135940

WESTON
MANAGERS DESIGNERS/CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: June 8, 1988

SUBJECT: Evaluation of Bench Scale Treatability Study
Site: Avtex Fibers Front Royal, ESAT TID #03880303

FROM: Mila Javellana
ESAT Senior Chemist

TO: Diana Baldi
ESAT Deputy Project Officer

THRU: Gail DeRuzzo
ESAT Team Manager

INTRODUCTION

The purpose of this review was to evaluate the bench scale treatability study presented in the Draft Report, RI/FS by G&M Consulting Engineers, March 4, 1988.

The bench scale treatability study at Avtex Fibers, Inc. was conducted to determine whether the existing waste water treatment plant (WWTP) would be able to treat the recovered ground waters and viscose-basin fluids. Three (3) bench scale units were used to simulate conditions at the existing reactors in the WWTP: one control, one fed with 5% ground water (TR1) and one fed with 2.5% ground water (TR2). Samples of the influents and effluents from each reactor were collected from 9/2/87 to 10/6/87 and were analyzed by Avtex for the following parameters:

- BOD
- COD
- Dissolved Oxygen
- pH
- Zn
- Total Suspended Solids (TSS)
- Sludge Settling Rate
- Mixed Liquor Suspended Solids (MLSS)
- Mixed Liquor Volatile Suspended Solids (MLVSS)
- Temperature
- Flow
- Retention Time
- Dissolved Oxygen Uptake Rate (DOUR)

Samples collected and analyzed before 9/11/87 were not considered in the evaluation.

Samples collected on 9/17/87, 9/23/87 and 10/1/87 were analyzed by Cambridge Analytical Association (CAA) for the following parameters:

Chloride	Sulfate
COD	TKN
Ammonia	TOC
Total Phenolics	Zn
Phosphate	Carbon Disulfide
Sulfide	

The inorganic data was validated by Weston according to the National Functional Guidelines for Evaluating Inorganic Analyses. Carbon disulfide was validated according to the Region III Functional Guidelines for Evaluating Organic Analyses. The QC criteria presented in the RI/FS, Section 3, Quality Assurance/Quality Control by G&M, January 1, 1987 was used to qualify data analyzed by Avtex. Data was qualified and corrections made for parameters found in Appendix A in the Draft Report RI/FS dated March 1988 and in the Field Investigation Summary Document, Vol.1, dated February 1988. Values with quality control results outside the control limits or questionable results were qualified. (Refer to Attachment A, Inorganic Data Validation, Appendix A and Attachment B, Organic Data Validation, Appendix A).

DISCREPANCIES THAT MAY HAVE AFFECTED G & M's EVALUATION PRESENTED IN THE RI/FS DRAFT REPORT, APPENDIX A, MARCH 1, 1988

Biochemical Oxygen Demand (BOD), Page 27

BOD_5 is a critical parameter for maintaining compliance with NPDES permit. The laboratory failed to maintain the 20±° C temperature specified in Standard Methods for incubating the BOD samples. The lab's temperature range was 22-25°C.

Temperatures were recorded only in the early part of the test, 9/2/87-9/16/87. There were no temperatures recorded from 9/17/87-10/6/87. The utility of BOD results is directly linked with adherence to the defined test conditions. The direction in which BOD (caused by deviating from conditions) changes cannot be

AR303812

predicted because living organism response is non-linear and can be positive or negative. Although the QC passed, it cannot be concluded that the sample results are valid.

Carbon Disulfide, Page 42 & 44

Due to laboratory error, the results were difficult to interpret. After data validation by WESTON, several values changed as presented in Attachment B, Organic Data validation. The discussion found in Appendix A in the Draft Report RI/FS dated March 1988, should be revised as follows:

> In reference to samples run on 9/23/87, page 42, it is stated that there is a slight increase in CS_2 from influent to the effluent of the control reactor (CTR). This should be changed to: a slight decrease in CS_2 from influent to the effluent of the control reactor.
>
> In reference to samples run on 10/1/87, page 44, it stated that the effluent concentration was lowered slightly in TR-1 and increased slightly in TR-2. This should be changed to: The effluent concentration was lowered slightly in TR-1 and lowered significantly in TR-2.

Zinc, Page 56

The zinc values reported by Avtex are unusable based on the way zinc was analyzed. (Refer to Attachment A). Zinc data was validated using the Avtex laboratory worksheets in Volume III, Field Investigation Summary Document, March 1988. No instrument printout was submitted nor was an explanation provided on how the data was calculated. The reviewer concluded from what was presented in the worksheets that the samples were diluted four to ten times (4x to 10X) and were subsequently run below the lowest standard concentration of the calibration curve. The diluted Zn concentration levels were close to the instrument noise.

The major discrepancies that have impacted G&M's conclusions are summarized in Table I.

WESTON

TABLE I

MAJOR DISCREPANCIES AND THEIR EFFECTS ON G & M's EVALUATION

Parameter	Section in Appendix A of Draft Report	Discrepancies	Effect on the Evaluation	Changes
BOD	BOD,p.27	Temperature	Unknown	
Carbon Disulfide	Carbon Disulfide, p.42	Improperly calculated	Effect on conclusion	Referring to samples run on 9/23/87, the statement should be changed to "a slight decrease in CS_2 from influent to the effluent of the control reactor."
	Carbon Disulfide p.44	Improperly calculated	Effect on conclusion	Referring to samples run on 10/1/87, the statement should be changed to "the effluent concentration was lowered significantly in TR2."
Zinc	Zinc,p.56	Overdilution and analyzed at levels well below lowest standard calibration; improper calculation.	Values presented in Table 16, p.56 of Appendix A, Draft Report were changed.	Refer to Attachment A, page A26 for the changes.

DISCREPANCIES THAT HAVE NEGLIGIBLE OR NO EFFECT ON G & M'S EVALUATION

The discrepancies and effects on G&M's evaluation are presented in Table II.

TABLE II

DISCREPANCIES THAT HAVE NEGLIGIBLE OR NO EFFECT ON G&M'S EVALUATION

Parameter	Section in Appendix A of Draft Report	Discrepancies	Effect on the Evaluation	Changes
pH	Table I, Page 11	Transcription errors. (10/3/87,TR2) RCT and EFF data interchanged.	None	See p.A14, Attach. A.
		(10/1/87,CTR), RCT and EFF interchanged.	None	See p.A14, Attach. A.
Dissolved Oxygen	Table 3, Page 13	Transcription error found for TR2, 9/20/87	None	See p.A16, Attach. A.
DOUR	Table 4, Page 20	Miscalculation for DOUR test, 9/15/87	Effect on the plot appearance Fig 4,page 24, but not the evaluation.	See p.A17, Attach.A.
Sludge Settling Rate	Table 4, Page 20	Unusally high value for TR1, TR2 and CTR (9/19/87)	This data was rejected by G&M and not included in the plot presented in Fig. 3,page 21.	

TABLE II (Cont.)

Parameter	Section in Appendix A of Draft Report	Discrepancies	Effect on the Evaluation	Changes
Suspended Solids	Table 5, Page 26	Calculation errors, high blank value and out of control RPDs.	None	See p.A18, Attach.A.
BOD & COD	Table 6, Page 29-32	Samples with duplicate analyses were averaged and mean reported by the laboratory.	None	The mean values were changed to values of the orginal samples. See p.A22 -25, Attach. A.

SUMMARY AND RECOMMENDATIONS

Carbon Disulfide

There is limited amount of CS_2 data generated thoughout the bench scale study. Results after ground water addition showed some degree of CS_2 removal in the reactor but there is not enough data to see a trend and therefore, it is not possible to adequately evaluate which groundwater/process wastewater ratio is effective for treatment.

Since CS_2 is a major constituent of the ground water for which treatment is considered, further testing may be necessary before conclusions could be made. Ideally, dilutions of samples should be performed, if necessary, so that the concentrations fall about mid-range of the calibration curve of the instrument. Refer to Attachment B, Organic Data Validation.

Zinc

The zinc values obtained by CAA are not conclusive. There is not enough data generated to see a trend. As discussed above, the zinc results analyzed by Avtex are unuseable. If Zn is an important parameter used to evaluate the bench scale study, reanalysis should be done, correcting problems cited in Attachment A, Inorganic Data Validation. The main issue is that Zn was overdiluted and analysed well below the concentration of the lowest standard in the calibration curve. Conclusion on efficiency of the WWTP for zinc removal cannot be drawn from results reported by both Avtex and CAA.

BOD

BOD is an important component used to measure the effectiveness of the treatment plant and a critical parameter for maintaining compliance with NPDES permit. The BOD analytical results show that the BOD removal is significant before and after groundwater addition. There is a slight decrease in the percentage of BOD removed after groundwater was added (TR1, from 75% to 74% ; and TR2, from 76 to 66%). The BOD concentration rose significantly upon ground water addition (approximately 4x) which indicates that the ground water portion of the feed contains high biochemically oxidizable constituents. Even though the efficiency or % BOD removed remained high with the addition of ground water, because of the high BOD content in the influent, the BOD content in the effluent was also proportionally high . Another consideration that may have caused the BOD content to rise in the effluent is the effect of increased pH as a result of ground water addition. As indicated by G & M, it may be helpful if a study on the potential impact of the pH conditions was conducted. For instance, if pH conditions had been neutral, an increase in the efficiency of biological oxidation in the TR1 and TR2 reactors may result.

It should be noted, as discussed previously, that the BOD analyses were conducted at temperatures higher than the optimum specified by the method. For future studies it is recommended that the test should be conducted with the correct incubation temperature.

LIST OF ATTACHMENTS **PAGE**

I ATTACHMENT A - INORGANIC DATA VALIDATION A1

TABLE 1 - SUMMARY OF QUALIFIERS of CAA DATA SUMMARY AFTER DATA VALIDATION A7

TABLE 2 - SUMMARY OF QUALIFIERS ON AVTEX DATA SUMMARY AFTER DATA VALIDATION A8

TABLE 3 - CODES USED IN COMMENTS COLUMN A10

TABLE 4 - GLOSSARY OF DATA QUALIFIER CODES A11

APPENDIX A - DATA FORMS A12

II. ATTACHMENT B - ORGANIC DATA VALIDATION B1

APPENDIX A - REVIEWER REPORTED RESULTS B4

APPENDIX B - SUPPORT DOCUMENTATION B6

WESTON

ATTACHMENT A

INORGANIC DATA VALIDATION

WESTON
MANAGERS DESIGNERS/CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: June 8, 1988

SUBJECT: INORGANIC DATA VALIDATION
SITE: AVTEX FIBERS FRONT ROYAL

FROM: MARY ANNA BABICH AND MILA JAVELLANA
ESAT SENIOR INORGANIC DATA REVIEWERS

TO: DIANA BALDI
ESAT DEPUTY PROJECT OFFICER

THRU: GAIL DeRUZZO GD
ESAT TEAM MANAGER

OVERVIEW

The set of samples for Avtex Fibers analyzed by Cambridge Analytical Association (CAA) and Avtex, were not analyzed through the Contract Laboratory Program Routine Analytical Services. The Table below is a list of the Parameters and number of samples analyzed by CAA and Avtex.

CAA		AVTEX	
PARAMETER	QUANTITY	PARAMETER	QUANTITY
Chloride	21	BOD	127
COD	21	COD	56
Ammonia	21	Dissolved Oxygen	223
Total Phenolics	21	pH	223
Phosphate	21	Zn	117
Sulfide	21	Total Suspended Solids(TSS)	62
Sulfate	21	Mixed Liquor Suspended Solids (MLSS)	30
TKN	21	Mixed Liquor Volatile Suspended Solids (MLVSS)	30
TOC	21	Temperature	226
Zn	21	Flow	226
		Retention Time	226
		Dissolved Oxygen Uptake Rate (DOUR)	76
		Sludge Settling Rate	53

Samples were collected on the following dates 9/17/87, 9/23/87 and 10/1/87 and sent to CAA for analysis. An influent and effluent sample from each of the three reactors and a field duplicate were collected. Below is a list of the sample ID's:

TR1 - influent
TR1 - effluent
TR2 - influent
TR2 - effluent
CR - influent
CR - effluent

Samples from the above locations were also collected daily from approximately 9/2/87 to 10/6/87 and sent to Avtex for in-house analysis.

To simplify the report the date of sampling is specified when data is qualified. All samples listed above are affected unless specified.

SUMMARY

All parameters were successfully analyzed in all samples except for the following parameters: Zn and BOD (samples collected 9/2/87 - 10/5/87, analyzed by Avtex); Phosphate and Sulfide (samples collected 9/17/87 and for sulfide only, 10/01/87). Areas of concern with respect to data usability are listed according to the seriousness of the problem. These include:

MAJOR ISSUES

Samples collected on 9/17/87 were analyzed well beyond the required holding times for the following parameters:

Parameter	Holding Time	Days Analysis Delayed
Phosphate	48 hours	29
Sulfide	7 days	41

The date of analysis for sulfide samples collected on 10/01/87 was not reported. Therefore reported results for these samples may be biased extremely low and are qualified "L".

All BOD samples analyzed by Avtex were incubated at a temperature range of 22-25°C which is above the temperature specified in the method (20°C). Therefore, all BOD data collected from 8/27/87 to 10/06/87 are estimated and are qualified "J".

Samples collected 9/2/87 - 10/5/87 for Zn analysis and analyzed by Avtex, were excessively diluted. This resulted in samples being analyzed at levels well below the concentration of the lowest standard in the calibration curve. All reported values are estimated and qualified "J" and the non-detected samples were qualified "UJ".

MINOR ISSUES

The following parameters were analyzed by CAA shortly after the required holding times:

Parameter	Holding Time	Days Delayed
Chloride	28 days	1
TKN	28 days	5
TOC	28 days	6

Therefore, the reported results may be biased low. The data for the following parameters and the corresponding dates of sampling are qualified "L": chloride 9/17/87, TKN 9/17/87 and TOC 9/17/87.

The field duplicates analyzed by CAA, CR-Effluent for COD (49%) sampled on 9/17/87 and TR1-Effluent for TKN (76%) sampled on 9/23/87, have a relative percent difference of >20%. Therefore, all the reported data for the above parameters and the associated sampling dates are estimated "J".

The BOD field duplicates analyzed by Avtex on the following dates have a relative percent difference of >20%:

CR-Effluent	9/16/87	(69%)
TR1-Influent	9/17/87	(46%)

All BOD reported data sampled on the above dates are estimated and have been qualified "J".

The COD field duplicates analyzed by Avtex on the following dates have a relative percent difference of >20%:

TR2-Influent	9/14/87	(128%)
CR-Influent	9/22/87	(24%)
TR1-Influent	9/25/87	(25%)

All COD reported data sampled on the above dates are estimated and have been qualified "J".

A COD QC sample was not analyzed by Avtex on the following dates: 9/11/87 and 9/14/87. The COD data analyzed on the noted dates have been qualified estimated, "J".

The COD QC sample analyzed by Avtex on 9/8/87 and 9/29/87 was below the 95% confidence interval. The COD data analyzed on the above dates may be biased low. Therefore, the data is qualified "L".

The matrix spike recovery for Zn analyses performed by Avtex were low (<85%) for samples run on the following dates: 9/9/87 and 9/21/87 (80%), 9/25/87 (82%), 9/28/87 (78%), 9/30/87 (76%), 10/2/87 (64%) and 10/5/87 (77%). The Zn values may be biased low. The matrix spike recovery for Zn was high (>115%) for samples analyzed on 9/11/87 (167%). The data may be biased high. However all data were qualifed "J" or "UJ" because all sample were analyzed at concentrations well below the lowest concentration of the standard curve.

The TSS blank values for sample analyzed by Avtex on the following dates were high: 9/2/87 (10 mg/L), 9/8/87 (11 mg/L) and 9/9/87 (3 mg/L). The TSS values of <5X the blank values may be biased high and therefore, were qualified "B".

Due to out of control relative percent difference of duplicate samples (RPD >15%), the reported results for total suspended solids (TSS) analyzed by Avtex were qualified "J" for samples collected on the following dates: 9/23/87 (62%), and 9/30/87 (45%).

Samples collected on 9/2/87 (31%), 9/8/87 (30%) and 9/9/87 (120%) also had out of control RPD but were qualified "B" because of the high blank values.

Due to out of control relative percent difference of duplicate samples (RPD >15%), the reported results for mixed liquor suspended solids (MLSS), analyzed by Avtex, were qualified "J" for samples collected on the following dates: 9/03/87 (54%), 9/8/87 (72%), 9/10/87 (35%), 9/15/87 (29%), 9/29/87 (23%), and 10/6/87 (21%). The nondetected values were qualified "UJ".

The MLVSS blank value for samples analyzed by Avtex on 9/8/87 was high (7 mg/L). The MLVSS values for samples <5X the blank value may be biased high and therefore were qualified "B".

Due to out of control relative percent difference of duplicate samples (RPD >15%), the reported results of mixed liquor volatile suspended solids (MLVSS) analyzed by Avtex were qualified "J" for samples collected on the following dates: 9/3/87 (40%), 9/8/87 (72%), 9/10/35 (35%), 9/15/87 (67%), 9/22/87 (17%) and 9/29/87 (20%). The nondetected values were qualified "UJ". An exception is sample TR-1, analyzed on 9/8/87, which was qualified "B" due to the MLVSS value being <5x the blank value.

NOTES

The Zn data in Table 2 was recalculated by the reviewer to reflect the concentration based on the actual instrument readout. This is to correct the laboratory's erroneous procedures of calculating the Zn values which was to take the actual instrument readout and multiply by the dilution factor first. The resulting number was used to read Zn concentration off the calibration curve.

QC samples are not available for dissolved oxygen, pH, temperature, flow, retention time, dissolved oxygen uptake rate and sludge settling rate. Therefore, qualification/evaluation based on known performance is not possible. Minor changes were made to the numbers on the data summary due to transcription or calculation errors made by the laboratory.

The data forms found in Appendix A, that are used to qualify the bench scale treatability study were taken from the following documents:

Page Number in Appendix A	Name Of The Document Table Was Taken From
A13	Field Investigation, Summary Document Volume I , February, 1988
A14-18,A22-26	Draft Report, Feasibility Study, Appendix A, Prepared by G & M, March 4, 1988

Page A19-21 and A27 are tables generated by the data reviewers. The data were taken from Avtex in-house laboratory worksheets found in Field Investigation, Summary Document, Volume III, February, 1988.

The data was reviewed according to the National Functional Guidelines for Evaluating Inorganic Analyses.

INFORMATION REGARDING REPORT CONTENT

Tables 1 and 2 are summaries of qualifiers added to the laboratory's results during evaluation.

ATTACHMENTS

TABLE 1	SUMMARY OF QUALIFIERS ON CAA DATA SUMMARY AFTER DATA VALIDATION
TABLE 2	SUMMARY OF QUALIFIERS ON AVTEX DATA SUMMARY AFTER DATA VALIDATION
TABLE 3	CODES USED IN COMMENTS COLUMN
TABLE 4	GLOSSARY OF DATA QUALIFIER CODES
APPENDIX A	DATA FORMS

MJ:bjt
inorg#4/avtexprp

WESTON

TABLE 1

SUMMARY OF QUALIFIERS ON THE CAA DATA SUMMARY AFTER DATA VALIDATION

PARAMETER	DATE SAMPLED	QUALIFIER: POSITIVE VALUES	QUALIFIER: NON-DETECTED VALUES	BIAS	COMMENTS*
Cl^-	9/17/87	L		Low	A
COD	9/17/87	J			B (49%)
$PO_4^=$	9/17/87	L		Extremely Low	J
S^{2-}	9/17/87; 10/01/87	L		Extremely Low	J
TKN	9/17/87	L		Low	A
	9/23/87	J			B (76%)
TOC	9/17/87	L		Low	A

* See explanation of comments in Table 3

WESTON

TABLE 2

SUMMARY OF QUALIFIERS ON AVTEX
IN-HOUSE DATA SUMMARY AFTER DATA VALIDATION

PARAMETER	DATE SAMPLED	QUALIFIER: POSITIVE VALUES	QUALIFIER: NON-DETECTED VALUES	BIAS	COMMENTS*
BOD	8/27/87-10/6/87	J			K
	9/16/87				B(69%)
	9/17/87				B(46%)
COD	9/11/87	J			C
	9/14/87				C&B(128%)
	9/22/87				B(24%)
	9/25/87				B(25%)
	9/08/87	L		Low	D(86%)
	9/29/87				(86%)
Zn	9/02/87-10/5/87	J	UJ		E
	9/9/87, 9/21/87			Low	F(80%)
	9/25/87				F(82%)
	9/28/87				F(78%)
	9/30/87				F(76%)
	10/02/87				F(64%)
	10/05/87				F(77%)
	9/11/87			High	G(167%)
TSS	9/02/87	B			H(31%),I
	9/08/87				H(30%),I
	9/09/87				H(120),I
	9/23/87	J			H(62%)
	9/30/87				H(45%)
MLSS	9/15/87,	J	UJ		H(29%)
	9/03/87	J			H(54%)
	9/29/87				H(23%)
	10/06/87				H(21%)
	9/08/87				H(72%)
	9/10/87				H(35%)

TABLE 2 (Con't.)

PARAMETER	DATE SAMPLED	QUALIFIER POSITIVE VALUES	QUALIFIER NON-DETECTED VALUES	BIAS	COMMENTS*
MLVSS	9/15/87	J	UJ		H(67%)
	9/03/87	J			H(40%)
	9/10/87				H(35%)
	9/22/87				H(17%)
	9/29/87				H(20%)
	9/08/87(TR-2,CTR)	J			H(72%)
	9/08/87(TR-1)	B			H(72%),I

* See explanation of comments in Table 3

TABLE 3

CODES USED IN COMMENTS COLUMN

A = The analysis was performed shortly after the established holding time. Therefore, the reported results may be biased low.

B = The field duplicate has a relative percent difference (% difference in parentheses) >20%. Therefore, the reported values are estimated.

C = A QC sample was not performed during the analysis. Therefore, the reported results are estimated.

D = The QC sample recovery was below the 95% confidence limits. Therefore, the reported results may be biased low.

E = All reported values may be inaccurate because they were all analyzed well below the concentration of the lowest standard in the calibration curve. All samples were excessively diluted.

F = Due to a low matrix spike recovery (% recovery in parentheses), indicating a matrix interference or laboratory specific problem, the reported results may be biased low. There is a possibility of false negatives for nondetected values.

G = Due to a high matrix spike recovery (% recovery in parentheses), indicating a matrix interference or laboratory specific problem, the reported results may be biased high.

H = The laboratory duplicate analysis results were outside the control windows (relative percent difference of >15%). The reported results are estimated.

I = Due to samples <5X the blank value, the reported results may be biased high.

J = The analysis was performed well beyond the established holding time. Therefore, the reported results may be biased extremely low.

K = The incubation temperature was above the 20°C specified in the method for analyzing BOD. The reported results are estimated.

TABLE 4

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATING TO IDENTIFICATION
(confidence concerning presence or absence of compounds):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION
(can be used for both positive results and sample quantitation limits):

J = Analyte Present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

APPENDIX A

DATA FORMS

CAMBRIDGE ANALYTICAL ASSOCIATES, INC.

- TREAT... ...TY STUDY

SAMPLE ID	Date Sampled	Chloride	COD	Ammonia	Total Phenolics	Phosphate #	Sulfide #	Sulfate	TKN	TOC	Zinc
			10-1			10-19	9-28			10-21	
1-I	9-17-87	54 L	150 J	0.66	2.2	1.5 L	16 L	4000	1.9 # L	70 # L	0.91
1-E	9-17-87	77 L	97 J	4.8	0.02	0.21 L	1.2 L	4000	12 # L	43 # L	0.71
2-I	9-17-87	57 L	150 J	0.65	4.1	0.61 L	9.2 L	3600	1.6 # L	71 # L	0.86
2-E	9-17-87	59 L	62 J	4.9	0.01	0.41 L	1.2 L	4100	8.2 # L	24 # L	~~0.56~~ .52
-I	9-17-87	54 L	140 J	0.73	4.6	0.64 L	4.0 L	3600	2.2 # L	69 # L	0.91
-E	9-17-87	62 L	76 J	5.4	0.03	0.22 L	2.0 L	3700	7.8 # L	22 # L	0.31
-E (REPLICATE)	9-17-87	61 L	46 J	5.4	0.01	0.23 L	3.2 L	3800	8.1 # L	20 # L	-
			10-2			10-19	9-28			10-21	
1-I	9-23-87	110 118	820	1.7	5.0	0.57	270	3600	4.6 J	180	~~0.51~~ .70
1-E	9-23-87	86	600	0.70	2.9	1.3	65	3600	2.8 J	132	0.38
1-E (REPLICATE)	9-23-87	94	600	0.66	2.8	0.98	63	3900	6.2 J	120	0.19
2-I	9-23-87	88	500	1.4	4.6	0.40	91	4000	3.1 J	120	0.38
2-E	9-23-87	97	380	1.0	2.9	0.38	20	3900	3.5 J	91	0.38
-I	9-23-87	94	180	0.49	2.2	0.75	2.8	3200	2.4 J	68	1.2
-E	9-23-87	94	80	3.9	0.01	0.73	1.0	3800	7.2 J	22	0.51
			10-15			10-20	No date			10-22	
1-I	10-1-87	92	620	1.5	4.0	0.50	250 L	4000	7.2	170	0.46
1-E	10-1-87	89	630	1.0	4.6	0.71	68 L	3700	6.6	140	1.3
2-I	10-1-87	~~82~~ 79	470	1.0	3.8	0.46	66 L	3700	3.9	120	0.42
2-E	10-1-87	76	340	0.39	3.9	0.50	22 L	3700	6.0	92	0.99
2-E (REPLICATE)	10-1-87	79	340	.50	4.0	0.58	21 L	3800	5.3	91	0.86
-I	10-1-87	73	190	0.83	3.3	2.0	9.0 L	3200	2.0	77	1.2
-E	10-1-87	73	91	5.2	0.01	0.88	1.6 L	3800	6.6	26	0.30
etection Limit (mg/L)		0.1	10	0.1	0.01	0.1	1.0	0.5	0.1	0.01	0.02

l results listed as mg/l

Holding times exceeded on these samples and values may be low

AR303832

Kept
WESTON

TABLE 1.
pH DATA FOR THE AVTEX TREATABILITY STUDY

	pH								
	TR-1			TR-2			CTR		
	INF	RCT	EFF	INF	RCT	EFF	INF	RCT	EFF
9-11-87	6.28	6.62	7.10	6.16	6.78	7.10	6.44	6.89	7.20
9-14-87	6.21	6.68	6.92	6.01	6.91	7.30	6.06	6.92	7.25
9-15-87	6.32	6.92	7.08	6.12	6.94	7.16	6.17	7.11	6.94
9-16-87	6.20	6.78	6.91	6.12	6.75	7.07	6.14	6.89	7.16
9-17-87	6.05	6.67	7.00	6.11	6.69	7.03	6.73	6.69	7.03
9-18-87	6.15	6.83	7.12	6.15	7.02	7.14	6.12	6.82	7.09
9-19-87	6.26	6.98	7.13	6.27	6.91	6.94	6.22	-- (2)	7.02
9-21-87	6.60	7.00	7.27	6.29	6.90	7.33	6.34	7.05	7.32
9-22-87	9.79	8.01	7.97	9.42	7.56	7.45	6.46	7.09	7.33
9-23-87	9.63	8.33	8.23	9.20	7.82	7.70	6.44	6.79	7.04
9-24-87	9.84	8.42	8.40	9.17	7.97	7.62	6.18	7.03	7.16
9-25-87	9.63	8.76	8.68	9.16	7.70	7.80	6.27	6.80	7.11
9-26-87	9.82	8.98	8.91	9.14	8.02	7.69	6.14	6.78	7.00
9-27-87	9.76	8.97	9.09	9.13	7.82	7.80	6.39	6.85	6.96
9-28-87	9.71	8.89	8.92	9.14	7.68	7.49	6.19	6.82	7.14
9-29-87	9.60	8.52	8.43	9.10	7.68	7.64	6.38	6.83	7.06
9-30-87	9.55	8.80	8.82	9.00	7.76	7.48	6.35	6.96	7.23
10-1-87	9.40	8.68	8.62	8.88	7.84	7.54	6.50	7.21	6.96 (1)
10-2-87	9.76	8.82	8.81	9.49	7.73	7.44	6.82	7.19	7.38
10-3-87	9.75	8.60	8.57	9.50	7.86	7.76 (1)	6.76	6.84	7.11
10-4-87	9.64	8.89	--	9.31	7.76	7.44	6.61	7.04	--
10-5-87	9.32	8.57	8.48	9.20	6.96	6.74	6.71	6.75	7.08
10-6-87	7.51	8.06	7.86	7.46	6.09	6.34	6.78	7.13	7.06

(1) interchanged
(2) 4.30 on data sheet

TR-1: Reactor fed 5 percent ground water after 9-21-87 measurement.
TR-2: Reactor fed 2.5 percent ground water after 9-21-87 measurement.
CTR: Reactor fed only process wastewater throughout study.
INF: Influent
RCT: Reactor
EFF: Effluent

AR303833

TABLE 2.
TEMPERATURE DATA FOR THE AVTEX TREATABILITY STUDY

	TEMPERATURE °C								
	TR-1			TR-2			CTR		
	INF	RCT	EFF	INF	RCT	EFF	INF	RCT	EFF
9-11-87	26.0	38.0	33.5	26.0	37.0	32.0	25.5	37.0	32.0
9-14-87	25.0	36.5	32.5	24.5	38.0	32.0	24.5	38.0	33.0
9-15-87	26.0	37.0	33.0	26.0	40.0	34.0	26.0	38.5	33.0
9-16-87	26.0	36.5	33.0	25.5	38.0	33.0	25.5	37.0	32.5
9-17-87	26.0	37.5	32.0	25.0	38.0	32.5	25.0	37.0	32.5
9-18-87	27.5	37.5	33.0	26.5	37.0	--	29.5	37.0	32.0
9-19-87	25.5	38.0	30.2	26.5	37.7	29.0	25.5	36.9	29.5
9-20-87	--	37.5	--	--	35.5	--	--	37.0	--
9-22-87	21.0	37.0	32.0	21.0	37.0	31.0	23.0	37.0	31.5
9-23-87	22.5	38.0	31.0	22.5	36.0	30.0	24.0	38.0	30.5
9-24-87	24.0	38.0	30.0	23.5	36.0	30.0	23.5	37.0	32.0
9-25-87	23.0	38.0	33.0	23.0	37.0	31.0	24.0	38.0	32.0
9-26-87	23.0	37.0	33.0	22.5	36.0	30.0	24.0	37.0	31.0
9-27-87	23.0	37.5	33.0	23.0	37.0	31.0	24.0	36.0	32.0
9-28-87	25.5	37.0	33.0	26.0	37.0	31.0	24.5	35.5	31.5
9-29-87	25.0	37.0	33.0	25.0	37.0	31.0	24.0	36.0	31.5
9-30-87	25.0	38.0	33.0	24.0	37.5	31.0	24.0	36.5	30.0
10-1-87	23.0	37.0	32.0	23.0	37.0	30.0	23.0	37.0	31.0
10-2-87	22.0	38.0	32.0	21.0	36.5	30.0	22.0	36.0	30.5
10-3-87	23.5	37.5	29.8	22.8	35.5	29.8	23.3	35.2	29.2
10-4-87	19.1	37.2	31.0	19.1	36.0	--	18.7	36.0	--
10-5-87	21.0	37.5	32.0	20.0	37.0	29.0	17.5	36.5	28.5
10-6-87	20.0	37.0	31.0	19.0	37.0	27.0	20.	36.5	27.0

TR-1: Reactor fed 5 percent ground water after 9-21-87 measurement.
TR-2: Reactor fed 2.5 percent ground water after 9-21-87 measurement.
CTR: Reactor fed only process wastewater throughout study.
INF: Influent
RCT: Reactor
EFF: Effluent

AR303834

AR303834

WESTON

P A16

TABLE 3.
DISSOLVED OXYGEN DATA FOR THE AVTEX TREATABILITY STUDY

	DISSOLVED OXYGEN (mg/l)								
	TR-1			TR-2			CTR		
	INF	RCT	EFF	INF	RCT	EFF	INF	RCT	EFF
9-11-87	1.1	4.2	2.4	0.4	5.6	3.1	0.2	3.0	2.6
9-14-87	1.1	5.6	2.6	0.3	6.1	3.4	0.5	3.2	1.4
9-15-87	1.0	1.0	0.5	0.7	2.7	1.3	0.5	5.5	0.7
9-16-87	0.9	2.1	0.5	0.3	2.4	1.0	0.4	5.7	1.5
9-17-87	0.4	3.2	0.4	0.4	3.3	0.5	0.1	4.8	0.5
9-18-87	1.4	5.3	1.4	0.5	4.6	--	0.4	5.2	0.7
9-19-87	0.8	2.5	4.2	0.6	4.9	2.75	--	4.3	3.95
9-20-87	--	1.8	--	--	~~.05~~ 0.5	--	--	0.8	--
9-22-87	0.9	4.6	0.4	1.1	2.7	0.6	1.5	3.3	1.2
9-23-87	1.2	2.2	0.2	1.2	0.4	0.2	1.3	3.0	0.1
9-24-87	0.6	0.6	0.1	0.3	0.4	0.1	0.3	1.9	0.2
9-25-87	0.7	0.7	0.3	0.7	0.3	0.2	0.4	1.4	0.2
9-26-87	0.3	2.4	0.2	0.2	0.3	0.2	0.4	3.7	0.3
9-27-87	2.3	0.6	0.3	1.4	0.4	0.3	0.7	1.7	0.3
9-28-87	1.7	1.1	0.3	0.7	0.4	0.4	1.6	1.4	0.4
9-29-87	1.7	1.2	0.6	1.4	0.6	0.4	0.8	1.6	0.8
9-30-87	0.4	0.6	0.2	0.3	0.2	0.2	0.3	0.5	0.2
10-1-87	1.5	3.7	0.3	1.3	0.4	0.3	1.10	1.9	0.4
10-2-87	1.5	5.4	0.3	0.6	0.4	0.3	0.6	0.7	0.3
10-3-87	2.2	3.1	1.1	2.0	1.9	1.2	2.7	1.6	--
10-4-87	0.9	4.4	0.2	1.4	0.5	--	1.6	1.0	--
10-5-87	0.9	6.2	1.9	0.3	0.2	0.2	1.3	0.2	0.3
10-6-87	0.3	6.5	0.3	0.1	0.5	0.2	0.2	3.9	0.9

TR-1: Reactor fed 5 percent ground water after 9-21-87 measurement.
TR-2: Reactor fed 2.5 percent ground water after 9-21-87 measurement.
CTR: Reactor fed only process wastewater throughout study.
INF: Influent
RCT: Reactor

AR303835

Page A17

TABLE 4.
DISSOLVED OXYGEN UPTAKE AND SLUDGE SETTLING RATES DATA
FOR THE AVTEX TREATABILITY STUDY

	DISSOLVED OXYGEN UPTAKE RATE (mg/l/min)			SLUDGE SETTLING RATE (ml/min)		
	TR-1	TR-2	CTR	TR-1	TR-2	CTR
9-11-87	0.75	0.55	0.66	--	--	--
9-14-87	0.55	0.64	0.69	--	--	--
9-15-87	0.95	0.72	~~0.51~~ 0.91	--	--	--
9-16-87	0.80	0.87	0.73	1.80	2.33	1.73
9-17-87	0.82	0.79	0.76	1.67	2.07	2.27
9-18-87	0.59	0.49	0.63	1.20	2.10	2.20
9-19-87	0.45	~~0.52~~ 0.51	0.62	30.0 ①	29.3 ①	29.3 ①
9-20-87	--	--	--	--	--	--
9-21-87	--	--	--	0.63	0.96	1.07
9-22-87	0.76	0.76	0.74	0.83	0.70	0.86
9-23-87	1.32	1.52	0.91	0.50	0.77	1.47
9-24-87	1.57	1.58	0.93	0.87	0.90	1.53
9-25-87	1.54	1.57	0.86	0.97	1.13	1.80
9-26-87	1.02	1.30	0.75	--	--	--
9-27-87	1.24	1.48	0.80	0.57	0.63	1.73
9-28-87	1.08	1.37	0.73	0.80	1.17	2.73
9-29-87	0.92	1.44	0.80	0.30	0.60	1.40
9-30-87	1.32	1.40	0.71	2.30*	0.77	0.43
10-1-87	0.76	0.88	0.82	0.73	1.33	3.00
10-2-87	0.92	1.29	0.80	--	--	--
10-3-87	1.06	1.14	0.98	--	--	--
10-4-87	0.64	1.04	0.96	--	--	--
10-5-87	0.42	0.85	0.74	0.15	0.66	0.90
10-6-87	0.76	1.38	0.35	0.43	0.80	1.33

TR-1: Reactor fed 5 percent ground water after 9-21-87 measurement.

TR-2: Reactor fed 2.5 percent ground water after 9-21-87 measurement.

CTR: Reactor fed only process wastewater throughout study.

① Outlier - not recorded on graph (page 21)

AR303836

WESTON

TABLE 5:
SUSPENDED SOLIDS DATA FOR THE AVT REATABILITY STUDY

	TOTAL SUSPENDED SOLIDS (mg/1)						MIXED LIQUOR SUSPENDED SOLIDS (mg/1)			MIXED LIQUOR VOLATILE SUSPENDED SOLIDS (mg/1)		
	TR-1		TR-2		CTR							
	INF	EFF	INF	EFF	INF	EFF	TR-1	TR-2	CTR	TR-1	TR-2	CTR
9-14-87	8	15	17	16	23	17	--	--	--	--	--	--
9-15-87	--	--	--	--	--	--	10J	0 UJ	80J	~~10~~ 14 J	0 UJ	78J
9-16-87	3	11	1	2	3	1	--	--	--	--	--	--
9-17-87	--	--	--	--	--	--	72	52	~~144~~ 0	62	38	~~135~~ 0
9-21-87	10	29	9	20	13	20	--	--	--	--	--	--
9-22-87	--	--	--	--	--	--	39	90	44	30 J	76 J	35 J
9-23-87	10J	38J	12 J	35J	18J	28J	--	--	--	--	--	--
9-24-87	--	--	--	--	--	--	65	52	105	60	52	97
9-29-87	18	16	8	18	18	26	45J	39 J	80 J	35 J	36 J	64J
9-30-87	10 J	16 J	10 J	19 J	34 J	26 J	--	--	--	--	--	--
10-1-87	--	--	--	--	--	--	26	9	27	26	9	27
10-5-87	11	11	8	7	23	27	--	--	--	--	--	--
10-6-87	--	--	--	--	--	--	21J	13 J	55J	17	10	51

AR303887

R-1: Reactor fed 5 percent ground water after 9-22-87 measurement.
R-2: Reactor fed 2.5 percent ground water after 9-22-87 measurement.
TR: Reactor fed only process wastewater throughout study.
NF: Influen

Xeni West

TABLE 5:
SUSPENDED SOLIDS DATA FOR THE AV REATABILITY STUDY

	TOTAL SUSPENDED SOLIDS (mg/l)						MIXED LIQUOR SUSPENDED SOLIDS (mg/l)			MIXED LIQUOR VOLATILE SUSPENDED SOLIDS (mg/l)		
	TR-1		TR-2		CTR							
	INF	EFF	INF	EFF	INF	EFF	TR-1	TR-2	CTR	TR-1	TR-2	CTR
9/1/87	2.0	30.0	1.0	50.0	–	–	–	–	–	–	–	–
9/2/87	15.0 B	21.0B	14.0B	15.0B	–	–	–	–	–	–	–	–
9/3/87	–	–	–	–	–	–	56 J	53 J	109J	54J	45J	93J
9/8/87	10.0 B	16.0B	19.0B	43.0B	6.0 B	14.0B	8J	32J	56J	9 B	30J	49J
9/9/87	6.0 B	8.0B	7.0 B	8.0 B	10.0 B	8.0B	–	–	–	–	–	–
9/10/87	–	–	–	–	–	–	16.0J	15.0J	14.0J	15.0J	15.0J	14.0J

AR303838

R-1: ...tor fed 5 percent ground water after 9-22-87 measurement.
R-2: Reactor fed 2.5 percent ground water after 9-22-87 measurement.
TR: Reactor fed only process wastewater throughout study.
NF: Influent

P. - A20

Not Reported

TABLE 6.
BOD_5 AND COD DATA FOR THE AVTEX TREATABILITY STUDY

	8-27-87			9-1-87			9-2-87			9-3-87			9-8-87		
	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR
BOD_5 (mg/l) INFLUENT	–	–	–	83xJ	79xJ	81xJ	103J	161J	152J	125J	112J	101J	141J	144J	128J
BOD_5 (mg/l) EFFLUENT	–	20J	–	82xJ	79xJ	80xJ	25J	30J	25J	13J	15J	11J	47J	22J	17J
BOD_5 (mg/l) REMOVED	–	–	–	1	0	1	78	131	127	112	97	90	94J	122J	111J
BOD_5 (%) REMOVED	–	–	–	1.2%	0	1.2	76	81	84	90	87	89	66	85	87J
COD (mg/l) INFLUENT	–	–	–	–	–	–	–	–	–	–	–	–	182L	164L	157L
COD (mg/l) EFFLUENT	–	–	–	–	–	–	–	–	–	–	–	–	146L	128L	86L
COD (mg/l) REMOVED	–	–	–	–	–	–	–	–	–	–	–	–	36	36	71
COD (%) REMOVED	–	–	–	–	–	–	–	–	–	–	–	–	20	22	45

* Value estimated because all final dissolved oxygen concentrations were less than 1.0 ppm.

All reactors were fed only process wastewater.

AR303839

AR303839

Kuhn
Z=STON

n-121

Not Reported

TABLE 6.
BOD_5 AND COD DATA FOR THE AVTEX TREATABILITY STUDY

	9-9-87			9-10-87											
	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR
BOD_5 (mg/l) INFLUENT	161 J	153 J	166 J	143 J	137 J	137 J									
BOD_5 (mg/l) EFFLUENT	75 J	38 J	36 J	16 J	34 J	29 J									
BOD_5 (mg/l) REMOVED	86	115	130	127	103	108									
BOD_5 (%) REMOVED	53	75	78	89	75	79									
COD (mg/l) INFLUENT	–	–	–	–	–	–									
COD (mg/l) EFFLUENT	–	–	–	–	–	–									
COD (mg/l) REMOVED	–	–	–	–	–	–									
COD (%) REMOVED	–	–	–	–	–	–									

a estimated because all final dissolved oxygen concentrations were less than 1.0 ppm.

All reactors were fed only process wastewater.

ARB038840

Geny. WESTON

P 4225

TABLE 6.
BOD_5 AND COD DATA FOR THE AVTEX TREATABILITY STUDY

	9 - 11 - 87			9 - 14 - 87			9 - 15 - 87			9 - 16 - 87			9 - 17 - 87		
	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR
BOD_5 (mg/l) INFLUENT	141 J	142 J	119 J	160 J	153 J	143 J	138 J	154 J	165 J 159	138 J	114 J	129 J	98 127 J	75 J	135 J
BOD_5 (mg/l) EFFLUENT	42 J	34 J	35 J	38 J	50 J 51	51 J	50 J	48 41 J	69 J	25 J	31 J	15 23 J	42 36 J	18 J	18 J
BOD_5 (mg/l) REMOVED	99	108	84	122	100	92	88	113	90	113	83	106	91	57	117
BOD_5 (%) REMOVED	70	76	71	76	65	64	64	73	57	82	73	82	72	76	87
COD (mg/l) INFLUENT	194 J	139 J	186 J	169 J	142 J	142 J	-	-	-	-	-	-	-	-	-
COD (mg/l) EFFLUENT	155 159 J	97 J	58 J	123 J	77 J	107 J	-	-	-	-	-	-	-	-	-
COD (mg/l) REMOVED	35	42	128	46	65	35	-	-	-	-	-	-	-	-	-
COD (%) REMOVED	18	30 NO QC	70	27	46 NO QC	25	-	-	-	-	-	-	-	-	-

e estimated because all final dissolved oxygen concentrations were less than 1.0 ppm.

All reactors were fed only process wastewater.

AR303841

AR303841

WESTON

P-123

TABLE 6. (continued)
BOD_5 AND COD DATA FOR THE AVTEX TREATABILITY STUDY

	9 - 18 - 87			9 - 19 - 87			9 - 21 - 87			9 - 22 - 87		
	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR
BOD_5 (mg/l) INFLUENT	-	-	-	133 J	125 J	125 J	102 J	128 J 141	141 J	105 J	116 J	137 J
BOD_5 (mg/l) EFFLUENT	-	-	-	29 J	27 J	21 J	29 J	23 J	34 J	18 J	19 J 20	19 J
BOD_5 (mg/l) REMOVED	-	-	-	104	98	104	73	118	107	87	96	118
BOD_5 (%) REMOVED	-	-	-	78	78	83	72	84	76	83	83	86
COD (mg/l) INFLUENT	163	107	174	-	-	-	-	-	-	153 J	120 J	120 137 J
COD (mg/l) EFFLUENT	148	111 109	78	-	-	-	-	-	-	103 J	83 J	79 J
COD (mg/l) REMOVED	15	-2	96	-	-	-	-	-	-	50	37	58
COD (%) REMOVED	9	-2	55	-	-	-	-	-	-	33	31	42

* Value estimated because all final dissolved oxygen concentrations were less than 1.0 ppm.

Note: All reactors were fed only process wastewater.

Jepi WESTON

AR303842

AR303842

AVTEX-in hou

Proc 424.

TABLE 6. (continued)
BOD_5 AND COD DATA FOR THE AVTEX TREATABILITY STUDY

	9 - 23 - 87			9 - 24 - 87			9 - 25 - 87			9 - 28 - 87			9 - 29 - 87		
	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR
BOD_5 (mg/l) INFLUENT	233* J	247 J	111 J 100	217 J	217* J	131 J 130	217* J	240* J	127 J	665* J	510 J	143 J	800* J	770* J	154 J
BOD_5 (mg/l) EFFLUENT	49 J 71*	73* J	22 J	65 J	67* J	21 J	68* J	69* J	17 18 J	180* J	180* J	26 J	160 J	148 J	21 J
BOD_5 (mg/l) REMOVED	162	174	78	152	150	109	149	171	109	485	330	117	640	622	133
BOD_5 (%) REMOVED	70	70	78	70	69	84	69	71	86	73	65	82	80	81	86
COD (mg/l) INFLUENT	-	-	-	-	-	-	1373 1554 J	1089 J	168 J	-	-	-	847 L	795 L	138 L
COD (mg/l) EFFLUENT	-	-	-	-	-	-	1340 J	826 J	39 J	-	-	-	678 684 L	328 L	93 L
COD (mg/l) REMOVED	-	-	-	-	-	-	214	263	129	-	-	-	163	467	45
COD (%) REMOVED	-	-	-	-	-	-	14	24	77	-	-	-	19	59	33

'ue estimated because all final dissolved oxygen concentrations were less than 1.0 ppm.

Reactor fed 5 percent ground water.
Reactor fed 2.5 percent ground water.
Reactor fed only process wastewater.

Sky/WESTON

AR303843

e AR5

TABLE 6. (continued)
BOD_5 AND COD DATA FOR THE AVTEX TREATABILITY STUDY

	9 - 30 - 87			10 - 1 - 87			10 - 2 - 87			10 - 5 - 87			10 - 6 - 87		
	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR	TR-1	TR-2	CTR
BOD_5 (mg/l) INFLUENT	695 J	398 J	159 J	700 J	480 J	177 J	700 J	520 J	177 J	710 J	540 J	166 J	700* J	590 J	230 J 240*
BOD_5 (mg/l) EFFLUENT	193 J	195* J	26 J	193* J	190* J	27 J	195* J	180 J	73 J	198* J	176 J 168	34 J	185* J	180* J	66 J
BOD_5 (mg/l) REMOVED	502	203	133	507	290	150	505	340	104	512	372	132	515	410	174
BOD_5 (%) REMOVED	72	51	84	72	60	85	72	65	59	72	69	80	74	69	73
COD (mg/l) INFLUENT	-	-	-	-	-	-	560	633 637	215	-	-	-	-	-	-
COD (mg/l) EFFLUENT	-	-	-	-	-	-	323	382	131	-	-	-	-	-	-
COD (mg/l) REMOVED	-	-	-	-	-	-	237	255	84	-	-	-	-	-	-
COD (%) REMOVED	-	-	-	-	-	-	42	40	39	-	-	-			

Value estimated because all final dossolved oxygen concentrations duing analysis were less than 1.0 ppm.

ote

R-1: Reactor fed 5 percent ground water.
R-2: Reactor fed 2.5 percent ground water.
TR: Reactor fed only process wastewater.

WESTON

AR303844

Page A-26

TABLE 16.
ZINC CONCENTRATIONS FOR THE AVTEX TREATABILITY STUDY
SAMPLES ANALYZED BY AVTEX
(Concentrations are in mg/l)

	TR-1		TR-2		CTR	
	INF	EFF	INF	EFF	INF	EFF
9-11-87	.79 J ~~1.22~~	0.69 J ~~1.12~~	0.06 J ~~0.96~~	0.0 UJ ~~0.31~~	0.44 J ~~0.87~~	0.01 J ~~0.44~~
9-14-87	0.0 UJ ~~0.46~~	0.0 UJ 0.20	0.04 J ~~0.53~~	0.0 UJ ~~0.22~~	0.27 J ~~0.76~~	0.0 UJ ~~BDL~~
9-16-87	0.74 J ~~1.20~~	0.0 UJ ~~0.20~~	0.56 J ~~1.02~~	0.0 UJ BDL	0.34 J ~~0.82~~	0.06 J ~~0.42~~
9-18-87	0.0 UJ ~~0.36~~	0.0 UJ ~~0.03~~	0.94 J ~~1.35~~	0.41 J ~~0.82~~	0.18 J ~~0.59~~	0.0 UJ ~~BDL~~
9-21-87	0.07 J ~~0.44~~	0.0 UJ 0.16	0.07 J ~~0.44~~	0.0 UJ ~~0.24~~	0.12 J ~~0.49~~	0.09 J ~~0.47~~
9-23-87	0.01 J ~~0.41~~	0.0 UJ ~~0.20~~	0.0 UJ ~~0.08~~	0.0 UJ ~~0.01~~	0.28 J ~~0.69~~	0.0 UJ ~~0.18~~
9-25-87	0.41 J ~~0.48~~	0.30 J ~~0.37~~	0.20 J ~~0.28~~	0.03 J ~~0.10~~	0.68 J ~~0.75~~	0.15 J ~~0.23~~
9-28-87	0.38 J ~~0.47~~	0.34 J ~~0.43~~	0.19 J ~~0.28~~	0.15 J ~~0.24~~	0.41 J ~~0.50~~	0.0 UJ 0.07
9-30-87	0.46 J ~~0.53~~	0.29 J ~~0.36~~	0.22 J ~~0.29~~	0.02 J ~~0.09~~	0.37 J ~~0.43~~	0.0 UJ ~~BDL~~
10-2-87	0.29 J ~~0.38~~	0.15 J ~~0.26~~	0.24 J ~~0.35~~	0.05 J ~~0.16~~	0.47 J ~~0.60~~	0.07 J ~~0.18~~
10-5-87	0.28 J ~~0.34~~	0.18 J ~~0.24~~	0.25 J ~~0.31~~	0.05 J ~~0.10~~	0.69 J ~~0.74~~	0.03 J ~~0.08~~

TR-1: Reactor fed 5 percent ground water after 9-22-87 measurement.
TR-2: Reactor fed 2.5 percent ground water after 9-22-87 measurement.
CTR: Reactor fed only process wastewater throughout study.
INF: Influent
EFF: Effluent

WESTON

AR303845.

Samples Not Included in 3/4/88 GM Report

ZINC CONCENTRATIONS FOR THE AVTEX TREATABILITY STUDY
SAMPLES ANALYZED BY AVTEX
(Concentrations are in mg/l)

	TR-1		TR-2		CTR	
	INF	EFF	INF	EFF	INF	EFF
9/2/87	0.0 UJ	0.0 UJ	—	0.0 UJ	0.0 UJ	0.0 UJ
9/8/87	0.08 J	0.0 UJ	0.11 J	1.63 J	0.0 UJ	0.32 J
9/9/87	0.15 J	0.0 UJ	0.17 J	0.0 UJ	0.20 J	0.05 J

TR-1: Reactor fed 5 percent ground water after 9-22-87 measurement.
TR-2: Reactor fed 2.5 percent ground water after 9-22-87 measurement.
CTR: Reactor fed only process wastewater throughout study.
INF: Influent
EFF: Effluent

RMI WESTON

WESTON

ATTACHMENT B

ORGANIC DATA VALIDATION

WESTON
MANAGERS DESIGNERS/CONSULTANTS
2568A RIVA ROAD
SUITE 300
ANNAPOLIS, MD 21401
PHONE: 301-266-9887

DATE: June 8, 1988

SUBJECT: Organic Data Validation
Site: Avtex Fibers, Inc.

FROM: Ivan B. DeLoatch
Organic Data Reviewer

TO: Diana Baldi
ESAT Deputy Project Officer

THRU: Gail E. DeRuzzo
ESAT Team Manager

Overview

The set of samples contained twenty-four (24) water samples. All samples were analyzed solely for carbon disulfide (CS_2) according to the Contract Laboratory Program (CLP) protocols. The analyses were performed by the Cambridge Analytical Association (CAA).

The samples were collected on three (3) dates at six (6) selected locations (three influents and three effluents). Included in the data set were a field duplicate and trip blank for each day that samples were collected. Because the same sample numbers were used on each collection date, the sample appended with the sampling date shall be referenced in this report.

MAJOR PROBLEMS:

- The following samples were reported with concentrations that had exceeded the linear range of the detector:

  TR2-I (09/17/87) TR1-I (09/23/87)
  CTR-I (09/17/87) TR2-I (09/23/87)

  These results have been qualified "J", estimated. These samples were rerun, but several days beyond their holding times. This reanalysis data is considered invalid and is not being used in the reviewer reported concentrations.

- The concentrations of carbon disulfide (CS_2) for samples CTR-I (09/23/87) and CTR-E (09/23/87) were incorrectly calculated as reported on page B7 in Appendix B. The corrected values are reported in the reviewers report on page B5 in Appendix A.

MINOR PROBLEMS

- The system performance calibration compound (SPCC), chloromethane, had an average response factor (RF) less than 0.300 in all initial calibrations. In addition, the percent relative standard deviation (%RSD) for vinyl chloride (CCC) in the initial calibration standard of 10/09/87 was greater than thirty percent (>30%).

- The response factor (RF) of the SPCC, chloromethane, was less than 0.300 in the following continuing calibration standards:

10/01/87 (12:24)	10/09/87 (09:50)
10/01/87 (14:10)	10/10/87 (18:24)
10/02/87 (13:16)	10/20/87 (08:59)

  In addition, the following continuing calibration standards had percent difference (%D) values for the calibration check compound (CCC), vinyl chloride, that were greater than twenty-five percent (>25%): 09/25/87 (12:09), 10/09/87 (09:50), and 10/10/87 (18:49).

QA/QC Comments

- There were no reported compounds found in the method blanks. Therefore no carbon disulfide interferences were present.

- Sample CTR-E (09/23/87) had one (1) surrogate recovery below the quality control limits. Because of this, the concentration of carbon disulfide is qualified "J" for estimated.

- Four (4) out of thirty (30) of the percent recoveries in the volatile matrix spike/matrix spike duplicate (MS/MSD) analyses were out of the advisory limits.

- Two (2) out of fifteen (15) of the relative percent differences (RPD) were out of the advisory limits for the volatile MS/MSD analyses.

Sample Specific Comments:

- The following samples showed no detectable levels of carbon disulfide in all analyses:

TR1-I (09/17/87)	CTR-E (09/17/87)
TR1-E (09/17/87)	CTR-E (10/01/87)
TR2-E (09/23/87)	

- Reviewer reported results for the following samples are based on quantitions from a single analysis.

TR2-E (09/23/87)	TR1-E (10/01/87)
CTR-I (09/23/87)	TR2-I (10/01/87)
CTR-E (09/23/87)	CTR-I (10/01/87)
TR1-I (10/01/87)	

- Reviewer reported results for the following samples are based on the best data from analyses performed within holding times. These samples were analyzed as either laboratory or field replicates.

TR2-I (09/17/87)	TR2-I (09/23/87)
CTR-I (09/17/87)	TR2-E (10/01/87)
TR1-I (09/23/87)	

  Reviewer reported results were qualified "J" for these samples if the resulting quantitation was above the calibrated linear range.

- The reviewer reported result for sample TR1-E (09/23/87) is the average of two replicate analyses performed within holding time.

Notes

- All data as reported by the laboratory and evaluated by the contract are found in Appendix B.

- All sample analyses were reviewed for consistency with the Contract Laboratory Program (CLP) Statement of Work (SOW) 7/87. Final reviewer reported results were arrived at based on validity of data according to the Functional Guidelines For Evaluating Organics Analyses With Modifications For Use Within Region III.

List of Attachments

1) Appendix A - Reviewer Reported Results
2) Appendix B - Support Documentation

APPENDIX A

Reviewer Reported Results

REVIEWER REPORTED RESULTS

TABLE 9.
CARBON DISULFIDE DATA FOR THE
AVTEX TREATABILITY STUDY
SAMPLES ANALYZED BY CAA
(Concentrations in ug/l)

	TR-1 Influent	TR-1 Effluent	TR-2 Influent	TR-2 Effluent	CTR Influent	CTR Effluent
9-17-87	5 U	5 U	3,200 J	5 U	1,300 J	5 U
9-22-87	47,000 J	1,740	70,000 J	2,000	6,100	5,100
10-1-87	9,800	7,000	6,600	2,200	8,900	5 U

TR-1: Reactor fed 5 percent ground water after 9-22-87 measurement.
TR-2: Reactor fed 2.5 percent ground water after 9-22-87 measurement.
CTR: Reactor fed only process wastewater throughout study.

GLOSSARY OF DATA QUALIFIER CODES (ORGANIC)

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

J = Analyte present. Reported value may not be accurate or precise.

AR303852

APPENDIX B

Support Documentation

TABLE 9.
CARBON DISULFIDE DATA FOR THE
AVTEX TREATABILITY STUDY
SAMPLES ANALYZED BY CAA
(Concentrations in ug/l)

	TR-1 Influent	TR-1 Effluent	TR-2 Influent	TR-2 Effluent	CTR Influent	CTR Effluent
9-17-87	<5	<5	3,250	<5	1,350	<5
9-23-87	28,000	1,740	81,000	2,000	2,100	3,100
10-1-87	9,800	7,000	6,600	7,600	8,900	<5

TR-1: Reactor fed 5 percent ground water after 9-22-87 measurement.
TR-2: Reactor fed 2.5 percent ground water after 9-22-87 measurement.
CTR: Reactor fed only process wastewater throughout study.

AR303854

AVTEX TREATABILITY STUDY - ORGANIC ANALYSIS RESULTS

Page B8

SAMPLE ID	DATE SAMPLED	DATE ANALYSED	CARBON DISULFIDE
TR1-I	9/17/87	9/25/87	5 u
TR1-E	9/17/87	9/25/87	5 u
TR2-I	9/17/87	9/22/87	3200*
TR2-I (RERUN)	9/17/87	10/2/87	3300
TR2-E	9/17/87	9/25/87	5 u
CR-I	9/17/87	9/25/87	1300
CR-I (MS)	9/17/87	9/25/87	1500
CR-I (MS RERUN)	9/17/87	10/2/87	1300
CR-I (MSD)	9/17/87	10/2/87	1200
CR-I (RERUN)	9/17/87	10/2/87	1400
CR-E	9/17/87	9/25/87	5 u
CR-E (REPLICATE)	9/17/87	9/25/87	5 u
TRIP	9/17/87	9/24/87	5 u
TR1-I	9/23/87	10/1/87	47000*
TR1-I (RERUN)	9/23/87	10/10/87	29000 j
TR1-E	9/23/87	10/1/87	680
TR1-E (REPLICATE)	9/23/87	10/1/87	2800
TR2-I	9/23/87	10/1/87	70000*
TR2-I (RERUN)	9/23/87	10/10/87	81000 j
TR2-E	9/23/87	10/1/87	2000
TR2-E (MS)	9/23/87	10/1/87	2700
TR2-E (MSD)	9/23/87	10/1/87	2300
CR-I	9/23/87	10/1/87	2100
CR-E	9/23/87	10/1/87	3100 j
CR-E (MS)	9/23/87	10/1/87	3700*
CR-E (MSD)	9/23/87	10/1/87	3700*
TRIP	9/23/87	10/1/87	6
TRIP (RERUN)	9/23/87	10/9/87	5 uj
TR1-I	10/1/87	10/9/87	9800
TR1-E	10/1/87	10/9/87	7000
TR2-I	10/1/87	10/9/87	6600
TR2-E	10/1/87	10/9/87	2200
TR2-E (REPLICATE)	10/1/87	10/9/87	8400*
TR2-E (REP)(RERUN)	10/1/87	10/20/87	13000 j
CR-I	10/1/87	10/9/87	2900
CR-I (MS)	10/1/87	10/9/87	4000*
CR-I (MS RERUN)	10/1/87	10/20/87	2400
CR-I (MSD)	10/1/87	10/9/87	4000*
CR-I (MSD RERUN)		10/20/87	2500
CR-E	10/1/87	10/9/87	5 u
TRIP	10/1/87	10/9/87	7
TRIP (RERUN)	10/1/87	10/20/87	3 j

AR303855

* Peak greater than nearest standard
u - Compound analysed for but not detected
j - Indicates an estimated value due to quality control problems

WESTON

SHEET ___ of ___

CLIENT/SUBJECT _____ W.O. NO. _____

TASK DESCRIPTION _____ TASK NO. _____

PREPARED BY _____ DEPT _____ DATE _____

MATH CHECK BY _____ DEPT _____ DATE _____

METHOD REV. BY _____ DEPT _____ DATE _____

APPROVED BY _____ DEPT _____ DATE _____

Recalculation

(CRI) SC-I

$$\frac{65892 \times 50}{44372 \times 1.22370} = \cancel{60.876} \; 60.676 \times 100 = 6{,}100 \text{ ug}$$

(CR-E) SC-E

$$\frac{5595405 \times 50}{2.5270 \times 2.16755} = 5107.72 \text{ ug/L}^{*}$$

* Values reported on table of the Reviewer Reported Results in Appendix A.

WATER SURROGATE PER[illegible]NT RECOVERY SUMMARY

Page B10

Case No. [illegible]-3.08 Contract Laboratory Cambrio[illegible]alytical Associates Contract No. 68-01-7270

	VOLATILE			SEMI-VOLATILE								PESTICIDE
SMO TRAFFIC NO.	TOLUENE-D8 (88-110)	BFB (86-115)	1,2 DICHLORO-ETHANE-D4 (76-114)	NITRO-BENZENE-D5 (35-114)	2-FLUORO-BIPHENYL (43-116)	TERPHENYL-D14 (33-141)			PHENOL-D6 (10-94)	2-FLUORO-PHENOL (21-100)	2,4,6 TRIBROMO-PHENOL (10-123)	DIBUTYL-CHLORENDATE (24-154)
SC-E	103	53*	101									
C-E MS	106	98	103									
C-E MSD	105	97	101									
[illegible] Blank	102	96	95									
[illegible] Blank	100	101	100									

VALUES ARE OUTSIDE OF CONTRACT REQUIRED QC LIMITS

LIMITS ONLY

Volatiles: 1 out of 15 ; outside of QC limits

Semi-Volatiles: ____ out of ____ ; outside of QC limits

Pesticides: ____ out of ____ ; outside of QC limits

AR303857

AR303857

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

Pa B4

Case No. 870034 Contractor CAMBRIDGE ANALYTICAL Contract No. ~~68-01-7278~~ M

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
VOA SMO SAMPLE NO. TC-1	1,1-Dichloroethene	50.0	0	43.2	86	47.9	96	13	14	61-145
	Trichloroethene	50.0		42.3	85	48.5	97	14	14	71-120
	Chlorobenzene	50.0		46.1	93	53.2	106	14*	13	75-130
	Toluene	50.0		46.9	93	46.6	93	13	13	76-125
	Benzene	50.0		43.1	86	50.7	101	16*	11	76-127
B/N SMO SAMPLE NO.	1,2,4-Trichlorobenzene								28	39-98
	Acenaphthene								31	46-118
	2,4 Dinitrotoluene								38	24-96
	Pyrene								31	26-127
	N-Nitroso-Di-n-Propylamine								38	41-116
	1,4-Dichlorobenzene								28	36-97
ACID SMO SAMPLE NO.	Pentachlorophenol								50	9-103
	Phenol								42	12-89
	2-Chlorophenol								40	27-123
	4-Chloro-3-Methylphenol								42	23-97
	4-Nitrophenol								50	10-80
PEST SMO SAMPLE NO.	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127

*ASTERISKED VALUES ARE OUTSIDE QC LIMITS.

RPD: VOAs 2 out of 5 outside QC limits
B/N ____ out of ____ outside QC limits
ACID ____ out of ____ outside QC limits
PEST ____ out of ____ outside QC limits

RECOVERY: VOAs 0 out of 10 outside QC limits
B/N ____ out of ____ outside QC limits
ACID ____ out of ____ outside QC limits
PEST ____ out of ____ outside QC limits

Comments:

AR303858

R3-6385

7/85

FORM III

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

2 of B12

Case No. 8709207 Contractor Cambridge Analytical Assoc Contract No. 68-01-7278 fy

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
VOA SMO SAMPLE NO. SD-E	1,1-Dichloroethene	50	0	26	52*	28	56*	7	14	61-145
	Trichloroethene			37	74	37	74	0	14	71-120
	Chlorobenzene			39	78	39	78	0	13	76-130
	Toluene			35	70*	35	70*	0	13	76-125
	Benzene			38	76	37	74	3	11	76-127
B/N SMO SAMPLE NO.	1,2,4-Trichlorobenzene								28	39-98
	Acenaphthene								31	46-118
	2,4 Dinitrotoluene								38	24-96
	Di-n-Butylphthalate								40	11-117
	Pyrene								31	26-127
	N-Nitroso-Di-n-Propylamine								38	41-116
	1,4-Dichlorobenzene								28	36-97
ACID SMO SAMPLE NO.	Pentachlorophenol								50	9-103
	Phenol								42	12-89
	2-Chlorophenol								40	27-123
	4-Chloro-3-Methylphenol								42	23-97
	4-Nitrophenol								50	10-80
PEST SMO SAMPLE NO.	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127

*ASTERISKED VALUES ARE OUTSIDE QC LIMITS.

RPD: VOAs 0 out of 5 : outside QC limits
B/N ____ out of ____ : outside QC limits
ACID ____ out of ____ : outside QC limits
PEST ____ out of ____ : outside QC limits

RECOVERY: VOAs 11 out of 10 : outside QC limits
B/N ____ out of ____ : outside QC limits
ACID ____ out of ____ : outside QC limits
PEST ____ out of ____ : outside QC limits

Comments:

AR303859

WATER MATRIX SPIKE/MATRIX SPIKE DUPLICATE RECOVERY

B13

Case No. 8709172 Contractor CAMBRIDGE ANALYTICAL Contract No. 68-01-7278

FRACTION	COMPOUND	CONC. SPIKE ADDED (ug/L)	SAMPLE RESULT	CONC. MS	% REC	CONC. MSD	% REC	RPD	QC LIMITS* RPD	QC LIMITS* RECOVERY
VOA SMO SAMPLE NO. CR-1	1,1-Dichloroethene	50	0	40	80	39	78	3	14	61-145
	Trichloroethene			40	80	39	78	3	14	71-120
	Chlorobenzene			43	86	44	88	2	13	75-130
	Toluene			38	76	40	80	5	13	76-125
	Benzene			39	78	39	78	0	11	76-127
B/N SMO SAMPLE NO.	1,2,4-Trichlorobenzene								28	39-98
	Acenaphthene								31	46-118
	2,4 Dinitrotoluene								38	24-96
	Pyrene								31	26-127
	N-Nitroso-Di-n-Propylamine								38	41-116
	1,4-Dichlorobenzene								28	36-97
ACID SMO SAMPLE NO.	Pentachlorophenol								50	9-103
	Phenol								42	12-89
	2-Chlorophenol								40	27-123
	4-Chloro-3-Methylphenol								42	23-97
	4-Nitrophenol								50	10-80
PEST SMO SAMPLE NO.	Lindane								15	56-123
	Heptachlor								20	40-131
	Aldrin								22	40-120
	Dieldrin								18	52-126
	Endrin								21	56-121
	4,4'-DDT								27	38-127

*ASTERISKED VALUES ARE OUTSIDE QC LIMITS.

RPD: VOAs 0 out of 5; outside QC limits
B/N ___ out of ___; outside QC limits
ACID ___ out of ___; outside QC limits
PEST ___ out of ___; outside QC limits

RECOVERY: VOAs 0 out of 10; outside QC limits
B/N ___ out of ___; outside QC limits
ACID ___ out of ___; outside QC limits
PEST ___ out of ___; outside QC limits

Comments:

AR303860

7/85

Page B14

SP10Hm

Initial Calibration Data
HSL Compounds

Case No: 8709172 Instrument ID: HP 5970 "H"

Contractor: CAMBRIDGE ANALYTICAL Calibration Date: ~~[illegible]~~ 9/10/87

Contract No:

Minimum $\overline{RF}$ for SPCC is 0.300 - Maximum % RSD for CCC is 30.0%

Compound	Laboratory ID: >H0016 RF 20.00	>H0014 RF 50.00	>H0017 RF 100.00	>H0015 RF 150.00	>H0013 RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC	
CHLOROMETHANE	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	4.829		**	see next page
BROMOMETHANE	.53136	.51027	.53289	.50752	.52933	.52227	2.359			
VINYL CHLORIDE	.40729	.42772	.42797	.42140	.47290	.43143	5.713	*		
CHLOROETHANE	.32954	.33341	.33360	.32449	.36976	.33816	5.336			
METHYLENE CHLORIDE	1.17430	1.04777	.98815	.95090	1.07820	1.04787	8.248			
ACETONE	.28011	.18584	.13332	.22953	.15400	.19664	30.107			
CARBON DISULFIDE	2.13009	2.30052	2.34752	2.07327	2.43997	2.25828	6.767			
1,1-DICHLOROETHENE	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	4.095	*		see next page
1,1-DICHLOROETHANE	2.01276	2.01645	2.02579	1.91640	2.08437	2.01116	3.002		**	
TRANS-1,2,DICHLOROETHENE	.95225	.98464	.96520	.92148	1.02728	.97017	4.054			
CHLOROFORM	3.06520	2.96456	3.06224	2.85321	2.89423	2.97189	3.243	*		
1,2-DICHLOROETHANE	2.04572	1.97220	2.00263	1.85765	1.91016	1.95767	3.809			
D4-1,2-DICHLOROETHANE (SS-1)	.77224	.76053	.82269	.80192	.80350	.79217	3.189			(Conc=100.0,100.0,100.0,100.0,100
2-BUTANONE (MEK)	.01902	.01858	.01555	.02302	.02200	.01963	15.124			
1,1,1-TRICHLOROETHANE	1.24504	1.06628	1.09033	1.01595	1.02570	1.02906	8.481			
CARBON TETRACHLORIDE	.94525	.96012	1.01437	.97800	.99215	.97798	2.760			
VINYL ACETATE	.21553	.20892	.18202	.17947	.22045	.20128	9.542			
BROMODICHLOROMETHANE	1.06249	1.09229	1.10219	1.09747	1.12015	1.09492	1.913			
1,2-DICHLORO PROPANE	.36179	.39915	.37096	.38549	.41553	.39058	4.405	*		
CIS-1,3-DICHLOROPROPENE	.51934	.54681	.54568	.53863	.60196	.55048	5.596			
TRICHLOROETHENE	.58589	.61760	.59239	.72707	.61894	.62838	9.088			
DIBROMOCHLOROMETHANE	.93661	.92502	.94478	.90033	.94545	.93084	2.034			
1,1,2-TRICHLOROETHANE	.35000	.34565	.33014	.32635	.34250	.33893	3.009			
BENZENE	.86392	.89182	.85950	.87549	.93471	.88509	3.438			
TRANS-1,3-DICHLOROPROPENE	.55509	.56601	.54039	.54328	.58119	.55731	2.999			
2-CHLOROETHYLVINYLETHER	.19168	.20333	.08208	.18267	.17315	.16658	29.135			
BROMOFORM	.70794	.71909	.71691	.69954	.73377	.71545	1.796		**	
4-METHYL-2-PENTANONE	.26723	.23611	.22510	.21927	.24950	.23944	8.080			
2-HEXANONE	.20422	.16240	.15696	.18445	.16796	.17520	10.965			
TETRACHLOROETHYLENE	.67765	.67095	.68436	.65455	.64812	.66713	2.300			
1,1,2,2-TETRACHLOROETHANE	.58971	.60612	.56212	.37383	.60619	.54759	18.041		**	
D-8 TOLUENE (SS-2)	.49172	.50236	.49132	.50181	.49976	.49739	1.056			(Conc=100.0,100.0,100.0,100.0,100

RF - Response Factor (Subscript is amount in US/L)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

AR303861

Corrected Rf values

Compound	Rf 20	Rf 50	Rf 100	Rf 150	Rf 200	$\overline{Rf}$	%RSD
chloroethane	0.2281	0.2243	0.2162	0.2073	0.235	0.2222	4.829	(23,37.5,115,172.5
1 dichloroethene	1.1392	1.1769	1.1480	1.118	1.241	1.1646	4.095	(18,45,90,135,

AR303862

Page B16

Initial Calibration Data
MSL Compounds

Case No: 8709172 Instrument ID: HP 5970 "H"

Contractor: CAMBRIDGE ANALYTICAL Calibration Date: 09/11/87

Contract No:

Maximum $\overline{RF}$ for SPCC is 0.300 Maximum % RSD for CCC is 30.0%

Compound	Laboratory ID: >H0016 RF 20.00	>H0014 RF 50.00	>H0017 RF 100.00	>H0015 RF 150.00	>H0013 RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC	
TOLUENE	.70361	.71045	.67466	.68328	.72276	.69095	2.823	*		
CHLOROBENZENE	1.00250	1.02118	.99587	.99802	1.04765	1.01303	2.148		**	
ETHYL BENZENE	.49077	.48853	.47904	.46756	.49688	.48456	2.366	*		
BROMOFLUOROBENZENE (SS-3)	.48160	.49563	.48925	.48721	.48117	.48597	1.226			(Conc=100.0,100.0,100.0,100.0,100
STYRENE	.99858	.67519	.99962	.97026	1.03328	.93539	15.732			
M-XYLENE	.55803	.57259	.55762	.53414	.56397	.56329	3.531			
O-XYLENE	.62141	.60972	.57937	.55787	.50935	.59154	4.234			

RF - Response Factor (Subscript is amount in UG/L)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

AR303863

Initial Calibration Data
VOA Compounds

Case No: 8709173 Instrument ID: HP 5973 "T" SC1153

Contractor: CMS Calibration Date: 05/11/87

Contract No: 68-01-7278

Minimum RF for SPCC is 0.3 Maximum % RSD for CCC is 30.0%

Compound	Laboratory ID: XC7767 RF 20.00	XC7768 RF 50.00	XC7769 RF 100.00	XC7770 RF 150.00	XC7771 RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC	
CHLOROMETHANE	.30763	.27904	.15159	.11853	.08323	.18430	51.861		**	(Conc=23.0,57.5,115.0,172.5,230.0
BROMOMETHANE	.26017	.24812	.19285	.15313	.11241	.19333	32.358			
VINYL CHLORIDE	.35256	.40178	.33657	.27582	.23081	.32091	20.955		*	
CHLOROETHANE	.22723	.24511	.22798	.18456	.15176	.20733	18.444			
METHYLENE CHLORIDE	.43466	.42559	.41863	.42459	.40153	.42099	2.922			
ACETONE	.48735	.45713	.35753	.37648	.35326	.51646	8.820			
CARBON DISULFIDE	1.47727	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			(Conc=[illegible] see next pg
1,1-DICHLOROETHENE	1.23145	1.23456	1.26855	1.21640	1.21157	1.23294	1.784		*	(Conc=18.0,45.0,90.0,135.0,180.0)
1,1-DICHLOROETHANE	2.52354	2.61618	2.64015	2.51356	2.52121	2.56333	2.420		**	
TRANS-1,2,DICHLOROETHENE	1.05123	1.07259	1.07251	1.04535	1.05240	1.06114	1.077			
CHLOROFORM	2.64233	2.57267	2.55375	2.47759	2.50529	2.58799	3.453		*	
1,2-DICHLOROETHANE	1.09352	1.01752	1.02089	1.04562	1.02424	1.05738	2.621			
84-1,2-DICHLOROETHANE (SS-1)	.75756	.79135	.82759	.80488	.84031	.80374	4.220			(Conc=100.0,100.0,100.0,100.0,100
2-BUTANONE (MEK)	.01385	.00662	.01287	.00955	.02513	.01342	52.752			
1,1,1-TRICHLOROETHANE	.45493	.44559	.45789	.46285	.44812	.45448	1.378			
CARBON TETRACHLORIDE	.52239	.50456	.51312	.53739	.51520	.51853	2.374			
VINYL ACETATE	.22334	.12994	.23857	.21138	.25872	.21219	23.242			
BROMODICHLOROMETHANE	.49729	.49533	.50316	.50750	.50004	.49666	1.678			
1,2-DICHLORO PROPANE	.31533	.33054	.34634	.34043	.33343	.33323	3.523		*	
CIS-1,3-DICHLOROPROPENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			(Conc=[illegible] see next pg
TRICHLOROETHENE	.35357	.35203	.35481	.39764	.34633	.35300	7.562			
DIBROMOCHLOROMETHANE	.46337	.45543	.46186	.46819	.47571	.46206	3.363			
1,1,2-TRICHLOROETHANE	.23745	.21943	.22353	.21965	.21802	.22372	3.561			
BENZENE	1.05027	.93561	1.02542	1.01400	.98195	1.00501	1.605			
TRANS-1,3-DICHLOROPROPENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			(Conc=[illegible] see next pg
2-CHLOROETHYL VINYL ETHER	.19327	.18450	.19792	.21174	.20780	.19905	5.326			
BROMOFORM	.25648	.22083	.25649	.25364	.28520	.25624	8.970		**	
4-METHYL-2-PENTANONE	.40293	.36117	.43650	.41643	.47293	.41819	9.952			
2-HEXANONE	.30195	.14643	.23798	.18553	.35351	.24948	33.917			
TETRACHLOROETHYLENE	.25676	.24206	.24525	.26009	.25762	.25248	3.165			
1,1,2,2-TETRACHLOROETHANE	.45187	.36445	.38058	.32550	.40728	.38752	12.167		**	
84-8 TOLUENE (SS-2)	.52657	.54619	.54682	.55528	.54117	.54401	1.811			(Conc=100.0,100.0,100.0,100.0,100
TOLUENE	.79799	.74855	.75185	.75443	.73641	.75765	3.092		*	
CHLOROBENZENE	1.03357	.96454	.99504	1.00733	1.00373	1.00124	2.650		**	
ETHYL BENZENE	.54606	.53135	.54151	.55223	.54566	.54336	1.422		*	
P-XYLENE/M-XYLENE (SS-3)	.29950	.29981	.30258	.30711	.30556	.30429	1.432			(Conc=100.0,100.0,100.0,100.0,100

AR303864

RF = Response Factor (Subscript is amount in UG/L)

$\overline{RF}$ = Average Response Factor

RSD = Percent Relative Standard Deviation

	Rf 20	Rf 50	Rf 100	Rf 150	Rf 200	$\bar{Rf}$	% de
trans 1,3 dichloropropene	0.3537	0.3465	0.3647	0.3620	0.3555	0.3585	2.6
cis 1,3 dichloropropene	0.3601	0.3671	0.3866	0.3897	0.3845	0.3776	3.
Cl_2	1.2926	1.3185	1.4180	1.5052	1.4344	1.3941	6.:

Initial Calibration Data
RSL Compounds

Page B-19

Case No: 8709173 Instrument ID: HP 5933 "C" HC1192

Contractor: CRA Calibration Date: 03/11/87

Contract No: 68-01-7278

Minimum $\overline{RF}$ for SPCC is 0.3 Maximum % RSD for CCC is 30.0%

Compound	Laboratory ID: X7767 RF 20.00	X7768 RF 50.00	X7769 RF 100.00	X7770 RF 150.00	X7771 RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC
STYRENE	1.25315	1.16649	1.24062	1.23405	1.17620	1.21418	3.276		
M-XYLENE	.72623	.65853	.70831	.69553	.65751	.69097	4.056		
O-XYLENE	.76497	.70833	.75226	.75462	.72432	.74103	3.158		

AR303866

RF - Response Factor (Subscript is amount in UG/L)

$\overline{RF}$ - Average Response Factor

%RSD - Percent Relative Standard Deviation

CCC - Calibration Check Compounds (a) SPCC - [illegible]

Page B2D

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: MS33

Contractor: CRL Calibration Date: 10/01/89 4/30/87

Contract No: 68-01-7279

Minimum $\overline{RF}$ for SPCC is 0.3 Maximum % RSD for CCC is 30.00

Laboratory ID: XC052 XC053 XC054 XC055 XC056

Compound	RF 20.00	RF 50.00	RF 100.00	RF 150.00	RF 200.00	$\overline{RF}$	% RSD	CCC	SPCC	
CHLOROMETHANE	.18633	.16036	.10533	.07354	.05325	.11701	46.881		**	(Conc=23.0,57.5,115.0,172.5,230.0
BROMOMETHANE	.18421	.19864	.15431	.11529	.08964	.14554	30.782			
VINYL CHLORIDE	.23751	.30249	.25784	.19956	.17971	.24550	21.904	*		
CHLOROETHANE	.18253	.15585	.13123	.11828	.14535	.17274	13.878			
METHYLENE CHLORIDE	.41618	.40431	.38438	.34733	.35743	.38203	7.742			
ACETONE	.51791	.51677	.49349	.51847	.45371	.48997	7.744			
CARBON DISULFIDE	1.38434	1.41613	1.38287	1.22221	1.10089	1.48129	13.699			
1,1-DICHLOROETHENE	1.18474	1.22436	1.09214	1.05531	1.03454	1.11502	7.320	*		(Conc=18.0,45.0,90.0,135.0,180.0)
1,1-DICHLOROETHANE	2.26542	2.37313	2.29356	2.11281	2.13377	2.22578	4.931		**	
TRANS-1,2,DICHLOROETHENE	1.05383	1.08743	1.05059	.97534	.98120	1.03088	4.845			
CHLOROFORM	2.64374	2.66562	2.60042	2.37463	2.31423	2.51973	6.474	*		
1,2-DICHLOROETHANE	1.77634	1.78254	1.74968	1.61517	1.58454	1.70179	5.553			
D4-1,2-DICHLOROETHANE (SS-1)	.65389	.68189	.71640	.71128	.72710	.69531	3.958			(Conc=100.0,100.0,100.0,100.0,100
2-BUTANONE (MEK)	-	.81121	.81636	.81618	.82132	.81642	25.233			
1,1,1-TRICHLOROETHANE	.47823	.49582	.48570	.45300	.44669	.47188	4.489			
CARBON TETRACHLORIDE	.52163	.54665	.54457	.51942	.52050	.53057	2.537			
VINYL ACETATE	.35334	.15720	.22562	.18482	.22760	.23027	33.001			
BROMODICHLOROMETHANE	.50093	.52703	.52385	.52053	.49736	.51014	2.758			
1,2-DICHLORO PROPANE	.30572	.32581	.32720	.30636	.30295	.31417	4.205	*		
CIS-1,3-DICHLOROPROPENE	.36138	.38143	.38618	.36790	.35345	.37135	3.384			
TRICHLOROETHENE	.35504	.37544	.37556	.35423	.35372	.36280	2.961			
DIBROMOCHLOROMETHANE	.46039	.47765	.47763	.45103	.44587	.46284	3.123			
1,1,2-TRICHLOROETHANE	.23342	.22561	.22937	.21329	.20462	.22106	5.514			
BENZENE	.99213	1.04375	1.01305	.96181	.93250	.98865	4.385			
TRANS-1,3-DICHLOROPROPENE	.33326	.35440	.34789	.32186	.31208	.33510	5.293			
2-CHLOROETHYLVINYLETHER	.15326	.15448	.14535	.15353	.16015	.15468	3.847			
BROMOFORM	.27066	.26716	.27562	.28032	.25208	.27733	3.613		**	
4-METHYL-2-PENTANONE	.36532	.37452	.44074	.50346	.41712	.42025	13.244			
2-HEXANONE	.28233	.19591	.25555	.27886	.30479	.25629	15.305			
TETRACHLOROETHYLENE	.29580	.28627	.29272	.29838	.29468	.29837	1.083			
1,1,2,2-TETRACHLOROETHANE	.48603	.46265	.44993	.45204	.42507	.45535	4.776		**	
B-8 TOLUENE (SS-2)	.49812	.49425	.50382	.51185	.50668	.50154	2.896			(Conc=100.0,100.0,100.0,100.0,100
TOLUENE	.82543	.80933	.81195	.78620	.76298	.79972	3.145	*		
CHLOROBENZENE	1.08370	1.07106	1.10228	1.04899	1.02185	1.06679	2.839		**	
ETHYL BENZENE	.54532	.55279	.56789	.52474	.51597	.54612	4.115	*		
BROMOFLUOROBENZENE (SS-3)	.27456	.27762	.29310	.28730	.29999	.28653	3.582			(Conc=100.0,100.0,100.0,100.0,100

AR303867

RF - Response Factor (Subscript is amount in ng/L)

$\overline{RF}$ - Average Response Factor

Page B-21

Initial Calibration Data
BSL Compounds

Case No: _____ Instrument ID: HP5993

Contractor: CBR Calibration Date: 10/01/87

Contract No: 68-01-7278

Minimum $\overline{RF}$ for SPCC is 0.3 Maximum % RSD for CCC is 30.0%

Laboratory ID:	XC8062	XC8063	XC8064	XC8065	XC8066				
	RF	RF	RF	RF	RF				
Compound	20.00	50.00	100.00	150.00	200.00	$\overline{RF}$	% RSD	CCC	SPCC
STYRENE	1.25331	1.26105	1.28157	1.20460	1.19419	1.23895	3.945		
M-XYLENE	.68152	.67547	.68565	.64169	.64122	.66511	3.292		
O-XYLENE	.73393	.73588	.74848	.64169	.70680	.71416	6.078		

AR303868

RF = Response Factor (Subscript is amount in UG/L)

$\overline{RF}$ = Average Response Factor

%RSD = Percent Relative Standard Deviation

Page B2

Initial Calibration Data
HSL Compounds

Case No: _____ Instrument ID: HP5995 "D"

Contractor: CAA _____ Calibration Date: ~~[illegible]~~ 10/6/87

Contract No: _____

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % RSD for CCC is 30.0%

Compound	>D6417 RF 20.00	>D6418 RF 50.00	>D6419 RF 100.00	>D6420 RF 150.00	>D6421 RF 200.00	$\overline{RF}$	%RSD	CCC	SPCC
CHLOROETHANE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	43.819		**
BROMOETHANE	.33052	.51697	.41199	.21043	.16770	.32752	43.793		
VINYL CHLORIDE	.64340	.87382	.86254	.23506	.12538	.54804	63.912	*	
CHLOROETHANE	.73844	.79830	.97701	.33506	.11217	.59219	60.207		
METHYLENE CHLORIDE	1.02156	1.26254	1.24114	1.10613	.94803	1.11588	12.219		
ACETONE	.35516	.13602	.19392	.29246	.63619	.32075	60.847		
CARBON DISULFIDE	2.45401	3.14907	3.32840	3.02954	2.93412	2.97903	11.021		
1,1-DICHLOROETHENE	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	9.770	*	
1,1-DICHLOROETHANE	2.02834	2.67175	2.65274	2.56116	2.49598	2.48193	10.616		**
TRANS-1,2,DICHOROETHENE	.92224	1.18776	1.22466	1.17444	1.17744	1.13751	10.717		
CHLOROFORM	2.24721	2.98670	3.00250	2.90691	2.81923	2.79371	11.256	*	
1,2-DICHLOROETHANE	1.81794	2.32294	2.33250	2.30932	2.27914	2.21157	9.998		
D4-1,2-DICHLOROETHANE (SS-1)	4.17535	1.78316	.91314	.64268	.52627	1.60812	94.342		
2-BUTANONE (MEK)	.09620	.09055	.10249	.12516	.21292	.12546	40.352		
1,1,1-TRICHLOROETHANE	.49636	.69028	.72279	.67785	.63576	.64461	13.736		
CARBON TETRACHLORIDE	.45652	.58638	.63753	.58834	.55626	.56500	11.908		
VINYL ACETATE	.01181	.01131	.01222	.01221	.01118	.01175	4.141		
BROMODICHLOROETHANE	.25547	.29527	.31191	.30128	.28818	.29042	7.364		
1,2-DICHLORO PROPANE	.33784	.42710	.42940	.40179	.37737	.39470	9.679	*	
TRANS-1,3-DICHLOROPROPENE	.40016	.50467	.53971	.52753	.50439	.49529	11.165		
TRICHLOROETHENE	.36838	.43305	.45774	.42452	.39965	.41667	8.173		
DIBROMOCHLOROMETHANE	.39073	.48803	.52580	.51248	.49518	.48244	11.059		
1,1,2-TRICHLOROETHANE	.26108	.28391	.31264	.32553	.26849	.29033	9.605		
BENZENE	.98070	1.20080	1.20728	1.14902	1.06417	1.12040	8.643		
CIS-1,3-DICHLOROPROPENE	.40178	.49826	.52930	.51706	.49294	.48787	10.307		
2-CHLOROETHYLVINYLETHER	.12729	.11409	.14426	.15234	.15094	.13819	12.150		
BROMOFORM	.23583	.28850	.32557	.32722	.33508	.30244	13.678		**
4-METHYL-2-PENTANONE	.38724	.42883	.49859	.51411	.50073	.46590	11.838		
2-HEXANONE	.27668	.24067	.31305	.37212	.49060	.33862	28.898		
TETRACHLOROETHYLENE	.35912	.42337	.44477	.42674	.40374	.41155	7.951		
1,1,2,2-TETRACHLOROETHANE	.44709	.51580	.52892	.54715	.55695	.52318	6.723		**
D-8 TOLUENE (SS-2)	3.09657	1.26066	.61284	.41537	.30938	1.13902	101.409		
TOLUENE	.78032	.95463	.96777	.95354	.88470	.90819	8.647	*	
CHLOROBENZENE	.89908	1.11822	1.11150	1.06994	1.00297	1.04034	8.778		
ETHYL BENZENE	.44802	.57914	.58417	.55931	.51189	.54051	9.169	*	
BROMOFLUOROBENZENE (SS-3)	1.63379	.66471	.33551	.22455	.16650	.60500	100.253		

RF - Response Factor (Subscript is amount in UG/L)

$\overline{RF}$ - Average Response Factor

AP000869

Contractor: CAA Time: 10:46 Page B23

Contract No: 68-01-7276 Laboratory ID: >C7E57

Instrument ID: HP 5993 "C" SE1193 Initial Calibration Date: 09/11/87

Minimum RF for SPCC is 0.3 Maximum % Diff for CCC is 25.0%

Compound	RF	RF	%Diff	CCC	SPCC
STYRENE	1.21410	1.08740	10.44		
M-XYLENE	.69097	.58513	15.32		
O-XYLENE	.74103	.64602	12.82		

RF - Response Factor from daily standard file at 50.00 UG/L

RF - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check

AR303870

Continuing Calibration Check
Volatile HSL Compounds

Page B24

Case No: 8709172 Region:

Contractor: Cambridge Analytical Associates

Contract No: 68-01-6791

Instrument ID: OWA

Calibration Date: 09/25/87

Time: 12:09

Laboratory ID: VOASTD1077

Initial Calibration Date: 09/19/87

Minimum RF for SPCC is 0.300 (0.25 for Bromoform) Maximum %D for CCC is 25%*

Compound		RF	RF_{50}	%D	CCC	SPCC
Chloromethane	0.8197	~~0.945~~	~~0.5428~~ 0.4650	43		
Bromomethane		0.584	0.433	26		•
Vinyl Chloride		0.953	0.582	34		
Chloroethane		0.616	0.505	5.5	•	
Methylene Chloride		0.900	0.983	9.2		
Acetone		0.180	0.063	65		
Carbon Disulfide		3.162	2.732	14		
1,1-Dichloroethene	1.5329	~~1.3074~~	~~1.1[illegible]~~ 1.3050	15		
1,1-Dichloroethane		3.074	3.305	7.5	•	
Trans-1,2-Dichloroethene		1.312	1.202	5.4		•
Chloroform		2.747	2.803	2.0		
1,2-Dichloroethane		2.036	2.096	2.9	•	
2-Butanone		0.018	0.027	50		
1,1,1-Trichloroethane		0.358	0.336	6.1		
Carbon Tetrachloride		0.282	0.245	13		
Vinyl Acetate		0.159	0.0675	58		
Bromodichloromethane		0.536	0.551	2.8		
1,2-Dichloropropane		0.501	0.595	14		
Trans-1,3-Dichloropropene		0.398	0.439	9.0	•	
Trichloroethene		0.383	0.336	12		
Dibromochloromethane		0.359	0.344	4.2		
1,1,2-Trichloroethane		0.343	0.361	5.2		
Benzene		1.257	1.240	1.4		
cis-1,3-Dichloropropene		0.428	0.404	5.6		
2-Chloroethylvinylether		0.337	0.423	26		
Bromoform		0.216	0.184	15		
4-Methyl-2-Pentanone		0.662	0.757	14		• •
2-Hexanone		0.413	0.497	20		
Tetrachloroethene		0.356	0.281	21		
1,1,2,2-Tetrachloroethane		0.626	0.762	22		
Toluene		0.725	0.738	1.8		• •
Chlorobenzene		0.907	0.897	1.1	•	
Ethylbenzene		0.504	0.507	0.39		• •
Styrene		0.910	0.918	0.7	•	
Total Xylenes		1.177	1.198	2.0		

RF_{50} - Response Factor from daily standard file at 50 ug/l
RF - Average Response Factor from initial calibration Form VI

%D - Percent Difference
CCC - Calibration Check Compounds (•)
SPCC - System Performance Check Compounds (••)

Form VII

AR303871

AR303871

Page B25

Continuing Calibration Check
BSL Compounds

Case No: _____ Calibration Date: 10/01/87

Contractor: CDM Time: 12:24

Contract No: 68-01-7278 Laboratory ID: XC0080

Instrument ID: HP5993 Initial Calibration Date: ~~10/01/87~~ 9/30/87

Minimum $\overline{RF}$ for SPCC is 0.3 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
CHLOROMETHANE	.11701	.14474	23.70		**	(Conc=57.50)
BROMOMETHANE	.14854	.15871	6.85			
VINYL CHLORIDE	.24550	.23193	5.53	*		
CHLOROETHANE	.17274	.17109	.96			
METHYLENE CHLORIDE	.38203	.37911	.77			
ACETONE	.48997	.54116	10.45			
CARBON DISULFIDE	1.48129	1.22370	17.39			
1,1-DICHLOROETHENE	1.11302	1.16823	4.42	*		(Conc=5.00)
1,1-DICHLOROETHANE	2.23578	2.21989	.71		**	
TRANS-1,2,DICHLOROETHENE	1.03088	1.05463	2.30			
CHLOROFORM	2.51973	2.58812	2.71	*		
1,2-DICHLOROETHANE	1.70179	1.74737	2.68			
D4-1,2-DICHLOROETHANE (SS-1)	.69931	.66014	5.60			(Conc=100.00)
2-BUTANONE (MEK)	.81642	.81909	16.28			
1,1,1-TRICHLOROETHANE	.47188	.46944	.52			
CARBON TETRACHLORIDE	.53057	.52452	1.18			
VINYL ACETATE	.23027	.22879	.64			
BROMODICHLOROMETHANE	.51014	.50557	.89			
1,2-DICHLORO PROPANE	.31417	.30371	3.33	*		
CIS-1,3-DICHLOROPROPENE	.37195	.37255	.16			
TRICHLOROETHENE	.36280	.35165	3.07			
DIBROMOCHLOROMETHANE	.46284	.46831	1.18			
1,1,2-TRICHLOROETHANE	.22406	.23391	4.40			
BENZENE	.98855	.99546	.69			
TRANS-1,3-DICHLOROPROPENE	.33510	.35620	6.30			
2-CHLOROETHYLVINYLETHER	.15468	.14756	4.61			
BROMOFORM	.27733	.28191	1.65		**	
4-METHYL-2-PENTANONE	.42035	.38508	8.39			
2-HEXANONE	.25629	.29595	11.14			
TETRACHLOROETHYLENE	.28837	.28983	.51			
1,1,2,2-TETRACHLOROETHANE	.45535	.48583	6.69		**	
D-8 TOLUENE (SS-2)	.50154	.48877	2.55			(Conc=100.00)
TOLUENE	.79972	.82498	3.16	*		
CHLOROBENZENE	1.86679	1.89720	2.05		**	
ETHYL BENZENE	.54612	.57399	5.10	*		
BROMOFLUOROBENZENE (SS-3)	.28653	.28083	1.99			(Conc=100.00)

AR303872

RF - Response Factor from daily standard file at 50.00 UG/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

Continuing Calibration Check
BSL Compounds

Case No: _____ Calibration Date: 10/01/87

Contractor: CRA _____ Time: 12:24

Contract No: 68-01-7278 _____ Laboratory ID: XC0080

Instrument ID: NP5993 _____ Initial Calibration Date: 10/01/87

Minimum $\overline{RF}$ for SPCC is 0.3 ---- Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
STYRENE	1.23895	1.32604	7.03		
N-XYLENE	.66571	.71131	6.95		
O-XYLENE	.71416	.78021	9.25		

AR303873

RF - Response Factor from daily standard file at 50.00 DG/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

Page B-27

Continuing Calibration Check
VOC Compounds

Case No: Calibration Date: 10/01/87

Contractor: [illegible] ANALYTICAL Time: 14:18

Contract No: Laboratory ID: [illegible]

Instrument ID: HP 5970 'B' Initial Calibration Date: ~~09/01/87~~ 9/10/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
CHLOROMETHANE	0.22218	0.21167	[illegible]		ok
BROMOMETHANE	.52227	.48645	6.86		
VINYL CHLORIDE	.43143	.40307	13.36	*	
CHLOROETHANE	.33316	.28539	17.28		
METHYLENE CHLORIDE	1.04787	.99452	5.09		
ACETONE	.19664	.25801	31.21		
CARBON DISULFIDE	2.25823	2.16755	4.02		
1,1-DICHLOROETHENE	1.6418	1.24891	24.11	*	
1,1-DICHLOROETHANE	2.01116	2.04527	1.70		ok
TRANS-1,2,DICHLOROETHENE	.97017	.95665	1.39		
CHLOROFORM	2.37189	2.14208	9.75	*	
1,2-DICHLOROETHANE	1.35787	1.52341	21.37		
BH-1,2-DICHLOROETHANE (SS-1)	.79217	.67119	15.27		(Conc=100.00)
2-BUTANONE (MEK)	.01963	.02297	16.97		
1,1,1-TRICHLOROETHANE	1.08906	.87501	19.65		
CARBON TETRACHLORIDE	.97758	.83913	14.20		
VINYL ACETATE	.20128	.16540	17.83		
BROMODICHLOROMETHANE	1.09412	.90890	16.99		
1,2-DICHLORO PROPANE	.39053	.41811	7.05	*	
CIS-1,3-DICHLOROPROPENE	.53048	.50274	5.67		
TRICHLOROETHENE	.62838	.68560	8.79		
DIBROMOCHLOROMETHANE	.93081	.75562	18.84		
1,1,2-TRICHLOROETHANE	.33233	.30420	10.31		
BENZENE	.82509	.90116	1.82		
TRANS-1,3-DICHLOROPROPENE	.55731	.47354	15.03		
2-CHLOROETHYLVINYLETHER	.16658	.12600	24.36		
BROMOFORM	.71545	.48133	32.72		ok
4-METHYL-2-PENTANONE	.23941	.26180	12.68		
2-HEXANONE	.17520	.23537	34.35		
TETRACHLOROETHYLENE	.66713	.57531	13.76		
1,1,2,2-TETRACHLOROETHANE	.84759	.80463	84.84		ok
BH-B TOLUENE (SS-2)	.49739	.54058	8.68		(Conc=100.00)

AR303874

RF - Response factor from daily standard file at 50.00 ng/L

$\overline{RF}$ - Average Response factor from Initial Calibration form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - [illegible]

Pg B 28

Continuing Calibration Check
RSL Compounds

Case No: _____ Calibration Date: 10/01/87

Contractor: CAMBRIDGE ANALYTICAL Time: 14:18

Contract No: _____ Laboratory ID: [illegible]

Instrument ID: HP 5970 "B" Initial Calibration Date: 09/11/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
TOLUENE	.69895	.73169	4.68	*	ε	
CHLOROBENZENE	1.81303	.99183	2.09		**	ε
ETHYL BENZENE	.49456	.49256	1.57	*	ε	
BROMOFLUOROBENZENE (SS-3)	.48697	.43173	11.34			(Conc=100.00)
STYRENE	.93539	.99048	5.89			
M-XYLENE	.56329	.57750	2.52			
O-XYLENE	.59154	.58932	.38			

RF - Response Factor from daily standard file at 50.00 UG/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

AR303875

Continuing Calibration Check
HSL Compounds

Case No: 709172 Calibration Date: 10/02/87

Contractor: CHROMOSOL ANALYTICAL Time: 13:16

Contract No: Laboratory ID: MOOSS

Instrument ID: HP 5970 'B' Initial Calibration Date: ~~09/17/87~~ 9/10/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
CHLOROETHANE 0.2222	~~.60[illegible]~~	~~.50[illegible]~~	20.19		**
BROMOETHANE	.52227	.44867	14.05		
VINYL CHLORIDE	.43143	.43078	.15	*	
CHLOROETHANE	.33516	.37690	11.45		
METHYLENE CHLORIDE	1.04787	.97249	7.19		
ACETONE	.19664	.18052	8.62		
CARBON DISULFIDE	2.25828	2.19227	2.66		
1,1-DICHLOROETHENE 1.1646	~~[illegible]~~	~~[illegible]~~	8.37	*	
1,1-DICHLOROETHANE	2.01116	2.14506	6.66		**
TRANS-1,2,DICHOROETHENE	.97017	.89129	8.13		
CHLOROFORM	2.97189	2.83725	4.53	*	
1,2-DICHLOROETHANE	1.95767	1.80221	7.94		
D4-1,2-DICHLOROETHANE (SS-1)	.79217	.80104	1.12		(Conc=100.00)
2-BUTANONE (MEK)	.01963	.01864	5.04		
1,1,1-TRICHLOROETHANE	1.09306	.98491	9.56		
CARBON TETRACHLORIDE	.97798	.95292	1.53		
VINYL ACETATE	.20128	.19671	2.27		
BROMODICHLOROMETHANE	1.09492	1.02279	6.59		
1,2-DICHLORO PROPANE	.39058	.44537	14.03	*	
CIS-1,3-DICHLOROPROPENE	.55048	.52190	5.19		
TRICHLOROETHENE	.62838	.48808	22.33		
DIBROMOCHLOROMETHANE	.93084	.81852	12.07		
1,1,2-TRICHLOROETHANE	.35893	.32516	4.06		
BENZENE	.85509	.81059	2.08		
TRANS-1,3-DICHLOROPROPENE	.55731	.51949	6.72		
2-CHLOROETHYLVINYLETHER	.16658	.10053	39.65		
BROMOFORM	.71545	.53078	25.81		**
4-METHYL-2-PENTANONE	.23944	.33376	39.39		
2-HEXANONE	.17520	.24048	37.26		
TETRACHLOROETHYLENE	.66713	.54753	17.93		
1,1,2,2-TETRACHLOROETHANE	.54759	.58672	7.15		**
B-B TOLUENE (SS-2)	.45739	.56587	13.77		(Conc=100.00)

AR303876

RF - Response Factor from daily standard file at 50.00 ug/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

Continuing Calibration Check
HSL Compounds

Case No: 709172 Calibration Date: 10/02/87

Contractor: CHESAPEAKE ANALYTICAL Time: 13:16

Contract No: Laboratory ID: [illegible]

Instrument ID: HP 5970 'B' Initial Calibration Date: 09/11/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
TOLUENE	.69195	.73830	6.63	*		
CHLOROBENZENE	1.01348	.95635	5.59		**	
ETHYL BENZENE	.48456	.47711	1.54	*		
BROMOFLUOROBENZENE (SS-3)	.48697	.46921	3.65			(Conc=100.00)
STYRENE	.95539	.90146	5.46			
M-XYLENE	.56329	.55326	1.78			
O-XYLENE	.59154	.52568	.99			

AR303377

RF - Response Factor from daily standard file at 50.00 UG/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

Page B31

Continuing Calibration Check
HSL Compounds

Case No: _____ Calibration Date: 10/05/87

Contractor: CAMBRIDGE ANALYTICAL Time: 09:50

Contract No: _____ Laboratory ID: N00166

Instrument ID: HP 5970 "B" Initial Calibration Date: ~~09/[illegible]/87~~ 9/10/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
CHLOROMETHANE	[redacted]	[redacted]	22.15		**
BROMOMETHANE	.52227	.26180	49.[illegible]		
VINYL CHLORIDE	.43143	.18773	[redacted]	*	
CHLOROETHANE	.33816	.26742	20.[illegible]		
METHYLENE CHLORIDE	1.04787	1.09705	4.69		
ACETONE	.19664	.54059	174.91		
CARBON DISULFIDE	2.25828	1.60655	28.96		
1,1-DICHLOROETHENE	1.04834	[illegible]	73.82	*	
1,1-DICHLOROETHANE	2.01116	2.82226	40.33		**
TRANS-1,2,DICHLOROETHENE	.97017	.86035	11.32		
CHLOROFORM	2.97189	3.64102	22.52	*	
1,2-DICHLOROETHANE	1.95767	2.64264	34.99		
D4-1,2-DICHLOROETHANE (SS-1)	.79217	1.15998	46.42		(Conc=100.00)
2-BUTANONE (MEK)	.01963	.01232	37.28		
1,1,1-TRICHLOROETHANE	1.08906	1.27845	17.35		
CARBON TETRACHLORIDE	.97798	1.29980	32.91		
VINYL ACETATE	.20128	.05321	73.57		
BROMODICHLOROMETHANE	1.09452	1.42274	30.05		
1,2-DICHLORO PROPANE	.39058	.67244	[redacted]	*	
CIS-1,3-DICHLOROPROPENE	.55048	.72189	31.14		
TRICHLOROETHENE	.62838	.50107	20.26		
DIBROMOCHLOROMETHANE	.93084	.95253	2.35		
1,1,2-TRICHLOROETHANE	.33293	.43327	27.83		
BENZENE	.88509	1.10342	24.67		
TRANS-1,3-DICHLOROPROPENE	.55731	.63093	23.98		
2-CHLOROETHYLVINYLETHER	.16658	.21159	27.02		
BROMOFORM	.71545	.55684	22.17		**
4-METHYL-2-PENTANONE	.23944	.68292	185.21		
2-HEXANONE	.17520	.58623	234.61		
TETRACHLOROETHYLENE	.66713	.53675	19.54		
1,1,2,2-TETRACHLOROETHANE	.54753	.76185	39.07		**
B-8 TOLUENE (SS-2)	.49739	.59308	19.24		(Conc=100.00)

AR303878

RF - Response Factor from daily standard file at 50.00 UG/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

Page B32

Continuing Calibration Check
BSL Compounds

Case No: _____ Calibration Date: 10/09/87

Contractor: CAMBRIDGE ANALYTICAL Time: 09:58

Contract No: _____ Laboratory ID: XH0166

Instrument ID: HP 5970 "H" Initial Calibration Date: 09/11/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.0%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
TOLUENE	.63895	.87382	[illegible]	*		
CHLOROBENZENE	1.01303	1.14249	[illegible]		**	
ETHYL BENZENE	.48456	.56926	17.48	*		
BROMOFLUOROBENZENE (SS-3)	.48697	.53761	10.40			(Conc=100.00)
STYRENE	.93539	1.20199	28.50			
M-XYLENE	.56329	.65581	16.43			
O-XYLENE	.59154	.67545	14.18			

AR303879

RF - Response Factor from daily standard file at 50.00 UG/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Form VI

%Diff - % Difference from original average or curve

Continuing Calibration Check
HSL Compounds

Case No: | Calibration Date: 10/10/87

Contractor: CAA | Time: 18:49

Contract No: | Laboratory ID: 3D6424

Instrument ID: HP5995 | Initial Calibration Date: 10/10/87

Minimum $\overline{RF}$ for SPCC is 0.300 | Maximum % Diff for CCC is 25.00%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
CHLOROETHANE	~~.22372~~ 0.7977	~~.19761~~ 0.7247	35.01		**
BROMOETHANE	.32752	.24742	24.46		
VINYL CHLORIDE	.54804	.71982	31.34	*	
CHLOROETHANE	.59219	.86768	~~46.52~~		
METHYLENE CHLORIDE	1.11588	1.27410	14.18		
ACETONE	.32075	.72138	124.90		
CARBON DISULFIDE	2.97903	3.13962	5.39		
1,1-DICHLOROETHENE	1.3100 ~~1.19107~~	~~1.25448~~ 1.1119	6.21	*	
1,1-DICHLOROETHANE	2.48193	2.56652	3.41		**
TRANS-1,2,DICHOROETHENE	1.13731	1.16570	2.50		
CHLOROFORM	2.79371	2.89317	3.56	*	
1,2-DICHLOROETHANE	2.21157	2.31010	4.46		
1,2-DICHLOROETHANE (SS-1)	1.60512	1.72835	7.48		
2-BUTANONE (MEK)	.12546	.23227	85.13		
1,1,1-TRICHLOROETHANE	.64461	.70570	9.48		
CARBON TETRACHLORIDE	.56500	.63595	12.56		
VINYL ACETATE	.01187	-	-		
BROMODICHLOROMETHANE	.29042	.33590	15.92		
1,2-DICHLORO PROPANE	.39470	.42474	7.61	*	
TRANS-1,3-DICHLOROPROPENE	.49529	.55243	11.54		
TRICHLOROETHENE	.41667	.48362	16.07		
DIBROMOCHLOROMETHANE	.48244	.55451	14.94		
1,1,2-TRICHLOROETHANE	.27116	.29539	8.94		
BENZENE	1.12040	1.23536	10.26		
CIS-1,3-DICHLOROPROPENE	.48787	.53709	10.09		
2-CHLOROETHYLVINYLETHER	.13819	.11327	18.03		
BROMOFORM	.30244	.35142	16.19		**
4-METHYL-2-PENTANONE	.46590	.50469	8.33		
2-HEXANONE	.33862	.48204	42.35		
TETRACHLOROETHYLENE	.41155	.45006	9.36		
1,1,2,2-TETRACHLOROETHANE	.52318	.58383	11.59		**
D-8 TOLUENE (SS-2)	1.13902	1.20614	5.89		
TOLUENE	.90819	.94465	4.01	*	
CHLOROBENZENE	1.04034	1.10297	6.02		**
ETHYLBENZENE	.54051	.58193	7.66	*	
BROMOFLUOROBENZENE (SS-3)	.60500	.65957	9.02		

✓ - Response Factor from daily standard file at 50.00 UG/L

$\overline{RF}$ - Average Response Factor from Initial Calibration Page III

AR303880

CCC = Calibration Check Compounds (*) — SPCC = System Performance Check Compounds (**)

Page B34

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/10/87

Contractor: CAA Time: 18:49

Contract No: Laboratory ID: >D6424

Instrument ID: HP5995 Initial Calibration Date: 10/10/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.00%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
STYRENE	1.14084	1.21243	6.28		
M-XYLENE	.62235	~~.69297~~	~~11.34~~ 10.32		
O-XYLENE	.65315	.69299	6.10		

AR303881

RF - Response Factor from daily standard file at 50.00 UG/L

Page B35

Continuing Calibration Check
MSL Compounds

Case No: Calibration Date: 10/20/87

Contractor: CAA Time: 08:59

Contract No: Laboratory ID: 9D6544

Instrument ID: HP5995 Initial Calibration Date: ~~10/16/87~~ 10/9/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.00%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC	
CHLOROMETHANE	.19193	.06952	63.78		**	(Conc=57.50)
BROMOMETHANE	.32752	.21196	35.28			
VINYL CHLORIDE	.54804	.42481	22.49	*		
CHLOROETHANE	.59219	.72392	22.24			
METHYLENE CHLORIDE	1.11588	1.17307	5.12			
ACETONE	.32075	.58390	82.04			
CARBON DISULFIDE	2.97903	2.84255	4.58			
1,1-DICHLOROETHENE	1.31007	1.34162	2.41	*		(Conc=45.00)
1,1-DICHLOROETHANE	2.48193	2.59220	4.44		**	
TRANS-1,2,DICHLOROETHENE	1.13731	1.36411	19.94			
CHLOROFORM	2.79371	3.33287	19.30	*		
1,2-DICHLOROETHANE	2.21157	2.88187	30.31			
D4-1,2-DICHLOROETHANE (SS-1)	1.60812	2.22914	38.62			
2-BUTANONE (MEK)	.12546	.18103	44.29			
1,1,1-TRICHLOROETHANE	.64461	.68517	6.29			
CARBON TETRACHLORIDE	.56500	.60027	6.24			
VINYL ACETATE	.81175	.81207	2.73			
BROMODICHLOROMETHANE	.29042	.29544	1.73			
1,2-DICHLORO PROPANE	.39470	.38055	3.59	*		
TRANS-1,3-DICHLOROPROPENE	.49529	.51085	3.14			
TRICHLOROETHENE	.41667	.43113	3.47			
DIBROMOCHLOROMETHANE	.48244	.50361	4.39			
1,1,2-TRICHLOROETHANE	.29033	.33432	15.15			
BENZENE	1.12040	1.07566	3.99			
CIS-1,3-DICHLOROPROPENE	.48787	.49493	1.45			
2-CHLOROETHYLVINYLETHER	.13819	.17315	25.30			
BROMOFORM	.30244	.31288	3.45		**	
4-METHYL-2-PENTANONE	.46590	.40151	13.82			
2-HEXANONE	.33862	.36030	6.40			
TETRACHLOROETHYLENE	.41155	.38947	5.36			
1,1,2,2-TETRACHLOROETHANE	.52318	.48187	7.90		**	
D-8 TOLUENE (SS-2)	1.13902	1.08273	4.94			
TOLUENE	.90819	.80214	11.68	*		
CHLOROBENZENE	1.04034	.90830	12.69		**	
ETHYL BENZENE	.54051	.47305	12.48	*		
BROMOFLUOROBENZENE (SS-3)	.60500	.68753	13.64			

$\overline{RF}$ = Response Factor from daily standard file at 50.00 UG/L

AR303882

CCC - Calibration Check Compounds (*) SPCC - System Performance Check Compounds (**)

Page B 36

Form VII Page 1 of 2

Continuing Calibration Check
HSL Compounds

Case No: Calibration Date: 10/20/87

Contractor: CAA Time: 08:59

Contract No: Laboratory ID: >D6544

Instrument ID: HP5995 Initial Calibration Date: 10/16/87

Minimum $\overline{RF}$ for SPCC is 0.300 Maximum % Diff for CCC is 25.00%

Compound	$\overline{RF}$	RF	%Diff	CCC	SPCC
STYRENE	1.14084	.98863	13.34		
M-XYLENE	.62235	.52450	15.72		
O-XYLENE	.65315	.55036	15.74		

AR303883