

**COMMERCIAL-SCALE DEMONSTRATION OF THE
LIQUID PHASE METHANOL (LPMEOH™) PROCESS**

ENVIRONMENTAL MONITORING REPORT NO. 9

For The Period

1 April - 30 June 1999

Prepared by

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and

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Kingsport, Tennessee**

for the

Air Products Liquid Phase Conversion Company, L.P.

**Prepared for the United States Department of Energy
National Energy Technology Laboratory
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ACRONYMS AND DEFINITIONS

Acurex	-	Acurex Environmental Corporation (now ARCADIS, Geraghty & Miller)
Air Products	-	Air Products and Chemicals, Inc.
AFDU	-	Alternative Fuels Development Unit - The "LaPorte PDU"
Balanced Gas	-	A syngas with a composition of hydrogen (H ₂), carbon monoxide (CO), and carbon dioxide (CO ₂) in stoichiometric balance for the production of methanol
BOD	-	Biochemical Oxygen Demand
Carbon Monoxide Gas	-	A syngas containing primarily carbon monoxide (CO); also called CO Gas
Crude Grade Methanol	-	Underflow from rectifier column (29C-20), defined as 80 wt% minimum purity; requires further distillation in existing Eastman equipment prior to use
DME	-	dimethyl ether
DOE	-	United States Department of Energy
DOE-NETL	-	The DOE's National Energy Technology Laboratory (Project Team)
DOE-HQ	-	The DOE's Headquarters - Coal Fuels and Industrial Systems (Project Team)
DTP	-	Demonstration Test Plan - The four-year Operating Plan for Phase 3, Task 2 Operation
DVT	-	Design Verification Testing
Eastman	-	Eastman Chemical Company
EIV	-	Environmental Information Volume
EMP	-	Environmental Monitoring Plan
EMR	-	Environmental Monitoring Report
EPRI	-	Electric Power Research Institute
HAPs	-	Hazardous Air Pollutants
Hydrogen Gas	-	A syngas containing an excess of hydrogen (H ₂) over the stoichiometric balance for the production of methanol; also called H ₂ Gas
IGCC	-	Integrated Gasification Combined Cycle, a type of electric power generation plant
IGCC/OTM	-	An IGCC plant with a "Once-Thru Methanol" plant (the LPMEOH™ Process) added-on
KSCF	-	Thousand Standard Cubic Feet
KSCFH	-	Thousand Standard Cubic Feet per Hour
LaPorte PDU	-	The DOE-owned experimental unit (PDU) located adjacent to Air Products' industrial gas facility at LaPorte, Texas, where the LPMEOH™ process was successfully piloted
LDAR	-	Leak Detection and Repair
LPDME	-	Liquid Phase DME process, for the production of DME as a mixed coproduct with methanol
LPMEOH™	-	Liquid Phase Methanol (the technology to be demonstrated)
Main Plant Purge	-	Unreacted synthesis gas stream from LPMEOH™ process returned to Eastman's fuel gas header
mg/m ³	-	Milligrams per cubic meter
NEPA	-	National Environmental Policy Act
NPDES	-	National Pollutant Discharge Elimination System
NSPS	-	New Source Performance Standard
OSHA	-	Occupational Safety and Health Administration
Partnership	-	Air Products Liquid Phase Conversion Company, L.P.
PDU	-	Process Development Unit
PFD	-	Process Flow Diagram(s)
ppbv	-	parts per billion (volume basis)
Project	-	Production of Methanol/DME Using the LPMEOH™ Process at an Integrated Coal Gasification Facility
psia	-	Pounds per Square Inch (Absolute)
psig	-	Pounds per Square Inch (gauge)
P&ID	-	Piping and Instrumentation Diagram(s)
RCRA	-	Resource and Conservation Recovery Act
Refined Grade Methanol	-	Distilled methanol, defined as 99.8wt% minimum purity; used directly in downstream Eastman processes
SCFH	-	Standard Cubic Feet per Hour

ACRONYMS AND DEFINITIONS (cont'd)

Sl/hr-kg	-	Standard Liter(s) per Hour per Kilogram of Catalyst
Syngas	-	Abbreviation for Synthesis Gas
Synthesis Gas	-	A gas containing primarily hydrogen (H ₂) and carbon monoxide (CO), or mixtures of H ₂ and CO; intended for "synthesis" in a reactor to form methanol and/or other hydrocarbons (synthesis gas may also contain CO ₂ , water, and other gases)
Tie-in(s)	-	the interconnection(s) between the LPMEOH™ Process Demonstration Facility and the Eastman Facility
TOC	-	Total Organic Carbon
TLV	-	Threshold Limit Value
TPD	-	Ton(s) per Day
VOC	-	Volatile Organic Compound
WBS	-	Work Breakdown Structure
wt	-	Weight

1. Introduction

The Liquid Phase Methanol (LPMEOH™) Demonstration Project at Kingsport, Tennessee, is a \$213.7 million effort being conducted under a cooperative agreement between the U.S. Department of Energy (DOE) and Air Products Liquid Phase Conversion Company, L.P. (the Partnership). Air Products and Chemicals, Inc. (Air Products) and Eastman Chemical Company (Eastman) formed the Partnership to execute the Demonstration Project. A demonstration unit producing 80,000 gallons per day (260 tons-per-day (TPD)) of methanol from coal-derived synthesis gas (syngas) was designed, constructed, and began a four-year operational period in April of 1997 at a site located at the Eastman complex in Kingsport. The Partnership will own and operate the facility for the four-year demonstration period.

This project is sponsored under the DOE's Clean Coal Technology Program, and its primary objective is to "demonstrate the production of methanol using the LPMEOH™ Process in conjunction with an integrated coal gasification facility." The project will also demonstrate the suitability of the methanol produced for use as a chemical feedstock or as a low-sulfur dioxide, low-nitrogen oxides alternative fuel in stationary and transportation applications. The project may also demonstrate the production of dimethyl ether (DME) as a mixed coproduct with methanol, if laboratory- and pilot-scale research and market verification studies show promising results. If implemented, the DME would be produced during the last six months of the four-year demonstration period.

The LPMEOH™ process is the product of a cooperative development effort by Air Products and the DOE in a program that started in 1981. It was successfully piloted at a 10-TPD rate in the DOE-owned experimental unit at Air Products' LaPorte, Texas, site. This Demonstration Project is the culmination of that extensive cooperative development effort.

2. Project Description

The demonstration unit, which occupies an area of 0.6 acre, is integrated into the existing 4,000-acre Eastman complex located in Kingsport, Tennessee. The Eastman complex employs approximately 10,000 people. In 1983, Eastman constructed a coal gasification facility utilizing Texaco technology. The syngas generated by this gasification facility is used to produce carbon monoxide and methanol. Both of these products are used to produce methyl acetate and ultimately cellulose acetate and acetic acid. The availability of this highly reliable coal gasification facility was the major factor in selecting this location for the LPMEOH™ Process Demonstration. Three different feed gas streams (hydrogen gas or H₂ Gas, carbon monoxide gas or CO Gas, and Balanced Gas) are available from existing operations to the LPMEOH™ Demonstration Unit, thus providing the range of syngas ratios (hydrogen to carbon monoxide) needed to meet the technical objectives of the Demonstration Project.

For descriptive purposes and for design and construction scheduling, the project has been divided into four major process areas with their associated equipment:

- *Reaction Area* - Syngas preparation and methanol synthesis reaction equipment.
- *Purification Area* - Product separation and purification equipment.
- *Catalyst Preparation Area* - Catalyst and slurry preparation and disposal equipment.
- *Storage/Utility Area* - Methanol product, slurry, and oil storage equipment.

The physical appearance of this facility closely resembles the adjacent Eastman process plants, including process equipment in steel structures.

- *Reaction Area*

The reaction area includes feed gas compressors, catalyst guard beds, the reactor, a steam drum, separators, heat exchangers, and pumps. The equipment is supported by a matrix of structural steel. The most salient feature is the reactor, since with supports, it is approximately 84-feet tall.

- *Purification Area*

The purification area features two distillation columns with supports; one is approximately 82-feet tall, and the other 97-feet tall. These vessels resemble the columns of the surrounding process areas. In addition to the columns, this area includes the associated reboilers, condensers, air coolers, separators, and pumps.

- *Catalyst Preparation Area*

The catalyst preparation area consists of a building with a roof and partial walls, in which the catalyst preparation vessels, slurry handling equipment, and spent slurry disposal equipment are housed. In addition, a hot oil utility system is included in the area.

- *Storage/Utility Area*

The storage/utility area includes two diked lot-tanks for methanol, two tanks for oil storage, a slurry holdup tank, a trailer loading/unloading area, and an underground oil/water separator. A vent stack for safety relief devices is located in this area.

3. Process Description

The LPMEOH™ Demonstration Unit is integrated with Eastman's coal gasification facility. A simplified process flow diagram is included in Appendix A. Syngas is introduced into the slurry reactor, which contains a slurry of liquid mineral oil with suspended solid particles of catalyst. The syngas dissolves through the mineral oil, contacts the catalyst, and reacts to form methanol. The heat of reaction is absorbed by the slurry and is removed from the slurry by steam coils. The methanol vapor leaves the reactor, is condensed to a liquid, sent to the distillation columns for removal of higher alcohols, water, and other impurities, and is then stored in the day tanks for sampling before being sent to Eastman's methanol storage. Most of the unreacted syngas is recycled back to the reactor with the syngas recycle

compressor, improving cycle efficiency. The methanol will be used for downstream feedstocks and in off-site fuel testing to determine its suitability as a transportation fuel and as a fuel for stationary applications in the power industry.

Demonstration Test Plan

Following the start-up of the LPMEOH™ Demonstration Unit, a four-year test plan is being performed by Air Products and Eastman. The goals of the Test Plan are structured to meet the commercialization objectives for the LPMEOH™ Process. Excerpts from Commercialization Objectives from the program Statement of Work are included here to provide the global perspective of the Demonstration Plan:

"Primary Objective

The primary objective of the Project is to demonstrate the commercial scale production of methanol using the LPMEOH™ Process...

The LPMEOH™ Process technology is expected to be commercialized as part of an IGCC electric power generation system. Therefore, the Project incorporates the commercially important aspects of the operation of the LPMEOH™ Process which would enhance IGCC power generation. These important aspects of LPMEOH™ Process integrations are:

- The coproduction of electric power and of high value liquid transportation fuels and/or chemical feedstocks from coal. This coproduction requires that the partial conversion of synthesis gas to storable liquid products be demonstrated.
- Using an energy load following operating concept which allows conversion of off-peak energy, at attendant low value, into peak energy commanding a higher value. The load-following concept makes use of gasifier capacity that is under utilized during low-demand periods by using the LPMEOH™ Process to convert the excess synthesis gas to a storable liquid fuel for use in electric power generation during the peak energy periods. This operating concept requires that on/off and synthesis gas load following capabilities be demonstrated...

During operation, the instrumentation system will allow for the collection of engineering data, analysis and reporting which will be done by on-site technical personnel. Typical reporting will include on-stream factors, material and energy balances, reactor and equipment performance, comparison with laboratory and LaPorte Alternative Fuels Development Unit (AFDU) results, conversion efficiencies and catalyst activity...

Secondary Objective

A secondary objective of the Project is to demonstrate the production of DME (Dimethyl ether) as a mixed coproduct with methanol...

Subject to Design Verification Testing (DVT), the Partnership proposes to enhance the Project by including the demonstration of the slurry reactor's capability to produce DME as a mixed co-product with methanol...

DVT is required to address issues such as catalyst activity and stability and to provide data for engineering design and demonstration decision making...

At the conclusion of the DVT Steps, a joint Partnership/DOE decision will be made regarding continuation of the methanol/DME demonstration. Timing of the final decision must ensure that the necessary design, procurement, construction and commissioning can be completed to allow for (Phase 3, Task 2.2) operation at the end of the primary LPMEOH™ process demonstration period."

The full Demonstration Test Plan (issued September 1996) provides details in the strategy and conditions to be tested during the four-year operating period.

4. Environmental Monitoring Plan (EMP) Description

Air Products Liquid Phase Conversion Company, L.P., has constructed and is operating the 260 ton-per-day Liquid Phase Methanol (LPMEOH™) Demonstration Unit at the Eastman Chemical facility in Kingsport, Tennessee. As specified in the Cooperative Agreement, the Partnership developed an Environmental Monitoring Plan (EMP) (issued August 1996) which describes in detail the environmental monitoring activities to be performed during the operation of the LPMEOH™ Demonstration Unit. The purpose of the EMP is to: 1) document the extent of compliance monitoring activities, i.e., those activities required to meet permit requirements, 2) confirm the specific environmental impacts predicted in the National Environmental Policy Act documentation, and 3) establish an information base for the assessment of the environmental performance of the technology for future commercialization.

The EMP describes three categories of environmental monitoring which are performed as a result of the operation of the LPMEOH™ Demonstration Unit. Details of streams internal to the demonstration unit are available in the Technical Progress Reports for the Project.

4.1 Eastman Reporting of Publicly Available Technical Data

As defined in the Statement of Work for the Demonstration Project, Eastman will provide data on three areas of operation of the Chemicals-from-Coal complex (refer to Table 4.1 for a breakdown of the streams to be monitored):

- 1) Gasifier material balance data
- 2) 10C-30 Guard Bed operating data
- 3) Wastewater and alcohols to wastewater treatment system

This technical information provides information from Eastman's existing facilities to provide an overall assessment of the LPMEOH™ technology. A Special Topical Report will provide this information. Updates, if any, are included in Quarterly EMRs if a significant change occurs.

4.2 Compliance Monitoring

Four areas of compliance monitoring have been identified to satisfy the permit requirements for the demonstration unit (Table 4.2):

- 1) Combined Vapor Flow from Demonstration Unit to Boiler
- 2) Fugitive Emissions
- 3) Particulate Emissions
- 4) Wastewater Treatment System Outlet Stream

Each of these sources is monitored at a frequency mandated by the relevant permit or industrial hygiene practice. The EMRs will include the results of any compliance monitoring generated during the reporting period.

4.3 Supplemental Monitoring

Three areas of supplemental monitoring have been identified in the EMP (Table 4.3):

Summary of Major Material Balance Streams for Demonstration Unit

The major feed streams (CO Gas, H₂ Gas, Balanced Gas) and product flows (Refined Grade Methanol, Crude Grade Methanol, Main Plant Purge) are provided as a summary table of the cumulative stream flows for the reporting period.

Solid/Liquid Discharges

Four other streams can be generated from the demonstration unit:

- 1) Compressor and Pump Lubricants
- 2) Oil Recovered in Oil/Water Separator
- 3) Spent Catalyst
- 4) 29C-40 Guard Bed Adsorbent

Any quantities generated during the reporting period are included in the EMR.

Noise

The EMP identified that a noise survey around the 29K-01 Recycle Compressor was planned during the initial start-up of the demonstration unit.

TABLE 4.1

LPMEOH™ DEMONSTRATION UNIT

**PUBLICLY AVAILABLE TECHNICAL DATA FROM EASTMAN
CHEMICALS-FROM-COAL COMPLEX**

Environmental Media

General Parameters

Coal	Pressure, Temperature, Coal Analysis
Oxygen to Gasifier	Pressure, Temperature, %O ₂
Water to Gasifier	Pressure, Temperature
Waste Water from Gasifier	Pressure, Temperature, Total Organic Carbon
Clean Synthesis Gas from Gasifier	Pressure, Temperature, Flow
Sulfur Recovered from Gasifier	Pressure, Temperature, Flow, %S
Carbon Dioxide from Gasifier	Pressure, Temperature, Flow, %CO ₂
Slag from Gasifier	Pressure, Temperature, Flow
Balanced Gas from 10C-30 Guard Bed	Pressure, Temperature, Flow, Composition
Wastewater and Alcohols to Wastewater Treatment System	Flow, Composition, BOD

TABLE 4.2

LPMEOH™ DEMONSTRATION UNIT

COMPLIANCE MONITORING

Environmental Media

General Parameters

Combined Vapor Flow from Demonstration
Unit to Boiler

Composition

Fugitive Emissions

Leak Detection and Repair (LDAR)
Report, Volatile Organic Carbon (VOC),
Background Ambient CO Concentration

Particulate Emissions

Threshold Limit Value (TLV)

Wastewater Treatment System Outlet
Stream

Flow, Total Organic Carbon, pH

TABLE 4.3

LPMEOH™ DEMONSTRATION UNIT

SUPPLEMENTAL MONITORING

<u>Environmental Media</u>	<u>General Parameters</u>
CO Gas to LPMEOH™ Demonstration Unit	Cumulative Flow for Quarter
H ₂ Gas to LPMEOH™ Demonstration Unit	Cumulative Flow for Quarter
Balanced Gas to LPMEOH™ Demonstration Unit	Cumulative Flow for Quarter
Main Vapor Purge from LPMEOH™ Demonstration Unit	Cumulative Flow for Quarter
Refined Grade Methanol	Cumulative Flow for Quarter
Crude Grade Methanol	Cumulative Flow for Quarter
Compressor and Pump Lubricants	Weight or Volume
Oil Recovered in Oil/Water Separator	Weight or Volume
Spent Catalyst	Weight, Weight% Solids
29C-40 Guard Bed Adsorbent	Weight or Volume
Noise Survey for 29K-01 Recycle Compressor	dBa

5. Project Summary

Synthesis gas was first introduced to the LPMEOH™ Demonstration Unit on 02 April 1997. The nameplate capacity of 80,000 gallons of methanol per day (260 tons-per-day) was achieved on 06 April 1997. During the reporting period, availability for the LPMEOH™ Demonstration Unit was 100%. Table 5.1 summarizes the onstream time and outages of the LPMEOH™ Demonstration Unit during the reporting period.

6. Updates on Eastman “Chemicals-from Coal” Facility Publicly Available Technical Data

6.1 Gasifier Facility

As defined in Section 7.1 of the Environmental Monitoring Plan, publicly available technical data from the Eastman “Chemicals-from-Coal” facility, which includes data on the streams associated with the Gasifier facility, will be issued in a Special Topical Report. If a significant change in gasifier facility operation (e.g., feedstock change, equipment modifications or additions, etc.) occurs, then an update will be provided in a future EMR.

6.2 10C-30 Catalyst Guard Bed

As defined in Section 7.1 of the Environmental Monitoring Plan, publicly available technical data on the trace impurities entering and leaving the Catalyst Guard Bed will be issued in a Special Topical Report.

During the reporting period, there was a change of adsorbent materials within the 10C-30 Catalyst Guard Bed. Prior to this reporting period, the 10C-30 had been charged with both zinc oxide (for sulfur removal) and manganese oxide (for arsine removal). Beginning on 05 June 1999, the Eastman operations team began the preparations for changing the adsorbents in the Catalyst Guard Bed; during this work, the existing materials were removed and the 10C-30 was recharged with only manganese oxide.

6.3 Wastewater and Alcohols to Wastewater Treatment System

The report on publicly available technical data from the Eastman “Chemicals-from-Coal” facility, which includes data on the streams associated with the wastewater and alcohols to the Wastewater Treatment System, will be issued in a Special Topical Report. This will consist of a comparison of the flow, composition, and BOD load of this stream before and after the addition of the LPMEOH™ Demonstration Unit.

Table 5.1

Summary of LPMEOH™ Demonstration Plant Onstream Time and Outages - April / June 1999

Operation Start	Operation End	Operating Hours	Shutdown Hours	Reason for Shutdown
4/1/99 00:00	4/17/99 04:30	388.5	272.0	Shutdown for Outage
4/28/99 12:30	5/7/99 10:30	214.0	11.0	Syngas Outage
5/7/99 21:30	6/27/99 07:00	1209.5	29.0	Syngas Outage
6/28/99 12:00	6/30/99 23:59	60.0		
Total Operating Hours			1872.0	
Total Elapsed Hours			2184.0	
Plant Availability, %			100.00	

7. Compliance Monitoring

7.1 Combined Vapor Flow from Demonstration Unit to Boiler

A sample of the header gas from the LPMEOH™ Demonstration Unit must be analyzed as part of the Boiler and Industrial Furnace regulations within RCRA. Sampling is currently required every three years. During the development of the EMP, it was anticipated that the new tie-in from the LPMEOH™ Demonstration Unit to the Eastman fuel header would require testing as a new source. After the EMP was published, it was determined that the new tie-in was not considered a significant change and did not require testing. Therefore, with the current sampling schedule, the next sample will be taken in February of 2000.

No activity occurred during the reporting period.

7.2 Fugitive Emissions

7.2.1 Leak Detection and Repair (LDAR)

No activity occurred during the reporting period. The next report on Leak Detection and Repair at the LPMEOH™ Demonstration Unit is scheduled for the third quarter of calendar year 1999.

7.2.2 Ambient Carbon Monoxide Background Concentration

This one-time study was completed in June of 1998, and documents the concentration of CO that is encountered by a LPMEOH™ operations person during the course of a normal day of plant operations. The report on this study is included in Environmental Monitoring Report No. 5. Both the time-weighted average and the peak values for CO were below the established limits by the Tennessee Operational Health and Safety Administration.

7.3 Particulate Emissions

This one-time study was completed in July of 1997, and documents the exposure level to particulate emissions that is encountered by a LPMEOH™ operations person during the catalyst charging process. The report on this study is included in Environmental Monitoring Report No. 1. Some engineering modifications to the catalyst loading system are planned to reduce the dust concentration and potential personnel exposure.

7.4 Wastewater Treatment System Outlet Stream

The reports on the outfall from the Wastewater Treatment System (Discharge Number 002) for the reporting period is attached in Appendix B. There were no permit excursions.

A process stream within the existing Eastman facility which is impacted by the operation of the LPMEOH™ Demonstration Unit contains the byproduct alcohols and water which are generated in parallel with the production of methanol. This stream is sent to the Eastman

Wastewater Treatment System. As noted in Section 6.3, a comparison of the flow, composition, and BOD load of this stream before and after the addition of the LPMEOH™ Demonstration Unit will be included in a Special Topical Report on publicly available technical data from the Eastman "Chemicals-from-Coal" facility.

During the reporting period, Eastman has determined that the LPMEOH™ Demonstration Unit is subject to a new regulation under the New Source Performance Standards (NSPS). Subpart YYY is targeted at reducing emissions of volatile organic compounds (VOC's) from wastewater streams. The new regulation applies to the LPMEOH™ Demonstration Unit since construction was completed after September of 1994. Eastman has reviewed this regulation and has determined that no modifications to the LPMEOH™ Demonstration Unit will be required.

8. Supplemental Monitoring

8.1 Total Synthesis Gas Use and Methanol Production

Table 8.1 contains the summary of the major process flows to and from the LPMEOH™ Demonstration Unit for the reporting period. Approximately 3,790,000 gallons (12,500 tons) of methanol (Refined and Crude Grades) were produced during the reporting period.

8.2 Oil/Water Separator

A total of 24,000 pounds of oil was removed from the Oil/Water Separator during the reporting period. In addition, a total of 24,000 pounds of oil was recovered from other equipment within the existing Eastman complex. This material has been incinerated for energy recovery.

8.3 Compressor and Pump Lubricants

No material was generated during the reporting period.

8.4 Spent Catalyst Slurry

A total of 26,400 pounds of methanol synthesis catalyst were removed from the LPMEOH™ reactor during prior reporting periods. This material was shipped to the off-site catalyst reclaimer during this reporting period.

An additional 13,200 pounds of spent catalyst slurry was removed from the LPMEOH™ Reactor (drained into drums) during this reporting period. This material is presently stored on site, and arrangements are being made to ship this material to the off-site catalyst reclaimer.

Table 8-1**Synthesis Gas Use and Methanol Production - April/June 1999
LPMEOH™ Demonstration Unit**

	April 1999	May 1999	June 1999	Total
Consumption, KSCF				
Balanced Gas	252,626.0	379,459.0	357,511.0	993,596.0
CO Gas	41.0	41.0	42.0	124.0
H ₂ Gas	0.0	0.0	0.0	0.0
Production, Tons				
Crude Methanol	1,047.3	1,700.5	1,609.3	4,357.1
Refined Methanol	2,063.4	3,258.3	2,821.5	8,143.2
Total Purge Gas, KSCF	43,931.0	52,511.0	41,712.0	138,154.0

8.5 29C-40 Catalyst Guard Bed Spent Adsorbent

During the reporting period, there was a change of adsorbent materials within the 29C-40 Carbonyl Guard Bed. Prior to this reporting period, the 29C-40 had been charged with both activated carbon (for removal of metal carbonyls). Beginning on 05 June 1999, the Eastman operations team began the preparations for changing the adsorbents in the Carbonyl Guard Bed. Approximately 6,553 pounds of activated carbon was removed from the vessel (placed into drums). The spent activated carbon is presently stored on site, and will be sent offsite for disposal. The 29C-40 was then recharged with 2,983 pounds of manganese oxide (for arsine removal) and 2,367 pounds of activated carbon.

8.6 Noise

The results of noise dosimetry measurements of the entire LPMEOH™ Demonstration Unit were reported in Environmental Monitoring Report No. 1. The results of an area noise survey at each platform of the LPMEOH™ Demonstration Unit and around the 29K-01 Recycle Compressor were reported in Environmental Monitoring Report No. 2. No additional surveys were performed during the reporting period.

9. Compliance

9.1 Compliance with Permit Limits

There were no excursions outside permit limits associated with the operation of the LPMEOH™ Demonstration Unit.

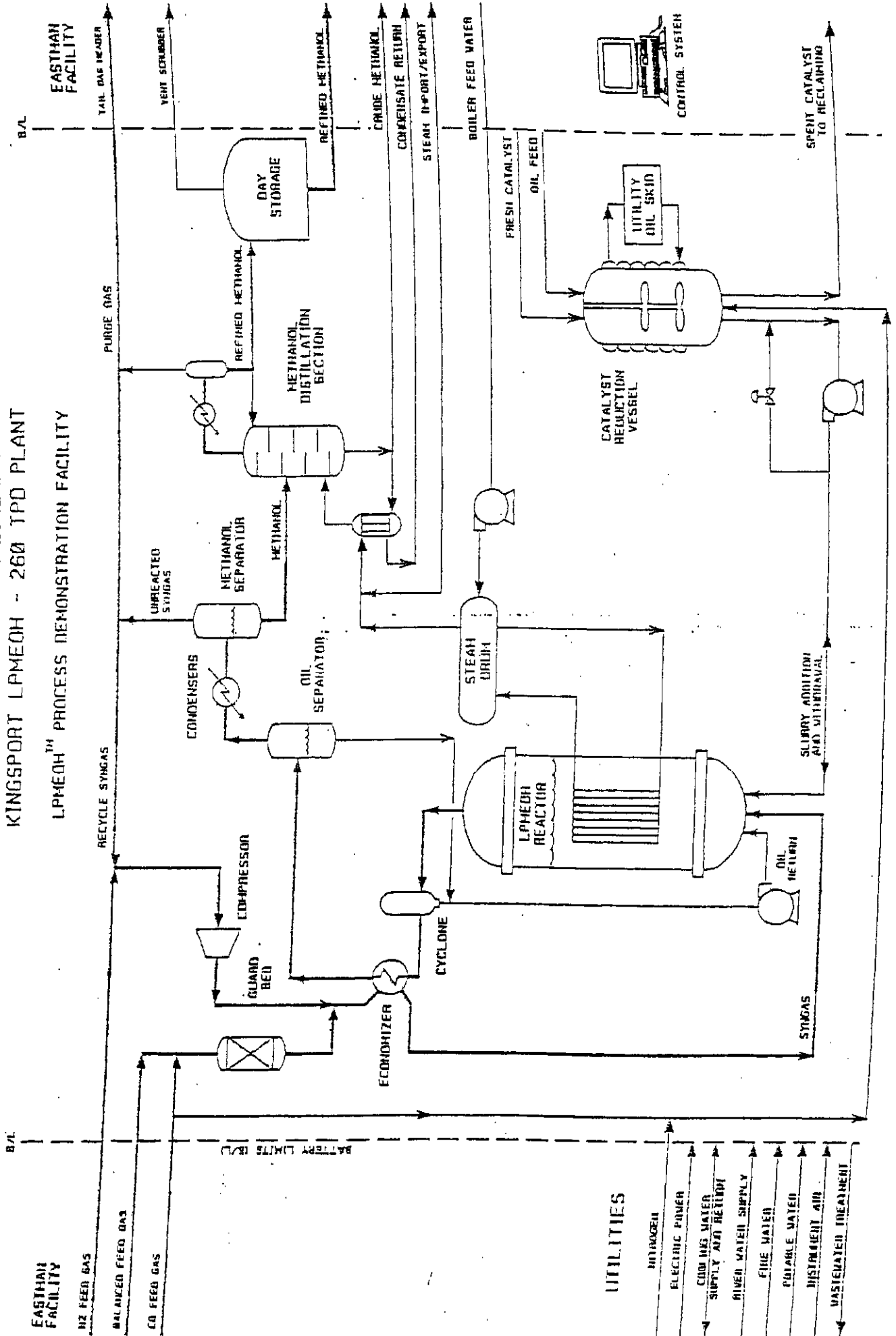
10. Problems and Recommendations

There have been no significant problems arising in the environmental area.

APPENDICES

APPENDIX A - SIMPLIFIED PROCESS FLOW DIAGRAM

**SIMPLIFIED PROCESS DIAGRAM
KINGSPORT LPMEOH - 260 TPD PLANT
LPMEOH™ PROCESS DEMONSTRATION FACILITY**



**APPENDIX B - NPDES REPORTS FOR WASTEWATER TREATMENT SYSTEM
OUTLET STREAM**

PERMITTEE NAME/ADDRESS:
 TN EASTMAN DIVISION
 DIVISION OF EASTMAN CHEMICAL CO.
 P.O. BOX 1993
 KINGSPOET, TN 37662-5393
 Facility: TN EASTMAN - KINGSPORT
 Location: SULLIVAN COUNTY TN 37662-5393

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 MAJOR (SUBR 06)
 F - FINAL
 INDUSTRIAL PROCESS WASTEWATER
 EFFLUENT

DISCHARGE MONITORING REPORT (DMR)
 002 G
 DISCHARGE NUMBER

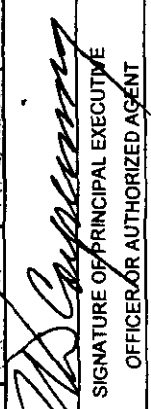
PERMIT NUMBER
 TN0002640

MONITORING PERIOD
 FROM 99-04-01 TO 99-04-30
 ** NO DISCHARGE **
 NOTE: Read instructions before completing this form.

PARAMETER (32-37)	(3 Card Only) (46-53)			Quantity or Loading (4 Card Only) (38-45)			Concentration (54-61)			NO. EX (62-63)	Frequency of Analysis (64-68)	Sample Type (69-70)
	AVERAGE	MAXIMUM	UNIT	MINIMUM	AVERAGE	UNIT	MAXIMUM	UNIT				
PH	SAMPLE MEASUREMENT	*****		6.5	*****		7.7	(12)	0	Continuous	N/A	
00400 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	*****	****	6.0 MINIMUM	*****	*****	*****	SU	0	CONTINUOUS	REGORDER	
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT	4,033	(26)	*****	*****	*****	*****		0	3/7	Composite	
00530 1 0 0 EFFLUENT GROSS VALUE	PERMIT REQUIREMENT	32697 DAILY MAX	LBS/DAY	*****	*****	*****	*****	****	0	1/7	Composite	
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT	37	(26)	*****	*****	0.2	0.5	(19)	0	1/7	Composite	
00610 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	6664 MON AVG	LBS/DAY	*****	*****	*****	*****	MG/L	0	1/30	Composite	
CYANIDE, TOTAL (AS CN)	SAMPLE MEASUREMENT	< 1.96	(26)	*****	*****	< 0.010	< 0.010	(19)	0	1/30	Grab	
00720 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	1049 MON AVG	LBS/DAY	*****	*****	0.048 MON AVG	0.33 DAILY MAX	MG/L	0	ONCE/MONTH	GRAB	
CHROMIUM, TOTAL (AS CR)	SAMPLE MEASUREMENT	1.55	(26)	*****	*****	0.008	0.008	(19)	0	1/30	Composite	
01034 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	1093 MON AVG	LBS/DAY	*****	*****	0.050 MON AVG	0.100 DAILY MAX	MG/L	0	ONCE/MONTH	COMPOSITE	
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT	5.12	(26)	*****	*****	0.026	0.026	(19)	0	1/30	Composite	
01042 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	1093 MON AVG	LBS/DAY	*****	*****	0.050 MON AVG	0.100 DAILY MAX	MG/L	0	ONCE/MONTH	COMPOSITE	
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT	0.63	(26)	*****	*****	0.003	0.003	(19)	0	1/30	Composite	
01051 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	3758 MON AVG	LBS/DAY	*****	*****	0.172 MON AVG	0.630 DAILY MAX	MG/L	0	ONCE/MONTH	COMPOSITE	

NAME / TITLE PRINCIPAL EXECUTIVE OFFICER
 H. H. Holliman, President
 Tennessee Eastman Division

TYPED OR PRINTED

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER


OFFICER OR AUTHORIZED AGENT

TELEPHONE
 (423) 229-2000

AREA CODE NUMBER
 99-05-12

DATE
 YEAR MO DAY

COMMENT AND EXPLANATION OF ANY VIOLATIONS
 (Reference all attachments here)

In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.

EPA FORM 3320-1 (REV. 9-85) Previous editions may be used.

PERMITTEE NAME/ADDRESS:
 TN EASTMAN DIVISION
 DIVISION OF EASTMAN CHEMICAL CO.
 P.O. BOX 1993
 KINGSFORT, TN 37662-5393
 Facility: TN EASTMAN - KINGSFORT
 Location: SULLIVAN COUNTY TN 37662-5393

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
DISCHARGE MONITORING REPORT (DMR)
 MAJOR (SUBR 06)
 F - FINAL
 INDUSTRIAL PROCESS WASTEWATER EFFLUENT

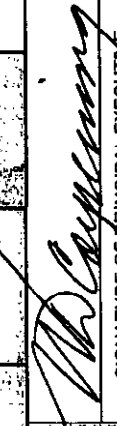
FORM APPROVED
 OMB No. 2040-0004

MONITORING PERIOD
 FROM 99-04-01 TO 99-04-30

** NO DISCHARGE **
 NOTE: Read instructions before completing this form.

PARAMETER (32-37)	Quantity or Loading (4 Card Only) (38-45)			Concentration (54-61)			NO. EX (62-63)	Frequency of Analysis (64-68)	Sample Type (69-70)
	AVERAGE (46-53)	MINIMUM (38-45)	UNIT (46-53)	AVERAGE (54-61)	MAXIMUM (54-61)	UNIT (54-61)			
NICKEL, TOTAL (AS NI)	2.85	*****	(26)	0.014	0.014	(19)	0	1/7	Composite
01067 2 0 0 EFFLUENT NET VALUE	422.84 MON AVG	*****	LBS/DAY	1690 MON AVG	1980 DAILY MAX	MGL		WEEKLY	COMPOSITE
ZINC, TOTAL (AS ZN)	12.69	*****	(26)	0.064	0.064	(19)	0	1/7	Composite
01092 2 0 0 EFFLUENT NET VALUE	158.00 MON AVG	*****	LBS/DAY	1770 MON AVG	1770 DAILY MAX	MGL		WEEKLY	COMPOSITE
FLOW, IN CONDUIT OR THRU TREATMENT PLANT	22.2	*****	(03)	*****	*****	*****	0	Continuous	N/A
50050 1 0 0 EFFLUENT GROSS VALUE	REPORT MON AVG	*****	MGD	*****	*****	*****		CONTINUOUS	REORDER
BOD, CARBONACEOUS 05 DAY, 20C	1,224	*****	(26)	*****	*****	*****	0	30/30	Composite
80082 2 W 0 EFFLUENT NET VALUE	6000 MON AVG	*****	LBS/DAY	*****	*****	*****		DAILY	COMPOSITE
MEASUREMENT									
PERMIT REQUIREMENT									
MEASUREMENT									
PERMIT REQUIREMENT									
MEASUREMENT									
PERMIT REQUIREMENT									
MEASUREMENT									
PERMIT REQUIREMENT									

NAME / TITLE PRINCIPAL EXECUTIVE OFFICER
 H. H. Holliman, President
 Tennessee Eastman Division

SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER


OFFICER OR AUTHORIZED AGENT
 (423) 229-2000
 AREA CODE NUMBER

TELEPHONE
 DATE
 99-05-12
 YEAR MO DAY

FORMS BY WINDOWCHEM(07)884-0845.ppt(1082)-6.01/4/98

COMMENT AND EXPLANATION OF ANY VIOLATIONS
 In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.

(REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

EPA FORM 3320-1 (REV.9-88) Previous editions may be used.

PAGE 3 OF 7

PERMITTEE NAME/ADDRESS:
 TN EASTMAN DIVISION
 DIVISION OF EASTMAN CHEMICAL CO.
 P.O. BOX 1993
 KINGSPOINT, TN 37662-5393
 Facility: TN EASTMAN - KINGSPORT

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 MAJOR
 DISCHARGE MONITORING REPORT (DMR)
 (SUBR 06)
 F - FINAL
 INDUSTRIAL PROCESS WASTEWATER
 EFFLUENT

FORM APPROVED
 OMB No. 2040-0004

MONITORING PERIOD
 FROM 99 - 06 - 01 TO 99 - 06 - 30

Location: SULLIVAN COUNTY TN 37662-5393

** NO DISCHARGE [] **

NOTE: Read instructions before completing this form.

PARAMETER (32-37)	SAMPLE MEASUREMENT REQUIREMENT	Quantity or Loading (4 Card Only) (38-45)		Quantity or Concentration (54-61)		NO. EX (62-63)	Frequency of Analysis (64-68)	Sample Type (69-70)
		AVERAGE (46-53)	MINIMUM (38-45)	AVERAGE (46-53)	MAXIMUM (54-61)			
PH	SAMPLE MEASUREMENT REQUIREMENT	*****	6.7	*****	7.5	0	Continuous	N/A
00400 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	6.0 MINIMUM	*****	*****	0	CONTINUOUS	RECORDER
SOLIDS, TOTAL SUSPENDED	SAMPLE MEASUREMENT REQUIREMENT	2.362	(26)	3.486	*****	0	3/7	Composite
00530 1 0 0 EFFLUENT GROSS VALUE	SAMPLE MEASUREMENT REQUIREMENT	10093 MON AVG	DAILY MAX	32687	*****	0	WEEK	COMPOSITE
NITROGEN, AMMONIA TOTAL (AS N)	SAMPLE MEASUREMENT REQUIREMENT	75	(26)	92	0.5	0	1/7	Composite
00610 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	5664 MON AVG	DAILY MAX	13329	*****	0	WEEK	COMPOSITE
CYANIDE, TOTAL (AS CN)	SAMPLE MEASUREMENT REQUIREMENT	< 2.10	(26)	< 2.10	< 0.010	0	1/30	Grab
00720 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	1049 MON AVG	DAILY MAX	74.95	*****	0	ONCE/MONTH	GRAB
CHROMIUM, TOTAL (AS CR)	SAMPLE MEASUREMENT REQUIREMENT	3.25	(26)	3.25	0.016	0	1/30	Composite
01034 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	1093 MON AVG	DAILY MAX	21.85	*****	0	ONCE/MONTH	COMPOSITE
COPPER, TOTAL (AS CU)	SAMPLE MEASUREMENT REQUIREMENT	1.09	(26)	1.09	0.005	0	1/30	Composite
01042 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	1093 MON AVG	DAILY MAX	21.85	*****	0	ONCE/MONTH	COMPOSITE
LEAD, TOTAL (AS PB)	SAMPLE MEASUREMENT REQUIREMENT	< 6.29	(26)	< 6.29	< 0.030	0	1/30	Composite
01051 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	37.58 MON AVG	DAILY MAX	150.77	*****	0	ONCE/MONTH	COMPOSITE
NAME / TITLE PRINCIPAL EXECUTIVE OFFICER		SIGNATURE OF PRINCIPAL EXECUTIVE		OFFICER OR AUTHORIZED AGENT		TELEPHONE		DATE
H. H. Holliman, President Tennessee Eastman Division						(423) 229-2000		99 - 07 - 13
TYPED OR PRINTED						AREA CODE NUMBER		YEAR MO DAY

COMMITTEE AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)

In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPC and SPC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.

EPA FORM 3320-1 (REV. 9-88) Previous editions may be used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

FORMS BY: WindowChem(707)964-0845;pm11090;v3.01/4/96

002 Q
 DISCHARGE NUMBER

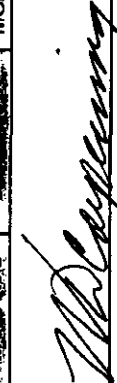
002 Q
 DISCHARGE NUMBER

002 Q
 DISCHARGE NUMBER

PERMIT NUMBER

*** NO DISCHARGE ***
 NOTE: Read instructions before completing this form.

MONITORING PERIOD
 FROM 99 - 04 - 01 TO 99 - 06 - 30

PARAMETER (32-37)	SAMPLE MEASUREMENT REQUIREMENT	(3 Card Only) (46-53)		Loading Unit	(4 Card Only) (38-45)		Concentration (54-61)		NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)
		Average	Maximum		Minimum	Average	Maximum	Unit			
CARBON TETRACHLORIDE	SAMPLE MEASUREMENT REQUIREMENT	*****	<0.23	(26)	*****	<0.001	*****	(19)	0	3/Quarter	Grab
32102 2 0 0 EFFLUENT NET VALUE 1,2-DICHLOROETHANE	SAMPLE MEASUREMENT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	*****	DAILY MAX	MON AVG	MG/L	0	QUARTERLY	GRAB
32103 2 0 0 EFFLUENT NET VALUE CHLOROFORM	SAMPLE MEASUREMENT REQUIREMENT	*****	<0.23	(26)	*****	<0.001	*****	(19)	0	3/Quarter	Grab
32106 2 0 0 EFFLUENT NET VALUE TOLUENE	SAMPLE MEASUREMENT REQUIREMENT	*****	<0.23	(26)	*****	<0.001	*****	(19)	0	3/Quarter	Grab
34010 2 0 0 EFFLUENT NET VALUE ACENAPHTHYLENE	SAMPLE MEASUREMENT REQUIREMENT	*****	<0.23	(26)	*****	<0.001	*****	(19)	0	3/Quarter	Grab
34200 2 0 0 EFFLUENT NET VALUE ACENAPHTHENE	SAMPLE MEASUREMENT REQUIREMENT	*****	<0.22	(26)	*****	<0.001	*****	(19)	0	2/Quarter	Grab
34205 2 0 0 EFFLUENT NET VALUE ACRYLONITRILE	SAMPLE MEASUREMENT REQUIREMENT	*****	<0.22	(26)	*****	<0.001	*****	(19)	0	2/Quarter	Grab
34215 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	<0.23	(26)	*****	<0.001	*****	(19)	0	3/Quarter	Grab
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER H. H. Holliman, President Tennessee Eastman Division TYPED OR PRINTED											
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER  OFFICER OR AUTHORIZED AGENT											
TELEPHONE (423) 229-2000										AREA CODE NUMBER 99 - 07 - 13	

*** NO DISCHARGE ***
 NOTE: Read instructions before completing this form.

MONITORING PERIOD
 FROM 99-04-01 TO 99-06-30

PARAMETER (32-37)	SAMPLE MEASUREMENT	(3 Card Only) (46-53)		Loading Unit	(4 Card Only) (38-45)		Quality or Concentration (54-61)	NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)
		Average	Maximum		Minimum	Average				
ANTHRACENE	MEASUREMENT	0.22	<0.22	(26)	*****	*****	<0.001	0	2/Quarter	Grab
34220 2 0 0	PERM. REQUIREMENT	0.354	DAILY MAX	LBS/DAY	*****	*****	DAILY MAX		QUARTERLY	GRAB
BENZENE, DISSOLVED	MEASUREMENT	0.23	<0.23	(26)	*****	*****	<0.001	0	3/Quarter	Grab
34235 2 0 0	PERM. REQUIREMENT	29.72	DAILY MAX	LBS/DAY	*****	*****	DAILY MAX		QUARTERLY	GRAB
BENZO (K) FLUORANTHENE	MEASUREMENT	0.22	<0.22	(26)	*****	*****	<0.001	0	2/Quarter	Grab
34242 2 0 0	PERM. REQUIREMENT	3.64	DAILY MAX	LBS/DAY	*****	*****	DAILY MAX		QUARTERLY	GRAB
BENZO (A) PYRENE	MEASUREMENT	0.22	<0.22	(26)	*****	*****	<0.001	0	2/Quarter	Grab
34247 2 0 0	PERM. REQUIREMENT	3.64	DAILY MAX	LBS/DAY	*****	*****	DAILY MAX		QUARTERLY	GRAB
CHLOROBENZENE	MEASUREMENT	0.23	<0.23	(26)	*****	*****	<0.001	0	3/Quarter	Grab
34301 2 0 0	PERM. REQUIREMENT	6.12	DAILY MAX	LBS/DAY	*****	*****	DAILY MAX		QUARTERLY	GRAB
CHRYSENE	MEASUREMENT	0.22	<0.22	(26)	*****	*****	<0.001	0	2/Quarter	Grab
34320 2 0 0	PERM. REQUIREMENT	0.354	DAILY MAX	LBS/DAY	*****	*****	DAILY MAX		QUARTERLY	GRAB
DIETHYL PHTHALATE	MEASUREMENT	0.22	<0.22	(26)	*****	*****	<0.001	0	2/Quarter	Grab
34336 2 0 0	PERM. REQUIREMENT	0.36	DAILY MAX	LBS/DAY	*****	*****	DAILY MAX		QUARTERLY	GRAB
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER H. H. Holliman, President Tennessee Eastman Division TYPED OR PRINTED SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OFFICER OR AUTHORIZED AGENT (423) 229-2000 AREA CODE NUMBER TELEPHONE DATE 99-07-13 YEAR MO DAY										

COMMENT AND EXPLANATION OF ANY VIOLATIONS
 In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.
 EPA FORM 3320-1 (REV. 9-88) Previous editions may be used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

DISCHARGE MONITORING REPORT (DMR)
 002 Q
 DISCHARGE NUMBER

PERMIT NUMBER
 TN0002640

*** NO DISCHARGE [] ***
 NOTE: Read instructions before completing this form.

MONITORING PERIOD
 FROM 99 - 04 - 01 TO 99 - 06 - 30

PARAMETER (32-37)	SAMPLE MEASUREMENT REQUIREMENT	(3 Card Only) (46-53)		Quantity or (54-61)		Loading Unit	(4 Card Only) (38-45)			Concentration (54-61)		NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)
		Average	Maximum	Average	Maximum		Minimum	Average	Maximum	Unit	Unit			
DIMETHYL PHTHALATE														
34341 2 0 0 EFFLUENT NET VALUE						(26)						0	2/Quarter	Grab
FLUORANTHENE													QUARTERLY	GRAB
34376 2 0 0 EFFLUENT NET VALUE						(26)						0	2/Quarter	Grab
FLUORENE													QUARTERLY	GRAB
34381 2 0 0 EFFLUENT NET VALUE						(26)						0	2/Quarter	Grab
HEXACHLOROBUTADIENE													QUARTERLY	GRAB
34391 2 0 0 EFFLUENT NET VALUE						(26)						0	2/Quarter	Grab
HEXACHLOROETHANE													QUARTERLY	GRAB
34396 2 0 0 EFFLUENT NET VALUE						(26)						0	2/Quarter	Grab
METHYL CHLORIDE													QUARTERLY	GRAB
34418 2 0 0 EFFLUENT NET VALUE						(26)						0	3/Quarter	Grab
METHYLENE CHLORIDE													QUARTERLY	GRAB
34423 2 0 0 EFFLUENT NET VALUE						(26)						0	3/Quarter	Grab
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER													
H. H. Holliman, President	OFFICER OR AUTHORIZED AGENT													
Tennessee Eastman Division	TELEPHONE													
TYPED OR PRINTED	(423) 229-2000													
COMMENT AND EXPLANATION OF ANY VIOLATIONS	AREA CODE NUMBER													
In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.	YEAR MO DAY													
EPA FORM 3320-1 (REV. 9-88) Previous editions may be used.	99 - 07 - 13													

MAJOR
(SUBR 06)
F - FINAL

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)

DISCHARGE MONITORING REPORT (DMR)

002 Q
DISCHARGE NUMBER

TN0002640
PERMIT NUMBER


PROCESSED WW QUARTERLY REPORT
EFFLUENT

*** NO DISCHARGE ***

NOTE: Read instructions before completing this form.

MONITORING PERIOD
FROM 99 - 04 - 01 TO 99 - 06 - 30

PERMITTEE NAME/ADDRESS:
TN EASTMAN DIVISION
DIVISION OF EASTMAN CHEMICAL CO.
P O BOX 1993
KINGSPORT TN 37662-5393
Facility: TN EASTMAN - KINGSPORT
Location: SULLIVAN COUNTY TN 37662-5393

PARAMETER (32-37)	SAMPLE MEASUREMENT REQUIREMENT	(3 Card Only) (46-53)		Quantity or (54-61)		Loading		(4 Card Only) (38-45)		Quality or (46-53)		Concentration (54-61)		NO. EX (62-63)	Frequency of analysis (64-66)	Sample Type (69-70)
		Average	MON AVG	Maximum	DAILY MAX	Unit	Minimum	Average	Maximum	Unit	Average	MON AVG	Maximum			
NITROBENZENE	SAMPLE MEASUREMENT REQUIREMENT	*****	590	<0.22	14.86	(26)	*****	*****	<0.001	0.027	DAILY MAX	(19)	0	2/Quarter	Grab	
34447 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.22	0.354	(26)	*****	*****	<0.001	0.00082	DAILY MAX	(19)	0	2/Quarter	GRAB	
PHENANTHRENE	SAMPLE MEASUREMENT REQUIREMENT	*****	0.179	<0.22	0.354	(26)	*****	*****	<0.001	0.00082	DAILY MAX	(19)	0	2/Quarter	Grab	
34461 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.22	0.354	(26)	*****	*****	<0.001	0.00082	DAILY MAX	(19)	0	2/Quarter	GRAB	
PYRENE	SAMPLE MEASUREMENT REQUIREMENT	*****	0.179	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	Grab	
34469 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	GRAB	
TETRACHLOROETHYLENE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	Grab	
34475 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	GRAB	
1,1 - DICHLOROETHANE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	Grab	
34496 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	GRAB	
1,1 - DICHLOROETHYLENE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	Grab	
34501 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	GRAB	
1,1,1 - TRICHLOROETHANE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	Grab	
34506 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	*****	*****	<0.23	12.24	(26)	*****	*****	<0.001	0.022	DAILY MAX	(19)	0	3/Quarter	GRAB	
I CERTIFY UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY INQUIRY OF THOSE INDIVIDUALS IMMEDIATELY RESPONSIBLE FOR OBTAINING THE INFORMATION, I BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT. SEE 18 USC 1001 AND 33 USC 1312. (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.)																
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER										SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT 						
H. H. Holliman, President										TELEPHONE (423) 229-2000						
Tennessee Eastman Division										AREA CODE NUMBER 99 - 07 - 13						
TYPED OR PRINTED										YEAR MO DAY						

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)


In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.

EPA FORM 3320-1 (REV. 9-88) Previous editions may be used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

MONITORING PERIOD
 FROM 99 - 04 - 01 TO 99 - 06 - 30

*** NO DISCHARGE [] ***
 NOTE: Read instructions before completing this form.

Facility: TN EASTMAN - KINGSPOST
 Location: SULLIVAN COUNTY TN 37662-5393

PARAMETER (32-37)	Sample Type	(3 Card Only) (46-53)			(4 Card Only) (38-45)			Quality or Concentration (54-61)		NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)	
		Average	Maximum	Unit	Minimum	Average	Maximum	Unit	Unit				
1,1,2 - TRICHLOROETHANE	SAMPLE MEASUREMENT	*****	<0.23	(26)	*****	<0.001	(19)	*****	<0.001	0	3/Quarter	Grab	
34511 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	4.50 MON. AVG	10.00 DAILY MAX	LBS/DAY	*****	0.02 MON. AVG	0.05 DAILY MAX	MG/L	0.001	0	QUARTERLY	GRAB	
BENZO (A) ANTHRACENE	SAMPLE MEASUREMENT	*****	<0.22	(26)	*****	<0.001	(19)	*****	<0.001	0	2/Quarter	Grab	
34526 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	1.75 MON. AVG	3.54 DAILY MAX	LBS/DAY	*****	0.008 MON. AVG	0.02 DAILY MAX	MG/L	0.001	0	QUARTERLY	GRAB	
1,2 - DICHLOROBENZENE	SAMPLE MEASUREMENT	*****	<0.23	(26)	*****	<0.001	(19)	*****	<0.001	0	3/Quarter	Grab	
34536 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	1.03 MON. AVG	3.52 DAILY MAX	LBS/DAY	*****	0.077 MON. AVG	0.165 DAILY MAX	MG/L	0.001	0	QUARTERLY	GRAB	
1,2 - DICHLOROPROPANE	SAMPLE MEASUREMENT	*****	<0.23	(26)	*****	<0.001	(19)	*****	<0.001	0	3/Quarter	Grab	
34541 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	33.43 MON. AVG	50.26 DAILY MAX	LBS/DAY	*****	0.453 MON. AVG	0.230 DAILY MAX	MG/L	0.001	0	QUARTERLY	GRAB	
1,2 - TRANS - DICHLOROETHYLENE	SAMPLE MEASUREMENT	*****	<0.23	(26)	*****	<0.001	(19)	*****	<0.001	0	3/Quarter	Grab	
34546 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	4.50 MON. AVG	11.80 DAILY MAX	LBS/DAY	*****	0.021 MON. AVG	0.05 DAILY MAX	MG/L	0.001	0	QUARTERLY	GRAB	
1,2,4 - TRICHLOROBENZENE	SAMPLE MEASUREMENT	*****	<0.22	(26)	*****	<0.001	(19)	*****	<0.001	0	2/Quarter	Grab	
34551 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	1.88 MON. AVG	30.59 DAILY MAX	LBS/DAY	*****	0.060 MON. AVG	0.05 DAILY MAX	MG/L	0.001	0	QUARTERLY	GRAB	
1,3 - DICHLOROPROPENE, TOTAL WEIGHT	SAMPLE MEASUREMENT	*****	<0.45	(26)	*****	<0.002	(19)	*****	<0.002	0	3/Quarter	Grab	
34561 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	6.34 MON. AVG	9.53 DAILY MAX	LBS/DAY	*****	0.023 MON. AVG	0.05 DAILY MAX	MG/L	0.001	0	QUARTERLY	GRAB	
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER H. H. Holliman, President Tennessee Eastman Division TYPED OR PRINTED													
SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER OR AUTHORIZED AGENT 													
										(423) 229-2000 AREA CODE NUMBER		99 - 07 - 13 YEAR MO DAY	

COMMENT AND EXPLANATION OF ANY VIOLATIONS
 (Reference all attachments here)
 In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.
 EPA FORM 3320-1 (REV. 9-86) Previous editions may be used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES)
 DISCHARGE MONITORING REPORT (DMR)
 002 Q
 DISCHARGE NUMBER

MAJOR (SUBR 06)
 F - FINAL
 PROCESSED WW QUARTERLY REPORT
 EFFLUENT

FORM APPROVED
 OMB No 2040-0004

*** NO DISCHARGE [] ***
 NOTE: Read instructions before completing this form.

PARAMETER (32-37)	SAMPLE MEASUREMENT REQUIREMENT	(3 Card Only) (46-53)		Loading Unit	(4 Card Only) (38-45)		Quality or Concentration (54-61)		NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)
		Average	Maximum		Minimum	Average	Maximum	Unit			
1,3 - DICHLOROBENZENE	SAMPLE MEASUREMENT REQUIREMENT	<0.23	9.61 DAILY MAX	(26)	<0.001	<0.001	(19)	0	3/Quarter	Grab	
34566 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	<0.23	6.12 DAILY MAX	(26)	<0.001	<0.001	(19)	0	3/Quarter	Grab	
1,4 - DICHLOROBENZENE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	20.4 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
34571 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	16.08 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
2 - CHLOROPHENOL	SAMPLE MEASUREMENT REQUIREMENT	<0.22	24.47 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
34586 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	7.87 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
2 - NITROPHENOL	SAMPLE MEASUREMENT REQUIREMENT	<0.22	62.27 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
34591 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	24.47 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
2,4 - DICHLOROPHENOL	SAMPLE MEASUREMENT REQUIREMENT	<0.22	7.87 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
34601 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	62.27 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
2,4 - DIMETHYLPHENOL	SAMPLE MEASUREMENT REQUIREMENT	<0.22	62.27 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
34606 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	62.27 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
2,4 - DINITROTOLUENE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	62.27 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
34611 2 0 0 EFFLUENT NET VALUE	SAMPLE MEASUREMENT REQUIREMENT	<0.22	62.27 DAILY MAX	(26)	<0.001	<0.001	(19)	0	2/Quarter	Grab	
FROM 99-04-01 TO 99-06-30 MONITORING PERIOD SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER: <i>H. H. Holliman</i> OFFICER OR AUTHORIZED AGENT: H. H. Holliman, President SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER: _____ OFFICER OR AUTHORIZED AGENT: _____ TELEPHONE: (423) 229-2000 AREA CODE NUMBER: 229-2000 YEAR: 99 - 07 - 13 MO: _____ DAY: _____											

COMMENT AND EXPLANATION OF ANY VIOLATIONS (Reference all attachments here)
 In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.
 EPA FORM 3320-1 (REV. 9-88) Previous editions may be used. (REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

*** NO DISCHARGE [] ***

NOTE: Read instructions before completing this form.

MONITORING PERIOD	
FROM	TO
99 - 04 - 01	99 - 06 - 30

PARAMETER (32-37)	MEASUREMENT	(3 Card Only) (46-53)		Loading Unit	Quantity or (54-61)		Quality or (46-53)	Concentration (54-61)		NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)
		Average	Maximum		Maximum	Maximum		Minimum	Average			
2,4 - DINITROPHENOL	SAMPLE MEASUREMENT	*****	<1.72	(26)	<0.008		*****			0	2/Quarter	Grab
34616 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	MON AVG	DAILY MAX	MON AVG	DAILY MAX			QUARTERLY	GRAB
2,6 - DINITROTOLUENE	SAMPLE MEASUREMENT	*****	<0.22	(26)	<0.001		*****			0	2/Quarter	Grab
34626 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	MON AVG	DAILY MAX	MON AVG	DAILY MAX			QUARTERLY	GRAB
4 - NITROPHENOL	SAMPLE MEASUREMENT	*****	<0.22	(26)	<0.001		*****			0	2/Quarter	Grab
34646 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	MON AVG	DAILY MAX	MON AVG	DAILY MAX			QUARTERLY	GRAB
4,6 - DINITRO - O - CRESOL	SAMPLE MEASUREMENT	*****	<0.22	(26)	<0.001		*****			0	2/Quarter	Grab
34657 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	MON AVG	DAILY MAX	MON AVG	DAILY MAX			QUARTERLY	GRAB
PHENOL, SINGLE COMPOUND	SAMPLE MEASUREMENT	*****	<0.22	(26)	<0.001		*****			0	2/Quarter	Grab
34694 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	MON AVG	DAILY MAX	MON AVG	DAILY MAX			QUARTERLY	GRAB
NAPHTHALENE	SAMPLE MEASUREMENT	*****	<0.22	(26)	<0.001		*****			0	2/Quarter	Grab
34696 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	MON AVG	DAILY MAX	MON AVG	DAILY MAX			QUARTERLY	GRAB
ETHYL BENZENE	SAMPLE MEASUREMENT	*****	<0.22	(26)	<0.001		*****			0	2/Quarter	Grab
37371 2 0 0 EFFLUENT NET VALUE	PERMIT REQUIREMENT	MON AVG	DAILY MAX	LBS/DAY	MON AVG	DAILY MAX	MON AVG	DAILY MAX			QUARTERLY	GRAB
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER											TELEPHONE	DATE
H. H. Holliman, President											(423) 229-2000	99 - 07 - 13
Tennessee Eastman Division											AREA CODE NUMBER	YEAR MO DAY
TYPED OR PRINTED											OFFICER OR AUTHORIZED AGENT	

H. H. Holliman
 SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER

(Reference all attachments here)

COMMENT AND EXPLANATION OF ANY VIOLATIONS

In addition to taking reasonable steps to prevent instances of noncompliance through the implementation of SPCC and SPCC-type plans, employee training, etc. when a potentially significant instance occurs, we notify the Division and provide information concerning the steps taken or planned to reduce, eliminate, and prevent recurrence of the instance.

EPA FORM 3320-1 (REV. 9-88) Previous editions may be used.

(REPLACES EPA FORM T-40 WHICH MAY NOT BE USED)

PARAMETER (32-37)	Sample Type (69-70)	Frequency of analysis (64-68)	NO. EX (62-63)	Concentration (54-61)		Unit	NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)
				Quality or (46-53)	Maximum				
PARAMETER (32-37)	Sample Type (69-70)	Frequency of analysis (64-68)	NO. EX (62-63)	Loading (54-61)		Unit	NO. EX (62-63)	Frequency of analysis (64-68)	Sample Type (69-70)
				Quantity or (54-61)	Maximum				
BIS (2 - ETHYLHEXYL) PHTHALATE	Grab	2/Quarter	0	Average	0.005	(19)	0	2/Quarter	Grab
39100 2 0 0 EFFLUENT NET VALUE	Grab	2/Quarter	0	MON AVG	0.279 DAILY MAX	MG/L	0	2/Quarter	GRAB
DI - N - BUTYL PHTHALATE	Grab	2/Quarter	0	Average	<0.002	(19)	0	2/Quarter	Grab
39110 2 0 0 EFFLUENT NET VALUE	Grab	2/Quarter	0	MON AVG	0.057 DAILY MAX	MG/L	0	2/Quarter	GRAB
VINYL CHLORIDE	Grab	3/Quarter	0	Average	<0.001	(19)	0	3/Quarter	Grab
39175 2 0 0 EFFLUENT NET VALUE	Grab	3/Quarter	0	MON AVG	0.268 DAILY MAX	MG/L	0	3/Quarter	GRAB
TRICHLOROETHYLENE	Grab	3/Quarter	0	Average	<0.001	(19)	0	3/Quarter	Grab
39180 2 0 0 EFFLUENT NET VALUE	Grab	3/Quarter	0	MON AVG	0.054 DAILY MAX	MG/L	0	3/Quarter	GRAB
HEXACHLOROBENZENE	Grab	2/Quarter	0	Average	<0.001	(19)	0	2/Quarter	Grab
39700 2 0 0 EFFLUENT NET VALUE	Grab	2/Quarter	0	MON AVG	0.00136 DAILY MAX	MG/L	0	2/Quarter	GRAB
3,4 BENZOFLUORANTHENE	Grab	2/Quarter	0	Average	<0.001	(19)	0	2/Quarter	Grab
79531 2 0 0 EFFLUENT NET VALUE	Grab	2/Quarter	0	MON AVG	0.00136 DAILY MAX	MG/L	0	2/Quarter	GRAB
CHLOROETHANE	Grab	3/Quarter	0	Average	<0.001	(19)	0	3/Quarter	Grab
85811 2 0 0 EFFLUENT NET VALUE	Grab	3/Quarter	0	MON AVG	0.00136 DAILY MAX	MG/L	0	3/Quarter	GRAB
NAME/TITLE PRINCIPAL EXECUTIVE OFFICER	GRAB	TELEPHONE		MON AVG	0.00136 DAILY MAX	MG/L		TELEPHONE	DATE
H. H. Holliman, President				MON AVG	0.00136 DAILY MAX	MG/L			
Tennessee Eastman Division				MON AVG	0.00136 DAILY MAX	MG/L			
TYPED OR PRINTED				MON AVG	0.00136 DAILY MAX	MG/L			
COMMENT AND EXPLANATION OF ANY VIOLATIONS				MON AVG	0.00136 DAILY MAX	MG/L			
Tennessee Eastman Division				SIGNATURE OF PRINCIPAL EXECUTIVE OFFICER		OFFICER OR AUTHORIZED AGENT		AREA CODE NUMBER	
TYPED OR PRINTED				H. H. Holliman		OFFICER OR AUTHORIZED AGENT		(423) 229-2000	
								99 - 07 - 13	
								YEAR MO DAY	

IN ADDITION TO TAKING REASONABLE STEPS TO PREVENT INSTANCES OF NONCOMPLIANCE THROUGH THE IMPLEMENTATION OF SPCC AND SPCC-TYPE PLANS, EMPLOYEE TRAINING, ETC. WHEN A POTENTIALLY SIGNIFICANT INSTANCE OCCURS, WE NOTIFY THE DIVISION AND PROVIDE INFORMATION CONCERNING THE STEPS TAKEN OR PLANNED TO REDUCE, ELIMINATE, AND PREVENT RECURRENCE OF THE INSTANCE.

(REPLACES EPA FORM T-40 WHICH MAY NOT BE USED.)

EP A FORM 3320-1 (REV. 9-88) Previous editions may be used.

(Reference all attachments here)

PERMITS UNDER PENALTY OF LAW THAT I HAVE PERSONALLY EXAMINED AND AM FAMILIAR WITH THE INFORMATION SUBMITTED HEREIN AND BASED ON MY KNOWLEDGE AND BELIEVE THE SUBMITTED INFORMATION IS TRUE, ACCURATE AND COMPLETE. I AM AWARE THAT THERE ARE SIGNIFICANT PENALTIES FOR SUBMITTING FALSE INFORMATION INCLUDING THE POSSIBILITY OF FINE AND IMPRISONMENT (SEE 18 USC 1001 AND 33 USC 1319 (PENALTIES UNDER THESE STATUTES MAY INCLUDE FINES UP TO \$10,000 AND OR MAXIMUM IMPRISONMENT OF BETWEEN 6 MONTHS AND 5 YEARS.))