Appendix G
Fuel/Lacolene Spill Remediation Documentation

MOBIL CHEMICAL FLEXIBLE PACKAGING
LACOLENE SPILL HISTORY
SPILL No. 9101737
Macedon (V) Wayne (C)

The following summarizes the lacolene spill of June 1982 and subsequent remediation activities.

1982 **June** Accidental leakage of lacolene solvent from underground tank #2 due to a failed pump seal. Estimate of solvent loss was negotiated at 5000 gallons. As part of the spill response action, four monitoring wells (B-1, B-2, B-3, B-4) and two recovery wells (RW-1, RW-2) were drilled and installed.

RELEASE:	5000 gal

1985 Recovered approximately 1800 gallons of free product from recovery wells 1 (RW1) and 2 (RW2) with majority of solvent recovered from RW2 due to ineffectiveness of RW1.

March Initiated solvent recovery evaluation by Blasland & Bouck due to a zero recovery rate at RW2.

July Contracted Blasland & Bouck to clean out monitoring wells B-1 through B-4, drill an additional three wells (B-5, B-6, B-7) to further define the extent of the solvent plume, and refurbish RW1 to assess its potential for further recovery operations.

September Blasland & Bouck publish "Solvent Recovery Evaluation".

December Reviewed above evaluation with NYSDEC and agreed to the following:

Implement hand bailing of wells with product.
Rehabilitate RW-2 by May 1986.
Seal RW-1 with concrete.
Continue operation of RW-2.

RECOVERY:	1982 - 1985	1800	gal
	cummulative:	1800	gal
REMAINING:		3200	gal

1986 During the period 1/2/86 - 11/30/86 approximately 12 gallons of product were recovered: RW1 @ 5", RW2 @ 2", SW2 @ 550".

May Notified NYSDEC that Mobil would put on hold the sealing of RW-1 and rehabilitate RW-2 pending assessment of underground tank removal project.

June Submitted proposal to NYSDEC to coordinate solvent recovery with underground tank removals in lieu of actions agreed upon in December 1985.

August NYSDEC agrees to proposal.

LACOLENE SPILL HISTORY

1986 continued

November Submitted closure plan for Solvent Tank removals to NYSDEC, Notified delay in tank removals to February 1987.

December Shutdown RW-2. Ceased bailing B-2 due to low recovery rate.

RECOVERY:	1986	12	gal
	cummulative:	1812	gal
REMAINING:		3188	gal

1987 Weekly observations conducted and documented. No floating product observed from 8/19/87 to year end.

April Old solvent tanks and piping integrity tested, confirmed tight and removed. No floating solvents were encountered although 121 cubic yards of BTX contaminated soil were disposed of as agreed with NYSDEC at Seneca Meadows. Product removed with soil estimated as 15.4 gallons.

May Initiated Phase II evaluation of solvent recovery operation by Blasland & Bouck to review alternatives for closing out recovery project.

Augment manual bailing with "Auto-Skimmer".
Install new recovery well with interceptor trench to enchance recovery program.
Open excavation to recover free solvent and remove contaminated soil.

RECOVERY:	1987	15.4	gal
	cummulative:	1827.4	gal
REMAINING:		3172.6	gal

1988 No floating product observed from 1/1/88 to 2/10/88. Since that date, another 52" of product recovered by bailing.

January Met with NYSDEC to discuss remediation of spill

September Met with NYSDEC to review history and technical aspects of the solvent recovery project. NYSDEC approved abandonment of wells RW-1 and RW-2 and requested that an additional monitoring well be installed. Weekly monitoring reports were submitted to NYSDEC on a monthly basis.

November Abandoned RW-1, redeveloped other site monitoring wells and installed monitoring well B-8. Recovery well RW-2 was not abandoned due to presence of product when evacuated.
December Letter report describing the November 1988 site activities submitted.

RECOVERY:	1988	2.5	gal
	cummulative:	1829.9	gal
REMAINING:		3170.1	gal

LACOLENE SPILL HISTORY

1989 Weekly observations conducted and documented.

February "Solvent Recovery Closure Report 1988" submitted.

RECOVERY:1989	2.4 gal
cummulative:	1832.3 gal
REMAINING:	3167.7 gal

1990 Weekly observations conducted and documented.

March Blasland & Bouck met with Mobil. Recommendations made at that time were the evacuation of RW-2 twice to determine whether free product would occur again at that location, daily monitoring (and bailing) of wells with free product present, and four monitoring wells could be abandoned.

September Letter summarizing the progress of the recovery program and recommendation submitted to NYSDEC.

RECOVERY:1990	4.0 gal
cummulative:	1836.3 gal
REMAINING:	3163.7 gal

1991 **April** Blasland & Bouck publishes "Solvent Recovery Closure Program 1990" report.

May Mobil met with NYSDEC to update them on project and get the go-ahead on abandoning RW-2 and four other monitoring wells (B-1, B-3, B-6, B-8). NYSDEC requested ground water sampling at all monitoring wells, a plan of action for residual lacolene remediation, a tabulation of product recovered, and additional chemical information on lacolene.

June Mobil and Blasland & Bouck working in formulating a plan to address NYSDEC's concerns.

September Initial groundwater and recovered product sampling complete.

October Identification of underground fuel oil lines between lifttruck shop and Bldg 12. Lines were determined to be full of product, but holding level (not leaking)

- 7 Initial GW sample results indicate levels of BTX, lacolene, and No. 2 fuel oil.
- 9 Mobil met with B&B to review initial GW lab results. Provided B&B with sample of product from underground lines.
- 10 Letter to DEC summarizing initial GW sample results.
- 16 Second round of GW and recovered product samples taken.
- 23 Received NYSDEC letter requesting complete lab report from initial GW sample.
- 28 Complete lab data from initial GW samples sent to NYSDEC.

1991 continued

November

26 Received results from second round of GW samples. Similar to initial set. Results show that recovered product from wells B-2 and B-4 is weathered No. 2 fuel oil.

27 Second round of lab results sent to NYSDEC.

December

10 No. 2 fuel oil product removed from underground lines.

19 Meeting with B&B to review second set of GW sample results. Directed B&B to develop site characterization proposal.

RECOVERY:	1991 (as of July 1)	1.6 gal
	cummulative:	1837.9 gal
REMAINING:		3162.1 gal

1992

January Point of contact at MCC- Plastics changed from Andy Reistetter to Andrea D'Ambrosia.

4 Update by Reistetter:
- Update meeting on 22nd
- B&B contract for Site Characterization ($18.9M) start 2/5
- B&B Phase I report to R.Cuhna 2/26
- DEC review meeting 3/18

22 Review B&B Site Characterization Program proposal.

March

18 Meeting with NYSDEC to discuss site characterization plan. Agreed:
Plan as prepared, no additonal workplan required.
Remediation of groundwater to drinking water standards (levels negotiable if risk assessment completed)
Monthly well monitoring (weekly not required).
Meet June 1st to discuss results.

June B&B publishes Site Characterization results. Summary:
1)Based on soil vapor results the distribution of lacolene is confined to the area North of Bldg 10 and is not found beneath it. Volatile soil vapors present at Geoprobe locations GP-7,-8,-9, and -3. Groundwater results from monitoring wells for 9/91 and 10/91 indicate highest level of lacolene contamination was present in wells B-2 and B-4.
2)Fuel oil soil vapors not detected under Bldg 10. Groundwater analysis indicates fuel oil constituents present at GP-7,-8,and -9. Groundwater results for monitoring wells for 10/91 indicate highest level of fuel oil contamination present at B-3 and B-4.
3)Source for fuel oil is not well defined. Seasonal fluctuation of canal level causes groundwater fluctuation and flow reversals which may complicate interpretations of possible source and migration pathways.

1992 continued

4)In general, contamination appears to be limited to the area between Bldg 10 and the Northern property line. Groundwater conditions in this area may be the result of overlapping contamination attributed to both lacolene and fuel oil.

July
16 Met with NYSDEC and agreed:
1)Soil vapor extraction study will be done in September to establish feasibility for product recovery.
2)No special air permits required for study.
3)Upon agreed method wells B-6,RW-2, B-8 will be sampled and tested by method 602 prior to formal implementation. One month following initiation of enhanced recovery same wells will be sampled and retested. Following six months of recovery system operation wells B-2 and B-4 will be sampled and tested in addition to wells B-6, RW-2, and B-8.
4)B&B reviewing lacolene concentration determinations and most accurate method for identifying lacolene in water - to be forwarded to DEC.

September Vapex Environmental Technologies,Inc. conduct a series of brief multi-phase extraction (MPE) field pilot tests to determine the feasibility of using it to remove lacolene and volatile fuel oil constituents. Conclusions:
1)VOC concentrations indicate optimal conditions for application of soil vapor and/or MPE technology for remediation.
2)Soil permeability allows application of soil vapor/MPE technology.
3)Soil vapor extraction not considered practical without groundwater control within and/or in the direct vicinity of the extraction wells.
4)Utilization of MPE system effectively controlled groundwater level within vicinity of well allowing sustainable air flow rates within remediation area.
5)Utilization of MPE system resulted in removal of VOCs primarily in vapor phase. Free product removal (without vacuum enhancement) through typical dual pump systems not feasible.
6)Groundwater recovery rates with MPE were significantly greater with vacuum enhancement.
7)Estimate approximately 955 gallons of lacolene exist either as free phase product and as residual soil contamination within the vicinity of the groundwater table.

October Vapex meeting. Free product recovery not feasible because of soil tightness and relatively low hydraulic gradient to well. MPE feasible.

LACOLENE SPILL HISTORY

1993

April

2 DEC (N.Rice): background info on spill:
In 1982 approx 5000 gal of lactol spirits was released as the result of a pump seal failure. All material, not immediately recovered, contaminated the surrounding soil. This area is located between bldg 10 and the canal. Since that time MCC has been working with NYSDEC/Avon on an ongoing basis. Remediation has consisted of well monitoring and hand-bailing of free product.

April

By 1990 free product diminished substantially and MCC made efforts to closeout the project with DEC. DEC requested groundwater testing of the spill area. Upon completion of testing and re-evaluation Fuel Oil No. 2 was discovered to also be present. As a result MCC completed a pilot study in 1992 which included up-to-date information on the contamination plume and an estimate of remaining material.
In 1993 Multi-phase extraction was selected as the remediation method. Remediation is expected to take 2 years. During this time continuous wastewater discharge of 2-4 gpm is anticipated.

7 B&B report on lacolene analytical methods presented to DEC

28 DEC (P.Miller) concurs with mulitphase extraction as a remediation method and asks MCC to begin ASAP.

May

27 SPDES permit modification submitted to DEC.

June

29 DEC (P.Miller) agreed:
1)Only Total Volatiles to be monitored weekly using OVA (following start-up)
2)Monthly reports of weekly monitoring information & operating status to P.Miller (Spill Div) and M.Wheeler (Air Div)
3)Air monitoring information presented graphically
4)Detailed quarterly reports prepared by VAPEX.

29 DEC (M.Wheeler):
Based on expected asymptotic reduction of Total Volatiles to air and water over the duration of remediation agreed:
1)annual potential-to-emit would not likely exceed 40 TPY
2)Total Volatiles likely to exceed 10 lb/hr
3)To prove that we will be operating within the 10 lb/hr guideline limit, agreed to the following monitoring schedule:
Hourly for 2 days of start-up, except for evening hr
Daily for 7 days following start-up
Weekly until completion of project.

July

16 DEC (N.Rice):Application for emergency authorization to discharge wastewater

1993 continued

Application for Emergency Authorization to Discharge Wastewater

Prepared by: Andrea L. D'Ambrosia 7/16/93

Section 4. Explicit Directions to Project and/or Discharge Site and Attach a Map Describing the Project Area:

Project location is at the Macedon Complex of Mobil Chemical Company in Macedon, NY. The facility can be reached by traveling East on Route 31 through the Town of Macedon. The Macedon Complex is located on the Northern side of Route 31 immediately following the traffic light which is located at Route 350.

The discharge site and project is located on the West end of the Macedon Complex behind the General Products Plant. Please refer to Attachment B for more specific location of discharge and project area relative to the Macedon Complex.

Section 5A. Describe Exact Nature of Emergency

Emergency Authorization for discharge of this wastewater is being requested in order to proceed with a remediation project at the facility.

Section 5b. Describe How Emergency Came to Exist:

A request for modification of the existing SPDES permit (NY0000272) has been submitted; however, it is not expected that the permit modification will be approved in time to proceed with the remediation project as scheduled and agreed to by NYSDEC-Region 8 Bureau of Spill Prevention and Response.

Section 5c. Pollutants Potentially Released in the Discharge (Toxics, Petroleum Products, Sewage, others):

The pre-treatment effluent contains benzene, MTBE, toluene, xylene and Total Petroleum Hydrocarbons as indicated in the attached analytical report (Attachment C). The source of these contaminants is believed to be Lactol Spirits and Fuel Oil. The effluent from the remediation project is to be treated by a Packed Tower Air Stripper prior to discharge. Air Stripper Design Information prepared by VAPEX Environmental Technologies has been attached (Attachment D). Oil and grease are to be treated with in-line carbon absorption prior to discharge in order to meet proscribed limits.

1993 continued

July

29 DEC (P.Miller): Agreed that quarterly well monitoring may be implemented for those wells which are not actively being used for recovery. These are wells B1, B3, B5-B8, and RW #2.

August

4 DEC (T.Pearson): As specified in the Emergency Authorization for Discharge [8071993-1] daily monitoring of influent and effluent for specifed contaminants has been conducted. Analytical results for daily monitoring are attached for July 21, 1993 through July 27, 1993.

effluent pH:
on the first day of operation was 9.82 and remained high until the third day of operation.
Carbtrol explanation of high pH is described in their attached letter dated July 30, 1993.
Effluent pH stabilized below the discharge limit of 8.5 on 7/23/93.
influent pH was 7.86 and remained below 8.00
oil & grease
Analytical was received the morning of 7/28/93. Potential breakthrough was confirmed with VAPEX and the carbon absorption units were taken out of the system that morning. Influent concentrations of oil & grease have remained below discharge limits of 15 mg/l.

13 DEC (T.Pearson): request a thirty-day extension

October

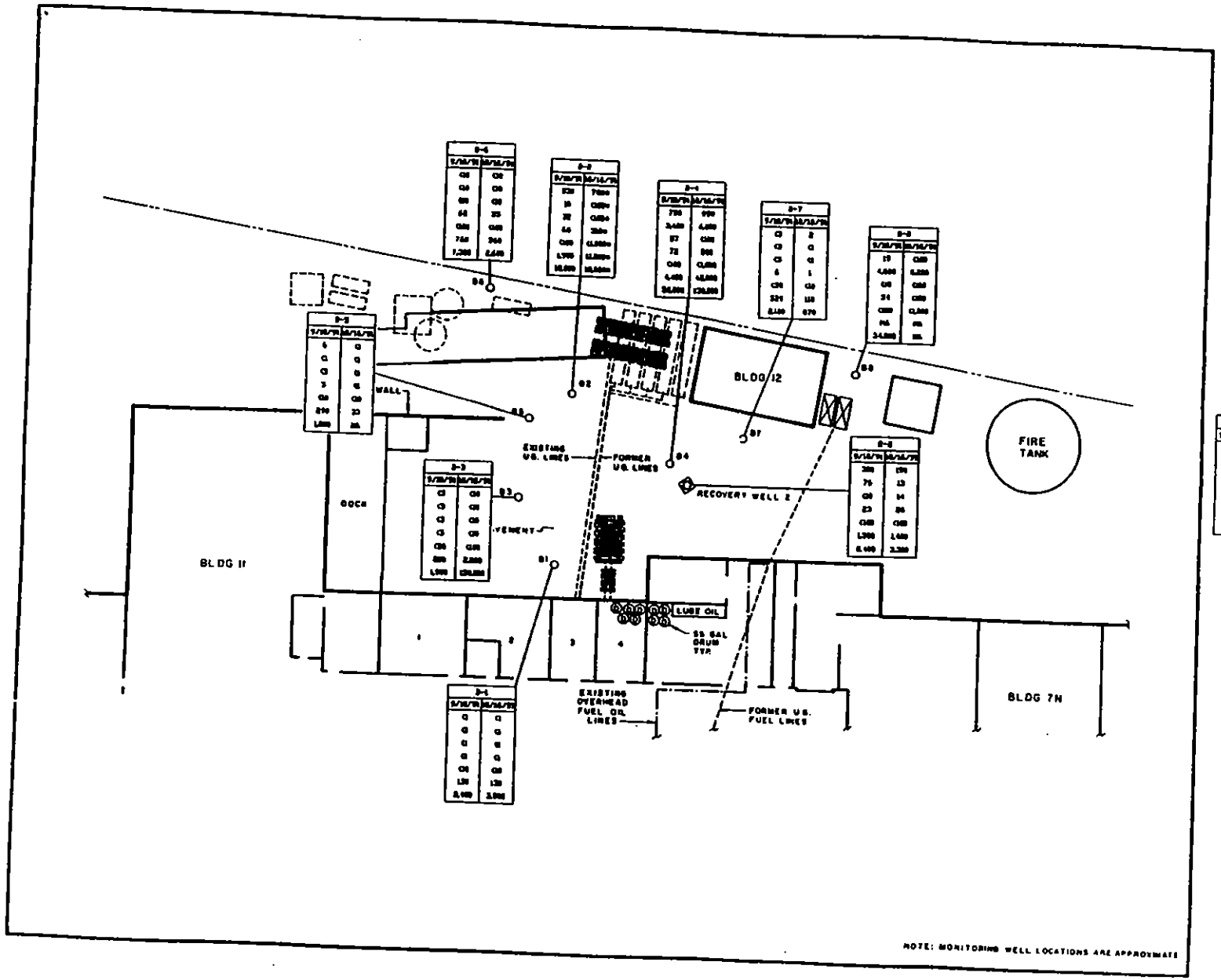
11 DEC(T.Pearson): regranted starting today 10/11/93

11 First Quarterly report from VAPEX (7/93-9/93):
368 lb (51 gal) removed as toluene

RECOVERY:	1993	51.0 gal
	cummulative:	1888.9 gal
REMAINING:		3111.1 gal

December

6 DEC (T.Pearson): request an additional 30-day extension



LEGEND

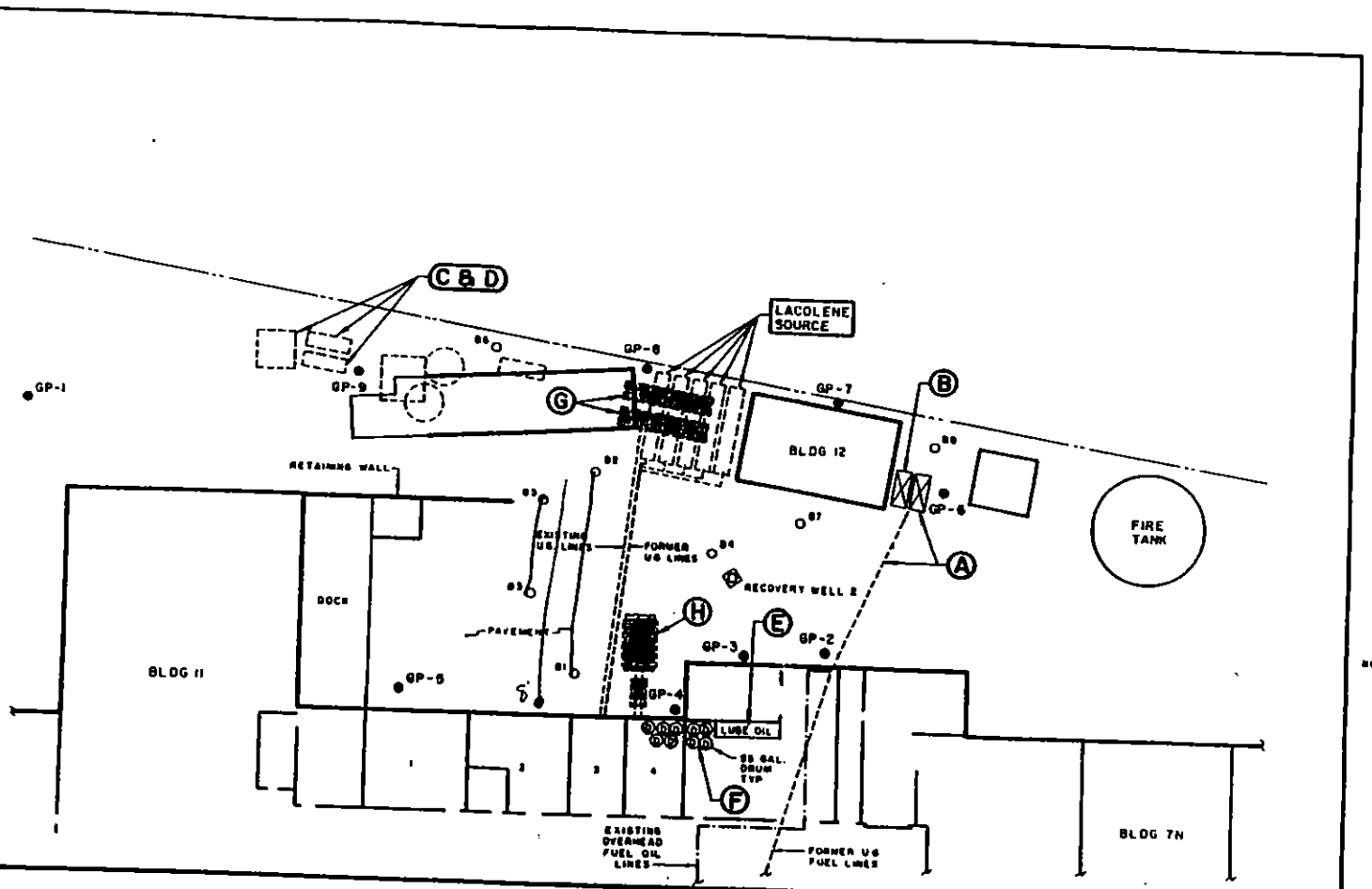
- GROUND-WATER MONITORING WEI
- FORMER UNDERGROUND TANK
- FORMER ABOVE GROUND TANK
- EXISTING UNDERGROUND TANK
- GROUND-WATER ANALYTICAL RESULTS (ug/l):
  - WELL NUMBER
  - SAMPLE DATE
  - BENZENE
  - TOLUENE
  - ETHYLBENZENE
  - ETHENE
  - XYLENE
  - NAPHTHALENE
  - FUEL OIL
- * FREE PRODUCT PRESENT IN SAMPLE
- NA NOT ANALYZED

MOBIL CHEMICAL
PLASTICS DIVISION
MACEDON, NEW YORK

GROUND-WATER ANALYTICAL RESULTS (9/10/91 AND 10/16/91)

SCALE
30' 0 30'

BEASLAND & BOUCK ENGINEERS P.C.



FUEL OIL/PETROLEUM PRODUCT LOCATIONS:

A - 4,000 gallon aboveground fuel oil tank with underground feeder pipes leading to the main manufacturing complex. The tank was used from 1971-1978 and then removed. Portions of the piping in the building were replaced with aboveground conduits in 1973. However, the underground pipes were not removed.

B - 4,000 gallon aboveground waste oil storage tank utilized from 1978-1986, and then removed.

C&D - Underground gasoline storage tank utilized from 1960 to 1978, and then removed. Aboveground diesel fuel storage tank utilized from early 1970 to 1978.

E&F - Other petroleum related products have been stored in this area. Lubrication oil is stored in 55-gallon drums and dispensed into small containers for use from 1978 to the present. Waste oil has been stored in a 250-gallon aboveground tank and is currently stored in 55-gallon drums.

G - 2 x 4,000 gallon underground cosolvent storage tanks installed in 1987 and registered as temporarily out of service in 1991. The tanks and piping are double wall construction with interstitial monitoring capabilities.

H - 6,000 gallon underground hazardous waste storage tank installed in 1987 and still in use. The tank and piping are double wall construction with interstitial monitoring capabilities.

LEGEND

- GROUND-WATER MONITORING
- FORMER UNDERGROUND TA
- FORMER ABOVE GROUND TA
- EXISTING UNDERGROUND TA
- GEOPROBE SAMPLING POINT

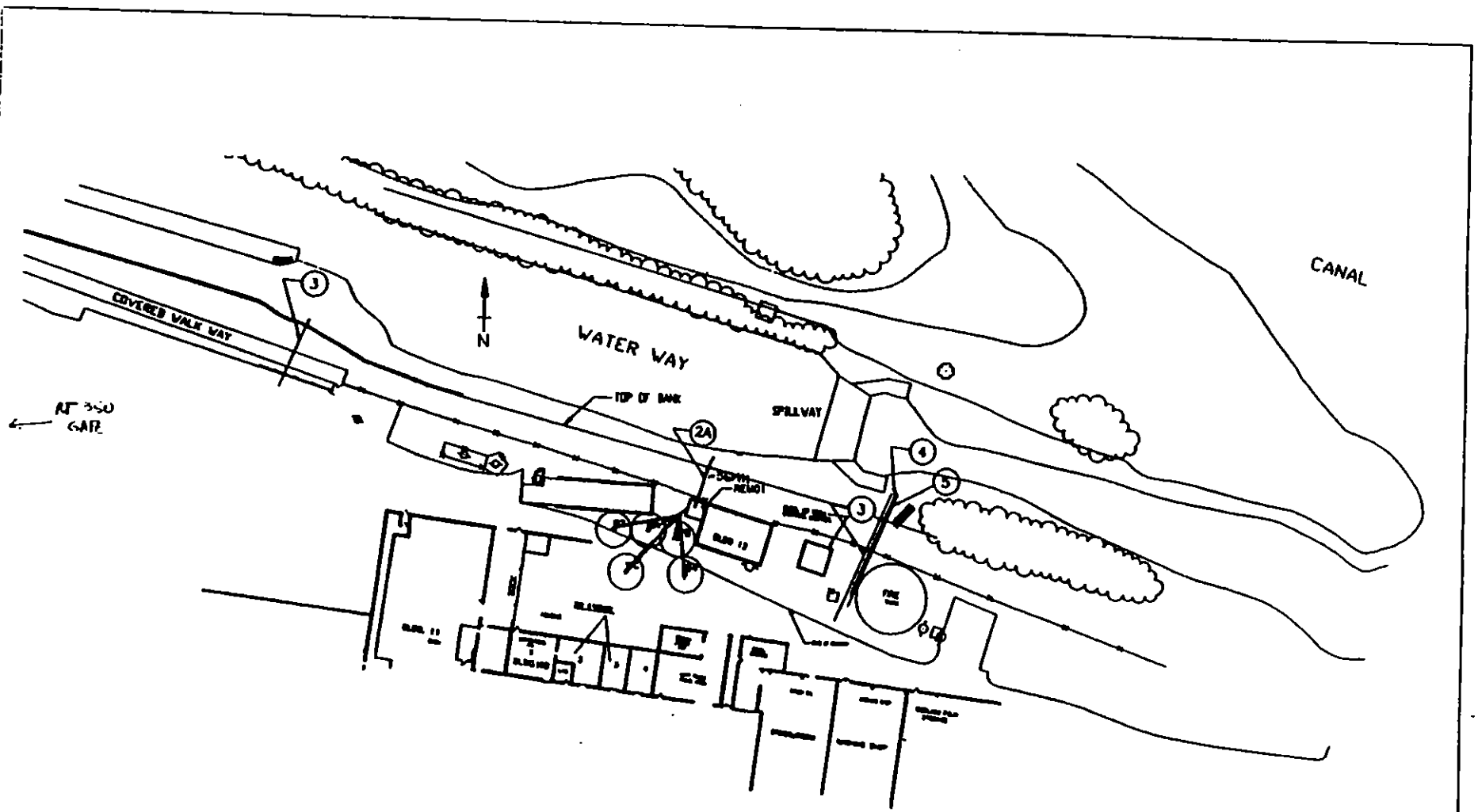
NOTE: MONITORING WELL LOCATIONS ARE APPRO

MOBIL CHEMICAL
PLASTICS DIVISION
MACEDON, NEW YORK

PROPOSED GEOPROBE LOCATIONS

SCALE
30' 0 30

BLASLAND & BOUCK ENGINEERS P.C.



050 5/7/93

DX1716

Mobil Chemical Company

PLASTICS DIVISION

MACEDON, NEW YORK 14502
TELEPHONE (315) 986-6111

October 23, 1995

Mr. Peter Miller
Spills Division
New York State Department of Environmental Conservation
6274 East Avon-Lima Road
Avon, NY 14414

re: REMEDIATION SYSTEM STATUS REPORT (10/20/94 -10/6/95)
MOBIL CHEMICAL COMPANY-PLASTICS DIVISION
MACEDON (V), WAYNE (C)
SPILL NO. 9101737

Dear Mr. Miller:

Status Report No. 4 for the Multi-Phase Extraction system implemented to help remediate the above spill is enclosed.

The report establishes that up through October 6, 1995:

1) system run time:	392 days (9402 hours)
2) groundwater processed:	156,054 gallons
3) "lacolene" removed:	2717 lb (375 gal)
4) average removal rate:	0.6 lb/day (current reporting period)

The air monitoring information is presented graphically in the report for the current reporting period (See Figure 3). Problems experienced with the system during this period are detailed within the report.

If you have any questions please contact me at 716-393-3267.

Sincerely,

Richard J. St. James
Environmental Engineer

cc: D. Hazebrouck, Envirogen (w/o attach.)
W. Hyatt (w/o attach.)
F. Mooney (w/o attach.)
T. Pistner (w/o attach.)
N. Rice, NYSDEC Region 8, Division of Water
M. Wheeler, NYSDEC Region 8, Division of Air

rsjdec95-5

October 17, 1995

Mr. Dick St. James
Environmental Engineer
Mobil Chemical Company
100 North Street
Canadaigua, NY 14424

RE: Multi-Phase Extraction System
Status Report No. 4
Mobil Chemical Facility
Macedon, NY
ENVIROGEN File No. 93-403

Dear Mr. St. James:

The objective of this report is to summarize the operation of the multi-phase extraction (MPE) system at the above referenced site and provide an evaluation of the performance of the MPE system since startup of the system on July 20, 1993. This report summarizes the operation and performance of the system over the period from October 20, 1994 through October 6, 1995 (reporting period). The work has been conducted in accordance with *ENVIROGEN*'s (formerly *VAPEX*) contract with Mobil Chemical dated August 31, 1993. The objective of this work has been to conduct regular site checks to monitor and optimize the operational performance of the MPE system.

The remedial objectives of the project and the MPE system are to remove source hydrocarbon-range volatile organic compounds (VOCs as lacolene) which currently exist as predominantly residual soil contamination within saturated and unsaturated zone soils at the site. Currently, no specific clean up goals or criteria have been established for the site.

The details of the MPE conceptual design were provided in a report entitled "Report on the Results of the Multi-Phase Extraction Feasibility Testing at Mobil Chemical Company, Macedon, NY," dated October 23, 1993 (MPE Feasibility

Report). Details regarding the installation and startup of the full scale MPE system were provided in a report entitled "Startup Report, Multi-phase Extraction System, Mobil Chemical Facility, Macedon, NY," dated August 18, 1993 (Startup Report).

1.0 OPERATION AND MONITORING

Over the reporting period, representatives of Mobil Chemical Company have monitored the status of the MPE system and recorded system operational parameters on a routine basis. Due to equipment problems encountered in late 1994 and personnel changes at the Macedon facility in the spring of 1995, the MPE was inactive for nearly the first half of 1995. In July, 1995, a mechanical contractor was retained by Mobil Chemical Company to refurbish and restart the MPE system.

Over this reporting period, *ENVIROGEN* conducted a total of 4 site checks to verify system operation and performance, balance the system for optimal removal of ource hydrocarbons, and conduct scheduled, and unscheduled maintenance of system components.

A general site plan indicating locations of MPE wells and their respective design radius of influence is presented in Figure 1. A simplified site plan showing system components is presented in Figure 2.

1.1 MPE System Operation

In late October, 1994, the Mobil Chemical Company field representative reported that the MPE had shut down several times due to a high liquid level alarm in the air/water separator which was attributed to reduced transfer pump capacity. During *ENVIROGEN*'s November 21, 1994 site check, it was determined that the cause of the transfer pump intermittent performance was excessive precipitate buildup on the liquid level floats which control the transfer pump operation. The floats were cleaned which corrected the problem.

Also during the November 21, 1995 site check, difficulties were encountered while npting to optimize VOC removal rates by the MPE system. Testing for VOC

concentrations at various points in the MPE system indicated that a break may have occurred in the buried portion of the manifold which allowed ambient air into the system, thereby, reducing the VOC concentrations and the effectiveness of the system. In order to pinpoint the suspected manifold break location, a helium tracer leak detection test was performed during the January 26, 1995 site visit. The helium leak test identified one area overlying the buried manifold where a significant frost heave was located and elevated levels of helium were detected. Due to the frozen soils, it was decided to postpone any excavation and repairs until spring.

On December 9, 1994, workers at the Macedon facility had disconnected electrical power to the MPE system while performing routine facility maintenance. Unfortunately, the power was not turned back on following completion of maintenance activities which allowed several of the MPE components which contain water to freeze. The only damage resulting from this freezing event was a ruptured water supply line for the liquid ring vacuum pump. The exact date of the ruptured water supply line repair is uncertain although it most likely occurred in mid-January, 1995.

During *ENVIROGEN*'s January 26, 1995 site check, it was determined that the capacity of the transfer pump which drains the air/water separator had declined significantly due to scale buildup on the pump impellers. By February, the Mobil Chemical Company field representative reported that the transfer pump could not keep up with the water intake rate in the air/water separator which caused frequent shutdowns. The Mobil Chemical Company field representative indicated that descaling of the transfer pump would be completed internally by Mobil or their on-site contractors.

Inquiries as to the status of the transfer pump repairs on February 17 and March 23, 1995 indicated that repairs were expected to be completed by mid-April, 1995. On May 1, 1995, *ENVIROGEN* was contacted by Atsco, Inc., a local mechanical contractor. The former Mobil Chemical Company field representative had reportedly left the facility and Atsco, Inc. had been contracted to review the MPE equipment status and refurbish MPE components as necessary. *ENVIROGEN*

worked with Atsco, Inc. through the months of June, July and August, 1995 to identify the necessary repairs.

Starting in July, 1995, repairs began on the MPE system. In mid-July, the section of manifold piping suspected of leaking was excavated and inspected by Atsco, Inc.. No breaks or leaks were observed so the manifold was buried and the pavement resurfaced. However, during repairs inside the equipment shed, a defective connection was found on the liquid ring pump unit which allowed ambient air into the process line which simulated a manifold leak. This repair and other maintenance activities such as sludge removal in the liquid ring reservoir tank, general equipment cleaning, and replacement of defective components were completed by Atsco, Inc.

On July 21, 1995, the MPE system was restarted in conjunction with *ENVIROGEN*'s site check. All MPE system components operated continuously until August 14, 1995 when the liquid ring pump motor failed. The liquid ring pump motor was replaced and the pump was refurbished prior to restarting the MPE system on August 18, 1995. Since these latest repairs, the MPE system has operated without incident.

1.2 MPE System Monitoring Results

1.2.1 Physical Monitoring

Over the reporting period, the MPE system operating vacuum ranged from 7 to 21 inches of mercury (in. Hg) and averaged approximately 15 in. Hg; MPE system air flow rates ranged from 28 standard cubic feet per minute (scfm) to 72 scfm and averaged 40 scfm. Since start up, the system has been operational for approximately 9402 hours (392 days). A summary of MPE physical operating conditions is presented in Table 1.

The volume of ground water pumped through the MPE system is recorded with a totalizing water meter. As of October 6, 1995 a total of 156,054 gallons of ground water had been extracted by the MPE system and pumped through the air stripping tower for treatment. A summary of water meter readings is presented in Table 1.

1.2.2 Chemical Monitoring

Table 2 presents the results of discharge calculations derived using periodic OVA measurements. Figure 3 graphically presents the removal rates and total cumulative hydrocarbons removed by the MPE system since the July 20, 1993 startup. Based upon results of the discharge calculations, the following conclusions can be derived:

- A total of approximately 2,717 pounds (375 gallons) of lacolene-range hydrocarbons have been removed since startup of the full scale system on July 20, 1993.

- The average VOC removal rate over the current reporting period was 0.6 pounds per day.

Upon restarting the MPE system on July 21, 1995, influent VOC concentrations were 135 ppmv. Following several days of operation, influent VOC concentrations declined to levels ranging from 8 ppmv to 22 ppmv. However, when the MPE system was off for repairs to the liquid ring pump (nine days), influent VOC concentrations rebounded to 135 ppmv upon start up. Influent VOC concentrations rebounded again when the MPE system was optimized during *ENVIROGEN*'s September 7, 1995 site visit but subsequently declined to levels ranging from 12 ppmv to 31 ppmv.

This pattern of rebounding VOC influent concentrations may be indicative of a potential VOC vapor source located outside of the current MPE system's effective radius of influence but which is contributing a consistent low level of VOC vapors to the system when operating at a steady state. Sampling of the existing wells following a brief period of down time should be performed to determine the general direction of potential VOC source(s) but a more accurate delineation of the source would require a shallow soil gas survey. A preliminary evaluation of potential VOC sources will be initiated during subsequent *ENVIROGEN* site visits in conjunction with monitoring by Mobil Chemical field representatives.

1.3 Effects of the MPE System on Groundwater Table Depression

Over the operating period, the MPE wells have been configured for maximum removal of groundwater using the MPE drop tube which is currently set near the bottom of the well (approx. 13 feet below grade). As a result of the operation of the MPE system with the drop tubes, the static groundwater table is depressed in the vicinity of the MPE wells. According to historic (1990) ground water level records, ground water elevations in nearby monitoring wells within the remediation area are lowest between the months of December through April and are at their highest elevations between the months of May through November. The seasonal ground water levels are directly affected by the surface water level maintained in the adjacent canal. Ground water levels were only measured in monitor well B7 in January, 1995 over the current reporting period due to frequent system down time. The limited water level data does not allow an adequate evaluation of hydraulic influence. However, following refurbishment of the liquid ring pump in August, 1995, ground water removal rates by the MPE system increased dramatically which is expected to have a corresponding significant effect on ground water draw down in the vicinity of the MPE wells.

1.4 System Air and Water Emission Summary

As specified in the MPE Feasibility and Startup Reports, the MPE system generates discharge emissions of air and water. Sources of air stream emissions are the MPE system and the air stripping tower. The source of ground water discharge is the air stripping tower effluent.

1.4.1 MPE System Vapor Emissions

Based upon calculations of the expected mass of hydrocarbons to be emitted by the MPE system and the air stripping tower, Mobil Chemical Corporation obtained an air permit from the New York Department of Environmental Conservation (NY-DEC) to discharge a maximum of 10 pounds per hour of total VOCs as Iacolene. Based upon the allowable emission limits, the MPE system has been continually monitored and balanced so that the allowable emission limits are not exceeded. Table 2 provides documentation of the average daily system discharge concentrations and VOC removal rates for the MPE system. The results shown in

Table 2 indicate that the MPE system emissions have remained well below the allowable discharge criteria.

1.4.2 Air Stripping Tower Aqueous Discharge

Based upon the results of the feasibility testing as described in the Feasibility Report, the application of MPE technology was expected to generate ground water containing VOC concentrations which are above NY-DEC limits for allowable discharge to a surface water body. As a result, it was determined that ground water treatment would be required prior to discharge. A packed air stripper tower was subsequently designed for removing VOCs from groundwater extracted by the MPE system.

Influent and effluent water samples were collected weekly from the air stripping tower over the periods from October 21, 1994 through November 4, 1994 and from July 25, 1995 through September 28, 1995 by Mobil Chemical field representatives. Based upon these laboratory analyses, the tower has consistently reduced the concentration of VOCs in the ground water to non-detectable discharge concentrations corresponding to an air stripping tower treatment efficiency of 100 percent. Copies of laboratory analysis results from the stripping tower effluent samples over this reporting period are provided in Appendix A.

2.0 CONCLUSIONS

Based on the monitoring results for the operation of the MPE system over the reporting period, the following conclusions can be stated:

- Over the period from October 20, 1994 to October 6, 1995, the MPE system has operated approximately for 135 days or 37 percent of the total reporting period. The periods of MPE system down time this reporting period are due to equipment malfunctions and electrical power interruptions allowing water in the system to freeze. Additionally, a lack of consistent equipment maintenance has also contributed to MPE system down time.

- The MPE system has removed approximately 2,717 pounds (375 gallons) of lacolene-range hydrocarbon VOCs (as Toluene).

- During the past several months of operation, whenever the MPE system has been inactive for equipment repairs, influent VOC concentrations rebound when the system is restarted. This pattern of rebounding VOC influent concentrations may be indicative of a potential VOC vapor source located outside of the current MPE system's effective radius of influence but which is contributing a consistent low level of VOC vapors to the system when operating at a steady state.

- Over the reporting period, both vapor phase and aqueous phase discharge levels have been maintained below NY-DEC discharge criteria.

3.0 RECOMMENDATIONS

- The primary objective of future site checks will be to quickly resolve equipment malfunctions as they occur and maintain optimal VOC removal rates. In general, MPE system optimization is achieved by balancing the air flow and MPE system groundwater extraction rates from each MPE well such that wells with the highest VOC concentrations achieve the highest flow rates.

- Monitored parameters will continue to include total VOC concentrations, wellhead vacuum, MPE system operating vacuum and ground water extraction rates.

- Although the equipment malfunctions encountered this reporting period have been resolved, given the complexity and age of the MPE system and controls, it is not unexpected that minor mechanical problems associated with the MPE system may arise in the future.

- *ENVIROGEN* will continue to optimize VOC removal rates on a monthly basis during routine scheduled site checks. If MPE system optimization is required on a more frequent basis, *ENVIROGEN* may instruct Mobil Chemical representatives or a third party on how to best optimize the MPE system configuration.

- In order to evaluate the hydraulic radius of influence resulting from MPE operation at each extraction well, site checks will incorporate measurements of ground water levels in available nearby monitor wells.

- Based on monitoring of VOC influent concentrations, a potential VOC vapor source may be located outside of the current MPE system's effective radius of influence which contributes a consistent low level of VOC vapors to the system. In order to evaluate this pattern of rebounding VOC influent concentrations, sampling of the existing wells should be performed following a brief period of down time to determine the general direction of potential VOC source(s). However, a more accurate delineation of the VOC source will require a shallow soil gas survey. A preliminary evaluation of potential VOC sources will be initiated during subsequent *ENVIROGEN* site visits in conjunction with monitoring by Mobil Chemical field representatives.

If you have any questions regarding this report or the MPE system in general, please do not hesitate to contact this office.

Sincerely,
ENVIROGEN, Inc.

David Hazebrouck, P.G.
Project Manager

E:\proj\93-403\995qrpt

SITE PLAN WITH FULL SCALE CONCEPTUAL DESIGN WELL LAYOUT

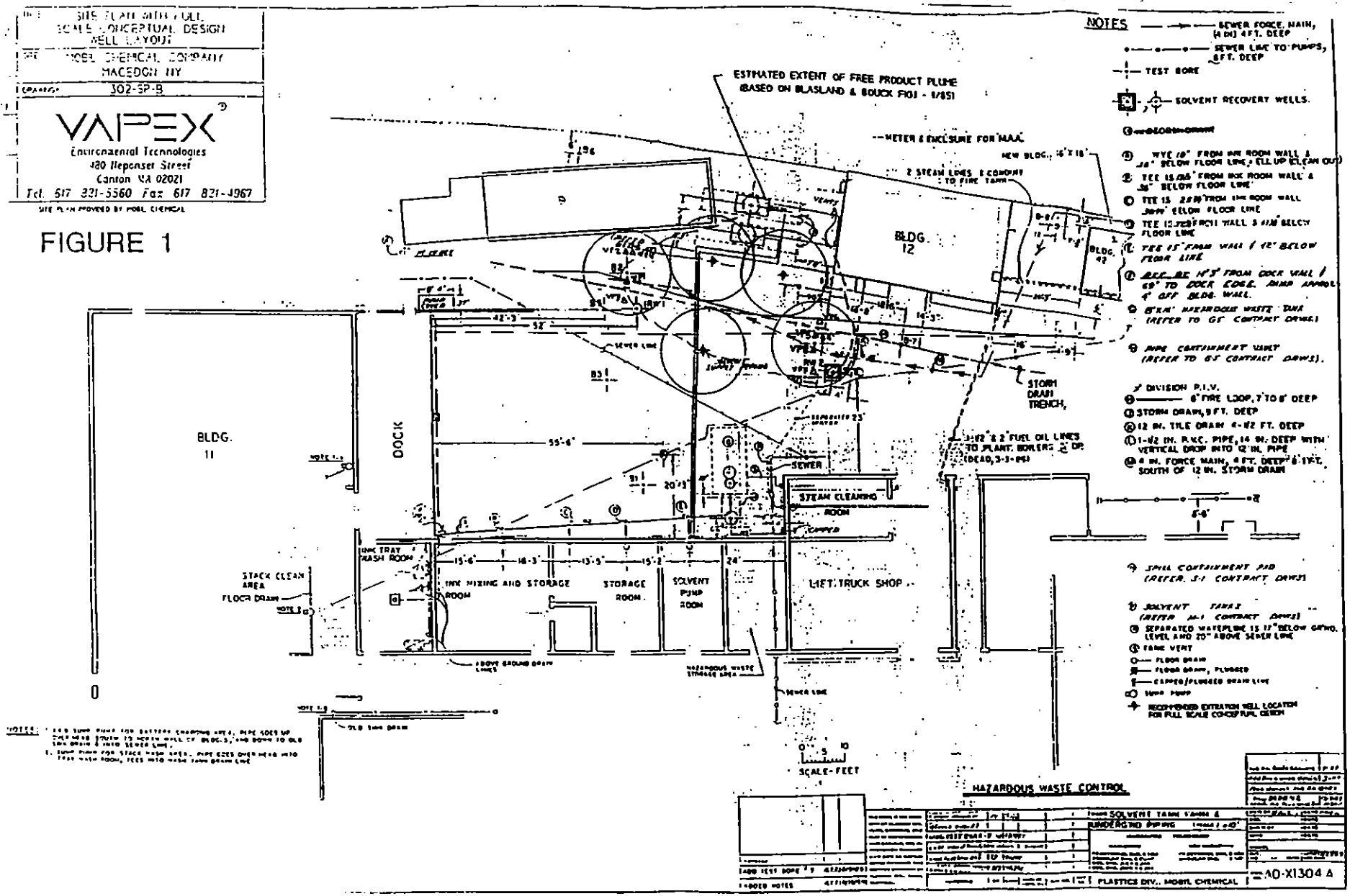
MOBIL CHEMICAL COMPANY MACEDON NY

DRAWING 302-SP-B

VAPEX
Environmental Technologies
480 Neponset Street
Canton MA 02021
Tel. 617 821-5560 Fax 617 821-4967

SITE PLAN PROVIDED BY MOBIL CHEMICAL

FIGURE 1



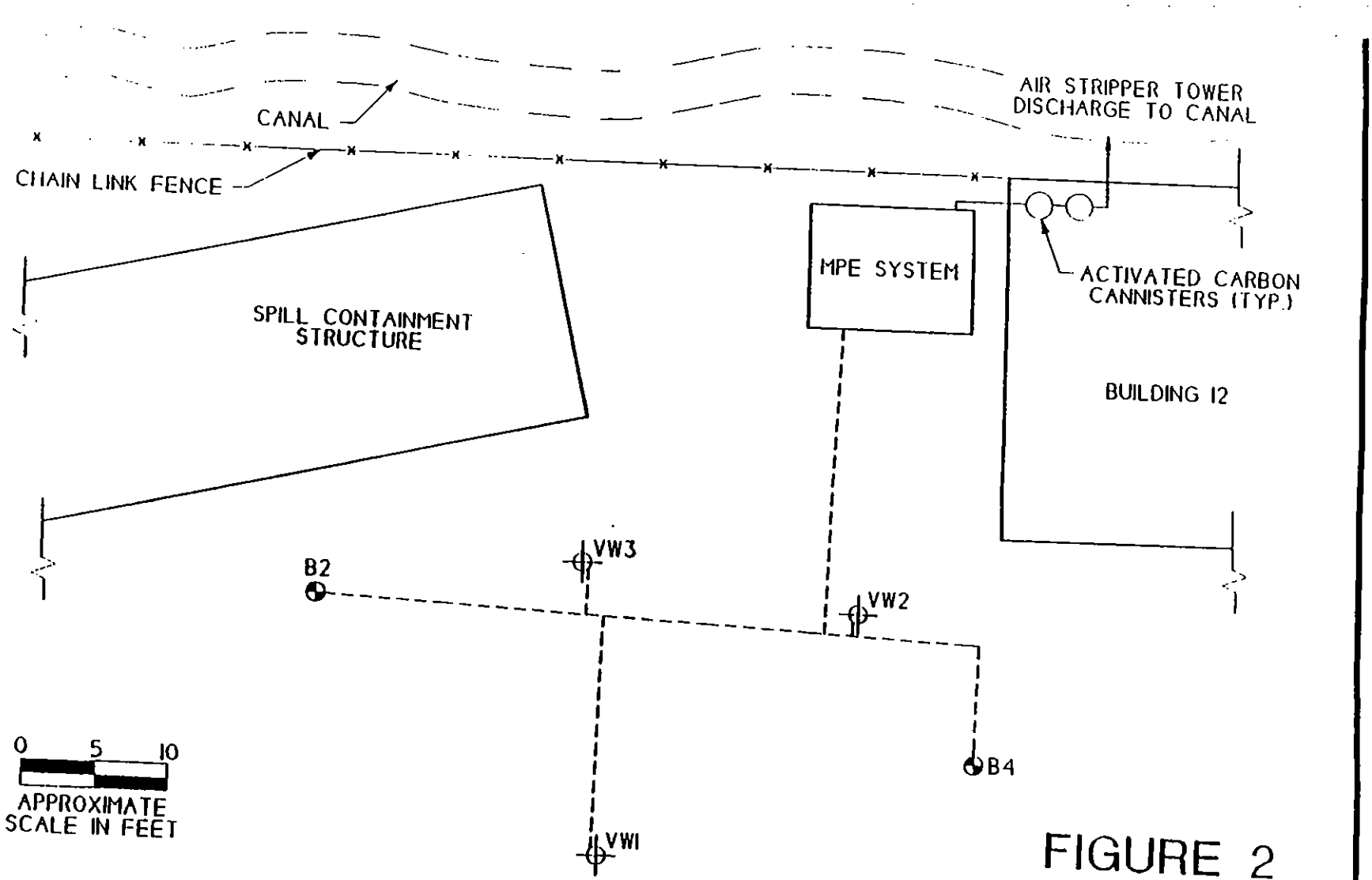


FIGURE 2

- MONITOR WELL CONVERTED TO MPE WELL
- NEW MPE WELL
- - - MPE UNDERGROUND SYSTEM MANIFOLD LINE
— MPE ABOVE GROUND SYSTEM MANIFOLD LINE

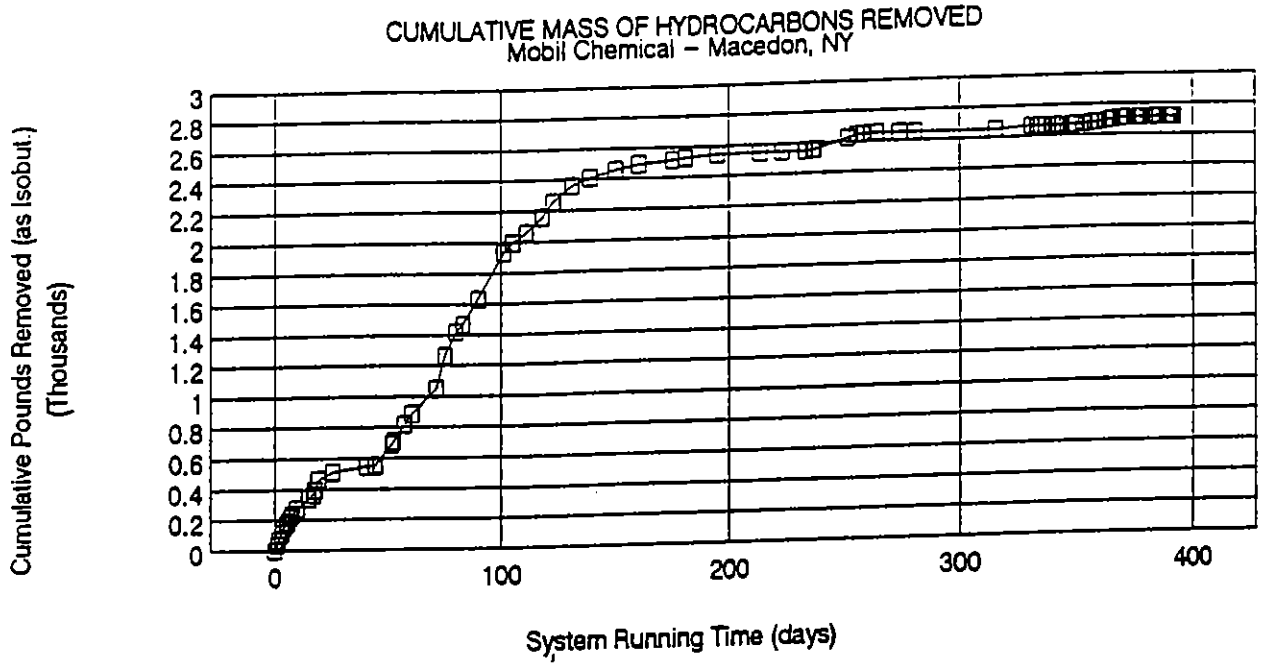
SITE:	MOBIL CHEMICAL MACEDON, N.Y.		
JOB#:	93-378	DRAWING#:	378-2
DATE:	8/16/93	DRAWN:	DAF
SCALE:	1" = 10'	CHECKED:	

TITLE: SITE PLAN WITH WELL AND MANIFOLD LOCATIONS

VAPEX®
Environmental Technologies

FIGURE 3

Site:	Mobil Chemical – Macedon, NY
Operating period:	10/20/94 to 10/6/95
Total Hydrocarbons Removed with MPES:	2717 pounds (as Toluene) 375 gallons (as Toluene)



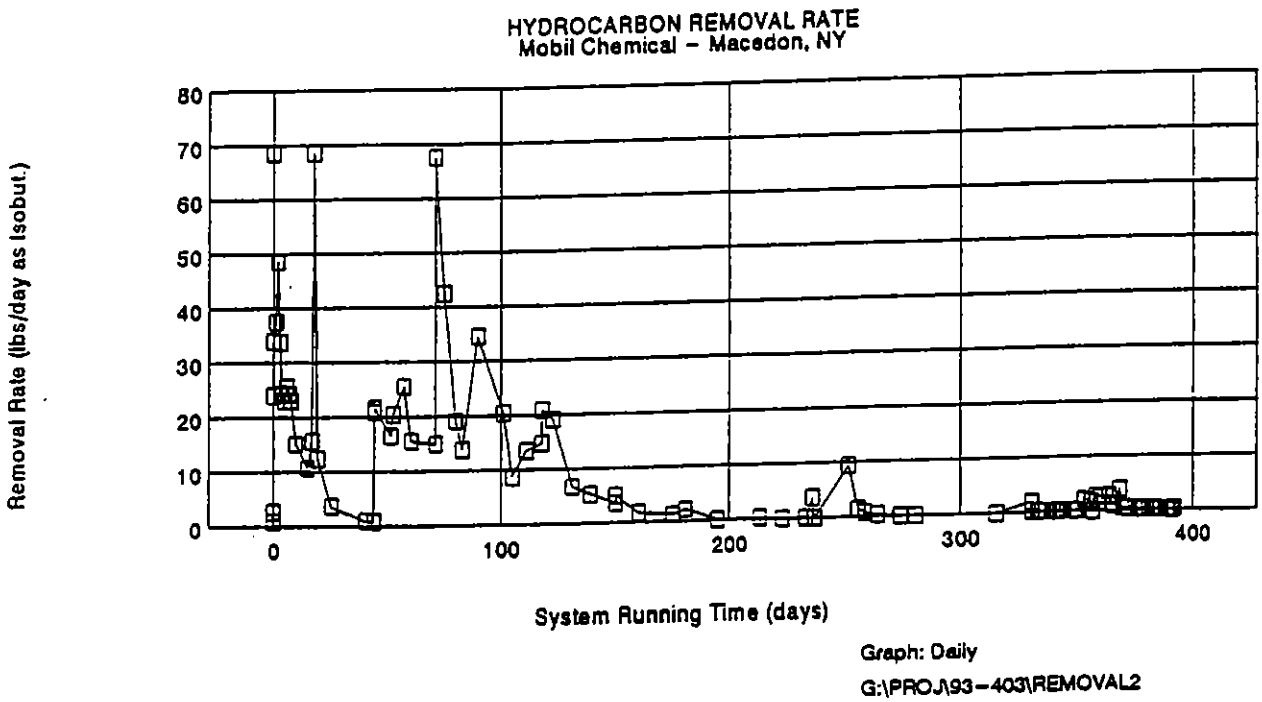


TABLE 1

MPE SYSTEM OPERATING DATA

Mobil Chemical Facility – Macedon, NY

Run Time Data			Pump Inlet Vacuum ("Hg)	Total VOCs* (ppmv)	Water Meter (gal)	Avg. Water Discharge (gpm)@	Flow/Vacuum Measurements**				Initials	Comments
Date	Time	Time Clock (hours)					dP ("H2O)	Vac. Pgauge ("Hg)	Temp (deg–F)	Air Flow (scfm)		
7/22/93	1140	41.5	10.0	1400	745	n/a	5	10.0	55	101	AJD	
7/23/93	1427	68.2	6.5	1000	1284	0.34	4	6.5	55	98	AJD	
7/24/93	1035	88.5	6.0	800	1468	0.15	3.2	6.0	55	88	AJD	
7/25/93	1215	114.2	7.0	700	1633	0.11	3.9	7.0	55	96	AJD	
7/26/93	1045	135.7	7.5	700	1870	0.18	4.9	7.5	55	106	AJD	
7/27/93	1040	160.8	10.0	760	2899	0.68	>5.0	10.0	55	0	AJD	
7/28/93	0824	182.3	10.5	730	3933	0.80	>5.0	10.5	55	0	AJD	
7/30/93	0827	230.4	12.0	500	6346	0.84	>5.0	12.0	55	0	AJD	
8/4/93	0845	350.7	12.5	340	13969	1.06	>5.0	12.5	55	0	AJD	
8/6/93	0940	399.6	12.0	520	17579	1.23	>5.0	12.0	55	0	AJD	
8/12/93	1337	405.9	12.0	n/a	replaced	n/a	>5.0	12.0	55	0	AJD	
8/17/93	0916	409.4	5.0	n/a	replaced	n/a	>5.0	5.0	55	0	AJD	
8/18/93	n/a	415.2	n/a	2050	74	n/a	n/a	n/a	55	0	AJD	
8/20/93	0848	456.7	4.0	340	82	0.00	5.0	4.0	55	0	AJD	
8/26/93	0840	600.2	5.5	95	82	0.00	6.0	5.5	55	0	AJD	
9/10/93	1508	963	5.5	25	82	0.00	6.0	5.5	55	0	AJD	
10/8/93	1512	1055.4	9.3	673	518	0.08	4.5	8.3	55	100	MP	
10/28/93	1600	1060	7.5	950	651	0.48	7.5	7.5	55	131	MP	
11/22/93	1045	1230.9	9.5	800	775	0.01	10	9.5	55	144	KC	
11/23/93	1120	1255.4	9.0	659	834	0.04	10	9.0	55	146	KC	
12/3/93	1300	1371	8.5	807	1348	0.07	4.5	8.5	55	99	KC	
12/6/93	1535	1446.5	9.0	538	1663	0.07	4.0	9.0	55	0	KC	
12/17/93	940	1704.8	9.0	484	2720	0.07	4.5	9.0	55	98	KC	
12/17/93	1440	1705.3	14.5	2691	2720	0.00	4.0	14.5	55	0	KC	
1/5/94	1330	1797.8	13.0	1615	3292	0.10	4.0	13.0	55	0	KC	
1/10/94	1310	1919.4	13.5	740	3822	0.07	4.0	13.5	55	0	KC	
1/13/94	1430	1991	13.0	565	4125	0.07	3.5	13.0	55	78	KC	

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Date	Time	Time Clock (hours)					dP ("H2O)	Vac. Pgauge ("Hg)	Temp (deg-F)	Air Flow (scfm)		
1/20/94	1150	2156.4	13.5	510	4805	0.07	3.9	13.5	55	81	KC	
1/20/94	1415	2158.1	13.5	2080	4811	0.06	3.7	13.5	55	79	KC	
1/20/94	1525	2159.1	16.1	1372	4815	0.07	2.8	16.1	55	63	KC	
1/28/94	1550	2350	14.0	n/a	5568	0.07	3.5	14.0	58	75	KC	
1/31/94	1600	2422.1	14.5	942	5900	0.08	3	14.5	55	69	KC	
2/4/94	1510	2517.3	14.4	404	6292	0.07	3	14.4	55	69	KC	
2/10/94	1645	2662.5	14.0	632	6812	0.06	2.8	14.0	55	67	KC	
2/17/94	1020	2824.2	13.4	673	7301	0.05	2.95	13.4	55	71	MP	
2/17/94	1545	2829.2	14.1	821	7323	0.08	4	14.1	55	80	MP	
2/22/94	920	2942.8	14.0	767	8247	0.14	3.8	14.0	55	79	KC	
3/2/94	14.25	3139.8	13.3	296	9710	0.12	3	13.3	55	71	KC	
3/10/94	1305	3332.5	13.8	242	11164	0.13	3	13.8	55	70	KC	
3/21/94	1000	3593.5	14.5	229	13642	0.16	3	14.5	55	69	KC	
3/31/94	1600	3837.5	14.5	87	15751	0.14	2.5	14.5	55	63	KC	
4/15/94	1530	4195.8	13.4	n/a	19001	0.15	2	13.4	55	58	KC	OVA out of H2
4/21/94	1218	4336.7	18.8	n/a	19629	0.07	2.5	18.8	55	53	MP	OVA regulator broken
5/5/94	1600	4676.5	18.0	<10	19629	0.00	2.2	18.0	55	52	KC	no dilution very low conc.
5/24/94	1612	5129.9	5.8	8.5	19629/160	0.01	5.8	20.0	55	77	MP	Replaced H20 meter
6/3/94	1605	5369.7	19.0	3	250	0.01	n/a	n/a	n/a	0	KC	Vac guage broken, low conc.
6/9/94	950	5373.8	n/a	n/a	250	0.00	n/a	n/a	n/a	0	KC	System off: restarted, no alarms
6/14/94	1100	5374.0	n/a	n/a	250	0.00	n/a	n/a	n/a	0	KC	System off:flow sensor elbow loose
6/24/94	1112	5614.4	18.5	<10	250	0.00	2.5	18.5	55	54	KC	No dilution
6/28/94	1600	5687.4	13.5	135	620	0.08	2.5	13.5	55	65	MP	Bypassed Y strainer
7/7/94	900	n/a	n/a	n/a	620	0.00	n/a	n/a	n/a	0	KC	system down water leak
7/14/94	1000	n/a	n/a	n/a	620	0.00	n/a	n/a	n/a	0	KC	system down, high alarm noted
7/21/94	1257	5707.1	18.8	80	1656	0.00	–	–	–	0	PJ	System off, faulty level switch
8/9/94	900	n/a	n/a	n/a	1656	0.00	n/a	n/a	n/a	0	KC	System down: replace floats

TABLE 1

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Mobil Chemical Facility – Macedon, NY

Run Time Data			Pump Inlet Vacuum ("Hg)	Total VOCs* (ppmv)	Water Meter (gal)	Avg. Water Discharge (gpm)@	Flow/Vacuum Measurements**				Initials	Comments
Date	Time	Time Clock (hours)					dP ("H2O)	Vac. Pgauge ("Hg)	Temp (deg-F	Air Flow (scfm)		
8/10/94	900	n/a	n/a	n/a	1656	0.00	n/a	n/a	n/a	0	KC	System down: tank overflow
8/16/94	n/a	5713	n/a	n/a	2963	0.00	n/a	n/a	n/a	0	PJ	OVA not charged: system running
9/8/94	1000	n/a	n/a	n/a	2963	0.00	n/a	n/a	n/a	0	KC	System down
9/12/94	n/a	n/a	n/a	n/a	2963	0.00	n/a	n/a	n/a	0	KC	System down
9/15/94	1530	6060	18	300	4731	0.00	15	18	55	135	PJ	Cleaned Transfer Pump, restarted
9/16/94	945	6073	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	KC	Off on high high alarm restarted
9/19/94	1605	6086	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	KC	Running
9/20/94	1110	6087	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	KC	Off on high high alarm left down
9/23/94	940	6087.5	n/a	n/a	n/a	0.00	n/a	n/a	n/a	n/a	KC	Increased started amps restarted
9/26/94	900	6159	15.5	69	5955	0.29	6	15.5	80	92	KC	No dilution
9/29/94	950	6231	18	36	6739	0.18	5.5	16	87	86	KC	No dilution
10/4/94	1440	6356	18	14	8005	0.17	6	16	86	90	KC	No dilution
10/19/94	1539	6593	18.5	260	9579	0.11	n/a	18.5	55	0	PJ	System running on departure
11/21/94	1200	6749	n/a	230	11365	0.19	n/a	n/a	n/a	n/a	PJ	System running on departure
1/26/95	910	7562	n/a	n/a	n/a	n/a	0.75	2	~60	41	MP	System unoperational - frozen
07/21/95	1430	7908	20	200	260	0.01	1.7	20	80	41		New water totalizer meter
07/22/95	915	7925	20	32	300	0.04	1.5	20	81	38		
07/24/95	1330	7978	20	22	320	0.01	1.5	20	89	38		
07/25/95	945	7998	20	21	324	0.00	1.6	20	92	39	TL	
07/26/95	1320	8025	17	21	340	0.01	1.2	17	95	38	TL	
07/31/95	1245	8145	17	21	347	0.00	1	17	98	35	TL	
08/01/95	1400	8170	17	14	348	0.00	1	17	106	35	TL	
08/02/95	830	8189	16.5	12	348	0.00	1	16.5	88	36	TL	
08/03/95	920	8213	21	22	345	0.00	1.2	21	100	32	TL	
08/04/95	1300	8240	21		345	0.00	1	21	105	29	TL	
08/08/95	1310	8337	20.5	30	390	0.01	1	20.5	108	30	TL	
08/09/95	1600	8364	20.5	21.5	409	0.01	1	20.5	112	29	TL	

TABLE 1

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Mobil Chemical Facility – Macedon, NY

Run Time Data			Pump Inlet Vacuum ("Hg)	Total VOCs* (ppmv)	Water Meter (gal)	Avg. Water Discharge (gpm)@	Flow/Vacuum Measurements**				Initials	Comments
Date	Time	Time Clock (hours)					dP ("H2O)	Vac. Pgauge ("Hg)	Temp (deg–F)	Air Flow (scfm)		
08/10/95	1345	8386	21	22	413	0.00	1	21	108	29	TL	
08/14/95											TL	Blower motor req. replacement
08/25/95	1430	8456	7.25	200	1131	0.00	1	7.25	86	47	TL	
08/28/95	1400	8527	10	150	4186	0.72	1.5	10	96	53	TL	
08/29/95	845	8546			5945	1.54				0	TL	
08/30/95	1508	8576	10.5	190	10787	2.69	2	10.5	90	61	TL	
09/01/95	1520	8624	10.5	185	17646	2.38	2	10.5	90	61	TL	
09/05/95	1500	8718	10.5	190	30586	2.29	2	10.5	92	61	TL	
09/06/95	1420	8741	10.5	135	33692	2.25	0.75	10.5	88	37	TL	
09/07/95	1200	8760	8.9	50	36454	2.42	2.5	8.9	80	72	PJ	
09/11/95	1630	8827	17	38	45235	2.18	1.5	17	88	43	TL	
09/12/95	1400	8849	15	36	48063	2.14	2	15	88	54	TL	
09/13/95	1400	8873	14	46	50788	1.89	1.5	14	88	48	TL	
09/14/95	1600	8894	15	44	53188	1.90	1	15	84	38	TL	
09/15/95	1340	8914	15.5	44	55745	2.13	2	15.5		57	TL	
09/18/95	1545	8989	15	32	63621	1.75	1.5	15	80	47	TL	
09/19/95	1430	9012	15	26	65952	1.69	1	15	82	38	TL	
09/20/95	1340	9035	14		68173	1.61	1	14	80	39	TL	
09/21/95	1420	9059	15	40	70548	1.65	1.5	15	78	47	TL	
09/22/95	830	9078	15	28	72273	1.51	1.5	15	76	47	TL	
09/25/95	1430	9156	14.5	32	79837	1.62	1	14.5	76	39	TL	
09/26/95	1500	9180	14.5	32	82147	1.60	1	14.5	74	39	TL	
09/27/95	1415	9203	14.5	28	84224	1.51	1	14.5	74	39	TL	
09/28/95	1510	9228	14.5	42	86455	1.49	1	14.5	80	39	TL	
09/29/95	1540	9253	15.5	40	88587	1.42	1	15.5	82	37	TL	
10/02/95	1530	9325	15	32	97063	1.96	1	15	80	38	TL	
10/09/95	1545	9333	14.5	18	98139	2.24	1	14.5	76	39	TL	

TABLE 1

MPE SYSTEM OPERATING DATA

Mobil Chemical Facility – Macedon, NY

Run Time Data			Pump Inlet Vacuum ("Hg)	Total VOCs* (ppmv)	Water Meter (gal)	Avg. Water Discharge (gpm)@	Flow/Vacuum Measurements**				Initials	Comments
Date	Time	Time Clock (hours)					dP ("H2O)	Vac. Pgauge ("Hg)	Temp (deg-F)	Air Flow (scfm)		
10/04/95	1415	9355	13	22	100891	2.08	1	13	70	41	TL	
10/05/95	1540	9380	14.5	38	104473	2.39	0	14.5	68	0	TL	
10/06/95	1330	9402	14	44	107481	2.28	0.5	14	84	28	TL	

G:\PROJ\93-403\DATA/WK1

* Samples analyzed for total VOCs using a Foxboro OVA Model No. 128; OVA calibrated to benzene prior to 10/8/93.
OVA calibrated to iso-butylene following 10/8/93. These concentrations are corrected for dilution and/or response factors.

** dP = differential pressure at Pitot Tube; Pgauge = static manifold pressure at Pitot Tube location; Temp = estimated vapor temperature at Pitot Tube port (assumed = 55)
Air flow calculated based on dP, Pgauge, Temp, pipe diameter (2 inches) as input to equation provided by Pitot Tube vendor.

n/a Sample not analyzed or data not available.

TABLE 2

DISCHARGE SAMPLING RESULTS AND CALCULATIONS

Mobil Chemical Facility – Macedon, NY

Date	Run Time (days)@	Inlet Vacuum ("Hg)	Air Flow Rate (scfm)**	Discharge Conc (ppmv)*	Removal Rate (lbs/day)	Total HC's Removed (lbs)***	Total HC's Removed (gals)***
07/20/93	0.0	–	53.5	1,840	34	0	0
07/21/93	1.0	–	43.5	2,500	37	36	5
07/22/93	1.7	10.0	100.8	1,400	49	67	9
07/23/93	2.8	6.5	97.8	1,000	34	113	16
07/24/93	3.7	6.0	88.4	800	24	143	20
07/25/93	4.8	7.0	95.5	700	23	168	23
07/26/93	5.7	7.5	105.9	700	26	191	26
07/27/93	6.7	10.0	92.6	760	24	216	30
07/28/93	7.6	10.5	91.5	730	23	237	33
07/30/93	9.6	12.0	87.8	500	15	275	38
08/04/93	14.6	12.5	91.5	340	11	340	47
08/06/93	16.7	12.0	87.5	520	16	367	51
08/18/93	17.3	–	97.2	2,050	69	395	55
08/20/93	19.0	4.0	105.6	340	12	464	64
08/26/93	25.0	5.5	112.3	95	4	512	71
09/10/93	40.1	5.5	112.3	25	1	547	76
09/13/93	44.0	–	100.8	25	1	551	76
10/08/93	44.0	9.3	89.9	673	21	551	76
10/28/93	44.2	7.5	98.0	639	22	555	77
11/22/93	51.3	9.5	89.0	538	16	690	95
11/23/93	52.3	9.0	90.0	659	20	709	98
12/03/93	57.1	8.5	91.6	807	25	819	113
12/06/93	60.3	9.0	83.9	538	16	884	122
12/17/93	71.0	9.0	89.6	484	15	1,048	145
12/17/93	71.1	14.5	72.9	2,691	67	1,049	145
01/05/94	74.9	13.0	76.4	1,615	42	1,261	174
01/10/94	80.0	13.5	75.0	740	19	1,417	196
01/13/94	83.0	13.0	71.0	565	14	1,466	202
01/20/94	89.9	13.5	73.0	1,372	34	1,632	225
01/31/94	100.9	14.5	63.0	942	20	1,936	267
02/04/94	104.9	14.4	63.0	404	9	1,994	275
02/10/94	110.9	14.0	62.0	632	13	2,061	285
02/17/94	117.7	13.4	64.0	673	15	2,156	298
02/17/94	117.8	14.3	74.0	821	21	2,158	298
02/17/94	117.9	14.1	74.0	821	21	2,161	298
02/22/94	122.6	14.0	72.6	767	19	2,255	312

TABLE 2

DISCHARGE SAMPLING RESULTS AND CALCULATIONS

Mobil Chemical Facility – Macedon, NY

Date	Run Time (days)@	Inlet Vacuum ("Hg)	Air Flow Rate (scfm)**	Discharge Conc (ppmv)*	Removal Rate (lbs/day)	Total HC's Removed (lbs)***	Total HC's Removed (gals)***
03/02/94	130.8	13.3	65.9	296	7	2,362	326
03/10/94	138.9	13.8	64.0	242	5	2,410	333
03/21/94	149.7	15.5	60.3	175	4	2,459	340
03/21/94	149.8	14.5	63.5	229	5	2,459	340
03/31/94	159.9	14.5	58.0	87	2	2,493	344
04/15/94	174.8	17.3	55.0	67	1	2,515	347
04/21/94	180.7	14.5	47.3	135	2	2,526	349
05/05/94	194.9	18.0	47.0	7	0.1	2,542	351
05/24/94	213.7	20.0	70.0	11	0.3	2,546	352
06/03/94	223.7	19.0	45.3	2	0.0	2,547	352
06/24/94	233.9	18.5	49.4	7	0.1	2,548	352
06/28/94	237.0	13.5	59.2	182	4	2,554	353
07/21/94	237.8	0.0	0.0	0	0	2,555	353
08/16/94	238.0	14.5	58.0	n/a	0	2,555	353
09/15/94	252.5	18	135	202	9	2,623	362
09/26/94	256.6	15.5	92	46	1	2,645	365
09/29/94	259.6	16	86	24	1	2,649	366
10/04/94	264.8	16	90	9	0.3	2,651	366
10/19/94	274.7	18.5	n/a	168	0	2653	366
11/21/94	281.2	n/a	n/a	155	n/a	n/a	n/a
01/26/95	315.1	n/a	n/a	n/a	n/a	n/a	n/a
07/21/95	330.0	20	41.0	135	1.9	2667	368
07/22/95	330.2	20	38	22	0.3	2667	368
07/24/95	332.4	20	38	15	0.2	2668	368
07/25/95	333.3	20	39	14	0.2	2668	368
07/26/95	334.4	17	38	14	0.2	2668	368
07/31/95	339.4	17	35	14	0.2	2669	369
08/01/95	340.4	17	35	9	0.1	2669	369
08/02/95	341.2	16.5	30	8	0.1	2669	369
08/03/95	342.2	21	32	15	0.2	2669	369
08/04/95	343.3	21	29	17	0.2	2669	369
08/08/95	347.4	20.5	30	20	0.2	2670	369
08/09/95	348.5	20.5	29	15	0.1	2670	369
08/10/95	349.4	21	29	15	0.1	2670	369
08/25/95	352.3	7.25	47	135	2.2	2674	369
08/28/95	355.3	10	53	101	1.8	2680	370

TABLE 2

DISCHARGE SAMPLING RESULTS AND CALCULATIONS

Mobil Chemical Facility – Macedon, NY

Date	Run Time (days)@	Inlet Vacuum ("Hg)	Air Flow Rate (scfm)**	Discharge Conc (ppmv)*	Removal Rate (lbs/day)	Total HC's Removed (lbs)***	Total HC's Removed (gals)***
08/29/95	356.1			114	0.0	2680	370
08/30/95	357.3	10.5	61	128	2.7	2682	370
09/01/95	359.3	10.5	61	124	2.6	2687	371
09/05/95	363.3	10.5	61	128	2.7	2698	373
09/06/95	364.2	10.5	37	91	1.2	2700	373
09/07/95	365.0	8.9	72	34	0.8	2700	373
09/11/95	367.8	17	43	262	3.9	2707	374
09/12/95	368.7	15	54	24	0.4	2709	374
09/13/95	369.7	14	48	31	0.5	2709	374
09/14/95	370.6	15	38	30	0.4	2710	374
09/15/95	371.4	15.5	57	30	0.6	2710	374
09/18/95	374.5	15.5	47	22	0.3	2712	375
09/19/95	375.5	15.5	38	17	0.2	2712	375
09/20/95	376.5	14	39	22	0.3	2712	375
09/21/95	377.5	15	47	27	0.4	2713	375
09/22/95	378.3	15	47	19	0.3	2713	375
09/25/95	381.5	14.5	39	22	0.3	2714	375
09/26/95	382.5	5	39	22	0.3	2714	375
09/27/95	383.5	14.5	39	19	0.3	2714	375
09/28/95	384.5	14.5	39	28	0.4	2715	375
09/29/95	385.5	15.5	37	27	0.3	2715	375
10/02/95	388.5	15	38	22	0.3	2716	375
10/03/95	388.9	14.5	39	12	0.2	2716	375
10/04/95	389.8	13	41	15	0.2	2716	375
10/05/95	390.8	14.5	0	26	0.0	2716	375
10/06/95	391.8	14	28	30	0.3	2717	375

g:\proj\93-403\removal2.wk1

@ Based on system run time meter.

* Samples were analyzed using a Foxboro OVA Model No. 128 Organic Vapor Analyzer; calibrated to iso-butylene and converted to "parts per million by volume as toluene" using the vendor's listed conversion factors.

** System flow rates from 7/27/93 through 7/30/93 are estimated based on the maximum range of the differential pressure gage used to determine flow rates. Flow rates at 10/8 – 11/23/93 are estimated based on previous measurements taken at similar operating (vacuum) conditions.

SCFM standard cubic feet per minute

*** Estimated pounds/gallons of hydrocarbons removed as toluene.

\# Instrument out of service: no readings taken this period

APPENDIX A
WATER QUALITY DATA

Attachment 2

MOBIL CHEMICAL COMPANY
MACEDON, NEW YORK

SOLVENT SPILL REMEDIATION CHRONOLOGY

- June 1982: Accidental leakage of "Iacolene" solvent from #2 underground tank pump due to a defective seal. Estimate of solvent loss was negotiated at 5000 gallons. As part of the spill response action, four monitoring wells (B-1, B-2, B-3, B-4) and two recovery wells (RW-1, RW-2) were drilled and installed.

- 1985: Recovered approximately 1800 gallons of free product from recovery well RW-1, with majority of solvent recovered from RW-2 due to ineffectiveness of RW-1.

- March 1985: Initiated solvent recovery evaluation by Blasland & Bouck due to a zero recovery rate from RW-2.

- July 1985: Contracted Blasland & Bouck Engineers to clean out monitoring wells B-1 through B-4, drill an additional three wells (B-5, B-6, B-7) to further define extent of the solvent plume, and refurbish RW-1 to assess its potential for further recovery operations.

- September 1985: Blasland & Bouck published "Solvent Recovery Evaluation."

- December 1985: Met with NYSDEC to review Blasland & Bouck evaluation. Following agreements were made:
  - Implement hand bailing of monitoring wells with product.
  - Rehabilitate RW-2 by May 1986.
  - Seal RW-1 with concrete.
  - Continue operation of RW-2.

- May 1986: Notified NYSDEC that Mobil would put on hold the sealing of RW-1 and rehabilitation of RW-2 pending assessment of underground tank removal project.

- June 1986: Submitted proposal to NYSDEC to coordinate solvent recovery with underground tank removals in lieu of actions agreed upon in December meeting.

- August 1986: NYSDEC agreed to proposal.

- November 1986: Submitted closure plan for solvent tank removals to NYSDEC. Notified delay in tank removals to February 1987.

- December 1986: Shutdown recovery well RW-2. Ceased bailing B-2 due to low recovery rate.

- April 1987: Solvent tanks and piping were integrity tested, confirmed tight, and removed. No floating solvents were encountered although 121 Cu. Yds. of BTX-contaminated soil was disposed as agreed with NYSDEC at Seneca Meadows.

- May 1987: Initiated Phase II evaluation of solvent recovery operation by Blasland & Bouck to review alternatives for closing out recovery project.

  - Augment manual bailing with "Auto-Skimmer."
  - Install new recovery well with interceptor trench to enhance recovery program.
  - Open excavation to recover free solvent and remove contaminated soil.

- January 1988: Met with NYSDEC to discuss remediation of solvent spill.

- September 1988: Met with NYSDEC to review history and technical aspects of the solvent recovery project. NYSDEC approved abandonment of recovery wells RW-1 and RW-2 and requested that an additional monitoring well be installed. Weekly monitoring reports were submitted to NYSDEC on a monthly basis.

- November 1988: Abandoned recovery well RW-1, redeveloped other site monitoring wells, and installed monitoring well B-8. Recovery well RW-2 was not abandoned due to a slight show of product when evacuated; however, no additional free product was observed after that time.

- December 1988: Letter report describing the November 1988 site activities submitted.

- February 1989: "Solvent Recovery Closure Report 1988" submitted.

- March 1990: Blasland & Bouck met with Mobil. Recommendations made at that time were the evacuation of recovery well RW-2 twice to determine whether free product would occur again at that location, daily monitoring (and bailing) of wells with free product present, and four monitoring wells could be abandoned. Recovery well RW-2 was evacuated once on March 20, 1990, and no free product occurrence was observed.

- May 1990: Recovery well RW-2 was evacuated for a second time and no free product occurrence was observed.

- August 1990: Depths of wells B-2, B-4, B-5, and B-7 checked with little change observed from November 1988.

- September 1990: Letter summarizing the progress of the recovery program and recommendation submitted to NYSDEC.

- April 1991: "Solvent Recovery Closure Program 1990" submitted.

- May 1991: Mobil met with NYSDEC to update them on project and get the go-ahead on abandoning recovery well RW-2 and four other monitoring wells (B-1, B-3, B-6, and B-8). NYSDEC requested ground-water sampling at all monitoring wells, a plan of action for residual lacolene remediation, a tabulation of product recovered, and additional chemical information on lacolene.

- June 1991: Mobil and Blasland & Bouck working in formulating a plan to address NYSDEC's concerns.

Attachment 3

MOBIL CHEMICAL COMPANY
MACEDON, NEW YORK

PRODUCT RECOVERED

1982	Lacolene spill occurred in June. Estimated (worst case scenario) loss of 5,000 gallons.
1982-1985	1,800 gallons recovered.
1986	12 Gallons recovered.
1987	121 cu. yds. BTX-contaminated soils removed, estimated as 15.4 gallons product removed with soil.
1987-1988	2.5 gallons recovered.
1989	2.4 gallons recovered.
1990	4 gallons recovered.[1]
1991	1.65 gallons recovered as of June 30, 1991.
Total:	1,836.3 gallons recovered 1982 - 1990

1. Increased frequency of handbailing

7/24/91
15918678

Attachment 4

LACOLENE ANALYSIS SUMMARY

USEPA Method 8010 Analysis

USEPA 8020 Analysis

Identification Observations

Chain of Custody

Case File

USEPA Method 8020 Scans

- Fuel Oil #2 Std. #1123
- Lacolene Std. #1261
- Gasoline Std. #1122

GC/FID Scans

- Homologous Series P-2021 1 ppm
- Homologous Series P-2020 600 ppm
- Gasoline P-1479 1000 ppm
- Kerosene P-1279 1000 ppm
- Mineral Spirits P-1480 400 ppm
- #2 Fuel P-1957 1000 ppm
- #6 Fuel P-1477 4910 ppm
- 10W30 P-1478 3000 ppm
- Lacolene M-7405 250 ppm
- Lacolene M-7405 100 ppm
- Solvent Blank, Methylene Chloride

USEPA Method 8010 Analysis

- Reagent Blank
- Standard #1257, #1259
- Lacolene Standard #1261

USEPA Method 8020 Analysis

- Reagent Blank
- Standard #1257, #1259
- Lacolene Standard #1261

Andreas Copy
7.15.92

REPORT

DRAFT

FOCUSED RISK CHARACTERIZATION
MOBIL CHEMICAL COMPANY
MACEDON, NY

· Summary should include an additional statement which includes no further action

JULY 1992

BLASLAND & BOUCK ENGINEERS, P.C.
6723 TOWPATH ROAD
SYRACUSE, NY 13214

TABLE OF CONTENTS

DRAFT

SECTION 1 - INTRODUCTION

The purpose of this assessment is to address potential risks which could be associated with the chemicals identified in ground water during the recent geoprobe and ground water sampling activities at the Mobil Chemical Company in Macedon, New York. For two major reasons, the focus of this assessment is upon potential impacts to human health and the environment associated with the discharge of chemicals in ground water to the adjacent Old Erie Canal. These reasons include: 1) the close proximity of the site to the canal; 2) the lack of potable wells between the site and the canal.

SECTION 2 - CHEMICALS OF INTEREST

The chemicals detected in ground water during recent sampling activities conducted at the site in 1990 and 1991 include the following:

Chemical	Maximum Concentration (ug/l)
Benzene	990
Toluene	6,200
Ethylbenzene	57
Xylene	310
2-Methylnaphthalene	66
Naphthalene	22
Fluorene	9.7
Phenanthrene	5. 9
Bis(2-ethylhexyl)phthalate	11
Isophorone	7.8

why presented this way?

SECTION 3 - EXPOSURE PATHWAYS

The site is located in an industrial area approximately 25 feet south of the Old Erie Canal. Both the Old Erie Canal and the Barge Canal (located north of the Old Erie Canal) are drained in the winter. The Old Erie Canal (the canal) is designated by New York State as a Class C surface water. The best usage for Class C surface waters is for fishing (both fish survival and propagation)(6NYCRR, Parts 700-705).

There are no potable wells between the site and the canal. Thus there are no current human pathways which involve use of ground water. Given the close proximity of the site to the canal and the industrialized nature of the area, no potable wells downgradient of the site are likely to be developed in the reasonably foreseeable future. Hypothetical future exposure pathways involving ground water use are thus, unlikely.

The only viable human exposure pathways associated with the chemicals detected in ground water discharged from the site would be those associated with fishing in the canal. Exposures via chemicals discharged to the canal could include dermal contact with water during fishing, inhalation of volatile organics released to air during fishing, and consumption of fish caught in the canal. Exposure from dermal contact with water from the canal is likely to be insignificant due to the limited duration and frequency of contact. Exposures associated with inhalation of volatile organics are likely to be negligible due to the probable low concentrations which occur in canal surface waters as a result of ground water discharge, and the limited frequency and duration of exposure. Exposures associated with fish consumption are likely to be very small due to the limited likelihood that people will eat fish caught in the canal, and due to the fact that none of the chemicals of interest readily bioconcentrate in fish tissue.

The primary ecological receptors associated with the site would be aquatic biota in the canal.

SECTION 4 - POTENTIALLY APPLICABLE NEW YORK STATE STANDARDS

4.1 General

The State of New York has promulgated ground water standards which are based on potable use (6NYCRR, Parts 700-705). However, since there is no current or reasonably foreseeable potable use of ground water downgradient of the site, these standards do not appear to be applicable.

The State of New York has also promulgated standards and guidance values for Class C surface waters (6NYCRR, Parts 700-705) based on fishing, fish propagation and fish survival. Of the chemicals detected in ground water beneath the site, the only available values include guidance value of 6 ug/l for benzene and a standard of 0.6 ug/l for bis(2-ethylhexyl)phthalate.

4.2 Benzene

The guidance value for benzene is based on bioaccumulation and protection of human health. 6NYCRR Part 702.8(a) states that "Standards and guidance values based on bioaccumulation and human consumption of fish shall be equal to the acceptable daily intake from fish consumption divided by a fish consumption rate of 0.033 kilograms per day and by a bioaccumulation factor." Assuming an acceptable risk of one-in-one-million (1E-06), a standard body weight of 70 kilograms, and the United States Environmental Protection Agency's (EPA's) verified carcinogenic slope factor of 0.029 $(mg/kg/day)^{-1}$, an acceptable daily intake for benzene can be calculated as follows:

Intake = 1E-06/0.029 $(mg/kg/day)^{-1}$ x 70 kg

= 2.41E-03 mg/day

Substituting the above value for acceptable daily intake into the following equation thus yields a water concentration which protects against the carcinogenic effects of benzene when exposure is through fish consumption:

$$Cw = \frac{\text{intake in mg/day}}{0.033 \text{ kg fish/day} \times BAF}$$

Where: Cw = Water Criterion (mg/l)

BAF = Bioaccumulation Factor (liters water/kg fish)

Although guidance documents do not explicitly state the value for BAF used in the calculation of the guidance value for benzene, by substituting New York State's guidance value of 6 ug/l (6E-03 mg/l) into the above equation, one can determine that a BAF of 12.19 l/kg must have been used. Howard (1989) reports an experimentally determined bioconcentration factor of 4.4 l/kg for goldfish, and an estimated bioconcentration factor of 24 based on log Kow (octanol/water partition coefficient) of 2.13. Had the experimentally determined value of 4.4 been used, a guidance value of 17 ug/l could have been derived.

Based on its low Kow and the concomitantly low bioconcentration factor (both experimental and estimated), benzene is not normally considered to bioaccumulate in aquatic systems. Thus, basing a water quality guidance value on bioaccumulation in fish and subsequent impacts on human consumers is tenuous. Furthermore, assuming that a fisherman is likely to ingest 33 g of fish per day for an entire lifetime (70 years) from the canal is a gross overestimate of potential exposure.

4.3 Bis(2-ethylhexyl)phthalate

The Class C surface water standard for bis(2-ethylhexyl)phthalate is based

on fish propagation. Since a variety of methods can be used to estimate standards based on propagation, and since the method used in the derivation of the bis(2-ethylhexyl)phthalate standard was not explicitly stated, it is not possible to evaluate the basis for the standard.

Bis(2-ethylhexyl)phthalate was only detected in one ground water sample at a concentration of 11 ug/l. Given the likelihood that any concentration of bis(2-ethylhexl)phthalate resulting in the canal as a result of ground water discharge, if any, would probably not be detectable, the presence of 11 ug/l bis(2-ethylhexyl)phthalate in one ground water sample is inconsequential.

4.4 Other Chemicals of Interest

There are no New York State Class C surface water standards for the remaining chemicals of interest which were detected in ground water beneath the site. This is probably based on the fact that these chemicals are, in general, of a low order of toxicity to humans and fish, and are not expected to bioaccumulate in aquatic systems.

SECTION 5 - EPA CRITERIA

EPA has derived Water Quality Criteria for the protection of human health and aquatic life. These values are intended as guidance values which apply to any navigable surface waters. Scanning the available EPA values reveals that with the exception of naphthalene, no criteria for the protection of fresh water aquatic life are available for chronic (long-term) exposure. There are however, a number of chemicals for which acute (short-term) water quality criteria have been derived. EPA has also derived a number of water quality criteria for the protection of human health based on consumption of fish. The available EPA water quality criteria for the chemicals of interest detected in ground water at the site are given in the following table:

Chemical	Maximum Detected Concentration (ug/l)	EPA Water Quality Criteria (ug/l)		
		Acute Aquatic	Chronic Aquatic	Human Fish Consumption
Benzene	990	5,300	-	40
Toluene	6,200	17,500	-	424,000
Ethylbenzene	57	32,000	-	3,280
Xylene	310	-	-	-
2-Methyl-naphthalene	66	2,300	-	-
Naphthalene	22	2,300	620	-
Fluorene	9.7	-	-	-
Phenanthrene	5.9	-	-	-
DEHP (1)	11	-	-	50,000
Isophorone	7.8	117,000	-	520,000

(1) Bis(2-ethylhexyl)phthalate

not a direct comparison

Based on the available EPA criteria, none of the chemicals present in ground water beneath the site is likely to be discharged to the canal at concentrations high enough to exceed these criteria.

SECTION 6 - CONCLUSIONS

1. Based on its known carcinogenic potential to humans, benzene is the primary chemical of interest detected in ground water at the site.

2. There are no viable ground water pathways for human exposure associated with the site. Thus the application of available ground water standards based on potable use would not be appropriate for ground water associated with the site.

3. The only possible human exposure pathways associated with the site are those associated with fishing in the canal.

4. None of the chemicals of interest are highly bioaccumulative or highly toxic to aquatic biota. Impacts on aquatic biota due to ground water discharge to the canal are likely to be negligible.

5. The available New York State guidance value of 6 ug/l for benzene in Class C surface waters is a grossly conservative number based on the fact that 1) benzene does not readily bioaccumulate; 2) fishing in the canal is of limited frequency and duration; and 3) the assumed fish ingestion rate of 33 grams of fish per day for 70 years is excessive. EPA's water quality criterion for the protection of human health based on fish consumption is 40 ug/l for benzene. Given the fact that benzene is not generally recognized as a chemical which bioaccumulates, and the fact that the human fish ingestion rate associated with the Old Erie Canal is likely to be minimal, both of these values are overly conservative.

actual fenceline is 28ppb not 990ppb max. Want to make sure this is appropriately spelled out. (+)

6. Due to the known nature and extent of contamination at the site, the volatile nature of most of the detected chemicals, and the large volume of mixing associated with ground water discharge to the canal, ground water discharge to the canal is likely to result in concentrations in the canal which are below the limits of detection.