frac{0.93 \text{ TPY in 1988(base data)}}{2{,}370{,}000 \text{ lbs used in 1988}} * 7{,}043{,}040 \text{ lbs} = 2.76 \text{ TPY (PM)}$$

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

= 33.18 TPY (PM)

AG-005 (101) Dust collector @ HRA

3.16 TPY in 1988(base data)

26,840,510 lbs flaked in 1988

* 61,320,000 lbs = 7.22 TPY (PM)

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 =	1.56 tpy	1.56 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 =		57.45 TPY(NOX)
CO = 84lb/mmCUFT nat gas =		17.23 TPY(CO)
VOC = 5.5lb/mmCUFT nat gas =		1.13 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 =		1.08 TPY(NOX)
CO = 84lb/mmCUFT nat gas =		0.91 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	44.93 TPY
TOT SO2	0.14 TPY
TOT NOX	60.22 TPY
TOT CO	19.56 TPY
TOT VOC	1.28 TPY

SO2 FROM 1988 DATA

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

$$\frac{\text{3.96 TPY (1988 Base data)}}{\text{21,495,048 lbs Poly-Pale (1988)}} * \text{60,426,480 lbs} = \text{11.13 TPY(SO2)}$$

VOC = VOC Assumed to be non-HAP

VOC FROM 1988 DATA

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

$$\frac{\text{6.07 TPY (1988 Base data)}}{\text{21,495,048 lbs Poly-Pale (1988)}} * \text{60,426,480 lbs} = \text{17.06 TPY(VOC)}$$

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

$$\frac{\text{49.35 TPY (1988 Base data)}}{\text{19,713,604 lbs Production (1988)}} * \text{56,064,000 lbs} = \text{140.35 TPY(VOC)}$$

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

$$\frac{\text{28.69 TPY (1988 Base data)}}{\text{26,840,510 lbs flaked (1988)}} * \text{61,320,000 lbs} = \text{65.55 TPY(VOC)}$$

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

32.14 TPY (1988 Base data) "ASSUME THE SAME" = 32.14 TPY(VOC)

'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 = 3.68 TPY(VOC)

Poly-Pale melter fugitives 1.57 TPY(VOC)

TOTAL VOC* = 228.21 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 LIGUID, oR = oF + 460

K = GAS-PHASE MASS TRANSFER COEFFICIENT, ft/second

K = 0.00438 (U) ^0.78 (D / 3.1 * 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	CAPACITY			
RESIN PRODUCTION	246,758,792	LBS		
PAPER PRODUCTION	425,035,200	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 = 3.68 TPY

ROSIN PLANT-WIDE VOC = 11.13 TPY (@ CAPACITY)

FOR ROSIN "VOC" ESTIMATES

ROSIN HANDLING FACTOR = 30 TANKS * 2 = 60

P / (Pa - P) = P / (14.7 - P) = 0

PAINT FACTOR = 1

SMALL TK. FACTOR = 1

PRODUCT FACTOR = 1

TANK CAPACITY = 11,750 GALS

ANNUAL THRUPUT = 1,028,162 GALS/TANK

NO. TURNOVERS = 88

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),resins = 29 LBS/YR

FOR 60 "TANKS" L(w),resins = 1,729.68 LBS/YEAR
0.197 LBS/HR
0.86 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 = 78,206,477 LBS (adjusted for %T.S.)

ROSIN HANDLING FACTOR = 10 TANKS * 2 = 20

ANNUAL THRUPUT = 5,312,940 GALS/TANK

NO. TURNOVERS = 452

TURNOVER FACTOR= 0

FOR BREATHING LOSSES , L(b),paper = 14 LBS/YR

FOR 20 "TANKS" L(b),paper = 271.31 LBS/YEAR
0.03 LBS/HR
0.14 TPY

FOR WORKING LOSSES , L(w),paper = 43 LBS/YR

FOR 20 "TANKS" L(w),paper = 864.00 LBS/YEAR
0.10 LBS/HR
0.43 TPY

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

L(total) = L(b),rosin + L(w),rosin + L(b),paper + L(w),paper
= 0.41 0.86 0.14 0.43

L(total) = 1.84 TPY

ASSUME PLANT-WIDE FUGITIVES (P,V,F) AND STEAM BLOWING SAME AS L(total)

THEREFORE TOTAL ROSIN VOC= 3.68 TPY

FOR CAPACITY:

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

TOLUENE TOTAL

CALANDER YEAR **CAPACITY**

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 adsorbtion 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)

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

	Ethyl Benz.		Xylene
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

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. (I	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	R5.2
NITROGEN VENTING/BLOWING	194,088		194,088	R5.2
WASTEWATER TREATMENT VENTING	25,726	e	25,726	
WWT PARTIONED TO SLUDGE	7,146	a	7,146	
WWT ADSORBTION/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	R6.1.A1., R8.7
QUANTITY ON-SITE IMPOUNDMENT	404	f	404	R5.5.3

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 RECY(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 ATMOSHPERE = 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 BELOIW

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 ADSORBTION 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)

	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

TANK NO.	LBS/YR	LBS/YR	LBS/YR	FACTOR				GAL/YR	GAL/YR	N	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% AC/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 STG	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 FEEI	58	58	0	302		0	0	7,446,000	17,167	434	4.50
T-33 ROSIN/DOW	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 STG	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 STOI	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		

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

TURNOVER FACTOR	
TURNOVERS	Kc
<35	1

SMALL TANK DIAMETER FACTOR	
DIA(FT)	C
1FT	0.05

T-13 #5 SEP	0.0	2,192		40	1	2FT	0.10
T-14 #5 POLYZ	0.0	2,192		45	1	3FT	0.15
T-15 #6 SEP	0.0	2,192		50	1	5FT	0.25
T-16 #6 POLYZ	0.0	2,192		60	1	7.5FT	0.40
T-17 #4 SEP	0.0	2,192		75	1	10FT	0.50
T-18 #4 POLYZ	0.0	2,192		100	0	12.5FT	0.65
T-21 PZD SOLN	8.5	5,218		150	0	15FT	0.75
T-22 PZD SEP	100.0	0	NO VENT	200	0	17.5FT	0.85
T-23 PZD SURGE	8.5	4,948		250	0	20FT	0.90
T-24 HYZ SOLN	86.7	6,274		300	0	25FT	0.95
T-25 WASH TK	65.8	8,602		400	0	30FT	1.00
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 MX	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: *EMISSIONS IN T-108 ARE SHOWN IN FINISHED PRODUCT MELHI

TOTAL TANKAGE CAPACITY = 128,668 GALLONS
TOTAL NITROGEN USAGE = 4,316 SCFH
FOR BREATHING DISPLACEMEI $\frac{P1\ V1}{T1} = \frac{P2\ V2}{T2}$
AVERAGE DAY TEMPERATURE(76.3 DEG F.
AVERAGE NIGHT TEMPERATUR 52.9 DEG F.

FOR NIGHT VOLUEME(V2) = 128,668 GALLONS OR 17,202 CU FT
THE DAY VOLUEME(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 DISPLACI 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 VOLUI 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 VOLUEME
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 STG	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

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

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

Nitrogen = 445 SCFH = 1.240 #moles/Hr

T1(Centigrade)		T1(Centigrade)	
37.8	100.0 oF	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 (I1178 * 8,760 HRS/YR) = 36,655 LBS/YEAR

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

THEREFORE, TOLUENE USAGE 94,608,000 LBS

PERCENT SOLVENT LOSSES = 0.84 % (BASED ON COST SHEET LOSSES AND TOTAL USAGE)
PERCENT SOLVENT LOSSES = 0.84 % (BASED ON CALCULATED LOSSES AND TOTAL USAGE)

FOR SOLVENT RECYCLE ASSUME SOLUTION IS 50 % TOTAL SOLIDS

THEREFORE SOLVENT IN SOLU 63,072,000 LBS

SOLVENT RECY(63,072,000 LBS LESS THE "LOSSES" (794,243 LBS) = 62,277,757 LBS/YEAR RECYCLED

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

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

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
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 = 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

FOR 98 % REMOVAL :

TREATED = 0.98 * 0 LBS = 0 LBS

DISCHARGE= 0 - 0 = 0 LBS

DISCHARGE TO POTW 109,797 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	***INPUT***	
CALANDER YEAR	CAPACITY	
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

FIGITIVE EMISSIONS	2,998	LBS/YEAR	R(II / 5.1)
POINT SOURCE EMISSIONS	4,841	LBS/YEAR	R(II / 5.2)
TO WWT	17,493	LBS/YEAR	
WWT VENTING	0	LBS/YEAR	
WWT TO SLUDGE	350	LBS/YEAR	
WWT BIOLOGICAL	2,274	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	8,189	LBS/YEAR	R(II / 8.1)
QUANTITY TREAT ON-SITE	2,274	LBS/YEAR	R(II / 8.6)
QUANTITY ON-SITE IMPOUND	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"

	OLD(1987)	UPDATE1992	LDAR(1995)	LDAR(1999)	SOCMI FACTORS (LBS/HR) 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 EXCECT 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: EPICHLOROHYDRIN

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

A =
B =
C = 22 oC

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

Nitrogen = 483 SCFH = 1.344 #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		745	0.980	1.3443	745	0.980	1.3443	37.6625	
EPI	15	15	0.020	0.0271	15	0.020	0.0271	2.5045	0.0000
Total		760.00	1.000	1.3714	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 = 2,998 LBS/YR (FROM LDAR P,V,F "F1236")
PT SOURCE = 4,841 LBS/YR ("D1257" + "D1262" + "H1341")
TO WWT = 17,493 LBS/YR ("E1256")

TOTAL = 25,332 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 %
BOILOGICAL 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 *	17493	LBS/YR =	0	LBS/YEAR
WWT PARTIONED TO THE SLUDGE = .02 *	17493	LBS/YR =	350	LBS/YEAR
WWT BIOLOGICAL TREATMENT = .13 *	17493	LBS/YR =	2274	LBS/YEAR
WWT ADSORBTION OR INCINERATION = .77 *	17493	LBS/YR =	0	LBS/YEAR
WWT EFFLUENT DISCHARGE = .08 *	17493	LBS/YR =	0	LBS/YEAR

WWT DISCHARGED TO POTW = 14,869 LBS/YEAR

AMMONIA

(WITHOUT LDAR COMPONENT UPDATE)

INPUT	**INPUT**		pH	Normality
CALANDER YEAR	CAPACITY			
AMMONIA USAGE	1,042,440	LBS	9.00	0.00010
NITRILE PRODUCTION	8,935,200	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
I.B. 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)	663,857	LBS			
FUGITIVE EMISSIONS	34,660	LBS			R(II / 5.1)
POINT SOURCE EMISSIONS	8,541	LBS			R(II / 5.2)
NH3 TO (NH4)2SO4 @ 90%, & 10% POTW	620,655	LBS			
AMMONIUM SULFATE PRODUCED	2,168,642	LBS	<?> 25,000LBS		
AMMONIA RECYCLE	6,012,989	LBS			R(II / 8.4)
NH3 "LOSSES"/ 1,000 LBS FEED	74.3	LBS/1,000 LBS FEED			
QUANTITY RELEASED	105,710	LBS			R(II / 8.1)
QUANTITY TO POTW	62,066	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	378,583			
AMMONIA LOSSES	663,857			
NH3 % EXCESS	175.35	%		
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) =	34,660	LBS/YEAR		
WASTEWATER FLOW	95,268	GPD		
ASSUME pH OF 10.0	0.00100	N =	0.01700	g/l
NH3 IN WASTEWATER	620,655	LBS		
AVG NH3 LOSS IN WASTEWATER =	1,000	LBS/DAY		
AMMONIUM SULFATE PRODUCED	2,168,642	LBS		
NH3 LIQ 300FT/2"LINE	245	LBS		
NH3 VAP 300FT/1"LINE	1	LBS		
LOSSES/TRUCK UNLOADING	246	LBS/TRUCK		
TOTAL BLEED DOWN	8,541	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)	595.68			
DAYS OPERATION(NH3)	645.56			
AVERAGE DAYS OPERATION	620.62	DAYS		
LBS RECYCLE	6,012,989	LBS		

FOR
AQ AMMONIA AT DRESINOL

$$H_2SO_4 + 2NH_4OH = (NH_4)_2SO_4 + 2H_2O$$
$$98 \qquad 70$$

$$(NH_4)_2SO_4 = (NH_4OH)$$
$$132 \qquad 35$$

ASSUME 1 TOTE/YEAR OF 40% ACID USED IN EDUCTOR 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

620,655 LBS * .10(%) = 62,066 LBS/YR

AMMONIA TO POTW = 62,066 LBS/YR (R6.1.A.1.)

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

180 MG/L*3.785 L/GAL*4 CUYD/DAY*365DAY/YR*202GAL/YD*1LB/454G*1G/1000MG = 443 LBS/YR

AMMONIA SURFACE IMPOUNDMENT (ON-SITE) = 443 LBS/YR

SO2 (Sulfur Dioxide) FUGITIVES @ POLY-PALE

INPUT

CALANDER YEAR	CAPACITY	
POLY-PALE PRODUCTION	60,426,480	LBS
MELHI PRODUCTION	2,645,520	LBS
TOTAL PRODUCTION**CALC**	63,072,000	LBS
98% SULFURIC ACID	7,348,712	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**	526	DAYS
100% CAUSTIC	3,060,540	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 =	616,290 LBS	1,023,380 LBS
	49 LBS/HR	81.13 LBS/HR
	308 TONS/YEAR	511.69 TONS/YEAR
AT CAPACITY =	615,586 LBS	1,022,211 LBS
	70 LBS/HR	116.69 LBS/HR
	308 TONS/YEAR	511.11 TONS/YEAR
RECYCLED OFF-SITE =	0 LBS/YEAR	
RECYCLED ON-SITE =	6,405,018 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 = 7,201,738 LBS

NEUTRALIZED = 0.84 * 7,201,738 = 6,049,460 LBS

THEREFORE, REMAINDER = 7,201,738 - 6,049,460 = **1,152,278** 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 @ 63,072,000 LBS PRODUCT

THEREFORE: H2SO4= 98lb/32lb * 500 /1,000,000 * 63,072,000 = **96,579** 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 * 943,694 = 616,290 LBS SO2
48.86 LBS/HR
308.14 TONS/YEAR

AT CAPACITY, SO2 = 615,586 LBS SO2
70.27 LBS/HR
307.79 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 = 6,405,018 LBS/YEAR

ACID / BASE BALANCE

POLY-PALE ACID (100% BASIS) = + 7,201,738 LBS

ACID NEUTRALIZED WITH CAUSTIC = - 3,749,162 LBS
ACID NEUTRALIZED WITH OTHER eq. = - 1,788,947 LBS H2SO4 REACTING WITH NH3 LOSSES OF 620,655 LBS
ACID IN MELHI AND POLY-PALE = - 96,579 LBS
ACID SOLD = - 0 LBS

REMAINING ACIDITY = 1,567,050 LBS

THEREFORE: SO2 = 64/98 * 1,567,050 = 1,023,380 LBS SO2
81.13 LBS/HR
511.69 TONS/YEAR

AT CAPACITY, SO2 = 1,022,211 LBS SO2
116.69 LBS/HR
511.11 TONS/YEAR

BIPHENYL ——— 2001

AREA	DOWTHERM(LBS)	NAT GAS(M CF)
AMINE	33,685	4,940
POLYRAD	0	0
DYMEREX	222,228	2,891
KETTLE	169,193	13,484
POLY-PALE	26,200	12,535
P-CYMENE	0	0

TOTAL 451,306 LBS 33.850 MCF

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

NEW PP BOILER DESIGN = $\frac{\text{2.0 MM BTU/HR VAPOR OUTPUT}}{\text{3.19 MM BTU/HR BURNER OUTPUT}}$ = .627

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 !**	FUGITIVE EMISSIONS =	0.09	LBS/YEAR	(R5.1, R8.1)
SANDBLASTING SAND	1,000	LBS	RELEASED ONSITE =	0.20	LBS/YEAR	(R5.5.4 R8.1)
SAND TCLP LEAD	1,142	PPM	TRANSFER OFFSITE =	1.24	LBS/YEAR	(R6.2 R8.1)
TYVEX SUITS	295	LBS	RECYCLED OFFSITE =	0.00	LBS/YEAR	(R8.5)
TYVEX TCLP LEAD	344	PPM	ACTIVITY INDEX =	1.00		
LEAD EMISSION FACTOR	1.5	LB / TON				
LEAD SHEETS	4,960	LBS				

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 SHEMPER

ACTIVITY INDEX = SAME AS POLY-PALE = 1.00

EQUAT 1 P/ Pa-P	EQUAT 1 TK DIA FT(D)	EQUAT 1 DAY/NITE DLTA T (F)	EQUAT 1 PAINT FACTOR(Fp)	EQUAT 1 SMALL TK FACTOR(C)	EQUAT 1 PRODUCT FACTOR(Kc)

0.075	9.4	20	1.4	0.47	1	
0.031	1.7	20	1.4	0.08	1	
0.031	2.5	20	1.4	0.13	1	
0.000	1.7	0	1.4	0.08	1	(OUT OF SERVICE)
0.000	2.5	0	1.4	0.13	1	(OUT OF SERVICE)
0.031	1.7	20	1.4	0.08	1	
0.031	2.5	20	1.4	0.13	1	
0.031	1.7	20	1.4	0.08	1	
0.031	2.5	20	1.4	0.13	1	
0.031	1.7	20	1.4	0.08	1	
0.031	2.5	20	1.4	0.13	1	
0.031	1.7	20	1.4	0.08	1	
0.031	2.5	20	1.4	0.13	1	
0.043	7.1	20	1.4	0.35	1	
0.050	2.0	20	1.4	0.10	0	(NO VENT)
0.043	5.8	20	1.4	0.28	1	
0.292	5.0	20	1.4	0.25	1	
0.107	9.2	20	1.4	0.47	1	
0.075	9.4	20	1.4	0.47	1	
0.075	9.4	20	1.4	0.47	1	
0.075	3.6	20	1.4	0.16	1	
0.075	3.6	20	1.4	0.16	1	
4899.000	2.0	20	1.4	0.10	0	(NO VENT)
4899.000	8.0	20	1.3	0.40	1	
0.075	3.5	20	1.3	0.18	1	
0.075	7.2	20	1.4	0.37	1	
0.075	12.0	20	1.0	0.60	1	(ATM VENT)
0.075	12.0	20	1.0	0.60	1	(ATM VENT)
0.075	7.0	20	1.3	0.35	1	
0.075	12.0	20	1.0	0.60	1	(ATM VENT)
0.075	12.0	20	1.4	0.60	1	(ATM VENT)
0.075	7.2	20	1.3	0.37	1	
0.815	6.3	20	1.4	0.32	1	
0.075	7.8	20	1.4	0.40	1	
0.075	9.4	20	1.4	0.47	1	
0.075	5.0	20	1.4	0.25	1	
0.075	9.4	20	1.4	0.47	1	
2939.000	6.0	20	1.4	0.30	1	(ATM VENT)
0.075	10.4	20	1.4	0.51	1	
0.292	7.5	20	1.4	0.37	1	
0.075	2.0	20	1.4	0.10	1	
0.815	6.3	20	1.4	0.32	1	(NO VENT)
0.075	16.0	20	1.3	0.76	1	(ATM VENT)
0.043	6.0	20	1.4	0.30	1	
0.043	6.0	20	1.4	0.30	1	
0.043	6.0	20	1.4	0.30	1	

0.000	17	20	1	1	1	
0.000	20	20	1	1	1	
0.000	4	20	1	0	1	
0.000	4	20	1	0	1	
0.000	10	20	1	1	1	
0.000	14	20	1	1	1	
0.000	28	20	1	1	1	
0.000	3	20	1	0	1	
0.000	16	20	1	1	1	
0.000	24	20	1	1	1	
0.000	15	20	1	1	1	

0.000	11	20	1	1	1	
0.000	12	20	1	1	1	
0.015	8	20	1	0	1	
0.000	10	20	1	1	1	
0.006	2	20	1	0	0	(NO VENT)
-1.659	3	20	1	0	0	(NO VENT)
0.006	5	20	1	0	1	
0.032	8	20	1	0	1	
-1.659	8	20	1	0	1	

2007 ACTUAL

10/10/08

FEES.01adj#2.xls

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

FEES

*** INPUT ***

CALANDER YEAR 2007

*** = No input change

E.O. USAGE IN POLYDAD	0	LBS	
E.O. USAGE IN E.O.D.	0	LBS	
TOTAL E.O. USAGE (CALC)	0	LBS	
POLYRAD 0515	0	LBS	
POLYRAD 0515A	0	LBS	
POLYRAD 1110	0	LBS	
POLYRAD 1110A	0	LBS	
SURFACTANT AR150	0	LBS	
SURFACTANT AR160	0	LBS	
# DAYS OP. (CAN USE NA)	0	DAYS (manual input	
2006 E. O. USAGE	????	required in "F132")	
SCRUBBER EFFICIENCY	0.0	% ASSUME***	

KYMENE 557H	27,158,686	LBS	
KYMENE 557LX	2,752,162	LBS	
KYMENE 738	3,475,509	LBS	
KYMENE 1022 (624)	8,503,986	LBS	
KYMENE MXC (G3140)	0		
KYMENE 621	0		
KYMENE 625LX	0		
TOTAL KYMENE **CALC**	41,890,343	LBS	
EPI IN 557H	1,288,512	LBS	
EPI IN 557LX	201,240	LBS	
EPI IN 738	859,363	LBS	
EPI IN 1022 (624)	402,093	LBS	
EPI IN MCX (G3140)	0		
EPI IN 621	0		
EPI IN 625LX	0		
TOTAL EPI **CALC**	2,749,208	LBS	
NITROGEN USAGE	3,884	MCF	
NITROGEN SWEEP EFFICIENCY	0.2		
2006 PRODUCTION	50,743,580	LBS	
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	#REFI	LBS/YR
AMMONIA IN I.B. SLUDGE	443	LBS/YR
I.B. SLUDGE GEN. RATE	4	CU YDS/ DAY

ROSIN 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	%

RESIN PRODUCTION	0	LBS
PAPER PRODUCTION	154,396,396	LBS
"ROSIN" HANDLING FACTOR(est)	2	(ie," DOUBLE" HANDLING)
NUMBER OF TANKS (est.)	0	RESINS

*** OUTPUT ***

E.O. "LOSSES"(USAGE-THEORY)	0	LBS	
FUGITIVE EMISSIONS	0	LBS	R(II / 5.1)
POINT SOURCE EMISSIONS	0	LBS	R(II / 5.2)
E.O. TO ETHYLENE GLYCOL	0	LBS	R(II / 8.6)
ETHYLENE GLYCOL PRODUCED	0	LBS	>25,000LBS ?
QUANTITY RELEASED	0	LBS	R(II / 8.1)
ACTIVITY INDEX	#DIV/0!		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	0	LBS	R(II/6.1.A.1)

FIGITIVE EMISSIONS	2,998	LBS/YEAR	R(II / 5.1)
POINT SOURCE EMISSION	2,096	LBS/YEAR	R(II / 5.2)
TO WWT	8,175	LBS/YEAR	
WWT VENTING	0	LBS/YEAR	
WWT TO SLUDGE	163	LBS/YEAR	
WWT BIOLOGICAL	1,063	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	5,258	LBS/YEAR	R(II / 8.1)
QUANTITY TREAT ON-SITE	1,063	LBS/YEAR	R(II / 8.6)
QUANTITY ON-SITE IMPOU	163	LBS/YEAR	R(II/ 5.5.3)
ACTIVITY INDEX	0.83		R(II / 8.9)
WWT DISCHARGE TO POT	6,949	LBS/YEAR	R(II8.7)

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
	0	lbs/year
	0.00	tpy

ROSIN PLANT-WIDE VOC = 0.59 TPY

ROSIN PLANT-WIDE VOC = 1.77 TPY(@ CAPA

Changed from 30 to 15 tanks in Resins because of Resins shut-down,

92	NUMBER OF TANKS (est.)			10	PAPER		except for RAD in 2005		
93	AVERAGE TANK DIAMETER(est)			10	FT		Changed from 15 to 0 tanks in Resins because of additional Resins shut-down,		
94	AVERAGE TANK HEIGHT(est)			20	FT		ie, RAD in 2006(actually input .01 to eliminate division by zero)		
95	AVG. VAPOR SPACE**CALC**			10	FT				
96	"ROSIN" MOL. WEIGHT			302					
97	TEMPERATURE			175	oC	or = 347	oF (calc)		
98	VAPOR PRESSURE			0.200	mm Hg	or= 0.003868	psi (calc)		
99	AMBIENT DELTA TEMP			20	oF				
100									
101									
102							TPY		
103							---		
104						PM	4.77		
105	EPI (Form R-Air "only")	5,094	lbs/yr			SO2	0.03		
106	Eth BZ (Form R-Air)	0	lbs/yr			NOX	5.71		
107	Eth GLYCOL(Form R-Air)	0	lbs/yr			CO	4.80		
108	Eth OXIDE (Form R-Air)	0	lbs/yr			VOC*	3.45		
109	MALEIC ANH (Form R-Air)	0	lbs/yr			TRS	0		
110	TOLUENE (Form R-Air)		lbs/yr			LEAD	0		
111	XLYENE (Form R-Air)	0	lbs/yr			CFC/HCFC	0		
112	Adipic acid - lbs	3,716,006	lbs/yr			Other	0		
113	Gum rosin/PP-lbs (melter)	0	lbs/yr			totHAP-voc	2.55		
114	Resin flaked/HRA-lbs	0	lbs/yr			TH non-voc	0		
115	Nat Gas-(Poly-Pale)	0	mcf						
116	(Power House)	114,226	mcf			SUM =	18.76	TPY	
117	(HRA)	0	mcf		2007	FEE RATE=	35.00	$/TON	
118	(Rosin Dist.)	0	mcf			TOTAL $ =	$656		
119	(Hydrogen)	0	mcf						
120	(RAD)	0	mcf			By quarters	164.12		
121	(Eff. Treatment)	0	mcf						
122	2007 Fee Rate =	35.00	$/TON						
123	HRA Kettle production	0	lbs/yr						
124	HRA Flaked	0	lbs/yr						
125	Plt. fug. est. non-HAP VOC	0.59	TPY						
126	Poly-Pale melter n-H- VOC	0	lbs/yr						
127									
128	Dowtherm-(Poly-Pale)	0	lbs/yr	BIPHENYL LOSS = .27*TOTAL=			0 LBS	(LESS THAN 10,000 LBS ?)	
129	Dowtherm-(HRA)	0	lbs/yr					NO REPORT REQUIRED	
130	Dowtherm-(Rosin Dist.)	0	lbs/yr						
131	Dowtherm-(RAD)	0	lbs/yr						
132									
133									
134									
135									
136	FROM FORM R CALCULATIONS=		"TPY"						
137			---						
138	EPICHLOROHYDRIN		2.55						
139	ETHYL BENZENE		0.00						
140	ETHYLENE GLYCOL		0.00						
141	ETHYLENE OXIDE		0.00						
142	MALEIC ANHYDRIDE		0.00						
143	TOLUENE		0.00						
144	XYLENE		0.00						
145									
146	total VOC (Form R)		2.55						
147									
148									
149									
150									
151									
152	AMMONIA USAGE @ RAD	0	LBS			NH3 "LOSSES"(USAGE-THEORY)	0	LBS = #DIV/0!	
153	NITRILE PRODUCTION	0	LBS OF 731-D FEED			FUGITIVE EMISSIONS	0	LBS	R(II / 5.1)
154	WASTEWATER FLOW AVG.	0	GPD			POINT SOURCE EMISSIONS	0	LBS	R(II / 5.2)
155	AVERAGE WASTEWATER pH	0.0				NH3 TO (NH4)2SO4 @ 90%, & 10% POTV	0	LBS	
156	pH NORMALITY	0.00000				AMMONIUM SULFATE PRODUCED	0	LBS <?> 25,000LBS	
157	I.B. SLUDGE GENERATE RATE	4	CU YD/DAY			AMMONIA RECYCLE	0	LBS	R(II / 8.4)
158						NH3 "LOSSES"/ 1,000 LBS FEED	#DIV/0!	LBS/1,000 LBS FEED	
159	AQ NH3 AT DRESINOL	0	LBS			QUANTITY RELEASED	443	LBS	R(II / 8.1)
160	H2SO4 TOTES @40% =	0	NUMBER			QUANTITY TO POTW	0	LBS	R(6.1A.1)(R8
161						QUANTITY ON-SITE IMPOUNDMENT	443	LBS	(RII/ 5.5.3)
162									
163									
164									
165									
166									
167	PARTICULATE MATTER								
168									
169									
170	AC-002 (162) Dust collector @ Kymene								
171									
172	0.93 TPY in 1988(base data)								
173	----------	*	3,716,006	lbs =	1.46	TPY (PM)			
174	2,370,000 lbs used in 1988								
175									
176									
177									
178	AC-004 (-) Gum rosin melted @ Poly-Pale								
179	Based on process weight equation, E = 4.1 * P ^0.67								
180	E = Particulate emissions in lbs/hour								
181	P = Process input capacity in tons/hour								
182	Capacity = 80drs/8hr shift = 2.5 tons/hour								
183				=	0.00	TPY (PM)			

AG-005 (101) Dust collector @ HRA

3.16 TPY in 1988(base data)

26,840,510 lbs flaked in 1988

0 lbs = 0.00 TPY (PM)

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

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)

For #7 Boiler

PM =7.6lb/mmCUFT nat gas =	0.43 tpy	0.43 TPY(PM)
PM(10)=0lb/mmCUFT nat gas =	0.00 tpy	
SO2 = 0.6lb/mmCUFT nat gas =		0.03 TPY(SO2)
NOX =100lb/mmCUFT nat gas =		5.71 TPY(NOX)
CO = 84lb/mmCUFT nat gas =		4.80 TPY(CO)
VOC = 5.5lb/mmCUFT nat gas =		0.31 TPY(VOC)

AB-001 Water scrubber @ Paracol/AKD (added)

Assume 75% scrubber efficiency
Capacity = 0.875 tons/hr
Emission factor from AP-42 section 11.13 = 3.0 lbs/ton
PM/PM10 = 2.87 TPY(PM)

TOTAL PM	4.77 TPY
TOT SO2	0.03 TPY
TOT NOX	5.71 TPY
TOT CO	4.80 TPY
TOT VOC	0.31 TPY

SO2 FROM 1988 DATA

VOC = VOC Assumed to be non-HAP

VOC FROM 1988 DATA

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

28.69 TPY (1988 Base data) / 26,840,510 lbs flaked (1988) * 0 lbs = 0.00 TPY(VOC)

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

From Plant-wide fugitive emission estimates spreadsheet = 0.59 TPY(VOC)

Poly-Pale melter fugitives 0.00 TPY(VOC)

TOTAL VOC* = 0.59 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	
	0	lbs/year	<----IF METLER DOES NOT OPERATE INPUT "0"
	0.00	tpy	FOR THE FORMULA "=+C480/2000"

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

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 LIGUID, oR = oF + 480

K = GAS-PHASE MASS TRANSFER COEFFICIENT, ft/second

K = 0.00438 (U) ^0.78 (D / 3.1 * 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	2,007				
RESIN PRODUCTION	0	LBS			
PAPER PRODUCTION	154,396,396	LBS	Paper Production		
"ROSIN" HANDLING FACTOR(est)	2	(ie," DOUBLE" HANDLING)			
NUMBER OF TANKS (est.)	0	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 = 0.59 TPY

ROSIN PLANT-WIDE VOC = 1.77 TPY (@ CAPACITY)

FOR ROSIN "VOC" ESTIMATES

ROSIN HANDLING FACTOR = 0 TANKS * 2 = 0

P / (Pa - P) = P / (14.7 - P) = 0

PAINT FACTOR = 1

SMALL TK. FACTOR = 1

PRODUCT FACTOR = 1

TANK CAPACITY = 11,750 GALS

ANNUAL THRUPUT = 0 GALS/TANK

NO. TURNOVERS = 0

TURNOVER FACTOR= 1

FOR BREATHING LOSSES , L(b),resins = 14 LBS/YR

FOR 0 "TANKS" L(b),resins = 0.27 LBS/YEAR
0.000 LBS/HR
0.00 TPY

FOR WORKING LOSSES , L(w),resins = 0 LBS/YR

FOR 0 "TANKS" L(w),resins = 0.00 LBS/YEAR
0.000 LBS/HR
0.00 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 = 28,408,937 LBS (adjusted for %T.S.)

ROSIN HANDLING FACTOR = 10 TANKS * 2 = 20

ANNUAL THRUPUT = 1,929,955 GALS/TANK

NO. TURNOVERS = 164

TURNOVER FACTOR= 0

FOR BREATHING LOSSES, L(b),paper = 14 LBS/YR

FOR 20 "TANKS" L(b),paper = 271.31 LBS/YEAR
0.03 LBS/HR
0.14 TPY

FOR WORKING LOSSES, L(w),paper = 16 LBS/YR

FOR 20 "TANKS" L(w),paper = 313.85 LBS/YEAR
0.04 LBS/HR
0.16 TPY

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

L(total) = L(b),rosin + L(w),rosin + L(b),paper + L(w),paper
= 0.00 0.00 0.14 0.16

L(total) = 0.29 TPY

ASSUME PLANT-WIDE FUGITIVES (P,V,F) AND STEAM BLOWING SAME AS L(total)

THEREFORE:TOTAL ROSIN VOC= 0.59 TPY

FOR CAPACITY:

RATIO FACTOR = 61.34 TPH (@ CAPACITY) / 20.38 TPH (1994) = 3.02

ETHYLENE OXIDE

With 1999 LDAR update for NON-LEAKING factors
2004 LDAR

INPUT	**INPUT**	
CALANDER YEAR	2,007	
E.O. USAGE IN POLYDAD	0 LBS	
E.O. USAGE IN E.O.D.	0 LBS	
TOTAL E.O. USAGE (CALC)	0 LBS	
POLYRAD 0515	0 LBS	
POLYRAD 0515A	0 LBS	
POLYRAD 1110	0 LBS	
POLYRAD 1110A	0 LBS	
SURFACTANT AR150	0 LBS	
SURFACTANT AR160	0 LBS	
# DAYS OPERATION (CAN USE NA)	0	DAYS (manual input required "F132")
SCRUBBER EFFICIENCY	0.0	% ASSUME

OUTPUT	*OUTPUT*	
E.O. "LOSSES"(USAGE-THEORY)	0 LBS	
FUGITIVE EMISSIONS	0 LBS	R(II / 5.1)
POINT SOURCE EMISSIONS	0 LBS	R(II / 5.2)
E.O. TO ETHYLENE GLYCOL	0 LBS	R(II / 8.6)
ETHYLENE GLYCOL PRODUCED	0 LBS	
QUANTITY RELEASED	0 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	0 LBS	R(II/6.1A.1

E.O. USAGE/ 1,000 LBS PRODUCT					#DIV/0!	LBS
E.O. "LOSSES"/ 1,000 LBS PRODUCT					#DIV/0!	LBS
FOR POLYRADS ASSUME						
ROSIN AMINE MOL. WT.					285	
ROSIN AMINE PURITY					94	%
ADJUSTED MOL.WT.					303	
POLYRAD 0515			0 * .85 =		0	
POLYRAD 0515A			0 * 7* 85=		0	
POLYRAD 0500 =					0	
POLYRAD 1110			0 * .90 =		0	
POLYRAD 1110A			0 * .7* 9=		0	
POLYRAD 1100 =					0	
FOR 0500:::	1 MOLE AMINE + 5 MOLES E.O. = 0500					
	303 + 5(44)			=523		
	E.O.= 5(44)/523 * LBS OF 0500 =				0	LBS
FOR 1100:::	1 MOLE AMINE + 11 MOLES E.O. = 1100					
	303 + 11(44)			=787		
	E.O.= 11(44)/787 * LBS 1100 =				0	LBS
FOR SURFACTANTS ASSUME						
WOOD ROSIN MOL. WT.					302	
WOOD ROSIN ACID NO.					160	
THEROETICAL ACID NO.					188	
WOOD ROSIN PURITY					86	%
ADJUSTED MOL. WT.					351	
SURFACTANT AR150			0 * 1.0 =		0	
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 =				0	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.					0	LBS
E.O. "LOSSES"(USAGE-THEORY)					0	LBS
E.O. USAGE = LBS OF E.O./(8.34*.85)					0	GALLONS
DAYS OF OPERATION, FROM LOG SHEETS =					0	DAYS
TOTAL E.O. ADDUCTS =					0	LBS
TYPICAL PRODUCTION = LBS % DAYS =					#DIV/0!	LBS/DAY
BASE YR 1993 TYP PROD = 5,470LBS/DAY						
DAYS OPERATION =					0	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
Flg&con/liq=	638	*	0.0001		0.08	LBS/HR
Flg&con/Vap=	52	*	0.0001		0.01	LBS/HR
RELIEF =	18	*	0.0980		1.57	LBS/HR
					2.04	LBS/HR
ON A CONTINUEOUS BASIS =					17,837	LBS/YR
SINCE WE BLOW THE LINES WE ONLY HAVE						
E.O. IN THE P,V,F SERVICE THE ACTUAL						
DAYS OF OPERATION =					0	DAYS
THEREFORE P,V,F FUGITIVE EMISSIONS =					0	LBS/YR
THEREFORE E.O. TO SCRUBBER =					0	LBS/YR
ASSUME SCRUBBER EFFICIENCY =			0.0			
E.O. TO ETHLYENE GLYCOL =					0	LBS/YR
E.O. VENTED FROM SCRUBBER STACK =					0	LBS/YR

ETHYLENE GLYCOL PRODUCED
LBS E O. * 62/44 = 0 LBS/YR

FOR 98 % REMOVAL

TREATED = 0.98 * 0 LBS = 0 LBS

DISCHARGE= 0 - 0 = 0 LBS

DISCHARGE TO POTW 0 LBS

FOR P.V.F (RA-50 with Unit down)

Pumps/liq=	1	*	0.0260	0.03 LBS/HR
Valves/liq=	5	*	0.0038	0.02 LBS/HR
Valves/Vap=	8	*	0.0011	0.01 LBS/HR
Flg&con/liq=	20	*	0.0001	0.00 LBS/HR
Flg&con/Vap=	52	*	0.0001	0.01 LBS/HR
RELIEF =	6	*	0.0980	0.59 LBS/HR
				0.00 LBS/HR

Input zero because no EO in the area in 2006

For RA-50/circulation/vent line/downtime
Tank Temperature and Pressure = 57 Deg F and 58psig Nitrogen pressure
EO vp @ 57F = 17psia, & 72.7psia nitrogen blanket
Percent EO in vapor = 23 %

Downtime emissions = 0 LBS/Year

EPICHLOROHYDRIN

(1999 LDAR UPDATE WITH NON-LEAKING FACTORS)

	INPUT	***INPUT***	
	CALANDER YEAR	2007	
	KYMENE 557H	27,158,686	LBS
	KYMENE 557LX	2,752,162	LBS
	KYMENE 736	3,475,509	LBS
	KYMENE 1022	8,503,986	LBS
	KYMENE MXC	0	
	KYMENE 621	0	
	KYMENE 625LX	0	
	TOTAL KYMENE **CALC**	41,890,343	LBS
	EPI IN 557H	1,288,512	LBS
	EPI IN 557LX	201,240	LBS
	EPI IN 736	859,363	LBS
	EPI IN 1022	402,093	LBS
	EPI IN MCX	0	
	EPI IN 621	0	
	EPI IN 625LX	0	
	TOTAL EPI **CALC**	2,749,208	LBS
	NITROGEN USAGE	3,884	MCF
	NITROGEN SWEEP EFFICIENCY	0.2	
	2006 PRODUCTION	50,743,580	
	PRODUCTION/ACTIVITY INDEX	0.83	
	SCRUBBER EFFICIENCY	98.0	% ASSUME

OUTPUT

FIGITIVE EMISSIONS	2,998 LBS/YEAR	R(II / 5.1)	
POINT SOURCE EMISSIONS	2,096 LBS/YEAR	R(II / 5.2)	
TO WWT	8,175 LBS/YEAR		
WWT VENTING	0 LBS/YEAR		
WWT TO SLUDGE	163 LBS/YEAR		
WWT BIOLOGICAL	1,063 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	5,258 LBS/YEAR	R(II / 8.1)	
QUANTITY TREAT ON-SITE	1,063 LBS/YEAR	R(II / 8.6)	
QUANTITY ON-SITE IMPOUND	163 LBS/YEAR	R(II/ 5.5.3)	
WWT DISCHARGE TO POTW	6,949 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 EXCECT 557LX
SINCE THE EPI "DROPS IN"
ASSUME ALL VAPOR SPACE DISPLACEMENT IS EPI

DISPLACEMENT = EPI* 1GAL/8.34*1.2 * 1FT/7.48GAL = 34,037 FT3
EPI TO SCRUBBER = EPI* 1MOLE/379FT3 * 92.5LBS/MOLE = 8,307 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 = 2,688 FT3
EPI TO SCRUBBER = EPI* 1MOLE/379FT3 *92.5LBS/MOLE = 35 LBS

TOTAL EPI(FROM RX) TO SCRUBBER = 8,342 LBS

ASSUME 98.0 PERCENT SCRUBBER EFFICIENCY
EPI IN SCRUBBER WATER TO WWT = 8,175 LBS
EPI FROM SCRUBBER VENT = 167 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 = 41,890,343 DIVIDED BY 107,000 = 391 BATCHES

FOR 30 SCFM NITROGEN PURGE FOR 30 MINUTES PER BATCH (30*30=900CFM/BATCH)
TOTAL NITROGEN PURGE = 391 * 900 = 352,349 CF

NITROGEN LEFT FOR BLANKET OF EPICHLOROHYDRIN AND DETA & HMDA = 3,531,651 CF

ASSUME NITROGEN SPLIT BETWEEN THE TWO SERVICES

THEREFORE NITROGEN IN EPI SERVICE = 1,765,826 = 202 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 = 202 SCFH = 0.561 #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		745	0.980	0.5615	745	0.980	0.5615	15.7310	
EPI	15	15	0.020	0.0113	15	0.020	0.0113	1.0461	0.0000
Total		760.00	1.000	0.5728	760.00	1.000	0.5728	16.7771	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 (I19 * 8,760 HRS/YR) = 9164 LBS/YEAR

FOR A NITROGEN SWEEP EFFICIENCY OF 0.2

EMISSIONS = 9,164 * 0.2 = 1,833 LBS/YEAR

FUGITIVE EMISSIONS =		2,998	LBS/YR	(FROM LDAR P,V,F "F1236")	
PT SOURCE =		2,096	LBS/YR	("D1257" + "D1262" + "H1341")	
TO WWT =		8,175	LBS/YR	("E1256")	
	TOTAL =	13,269	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 %
BOILOGICAL 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 *	8175	LBS/YR =	0	LBS/YEAR	
WWT PARTIONED TO THE SLUDGE = .02 *	8175	LBS/YR =	163	LBS/YEAR	
WWT BIOLOGICAL TREATMENT = .13 *	8175	LBS/YR =	1063	LBS/YEAR	
WWT ADSORBTION OR INCINERATION = .77 *	8175	LBS/YR =	0	LBS/YEAR	
WWT EFFLUENT DISCHARGE = .08 *	8175	LBS/YR =	0	LBS/YEAR	
WWT DISCHARGED TO POTW =			8,949	LBS/YEAR	

AMMONIA

(WITHOUT LDAR COMPONENT UPDATE)

INPUT	**INPUT**				
CALANDER YEAR	2007				
AMMONIA USAGE	0	LBS			
NITRILE PRODUCTION	0	LBS OF 731-D FEED			
WASTEWATER FLOW AVERAGE	0	GPD			
AVERAGE WASTEWATER pH	0.0				
pH NORMALITY	0.00000				
I.B. SLUDGE GENERATION RATE	4	CU YD/DAY			
OUTPUT	*OUTPUT*				
NH3 "LOSSES"(USAGE-THEORY)	0	LBS			
FUGITIVE EMISSIONS	0	LBS			R(II / 5.1)
POINT SOURCE EMISSIONS	0	LBS			R(II / 5.2)
NH3 TO (NH4)2SO4 @ 90%, & 10% POTW	0	LBS			
AMMONIUM SULFATE PRODUCED	0	LBS <?>	25,000LBS		
AMMONIA RECYCLE	0	LBS			R(II / 8.4)
NH3 "LOSSES"/ 1,000 LBS FEED	#DIV/0!	LBS/1,000 LBS FEED			
QUANTITY RELEASED	443	LBS			R(II / 8.1)
QUANTITY TO POTW	0	LBS			R(8.1A.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	0				
AMMONIA LOSSES	0				
NH3 % EXCESS	#DIV/0!	%			

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	0.28		
RELIEF	4.00	0.23	0.92		
		TOTAL =	2.33	LBS/HR	
		=	20,385	LBS/YEAR	

FUGITIVE EMISSIONS (P, V, F) = 0 LBS/YEAR

pH	Normality
9.00	0.00010
9.50	0.00050
10.00	0.00100
10.50	0.00500
11.00	0.01000
11.50	0.05000
12.00	0.10000
12.50	0.50000
13	1.00000

WASTEWATER FLOW			0	GPD			
ASSUME pH OF	0.0		0.00000	N	=	0.00000	g/l
NH3 IN WASTEWATER			0	LBS			
AVG NH3 LOSS IN WASTEWATER =			#DIV/0!	LBS/DAY			
AMMONIUM SULFATE PRODUCED			0	LBS			
NH3 LIQ 300FT/2"LINE			245	LBS			
NH3 VAP 300FT/1"LINE			1	LBS			
LOSSES/TRUCK UNLOADING			246	LBS/TRUCK			
TOTAL BLEED DOWN			0	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)			0.00				
DAYS OPERATION(NH3)			0.00				
AVERAGE DAYS OPERATION			0.00	DAYS			
LBS RECYCLE			0	LBS			

FOR
AMMONIUM SULFATE FORMED AT RAD

0 LBS * .10(%) = 0 LBS/YR

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

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

180 MG/L*3.785 L/GAL*4 CUYD/DAY*365DAY/YR*202GAL/YD*1LB/454G*1G/1000MG = 443 LBS/YR

AMMONIA SURFACE IMPOUNDMENT (ON-SITE) = 443 LBS/YR

BIPHENYL ------ 2007

AREA	DOWTHERM(LBS)	NAT GAS(M CF)
AMINE	0	0
POLYRAD	0	0
DYMEREX	0	0
KETTLE	0	0
POLY-PALE	0	0
P-CYMENE	0	0
TOTAL	0 LBS	0 MCF

DOWTHERM IS 27 PERCENT BIPHENYL
BIPHENYL LOSS = 27*TOTAL= 0 LBS (LESS THAN 10,000 LBS ?)
NO REPORT REQUIRED

2.0 MM BTU/HR VAPOR OUTPUT
NEW PP BOILER DESIGN = ---------- = 627
3.19 MM BTU/HR BURNER OUTPUT

OLDER BOILERS NOT AS EFFICIENT, USE AVERAGE PERCENT EFF. = .6

THEREFORE VAPOR OUTPUT = .6*TOTAL(MCF) = 0 (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.
= 0 LBS

BIPHENYL RECYCLE= .27 * DOWTHERM RECYCLE = 0 LBS

2002 ACTUAL

01/27/04
FEES.01adj#2.xls

Fees.01adj#2 uses a different calculation method for scrubber efficiency based upon MACT standards for E.O. and EPI.
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		
Discharge direct	172,261	R(II / 5.2)
WWT Ad/Inc	0	R(II / 5.3.1)
Venting@WWT	0	
Fug(by diff)	4,660	
Total Fug (Fug + wwtVent)	156,714	
Discharge to POTW	161,375	R(II / 5.1)
Total(Pt,Dis,Inc,Vt,Fug)	19,936	R(II / 6.1A1.)
Total(less Inc)	353,976	
Quantity on-site impoundment	353,976	
Quantity Released	404	R(II / 5.5.3)
Treated on-site	334,040	R(II / 8.1)
Treated off-site	0	R(II / 8.6)
	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
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***

	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	

LEAD USAGE		
LEAD BARS 1/4"	70	LBS
LEAD BARS 3/16"	44	LBS
TOTAL BURNING BARS	114	LBS >100 REPORT !
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 SHEMPER	0	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		

E.O. USAGE IN POLYDAD	51,884	LBS	E.O. "LOSSES"(USAGE-THEORY)	4,249	LBS	
E.O. USAGE IN E.O.D.	30,758	LBS	FUGITIVE EMISSIONS	1,127	LBS	R(II / 5.1)
TOTAL E.O. USAGE (CALC)	82,642	LBS	POINT SOURCE EMISSIONS	62	LBS	R(II / 5.2)
POLYRAD 0515	0	LBS	E.O. TO ETHYLENE GLYCOL	3,060	LBS	R(II / 8.6)
POLYRAD 0515A	23,650	LBS	ETHYLENE GLYCOL PRODUCED	4,312	LBS	>25,000LBS ?
POLYRAD 1110	73,790	LBS	QUANTITY RELEASED	1,189	LBS	R(II / 8.1)
POLYRAD 1110A	17,200	LBS				
SURFACTANT AR150	38,245	LBS	ACTIVITY INDEX	0.64		R(II/ 8.9)
SURFACTANT AR160	0	LBS	**FOR >25,000LBS :**			
# DAYS OP. (CAN USE NA)	28	DAYS (manual input	ETHYLENE GLYCOL DISCHARGED	0	LBS	R(II / 5.3.1)
2001 E. O. USAGE	128,154	required in "F132")	ETHYLENE GLYCOL TREATED ON-SITE	0	LBS	R(II/8.6)
SCRUBBER EFFICIENCY	98.0	% ASSUME***	ETHYLENE GLYCOL TO POTW	4,312	LBS	R(II/6.1.A.1)

KYMENE 557H	46,648,810	LBS	FIGITIVE EMISSIONS	2,998	LBS/YEAR	R(II / 5.1)
KYMENE 557LX	24,100,813	LBS	POINT SOURCE EMISSION	828	LBS/YEAR	R(II / 5.2)
KYMENE 736	1,868,409	LBS	TO WWT	8,669	LBS/YEAR	
KYMENE 1022	344,421	LBS	WWT VENTING	0	LBS/YEAR	
KYMENE MXC	101,480					
KYMENE 621	351,410					
KYMENE 625LX	47,340					
TOTAL KYMENE **CALC**	73,462,683	LBS	WWT TO SLUDGE	173	LBS/YEAR	
EPI IN 557H	2,121,156	LBS	WWT BIOLOGICAL	1,127	LBS/YEAR	R(II/ 8.6)
EPI IN 557LX	760,599	LBS	WWT ADSORB. / INCIN	0	LBS/YEAR	
EPI IN 736	468,099	LBS	WWT EFF. DISCHARGE	0	LBS/YEAR	R(II / 5.3.1)
EPI IN 1022	47,718	LBS	QUANTITY RELEASED	4,000	LBS/YEAR	R(II / 8.1)
EPI IN MCX	4,330					
EPI IN 621	25,645					
EPI IN 625LX	6,368					
TOTAL EPI **CALC**	3,433,915	LBS	QUANTITY TREAT ON-SITE	1,127	LBS/YEAR	R(II / 8.6)
NITROGEN USAGE	1,688	MCF	QUANTITY ON-SITE IMPOU	173	LBS/YEAR	R(II/ 5.5.3)
NITROGEN SWEEP EFFICIENCY	0.2		ACTIVITY INDEX	1.18		R(II / 8.9)
2001 PRODUCTION	62,497,806	LBS	WWT DISCHARGE TO POT	7,369	LBS/YEAR	R(II8.7)
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

ROSIN 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	23,458,712	LBS			ROSIN PLANT-WIDE VOC =	1.58	TPY
PAPER PRODUCTION	164,483,244	LBS					
"ROSIN" HANDLING FACTOR(est)	2	(ie," DOUBLE" HANDLING)			ROSIN PLANT-WIDE VOC =	4.79	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					

				TPY
			PM	7.86
EPI (Form R-Air "only")	3,827	lbs/yr	SO2	158.72
Eth BZ (Form R-Air)	0	lbs/yr	NOX	58.31
Eth GLYCOL(Form R-Air)	0	lbs/yr	CO	18.97
Eth OXIDE (Form R-Air)	1,189	lbs/yr	VOC*	200.55
MALEIC ANH (Form R-Air)	0	lbs/yr	TRS	0
TOLUENE (Form R-Air)	333,636	lbs/yr	LEAD	0
XLYENE (Form R-Air)	0	lbs/yr	CFC/HCFC	0
Adipic acid - lbs	4,417,347	lbs/yr	Other	0
Gum rosin/PP-lbs (melter)	4,313,790	lbs/yr	totHAP-voc	169.33
Resin flaked/HRA-lbs	9,676,150	lbs/yr	TH non-voc	0
Nat Gas-(Poly-Pale)	12,535	mcf		
(Power House)	417,857	mcf	SUM =	444.41 TPY
(HRA)	13,484	mcf	2002 FEE RATE=	25.00 $/TON
(Rosin Dist.)	2,891	mcf	TOTAL $ =	11,110
(Hydrogen)	0	mcf		
(RAD)	4,940	mcf	By quarters	2,777.58
(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		

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

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

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)
			NH3 "LOSSES"/ 1,000 LBS FEED	208.8	LBS/1,000 LBS FEED		
AQ NH3 AT DRESINOL	0	LBS	QUANTITY RELEASED	12,616	LBS		R(II / 8.1)
H2SO4 TOTES @40% =	0	NUMBER	QUANTITY TO POTW	8,621	LBS		R(6.1A.1.)(R8
			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 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 = 7.2lbs/yr + 7,907lbs/yr = 7,914lbs/yr = 3.96TPY

$$\frac{\text{3.96 TPY (1988 Base data)}}{\text{21,495,048 lbs Poly-Pale (1988)}} * \text{10,754,657 lbs} = \text{1.98 TPY(SO2)}$$

VOC = VOC Assumed to be non-HAP

VOC FROM 1988 DATA

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

$$\frac{\text{6.07 TPY (1988 Base data)}}{\text{21,495,048 lbs Poly-Pale (1988)}} * \text{10,754,657 lbs} = \text{3.04 TPY(VOC)}$$

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

$$\frac{\text{49.35 TPY (1988 Base data)}}{\text{19,713,604 lbs Production (1988)}} * \text{5,371,917 lbs} = \text{13.45 TPY(VOC)}$$

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

$$\frac{\text{28.69 TPY (1988 Base data)}}{\text{26,840,510 lbs flaked (1988)}} * \text{9,676,150 lbs} = \text{10.34 TPY(VOC)}$$

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

32.14 TPY (1988 Base data) "ASSUME THE SAME" = 32.14 TPY(VOC)

'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)

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 LIGUID, oR = oF + 460

K = GAS-PHASE MASS TRANSFER COEFFICIENT, ft/second

K = 0.00438 (U) ^0.78 (D / 3.1 * 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 / (Pa - 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),resins = 3 LBS/YR

FOR 60 "TANKS" L(w),resins = 164.44 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),paper = 14 LBS/YR

FOR 20 "TANKS" L(b),paper = 271.31 LBS/YEAR
0.03 LBS/HR
0.14 TPY

FOR WORKING LOSSES , L(w),paper = 17 LBS/YR

FOR 20 "TANKS" L(w),paper = 334.36 LBS/YEAR
0.04 LBS/HR
0.17 TPY

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

L(total) = L(b),rosin + L(w),rosin + L(b),paper + L(w),paper
= 0.41 0.08 0.14 0.17

L(total) = 0.79 TPY

ASSUME PLANT-WIDE FUGITIVES (P,V,F) AND STEAM BLOWING SAME AS L(total)

THEREFORE:TOTAL ROSIN VOC= 1.58 TPY

FOR CAPACITY:

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

	Poly-Pale	Met Res	Zeon	TOTAL	
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(il / 8.7)

	Ethyl Benz.		Xylene
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 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 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 RECY(	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 thruput 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 ASSU	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 ATMOSHPERE = 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 BELOIW

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 ADSORBTION 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

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	2,060	2265	2.50
T-30 1ST PP EV	2,649	5	2,644	92.13		1.025	0.250	4,666,428	420	11111	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 STG	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 FEEI	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 TANI	1	1	0	604		0	0	1,244,076	730	1704	4.00
T-106 MELHI STG	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		
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		

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

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	200	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 DISPLACEMEI $\frac{P1\ V1}{T1} = \frac{P2\ V2}{T2}$
AVERAGE DAY TEMPERATURE(76.3 DEG F.
AVERAGE NIGHT TEMPERATUR 52.9 DEG F.

FOR NIGHT VOLUEME(V2) = 128,668 GALLONS OR 17,202 CU FT
THE DAY VOLUEME(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 DISPLACI 286,447 FT3/YR + 11,556,868 FT3/YR
= 11,843,316 FT3/YEAR
= 1,352 SCFH

NITROGEN VENT 2,855 SCFH - 1,352 SCFH = 1,503 SCFH
(MAX) = 2,832 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 VOLUI 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 2,855 SCFH - 24 SCFH = 2,832 SCFH

FOR NITROGEN DISTRIBUTION BASED ON THRUPUT AND BREATHING VOLUEME
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 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 THRUPUT 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 SOI	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 MX	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: TOLUENE

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

A = 7

B = 1,345

C = 219 oC

Nitrogen = 97 SCFH = 0.270 #moles/Hr

T1(Centigrade)		T1(Centigrade)	
37.8	100.0 oF	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	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 (I1178 * 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 RECY(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*365DAY/YR*202GAL/YD*1LB/454G*1G/1000MG = 404 LBS/YR

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

ETHYLENE OXIDE

With 1999 LDAR update for NON-LEAKING factors

INPUT	**INPUT**
CALANDER YEAR	2,002
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 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(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	
QUANTITY RELEASED	1,189	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	4,312	LBS	R(II/6.1A.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 * 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 * 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) * LBS OF AR150 = 24,967 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.	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/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
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	***INPUT***	
CALANDER YEAR	2002	
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	
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"

	OLD(1987)	UPDATE1992	LDAR(1995)	LDAR(1999)	SOCMI FACTORS (LBS/HR) 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 EXCECT 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		745	0.980	0.1701	745	0.980	0.1701	4.7665	
EPI	15	15	0.020	0.0034	15	0.020	0.0034	0.3170	0.0000
Total		760.00	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 (I19 * 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 %
BOILOGICAL 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 ADSORBTION 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**		pH	Normality
CALANDER YEAR	2002			
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
I.B. 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

H2SO4 + 2NH4OH = (NH4)2SO4 +2H2O
98 70

(NH4)2SO4 = (NH4OH)
132 35

ASSUME 1 TOTE/YEAR OF 40% ACID USED IN EDUCTOR 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 LBS * .10(%) = 8,621 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 MG/L*3.785 L/GAL*4 CUYD/DAY*365DAY/YR*202GAL/YD*1LB/454G*1G/1000MG = 443 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	313,211	LBS
	27	LBS/HR	136.64	LBS/HR
	32	TONS/YEAR	156.61	TONS/YEAR
AT CAPACITY =	346,443	LBS	1,721,630	LBS
	40	LBS/HR	196.53	LBS/HR
	173	TONS/YEAR	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 H2SO4 REACTING WITH NH3 LOSSES OF 86,209 LBS
ACID IN MELHI AND POLY-PALE = - 17,550 LBS
ACID SOLD = - 0 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 / 3.19 MM BTU/HR BURNER OUTPUT = .627

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 !**	FUGITIVE EMISSIONS =	0.09 LBS/YEAR	(R5.1, R8.1)
SANDBLASTING SAND	1,000 LBS		RELEASED ONSITE =	0.20 LBS/YEAR	(R5.5.4 R8.1)
SAND TCLP LEAD	1,142 PPM		TRANSFER OFFSITE =	1.24 LBS/YEAR	(R6.2 R8.1)
TYVEX SUITS	295 LBS		RECYCLED OFFSITE =	0.00 LBS/YEAR	(R8.5)
TYVEX TCLP LEAD	344 PPM		ACTIVITY INDEX =	1.21	
LEAD EMISSION FACTOR	1.5 LB / TON				
LEAD SHEETS	4,960 LBS				

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 SHEMPER

ACTIVITY INDEX = SAME AS POLY-PALE = 1.21

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Hercules Inc

MASTERFILE
RELATED
STATUS
ATTACHMENTS
TASKS

ID	Branch	SIC	County	Basin	Start	End
2022	Chemical	2821, 2861, 2899, 2899	Forrest	Pascagoula River	06/11/1991	

Physical Address (Primary)	Mailing Address
613 West 7th Street Hattiesburg, MS 39401	613 West 7th Street Hattiesburg, MS 39401

Telecom Type	Address or Phone
Website	www.herc.com
Work Phone Number	(601) 545-3450

Alt ID	Alt Name	Alt Type	Start	End
2803500001	Hercules Inc	Air-AIRS AFS	06/11/1991	
080000001	*Hercules, Inc.*	*Air-State Operating*	*06/11/1991*	*06/01/1994*
080000001	Hercules, Inc.	Air-Title V Fee Customer	11/13/1998	
080000001	*Hercules, Inc.*	*Air-Title V Operating*	*11/13/1998*	*11/12/2003*
080000001	*Hercules, Inc.*	*Air-Title V Operating*	*04/22/2004*	*03/26/2009*
080000001	*Hercules, Inc.*	*Air-Title V Operating*	*03/26/2009*	*03/31/2009*
080000001	Hercules, Inc.	Air-Title V Operating	04/07/2009	03/31/2014
2022 001	Hercules Inc	GARD	04/13/1989	
MSR110153	*Hercules, Inc.*	*GP-Baseline*	*01/29/2001*	*12/16/2005*
MSR110153	*Hercules Inc*	*GP-Baseline*	*12/16/2005*	*03/26/2009*
MSR110153	Hercules Inc	GP-Baseline	03/26/2009	09/30/2010

MSR103943	*Hercules, Inc.*	*GP-Construction*	*01/03/2006*	*03/26/2009*
MSR103943	Hercules, Inc.	GP-Construction	03/26/2009	05/31/2010
MSR110153	*Hercules, Inc.*	*GP-Sara Title III*	*10/17/1997*	*01/29/2001*
MSD008182081	Hercules, Inc.	Hazardous Waste-EPA ID	01/20/1997	
2022	*Hercules Powder Company*	*Historic Site Name*	*01/01/1912*	*09/01/1968*
2022	Hercules, Inc.	Official Site Name	09/01/1968	
MS0001830	*Hercules, Inc.*	*Water - NPDES*	*09/29/1986*	*09/28/1991*
MS0001830	*Hercules, Inc.*	*Water - NPDES*	*10/22/1991*	*10/21/1996*
MS0001830	*Hercules, Inc.*	*Water - NPDES*	*09/30/1997*	*09/29/2002*
MS0001830	*Hercules, Inc.*	*Water - NPDES*	*10/31/2002*	*05/04/2007*
MS0001830	*Hercules, Inc.*	*Water - NPDES*	*05/04/2007*	*03/26/2009*
MS0001830	Hercules, Inc.	Water - NPDES	03/26/2009	04/30/2012
MSP091286	*Hercules, Inc.*	*Water - Pretreatment*	*03/12/1999*	*02/28/2004*
MSP091286	*Hercules Inc*	*Water - Pretreatment*	*11/05/2004*	*03/26/2009*
MSP091286	Hercules Inc	Water - Pretreatment	03/26/2009	10/31/2009

Program	SubProgram	Start Date	End Date
Air	MACT Subpart H	03/08/1998	
Air	*MACT Subpart PPP*	*06/01/1999*	*12/16/2005*
Air	MACT Subpart W	03/08/1998	
Air	NSPS Subpart Dc	09/12/1990	
Air	Title V - major	06/01/1900	
General Permit	No subprogram specified		
Hazardous Waste	*Conditional Exempt Small Quantity Generator*	*01/20/1997*	*11/21/2005*
Hazardous Waste	Large Quantity Generator	01/20/1997	
Water	Baseline Stormwater	01/29/2001	
Water	Construction Stormwater	01/03/2006	
Water	*NPDES Major*	*09/29/1986*	*03/12/1999*