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REPORTS

DATE:

MAY 1995

Remediation Systems Operations Quarterly Report

May 1995

Amoco Pipeline Station
Artesia, New Mexico

Prepared For:

AMOCO OIL COMPANY
130 East Randolph Drive
Chicago, Illinois 60680

Prepared By:

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Naperville, Illinois 60563
708-369-0201

Project 2775.01-02

May 1995

Mittelhauser CORPORATION

TABLE OF CONTENTS

Section — Page

1.0 INTRODUCTION 1

2.0 LABORATORY RESULTS 1
- 2.1 Monthly BETX Results for the Influent and Effluent to the Air Stripper 1
- 2.2 Quarterly BETX Results for Monitoring Wells with No Free Product . 2
- 2.3 Other Laboratory Results 3

3.0 PRODUCT THICKNESS 3

4.0 FLUIDS PUMPED 3

5.0 SOIL REMEDIATION 4

FIGURES

Figure 1 Free Product Thickness Map

TABLES

Table 1 Monthly BETX Results for the Influent to and Effluent from the Air Stripper

Table 2 Quarterly BETX Results for Monitoring Wells with No Free Product

Table 3 Monitoring Well Water / Product Levels

APPENDICES

Appendix A: Laboratory Results

Appendix B: Product Description for the Scaltec™ System

1.0 INTRODUCTION

Construction and installation of an interception trench and groundwater separation and treatment system for the Amoco Artesia Facility was completed in November 1994. This report summarizes the results of the remediation system operations for the period of November 1994 through March 1995.

Several difficulties were encountered during initial operations. First, significant fouling of the air stripper unit with calcium carbonate resulted in extended system shutdowns for maintenance and cleaning. In addition, fouling of the system led to the operational failure of the flow indicator/totalizer, and seizing of the discharge pump impeller. Monthly sampling events for January and March were suspended due to system shutdowns. In order to reduce the amount of calcium carbonate fouling in the system, a prefilter and a sequestering agent were installed on the influent piping. This installation occurred during the first half of April 1995. Information on the prefilter and sequestering agent is included in Appendix B. Secondly, high levels of hydrogen sulfide gas were detected in the separation and treatment system. This resulted in modifications to the standard operations and maintenance procedures, most notably in the inclusion of confined space entry procedures.

2.0 LABORATORY RESULTS

2.1 MONTHLY BETX RESULTS FOR THE INFLUENT AND EFFLUENT TO THE AIR STRIPPER

The monthly BETX results for the influent to the air stripper and the effluent from the air stripper are presented in Table 1. All Figures and Tables are presented at the end of the text before the Appendices. Analytical results for the samples taken on 2/28/95 and 4/12/95 are included in Appendix A. The results for 11/25/94 and

12/21/94 were included in the Interception Trench System Installation Report, dated February 1995. Note that all effluent results meet the regulatory requirements.

Sampling was not performed in January or March for the reasons described in the Introduction.

Based on the results shown in Table 1 the average removal efficiencies of the air stripper have been:

Benzene	99.9%
Ethylbenzene	99.7%
Toluene	99.8%
Xylene	99.7%

2.2 QUARTERLY BETX RESULTS FOR MONITORING WELLS WITH NO FREE PRODUCT

The quarterly BETX results for monitoring wells which did not contain free product are presented in Table 2. Results are presented for Monitoring Well 6 on 2/16/95 only since the monitoring well contained free product during the other sampling events. The analytical results are presented in Appendix A for the samples taken on 2/16/95. Results for samples taken on 11/25/94 and 12/28/94 were provided in the Interception Trench System Installation Report.

The two monitoring wells south of the interception trench, monitoring wells 11 and 14, continue to show no indication of BETX.

2.3 OTHER LABORATORY RESULTS

Due to the operational problems encountered, additional analyses were performed on the influent (from the west pump) to the air stripper and the effluent from the air stripper. Alkalinity (as $CaCO_3$), hardness, PH, TDS, TSS, and sulfate were run on both the influent and the effluent. In addition, calcium, magnesium, iron, and manganese were run on the influent from the west sump. These results are included in Appendix A, with the BETX samples taken on 2/28/95. The results were used to specify the prefilter and sequestering agent purchased to reduce fouling.

3.0 PRODUCT THICKNESS

Product thickness measurements were taken in the monitoring wells during the February sampling event. Table 3 contains product thickness information. The free product thickness map is shown in Figure 1.

4.0 FLUIDS PUMPED

During the first quarter of operation, it is estimated that the separation and treatment system recovered, treated, and discharged approximately 110,000 gallons of water. Totalizer readings taken during the April system rehabilitation and startup totaled 43,741 gallons. The estimated volume of 110,000 gallons is based on an average daily flowrate calculated for the months of December and January, multiplied by the number of operational days through the end of the first quarter. Corrective action taken during the first quarter will allow more accurate measuring in the future.

Free product recovery by the separation and treatment system is estimated at 25 gallons for the first quarter. This figure is based on product level measurements taken in the product recovery tank (product thickness of 0.13 feet at a depth of 3.22 feet in a tank with an inside diameter of 3.75 feet).

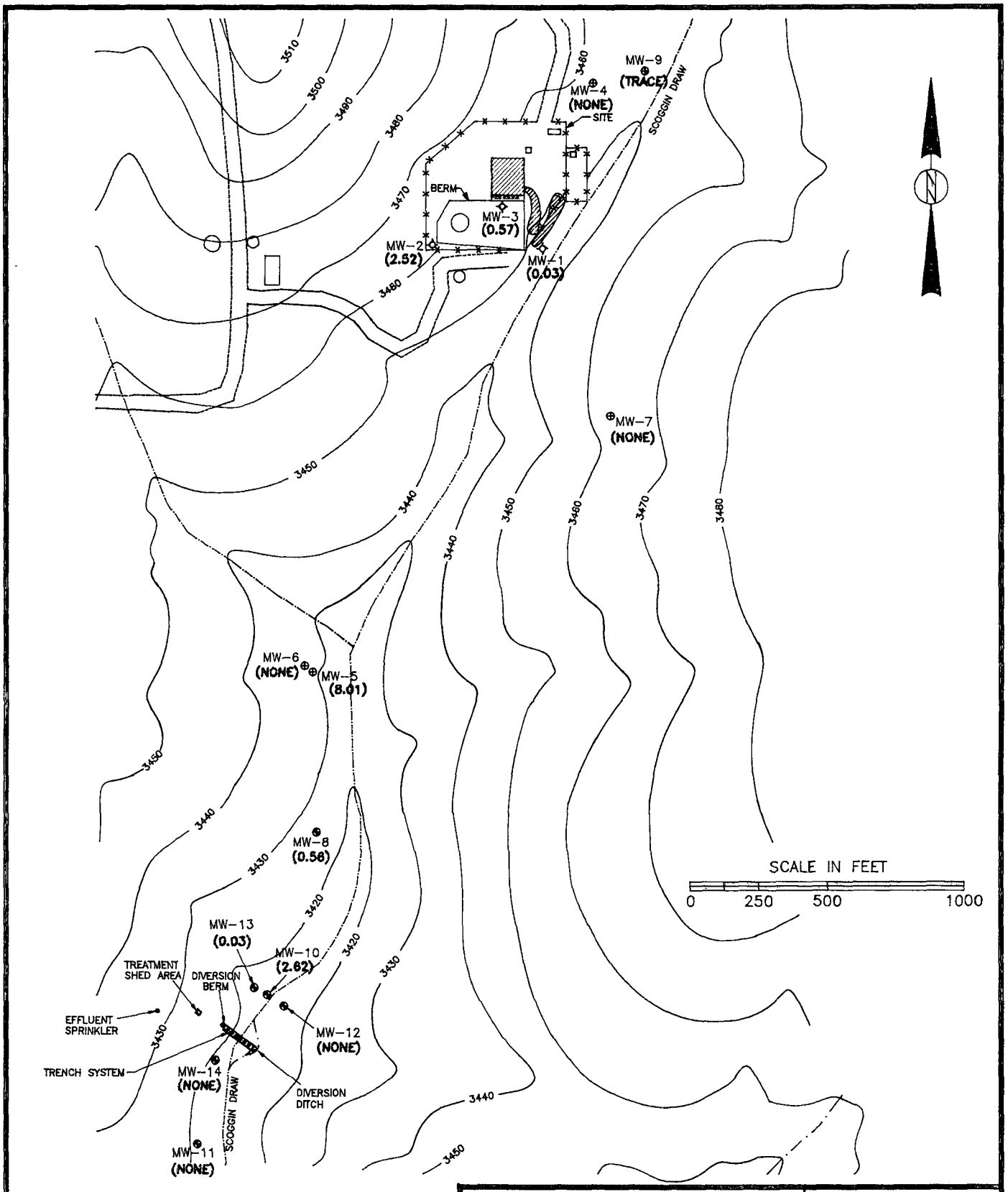
5.0 SOIL REMEDIATION

On March 4, 1995 the Oil Conservation Division (OCD) approved a soil remediation program submitted by Amoco Oil on January 16, 1995. The basic approach that was proposed was to disk the area around the bulk storage tank on a monthly basis and obtain samples for TPH (method 8015) on a quarterly basis. The first disking took place on April 27, 1995. The work performed was as follows:

- Pipelines in the area around the tank were identified by Amoco personnel.
- Large rocks were separated out of the contaminated soil and stockpiled on the north side of the area. This section is composed of solid rock which could not be disked.
- The contaminated soil was disked 10 times.

Three samples have been taken for TPH analyses. The results will be reported in the next quarterly report.

FIGURES



LEGEND

MW-1 TO 3 ⊹	MONITORING WELL LOCATION (CURA, 1993)
MW-4 TO 7 ⊕	PHASE II MONITORING WELL
MW-8 TO 14 ⊕	PHASE III MONITORING WELL
(0.57)	PRODUCT LEVEL THICKNESS (IN FEET)

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FREE PRODUCT
THICKNESS MAP

AMOCO PIPELINE COMPANY
ARTESIA, NEW MEXICO

CHECK BY	HMM
DRAWN BY	BCP
DATE	5-3-95
SCALE	AS SHOWN
CAD NO.	2775102C
PRJ NO.	2775.
FIGURE	1

TABLES

TABLE 1

MONTHLY BETX RESULTS FOR THE INFLUENT TO AND EFFLUENT FROM THE AIR STRIPPER

Amoco Pipeline Company
Artesia, New Mexico

Influent				
SAMPLE DATE	11/25/94	12/21/94	2/28/95	4/12/95
Benzene	2970	3070	3060	3300
Ethylbenzene	364	338	442	476
Toluene	808	1220	1350	1130
Xylene	1770	2130	2750	2500
Effluent				
SAMPLE DATE	11/25/94	12/21/94	2/28/95	4/12/95
Benzene	1.8	6.6	3.3	3.6
Ethylbenzene	<1.0	<1.0	1.4	2.8
Toluene	<1.0	5.1	2.2	2.8
Xylene	<1.0	5.7	6.6	14.5

NOTES: *All results are in ug/l.*

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TABLE 2

QUARTERLY BETX RESULTS FOR MONITORING WELLS WITH NO FREE PRODUCT

Amoco Pipeline Company
Artesia, New Mexico

Well 4			
SAMPLE DATE	11/25/94	12/22/94	2/16/95
Benzene	<1	<1	<1
Ethylbenzene	<1	<1	<1
Toluene	<1	<1	<1
Xylene	<1	<1	<1
Well 6			
SAMPLE DATE	11/25/94	12/21/94	2/16/95
Benzene	FREE PRODUCT PRESENT		2.2
Ethylbenzene			<1
Toluene			<1
Xylene			<1
Well 7			
SAMPLE DATE	11/25/94	12/22/94	2/16/95
Benzene	<1	1590	846
Ethylbenzene	<1	39	20.9
Toluene	<1	<10	<10
Xylene	<1	86.5	52.7
Well 11			
SAMPLE DATE	11/17/94	12/22/94	2/16/95
Benzene	<1	<1	<1
Ethylbenzene	<1	<1	<1
Toluene	<1	<1	<1
Xylene	<1	<1	<1
Well 12			
SAMPLE DATE	11/17/94	12/22/94	2/16/95
Benzene	75	5.6	<1
Ethylbenzene	1	<1	<1
Toluene	1.1	<1	<1
Xylene	1	<1	<1
Well 14			
SAMPLE DATE	11/17/94	12/22/94	2/16/95
Benzene	<1	<1	<1
Ethylbenzene	<1	<1	<1
Toluene	<1	<1	<1
Xylene	<1	<1	<1

NOTES: *All results are in ug/l.*

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TABLE 3

MONITORING WELL WATER / PRODUCT LEVELS

Amoco Pipeline Company
Artesia, New Mexico

Well Identification	Date	Depth To Product (feet)	Depth To Water (feet)	Product Level Thickness (feet)
MW-1	05/21/93		20.73	0.21
	11/17/94	17.54	17.56	0.02
	02/09/95	18.02	18.05	0.03
MW-2	05/21/93		27.56	1.75
	11/17/94	23.28	26.67	3.39
	02/09/95	23.98	26.50	2.52
MW-3	05/21/93		17.81	1.36
	11/17/94	13.07	13.65	0.58
	02/09/95	13.75	14.32	0.57
MW-4	11/17/94	NONE	28.28	NONE
	02/09/95	NONE	28.51	NONE
MW-5	11/17/94	16.22	24.19	7.97
	02/09/95	16.84	24.85	8.01
MW-6	11/17/94	TRACE	14.53	TRACE
	02/09/95	NONE	15.02	NONE
MW-7	11/17/94	NONE	34.33	NONE
	02/09/95	NONE	34.67	NONE
MW-8	11/17/94	13.69	14.95	1.26
	02/09/95	14.46	15.02	0.56
MW-9	11/17/94	23.07	23.10	0.03
	02/09/95	TRACE	23.41	TRACE
MW-10	11/17/94	19.02	21.24	2.22
	02/09/95	19.74	22.36	2.62
MW-11	11/17/94	NONE	19.34	NONE
	02/09/95	NONE	19.61	NONE
MW-12	11/17/94	NONE	16.47	NONE
	02/09/95	NONE	16.78	NONE
MW-13	11/17/94	20.41	20.49	0.08
	02/09/95	20.84	20.87	0.03
MW-14	11/17/94	NONE	18.11	NONE
	02/09/95	NONE	18.45	NONE

APPENDIX A

Laboratory Results

- *BETX Results Plus Alkalinity (CaO_3), Hardness, TDS, TSS, and Sulfate for the Influent to and Effluent from the Air Stripper - Samples Taken 2/28/95.*
- *BETX Results for the Influent to and Effluent from the Air Stripper - Samples Taken 4/12/95.*
- *BETX Results for Monitoring Wells 4, 6, 7, 11, 12, and 14 - Samples Taken 2/16/95.*

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

NET Job Number: 95.01341

IEPA Cert No. 100221
WDNR Cert No. 999447130
A2LA Cert No. 0453-01

Enclosed is the Quality Control Data and Analytical Results for the following samples submitted to NET, Inc. Bartlett Division for analysis:

Project Description: Amoco Pipeline Co; 2775.00-02

Sample Number	Sample Description	Date Taken	Date Received
295593	Influent	02/28/1995	03/01/1995
295594	Effluent	02/28/1995	03/01/1995
295595	Trip Blank	02/28/1995	03/01/1995
295596	West Sump	02/28/1995	03/01/1995

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. These results apply only to the samples analyzed. Reproduction of this report only in whole is permitted. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Procedures used follow NET Standard Operating Procedures which reference the methods listed on your report. Should you have questions regarding procedures or results, please do not hesitate to call. NET has been pleased to provide these analytical services for you.

This Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

Approved by:

Jean-Pierre C. Rouanet
Operations Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295593

NET Job No.: 95.01341

Sample Description: Influent
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken: 13:50
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	3,060	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Ethyl Benzene	442	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Toluene	1,350	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Xylenes, total	2,750	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Surr: 1,2-Dichloroethane-d4	97	%	03/08/1995	76-114	llj	930	8240 (1)
Surr: Toluene-d8	103	%	03/08/1995	88-110	llj	930	8240 (1)
Surr: 4-Bromofluorobenzene	94	%	03/08/1995	86-115	llj	930	8240 (1)

VOA ANALYZED AT A 20X DILUTION.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295594

NET Job No.: 95.01341

Sample Description: Effluent
Amoco Pipeline Co; 2775.00-02.

Date Taken: 02/28/1995
Time Taken: 13:50
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
Alkalinity, total (CaCO3)	435	mg/L	03/06/1995	5	sdf	273	310.1(3)
Hardness, Total	1,400	mg/L	03/07/1995	5	jpd	135	130.2(3)
pH	7.44	units	03/01/1995	0.10	jpd	908	150.1(3)
Solids, Total Dissolved	4,460	mg/L	03/02/1995	25	sdf	589	160.1(3)
Solids, Total Suspended	21	mg/L	03/02/1995	5	sdf	700	160.2(3)
Sulfate	1,980	mg/L	03/02/1995	10	kaf	327	375.4(3)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295594

NET Job No.: 95.01341

Sample Description: Effluent
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken: 13:50
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	3.3	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Ethyl Benzene	1.4	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Toluene	2.2	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Xylenes, total	6.4	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Surr: 1,2-Dichloroethane-d4	104	%	03/08/1995	76-114	llj	930	8240 (1)
Surr: Toluene-d8	109	%	03/08/1995	88-110	llj	930	8240 (1)
Surr: 4-Bromofluorobenzene	98	%	03/08/1995	86-115	llj	930	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295595

NET Job No.: 95.01341

Sample Description: Trip Blank
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken:
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	<1.0	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Ethyl Benzene	<1.0	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Toluene	<1.0	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Xylenes, total	<1.0	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Surr: 1,2-Dichloroethane-d4	99	%	03/08/1995	76-114	llj	930	8240 (1)
Surr: Toluene-d8	106	%	03/08/1995	88-110	llj	930	8240 (1)
Surr: 4-Bromofluorobenzene	101	%	03/08/1995	86-115	llj	930	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295596

NET Job No.: 95.01341

Sample Description: West Sump
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken: 13:40
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
Alkalinity, total (CaCO3)	935	mg/L	03/06/1995	5	sdf	273	310.1(3)
Hardness, Total	1,480	mg/L	03/07/1995	5	jpd	135	130.2(3)
pH	6.62	units	03/01/1995	0.10	jpd	908	150.1(3)
Solids, Total Dissolved	5,050	mg/L	03/02/1995	25	sdf	589	160.1(3)
Solids, Total Suspended	2,040	mg/L	03/02/1995	5	sdf	700	160.2(3)
Sulfate	1,970	mg/L	03/02/1995	10	kaf	327	375.4(3)
Calcium, AA	200	mg/L	03/09/1995	1.0	mic	1	215.1(3)
Magnesium, AA	860	mg/L	03/09/1995	1.0	jmt	1	242.1(3)
Iron, ICP	10.5	mg/L	03/09/1995	0.10	jmt	708 18	200.7 (3)
Manganese, ICP	0.654	mg/L	03/09/1995	0.010	mic	16	200.7 (3)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

CONTINUING CALIBRATION VERIFICATION

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Run Batch Number	CCV True Conc.	Conc. Found	Percent Recovery
Alkalinity, total (CaCO3)	273	100	106	106.0
Hardness, Total	135	80	80	100.0
pH	908	7.02	7.09	101.0
pH	908	7.02	7.02	100.0
pH	908	7.02	6.97	99.3
Sulfate	327	20.0	19.2	96.0
Manganese, ICP	16	1.00	0.935	93.5
VOLATILE COMPDS - 8240 AQUEOUS				
Benzene	930	50.0	55.0	110.0
Ethyl Benzene	930	50.0	61.5	123.0
Toluene	930	50.0	57.9	115.8
Xylenes, total	930	150	183	122.0

CCV - Continuing Calibration Verification

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

BLANK ANALYSIS

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis Results	Units	Reporting Limit	Analytical Method
Alkalinity, total (CaCO3)		273	<5	mg/L	5	310.1(3)
Hardness, Total		135	<5	mg/L	5	130.2(3)
Solids, Total Dissolved		589	<25	mg/L	25	160.1(3)
Solids, Total Suspended		700	<5	mg/L	5	160.2(3)
Sulfate		327	<10	mg/L	10	375.4(3)
Iron, ICP		18	<0.10	mg/L	0.10	200.7 (3)
VOLATILE COMPDS - 8240 AQUEOUS						8240 (1)
Benzene		930	<1.0	ug/L	1.0	8240 (1)
Ethyl Benzene		930	<1.0	ug/L	1.0	8240 (1)
Toluene		930	<1.0	ug/L	1.0	8240 (1)
Xylenes, total		930	<1.0	ug/L	1.0	8240 (1)
Surr: 1,2-Dichloroethane-d4		930	103	%	76-114	8240 (1)
Surr: Toluene-d8		930	101	%	88-110	8240 (1)
Surr: 4-Bromofluorobenzene		930	94	%	86-115	8240 (1)

Advisory Control Limits for Blanks:

All compounds should be less than the Reporting Limit, except for phthalate esters, toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit.

OCEAN GROUP

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

LABORATORY CONTROL STANDARD

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	True Conc.	Conc. Found	LCS % Recovery
Solids, Total Dissolved		589	330.	314	95.2
Solids, Total Suspended		700	100.0	100	100.0
VOLATILE COMPDS - 8240 AQUEOUS					
Benzene		930	20.0	20.6	103.0
Ethyl Benzene		930	20.0	23.0	115.0
Toluene		930	20.0	21.0	105.0
Xylenes, total		930	60.0	64.4	107.3
Surr: 1,2-Dichloroethane-d4		930	50.0	51.4	102.8
Surr: Toluene-d8		930	50.0	49.2	98.4
Surr: 4-Bromofluorobenzene		930	50.0	48.7	97.4

Advisory Control Limits - Inorganics - LCS recovery should be 80 - 120%.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
Alkalinity, total (CaCO3)		273	409	309	100	mg/L	100.0	417	100	mg/L	108.0	7.7
Hardness, Total		135	180	144	40	mg/L	90.0	176	40	mg/L	80.0	11.8
VOLATILE COMPDS - 8240 AQUE												
Benzene		930	301	<1.0	20.0	ug/L	1505.0	292	20.0	ug/L	1460.0	3.0
Ethyl Benzene		930	35.0	<1.0	20.0	ug/L	175.0	34.0	20.0	ug/L	170.0	2.9
Toluene		930	82.0	<1.0	20.0	ug/L	410.0	81.0	20.0	ug/L	405.0	1.2
Xylenes, total		930	260	<1.0	60.0	ug/L	433.3	159	60.0	ug/L	265.0	48.2

NOTE: Matrix Spike Samples may not be samples from this job.

Advisory Control Limits for MS/MSDs:

For Inorganic Parameters and GC Volatiles, the spike recovery should be 75 - 125% if the spike added value was greater than or equal to one fourth of the sample result value. If not, the control limits are not established. The RPD for the MS/MSD pair should be less than 20.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

OCEAN GROUP

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

DUPLICATES

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	Original Analysis	Duplicate Analysis	Units	RPD
Alkalinity, total (CaCO3)		273	277	275	mg/L	0.7
pH		908	7.49	7.48	units	0.1
pH		908	7.39	7.43	units	0.5
pH		908	7.40	7.38	units	0.3
pH		908	6.62	6.63	units	0.2
Solids, Total Dissolved		589	1,320	1,330	mg/L	0.8
Solids, Total Suspended		700	142	146	mg/L	2.8

NOTE: Spikes and Duplicates may not be samples from this job.

RPD - Relative Percent Difference

Advisory Control Limits for Duplicates - RPD should be less than 20.

NET Midwest, Bartlett Division

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in the results column indicates the analyte was not detected at or above the reported value.
mg/L	:	Concentration in units of milligrams of analyte per liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per million (ppm).
ug/g	:	Concentration in units of micrograms of analyte per gram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per million (ppm) or mg/Kg.
ug/L	:	Concentration in units of micrograms of analyte per liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per billion (ppb).
ug/Kg	:	Concentration in units of micrograms of analyte per kilogram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per billion (ppb).
B	:	Sample result flag indicating that the analyte was also found in the method blank analysis. The value after the B indicates the concentration found in the blank analysis.
D	:	Sample result flag indicating that the reported concentration is from an analysis performed at a dilution. The value following the D indicates the dilution factor of the analysis.
J	:	Sample result flag indicating that the reported concentration is below the routine reporting limit but greater than the Method Detection Limit. The value should be considered estimated.
TCLP	:	These initials appearing in front of an analyte name indicate that the Toxicity Characteristic Leaching Procedure (TCLP) was performed for this test.
%	:	Percent; To convert ppm to %, divide the result by 10,000. To convert % to ppm, multiply the result by 10,000.
Dry Weight (dw)	:	When indicated, the results are reported on a dry weight basis. The contribution of the moisture content in the sample is subtracted when calculating the concentration of the analyte.
ICP	:	Indicates analysis was performed using Inductively Coupled Plasma Spectroscopy.
AA	:	Indicates analysis was performed using Atomic Absorption Spectroscopy.
GFAA	:	Indicates analysis was performed using Graphite Furnace Atomic Absorption Spectroscopy.
PQL	:	Practical Quantitation Limit; the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Method References

(1) Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", USEPA SW-846, 3rd Edition, 1986.

(2) ASTM "American Society for Testing Materials

(3) Methods 100 through 499: see "Methods for Chemical Analysis of Water and Wastes", USEPA, 600/4-79-020, Rev. 1983.

(4) See "Standard Methods for the Examination of Water and Wastewater", 17th Ed, APHA, 1989.

(5) Methods 600 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants", USEPA Federal Register Vol. 49 No. 209, October 1984.

(6) Methods 500 through 599: see "Methods for the Determination of Organic Compounds in Drinking Water," USEPA 600/4-88/039, Rev. 1988.

Mittelhauser
CORPORATION
1240 IROQUOIS DRIVE • NAPERVILLE, IL 60563
(708) 369-0201

CHAIN OF CUSTODY RECORD

PROJECT NAME: Amoco Pipeline Co.

PROJECT NUMBER: 2775.00-02

SAMPLED BY: (PRINTED AND SIGNATURE)

CLAY BARN HILL

SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): 8240 BTEX	Ca, Mg, Mn, Fe	Alkalinity, Sulfate	Hardness, pH, TSS, TDS	PRESERVATIVE	REMARKS
INFLUENT	2/28/95	1:50pm	H_2O	INFLUENT	2	X				HCl 4°C	
EFFLUENT	2/28/95	1:50pm	H_2O	EFFLUENT	2	X				HCl 4°C	
TRIP BLANK	2/28/95	—	H_2O	TRIP BLANK	1	X				HCl 4°C	
WEST SUMP	2/28/95	1:40pm	H_2O	WEST SUMP	1		X			HNO_3 4°C	
WEST SUMP	2/28/95	1:40pm	H_2O	WEST SUMP	1			X	X	4°C	
EFFLUENT	2/28/95	1:50pm	H_2O	EFFLUENT	1			X	X	4°C	

RELINQUISHED BY: (SIGNATURE)	DATE 2/28/95	TIME 3:40pm	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLES (THIS SHIPMENT): 3
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 8
RELINQUISHED BY: (SIGNATURE)	DATE 3/1/95	TIME 9:45	RECEIVED FOR LABORATORY BY: (SIGNATURE) Barbara Valdez	LABORATORY: NET BARTLETT
			LABORATORY CONTACT: MOIRA HOLLAND	LABORATORY PHONE NUMBER: (708) 289-3100
			SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( ) YES (X) NO	

DISTRIBUTION: WHITE, MITTELHAUSER CORPORATION
CANARY, LABORATORY
PINK, CLIENT
GOLD, PROJECT FILE

REMARKS: COC Seal #'s 15394, 15393

Results To H. Mittelhauser

Cooler temp 7°C one VOA had a bubble or head space

ATTN: [illegible] [illegible] [illegible] H. MITTELHAUSER

NET® NATIONAL ENVIRONMENTAL TESTING, INC.

CHAIN OF CUSTODY [redacted]CORD

COMPANY Amoco Pipeline Co.
ADDRESS Mail Code PO630L2 PO Box 7513 Chicago Ill 60680-7513
PHONE 312-856-7251 FAX 312-856-3731
PROJECT NAME/LOCATION Amoco Pipeline Station, Artesia NM
PROJECT NUMBER Facility 10145
PROJECT MANAGER Douglas Earney

REPORT TO: Douglas Earney
INVOICE TO: Amoco Pipeline Co
P.O. NO.
NET QUOTE NO.

MBF SERVICES

SAMPLED BY Clayton M Barnhill (PRINT NAME) — SIGNATURE [signature]
(PRINT NAME) — SIGNATURE

Date	Time	Sample		# and Type of Containers		ANALYSES: 8240 BETEX	COMMENTS
2/16/95	12:30 pm	Monitor Well #6 2 Vials	H2O	X	X	X	
2/16/95	2:05 pm	Monitor Well #7 2 Vials	H2O	X	X	X	
2/16/95	2:50 pm	Monitor Well #4 2 Vials	H2O	X	X	X	
2/15/95	2:00 pm	Monitor Well #11 2 Vials	H2O	X	X	X	
2/15/95	3:16 pm	Monitor Well #14 2 Vials	H2O	X	X	X	
2/16/95	11:15 am	Monitor Well #2 2 Vials	H2O	X	X	X	

(# and Type of Containers: 2 each)

CONDITION OF SAMPLE: BOTTLES INTACT? YES / NO
FIELD FILTERED? YES / NO
COC SEALS PRESENT AND INTACT? YES / NO
VOLATILES FREE OF HEADSPACE? YES / NO
TEMPERATURE UPON RECEIPT: 4.3°
Bottles supplied by NET? YES / NO

SAMPLE REMAINDER DISPOSAL: RETURN SAMPLE REMAINDER TO CLIENT VIA
I REQUEST NET TO DISPOSE OF ALL SAMPLE REMAINDERS DATE

RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	RELINQUISHED BY:	DATE/TIME	RECEIVED FOR NET BY:
Clayton M Barnhill	2/17/95 7 Am			2/18/95 3:00pm	[signature]

METHOD OF SHIPMENT

REMARKS: Send A Copy of the Report to H. Mittelhauser #2775

Rec by: Lou Denison 2-20-95 07:00 from Walker cooler

PT 1 - ORIGINAL - WHITE PT 2 - NET PROJECT MANAGER - YELLOW PT 3 - CUSTOMER COPY - PINK

NET NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

04/24/1995

NET Job Number: 95.02417

IEPA Cert. No.: 100221
WDNR Cert. No.: 999447130
A2LA Cert. No.: 0453-01

Enclosed is the Analytical and Quality Control reports for the following samples submitted to Bartlett Division of NET, Inc. for analysis.

Project Description: Amoco Pipeline Company; 2775.00-02

Sample Number	Sample Description	Date Taken	Date Received
300158	Influent	04/12/1995	04/13/1995
300159	Effluent	04/12/1995	04/13/1995

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. These results apply only to the samples analyzed. Reproduction of this report only in whole is permitted. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Procedures used follow NET Standard Operating Procedures which reference the methods listed on your report. Should you have questions regarding procedures or results, please do not hesitate to call. NET has been pleased to provide these analytical services for you.

This Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

Approved by:

Jean-Pierre C. Rouanet
Operations Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

04/24/1995

Sample No. : 300158

NET Job No.: 95.02417

Sample Description: Influent
Amoco Pipeline Company; 2775.00-02

Date Taken: 04/12/1995
Time Taken: 09:00
IEPA Cert. No. 100221

Date Received: 04/13/1995
Time Received:
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	3,300	ug/L	04/20/1995	1.0	llj	995	8240 (1)
Ethyl Benzene	476	ug/L	04/20/1995	1.0	llj	995	8240 (1)
Toluene	1,130	ug/L	04/20/1995	1.0	llj	995	8240 (1)
Xylenes, total	2,500	ug/L	04/20/1995	1.0	llj	995	8240 (1)
Surr: 1,2-Dichloroethane-d4	97.6	%	04/20/1995	76-114	llj	995	8240 (1)
Surr: Toluene-d8	102.4	%	04/20/1995	88-110	llj	995	8240 (1)
Surr: 4-Bromofluorobenzene	95.8	%	04/20/1995	86-115	llj	995	8240 (1)

VOA ANALYZED AT A 100X DILN.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

04/24/1995

Sample No. : 300159

NET Job No.: 95.02417

Sample Description: Effluent
Amoco Pipeline Company; 2775.00-02

Date Taken: 04/12/1995
Time Taken: 09:05
IEPA Cert. No. 100221

Date Received: 04/13/1995
Time Received:
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	3.6	ug/L	04/24/1995	1.0	llj	997	8240 (1)
Ethyl Benzene	2.8	ug/L	04/24/1995	1.0	llj	997	8240 (1)
Toluene	2.8	ug/L	04/24/1995	1.0	llj	997	8240 (1)
Xylenes, total	14.5	ug/L	04/24/1995	1.0	llj	997	8240 (1)
Surr: 1,2-Dichloroethane-d4	79.2	%	04/24/1995	76-114	llj	997	8240 (1)
Surr: Toluene-d8	104.6	%	04/24/1995	88-110	llj	997	8240 (1)
Surr: 4-Bromofluorobenzene	96.4	%	04/24/1995	86-115	llj	997	8240 (1)

OCEAN CROUP

NET NATIONAL ENVIRONMENTAL TESTING, INC.®

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

CONTINUING CALIBRATION VERIFICATION

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

04/24/1995

NET Job Number: 95.02417

Analyte	Run Batch Number	CCV True Conc.	Conc. Found	Percent Recovery
VOLATILE COMPDS - 8240 AQUEOUS				
Benzene	995	50.0	55.2	110.4
Ethyl Benzene	995	50.0	59.3	118.6
Toluene	995	50.0	58.1	116.2
Xylenes, total	995	150	169	112.7
Surr: 1,2-Dichloroethane-d4	995	50	52.6	105.2
Surr: Toluene-d8	995	50	51.1	102.2
Surr: 4-Bromofluorobenzene	995	50	46.8	93.6

CCV - Continuing Calibration Verification

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

CONTINUING CALIBRATION VERIFICATION

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

04/24/1995

NET Job Number: 95.02417

Analyte	Run Batch Number	CCV True Conc.	Conc. Found	Percent Recovery
VOLATILE COMPDS - 8240 AQUEOUS				
Benzene	997	50.0	49.8	99.6
Ethyl Benzene	997	50.0	49.1	98.2
Toluene	997	50.0	48.0	96.0
Xylenes, total	997	150	144	96.0
Surr: 1,2-Dichloroethane-d4	997	50	42.3	84.6
Surr: Toluene-d8	997	50	49.0	98.0
Surr: 4-Bromofluorobenzene	997	50	45.9	91.8

CCV - Continuing Calibration Verification

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

BLANK ANALYSIS

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

04/24/1995

NET Job Number: 95.02417

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis Results	Units	Reporting Limit	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS						8240 (1)
Benzene		995	<1.0	ug/L	1.0	8240 (1)
Ethyl Benzene		995	<1.0	ug/L	1.0	8240 (1)
Toluene		995	<1.0	ug/L	1.0	8240 (1)
Xylenes, total		995	<1.0	ug/L	1.0	8240 (1)
Surr: 1,2-Dichloroethane-d4		995	96.6	%	76-114	8240 (1)
Surr: Toluene-d8		995	100.8	%	88-110	8240 (1)
Surr: 4-Bromofluorobenzene		995	98.8	%	86-115	8240 (1)

Advisory Control Limits for Blanks:

All compounds should be less than the Reporting Limit, except for phthalate esters, toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit.

OCEAN GROUP

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

BLANK ANALYSIS

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

04/24/1995

NET Job Number: 95.02417

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis Results	Units	Reporting Limit	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS						8240 (1)
Benzene		997	<1.0	ug/L	1.0	8240 (1)
Ethyl Benzene		997	<1.0	ug/L	1.0	8240 (1)
Toluene		997	<1.0	ug/L	1.0	8240 (1)
Xylenes, total		997	<1.0	ug/L	1.0	8240 (1)
Surr: 1,2-Dichloroethane-d4		997	79.0	%	76-114	8240 (1)
Surr: Toluene-d8		997	106.8	%	88-110	8240 (1)
Surr: 4-Bromofluorobenzene		997	96.8	%	86-115	8240 (1)

Advisory Control Limits for Blanks:

All compounds should be less than the Reporting Limit, except for phthalate esters, toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

LABORATORY CONTROL STANDARD

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

04/24/1995

NET Job Number: 95.02417

Analyte	Prep Batch Number	Run Batch Number	True Conc.	Conc. Found	LCS % Recovery
VOLATILE COMPDS - 8240 AQUEOUS					
Benzene		995	20.0	21.7	108.5
Ethyl Benzene		995	20.0	24.4	122.0
Toluene		995	20.0	22.3	111.5
Xylenes, total		995	60.0	67.5	112.5
Surr: 1,2-Dichloroethane-d4		995	50.0	53.1	106.2
Surr: Toluene-d8		995	50.0	49.9	99.8
Surr: 4-Bromofluorobenzene		995	50.0	47.8	95.6

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

LABORATORY CONTROL STANDARD

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

04/24/1995

NET Job Number: 95.02417

Analyte	Prep Batch Number	Run Batch Number	LCS Amount	Units	LCS Result	Percent Recovery	LCSD Result	Percent Recovery	Relative Percent Difference
VOLATILE COMPDS - 8240 AQU									
Benzene		995	20.0	ug/L	21.7	108.5			
Ethyl Benzene		995	20.0	ug/L	24.4	122.0			
Toluene		995	20.0	ug/L	22.3	111.5			
Xylenes, total		995	60.0	ug/L	67.5	112.5			
Surr: 1,2-Dichloroethane-		995	50.0	ug/L	53.1	106.2			
Surr: Toluene-d8		995	50.0	ug/L	49.9	99.8			
Surr: 4-Bromofluorobenzen		995	50.0	ug/L	47.8	95.6			

21817

Mittelhauser
CORPORATION

1240 IROQUOIS DRIVE • NAPERVILLE, IL 60563
(708) 369-0201

CHAIN OF CUSTODY RECORD

PAGE 1 OF 1

PROJECT NAME: AMOCO PIPELINE COMPANY
PROJECT NUMBER: 2775.00-02

SAMPLED BY: (PRINTED AND SIGNATURE)
~~CLAY BARNHILL~~
KURT LINDSTROM

SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): 8240 BTEX						PRESERVATIVE	REMARKS
INFLUENT	1/12/95	900	H2O	INFLUENT	2	X						HCl	4°C
EFFLUENT	1/12/95	905	H2O	EFFLUENT	2	X						HCl	4°C

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	TOTAL NO. OF SAMPLES (THIS SHIPMENT)	2
	1/12/95	1000		TOTAL NO. OF CONTAINERS (THIS SHIPMENT)	4
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	LABORATORY CONTACT: MOIRA HOLLAND	LABORATORY PHONE NUMBER: (708) 289-3100
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED FOR LABORATORY BY: (SIGNATURE)	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( ) YES (XXX) NO	

LABORATORY: NET-BARTLETT

DISTRIBUTION: WHITE, MITTELHAUSER CORPORATION
CANARY, LABORATORY
PINK, CLIENT
GOLD, PROJECT FILE

REMARKS: RESULTS TO H. MITTELHAUSER (708) 369-0201
COC SEAL #'S 15607, 15608 cooler temp 8.3°

04/24/95 16:37 ☎708 289 5445 NET BARTLETT DIV →→→ MITTELHAUSER ☑010/010

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

02/28/1995

NET Job Number: 95.01091

IEPA Cert No. 100221
WDNR Cert No. 999447130
A2LA Cert No. 0453-01

Enclosed is the Quality Control Data and Analytical Results for the following samples submitted to NET, Inc. Bartlett Division for analysis:

Project Description: Amoco Pipeline Station, Artesia, NM.

Sample Number	Sample Description	Date Taken	Date Received
294461	Monitor Well #6; Grab	02/16/1995	02/20/1995
294462	Monitor Well #7; Grab	02/16/1995	02/20/1995
294467	Monitor Well #4; Grab	02/16/1995	02/20/1995
294468	Monitor Well #11; Grab	02/15/1995	02/20/1995
294469	Monitor Well #14; Grab	02/15/1995	02/20/1995
294470	Monitor Well #12; Grab	02/16/1995	02/20/1995

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. These results apply only to the samples analyzed. Reproduction of this report only in whole is permitted. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Procedures used follow NET Standard Operating Procedures which reference the methods listed on your report. Should you have questions regarding procedures or results, please do not hesitate to call. NET has been pleased to provide these analytical services for you.

This Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

Approved by:

Jean-Pierre C. Rouanet
Operations Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

02/28/1995

Sample No. : 294461

NET Job No.: 95.01091

Sample Description: Monitor Well #6; Grab
Amoco Pipeline Station, Artesia, NM.

Date Taken: 02/16/1995
Time Taken: 12:30
IEPA Cert. No. 100221

Date Received: 02/20/1995
Time Received: 07:00
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	2.2	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Ethyl Benzene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Toluene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Xylenes, total	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Surr: 1,2-Dichloroethane-d4	109	%	02/26/1995	76-114	rla	918	8240 (1)
Surr: Toluene-d8	99	%	02/26/1995	88-110	rla	918	8240 (1)
Surr: 4-Bromofluorobenzene	96	%	02/26/1995	86-115	rla	918	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

02/28/1995

Sample No. : 294462

NET Job No.: 95.01091

Sample Description: Monitor Well #7; Grab
Amoco Pipeline Station, Artesia, NM.

Date Taken: 02/16/1995
Time Taken: 14:05
IEPA Cert. No. 100221

Date Received: 02/20/1995
Time Received: 07:00
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	846	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Ethyl Benzene	20.9	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Toluene	<10	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Xylenes, total	52.7	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Surr: 1,2-Dichloroethane-d4	104	%	02/27/1995	76-114	llj	923	8240 (1)
Surr: Toluene-d8	109	%	02/27/1995	88-110	llj	923	8240 (1)
Surr: 4-Bromofluorobenzene	96	%	02/27/1995	86-115	llj	923	8240 (1)

VOA analyzed at a 10x dilution.

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Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

02/28/1995

Sample No. : 294467

NET Job No.: 95.01091

Sample Description: Monitor Well #4; Grab
Amoco Pipeline Station, Artesia, NM.

Date Taken: 02/16/1995
Time Taken: 02:50
IEPA Cert. No. 100221

Date Received: 02/20/1995
Time Received: 07:00
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Ethyl Benzene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Toluene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Xylenes, total	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Surr: 1,2-Dichloroethane-d4	103	%	02/26/1995	76-114	rla	918	8240 (1)
Surr: Toluene-d8	101	%	02/26/1995	88-110	rla	918	8240 (1)
Surr: 4-Bromofluorobenzene	98	%	02/26/1995	86-115	rla	918	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

02/28/1995

Sample No. : 294468

NET Job No.: 95.01091

Sample Description: Monitor Well #11; Grab
Amoco Pipeline Station, Artesia, NM.

Date Taken: 02/15/1995
Time Taken: 14:00
IEPA Cert. No. 100221

Date Received: 02/20/1995
Time Received: 07:00
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Ethyl Benzene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Toluene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Xylenes, total	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Surr: 1,2-Dichloroethane-d4	98	%	02/26/1995	76-114	rla	918	8240 (1)
Surr: Toluene-d8	107	%	02/26/1995	88-110	rla	918	8240 (1)
Surr: 4-Bromofluorobenzene	103	%	02/26/1995	86-115	rla	918	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

02/28/1995

Sample No. : 294469

NET Job No.: 95.01091

Sample Description: Monitor Well #14; Grab
Amoco Pipeline Station, Artesia, NM.

Date Taken: 02/15/1995
Time Taken: 15:15
IEPA Cert. No. 100221

Date Received: 02/20/1995
Time Received: 07:00
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Ethyl Benzene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Toluene	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Xylenes, total	<1.0	ug/L	02/26/1995	1.0	rla	918	8240 (1)
Surr: 1,2-Dichloroethane-d4	100	%	02/26/1995	76-114	rla	918	8240 (1)
Surr: Toluene-d8	106	%	02/26/1995	88-110	rla	918	8240 (1)
Surr: 4-Bromofluorobenzene	103	%	02/26/1995	86-115	rla	918	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

02/28/1995

Sample No. : 294470

NET Job No.: 95.01091

Sample Description: Monitor Well #12; Grab
Amoco Pipeline Station, Artesia, NM.

Date Taken: 02/16/1995
Time Taken: 11:15
IEPA Cert. No. 100221

Date Received: 02/20/1995
Time Received: 07:00
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	<1.0	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Ethyl Benzene	<1.0	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Toluene	<1.0	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Xylenes, total	<1.0	ug/L	02/27/1995	1.0	llj	923	8240 (1)
Surr: 1,2-Dichloroethane-d4	99	%	02/27/1995	76-114	llj	923	8240 (1)
Surr: Toluene-d8	99	%	02/27/1995	88-110	llj	923	8240 (1)
Surr: 4-Bromofluorobenzene	100	%	02/27/1995	86-115	llj	923	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

CONTINUING CALIBRATION VERIFICATION

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Run Batch Number	CCV True Conc.	Conc. Found	Percent Recovery
VOLATILE COMPDS - 8240 AQUEOUS				
Benzene	918	50.0	50.5	101.0
Ethyl Benzene	918	50.0	50.6	101.2
Toluene	918	50.0	51.7	103.4
Xylenes, total	918	150	158	105.3

CCV - Continuing Calibration Verification

OCEAN GROUP

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

CONTINUING CALIBRATION VERIFICATION

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Run Batch Number	CCV True Conc.	Conc. Found	Percent Recovery
VOLATILE COMPDS - 8240 AQUEOUS				
Benzene	923	50.0	52.9	105.8
Ethyl Benzene	923	50.0	58.2	116.4
Toluene	923	50.0	53.7	107.4
Xylenes, total	923	150	171	114.0

CCV - Continuing Calibration Verification

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

BLANK ANALYSIS

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis Results	Units	Reporting Limit	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS						8240 (1)
Benzene		918	<1.0	ug/L	1.0	8240 (1)
Ethyl Benzene		918	<1.0	ug/L	1.0	8240 (1)
Toluene		918	<1.0	ug/L	1.0	8240 (1)
Xylenes, total		918	<1.0	ug/L	1.0	8240 (1)
Surr: 1,2-Dichloroethane-d4		918	106	%	76-114	8240 (1)
Surr: Toluene-d8		918	99	%	88-110	8240 (1)
Surr: 4-Bromofluorobenzene		918	98	%	86-115	8240 (1)

Advisory Control Limits for Blanks:

All compounds should be less than the Reporting Limit, except for phthalate esters, toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

BLANK ANALYSIS

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis Results	Units	Reporting Limit	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS						8240 (1)
Benzene		923	<1.0	ug/L	1.0	8240 (1)
Ethyl Benzene		923	<1.0	ug/L	1.0	8240 (1)
Toluene		923	<1.0	ug/L	1.0	8240 (1)
Xylenes, total		923	<1.0	ug/L	1.0	8240 (1)
Surr: 1,2-Dichloroethane-d4		923	97	%	76-114	8240 (1)
Surr: Toluene-d8		923	107	%	88-110	8240 (1)
Surr: 4-Bromofluorobenzene		923	106	%	86-115	8240 (1)

Advisory Control Limits for Blanks:

All compounds should be less than the Reporting Limit, except for phthalate esters, toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit.

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Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

LABORATORY CONTROL STANDARD

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Prep Batch Number	Run Batch Number	True Conc.	Conc. Found	LCS % Recovery
VOLATILE COMPDS - 8240 AQUEOUS					
Benzene		918	20.0	19.6	98.0
Ethyl Benzene		918	20.0	19.3	96.5
Toluene		918	20.0	20.0	100.0
Xylenes, total		918	60.0	60.9	101.5
Surr: 1,2-Dichloroethane-d4		918	20.0	104	520.0
Surr: Toluene-d8		918	20.0	101	505.0
Surr: 4-Bromofluorobenzene		918	20.0	99	495.0

Advisory Control Limits - Inorganics - LCS recovery should be 80 - 120%.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

LABORATORY CONTROL STANDARD

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Prep Batch Number	Run Batch Number	True Conc.	Conc. Found	LCS % Recovery
VOLATILE COMPDS - 8240 AQUEOUS					
Benzene		923	20.0	20.6	103.0
Ethyl Benzene		923	20.0	22.5	112.5
Toluene		923	20.0	22.5	112.5
Xylenes, total		923	60.0	68.8	114.7
Surr: 1,2-Dichloroethane-d4		923	50.0	48.1	96.2
Surr: Toluene-d8		923	50.0	54.2	108.4
Surr: 4-Bromofluorobenzene		923	50.0	52.7	105.4

Advisory Control Limits - Inorganics - LCS recovery should be 80 - 120%.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Prep Batch Number	Run Batch Number	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
VOLATILE COMPDS - 8240 AQUE												
Benzene		918	20.2	<1.0	20.0	ug/L	101.0	15.4	20.0	ug/L	77.0	26.9
Xylenes, total		918	60.3	<1.0	60.0	ug/L	100.5	46	60.0	ug/L	76.7	26.8

NOTE: Matrix Spike Samples may not be samples from this job.

Advisory Control Limits for MS/MSDs:

For Inorganic Parameters and GC Volatiles, the spike recovery should be 75 - 125% if the spike added value was greater than or equal to one fourth of the sample result value. If not, the control limits are not established. The RPD for the MS/MSD pair should be less than 20.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

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Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

02/28/1995

NET Job Number: 95.01091

Analyte	Prep Batch Number	Run Batch Number	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
VOLATILE COMPDS - 8240 AQUE												
Benzene		923	20.6	<1.0	20.0	ug/L	103.0	18.5	20.0	ug/L	92.5	10.6
Xylenes, total		923	62.7	<1.0	60.0	ug/L	104.5	63.4	60.0	ug/L	105.7	1.1

NOTE: Matrix Spike Samples may not be samples from this job.

Advisory Control Limits for MS/MSDs:

For Inorganic Parameters and GC Volatiles, the spike recovery should be 75 - 125% if the spike added value was greater than or equal to one fourth of the sample result value. If not, the control limits are not established. The RPD for the MS/MSD pair should be less than 20.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

NET Midwest, Bartlett Division

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in the results column indicates the analyte was not detected at or above the reported value.
mg/L	:	Concentration in units of milligrams of analyte per liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per million (ppm).
ug/g	:	Concentration in units of micrograms of analyte per gram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per million (ppm) or mg/Kg.
ug/L	:	Concentration in units of micrograms of analyte per liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per billion (ppb).
ug/Kg	:	Concentration in units of micrograms of analyte per kilogram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per billion (ppb).
B	:	Sample result flag indicating that the analyte was also found in the method blank analysis. The value after the B indicates the concentration found in the blank analysis.
D	:	Sample result flag indicating that the reported concentration is from an analysis performed at a dilution. The value following the D indicates the dilution factor of the analysis.
J	:	Sample result flag indicating that the reported concentration is below the routine reporting limit but greater than the Method Detection Limit. The value should be considered estimated.
TCLP	:	These initials appearing in front of an analyte name indicate that the Toxicity Characteristic Leaching Procedure (TCLP) was performed for this test.
%	:	Percent; To convert ppm to %, divide the result by 10,000. To convert % to ppm, multiply the result by 10,000.
Dry Weight (dw)	:	When indicated, the results are reported on a dry weight basis. The contribution of the moisture content in the sample is subtracted when calculating the concentration of the analyte.
ICP	:	Indicates analysis was performed using Inductively Coupled Plasma Spectroscopy.
AA	:	Indicates analysis was performed using Atomic Absorption Spectroscopy.
GFAA	:	Indicates analysis was performed using Graphite Furnace Atomic Absorption Spectroscopy.
PQL	:	Practical Quantitation Limit; the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Method References

(1) Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", USEPA SW-846, 3rd Edition, 1986.

(2) ASTM "American Society for Testing Materials

(3) Methods 100 through 499: see "Methods for Chemical Analysis of Water and Wastes", USEPA, 600/4-79-020, Rev. 1983.

(4) See "Standard Methods for the Examination of Water and Wastewater", 17th Ed, APHA, 1989.

(5) Methods 600 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants", USEPA Federal Register Vol. 49 No. 209, October 1984.

(6) Methods 500 through 599: see "Methods for the Determination of Organic Compounds in Drinking Water," USEPA 600/4-88/039, Rev. 1988.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

NET Job Number: 95.01341

IEPA Cert No. 100221
WDNR Cert No. 999447130
A2LA Cert No. 0453-01

Enclosed is the Quality Control Data and Analytical Results for the following samples submitted to NET, Inc. Bartlett Division for analysis:

Project Description: Amoco Pipeline Co; 2775.00-02

Sample Number	Sample Description	Date Taken	Date Received
295593	Influent	02/28/1995	03/01/1995
295594	Effluent	02/28/1995	03/01/1995
295595	Trip Blank	02/28/1995	03/01/1995
295596	West Sump	02/28/1995	03/01/1995

Sample analysis in support of the project referenced above has been completed and results are presented on the following pages. These results apply only to the samples analyzed. Reproduction of this report only in whole is permitted. Please refer to the enclosed "Key to Abbreviations" for definition of terms. Procedures used follow NET Standard Operating Procedures which reference the methods listed on your report. Should you have questions regarding procedures or results, please do not hesitate to call. NET has been pleased to provide these analytical services for you.

This Quality Control report is generated on a batch basis. All information contained in this report is for the analytical batch(es) in which your sample(s) were analyzed.

Approved by:

Jean-Pierre C. Rouanet
Operations Manager

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295593

NET Job No.: 95.01341

Sample Description: Influent
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken: 13:50
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	3,060	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Ethyl Benzene	442	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Toluene	1,350	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Xylenes, total	2,750	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Surr: 1,2-Dichloroethane-d4	97	%	03/08/1995	76-114	llj	930	8240 (1)
Surr: Toluene-d8	103	%	03/08/1995	88-110	llj	930	8240 (1)
Surr: 4-Bromofluorobenzene	94	%	03/08/1995	86-115	llj	930	8240 (1)

VOA ANALYZED AT A 20X DILUTION.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295594

NET Job No.: 95.01341

Sample Description: Effluent
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken: 13:50
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
Alkalinity, total (CaCO3)	435	mg/L	03/06/1995	5	sdf	273	310.1(3)
Hardness, Total	1,400	mg/L	03/07/1995	5	jpd	135	130.2(3)
pH	7.44	units	03/01/1995	0.10	jpd	908	150.1(3)
Solids, Total Dissolved	4,460	mg/L	03/02/1995	25	sdf	589	160.1(3)
Solids, Total Suspended	21	mg/L	03/02/1995	5	sdf	700	160.2(3)
Sulfate	1,980	mg/L	03/02/1995	10	kaf	327	375.4(3)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295594

NET Job No.: 95.01341

Sample Description: Effluent
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken: 13:50
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	3.3	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Ethyl Benzene	1.4	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Toluene	2.2	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Xylenes, total	6.4	ug/L	03/08/1995	1.0	llj	930	8240 (1)
Surr: 1,2-Dichloroethane-d4	104	%	03/08/1995	76-114	llj	930	8240 (1)
Surr: Toluene-d8	109	%	03/08/1995	88-110	llj	930	8240 (1)
Surr: 4-Bromofluorobenzene	98	%	03/08/1995	86-115	llj	930	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

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Bartlett, IL 60103
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ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295595

NET Job No.: 95.01341

Sample Description: Trip Blank
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken:
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
VOLATILE COMPDS - 8240 AQUEOUS							
Benzene	<1.0	ug/L	03/08/1995	1.0	LLJ	930	8240 (1)
Ethyl Benzene	<1.0	ug/L	03/08/1995	1.0	LLJ	930	8240 (1)
Toluene	<1.0	ug/L	03/08/1995	1.0	LLJ	930	8240 (1)
Xylenes, total	<1.0	ug/L	03/08/1995	1.0	LLJ	930	8240 (1)
Surr: 1,2-Dichloroethane-d4	99	%	03/08/1995	76-114	LLJ	930	8240 (1)
Surr: Toluene-d8	106	%	03/08/1995	88-110	LLJ	930	8240 (1)
Surr: 4-Bromofluorobenzene	101	%	03/08/1995	86-115	LLJ	930	8240 (1)

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Mr. Hank Mittelhauser
MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563

03/09/1995

Sample No. : 295596

NET Job No.: 95.01341

Sample Description: West Sump
Amoco Pipeline Co; 2775.00-02

Date Taken: 02/28/1995
Time Taken: 13:40
IEPA Cert. No. 100221

Date Received: 03/01/1995
Time Received: 09:45
WDNR Cert. No. 999447130

Parameter	Results	Units	Date of Analysis	Method PQL	Analyst	Batch No. Prep/Run	Analytical Method
Alkalinity, total (CaCO3)	935	mg/L	03/06/1995	5	sdf	273	310.1(3)
Hardness, Total	1,480	mg/L	03/07/1995	5	jpd	135	130.2(3)
pH	6.62	units	03/01/1995	0.10	jpd	908	150.1(3)
Solids, Total Dissolved	5,050	mg/L	03/02/1995	25	sdf	589	160.1(3)
Solids, Total Suspended	2,040	mg/L	03/02/1995	5	sdf	700	160.2(3)
Sulfate	1,970	mg/L	03/02/1995	10	kaf	327	375.4(3)
Calcium, AA	200	mg/L	03/09/1995	1.0	mic	1	215.1(3)
Magnesium, AA	860	mg/L	03/09/1995	1.0	jmc	1	242.1(3)
Iron, ICP	10.5	mg/L	03/09/1995	0.10	jmc	708 18	200.7 (3)
Manganese, ICP	0.654	mg/L	03/09/1995	0.010	mic	16	200.7 (3)

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
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Fax: (708) 289-5445

QUALITY CONTROL REPORT

CONTINUING CALIBRATION VERIFICATION

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Run Batch Number	CCV True Conc.	Conc. Found	Percent Recovery
Alkalinity, total (CaCO3)	273	100	106	106.0
Hardness, Total	135	80	80	100.0
pH	908	7.02	7.09	101.0
pH	908	7.02	7.02	100.0
pH	908	7.02	6.97	99.3
Sulfate	327	20.0	19.2	96.0
Manganese, ICP	16	1.00	0.935	93.5
VOLATILE COMPDS - 8240 AQUEOUS				
Benzene	930	50.0	55.0	110.0
Ethyl Benzene	930	50.0	61.5	123.0
Toluene	930	50.0	57.9	115.8
Xylenes, total	930	150	183	122.0

CCV - Continuing Calibration Verification

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
950 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

BLANK ANALYSIS

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	Blank Analysis Results	Units	Reporting Limit	Analytical Method
Alkalinity, total (CaCO3)		273	<5	mg/L	5	310.1(3)
Hardness, Total		135	<5	mg/L	5	130.2(3)
Solids, Total Dissolved		589	<25	mg/L	25	160.1(3)
Solids, Total Suspended		700	<5	mg/L	5	160.2(3)
Sulfate		327	<10	mg/L	10	375.4(3)
Iron, ICP		18	<0.10	mg/L	0.10	200.7 (3)
VOLATILE COMPDS - 8240 AQUEOUS						8240 (1)
Benzene		930	<1.0	ug/L	1.0	8240 (1)
Ethyl Benzene		930	<1.0	ug/L	1.0	8240 (1)
Toluene		930	<1.0	ug/L	1.0	8240 (1)
Xylenes, total		930	<1.0	ug/L	1.0	8240 (1)
Surr: 1,2-Dichloroethane-d4		930	103	%	76-114	8240 (1)
Surr: Toluene-d8		930	101	%	88-110	8240 (1)
Surr: 4-Bromofluorobenzene		930	94	%	86-115	8240 (1)

Advisory Control Limits for Blanks:

All compounds should be less than the Reporting Limit, except for phthalate esters, toluene, methylene chloride, acetone and chloroform should be less than 5 times the Reporting Limit.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

LABORATORY CONTROL STANDARD

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	True Conc.	Conc. Found	LCS % Recovery
Solids, Total Dissolved		589	330.	314	95.2
Solids, Total Suspended		700	100.0	100	100.0
VOLATILE COMPDS - 8240 AQUEOUS					
Benzene		930	20.0	20.6	103.0
Ethyl Benzene		930	20.0	23.0	115.0
Toluene		930	20.0	21.0	105.0
Xylenes, total		930	60.0	64.4	107.3
Surr: 1,2-Dichloroethane-d4		930	50.0	51.4	102.8
Surr: Toluene-d8		930	50.0	49.2	98.4
Surr: 4-Bromofluorobenzene		930	50.0	48.7	97.4

Advisory Control Limits - Inorganics - LCS recovery should be 80 - 120%.

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	Matrix Spike Result	Sample Result	Spike Amount	Units	Percent Recovery	MSD Result	MSD Spike Amount	Units	Percent Recovery	MS/MSD RPD
Alkalinity, total (CaCO3)		273	409	309	100	mg/L	100.0	417	100	mg/L	108.0	7.7
Hardness, Total		135	180	144	40	mg/L	90.0	176	40	mg/L	80.0	11.8
VOLATILE COMPDS - 8240 AQUE												
Benzene		930	301	<1.0	20.0	ug/L	1505.0	292	20.0	ug/L	1460.0	3.0
Ethyl Benzene		930	35.0	<1.0	20.0	ug/L	175.0	34.0	20.0	ug/L	170.0	2.9
Toluene		930	82.0	<1.0	20.0	ug/L	410.0	81.0	20.0	ug/L	405.0	1.2
Xylenes, total		930	260	<1.0	60.0	ug/L	433.3	159	60.0	ug/L	265.0	48.2

NOTE: Matrix Spike Samples may not be samples from this job.

Advisory Control Limits for MS/MSDs:

For Inorganic Parameters and GC Volatiles, the spike recovery should be 75 - 125% if the spike added value was greater than or equal to one fourth of the sample result value. If not, the control limits are not established. The RPD for the MS/MSD pair should be less than 20.

MS = Matrix Spike
MSD = Matrix Spike Duplicate
RPD = Relative Percent Difference

NATIONAL ENVIRONMENTAL TESTING, INC.

Bartlett Division
850 W. Bartlett Rd.
Bartlett, IL 60103
Tel: (708) 289-3100
Fax: (708) 289-5445

QUALITY CONTROL REPORT

DUPLICATES

MITTELHAUSER CORPORATION
1240 Iroquois Drive
Suite 206
Naperville, IL 60563
Mr. Hank Mittelhauser

03/09/1995

NET Job Number: 95.01341

Analyte	Prep Batch Number	Run Batch Number	Original Analysis	Duplicate Analysis	Units	RPD
Alkalinity, total (CaCO3)		273	277	275	mg/L	0.7
pH		908	7.49	7.48	units	0.1
pH		908	7.39	7.43	units	0.5
pH		908	7.40	7.38	units	0.3
pH		908	6.62	6.63	units	0.2
Solids, Total Dissolved		589	1,320	1,330	mg/L	0.8
Solids, Total Suspended		700	142	146	mg/L	2.8

NOTE: Spikes and Duplicates may not be samples from this job.

RPD - Relative Percent Difference

Advisory Control Limits for Duplicates - RPD should be less than 20.

NET Midwest, Bartlett Division

KEY TO ABBREVIATIONS and METHOD REFERENCES

<	:	Less than; When appearing in the results column indicates the analyte was not detected at or above the reported value.
mg/L	:	Concentration in units of milligrams of analyte per liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per million (ppm).
ug/g	:	Concentration in units of micrograms of analyte per gram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per million (ppm) or mg/Kg.
ug/L	:	Concentration in units of micrograms of analyte per liter of sample. Measurement used for aqueous samples. Can also be expressed as parts per billion (ppb).
ug/Kg	:	Concentration in units of micrograms of analyte per kilogram of sample. Measurement used for non-aqueous samples. Can also be expressed as parts per billion (ppb).
B	:	Sample result flag indicating that the analyte was also found in the method blank analysis. The value after the B indicates the concentration found in the blank analysis.
D	:	Sample result flag indicating that the reported concentration is from an analysis performed at a dilution. The value following the D indicates the dilution factor of the analysis.
J	:	Sample result flag indicating that the reported concentration is below the routine reporting limit but greater than the Method Detection Limit. The value should be considered estimated.
TCLP	:	These initials appearing in front of an analyte name indicate that the Toxicity Characteristic Leaching Procedure (TCLP) was performed for this test.
%	:	Percent; To convert ppm to %, divide the result by 10,000. To convert % to ppm, multiply the result by 10,000.
Dry Weight (dw)	:	When indicated, the results are reported on a dry weight basis. The contribution of the moisture content in the sample is subtracted when calculating the concentration of the analyte.
ICP	:	Indicates analysis was performed using Inductively Coupled Plasma Spectroscopy.
AA	:	Indicates analysis was performed using Atomic Absorption Spectroscopy.
GFAA	:	Indicates analysis was performed using Graphite Furnace Atomic Absorption Spectroscopy.
PQL	:	Practical Quantitation Limit; the lowest level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions.

Method References

(1) Methods 1000 through 9999: see "Test Methods for Evaluating Solid Waste", USEPA SW-846, 3rd Edition, 1986.

(2) ASTM "American Society for Testing Materials

(3) Methods 100 through 499: see "Methods for Chemical Analysis of Water and Wastes", USEPA, 600/4-79-020, Rev. 1983.

(4) See "Standard Methods for the Examination of Water and Wastewater", 17th Ed, APHA, 1989.

(5) Methods 600 through 625: see "Guidelines Establishing Test Procedures for the Analysis of Pollutants", USEPA Federal Register Vol. 49 No. 209, October 1984.

(6) Methods 500 through 599: see "Methods for the Determination of Organic Compounds in Drinking Water," USEPA 600/4-88/039, Rev. 1988.

Mittelhauser

CORPORATION

1240 IROQUOIS DRIVE • NAPERVILLE, IL 60563
(708) 369 0201

CHAIN OF CUSTODY RECORD

PROJECT NAME: Amoco Pipeline Co.

PROJECT NUMBER: 2775.00-02

SAMPLED BY: (PRINTED AND SIGNATURE) CLAY BARNHILL

SAMPLE NUMBER	DATE	TIME	TYPE	SAMPLE LOCATION	NUMBER OF CONTAINERS	ANALYSIS(ES): 8240 BEX	Ca, Mg, Mn, Fe	Alkalinity, Sulfate	Hardness, pH, TSS, TDS	PRESERVATIVE	REMARKS
INFLUENT	2/28/95	1:50pm	H_2O	INFLUENT	2	X				HCl 4°C	
EFFLUENT	2/28/95	1:50pm	H_2O	EFFLUENT	2	X				HCl 4°C	
TRIP BLANK	2/28/95	—	H_2O	TRIP BLANK	1	X				HCl 4°C	
West Sump	2/28/95	1:44pm	H_2O	West Sump	1		X			HNO_3 4°C	
West Sump	2/28/95	1:44pm	H_2O	West Sump	1			X	X	4°C	
EFFLUENT	2/28/95	1:50pm	H_2O	EFFLUENT	1			X	X	4°C	

RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)		
[signature]	2/28/95	3:40pm		TOTAL NO. OF SAMPLES (THIS SHIPMENT): 3 TOTAL NO. OF CONTAINERS (THIS SHIPMENT): 8	LABORATORY: NET BARTLETT
RELINQUISHED BY: (SIGNATURE)	DATE	TIME	RECEIVED BY: (SIGNATURE)	LABORATORY CONTACT: MOIRA HOLLAND	LABORATORY PHONE NUMBER: (708) 289-3100
RELINQUISHED BY: (SIGNATURE)	DATE 3/1/95	TIME 9:45	RECEIVED FOR LABORATORY BY: (SIGNATURE) [signature]	SAMPLE ANALYSIS REQUEST SHEET ATTACHED: ( ) YES (X) NO	

DISTRIBUTION: WHITE, MITTELHAUSER CORPORATION
CANARY, LABORATORY
PINK, CLIENT

REMARKS: COC Seal #s 15394, 15393
Paulette To H. Mittelhauser

cooler temp 7.4°C one VOA had a bubble ... 58

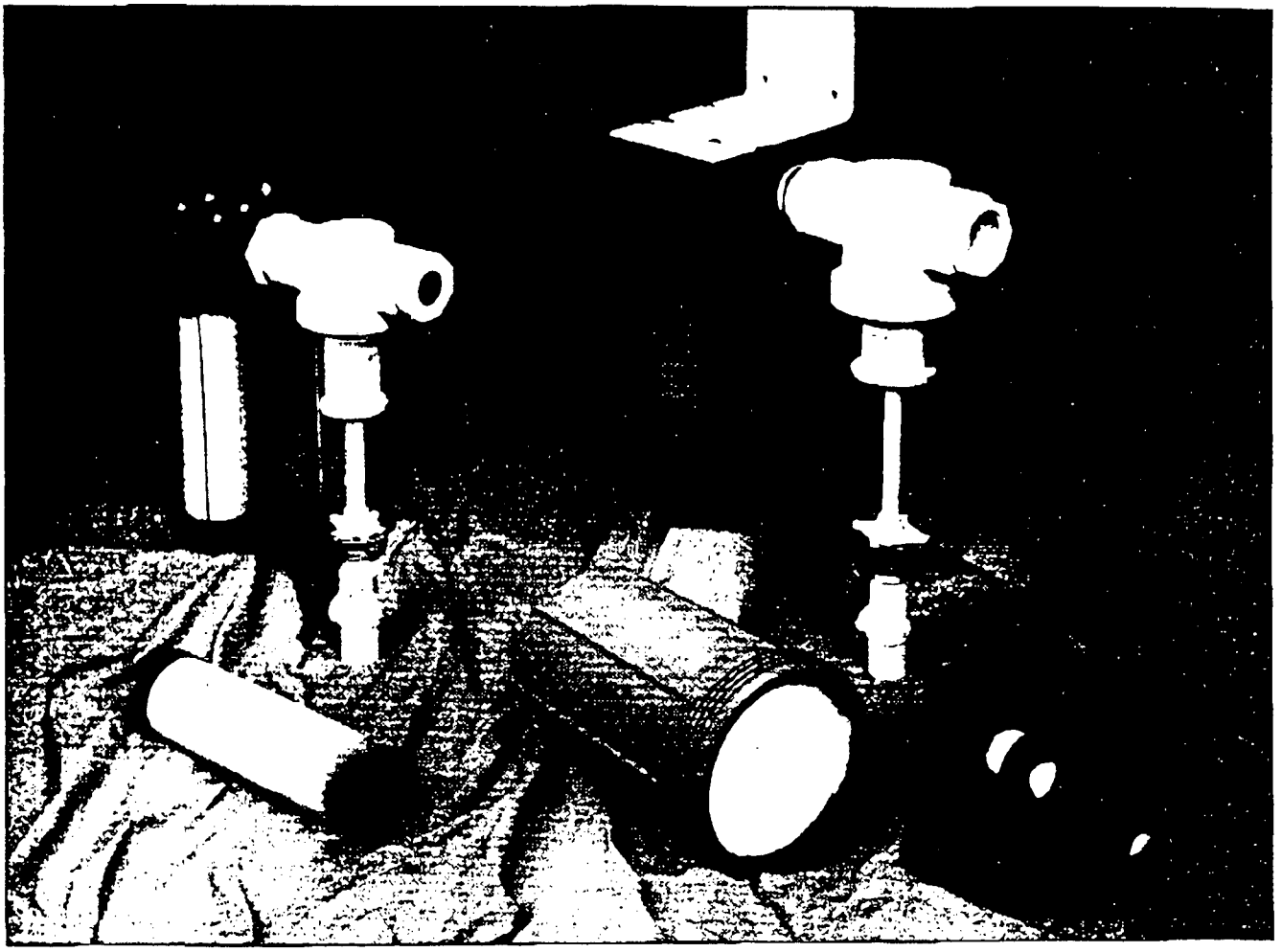
APPENDIX B

Product Description for the Scaltec™ System

Mittelhauser CORPORATION

Longyear

SCALTEC™ SYSTEM



SCALTEC™ is a water treatment system designed to eliminate iron, calcium & magnesium fouling in groundwater remediation systems. SCALTEC™ uses a venturi feed system to automatically deliver the media into the water stream eliminating the need for metering pumps. The media is in a compact block form, contained within a housing, simplifying replacement. The SCALTEC™ 500 will treat up to 500,000 gallons of water. The SCALTEC™ 80 will treat up to 80,000 gallons of water.

SCALTEC™ works in three ways:

- SCALTEC™ acts as a scale inhibitor by distorting the almost perfect cube-like shape of the calcium carbonate molecule as it precipitates out of the water, preventing the molecules from building on each other. It will gradually remove existing scale from the system (Cleaning is recommended prior to installation of SCALTEC™).
- SCALTEC™ is a sequestrant to iron and manganese in that it prevents the close contact between the ions that is necessary for them to form molecules, creating ~~oxides~~ or "rust" which precipitate.

hydroxides

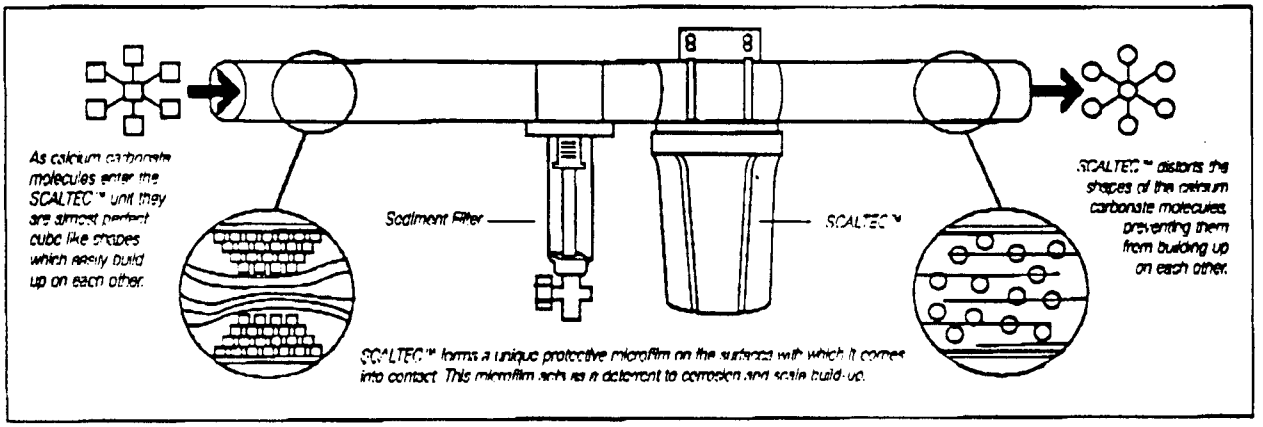
- SCALTEC™ combines with the calcium carbonate to form a protective microfilm of calcium phosphate on all wetted surfaces which acts as a deterrent to corrosion and scale. This microfilm does not increase in thickness as it is continually washed off and replaced.

BENEFITS

- No metering pumps or electrical requirements
- No need to adjust chemical feeds
- SCALTEC™ releases media only when water passes through the system reducing treatment cost per gallon.
- SCALTEC™ 500 treats 500,000 gallons. SCALTEC™ 80 treats 80,000 gallons.
- Replacement cartridges weigh only 16 lb for SCALTEC™ 500, 6 lb for SCALTEC™ 80.
- SCALTEC™ has successfully treated 32 ppm of iron and 108 grains of hardness.

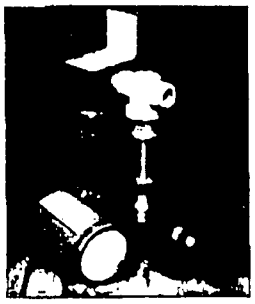
Longyear

SCALTEC™ SYSTEM



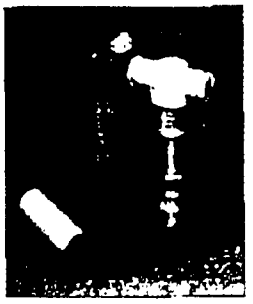
It is recommended that the SCALTEC™ unit be used as a system, with the filter unit to remove particles that could clog the venturi ports.

SCALTEC 500 SPECIFICATIONS



- Water flow: 5–50 gpm (19-189 L/min)
- Maximum operating pressure: 125 psi (862 kPa)
- Maximum operating temperature: 85°F (29°C)
- Water treated per cartridge: 500,000 gals.
- Line size: 1-1/2 in NPT (38mm)
- Dimensions (WxHxD): 16 in (406 mm) x 17 in (432 mm) x 9 in (229 mm)

SCALTEC 80 SPECIFICATIONS



- Water flow: 0–5 gpm (0-19 L/min)
- Maximum operating pressure: 125 psi (862 kPa)
- Maximum operating temperature: 85°F (29°C)
- Water treated per cartridge: 80,000 gals.
- Line sizes: 3/4 in NPT (19mm)
- Dimensions (WxHxD): 12 in (305 mm) x 14 in (356 mm) x 6 in (152 mm)

Application Calculations

How long will the product last at a given flow rate?

500,000 ÷ GPM ÷ 1440 = capacity of SCALTEC™ in days

Example:

500,000 ÷ 10 gpm ÷ 1440 minutes per day = 34.7 days

Replace SCALTEC™ media every 34.7 days at this site

Application Calculations

How long will the product last at a given flow rate?

80,000 ÷ GPM ÷ 1440 = capacity of SCALTEC™ in days

Example:

80,000 ÷ 3 gpm ÷ 1440 minutes per day = 18.5 days

Replace SCALTEC™ media every 18.5 days at this site.

Ordering information

300115	500,000 gallon SCALTEC™ assembly	**300431**	80,000 gallon SCALTEC™ assembly
300432	500,000 gallon SCALTEC™ assembly with filter	**300430**	80,000 gallon SCALTEC™ assembly with filter
300116	500,000 gallon SCALTEC™ replacement bowl	**300429**	80,000 gallon SCALTEC™ replacement bowl
300427	500,000 gallon SCALTEC™ filter only	**300428**	80,000 gallon SCALTEC™ filter only

Longyear Company is constantly striving to improve its products and, therefore, reserves the right to change materials, design, specifications and price without notice.

Longyear

2175 W. Park Ct., P.O. Box 1959
Stone Mountain, GA 30086 USA
Ph: (404) 469-2720, Fax: (404) 498-2841
1-800-241-9408

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TECHNICAL DATA SHEET

SCALTEC™ SYSTEM

Air Stripping Systems:
Water Chemistry Problems & Treatment

Working in the remediation industry, we have encountered a scaling problem inherent to treating groundwater.

This scaling is directly related to the amounts of calcium and magnesium in the water to be treated and is commonly referred to as hardness. These invisible hardness minerals are in solution in the groundwater due to many factors. Groundwater in 85% of the United States is hard. No natural water supply is completely free of hardness.

Here's what usually occurs when the groundwater is pumped and exposed to the atmosphere. The hardness and iron starts to form scale that is deposited on equipment. This is due to:

- the breakdown of calcium and magnesium bicarbonates,
- their reversion to the highly insoluble carbonate forms,
- their oxidation from Fe^{++} (ferrous) to Fe^{+++} (ferric) state,

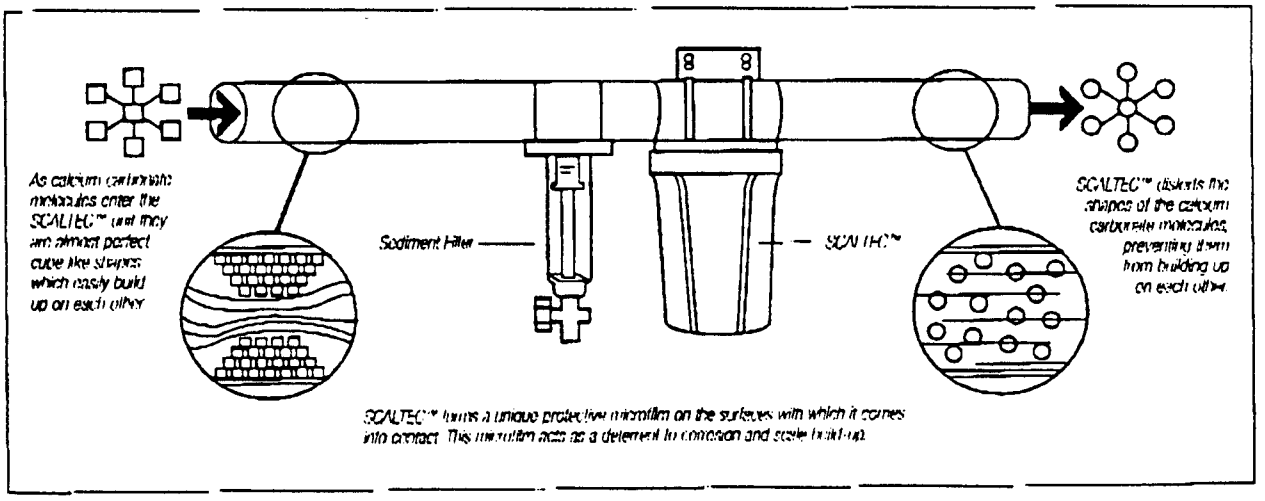
and

- their concentration on the interior surfaces of the air stripper. This scale can lead to a sharp reduction in operating efficiency in the stripper.

Air strippers with scale deposits require expensive maintenance, operate unpredictably, potentially causing undetected discharge of contaminants for extended periods.

Using proven technologies, Longyear now offers a very inexpensive treatment process to eliminate fouling and prevent unnecessary maintenance. This system is SCALTEC,™ which is a proprietary potable water grade ingredient that prevents iron, calcium and magnesium from forming scale in strippers and associated equipment.

The delivery system and installation for SCALTEC™ is unique and extremely simple. There are no moving parts or power requirements. The SCALTEC™ 500 is designed to treat 500,000 gallons of water and the SCALTEC™ 80 is designed to treat 80,000 gallons. Maintenance is accomplished in minutes by simply replacing the SCALTEC™ unit.



SCALTEC™
ANSWERS TO COMMON QUESTIONS

1. **What is the Scaltec™ media?**
   The media is a long linear chain polyphosphate and other proprietary ingredients.
2. **Does Scaltec™ affect the pH of water?**
   The unit is set to discharge a pH of about 8.4. However, at 4 ppm feed rate, this will have no noticeable effect on the motive flow pH.
3. **Does Scaltec™ have an effect on carbon?**
   The material is inorganic and should have no negative effect on carbon. Again, the feed rate is 4 ppm, so if any is absorbed by the GAD, it is insignificant.
4. **Has Scaltec™ been approved by the EPA or other regulatory agencies?**
   The raw materials used to make the solid block are National Sanitation Foundation (NSF) approved for potable water use at 10 ppm feed rate. As a matter of fact, the same ingredients in a different physical state (not a block) are currently being used by several large cities for prevention of fouling and scale control in potable water systems.
5. **Is Scaltec™ affected by silts or suspended solids?**
   The manufacturer recommends using the 700 micron spin filter prior to the Scaltec™ assembly. Further filtration may be necessary if suspended solids are severe. This delivery system is definitely affected by silts in the stream to be treated. The delivery system for the media consists of two very small orifices. If these orifices become plugged by sediment, sand, silt, etc., then the media will not come into contact with the stream to be treated.
6. **What is the rate of reversion for Scaltec™?**
   Scaltec™ will revert 20% in 14 days. Reversion should not be a factor in typical remediation projects.
7. **Can Scaltec™ be placed before an oil/water separator?**
   Yes. Refer to the reversion rate. Hydrocarbons have no noticeable effect on Scaltec™
8. **Are there any hazardous materials in the Scaltec™ media?**
   There are no hazardous materials present in this device. A Material Safety Data Sheet (MSDS) is supplied with every unit as a matter of safety.
9. **What is the maximum concentration of iron that can be successfully treated by Scaltec™?**
   The highest concentrations successfully treated are 108 grains per gallon (1846 ppm) hardness and 32 ppm iron. It is possible to treat higher concentrations of iron. Contact Longyear for details.
10. **Does Scaltec™ have an effect on the chemicals in groundwater?**
    This system will impact the chemistry of iron, calcium and magnesium. Any other dissolved inorganic salts, i.e., lead, zinc, copper, etc., may also be impacted. This would depend upon the ability of the dissolved salt to oxidize or precipitate. In groundwater applications it is relatively rare to encounter other metals in a dissolved state to a degree that would matter. If these salts are present then some sequestering may occur.
11. **Is piping distance a factor for the effectiveness of Scaltec™?**
    Distance is not a problem (see #6 – reversion).
12. **What are the minimum and maximum flow rates for the 1.5 in unit?**
    1.5 in system – 5–50 gallons per minute, 3/4 in system – 0–20 gallons per minute.
13. **Will the effectiveness of the media change with flow rate?**
    Scaltec™ will maintain its effectiveness throughout the recommended flow range.
14. **What if the flow exceeds 50 gallons per minute?**
    Systems can be installed in parallel to treat flows greater than 50 gallons per minute.
15. **What minerals will be sequestered by Scaltec™?**
    Scaltec™ will sequester iron, magnesium, calcium and manganese.
16. **When will Scaltec™ be needed? At what degree of hardness or mineral levels?**
    There is great potential for scale deposition when the water contains more than 30 ppm of hardness and 3 ppm of iron.
17. **Does pH have an effect on Scaltec™ and at what levels?**
    The optimum pH range is 5–8, other pH levels will hamper the effectiveness of Scaltec™ Contact your distributor for more information.
18. **What are the most common water treatment processes that Scaltec™ will not work on?**
    Scaltec™ is not recommended with any advanced process. However, Scaltec™ will eliminate scaling on the quartz lenses used in UV systems.

LIFE EXPECTANCY AND APPROXIMATE COST OF SCALTEC™ AT GIVEN FLOW RATES

SCALTEC™ 80

FLOW (gpm)	LIFE (days)	annual cost $
0.2	277.8	412
0.3	185.2	511
0.4	138.9	609
0.5	111.1	708
0.6	92.6	806
0.7	79.4	905
0.8	69.4	1,003
0.9	61.7	1,102
1.0	55.6	1,201
1.1	50.5	1,299
1.2	46.3	1,398
1.3	42.7	1,496
1.4	39.7	1,595
1.5	37.0	1,693
1.6	34.7	1,792
1.7	32.7	1,890
1.8	30.9	1,989
1.9	29.2	2,087
2.0	27.8	2,186
2.1	26.5	2,285
2.2	25.3	2,383
2.3	24.2	2,482
2.4	23.1	2,580
2.5	22.2	2,679
2.6	21.4	2,777
2.7	20.6	2,876
2.8	19.8	2,974
2.9	19.2	3,073
3.0	18.5	3,172
3.1	17.9	3,270
3.2	17.4	3,369
3.3	16.8	3,467
3.4	16.3	3,566
3.5	15.9	3,664
3.6	15.4	3,763
3.7	15.0	3,861
3.8	14.6	3,960
3.9	14.2	4,058
4.0	13.9	4,157
4.1	13.6	4,256
4.2	13.2	4,354
4.3	12.9	4,453
4.4	12.6	4,551
4.5	12.3	4,650
4.6	12.1	4,748
4.7	11.8	4,847
4.8	11.6	4,945
4.9	11.3	5,044

SCALTEC™ 500

FLOW (gpm)	LIFE (days)	annual cost $	FLOW (gpm)	LIFE (days)	annual cost $	FLOW (gpm)	LIFE (days)	annual cost $	FLOW (gpm)	LIFE (days)	annual cost $
5.0	69.4	2,611	10.2	34.0	4,770	15.4	22.5	6,929	20.6	16.8	9,089
5.1	68.1	2,663	10.3	33.7	4,812	15.5	22.4	6,971	20.7	16.8	9,130
5.2	68.2	2,850	10.4	33.4	4,853	15.6	22.3	7,012	20.8	16.7	9,172
5.3	68.3	2,646	10.5	33.1	4,895	15.7	22.1	7,054	20.9	16.6	9,213
5.4	68.4	2,643	10.6	32.8	4,936	15.8	22.0	7,096	21.0	16.5	9,255
5.5	68.5	2,640	10.7	32.5	4,978	15.9	21.8	7,137	21.1	16.5	9,296
5.6	68.6	2,637	10.8	32.2	5,019	16.0	21.7	7,179	21.2	16.4	9,338
5.7	68.7	2,634	10.9	31.9	5,061	16.1	21.6	7,220	21.3	16.3	9,379
5.8	68.8	2,631	11.0	31.6	5,102	16.2	21.4	7,262	21.4	16.2	9,421
5.9	68.9	2,628	11.1	31.3	5,144	16.3	21.3	7,303	21.6	16.1	9,504
6.0	69.0	2,625	11.2	31.0	5,186	16.4	21.2	7,345	21.8	15.9	9,587
6.1	69.1	2,622	11.3	30.7	5,227	16.5	21.0	7,386	22.0	15.8	9,670
6.2	69.2	2,619	11.4	30.5	5,269	16.6	20.9	7,428	22.2	15.6	9,753
6.3	69.3	2,616	11.5	30.2	5,310	16.7	20.8	7,469	22.4	15.5	9,836
6.4	69.4	2,613	11.6	29.9	5,352	16.8	20.7	7,511	22.6	15.4	9,919
6.5	69.5	2,610	11.7	29.7	5,393	16.9	20.5	7,552	22.8	15.2	10,002
6.6	69.6	2,607	11.8	29.4	5,435	17.0	20.4	7,594	23.0	15.1	10,085
6.7	69.7	2,604	11.9	29.2	5,476	17.1	20.3	7,635	23.2	15.0	10,168
6.8	69.8	2,601	12.0	28.9	5,518	17.2	20.2	7,677	23.4	14.8	10,251
6.9	69.9	2,598	12.1	28.7	5,559	17.3	20.1	7,718	23.6	14.7	10,334
7.0	70.0	2,595	12.2	28.5	5,601	17.4	20.0	7,760	23.8	14.6	10,417
7.1	70.1	2,592	12.3	28.2	5,642	17.5	19.8	7,801	24.0	14.5	10,500
7.2	70.2	2,589	12.4	28.0	5,684	17.6	19.7	7,843	24.2	14.3	10,583
7.3	70.3	2,586	12.5	27.8	5,725	17.7	19.6	7,884	24.4	14.2	10,666
7.4	70.4	2,583	12.6	27.6	5,767	17.8	19.5	7,926	24.6	14.1	10,750
7.5	70.5	2,581	12.7	27.3	5,808	17.9	19.4	7,968	24.8	14.0	10,833
7.6	70.6	2,578	12.8	27.1	5,850	18.0	19.3	8,009	25.0	13.9	10,916
7.7	70.7	2,575	12.9	26.9	5,891	18.1	19.2	8,051	25.2	13.8	10,999
7.8	70.8	2,572	13.0	26.7	5,933	18.2	19.1	8,092	25.4	13.7	11,082
7.9	70.9	2,569	13.1	26.5	5,974	18.3	19.0	8,134	25.6	13.6	11,165
8.0	71.0	2,566	13.2	26.3	6,016	18.4	18.9	8,175	25.8	13.5	11,248
8.1	71.1	2,563	13.3	26.1	6,057	18.5	18.8	8,217	26.0	13.4	11,331
8.2	71.2	2,560	13.4	25.9	6,099	18.6	18.7	8,258	26.2	13.3	11,414
8.3	71.3	2,558	13.5	25.7	6,141	18.7	18.6	8,300	26.4	13.2	11,497
8.4	71.4	2,555	13.6	25.5	6,182	18.8	18.5	8,341	26.6	13.1	11,580
8.5	71.5	2,552	13.7	25.3	6,224	18.9	18.4	8,383	26.8	13.0	11,663
8.6	71.6	2,549	13.8	25.2	6,265	19.0	18.3	8,424	27.0	12.9	11,746
8.7	71.7	2,546	13.9	25.0	6,307	19.1	18.2	8,466	27.2	12.8	11,829
8.8	71.8	2,543	14.0	24.8	6,348	19.2	18.1	8,507	27.4	12.7	11,912
8.9	71.9	2,541	14.1	24.6	6,390	19.3	18.0	8,549	27.6	12.6	11,995
9.0	72.0	2,538	14.2	24.5	6,431	19.4	17.9	8,590	27.8	12.5	12,078
9.1	72.1	2,535	14.3	24.3	6,473	19.5	17.8	8,632	28.0	12.4	12,161
9.2	72.2	2,532	14.4	24.1	6,514	19.6	17.7	8,673	28.2	12.3	12,244
9.3	72.3	2,530	14.5	23.9	6,556	19.7	17.6	8,715	28.4	12.2	12,327
9.4	72.4	2,527	14.6	23.8	6,597	19.8	17.5	8,756	28.6	12.1	12,410
9.5	72.5	2,524	14.7	23.6	6,639	19.9	17.4	8,798	28.8	12.1	12,493
9.6	72.6	2,521	14.8	23.5	6,680	20.0	17.4	8,839	29.0	12.0	12,576
9.7	72.7	2,519	14.9	23.3	6,722	20.1	17.3	8,881	29.2	11.9	12,660
9.8	72.8	2,516	15.0	23.1	6,763	20.2	17.2	8,923	29.4	11.8	12,743
9.9	72.9	2,513	15.1	23.0	6,805	20.3	17.1	8,964	29.6	11.7	12,826
10.0	72.0	2,510	15.2	22.8	6,846	20.4	17.0	9,006	29.8	11.7	12,909
10.1	72.8	2,516	15.3	22.7	6,888	20.5	16.9	9,047	30.0	11.6	12,992

Annual cost calculated on the basis of one initial complete unit and replacement bowls at the selling price in effect at time of publication.