2 8 0054

Break: 2.8
Other:

PHASE 2 TEST REPORT

GENERAL REFINING SITE
SAVANNAH, GEORGIA

FEBRUARY, 1986

Prepared for

HAZTECH

by

Resources Conservation Co.
Bellevue, Washington

BRF

2 8 0055

LIST OF ATTACHMENTS FOR PHASE 2 REPORT

Attachment	Description
A	Baseline Phase 2 Results
B	Phase 2 Antifoam Investigation
C	Additional Phase 2 Data
D	Water Stripper pH vs Residual TEA Concentration
E	Emulsion Composition vs Viscosity

PHASE 2

INTRODUCTION

The purpose of the Phase 2 testing was to establish operating conditions for the B.E.S.T. system components and to determine the quality of the B.E.S.T. products, namely, recovered oil, water, and solids. At least two different types of feed were processed through key B.E.S.T. components. The B.E.S.T. water product was treated by a two stage, coagulation process to reduce the amount of oil, metals and other contaminants.

COMPONENT TEST FEED COMPOSITIONS

After Phase 1 evaluation of the site materials composition, including calculation of the expected polychlorinated biphenyl (PCB) levels in the oil product, it was determined that a blend of the site materials would be the most probable feed stock for on-site B.E.S.T. processing. Because of the differences of Pond 1 versus Pond 2-4 sludge evident from Phase 1 testing, Pond 1 was handled separately from Ponds 2-4 sludge. Calculations were made to estimate the ratio of site materials to blend to achieve a representative feed stock which would allow the processing of all site materials at a constant feed composition.

The following is a description of the two type of feed stocks used for component testing:

Site Components	Composition of Sludge Feed Mixtures	
	Feed 1	Feed 2
Pond 2 - 4 Sludge	19%	0%
Pond 1 Sludge	0%	17%
Filter Cake	16%	15%
Pond 2 - 4 'Free Water'	33%	40%
Backfilled Lagoon	32%	28%

COMPONENT TEST OPTIMIZATION

Foaming was experienced during operation of the water stripper. Therefore, tests were conducted using several types of antifoam agents with the conclusion that the foaming could be overcome by the use of 1,600ppm of Dow Corning 'DB 110A'. This was further optimized as discussed later.

Significant problems were also encountered when running the solvent stripper component. The problem was the formation of oil/water emulsions on the trays of the stripping column. The effect of these emulsions is to raise the viscosity of the

material in the stripping column to the point where the flow down the trays of the column is severely slowed. The effect of these emulsion formations is high BS&W in the recovered oil product. This was overcome while running feed 1 by stopping steam addition while continuing indirect heating. Feed 2 was stripped with continuous steam addition. As a consequence, the recovered oil from this feed showed a higher BS&W than that of the feed 1 recovered oil.

ANALYTICAL TESTING OF RECOVERED FRACTIONS

Attachment "A" presents the analytical data obtained from testing of the oil, water and solids products recovered from B.E.S.T. component processing for both feed stocks.

DISCUSSION OF COMPONENT TEST RESULTS

As a result of testing of the products obtained from component testing of the two types of feed sludge blends, several additional tests were conducted.

As discussed earlier, an antifoam agent was added to the water stripper. Further investigation of several types of antifoam was undertaken in the laboratory to determine the optimum antifoam agent and concentration. The best foam suppression was observed when using Mazer antifoam Mazu DF 230SX, Attachment "B". The estimated amount of this antifoam needed to control foaming in the water stripper is 100-400ppm.

The residual TEA level in the stripped water was significantly higher than expected and impacted the quality of the water product. An additional B.E.S.T. component extraction/separation was performed on a mixture of the Pond 2-4 sludge and Pond 2-4 'free water' to determine the effect of elevation of the pH on the residual level of TEA in the stripped water. The results are shown in Attachment "C". Because of the dramatic impact of pH on residual TEA levels in the water product an additional experiment was conducted on water stripper feed in the laboratory to determine the full extent of pH influence on residual TEA levels in the product water. The results of this testing are shown in Attachment "D". From this data it appears that the best possible water quality can be obtained by running the water stripper at pH's of 9.5 and above.

As indicated earlier, emulsion formations in the solvent stripper were encountered during the component tests. In order to better understand the effect of these emulsion formations on the operation of the solvent stripper, a laboratory experiment was conducted to determine the viscosity of recovered oil/water emulsions as a function of composition. A comparison was made between the emulsions when pure distilled water was used and when 'free water' was used. The results of this experiment are shown in Attachment "E". After evaluation of this data, it was

determined that emulsion formations could be alleviated by feeding the solvent stripper with an oil-rich material, thus avoiding the high viscosity emulsions and their associated problems. This can be accomplished by recycling the oil rich stripper bottoms with the incoming feed to the solvent stripper.

SOLIDS FIXATION

Haztech requested that fixation of the solids be conducted if it was determined that they could not pass the Hazardous Waste delisting criterion for heavy metals. As can be seen in the B.E.S.T. solids analytical results presented in Attachment "A", the level of lead in the EP Toxicity extracts was below the maximum contamination level for the determination of hazardous wastes but is not low enough to allow delisting of the solids. In order to delist the solids the EP Toxicity extract must show a lead level below 0.3ppm.

To lower the EP Toxicity leachate lead concentrations, the solids were fixated with fly ash and portland cement. The ratio used for this fixation was 8 parts dried B.E.S.T. solids, 2 parts fly ash, 2 parts portland cement, and 3 parts water. After allowing the mixture to cure for three days, the EP Toxicity procedure was repeated. The lead level was reduced by this technique to less than 0.25ppm, which will pass the VHS model for delisting of a hazardous waste.

GRF

ATTACHMENT A

BASELINE PHASE 2 ANALYTICAL RESULTS

2 8 0060

HAZTECH/SAVANNAH/PHASE II
OIL PRODUCT

Item	Method	Feed 1	Feed 2
Cyanides	Colorim	< 0.4	<0.8
Sulfides	Titration	<25.	<25.
pH	Water extraction	6.67	6.03
PCB's	G.C. mg/kg	45.	36.
TEA	G.C. mg/kg	2,600	7,200
As	ICP org. (mg/kg)	5.	8.
Ba	ICP org. (mg/kg)	70.	390.
Cd	ICP org. (mg/kg)	0.9	1.0
Cr (hexavalent)	Colorimetric (mg/kg)	< 0.2	< 0.2
Cr	ICP org. (mg/kg)	3.	8.
Cu	ICP org. (mg/kg)	27.	16.
Fe	Ash/ICP (mg/kg)	110.	320.
Pb	ICP org. (mg/kg)	730.	1,500
Mn	ICP org. (mg/kg)	0.7	1.8
Hg	ICP org. (mg/kg)	<10.	<10.
Ni	ICP org. (mg/kg)	< 0.2	< 0.2
Se	ICP org. (mg/kg)	38.	29.
Ag	ICP org. (mg/kg)	< 0.1	< 0.1
Zn	ICP org. (mg/kg)	14.	110.

2 8 0061

HAZTECH/SAVANNAH
PHASE II OIL PRODUCT

Analyte	Feed 1	Feed 2
API Gravity @ 60°F	24.3	19.5.
Flash Point (°F)	378.	>212.
Pour Point (°F)	2.	4.
Viscosity, SFS @ 122°F	94.3	203.
Ash Content (%)	.62	1.35
Total Sulfur (%)	.45	.77
B S & W (%)	0.1	15.
BTU Content (BTU/16)	18,000	16,000
Organic Halogens (%)	.053	.084

Sample No: Method blank - C

2.8 0062

Organics Analysis Data Sheet
(Page 1)

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No: 0027-MB I
Sample Matrix: Oils
Data Release Authorized By: SDRon

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1:10 **pH:** N/A

Percent Moisture: N/A

Compound	ug/Kg	Compound	ug/Kg
Chloromethane	1000U	1,1,2,2-Tetrachloroethane	500U
Bromomethane	1000U	1,2-Dichloropropane	500U
Vinyl Chloride	1000U	t-1,3-Dichloropropene	500U
Chloroethane	1000U	Trichloroethene	500U
Methylene Chloride	5000 B	Dibromochloromethane	500U
Acetone	1000U	1,1,2-Trichloroethane	500U
Carbon Disulfide	500U	Benzene	500U
1,1,-Dichloroethene	500U	c-1,3-Dichloropropene	500U
1,1-Dichloroethane	500U	2-Chloroethylvinylether	1000U
t-1,2-Dichloroethene	500U	Bromoform	500U
Chloroform	500U	2-Hexanone	1000U
1,2-Dichloroethane	500U	4-Methyl-2-Pentanone	1000U
2-Butanone	1000U	Tetrachloroethene	500U
1,1,1-Trichloroethane	500U	Toluene	500U
Carbon Tetrachloride	500U	Chlorobenzene	500U
Vinyl Acetate	1000U	Ethylbenzene	500U
Bromodichloromethane	500U	Styrene	500U
		Total Xylenes	500U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

GR

Laboratory: ANALYTICAL RESOURCES, INC.
Client: Resources Conservation Co.

Sample No: Method Blar

alculate? from low MB.

2 8 0063

Organics Analysis Data Sheet
(Page 2)

Concentration: ~~Low~~ Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:2

Compound	ug/Kg	Compound	ug/Kg
N-Nitrosodimethylamine	19800U	Acenaphthene	19800U
Phenol	19800U	2,4-Dinitrophenol	9600U
Aniline	19800U	4-Nitrophenol	9600U
bis(2-Chloroethyl)ether	19800U	Dibenzofuran	19800U
2-Chlorophenol	19800U	2,4-Dinitrotoluene	19800U
1,3-Dichlorobenzene	19800U	2,6-Dinitrotoluene	19800U
1,4-Dichlorobenzene	19800U	Diethylphthalate	19800U
Benzyl Alcohol	19800U	4-Chlorophenyl phenylether	19800U
1,2-Dichlorobenzene	19800U	Fluorene	19800U
2-Methylphenol	19800U	4-Nitroaniline	9600U
bis(2-Chloroisopropyl)ether	19800U	4,6-Dinitro-2-methylphenol	9600U
4-Methylphenol	19800U	N-Nitrosodiphenylamine (1)	19800U
N-Nitroso-Dipropylamine	19800U	4-Bromophenyl phenylether	19800U
Hexachloroethane	19800U	Hexachlorobenzene	19800U
Nitrobenzene	19800U	Pentachlorophenol	9600U
Isophorone	19800U	Phenanthrene	19800U
2-Nitrophenol	19800U	Anthracene	19800U
2,4-Dimethylphenol	19800U	Di-n-butylphthalate	19800U
Benzoic Acid	9600U	Fluoranthene	19800U
bis(2-Chloroethoxy)methane	19800U	Benzidine	156000U
2,4-Dichlorophenol	19800U	Pyrene	19800U
1,2,4-Trichlorobenzene	19800U	Butylbenzylphthalate	19800U
Naphthalene	19800U	3,3'-Dichlorobenzidine	39600U
4-Chloroaniline	19800U	Benzo(a)anthracene	19800U
Hexachlorobutadiene	19800U	Bis(2-Ethylhexyl)phthalate	**20,000**
4-Chloro-3-methylphenol	19800U	Chrysene	19800U
2-Methylnaphthalene	19800U	Di-n-Octylphthalate	19800U
Hexachlorocyclopentadiene	19800U	Benzo(b)fluoranthene	19800U
2,4,6-Trichlorophenol	19800U	Benzo(k)fluoranthene	19800U
2,4,5-Trichlorophenol	9600U	Benzo(a)pyrene	19800U
2-Chloronaphthalene	19800U	Indeno(123-cd)pyrene	19800U
2-Nitroaniline	9600U	Dibenzo(ah)anthracene	19800U
Dimethylphthalate	19800U	Benzo(ghi)perylene	19800U
Acenaphthylene	19800U		
3-Nitroaniline	9600U		

(1) Cannot be separated from diphenylamine

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co.

Sample No: Method Blank

calculated from low M.B.

2 8 0064

Organics Analysis Data Sheet
(Page 3)

Concentration: Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1

Compound	ug/Kg
Alpha-BHC	20U
Beta-BHC	20U
Delta-BHC	20U
Gamma-BHC (Lindane)	20U
Heptachlor	20U
Aldrin	20U
Heptachlor Epoxide	20U
Endosulfan I	20U
Dieldrin	20U
4,4'-DDE	20U
Endrin	20U
Endosulfan II	20U
4,4'-DDD	20U
Endrin Aldehyde	20U
Endosulfan Sulfate	20U
4,4'-DDT	20U
Methoxychlor	100U
Endrin Ketone	20U
Chlordane	100U
Toxaphene	100U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) N/A **or W(s)** 1.0 gm **V(t)** 2000 **V(i)** 2.0

Sample No: 5122-4

Organics Analysis Data Sheet
(Page 1)

2 8 0065

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No: 0027-A
Sample Matrix: Oils
Data Release Authorized By: SDRiva

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1:10 **pH:** N/A

Percent Moisture: N/A

Compound	ug/Kg	Compound	ug/Kg
Chloromethane	1000U	1,1,2,2-Tetrachloroethane	500U
Bromomethane	1000U	1,2-Dichloropropane	500U
Vinyl Chloride	1000U	t-1,3-Dichloropropene	500U
Chloroethane	1000U	Trichloroethene	500U
Methylene Chloride	56,000 B	Dibromochloromethane	500U
Acetone	1000U	1,1,2-Trichloroethane	500U
Carbon Disulfide	500U	Benzene	500U
1,1,-Dichloroethene	500U	c-1,3-Dichloropropene	500U
1,1-Dichloroethane	500U	2-Chloroethylvinylether	1000U
t-1,2-Dichloroethene	500U	Bromoform	500U
Chloroform	500U	2-Hexanone	1000U
1,2-Dichloroethane	500U	4-Methyl-2-Pentanone	1000U
2-Butanone	1000U	Tetrachloroethene	500U
1,1,1-Trichloroethane	500U	Toluene	500U
Carbon Tetrachloride	500U	Chlorobenzene	500U
Vinyl Acetate	1000U	Ethylbenzene	500U
Bromodichloromethane	500U	Styrene	500U
		Total Xylenes	500U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

GRF

Laboratory: ANALYTICAL RESOURCES, INC.
Client: Resources Conservation Co

Sample No: S122-4

2 8 0066

Organics Analysis Data Sheet
Method 1625 Report

Concentration: Low Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:4

Compound	ug/Kg	Compound	ug/Kg
N-Nitrosodimethylamine	15000U	Acenaphthene	30000U
Phenol	**24000**	2,4-Dinitrophenol	13000U
Aniline	12000U	4-Nitrophenol	8000U
bis(2-Chloroethyl)ether	19000U	Dibenzofuran	14000U
2-Chlorophenol	10000U	2,4-Dinitrotoluene	8800U
1,3-Dichlorobenzene	12000U	2,6-Dinitrotoluene	10000U
1,4-Dichlorobenzene	14000U	Diethylphthalate	6000U
Benzyl Alcohol	16000U	4-Chlorophenyl phenylether	25000U
1,2-Dichlorobenzene	15000U	Fluorene	12000U
2-Methylphenol	10000U	4-Nitroaniline	29000U
bis(2-Chloroisopropyl)ether	10000U	4,6-Dinitro-2-methylphenol	4400U
4-Methylphenol	14000U	N-Nitrosodiphenylamine (1)	13000U
N-Nitroso-Dipropylamine	19000U	4-Bromophenyl phenylether	13000U
Hexachloroethane	21000U	Hexachlorobenzene	18000U
Nitrobenzene	15000U	Pentachlorophenol	4400U
Isophorone	10000U	**Phenanthrene**	**29000**
2-Nitrophenol	13000U	Anthracene	14000U
2,4-Dimethylphenol	18000U	Di-n-butylphthalate	16000U
Benzoic Acid	13000U	**Fluoranthene**	**7000**
bis(2-Chloroethoxy)methane	14000U	Benzidine	72000U
2,4-Dichlorophenol	7200U	Pyrene	8400U
1,2,4-Trichlorobenzene	17000U	Butylbenzylphthalate	17000U
Naphthalene	12000U	3,3'-Dichlorobenzidine	8000U
4-Chloroaniline	7200U	**Benzo(a)anthracene**	**8000**
Hexachlorobutadiene	17000U	**Bis(2-Ethylhexyl)phthalate**	**140,000**
4-Chloro-3-methylphenol	5600U	**Chrysene**	**13000**
2-Methylnaphthalene	21000U	Di-n-Octylphthalate	4000U
Hexachlorocyclopentadiene	21000U	Benzo(b)fluoranthene	16000U
2,4,6-Trichlorophenol	8000U	Benzo(k)fluoranthene	13000U
2,4,5-Trichlorophenol	12000U	Benzo(a)pyrene	4400U
2-Chloronaphthalene	7200U	Indeno(123-cd)pyrene	8400U
2-Nitroaniline	4800U	Dibenzo(ah)anthracene	7600U
Dimethylphthalate	12000U	Benzo(ghi)perylene	14000U
Acenaphthylene	3200U		
3-Nitroaniline	26000U		

(1) Cannot be separated from diphenylamine

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Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co

Sample No: S122-4

2 8 0067

Organics Analysis Data Sheet
(Page 3)

Concentration: Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1:2

Compound	ug/Kg
Alpha-BHC	40U
Beta-BHC	40U
Delta-BHC	40U
Gamma-BHC (Lindane)	40U
Heptachlor	40U
Aldrin	40U
Heptachlor Epoxide	40U
Endosulfan I	40U
Dieldrin	40U
4,4'-DDE	40U
Endrin	40U
Endosulfan II	40U
4,4'-DDD	40U
Endrin Aldehyde	40U
Endosulfan Sulfate	40U
4,4'-DDT	40U
Methoxychlor	200U
Endrin Ketone	40U
Chlordane	200U
Toxaphene	200U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extracted (g)

V(t) = Volume of total extract (ul)

V(s) N/A **or W(s)** 1.0 gm **V(t)** 4000 **V(i)** [illegible]

Sample No: 5122-8

Organics Analysis Data Sheet
(Page 1)

2 8 0068

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No: 0027-8
Sample Matrix: Oils
Date Release Authorized By: SDKOW

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1:10 pH: N/A

Percent Moisture: N/A

Compound	ug/Kg	Compound	ug/Kg
Chloromethane	1000U	1,1,2,2-Tetrachloroethane	500U
Bromomethane	1000U	1,2-Dichloropropane	500U
Vinyl Chloride	1000U	t-1,3-Dichloropropene	500U
Chloroethane	1000U	Trichloroethene	500U
Methylene Chloride	13,000 B	Dibromochloromethane	500U
Acetone	1000U	1,1,2-Trichloroethane	500U
Carbon Disulfide	500U	Benzene	500U
1,1,-Dichloroethene	500U	c-1,3-Dichloropropene	500U
1,1-Dichloroethane	500U	2-Chloroethylvinylether	1000U
t-1,2-Dichloroethene	500U	Bromoform	500U
Chloroform	500U	2-Hexanone	1000U
1,2-Dichloroethane	500U	4-Methyl-2-Pentanone	1000U
2-Butanone	1000U	Tetrachloroethene	500U
1,1,1-Trichloroethane	500U	Toluene	500U
Carbon Tetrachloride	500U	Chlorobenzene	500U
Vinyl Acetate	1000U	Ethylbenzene	500U
Bromodichloromethane	500U	Styrene	500U
		Total Xylenes	500U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

GR

Laboratory: ANALYTICAL RESOURCES, INC.
Client: Resources Conservation Co.

Sample No: 5122-6

2 8 0069

Organics Analysis Data Sheet
(Page 2)

Concentration: Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:16

Compound	ug/Kg	Compound	ug/Kg
N-Nitrosodimethylamine	40000U	Acenaphthene	40000U
Phenol	40000U	2,4-Dinitrophenol	200000U
Aniline	40000U	4-Nitrophenol	200000U
bis(2-Chloroethyl)ether	40000U	Dibenzofuran	40000U
2-Chlorophenol	40000U	2,4-Dinitrotoluene	40000U
1,3-Dichlorobenzene	40000U	2,6-Dinitrotoluene	40000U
1,4-Dichlorobenzene	40000U	Diethylphthalate	40000U
Benzyl Alcohol	40000U	4-Chlorophenyl phenylether	40000U
1,2-Dichlorobenzene	40000U	Fluorene	40000U
2-Methylphenol	40000U	4-Nitroaniline	200000U
bis(2-Chloroisopropyl)ether	40000U	4,6-Dinitro-2-methylphenol	200000U
4-Methylphenol	40000U	N-Nitrosodiphenylamine (1)	40000U
N-Nitroso-Dipropylamine	40000U	4-Bromophenyl phenylether	40000U
Hexachloroethane	40000U	Hexachlorobenzene	40000U
Nitrobenzene	40000U	Pentachlorophenol	200000U
Isophorone	40000U	Phenanthrene	40000U
2-Nitrophenol	40000U	Anthracene	40000U
2,4-Dimethylphenol	40000U	Di-n-butylphthalate	40000U
Benzoic Acid	200000U	Fluoranthene	40000U
bis(2-Chloroethoxy)methane	40000U	Benzidine	300000U
2,4-Dichlorophenol	40000U	Pyrene	40000U
1,2,4-Trichlorobenzene	40000U	Butylbenzylphthalate	40000U
Naphthalene	40000U	3,3'-Dichlorobenzidine	80000U
4-Chloroaniline	40000U	Benzo(a)anthracene	40000U
Hexachlorobutadiene	40000U	Bis(2-Ethylhexyl)phthalate	**260,000 B**
4-Chloro-3-methylphenol	40000U	Chrysene	40000U
2-Methylnaphthalene	40000U	Di-n-Octylphthalate	40000U
Hexachlorocyclopentadiene	40000U	Benzo(b)fluoranthene	40000U
2,4,6-Trichlorophenol	40000U	Benzo(k)fluoranthene	40000U
2,4,5-Trichlorophenol	200000U	Benzo(a)pyrene	40000U
2-Chloronaphthalene	40000U	Indeno(123-cd)pyrene	40000U
2-Nitroaniline	200000U	Dibenzo(ah)anthracene	40000U
Dimethylphthalate	40000U	Benzo(ghi)perylene	40000U
Acenaphthylene	40000U		
3-Nitroaniline	200000U		

(1) Cannot be separated from diphenylamine

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co.

Sample No: 5122-3

2 8 0070

Organics Analysis Data Sheet
(Page 3)

Concentration: Medium

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1:2

Compound	ug/Kg
Alpha-BHC	40U
Beta-BHC	40U
Delta-BHC	40U
Gamma-BHC (Lindane)	40U
Heptachlor	40U
Aldrin	40U
Heptachlor Epoxide	40U
Endosulfan I	40U
Dieldrin	40U
4,4'-DDE	40U
Endrin	40U
Endosulfan II	40U
4,4'-DDD	40U
Endrin Aldehyde	40U
Endosulfan Sulfate	40U
4,4'-DDT	40U
Methoxychlor	200U
Endrin Ketone	40U
Chlordane	200U
Toxaphene	200U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) N/A **or W(s)** 1.0 gm **V(t)** 4000 **V(i)** 2.0

2 8 0071

HAZTECH/SAVANNAH/PHASE 2
TREATED WATER PRODUCT

Item	Method	Feed 1	Feed 2
pH	Meter	8.08	8.36
Cond.	Micromhos	9,440.	26,800.
TDS	at 105°C (mg/l)	16,000.	53,000.
TSS	at 105°C (mg/l)	210.	560.
O & G	Partition/Grav.	41.	115.
COD	Dichromate reflux (mg/l)	5,600.	12,000.
BOD	(mg/l)	560.	1,700.
NO_3(N)	Colorim (mg/l)	19.	70.
NO_2(N)	Colorim (mg/l)	.16	.17
TKN	Macko Kjeldahl (mg/l)	360.	5,400.
Phenols	4AAP (mg/l)	.81	2.2
Cyanides	Colorim (mg/l)	< .1	< .1
Triethylamine	(mg/l)	6,400.	20,000.
PCB's	G.C. (mg/l)	< .01	< .01
Cr (hexavalent)	Colormetric (mg/l)	< .05	< .05
Cl^-	Potentiometric	360.	930.
TOC	DC-80	9,300.	27,000.
As	ICP (mg/l)	<0.5	<0.5
Ba	ICP (mg/l)	.14	.12
Cd	ICP (mg/l)	< .01	< .01
Cr	ICP (mg/l)	.02	.05
Cu	ICP (mg/l)	.13	.22
Fe	ICP (mg/l)	.16	.36
Pb	ICP (mg/l)	1.2	1.2
Mn	ICP (mg/l)	.06	< .01
Hg	ICP (mg/l)	< .05	< .05
Ni	ICP (mg/l)	< .02	.03
Se	ICP (mg/l)	< .03	<0.3
Ag	ICP (mg/l)	< .01	< .01
Zn	ICp (mg/l)	.28	.40

ARF

Sample No: Method blank

2 8 0072

Organics Analysis Data Sheet
(Page 1)

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No: 0027-MB
Sample Matrix: Waters
Data Release Authorized By: SDRoss

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1 **pH:** N/A

Percent Moisture: N/A

Compound	ug/L	Compound	ug/L
Chloromethane	10U	1,1,2,2-Tetrachloroethane	5U
Bromomethane	10U	1,2-Dichloropropane	5U
Vinyl Chloride	10U	t-1,3-Dichloropropene	5U
Chloroethane	10U	Trichloroethene	5U
Methylene Chloride	13	Dibromochloromethane	5U
Acetone	10U	1,1,2-Trichloroethane	5U
Carbon Disulfide	5U	Benzene	5U
1,1,-Dichloroethene	5U	c-1,3-Dichloropropene	5U
1,1-Dichloroethane	5U	2-Chloroethylvinylether	10U
t-1,2-Dichloroethene	5U	Bromoform	5U
Chloroform	5U	2-Hexanone	10U
1,2-Dichloroethane	5U	4-Methyl-2-Pentanone	10U
2-Butanone	10U	Tetrachloroethene	5U
1,1,1-Trichloroethane	5U	Toluene	5U
Carbon Tetrachloride	5U	Chlorobenzene	5U
Vinyl Acetate	10U	Ethylbenzene	5U
Bromodichloromethane	5U	Styrene	5U
		Total Xylenes	5U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

Laboratory: ANALYTICAL RESOURCES, INC.
Client: Resources Conservation Co.

Sample No: Method Blank

.2 8 0073

Organics Analysis Data Sheet
(Page 2)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1

Compound	ug/L	Compound	ug/L
N-Nitrosodimethylamine	10U	Acenaphthene	10U
Phenol	10U	2,4-Dinitrophenol	50U
Aniline	10U	4-Nitrophenol	50U
bis(2-Chloroethyl)ether	10U	Dibenzofuran	10U
2-Chlorophenol	10U	2,4-Dinitrotoluene	10U
1,3-Dichlorobenzene	10U	2,6-Dinitrotoluene	10U
1,4-Dichlorobenzene	10U	Diethylphthalate	10U
Benzyl Alcohol	10U	4-Chlorophenyl phenylether	10U
1,2-Dichlorobenzene	10U	Fluorene	10U
2-Methylphenol	10U	4-Nitroaniline	50U
bis(2-Chloroisopropyl)ether	10U	4,6-Dinitro-2-methylphenol	50U
4-Methylphenol	10U	N-Nitrosodiphenylamine (1)	10U
N-Nitroso-Dipropylamine	10U	4-Bromophenyl phenylether	10U
Hexachloroethane	10U	Hexachlorobenzene	10U
Nitrobenzene	10U	Pentachlorophenol	50U
Isophorone	10U	Phenanthrene	10U
2-Nitrophenol	10U	Anthracene	10U
2,4-Dimethylphenol	10U	Di-n-butylphthalate	10U
Benzoic Acid	50U	Fluoranthene	10U
bis(2-Chloroethoxy)methane	10U	Benzidine	80U
2,4-Dichlorophenol	10U	Pyrene	10U
1,2,4-Trichlorobenzene	10U	Butylbenzylphthalate	10U
Naphthalene	10U	3,3'-Dichlorobenzidine	20U
4-Chloroaniline	10U	Benzo(a)anthracene	10U
Hexachlorobutadiene	10U	Bis(2-Ethylhexyl)phthalate	**1200**
4-Chloro-3-methylphenol	10U	Chrysene	10U
2-Methylnaphthalene	10U	Di-n-Octylphthalate	10U
Hexachlorocyclopentadiene	10U	Benzo(b)fluoranthene	10U
2,4,6-Trichlorophenol	10U	Benzo(k)fluoranthene	10U
2,4,5-Trichlorophenol	50U	Benzo(a)pyrene	10U
2-Chloronaphthalene	10U	Indeno(123-cd)pyrene	10U
2-Nitroaniline	50U	Dibenzo(ah)anthracene	10U
Dimethylphthalate	10U	Benzo(ghi)perylene	10U
Acenaphthylene	10U		
3-Nitroaniline	50U		

(1) Cannot be separated from diphenylamine

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co

Sample No: Method Blank

2 8 0074

Organics Analysis Data Sheet
(Page 3)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1

Compound	ug/L
Alpha-BHC	0.2U
Beta-BHC	0.2U
Delta-BHC	0.2U
Gamma-BHC (Lindane)	0.2U
Heptachlor	0.2U
Aldrin	0.2U
Heptachlor Epoxide	0.2U
Endosulfan I	0.2U
Dieldrin	0.2U
4,4'-DDE	0.2U
Endrin	0.2U
Endosulfan II	0.2U
4,4'-DDD	0.2U
Endrin Aldehyde	0.2U
Endosulfan Sulfate	0.2U
4,4'-DDT	0.2U
Methoxychlor	1.0U
Endrin Ketone	0.2U
Chlordane	1.0U
Toxaphene	1.0U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) 100 ml **or W(s)** N/A **V(t)** 2000 **V(i)** 2.0

Sample No: 5122-6

RF

2 8 0075

Organics Analysis Data Sheet
(Page 1)

Laboratory: ANALYTICAL RESOURCES INC
Lab Sample ID No: 0027-E
Sample Matrix: Waters
Date Release Authorized By:_____

Client: Resources Conservation Co
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1 **pH:** N/A

Percent Moisture: N/A

Compound	ug/L	Compound	ug/L
Chloromethane	10U	1,1,2,2-Tetrachloroethane	5U
Bromomethane	10U	1,2-Dichloropropane	5U
Vinyl Chloride	10U	t-1,3-Dichloropropene	5U
Chloroethane	10U	Trichloroethene	5U
Methylene Chloride	1900 B	Dibromochloromethane	5U
Acetone	10U	1,1,2-Trichloroethane	5U
Carbon Disulfide	5U	Benzene	5U
1,1,-Dichloroethene	5U	c-1,3-Dichloropropene	5U
1,1-Dichloroethane	5U	2-Chloroethylvinylether	10U
t-1,2-Dichloroethene	5U	Bromoform	5U
Chloroform	5U	2-Hexanone	10U
1,2-Dichloroethane	5U	4-Methyl-2-Pentanone	10U
2-Butanone	10U	Tetrachloroethene	5U
1,1,1-Trichloroethane	5U	Toluene	5U
Carbon Tetrachloride	5U	Chlorobenzene	5U
Vinyl Acetate	10U	Ethylbenzene	5U
Bromodichloromethane	5U	Styrene	5U
		Total Xylenes	5U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co

Sample No: 5122-5

2 8 0076

Organics Analysis Data Sheet
(Page 2)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:10

Compound	ug/L	Compound	ug/L
N-Nitrosodimethylamine	100U	Acenaphthene	100U
Phenol	**2000**	2,4-Dinitrophenol	500U
Aniline	100U	4-Nitrophenol	500U
bis(2-Chloroethyl)ether	100U	Dibenzofuran	100U
2-Chlorophenol	100U	2,4-Dinitrotoluene	100U
1,3-Dichlorobenzene	100U	2,6-Dinitrotoluene	100U
1,4-Dichlorobenzene	100U	Diethylphthalate	100U
Benzyl Alcohol	100U	4-Chlorophenyl phenylether	100U
1,2-Dichlorobenzene	100U	Fluorene	100U
2-Methylphenol	100U	4-Nitroaniline	500U
bis(2-Chloroisopropyl)ether	100U	4,6-Dinitro-2-methylphenol	500U
4-Methylphenol	**1100**	N-Nitrosodiphenylamine (1)	100U
N-Nitroso-Dipropylamine	100U	4-Bromophenyl phenylether	100U
Hexachloroethane	100U	Hexachlorobenzene	100U
Nitrobenzene	100U	Pentachlorophenol	500U
Isophorone	100U	Phenanthrene	100U
2-Nitrophenol	100U	Anthracene	100U
2,4-Dimethylphenol	**190**	Di-n-butylphthalate	100U
Benzoic Acid	**500 J**	Fluoranthene	100U
bis(2-Chloroethoxy)methane	100U	Benzidine	800U
2,4-Dichlorophenol	100U	**Pyrene**	**120**
1,2,4-Trichlorobenzene	100U	Butylbenzylphthalate	100U
Naphthalene	100U	3,3'-Dichlorobenzidine	200U
4-Chloroaniline	100U	Benzo(a)anthracene	100U
Hexachlorobutadiene	100U	Bis(2-Ethylhexyl)phthalate	100U
4-Chloro-3-methylphenol	100U	Chrysene	100U
2-Methylnaphthalene	**110**	Di-n-Octylphthalate	100U
Hexachlorocyclopentadiene	100U	Benzo(b)fluoranthene	100U
2,4,6-Trichlorophenol	100U	Benzo(k)fluoranthene	100U
2,4,5-Trichlorophenol	500U	Benzo(a)pyrene	100U
2-Chloronaphthalene	100U	Indeno(123-cd)pyrene	100U
2-Nitroaniline	500U	Dibenzo(ah)anthracene	100U
Dimethylphthalate	100U	Benzo(ghi)perylene	100U
Acenaphthylene	100		
3-Nitroaniline	500U		

(1) Cannot be separated from diphenylamine

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co.

Sample No: S122-5

2 8 0077

Organics Analysis Data Sheet
(Page 3)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1

Compound	ug/L
Alpha-BHC	0.2U
Beta-BHC	0.2U
Delta-BHC	0.2U
Gamma-BHC (Lindane)	0.2U
Heptachlor	0.2U
Aldrin	0.2U
Heptachlor Epoxide	0.2U
Endosulfan I	0.2U
Dieldrin	0.2U
4,4'-DDE	0.2U
Endrin	0.2U
Endosulfan II	0.2U
4,4'-DDD	0.2U
Endrin Aldehyde	0.2U
Endosulfan Sulfate	0.2U
4,4'-DDT	0.2U
Methoxychlor	0.2U
Endrin Ketone	0.2U
Chlordane	0.2U
Toxaphene	0.5U

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) 100 mls **or W(s)** N/A **V(t)** 2000 **V(i)** 2.0

BRF

Sample No: 5122-7

2 8 0078

Organics Analysis Data Sheet
(Page 1)

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No: 0027-F
Sample Matrix: Waters
Date Release Authorized By: _____

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1 **pH:** N/A

Percent Moisture: N/A

Compound	ug/L	Compound	ug/L
Chloromethane	10U	1,1,2,2-Tetrachloroethane	5U
Bromomethane	10U	1,2-Dichloropropane	5U
Vinyl Chloride	10U	t-1,3-Dichloropropene	5U
Chloroethane	10U	Trichloroethene	5U
Methylene Chloride	**180 B**	Dibromochloromethane	5U
Acetone	**340**	1,1,2-Trichloroethane	5U
Carbon Disulfide	5U	Benzene	**50 J**
1,1,-Dichloroethene	5U	c-1,3-Dichloropropene	5U
1,1-Dichloroethane	5U	2-Chloroethylvinylether	10U
t-1,2-Dichloroethene	5U	Bromoform	5U
Chloroform	5U	2-Hexanone	10U
1,2-Dichloroethane	5U	4-Methyl-2-Pentanone	10U
2-Butanone	10U	Tetrachloroethene	5U
1,1,1-Trichloroethane	5U	Toluene	5U
Carbon Tetrachloride	5U	Chlorobenzene	5U
Vinyl Acetate	10U	Ethylbenzene	5U
Bromodichloromethane	5U	Styrene	5U
		Total Xylenes	5U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

Laboratory: ANALYTICAL RESOURCES, INC
GRF Client: Resources Conservation Co.

Sample No: 5122-7

2 8 0079

Organics Analysis Data Sheet
(Page 2)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:40

Compound	ug/L	Compound	ug/L
N-Nitrosodimethylamine	400U	Acenaphthene	400U
Phenol	**6700**	2,4-Dinitrophenol	2000U
Aniline	400U	4-Nitrophenol	2000U
bis(2-Chloroethyl)ether	400U	Dibenzofuran	400U
2-Chlorophenol	400U	2,4-Dinitrotoluene	400U
1,3-Dichlorobenzene	400U	2,6-Dinitrotoluene	400U
1,4-Dichlorobenzene	400U	Diethylphthalate	400U
Benzyl Alcohol	400U	4-Chlorophenyl phenylether	400U
1,2-Dichlorobenzene	400U	Fluorene	400U
2-Methylphenol	400U	4-Nitroaniline	2000U
bis(2-Chloroisopropyl)ether	400U	4,6-Dinitro-2-methylphenol	2000U
4-Methylphenol	**3200**	N-Nitrosodiphenylamine (1)	400U
N-Nitroso-Dipropylamine	400U	4-Bromophenyl phenylether	400U
Hexachloroethane	400U	Hexachlorobenzene	400U
Nitrobenzene	400U	Pentachlorophenol	2000U
Isophorone	400U	Phenanthrene	400U
2-Nitrophenol	400U	Anthracene	400U
2,4-Dimethylphenol	**820**	Di-n-butylphthalate	400U
Benzoic Acid	**3900**	Fluoranthene	400U
bis(2-Chloroethoxy)methane	400U	Benzidine	80U
2,4-Dichlorophenol	400U	**Pyrene**	**400 J**
1,2,4-Trichlorobenzene	400U	Butylbenzylphthalate	400U
Naphthalene	400U	3,3'-Dichlorobenzidine	20U
4-Chloroaniline	400U	Benzo(a)anthracene	400U
Hexachlorobutadiene	400U	Bis(2-Ethylhexyl)phthalate	400U
4-Chloro-3-methylphenol	400U	Chrysene	400U
2-Methylnaphthalene	**1400**	Di-n-Octylphthalate	400U
Hexachlorocyclopentadiene	400U	Benzo(b)fluoranthene	400U
2,4,6-Trichlorophenol	400U	Benzo(k)fluoranthene	400U
2,4,5-Trichlorophenol	2000U	Benzo(a)pyrene	400U
2-Chloronaphthalene	400U	Indeno(123-cd)pyrene	400U
2-Nitroaniline	2000U	Dibenzo(ah)anthracene	400U
Dimethylphthalate	400U	Benzo(ghi)perylene	400U
Acenaphthylene	400U		
3-Nitroaniline	2000U		

(1) Cannot be separated from diphenylamine

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co.

Sample No: 5122-7

Organics Analysis Data Sheet
(Page 3)

2 8 0080

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1

Compound	ug/L
Alpha-BHC	0.2U
Beta-BHC	0.2U
Delta-BHC	0.2U
Gamma-BHC (Lindane)	0.2U
Heptachlor	0.2U
Aldrin	0.2U
Heptachlor Epoxide	0.2U
Endosulfan I	0.2U
Dieldrin	0.2U
4,4'-DDE	0.2U
Endrin	0.2U
Endosulfan II	0.2U
4,4'-DDD	0.2U
Endrin Aldehyde	0.2U
Endosulfan Sulfate	0.2U
4,4'-DDT	0.2U
Methoxychlor	1.0U
Endrin Ketone	0.2U
Chlordane	1.0U
Toxaphene	1.0U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) 100 mls **or W(s)** N/A **V(t)** 2000 **V(i)** 20

GRF

2 8 0081

HAZTECH/SAVANNAH/PHASE 2
SOLIDS PRODUCT

Item	Method	Feed 1	Feed 2
AS	EP Tox (mg/kg)	<0.2	<0.2
Ba	EP Tox (mg/kg)	0.1	0.1
Cd	EP Tox (mg/kg)	< .01	< .01
Cr	EP Tox (mg/kg)	< .02	< .02
Cu	EP Tox (mg/kg)	< .01	< .01
Fe	EP Tox (mg/kg)	.48	7.1
Pb	EP Tox (mg/kg)	1.7	4.8
Mn	EP Tox (mg/kg)	.13	.11
Hg	EP Tox (mg/kg)	< .05	< .05
Ni	EP Tox (mg/kg)	< .02	< .02
Se	EP Tox (mg/kg)	<0.3	<0.3
Ag	EP Tox (mg/kg)	< .01	< .01
Zn	EP Tox (mg/kg)	.66	2.5
TEA	G.C. (mg/kg)	<100.	<100.
PCB's	G.C. (mg/kg)	0.14	0.02
As	Total Digest (mg/kg)	7.	<5.
Ba	Total Digest (mg/kg)	300.	90.
Cd	Total Digest (mg/kg)	0.6	0.3
Cr	Total Digest (mg/kg)	12.	5.3
Cu	Total Digest (mg/kg)	14.	7.7
Fe	Total Digest (mg/kg)	3,000.	1,700.
Pb	Total Digest (mg/kg)	3,000.	1,200.
Mn	Total Digest (mg/kg)	13.	7.
Hg	Total Digest (mg/kg)	<1.0	<1.0
Ni	Total Digest (mg/kg)	2.0	1.0
Se	Total Digest (mg/kg)	7.	<6.
Ag	Total Digest (mg/kg)	<0.2	<0.2
Zn	Total Digest (mg/kg)	58.	50.
O&G		0.4%	0.5%

ORF

Sample No: Method blank -

2 8 0082

Organics Analysis Data Sheet
(Page 1)

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No:- 0027-MB
Sample Matrix: Soils
Data Release Authorized By: SDRoss

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1 **pH:** N/A

Percent Moisture: N/A

Compound	ug/Kg	Compound	ug/Kg
Chloromethane	10U	1,1,2,2-Tetrachloroethane	5U
Bromomethane	10U	1,2-Dichloropropane	5U
Vinyl Chloride	10U	t-1,3-Dichloropropene	5U
Chloroethane	10U	Trichloroethene	5U
Methylene Chloride	13	Dibromochloromethane	5U
Acetone	10U	1,1,2-Trichloroethane	5U
Carbon Disulfide	5U	Benzene	5U
1,1,-Dichloroethene	5U	c-1,3-Dichloropropene	5U
1,1-Dichloroethane	5U	2-Chloroethylvinylether	10U
t-1,2-Dichloroethene	5U	Bromoform	5U
Chloroform	5U	2-Hexanone	10U
1,2-Dichloroethane	5U	4-Methyl-2-Pentanone	10U
2-Butanone	10U	Tetrachloroethene	5U
1,1,1-Trichloroethane	5U	Toluene	5U
Carbon Tetrachloride	5U	Chlorobenzene	5U
Vinyl Acetate	10U	Ethylbenzene	5U
Bromodichloromethane	5U	Styrene	5U
		Total Xylenes	5U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

Laboratory: ANALYTICAL RESOURCES, INC.
Client: Resources Conservation Co.

Sample No: Method Blank

2 8 0083

Organics Analysis Data Sheet
(Page 2)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:2

Compound	ug/Kg	Compound	ug/Kg
N-Nitrosodimethylamine	330U	Acenaphthene	330U
Phenol	330U	2,4-Dinitrophenol	1600U
Aniline	330U	4-Nitrophenol	1600U
bis(2-Chloroethyl)ether	330U	Dibenzofuran	330U
2-Chlorophenol	330U	2,4-Dinitrotoluene	330U
1,3-Dichlorobenzene	330U	2,6-Dinitrotoluene	330U
1,4-Dichlorobenzene	330U	Diethylphthalate	330U
Benzyl Alcohol	330U	4-Chlorophenyl phenylether	330U
1,2-Dichlorobenzene	330U	Fluorene	330U
2-Methylphenol	330U	4-Nitroaniline	1600U
bis(2-Chloroisopropyl)ether	330U	4,6-Dinitro-2-methylphenol	1600U
4-Methylphenol	330U	N-Nitrosodiphenylamine (1)	330U
N-Nitroso-Dipropylamine	330U	4-Bromophenyl phenylether	330U
Hexachloroethane	330U	Hexachlorobenzene	330U
Nitrobenzene	330U	Pentachlorophenol	1600U
Isophorone	330U	Phenanthrene	330U
2-Nitrophenol	330U	Anthracene	330U
2,4-Dimethylphenol	330U	Di-n-butylphthalate	330U
Benzoic Acid	1600U	Fluoranthene	330U
bis(2-Chloroethoxy)methane	330U	Benzidine	2600U
2,4-Dichlorophenol	330U	Pyrene	330U
1,2,4-Trichlorobenzene	330U	Butylbenzylphthalate	330U
Naphthalene	330U	3,3'-Dichlorobenzidine	660U
4-Chloroaniline	330U	Benzo(a)anthracene	330U
Hexachlorobutadiene	330U	Bis(2-Ethylhexyl)phthalate	**20,000**
4-Chloro-3-methylphenol	330U	Chrysene	330U
2-Methylnaphthalene	330U	Di-n-Octylphthalate	330U
Hexachlorocyclopentadiene	330U	Benzo(b)fluoranthene	330U
2,4,6-Trichlorophenol	330U	Benzo(k)fluoranthene	330U
2,4,5-Trichlorophenol	1600U	Benzo(a)pyrene	330U
2-Chloronaphthalene	330U	Indeno(123-cd)pyrene	330U
2-Nitroaniline	1600U	Dibenzo(ah)anthracene	330U
Dimethylphthalate	330U	Benzo(ghi)perylene	330U
Acenaphthylene	330U		
3-Nitroaniline	1600U		

(1) Cannot be separated from diphenylamine

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co.

Sample No: Method Blank

2 8 0084

Organics Analysis Data Sheet
(Page 3)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1

Compound	ug/Kg
Alpha-BHC	1.0U
Beta-BHC	1.0U
Delta-BHC	1.0U
Gamma-BHC (Lindane)	1.0U
Heptachlor	1.0U
Aldrin	1.0U
Heptachlor Epoxide	1.0U
Endosulfan I	1.0U
Dieldrin	1.0U
4,4'-DDE	1.0U
Endrin	1.0U
Endosulfan II	1.0U
4,4'-DDD	1.0U
Endrin Aldehyde	1.0U
Endosulfan Sulfate	1.0U
4,4'-DDT	1.0U
Methoxychlor	5.0U
Endrin Ketone	1.0U
Chlordane	5.0U
Toxaphene	5.0U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) N/A **or W(s)** 30 gm **V(t)** 2000 **V(i)** 2.0

ARF

Sample No: 5122-2

2 8 0085

Organics Analysis Data Sheet
(Page 1)

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No: 0027-C
Sample Matrix: Soils
Data Release Authorized By: SDRoss

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1 **pH:** N/A

Percent Moisture: N/A

Compound	ug/Kg	Compound	ug/Kg
Chloromethane	10U	1,1,2,2-Tetrachloroethane	5U
Bromomethane	10U	1,2-Dichloropropane	5U
Vinyl Chloride	10U	t-1,3-Dichloropropene	5U
Chloroethane	10U	Trichloroethene	5U
Methylene Chloride	**730 B**	Dibromochloromethane	5U
Acetone	**330**	1,1,2-Trichloroethane	5U
Carbon Disulfide	5U	Benzene	5U
1,1,-Dichloroethene	5U	c-1,3-Dichloropropene	5U
1,1-Dichloroethane	5U	2-Chloroethylvinylether	10U
t-1,2-Dichloroethene	5U	Bromoform	5U
Chloroform	5U	2-Hexanone	10U
1,2-Dichloroethane	5U	4-Methyl-2-Pentanone	10U
2-Butanone	10U	Tetrachloroethene	5U
1,1,1-Trichloroethane	5U	Toluene	5U
Carbon Tetrachloride	5U	Chlorobenzene	5U
Vinyl Acetate	10U	Ethylbenzene	5U
Bromodichloromethane	5U	Styrene	5U
		Total Xylenes	5U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

Laboratory: ANALYTICAL RESOURCES, INC.
Client: Resources Conservation Co.

Sample No: 5122-2

2 8 0086

Organics Analysis Data Sheet
(Page 2)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:4

Compound	ug/Kg	Compound	ug/Kg
N-Nitrosodimethylamine	660U	Acenaphthene	660U
Phenol	660U	2,4-Dinitrophenol	3200U
Aniline	660U	4-Nitrophenol	3200U
bis(2-Chloroethyl)ether	660U	Dibenzofuran	660U
2-Chlorophenol	660U	2,4-Dinitrotoluene	660U
1,3-Dichlorobenzene	660U	2,6-Dinitrotoluene	660U
1,4-Dichlorobenzene	660U	Diethylphthalate	660U
Benzyl Alcohol	660U	4-Chlorophenyl phenylether	660U
1,2-Dichlorobenzene	660U	Fluorene	660U
2-Methylphenol	660U	4-Nitroaniline	3200U
bis(2-Chloroisopropyl)ether	660U	4,6-Dinitro-2-methylphenol	3200U
4-Methylphenol	660U	N-Nitrosodiphenylamine (1)	660U
N-Nitroso-Dipropylamine	660U	4-Bromophenyl phenylether	660U
Hexachloroethane	660U	Hexachlorobenzene	660U
Nitrobenzene	660U	Pentachlorophenol	3200U
Isophorone	660U	Phenanthrene	660U
2-Nitrophenol	660U	Anthracene	660U
2,4-Dimethylphenol	660U	Di-n-butylphthalate	660U
Benzoic Acid	3200U	Fluoranthene	660U
bis(2-Chloroethoxy)methane	660U	Benzidine	5200U
2,4-Dichlorophenol	660U	Pyrene	660U
1,2,4-Trichlorobenzene	660U	Butylbenzylphthalate	660U
Naphthalene	660U	3,3'-Dichlorobenzidine	1320U
4-Chloroaniline	660U	Benzo(a)anthracene	660U
Hexachlorobutadiene	660U	Bis(2-Ethylhexyl)phthalate	**660 J**
4-Chloro-3-methylphenol	660U	Chrysene	660U
2-Methylnaphthalene	660U	Di-n-Octylphthalate	660U
Hexachlorocyclopentadiene	660U	Benzo(b)fluoranthene	660U
2,4,6-Trichlorophenol	660U	Benzo(k)fluoranthene	660U
2,4,5-Trichlorophenol	3200U	Benzo(a)pyrene	660U
2-Chloronaphthalene	660U	Indeno(123-cd)pyrene	660U
2-Nitroaniline	3200U	Dibenzo(ah)anthracene	660U
Dimethylphthalate	660U	Benzo(ghi)perylene	660U
Acenaphthylene	660U		
3-Nitroaniline	3200U		

(1) Cannot be separated from diphenylamine

ARF Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co.

Sample No: S122-2

2 8 0087

Organics Analysis Data Sheet
(Page 3)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1.2

Compound	ug/Kg
Alpha-BHC	2U
Beta-BHC	2U
Delta-BHC	2U
Gamma-BHC (Lindane)	2U
Heptachlor	2U
Aldrin	2U
Heptachlor Epoxide	2U
Endosulfan I	2U
Dieldrin	2U
4,4'-DDE	2U
Endrin	2U
Endosulfan II	2U
4,4'-DDD	2U
Endrin Aldehyde	2U
Endosulfan Sulfate	2U
4,4'-DDT	2U
Methoxychlor	10U
Endrin Ketone	2U
Chlordane	10U
Toxaphene	10U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) N/A **or W(s)** 30 gm **V(t)** 4000 **V(i)** 2.0

GRF

Sample No: 5122-6

2 8 0088

Organics Analysis Data Sheet
(Page 1)

Laboratory: ANALYTICAL RESOURCES INC.
Lab Sample ID No: .0027-D
Sample Matrix: Soils
Data Release Authorized By: SDKoa

Client: Resources Conservation Co.
QC Report No: 0027
Contract No: #15148
Date Sample Received: 12/29/85

Volatile Compounds

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85

Conc/Dil Factor: 1 **pH:** N/A

Percent Moisture: N/A

Compound	ug/Kg	Compound	ug/Kg
Chloromethane	10U	1,1,2,2-Tetrachloroethane	5U
Bromomethane	10U	1,2-Dichloropropane	5U
Vinyl Chloride	10U	t-1,3-Dichloropropene	5U
Chloroethane	10U	Trichloroethene	5U
Methylene Chloride	**470 B**	Dibromochloromethane	5U
Acetone	**66**	1,1,2-Trichloroethane	5U
Carbon Disulfide	5U	Benzene	5U
1,1,-Dichloroethene	5U	c-1,3-Dichloropropene	5U
1,1-Dichloroethane	5U	2-Chloroethylvinylether	10U
t-1,2-Dichloroethene	5U	Bromoform	5U
Chloroform	5U	2-Hexanone	10U
1,2-Dichloroethane	5U	4-Methyl-2-Pentanone	10U
2-Butanone	10U	Tetrachloroethene	5U
1,1,1-Trichloroethane	5U	Toluene	5U
Carbon Tetrachloride	5U	Chlorobenzene	5U
Vinyl Acetate	10U	Ethylbenzene	5U
Bromodichloromethane	5U	Styrene	5U
		Total Xylenes	5U

Data Reporting Qualifiers

Value If the result is a value greater than or equal to the detection limit report the value

U Indicates compound was analyzed for but not detected. Report the minimum detection limit

B This flag is used when the analyte is found in the blank as well as a sample

J Indicates an estimated value - compound present but below reportable detection limit

Laboratory: ANALYTICAL RESOURCES, INC.
Client: Resources Conservation Co.

Sample No: 5122-5

2 8 0089

Organics Analysis Data Sheet
(Page 2)

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 1/3/86

Conc/Dil Factor: 1:4

Compound	ug/Kg	Compound	ug/Kg
N-Nitrosodimethylamine	660U	Acenaphthene	660U
Phenol	660U	2,4-Dinitrophenol	3200U
Aniline	660U	4-Nitrophenol	3200U
bis(2-Chloroethyl)ether	660U	Dibenzofuran	660U
2-Chlorophenol	660U	2,4-Dinitrotoluene	660U
1,3-Dichlorobenzene	660U	2,6-Dinitrotoluene	660U
1,4-Dichlorobenzene	660U	Diethylphthalate	660U
Benzyl Alcohol	660U	4-Chlorophenyl phenylether	660U
1,2-Dichlorobenzene	660U	Fluorene	660U
2-Methylphenol	660U	4-Nitroaniline	3200U
bis(2-Chloroisopropyl)ether	660U	4,6-Dinitro-2-methylphenol	3200U
4-Methylphenol	660U	N-Nitrosodiphenylamine (1)	660U
N-Nitroso-Dipropylamine	660U	4-Bromophenyl phenylether	660U
Hexachloroethane	660U	Hexachlorobenzene	660U
Nitrobenzene	660U	Pentachlorophenol	3200U
Isophorone	660U	Phenanthrene	660U
2-Nitrophenol	660U	Anthracene	660U
2,4-Dimethylphenol	660U	Di-n-butylphthalate	660U
Benzoic Acid	3200U	Fluoranthene	660U
bis(2-Chloroethoxy)methane	660U	Benzidine	5200U
2,4-Dichlorophenol	660U	Pyrene	660U
1,2,4-Trichlorobenzene	660U	Butylbenzylphthalate	660U
Naphthalene	660U	3,3'-Dichlorobenzidine	1320U
4-Chloroaniline	660U	Benzo(a)anthracene	660U
Hexachlorobutadiene	660U	Bis(2-Ethylhexyl)phthalate	**660 J**
4-Chloro-3-methylphenol	660U	Chrysene	660U
2-Methylnaphthalene	660U	Di-n-Octylphthalate	660U
Hexachlorocyclopentadiene	660U	Benzo(b)fluoranthene	660U
2,4,6-Trichlorophenol	660U	Benzo(k)fluoranthene	660U
2,4,5-Trichlorophenol	3200U	Benzo(a)pyrene	660U
2-Chloronaphthalene	660U	Indeno(123-cd)pyrene	660U
2-Nitroaniline	3200U	Dibenzo(ah)anthracene	660U
Dimethylphthalate	660U	Benzo(ghi)perylene	660U
Acenaphthylene	660U		
3-Nitroaniline	3200U		

(1) Cannot be separated from diphenylamine

Laboratory: ANALYTICAL RESOURCES, INC
Client: Resources Conservation Co.

Sample No: 5122-6

Organics Analysis Data Sheet
(Page 3)

2 8 0090

Concentration: Low

Date Extracted/Prepared: 12/29/85

Date Analyzed: 12/29/85-1/3/85

Conc/Dil Factor: 1:2

Compound	ug/Kg
Alpha-BHC	2U
Beta-BHC	2U
Delta-BHC	2U
Gamma-BHC (Lindane)	2U
Heptachlor	2U
Aldrin	**10.7**
Heptachlor Epoxide	2U
Endosulfan I	2U
Dieldrin	2U
4,4'-DDE	2U
Endrin	2U
Endosulfan II	2U
4,4'-DDD	2U
Endrin Aldehyde	2U
Endosulfan Sulfate	2U
4,4'-DDT	2U
Methoxychlor	10U
Endrin Ketone	2U
Chlordane	10U
Toxaphene	10U

V(i) = Volume of extract injected (ul)

V(s) = Volume of water extracted (ml)

W(s) = Weight of sample extract (g)

V(t) = Volume of total extract (ul)

V(s) N/A **or W(s)** 30 gm **V(t)** 4000 **V(i)** 2.0

GRF

ATTACHMENT B

2 8 0091

PHASE 2 ANTIFOAM INVESTIGATION

GRF

2 8 0092

Type	Antifoam Conc. (PPM)	Foam Height @ 180°F(mm)	Dilution Factor	Comments
Control	-----	40	---	----------
DF-650	1500	45	pure	no effect
SAG-10	200	45	1:4	20% solution
	400	40	1:4	20% solution
	600	20	1:4	20% solution
	700	15	1:4	20% solution
	800	15	1:4	20% solution
DF-108L	250	40	pure	100% pure
	500	5	pure	final volume was 45mm
	750	20	pure	overdosed system
DF-230SX	50	20	1:9	10% solution
	100	10	1:9	final volume was 50mm
Control	-----	100+	---	
DB-31	1500.0	30	1:3	25% solution
DB-110A	277.3	30	1:5	16.7% solution
H-10	1664.0	35	pure	
1520	1664.0	40	pure	
Mark X	1664.0	20	pure	
Mark X	3322.0	5	pure	
Silwet L-7002	832.0	30	1:1	50% solution
Silwet L-7002	1664.0	20	1:1	50% solution
DB-100	1664.0	40	1:1 isopropanol	diluted in
DF 141	> 3000.0	100+	pure	no effect
NALCO	> 3000.0	100+	pure	no effect
DB-110A	832.6	59	1:5	
(repeat)	1110.0	34	1:5	
	1387.0	29	1:5	

GRF

ATTACHMENT C

2 8 0093

ADDITIONAL PHASE 2 DATA

GRF

2 8 0094

Stripped Water
After Excess Caustic Addition

Feed: 50:50 Pond 2-4 "Sludge" and "Free Water"

Analyte	Raw Stripped Water	Post-Treated Stripped Water
pH	12.2	----
BOD (mg/l)	750.	390.
COD (mg/l)	21,000	2,300.
Arsenic (mg/l)	----	< 0.2
Lead (mg/l)	----	0.26
Total Kjeldahl Nitrogen (mg/l)	----	80.
Oil & Grease (mg/l)	1,300.	32.
Total Organic Carbon (mg/l)	2,000.	400.
Residual Triethylamine (mg/l)	40.	40.

GRF

2 8 0095

ATTACHMENT D

WATER STRIPPER pH vs RESIDUAL TEA CONCENTRATION

TEST RESULTS

Glassware Results

The results of all eight distillations are presented in Figure 1 as a plot of triethylamine concentration in mg/l vs final, stripped water pH. Figure 2 is a plot of the alkaline pH data. As expected, the residula triethylamine level sharply diminishes with increasing stripped pH. These plots agree with the ionization vs. pH curve for ammonia, which is chemically related to triethylamine.

The test data and the computer curve fit data are presented below. The triethylamine concentration in the feed stock was 35,000 mg/l. The computer selected equation to relate residual triethylamine to stripped water pH is:

$$\text{TEA, mg/l} = (1.05 \times 10^{12})(\text{pH})^{-10.3}$$

The correlation coefficient for this equation, 0.89, is somewhat poor but is still acceptable. The equation was used in preparing the following table:

Stripped Water pH	8.5	9.0	9.5	10.0	10.5	11.0
Residual TEA, mg/l	260	150	83	49	30	18

The design, residual triethlyamine concentration in the production unit stripped water is 70-100 mg/l which would dictate a stripped water pH of ~9.5.

GRF

2 8 0097

TEST RESULTS, RAW DATA

Test No.	Starting pH	Final Water pH	Residual TEA mg/l
As-is	---	---	35,000
1	11.23	5.89	12,600
2	---	6.13	5,600
3	11.91	7.30	1,600
4	11.99	7.91	990
5	12.23	7.93	560
6	11.95	8.79	106
7	12.43	9.87	41
8	12.41	10.75	31

GRF

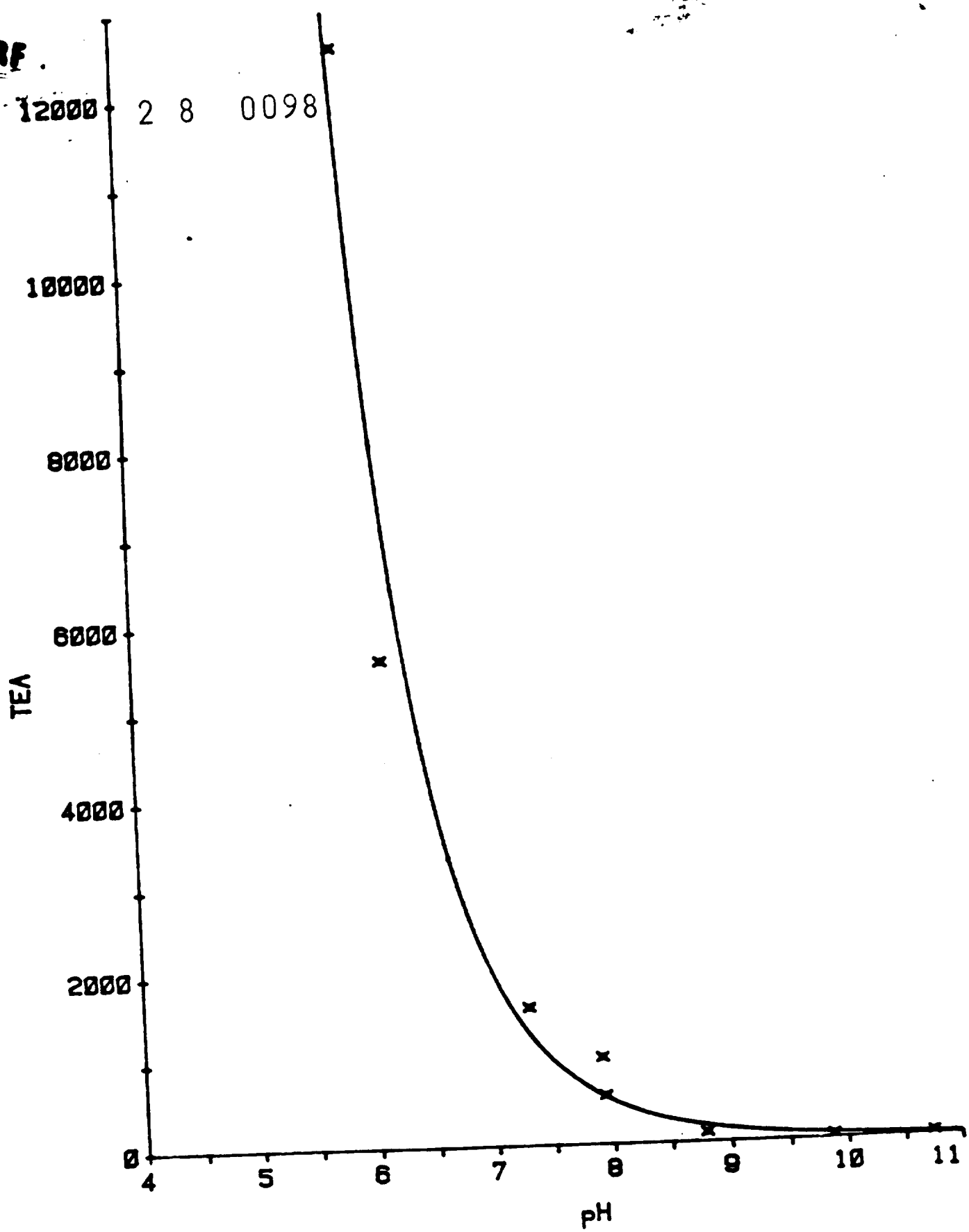


Figure 1. Residual TEA vs. Stripped Water pH

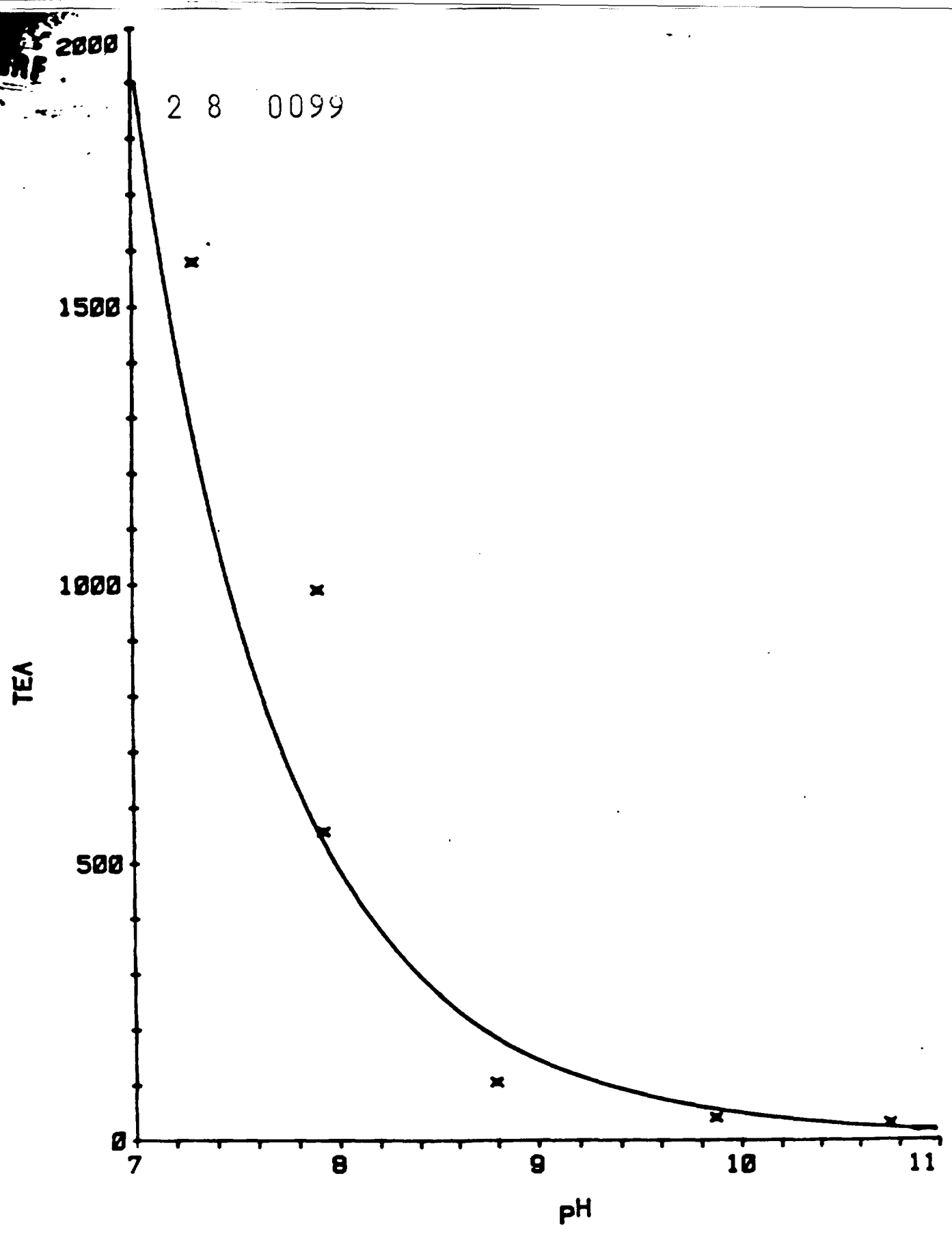


Figure 2. Residual TEA vs. Stripped Water pH
Alkaline Data

BRF

2 8 0100

ATTACHMENT E

PHASE 2 EMULSION COMPOSITION vs VISCOSITY

GRF

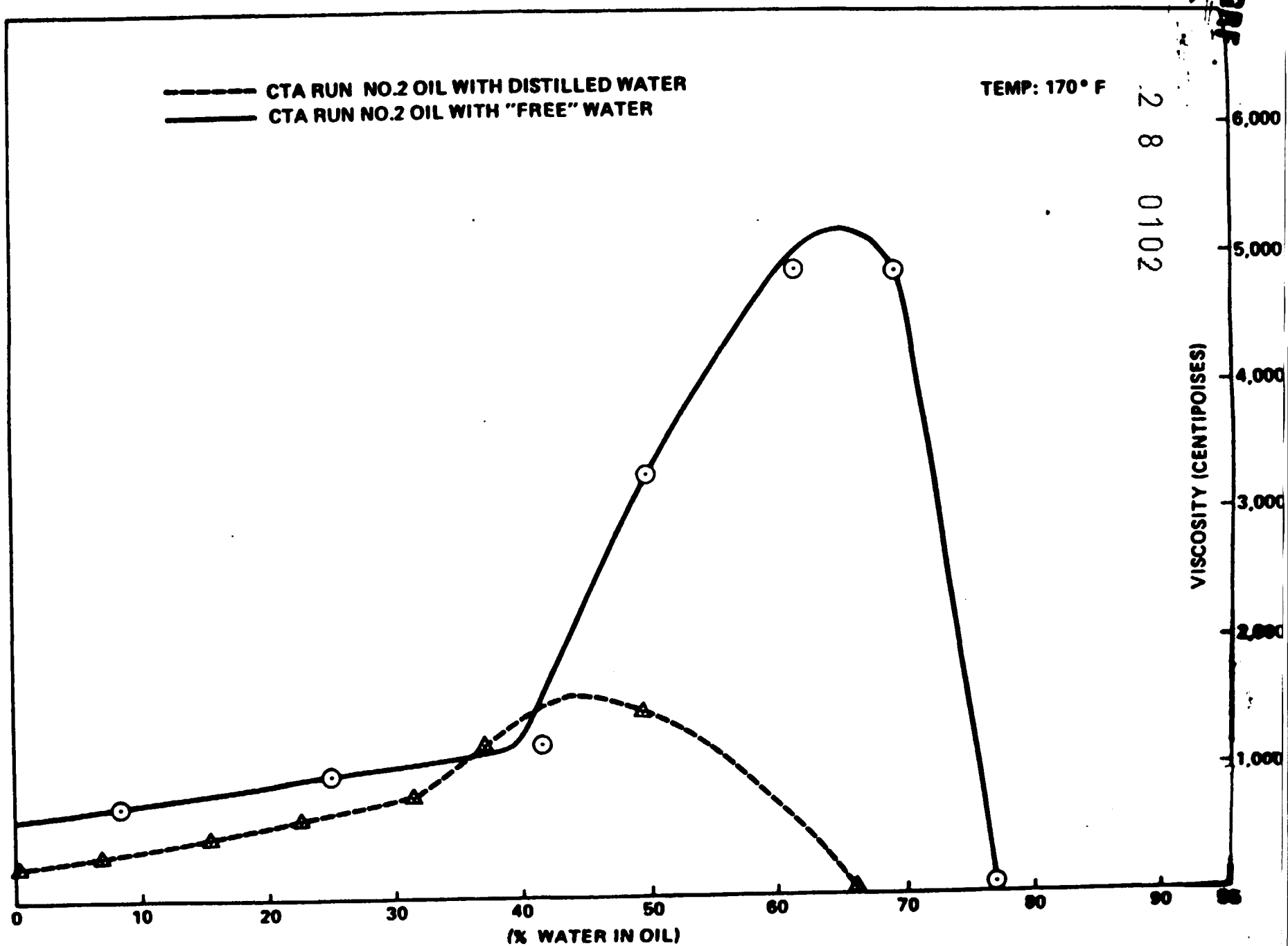
2 8 0101

DATA FROM DISTILLED WATER/OIL EMULSION TESTING

Water % in Oil	Viscosity (centipoises) at 170°F
0	234.
7.3	357.
15.3	439.
22.3	602.
31.5	775.
36.5	1,180.
49.5	1,410.
66.1	30.

DATA FROM "FREE" WATER/OIL EMULSION TESTING

Water % in Oil	Viscosity (centipoises) at 170°F
8.2	714.
25.	959.
41.6	1,200.
49.7	3,260.
61.5	4,890.
69.1	4,890.
76.8	82.


CTA RUN NO.2 OIL WITH DISTILLED WATER
CTA RUN NO.2 OIL WITH "FREE" WATER
TEMP: 170° F
VISCOSITY (CENTIPOISES)
6,000
5,000
4,000
3,000
2,000
1,000
0
10
20
30
40
50
60
70
80
90
100
(% WATER IN OIL)

2 8 0102