SOURCE CONTROL
REMEDIAL INVESTIGATION REPORT
FOR
SHERIDAN DISPOSAL SERVICE SITE
HEMPSTEAD, TEXAS

APPENDICES
VOLUME I

PREPARED FOR

ENVIRONMENTAL PROTECTION AGENCY
TEXAS WATER COMMISSION

BY

SHERIDAN SITE COMMITTEE

JUNE 1987

RESOURCE ENGINEERING

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APPENDIX 2

SHERIDAN DISPOSAL SERVICE FACILITY PERMITS

001720

PERMIT NO. 00500

TEXAS WATER POLLUTION CONTROL BOARD

1100 WEST 49TH STREET
AUSTIN 3, TEXAS

PERMIT to dispose of wastes under provisions of Article 7621d, Vernon's Civil Statutes

I. Name of Permittee

1. Name Sheridan Disposal Service
2. Address P. O. Box 42
3. City Hempstead, Texas

II. Type of Permit

Statutory

III. Nature of Business Producing Waste

Offsite Disposal of Industrial Wastes

IV. General Description and Location of Waste Disposal System

A disposal area consisting of approximately 20 acres in the northeast portion of a 696.59 acre tract in the Thomas Stevens Sur. Abstract 857 owned by Duane C. Sheridan and Wife, Ruby (deed from A. S. Fletcher and wife to Duane Sheridan, Jan. 3, 1948 Vol. 108/309) in Waller County, Texas, about 10 miles NW of Hempstead and as shown on the application maps.

V. Conditions of the Permit

1. Character, volume and disposal area(s) or point(s) of discharge authorized under this Permit. The conditions on the reverse side are a part of this Permit and apply for all purposes.

As described on Page 2 of 3 Pages and Page 3 of 3 Pages.

2. Special Provisions
   1. The disposal of any wastes having characteristics other than as described on Pages 2 and 3 of 3 pages shall be cleared with the Water Pollution Control Board staff.
   2. A surveillance program, including but not restricted to sampling or observation wells, for checking the quality of the ground water in the disposal area and the surrounding area shall be established.

3. This permit becomes effective _____ and is valid until amended or revoked by the

ISSUED this _____ day of _____ 19

(See Page 3)

_____
Executive Secretary

SUPERSEDED

001721

Standard Provisions

(a) This permit is granted in accordance with the Texas Water Pollution Control Act (Article 7621d of V. T. C. S.) and the Rules, Regulations and Modes of Procedure adopted by the Board, and is granted subject to the rules and regulations of the Board, the laws of the State of Texas, and further orders of the Board issued in accordance with said rules and laws.

(b) In the event the permittee discharges wastes which exceed the quantity or quality authorized by this Permit, the permittee shall give immediate notice to the office of the Board.

(c) Acceptance of this permit constitutes an acknowledgement and agreement that the permittee will comply with all the terms, provisions, conditions, limitations and restrictions embodied in this permit and with the rules, regulations, and orders of the Board. Such agreement is a condition precedent to the granting of this Permit.

(d) This permit cannot be transferred without prior notification to the Board.

(e) This permit is issued pursuant to the terms of section 5 of Article 7621d of V. T. C. S., which reads in part as follows:

"Upon receipt of such application, the Executive Secretary of the Board is hereby authorized to, and he shall immediately, issue to such applicant a permit to continue the existing discharge covered by such application until further order of the Board. Thereafter, the permittee may be required for good cause, from time to time, after public hearing initiated by the Board, to conform to new or additional conditions and terms imposed by the Board. . . . .

Such permit or amended permit shall never become a vested right in the permittee, and it may be revoked for good cause shown, after public hearing initiated by the Board, in the event of the permittee's failure to comply with the condition or conditions of such permit as issued or as amended."

(f) The application pursuant to which this permit has been issued is incorporated herein: provided, however that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

001722

PERMIT
NO. XXXXXXXXXXXXXXXX

TEXAS WATER POLLUTION CONTROL BOARD

1100 WEST 49TH STREET
AUSTIN 5, TEXAS

PERMIT to dispose of wastes under provisions of
Article 7621d, Vernon's Civil Statutes

I. Name of Permittee

1. Name Sheridan Disposal Service (Waste No. 1) Labeled permit pg. #1 over
2. Address P. O. Box 42
3. City Hempstead, Texas

II. Type of Permit

Statutory

III. Nature of Business Producing Waste

Offsite Disposal of Industrial Wastes

IV. General Description and Location of Waste Disposal System

A disposal area consisting of approximately 20 acres in the northeast portion of a 696.50 acre tract in the Thomas Stevens Sur. Abstract #57 owned by Duane C. Sheridan and Wife, Ruby (deed from A. S. Fletcher and wife to Duane Sheridan, Jan. 3, 1948 Vol. 108/309) in Waller County, Texas, about 18 miles N.W. of Hempstead and as shown on the application maps.

V. Conditions of the Permit

1. Character, volume and disposal area(s) or point(s) of discharge authorized under this Permit. The conditions on the reverse side are a part of this Permit and apply for all purposes.

CHARACTER: Industrial Wastes
VOLUME: Not to exceed 120,000 gallons per month
QUALITY:

Item	Average Content by Weight
Caustic Soda	0 to 20%
Magnesium Chloride	0 to 20%
Calcium Chloride	0 to 20%
Sodium Chloride	0 to 20%
Aldrhydes	0 to 5%
Alcohols	0 to 10%
Ketones	0 to 10%
Esters	0 to 10%
Hydrocarbons	0 to 10%
Organic Acid Salts (Water Soluble)	0 to 5%
Glycols	0 to 100%

POINT OF DISCHARGE: Retained within the disposal area described above and in the Brazos River Basin.

2. Special Provisions

Special provisions apply as on Page 1 of 3 Pages

3. This permit becomes effective _____ and is valid until amended or revoked by the Board.

ISSUED this _____ day of _____ 19

(See Page 3)

_____
Executive Secretary

P. C. B. 105

001723

Standard Provisions

(a) This permit is granted in accordance with the Texas Water Pollution Control Act (Article 7621d of V. T. C. S.) and the Rules, Regulations and Modes of Procedure adopted by the Board, and is granted subject to the rules and regulations of the Board, the laws of the State of Texas, and further orders of the Board issued in accordance with said rules and laws.

(b) In the event the permittee discharges wastes which exceed the quantity or quality authorized by this Permit, the permittee shall give immediate notice to the office of the Board.

(c) Acceptance of this permit constitutes an acknowledgement and agreement that the permittee will comply with all the terms, provisions, conditions, limitations and restrictions embodied in this permit and with the rules, regulations, and orders of the Board. Such agreement is a condition precedent to the granting of this Permit.

(d) This permit cannot be transferred without prior notification to the Board.

(e) This permit is issued pursuant to the terms of section 5 of Article 7621d of V. T. C. S., which reads in part as follows:

> Upon receipt of such application, the Executive Secretary of the Board is hereby authorized to, and he shall immediately, issue to such applicant a permit to continue the existing discharge covered by such application until further order of the Board. Thereafter, the permittee may be required for good cause, from time to time, after public hearing initiated by the Board, to conform to new or additional conditions and terms imposed by the Board . . .
>
> Such permit or amended permit shall never become a vested right in the permittee, and it may be revoked for good cause shown, after public hearing initiated by the Board, in the event of the permittee's failure to comply with the condition or conditions of such permit as issued or as amended."

(f) The application pursuant to which this permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

001724

PERMIT
NO. XXXXXXXXXXXXXXXXXX

TEXAS WATER POLLUTION CONTROL BOARD

1100 WEST 49TH STREET
AUSTIN 5, TEXAS

PERMIT to dispose of wastes under provisions of
Article 7621d, Vernon's Civil Statutes

I. Name of Permittee

1. Name Sheridan Disposal Service (Waste No. 2) [illegible]
2. Address P. O. Box 42
3. City Hempstead, Texas

II. Type of Permit

Statutory

III. Nature of Business Producing Waste

Offsite Disposal of Industrial Waste

IV. General Description and Location of Waste Disposal System

A disposal area consisting of approximately 20 acres in the northwest portion of a 686.50 acre tract in the Thomas Stevens Sur. Abstract 857 owned by Duane C. Sheridan and Wife, Ruby (deed from A. E. Fletcher and wife to Duane Sheridan, Jan. 3, 1948 Vol. 103/309) in Waller County, Texas, about 10 miles N.W. of Hempstead and as shown on the application maps.

V. Conditions of the Permit

1. Character, volume and disposal area(s) or point(s) of discharge authorized under this Permit. The conditions on the reverse side are a part of this Permit and apply for all purposes.

CHARACTER: Industrial Wastes
VOLUME: Not to exceed 900 tons per month
QUALITY: Filter Cake - Solids consisting of diatomaceous earth primarily but also possibly including chlorides of sodium and calcium; carbonates of calcium and barium; hydroxides of zinc and calcium; and trace amounts of phosphates, sulfates, and sulfites of the foregoing metals.
POINT OF DISCHARGE: Retained in the disposal area described above and in the Brazos River Basin.

2 Special Provisions

Special provisions apply as on Page 1 of 3 Pages

3. This permit becomes effective immediately and is valid until amended or revoked by the Board.

ISSUED this 11th day of March 19 63

Executive Secretary

001725

W. P. C. B. 105

Standard Provisions

(a) This permit is granted in accordance with the Texas Water Pollution Control Act (Article 7621d of V. T. C. S.) and the Rules, Regulations and Modes of Procedure adopted by the Board, and is granted subject to the rules and regulations of the Board, the laws of the State of Texas, and further orders of the Board issued in accordance with said rules and laws.

(b) In the event the permittee discharges wastes which exceed the quantity or quality authorized by this Permit, the permittee shall give immediate notice to the office of the Board.

(c) Acceptance of this permit constitutes an acknowledgement and agreement that the permittee will comply with all the terms, provisions, conditions, limitations and restrictions embodied in this permit and with the rules, regulations, and orders of the Board. Such agreement is a condition precedent to the granting of this Permit.

(d) This permit cannot be transferred without prior notification to the Board.

(e) This permit is issued pursuant to the terms of section 5 of Article 7621d of V. T. C. S., which reads in part as follows:

> "Upon receipt of such application, the Executive Secretary of the Board is hereby authorized to, and he shall immediately, issue to such applicant a permit to continue the existing discharge covered by such application until further order of the Board. Thereafter, the permittee may be required for good cause, from time to time, after public hearing initiated by the Board, to conform to new or additional conditions and terms imposed by the Board . . .
>
> Such permit or amended permit shall never become a vested right in the permittee, and it may be revoked for good cause shown, after public hearing initiated by the Board, in the event of the permittee's failure to comply with the condition or conditions of such permit as issued or as amended."

(f) The application pursuant to which this permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

001726

RECEIVED

WASTE CONTROL ORDER

NO. 00508 PAGE NO. 1

This amendment supersedes and replaces Pages 1, 2 and 3 (issued March 11, 1963) of Waste Control Order No. 00508.

TEXAS WATER QUALITY BOARD
P.O. Box 13246, Capitol Station
Austin, Texas 78711

PERMIT to dispose of wastes under provisions of Article 7621d-1, Vernon's Texas Civil Statutes

I. Name of Permittee

1. Name — Sheridan Disposal Service
2. Address — P. O. Box 42
3. City — Hempstead, Texas 77445

II Type of Permit: Regular _____ Amended XXX

III Nature of Business Producing Waste

Industrial Waste Disposal Operation

IV General Description and Location of Waste Disposal System

Description: The disposal area consists of approximately 20 acres. Facilities include (1) a 400,000 gallon clay lined receiving pond, (2) a series of metal tanks with a combined volume of 70,000 gallons designed to break and separate oil-water emulsions, (3) a 40,000 gallon oil storage tank, (4) three waste burners and appropriate utilities including a steam boiler. A 14-acre disposal pit, formerly used to contain all incoming wastes, is temporarily available for an evaporation pond. Additional metal tankage will be installed to receive incoming wastes.

Location: An area of approximately 20 acres in the northeast portion of a 696.5 acre tract adjacent to the Brazos River about 10 miles northwest of the City of Hempstead and about two miles northwest of the intersection of Clark Bottom Road and FM 1736 in Waller County, Texas.

V. CONDITIONS OF THE WASTE CONTROL ORDER

Character: Industrial Waste: Oil-water mixtures, neutralized acid wastes, caustics, and non-chlorinated solvents.

Volume: The volume of waste materials received will be limited to that amount which can be processed through the separation equipment and burners described above. No additional materials will be placed in the 14-acre disposal pit after April 1, 1973. Flow rates of waste materials fed to the burners will be restricted to achieve complete combustion of organics and complete evaporation of water.

Quality: No materials will be received which cannot be processed in the equipment described in this waste control order.

CONTINUED ON CONTINUATION SHEET I and II

APPROVED the 29th day of November, 1972 and corrections ratified the 19th day of December, 1972.

Executive Director

For the Board

001727

Standard Provisions

(a) This permit is granted in accordance with the Texas Water Quality Act of 1967 (Article 7621d-1, V.T.C.S.) and the rules adopted by the Board, and is granted subject to the rules of the Board, the laws of the State of Texas, and further orders of the Board issued in accordance with said rules and laws.

(b) In the event the permittee discharges wastes which exceed the quantity or quality authorized by this permit, the permittee shall give immediate notice to the office of the Board.

(c) Acceptance of this permit constitutes an acknowledgement and agreement that the permittee will comply with all the terms, provisions, conditions, limitations and restrictions embodied in this permit and with the rules of the Board, the laws of the State of Texas, and further orders of the Board. Such agreement is a condition precedent to the granting of this permit.

(d) This permit cannot be transferred without prior notification to the Board.

(e) This permit is issued subject to the terms of Section 11(f), Article 7621d-1, V.T.C.S., which reads in part as follows:

> "The permittee may be required, for good cause, from time to time, after notice to the permittee and after public hearing initiated by the Board, to conform to new or additional conditions and terms imposed by the Board following such hearing. The Board shall allow the permittee a reasonable time to conform to such new or additional terms and conditions; provided, however, that upon application of the permittee, the Board, in its discretion, may grant the permittee an additional period of time within which to conform to such new or additional terms and conditions. Such permit or amended permit shall never become a vested right in the permittee, and it may be revoked or suspended for good cause shown, after notice to the permittee and after public hearing initiated by the Board, in the event of the permittee's failure to comply with the terms and conditions of such permit as issued or as amended."

(f) The application pursuant to which the permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

(g) (The provisions of this paragraph (g) of the Standard Provisions of this permit apply only to drinking water supply systems and sewage disposal systems designed for public use as contemplated in Section 12, Article 4477-1, V.T.C.S.) There may be substituted for the foregoing features of the plant other mechanisms, equipment, or treatment methods on prior approval of the State Health Department, provided such substitutions do not result in a reduction of the efficiency and operating safety of the plant nor result in the discharge of a lower quality of effluent than that authorized under the permit.

.001728

WASTE CONTROL ORDER

WCO 00509 PAGE NO. 1 CONTINUATION SHEET I

NAME: Sheridan Disposal Service

APPROVED: November 29, 1972
RATIFIED: December 19, 1972

Point of Discharge: No discharge. All wastes are to be retained at the disposal site in the Brazos River Basin for reclamation or disposal by burning of organics, evaporation of water and landfill in a portion of the disposal pit.

SPECIAL PROVISIONS:

Quarterly reviews of the projects discussed under Phase I, Phase II and Phase III below will be conducted with the staff of the Texas Water Quality Board.

Phase I of the construction project will be completed by August 1, 1973. The purpose of the Phase I construction is to install sufficient equipment to bring the disposal capacity into balance with the incoming wastes so that no further additions will be made to the disposal pit. The following work and time schedule to complete Phase I are required by this waste control order:

1) Install the third burner, coil, and protective dike - January 15, 1973.
2) Skim all removable oil from the 14-acre disposal pit - February 28, 1973
3) Install tankage to receive all incoming waste materials, Provide an unloading ramp of hard surface material such as concrete for the new tankage. The ramp will be designed so that all spills drain to a sump for collection and recovery or to the disposal pit - April 1, 1973.
4) Install a vent system connected so that all flammable gases which are vented from the tanks will be burned - August 1, 1973.
5) Dike all tanks so that leakage will be retained locally - February 28, 1973.
6) The only waste materials that shall be placed in the 14-acre pond until April 1, 1973, shall be water containing small amounts of detergents and water with up to 1% carbon.
7) The 400,000 gallon receiving pond will be used for emergency holding. All materials placed in this pond during emergencies will be recycled through the treatment process.

The purpose of the Phase II projects is to provide equipment for growth and improved reliability of operation. It is required that sufficient equipment be provided to handle all business growth so that no additions of waste materials will be made to the disposal pit except during emergencies, The following work to complete all of Phase II by December 1, 1973 is required by this waste control order:

1) A control laboratory will be established for the purpose of examining incoming wastes to verify customer analyses and for other analytical requirements by June 30, 1973.

2) Facilities to receive, store and neutralize acids and bases will be installed prior to receipt of such materials. Plans for the facilities will be submitted to the Executive Director of the Texas Water Quality Board for consideration of approval prior to construction.

3) Additional burner tests will be conducted with the object of [illegible] the reliability of the burner operation [illegible]

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WASTE CONTROL ORDER

NO. 00508 PAGE NO. 1

CONTINUATION SHEET II

NAME: Sheridan Disposal Service

APPROVED: November 29, 1972
RATIFIED: December 19, 1972

SPECIAL PROVISIONS: (Cont'd)

The purpose of the Phase III projects is to examine the contents of the 14-acre disposal pond with the ultimate aim of reducing the size of this pond, or eliminating it.

1) A study of the contents of the 14-acre disposal pit will be made to determine the composition of the aqueous phase and the sludge. A report on the composition of the sludge at four separate points will be submitted to the Executive Director of the Texas Water Quality Board by June 1, 1973.

2) A plan with a proposed time schedule for (1) the reduction in size or elimination of the disposal pit, (2) revision of the receiving pond to that size required for emergencies and (3) final disposition of all metal drums will be submitted to the Executive Director of the Texas Water Quality Board for consideration of approval by December 1, 1973.

3) Approximately three acres of the disposal pit described as the "filter cake disposal area" will be covered with at least 24 inches of compacted native soil and eliminated as a part of the disposal pit by December 1, 1973.

Emergencies are defined for this waste control order as events resulting directly from major equipment failure in the plant such as boiler malfunction. Emergencies do not include times when the receiving tanks are full but equipment is operable. Immediate notification to the Texas Water Quality Board District 7 Office is required when waste material is added to the receiving pond after April 1, 1973. Notification is to include a description of the waste material.

Liquid levels in the 14-acre disposal pond will be maintained at least two feet below the top of the dike. The dike elevation will not be raised, and the top of the dike is to be no higher than 178 feet above mean sea level.

Drummed waste material shall be emptied into receiving and processing vessels at the site and the drum shall be returned to the point of origin, or crushed and buried on the site, or disposed of by other procedures acceptable to the Board.

This waste control order supersedes and replaces all previous waste control orders, Board orders, and written instructions issued to Sheridan Disposal Service, Inc.

This waste control order will be subject to review by the Board after one year from issuance of the order. The Board may amend the waste control order as appropriate at that time to reflect any desired changes based on data submitted by the holder.

This waste control order becomes effective upon date of Board approval and is valid until amended, cancelled or revoked by the Board.

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TEXAS WATER QUALITY BOARD

J. [illegible] GLASS TOOLE
CHAIRMAN

FRANK H. LEWIS
VICE CHAIRMAN

M. F. FROST

FRATIE L. DUFF, MD

T.W.Q.
COPY

[illegible]

[illegible]

JAMES M. ROSE

HUGH C. YANTIS, JR.
EXECUTIVE DIRECTOR

PH [illegible]

1700 NORTH CONGRESS AVE
P.O. BOX 13246 CAPITOL STATION 78711
AUSTIN, TEXAS

ENDORSEMENT TO TEXAS WATER QUALITY BOARD PERMIT NO. 00508

FOR SHERIDAN DISPOSAL SERVICE
(TO RENUMBER PERMIT ISSUED JANUARY 28, 1976)

In order to change for administrative purposes the permit number, the above mentioned permit is hereby changed from

Permit No. 00508 to Permit No. 39007

This endorsement shall be securely attached to the subject permit and shall become effective upon date of issuance.

Issued this 19th day of March, 1976, under authority granted me by the rules of the Texas Water Quality Board.

(SEAL)

Dick Whittington for
Hugh C. Yantis, Jr., Executive Director
Texas Water Quality Board

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PERMIT NO. 00508

This permit supersedes and replaces Permit No. 00508 approved November 29, 1972 and corrections ratified December 19, 1972.

TEXAS WATER QUALITY BOARD
P.O. Box 13246, Capitol Station
Austin, Texas 78711

PERMIT to dispose of wastes under provisions of Article 7621d-1, Vernon's Texas Civil Statutes

I. Name of Permittee
A. Name — Sheridan Disposal Service

B. Address — P. O. Box 42 R-1 Box 12PD
Hempstead, Texas 77445

II. Type of Permit: Regular _____ Amended xxx

III. Nature of Business Producing Waste

Industrial Waste Disposal System

IV. General Description and Location of Waste Disposal System

Description: Disposal area includes a 14-acre waste pit, formerly used to contain all incoming waste. Presently all incoming industrial wastes are routed to metal storage tanks prior to final disposal by incineration. Any water received with burnable waste material is evaporated by the heat generated from incineration. Other wastewater, particularly that contained in the 14-acre pit, will be disposed of by various means as described herein.

Location: An area in the northeast portion of a 696.5-acre tract in the Thomas Stevens survey, Abstract 857 (deed from A. S. Fletcher and wife to Duane Sheridan, January 3, 1948, Volume 108/39) in Waller County, Texas, adjacent to the Brazos River and about 10 miles northwest of the City of Hempstead and about 2 miles northwest of the intersection of Clark Bottom Road and FM 1736 in Waller County, Texas.

CONTINUED ON CONTINUATION SHEETS II, III, IV, AND V

APPROVED this 28th day of January, 19 76.

Dick Whittington
Executive Director
Deputy

G. Douglas Zook
For the Board

WQB-7 (Rev. 6/75)

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PERMIT NO. 00508 [illegible] SHEET II

NAME: Sheridan Disposal Service APPROVED: January 26, 1976

V. General Conditions of the Permit

Character and Volume: Industrial Waste: Only waste materials which can be processed by the Service's liquid waste incinerator(s) in accordance with the appropriate Texas Air Control Board operating permit(s) may be received at the site. Likewise, the volume of waste material received shall be limited to that amount which can be processed by the liquid waste incinerator(s) and associated metal storage tanks for temporary holding. In no case shall wastewaters received by the permittee be placed in the 14-acre waste pit or in any other open pit or pond.

Point of Discharge: No discharge: All waste materials shall be retained at the disposal site in the Brazos River Basin (Segment No. 1201) for processing and final disposal.

Report of Waste Materials Received: The permittee shall record and keep on record at the site, the number of trucks arriving each day carrying waste material, the volume of waste received each day, the source of the material (company name and address), the type of material (general chemical composition and physical properties), the number of hours each burner or incinerator operates each day, and the total amount of waste material incinerated, or evaporated, in the incinerator each month. At the end of each month the information listed above will be compiled by the permittee, and prior to the 10th of the following month, be submitted in writing to the Texas Water Quality Board's Austin Office.

VI. Special Conditions of the Permit

Beginning immediately, the permittee shall undertake an active program to cause the eventual elimination of the 14-acre waste pit (hereafter referred to as the pit). The program undertaken shall be one which will enable the permittee to reduce the liquid level of the pit in compliance with both the annual and quarterly liquid level reduction schedules contained in Attachment I.

Additionally, until such time as the liquid material in the pit is eliminated and the pit properly closed, the liquid level in the pit shall be maintained at least 24 inches below the top of the surrounding dike. If for any reason, the freeboard is less than 24 inches, the permittee shall immediately notify the Executive Director of the Texas Water Quality Board and describe those measures being undertaken to increase the freeboard to at least 24 inches. The dikes surrounding the pit will not be raised without prior notification of the Executive Director, except in certain emergency situations to prevent an overflow from the pit.

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If, during any defined schedule period, the total rainfall at the site can be shown to have exceeded the maximum rainfall calculated for in the appropriate schedule period (i.e. the bottom rainfall figure shown in each of the appropriate schedules), and if it can be demonstrated that a significant portion of that excessive rainfall occurred during the last 14 days of the schedule period, then, if requested by the permittee, an additional 14 days of time shall be allowed in order that appropriate back-up disposal procedures may be employed to comply with those liquid levels which were to have been achieved by the end of that particular schedule period. Although an additional 14 days may be granted to comply with the annual or quarterly schedules, all subsequent schedule periods shall commence on the date which the period would have begun had additional time not been needed. Likewise, the liquid level at the beginning of each schedule period shall be established as either the liquid level measured on the first day of the month or the liquid level which according to the reduction schedules was to have been achieved by that date, whichever is less.

By no later than February 15, 1976, the permittee shall submit for the approval of the Executive Director, detailed plans of a proposed irrigation system. Approval or modification of the irrigation plan shall be issued by March 15, 1976. The irrigation plan plus any changes or modifications to the plan determined by the Executive Director to be necessary shall be carried out by June 15, 1976. An extension for the completion of the irrigation system beyond June 15, 1976 may be granted by the Executive Director upon request for those delays unavoidably caused by an act of God or other catastrophe. The permittee agrees that sufficient land area will be leased for a term not to exceed the life of the permittee's permit or future amended permit or otherwise be made available for the irrigation system contemplated under the plan to be submitted by the permittee and approved by the Executive Director, and that such land area will continue to be made available for the irrigation system for as long as necessary to eliminate the materials in the pit reasonably disposable under the irrigation system plan.

The dikes surrounding the pit shall not be lowered or removed except as allowed in an approved plan or plans for closure of the pit. The permittee shall at all times maintain the dikes in good condition and shall take whatever measures necessary to insure that excessive erosion of the dikes does not occur. All dikes surrounding the pit shall have a minimum top width of 8 feet, and shall have outer wall slopes of no greater than 1.5 to 1 (1.5 horizontal units to 1 vertical unit). In addition, the tops of the dikes shall have sufficient slope

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to prevent rainfall from ponding on the top of the dikes, and shall be sloped such that rainfall falling on the top of the dikes will not drain into the pit.

No waste material or water from any source, with the exception of rainwater which falls directly into the pit or into any auxiliary holding or evaporation basins as might be approved later by the Executive Director for the purpose of achieving the overall objectives of this permit, shall be discharged into the pit. All floating oil shall be kept skimmed from the pit.

All material contained in the pit shall be retained on the permittee's property, at the location described in Section IV, until such time as it shall be disposed of by either irrigation, evaporation, incineration, or other disposal techniques approved by the Executive Director. The permittee shall utilize at least one or more of these various methods in order to comply with the liquid level requirements of this permit. The permittee shall, however, before utilizing any methods requiring the construction of additional ponds or basins first obtain approval from the Executive Director. Approval to utilize a particular method may carry with it specific conditions with regards to maintenance, operating procedures, monitoring, and self-reporting. Any information needed by the Executive Director in evaluating a proposed disposal method shall be provided by the permittee upon request. Alternately, pit contents may, provided prior approval is first obtained from the Executive Director, be transported to a duly authorized commercial waste disposal site or identified industrial plant for further processing and/or disposal.

By March 1, 1976, the permittee shall establish a permanent bench mark or elevation reference point at the site in order that reliable measurements of the relative rise or drop in liquid levels might be taken. In addition, a marker should be established in the waste pit to facilitate the determination of liquid level elevation changes.

The permittee shall record the rainfall at the site, and shall on the first day of each month measure the liquid level in the pit. Prior to the tenth day of each month, the permittee shall report in writing to the Texas Water Quality Board's Austin Office the liquid level measured on the first day of each month in relation to the elevation of the permanent bench mark, the increase or decrease in the liquid level since the last reporting date, and the total rainfall measured during the previous month.

At such time as the liquid level of the pit is reduced to the point where substantial areas of the pit bottom are exposed (approximately 50%), the permittee shall submit to the Board a plan or plans for the projected closure of the pit and shall, upon approval of the plan by the Executive Director proceed,

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according to a schedule developed at the time of approval, to cover and close the pit site.

This waste control order becomes effective upon date of Board approval and is valid until amended, cancelled or revoked by the Board.

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ANNUAL SCHEDULE

Effective June 1, 1976, through Permit Expiration

Schedule Period: The first day of June of any year to the last day of May of the following year.

Total Rainfall during 12-month period, in inches*	Minimum net reduction in liquid level during 12-month period, in inches	Total Rainfall during 12-month period, in inches*	Minimum net reduction in liquid level during 12-month period, in inches
36 or less	24	48	12
37	23	49	11
38	22	50	10
39	21	51	9
40	20	52	8
41	19	53	7
42	18	54	6
43	17	55	5
44	16	56	4
45	15	57	3
46	14	58	2
47	13	59	1
		60 or more**	0

*Total rainfall shall be determined as the average of the rainfall totals reported for the appropriate 12-month period at the following three National Weather Service Cooperative Substations: (1) Brenham, Texas, Station No. 1048; (2) Washington State Park, Texas, Station No. 9491, and (3) Hempstead, Texas, Station No. 4080.

** Maximum calculated rainfall for schedule period.

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QUARTERLY SCHEDULE
Effective for the Appropriate Quarter Beginning
June 1, 1976 and continuing through Permit Expiration Date

SUMMER QUARTER Schedule Period: June 1 through last day of August		FALL QUARTER Schedule Period: September 1 through last day of November	
Total Rainfall during 3-month period, in inches *	Minimum Net reduction in liquid level during 3-month period, in inches***	Total Rainfall during 3-month period, in inches *	Minimum Net reduction in liquid level during 3-month period, in inches**
0	21	0	15
1	20	1	14
2	19	2	13
3	18	3	12
4	17	4	11
5	16	5	10
6	15	6	9
7	14	7	8
8	13	8	7
9	12	9	6
10	11	10	5
11	10	11	4
12	9	12	3
13	8	13	2
14	7	14	1
15	6	15	0
16	5	16	-1
17	4	17	-2
18	3	18	-3
19	2	19	-4
20	1	20	-5
21	0	21 or more**	-6
22	-1		
23	-2		
24	-3		
25	-4		
26	-5		
27 or more**	-6		

*Total rainfall shall be determined as the average of the rainfall totals reported for the appropriate 3-month period at the following three National Weather Service Cooperative Substations: (1) Brenham, Texas, Station No. 1048; (2) Washington State Park, Texas Station No. 9491, and (3) Hempstead, Texas, Station No. 4080.

** Maximum calculated rainfall for schedule period.

*** Negative net reduction is defined as a rise in liquid level. Any rise allowed by the schedule is defined as a maximum rise.

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QUARTERLY SCHEDULE
Effective for the Appropriate Quarter Beginning
June 1, 1976 and continuing through Permit Expiration Date

WINTER QUARTER Schedule Period: December 1 through last day of February		SPRING QUARTER Schedule Period: March through last day of May	
Total Rainfall during 3-month period, in inches *	Minimum Net reduction in liquid level during 3-month period, in inches***	Total Rainfall during 3-month period, in inches *	Minimum Net reduction in liquid level during 3-month period, in inches***
0	6	0	15
1	5	1	14
2	4	2	13
3	3	3	12
4	2	4	11
5	1	5	10
6	0	6	9
7	-1	7	8
8	-2	8	7
9	-3	9	6
10	-4	10	5
11	-5	11	4
12	-6	12	3
13	-7	13	2
14	-8	14	1
15	-9	15	0
16	-10	16	-1
17	-11	17	-2
18 or more**	-12	18	-3
		19	-4
		20	-5
		21 or more**	-6

*Total rainfall shall be determined as the average of the rainfall totals reported for the appropriate 3-month period at the following three National Weather Service Cooperative Substations: (1) Brenham, Texas, Station No. 1048; (2) Washington State Park, Texas, Station No. 9491, and (3) Hempstead, Texas, Station No. 4080.

**Maximum calculated rainfall for schedule period.

***Negative net reduction is defined as a rise in liquid level. Any rise allowed by the schedule is defined as a maximum rise.

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Standard Provisions

(a) This permit is granted in accordance with the Texas Water Quality Act of 1967 (Article 7621d-1, V.T.C.S.) and the rules adopted by the Board, and is granted subject to the rules of the Board, the laws of the State of Texas, and further orders of the Board issued in accordance with said rules and laws.

(b) In the event the permittee discharges wastes which exceed the quantity or quality authorized by this permit, the permittee shall give immediate notice to the office of the Board

(c) Acceptance of this permit constitutes an acknowledgement and agreement that the permittee will comply with all the terms, provisions, conditions, limitations and restrictions embodied in this permit and with the rules of the Board, the laws of the State of Texas, and further orders of the Board. Such agreement is a condition precedent to the granting of this permit.

(d) This permit cannot be transferred without prior notification to the Board.

(e) This permit is issued subject to the terms of Section 11(f), Article 7621d-1, V.T.C.S., which reads in part as follows:

> "The permittee may be required, for good cause, from time to time, after notice to the permittee and after public hearing initiated by the Board, to conform to new or additional conditions and terms imposed by the Board following such hearing. The Board shall allow the permittee a reasonable time to conform to such new or additional terms and conditions: provided, however, that upon application of the permittee, the Board, in its discretion, may grant the permittee an additional period of time within which to conform to such new or additional terms and conditions. Such permit or amended permit shall never become a vested right in the permittee, and it may be revoked or suspended for good cause shown, after notice to the permittee and after public hearing initiated by the Board, in the event of the permittee's failure to comply with the terms and conditions of such permit as issued or as amended."

(f) The application pursuant to which the permit has been issued is incorporated herein; provided, however, that in the event of a conflict between the provisions of this permit and the application, the provisions of the permit shall control.

(g) (The provisions of this paragraph (g) of the Standard Provisions of this permit apply only to drinking water supply systems and sewage disposal systems designed for public use as contemplated in Section 12, Article 4477-1, V.T.C.S.) There may be substituted for the foregoing features of the plant other mechanisms, equipment, or treatment methods on prior approval of the State Health Department, provided such substitutions do not result in a reduction of the efficiency and operating safety of the plant nor result in the discharge of a lesser quality of effluent than that authorized under the permit.

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TEXAS WATER QUALITY BOARD
P. O. Box 13246, Capitol Station
Austin, Texas 78711

EMERGENCY ORDER NO. 75-7E

AN ORDER of the Texas Water Quality Board setting forth certain emergency measures for the Sheridan Disposal Service to employ at its Waller County site, in order that accidental, but impending discharge of the contents of the company's 14-acre disposal pit be avoided.

PREAMBLE

Due to the inability on the part of Sheridan Disposal Ser[illegible] to maintain the required freeboard levels in their [illegible] waste disposal pit, and because the disposal pit [illegible] to the extent that there is a real and immediate [illegible] the dikes may be breached and the waste contents discharged to the waters of the State, emergency action is urgently needed to prevent that occurrence. Waste Control Order 00508, which was approved on November 29, 1972, required that the company maintain a freeboard of at least 24 inches and prohibited the company from adding waste material to the pit after April 1, 1973. On February 17, 1975, the available freeboard was observed to be approximately 6 inches. In addition, the dikes were observed on that date as needing substantial amounts of maintenance. The dikes were noted to be soft and in danger of collapse. Now, therefore,

BE IT ORDERED BY THE TEXAS WATER QUALITY BOARD:

1. That Sheridan Disposal Service employ any or all means necessary to prevent the accidental discharge of wastewater from the 14-acre disposal pit.

2. That this Order sets aside the restriction contained on CONTINUATION SHEET II of Waste Control Order 00508, approved by the Board on November 29, 1972, which stated that the dikes surrounding the 14-acre pit might not be raised to an elevation higher than 178 feet above mean sea level.

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3. That Sheridan Disposal Service shall continue to allow no waste material or water, received together with waste material, to be placed in the disposal pit.

4. That Sheridan Disposal Service immediately, and using all necessary precautions, undertake the renovation and maintenance of the dikes surrounding the 14-acre disposal pit. Such renovation and maintenance shall be ongoing and shall continue so long as the pit contains water of quality unfit and/or unauthorized for discharge.

5. That this Emergency Authorization shall in no way affect or prejudice the ultimate decision of the Texas Water Quality Board on any aspect whatsoever of the operation of Sheridan Disposal Service.

6. That a certified copy of this Order be sent to Sheridan Disposal Service.

Passed and approved this 25th day of February, 1975.

TEXAS WATER QUALITY BOARD

J. Douglass Cole

J. Douglass Cole, Chairman

(Seal)

ATTEST:

Hugh C. Yantis

Hugh C. Yantis, Jr., Executive Director

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SPECIAL PROVISIONS
R-2172

1. The opacity of the emissions from the incinerator stack must not exceed 20% averaged over a 5-minute interval as determined by a trained observer, except for those periods described in Rule 103.1 of Regulation I.

2. The operation of this facility must be such that dust and odor do not cause or contribute to a condition of 'air pollution' as defined in Section 1.03.(3) of the Texas Clean Air Act.

3. The incineration of the following list of compounds or materials containing these compounds in the waste burner is prohibited:

   a) Halogen containing compounds.

   b) Compounds with a sulfur content greater than 1% by weight.

   c) Compounds containing chromium, mercury or lead.

   d) Compounds containing cyanides or phenols.

   e) Compounds with an inorganic solid content of greater than 0.5% by weight.

4. Incoming trucks containing liquid wastes must be unloaded into storage tanks. Open pit storage of liquid waste is prohibited.

5. An operator must be on duty at all times while the incinerator is in operation. Within 6 months of the issuance of this permit, the operator should be certified as a visible emission evaluator. Until the operator has been certified, Sheridan Disposal Services, Inc. must contact the Regional Supervisor prior to operating the incinerator.

6. A log book should be established to monitor the operation of the incinerator. To be included in this log book are the times of operation for the incinerator, the average opacity from one plume observation for any period of operation lasting more than an hour, and a note to include any problems associated with the incinerator. This log book is to be available for inspection by any representative of the Texas Air Control Board.

7. All fuel must be filtered prior to storage in tanks and prior to injection into the burner.

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APPENDIX 3A

TWQB & TDWR ANALYTICAL DATA REPORTS

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TEX / TANS 2/23/84

TEXAS WATER QUALITY BOARD

INDUSTRIAL WATER DISCHARGE REPORT

District 7 County Waller River Basin Brazos Date 2-18-70

Discharger Sheridan Disposal Service Permit No. 00508 Page No. 1

Address P.O. Box 42 - Hempstead, Texas Phone No. VA6-2066

Officials (contacted & not contacted) Name & Titles

Mrs. Sheridan, Owner

Mr. Sheridan, Owner

Type Industry Industrial Disposal Pit

Manufacture Principally

Flow Recorder Provided No Sampling Point Provided No

Purpose of Contact Complaints

EFFLUENT DATA

		Permitted	Pit	Red Gully at Clark Bottom Rd.	Donohoe Creek at Clark Bottom Rd. (Upstream)
Sample			Effluent		
Weather		Statutory	Clear		
Time			10:10 a.m.	11:15 a.m.	11:35 a.m.
Sewage Flow	mgd			No	
Industrial Flow	mgd	No	None	Flow	
pH		Discharge	8.8	7.9	8.0
Conductivity	μ mhos/cm		14284	616	664
T. S. Solids	mg/l		1147	10	78
Hardness as $CaCO_3$	mg/l		428	198	133
B.O.D.	mg/l		>2250	14.5	1.0
C.O.D.	mg/l		59,400	65	<20
Temp.	°F				
D.O.	mg/l				
Turbidity	JTU		500		
P. Alkalinity as $CaCO_3$	mg/l		124	0	0
T. Alkalinity as $CaCO_3$	mg/l		2690	194	164
Petroleum ether extract	mg/l		-	-	-

JUL 1970 TEXAS WATER QUALITY BOARD

STREAM DATA

Receiving Red Gully Donohoe Creek

Distance to Brazos River River

Type Area Traversed Cattle grazing Dilution ratio None

Downstream uses Fishing

FIELD REQUIRED				
DATE		ACT	NOTE	
	B.D.			
	C.T.			
	G.S.			

Second 1-68 WQB 16

001745

TEXAS WATER QUALITY BOARD

AUSTIN, TEXAS

TO: John B. Latchford, Jr., Director of Field Operations

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service, W.C.O. No. 00508, Hempstead

INTER-OFFICE MEMORANDUM

As per your telephone request of February 6, 1973, I sampled the Sheridan disposal pond for spectrographic analysis on March 8, 1972. The scan was performed by Southwestern Labs, and the results are attached for your information. Manganese and nickel are the only two metals exceeding the discharge quantities as stated in Board Order 70-0828-5 which pertains to hazardous metals.

001746

JBL

Signed Tom Kearns

Date May 23, 1973

M.J. Colston, P.E., May 25, '73

TK pb

JB-33

Texas Water Quality Board
2318 Center Street
Deer Park, Texas

Spectrographic Examination

Station Marks

	Sheridan Pit 3-8-73
Mercury, u/l	4.0
Sulfated Solids, mg/l	18,080.

SPECTROGRAPHIC EXAMINATION

Element	Estimate of Quantity Present Approximate No. of mg/l
Aluminum	40.
Barium	Trace
Calcium	496.
Chromium	3.
Copper	0.3
Iron	20.
Lead	N.D.
Magnesium	893.
Manganese	4.
Molybdenum	0.8
Nickel	2.
Potassium	81.
Silicon	2.
Sodium	3699.
Strontium	Trace
Vanadium	3.

The following elements were specifically sought. If their presence is not reported above, they were not detected, i.e. either they are not present or they are below the limits of detection by the examination procedure: Ag, Al, As, Au, B, Ba, Bi, Be, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, Ge, Hf, Hg, In, Ir, K, Li, Mg, Mn, Mo, Na, Nb, Ni, Os, P, Pb, Pd, Pt, Sb, Re, Rh, Ru, Sb, Se, Si, Sn, Sr, Ta, Te, Ti, Tl, V, W, Zn, Zr.

ATTACHMENT
5/23/73

SOUTHWESTERN LABORATORIES

13556
ns

SLUDGE OR WATER?

WATER

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SHILSTONE ENGINEERING TESTING LABORATORY, INC.
INSPECTING AND TESTING
ENGINEERS-CHEMISTS-METALLURGISTS
1716 W. CAPITOL AVE. BOX 1463 / HOUSTON, TEXAS 77008 / PHONE (713) 224-2047

REPORT NO. A-3523/01 DATE May 29, 1973

TEST REPORT

MADE ON Liquid

CLIENT Sheridan Disposal Service, Inc., P.O. Box 42, Hempstead, Texas

Attn: Mr. Jim Mussett

IDENTIFICATION As indicated below

SAMPLE NO.	N.E. [illegible]	N.W. Bottoms	S.W. Bottoms	S.E. [illegible]	S.W. Water	N.W. Water
[illegible] SOLIDS,%	71.58	39.36	53.38	48.50	50.31	[illegible]
[illegible]	12.17	20.6	3.14	2.50	2.47	[illegible]
[illegible]	8.6	7.2	7.7	7.5	3	7.5

SEMI-QUANTITATIVE SPECTROGRAPHIC ANALYSIS

[illegible]	APPROXIMATE %, On ashed basis					
[illegible]um	8.	9.	11.	0.2	0.2	0.07
[illegible]	2.	2.	2.	Trace	Trace	[illegible]
[illegible]	0.04	0.03	0.01	0.06	0.07	0.04
[illegible]	9.	8.	9.	6.	6.	7.
[illegible]um	0.4	0.5	0.2	0.01	0.01	0.005
[illegible]	0.02	0.02	0.01	ND	ND	ND
[illegible]er	0.04	0.04	0.03	0.002	0.002	0.001
[illegible]	6.	7.	4.	0.1	0.08	0.04
[illegible]	0.2	0.3	0.3	ND	ND	ND
[illegible]ium	4.	3.	4.	3.	2.	2.
[illegible]nium	0.02	0.03	0.01	0.02	0.01	0.01
[illegible]	0.1	0.1	0.07	0.04	0.04	0.07
[illegible]	ND	ND	ND	2.	2.	2.
[illegible]	9.0	10.	6.	0.1	0.1	[illegible]
[illegible]um	4.	4.	4.	26.	27.	26.
[illegible]um	Trace	Trace	Trace	Trace	Trace	Trace
[illegible]ium	1.	1.	2.	0.02	0.008	ND

[illegible] Not Detected

LAB ATTACHMENT
6/12/73

Respectfully submitted,

SHILSTONE ENGINEERING TESTING LABORATORY, INC.

B. L. McClellan

001748

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section
Gary Schroeder, P.E., Chief, Enforcement Support Section

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.Q. #00508

INTER-OFFICE MEMORANDUM

Attached herewith are two (2) sample sheets relating the metal parameters found in the sludges from two (2) locations in the Sheridan disposal pit: the north end and the south end. Additionally, a pesticide scan was also made. In comparison, the data is tabulated along with the EPA's limits for metals found in sediment samples.

Parameter	North	South	EPA Limits
Zn	633.8 mg/Kg	115.6 mg/Kg	75.0 mg/Kg
Pb	537.1 mg/Kg	365.3 mg/Kg	50.0 mg/Kg
Cu	91.1 mg/Kg	33.5 mg/Kg	50.0 mg/Kg
Cr	183.1	300.6 mg/Kg	100.0 mg/Kg
Ni	69.5	76.3 mg/Kg	50.0 mg/Kg
Ba	403.8	647.4 mg/Kg	
Cd	1.9	2.3 mg/Kg	2.0 mg/Kg
Pesticides	None noted	None noted	

TK:pb

Attachments: Sample Sheets

Signed Tom Kearns

Date March 1, 1976

WQH-33 Approved

001749

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (Filed)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.O. #39007 - Hempstead

INTER-OFFICE MEMORANDUM

As part of the ongoing surveillance of the Sheridan's land irrigation project, an inspection of the site was made on September 1, 1976 to collect water and soil samples necessary to gauge both the effectiveness and the impact of the disposal technique. Additionally, two Bermuda grass samples were collected - one from the test plot and one for control purposes, to detect any possible uptake of metals in the vegetation cover over the initial test area. The analytical data is tabulated and summarized below. Where possible, the data is compared with previously collected samples to note any changes. On September 1, the surface level of the pond had dropped 40 inches since June 1, which indicates approximately 12 million gallons of wastewater has been disposed of through the irrigation system.

Pond Water

Parameter	9-1-76	9-6-75
pH	6.2	6.4
COD, mg/l	33700	27980
BOD, mg/l	7000	> 3220
TOC, mg/l	> 6400	-
TDS, mg/l	23000	21310
Cl, mg/l	5000	4400
Conductivity, mg/l	20000	17500

Signed _____

Date October 12, 1976

WQB-33

001750

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

FIELD OPERATIONS OCT 27 1976

TO: George E. Green, Chief, Field Support Section (Filed)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service, W.C.O. #28083

INTER-OFFICE MEMORANDUM

On September 2, 1976, an inspection of the subject facility was made to collect a sample from the waste pond to determine the concentrations of metals in the waste. Additionally, a soil sample from the waste irrigation field was collected to determine if leachate from the soil sample was high in selective metals. The analytical results are tabulated below:

Parameters	Pond Waste	Soil Leachate
Cd	90 ug/l	< 10 ug/l
Pb	88 ug/l	< 50 ug/l
Ni	190 ug/l	-
Zn	390 ug/l	-
Ba	500 ug/l	-
Ca	1770 ug/l	-
Mg	2590 ug/l	1060 ug/l
Cu	230 ug/l	-
Hg	.2 ug/l	-

The data shows no significant concentrations in either sample; however, in terms of the concentration of metals in the soil, analysis from the soil itself might be more meaningful.

TK:pb

Attachment: Sample Sheets

Signed Tom Kearns

WQB-33 Billy H. Berger
Approved

Date October 25, 1976

001751

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

File

TO: Lew N. Griffith, P.E., Chief, Field Support Section

FROM: Gus Garcia, District 7 Representative

SUBJECT: Sheridan Disposal Service, W.C.O. #00508
Biooxidation Batch Test

INTER-OFFICE MEMORANDUM

Three biooxidation batch tests were conducted using the waste in the Sheridan pit.

Activated sludge for the tests was obtained from the Bayport industrial waste treatment plant.

The batch tests were performed in an eight liter reactor.

Oxygen uptake rates of 30 mg/l/hour were recorded on the fresh endogenous sludge. After addition of 1 liter of waste to 7 liters of sludge the uptake increased to 130 mg/l/hour indicating that the waste was not toxic to the biomass and that at least a portion of the organic material was biodegradable.

The first two batch tests indicated that approximately 30% of the COD was biodegradable at detention times of 36 to 48 hours.

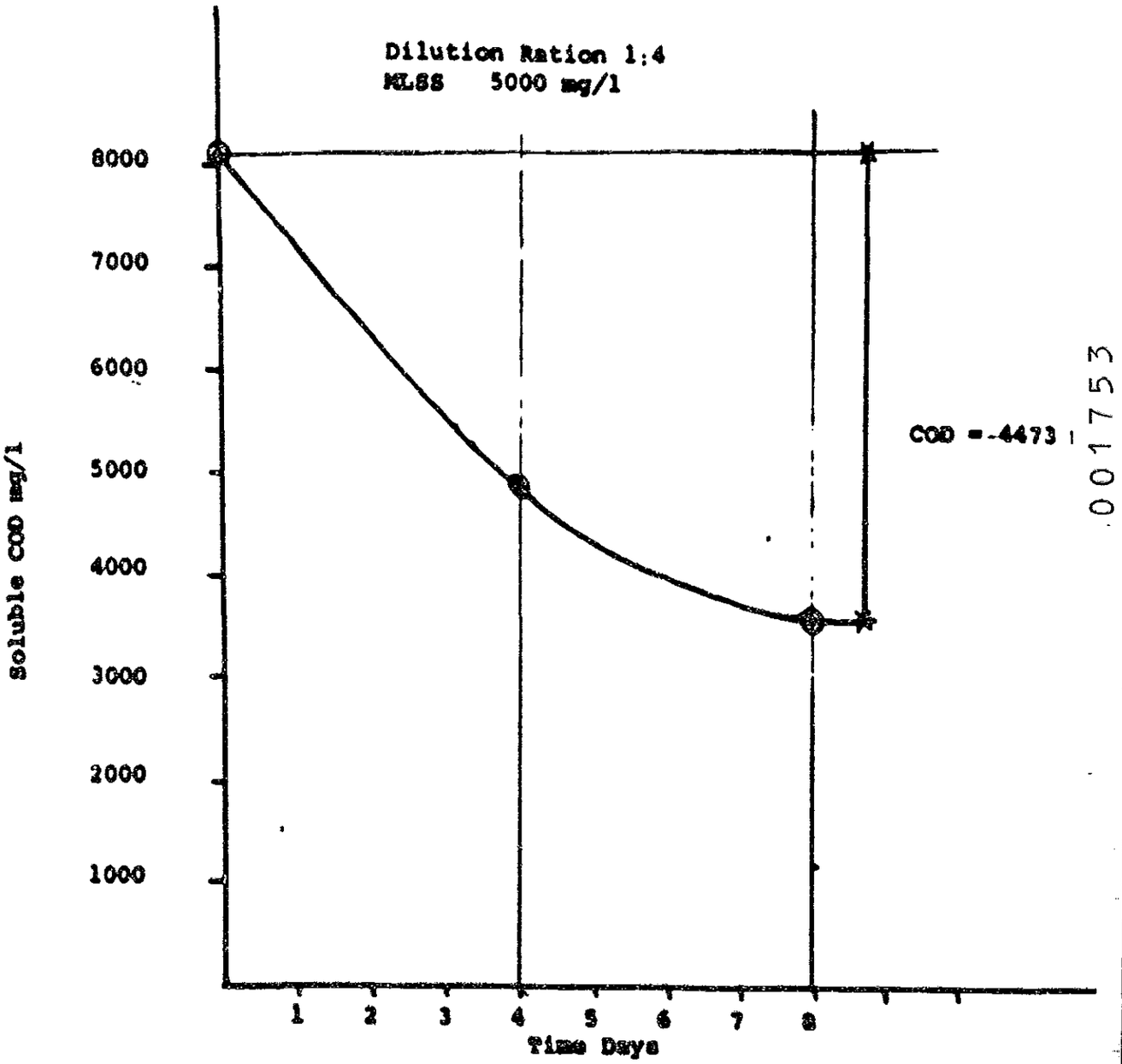
The third test was performed extending the aeration time to 8 days. The results are plotted on the following page.

Signed G. H. Garcia

Date March 21, 1973

WQH-33

001752



From the graph the ThOD (after Busch)

ThOD = 4473 mg/l x 4 = 17,892 mg/l

The ThOD according to Art Busch is an approximation of ultimate BOD or 20 day BOD.

0017753

Results of the 8 days test indicate that up to 50% of the COD is biodegradable. (TOC showed similar removals.)

Arrangements are being made to run a bioassay to test if the "treated" waste is toxic and compare it to the raw waste.

From the very preliminary results obtained, the following "guesstimate" of a treatment plant can be made.

Waste volume = 14 acres x 10 ft. = 140 acre ft.
≈ 45.7 MG

Assuming that a biological plant was designed to treat this waste in one year.

Daily flow	=	0.125 MGD
Organic load (TbOD)	=	17,892 mg/l
Organic load #/day	=	18,652 #/day

Oxygen required assuming that 1# of TbOD requires 1# of O_2

O_2 required	=	18,652 #/day
	=	777 #/hour

Assuming an oxygen transfer of 2# O_2/H.P. hour using floating aerators.

H.P. required $= \frac{777 \text{ \#/hour } O_2}{2\text{\# } O_2\text{/H.P. hour}} = 390$ H.P.

8 - 50 H.P. aerators required

Aeration basin volume for 8 days retention time.

= 1 million gallons

Clarifier size for daily flow of 125,000 gpd, using overflow rate of 500 gpd/ft.^{2}.

= 250 ft.^{2}
≈ 20 ft. diameter clarifier

001754

F/M assuming 3000 mg/l of "bugs"

1 MG x 3000 mg/l x 8.34 = 25,000 # bugs

$$\frac{18,652 \text{ \# TbOD/day}}{25,000 \text{ \# bugs}} = 0.75 \text{ - too high}$$

Increase detention time to 12 days and MLSS to 4000 mg/l

Aeration basin volume 1.5 MG

1.5 MG x 4000 mg/l x 8.34 = 50,000#

$$F/M = \frac{18,652\text{\# TbOD/day}}{50,000 \text{ \# bugs}} = 0.37 \text{ - OK}$$

Very Preliminary Cost Estimate

Aeration Basin

Excavation 7500 c.y. @ $4/c.y.		$30,000
Concrete lining		$20,000
Aerators 8-50 hp @ $10,000		$80,000
Final clarifier 20 ft. diameter @ $2500/ft. of diameter		$50,000
Subtotal		$180,000
Piping @ 15%	$27,000	
Electrical @ 12%	$22,000	
Site work @ 5%	$10,000	
Engineering @ 8%	$15,000	
	$74,000	$74,000
		$254,000
Contingency @ 15%	=	$38,000
Total guesstimate	=	$292,000

Signed [signature]

Date March 21, 1975

GG:pb

[signature]
Approved

001755

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

Gary Schroeder, P.E., Chief, Enforcement Support Section (Actic

TO: ~~Attention: Chas Sievins~~

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.O. #00508 - Hempstead - Waller County

INTER-OFFICE MEMORANDUM

001756

I. Introduction:

On October 14, 1975, an inspection of the subject facility was made to determine the degree of compliance with the existing W.C.O. Additionally, Mr. and Mrs. Sheridan were contacted to discuss the new proposed permit now in final draft form. The results of that discussion will be reported in narrative form in the Narrative Section of this report.

II. Findings:

1. The surface level of the waste lagoon has dropped 14 inches since September 2, a net decrease of 3.75", since the pond marker was installed in April 1975. The pond marker now reads 57.75 inches; the original baseline was 54.00 inches.

2. Freeboard along the perimeter dike averages 18-24 inches.

3. During the inspection, four (4) 130 barrel vacuum trucks were observed dumping into the 400,000 gallon receiving pond adjacent to the main disposal pond. According to company personnel, waste was placed into the receiving pond instead of the storage tanks due to a malfunction of the transfer pump.

4. The incinerator used to burn waste oil and evaporate waste-water appears to be inoperative, although Mr. Sheridan denies the claim. The inside tank has buckled and numerous multi-chambered "dirt-dobber" nests were observed inside the fire area.

Signed _____

WQR 11

Date October 17, 1975

5. The pilot land irrigation study is due to commence October 20, 1975, pending the completion of a retaining dike and the application of nitrogen fertilizer to the soil.

6. Recent sampling of the lagoon (September 2) indicates the aqueous phase maintains a uniform depth of 11.0'-12.0' over approximately 3 feet of extremely oily sludges. The elevation of the dike is 15.5 feet above ground level.

7. Analytical data regarding the quality of both the aqueous and bottom sludges will be forwarded after completion by the lab.

III. Recommendations:

This report is to update existing actions concerning the subject site.

IV. Narration:

Recently, a draft permit seeking to regulate the dewatering of the Sheridan lagoon was forwarded to the Sheridans for their consent. Essentially, the new permit seeks to implement both long and short term schedules to lower the surface level of the waste pit until ultimate closure. Among other things, the permit requires that, if necessary, the schedule shall be met using an approved land irrigation method which necessitates the use of 50 acres of farm land owned by the Sheridans, but not included as assets in the disposal company.

Mr. and Mrs. Sheridan vehemently oppose many stipulations of the permit including:

1. The preparation of additional reports which might require the services of additional personnel.

2. The use of 50 acres of privately held land to dispose of the waste by irrigation.

   a. The use of any land without a pilot study which demonstrates the practicality of such a project.

001757

3. The idea of scheduling a reduction of the liquid level using rainfall records as a criterion.

4. The idea that the dikes shall not be raised except by authorization by the Executive Director.

No doubt the Sheridans are opposed to other conditions and stipulations in the permit but, in essence, the Sheridans apparently feel that they are "being pushed to the wall" with a permit they believe is unreasonable, prohibitive in its restrictions, and too expensive to implement. Mr. and Mrs. Sheridan indicated that for over 10 years the TWQB allowed and permitted the disposal of waste within the pit and now - a few years later - we (TWQB) want the waste removed - at their expense - which, in their viewpoint, amoun to a position of blatant hypocrisy.

Mr. Sheridan stated that he was also disturbed that the first draft of the permit - which, to a certain extent, had his approval - was leaked by the singular action of Mr. D. Toole - Chairman of the TWQB without being formally submitted to the Board for discussion. Furthermore, Mr. Sheridan resented the idea that the final draft might have been written under Mr. Tool's guidance and direction, as a result of pressure placed on the Chairman from Mr. Sheridan's neighbors who, according to Mr. Sheridan, would like to see the disposal site closed.

Mr. Sheridan stated that he would not sign a consent to the permit, but would, in fact, seek a restraining order from the local district court to prevent the TWQB from implementing the permit and to prevent a public hearing from being held in Hempstead on the grounds that "it is designed to create a circus atmosphere and make fools of him and his wife".

Without a doubt, Mr. Sheridan, judging from his words and behavior, was indicating his feeling and belief that the TWQB was pushing him to the end, financially, physically, and emotionally. He stated that if the TWQB wanted the material out of the pit we would do and get it.

001758

Concerning other matters, the Sheridans are still interested, restraining order or not, in participating in the pilot study seeking information to probe the feasibility of using land irrigation as a disposal method to reduce the level of the pond. Mr. Sheridan stated that he gave his word on that and he intends to keep it. The pilot study will begin October 20, 1975, weather permitting.

Signed _____

Date October 17, 1975

TK:pb

_____
Approved

001759

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.O. #00508 - Hempstead

INTER-OFFICE MEMORANDUM

On October 20, 1975, a pilot study was instigated at the subject facility to determine the feasibility of utilizing land irrigation methods to dispose of industrial wastewaters impounded at the site. Hopefully, the existing technology of land treatment could provide a method to dispose of the wastewaters by evaporation, evapotranspiration and biodegradation.

Presently, approximately 180 acre feet (59 million gallons) of waste materials - including both aqueous and sediment phases - are impounded in a 14-acre earthen lagoon. The source of the waste materials includes a wide variety of waste streams from equally varied industrial sources. Generally, the waste can best be characterized as a "petrochemical soup" including organics, solvents, herbicides, oily waste, tars, "bottoms", and other sundry components.

Waste disposal operations at the site began in 1959 using a pond to evaporate the waste. Active use of the pond ceased in April 1973 with the issuance of the first amended permit which precluded direct discharges into the pond after that date. Since April 1973, the pond has collected an additional 48-acre feet of rainwater.

Waste Characteristics

Prior to initial application on the land surface, samples of the wastewater were collected for appropriate analysis. Wastewater was collected with a Kemmeren sampler at depths ranging from 0.5' to 5'-0' to 10.5'; sludge samples were collected with an Ekman dredge. Analytical results, exclusive of parameters not yet available from the lab, are tabulated below:

Signed _____

WQB-33

Date February 5, 1976

001760

Parameters	North 0.5'	North 5.0'	North 10.0'	South 0.5'	South 5.0'	South 10.0'	Sludge North	Sludge South
pH		6.4	6.4		6.3			
BOD	> 3220		> 3260		3240		Not available	Not available
COD	27980		29730		29520			
TOC	Too oily		Too oily		Too oily			
TDS	21310		10800					
Cl^-	4400		4400		4500			
Cu		1.26	1.26		2.99			
Pb		0.12	0.12		0.60			
Ni		0.25	0.25		0.50			
Cd		< 0.01	< 0.01		< 0.01			
Cr		0.22	0.22		2.27			
BA		0.3	0.3		1.6			
Zn		3.25	3.25		5.10			

001761

Test Plot - Physical Description

A three-acre plot located 100 yards northwest of the lagoon was selected at the test area for the initial application (see site diagram). The plot, as well as the Sheridan's 700 acre ranch, is

located on an outcrop of the Miller/Norwood Clay, "A level deep, fine, and medium textured and moderately permeable soil". The upper portion of the profile contains a small amount of sand - probably less than 5% and equally small amounts of organic matter. The site is fenced, surrounded by a one (1) foot high retaining dike and relatively flat with a gradual slope away from the Brazos River. The structure of the upper ten (10) inches of soil was broken using a twenty (20) inch disc. Additionally, the plot was dressed with a light application of nitrogen fertilizer.

A leachate test was conducted prior to the initial application to establish baseline data regarding the concentrations of TDS, TOC and Cl in the soil. The apparatus and method for the leachate test is as follows:

A one (1) inch chromatographic column was packed with 100 gms of soil ~~with~~ a total of 600 ml of deionized water was filtered through the soil in six (6) applications. Analytical results of the leachate are tabulated below:

pH	7.2
TDS	234
Cl^-	3.5
TOC	18

Application

The standard application rate for biodegradable wastewater applied on the land using a "spray method" is "2 inches per acre per week".

Because of the high organic load and, again, because a spray system is not available at the site, an application rate per se was not designed, but rather the total volume was limited to 100,000 gallons to be applied as weather and transportation dictate.

The waste was loaded in two 1300 gallon tanks with spray nozzles pointed downward. The tanks were pulled by tractor and the waste released as the tanks circled the test plot.

001762

By December 10, 1975, a total of 75,000 gallons had been applied on the three acre plot. Soil samples were collected on November 6 (after 37,200 gallons) and again on December 12 (after 75,000 gallons). The leachate test was conducted with the following results:

	Prior to Application	After 37,200 Gallons	After 75,000 Gallons
pH	7.2	7.0	6.5
TDS	234	822	368
Cl^-	3.5	54	36
TOC	18	32	75

The test results do not indicate a significant increase in salts which was expected judging from the nature of the waste. However, this might be due to the inaccuracies of the leachate test rather than a reflection of the actual situation. The three acre plot - as seen today - is still barren, i.e., without vegetation. No doubt the salt buildup is higher than the leachate test has indicated.

Results

It seems clear that the wastewater in the Sheridan's pond can be applied to the land only if deleterious effects are accepted. The concentration of inorganic salts, particularly chlorides, will render the land unsuitable for any agricultural use until such time as the salts are leached out by rainfall or artificial flooding.

Signed [signature]

Date February 5, 1976

TK:pb

[signature]
Approved

001763

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George R. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service, W.C.O. #19007

INTER-OFFICE MEMORANDUM

Attached hereto is a lab sheet reporting TOC, TDS, COD and Cl^- values for the leachate obtained from a representative soil sample on the subject facility's proposed land irrigation plot. The values represent the condition prior to the first application and will be used as background data. The parameters are tabulated below:

TOC	15 ppm
TDS	381 ppm
Cl^-	36 ppm
COD	71.1 ppm

The leachate method is as follows: 100 gms of dry soil were placed in a 1000 ml beaker. 800 ml of deionized water was added and agitated to produce a solution. The mixture was allowed to settle, the supernate decanted, and appropriate analyses run.

CENTRAL OPERATIONS MAY 26 1976

TK:pb

Attachment: Lab Sheet

Signed Tom Kearns

WQB: Approved

Date May 10, 1976

001764

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George F. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service, #39007

INTER-OFFICE MEMORANDUM

On May 17, 1976, the subject company began operation of their land irrigation system which is designed as the principal means of dewatering the main disposal lagoon. The system, as designed, is an "evaporation rapid infiltration method of flood irrigation". That is, the supernatant from the lagoon is used to flood a series of terraces constructed on a 46 acre tract east of the pond. The disposal of the wastewater is through biodegradation, evaporation and infiltration.

Specifically, the system is operated in the following manner: the supernatant is decanted through an eight inch pipe to the highest point on a 46 acre tract of land east of the lagoon. The wastewater, flowing at a maximum rate of approximately 650 GPM, saturates and fills the first of six completed terraced structures constructed on six inch contour intervals. The field is terraced in the manner of a rice field. The first terrace encompasses approximately two acres (see photos).

The application rates and duration are largely dependent upon the short term weather projections and not waste loadings. Biodegradation is an unknown factor in the disposal method primarily due to the high percent of non biodegradable COD and high concentrations of TDS, especially chlorides. The system, therefore, is considered primarily a rapid infiltration evaporation design. However, biodegradation is expected to continue to an unknown degree. As such, enhancement measures will be utilized, i.e., periodic tilling of the soil, no standing pools beyond an 8 hour period, periodic applications of fertilizers, to maintain aerobic conditions in the top soil to enhance any possible bio activity and to prevent anerobic conditions from setting in. Additionally, structural damage to the soil will also be minimized by tilling.

Signed

Date: May 22, 1976

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POOR QUALITY
ORIGINAL

001765

Surface waters adjacent to the irrigation tract are protected by a 2.5 foot clay berm circumscribing the entire tract; the groundwaters are protected from vertical migration by a clay rich soil. The water table is approximately 45 feet below ground surface. Excess wastewater is likely to commingle with the free water faction in the soil which, of course, will probably further "burn" the soil with a steady accumulation of salts. The salts will remain in the soil until leachated out by rainfall. Additionally, as the percentage of exchangeable sodium increases, the soil permeability will be reduced due to the swelling of the clays. Nevertheless, the effects of both phenomenon, that is, the concentration of salts, noteably chlorides, and the reduced permeability and hence reduced infiltration, will be minimized with frequent tilling of the applied areas and normal rainfall. Heavy metal accumulation is not expected to be a problem due to the low concentrations of metals in the wastewaters. Nevertheless, the accumulation of metals in the soil, as well as salt, will be monitored on a regular basis.

Obviously, the success or failure of this method of wastewater disposal is not to be judged by the consequences of the effects upon the land surface, but rather as to whether the method adequately serves the purpose to which it was intended. The method <u>will have</u> an adverse effect on the land surface (as demonstrated in the pilot study) to the degree to which it would have served an agricultural purpose. It should not have an adverse impact upon the surface or groundwaters if the operating controls are carefully followed. Inclusion of the irrigation method in the permit presupposes an acceptance of adverse effects upon the land surface. Any harmful effects rendered to the land will be minimized through the action of natural recuperative processes or necessary interventions. In the event of severe contamination, e.g., a rapid accumulation of heavy metals, the affected substrate zones could be scraped and placed back into the pit as fill material.

Initially, 660,000 gallons of wastewater was channeled into terrace I at the rate of 650 GPM (note: the actual operation of the system differs from the afore described design in that only the amount of wastewater necessary to saturate and pool uniformly over the terrace is applied at one time, than the water is channeled to the next terrace to repeat the process). The water does not overflow i.m terrace to

001766

ATTACHMENT
5/27/76

terrace as this would necessitate a long "standing pool" time. As of May 20, 1976, the system has handled approximately 1 million gallons of wastewater with a subsequent lowering of the lagoon level of approximately 2.5 inches. (Note: the pond marker reading on May 20, 1976, 1100 hours, was 56 3/4".)

The Sheridans plan to utilize the first three terraces for disposal purposes (an estimated 25 acres); the remaining acreage will be held in reserve as a safety factor, that is, the reserve tract will catch the washdown from the first three terraces in the event unexpected rainfall occurs while the system is flooded. The last three terraces, as well as the circumscribing dike, would hold the wastewater on-site.

No difficulties were noted in the system; however, the soil conditions and the groundwater will be monitored on a regular basis. Additionally, close contact will be maintained with the Sheridans to insure that they observe proper operating controls and maintain records. Adjustments to the system will be made as necessary with Austin's concurrance.

Signed Tom Peters

Date May 27, 1976

TK:pb

Attachment: (6) Photos

Billy W. Biggs
Approved

ATTACHMENT
5/27/76

001767

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Company - #39007

INTER-OFFICE MEMORANDUM

Attached hereto are three sample sheets relating leachate analyses from soil samples collected from the irrigation field at the Sheridan Disposal site. The soil samples represent the first collected since the waste irrigation project was begun. The samples were collected three weeks after approximately 1.2 million gallons of waste were applied on the field. The analyses of the leachates as well as baseline data are tabulated below:

Parameter	Baseline	N.Field #1	Field-Disch.#1
COD	71	490	580
TDS	281	1291	1340
TOC	15	170	195
Cl^-	36	215	280
pH	-	7.4	7.4

The sample points are further identified as follows: the baseline sample and the sample identified as "Field-Disch.#1" were collected from a point in the field 150' north of the discharge pipe; the sample identified as "North-Field #1" was collected from the north-east corner of the field (see site diagram).

The analyses indicate a significant elevation of all parameters over the baseline data. Subsequent to this sampling, the field has been tilled and another waste application made. Further soil samples will be collected and monitored as necessary.

TK:pb

Signed Tom Kearns

WQH 33

Approved

Date July 9, 1976

001768

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

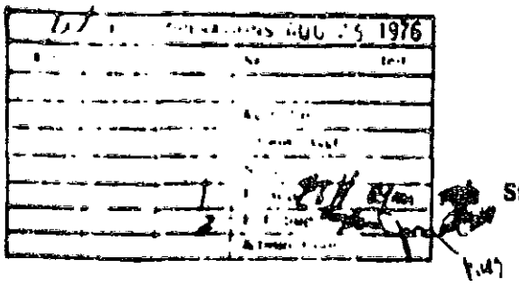
SUBJECT: Sheridan Disposal Service - Hempstead - W.C.O. #39007

INTER-OFFICE MEMORANDUM

On August 11, 1976, soil samples from the irrigation field were collected to assess, insomuch as possible, the status of the waste irrigation project with respect to 1) the accumulation of inorganic salts in the soil profile and 2) the degree of biological activity as measured by changes in the pH. The samples were processed according to the leachate test as described in the Solid Waste Guidelines. The results are tabulated below:

	Baseline	Point #1 (mg/l)	Point #2 (mg/l)
pH	7.7	8.1	7.6
Cl	36	180	375
TDS	281	1460	1230
TOC	15	630	160
COD	71	4990	311

The values from both points show a marked elevation over the baseline data. As a point of comparison, however, the mean values of Point #1 and Point #2 compared with the mean of identical points collected June 21, 1976 show a slight rise in values with the exception of COD. Considering the large percentage of nonbiodegradable COD present in the waste, the elevated COD was expected and should continue to rise. The arithmetic mean of both samples is tabulated below along with baseline data.



Signed

Date August 24, 1976

WQB-33

001769

Sheridan Disposal Service
W.C.O. #39007
Page 2

	Baseline	6-21-76	8-11-76
pH	7.7	7.4	7.8
COD, mg/l	71	535	2650
TOC, mg/l	15	183	395
TOD, mg/l	281	1312	1345
Cl^-, mg/l	36	248	278

The relative stable pH values suggest that the anaerobic bacterial action is proceeding in a relatively balanced fashion.

Signed Tom Kiesner

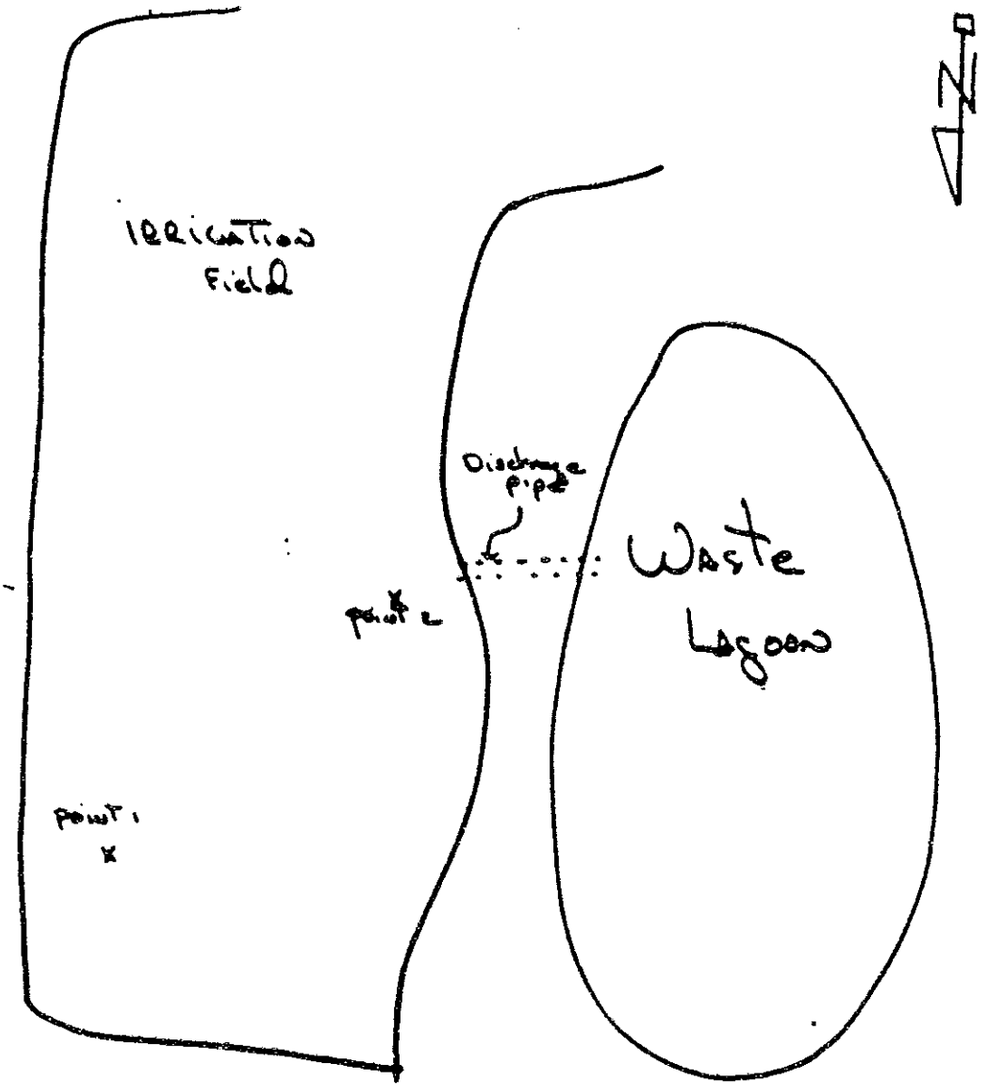
Date August 24, 1976

TK:pb

Billy L. Boggs
Approved

001770

ATTACHMENT
8/24/76



Sheridan Disposal Service

LAST ATTACHMENT

001771

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.O. #19007 - Hempstead

INTER-OFFICE MEMORANDUM

As part of the ongoing surveillance of the Sheridan's land irrigation project, an inspection of the site was made on September 1, 1976 to collect water and soil samples necessary to gauge both the effectiveness and the impact of the disposal technique. Additionally, two Bermuda grass samples were collected - one from the test plot and one for control purposes, to detect any possible uptake of metals in the vegetation cover over the initial test area. The analytical data is tabulated and summarized below. Where possible, the data is compared with previously collected samples to note any changes. On September 1, the surface level of the pond had dropped 40 inches since June 1, which indicates approximately 12 million gallons of wastewater has been disposed of through the irrigation system.

Pond Water

Parameter	9-1-76	9-6-75
pH	6.2	6.4
COD, mg/l	33700	27980
BOD, mg/l	7000	> 3220
TOC, mg/l	> 6400	-
TDS, mg/l	23000	21310
Cl, mg/l	5000	4400
Conductivity, mg/l	20000	17500

Signed _____

WQB-33

Date October 12, 1976

001772

The decrease in water quality of the pond water - as noted in the latest sampling - could be attributed to an assumption that the closed pond was stratified by density levels with the "fresh" water floating on more saline water. Since the uppermost four feet have been removed from the pond, the remaining quantities would be expected to have an increase in just those parameters noted above. The continued lowering of the pH could indicate a slight but steady increase in biological activity The lower pH, however, if it continues to drop near the 5.5 level, will present difficulties to the land irrigation project in two areas: 1) the acidic waters may inhibit biological activity, and, 2) the acidic waters will increase the solubility of the metals which are in high concentrations in the sludges. An increase in metal concentrations would prevent further use of the land irrigation system since an accumulation of metals on the soil would be relatively permanent and detrimental to the use of the land for agricultural purposes.

001773

Grass Samples

Sample #1		Sample #2 (control)
Pb	2.27 mg/Kg	8.150 mg/Kg

Obviously, since the control is 4 times higher than the test sample, the values are meaningless in determining whether a heavy metals uptake has resulted from the application of waste upon the land. Background samples of the soil showed a lead value of slightly over 4 ppm.

Soil Samples

Two soil samples from the irrigation field were collected to assess the status of the irrigation project with respect to: 1) the accumulation of inorganic salts in the soil profile and, 2) the degree of chemical and biological activity as measured by changes in the pH. The samples were processed according to the leachate test as described in the Solid Waste Guidelines. The results are tabulated below:

ATTACHMENT
10/12/76

Baseline (5-10-76)		Point #1 (9-1-76)	Point #2 (9-1-76)
pH	7.7	7.8	7.8
Cl, mg/l	36	150	170
TDS, mg/l	281	3046	611
TOC, mg/l	15	155	-
COD, mg/l	71	460	130

The values from both points show a marked elevation over the baseline data. As a point of comparison the mean value of Point #1 and Point #2 combined were compared with the mean of identical points collected on June 21 and August 11. The arithmetic mean of all three samples is tabulated below:

	6-21-76 (After 1.2 MM gals of waste)	8-11-76 (After 7.2 MM gals)	8-30-76 (After 12 MM gals)
pH	7.4	7.8	7.8
COD, mg/l	535	2650	295
TOC, mg/l	183	393	185*
TDS, mg/l	1312	1345	1830
Cl, mg/l	248	278	160

* Not a mean

The values are relatively stable across the sampling. The fluctuations are no doubt largely due to sampling techniques and variations in the samples, especially the amount of waste in the free water fraction of the soil.

The stable pH values suggest that the anaerobic action is proceeding in a relatively balanced fashion.

Signed Tom Keane

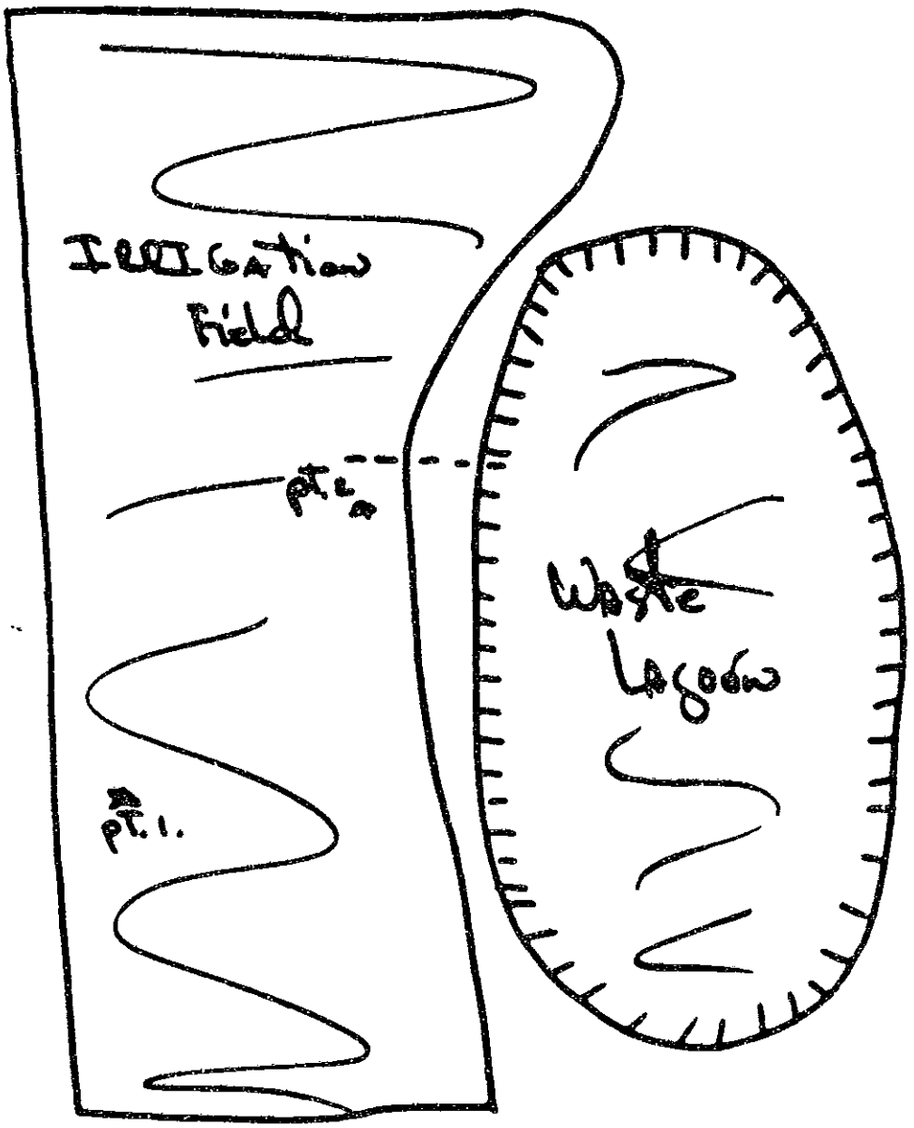
Date October 12, 1976

TK:pb
Attachments: Sample Sheets
Sketch

[illegible]
Approved

ATTACHMENT
10/12/76

001774



Shallow Piezometer -
soil moisture pts.

ATTACHMENT

001775

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service, W.C.O. #39007

INTER-OFFICE MEMORANDUM

On September 2, 1976, an inspection of the subject facility was made to collect a sample from the waste pond to determine the concentrations of metals in the waste. Additionally, a soil sample from the waste irrigation field was collected to determine if leachate from the soil sample was high in selective metals. The analytical results are tabulated below:

Parameters	Pond Waste	Soil Leachate
Cd	90 ug/l	< 10 ug/l
Pb	88 ug/l	< 50 ug/l
Ni	190 ug/l	-
Zn	390 ug/l	-
Ba	500 ug/l	-
Ca	1770 ug/l	-
Mg	2590 ug/l	1060 ug/l
Cu	230 ug/l	-
Hg	.2 ug/l	-

The data shows no significant concentrations in either sample; however, in terms of the concentration of metals in the soil, analysis from the soil itself might be more meaningful.

TK:pb

Attachment: Sample Sheets

Signed Tom Kearns

WQB-33 Billy H. Brown
Approved

Date October 25, 1976

001776

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service, W.C.O. #39007, Waller County

INTER-OFFICE MEMORANDUM

Attached hereto is a sample sheet showing background metal concentrations in the leachate from the topsoil comprising the Sheridan waste irrigation field. The analytical data is tabulated below:

Cd	< 10 ug/l
Pb	< 50 ug/l
Ni	30 ug/l
Zn	20 ug/l
Ba	200 ug/l
Cr	< 20 ug/l
Mg	100 ug/l
Cu	10 ug/l
Hg	.55 ug/l
Ca	70 mg/l
Na	.98 mg/l

This information is submitted as file data.

TK:pb
Attachment. Sample Sheet

Signed Tom Kearns

WQR-33

Approved

Date November 12, 1976

001777

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.O. #39007 - Hempstead

INTER-OFFICE MEMORANDUM

001778

I. Introduction:

On December 9, 1976, a compliance inspection of the subject facility was made prior to participating in a meeting - in Austin - regarding the closing plan submitted by Sheridan on October 8, 1976. Mr. D. Sheridan, owner, was contacted.

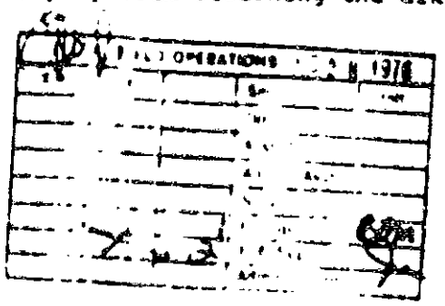
II. Findings:

1. The surface level of the disposal pond has risen only 1½-3" since September 27, 1976 despite the recent heavy rains The pond marker now measures 50".

2. Once again, Mr. Sheridan reiterated his concern that he had received no response from Austin regarding the closing plan submitted on October 8, 1976. Mr. Sheridan was informed a meeting would be held in Austin the following day to discuss just that item.

3. Oil on the surface of the ponds covered about 5% of the total area.

4. The irrigation system has not been used since September, 1976. The wet weather, however, has also prevented the company from reworking the dikes and tilling the fields.



Signed _____

Date December 22, 1976

WQB 33

5. Leachate from a soil sample taken from point 1 in the irrigation field produced the following parameters:

11-15-76

pH	7.8
TDS	16000
Cl	35
COD	967

III. Recommendations:

None at this time.

Signed Tom Keane

Date December 22, 1976

TK:pb

[illegible]
Approved

001779

NE C. SHERIDAN,
PRESIDENT
RUBY G. SHERIDAN,
SECRETARY-TREASURER

SHERIDAN DISPOSAL SERVICE, INC.
P. O. Box 42
HEMPSTEAD, TEXAS 77445

OFFICE PHONE: 713-826-3766

June 11, 1973

Texas Air Control Board General Application

For: Excavated Type Furnace Liquid Waste Incinerator
Application for Construction Permit

The Following is a list of chemical compounds which will be incinerated. The materials will be blended in receiving tanks prior to processing:

- ~~Toluene - CH_3 C_6 H_5 flash point 6-12° C~~
- xylene - $C_6 H_4$ $(CH_3)_2$
- acetone - CH_3 $COCH_3$ flash point 15° F
- methyl isobutyl ketone $(CH_3)_2$ $CHCH_2$ $COCH_3$ flash point 23° C
- methyl ethyl ketone - CH_3 COC_2H_5 flash point 24° F
- various alcohols
- water

The above chemicals when received as waste products for incineration are seldom received as pure compounds, they usually contain a mixture of water.

001780

102

STEAM PLANTS
PLANTS

Hm

LIQUID WASTE INCINERATORS
SOLID WASTE INCINERATORS

LEWIS F. CHEEK

CONSULTING ENGINEERS

AREA CODE 713 427-3893

BAYTOWN, TEXAS 77520

1706 IVIE LEE

May 16, 1973

Texas Air Control Board
820 East 53rd Street
Austin, Texas 78751

Attention: Mr. Dennis Haverlah

Subject: Analysis - Liquid Waste Disposal

Dear Mr. Haverlah:

One of our clients is a waste disposal firm.

Attached are copies of chemical analysis of various water - liquid hydrocarbon wastes which we intend to incinerate, pending the Board's approval.

Our questions are:

A. Will these analysis be sufficiently in detail to present with applications for Constructions Permits and Operating Permits?

B. If not, please let us know how much additional detail your office will require.

Thank you for your assistance. We appreciate it.

Very truly yours,

Lewis F. Cheek

Lewis F. Cheek
Professional Engineer

LFC/mp

We are trying to get all our "ducks" lined up prior to actually submitting (or assisting in submittals) of applications for Permits — your suggestions are greatly appreciated!!

Lewis F. Cheek

001781

ANALYSIS FOR LIQUID DISPOSAL

1. Disposal of material from tank number 254 has been discontinued. - 90% water, 3% oil and balance Hydrocarbons. Hydrocarbons consist of - Napha, mineral oil, virgin oil, and Nitrogen.

2. Tank number 154 disposal material. This material consist of approximately 60% water and 40% hydrocarbons and has a PH of approximately 8%. Hydrocarbons consist of - Napha, calcium, mineral oil, virgin oil, and benzine.

3. Tank B-127 disposal material. This material consists of approximately 95% water and 5% hydrocarbons and has a PH range of approximately 7-9. The hydrocarbons consist of - Mineral, methynol, benzine, and virgin oil.

4. Tank number U-0614 disposal material. This material consist of approximately 60% water and 40% hydrocarbons and has a PH range of approximately 7-9. Hydrocarbons consist of - Napha, mineral oil, virgin oil, nitrogen.

5. B-32 -- 50-90% water, 1-2% sulfur, 0.5-1% calcium. No [illegible] inorganic elements above 0.5% -- balance hydrocarbons. Hydrocarbons cons[illegible] - Nitrogen, calcium Napha, mineral oil, and virgin oil.

6. T-19X -- 20-50% water, 1-5% sulfur. No other inorganic elements above 0.5%, balance hydrocarbons. Hydrocarbons consist of - Napha, mineral oil, virgin oil, and Nitrogen.

7. T-23-X -- An all inorganic aqueous salt solution of 15% sodium chloride and sodium aluminate, sodium Hydroxide.

8. H-6 -- All water and hydrocarbons. No metals, sulfur, etc. Hydrocarbons consist of - motor oil, stock, calcium, C 12 cut.

9. P-61 -- All hydrocarbons. No metals, sulfur, etc. Hydrocarbons consist of - Napha, mineral oil, virgin oil, motor oil stock, and nitrogen.

10. C-61 -- An aqueous solution of calcium carbonate. 80% water, calcium carbonate, Organic - 1% sulfur, 10% calcium, motor oil stock.

11. 237A -- 38% Toluene, 16% DI-N-Butyl Ether, 2% Butanol, balance oil.

12. The approximate composition of the waste material you are obtaining from our tank, C-435 is as follows: 80% H_2O, 15% salt, 5% organic, which consist of Ammonia, Sulfur, calcium, and motor oil stock.

Joe King
Fred Bruce

SIGNED [illegible]

DATE July 20, 1973

001782

Water	-	15%
Xylene	-	70%
Methanol	-	15%
Trace quantities of polypropylene powder	-	

I trust this information will be satisfactory in your record-keeping procedures.

Very truly yours,

EDWIN S. CANGLUFF

By:

P. R. Watters

PRW:sh
cc: FJL LEB DLL HWN RAM

P O BOX 4004 BAYTOWN TEXAS 77520

001783

The approximate composition of the waste material you are obtaining from our tank C-453 is as follows:

80% H_2O

15% Salt

5% Organic

Very truly yours,

N E Ward Jr

N. E. Ward, Jr.

vls

App. HU [illegible] pale at present time
Slight cake.

001784

TEXAS AIR CONTROL BOARD
LABORATORY
6330 Highway 290 East
Austin, Texas 78723

Sample: Sheridan Disposal Service

ACL Number: 2730

City/County: Hempstead/ Waller

Delivered By: Steven Taylor, R.7

Description: oil from waste disposal

Date Sampled: 4-26-82

001785

LABORATORY ANALYSIS

A sample of the oil (51.5 mg) was absorbed out a membrane filter and analyzed by X-ray fluorescence. These elements showing concentrations above a minimum detectable level were:

Element	ppm
Cl	7200
Br	215
I	72
S	26000
Cr	50
Pb	50

Mercury was estimated separately and none was detected at an estimated MDL of 10 ppm.

An attempt was made to analyze for cyanide and total inorganic solids by extracting a portion of the oil with water and then analyzing an aliquot for cyanide and evaporating the remainder to dryness to determine total inorganic solids.

The oil and water mixture formed an emulsion that proved impossible to separate and therefore cyanide and total inorganic salts are not reported.

4-28-82
Date Received

4-15-83
Date Reported

Vincent Anselmo
Analysis Performed By

Vincent Anselmo

WA-0007-L

TEXAS AIR CONTROL BOARD
LABORATORY
6330 Highway 290 East
Austin, Texas 78723

Sample: Sheridan Disposal Service

ACL Number: 2730

City/County: Hempstead/Waller

Delivered By: Steven Taylor, P.7

Description:
oil from waste disposal

Date Sampled: 4-26-82

LABORATORY ANALYSIS

No polychlorinated biphenyls (PCB's) were found. The sample contained long chain aliphatic and aromatic hydrocarbons.

001786

4-28-82
Date Received

5-23-83
Date Reported

Nabi Zarr
Analysis Performed By
Nabi S. Zarr

WB-0009-

TEXAS AIR CONTROL BOARD
LABORATORY
6330 Highway 290 East
Austin, Texas 78723

TEXAS AIR CONTROL BOARD
JUN 18 5 17 PM '82
COMPLIANCE DIVISION

Sample: Sheridan Disposal

City/County: Hempstead/Waller

Description: Hydrocarbons on solid absorber

ACL Number: 2518

Delivered By: Region 7

Date Sampled: 5/27/81

LABORATORY ANALYSIS

Mass spectra of the subject sample indicated the possible presence of the following classes of compounds:

- Alcohols
- Acids
- Ketones
- Ethers
- Esters
- Cyclic organics with O and N replacing C in the ring as well as being attached to the ring.
- Amines
- Nitriles
- Nitrates
- Sulfides
- Thiols

No PCB's were detected in the sample as analyzed.

001787

5/27/81
Date Received

6/17/82
Date Reported

Analysis Performed By

SHILSTONE ENGINEERING TESTING LABORATORY, INC.
INSPECTING AND TESTING
ENGINEERS-CHEMISTS-METALLURGISTS

17th W. CAPITOL AVE. BOX 13163 / HOUSTON, TEXAS 77019 / PHONE (713) 224-2047

REPORT NO. A-3523/01

TEST REPORT

DATE May 29, 1973

MADE ON Liquid

CLIENT Sheridan Disposal Service, Inc., P.O. Box 42, Hempstead, Texas
Attn: Mr. Jim Mussett

IDENTIFICATION As indicated below

SAMPLE NO.	N.E.	N.W. Bottoms	S.W. Bottoms	S.E.	S.W. Water	N.W. Water
[illegible]	71.58	39.36	53.38	48.50	50.31	[illegible]
[illegible]	12.17	20.6	3.14	2.50	2.47	[illegible]

SEMI-QUANTITATIVE SPECTROGRAPHIC ANALYSIS

APPROXIMATE %, On ashed basis

[illegible]um	8.	9.	11.	0.2	0.2	0.09
[illegible]	2.	2.	2.	Trace	Trace	[illegible]
[illegible]	0.04	0.03	0.01	0.06	0.07	0.04
[illegible]	9.	8.	9.	6.	6.	7.
[illegible]um	0.4	0.5	0.2	0.01	0.01	0.008
[illegible]	0.02	0.02	0.01	ND	ND	ND
[illegible]	0.04	0.04	0.03	0.002	0.002	0.001
[illegible]	6.	7.	4.	0.1	0.06	0.09
[illegible]	0.2	0.3	0.3	ND	ND	ND
[illegible]	4.	3.	4.	3.	2.	2.
[illegible]num	0.02	0.05	0.01	0.02	0.01	0.01
[illegible]	0.1	0.1	0.07	0.04	0.04	0.09
[illegible]	ND	ND	ND	2.	2.	2.
[illegible]	9.0	10.	6.	0.1	0.1	[illegible]
[illegible]	4.	4.	4.	26.	27.	26.
[illegible]um	Trace	Trace	Trace	Trace	Trace	Trace
[illegible]	1.	1.	2.	0.02	0.008	ND

*Not Detected

LAB-ATTACHMENT
6/12/73

Respectfully submitted,
SHILSTONE ENGINEERING TESTING
LABORATORY, INC.

B. L. McClellan

001788

TEXAS WATER QUALITY BOARD
WESTERN DIVISION

To: George E. Green, Chief, Field Support Section
Gary Schroeder, P.E., Chief, Enforcement Support Section

From: Tom Kearns, District 7 Representative

Subject: Sheridan Disposal Service - W.C.Q. #00508

INTER-OFFICE MEMORANDUM

Attached herewith are two (2) sample sheets relating the metal parameters found in the sludges from two (2) locations in the Sheridan disposal pit: the north end and the south end. Additionally, a pesticide scan was also made. In comparison, the data is tabulated along with the EPA's limits for metals found in sediment samples.

Parameter	North	South	EPA Limits
Zn	633.8 mg/Kg	115.6 mg/Kg	75.0 mg/Kg
Pb	537.1 mg/Kg	365.3 mg/Kg	50.0 mg/Kg
Cu	91.1 mg/Kg	33.5 mg/Kg	50.0 mg/Kg
Cr	183.1	300.6 mg/Kg	100.0 mg/Kg
Ni	69.5	76.3 mg/Kg	50.0 mg/Kg
Ba	403.8	647.4 mg/Kg	
Cd	1.9	2.3 mg/Kg	2.0 mg/Kg
Pesticides	None noted	None noted	

TK:pb

Attachments: Sample Sheets

Approved

Signed Tom Kearns

Date March 1, 1976

001789

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.O. #39007 - Hempstead

INTER-OFFICE MEMORANDUM

As part of the ongoing surveillance of the Sheridan's land irrigation project, an inspection of the site was made on September 1, 1976 to collect water and soil samples necessary to gauge both the effectiveness and the impact of the disposal technique. Additionally, two Bermuda grass samples were collected - one from the test plot and one for control purposes, to detect any possible uptake of metals in the vegetation cover over the initial test area. The analytical data is tabulated and summarized below. Where possible, the data is compared with previously collected samples to note any changes. On September 1, the surface level of the pond had dropped 40 inches since June 1, which indicates approximately 12 million gallons of wastewater has been disposed of through the irrigation system.

Parameter	Pond Water 9-1-76	9-6-75
pH	6.2	6.4
COD, mg/l	33700	27980
BOD, mg/l	7000	> 3220
TOC, mg/l	> 6400	-
TDS, mg/l	23000	21310
Cl, mg/l	5000	4400
Conductivity, mg/l	20000	17500

Signed

Date October 12, 1976

WQB-33

001790

Texas Water Quality Board
2318 Center Street
Deer Park, Texas

Spectrographic Examination

Sign Marks

	Sheridan Pit 3-8-73
Mercur, u/l	4.0
Sulfated Solids, mg/l	18,080.

SPECTROGRAPHIC EXAMINATION

Element	Estimate of Quantity Present Approximate No. of mg/l
Aluminum	40.
Barium	Trace
Calcium	496.
Chromium	3.
Copper	0.3
Iron	20.
Lead	N.D.
Magnesium	893.
Manganese	4
Molybdenum	0.8
Nickel	2
Potassium	81.
Silicon	2.
Sodium	3699.
Strontium	Trace
Vanadium	3.

The following elements were specifically sought. If their presence is not reported above, they were not detected, i.e. either they are not present or they are below the limits of detection by the examination procedure: Ag, Al, As, Au, B, Ba, Bi, Be, Ca, Cd, Co, Cr, Cs, Cu, Fe, Ga, Ge, Hf, Hg, In, Ir, K, Li, Mg, Mn, Mo, Na, Nb, Ni, Os, P, Pb, Pd, Pt, Ru, Re, Rh, Ru, Sb, Se, Si, Sn, Sr, Ta, Te, Ti, Tl, V, W, Zn, Zr.

ATTACHMENT
5/23/73

13556
ns

SOUTHWESTERN LABORATORIES

SLUDGE OR WATER?

WATER

001791

SHILSTONE ENGINEERING TESTING LABORATORY, INC.

INSPECTING AND TESTING
ENGINEERS-CHEMISTS-METALLURGISTS

1714 W. CAPITOL AVE. BOX 13163 / HOUSTON, TEXAS 77019 / PHONE (713) 224-2047

ASSOCIATES AND REPRESENTATIVES AT MAJOR POINTS

FORM NO. A-3523/01

TEST REPORT

DATE May 29, 1973

DE ON Liquid

ENT Sheridan Disposal Service, Inc., P.O. Box 42, Hempstead, Texas

Attn: Mr. Jim Mussett

NTIFICATION As indicated below

LE NO.	N.E.	N.W. Bottoms	S.W. Bottoms	S.E.	S.W. Water	N.W. Water
[illegible]	71.58	39.36	53.38	48.50	50.31	[illegible]
[illegible]	12.17	20.6	3.14	2.50	2.47	[illegible]

SEMI-QUANTITATIVE SPECTROGRAPHIC ANALYSIS

	APPROXIMATE %, On ashed basis					
[illegible]um	8.	9.	11.	0.2	0.2	0.09
[illegible]	2.	2.	2.	Trace	Trace	[illegible]
[illegible]	0.04	0.03	0.01	0.06	0.07	0.04
[illegible]	9.	8.	9.	6.	6.	7.
[illegible]um	0.4	0.5	0.2	0.01	0.01	0.008
[illegible]	0.02	0.02	0.01	ND	ND	ND
[illegible]er	0.04	0.04	0.03	0.002	0.002	0.001
	6.	7.	4.	0.1	0.08	0.04
	0.2	0.3	0.3	ND	ND	ND
[illegible]	4.	3.	4.	3.	2.	2.
[illegible]num	0.02	0.05	0.01	0.02	0.01	0.01
[illegible]	0.1	0.1	0.07	0.04	0.04	0.09
[illegible]um	ND	ND	ND	2.	2.	2.
[illegible]	9.0	10.	6.	0.1	0.1	[illegible]
[illegible]	4.	4.	4.	26.	27.	26.
[illegible]um	Trace	Trace	Trace	Trace	Trace	Trace
[illegible]um	1.	1.	2.	0.02	0.008	ND

[illegible] Detected

LAB ATTACHMENT
6/12/73

Respectfully submitted,

SHILSTONE ENGINEERING TESTING
LABORATORY, INC.

B. L. McClellan

B. L. McClellan

001792

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

To: George E. Green, Chief, Field Support Section
Gary Schroeder, P.E., Chief, Enforcement Support Section

From: Tom Kearns, District 7 Representative

Subject: Sheridan Disposal Service - W.C.O. #00508

INTER-OFFICE MEMORANDUM

Attached herewith are two (2) sample sheets relating the metal parameters found in the sludges from two (2) locations in the Sheridan disposal pit: the north end and the south end. Additionally, a pesticide scan was also made. In comparison, the data is tabulated along with the EPA's limits for metals found in sediment samples.

Parameter	North	South	EPA Limits
Zn	633.8 mg/Kg	115.6 mg/Kg	75.0 mg/Kg
Pb	537.1 mg/Kg	365.3 mg/Kg	50.0 mg/Kg
Cu	91.1 mg/Kg	33.5 mg/Kg	50.0 mg/Kg
Cr	183.1	300.6 mg/Kg	100.0 mg/Kg
Ni	69.5	76.3 mg/Kg	50.0 mg/Kg
Ba	403.8	647.4 mg/Kg	
Cd	1.9	2.3 mg/Kg	2.0 mg/Kg
Pesticides	None noted	None noted	

TK:pb

Attachments: Sample Sheets

Approved

Signed Tom Kearns

Date March 1, 1976

001793

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service - W.C.O. 039007 - Hempstead

INTER-OFFICE MEMORANDUM

As part of the ongoing surveillance of the Sheridan's land irrigation project, an inspection of the site was made on September 1, 1976 to collect water and soil samples necessary to gauge both the effectiveness and the impact of the disposal technique. Additionally, two Bermuda grass samples were collected - one from the test plot and one for control purposes, to detect any possible uptake of metals in the vegetation cover over the initial test area. The analytical data is tabulated and summarized below. Where possible, the data is compared with previously collected samples to note any changes. On September 1, the surface level of the pond had dropped 40 inches since June 1, which indicates approximately 12 million gallons of wastewater has been disposed of through the irrigation system.

Pond Water

Parameter	9-1-76	9-6-75
pH	6.2	6.4
COD, mg/l	33700	27980
BOD, mg/l	7000	> 3220
TOC, mg/l	> 6400	-
TDS, mg/l	23000	21310
Cl, mg/l	5000	4400
Conductivity, mg/l	20000	17500

Signed

Date October 12, 1976

WQB-33

001794

TEXAS WATER QUALITY BOARD
AUSTIN, TEXAS

TO: George E. Green, Chief, Field Support Section (File)

FROM: Tom Kearns, District 7 Representative

SUBJECT: Sheridan Disposal Service, W.C.O. 639007

INTER-OFFICE MEMORANDUM

On September 2, 1976, an inspection of the subject facility was made to collect a sample from the waste pond to determine the concentrations of metals in the waste. Additionally, a soil sample from the waste irrigation field was collected to determine if leachate from the soil sample was high in selective metals. The analytical results are tabulated below:

Parameters	Pond Waste	Soil Leachate
Cd	90 ug/l	< 10 ug/l
Pb	88 ug/l	< 50 ug/l
Ni	190 ug/l	-
Zn	390 ug/l	-
Ba	500 ug/l	-
Ca	1770 ug/l	-
Mg	2590 ug/l	1060 ug/l
Cu	230 ug/l	-
Hg	.2 ug/l	-

The data shows no significant concentrations in either sample; however, in terms of the concentration of metals in the soil, analysis from the soil itself might be more meaningful.

TK:pb

Attachment: Sample Sheets

Signed Tom Kearns

WQB-33 Billy H. Berger
Approved

Date October 25, 1976

001795

4. Analyses of water samples collected from the pond are tabulated below. As a point of comparision, similar data from the September 2, 1976 sampling is also listed.

	April 27, 1979	September 2, 1976
Ph	5.6	6.2
TOC	7900 mg/l	>6400 mg/l
COD	32000 mg/l	33700 mg/l
TDS	22593 mg/l	23000 mg/l
cl	4800 mg/l	5000 mg/l
Cond.	17000 mg/l	20000 mg/l
As	23 ug/l	-
Ca	30 ug/l	1770 ug/l
Pb	210 ug/l	88 ug/l
N	1240 ug/l	190 ug/l
Zn	9000 ug/l	390 ug/l
Ba	300 ug/l	500 ug/l
Cr	260 ug/l	-
mg	5500 ug/l	2590 ug/l
Cu	1170 ug/l	230 ug/l
Ag	<0.2 ug/l	<0.2 ug/l

The quality of the waste in the pond - with one exception - is generally stable. The pH of the pond water continues to decline. The pH has steadily declined from a 1976 reading of 7.2 to the present 5.6. The cause is unknown. The decline in the pH has probably also contributed to the increase in the concentrations of selective metals as well, notably Zn, Pb, and Cu.

5. Samples were also collected from two of the three groundwater monitoring wells adjacent to the disposal pond. The third well - the south well located "upstream" of the pond - was not functioning properly and no sample was obtained. Analytical data attached as addendum "A" shows that the quality of the shallow groundwater remains relatively stable since the last sampling in December, 1978.

R/IDWR

ATTACHMENT
6/7/79

001796

APPENDIX 3B

RESOURCE ENGINEERING ANALYTICAL DATA REPORTS

001797

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number: 064911
Invoice Number: 159950
April 13, 1984

Alpha Environmental Laboratories
(Resources Engineering)
#11 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab No. 4926-B
Composite of LS-2,3,5,7,8
Priority Pollutants
Date Sampled: 3/27/84
Date Received: 3/30/84

001768

The above described sample was analyzed for its constituents by packed column and capillary column gas chromatography/mass spectrometry. Enclosed are chromatograms, library matches and the lists of the relative quantities of the components in the two analyses.

Primarily the samples contain a wide array of all types of components in very high concentrations. The major component could not be identified (the mass spectrum is enclosed) and is 1.3% of the sample.

The sample contained a full range of aromatics, e.g., benzene (480ppm) toluene (1750ppm), ethylbenzene (740ppm), xylenes (2700ppm), styrene (500ppm), naphthalene (410ppm) and methyl naphthalenes (450ppm).

The sample contained chlorinated solvents e.g., trichloroethylene (100ppm) and the tetrachloroethylene (60ppm).

The sample also contained a full array of phenols : phenol (1150ppm), methylphenol (150ppm), and dimethylphenols (580ppm).

Also the sample contained PCB's: Aroclor 1242 (143ppm) and Aroclor 126((44ppm).

If we can be of any furthur service please contact me at 713/660-0901.

Sincerely,

Dan Di Feo

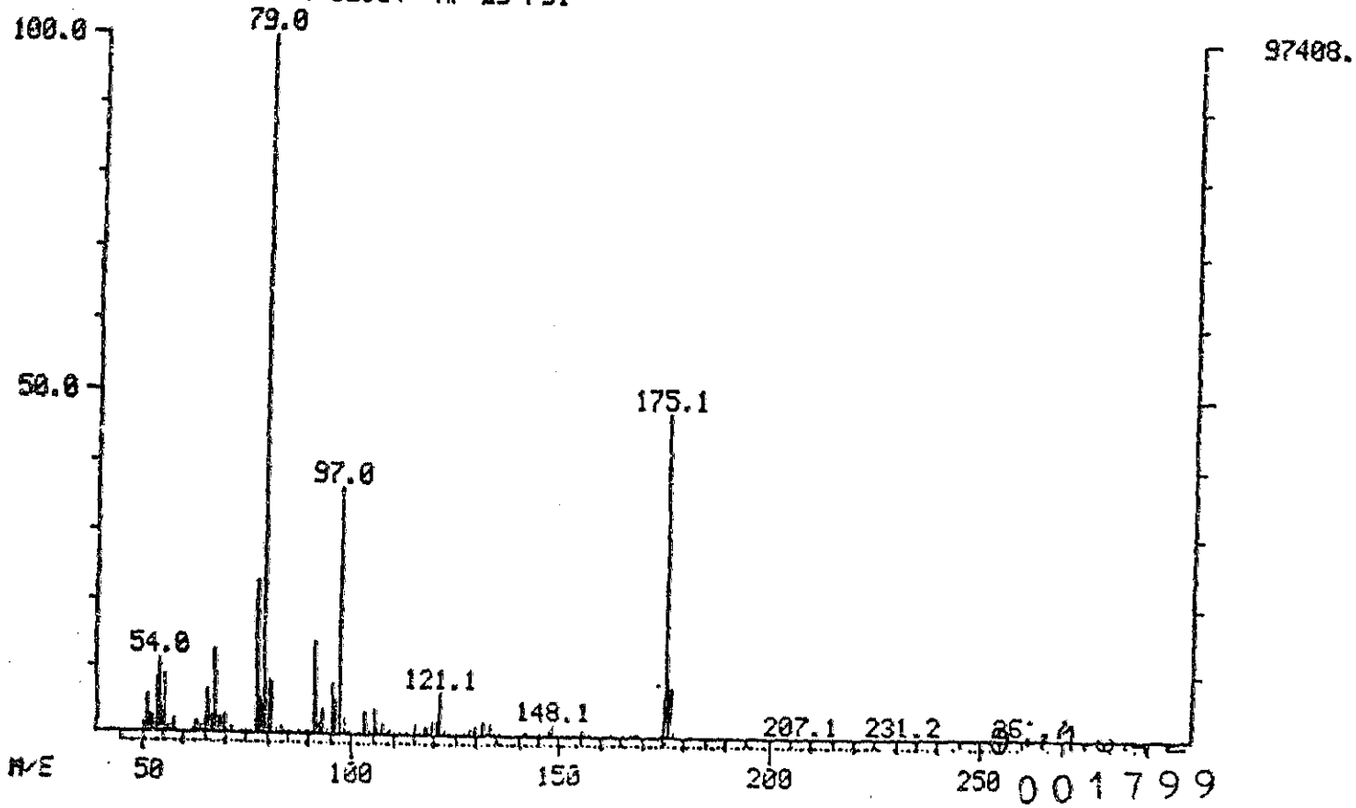
Dan Di Feo

kll

MASS SPECTRUM
04/11/84 15:48:00 + 52:24
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS
CONDS.: 35/4-325@4--HP 29 PSI

DATA: ALPHAEXTA #3144
CALI: CAL41184 #3

BASE M/E: 79
RIC: 386560.

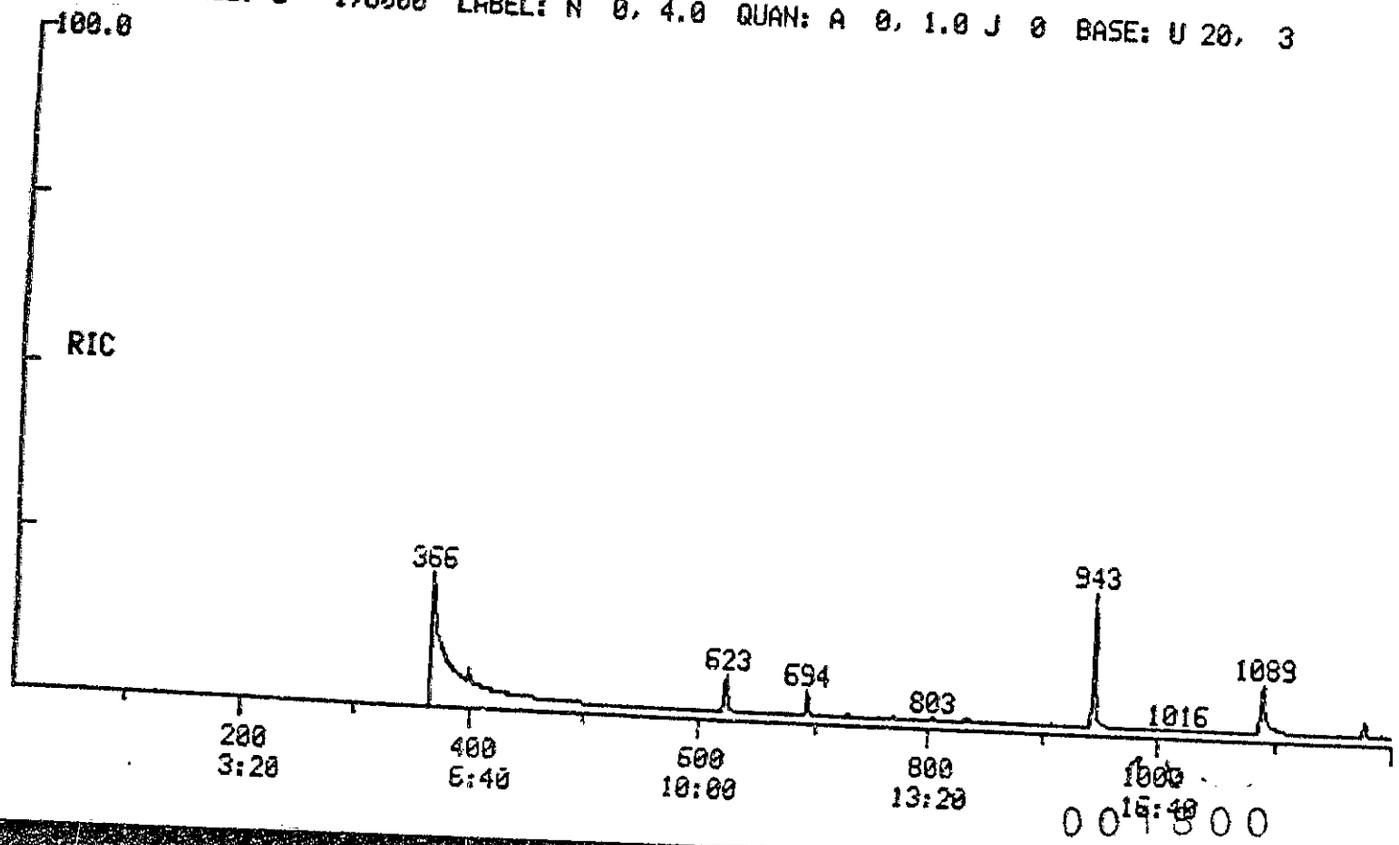


001799

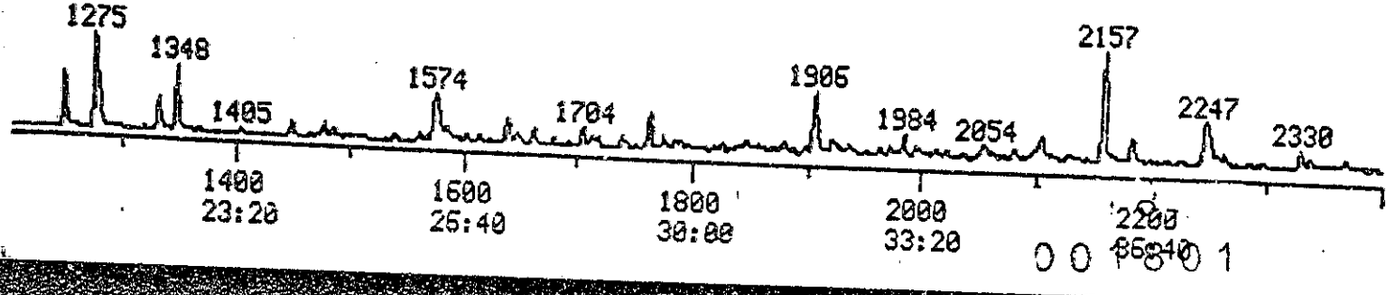
RIC
04/11/84 16:48:00
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS
CONDS.: 35/4-325@4--HP 29 PSI
RANGE: G 1,6000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: ALPHAEXTA #4709
CALI: CAL41184 #3

SCANS 1 TO 1201
OUT OF 1 TO 6000



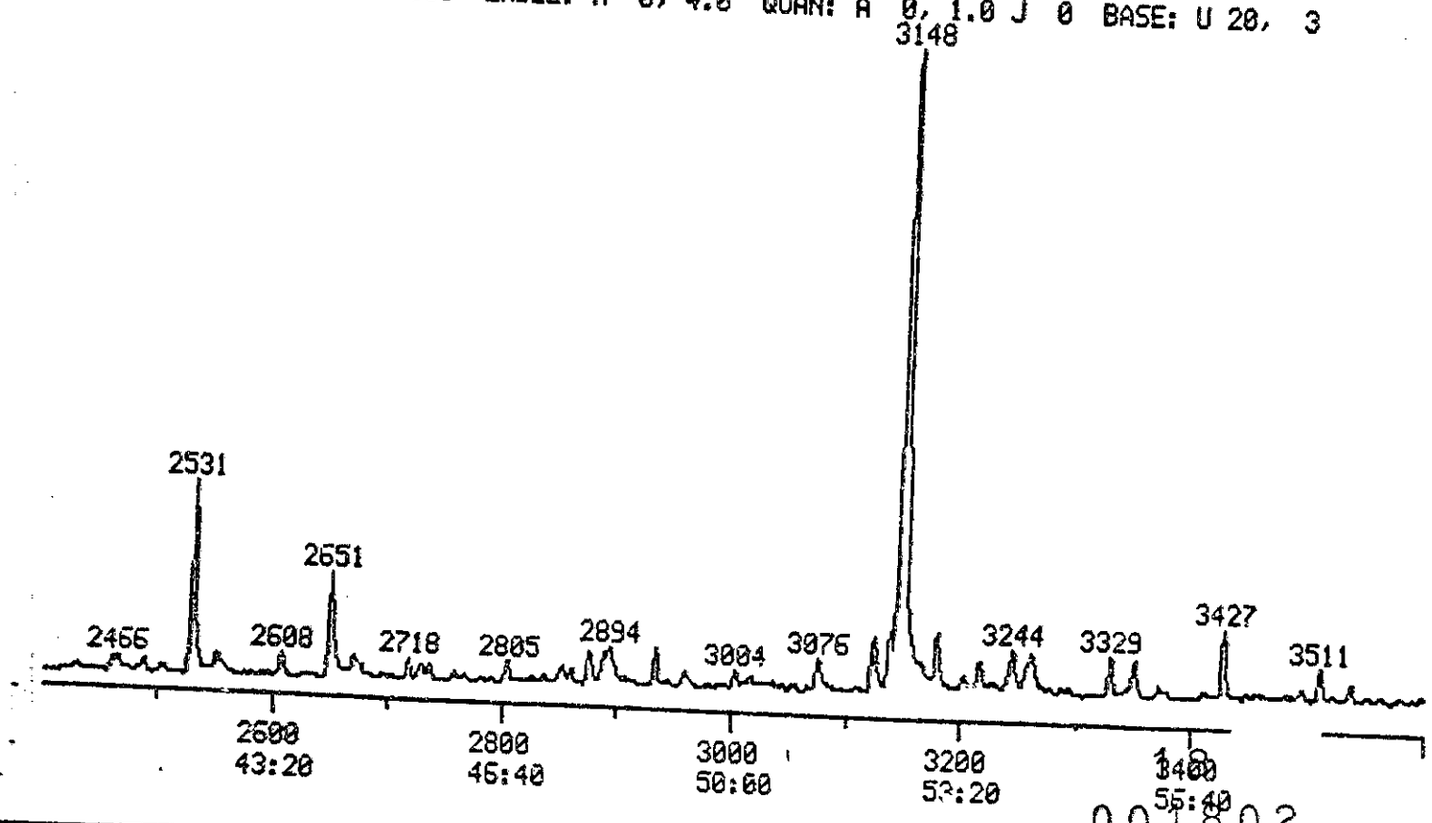
RIC
04/11/84 16:48:00 DATA: ALPHAEXTA #4709 SCANS 1201 TO 2401
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS CALI: CAL41184 #3 OUT OF 1 TO 6000
CONDS.: 35/4-32504--HP 29 PSI
RANGE: G 1.6000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



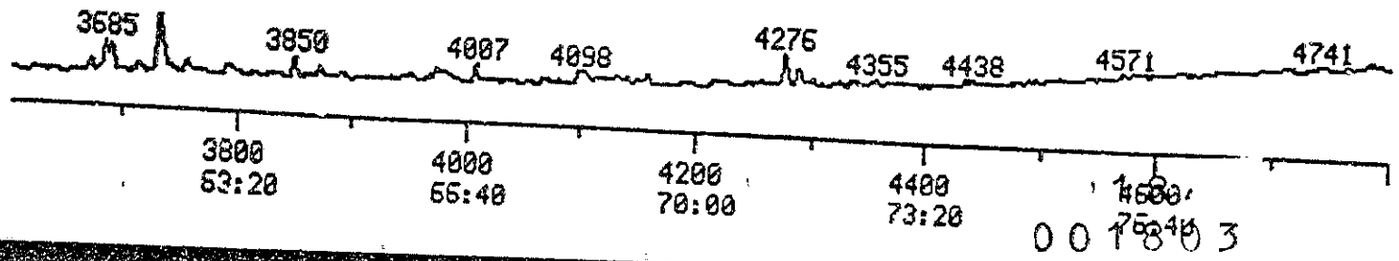
RIC
04/11/84 16:48:00
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS
CONDS.: 35/4-325@4--HP 29 PSI
RANGE: G 1,6000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: ALPHAEXTA #4709
CALI: CAL41184 #3

SCANS 2401 TO 3601
OUT OF 1 TO 6000

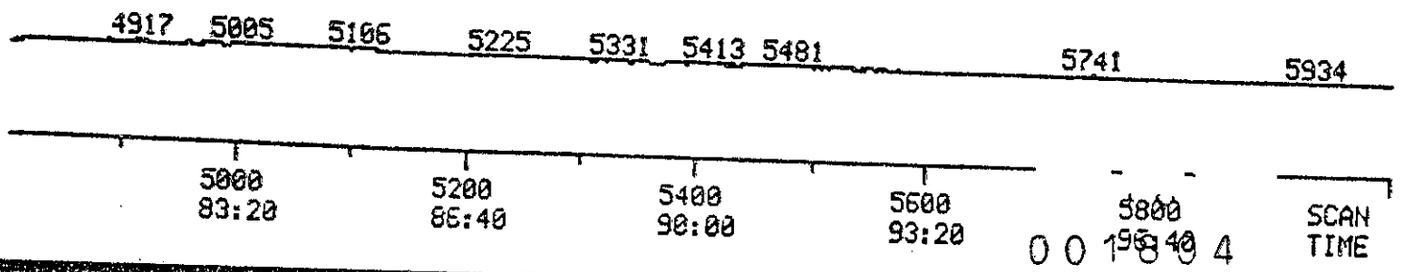


RIC
04/11/84 16:48:00 DATA: ALPHAEXTA #4709 SCANS 3601 TO 4801
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS CALI: CAL41184 #3 OUT OF 1 TO 6000
CONDS.: 35/4-325@4--HP 29 PSI
RANGE: G 1,6000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3



RIC
04/11/84 16:48:00 DATA: ALPHAEXTA #4709 SCANS 4801 TO 6000
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS CALI: CAL41184 #3 OUT OF 1 TO 6000
CONDS.: 35/4-325@4--HP 29 PSI
RANGE: G 1.6000 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

793600.



PAGE 1 OF QUANTITATION REPORT FOR FILE ALPHAEXTA

QUANTITATION REPORT FILE: PQUANTEMP

DATA: ALPHAEXTA.TI
04/11/84 16:48:00
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS
SUBMITTED BY: ANALYST: DIFEO

AMOUNT=AREA * REF.AMNT/(REF.AREA)* RESP.FACT)
RESP. FAC. FROM LIBRARY ENTRY

NO	NAME
1	~~CROTONALDEHYDE,2-VINYL-~~ Unknown - 13750 ppm
2	BENZENE - 480 ppm
3	CYCLOBUTANE,ETHENYL-
4	ETHENE,TRICHLORO- 75 ppm
5	HEPTANE
6	1-PENTENE,2,4,4-TRIMETHYL-
7	ETHER,PROPENYLPROPYL
8	CYCLOHEXANE,METHYL-
9	2-PENTANOL,4-METHYL-
10	BENZENE,METHYL-
11	HEPTANE,3-METHYL-
12	CYCLOHEXANE,1,3-DIMETHYL-,CIS-
13	CHLORINEOXIDE(CLO2)
14	UNKNOWN
15	CYCLOHEXENE,4-ETHENYL-
16	CYCLOHEXANE,ETHYL-
7	BENZENE,ETHYL-
18	BENZENE,1,3-DIMETHYL-
19	CYCLOBUTANONE,2,3-DIMETHYL-
20	BENZENE,ETHENYL- 500 ppm
21	BENZENE,1,2-DIMETHYL-
22	NONANE
23	BENZENE,(1-METHYLETHYL)-
24	3-CYCLOHEXENE-1-CARBOXALDEHYDE
25	3-HEPTENE,2-METHYL-,(E)-
26	CYCLOHEXANOL,2-METHYL-,PROPIONATE,TRANS-
27	4H-1,2,4-TRIAZOLE,4-METHYL-
28	UNKNOWN
29	BENZENE,PROPYL-
30	BENZENE,1-ETHYL-3-METHYL-
31	BENZENE,1-ETHYL-4-METHYL-
32	PHENOL - 1150 ppm
33	BENZENE,1,2,3-TRIMETHYL-
34	HEXANE,1,1'-OXYBIS-
35	NONANE,4-METHYL-
36	UNDECANE,3-METHYL-
37	BENZENE,(1-METHYLETHENYL)-
38	NONANE,3-METHYL-
39	CYCLOHEXANE,1,3,5-TRIMETHYL-
40	2-HEXENE,2-METHYL-
41	UNKNOWN
42	CYCLOBUTANE,1,2-BIS(METHYLENE)-
43	BENZENE,1,2,4-TRIMETHYL-
44	UNKNOWN
45	1-PENTENE,3-ETHYL-
46	CYCLOHEPTANONE,4-METHYL-,(-)-

001805

NO	NAME
47	HEXANE, 2, 4-DIMETHYL-
8	DECANE
9	BENZENEETHANAMINE, N-(2-PHENYLETHYL)-, HYDROCHLORIDE
50	3-PENTEN-1-OL, 2-METHYL-
51	UNKNOWN
52	1-PROPENE, 2-METHYL-, TRIMER
53	BENZENE, 1-ETHYL-2-METHYL-
54	BENZENE, 1-METHYL-4-(1-METHYLETHYL)-
55	UNDECANE, 6, 6-DIMETHYL-
56	ETHANONE, 1-(3-CYCLOHEXEN-1-YL)-
57	2-CYCLOHEXEN-1-ONE, 3-METHYL-
58	3-OCTENE, 4-ETHYL-
59	DECANE, 2, 2-DIMETHYL-
60	PHENOL, 2-METHYL- 150 ppm
61	BENZENE, 1-ETHYNYL-4-METHYL-
62	CYCLOHEXANE, BUTYL-
63	HEPTANE, 4-ETHYL-2, 2, 6, 6-TETRAMETHYL-
64	ETHANONE, 2-CHLORO-1-PHENYL-
65	HEXANE, 3, 3-DIMETHYL-
66	BENZENE, 1-METHYL-3-PROPYL-
67	CYCLOBUTENE, 2-PROPENYLIDENE-
68	BENZENE, 1-ETHYL-2, 4-DIMETHYL-
69	PYRAZINE, ETHYL-
70	CYCLOHEPTATRIENYLIUM, BROMIDE
71	OCTANE, 2, 3, 6-TRIMETHYL-
72	HEXANE, 2, 2-DIMETHYL-
73	NAPHTHALENE, DECAHYDRO-, CIS-
4	2-HEXENE, 5, 5-DIMETHYL-, (Z)-
75	DECANE, 2-METHYL-
76	HEPTANE, 4-ETHYL-2, 2, 6, 6-TETRAMETHYL-
77	2-CYCLOHEXEN-1-ONE, 3, 5-DIMETHYL-
78	ETHANONE, 1-(METHYLPHENYL)-
79	1-PENTEN-3-YNE
80	BENZENE, METHYL(1-METHYLETHENYL)-
81	UNDECANE, 2, 8-DIMETHYL-
82	TETRACONTANE, 3, 5, 24-TRIMETHYL-
83	2-PROPENAL, 3-PHENYL-
84	ETHANONE, 1-(METHYLPHENYL)-
85	UNDECANE
86	1H-INDENE, OCTAHYDRO-, TRANS-
87	CYCLOPENTENE
88	L-ALANINE, N-BENZOYL-, METHYLESTER
89	BENZENE, 1, 2, 3, 5-TETRAMETHYL-
90	CYCLOPENTENE, 1, 4-DIMETHYL-5-(1-METHYLETHYL)-
91	BENZENE, 1, 2, 3, 4-TETRAMETHYL-
92	4, 7-METHANO-1H-INDEN-1-OL, OCTAHYDRO-
93	[1, 1'-BICYCLOHEXYL]-2-ONE
94	NONANE, 3, 7-DIMETHYL-
95	PHENOL, 2, 5-DIMETHYL-
96	DECANE, 3-METHYL-
97	1H-INDENE, 2, 3-DIHYDRO-5-METHYL-
98	2-CYCLOHEXEN-1-ONE, 3, 5, 5-TRIMETHYL-
9	1H-INDENE, 1-METHYL-
0	UNKNOWN
101	PHENOL, 3, 4-DIMETHYL-
102	BENZENE, 1, 3-BIS(1-METHYLETHYL)-

317800 counts =
1000 ppm

001806

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
47	TOT	1693	28:13	1	0.538	A BB	7540.	0.887	0.12
8	TOT	1704	28:24	1	0.541	A BV	77338.	9.098	1.27
+9	TOT	1714	28:34	1	0.544	A VV	5881.	0.692	0.10
50	TOT	1717	28:37	1	0.545	A VB	26933.	3.168	0.44
51	NOT	FOUND							
52	TOT	1738	28:58	1	0.552	A BB	43487.	5.116	0.72
53	TOT	1743	29:03	1	0.554	A BV	26743.	3.146	0.44
54	TOT	1751	29:11	1	0.556	A VB	8788.	1.034	0.14
55	TOT	1758	29:18	1	0.558	A BV	5450.	0.641	0.09
56	TOT	1762	29:22	1	0.560	A BV	137238.	16.144	2.26
57	TOT	1774	29:34	1	0.564	A BV	45628.	5.368	0.75
58	TOT	1785	29:45	1	0.567	A BB	47736.	5.616	0.79
59	TOT	1786	29:46	1	0.567	A BB	47068.	5.537	0.77
60	TOT	1790	29:50	1	0.569	A BB	47590.	5.598	0.78
61	TOT	1796	29:56	1	0.571	A VB	15237.	1.792	0.25
62	TOT	1803	30:03	1	0.573	A BV	14238.	1.675	0.23
63	TOT	1809	30:09	1	0.575	A VB	18650.	2.194	0.31
64	TOT	1818	30:18	1	0.578	A BV	17126.	2.015	0.28
65	TOT	1825	30:25	1	0.580	A BV	30240.	3.557	0.50
66	TOT	1838	30:38	1	0.584	A BV	22023.	2.591	0.36
67	TOT	1841	30:41	1	0.585	A BV	9746.	1.146	0.16
68	TOT	1844	30:44	1	0.586	A VV	31116.	3.660	0.51
69	TOT	1847	30:47	1	0.587	A BV	46310.	5.448	0.76
70	TOT	1857	30:57	1	0.590	A VV	5896.	0.694	0.10
71	TOT	1862	31:02	1	0.591	A BB	5200.	0.612	0.09
72	TOT	1870	31:10	1	0.594	A BB	5928.	0.697	0.10
73	TOT	1877	31:17	1	0.596	A BV	13545.	1.593	0.22
4	TOT	1880	31:20	1	0.597	A VV	43100.	5.070	0.71
75	TOT	1888	31:28	1	0.600	A VB	23848.	2.805	0.39
76	TOT	1898	31:38	1	0.603	A BV	29721.	3.496	0.49
77	TOT	1906	31:46	1	0.605	A BV	300960.	35.404	4.95
78	TOT	1921	32:01	1	0.610	A BB	42120.	4.955	0.69
79	TOT	1924	32:04	1	0.611	A BB	35338.	4.157	0.58
80	TOT	1926	32:06	1	0.612	A VB	10650.	1.253	0.18
81	TOT	1936	32:16	1	0.615	A BB	38888.	4.575	0.64
82	TOT	1964	32:44	1	0.624	A BB	23312.	2.742	0.38
83	TOT	1972	32:52	1	0.626	A BB	37716.	4.437	0.62
84	TOT	1979	32:59	1	0.629	A VB	6971.	0.820	0.11
85	TOT	1984	33:04	1	0.630	A BV	94488.	11.115	1.55
86	TOT	1995	33:15	1	0.634	A BB	59202.	6.964	0.97
87	TOT	1998	33:18	1	0.635	A VB	11738.	1.381	0.19
88	TOT	2005	33:25	1	0.637	A VV	6506.	0.765	0.11
89	TOT	2012	33:32	1	0.639	A VV	24315.	2.860	0.40
90	TOT	2015	33:35	1	0.640	A BV	13322.	1.567	0.22
91	TOT	2022	33:42	1	0.642	A VB	29710.	3.495	0.49
92	TOT	2036	33:56	1	0.647	A BB	5246.	0.617	0.09
93	TOT	2037	33:57	1	0.647	A BB	12369.	1.455	0.20
94	TOT	2050	34:10	1	0.651	A BB	16052.	1.888	0.26
95	TOT	2054	34:14	1	0.652	A BB	127162.	14.959	2.09
96	TOT	2062	34:22	1	0.655	A BV	18836.	2.216	0.31
97	TOT	2071	34:31	1	0.658	A BB	9106.	1.071	0.15
98	TOT	2081	34:41	1	0.661	A BV	37561.	4.418	0.62
9	TOT	2093	34:53	1	0.665	A BV	7436.	0.875	0.12
.00	NOT	FOUND							
101	TOT	2099	34:59	1	0.667	A BV	46364.	5.454	0.76
102	TOT	2104	35:04	1	0.668	A BV	117071.	13.772	1.93

001807

NO	NAME
103	1H-IMIDAZOLE, 4, 5-DIHYDRO-2-METHYL-
[illegible]	PROPANOICACID, 3-[(PHENYLMETHYL)THIO]-
[illegible]	PHENOL, 3, 5-DIMETHYL-
106	BENZALDEHYDE, 2, 4, 6-TRIMETHYL-
107	PROPIONICACID, THIO-, S-HEPTYLESTER
108	1H-IMIDAZOLE, 2-ETHYL-
109	HEXANE, 2, 3, 4-TRIMETHYL-
110	UNKNOWN

317800 = 1000 ppm

ppm

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
1	TOT	3148	52:28	1	1.000	A BB	850076.	100.000	13.98
2	TOT	623	10:23	1	0.198	A BB	152091.	17.891	2.50
3	TOT	694	11:34	1	0.220	A BB	89854.	10.570	1.48
4	TOT	730	12:10	1	0.232	A BB	23876.	2.809	0.39
5	TOT	770	12:50	1	0.245	A BB	18251.	2.147	0.30
6	TOT	803	13:23	1	0.255	A BB	19936.	2.345	0.33
7	TOT	833	13:53	1	0.265	A BV	19720.	2.320	0.32
8	TOT	836	13:56	1	0.266	A BB	7244.	0.852	0.12
9	TOT	909	15:09	1	0.289	A BV	13449.	1.582	0.22
10	TOT	943	15:43	1	0.300	A BB	557474.	65.579	9.17
11	TOT	1004	16:44	1	0.319	A BB	5728.	0.674	0.09
12	TOT	1016	16:56	1	0.323	A BV	5654.	0.665	0.09
13	TOT	1089	18:09	1	0.346	A BV	18114.	2.131	0.30
14	NOT FOUND								
15	TOT	1178	19:38	1	0.374	A BV	61463.	7.230	1.01
16	TOT	1193	19:53	1	0.379	A VB	5534.	0.651	0.09
17	TOT	1248	20:48	1	0.396	A BB	235521.	27.706	3.87
[illegible]	TOT	1275	21:15	1	0.405	A BB	564993.	66.464	9.29
19	TOT	1319	21:59	1	0.419	A BB	3081.	0.362	0.05
20	TOT	1332	22:12	1	0.423	A BB	158528.	18.649	2.61
21	TOT	1348	22:28	1	0.428	A VB	291021.	34.235	4.79
22	TOT	1405	23:25	1	0.446	A BB	25507.	3.001	0.42
23	TOT	1449	24:09	1	0.460	A BB	65644.	7.722	1.08
24	TOT	1473	24:33	1	0.468	A BV	8711.	1.025	0.14
25	TOT	1477	24:37	1	0.469	A BV	52778.	6.209	0.87
26	TOT	1485	24:45	1	0.472	A VB	25851.	3.041	0.43
27	TOT	1500	25:00	1	0.476	A BV	8487.	0.998	0.14
28	NOT FOUND								
29	TOT	1540	25:40	1	0.489	A BB	13482.	1.586	0.22
30	TOT	1561	26:01	1	0.496	A BV	25326.	2.979	0.42
31	TOT	1568	26:08	1	0.498	A VV	11557.	1.359	0.19
32	TOT	1574	26:14	1	0.500	A BB	366148.	43.072	6.02
33	TOT	1585	26:25	1	0.503	A VB	22907.	2.695	0.38
34	TOT	1589	26:29	1	0.505	A VV	8421.	0.991	0.14
35	TOT	1595	26:35	1	0.507	A VV	10635.	1.251	0.17
36	TOT	1602	26:42	1	0.509	A VB	24277.	2.856	0.40
37	TOT	1613	26:53	1	0.512	A BB	28849.	3.394	0.47
38	TOT	1622	27:02	1	0.515	A BB	12383.	1.457	0.20
39	TOT	1631	27:11	1	0.518	A BV	5813.	0.684	0.10
40	TOT	1638	27:18	1	0.520	A VV	77820.	9.155	1.28
41	NOT FOUND								
42	TOT	1647	27:27	1	0.523	A BB	19889.	2.340	0.33
[illegible]	TOT	1661	27:41	1	0.528	A VB	67092.	7.892	1.10
[illegible]	NOT FOUND								
45	TOT	1678	27:58	1	0.533	A VB	21108.	2.483	0.35
46	TOT	1692	28:12	1	0.537	A BB	11835.	1.392	0.19

001808

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
103	TOT	2113	35:13	1	0.671	A BB	5286.	0.622	0.09
[illegible]	TOT	2117	35:17	1	0.672	A BB	1511.	0.178	0.02
[illegible]	TOT	2127	35:27	1	0.676	A BV	12351.	1.453	0.20
106	TOT	2129	35:29	1	0.676	A BV	16948.	1.994	0.28
107	TOT	2131	35:31	1	0.677	A BB	11389.	1.340	0.19
108	TOT	2136	35:36	1	0.679	A VB	19415.	2.284	0.32
109	TOT	2144	35:44	1	0.681	A BB	5960.	0.701	0.10
110	NOT FOUND								

001809

AGE 2 OF QUANTITATION REPORT FOR FILE ALPHAEXTA

'''NTITATION REPORT FILE: PQUANTEMP

ATA: ALPHAEXTA.TI
4/11/84 16:48:00
AMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS
UBMITTED BY: ANALYST: DIFEO

MOUNT=AREA * REF.AMNT/(REF.AREA)* RESP.FACT)
ESP. FAC. FROM LIBRARY ENTRY

NO NAME
1 ~~CROTONALDEHYDE,2-VINYL-~~ Unknown
2 BENZENE,1,3-BIS(1-METHYLETHYL)-
3 BENZENE,1,3,5-TRIMETHYL-2-(1,2-PROPADIENYL)-
4 HEPTANE,5-ETHYL-2-METHYL-
5 NAPHTHALENE 410
6 1H-INDENE,OCTAHYDRO-5-METHYL-
7 NAPHTHALENE,5-ETHYL-1,2,3,4-TETRAHYDRO-
8 TOLUENE,P-(1-ETHYLPROPYL)-
9 UNKNOWN
10 PENTANE,2,3,3,4-TETRAMETHYL-
11 PHENOL,4-(1-METHYLETHYL)-
12 BENZENE,1-ETHYL-3-(1-METHYLETHYL)-
13 HEXANEDIOICACID,DIMETHYLESTER
14 ACETICACID,METHYLESTER
15 DECANE,2-METHYL-
BENZENE,1,4-DIMETHYL-2-(2-METHYLPROPYL)-
17 CYCLOHEXANE,1,2-DIETHYL-3-METHYL-
18 BENZENE,1-(1-METHYLETHENYL)-3-(1-METHYLETHYL)-
19 2-CYCLOHEXEN-1-ONE,3-METHYL-6-(1-METHYLETHYL)-
20 PHENOL,2,4,5-TRIMETHYL-
21 CYCLOHEXANE,(1,2-DIMETHYLBUTYL)-
22 1H-INDENE,2,3-DIHYDRO-1,2-DIMETHYL-
23 OCTANE,2,7-DIMETHYL-
24 PHENOL,2-(1,1-DIMETHYLETHYL)-
25 1,3-ISOBENZOFURANDIONE
26 UNKNOWN
27 OCTANE,2,3,7-TRIMETHYL-
28 1H-INDENE,2,3-DIHYDRO-1,6-DIMETHYL-
29 BICYCLO[3.1.0]HEX-2-ENE,4-METHYL-1-(1-METHYLETHYL)-
30 CYCLOHEXANE,(3-CHLORO-1-PROPYNYL)-
31 NAPHTHALENE,2-METHYL-
32 TRIDECANE
33 BICYCLO[3.1.0]HEXANE,6-ISOPROPYLIDENE-
34 NAPHTHALENE,2-METHYL-
35 BENZENE,1-(1-METHYLETHENYL)-3-(1-METHYLETHYL)-
36 2-HEXYNE
37 BENZENE,SEC-BUTYLETHYL-
38 BENZENE,3-CYCLOHEXEN-1-YL-
39 CYCLOHEXENE,3-ETHENYL-4-(1-METHYLETHENYL)-
40 BENZENE,ETHOXY-
1 DODECANE,3-METHYL-
2 1,1'-BIPHENYL 2110 ppm
43 OCTANE,2,7-DIMETHYL-
44 ETHANONE,1-[4-(1-METHYLETHENYL)PHENYL]-
45 1-PROPANONE,1-(4-METHOXYPHENYL)-
46 3-OCTYNE,7-METHYL-

001810

NO	NAME
47	HEXANE, 3, 3-DIMETHYL-
3	L-ALANINE, N-[(PHENYLMETHOXY)CARBONYL]-
49	BENZENE, 1, 4-BIS(1-METHYLETHENYL)-
50	BENZENE, 1, 1'-OXYBIS-
51	ISOOCTANOL
52	BENZOICACID, 4-METHYL-, 2-OXO-2-PHENYLETHYLESTER
53	DECANE, 2, 3, 7-TRIMETHYL-
54	NAPHTHALENE, 1, 5-DIMETHYL-
55	1, 4-HEXADIENE, 2, 3, 4, 5-TETRAMETHYL-
56	NAPHTHALENE, 1, 7-DIMETHYL-
57	BENZENE, 1-CYCLOHEXYL-3-METHYL-
58	NAPHTHALENE, 1, 5-DIMETHYL-
59	HEPTANE, 2-METHYL-
60	1(2H)-NAPHTHALENONE, 3, 4-DIHYDRO-8-METHYL-
61	BENZENE, 1, 3-BIS(1-METHYLETHENYL)-
62	1, 4-UNDECADIENE, (Z)-
63	ETHANONE, 1-[4-(1-METHYLETHENYL)PHENYL]-
64	1H-INDENE, OCTAHYDRO-2, 2, 4, 4, 7, 7-HEXAMETHYL-, TRANS-
65	6-AZABICYCLO[3. 2. 1]OCTAN-3-ONE, 6-METHYL-
66	BENZENEPROPANAMINE
67	UNKNOWN
68	1, 2, 4-TRITHIOLANE, 3, 5-BIS(1-METHYLETHYL)-
69	DECANE, 2, 3, 7-TRIMETHYL-
70	BENZENE, 1, 4-BIS(1-METHYLETHENYL)-
71	UNKNOWN
72	ETHANONE, 1-[4-(1-METHYLETHENYL)PHENYL]-
73	UNKNOWN
4	4-UNDECYNE
75	2H-INDEN-2-ONE, 1, 3-DIHYDRO-
76	1H-INDENE, OCTAHYDRO-2, 2, 4, 4, 7, 7-HEXAMETHYL-, TRANS-
77	BENZENE, 1-(1, 1-DIMETHYLETHYL)-3-ETHYL-5-METHYL-
78	SILANE, (3-METHOXYPHENOXY)TRIMETHYL-
79	PENTADECANE
80	NAPHTHALENE, 2-(1-METHYLETHYL)-
81	BENZENEMETHANOL, AR-ETHENYL-
82	2, 4-HEPTADIEN-1-OL, (E, E)-
83	BENZENE, (1-ETHOXYETHYL)-
84	NAPHTHALENE, 1, 3, 6-TRIMETHYL-
85	NAPHTHALENE, 1, 3, 6-TRIMETHYL-
86	UNKNOWN
87	CYCLOHEXANE, 2-PROPYNYLIDENE-
88	3H-1, 2, 4-TRIAZOL-3-ONE, 2, 4-DIHYDRO-2-PHENYL-
89	UNKNOWN
90	CYCLOHEXANE, 2-PROPYNYLIDENE-
91	1(2H)-NAPHTHALENONE, 3, 4-DIHYDRO-6, 7-DIMETHYL-
92	ETHANE, (METHYLSELENO)-
93	CYCLOHEXENE, 1, 5, 5-TRIMETHYL-6-(2-PROPENYLIDENE,-
94	NAPHTHALENE, 1, 3, 6-TRIMETHYL-
95	3H-1, 2, 4-TRIAZOL-3-ONE, 2, 4-DIHYDRO-2-PHENYL-
96	UNKNOWN
97	NAPHTHALENE, 1, 3, 6-TRIMETHYL-
98	DECANE, 3-METHYL-
9	NONANE, 4, 5-DIMETHYL-
100	OCTANE, 2-BROMO-
101	UNKNOWN
102	BICYCLO[3. 2. 1]OCT-2-ENE, 3-METHYL-4-METHYLENE-

001811

NO	NAME
103	HEPTANE, 2, 6-DIMETHYL-
4	2, 4-CYCLOHEXADIEN-1-ONE, 2, 6-DIMETHYL-6-(2-PROPYNYL)-
105	DIBENZOFURAN, 4-METHYL-
106	9H-FLUORENE
107	BENZENE, 1, 1'-[OXYBIS(METHYLENE)]BIS[4-ETHYL-
108	BICYCLO[3. 2. 1]OCT-2-ENE, 3-METHYL-4-METHYLENE-
109	UNKNOWN
110	UNDECANE, 4, 7-DIMETHYL-

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
1	TOT	3148	52:28	1	1.000	A BB	850076.	100.000	13.86
2	TOT	2157	35:57	1	0.685	A BB	468616.	55.126	7.64
3	TOT	2164	36:04	1	0.687	A VB	19909.	2.342	0.32
4	TOT	2178	36:18	1	0.692	A VV	16461.	1.936	0.27
5	TOT	2183	36:23	1	0.693	A BB	130592.	15.362	2.13
6	TOT	2191	36:31	1	0.696	A VB	7952.	0.935	0.13
7	TOT	2199	36:39	1	0.699	A BB	3580.	0.421	0.06
8	TOT	2225	37:05	1	0.707	A VB	11427.	1.344	0.19
9	NOT	FOUND							
10	TOT	2246	37:26	1	0.713	A BB	94632.	11.132	1.54
11	TOT	2248	37:28	1	0.714	A BV	218394.	25.691	3.56
12	TOT	2252	37:32	1	0.715	A VV	15616.	1.837	0.25
13	TOT	2258	37:38	1	0.717	A VV	28152.	3.312	0.46
14	TOT	2264	37:44	1	0.719	A VB	12877.	1.515	0.21
15	TOT	2285	38:05	1	0.726	A BB	11060.	1.301	0.18
16	TOT	2291	38:11	1	0.728	A BV	3517.	0.414	0.06
17	TOT	2299	38:19	1	0.730	A BB	13538.	1.593	0.22
3	TOT	2330	38:50	1	0.740	A BB	73044.	8.593	1.19
19	TOT	2339	38:59	1	0.743	A BV	39714.	4.672	0.65
20	TOT	2360	39:20	1	0.750	A BB	3744.	0.440	0.06
21	TOT	2370	39:30	1	0.753	A BB	22641.	2.663	0.37
22	TOT	2395	39:55	1	0.761	A BB	5048.	0.594	0.08
23	TOT	2404	40:04	1	0.764	A BB	4888.	0.575	0.08
24	TOT	2418	40:18	1	0.768	A BV	18265.	2.149	0.30
25	TOT	2426	40:26	1	0.771	A BB	37609.	4.424	0.61
26	NOT	FOUND							
27	TOT	2431	40:31	1	0.772	A BB	19918.	2.343	0.32
28	TOT	2440	40:40	1	0.775	A BB	1826.	0.215	0.03
29	TOT	2448	40:48	1	0.778	A BB	9242.	1.087	0.15
30	TOT	2461	41:01	1	0.782	A BB	27012.	3.178	0.44
31	TOT	2466	41:06	1	0.783	A BB	89877.	10.573	1.46
32	TOT	2489	41:29	1	0.791	A BB	56492.	6.646	0.92
33	TOT	2501	41:41	1	0.794	A BB	8522.	1.002	0.14
34	TOT	2505	41:45	1	0.796	A BB	54303.	6.388	0.89
35	TOT	2531	42:11	1	0.804	A BB	754385.	88.743	12.30
36	TOT	2547	42:27	1	0.809	A BV	12261.	1.442	0.20
37	TOT	2552	42:32	1	0.811	A BB	94602.	11.129	1.54
38	TOT	2558	42:38	1	0.813	A VB	45043.	5.299	0.73
39	TOT	2598	43:18	1	0.825	A BB	4380.	0.515	0.07
40	TOT	2609	43:29	1	0.829	A BB	50397.	5.928	0.82
41	TOT	2638	43:58	1	0.838	A VB	9612.	1.131	0.16
42	TOT	2651	44:11	1	0.842	A BB	671697.	79.016	10.95
3	TOT	2655	44:15	1	0.843	A VB	7835.	0.922	0.13
44	TOT	2664	44:24	1	0.846	A VV	6244.	0.735	0.10
45	TOT	2667	44:27	1	0.847	A BV	14706.	1.730	0.24
46	TOT	2671	44:31	1	0.848	A BV	48855.	5.747	0.80

001812

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
47	TOT	2674	44:34	1	0.849	A BB	38493.	4.528	0.63
8	TOT	2677	44:37	1	0.850	A VB	15454.	1.818	0.25
49	TOT	2684	44:44	1	0.853	A VB	13661.	1.607	0.22
50	TOT	2693	44:53	1	0.855	A BV	8399.	0.988	0.14
51	TOT	2695	44:55	1	0.856	A BB	11449.	1.347	0.19
52	TOT	2704	45:04	1	0.859	A BB	1194.	0.141	0.02
53	TOT	2718	45:18	1	0.863	A BV	89312.	10.506	1.46
54	TOT	2729	45:29	1	0.867	A BB	59974.	7.055	0.98
55	TOT	2737	45:37	1	0.869	A VB	28841.	3.393	0.47
56	TOT	2759	45:59	1	0.876	A BV	55385.	6.515	0.90
57	TOT	2762	46:02	1	0.877	A BV	12467.	1.467	0.20
58	TOT	2768	46:08	1	0.879	A VB	38087.	4.480	0.62
59	TOT	2781	46:21	1	0.883	A BB	4986.	0.587	0.08
60	TOT	2783	46:23	1	0.884	A BV	7164.	0.843	0.12
61	TOT	2792	46:32	1	0.887	A BB	7181.	0.845	0.12
62	TOT	2805	46:45	1	0.891	A BB	49594.	5.834	0.81
63	TOT	2815	46:55	1	0.894	A VB	13089.	1.540	0.21
64	TOT	2828	47:08	1	0.898	A BV	20128.	2.368	0.33
65	TOT	2837	47:17	1	0.901	A BB	11555.	1.359	0.19
66	TOT	2843	47:23	1	0.903	A VV	7265.	0.855	0.12
67	NOT FOUND								
68	TOT	2853	47:33	1	0.906	A BV	103409.	12.165	1.69
69	TOT	2861	47:41	1	0.909	A VB	69224.	8.143	1.13
70	TOT	2876	47:56	1	0.914	A BB	98220.	11.554	1.60
71	NOT FOUND								
72	TOT	2889	48:09	1	0.918	A VB	135889.	15.985	2.21
73	NOT FOUND								
4	TOT	2894	48:14	1	0.919	A BV	72263.	8.501	1.18
75	TOT	2897	48:17	1	0.920	A VB	35264.	4.148	0.57
76	TOT	2907	48:27	1	0.923	A VB	14243.	1.675	0.23
77	TOT	2912	48:32	1	0.925	A BB	10800.	1.270	0.18
78	TOT	2917	48:37	1	0.927	A BB	6565.	0.772	0.11
79	TOT	2934	48:54	1	0.932	A BV	155989.	18.350	2.54
80	TOT	2945	49:05	1	0.936	A BB	14110.	1.660	0.23
81	TOT	2946	49:06	1	0.936	A BB	5610.	0.660	0.09
82	TOT	2960	49:20	1	0.940	A BB	34941.	4.110	0.57
83	TOT	2964	49:24	1	0.942	A BB	40893.	4.810	0.67
84	TOT	2982	49:42	1	0.947	A BB	3586.	0.422	0.06
85	TOT	2991	49:51	1	0.950	A VV	14080.	1.656	0.23
86	NOT FOUND								
87	TOT	3004	50:04	1	0.954	A BV	41396.	4.870	0.67
88	TOT	3011	50:11	1	0.956	A VV	5330.	0.627	0.09
89	NOT FOUND								
90	TOT	3017	50:17	1	0.958	A VV	37656.	4.430	0.61
91	TOT	3023	50:23	1	0.960	A VB	13910.	1.636	0.23
92	TOT	3025	50:25	1	0.961	A VB	8062.	0.948	0.13
93	TOT	3029	50:29	1	0.962	A BV	6093.	0.717	0.10
94	TOT	3036	50:36	1	0.964	A BV	12413.	1.460	0.20
95	TOT	3039	50:39	1	0.965	A BB	5717.	0.673	0.09
96	NOT FOUND								
97	TOT	3046	50:46	1	0.968	A VB	14276.	1.679	0.23
98	TOT	3055	50:55	1	0.970	A VB	24950.	2.935	0.41
9	TOT	3055	50:55	1	0.970	A VB	26670.	3.137	0.43
100	TOT	3066	51:06	1	0.974	A BB	9812.	1.154	0.16
101	NOT FOUND								
102	TOT	3076	51:16	1	0.977	A BB	137586.	16.185	2.24

001813

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
103	TOT	3082	51:22	1	0.979	A VB	11734.	1.383	0.19
104	TOT	3086	51:26	1	0.980	A VB	5367.	0.631	0.09
105	TOT	3105	51:45	1	0.986	A BB	7616.	0.896	0.12
106	TOT	3108	51:48	1	0.987	A BB	23335.	2.745	0.38
107	TOT	3114	51:54	1	0.989	A BB	4380.	0.515	0.07
108	TOT	3124	52:04	1	0.992	A BB	173760.	20.440	2.83
109	NOT FOUND								
110	TOT	3137	52:17	1	0.997	A BV	157887.	18.573	2.57

001814

ıUANTITATION REPORT FILE: PQUANTEMP

ıATA: ALPHAEXTA.TI
)4/11/84 16:48:00
ıAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS
ıUBMITTED BY: ANALYST: DIFEO

ıMOUNT=AREA * REF.AMNT/(REF.AREA)* RESP.FACT)
ıESP. FAC. FROM LIBRARY ENTRY

NO	NAME
1	~~CROTONALDEHYDE,2-VINYL-~~ Unknown
2	UNKNOWN
3	UNKNOWN
4	CROTONALDEHYDE,2-VINYL-
5	2-BUTANOL,3-METHYL-4-(TRIMETHYLSTANNYL)-
6	BENZENE,1-ETHYL-3-(1-METHYLETHYL)-
7	BENZENE,1,2-DIMETHYL-4-(PHENYLMETHYL)-
8	CYCLOPROPANE,ETHENYLMETHYLENE-
9	2-FURANCARBOXALDEHYDE,5-(2-FURANYLMETHYL)-
10	BENZENE,1,2-DIETHYL-
11	UNKNOWN
12	BENZENE,1,1'-(1,3-PROPANEDIYL)BIS-
13	OCTANE,2-BROMO-
14	BENZENE,1,2-DIMETHYL-4-(PHENYLMETHYL)-
15	1H-IMIDAZOLE-4-METHANOL
'6	CYCLOPROPANE,1-(2-METHYLENE-3-BUTENYL)-1-(1-METHYLENEPROPYL)-
7	UNKNOWN
18	UNDECANE,2,10-DIMETHYL-
19	1H-INDENE,1-ETHYLIDENEOCTAHYDRO-,TRANS-
20	BENZENE,(1-ETHYLPROPYL)-
21	1,1'-BIPHENYL,2,4-DICHLORO-
22	HEPTADECANE,2,6,10,15-TETRAMETHYL-
23	UNKNOWN
24	BENZENE,1,1'-(1,1,2,2-TETRAMETHYL-1,2-ETHANEDIYL)BIS-
25	PENTADECANE,2,6,10,14-TETRAMETHYL-
26	BENZENE,(1,1-DIMETHYLDECYL)-
27	UNKNOWN
28	BENZENE,(1,1-DIMETHYLDECYL)-
29	UNKNOWN
30	UNKNOWN
31	CYCLOPENTANECARBOXYLICACID,ETHENYLESTER
32	CYCLOHEXANE,(3-CHLORO-1-PROPYNYL)-
33	1-PENTYN-3-OL,3,4-DIMETHYL-
34	AZIRIDINE,1-PHENYL-
35	1-PENTANOL,4-METHYL-2-PROPYL-
36	CYCLOHEXANE,HEXYL-
37	OCTANE,2,7-DIMETHYL-
38	BENZENE,(1-NITROETHYL)-
39	ANTHRACENE
40	PENTADECANE,2-METHYL-2-PHENYL-
41	HEPTADECANE,2,6,10,15-TETRAMETHYL-
2	6(5H)-PHENANTHRIDINONE
43	OCTANE,6-ETHYL-2-METHYL-
44	BENZENEMETHANOL,AR-ETHENYL-
45	1H-INDEN-1-ONE,2,3-DIHYDRO-3,3-DIMETHYL-
46	BENZENE,1,1'-(1,2-ETHYNEDIYL)BIS[4-METHOXY-

001815

NO	NAME
47	1H-PYRROLO[2,3-B]PYRIDINE,2-PHENYL-
8	ETHANONE,1-PHENYL-2-(PHENYLSULFONYL)-
49	OCTANE,2,7-DIMETHYL-
50	9H-THIOXANTHENE
51	1H-1,2,4-TRIAZOLE,1-BUTYL-
52	1,1':2',1''-TERPHENYL
53	BENZENE,2-(1,3-BUTADIENYL)-1,3,5-TRIMETHYL-
54	BENZENEETHANAMINE,N-[(PENTAFLUOROPHENYL)METHYL]-
55	HEPTADECANE,2,6,10,15-TETRAMETHYL-
56	1,4-CYCLOHEXADIENE,1-METHYL-
57	PHENANTHRENE,4-METHYL-
58	1(2H)-NAPHTHALENONE,3,4-DIHYDRO-8-METHYL-
59	BENZENE,1-METHOXY-3-METHYL-
60	PHENANTHRENE,9-METHYL-
61	BENZENE,1,1'-(1,2-ETHYNEDIYL)BIS[4-METHOXY-
62	UNKNOWN
63	2,4-CYCLOHEXADIEN-1-ONE,2,6-DIMETHYL-6-(2-PROPYNYL)-
64	HEXANE,3,3,4-TRIMETHYL-
65	2H-1-BENZOPYRAN-2-ONE,7-HYDROXY-
66	1-OXASPIRO[4.5]DECA-3,6-DIENE,6,10,10-TRIMETHYL-
67	CYCLOHEXANE,(1-METHYLETHYL)-
68	NAPHTHALENE,1,3,6-TRIMETHYL-
69	BENZOICACID,P-NITROTHIO-,O-METHYLESTER
70	UNDECANE,3,8-DIMETHYL-
71	6H-1,2,4-TRIAZOLO[4,3-A]INDOLE,4A,5,7,8,8A,9-HEXAHYDRO-9-METHYLENE-
72	CYCLONONANONE
73	BENZENE,(1-METHYLTRIDECYL)-
74	PHENANTHRENE,9-ETHYL-3,6-DIMETHOXY-10-METHYL-
75	4(1H)-QUINOLINONE,1-METHYL-
76	PHENANTHRENE,2,3-DIMETHYL-
77	2-CYCLOHEXEN-1-ONE,3,6-DIMETHYL-6-(1-METHYLETHYL)-
78	OCTANE,2,7-DIMETHYL-
79	1,6-ETHENOAZULENE,1,3A,6,8A-TETRAHYDRO-
80	1-PENTANOL,2-ETHYL-4-METHYL-
81	PYRENE
82	HEPTADECANE,2,6,10,15-TETRAMETHYL-
83	1,7-OCTADIYNE
84	BENZENE,1,1'-CYCLOHEXYLIDENEBIS-
85	UNDECANE,2,10-DIMETHYL-
86	1,1'-BIPHENYL,3,3'-DIMETHOXY-
87	BENZENE,1-METHOXY-3-METHYL-
88	PHOSPHORODITHIOICACID,S-[2-(ACETYLOXY)ETHYL]O,O-DIETHYLESTER
89	PHENANTHRENE,1,2,3,4,5,6,7,8-OCTAHYDRO-
90	NONANE,4,5-DIMETHYL-
91	BENZENE,2-(1,3-BUTADIENYL)-1,3,5-TRIMETHYL-
92	TETRACONTANE,3,5,24-TRIMETHYL-
93	DODECANE,2-METHYL-6-PROPYL-
94	BENZENE,(1,1-DIMETHYLNONYL)-
95	NONANE,5-METHYL-5-PROPYL-
96	1,3-CYCLOPENTADIENE,METHYL-
97	BENZENE,1,3,5-TRIMETHYL-2-(3-METHYL-1,3-BUTADIENYL)-
98	BICYCLO[3.2.0]HEPT-6-ENE
99	PENTADECANE,2-METHYL-2-PHENYL-
100	BENZENE,1-METHOXY-4-METHYL-
101	1,4-CYCLOHEPTADIENE,6-(1-BUTENYL)-,[S-(Z)]-
102	HEPTADECANE,2,6,10,15-TETRAMETHYL-

001816

NO	NAME
103	1,4-CYCLOHEXADIENE,1-METHYL-4-(1-METHYLETHYL)-
104	UNDECANE,3,8-DIMETHYL-
105	DECANE,3,8-DIMETHYL-
106	UNDECANE,3,8-DIMETHYL-
107	OCTANE,2-BROMO-
108	BENZENE,1,1'-[4-(3-PHENYLPROPYL)-1,7-HEPTANEDIYL]BIS-
109	NONANE,4,5-DIMETHYL-
110	OCTANE,2,7-DIMETHYL-

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
1	TOT	3148	52:28	4	1.000	A BB	850076.	100.000	15.68
2	NOT FOUND								
3	NOT FOUND								
4	TOT	3148	52:28	4	1.000	A BB	850076.	100.000	15.68
5	TOT	3151	52:31	4	1.001	A VB	2388.	0.281	0.04
6	TOT	3165	52:45	4	1.005	A BB	10278.	1.209	0.19
7	TOT	3178	52:58	4	1.010	A BB	256784.	30.207	4.74
8	TOT	3202	53:22	4	1.017	A BV	32517.	3.825	0.60
9	TOT	3207	53:27	4	1.019	A VV	7703.	0.906	0.14
10	TOT	3215	53:35	4	1.021	A VV	92534.	10.885	1.71
11	NOT FOUND								
12	TOT	3230	53:50	4	1.026	A VB	26878.	3.162	0.50
13	TOT	3239	53:59	4	1.029	A VB	59667.	7.019	1.10
14	TOT	3244	54:04	4	1.030	A BB	171878.	20.219	3.17
15	TOT	3257	54:17	4	1.035	A BB	74745.	8.793	1.38
16	TOT	3260	54:20	4	1.036	A BB	152888.	17.985	2.82
17	NOT FOUND								
18	TOT	3278	54:38	4	1.041	A BB	11781.	1.386	0.22
19	TOT	3287	54:47	4	1.044	A BV	13241.	1.558	0.24
20	TOT	3293	54:53	4	1.046	A VB	19431.	2.286	0.36
21	TOT	3319	55:19	4	1.054	A BV	5894.	0.693	0.11
22	TOT	3329	55:29	4	1.057	A BB	159491.	18.762	2.94
23	NOT FOUND								
24	TOT	3345	55:45	4	1.063	A VV	46192.	5.434	0.85
25	TOT	3350	55:50	4	1.064	A BV	178163.	20.958	3.29
26	TOT	3353	55:53	4	1.065	A VB	45140.	5.310	0.83
27	NOT FOUND								
28	TOT	3372	56:12	4	1.071	A BB	69744.	8.204	1.29
29	NOT FOUND								
30	NOT FOUND								
31	TOT	3379	56:19	4	1.073	A BB	27320.	3.214	0.50
32	TOT	3411	56:51	4	1.084	A BB	16636.	1.957	0.31
33	TOT	3428	57:08	4	1.089	A BB	303797.	35.738	5.60
34	TOT	3430	57:10	4	1.090	A VB	9594.	1.129	0.18
35	TOT	3448	57:28	4	1.095	A BB	11537.	1.357	0.21
36	TOT	3456	57:36	4	1.098	A BV	9563.	1.125	0.18
37	TOT	3463	57:43	4	1.100	A BB	7352.	0.865	0.14
38	TOT	3481	58:01	4	1.106	A BV	20206.	2.377	0.37
39	TOT	3494	58:14	4	1.110	A BB	37823.	4.449	0.70
40	TOT	3496	58:16	4	1.111	A BB	24680.	2.903	0.46
41	TOT	3511	58:31	4	1.115	A BB	140495.	16.527	2.59
42	TOT	3536	58:56	4	1.123	A BB	8660.	1.019	0.16
43	TOT	3538	58:58	4	1.124	A BB	73888.	8.692	1.36
44	TOT	3562	59:22	4	1.132	A VB	15143.	1.781	0.28
45	TOT	3581	59:41	4	1.138	A BV	14286.	1.681	0.26
46	TOT	3599	59:59	4	1.143	A BB	20484.	2.410	0.38

001817

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
47	TOT	3605	60:05	4	1.145	A VB	7206.	0.848	0.13
3	TOT	3621	60:21	4	1.150	A BB	4332.	0.510	0.08
.9	TOT	3623	60:23	4	1.151	A VV	11100.	1.306	0.20
50	TOT	3629	60:29	4	1.153	A VB	10175.	1.197	0.19
51	TOT	3639	60:39	4	1.156	A BB	10362.	1.219	0.19
52	TOT	3655	60:55	4	1.161	A BB	4694.	0.552	0.09
53	TOT	3672	61:12	4	1.166	A BB	14844.	1.746	0.27
54	TOT	3680	61:20	4	1.169	A BV	7591.	0.893	0.14
55	TOT	3684	61:24	4	1.170	A BB	162137.	19.073	2.99
56	TOT	3690	61:30	4	1.172	A BB	51595.	6.069	0.95
57	TOT	3710	61:50	4	1.179	A BB	12122.	1.426	0.22
58	TOT	3714	61:54	4	1.180	A BB	22766.	2.678	0.42
59	TOT	3731	62:11	4	1.185	A BB	238519.	28.058	4.40
60	TOT	3743	62:23	4	1.189	A VV	12952.	1.524	0.24
61	TOT	3756	62:36	4	1.193	A BB	16999.	2.000	0.31
62	NOT	FOUND							
63	TOT	3769	62:49	4	1.197	A VB	6675.	0.785	0.12
64	TOT	3783	63:03	4	1.202	A BB	5136.	0.604	0.09
65	TOT	3792	63:12	4	1.205	A BB	42301.	4.976	0.78
66	TOT	3795	63:15	4	1.206	A BB	18106.	2.130	0.33
67	TOT	3814	63:34	4	1.212	A BB	9408.	1.107	0.17
68	TOT	3817	63:37	4	1.213	A BB	4444.	0.523	0.08
69	TOT	3829	63:49	4	1.216	A BV	4128.	0.486	0.08
70	TOT	3831	63:51	4	1.217	A BB	15140.	1.781	0.28
71	TOT	3841	64:01	4	1.220	A BB	2042.	0.240	0.04
72	TOT	3850	64:10	4	1.223	A BB	33760.	3.971	0.62
73	TOT	3872	64:32	4	1.230	A BB	43557.	5.124	0.80
4	TOT	3876	64:36	4	1.231	A BB	4229.	0.498	0.08
75	TOT	3908	65:08	4	1.241	A BB	3461.	0.407	0.06
76	TOT	3934	65:34	4	1.250	A BV	10648.	1.253	0.20
77	TOT	3950	65:50	4	1.255	A BB	13724.	1.614	0.25
78	TOT	3967	66:07	4	1.260	A BV	10265.	1.208	0.19
79	TOT	3974	66:14	4	1.262	A BB	31744.	3.734	0.59
80	TOT	3980	66:20	4	1.264	A VB	33196.	3.905	0.61
81	TOT	3983	66:23	4	1.265	A VB	16384.	1.927	0.30
82	TOT	4007	66:47	4	1.273	A BB	73108.	8.600	1.35
83	TOT	4019	66:59	4	1.277	A BB	6808.	0.801	0.13
84	TOT	4055	67:35	4	1.288	A BB	6747.	0.794	0.12
85	TOT	4067	67:47	4	1.292	A BV	35826.	4.214	0.66
86	TOT	4097	68:17	4	1.301	A BB	22123.	2.602	0.41
87	TOT	4102	68:22	4	1.303	A BB	49523.	5.826	0.91
88	TOT	4114	68:34	4	1.307	A BB	3732.	0.439	0.07
89	TOT	4131	68:51	4	1.312	A BB	25526.	3.003	0.47
90	TOT	4138	68:58	4	1.314	A BB	12906.	1.518	0.24
91	TOT	4150	69:10	4	1.318	A BB	10796.	1.270	0.20
92	TOT	4157	69:17	4	1.321	A BB	40672.	4.785	0.75
93	TOT	4214	70:14	4	1.339	A BV	15506.	1.824	0.29
94	TOT	4215	70:15	4	1.339	A BV	9936.	1.169	0.18
95	TOT	4221	70:21	4	1.341	A VB	45554.	5.359	0.84
96	TOT	4227	70:27	4	1.343	A VB	7194.	0.846	0.13
97	TOT	4242	70:42	4	1.348	A BV	4163.	0.490	0.08
98	TOT	4255	70:55	4	1.352	A BB	10657.	1.254	0.20
9	TOT	4270	71:10	4	1.356	A BV	6988.	0.822	0.13
.00	TOT	4276	71:16	4	1.358	A BB	54213.	6.377	1.00
.01	TOT	4288	71:28	4	1.362	A BB	31844.	3.746	0.59
.02	TOT	4301	71:41	4	1.366	A VB	29361.	3.454	0.54

001818

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
103	TOT	4324	72:04	4	1.374	A BB	6480.	0.762	0.12
4	TOT	4337	72:17	4	1.378	A BB	25680.	3.021	0.47
105	TOT	4354	72:34	4	1.383	A BB	11332.	1.333	0.21
106	TOT	4438	73:58	4	1.410	A VB	21336.	2.510	0.39
107	TOT	4488	74:48	4	1.426	A VB	16386.	1.928	0.30
108	TOT	4494	74:54	4	1.428	A BB	10928.	1.286	0.20
109	TOT	4571	76:11	4	1.452	A BV	17873.	2.102	0.33
110	TOT	4653	77:33	4	1.478	A BB	33456.	3.936	0.62

001819

QUANTITATION REPORT FILE: PQUANTEMP

ITA: ALPHAEXTA.TI
04/11/84 16:48:00
SAMPLE: 2 UL INJ.-SPLIT-4 GMS:10 MLS
SUBMITTED BY: ANALYST: DIFEO

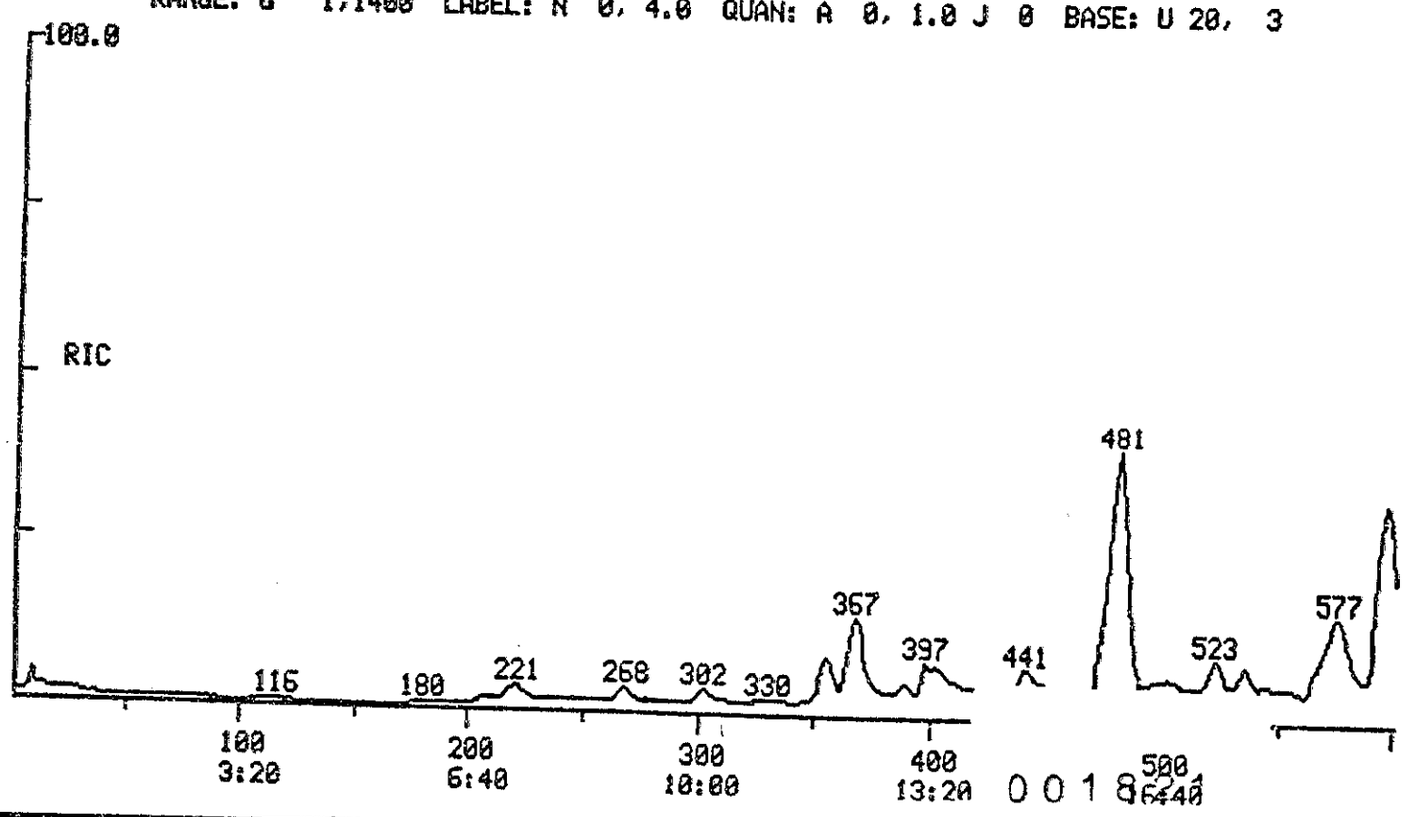
AMOUNT=AREA * REF.AMNT/(REF.AREA)* RESP.FACT)
RESP. FAC. FROM LIBRARY ENTRY

NO	NAME
1	~~CROTONALDEHYDE,2-VINYL-~~ Unknown
2	DECANE,3,8-DIMETHYL-
3	TRICYCLO[3.2.1.01,5]OCTANE

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
1	TOT	3148	52:28	1	1.000	A BB	850076.	100.000	96.7
2	TOT	4697	78:17	1	1.492	A VV	18453.	2.171	2.1
3	TOT	4709	78:29	1	1.496	A BB	10424.	1.226	1.1

001820

RIC
04/11/84 10:24:00 DATA: ALPHAVOA #1393 SCANS 1 TO 601
CALI: CAL41184 #3 OUT OF 1 TO 1400
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-22008--VOAS
RANGE: G 1,1400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

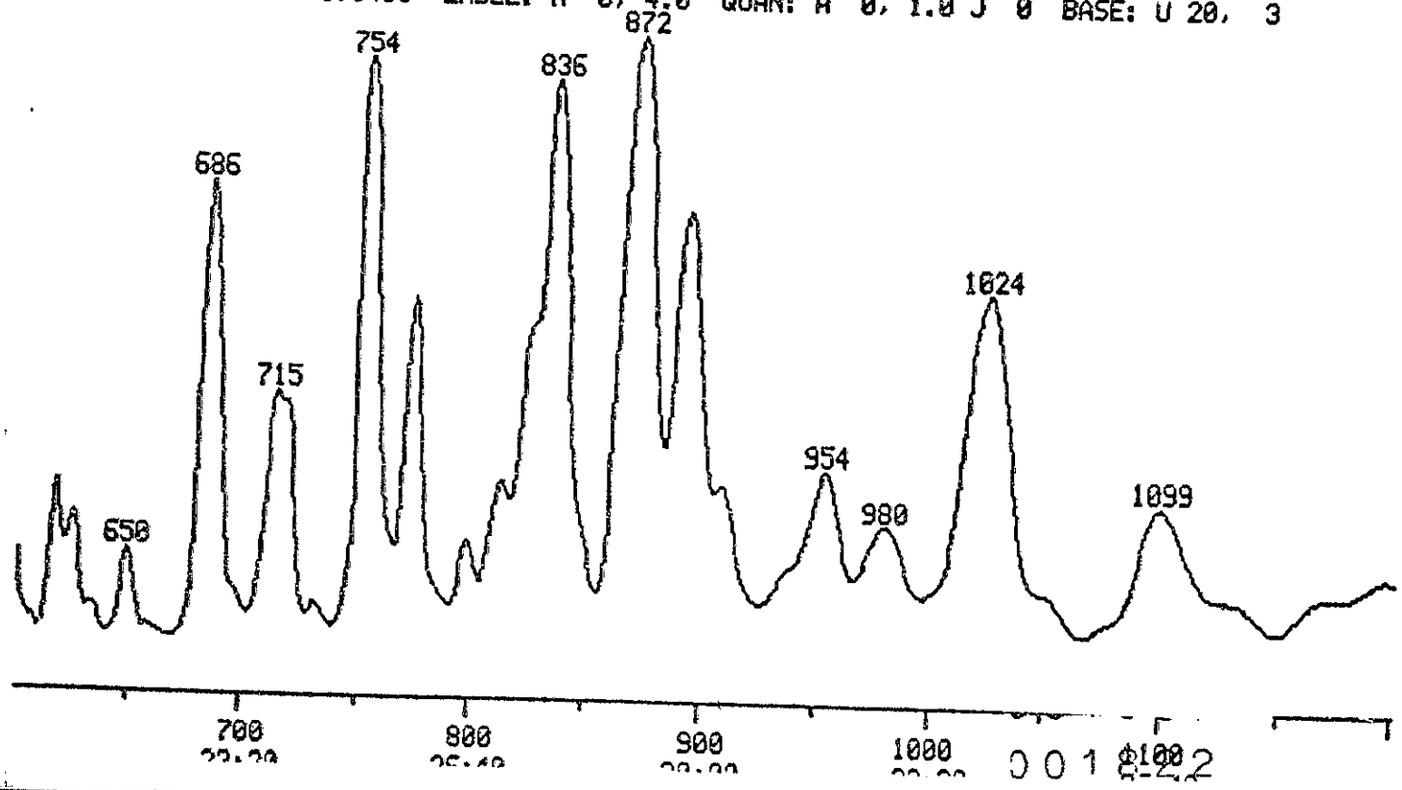


0018

RIC
04/11/84 10:24:00
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
RANGE: G 1,1400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: ALPHAVOA #1393
CALI: CAL41184 #3

SCANS 601 TO 1201
OUT OF 1 TO 1400



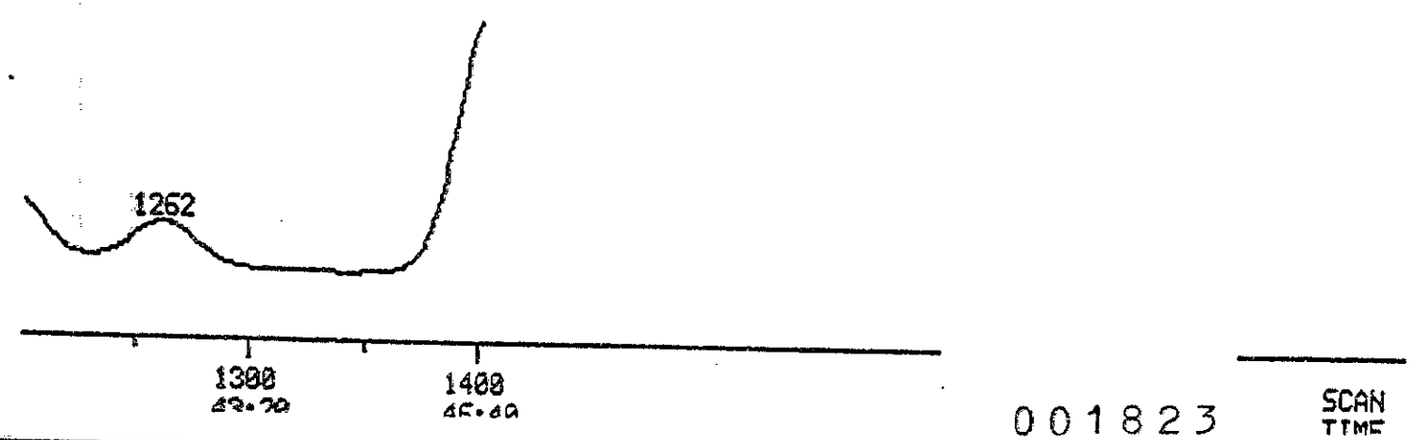
0018-22

RIC
04/11/84 10:24:00
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
RANGE: G 1,1400 LABEL: N 0, 4.0 QUAN: A 0, 1.0 J 0 BASE: U 20, 3

DATA: ALPHAVOA #1393
CALI: CAL41184 #3

SCANS 1201 TO 1400
OUT OF 1 TO 1400

4595710.



UANTITATION REPORT FILE: ALPHAVOA

ATA: ALPHAVOA.TI
11/84 10:24:00
AMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
UBMITTED BY: ANALYST: DIFEO

MOUNT=AREA * REF.AMNT/(REF.AREA)* RESP.FACT)
ESP. FAC. FROM LIBRARY ENTRY

NO	NAME
1	2-PROPANONE
2	3-PENTENOICACID, 4-METHYL-
3	2-PROPANOL
4	FURAN, TETRAHYDRO-
5	2-PROPANOL, 2-METHYL-
6	ETHANE, 1,1,2-TRICHLORO-1,2,2-TRIFLUORO-
7	2-BUTANONE
8	3-BUTEN-2-ONE
9	2-BUTANOL, (R)-
10	ACETICACID
11	PROPANE, 2-METHYL-
12	CYCLOPENTANE, BROMO-
13	1-BUTANOL
14	PEROXIDE, BIS(1-METHYLPROPYL)
15	ETHENE, TRICHLORO-
16	BENZENE
17	ETHANOL, 1-METHOXY-, ACETATE
18	PROPANENITRILE, 3-METHOXY-
19	BUTANE, 1-CHLORO-2-METHYL-
20	2-BUTANETHIOL, 2-METHYL-
21	CYCLOHEXANE, METHYL-
22	1-PENTANOL
23	2-PENTANONE, 4-METHYL-
24	2-FURANCARBOXALDEHYDE
25	2-PENTANOL, 4-METHYL-
26	METHANE, OXYBIS[CHLORO-
27	ETHENE, TETRACHLORO-
28	2-PROPANAMINE, N-(1-METHYLETHYL)-
29	HEPTANE
30	CYCLOHEPTATRIENYLIUM, BROMIDE
31	1,5-CYCLOOCTADIENE
32	1,5-CYCLOOCTADIENE, (E,E)-
33	2-PYRROLIDINECARBOXYLICACID, 1,2-DIMETHYL-5-OXO ETHYLESTER
34	CYCLOHEXENE, 4-ETHENYL-
35	UNKNOWN
36	PHENOL
37	2H-PYRAN, TETRAHYDRO-2-(1-METHYLETHOXY)-
38	BENZENE, 1,4-DIMETHYL-
39	METHYLAMINE, N-CYCLOPENTYLIDENE-
40	2-FURANCARBOXALDEHYDE, 5-METHYL-
41	CYCLOHEPTANONE, 3-METHYL-, (+)-
42	2-HEXENE, 3-METHYL-, (Z)-
43	2-CYCLOHEXEN-1-ONE, 3-METHYL-
	ETHANONE, 1-(3-CYCLOHEXEN-1-YL)-
45	THIAZOLE, 4-METHYL-
46	BENZENE, ETHENYL-

001824

NO	NAME
47	3-HEPTENE
48	CYCLOPENTENE, 1-ETHENYL-3-METHYLENE-
7	PYRAZINE, ETHYL-
50	1-HEXENE, 4-METHYL-
51	PHENOL, 3-METHYL-
52	PHENOL, 2-METHYL-
53	1H-INDENE, OCTAHYDRO-, TRANS-
54	AZETIDINE, 3-METHYL-3-PHENYL-
55	1,2-HEPTADIENE
56	BENZENE, 1-ETHYL-4-METHYL-
57	CYCLOPENTENE, 1,4-DIMETHYL-5-(1-METHYLETHYL)-
58	ETHANOL, 2,2'-[1,2-ETHANEDIYLBIS(OXY)]BIS-
59	ETHANONE, 2-(FORMYLOXY)-1-PHENYL-
60	2-PROPANONE, 1-CYCLOHEXYLIDENE-
61	PHENOL, 2-ETHYL-
62	2-PYRROLIDINECARBOXYLICACID, 1,2-DIMETHYL-5-OXO- ,,ETHYLESTER
63	PHENOL, 2-ETHYL-
64	BENZENEACETICACID, 2-PROPENYLESTER

NO	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
1	TOT	221	7:22	36	0.293	A VV	1016720.	3.176	0.34
2	TOT	232	7:44	36	0.308	A VB	51697.	0.162	0.02
3	TOT	268	8:56	36	0.355	A BB	566227.	1.769	0.19
4	TOT	302	10:04	36	0.401	A BB	542156.	1.694	0.18
5	TOT	329	10:58	36	0.436	A BB	77712.	0.243	0.03
6	TOT	334	11:08	36	0.443	A BB	54566.	0.170	0.02
7	TOT	355	11:50	36	0.471	A BV	1683190.	5.259	0.56
8	TOT	367	12:14	36	0.487	A VB	4469370.	13.963	1.48
9	TOT	389	12:58	36	0.516	A BB	353024.	1.103	0.12
10	TOT	397	13:14	36	0.527	A BB	1547960.	4.836	0.51
11	TOT	403	13:26	36	0.534	A VB	1049720.	3.280	0.35
12	TOT	432	14:24	36	0.573	A BB	19072.	0.060	0.01
13	TOT	441	14:42	36	0.585	A BB	1439860.	4.498	0.48
14	TOT	467	15:34	36	0.619	A BV	83182.	0.260	0.03
15	TOT	476	15:52	36	0.631	A BB	3931620.	12.283	1.30
16	TOT	482	16:04	36	0.639	A BB	12350700.	38.586	4.08
17	TOT	496	16:32	36	0.658	A VB	509041.	1.590	0.17
18	TOT	523	17:26	36	0.694	A BV	1219080.	3.809	0.40
19	TOT	536	17:52	36	0.711	A VV	967936.	3.024	0.32
20	TOT	545	18:10	36	0.723	A VV	144768.	0.452	0.05
21	TOT	555	18:30	36	0.736	A VB	262848.	0.821	0.09
22	TOT	577	19:14	36	0.765	A BB	4790010.	14.965	1.58
23	TOT	597	19:54	36	0.792	A BB	9181180.	28.684	3.03
24	TOT	618	20:36	36	0.820	A BB	7312630.	22.846	2.42
25	TOT	626	20:52	36	0.830	A BB	5814270.	18.165	1.92
26	TOT	635	21:10	36	0.842	A VB	722848.	2.258	0.24
27	TOT	650	21:40	36	0.862	A BB	3233740.	10.103	1.07
28	TOT	659	21:58	36	0.874	A VB	423526.	1.323	0.14
29	TOT	676	22:32	36	0.897	A BV	786944.	2.459	0.26
30	TOT	685	22:50	36	0.908	A BB	13946200.	43.571	4.61
31	TOT	697	23:14	36	0.924	A VB	401024.	1.253	0.13
32	TOT	712	23:44	36	0.944	A BB	6241150.	19.499	2.06
33	TOT	720	24:00	36	0.955	A BB	6971770.	21.781	2.30
34	TOT	732	24:24	36	0.971	A BB	646528.	2.020	0.21
35	NOT FOUND								
36	TOT	754	25:08	36	1.000	A BB	32008100.	100.000	10.57

001825

10	M/E	SCAN	TIME	REF	RRT	METH	AREA(HGHT)	AMOUNT	%TOT
37	TOT	765	25:30	36	1.015	A BB	460224.	1.438	0.15
38	TOT	774	25:48	36	1.027	A BB	15458000.	48.294	5.11
	TOT	783	26:06	36	1.038	A VB	509952.	1.593	0.17
40	TOT	788	26:16	36	1.045	A BB	139008.	0.434	0.05
41	TOT	798	26:36	36	1.058	A BB	2359290.	7.371	0.78
42	TOT	812	27:04	36	1.077	A BV	2370550.	7.406	0.78
43	TOT	825	27:30	36	1.094	A BV	9420790.	29.432	3.11
44	TOT	836	27:52	36	1.109	A BB	26447300.	82.627	8.74
45	TOT	848	28:16	36	1.125	A VB	732416.	2.288	0.24
46	TOT	866	28:52	36	1.149	A BB	22480100.	70.232	7.43
47	TOT	875	29:10	36	1.160	A BB	14797000.	46.229	4.89
48	TOT	893	29:46	36	1.184	A BV	24919500.	77.854	8.23
49	TOT	909	30:18	36	1.206	A VB	3626110.	11.329	1.20
50	TOT	938	31:16	36	1.244	A BB	1854970.	5.795	0.61
51	TOT	954	31:48	36	1.265	A BB	8929530.	27.898	2.95
52	TOT	976	32:32	36	1.294	A BB	2747130.	8.583	0.91
53	TOT	983	32:46	36	1.304	A BB	5499390.	17.181	1.82
54	TOT	998	33:16	36	1.324	A BB	160281.	0.501	0.05
55	TOT	1024	34:08	36	1.358	A BB	15471600.	48.336	5.11
56	TOT	1050	35:00	36	1.393	A BB	873600.	2.729	0.29
57	TOT	1079	35:58	36	1.431	A BB	537856.	1.680	0.18
58	TOT	1097	36:34	36	1.455	A BB	8825850.	27.574	2.92
59	TOT	1105	36:50	36	1.466	A BB	1771960.	5.536	0.59
60	TOT	1134	37:48	36	1.504	A BB	1650430.	5.156	0.55
61	TOT	1167	38:54	36	1.548	A BB	2482300.	7.755	0.82
62	TOT	1188	39:36	36	1.576	A BV	363776.	1.137	0.12
63	TOT	1202	40:04	36	1.594	A BB	1951230.	6.096	0.64
64	TOT	1261	42:02	36	1.672	A BB	1091450.	3.410	0.36

001826

LIBRARY SEARCH DATA: ALPHAVOA # 221 BASE M/E: 43
04/11/84 10:24:00 + 7:22 CALI: CAL41184 # 3 RIC: 79743.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-22008--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
78 MATCHED AT LEAST 6 OF THE 16 LARGEST PEAKS IN E UNKNOWN
17 HAD FIT AT LEAST 500

RANK	IN	NAME
1	44	2-PROPANONE
2	47	ETHENE, METHOXY-
3	51	BUTANE
4	1040	1-PROPEN-2-OL, ACETATE
5	1047	ACETICACID, 2-PROPENYLESTER
6	2014	2-HEXANONE, 5-METHYL-
7	50	PROPANE, 2-METHYL-
8	2022	2-PENTANONE, 4, 4-DIMETHYL-
9	1073	2-PENTANONE, 4-METHYL-

RANK	FORMULA	M. WT	B. PK	RITY	FIT	RFIT
1	C3. H6. O	58	43	913	973	937
2	C3. H6. O	58	58	827	872	844
3	C4. H10	58	43	810	853	855
4	C5. H8. O2	100	43	761	795	906
5	C5. H8. O2	100	43	752	793	814
6	C7. H14. O	114	43	706	753	842
7	C4. H10	58	43	690	719	718
8	C7. H14. O	114	43	659	701	718
9	C6. H12. O	100	43	664	701	814

001827

LIBRARY SEARCH DATA: ALPHAVOA # 232 BASE M/E: 43
04/11/84 10:24:00 + 7:44 CALI: CAL41184 # 3 RIC: 10143.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
ENHANCED (6 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
222 MATCHED AT LEAST 6 OF THE 16 LARGEST PEAKS IN E UNKNOWN
65 HAD FIT AT LEAST 500

RANK	IN	NAME
1	1954	3-PENTENOICACID, 4-METHYL-
2	44	2-PROPANONE
3	223	ACETICACID, HYDRAZIDE
4	7275	BUTANOICACID, 3-OXO-, 2-METHYLPROPYLESTER
5	51	BUTANE
6	1047	ACETICACID, 2-PROPENYLESTER
7	55	METHANAMINE, N-METHYL-, COMPD. WITHBORANE(1:1)
8	47	ETHENE, METHOXY-
9	2630	2-PROPENAL, 3-(2-FURANYL)-

RANK	FORMULA	M.WT	B.PK	RITY	FIT	RFIT
1	C6.H10.O2	114	43	614	856	614
2	C3.H6.O	58	43	619	801	620
3	C2.H6.O.N2	74	43	408	771	436
4	C8.H14.O3	158	43	486	763	545
5	C4.H10	58	43	588	761	603
6	C5.H8.O2	100	43	548	754	576
7	C2.H10.N.B	59	56	550	707	622
8	C3.H6.O	58	58	545	705	548
9	C7.H6.O2	122	43	472	698	607

001828

LIBRARY SEARCH DATA: ALPHAVOA # 268 BASE M/E: 45
04/11/84 10:24:00 + 8:56 CALI: CAL41184 # 3 RIC: 94975.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
ENHANCED (S 15B 2N 0T)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
136 MATCHED AT LEAST 7 OF THE 16 LARGEST PEAKS IN E UNKNOWN
41 HAD FIT AT LEAST 500

RANK	IN	NAME
1	73	2-PROPANOL
2	510	4-PENTEN-2-OL
3	266	1,2-PROPANEDIOL
4	50	PROPANE, 2-METHYL-
5	243	2-BUTANOL
6	619	PROPANE, 2-NITRO-
7	246	2-BUTANOL, (R)-
8	200	PENTANE
9	51	BUTANE

RANK	FORMULA	M.WT	B.PK	RITY	FIT	RFIT
1	C3.H8.O	60	45	862	979	863
2	C5.H10.O	86	45	794	901	858
3	C3.H8.O2	76	45	825	892	870
4	C4.H10	58	43	340	871	348
5	C4.H10.O	74	45	777	855	787
6	C3.H7.O2.N	89	43	332	854	340
7	C4.H10.O	74	45	783	853	799
8	C5.H12	72	43	295	850	313
9	C4.H10	58	43	325	844	336

001829

LIBRARY SEARCH DATA: ALPHAVOA # 277 BASE M/E: 40
04/11/84 10:24:00 + 9:14 CALI: CAL41184 # 3 RIC: 16079.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
127 MATCHED AT LEAST 3 OF THE 16 LARGEST PEAKS IN E UNKNOWN
11 HAD FIT AT LEAST 500

RANK IN NAME
1 18281 BENZENE, 5-(2-ISOTHIOCYANATOETHYL)-1, 2, 3-TRI HOXY-
2 28256 D: A-FRIEDOOLEANAN-29-OL, (20. ALPHA.)-
3 19288 ETHANONE, 1-[4-(METHYLTELLURO)PHENYL]-
4 19225 NAPHTHO[1, 2-B]FURAN-2, 6(3H, 4H)-DIONE, 3A, 5, 5 , 9A, 9B-HEXAHYDRO-9-HYDRO
5 31210 D-GLUCOSE, 3-O-[6-DEOXY-2, 3, 4-TRIS-O-(TRIMET SILYL)-. ALPHA. -L-MANNOPY
6 21487 ESTR-5(10)-EN-17-OL, 3-FLUORO-6-METHYL-, (3. A A. , 6. BETA. , 17. BETA.)-
7 17968 2H-1, 4-BENZOTHIAZIN-3(4H)-ONE, 4-HYDROXY-6-(TRIFLUOROMETHYL)-
8 20424 METHANAMINE, N-METHYL-, MOLYBDENUM(4+)SALT
9 28647 D: A-FRIEDOOLEANAN-29-DICACID, (20. ALPHA.)-

RANK	FORMULA	M. WT	B. PK	PURITY	FIT	RFIT
1	C12. H15. O3. N. S	253	181	15	716	18
2	C30. H52. O	428	259	24	609	38
3	C9. H10. O. TE	264	264	30	585	48
4	C15. H20. O4	264	249	12	563	18
5	C33. H78. O10. SI7	830	363	13	563	19
6	C19. H29. O. F	292	292	18	556	32
7	C9. H6. O2. N. S. F3	249	249	22	552	33
8	C2. H7. N. MO	278	274	15	532	24
9	C30. H50. O2	442	217	21	527	39

001830

LIBRARY SEARCH DATA: ALPHAVOA # 302 BASE M/E: 42
04/11/84 10:24:00 + 10:04 CALI: CAL41184 # 3 RIC: 62079.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
199 MATCHED AT LEAST 6 OF THE 16 LARGEST PEAKS IN THE UNKNOWN
92 HAD FIT AT LEAST 500

RANK	IN	NAME
1	183	FURAN, TETRAHYDRO-
2	184	1-PROPENE, 2-METHOXY-
3	188	OXIRANE, 2, 2-DIMETHYL-
4	4	AZIRIDINE
5	181	OXIRANE, ETHYL-
6	1231	1, 3-DIOXOLANE, 4-ETHYL-
7	190	3-BUTEN-1-OL
8	177	FORMALDEHYDE, DIMETHYLHYDRAZONE
9	137	1H-TETRAZOLE

RANK	FORMULA	M. WT	B. PK	PURITY	FIT	RFIT
1	C4. H8. O	72	42	921	983	931
2	C4. H8. O	72	42	708	914	750
3	C4. H8. O	72	41	692	910	729
4	C2. H5. N	43	42	523	894	533
5	C4. H8. O	72	42	821	875	904
6	C5. H10. O2	102	42	806	859	839
7	C4. H8. O	72	42	793	851	851
8	C3. H8. N2	72	42	751	789	821
9	C. H2. N4	70	42	561	775	569

001831

LIBRARY SEARCH DATA: ALPHAVOA # 329 BASE M/E: 59
04/11/84 10:24:00 + 10:58 CALI: CAL41184 # 3 RIC: 13103.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
99 MATCHED AT LEAST 6 OF THE 16 LARGEST PEAKS IN THE UNKNOWN
51 HAD FIT AT LEAST 500

RANK	IN	NAME
1	241	2-PROPANOL, 2-METHYL-
2	607	3-PENTANOL
3	2258	2-PENTANOL, 2, 4-DIMETHYL-
4	1260	PROPANE, 1-ETHOXY-2-METHYL-
5	1210	2-BUTANONE, 3-HYDROXY-3-METHYL-
6	656	1-PROPANOL, 2-METHOXY-
7	2347	PROPANOICACID, 2-HYDROXY-2-METHYL-, METHYLESTER
8	54	FORMAMIDE, N-METHYL-
9	2274	PROPANE, 2-METHYL-2-(1-METHYLETHOXY)-

RANK	FORMULA	M. WT	B. PK	PURITY	FIT	RFIT
1	C4. H10. O	74	59	706	947	737
2	C5. H12. O	88	59	708	903	758
3	C7. H16. O	116	59	696	869	778
4	C6. H14. O	102	59	684	867	764
5	C5. H10. O2	102	59	669	862	738
6	C4. H10. O2	90	59	663	862	712
7	C5. H10. O3	118	59	619	850	674
8	C2. H5. O. N	59	59	626	840	636
9	C7. H16. O	116	59	632	797	699

001832

LIBRARY SEARCH DATA: ALPHAVOA # 335 BASE M/E: 101
04/11/84 10:24:00 + 11:10 CALI: CAL41184 # 3 RIC: 9871.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-22008--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
69 MATCHED AT LEAST 4 OF THE 16 LARGEST PEAKS IN THE UNKNOWN
18 HAD FIT AT LEAST 500

RANK	IN	NAME
1	11173	ETHANE, 1,1,2-TRICHLORO-1,2,2-TRIFLUORO-
2	4034	METHANE, TRICHLOROFLUORO-
3	2137	ETHENE, CHLOROTRIFLUORO-
4	5558	BUTANE, 1,1-DIETHOXY-
5	11174	ETHANE, 1,1,1-TRICHLORO-2,2,2-TRIFLUORO-
6	22295	BUTANE, 1,1,3,4-TETRACHLORO-1,2,2,3,4,4-HEXAFLUORO-
7	2374	BUTANE, 1,1-DIMETHOXY-
8	9178	PENTANOICACID, PENTYLESTER
9	31323	FREON

RANK	FORMULA	M. WT	B. PK	PURITY	FIT	RFIT
1	C2. CL3. F3	186	101	789	995	789
2	C. CL3. F	136	101	367	971	373
3	C2. CL. F3	116	66	98	761	117
4	C8. H18. O2	146	103	283	729	347
5	C2. CL3. F3	186	151	508	680	533
6	C4. CL4. F6	302	101	525	669	758
7	C6. H14. O2	118	103	226	659	334
8	C10. H20. O2	172	70	142	646	198
9		0	85	277	644	299

001833

LIBRARY SEARCH DATA: ALPHAVOA # 355 BASE M/E: 43
04/11/84 10:24:00 + 11:50 CALI: CAL41184 # 3 RIC: 263679.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-22008--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
84 MATCHED AT LEAST 7 OF THE 16 LARGEST PEAKS IN THE UNKNOWN
30 HAD FIT AT LEAST 500

RANK	IN	NAME
1	180	2-BUTANONE
2	1040	1-PROPEN-2-OL, ACETATE
3	50	PROPANE, 2-METHYL-
4	51	BUTANE
5	179	PROPANAL, 2-METHYL-
6	191	1-PROPENE, 3-METHOXY-
7	44	2-PROPANONE
8	200	PENTANE
9	1978	2,3-PENTANEDIONE, 4-METHYL-

RANK	FORMULA	M.WT	B.PK	PURITY	FIT	RFIT
1	C4.H8.O	72	43	966	993	969
2	C5.H8.O2	100	43	771	804	811
3	C4.H10	58	43	586	780	594
4	C4.H10	58	43	579	773	590
5	C4.H8.O	72	43	724	736	732
6	C4.H8.O	72	72	264	730	268
7	C3.H6.O	58	43	534	724	544
8	C5.H12	72	43	682	701	697
9	C6.H10.O2	114	43	649	672	695

001834

LIBRARY SEARCH DATA: ALPHAVOA # 368 BASE M/E: 55
04/11/84 10:24:00 + 12:16 CALI: CAL41184 # 3 RIC: 464895.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
98 MATCHED AT LEAST 7 OF THE 16 LARGEST PEAKS IN THE UNKNOWN
56 HAD FIT AT LEAST 500

RANK	IN	NAME
1	141	3-BUTEN-2-ONE
2	142	ETHENE, 1, 1'-OXYBIS-
3	1113	OXETANE, 3-(1-METHYLETHYL)-
4	149	3-BUTYN-2-OL
5	1976	2(3H)-FURANONE, DIHYDRO-3, 5-DIMETHYL-
6	156	1-BUTENE, 3-METHYL-
7	163	CYCLOPROPANE, 1, 1-DIMETHYL-
8	1417	PENTANE, 1-CHLORO-
9	4	AZIRIDINE

RANK	FORMULA	M. WT	B. PK	PURITY	FIT	RFIT
1	C4. H6. O	70	55	973	983	978
2	C4. H6. O	70	43	470	844	479
3	C6. H12. O	100	55	787	827	801
4	C4. H6. O	70	55	629	818	651
5	C6. H10. O2	114	42	776	796	838
6	C5. H10	70	55	751	792	770
7	C5. H10	70	55	756	776	783
8	C5. H11. CL	106	42	723	767	786
9	C2. H5. N	43	42	261	764	279

001635

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number 065214
Invoice Number 161506
May 11, 1984

Alpha Environmental Laboratories
(Resources Engineering)
#11 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab # 4925
Dike Material
Soil Sample

Date Received: 04/11/84

001836

			Date	Time	Analyst
Polychlorinated biphenyls	< 1.0	ppm	05/05/84	12:00 pm	DD

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. Winfrey

P.O. BOX 20507 HOUSTON, TEXAS 77225 | P.O. BOX 31790 LAFAYETTE, LA 70503 | P.O. BOX 10278 JEFFERSON, LA 70181 | P.O. BOX 370 ACME, MI 49319 | P.O. BOX 546 CARTHAGE, TX 75633

LIBRARY SEARCH DATA: ALPHAVOA # 389 BASE M/E: 45
04/11/84 10:24:00 + 12:58 CALI: CAL411B4 # 3 RIC: 81407.
SAMPLE: VOA MEOH--10 UL--ALPHA COMPOSITE
CONDS.: 45/4-220@8--VOAS
ENHANCED (S 15B 2N OT)

31331 SPECTRA IN LIBRARYNB SEARCHED FOR MAXIMUM FIT
179 MATCHED AT LEAST 7 OF THE 16 LARGEST PEAKS IN THE UNKNOWN
93 HAD FIT AT LEAST 500

RANK	IN	NAME
1	246	2-BUTANOL, (R)-
2	243	2-BUTANOL
3	510	4-PENTEN-2-OL
4	73	2-PROPANOL
5	451	CYANICACID, PROPYLESTER
6	1250	2-PENTANOL, 3-METHYL-
7	244	PROPANE, 1-METHOXY-
8	608	2-BUTANOL, 3-METHYL-
9	1259	2-HEXANOL

RANK	FORMULA	M.WT	B.PK	PURITY	FIT	RFIT
1	C4.H10.O	74	45	842	945	865
2	C4.H10.O	74	45	820	938	840
3	C5.H10.O	86	45	684	909	712
4	C3.H8.O	60	45	762	888	765
5	C4.H7.O.N	85	56	241	874	251
6	C6.H14.O	102	45	790	872	831
7	C4.H10.O	74	45	689	869	689
8	C5.H12.O	88	45	663	863	725
9	C6.H14.O	102	45	733	862	792

001837

SOUTHERN PETROLEUM LABORATORIES, INC.

40 YEARS THE MEASURE OF EXCELLENCE

CERTIFICATE NUMBER [illegible]
INVOICE NUMBER 160214
APRIL 18, 1984

ALPHA ENVIRONMENTAL LABORATORIES
[illegible] SOURCES ENGINEERING
[illegible] GREEN [illegible] PLAZA
SUITE 1724
HOUSTON, TEXAS 77 [illegible]

ATTENTION: [illegible] BLANKFIELD [illegible] L. [illegible]

SAMPLE DESCRIPTION: LAB NO. [illegible]
[illegible] L. 47 [illegible]
DATE SAMPLED: 3/27/84
DATE RECEIVED: 3/30/84

001838

			DATE	TIME	ANALYST
CYANIDE TOTAL EPA STORET NUMBER [illegible]	< 1	PPM	04/10/84	2:00 PM	KKH
POLYCHLORINATED BIPHENYLS AROCLOR 1242	7[illegible]	PPM	04/10/84	10:00 AM	DD
POLYCHLORINATED BIPHENYLS AROCLOR 12[illegible]	76	PPM	04/10/84	10:00 AM	DD
SULFIDE TOTAL EPA STORET NUMBER [illegible]0745	< 1	PPM	04/10/84	2:00 PM	SLB

QUALITY ASSURANCE: THESE ANALYSES ARE PERFORMED IN ACCORDANCE WITH EPA GUIDELINES FOR QUALITY ASSURANCE. THESE PROCEDURES INCLUDE THE FOLLOWING AS A MINIMUM REQUIREMENT: COMPARISONS AGAINST KNOWN STANDARDS IN EACH RUN, ONE IN TEN SAMPLE SPLITS, AND A QUARTERLY METHOD REVIEW AGAINST KNOWN SPIKE SAMPLES.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. [illegible]

P.O. BOX 23807 HOUSTON, TX 77225 | P.O. BOX 31750 LAFAYETTE, LA 70503 | P.O. BOX 10276 JEFFERSON, LA 70191 | P.O. BOX 379 ACME, MI 49610 | P.O. BOX 548 CARTHAGE, TX 75633

SOUTHERN PETROLEUM LABORATORIES, INC.

40 YEARS
THE MEASURE OF EXCELLENCE

CERTIFICATE NUMBER [illegible]
INVOICE NUMBER [illegible]
APRIL 10, 1984

ALPHA ENVIRONMENTAL LABORATORIES
OF SOURCES ENGINEERING
[illegible] GREEN ENERGY PLAZA
SUITE 1724
HOUSTON, TEXAS 77 [illegible]

ATTENTION: MR BLANKFIELD & GREG L. MALPI

SAMPLE DESCRIPTION: LAB [illegible] 492 [illegible]
L. [illegible] L[illegible]
DATE SAMPLED: 3/27/84
DATE RECEIVED: 3/30/84

001839

			DATE	TIME	ANALYST
CYANIDE TOTAL EPA STORET NUMBER [illegible]	< [illegible]	PPM	04/10/84	2:30 PM	KKM
POLYCHLORINATED BIPHENYLS AR CLOR 1242	[illegible]54	PPB	04/10/84	10:00 AM	DD
POLYCHLORINATED BIPHENYLS ARCLOR 1260	[illegible]	PPB	04/10/84	10:00 AM	DD
SELENIUM TOTAL EPA STORET NUMBER [illegible]6745	< 1	PPM	04/10/84	2:00 PM	SLM

QUALITY ASSURANCE: THESE ANALYSES ARE PERFORMED IN ACCORDANCE WITH EPA GUIDELINES FOR QUALITY ASSURANCE. THESE PROCEDURES INCLUDE THE FOLLOWING AS A MINIMUM REQUIREMENT: COMPARISONS AGAINST KNOWN STANDARDS IN EACH RUN, ONE IN TEN SAMPLE SPLITS, AND A QUARTERLY METHOD REVIEW AGAINST KNOWN SPIKE SAMPLES.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. W. [illegible]

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number 065216
Invoice Number 161506
May 11, 1984

Alpha Environmental Laboratories
(Resources Engineering)
#11 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab # 4924
Pond
Water Sample
Date Received: 04/11/84

001840

			Date	Time	Analyst
Polychlorinated biphenyls	< 20	ppm	05/05/84	5:00 pm	DD

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. Winfrey

SOUTHERN PETROLEUM LABORATORIES, INC.

40 YEARS
THE MEASURE OF EXCELLENCE

CERTIFICATE NUMBER [illegible]
INVOICE NUMBER [illegible]
APRIL 18, 1984

[illegible] ENVIRONMENTAL LABORATORIES
[illegible] ENGINEERING
[illegible] GREEN WAY PLAZA
SUITE 1724
HOUSTON, TEXAS 77[illegible]

ATTENTION: [illegible] BLANKENFIELD [illegible] L. MAURT

SAMPLE DESCRIPTION: LAB NO. 45[illegible]
[illegible] - US [illegible] - LINCOLN
DATE SAMPLED: 3/27/84
DATE RECEIVED: [illegible]/30/84

			DATE	TIME	ANALYST
CYANIDE TOTAL EPA STORET NUMBER [illegible]	1.5	PPM	04/10/84	2:[illegible] PM	KRP
POLYCHLORINATED DIPHENYLS ARCOLOR 1242	132	PPM	04/10/84	1[illegible]:[illegible] AM	DC
SULFIDE TOTAL EPA STORET NUMBER [illegible]	< 1	PPM	04/10/84	2:[illegible] PM	SLF

QUALITY ASSURANCE: THESE ANALYSES ARE PERFORMED IN ACCORDANCE WITH EPA GUIDELINES FOR QUALITY ASSURANCE. THESE PROCEDURES INCLUDE THE FOLLOWING AS A MINIMUM REQUIREMENT: COMPARISONS AGAINST KNOWN STANDARDS IN EACH RUN, ONE IN TEN SAMPLE SPLITS, AND A QUARTERLY METHOD REVIEW AGAINST KNOWN SPIKE SAMPLES.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. [illegible]

001841

SOUTHERN PETROLEUM LABORATORIES, INC.

40 YEARS THE MEASURE OF EXCELLENCE

CERTIFICATE NUMBER [illegible]
INVOICE NUMBER [illegible]
APRIL 1[illegible], 1984

ALPHA ENVIRONMENTAL LABORATORIES
(RESOURCES ENGINEERING)
[illegible] ORLE[illegible] PLAZA
SUITE 1724
HOUSTON, TEXAS 77[illegible]

ATTENTION: [illegible] BLANKFIELD OR GREG L. [illegible]

SAMPLE DESCRIPTION: LAB NO. 49[illegible]
[illegible] LAGOON

DATE SAMPLED: 3/27/84
DATE RECEIVED: 3/30/84

001842

			DATE	TIME	ANAL.
CYANIDE TOTAL EPA STORET NUMBER [illegible]	< 1	PPM	04/10/84	2:00 PM	KKH
POLYCHLORINATED BIPHENYLS AROCLOR 1242	125	PPM	04/10/84	10:00 AM	DD
POLYCHLORINATED BIPHENYLS AROCLOR 1260	75	PPM	04/10/84	10:00 AM	DD
SULFIDE TOTAL EPA STORET NUMBER [illegible]	< 1	PPM	04/10/84	2:00 PM	SLH

QUALITY ASSURANCE: THESE ANALYSES ARE PERFORMED IN ACCORDANCE WITH EPA GUIDELINES FOR QUALITY ASSURANCE. THESE PROCEDURES INCLUDE THE FOLLOWING AS A MINIMUM REQUIREMENT: COMPARISONS AGAINST KNOWN STANDARDS IN EACH RUN, ONE IN TEN SAMPLE SPLITS, AND A QUARTERLY METHOD REVIEW AGAINST KNOWN SPIKE SAMPLES.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. WINFREY

P.O. BOX 20807
HOUSTON, TX 77225

P.O. BOX 31780
LAFAYETTE, LA 70503

P.O. BOX 10278
JEFFERSON, LA 70181

P.O. BOX 378
ACME, MI 49510

P.O. BOX 548
CARTHAGE, TX 75633

SOUTHERN PETROLEUM LABORATORIES, INC.

40 YEARS THE MEASURE OF EXCELLENCE

CERTIFICATE NUMBER [illegible]
INVOICE NUMBER [illegible]
APRIL 1[illegible], 1984

ALPHA ENVIRONMENTAL LABORATORIES
(RESOURCES ENGINEERING)
[illegible] CREE [illegible] PLAZA
SUITE 1724
HOUSTON, TEXAS 77 [illegible]

ATTENTION: [illegible] BLACKFIELD OR GREG L. [illegible]

SAMPLE DESCRIPTION: LAB NO. 492[illegible]
[illegible] LAGOON

DATE SAMPLED: 3/27/84
DATE RECEIVED: 3/30/84

001843

			DATE	TIME	ANAL.
CYANIDE TOTAL EPA STORET NUMBER [illegible]	< 1	PPM	04/10/84	2:00 PM	KKP
POLYCHLORINATED BIPHENYLS AROCLOR 1242	123	PPM	04/10/84	10:00 AM	DD
POLYCHLORINATED BIPHENYLS AROCLOR 1260	75	PPM	04/10/84	10:00 AM	DD
SULFIDE TOTAL EPA STORET NUMBER 00745	< 1	PPM	04/10/84	2:00 PM	SLH

QUALITY ASSURANCE: THESE ANALYSES ARE PERFORMED IN ACCORDANCE WITH EPA GUIDELINES FOR QUALITY ASSURANCE. THESE PROCEDURES INCLUDE THE FOLLOWING AS A MINIMUM REQUIREMENT: COMPARISONS AGAINST KNOWN STANDARDS IN EACH RUN, ONE IN TEN SAMPLE SPLITS, AND A QUARTERLY METHOD REVIEW AGAINST KNOWN SPIKE SAMPLES.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. WINFREY

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P.O. BOX 378
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P.O. BOX 546
CARTHAGE, TX 75933

SCR
LABORATORIES, INC. 4800 West 34th, Suite A-12 • Houston, Texas 77092 • (713) 682-6738, 682-6739

April 11, 1984

TO: Resource Engineering, Inc.
#11 Greenway Plaza, Suite 1724
Houston, Texas 77046

ATTENTION: Greg L. Maupin

LABORATORY REPORT NO.: 13788 P. O. NO.: Letter 4-4-84

SAMPLE DESCRIPTION: Two Sludge Samples

001844

X-ray Diffraction Analysis

4852-5		4926-B	
α-SiO_2	Major	α-SiO_2 (Quartz)	Major
$CaSO_4 \cdot 2H_2O$	Minor	α-SiO_2 (Cristobalite)	Major
Feldspar	Minor	$CaCO_3$	Minor
Amorphous	Major	$BaSO_4$	Minor
		$CaSO_4 \cdot 2H_2O$	Minor
		Feldspar	Minor
		Illite	Minor
		Kalonite	Minor
		Amorphous	Major

FRENCH

SHERIDAN-

Major: >10%
Minor: 1-10%

Respectfully submitted,

M. E. Foster
SCR Laboratories, Inc.

Our reports are for the exclusive use of the client to whom they are addressed and are representative only of the sample(s) tested. The use of our name must receive our prior written approval.

Technical Report

for

RESOURCE ENGINEERING

11 GREENWAY PLAZA

HOUSTON, TX 77406

001845

LAGOON SLUDGE

Chain of Custody Data Required for ETC Data Management Summary Reports						
E8063	RESOURCE ENGINEERING	RES-288-01	LAGOON1	840530		
ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Denis C. K. Lin, Ph.D.
Vice President
Research and Operations

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 27, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RESSHER	LAGOONI	840530		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg*	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1V	Acrolein	ND	2.50E+06	ND	ND	ND	1600	55.	ND	1600	83.
2V	Acrylonitrile	ND	2.50E+06	ND	ND	ND	160	107	ND	160	103
3V	Benzene	>2.50E+06	2.50E+05	ND	1	ND	36	98	2	36	90
4V	bis(Chloromethyl)ether	ND	2.50E+05	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	2.50E+05	ND	ND	ND	36	83	ND	36	85
6V	Carbon tetrachloride	ND	2.50E+05	ND	ND	ND	36	103	ND	36	91
7V	Chlorobenzene	ND	2.50E+05	ND	1	ND	36	110	ND	36	97
8V	Chlorodibromomethane	ND	2.50E+05	ND	ND	ND	36	97	ND	36	94
9V	Chloroethane	ND	2.50E+05	ND	ND	ND	36	114	ND	36	104
10V	2-Chloroethylvinyl ether	ND	2.50E+05	ND	ND	ND	36	88	ND	36	84
11V	Chloroform	ND	2.50E+05	ND	ND	ND	36	103	ND	36	98
12V	Dichlorobromomethane	ND	2.50E+05	ND	ND	ND	36	104	ND	36	97
13V	Dichlorodifluoromethane	ND	2.50E+05	ND	ND	ND	0	-	ND	0	-
14V	1,1-Dichloroethane	ND	2.50E+05	ND	ND	ND	36	119	ND	36	109
15V	1,2-Dichloroethane	ND	2.50E+05	ND	ND	ND	36	112	ND	36	99
16V	1,1-Dichloroethylene	ND	2.50E+05	ND	ND	ND	36	124	ND	36	111
17V	1,2-Dichloropropane	BMDL	2.50E+05	ND	ND	ND	36	97	ND	36	98
18V	cis-1,3-Dichloropropylene	ND	2.50E+05	ND	ND	ND	36	68	ND	36	70
19V	Ethylbenzene	>8.48E+06	2.50E+05	ND	ND	ND	36	122	1	36	96
20V	Methyl bromide	ND	2.50E+05	ND	ND	ND	36	140.	ND	36	85.
21V	Methyl chloride	ND	2.50E+05	ND	ND	ND	36	133	ND	36	108
22V	Methylene chloride	BMDL	2.50E+05	8	ND	BMDL	36	79	ND	36	88
23V	1,1,2,2-Tetrachloroethane	ND	2.50E+05	ND	ND	ND	36	88	ND	36	92
24V	Tetrachloroethylene	2.51E+05	2.50E+05	56	58	ND	36	121	3	36	101
25V	Toluene	>3.66E+07	2.50E+05	ND	1	BMDL	36	97	2	36	93
26V	1,2-Trans-dichloroethylene	ND	2.50E+05	ND	3	ND	36	113	ND	36	104
27V	1,1,1-Trichloroethane	BMDL	2.50E+05	ND	ND	ND	36	108	ND	36	96
28V	1,1,2-Trichloroethane	ND	2.50E+05	ND	ND	ND	36	94	ND	36	91
29V	Trichloroethylene	BMDL	2.50E+05	24	26	ND	36	108	ND	36	94
30V	Trichlorofluoromethane	ND	2.50E+05	ND	ND	ND	36	129	ND	36	117
31V	Vinyl chloride	ND	2.50E+05	ND	ND	ND	36	126	ND	36	109

ETC ENVIRONMENTAL TESTING and CERTIFICATION

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

JUN 27, 1984

Volatile Compounds – GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RESSHER	LAGOON1	840530		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg*	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
	trans-1,3-Dichloropropylene	ND	2.50E+05	ND	ND	ND	36	118	ND	36	74

* ETC established Method Detection Limit for this particular sample.
B Recovery normally variable using EPA Protocol Method 624.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 25, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RESSHER	LAGOONI	840530		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1A	2-Chlorophenol	ND	83300	ND	ND	ND	0	-	ND	5208	76
2A	2,4-Dichlorophenol	ND	83300	ND	ND	ND	0	-	ND	5208	59
3A	2,4-Dimethylphenol	2.24E+05	83300	ND	ND	ND	0	-	ND	5208	48
4A	4,6-Dinitro-o-cresol	ND	8.33E+05	ND	ND	ND	0	-	ND	8681	33c
5A	2,4-Dinitrophenol	ND	8.33E+05	ND	ND	ND	0	-	ND	8681	22c
6A	2-Nitrophenol	ND	83300	ND	ND	ND	0	-	ND	5208	57
7A	4-Nitrophenol	BMDL	83300	ND	ND	ND	0	-	ND	5208	30
8A	p-Chloro-m-cresol	ND	83300	ND	ND	ND	0	-	ND	5208	56
9A	Pentachlorophenol	ND	83300	ND	ND	ND	0	-	ND	5208	60
10A	Phenol	1.34E+06	83300	ND	ND	ND	0	-	ND	5208	68
11A	2,4,6-Trichlorophenol	ND	83300	ND	ND	ND	0	-	ND	5208	65

D ETC unadjusted Method Detection Limit for this particular sample.

B Reagent Blank. Spiked Blank cannot be performed for this sample matrix.

C Recovery normally low using EPA Protocol Method 625.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 30, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-288-01	LAGOON1	840530		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Conten. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1B	Acenaphthene	ND	32000	ND	ND	ND	0	-	238	3472	136
2B	Acenaphthylene	ND	32000	ND	ND	ND	0	-	ND	3472	123
3B	Anthracene	33000	32000	ND	ND	ND	0	-	298	3472	136
4B	Benzidine	ND	32000	ND	ND	ND	0	-	ND	3472	0
5B	Benzo(a)anthracene	ND	32000	ND	132	ND	0	-	351	3472	31
6B	Benzo(a)pyrene	BMDL	32000	257	179	ND	0	-	333	3472	113
7B	Benzo(b)fluoroanthene	BMDL	32000	496	267	ND	0	-	167	3472	82
8B	Benzo(ghi)perylene	ND	32000	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	BMDL	32000	ND	88	ND	0	-	60	3472	60
10B	bis(2-Chloroethoxy)methane	ND	32000	ND	ND	ND	0	-	ND	3472	92
11B	bis(2-Chloroethyl) ether	ND	32000	ND	ND	ND	0	-	ND	3472	156
12B	bis(2-Chloroisopropyl)ether	ND	32000	ND	ND	ND	0	-	ND	3472	110
13B	bis(2-Ethylhexyl)phthalate	BMDL	32000	10358	5993	BMDL	0	-	16794	3472	657
14B	4-Bromophenyl phenyl ether	ND	32000	ND	ND	ND	0	-	ND	3472	119
15B	Butyl benzyl phthalate	ND	32000	370	328	ND	0	-	ND	3472	50
16B	2-Chloronaphthalene	ND	32000	ND	ND	ND	0	-	ND	3472	143
17B	4-Chlorophenyl phenyl ether	ND	32000	ND	ND	ND	0	-	ND	3472	122
18B	Chrysene	ND	32000	ND	264	ND	0	-	436	3472	30
19B	Dibenzo(a,h)anthracene	ND	32000	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	32000	ND	ND	ND	0	-	ND	3472	105
21B	1,3-Dichlorobenzene	ND	32000	ND	ND	ND	0	-	ND	3472	114
22B	1,4-Dichlorobenzene	ND	32000	ND	ND	ND	0	-	ND	3472	129
23B	3,3'-Dichlorobenzidine	ND	32000	ND	ND	ND	0	-	ND	3472	2
24B	Diethyl phthalate	ND	32000	ND	ND	ND	0	-	ND	3472	153
25B	Dimethyl phthalate	ND	32000	ND	ND	ND	0	-	ND	3472	134
26B	Di-n-butyl phthalate	ND	32000	ND	ND	ND	0	-	ND	3472	0
27B	2,4-Dinitrotoluene	ND	32000	ND	ND	ND	0	-	ND	3472	147
28B	2,6-Dinitrotoluene	ND	32000	ND	ND	ND	0	-	ND	3472	105
29B	Di-n-octyl phthalate	ND	32000	ND	ND	ND	0	-	ND	3472	53
30B	1,2-Diphenylhydrazine	ND	32000	ND	ND	ND	0	-	ND	3472	154
31B	Fluoranthene	ND	32000	1036	889	ND	0	-	1961	3472	78

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUN 30, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-288-01	LAGOON1	840530		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg[a]	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov [e]	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov [e]
32B	Fluorene	55900	32000	ND	ND	ND	0	-	ND	3472	145
33B	Hexachlorobenzene	ND	32000	ND	ND	ND	0	-	ND	3472	-95
34B	Hexachlorobutadiene	ND	32000	ND	ND	ND	0	-	ND	3472	77
35B	Hexachlorocyclopentadiene	ND	32000	ND	ND	ND	0	-	ND	0	-
36B	Hexachloroethane	ND	32000	ND	ND	ND	0	-	ND	3472	30
37B	Indeno(1,2,3-c,d)pyrene	ND	32000	ND	ND	ND	0	-	ND	0	-
38B	Isophorone	99800	32000	ND	ND	ND	0	-	ND	3472	287
39B	Naphthalene	92000	32000	1212	892	ND	0	-	ND	3472	136
40B	Nitrobenzene	ND	32000	ND	ND	ND	0	-	ND	3472	91
41B	N-Nitrosodimethylamine	ND	32000	ND	ND	ND	0	-	ND	0	-
42B	N-Nitrosodi-n-propylamine	ND	32000	ND	ND	ND	0	-	ND	3472	114
43B	N-Nitrosodiphenylamine	ND	32000	ND	ND	ND	0	-	ND	3472	118
44B	Phenanthrene	42800	32000	624	500	ND	0	-	ND	3472	284
45B	Pyrene	ND	32000	842	811	ND	0	-	1493	3472	101.
46B	1,2,4-Trichlorobenzene	ND	32000	ND	ND	ND	0	-	ND	3472	130

[a] ETC established method detection limit for this particular sample.

[b] Reagent blank. Spiked blank cannot be performed for this sample matrix.

[c] Extract required dilution which resulted in variable recoveries for spiked compounds.

[d] Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

[e] Recovery usually low using EPA Protocol Method 625.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide Compounds – GC/MS Analysis Data (QR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-288-01	LAGOONI	840530		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg[a]	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov[b]	Unspiked Sample ug/kg	Concen Added ug/kg	% Recov[c]
1P	Aldrin	ND	32000	ND	ND	ND	0	-	ND	3472	110
2P	Alpha-BHC	ND	32000	ND	ND	ND	0	-	ND	3472	153
3P	Beta-BHC	ND	32000	ND	ND	ND	0	-	ND	3472	98
4P	Gamma-BHC	ND	32000	ND	ND	ND	0	-	ND	34[illegible]	98
5P	Delta-BHC	ND	32000	ND	ND	ND	0	-	ND	34[illegible]	90
6P	Chlordane	ND	32000	ND	ND	ND	0	-	ND	6944	43
7P	4,4'-DDT	ND	32000	ND	ND	ND	0	-	ND	347[illegible]	87
8P	4,4'-DDE	ND	32000	ND	ND	ND	0	-	ND	3472	93
9P	4,4'-DDD	ND	32000	ND	ND	ND	0	-	ND	3472	73
10P	Dieldrin	ND	32000	ND	ND	ND	0	-	ND	3472	91
11P	Endosulfan I	ND	32000	ND	ND	ND	0	-	ND	3472	124
12P	Endosulfan II	ND	32000	ND	ND	ND	0	-	ND	3472	31
13P	Endosulfan sulfate	ND	32000	ND	ND	ND	0	-	ND	3472	23
14P	Endrin	ND	32000	ND	ND	ND	0	-	ND	3472	91
15P	Endrin aldehyde	ND	32000	ND	ND	ND	0	-	ND	3472	68
16P	Heptachlor	ND	32000	ND	ND	ND	0	-	ND	3472	59
17P	Heptachlor epoxide	ND	32000	ND	ND	ND	0	-	ND	3472	87
18P	PCB-1242	2.19E+05[e]	9170	ND	ND	ND	0	-	ND[e]	0	-
19P	PCB-1254	ND [e]	9170	ND	ND	ND	0	-	ND[e]	0	-
20P	PCB-1221	ND [e]	9170	ND	ND	ND	0	-	ND[e]	0	-
21P	PCB-1232	ND [e]	9170	ND	ND	ND	0	-	ND[e]	0	-
22P	PCB-1248	ND [e]	9170	ND	ND	ND	0	-	ND[e]	0	-
23P	PCB-1260	ND [e]	9170	ND	ND	ND	0	-	ND[e]	0	-
24P	PCB-1016	ND [e]	9170	ND	ND	ND	0	-	ND[e]	0	-
25P	Toxaphene	ND [e]	32000	ND	ND	ND	0	-	ND[e]	0	-

[a] ETC established Method Detection Limit for this particular sample.

[b] Reagent Blank. Spiked Blank cannot be performed for this sample matrix.

[c] Extract recovered Criterion which resulted in variable recoveries for spiked compounds.

[d] Part num.

[e] PCB by SIM.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 30, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Volatile Fraction (QR06)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-288-01	LAGOONI	840530		

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	Estimated Concen. ug/kg		
1 2-Butene	178	8.0	56	590181	C_4H_8	22		
2 1,2-Butadiene	200	8.8	54	590192	C_4H_6	40		
3 Cyclopentane	241	10.4	70	287923	C_5H_{10}	17		
4 Cyclopropane, methylmethylene-	268	11.5	68	18631840	C_5H_8	20		
5 2-pentene	307	13.0	70	627203	C_5H_{10}	370		
6 2-propenoic acid	315	13.3	72	79107	$C_3H_4O_2$	60		
7 Pentane	340	14.3	72	109660	C_5H_{12}	100		
8 2-pentene	352	14.7	70	627203	C_5H_{10}	1600		
9 Cyclohexane	362	15.1	84	110827	C_6H_{12}	86		
10 Cyclobutane, ethyl-	381	15.8	84	4806615	C_6H_{12}	310		
11 Pentane, 2-methyl-	486	19.9	86	96140	C_6H_{14}	510		
12 Cyclopentane, 1,3-dimethyl-, trans-	505	20.7	98	1759586	C_7H_{14}	100		
13 1-pentene, 3,3-dimethyl-	512	20.9	98	3404737	C_7H_{14}	690		
14 Hexane, 3-methyl-	567	23.1	100	589344	C_7H_{16}	190		
15 1-Pentene, 2,4,4-trimethyl-	591	24.0	112	107391	C_8H_{16}	260		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 30, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Volatile Fraction (QR06)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
28063	RESOURCE ENGINEERING	RES-288-01	LAGOCN1	840530		

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	Estimated Concen. ug/kg		
16 Cyclohexene, 4-ethenyl-	641	25.9	108	100403	C_8H_{12}	770		
17 Benzene,(1-methyl ethyl)-	759	30.5	120	98828	C_9H_{12}	1300		
18 1,3,5-Cycloheptatriene, 3-chloro-	871	34.9	126	55619051	C_7H_7Cl	160		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 30, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Acid Fraction (QR07)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-288-01	LAGOON1	840530		

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	Estimated Concen. ug/kg		
1 Methyl phenol	214	7.67	108	-	C_7H_8O	79000		
2 Methyl phenol	235	8.05	108	-	C_7H_8O	15000		
3 C_2-Alkyl phenol	301	9.24	122	-	$C_8H_{10}O$	15000		
4 C_2-Alkyl phenol	313	9.45	122	-	$C_8H_{10}O$	48000		
5 C_2-Alkyl phenol	335	9.85	122	-	$C_8H_{10}O$	120000		
6 C_2-Alkyl phenol	345	10.03	122	-	$C_8H_{10}O$	18000		
7 C_2-Alkyl phenol	360	10.30	122	-	$C_8H_{10}O$	71000		
8 C_3-Alkyl phenol	394	10.91	136	-	$C_9H_{12}O$	93000		
9 C_3-Alkyl phenol	428	11.53	136	-	$C_9H_{12}O$	43000		
10 Unsaturated aromatic hydrocarbon	483	12.52	158	-	$C_{12}H_{14}$	45000		
11 Biphenyl	555	13.82	154	92524	$C_{12}H_{10}$	96000		
12 Aromatic ketone	570	14.09	160	-	$C_{11}H_{12}O$	6000		
13 Aromatic ketone	763	17.58	160	-	$C_{11}H_{12}O$	6700		
14 Aromatic hydrocarbon	777	17.83	196	-	$C_{15}H_{16}$	25000		
15 C_7-Alkyl benzene	798	18.21	176	-	$C_{13}H_{20}$	14000		
16 Aromatic hydrocarbon	803	18.30	196	-	$C_{15}H_{16}$	21000		
17 Aromatic hydrocarbon	824	18.68	210	-	$C_{16}H_{18}$	5500		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 30, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Acid Fraction (QR07)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-288-01	LAGCON1	840530		

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	Estimated Concen. ug/kg		
18 Aromatic ether	974	21.39	228	-	$C_{15}H_{16}O_2$	8500		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 30, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-288-01	LAGOON1	840530		

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	Estimated Concen. ug/kg		
1 1,3,5,7-Cyclo octatetraene	112	4.22	104	629209	C_8H_8	560		
2 1-methyl ethyl benzene	138	4.68	121	98828	C_9H_{12}	850		
3 3-methyl cyclo heptanone	207	5.99	126	13609580	$C_8H_{14}O$	250		
4 Butanedioic acid, dimethyl ester	239	6.47	146	106650	$C_6H_{10}O_4$	2060		
5 Ethanone,1-(3-cyclohexen-1-yl)-	252	6.70	124	7353766	$C_8H_{12}O$	1910		
6 3,5-dimethyl-2-Cyclohexen-1-one	310	7.73	124	1123097	$C_8H_{12}O$	8780		
7 1,4-dimethyl-5-(1-methylethyl)-Cyclopentene	338	8.22	136	61142334	$C_{10}H_{18}$	920		
8 Hexanedioic acid, dimethyl ester	460	10.38	174	627930	$C_8H_{14}O_2$	6040		
9 1-[4-(1-hydroxy-1-methylethyl) phenyl]-Ethanone	558	12.12	178	54549723	$C_{11}H_{14}O_2$	7		
10 1,1-diphenyl-2-propanone	702	14.68	210	781351	$C_{15}H_{14}O$	20		
11 1,2-dimethyl-4-(phenylmethyl)-benzene	709	14.80	196	13540562	$C_{15}H_{16}$	360		
12 1,1'-(1,3-propanediyl)bis-benzene	844	17.2	196	1081750	$C_{15}H_{16}$	3730		
13 Docosane	1019	20.32	312	629970	$C_{22}H_{46}$	90		
14 1,1-bis(p-ethyl phenyl)-ethane	1035	20.61	238	10224916	$C_{18}H_{22}$	1210		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

June 30, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E8063	RESOURCE ENGINEERING	RES-286-01	LAGOONI	840530		

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula	Estimated Concen. ug/kg		
15 Naphtho[1,8-bc]pyran-7,8-dione, 2,3-dihydro-3,6,9-trimethyl-	1210	23.73	242	5090879	$C_{15}H_{14}O_3$	240		
16 2-Cyclohexen-1-one-3-methyl-6-(1-methylethylidene)-	564	12.2	150	491098	$C_{10}H_{14}O$	2463		
17 Bicyclo[3.1.0]hexan-2-one,5-(1-methylethyl)-	346	8.4	138	513202	$C_9H_{14}O$	725		

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

RESOURCE ENGINEERING

11 GREENWAY PLAZA

HOUSTON, TX 77406

001858

LAGOON WATER

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

James N. Bowe / for

Denis C. K. Lin, Ph.D.

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 7, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds – GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1V	Acrolein	ND	5000	ND	ND	ND	1600	57.	ND	1600	88.
2V	Acrylonitrile	ND	5000	ND	ND	ND	160	294.	ND	160	216.
3V	Benzene	BMDL	500	ND	ND	ND	36	94	ND	36	106
4V	bis(Chloromethyl)ether	ND	500	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	500	ND	ND	ND	36	112	ND	36	137.
6V	Carbon tetrachloride	ND	500	ND	ND	ND	36	108	ND	36	109
7V	Chlorobenzene	ND	500	ND	ND	ND	36	101	ND	36	115
8V	Chlorodibromomethane	ND	500	ND	ND	ND	36	105	ND	36	122
9V	Chloroethane	ND	500	ND	ND	ND	36	88	ND	36	92
10V	2-Chloroethylvinyl ether	ND	500	ND	ND	ND	36	86	ND	36	87
11V	Chloroform	ND	500	42	43	ND	36	98	ND	36	107
12V	Dichlorobromomethane	ND	500	ND	ND	ND	36	106	ND	36	114
13V	Dichlorodifluoromethane	ND	500	ND	ND	ND	0	-	ND	0	-
14V	1,1-Dichloroethane	ND	500	ND	3	ND	36	101	ND	36	102
15V	1,2-Dichloroethane	ND	500	ND	ND	ND	36	104	ND	36	111
16V	1,1-Dichloroethylene	ND	500	259	272	ND	36	93	ND	36	93
17V	1,2-Dichloropropane	ND	500	ND	ND	BMDL	36	95	ND	36	106
18V	cis-1,3-Dichloropropylene	ND	500	ND	ND	ND	36	102	ND	36	111
19V	Ethylbenzene	BMDL	500	ND	ND	ND	36	104	ND	36	119
20V	Methyl bromide	ND	500	ND	ND	ND	36	90	ND	36	99
21V	Methyl chloride	ND	500	5	2	ND	36	83	7	36	67
22V	Methylene chloride	ND	500	ND	ND	BMDL	36	50	6	36	51
23V	1,1,2,2-Tetrachloroethane	ND	500	ND	ND	ND	36	102	ND	36	118
24V	Tetrachloroethylene	510	500	59	62	ND	36	90	1	36	100
25V	Toluene	1610	500	ND	ND	BMDL	36	90	ND	36	114
26V	1,2-Trans-dichloroethylene	ND	500	305	319	ND	36	100	ND	36	98
27V	1,1,1-Trichloroethane	ND	500	1509	1552	ND	36	105	ND	36	114
28V	1,1,2-Trichloroethane	ND	500	ND	ND	ND	36	100	ND	36	116
29V	Trichloroethylene	2910	500	ND	ND	ND	36	99	ND	36	104
30V	Trichlorofluoromethane	ND	500	ND	ND	ND	36	93	ND	36	96
31V	Vinyl chloride	ND	500	ND	ND	ND	36	68	ND	36	71

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 7, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l a	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
	trans-1,3-Dichloropropylene	ND	500	ND	ND	ND	36	97	ND	36	104

a EPA published Method Detection Limit.

b Recovery normally variable using EPA Protocol Method 624.

c Recovery variable due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 9, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l a	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov a
1A	2-Chlorophenol	ND	500	ND	ND	ND	150	75	ND	150	51
2A	2,4-Dichlorophenol	ND	500	ND	ND	ND	150	96	ND	150	45
3A	2,4-Dimethylphenol	BMDL	500	228	228	ND	150	107	228	150	69c
4A	4,6-Dinitro-o-cresol	ND	5000	ND	ND	ND	250	109	ND	250	22
5A	2,4-Dinitrophenol	ND	5000	ND	ND	ND	250	116	ND	250	31
6A	2-Nitrophenol	ND	500	ND	ND	ND	150	97	ND	150	36
7A	4-Nitrophenol	ND	500	ND	ND	ND	150	59	ND	150	30
8A	p-Chloro-m-cresol	ND	500	ND	ND	ND	150	87	ND	150	78
9A	Pentachlorophenol	ND	500	ND	ND	ND	150	108	ND	150	71
10A	Phenol	3550	500	2797	3552	ND	150	44	3552	150	0c
11A	2,4,6-Trichlorophenol	ND	500	ND	ND	ND	150	90	ND	150	46

a ETC established Method Detection Limit for this particular sample.

b Correct required dilution which resulted in unreliable recoveries for spiked compounds.

c Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

JUL 8, 1984

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
1B	Acenaphthene	ND	50	ND	ND	ND	100	77	ND	100	70
2B	Acenaphthylene	ND	50	ND	ND	ND	100	86	ND	100	86
3B	Anthracene	ND	50	ND	ND	ND	100	83	ND	100	72
4B	Benzidine	ND	50	ND	ND	ND	100	1c	ND	100	10c
5B	Benzo(a)anthracene	ND	50	ND	ND	ND	100	72	ND	100	103
6B	Benzo(a)pyrene	ND	50	ND	ND	ND	100	50	ND	100	86
7B	Benzo(b)fluoroanthene	ND	50	ND	ND	ND	100	54	ND	100	100
8B	Benzo(ghi)perylene	ND	50	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	50	ND	ND	ND	100	47	ND	100	119
10B	bis(2-Chloroethoxy)methane	ND	50	ND	ND	ND	100	78	ND	100	66
11B	bis(2-Chloroethyl) ether	ND	50	ND	ND	ND	100	94	ND	100	87
12B	bis(2-Chloroisopropyl)ether	ND	50	ND	ND	ND	100	69	ND	100	0
13B	bis(2-Ethylhexyl)phthalate	ND	50	ND	ND	ND	100	62	ND	100	116
14B	4-Bromophenyl phenyl ether	ND	50	ND	ND	ND	100	83	ND	100	79
15B	Butyl benzyl phthalate	ND	50	ND	ND	ND	100	54	ND	100	98
16B	2-Chloronaphthalene	ND	50	ND	ND	ND	100	75	ND	100	75
17B	4-Chlorophenyl phenyl ether	ND	50	ND	ND	ND	100	73	ND	100	55
18B	Chrysene	ND	50	ND	ND	ND	100	54	ND	100	97
19B	Dibenzo(a,h)anthracene	ND	50	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	50	ND	ND	ND	100	73	ND	100	37
21B	1,3-Dichlorobenzene	ND	50	ND	ND	ND	100	69	ND	100	23
22B	1,4-Dichlorobenzene	ND	50	ND	ND	ND	100	76	ND	100	41
23B	3,3'-Dichlorobenzidine	ND	50	ND	ND	ND	100	18c	ND	100	26c
24B	Diethyl phthalate	ND	50	ND	ND	ND	100	2c	ND	100	4c
25B	Dimethyl phthalate	ND	50	ND	ND	ND	100	1c	ND	100	0c
26B	Di-n-butyl phthalate	ND	50	ND	ND	ND	100	70	ND	100	55
27B	2,4-Dinitrotoluene	ND	50	ND	ND	ND	100	88	ND	100	0
28B	2,6-Dinitrotoluene	ND	50	ND	ND	ND	100	85	ND	100	0
29B	Di-n-octyl phthalate	ND	50	ND	ND	ND	100	60	ND	100	111
30B	1,2-Diphenylhydrazine	ND	50	ND	ND	ND	100	78	ND	100	85
31B	Fluoranthene	ND	50	ND	ND	ND	100	93	ND	100	50

ETC ENVIRONMENTAL TESTING and CERTIFICATION

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

JUL 8, 1984

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l a	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov	Unspiked Sample ug/l	Concen. Added ug/l	% Recov
32B	Fluorene	ND	50	ND	ND	ND	100	81	ND	100	70
33B	Hexachlorobenzene	ND	50	ND	ND	ND	100	67	ND	100	72
34B	Hexachlorobutadiene	ND	50	ND	ND	ND	100	45	ND	100	31
35B	Hexachlorocyclopentadiene	ND	50	ND	ND	ND	0	-	ND	0	-
36B	Hexachloroethane	ND	50	ND	ND	ND	100	16c	ND	100	0c
37B	Indeno(1,2,3-c,d)pyrene	ND	50	ND	ND	ND	0	-	ND	0	-
38B	Isophorone	77	50	101	77	ND	100	102	77	100	35
39B	Naphthalene	BMDL	50	30	21	ND	100	78	21	100	64
40B	Nitrobenzene	ND	50	ND	ND	ND	100	77	ND	100	0
41B	N-Nitrosodimethylamine	ND	50	ND	ND	ND	0	-	ND	0	-
42B	N-Nitrosodi-n-propylamine	ND	50	ND	ND	ND	100	94	ND	100	25
43B	N-Nitrosodiphenylamine	ND	50	ND	ND	ND	100	91	ND	100	65
44B	Phenanthrene	BMDL	50	71	43	ND	100	83	43	100	66
45B	Pyrene	ND	50	ND	ND	ND	100	89	ND	100	51
46B	1,2,4-Trichlorobenzene	ND	50	ND	ND	ND	100	263b	ND	100	83b

a ETC established Method Detection Limit for this particular sample.

B Extract required dilution which resulted in variable recoveries for spiked compounds.

C Recovery normally low using EPA Protocol Method 625.

b Recovery normally variable using EPA Protocol Method 625.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JUL 9, 1984

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide Compounds – GC/MS Analysis Data (QR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/l	MDL ug/l a	First ug/l	Second ug/l	Blank Data ug/l	Concen. Added ug/l	% Recov b	Unspiked Sample ug/l	Concen. Added ug/l	% Recov c
1P	Aldrin	ND	50	ND	ND	ND	100	143	ND	100	100
2P	Alpha-BHC	ND	50	ND	ND	ND	100	14	ND	100	0
3P	Beta-BHC	ND	50	ND	ND	ND	100	144	ND	100	145
4P	Gamma-BHC	ND	50	ND	ND	ND	100	18	ND	100	84
5P	Delta-BHC	ND	50	ND	ND	ND	100	4	ND	100	16
6P	Chlordane	ND	50	ND	ND	ND	200	42	ND	200	16
7P	4,4'-DDT	ND	50	ND	ND	ND	100	94	ND	100	40
8P	4,4'-DDE	ND	50	ND	ND	ND	100	164	ND	100	96
9P	4,4'-DDD	ND	50	ND	ND	ND	100	128	ND	100	89
10P	Dieldrin	ND	50	ND	ND	ND	100	194	ND	100	119
11P	Endosulfan I	ND	50	ND	ND	ND	100	6	ND	100	0
12P	Endosulfan II	ND	50	ND	ND	ND	100	15	ND	100	0
13P	Endosulfan sulfate	ND	50	ND	ND	ND	100	60	ND	100	53
14P	Endrin	ND	50	ND	ND	ND	100	95	ND	100	51
15P	Endrin aldehyde	ND	50	ND	ND	ND	100	69	ND	100	13
16P	Heptachlor	ND	50	ND	ND	ND	100	128	ND	100	85
17P	Heptachlor epoxide	ND	50	ND	ND	ND	100	153	ND	100	84
18P	PCB-1242	ND	50	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	50	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	50	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	50	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	50	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	ND	50	ND	ND	ND	0	-	ND	0	-
24P	PCB-1016	ND	50	ND	ND	ND	0	-	ND	0	-
25P	Toxaphene	ND	50	ND	ND	ND	0	-	ND	0	-

a ETC Determined Method Detection Limit for this particular sample.

b Recovery normally variable using EPA Protocol Method 625.

c Extract required dilution which resulted in variable recoveries for spiked compounds.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

July 6, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Volatile Fraction (QR06)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula			
None Found								

ETC ENVIRONMENTAL

001865

ETC ENVIRONMENTAL TESTING and CERTIFICATION

July 10, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Acid Fraction (QR07)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

Compound Name	Data			Identifiers	
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula
1 Butanoic Acid	18	4.06	88	107926	$C_4H_8O_2$
2 Pentanoic Acid	55	4.73	102	109524	$C_5H_{10}O_2$
3 Pentanoic Acid, methyl	74	5.07	116	-	$C_6H_{12}O_2$
4 Pentanoic Acid, methyl	158	6.59	116	-	$C_6H_{12}O_2$
5 Hexanoic Acid	204	7.42	116	142621	$C_6H_{12}O_2$
6 Phenol, methyl	234	7.96	108	-	C_7H_8O
7 Hexanoic Acid	281	8.81	116	142621	$C_6H_{12}O_2$
8 Benzoic Acid	367	10.36	122	65850	$C_7H_{12}O_2$
9 Phenol, ethylethyl	390	10.78	136	-	$C_9H_{12}O$
10 Benzoic Acid, methyl	458	12.01	136	-	$C_8H_8O_2$
11 Benzenepropanoic Acid	527	13.25	150	501520	$C_9H_{10}O_2$

ETC ENVIRONMENTAL TESTING and CERTIFICATION

July 10, 1984

TABLE 1: QUALITATIVE RESULTS

Tentatively Identified Organic Compounds – GC/MS Analysis Data – Base/Neutral Fraction (QR08)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
E9439	RESOURCE ENGINEERING	RES28801	ISECORNER	840628	1115	

Compound Name	Data			Identifiers				
	Scan Number	Retention Time (Min)	M.W.	CAS Number	Empirical Formula			
1 Benzeneethanol	248	8.70	122	60128	$C_8H_{10}O$			
2 Benzeneethanol,-methyl	309	9.79	136	-	$C_9H_{12}O$			
3 Ethanol,-phenoxy	386	11.17	138	-	$C_8H_{10}O_2$			
4 2H-1-Benzopyran-2-one	446	12.24	148	119486	$C_9H_8O_2$			
5 4 (1H)-Pyrimidinon, 2 amino 3,4 dihydro	545	14.02	111	108532	$C_4H_5N_3O$			
6 Benzenemethanamine, fluoro	644	15.79	125	-	C_7H_8FN			
7 Pyridine, ethenyl-methyl	657	16.02	119	-	C_8H_9N			

SOUTHERN PETROLEUM LABORATORIES, INC.

40 YEARS
THE MEASURE OF EXCELLENCE

CERTIFICATE NUMBER [illegible]
INVOICE NUMBER [illegible]
APRIL 18, 1984

[illegible] LABORATORIES
[illegible]
[illegible]
[illegible]
[illegible]

ATTENTION: [illegible]

SAMPLE DESCRIPTION: LAB NO. 49[illegible]
[illegible] - [illegible] - [illegible]
DATE SAMPLED: [illegible]/27/84
DATE RECEIVED: [illegible]/30/84

			DATE	TIME	ANALYST
OXYGENIZE TOTAL [illegible] STORET NUMBER [illegible]	1.5	PPM	04/10/84	2:[illegible] PM	KKH
POLYCHLORINATED DIPHENYLS AROCLOR 124[illegible]	132	PPM	04/10/84	1[illegible]:[illegible] AM	DD
SULFIDE TOTAL [illegible] STORET NUMBER [illegible]	< 1	PPM	04/10/84	2:00 PM	SLP

QUALITY ASSURANCE: THESE ANALYSES ARE PERFORMED IN ACCORDANCE WITH [illegible] GUIDELINES FOR QUALITY ASSURANCE. THESE PROCEDURES INCLUDE THE FOLLOWING AS A MINIMUM REQUIREMENT: COMPARISONS AGAINST KNOWN STANDARDS IN EACH RUN, ONE IN TEN SAMPLE SPLITS, AND A QUARTERLY METHOD REVIEW AGAINST KNOWN SPIKE SAMPLES.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. [illegible]

001868

SOUTHERN PETROLEUM LABORATORIES, INC.

40 YEARS THE MEASURE OF EXCELLENCE

CERTIFICATE NUMBER [illegible]
INVOICE NUMBER [illegible]
APRIL 18, 1984

[illegible] VIRONMENTAL LABORATORIES
[illegible]
[illegible]
SUITE [illegible]
HOUSTON, TEXAS 77[illegible]

ATTENTION: [illegible] BLANKFIELD OR GREG L. [illegible]

SAMPLE DESCRIPTION: [illegible]
[illegible]
DATE SAMPLED: 3/27/84
DATE RECEIVED: 3/30/84

001869

			DATE	TIME	ANALYST
OXIDIZE TOTAL STORET NUMBER [illegible]	< [illegible]	PPM	04/10/84	2:00 PM	KKH
POLYCHLORINATED BIPHENYLS AROCLOR 1242	[illegible]	PPM	04/10/84	10:00 AM	DD
POLYCHLORINATED BIPHENYLS AROCLOR [illegible]	[illegible]	PPM	04/10/84	10:00 AM	DD
SULFIDE TOTAL [illegible] STORET NUMBER [illegible]	10.3	PPM	04/10/84	2:00 PM	SLE

QUALITY ASSURANCE: THESE ANALYSES ARE PERFORMED IN ACCORDANCE WITH [illegible] GUIDELINES FOR QUALITY ASSURANCE. THESE PROCEDURES INCLUDE THE FOLLOWING AS A MINIMUM REQUIREMENT: COMPARISONS AGAINST KNOWN STANDARDS TO EACH RUN, ONE IN TEN SAMPLE SPLITS, AND A QUARTERLY METHOD REVIEW AGAINST KNOWN SPIKE SAMPLES.

SOUTHERN PETROLEUM LABORATORIES, INC.

[illegible]

CLIENT Sheridan Ranch

PROJECT NO. Steering & Co 283-01

SAMPLED BY TB, BB

DATE SAMPLED 3-27-84 3-29-84

DATE RECEIVED 3-29-84

DATE COMPLETED 4-16-84

RESOURCE ENGINEERING INC.

LAB NO. 4924

RESULTS TO BZ

PROJECT MANAGER BZ

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	Ph	TSS	TOC	COD	BOD	O&G	Cl⁻	SO₄	Phenol	TKN
#2 LANDFARM - H_2O 3-27-84	6.9	780	2958	6013	2,769	129.0	723	<5.0	15.12	430
#4 LANDFARM - H_2O "	7.6	528	1,180	2,957	1072	74.0	1078	<5.0	0.97	134
#7 LANDFARM - H_2O "	7.4	1,777	1,413	1,790	794	125.0	1,050	<5.0	1.06	72
#(LS) LAGOON - H_2O - COMPOSITE	5.4	768	7,130	12,918	5,210	640.0	3,194	<5.0	13.84	85
(3-29-84	units	mg/l	(7,143)	(13,511)	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
			(Repeat)	(Repeat)						
			mg/l	mg/l						
TESTED BY	BB	BB	BB	BB	BB	BB	BB	GM	BB	SPL
ANALYSIS COST	12	40	80	64	80	64	48	48	100	100

Billed 4-17-84

CLIENT SHERIDAN

PROJECT NO. 288-01

SAMPLED BY TB, BB

DATE SAMPLED 3-27,28-86

DATE RECEIVED 3-29-86

DATE COMPLETED 4-16-86

RESOURCE ENGINEERING INC.

LAB NO. 4924

RESULTS TO

PROJECT MANAGER BZ

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	As	Ba	Cu	Cr	Cd	Hg	Ni	Ag	Se	Zn
#2	<0.01	<0.5	0.02	<.01	<.01	<0.005	0.10	<.01	<0.01	0.02
#4	<0.01	<0.5	0.03	<.01	<.01	<0.005	<.01	<.01	<0.01	0.01
#7	<0.01	<0.5	0.04	<.01	<.01	<0.005	<0.01	0.11	<0.01	0.03
LAGOON - H_2O - COMPOSITE	<0.01	<0.5	0.20	0.25	<.01	<0.005	0.13	<.01	<0.01	1.07
	mg/l	→								→
TESTED BY	GM	→								→
ANALYSIS COST	850	50	60	60	60	100	60	60	60	60

001871

CLIENT SHERIDAN

PROJECT NO.

SAMPLED BY

DATE SAMPLED

DATE RECEIVED

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 4924

RESULTS TO

PROJECT MANAGER

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	Pb	Mn	Fe	TDS						
#2	<.01	1.69	13.25							
#4	<.01	0.80	20.50							
#7	<.01	1.46	11.50							
LAGOON - H_2O - COMPOSITE	<.01	2.97	35.2	4832						
TESTED BY	am →			BB						
ANALYSIS COST	6.C	6.C	6.C	8						

001872

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Project Number	Project Name	Location
288-01	SHERIDAN RICHFIELD & Co	HEMSTEAD TEXAS

Field Sample Number	Date	Time	Grab	Comp.	Sample Container (Size/Mat'l)	Sample Type	Preservative	Analyses Requested	Comments and Hold Storage Date
LF-#1 POND	3-27-84	AM		✓	32 oz 9 oz 9 oz	H_2O	4°C H_2SO_4 HNO_3	Ph, TSS, TDS, COD, BOD O&G, Cl⁻ $SO_4^{=}$ PHENOL TKN As, Be, Cu, Cr, Cd, Hg, Ni, Ag, Se, Zn, Pb, Mn, Fe	
LF-#2 POND	3-27-84	AM		✓	"	"	"	"	
LF-#3 POND	3-27-84	AM		✓	"	"	"	"	
LF-#4 POND	3-27-84	AM		✓	"	"	"	"	
LF-#5 POND	3-27-84	AM		✓	"	"	"	"	
LF-#6 POND	3-27-84	AM		✓	"	"	"	"	
LF-#7 POND	3-27-84	AM		✓	"	"	"	"	
WASTE LAGOON #1				✓	"	"	"	"	

Lab Sample No.	Remarks	Sampler Signature
4924	Split	L. Blankfield

Relinquished By	Date	Time	Received By	Relinquished By	Date	Time	Received By
L. Blankfield	4/2/84	8:45	Dan Di Tu				
Relinquished By	Date	Time	Received By	Relinquished By	Date	Time	Received By
Relinquished By	Date	Time	Received By	Relinquished By	Date	Time	Received By

001873

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 209 D STD METHODS 15th edition PARAMETER TSS MATRIX WATER

ANALYST B Blankfield DATE 3-30-86 TIME 0945

CALIBRATION STANDARDS/BLANK	~~ABSORBANCE~~ mg/L
BLANK	0.0000 -0-
BLANK	0.0002 (2 mg/L)

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN 4924 #LF-#2, #4, #7, LAGOON H_2O (COMP) 4923 (#1) 4927 (TC)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
4924 #LF#2	780 mg/L	769 mg/L	1.41 %						
ABOVE REPEATED	780 mg/L	774 mg/L	0.77 %						

TIME _____ ANALYST B.B.

QC APPROVAL Greg L Maupin

001874

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 505 STD METHODS 15th edition PARAMETER TOC TOTAL ORGANIC CARBON MATRIX WATER

ANALYST [illegible] DATE 3-30-84 TIME 1015

CALIBRATION STANDARDS/BLANK	~~ABSORBANCE~~ Conc/mg/l		STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	0.49					
STD 50	TC 50.5	IC 48.7				
100	98.1	99.3				
200	197	—				

PROJECT #/LAB NUMBERS IN THIS RUN 4924 #2, #4, #7, LAGOON H2O COMP 4929(39-45)

QUALITY CONTROL SPIKES

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • CONC.)	STD. CONC.	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924 comp #1 LAB H2O	7,130	7,143	0.17 %							
4924 #LF2 TC	4,180	4,194	1.17 %							

TIME _____ ANALYST [illegible]

001875

QC APPROVAL Greg S Maupin

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 508 A STD METH 15th ed. PARAMETER COD MATRIX WATER

ANALYST B. Blakfield DATE 3-30-84 TIME 0900

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLANK	

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
STD 1000 $KHC_8H_4O_4$	989 mg/L	1000 mg/L	1.1 %

PROJECT #/LAB NUMBERS 4924 LF #2, #4, #7, LAGOON (H_2O)
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.) +	PERCENT (STANDARD · STD. CONC.) =	THEORETICAL CONC.	SPIKE CONC. +	THEO. CONC. =	PERCENT RECOVERY
4924 #1 comp LAGOON (H_2O)	12,918	13,511	4.39 %						

TIME _____ ANALYST [signature]

001876

QC APPROVAL Greg L Mankin

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS STD METHOD 15th (ed) PARAMETER BOD5 MATRIX WATER

ANALYST B. Blakfield DATE ON 3-29-84 OFF 4-3-84 TIME 14:00

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLANK	
Seed Depletion	0.6
STD	0.5 Depl.

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS 4923, 4924 #2, 4, 7, LAGOON WATER
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
4924 #LF-2	~~2769~~ 2667	2870	7.07 %						
4923	~~26~~ 24	28	14.3 %						

TIME _____ ANALYST BB

QC APPROVAL Greg L Maupin

001877

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 503A STD METH 15th edition PARAMETER O&G MATRIX WATER

ANALYST [illegible] DATE 3-29-84 TIME 1410

CALIBRATION STANDARDS/BLANK	~~ABSORBANCE~~ mg/l
BLANK	0.0002(2)

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN 4922(1,2) 4924(#2, #4 #7, LS Comp) 4927 #1

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+	PERCENT (STANDARD · STD. CONC.)	=	THEORETICAL CONC.	SPIKE CONC.	+	THEO. CONC.	=	PERCENT RECOVERY
4924 #4	74.0 mg/l	71.0 mg/l	4.05%										
SPIKE BLANK DI	23 mg/l	—	—	100% Add		—		Added 0.0235 gms	231 mg/l 0.0231		235		98.3%

TIME 1520 ANALYST [illegible]

001878

QC APPROVAL Greg S Maupin

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 407A STD Meth 15th ed. PARAMETER Chloride MATRIX Liq/Solids

ANALYST B. Blackfield DATE 4-6-86 TIME 1410

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	2.0		
STD 25	24.8		
100	98.5		
500	508		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (#2,4,7 Lab #1) 4925 1-8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC. + THEO CONC	PERCENT RECOVERY
4924 LF #4	1078 mg/L	1072	.56 %	25 % · 1078	75 % ·	100.0	344.5	340.4	98.8 %
4925 LF #3	1062 mg/kg 4:1 253 mg/L	257	1.56 %	50 % · 253	50 % ·	100.0	176.5	179.8	101.9 %

TIME _____ ANALYST B. Blackfield

QC APPROVAL Greg S. Mangan

001879

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 426 C STD Meth 15th ed PARAMETER $SO_4^=$ MATRIX Liquid/Solids

ANALYST BB DATE 4-6-84 TIME 0915

CALIBRATION STANDARDS/BLANK	ABSORBANCE
y = 0.337x	

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	0.10		
STD 10.0	9.44		
25.0	25.8		
40.0	41.1		
IS 30.0	29.1		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (#LF-2, 4, 7, Lab #1), 4925 (1-8)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	PERCENT RECOVERY
4924 LF-2	<5.0 mg/L	<5.0	0 %	50% · <5.0	50% · 40.0	22.5	20.7	92%
4924 LF-7	<5.0 mg/L	<5.0	0 %	—	—	—	—	—
4925 LF-2	230 mg/kg (DS) 57.5	56.0	2.61%	60% · 57.5	40% · 100.0	74.5	73.6	98.8%

TIME _____ ANALYST BB

QC APPROVAL Greg L Maupin

001880

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 510C Std Meth 15th ed PARAMETER Phenol MATRIX soil

ANALYST G Maupin DATE 4/2/84 TIME 1420

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00ppm	0.131
2.00ppm	0.263
3.00ppm	0.378

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	0.00		
1.00ppm	1.02		1.96 %
2.00ppm	1.97		1.50 %
3.00ppm	3.07		2.28 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925→(1→8), 4924*(2,4,7 #1 Comp) 4926 1→5

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4925-1	4/1→0.89 (356 mg/kg)	0.86	3.37%	80 · 0.89	20 · 3.00	1.31	1.28	97.7%
4926-1	10/1 27.2	27.7	1.80%	80 · 2.72 (10/1)	20 · 1.00	2.38	2.26	95.0%

TIME _____ ANALYST Greg L Maupin QC APPROVAL [signature]

001881

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS Std Methods 15th edition PARAMETER Total Kjeldahl Nitrogen MATRIX Solids/Water

ANALYST SLB DATE 9:00 PM TIME 4-11-84

CALIBRATION STANDARDS/BLANK	ABSORBANCE
0.032 N H_2SO_4	titrant

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN 4925, LF Soils 1-6, Dike, Largest Cell, 4924 #2,4,7 (Lagoon H_2O)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
No QAQC	Reported	By Southern	Petroleum	Labs						

TIME _____ ANALYST _____

001882

QC APPROVAL _____

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A (Hydride Generation) PARAMETER As MATRIX Solid/liquid

ANALYST G Maupin DATE 3-30-84 TIME 0930

CALIBRATION STANDARDS/BLANK	ABSORBANCE
5.0 ppb	0.009
10.0 "	0.017
15.0 "	0.025
BLANK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.0 ppb	10.21		2.06%
5.0 ppb	5.16		3.20%
15.0 ppb	14.57		2.87%
Blank	0.04		

PROJECT #/LAB NUMBERS IN THIS RUN 4926 A (23, 5, 7, 8) 4926 B Composite 4924 (2, 4, 7 Lagoon) 4925 (1→8)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+	PERCENT (STANDARD · STD. CONC.)	=	THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01		50 · 15.0		7.50	7.46	99.5%
4924-4	<0.01	<0.01	0	50 · <0.01		50 · 15.0		7.50	7.42	98.9%

TIME _____ ANALYST G Maupin

001883

QC APPROVAL B Blitfield

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Ba MATRIX liquid

ANALYST G. Maupin DATE 3-30-84 TIME 1600

CALIBRATION STANDARDS/BLANK	ABSORBANCE
0.50 ppm	0.004
2.00 ppm	0.015
5.00 ppm	0.038
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
0.50 ppm	0.53		6.00 %
2.00	2.11		5.50 %
5.00	5.32		6.40 %
BLK	0.02		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 2,4,7 Lagoon) 4926 A comp 2,3,5 7,8) 4926B comp

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	= PERCENT RECOVERY
4924-4	<0.50	<0.50	0	50 • <0.50	50 • 5.00	2.50	2.38		95.2%
4927-7	<0.50	<0.50	0	50 • <0.50	50 • 5.00	2.50	2.41		96.4%

TIME _____ ANALYST Greg L Maupin

001884

QC APPROVAL [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Co MATRIX liquid/solid

ANALYST G. Maupin DATE 3-31-84 TIME 1300

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank	0.000
1.00 ppm	0.024
2.00	0.045
3.00	0.067

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blank	0.02		
1.00	1.04		4.00 %
2.00	2.03		1.50 %
3.066	2.97		1.00 %

PROJECT #/LAB NUMBERS IN THIS RUN 4926A (2, 3, 5, 7, 8), 4926 B, 4924 (2, 4, 7 Lagoon) 4925 1 -> 8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	0.02	0.02	0	50 · 0.02	50 · 2.0	1.01	0.97		96.02
-Lagoon	0.20	0.19	5.00	50 · 0.20	50 · 2.0	1.10	1.07		97.3%

TIME _____ ANALYST Greg S Maupin QC APPROVAL B. [illegible]

001885

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Cr MATRIX liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 1030

CALIBRATION STANDARDS/BLANK	ABSORBANCE
1.00 ppm	0.018
3.00	0.057
5.00	0.087
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
1.00	1.02		2.0 %
3.00	3.08		2.67 %
5.00	4.87		2.60 %
BLK	0.01		

PROJECT #/LAB NUMBERS IN THIS RUN 4926 A 2,3 5 7 8 4926 B comp 4924 2,4,7 Lagoon 4925 1->8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 3.00	1.50	1.46		93.7%
4924-Lagoon	0.28	0.31	9.68	50 · 0.28	50 · 3.00	3.14	3.02		96.2%

TIME _____ ANALYST Greg L Maupin

001886

QC APPROVAL B. [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Cd MATRIX liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 0900

CALIBRATION STANDARDS/BLANK	ABSORBANCE
0.10 ppm	0.022
0.20 ppm	0.043
0.30 ppm	0.065
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
0.10 ppm	0.10		0 %
0.20	0.21		5.00 %
0.30	0.33		10.0 %
BLK	0.00		

PROJECT #/LAB NUMBERS IN THIS RUN 4926 A 2,3578 4926 B Comp. 4924 2,4,7 Lagoon 4935 1-8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 0.30	0.15	0.142		94.7%
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 0.30	0.15	0.145		97.9%

TIME _____ ANALYST Greg L Maupin

001887

QC APPROVAL B. Blefield

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A (Cold Vapor) PARAMETER Hg MATRIX liquid

ANALYST G Maupin DATE 3-30-84 TIME 1130

CALIBRATION STANDARDS/BLANK	ABSORBANCE
5.0 ppb	0.008
6.0 ppb	0.010
9.0 ppb	0.014
Blank	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
6.0 ppb	6.07		1.15%
5.0 ppb	5.11		2.20%
9.0 ppb	9.14		1.56%
Blank	0.010		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2, 4, 7, Lagoon) 4926A (Comp, 2, 3, 5, 7, 8), 4926-B (comp.)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	PERCENT (STANDARD CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC. + THEO. CONC. =	PERCENT RECOVERY
4926 - 3	<5.00	<5.00	0	50 <5.0	50	9.0	4.50	4.57	101.6%
4926 - 5	<5.00	<5.00	0	50 <5.0	50	9.0	4.50	4.43	98.4%

TIME _____ ANALYST G Maupin

001888

QC APPROVAL L. Blackford

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Ni MATRIX Liquid/Solid

ANALYST G. Maupin DATE 3-31-84 TIME 1355

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00 ppm	0.017
3.00 ppm	0.049
5.00 ppm	0.081

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.001		
1.00 ppm	1.04		4.00 %
3.00 ppm	2.95		1.67 %
5.00 ppm	4.91		1.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925 1→8 4924 2, 4, 7 Lagoon 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	0.10	0.09	10.0	50 · 0.10	50 · 3.00	1.55	1.48	95.5 %
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 3.00	1.50	1.42	94.7 %

TIME _____ ANALYST Greg L Maupin

001889

QC APPROVAL [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Ag MATRIX Liquid/Solid

ANALYST G Maupin DATE 3-31-84 TIME 1540

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
0.100 ppm	0.007
0.300 ppm	0.020
0.500 ppm	0.034

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.000		
0.10	0.110		10.0 %
0.300	0.270		10.0 %
0.500	0.480		4.0 %

PROJECT #/LAB NUMBERS 4924 2,4,7 #1 Lagoon 4926 A 2,35,78 & 4926 B

IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 0.50	0.25	0.23	92.0%
-4	<0.01	<0.01	0	50 · <0.01	50 · 0.50	0.25	0.22	88.0%

TIME _____ ANALYST Greg L Maupin QC APPROVAL B. Blakfield

001890

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA Hydride generation PARAMETER Se MATRIX liquid

ANALYST G Maupin DATE 3-30 84 TIME 1330

CALIBRATION STANDARDS/BLANK	ABSORBANCE
10.0ppb	0.004
20.0ppb	0.008
30.0ppb	0.013
Blank	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.0ppb	10.41		4.10 %
20.0ppb	20.64		3.20 %
30.0ppb	31.82		6.07 %
Blank	0.001		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2,4,7 Lagoon) 4926A (comp 2,3,5,7,8) 4926B (comp)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC mg/L	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-4	<0.01	<0.01	0	50 • <0.01	50 • 0.03	0.015	0.143		95.3%
4924-7	<0.01	<0.01	0	50 • <0.01	50 • 0.03	0.015	0.144		96.0%

TIME _____ ANALYST Greg S Maupin

QC APPROVAL B. Blackfield

001891

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A CC PARAMETER Zn MATRIX Liquid/Solid

ANALYST G Maupin DATE 3-31-84 TIME 1710

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.005
0.100 ppm	0.032
0.500 ppm	0.133
1.000 ppm	0.221

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.02		
0.100 ppm	0.109		8.3%
0.500	0.57		14%
1.000	1.03		3.0%

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2,4,7 Lagoon) 4925(1->8) 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE • CONC.) + PERCENT (STANDARD • STD. CONC.) = THEORETICAL CONC.

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	PERCENT (STANDARD • STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	0.02	0.02	0	50 • 0.02	50 • 1.0	0.51	0.54		105.9%
4924-4	0.01	0.01	0	50 • 0.01	50 • 1.0	0.50	0.47		94.0%

TIME _____ ANALYST Greg S Maupin QC APPROVAL [illegible]

001892

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Pb MATRIX Liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 1455

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00 ppm	0.009
3.00 ppm	0.026
5.00 ppm	0.045

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.000		
1.00	0.47		3.00 %
3.00	2.89		3.67 %
5.00	5.04		0.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925 1->8, 4924 2,4,7 Lagoon, 4926 A 2 3578, 4926B,

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 5.0	2.50	2.47	98.8 %
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 5.0	2.50	2.44	96.0 %

TIME _____ ANALYST Greg L Maupin QC APPROVAL B. Blackfield

001893

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Mn MATRIX liquid/solid

ANALYST G. Maupin DATE 4-1-84 TIME 0845

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00	0.035
3.00	0.104
5.00	0.163

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.004		
1.00	1.04		4.0 %
3.00	3.07		2.33 %
5.00	5.09		1.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2, 4, 7, Lagoon) 4926 B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	1.69	1.73	2.31	50 · 1.69	50 · 5.0	3.35	3.27		97.6%
4924-4	0.80	0.83	3.75						

TIME _____ ANALYST Greg S Maupin QC APPROVAL B. Blackwell

001894

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Fe MATRIX liquid

ANALYST G Maupin DATE 4-1-84 TIME 0930

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00	0.022
3.00	0.063
5.00	0.115

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.020		
1.00	1.02		2.0 %
3.00	2.96		1.33 %
5.00	4.96		0.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2,4,7 Lagoon) 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	÷ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	10/1 1.33	1.37	3.01%	50 • 1.33	50 • 5.0	3.17	3.11		98.1%

TIME _____ ANALYST Greg L Maupin QC APPROVAL [illegible]

001895

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 209C Std Mgtt 15th ed. PARAMETER TDS MATRIX H_2O

ANALYST B. Blefd DATE 3-29 TIME 1045

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLANK	0.0001 .5 mg/L

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS 4924 - Lagoon Water #1
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+(PERCENT STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924 Lagoon Comp	9,832	9,794	0.39%						

TIME _____ ANALYST LB

001896

QC APPROVAL Greg S. Marquin

CLIENT SHERIDAN

PROJECT NO. 288-01

SAMPLED BY BB, TB

DATE SAMPLED 3-27-84

DATE RECEIVED 3-29-84

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 4925

RESULTS TO BZ

PROJECT MANAGER BZ

ANALYTICAL COST $

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	Ph	CEC	NAR	Na	Ca	Mg	K	TKN	$SO_4^=$	Cl^-
#1 LANDFARM SOILS #1 COMPOSITES	8.7	[illegible]	2.62	11.9	37.2	47	1.25	1480	855	835
2 LANDFARM " #2 "	8.3	54.6	3.48	16.1	41.4	54.6	2.34	1160	830	1223
3 " " #3 "	8.5	56.1	2.63	12.9	42.1	46.9	1.70	941	532	1062
4 " " #4 "	8.5	58.2	2.95	14.5	42.9	54.7	1.80	1590	674	1019
5 " " #5 "	8.5	55.5	3.53	17.1	41.3	42.7	1.83	1900	987	1221
6 " " #6 "	8.6	53.7	3.00	14.5	41.7	4.87	1.89	1270	867	1095
7 LANDFARM SOIL - DIKE MATERIAL (3-29-84)	8.0	25.7	1.47	4.9	19.8	2.37	1.57	1760	664	1844
8 SLUDGE FROM LARGE LFARM POND (COMPOSITE 3-29-84)	8.7	52.0	3.06	14.3	37.1	6.66	3.60	1330	568	920.7
		meq/100 gm	—	meq/100 gm	→			PPM		
TESTED BY	BB	GM	GM	→				SPL	BB	BB
ANALYSIS COST	24	100	100					200	96	96

Billed 5-10-84

001897

CLIENT _____

PROJECT NO. _____

SAMPLED BY _____

DATE SAMPLED _____

DATE RECEIVED _____

DATE COMPLETED _____

RESOURCE ENGINEERING INC.

LAB NO. _____

RESULTS TO _____

PROJECT MANAGER _____

ANALYTICAL COST 920

MILEAGE _____ COST _____

HOURS _____ RATE _____ COST _____

SUBTOTAL _____

DISCOUNT _____

TOTAL COST _____

SAMPLE DESCRIPTION / PARAMETER	% H_2O	As	Cd	Cr	Cu	Ni	Pb	Zn	% x Base	Exchange Base
1 LF #1	33.8%	<1.43	<1.43	28.6	32.9	<1.43	<1.43	107	95%	54.95
2 #2	32.7	<1.43	<1.43	22.9	31.4	2.86	<1.43	81	85%	64.30
3 #3	23.2	<1.43	<1.43	36.0	32.8	11.4	<1.43	63	90%	62.70
4 #4	27.7	<1.43	<1.43	34.3	32.8	7.14	<1.43	77	90%	64.70
5 #5	31.5	<1.43	4.14	32.9	37.1	<1.43	<1.43	110	85%	66.00
6 #6	24.9	<1.43	<1.43	<1.43	22.9	<1.43	<1.43	81	85%	53.00
7 LF DIKE MATERIAL	47.0	<1.43	3.14	5.70	41.4	<1.43	<1.43	60	90%	28.60
3-29-84										
8 SLUDGE FROM LARGE CELL	36.4	<1.43	1.86	27.1	97.1	<1.43	<1.43	66	84%	61.70
	%	mg/kg							%	mg/kg
TESTED BY	BB	GM								
ANALYSIS COST	40	160	120	120	120	120	120	120	—	—

001898

CLIENT SHERIDAN

PROJECT NO. 288 01

SAMPLED BY

DATE SAMPLED

DATE RECEIVED

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO.

RESULTS TO

PROJECT MANAGER

ANALYTICAL COST 494

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	÷CBs						PREP			
1 LANDFARM SOILS #1	<1.0 PPM	60								
2 LANDFARM SOILS #6	<10 PPM									
3 LANDFARM DIKE MATERIAL	<10 PPM									
4 LANDFARM SOIL - FROM LARGE LF-CELL	<10 PPM									
5 OIL FROM LAGOON POND (4926A)	<20.0 PPM	* 50								
6 WATER FROM LAGOON POND	ND	70								
* N/D - NONE DETECTED										
* Because of the makeup of this particular sample <20 PPM WAS the lowest answer available.										
[redacted]										
TESTED BY	SPL						BB			
ANALYSIS COST	360 .15%						80.00			
	414.00									

001899

CLIENT Sheridan

PROJECT NO. 288-01

SAMPLED BY BB-TB

DATE SAMPLED 3-27-84

DATE RECEIVED 3-29-84

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 4925

RESULTS TO BZ-CO

PROJECT MANAGER BZ-CO

ANALYTICAL COST 200.00

MILEAGE _____ COST _____

HOURS _____ RATE _____ COST _____

SUBTOTAL

DISCOUNT

TOTAL COST 200.00

SAMPLE DESCRIPTION / PARAMETER	Pb		Prep							
1 Landfarm Soils #1 Comp	103.0									
2 2 "	55.0									
3 3 "	70.0									
4 4 "	66.0									
5 5 "	68.0									
6 6 "	62.0									
7 Dike Material Grab	121									
8 ~~Sand~~ Soil From Large Cell Comp	62									
TESTED BY										
ANALYSIS COST	120		80							

B: 11/20
8-1-84

001900

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Project Number	Project Name	Location
288-01	SHERIDAN STEERING COMMITTE	HEMSTEAD, TX

Field Sample Number	Date	Time	Grab	Comp.	Sample Container (Size/Mat'l)	Sample Type	Preservative	Analyses Requested	Comments and Hold Storage Date
LF-1	3-27-84	AM		✓	32oz GLASS	SLUDGE	4°C	Ph, CEC, NAR, TKN SPCONDUCT Cl⁻ H_2O, As, Cd, Cr, Cu, Ni, Pb, ZN, DEG, ϕ	
LF-2	3/27/84	"		✓	"	"	"	"	
LF-3	"	"		✓	"	"	"	"	
LF-4	"	"		✓	"	"	"	"	
LF-5	"	"		✓	"	"	"	"	
LF-6	"	"		✓	32oz ~~9oz~~ GLASS	"	"	"	
LF-7 DIKE M.	3/29/84	PM			9oz GLASS	"	"	"	
LF-8 LARGE CELL	3/29/84	"			9oz	"	"	"	

Lab Sample No.	Remarks	Sampler Signature
4925	TKN FOR ANALYSIS TO SPL-LABS ONLY	Bo Blankfield

Relinquished By	Date	Time	Received By	Relinquished By	Date	Time	Received By
Bo Blankfield	4-2-84	8:45	Dan Dites				
Relinquished By	Date	Time	Received By	Relinquished By	Date	Time	Received By
Relinquished By	Date	Time	Received By	Relinquished By	Date	Time	Received By

001901

CLIENT Sheridan

PROJECT NO. 288-01

SAMPLED BY TB BB

DATE SAMPLED 5-27-84

DATE RECEIVED For Test 4-27-84

DATE COMPLETED 4-28-84

RESOURCE ENGINEERING INC.

LAB NO. 4925

RESULTS TO BZ, Co

PROJECT MANAGER BZ, CO

ANALYTICAL COST 328.00

MILEAGE _____ COST _____

HOURS _____ RATE _____ COST _____

SUBTOTAL _____

DISCOUNT _____

TOTAL COST 328.00

SAMPLE DESCRIPTION / PARAMETER	O&G	Phenol
#1 LF Soils (Landfarm)	428.0	3.56
#2 "	153.0	3.96
#3 "	118.0	4.80
#4 "	0.492	3.20
#5 "	0.412	3.61
#6 "	626	3.32
#7 LF - Dike Material	2.212	11.3
#8 LF - Large Cell	57.0	2.98
	PPM AND	mg/kg
TESTED BY	BB	
ANALYSIS COST	128	200

B. Hen 5-30-84

001902

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS F. Emmis. PARAMETER Na MATRIX Soils

ANALYST G Maupin DATE 4/1/84 TIME 1555

CALIBRATION STANDARDS/BLANK	ABSORBANCE
ppm 10.0	0.100
30.0	0.232
50.0	0.382

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.00	10.32		3.20 %
30.00	30.67		2.23 %
50.00	51.42		2.84 %
BLANK	0.14		

PROJECT #/LAB NUMBERS 4925 1→8
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC. mg/L	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4925-1	11.9	11.6	2.52	80 · 11.9	20 · 50	19.5	19.3	99.0%

TIME _____ ANALYST Gregg Maupin QC APPROVAL [signature]

001903

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS F Emmis PARAMETER Ca MATRIX Digested soils

ANALYST G Maupin DATE 4/1/84 TIME 1630

CALIBRATION STANDARDS/BLANK	ABSORBANCE
ppm 10.00	0.100
30.00	0.221
50.00	0.368

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.00	9.73		2.70 %
30.00	29.21		2.63 %
50.00	48.72		2.56 %
BLANK	0.23		

PROJECT #/LAB NUMBERS IN THIS RUN 4925 1-78

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC/mg/L	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4925-1	37.2	38.1	2.36	50 • 37.2	20 • 10	30.8	29.7		96.4%

TIME _____ ANALYST Greg L Maupin QC APPROVAL [illegible]

001904

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS F. Ennis PARAMETER Mg MATRIX Liquid Soils

ANALYST G Maupin DATE 4/2/84 TIME 1725

CALIBRATION STANDARDS/BLANK	ABSORBANCE
ppm 10.00	0.21
30.00	0.54
50.00	0.86

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.00	10.45		4.50 %
30.00	28.91		3.63 %
50.00	47.94		4.12 %
BLANK	0.18		

PROJECT #/LAB NUMBERS IN THIS RUN 4925 (1-8)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC. mg/L	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	= PERCENT RECOVERY
4925-1	4.1	4.1	0	50 · 4.1	50 ·	50	27.05	28.1		103.9%

TIME _____ ANALYST Greg S Maupin QC APPROVAL R. Blefld

001905

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS F. Emiss PARAMETER K MATRIX Soils

ANALYST G. Maupin DATE 4/2/84 TIME 0900

CALIBRATION STANDARDS/BLANK	ABSORBANCE
STD 10 ppm	.035
STD 30 ppm	.104
STD 50 ppm	.172

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.03		
STD 10.0	10.09		0.90 %
STD 30.0	30.26		0.87 %
STD 50.0	49.87		0.26 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925 (1-8)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4925-1	1.75	1.82	4.00	50 • 1.75	50 • 10	5.88	6.13		104.3%

TIME _____ ANALYST Greg L Maupin QC APPROVAL R Blanfield

001906

RESOURCE ENGINEERING L ORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 426 C STD Meth 15th ed PARAMETER $SO_4^=$ MATRIX LIQUID/SOLIDS

ANALYST BB DATE 4-6-84 TIME 0915

CALIBRATION STANDARDS/BLANK	ABSORBANCE
y = 0.337x	

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	0.10		
STD 10.0	9.44		
25.0	25.8		
40.0	41.1		
IS 30.0	29.1		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (#LF-2, 4, 7, LAG #1), 4925 (1-8)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924 LF-2	<5.0 mg/L	<5.0	0 %	50% · <5.0	50% · 40.0	22.5	20.7		92%
4924 LF-7	<5.0 mg/L	<5.0	0 %	—	—	—	—		—
4925 LF-2	230 mg/kg 57.5 (25% mb)	56.0	2.61%	60% · 57.5	40% · 100.0	74.5	73.6		98.8%

TIME _____ ANALYST BB

QC APPROVAL Greg L Maupin

001907

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 407A STD Mert 15th ed. PARAMETER Chloride MATRIX Liq/Solids

ANALYST B. Blefield DATE 4-6-86 TIME 1410

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	2.0		
STD 25	24.8		
100	98.5		
500	508		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (#2,4,7 Lab #1) 4925 1-8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924 LF#4	1078 mg/L	1072	.56 %	25 % · 1078	75 % ·	100.0	344.5	340.4		98.8 %
4925 LF#3	1002 mg/L 4:1 253 mg/L	257	1.56 %	50 % · 253	50 % ·	100.0	176.5	179.8		101.9 %

TIME _____ ANALYST B.B.

QC APPROVAL Guy L Maupin

001908

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS SW Methods 15th edition PARAMETER Total Kjeldahl Nitrogen MATRIX Solids/water

ANALYST SLB DATE 9:00 PM TIME 4-11-84

CALIBRATION STANDARDS/BLANK	ABSORBANCE
0.032 N H_2SO_4	titrant

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN 4925, - LF Soils 1-6, Dike, Largest Cell, 4924 #2, 4, 7 (Lagoon H_2O)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE • CONC.) + (PERCENT STANDARD • STD. CONC.) = THEORETICAL SPIKE CONC.

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	THEO. CONC.	PERCENT RECOVERY
No QAQC Reported By Southern Petroleum Labs					

TIME _____ ANALYST _____ QC APPROVAL _____

001909

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A (Hydride Generation) PARAMETER As MATRIX Solid/liquid

ANALYST G Maupin DATE 3-30-84 TIME ~~9~~ 0930

CALIBRATION STANDARDS/BLANK	ABSORBANCE
5.0 ppb	0.009
10.0 "	0.017
15.0 "	0.025
BLANK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.0 ppb	10.21		2.06%
5.0 ppb	5.16		320
15.0 ppb	14.57		2.87
Blank	0.08		

PROJECT #/LAB NUMBERS IN THIS RUN 4926 A (2,3,5,7,8) 4926 B Composite 4924 (2,4,7 Lagoon) 4925 (1→8)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+	PERCENT (STANDARD · STD. CONC.)	=	THEORETICAL CONC.	SPIKE CONC. +	THEO. CONC. =	PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50	· <.01	50	~~0.15~~ 15.0	7.50	7.46		99.5
4924-4	<0.01	<0.01	0	50	· <.01	50	~~0.15~~ 15.0	7.50	7.42		98.9

TIME _____ ANALYST G Maupin QC APPROVAL [signature]

001910

RESOURCE ENGINEERIN. LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Cd MATRIX liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 0900

CALIBRATION STANDARDS/BLANK	ABSORBANCE
0.10 ppm	0.022
0.20 ppm	0.043
0.30 ppm	0.065
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
0.10 ppm	0.10		0 %
0.20	0.21		5.00 %
0.30	0.33		10.0 %
BLK	0.00		

PROJECT #/LAB NUMBERS IN THIS RUN 4926 A 2,3578 4926B Comp. 4924 2,4,7 Lagoon 4935 1-8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 0.30	0.15	0.142		94.7%
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 0.30	0.15	0.145		97.9%

TIME _____ ANALYST Greg L Maupin QC APPROVAL B. Blatfield

0.0.1.9.1.1

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Cu MATRIX liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 1030

CALIBRATION STANDARDS/BLANK	ABSORBANCE
1.00 ppm	0.018
3.00	0.057
5.00	0.087
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
1.00	1.02		2.0 %
3.00	3.08		2.67 %
5.00	4.87		2.60 %
BLK	0.01		

PROJECT #/LAB NUMBERS IN THIS RUN 4926 A 2,3 5 7 8 4926 B comp 4924 2,47 Lagoon 4925 1->8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE · CONC.) + (PERCENT STANDARD · STD. CONC.) = THEORETICAL CONC. SPIKE CONC. ± THEO. CONC. = PERCENT RECOVERY

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	PERCENT STANDARD · STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 3.00	1.50	1.46		93.7%
4924-Lagoon	0.28	0.31	9.68	50 0.28	50 · 3.00	3.14	3.02		96.2%

TIME _____ ANALYST Greg L Maupin QC APPROVAL B. Blackfield

001912

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Co MATRIX liquid/solid

ANALYST G. Maupin DATE 3-31-84 TIME 1300

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank	0.000
1.00 ppm	0.024
2.00	0.045
3.00	0.067

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blank	0.02		
1.00	1.04		4.00 %
2.00	2.03		1.50 %
3.00	2.97		1.00 %

PROJECT #/LAB NUMBERS IN THIS RUN 4926A (2,3,5,7,8), 4926 B, 4924 (2,4,7 Lagoon) 4925 1->8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	PERCENT (STANDARD · STD. CONC.)	THEORETICAL CONC.	SPIKE CONC. + THEO. CONC. =	PERCENT RECOVERY
4924-2	0.02	0.02	0	50 0.02	50 · 2.0	1.01	0.97	96.0 %
-Lagoon	0.20	0.19	5.00	50 · 0.20	50 · 2.0	1.10	1.07	97.3%

TIME _____ ANALYST Greg S Maupin QC APPROVAL B. Clifford

001913

RESOURCE ENGINEERI. LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Ni MATRIX Liquid/Solid

ANALYST G. Maupin DATE 3-31-84 TIME 1355

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00 ppm	0.017
3.00 ppm	0.049
5.00 ppm	0.081

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.001		
1.00 ppm	1.04		4.00 %
3.00 ppm	2.95		1.67 %
5.00 ppm	4.91		1.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925 1->8 4924 2,4,7 Lagoon 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · CONC.)	STD. CONC.	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	0.10	0.09	10.0	50 · 0.10	50 · 3.00		1.55	1.48		95.5 %
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 3.00		1.50	1.42		94.7 %

TIME _____ ANALYST Greg L. Maupin QC APPROVAL [illegible]

001914

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Pb MATRIX Liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 1455

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00 ppm	0.009
3.00 ppm	0.026
5.00 ppm	0.045

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.000		
1.00	0.97		3.00 %
3.00	2.89		3.67 %
5.00	5.04		0.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925 1->8, 4924 2,4,7 Lagoon, 4926 A 2.3578, 4926B,

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 5.0	2.50	2.47	98.8 %
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 5.0	2.50	2.44	96.0 %

TIME _____ ANALYST Greg L Maupin QC APPROVAL B. Blackfield

001915

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A CC PARAMETER Zn MATRIX Liquid/Solid

ANALYST G Maupin DATE 3-31-84 TIME 1710

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BCK	0.005
0.100ppm	0.032
0.500ppm	0.133
1.000ppm	0.221

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.02		
0.100ppm	0.109		8.3%
0.500	0.57		14%
1.000	1.03		3.0%

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2,4,7 Lagoon) 4925(1->8) 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	0.02	0.02	0	50 · 0.02	50 · 1.0	0.51	0.54	105.9%
4924-4	0.01	0.01	0	50 · 0.01	50 · 1.0	0.50	0.47	94.0%

TIME _____ ANALYST Greg S Maupin QC APPROVAL B Blakfield

001916

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 503D STD METH 15th edition PARAMETER O&G MATRIX SOLIDS

ANALYST BB DATE 3-30-84 TIME 0755

CALIBRATION STANDARDS/BLANK	~~ABSORBANCE~~ mg/L
BLANK	0.0003 3 mg/L
BLANK	0.0005 5 mg/L

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS [4925 (1-8 L FARM) #7-D.KE #8-LARGE CELL AREA)] 4926-LAGOON LS 2,3,
IN THIS RUN 5,7,8 #7A 10' FROM LAGOON 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4925 #2	153 mg/Kg	146 mg/Kg	4.58 %					
4926A-LS #8	12.26 %	12.38 %	0.97 %					
BLANK SPIKE (DI)	1,064 mg/L	—	—	100% DI	Added .1064g	1070 mg/L .1070	1064 mg/L .1064	99.4 %
BLANK SPIKE (DI)	96 mg/L	—	—	100% DI	Added .0096	89 mg/L .0089	96 mg/L .0096	108 %

TIME _____ ANALYST B. Blackfield QC APPROVAL Greg L Maupin

001917

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 510C Std Meth 15th ed PARAMETER Phenol MATRIX soil

ANALYST G Maupin DATE 4/2/84 TIME 1420

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00ppm	0.131
2.00ppm	0.263
3.00ppm	0.378

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	0.00		
1.00ppm	1.02		1.96 %
2.00ppm	1.97		1.50 %
3.00ppm	3.07		2.28 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925→(1→8), 4924→(2,4,7 #1 Comp) 4926 1→5

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4925-1	4/1 (356 mg/kg) →0.89	0.86	3.37%	80 · 0.89	20 · 3.00	1.31	1.28	97.7%
4926-1	10/1 27.2	27.7	1.80%	80 · 2.72 (10/1)	20 · 1.00	2.38	2.26	95.0%

TIME _____ ANALYST Greg L Maupin QC APPROVAL B. Blakfield

001918

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number 065212
Invoice Number 161506
May 11, 1984

Alpha Environmental Laboratories
(Resources Engineering)
#11 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab # 4925 Sheridan S. Co
1F # 1
West
Soil Sample

Date Received: 04/11/84

001919

			Date	Time	Analyst
lychlorinated biphenyls	< 1.0	ppm	05/05/84	10:00 am	DD

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. Winfrey

J. C. Winfrey

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number 065213
Invoice Number 161506
May 11, 1984

Alpha Environmental Laboratories
(Resources Engineering)
#11 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab # 4925
6
Soil Sample

Date Received: 04/11/84

001920

			Date	Time	Analyst
Polychlorinated biphenyls	< 1.0	ppm	05/05/84	11:00 am	DD

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. Winfrey

P.O. BOX 20607 HOUSTON, TEXAS 77225 | P.O. BOX 31760 LAFAYETTE, LA 70503 | P.O. BOX 10276 JEFFERSON, LA 70181 | P.O. BOX 379 ACME, MI 49619 | P.O. BOX 548 CARTHAGE, TX 75633

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number 065214
Invoice Number 161506
May 11, 1984

Alpha Environmental Laboratories
(Resources Engineering)
#11 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab # 4925
Dike Material
Soil Sample

Date Received: 04/11/84

001921

			Date	Time	Analyst
Polychlorinated biphenyls	< 1.0	ppm	05/05/84	12:00 pm	DD

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. Winfrey

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number 065215
Invoice Number 161506
May 11, 1984

Alpha Environmental Laboratories
(Resources Engineering)
411 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab # 4925
Oil Sample
Date Received: 04/11/84

001922

			Date	Time	Analyst
Polychlorinated biphenyls	< 1.0	ppm	05/05/84	1:00 pm	DD

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. Whitney

SOUTHERN PETROLEUM LABORATORIES, INC.

Certificate Number 065216
Invoice Number 161506
May 11, 1984

Alpha Environmental Laboratories
(Resources Engineering)
#11 Greenway Plaza
Suite 1724
Houston, Texas 77046

Attention: Bo Blankfield or Greg L. Maupin

Sample Description: Lab # 4924
Pond
Water Sample

Date Received: 04/11/84

001923

			Date	Time	Analyst
Polychlorinated biphenyls	< 20	ppm	05/05/84	5:00 pm	DD

Quality Assurance: These analyses are performed in accordance with EPA guidelines for quality assurance. These procedures include the following as a minimum requirement: comparisons against known standards in each run, one in ten sample splits, and a quarterly method review against known spike samples.

SOUTHERN PETROLEUM LABORATORIES, INC.

J. C. Winfrey

P.O. BOX 20407 HOUSTON, TEXAS 77225 | P.O. BOX 31750 LAFAYETTE, LA 70503 | P.O. BOX 14978 JEFFERSON, LA 70181 | P.O. BOX 372 ACME, MI 49619 | P.O. BOX 543 CARTHAGE, TX 75633

UN 1 PCB

#2

ENSITIVITIES 300 15 Sl #65212

0.40

B

B 2.25
2.73
B
BGN

B 4.50

6.06

6.98

7.98
8.29
8.54

9.16

9.72

10.47

11.19
B
11.91
12.34
12.70
B

18.12
B

END

001924

NST 2 METH 10 FILE 155

UN 1 PCB 11 : 8.2 4 / 1 / 84

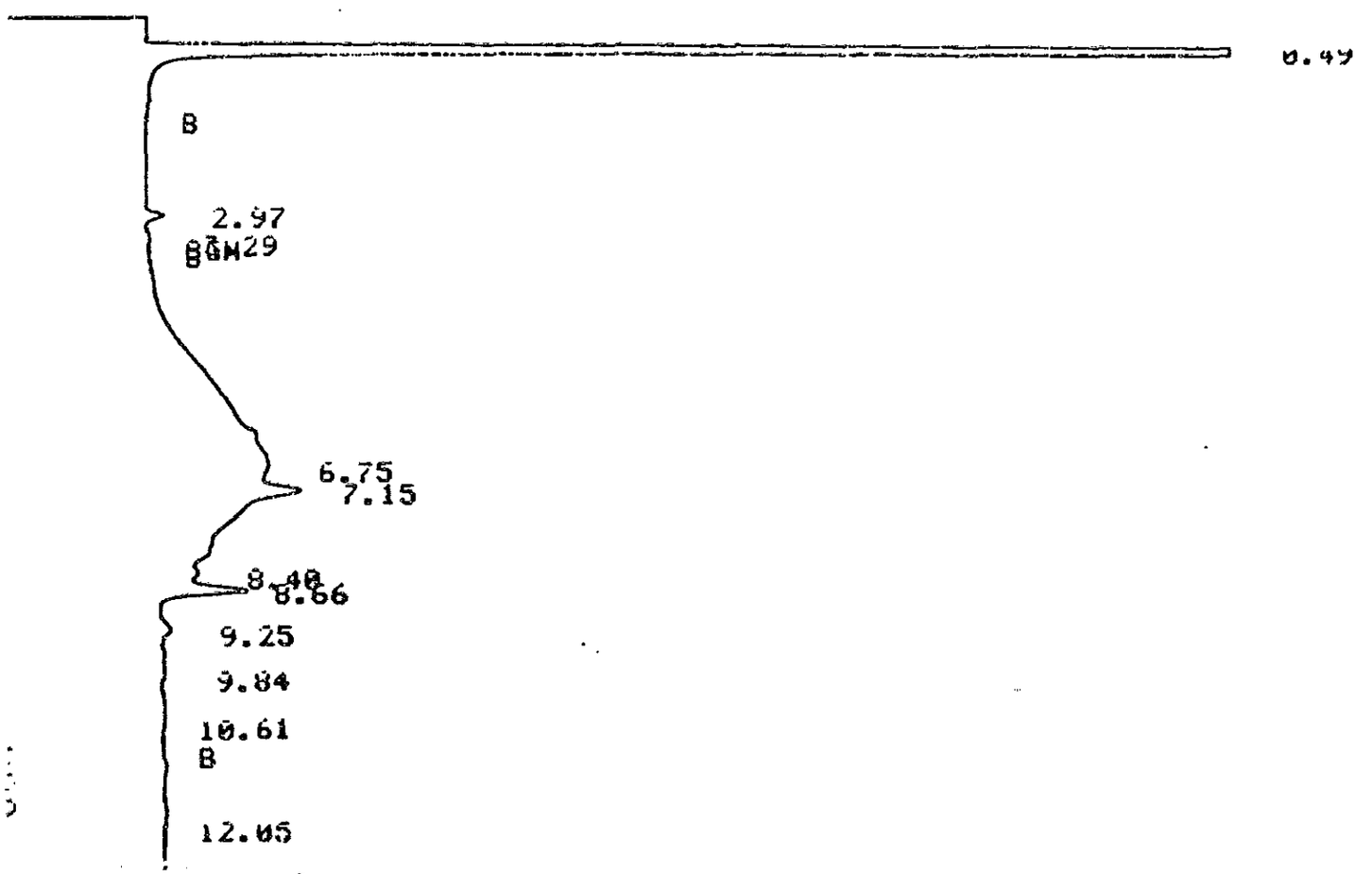
TIME	AREA	BC	RRT	RF	C	NAME
4.50	0.0077		0.450	1.000	0.5424	:
6.06	0.0164	V	0.606	1.000	1.1379	:
6.98	0.1047	V	0.698	1.000	7.3617	:
7.98	0.0740	I	0.798	1.000	5.1991	:
8.27	0.0510	I	0.827	1.000	3.5846	:
8.54	0.2109	V	0.854	1.000	14.8189	:
9.16	0.0946	I	0.916	1.000	6.6478	:
9.72	0.1691	T	0.972	1.000	11.8821	:
10.47	0.2660	T	1.047	1.000	18.6887	:
11.19	0.2154		1.119	1.000	15.1395	:
11.91	0.0301	T	1.191	1.000	2.1176	:
12.34	0.0287	T	1.234	1.000	2.0164	:
12.70	0.0359		1.270	1.000	2.5237	:
18.12	0.1184		1.812	1.000	8.3200	:

001925

NST 2 METH 10 FILE 149

UN 2 PCB #3

SITIVITIES 300 15 Spl #65213



B

END

INST 2 METH 10 FILE 149

RUN 2 PCB 11 : 34.0 4 / 17 / 84

SENSITIVITIES 300 15

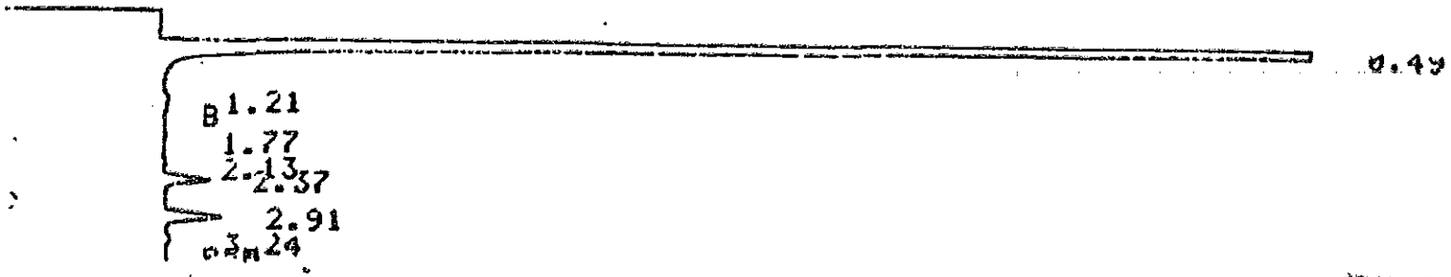
TIME	AREA	BC	RRT	RF	C	NAME
6.76	2.9891	T	0.676	1.000	36.3982	:
7.16	3.8700	T	0.716	1.000	47.1233	:
8.41	0.3016	T	0.841	1.000	3.6733	:
8.67	0.8058	V	0.867	1.000	9.8131	:
9.26	0.1123	T	0.926	1.000	1.3673	:
9.85	0.0504	V	0.985	1.000	0.6142	:
10.62	0.0499		1.062	1.000	0.6084	:
12.06	0.0328		1.206	1.000	0.3996	:

INST 2 METH 10 FILE 148

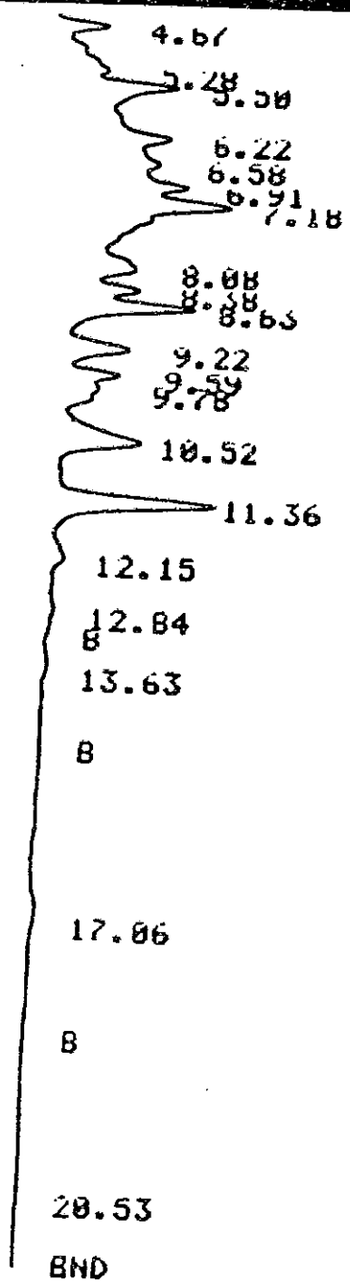
RUN 3 PCB

SENSITIVITIES 300 15

#4 Sp 65214



001926



001927

IST 2 METH 10 FILE 148

IN 3 PCB 12 : 0.2 4 / 17 / 84

NSITIVITIES 300 15

TIME	AREA	BC	RRT	RF	L	NAME
4.67	0.4007	T	0.467	1.000	1.7014	:
5.28	0.9736	T	0.528	1.000	4.1334	:
5.50	1.7212	T	0.550	1.000	7.3087	:
6.22	2.1642	T	0.622	1.000	9.1874	:
6.58	1.6517	T	0.658	1.000	7.0119	:
6.91	1.6170	T	0.691	1.000	6.8643	:
7.18	4.0691	T	0.718	1.000	17.2759	:
8.08	1.4576	T	0.808	1.000	6.1888	:

9.59	0.6303 T	0.959	1.000	[illegible] :
9.78	0.7630 T	0.978	1.000	[illegible] :
10.52	1.5744 T	1.052	1.000	[illegible] :
11.36	2.0556 T	1.136	1.000	[illegible] :
[illegible].15	0.3790 T	1.215	1.000	[illegible] :
[illegible]2.84	0.1520	1.284	1.000	[illegible] :
13.63	0.0322	1.363	1.000	[illegible] :
17.06	0.2754	1.706	1.000	[illegible] :
20.53	0.0215	2.053	1.000	[illegible] :

001928

CLIENT Sheridan Ranch

PROJECT NO. 288-01

SAMPLED BY BR, TB

DATE SAMPLED 3-29-84

DATE RECEIVED 3-29-84

DATE COMPLETED 4-16-84

RESOURCE ENGINEERING INC.

LAB NO. 4926-A

RESULTS TO BZ

PROJECT MANAGER BZ

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	PCBs	% H_2O	VSS%	TS%	O&G	Sulfide	CN		Ph	Totals
#1 LS #2	132 PPM	56.55	32.0	43.45	15.81%	<1.0	1.50		5.7	11.45
2 LS #3	137 PPM	53.3	20.8	46.7	6.99%	10.3	<1.0		6.5	25.9
3 LS #5 } LAGOON	158 PPM	44.0	38.6	56.0	13.62%	<1.0	<1.0		6.4	17.4
4 LS #7	149 PPM	52.9	38.1	47.1	8.61%	<1.0	<1.0		6.4	7.0
5 LS #8	223 PPM	42.5	20.6	57.5	12.26%	<1.0	<1.0		6.4	36.9
6 COMPOSITE OF 2,3,5,7 & 8	* NEXT		PAGE	4926B		*				
7 SLUDGE 10' FROM LAGOON (3½')					1.60%					
8 SLUDGE 10' FROM LAGOON (4-4½')					6.48%					
						PPM	PPM			
TESTED BY	SPL	GM/BB				SPL	SPL	X	BB	
ANALYSIS COST	402.50	25	60	50	90	125	125	~~[illegible]~~	15	25

3.11 RD
4-17-84

5070+1.6

001929

(217.50)

CLIENT SHERIDAN

PROJECT NO. 288-01

SAMPLED BY BB-TB

DATE SAMPLED 3-29-84

DATE RECEIVED 3-29-84

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 4926-A CONT

RESULTS TO BZ

PROJECT MANAGER BZ

ANALYTICAL COST ~~230.00~~ 265.00

MILEAGE _____ COST _____

HOURS _____ RATE _____ COST _____

SUBTOTAL

DISCOUNT

TOTAL COST ~~230.00~~ 265.00

SAMPLE DESCRIPTION / PARAMETER	Flash Pt	Phenol
#1 LS #2	*	272
#2 #3	>220°F	361
#3 #5	*	536
#4 #7	>220°F	379
#5 #8	>220°F	73.1
COMPOSITE OF 2,3,5,7,8		
	°F	mg/kg
* NOT ENOUGH SAMPLE FOR THEM. FLASH PT		
TESTED BY		
ANALYSIS COST	105	185

R. Hill 4-30-84

001930

CLIENT SHERIDAN

PROJECT NO.

SAMPLED BY

DATE SAMPLED

DATE RECEIVED

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 4926A

RESULTS TO

PROJECT MANAGER

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	Cl^-	$SO_4^=$		PREP	PCBs					
#1 LS #2	287.0	581								
#3	1948	986								
5	3010	11,000								
7	834	989								
8	1220	371								
Composite	1637	2,970			187 ppm					
	mg/Kg	mg/Kg								
TESTED BY	SL	SL								
ANALYSIS COST	72	72		60 ea						

001931

CLIENT SHERIDAN

PROJECT NO. 288-01

SAMPLED BY BB - TB

DATE SAMPLED 3-29-84

DATE RECEIVED 3-29-84

DATE COMPLETED 4-16-84

RESOURCE ENGINEERING INC.

LAB NO. 4926-A

RESULTS TO BZ Co

PROJECT MANAGER BZ, Co

ANALYTICAL COST 975.00

MILEAGE _____ COST _____

HOURS _____ RATE _____ COST _____

SUBTOTAL _____

DISCOUNT _____

TOTAL COST _____

SAMPLE DESCRIPTION / PARAMETER	As	Ba	Cd	Cr	Pb	Ag	Hg	Se		
HEP EXTRACTION ON LS #2, 3, 5, 7, 8	<.01	<.50	<.01	<.01	<.01	<.01	<.005	<.01		
#3	<.01	<.50	<.01	<.01	<.01	<.01	<.005	<.01		
#5	<.01	<.50	<.01	<.01	<.01	<.01	<.005	<.01		
#7	<.01	<.50	<.01	<.01	<.01	<.01	<.005	<.01		
#8	<.01	<.50	<.01	<.01	<.01	<.01	<.005	<.01		
	mg/l									
TESTED BY										
ANALYSIS COST	195								X	

001932

CLIENT Sheridan Ranch

PROJECT NO. 288-01

SAMPLED BY BB - TB

DATE SAMPLED 3-29-84

DATE RECEIVED 3-29-84

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 4926-B

RESULTS TO BZ-Co

PROJECT MANAGER BZ

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	VOA	Priority Poll.	O&G	X-Ray Diffract	% H_2O	TS	VSS	As	Ba	Cu
Composite of LS 2,3,5,7 & 8 (Dig)	Attached	Attached	11.89 %	Attached	47.2 %	52.8 %	31.0 %	<9.00	<100	388
				Cobb Schar		TFS — 21.8 %				
TESTED BY										
ANALYSIS COST	SPL	SPL	BB	SCR Labs	BB	BB	BB	GM	GM	GM
	500	→	16	255.75	5	10	10	20	20	15

500 + 15% 575

001933

CLIENT SHERIDAN

PROJECT NO.

SAMPLED BY

DATE SAMPLED

DATE RECEIVED

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 4926 B

RESULTS TO

PROJECT MANAGER

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	Cr	Cd	Hg	Ni	Ag	Se	Zn	Pb	Mn	Fe	
											ppb
Composite of LS 2,3,5,7 & 8	302	<2.00	<1.00	52	<2.00	<2.00	1.38%	<2.00	144.0	~~[illegible]~~	
T-Metals										~~8,500~~	
TESTED BY	GM										
ANALYSIS COST	15	15	25	15	15	25	15	15	15	15	16

001934

CLIENT Sheridan Steering Co

RESOURCE ENGINEERING INC.

PROJECT NO.

SAMPLED BY TB, BB

DATE SAMPLED

DATE RECEIVED

DATE COMPLETED

LAB NO. 4926 B

RESULTS TO BZ-CO

PROJECT MANAGER BZ CO

ANALYTICAL COST 875-00

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST $ 875-00

SAMPLE DESCRIPTION / PARAMETER	Endrin	Lindane	Meth Oxychlor	Toxaphene	2,4-D	2,4,5-TP Silvex				
LS #2 EP LEACHATE	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
LS #3	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
LS #5	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
LS #7	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
LS #8	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01				
	PPM	PPM	PPM	PPM	PPM	PPM				
TESTED BY										
ANALYSIS COST	175-00	X								

001935

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

Project Number	Project Name	Location
288-01	SHERIDAN STEERING CO	HEMSTEAD, TX

Field Sample Number	Date	Time	Grab	Comp.	Sample Container (Size/Mat'l)	Sample Type	Preservative	Analyses Requested	Comments and Hold Storage Date
LS #2	3/29/84	AM		✓	32 oz Glass	SLUDGE	4°C		
LS #3	"	AM		✓	"	SLUDGE	"		
LS #4	"	AM	✓		90z Glass	SLUDGE	"		
LS #5	"	AM		✓	32 oz Glass	SLUDGE	"		
LS #6	"	AM	✓		90z Glass	TOP OIL	"		
LS #7	"	PM		✓	32 oz	SLUDGE	"		
LS #8	"	PM		✓	32 oz	SLUDGE	"		
~~LS #9~~	"	PM	✓		9 oz	SLUDGE	"		
	"	PM	✓		9 oz	SLUDGE	"		

Lab Sample No. 4926

Remarks PCB's 5 - CN - SPLIT SAMPLE ALLOCATED (SPLIT SAMPLE FOR PCB's 4-10-84) BACKUP LABS ; COMPOSITE OF LS #2, 3, 5, 7, 8 (4926 B) FOR PRIORITY POLLUTANTS, VOA ; X-RAY DIFFRACTION

Sampler Signature: Bo Blankfield

Relinquished By	Date	Time	Received By	Relinquished By	Date	Time	Received By
Bo Blankfield	4-2-84 8:4	8:45	Don DiPeo				
Bo Blankfield	4/10/84	7:04 AM	Sharon Dooley				

Proj. No. ____

001936

4926 A
#5.

SAMPLE IDENTIFICATION: SLUDGE

SEPARATION PROCEDURE RESULTS: ☐ < 0.5% Solids ☑ ≥ 0.5% Solids

FRACTION TO BE TESTED: ☐ Liquid ☑ Solid

Note: If liquid fraction is used, proceed directly to analysis - no extraction is required. Items 4 through 11 pertain to extraction of samples containing solids ≥ 0.5%.

SIZE REDUCTION REQUIRED: ☐ Yes ☑ No

WEIGHT OF SAMPLE: 50 grams - LACK OF SAMPLE FOR USUAL 100 gram USAGE

WEIGHT OF DIST. WATER ADDED (16 x Sample Wt.): 800 mls

TIME AGITATION BEGUN: 6:45

FIRST pH MEASUREMENT (One minute after agitation is begun):

a. Initial pH: 6.4

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 8 mls

c. Time agitation restarted:

SECOND pH MEASUREMENT (15 minutes after initial agitation):

a. Initial pH: 5.6

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 8

c. Time agitation restarted: 10:15

THIRD pH MEASUREMENT (30 minutes after initial agitation):

a. Initial pH: 4.8

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: NONE

c. Time agitation restarted: 11:45

FOURTH pH MEASUREMENT (60 minutes after initial agitation):

a. Initial pH: 4.8

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: NONE

c. Time agitation restarted: 12:45

Note: Continue to check pH at 60 minute intervals for first six hours and adjust as necessary to maintain pH at 5.0 ± 0.2. Record data for each check/adjustment interval on back form noting initial pH, amount of acid added, and time agitation restarted. Do this until pH is stable or the maximum amount of acid allowed has been used. If, at the end of the 18 hour extraction period, the pH is above 5.2 and the maximum amount of acid (4 ml. per gram sample) has not been used, adjust pH to 5.0 ± 0.2 and continue to extract for four (4) hours, adjusting the pH at one hour intervals.

At the end of the extraction period, add deionized water to the extractor in the amount determined by the following equation: $V = 20(W) - 16(W) - A$

Where: V = mls. deionized water to be added
W = gms. of sample (solids) used
A = mls. 0.5 N acetic acid added (total)

ANALYTICAL RESULTS OF TESTING LIQUID FRACTION (EXTRACT OR THE WASTE ITSELF IF < 0.5% SOLIDS):

ARSENIC: _____ BARIUM: _____ CADMIUM: _____

HEXAVALENT CHROMIUM: _____ LEAD: _____

SILVER: _____ MERCURY: _____ SELENIUM: _____

001937

SAMPLE IDENTIFICATION: Sludge

4926A
LF #2

SEPARATION PROCEDURE RESULTS: ☐ < 0.5% Solids ☑ ≥ 0.5% Solids

RACTION TO BE TESTED: ☐ Liquid ☑ Solid

Note: If liquid fraction is used, proceed directly to analysis - no extraction is ired. Items 4 through 11 pertain to extraction of samples containing solids ≥ 0.5%.

SIZE REDUCTION REQUIRED: ☐ Yes ☑ No

WEIGHT OF SAMPLE: 50 grams - LACK OF SAMPLE FOR USUAL 100 gram USAGE

WEIGHT OF DIST. WATER ADDED (16 x Sample Wt.): 800

TIME AGITATION BEGUN: 6:45

FIRST pH MEASUREMENT (One minute after agitation is begun):

a. Initial pH: 5.7

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 10 ml's

c. Time agitation restarted: 6:47

SECOND pH MEASUREMENT (15 minutes after initial agitation):

a. Initial pH: 4.8

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: None

c. Time agitation restarted: 10:15

THIRD pH MEASUREMENT (30 minutes after initial agitation):

a. Initial pH: 4.8

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: None

c. Time agitation restarted: 11:45

FOURTH pH MEASUREMENT (60 minutes after initial agitation):

a. Initial pH: 4.8

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: None

c. Time agitation restarted: 12:45

Note: Continue to check pH at 60 minute intervals for first six hours and adjust a ssary to maintain pH at 5.0 ± 0.2. Record data for each check/adjustment interval on ba orm noting initial pH, amount of acid added, and time agitation restarted. Do this unti s stable or the maximum amount of acid allowed has been used. If, at the end of the our extraction period, the pH is above 5.2 and the maximum amount of acid (4 ml. per gra ample) has not been used, adjust pH to 5.0 ± 0.2 and continue to extract for four (4) s, adjusting the pH at one hour intervals.

At the end of the extraction period, add deionized water to the extractor in amount determined by the following equation: $V = 20(W) - 16(W) - A$

Where: V = mls. deionized water to be added
W = gms. of sample (solids) used
A = mls. 0.5 N acetic acid added (total)

NALYTICAL RESULTS OF TESTING LIQUID FRACTION (EXTRACT OR THE WASTE SELF IF < 0.5% SOLIDS):

ARSENIC: _____ BARIUM: _____ CADMIUM: _____

HEXAVALENT CHROMIUM: _____ LEAD: _____

SILVER: _____ MERCURY: _____ SELENIUM: _____

001938

LF #3
4926A

SAMPLE IDENTIFICATION:

SEPARATION PROCEDURE RESULTS: ☐ < 0.5% Solids ☑ ≥ 0.5% Solids

FRACTION TO BE TESTED: ☐ Liquid ☑ Solid

Note: If liquid fraction is used, proceed directly to analysis - no extraction is quired. Items 4 through 11 pertain to extraction of samples containing solids ≥ 0.5%.

SIZE REDUCTION REQUIRED: ☐ Yes ☑ No

WEIGHT OF SAMPLE: 100 grams

WEIGHT OF DIST. WATER ADDED (16 x Sample Wt.): 100 grams

TIME AGITATION BEGUN: 6:45

FIRST pH MEASUREMENT (One minute after agitation is begun):

a. Initial pH: 6.5

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 12 mls

c. Time agitation restarted: 9:49

SECOND pH MEASUREMENT (15 minutes after initial agitation):

a. Initial pH: 6.1

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 9 mls

c. Time agitation restarted: 10:15

THIRD pH MEASUREMENT (30 minutes after initial agitation):

a. Initial pH: 5.5

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 18 mls

c. Time agitation restarted: 11:45

FOURTH pH MEASUREMENT (60 minutes after initial agitation):

a. Initial pH: 5.1

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: None

c. Time agitation restarted: 12:45

Note: Continue to check pH at 60 minute intervals for first six hours and adjust essary to maintain pH at 5.0 ± 0.2. Record data for each check/adjustment interval on b form noting initial pH, amount of acid added, and time agitation restarted. Do this unt is stable or the maximum amount of acid allowed has been used. If, at the end of the hour extraction period, the pH is above 5.2 and the maximum amount of acid (4 ml. per gr sample) has not been used, adjust pH to 5.0 ± 0.2 and continue to extract for four (4) rs, adjusting the pH at one hour intervals.

At the end of the extraction period, add deionized water to the extractor i amount determined by the following equation: $V = 20(W) - 16(W) - A$

Where: V = mls. deionized water to be added
W = gms. of sample (solids) used
A = mls. 0.5 N acetic acid added (total)

ANALYTICAL RESULTS OF TESTING LIQUID FRACTION (EXTRACT OR THE WASTE ITSELF IF < 0.5% SOLIDS):

ARSENIC: _____ BARIUM: _____ CADMIUM: _____

HEXAVALENT CHROMIUM: _____ LEAD: _____

SILVER: _____ MERCURY: _____ SELENIUM: _____

OTHER: _____

-001939

492uA
#7.

SAMPLE IDENTIFICATION: Sluce

SEPARATION PROCEDURE RESULTS: ☐ < 0.5% Solids ☑ ≥ 0.5% Solids

FRACTION TO BE TESTED: ☐ Liquid ☑ Solid

Note: If liquid fraction is used, proceed directly to analysis - no extraction is required. Items 4 through 11 pertain to extraction of samples containing solids > 0.5%.

SIZE REDUCTION REQUIRED: ☐ Yes ☑ No

WEIGHT OF SAMPLE: 100 grams

WEIGHT OF DIST. WATER ADDED (16 x Sample Wt.): 1600 mls

TIME AGITATION BEGUN: 6:45 AM

FIRST pH MEASUREMENT (One minute after agitation is begun):

a. Initial pH: 6.4

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 10 mls

c. Time agitation restarted:

SECOND pH MEASUREMENT (15 minutes after initial agitation):

a. Initial pH: 5.5

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 6 mls

c. Time agitation restarted: 10:15 AM

THIRD pH MEASUREMENT (30 minutes after initial agitation):

a. Initial pH: 5.4

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 9 mls

c. Time agitation restarted: 11:45 AM

FOURTH pH MEASUREMENT (60 minutes after initial agitation):

a. Initial pH: 5.3

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 7 mls

c. Time agitation restarted: 12:45

Note: Continue to check pH at 60 minute intervals for first six hours and adjust a ssary to maintain pH at 5.0 ± 0.2. Record data for each check/adjustment interval on ba orm noting initial pH, amount of acid added, and time agitation restarted. Do this unti s stable or the maximum amount of acid allowed has been used. If, at the end of the our extraction period, the pH is above 5.2 and the maximum amount of acid (4 ml. per gra ample) has not been used, adjust pH to 5.0 ± 0.2 and continue to extract for four (4) s, adjusting the pH at one hour intervals.

At the end of the extraction period, add deionized water to the extractor in amount determined by the following equation: $V = 20(W) - 16(W) - A$

Where: V = mls. deionized water to be added
W = gms. of sample (solids) used
A = mls. 0.5 N acetic acid added (total)

ANALYTICAL RESULTS OF TESTING LIQUID FRACTION (EXTRACT OR THE WASTE SELF IF < 0.5% SOLIDS):

ARSENIC: _____ BARIUM: _____ CADMIUM: _____

HEXAVALENT CHROMIUM: _____ LEAD: _____

SILVER: _____ MERCURY: _____ SELENIUM: _____

OTHER: _____

001940

34 -

4426, #8

SAMPLE IDENTIFICATION: Sludge

SEPARATION PROCEDURE RESULTS: ☐ < 0.5% Solids ☑ ≥ 0.5% Solids

FRACTION TO BE TESTED: ☐ Liquid ☑ Solid

Note: If liquid fraction is used, proceed directly to analysis - no extraction is required. Items 4 through 11 pertain to extraction of samples containing solids ≥ 0.5%.

SIZE REDUCTION REQUIRED: ☐ Yes ☑ No

WEIGHT OF SAMPLE: 100 grams

WEIGHT OF DIST. WATER ADDED (16 x Sample Wt.):

TIME AGITATION BEGUN: 6:45

FIRST pH MEASUREMENT (One minute after agitation is begun):

a. Initial pH: 6.4

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 12 ml/s

c. Time agitation restarted:

SECOND pH MEASUREMENT (15 minutes after initial agitation):

a. Initial pH: 5.9

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 8 ml/s

c. Time agitation restarted: 10:15

THIRD pH MEASUREMENT (30 minutes after initial agitation):

a. Initial pH: 5.7

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 15 ml/s

c. Time agitation restarted: 11:45

FOURTH pH MEASUREMENT (60 minutes after initial agitation):

a. Initial pH: 5.4

b. Amount of 0.5 N Acetic Acid added to obtain pH of 5.0 ± 0.2: 20 ml/s

c. Time agitation restarted: 12:45

Note: Continue to check pH at 60 minute intervals for first six hours and adjust a ssary to maintain pH at 5.0 ± 0.2. Record data for each check/adjustment interval on ba orm noting initial pH, amount of acid added, and time agitation restarted. Do this unti s stable or the maximum amount of acid allowed has been used. If, at the end of the our extraction period, the pH is above 5.2 and the maximum amount of acid (4 ml. per gra ample) has not been used, adjust pH to 5.0 ± 0.2 and continue to extract for four (4) s, adjusting the pH at one hour intervals.

At the end of the extraction period, add deionized water to the extractor in amount determined by the following equation: $V = 20(W) - 16(W) - A$

Where: V = mls. deionized water to be added
W = gms. of sample (solids) used
A = mls. 0.5 N acetic acid added (total)

ANALYTICAL RESULTS OF TESTING LIQUID FRACTION (EXTRACT OR THE WASTE SELF IF < 0.5% SOLIDS):

ARSENIC: _____ BARIUM: _____ CADMIUM: _____

HEXAVALENT CHROMIUM: _____ LEAD: _____

SILVER: _____ MERCURY: _____ SELENIUM: _____

OTHER:

001941

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS GC PARAMETER PESTICIDES & HERB MATRIX EP EXTRACTIONS

ANALYST W. EMMONS DATE 4-7-84 TIME —

CALIBRATION STANDARDS/BLANK	ABSORBANCE
—	

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4926 A	NO QAQC DATA - COULDN'T FIND DATA								

TIME _____ ANALYST _____ QC APPROVAL —

001942

REPORT OF ANALYSIS
ISSUED BY
CHARLES V. BACON, INC.

A DELAWARE CORPORATION

Bulk Oils, Chemicals
Bulk Commodities
Agri-Products
General Cargo
Technical Inspections

Surveying, Sampling,
Inspection, Supervision
Loading, Discharging
Consulting

INTERNATIONAL MARINE BULK OIL, CHEMICAL & CARGO
SURVEYORS SAMPLERS & WEIGHERS

ANALYTICAL & CONSULTING CHEMISTS

1308 HOLLAND AVENUE, GALENA PARK, TEXAS 77547

TELEPHONE (713) 433-6325

P. O. BOX 65
GALENA PARK, TEXAS 77547

TWX: 910-881-3705

CABLE: ANALYCHEM

SAMPLE SUBMITTED AS Water NO. G-39352 1-5 DATE May 8, 1984

MARKED All #4926A; 1. #LS 2; 2. #LS 3; 3. #LS 5; 4. #LS 7; 5. #LS 8; submitted 4/30/84

RECEIVED FROM, OR FOR ACCOUNT OF Resource Engineering, Inc. Sheridan Stirling Co.

CERTIFICATE OF ANALYSIS

PESTICIDE-HERBICIDE	1. PPM	2. PPM	3. PPM	4. PPM	5. PPM
2,4-D	*	*	*	*	*
2,4,5-TP	*	*	*	*	*
Lindane	*	*	*	*	*
Aldrin	*	*	*	*	*
Endrin	*	*	*	*	*
p,p'-DDT	*	*	*	*	*
Methoxychlor	*	*	*	*	*
Toxaphene	*	*	*	*	*

*Denotes Less than 0.01 ppm.

Note: Detection limit = 0.01 ppm

001943

The above tests were conducted in accordance with current A.O.C.S. Methods, or other standard methods where applicable.

Respectfully submitted,

CHARLES V. BACON, INC.

SERVING THE INDUSTRIES SINCE 1908

CHICAGO
1335 ENTRANCE ROAD
P. O. BOX 411
LANSING, ILLINOIS 60438
(312) 895-6029
TWX: 910-651-0904

NEW YORK AREA
34 EXCHANGE PLACE
JERSEY CITY, NEW JERSEY 07302
(201) 433-0500
TWX: 710-730-8315

NEW ORLEANS
730 BAYATARIA BLVD.
P. O. BOX 97
METAIRIE, LOUISIANA 70003
(504) 347-1488
TWX: 810-951-5788

HOLLAND
P. O. BOX 3818
3008 AV ROTTERDAM
TEL. 010-857036-437848
TELEX: 28539-NOOTT NL
CABLE: ANALYCHEM

CORRESPONDENTS AT PRINCIPAL WORLD PORTS

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 209A, 209B Std Meth 15th PARAMETER H_2O, TS, VSS, TFS (PARTION) MATRIX SOLIDS

ANALYST L Bloffield DATE 3-30-84 TIME 0.945

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN 4926-A LS #2, 3, 5, 7, 8 #7, #8, 4926 B (COND)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4926-A-LS #5	H_2O 44 %	45 %	.22 %					
4926-A-LS #5	TS 56 %	55 %	1.79 %					
4926-A-LS #5	VSS 38.6 %	37.8 %	2.07 %					
4926 A LS #5	TFS 17.4 %	17.2 %	1.15 %					

TIME _____ ANALYST LB

QC APPROVAL Greg S Marpen

001944

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 503D STD METH 15th edition PARAMETER O&G MATRIX SOLIDS

ANALYST [illegible] DATE 3-30-84 TIME 0755

CALIBRATION STANDARDS/BLANK	~~ABSORBANCE~~ mg/L
BLANK	0.0003 3mg/L
BLANK	0.0005 5mg/L

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN [4925 (1-8 L FARM) #7-D.K. #8-LARGE CELL AREA] 4926-LAGOON LS 2,3,
5,7,8 #7A 10' FROM LAGOON, 4926B

QUALITY CONTROL SPIKES

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE • CONC.)	+ (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. ÷ THEO. CONC.	= PERCENT RECOVERY
4925 #2	153 mg/Kg	146 mg/Kg	4.58 %					
4926A-LS #8	12.26 %	12.38 %	0.97 %					
BLANK SPIKE (DI)	1,064 mg/L	—	—	100% DI	Added .1064g	.1070 mg/L	.1064 mg/L	99.4 %
BLANK SPIKE (DI)	96 mg/L	—	—	100% DI	Added .0096	89 mg/L .0089	.0096 96 mg/L	108 %

TIME _____ ANALYST [illegible] QC APPROVAL [illegible]

001945

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS —— PARAMETER SULFIDE AND CYANIDE MATRIX SOLIDS

ANALYST SLB DATE 4-13-84 TIME 1:00 4:00 PM

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS 4926
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
No QAQC Data Available From Southern Petroleum Labs										

TIME _____ ANALYST _____ QC APPROVAL _____

001946

RESOURCE ENGINE...ING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS — PARAMETER Chlorides & SO4 MATRIX Sludge

ANALYST SLB DATE 4-12-84 TIME 4:00 10:00

CALIBRATION STANDARDS/BLANK	ABSORBANCE
—	

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:
PERCENT (SAMPLE • CONC.) + PERCENT (STANDARD • STD. CONC.) = THEORETICAL CONC.
SPIKE CONC. + THEO. CONC. = PERCENT RECOVERY

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION					
No QAQC Data Done By Southern Petroleum Labs								

TIME ANALYST QC APPROVAL —

001947

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA (Hydride Generation) PARAMETER As MATRIX Solid/liquid

ANALYST G Maupin DATE 3-30-84 TIME 0930

CALIBRATION STANDARDS/BLANK	ABSORBANCE
5.0 ppb	0.009
10.0 "	0.017
15.0 "	0.025
BLANK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.0ppb	10.21		2.06%
5.0ppb	5.16		3.20%
15.0ppb	14.57		2.87%
Blank	0.00		

PROJECT #/LAB NUMBERS IN THIS RUN 4926 A (2,3,5,7,8) 4926 B Composite 4924 (2,4,7 Lagoon) 4925 (1→8)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <.01	50 ·	15.0	7.50	7.46		99.5%
4924-4	<0.01	<0.01	0	50 · <.01	50 ·	15.0	7.50	7.42		98.9%

TIME _____ ANALYST G Maupin

001948

QC APPROVAL B Shield

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Ba MATRIX liquid

ANALYST G. Maupin DATE 3-30-84 TIME 1600

CALIBRATION STANDARDS/BLANK	ABSORBANCE
0.50 ppm	0.004
2.00 ppm	0.015
5.00 ppm	0.038
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
0.50 ppm	0.53		6.00 %
2.00	2.11		5.50 %
5.00	5.32		6.40 %
BLK	0.02		

PROJECT #/LAB NUMBERS 4924 2,4,7 Lagoon) 4926 A comp 2,3,5,7,8) 4926B comp
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE	CONC.)	+ PERCENT (STANDARD	STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
4924-4	<0.50	<0.50	0	50	<0.50	50	5.00	2.50	2.38		95.2 %
4927-7	<0.50	<0.50	0	50	<0.50	50	5.00	2.50	2.41		96.4 %

TIME _____ ANALYST G Maupin

001949

QC APPROVAL [signature]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Cd MATRIX liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 0900

CALIBRATION STANDARDS/BLANK	ABSORBANCE
0.10 ppm	0.022
0.20 ppm	0.043
0.30 ppm	0.065
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
0.10 ppm	0.10		0 %
0.20	0.21		5.00 %
0.30	0.33		10.0 %
BLK	0.00		

PROJECT #/LAB NUMBERS IN THIS RUN 4926A 2,3578 4926B Comp. 4924 2,4,7 Lagoon 4935 1→8

QUALITY CONTROL SPIKES

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	THEORETICAL = CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 0.30	0.15	0.142	94.7%
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 0.30	0.15	0.145	97.9%

TIME _____ ANALYST Greg L Maupin

001950 [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Ca MATRIX liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 1030

CALIBRATION STANDARDS/BLANK	ABSORBANCE
1.00 ppm	0.018
3.00	0.057
5.00	0.087
BLK	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
1.00	1.02		2.0 %
3.00	3.08		2.67 %
5.00	4.87		2.60 %
BLK	0.01		

PROJECT #/LAB NUMBERS IN THIS RUN 4926A 2,3578 4926B comp 4924 2,47 Lagoon 4925 1->8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 3.00	1.50	1.46	93.7%
4924-Lagoon	0.28	0.31	9.68	50 · 0.28	50 · 3.00	3.14	3.02	96.2%

TIME _____ ANALYST Greg L Maupin QC APPROVAL B. [illegible]

001951

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Pb MATRIX Liquid/solid

ANALYST G Maupin DATE 3-31-84 TIME 1455

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00 ppm	0.009
3.00 ppm	0.026
5.00 ppm	0.045

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.000		
1.00	0.47		3.00 %
3.00	2.89		3.67 %
5.00	5.04		0.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925 1->8, 4924 2,4,7 Lagoon, 4926 A 2 3578, 4926B,

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 • <0.01	50 • 5.0	2.50	2.47		98.8 %
4924-4	<0.01	<0.01	0	50 • <0.01	50 • 5.0	2.50	2.44		96.0 %

TIME _____ ANALYST Greg L Maupin

001-9-52

QC APPROVAL B. Blackfield

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Ag MATRIX Liquid/Solid

ANALYST G Maupin DATE 3-31-84 TIME 1540

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
0.100 ppm	0.007
0.300 ppm	0.020
0.500 ppm	0.034

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.000		
0.10	0.11		10.0 %
0.300	0.27		10.0 %
0.500	0.48		4.0 %

PROJECT #/LAB NUMBERS 4924 2,4,7 #1 Lagoon 4926 A 2,35,78 & 4926 B

IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4924-2	<0.01	<0.01	0	50 · <0.01	50 · 0.50	0.25	0.23	92.0%
-4	<0.01	<0.01	0	50 · <0.01	50 · 0.50	0.25	0.22	88.0%

TIME _____ ANALYST Greg L Maupin QC APPROVAL [signature]

001953

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A (Cold Vapor) PARAMETER Hg MATRIX liquid

ANALYST G Maupin DATE 3-30-84 TIME 1130

CALIBRATION STANDARDS/BLANK	ABSORBANCE
3.0 ppb	0.008
6.0 ppb	0.010
9.0 ppb	0.014
Blank	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
6.0 ppb	6.07		1.15%
5.0 ppb	5.11		2.20%
9.0 ppb	9.14		1.56%
Blank	0.010		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2, 4, 7, Lagoon) 4926A (Comp, 2, 3, 5, 7, 8), 4926B (comp.)

QUALITY CONTROL SPIKES

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE CONC.)		PERCENT (STANDARD CONC.)		THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	PERCENT RECOVERY
4926 - 3	<5.00	<5.00	0	50	<5.0	50	9.0	4.50	4.57	101.6%
4926 - 5	<5.00	<5.00	0	50	<5.0	50	9.0	4.50	4.43	98.4%

TIME _____ ANALYST G Maupin

001954

QC APPROVAL B. [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA Hydride generation PARAMETER Se MATRIX liquid

ANALYST G Macyson DATE 3-30-84 TIME 1330

CALIBRATION STANDARDS/BLANK	ABSORBANCE
10.0ppb	0.004
20.0ppb	0.008
30.0ppb	0.013
Blank	0.000

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
10.0ppb	10.41		4.10
20.0ppb	20.64		3.20
30.0ppb	31.82		6.07
Blank	0.001		

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2,4,7 Lagoon) 4926A (comp 2,3,5,7,8) 4926B (comp)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC/mg/L	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-4	<0.01	<0.01	0	50 · <0.01	50 · 0.03	0.015	0.143		95.3%
4924-7	<0.01	<0.01	0	50 · <0.01	50 · 0.03	0.015	0.144		96.0%

TIME _____ ANALYST Greg L Macyson

001955

QC APPROVAL B. [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Cu MATRIX liquid/solid

ANALYST G. Maupin DATE 3-31-84 TIME 1300

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank	0.000
1.00 ppm	0.024
2.00	0.045
3.00	0.067

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blank	0.02		
1.00	1.04		4.00 %
2.00	2.03		1.50 %
3.068	2.97		1.00 %

PROJECT #/LAB NUMBERS IN THIS RUN 4926A (2,3,5,7,8), 4926 B, 4924 (24.7 Lagoon) 4925 1→8

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. - THEO. CONC.	PERCENT RECOVERY
4924-2	0.02	0.02	0	50 · 0.02	50 · 2.0	1.01	0.97	96.0 %
-Lagoon	0.20	0.19	5.00	50 · 0.20	50 · 2.0	1.10	1.07	97.3%

TIME _____ ANALYST Greg S Maupin

001956

QC APPROVAL [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Ni MATRIX Liquid/Solid

ANALYST G. Maupin DATE 3-31-84 TIME 1355

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00 ppm	0.017
3.00 ppm	0.049
5.00 ppm	0.081

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.001		
1.00 ppm	1.04		4.00 %
3.00 ppm	2.95		1.67 %
5.00 ppm	4.91		1.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4925 1→8 4924 2, 4, 7 Lagoon 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	0.10	0.09	10.0	50 • 0.10	50 • 3.00	1.55	1.48		95.5%
4924-4	<0.01	<0.01	0	50 • <0.01	50 • 3.00	1.50	1.42		94.7%

TIME _____ ANALYST Gregg Maupin

001957

QC APPROVAL B. Blackwell

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A CC PARAMETER Zn MATRIX Liquid/Solid

ANALYST G Maupin DATE 3-31-84 TIME 1710

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.005
0.100 ppm	0.032
0.500 ppm	0.133
1.000 ppm	0.221

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.02		
0.100 ppm	0.109		8.3%
0.500	0.57		14%
1.000	1.03		3.0%

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2,4,7 Lagoon) 4925(1->8) 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE • CONC.)+(PERCENT STANDARD • STD. CONC.) = THEORETICAL CONC. SPIKE CONC. ± THEO. CONC. = PERCENT RECOVERY

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT	(SAMPLE • CONC.)	PERCENT	(STANDARD • STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	0.02	0.02	0	50	0.02	50	1.0	0.51	0.54		105.9%
4924-4	0.01	0.01	0	50	0.01	50	1.0	0.50	0.47		94.0%

TIME _____ ANALYST Greg S Maupin

001958

QC APPROVAL S Blackfield

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Mn MATRIX liquid/solid

ANALYST C. Maupin DATE 4-1-84 TIME 0845

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00	0.035
3.00	0.104
5.00	0.163

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.004		
1.00	1.04		4.0 %
3.00	3.07		2.33 %
5.00	5.09		1.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2, 4, 7, Lagoon) 4926 B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	PERCENT (STANDARD CONC.)	STD. CONC.	THEORETICAL SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
4924-2	1.69	1.73	2.31	50 1.69	50	5.0	3.35	3.27	97.6%
4924-4	0.80	0.83	3.75						

TIME _____ ANALYST Greg S Maupin

001959

QC APPROVAL B. Blackwell

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Fe MATRIX liquid

ANALYST G Maupin DATE 4-1-84 TIME 0930

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00	0.022
3.00	0.063
5.00	0.115

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.020		
1.00	1.02		2.0 %
3.00	2.96		1.33 %
5.00	4.96		0.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 4924 (2,4,7 Lagoon) 4926B

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	- THEO. CONC.	PERCENT RECOVERY
4924-2	10/1 1.33	1.37	3.01%	50 • 1.33	50 • 5.0	3.17	3.11		98.1%

TIME _____ ANALYST Greg L Maupin

001960

A. [illegible]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 510C Std Meth 15th ed PARAMETER Phenol MATRIX soil

ANALYST G Maupin DATE 4/2/84 TIME 1420

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
1.00ppm	0.131
2.00ppm	0.263
3.00ppm	0.378

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLANK	0.00		
1.00ppm	1.02		1.96 %
2.00ppm	1.97		1.50 %
3.00ppm	3.07		2.28 %

PROJECT #/LAB NUMBERS 4925 1→8, 4924*(2,4,7 #1 Comp)
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
4925-1	4/1→0.89 (356 mg/kg)	0.86	3.37%	80 · 0.89	20 · 3.00	1.31	1.28	97.7%

TIME _____ ANALYST Greg L Maupin

001961

QC APPROVAL B. Blackwell

CLIENT Sheridan Steering Co

RESOURCE ENGINEERING INC.

PROJECT NO. 288-04

SAMPLED BY TB

DATE SAMPLED 5-30-84

DATE RECEIVED 5-31-84

DATE COMPLETED 6

LAB NO. 5036

RESULTS TO CO-BZ

PROJECT MANAGER CO, BZ

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST $

SAMPLE DESCRIPTION / PARAMETER	O&G %	ZN	% H2O	Cl⁻	Cr	PREP	PCBs	VOA VOLATILES	ACID BASE	Pb
#1 LF-1 TOP 6"	0.78	145	28.2	2290	72					188
#2 LF-1 BOTTOM 6"	0.30	57	20.8	1450	54					81
3 LF-2 TOP 6"	0.72	103	28.0	2100	64					60
4 LF-2 BOTTOM 6"	0.38	52	24.9	1530	62					47
5 LF-6 TOP 6"	0.85	100	27.5	1810	78					56
6 LF-6 BOTTOM 6"	0.27	46	22.2	1530	53					48
7 WS-6 TOP 6"	0.66	81	23.4	1810	50					21
8 WS-6 BOTTOM 6"	0.29	60	22.9	1930	45					10
9 WS-7 TOP 6"	0.61	61	21.6	1810	56					5
10 WS-7 BOTTOM 6"	0.34	55	25.0	1690	60					7
11 CLARK LAKE #1	1.09	68	48.6	1570	60					165
12 " " 2	1.15	114	73.8	1510	75					56
13 " " 3	1.11	128	75.4	1510	80					26
14 " " 4	1.78	68	63.3	1450	62					18
15 " " 5	2.21	64	75.1	1390	69					17
16 BACKGROUND 1 TOP 6"	0.09	14	13.3	1690	24					9
17 " 1 BOTTOM 6"	0.06	18	13.7	1570	26					5
18 " 2 TOP 6"	0.07	13	11.0	1630	16					2
19 " 2 BOTTOM 6"	0.07	16	12.8	1690	27					3
20 " 3 TOP 6"	0.10	11	12.4	1690	14					<1.0
21 " 3 BOTTOM 6"	0.07	15	12.3	1690	18					<1.0
22 LAGOON 2										
23 LAGOON 3										
	%	mg/Kg	%	mg/Kg	mg/Kg					mg/Kg
TESTED BY	GM									
ANALYSIS COST	336	315	105	252	315	220	-SENT	OUT	—	315

Billed 6-15-84

001962

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	LOCATION
2E8-04	Sheridan	Hempstead Tx

FIELD SAMPLE NUMBER	DATE 1994	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESER-VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
LF 1 TOP 6"	5-30	AM		✓	8-glass	SOIL	NONE	oil + grease, zinc chlorides	
LF 1 Bottom 6"	"	"		✓	"	"			
LF 2 TOP 6"									
LF2 Bottom 6"									
LF 6 TOP 6"									
LF 6 Bottom 6"									
WS-6 TOP 6"									
WS-6 Bottom 6"									

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
5036		Tom Beck

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
Tom Beck	5-31	8:00 PM	[illegible]				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	LOCATION
288-04	Sheridan	Hempstead, Tx

FIELD SAMPLE NUMBER	DATE 1984	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESER-VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
Background 1 Top 6"	5-30	PM			8-oz glass	soil	None	Oil & Grease Chlorides Zinc	
Background 1 Bottom 6"									
Background 2 Top 6"									
Background 2 Bottom 6"									
Background 3 Top 6"									
Background 3 Bottom 6"									

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
5036		Tom Beck

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
Tom Beck	5-30	8:00 PM	[illegible]				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

001964

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	LOCATION
288-04	Sheridan	Hempstead Tk

FIELD SAMPLE NUMBER	DATE 1984	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESERVATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
WS-7 Top 6"	5-30	Am		✓	8-oz glass	soil	NONE	Oil + grease Chlorides ZINC	
WS-7 ~~Top 6"~~ Bottom	"	"		"	"	"	"	" "	
Clark Lake #1	"		✓			Sludge	4°c	SAVE	
Clark Lake #2			✓				4°c	SAVE	
Clark Lake #3			✓				4°c	SAVE	
Clark Lake #4			✓				4°c	Oil, grease Chlorides ZINC	
Clark Lake #5			✓				4°c	" "	
Lagoon #1		PM		✓	1 Liter glass 40ml Vial (2)	Sludge	4°c	GC/MS VOA VOLATILES ACID/BASE EXTRACTABLES	
"					8-oz	Sludge		PCB	

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
5036		Tom Beck

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
Tom Beck	5-30	8:00 PM	Bo Blankfield				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 503 D Std Meth 16th edition PARAMETER O&G MATRIX Solids

ANALYST [illegible] DATE 6-1-84 TIME 0715

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank	0.0002 (2 mg/L)

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN 5036 (1-21)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC/%	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	÷ THEO. CONC.	= PERCENT RECOVERY
5036 LF-1 Top	0.78 % (7,800 mg/kg)	0.75	3.84 %						
5036 LF-6 Btm	0.27 % (2,700)	0.27	0 %						
5036 WS-7 Top	0.61 % (6,100)	0.63	3.17 %						
Blank Spike #1	1067 mg/L	—	—	100% DI	Added .1067 g	0.1058 (1,058)	0.1067 (1067)		99.1 %
Blank Spike #2	906 mg/L	—	—	100% DI	Added .0906 (906)	0.0889 (889)	0.0906 (906)		98.1 %
Blank Spike #3	296 mg/L	—	—	100% DI	Added .0296	0.0279	0.0296		94.3 %

TIME _____ ANALYST [illegible]

QC APPROVAL [illegible]

001966

RESOURCE ENGINEERING . ORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Zn MATRIX Soil

ANALYST G Maupin DATE 4/2/88 TIME

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
0.100	0.028
0.50	0.119
1.00	0.195

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.012		
0.100	0.10		0 %
0.50	0.52		3.85 %
1.00	1.03		3.00 %

PROJECT #/LAB NUMBERS IN THIS RUN 5036 1->21

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
5036 -2	100/1 0.57	0.55	3.51	20 · 0.57	80 · 1.0	0.91	0.89		97.8%
4	100/1 0.52	0.52	0	50 · 0.52	50 · 1.0	0.76	0.79		104.0%
-6	100/1 0.46	0.49	6.12	50 · 0.46	50 · 1.0	0.73	0.77		105.5%

TIME ANALYST Greg G Maupin QC APPROVAL [illegible]

001967

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 407A Std Meth 14th ed PARAMETER Cl⁻ MATRIX Solids

ANALYST [illegible] DATE 6-4-84 TIME 1230

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank	.60

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
STD 50	49.99		0
STD 250	248		.8 %
STD 500	504		.79 %

PROJECT #/LAB NUMBERS 5036 (1-21)
IN THIS RUN 25g/100mL DI

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD.	= THEORETICAL CONC.	SPIKE CONC.	± THEO. CONC.	= PERCENT RECOVERY
5036 LF-1 B-6" #2	4:1 1450 mg/L 362.5 mg/L	371 mg/L	2.29 %	80 % · 362.5	20 % ·	500 ppm	390	377		96.7 %
5036 WS-7 #10	4:1 1690 mg/L 422.5	436.5	3.2 %	70 % · 422.5	30 % ·	500 ppm	445.8	428		96 %
5036 BG #1 #17	4:1 1570 mg/L 392.5 mg/L	379	3.4 %	80 % · 392.5	20 % ·	500	414	419		101 %

TIME _____ ANALYST LB.

QC APPROVAL Gary L Maupin

001968

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A PARAMETER Cr MATRIX Soils

ANALYST G Maupin DATE 4/2/84 TIME 1000

CALIBRATION STANDARDS/BLANK	ABSORBANCE
1.00	0.021
3.00	0.059
5.00	0.103

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.01		
1.00	1.03		3.00 %
3.00	3.06		2.00 %
5.00	5.07		1.38 %

PROJECT #/LAB NUMBERS IN THIS RUN 5036 1->21

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION: PERCENT (SAMPLE · CONC.)+(STANDARD · STD. CONC.) = THEORETICAL CONC.

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	PERCENT (STANDARD · STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
5036 - 1	100% 0.72	0.69	4.17	50 · 0.69	50 · 3.00	0.85	0.82		96.5
2	100% 0.54	0.51	5.56	80 · 0.54	20 · 3.00	1.03	0.99		96.1
3	100% 0.64	0.66	3.03	70 · 0.64	30 · 3.00	1.35	1.29		104.4

TIME _____ ANALYST Greg S Maupin QC APPROVAL [illegible]

001969

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS A.A. PARAMETER Pb MATRIX Soils

ANALYST G Maupin DATE 4/2/84 TIME 1055

CALIBRATION STANDARDS/BLANK	ABSORBANCE
1.00	0.008
3.00	0.023
5.00	0.039

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	0.000		
1.00	0.97		3.00 %
3.00	2.87		4.33 %
5.00	4.91		1.80 %

PROJECT #/LAB NUMBERS IN THIS RUN 5036 1->21

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	PERCENT (STANDARD · STD. CONC.)	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
5036-2	100% 0.81	0.85	4.71	50 · 0.85	50 · 3.00	1.93	1.58		92.4%
3	100% 0.60	0.63	~~5.00~~ 4.76	20 · 0.60	80 · 3.00	2.52	2.58		102.4%
1	100% 1.88	1.94	3.09	30 · 1.88	70 · 5.00	4.06	3.92		96.6%

TIME _____ ANALYST Greg S Maupin

QC APPROVAL [signature]

001970

CLIENT SHERIDAN

PROJECT NO. 288-04

SAMPLED BY J. BIONS

DATE SAMPLED 12-17-85

DATE RECEIVED 12-18-85

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 6857

RESULTS TO J BIONS, D CAPUTO

PROJECT MANAGER D CAPUTO

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER				O&G	Ni	Cr	Pb	Zn		PREP			
#1 SOIL	ES-13a	COMP	(0"-6")	39.2%	43.9	207	691	1240					
2	ES-13b	GRAB	(6"-12")	11.3%	43.6	61.3	76.3	1160					
3	ES-13c	"	(12-18")	2.95%	43.7	76.1	36.8	1270					
4	ES-13d	"	(36"-40")	350	15.1	14.7	12.2	43.2					
5	ES-13e	"	(48"-52")	385	11.0	9.00	2.10	22.1					
6	ES-14a	COMP	(0"-6")	1.09%	25.0	34.1	23.1	118					
7	ES-14b	GRAB	(6"-12")	3,011	27.0	29.4	17.2	78.9					
8	ES-14c	"	(12"-18")	616	35.7	30.0	17.7	60.3					
9	ES-14d	"	(34"-3	750	12.7	11.0	6.50	23.7	14				
10	ES-17a	COMP	(0"-6") 0.25	4.8%	38.3	55.2	52.0	141					
11	ES-17b	COMP	— 0.75	1.2%	26.3	26.2	14.6	53.2	5				
12	ES-17c	GRAB	(16"-20") 1.5	3,526	24.0	22.0	10.3	47.1	2				
13	ES-17d	GRAB	— 3.0	776	10.5	11.0	6.00	23.3	—				
				mg/Kg	mg/kg	mg/kg	mg/kg	mg/kg					

ANALYSES RESULTS IN DRY WT BAS

TESTED BY		S.B.	JH	JH	JH	JH					
ANALYSIS COST		325	195	195	195	195		195			

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECOR

PROJECT NO.	PROJECT NAME	LOCATION
288-04	Sheridan	Hempstead

FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESERVATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
ES 13a	12/17/85		X	X	16oz	Soil	4°C	O+G; Ni, Cr, Pb, Zn	HNU 5-10 ppm
ES 13b	12/17/85		\		8oz	Soil	4°C	O+G; Pb, Ni, Cr, Zn	HNU - 5 ppm
ES 13c	12/17/85		\		8oz	Soil	4°C	O+G; Pb Ni, Cr, Zn	HNU - 10 ppm
ES 13d	12/17/85		\		16oz	Soil	4°C	O+G; Pb, Ni, Cr, Zn	HNU 2.8 ppm
ES-13e	12/17/85		X		8oz	Soil	4°C	O+G; Pb; Ni, Cr, Zn	HNU 1.5 ppm
ES-14a	12/17/85			X	8oz	Soil	4°C	O+G; Pb, Ni, Cr, Zn	
ES-14b	12/17/85		X		8oz	Soil	4°C	O+G, Pb, Ni, Cr, Zn	
ES-14c	12/17/85		X		8oz	Soil	4°C	O+G, Pb, Ni, Cr, Zn	
ES-14d	12/17/85		X		8oz	Soil	4°C	O+G, Pb, Ni, Cr, Zn	HNU 1.6 ppm

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
6857		

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
John Bin	12/17/85	12-18-85 0100	Lab Bo Blankfield				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

KEE JRCE ENGINEERING - ANALYSIS QUEST AND CHAIN OF CUSTODY RECORD

PROJECT NO.	PROJECT NAME	LOCATION
288-04	Sheridan	Hempstead, TX

FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESER-VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
ES-17a	12/17/85	2:30p		X	8 oz	Soil	4°C	O&G, Pb, Cr, Zn, Ni	
ES-17b	12/17/85	2:45p		X	8 oz	Soil	4°C	O&G, Pb, Cr, Zn, Ni	
ES-17c	12/17/85	4:45p	X		8 oz	Soil	4°C	O&G, Pb, Cr, Zn, Ni	0.6 ppm HNU reading
ES-17d	12/17/85	5:15p	X		CP 16 & 8 oz	Soil	4°C	O&G, Pb, Cr, Zn, Ni	0.8 ppm HNU reading

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
6857		

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
John Bin	12/17/85	0700 2:00Pm	[illegible]				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Ni MATRIX H2O

ANALYST JH DATE 1-6-86 TIME 15:30-15:45

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
0.300	0.010
0.500	0.018
1.000	0.035

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blk.	<0.01		
0.300	0.311		
0.500	0.527		
1.000	1.027		
EPA#2 (284)	0.219	0.207	5.47%

PROJECT #/LAB NUMBERS IN THIS RUN 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD.	THEORETICAL = CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
6857-5	11.0 mg/kg	13.7 mg/kg	19.7%	80% (0.110)	20% (3ppm)		0.688	0.585		85%
6857-10	28.3 mg/kg	26.3 mg/kg	7.07%	—	—		—	—		—
6860-5	22.7 mg/kg	26.9 mg/kg	15.6%	—	—		—	—		—
6860-10	24.4 mg/kg	—	—	80% (0.244)	+20% (3ppm)		0.795	0.743		93%
6862-4	7.60 mg/kg	—	—	80% (0.076)	+20% (3ppm)		0.661	0.650		98%

001974

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Cr MATRIX H_2O

ANALYST JH DATE 1-6-86 TIME 13:30-14:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
0.500	0.022
1.000	0.042
3.000	0.116

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blk	<0.01		
0.500	0.519		
1.000	0.999		
3.000	3.011		
EPA#2 (284)	0.263	0.261	0.76%

PROJECT #/LAB NUMBERS IN THIS RUN 6858 EPTOX, 6849, 6853, 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
6858-16	<0.01	0.02	50%	0.470 - 0	+ 0.5 ppm	0.50	0.470		94%
6858-40	0.01	0.02	50%	0.491 - 0	+ 0.5 ppm	0.50	0.491		96%
6858-63	0.04	0.04	0%	0.507 - 0.04	+ 0.5 ppm	0.50	0.467		93%
6853-1D	<0.01	<0.01	0%	0.504 - 0	+ 0.5 ppm	0.50	0.504		101%
6857-5	9.00 mg/kg	9.30 mg/kg	3.22%	80% (0.09)	+ 20% (2 ppm)	0.472	0.443		94%
6857-10	55.2 mg/kg	54.2 mg/kg	1.81%						
6860-5	23.7 mg/kg	23.7 mg/kg	7.78%						
6862-4	9.90 mg/kg	—	—	80% (0.099)	20% (3 ppm)	0.677	0.608		90%

001975

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS FIA PARAMETER Pb MATRIX H2O

ANALYST JH DATE 1-6-86 TIME 14.35-15:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
0.500	0.006
1.000	0.010
3.000	0.030

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	<0.01		
0.5000	0.52		
1.000	1.041		
3.000	3.066		
EPA #2(284)	0.456	0.435	4.60%

PROJECT #/LAB NUMBERS IN THIS RUN 6858 EPTOX, 6849, 6853, 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE - CONC.)	+ PERCENT (STANDARD - CONC.)	STD. CONC.	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	= PERCENT RECOVERY
6858-16	<0.01	<0.01	0%	0.525 - 0		+0.5ppm	0.50	0.525		105%
6858-40	<0.01	<0.01	0%	0.523 - 0		+0.5ppm	0.50	0.523		105%
6858-63	<0.01	0.03	—	0.493 - 0		+0.5ppm	0.50	0.493		99%
6853-1D	<0.01	<0.01	0%	0.514 - 0		+0.5ppm	0.50	0.514		103%
6857-5	2.10 mg/kg	3.0 mg/kg	30%	80% (0.021)		+20% (3ppm)	0.617	0.573		93%
6857-10	52.0 mg/kg	45.8 mg/kg	11.9%							
6860-5	20.2 mg/kg	20.5 mg/kg	1.46%							
6860-10spk	12.3 mg/kg	—	—	80% (0.125)		+20% (3ppm)	0.70	0.690		99%
6862-4spk	7.90 mg/kg	—	—	80% (0.079)		+20% (3ppm)	0.663	0.657		99%

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Zn MATRIX H_2O

ANALYST JH DATE 1-6-86 TIME 15:45-16:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
B/K	-0.002
0.300	0.057
0.500	0.087
1.000	0.168

STANDARDS	CONC.	+ STD. CONC.	- PERCENT DEVIATION
B/K	<0.01		
0.300	0.307		
0.500	0.489		
1.000	1.007		
EPA#2 (284)	0.422	0.418	0.95%

PROJECT #/LAB NUMBERS 6858 EPTOX, 6857, 6860, 6862
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	- THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	- PERCENT RECOVERY
6858-16	0.04	0.03	25%	0.502-0.04	+0.5ppm	0.50	0.462		92%
6858-40	0.06	0.06	0%	0.502-0.06	+0.5ppm	0.50	0.442		88%
6858-63	0.11	0.09	18.2%	0.572-0.11	+0.5ppm	0.50	0.462		92%
6857-5	22.1 mg/kg	22.8 mg/kg	3.07%	80% (0.221)	+20% (3ppm)	0.777	0.74		95%
6857-10	141 mg/kg	136 mg/kg	3.55%	—	—	—	—		—
6860-5	55.9 mg/kg	55.3 mg/kg	1.07%	—	—	—	—		—
6860-10	47.0 mg/kg	—	—	80% (0.470)	20% (3ppm)	0.976	1.027		105%
6862-4	26.4 mg/kg	—	—	80% (0.264)	20% (3ppm)	0.811	0.795		98%

001977

RESOURCE ENGINEERING LABORATORIES

QUALITY CONTROL LOG

METHOD OF ANALYSIS 503-D STD methods 15th Add. PARAMETER O&G MATRIX Soil

ANALYST Jeff. B. DATE 1-7-86 TIME 5:30 pm.

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank-	0.0008

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION

PROJECT #/LAB NUMBERS IN THIS RUN 6857 #6

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • CONC.)	STD. CONC.	THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
6857 #6	10,867 mg/kg	12,930 mg/kg	15.0 %							
~~[illegible]~~										

TIME _____ ANALYST _____ QC APPROVAL [illegible]

001978

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 503-D STD methods 15th Add. PARAMETER O&G MATRIX Soil

ANALYST Jeff. B. DATE 1-8-86 TIME 5:30 p.m.

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank	0.0008

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION

PROJECT #/LAB NUMBERS 6857,-10
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
6857 #10	45,750 mg/kg	—	—	0.0576 48,880 6857-10	0.1664 (3m)	0.2240	0.2268	101%

TIME ANALYST 001979 QC APPROVAL [signature]

CLIENT SHERIDAN

PROJECT NO. 288-04

SAMPLED BY J Binns

DATE SAMPLED 12-19-85

DATE RECEIVED 12-19-85

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 6862

RESULTS TO J. Binns

PROJECT MANAGER D Caputo

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER			PCBs	Pb	Cr	Zn	Ni		Prep			
#1 SOIL GRABS	TP-1a	(0"-6")		8.68	11.5	80.0	7.70					
2	TP-3	(0"-6")		<1.00	8.20	20.3	12.4					
3	TP-2	(0"-6")		1.30	6.70	19.7	10.5					
4	TP-1b	(6"-12")		7.90	9.90	26.4	7.60					
5	C-1	(0-6")		mg/kg	mg/kg	mg/kg	mg/kg					
6	C-2	(0-6")										
7	C-3	(0-6") ✓	<1.0									
8	C-4	(0-6")										
9	C-5	(0-2")										
10	C-6	(0-2") ✓	<10									
11	C-7	(0-6") ✓	<10.0									
12	C-8	(0-6")										
13	C-9	(0-6")										
14	L-1	Bottom										
15	L-2	Bottom										
16	L-3	Bottom										
			PPM									
		1 PPM										
		CHLORANATED Si										
TESTED BY			SWL	JH	JH	JH	JH					
ANALYSIS COST			276	60	60	60	60		60			

80+15% = 001980

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECO

PROJECT NO.	PROJECT NAME	LOCATION
285-04	Sheridan	Hempstead, TX

FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESER-VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
L-1	12/19/85	9:15		X	16oz.	soil	4°C	HOLD	
L-2	12/19/85	9.45		X	16oz	soil	4°C	HOLD	
L-3	12/19/85	10:10		X	16oz.	soil	4°C	HOLD	
TP-1a	12/19/85	11:12		X	8oz	soil	4°C	Pb, Cr, Zn, Ni	
~~TP~~ TP-1b	12/19/85			X	8oz	soil	4°C	Pb, Cr, Zn, Ni	
TP-2	12/19/85	11:30		X	8oz	soil	4°C	Pb, Cr, Zn, Ni	
TP-3	12/19/85			X	8 oz.	soil	4°C	Pb, Cr, Zn, Ni	
C-1	12/19/85	12:14		X	8oz	soil	4°C	PCB	
C-2	12/19/85	12:17		X	8oz		4°C	PCB	

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
6862		

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
[illegible]	12/19/85	1700	[illegible]				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

R_OURCE ENGINEERING - ANALYS REQUEST AND CHAIN OF CUSTODY REC

PROJECT NO.	PROJECT NAME	LOCATION
288-04	Sheridan	Hempstead, TX

FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESER-VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
C-3	12/19/85	12 20 P		X	8 oz	soil	4°C	PCB	
C-4	12/19/85	12 25 P		X	8 oz	soil	4°C	PCB	
C-5	12/19/85	12 35 P		X	8 oz	soil	4°C	PCB	
C-6	12/19/85	12 55 P		X	8 oz	soil	4°C	PCB	
C-7	12/19/85	1 52 P		X	8 oz	soil	4°C	PCB	
C-8	12/19/85	2 00 P		X	8 oz	soil	4°C	PCB	
C-9	12/19/85	2 04 P		X	8 oz	soil	4°C	PCB	

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
6862		

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
John Bin	12/19/85	1700	Lobel Bagon				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS FIA PARAMETER Pb MATRIX H2O

ANALYST JH DATE 1-6-86 TIME 14.35-15:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
0.500	0.006
1.000	0.010
3.000	0.030

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blk	<0.01		
0.5000	0.526		
1.000	1.041		
3.000	3.066		
EPA #2(284)	0.456	0.435	4.60%

PROJECT #/LAB NUMBERS IN THIS RUN 6858 EPTOX, 6849, 6853, 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · CONC.)	STD. CONC. = THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
6858-16	<0.01	<0.01	0%	0.525-0	+0.5ppm	0.50	0.525		105%
6858-40	<0.01	<0.01	0%	0.523-0	+0.5ppm	0.50	0.523		105%
6858-63	<0.01	0.03	—	0.493-0	+0.5ppm	0.50	0.493		99%
6853-1D	<0.01	<0.01	0%	0.514-0	+0.5ppm	0.50	0.514		103%
6857-5	2.10 mg/kg	3.0 mg/kg	30%	80% (0.021)	+20% (3ppm)	0.617	0.573		93%
6857-1D	52.0 mg/kg	45.8 mg/kg	11.9%						
6860-5	20.2 mg/kg	20.5 mg/kg	1.46%						
6860-10spk	12.3 mg/kg	—	—	80% (0.125)	+20% (3ppm)	0.70	0.690		99%
6862-4spk	7.90 mg/kg	—	—	80% 0.079	+20% (3ppm)	0.663	0.657		99%

001085

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Cr MATRIX H_2O

ANALYST JH DATE 1-6-86 TIME 13:30-14:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
0.500	0.022
1.000	0.042
3.000	0.116

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION
Blk	<0.01		
0.500	0.519		
1.000	0.999		
3.000	3.011		
EPA#2 (284)	0.263	0.261	0.76%

PROJECT #/LAB NUMBERS 6858 EPTOX, 6849, 6853, 6857, 6860, 6862
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
6858-16	<0.01	0.02	50%	0.470 - 0	+0.5 ppm	0.50	0.470		94%
6858-40	0.01	0.02	50%	0.491 - 0	+0.5 ppm	0.50	0.491		96%
6858-63	0.04	0.04	0%	0.507 - 0.04	+0.5 ppm	0.50	0.467		93%
6853-1D	<0.01	<0.01	0%	0.504 - 0	+0.5 ppm	0.50	0.504		101%
6857-5	9.00 mg/kg	9.30 mg/kg	3.22%	80% (0.09)	+20% (2ppm)	0.472	0.443		94%
6857-10	55.2 mg/kg	54.2 mg/kg	1.81%						
6860-5	25.7 mg/kg	23.7 mg/kg	7.78%						
6862-4	9.50 mg/kg	—	—	80% (0.099)	20% (3ppm)	0.679	0.608		90%

001984

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Ni MATRIX H_2O

ANALYST JH DATE 1-6-86 TIME 15:30-15:45

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
0.300	0.010
0.500	0.018
1.000	0.035

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION
Blk.	<0.01		
0.300	0.311		
0.500	0.527		
1.000	1.027		
EPA#2 (284)	0.219	0.207	5.47%

PROJECT #/LAB NUMBERS IN THIS RUN 6857, 6860, 6862.

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE CONC.)	+ PERCENT (STANDARD CONC.)	STD.	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
6857-5	11.0 mg/kg	13.7 mg/kg	19.7%	80% (0.110)	20%	(3ppm)	0.688	0.585		85%
6857-10	28.3 mg/kg	26.3 mg/kg	7.07%	—	—		—	—		—
6860-5	22.7 mg/kg	26.9 mg/kg	15.6%	—	—		—	—		—
6860-10	24.4 mg/kg	—	—	80% (0.244)	+20%	(3ppm)	0.795	0.743		93%
6862-4	7.60 mg/kg	—	—	80% (0.076)	+20%	(3ppm)	0.661	0.650		98%

001085

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Zn MATRIX H2O

ANALYST JH DATE 1-6-86 TIME 15:45-16:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	-0.002
0.300	0.057
0.500	0.087
1.000	0.168

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	<0.01		
0.300	0.307		
0.500	0.489		
1.000	1.007		
EPA#2 (224)	0.422	0.418	0.95%

PROJECT #/LAB NUMBERS IN THIS RUN 6858 EPTOX, 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · CONC.)	STD. CONC. = THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
6858-16	0.04	0.03	25%	0.502-0.04	+0.5ppm	0.50	0.462	92%
6858-40	0.06	0.06	0%	0.502-0.06	+0.5ppm	0.50	0.442	88%
6858-63	0.11	0.09	18.2%	0.572-0.11	+0.5ppm	0.50	0.462	92%
6857-5	22.1 mg/kg	20.8 mg/kg	3.07%	50% (0.221)	+20% (3ppm)	0.777	0.74	95%
6857-10	141 mg/kg	136 mg/kg	3.55%	—	—	—	—	—
6860-5	559 mg/kg	553 mg/kg	1.07%	—	—	—	—	—
6860-10	47.0 mg/kg	—	—	80% (0.470)	20% (3ppm)	0.976	1.027	105%
6862-4	26.4 mg/kg	—	—	80% (0.264)	20% (3ppm)	0.811	0.795	98%

001986.

CLIENT Sheridan

PROJECT NO. 288-04

SAMPLED BY J. Binns

DATE SAMPLED 12/18/85

DATE RECEIVED 12/19/85

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 6860

RESULTS TO DC

PROJECT MANAGER D Caputo

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER				O+G	Pb	Cr	Zn	Ni		Prep			
1	comp	ES-15a	soil 0-6	599	10.3	25.4	64.2	22.6					
2	grab	ES-15b	6-11"	355	19.8	25.9	58.1	21.6					
3	"	ES-15c	12-18	458	9.8	25.9	55.6	23.9					
4	"	ES-15d	35-39	429	13.2	30.1	65.4	33.9					
5	comp	ES-16a	0-6	402	20.2	25.7	55.9	22.7					
6	grab	ES-16b	6-12"	752	21.0	26.0	56.8	24.6					
7	grab	ES-16c	12-18	527	18.8	28.1	62.9	29.0					
8	grab	ES-16d	35-39	578	23.8	29.5	64.3	29.6					
9	comp	BS-1	0-6	2,004	22.1	56.1	56.0	15.5					
10	"	BS-2	0-6	431	12.5	18.6	47.0	24.4					
11	"	BS-3a	0-6	277	<1.00	6.10	22.3	12.8					
12	"	BS-3b	6-12	228	8.30	11.7	23.1	9.80					
				mg/kg	mg/kg	mg/kg	mg/kg	mg/kg					
TESTED BY				S.B.	JH	JH	JH	JH					
ANALYSIS COST				300	180	180	180	180		180			

001987

RES_JRCE ENGINEERING - ANALYSIS QUEST AND CHAIN OF CUSTODY RECORI

PROJECT NO.	PROJECT NAME	LOCATION
3[illegible]-04	Sheridan	Hempstead, TX

FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, E[illegible])	PRESER-VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
ES 15a	12/14/85	10:15		X	8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
ES-15b	12/14/85	10:30	X	X	8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
ES-15c	12/14/85	10:47	X	X	8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
ES-15d	12/14/85	11:03	X	X	8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
ES-16a	12/14/85	11:45		X	8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
ES-16b	12/14/85	12:45	X		8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
ES-16c	12/14/85	1:03	X		8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
ES-16d	12/14/85	1:37	X		8 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
BS-1	12/14/85	4:15		X	16 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
6860		

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
[illegible]	12/14/85	900	[illegible]				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

PROJECT NO. 288-04

PROJECT NAME Sheridan

LOCATION Hempstead, TX

FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESER-VATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
BS-2	12/18/85			X	16 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
BS-3a	12/18/85			X	16 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	
BS-3b	12/18/85			X	16 oz	Soil	4°C	O+G, Pb, Cr, Zn, Ni	

LAB SAMPLE NO.

REMARKS

SAMPLER SIGNATURE

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
John Bins	12/18/85	900	Mark Bergen				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS FlA PARAMETER Pb MATRIX H2O

ANALYST JH DATE 1-6-86 TIME 14.35-15:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
0.500	0.006
1.000	0.010
3.000	0.030

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION
BLK	<0.01		
0.5000	0.526		
1.000	1.041		
3.000	3.066		
EPA#2(284)	0.456	0.435	4.60%

PROJECT #/LAB NUMBERS IN THIS RUN 6858 EPTOX, 6849, 6853, 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
6858-16	<0.01	<0.01	0%	0.525-0	+0.5ppm	0.50	0.525	105%
6858-40	<0.01	<0.01	0%	0.523-0	+0.5ppm	0.50	0.523	105%
6858-63	<0.01	0.03	—	0.493-0	+0.5ppm	0.50	0.493	99%
6853-10	<0.01	<0.01	0%	0.514-0	+0.5ppm	0.50	0.514	103%
6857-5	2.10mg/kg	3.0mg/kg	30%	80% (0.021)	+20% (3ppm)	0.617	0.573	93%
6857-10	52.0mg/kg	45.8mg/kg	11.9%					
6860-5	20.2mg/kg	20.5mg/kg	1.46%					
6860-10spk	12.3mg/kg	—	—	80% (0.125)	+20% (3ppm)	0.70	0.690	99%
6862-4spk	7.90mg/kg	—	—	80% (0.079)	+20% (3ppm)	0.663	0.657	99%

001990

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 503-D STD methods 15th Add. PARAMETER O&G MATRIX Soil

ANALYST Jeff. B. DATE 1-9-86 TIME 5:00 p.m.

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blank	

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION

PROJECT #/LAB NUMBERS 6860 - 5, 10, 12
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
6860 #5	402 mg/kg	563 mg/kg	28.5 %						
6860 #10	431 mg/kg	—	—	0.0008 (gm)	0.1413 (gm)	0.1421	0.1364		96 %
6860 #12	228 mg/kg	195 mg/kg	14.0 %						

TIME _____ ANALYST _____ QC APPROVAL [signature]

001991

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Zn MATRIX H2O

ANALYST JH DATE 1-6-86 TIME 15:45-16:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	-0.002
0.300	0.057
0.500	0.087
1.000	0.168

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blk	<0.01		
0.300	0.307		
0.500	0.489		
1.000	1.007		
EPA#2 (284)	0.422	0.418	0.95%

PROJECT #/LAB NUMBERS IN THIS RUN 6858 EPTOX, 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE - CONC.)	+ PERCENT (STANDARD - CONC.)	STD.	THEORETICAL = CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
6858-16	0.04	0.03	25%	0.502-0.04	+0.5ppm		0.50	0.462		92%
6858-40	0.06	0.06	0%	0.502-0.06	+0.5ppm		0.50	0.442		88%
6858-63	0.11	0.09	18.2%	0.572-0.11	+0.5ppm		0.50	0.462		92%
6857-5	22.1 mg/kg	20.8 mg/kg	3.07%	50% (0.221)	+20% (3ppm)		0.777	0.74		95%
6857-10	141 mg/kg	136 mg/kg	3.55%	—	—		—	—		—
6860-5	55.9 mg/kg	55.3 mg/kg	1.07%	—	—		—	—		—
6860-10	47.0 mg/kg	—	—	80% (0.470)	20% (3ppm)		0.976	1.027		105%
6862-4	26.4 mg/kg	—	—	80% (0.264)	20% (3ppm)		0.811	0.795		98%

1.1.15 T77 001992 K Blackford

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Ni MATRIX H_2O

ANALYST JH DATE 1-6-86 TIME 15:30-15:45

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
0.300	0.010
0.500	0.018
1.000	0.035

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION
Blk.	<0.01		
0.300	0.311		
0.500	0.527		
1.000	1.027		
EPA#2 (284)	0.219	0.207	5.47%

PROJECT #/LAB NUMBERS IN THIS RUN 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
6857-5	11.0 mg/kg	13.7 mg/kg	19.7%	80% (0.110)	20% (3ppm)	0.688	0.585	85%
6857-10	28.3 mg/kg	26.3 mg/kg	7.07%	—	—	—	—	—
6860-5	22.7 mg/kg	26.9 mg/kg	15.6%	—	—	—	—	—
6860-10	24.4 mg/kg	—	—	80% (0.244)	+20% (3ppm)	0.795	0.743	93%
6862-4	7.60 mg/kg	—	—	80% (0.076)	+20% (3ppm)	0.661	0.650	98%

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Cr MATRIX H_2O

ANALYST JH DATE 1-6-86 TIME 13:30-14:30

CALIBRATION STANDARDS/BLANK	ABSORBANCE
BLK	0.000
0.500	0.022
1.000	0.042
3.000	0.116

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
BLK	<0.01		
0.500	0.519		
1.000	0.999		
3.000	3.011		
EPA#2 (284)	0.263	0.261	0.76%

PROJECT #/LAB NUMBERS IN THIS RUN 6858 EPTOX, 6849, 6853, 6857, 6860, 6862

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
6858-16	<0.01	0.02	50%	0.470 - 0	+ 0.5 ppm	0.50	0.470		94%
6858-40	0.01	0.02	50%	0.491 - 0	+ 0.5 ppm	0.50	0.491		96%
6858-63	0.04	0.04	0%	0.507 - 0.04	+ 0.5 ppm	0.50	0.467		93%
6853-1D	<0.01	<0.01	0%	0.504 - 0	+ 0.5 ppm	0.50	0.504		101%
6857-5	9.00 mg/kg	9.30 mg/kg	3.22%	80% (0.99)	+ 20% (2 ppm)	0.472	0.443		94%
6857-10	55.2 mg/kg	54.2 mg/kg	1.81%						
6860-5	25.7 mg/kg	23.7 mg/kg	7.78%						
6862-4	9.90 mg/kg	—	—	80% (0.099)	20% (3 ppm)	0.679	0.608		90%

TIME 11:30 ANALYST JH QC APPROVAL B Bloomfield

001994

CLIENT SHERIDAN

PROJECT NO. 288-04

SAMPLED BY G. GREENE

DATE SAMPLED 12-18-85

DATE RECEIVED 12-19-85

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 6861

RESULTS TO

PROJECT MANAGER D. CARATO

ANALYTICAL COST

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	HCO_3^-	CO_3^-	$SO_4^=$	TDS	Specific Conductance	pH	Cl^-	Na	Ca	Mg
HW-29	272	<0.01	17.4	470	570	7.4	68	43.9	88.2	14.8
	mg/L as $CaCO_3$	mg/L as $CaCO_3$	mg/L	mg/L	umhos/cm	units	mg/L	mg/L	mg/L	mg/L
TESTED BY	GM	GM	DR	SB	HH	AB	JH	JH	JH	JH
ANALYSIS COST	10	—	12	10	10	3	12	15	15	15

001995

CLIENT SHERIDAN

PROJECT NO. 288-04

SAMPLED BY

DATE SAMPLED

DATE RECEIVED

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 6861

RESULTS TO

PROJECT MANAGER D CAPUTO

ANALYTICAL COST 15.00

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST

SAMPLE DESCRIPTION / PARAMETER	K
MW29	3.69
	mg/L
TESTED BY	JH
ANALYSIS COST	15.00

001996

RESOURCE ENGINEERING - ANALYSIS REQUEST AND CHAIN OF CUSTODY RECO

PROJECT NO.	PROJECT NAME	LOCATION
283-04	Sheridan Disposal	Hempstead, TX

FIELD SAMPLE NUMBER	DATE	TIME	GRAB	COMP.	SAMPLE CONTAINER (SIZE/MAT'L)	SAMPLE TYPE (LIQUID SLUDGE, ETC.)	PRESERVATIVE	ANALYSIS REQUESTED	COMMENTS AND HOLD STORAGE DATE
MW 29	12/14/85	2200	✓		quart 320 ml	ground water	blank	HCO_3, CO_3, SO_4, total dissolved solids, EC, pH, Cl, Na	
MW-29	12/16/85	2200	✓		32 oz quart	ground water	HNO_3	Ca, Mg, K,	

LAB SAMPLE NO.	REMARKS	SAMPLER SIGNATURE
6861		[signature]

RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
[signature]	12/19/85	1030	[signature]				
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)
RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)	RELINQUISHED BY (SIGNATURE)	DATE	TIME	RECEIVED BY (SIGNATURE)

PROJECT NO.

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS Std Meth 15th ed. 403 PARAMETER $HCO_3^-/CO_3^=$ MATRIX water

ANALYST Gm DATE 1/9/86 TIME 2 25 pm

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
400 mg/l	403		0.75%

PROJECT #/LAB NUMBERS IN THIS RUN 6861

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	PERCENT RECOVERY
6861	272	270	0.74%	~~278~~ 80% - 272	20 · 400	297	298		100.3%

001998

QUALITY CONTRC _OG

METHOD OF ANALYSIS Turbidimetric Std Methods 426.C 15th Ed. PARAMETER $SO_4^=$ MATRIX H_2O

ANALYST DR DATE 01/08/86 TIME 1000

CALIBRATION STANDARDS/BLANK	~~ABSORBANCE~~ NTU
Blank 0 ppm	0.20
10 ppm	27.74
25 ppm	76.65
40 ppm	117.73

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
TS 30 ppm	31.0	30.0	3.23
10 ppm	9.49		
25 ppm	26.2		
40 ppm	40.3		

PROJECT #/LAB NUMBERS IN THIS RUN 6861, 6851(1-3), 6876(1503-1505, 33022-33032)

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+ PERCENT (STANDARD • STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
6851-3	77.8	78.2	0.51	25% · 77.8	10% · 100 ppm	29.5	30.3	102.7
6876-1505	3.84	4.00	4.00					
6876-33024	38.3			50% · 38.3	50% · 20 ppm	29.1	26.1	89.7
6876-33025	2.78	2.55	8.27					
6876-33027	19.7			50% · 19.7	50% · 20 ppm	19.9	20.2	101.5
6876-33032	1053			2% · 1053	10% · 100 ppm	31.1	32.2	103.5

TIME 1700 ANALYST Dru Rosson QC APPROVAL Joan Hassel

001999

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

15th Add.

METHOD OF ANALYSIS STD 209-C 209-D PARAMETER TSS/TDS MATRIX Water

ANALYST J.B. DATE 1-2-86 TIME 5:00 p.m.

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION

PROJECT #/LAB NUMBERS 6868, 6869, 6855, 6861, 6850,
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
6868	34.0 mg/L	42.0 mg/L	19 %						
6869	28.0 mg/L	34.0 mg/L	18 %						
6855	20.0 mg/L	18.0 mg/L	10 %						
6861	470.0 mg/L	470.0 mg/L	-0- %						
6850 #1	702.0 mg/L	688.0 mg/L	2 %						

TIME _____ ANALYST _____

002000

QC APPROVAL [signature]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS Meth 205 Std Meth 15th ed. PARAMETER Specific Cond MATRIX Water

ANALYST B. Blankfield DATE 1-7-85 TIME 0900

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blank/DI	0.30	umhos/cm	
STD-REF	47.0	46.7	0.64
	446	447	0.22
	2070	2070	0%

PROJECT #/LAB NUMBERS 6851(1-3) 6861
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE • CONC.)	+	PERCENT (STANDARD • CONC.)	STD. CONC.	=	THEORETICAL CONC.	SPIKE CONC.	÷	THEO. CONC.	=	PERCENT RECOVERY
6861	860	862	0.23%											

TIME _____ ANALYST _____

002004

QC APPROVAL B. Blankfield

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS 407.A (STD METH 15th ed) PARAMETER Cl⁻ MATRIX H_2O

ANALYST J Ricott DATE 1-3-86 TIME 10:00

CALIBRATION STANDARDS/BLANK	ABSORBANCE

STANDARDS	CONC.	STD. CONC.	PERCENT DEVIATION
Blk	.99		
100ppm	9999		
510ppm	525		

PROJECT #/LAB NUMBERS 6861

IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
6861-MW29	68	75	11.8%	80 X 68	20 X 100	74	70/74	95%
~~6861-Blank~~								

TIME 1030 ANALYST J Ricott QC APPROVAL B. Blatfield

002002

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Na MATRIX H_2O

ANALYST JH DATE 1-2-85 TIME 15:20-15.35

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
1.000	0.146
2.000	0.249
5.000	0.440

STANDARDS	CONC.	+ STD. CONC.	= PERCENT DEVIATION
Blk	<0.01		
1.000	0.981		
2.000	2.060		
5.000	5.008		
EPA#2 (WP1183)	1.679	1.50	10.7%

PROJECT #/LAB NUMBERS 6861

IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	+ THEO. CONC.	= PERCENT RECOVERY
6861 MW29	43.9	45.5	3.52%	4.987-4.547	20% (on dup) (2ppm)	0.40	0.431		110%

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Ca MATRIX H2O

ANALYST JH DATE 12-86 TIME 14:30-14:40

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.001
5.000	0.084
10.000	0.152
30.00	0.327

STANDARDS	CONC. +	STD. CONC. =	PERCENT DEVIATION
Blk	<0.01		
5.000	5.05		
10.000	10.14		
30.00	30.44		
Internal 20ppm	20.436	20.0	2.13%

PROJECT #/LAB NUMBERS 6861

IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)+	PERCENT (STANDARD · STD. CONC.) =	THEORETICAL CONC.	SPIKE CONC. +	THEO. CONC. =	PERCENT RECOVERY
6861 MW29	88.21	89.2	1.11%	16.181-9575	20% 30ppm (on dry)	6	6.606		110%

002004

QC APPROVAL [signature]

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER Mg MATRIX H2O

ANALYST JH DATE 1-2-86 TIME 14:50-1500

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
0.250	0.167
0.500	0.323
1.000	0.640

STANDARDS	CONC. +	STD. CONC. =	PERCENT DEVIATION
Blk	<0.01		
0.250	0.252		
0.500	0.498		
1.000	1.006		
EPA#2 (WP1183)	0.493	0.500	1.40%

PROJECT #/LAB NUMBERS 6861
IN THIS RUN

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC. + THEO. CONC.	= PERCENT RECOVERY
6861 MW29	14.8	14.1	4.72%	(on dilution) 0.932-0.74	+20% 1ppm	0.20	0.92	96%

002005

RESOURCE ENGINEERING LABORATORIES
QUALITY CONTROL LOG

METHOD OF ANALYSIS AA PARAMETER K MATRIX H_2O

ANALYST JH DATE 1-2-86 TIME 15:10-15:25

CALIBRATION STANDARDS/BLANK	ABSORBANCE
Blk	0.000
1.000	0.054
2.000	0.106
5.000	0.263

STANDARDS	CONC.	÷ STD. CONC.	= PERCENT DEVIATION
Blk	<0.01		
1.000	0.999		
2.000	2.079		
5.000	5.030		
EPA#2 (WP1183)	1.504	1.50	0.27%

PROJECT #/LAB NUMBERS IN THIS RUN 6861

QUALITY CONTROL SPIKES

PERCENT RECOVERY CALCULATION:

LAB #-SAMPLE ID #	CONC.	REPLICATE CONC.	PERCENT DEVIATION	PERCENT (SAMPLE · CONC.)	+ PERCENT (STANDARD · STD. CONC.)	= THEORETICAL CONC.	SPIKE CONC.	THEO. CONC.	= PERCENT RECOVERY
6861 MW29	3.69	3.61	2.17%	80% (3.69)	20% (4)	3.61	3.76		104%

CLIENT SHERIDAN

PROJECT NO. 288-04

SAMPLED BY J BROTHERS

DATE SAMPLED 3-6-85

DATE RECEIVED 12-17-85

DATE COMPLETED

RESOURCE ENGINEERING INC.

LAB NO. 6852

RESULTS TO [illegible]

PROJECT MANAGER D. CAPUTO

ANALYTICAL COST 340.—

MILEAGE COST

HOURS RATE COST

SUBTOTAL

DISCOUNT

TOTAL COST $340.00

SAMPLE DESCRIPTION / PARAMETER	PCBs									
#1 T-1	<50									
2 T-2	<50									
3 T-3	<50									
4 T-4	<50									
5 EPA REF STD	34.0	50.0	32.7 → 62.3							
	TESTED	ACTUAL	95% CONFIDENCE LEVEL							
	PPM									
TESTED BY	SWL									
ANALYSIS COST	340									

4@85

002007

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

RESOURCE ENGINEERING

ATTENTION: CHRIS ITIN

3000 RICHMOND AVENUE

HOUSTON, TX 77098

EVAPORATION SYSTEM

SAMPLE # ES13A

002008

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8172	RESOURCE ENGINEERING	RES28804	TES13A	851217		

Denis C. K. Lin, Ph.D.

Vice President
Research and Operations

This Technical Report is an INSITE™ service generated by LODESTAR™ Data Management Software.

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00-20-0-0

Introduction

This report contains the analytical results on your sludge sample, TES13A 85/12/17. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your sample are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (i.e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your sample and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the sample are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Priority Pollutants

The priority pollutant compounds and elements are listed with their NPDES (National Pollution Discharge Elimination System) numbers, and the Method Detection Limit (MDL) published in the Federal Register. When a compound or element is present below its published MDL it is reported as BMDL (Below Method Detection Limit). When a compound or element is not present at any detectable concentrations it is reported as ND (Not Detected). MDL's for non-aqueous matrices are based on USEPA published MDL's but are adjusted as per sample weight. Matrix spike and replicate analyses, where included, were performed on samples randomly chosen within each quality assurance batch and are therefore not necessarily spikes and replicates of this report's sample. Surrogate compound recovery data and instrument calibration data are included in the Method Performance Data Tables.

002010

K8172

COMMENTS

Base/Neutrals: Surrogates were not recovered for this fraction due to high dilution level (1:1000) When run at more concentrated levels, the sample overloaded and shut down the mass spec due to excessive amounts of aliphatic hydrocarbons.

002011

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 8, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8172	RESOURCE ENGINEERING	RES28804	TES13A	851217		

NPDES Number	Compound (Acrolein and Acrylonitrile values are screen only.)	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen. Added ug/kg	QC Matrix Spike: % Recov
1V	Acrolein	ND	500000	ND	ND	ND	400000	71	ND	800000	99
2V	Acrylonitrile	ND	500000	ND	ND	ND	40000	86	ND	80000	104
3V	Benzene	67900	22000	ND	ND	ND	9000	86	ND	18000	114
4V	bis(Chloromethyl)ether	ND	50000	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	24000	ND	ND	ND	9000	89	ND	18000	101
6V	Carbon tetrachloride	ND	14000	ND	ND	ND	9000	94	ND	18000	111
7V	Chlorobenzene	ND	30000	2950	2680	ND	9000	91	3970	18000	107
8V	Chlorodibromomethane	ND	16000	ND	ND	ND	9000	92	ND	18000	107
9V	Chloroethane	ND	50000	ND	ND	ND	9000	87	ND	18000	105
10V	2-Chloroethylvinyl ether	ND	50000	ND	ND	ND	9000	0.	ND	18000	0.
11V	Chloroform	ND	8000	ND	ND	ND	9000	92	ND	18000	111
12V	Dichlorobromomethane	ND	11000	ND	ND	ND	9000	90	ND	18000	106
13V	Dichlorodifluoromethane	ND	50000	ND	ND	ND	9000	87	ND	18000	103
14V	1,1-Dichloroethane	ND	24000	ND	ND	ND	9000	89	ND	18000	108
15V	1,2-Dichloroethane	ND	14000	ND	ND	ND	9000	98	ND	18000	107
16V	1,1-Dichloroethylene	ND	14000	ND	ND	ND	9000	87	ND	18000	113
17V	1,2-Dichloropropane	ND	30000	ND	ND	ND	9000	91	ND	18000	109
18V	cis-1,3-Dichloropropylene	ND	25000	ND	ND	ND	9000	91	ND	18000	113
19V	Ethylbenzene	579000	36000	ND	ND	ND	9000	91	ND	18000	111
20V	Methyl bromide	ND	50000	ND	ND	ND	9000	115	ND	18000	141
21V	Methyl chloride	ND	50000	ND	ND	ND	9000	84	ND	18000	112
22V	Methylene chloride	ND	14000	ND	ND	ND	9000	116	ND	18000	101
23V	1,1,2,2-Tetrachloroethane	ND	35000	ND	ND	ND	9000	96	ND	18000	120
24V	Tetrachloroethylene	43500	21000	ND	ND	ND	9000	94	ND	18000	115
25V	Toluene	263000	30000	3470	3350	ND	9000	91	3220	18000	108
26V	1,2-Trans-dichloroethylene	ND	8000	ND	ND	ND	9000	89	ND	18000	110
27V	1,1,1-Trichloroethane	ND	19000	ND	ND	ND	9000	95	ND	18000	107
28V	1,1,2-Trichloroethane	ND	25000	ND	ND	ND	9000	94	ND	18000	113
29V	Trichloroethylene	ND	9500	ND	ND	ND	9000	86	ND	18000	103
30V	Trichlorofluoromethane	ND	50000	ND	ND	ND	9000	91	ND	18000	105
31V	Vinyl chloride	ND	50000	ND	ND	ND	9000	86	ND	18000	115
18V	trans-1,3-Dichloropropylene	ND	50000	ND	ND	ND	9000	90	ND	18000	106

* Recovery normally variable using EPA Protocol Method 624.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 16, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8172	RESOURCE ENGINEERING	RES28804	TES13A	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov *
1A	2-Chlorophenol	ND	10000	ND	ND	ND	0	-	ND	30300	65
2A	2,4-Dichlorophenol	ND	8200	ND	ND	ND	0	-	ND	30300	0
3A	2,4-Dimethylphenol	49400	8200	49400	56200	ND	0	-	ND	30300	0
4A	4,6-Dinitro-o-cresol	ND	73000	ND	ND	ND	0	-	ND	30300	0
5A	2,4-Dinitrophenol	ND	130000	ND	ND	ND	0	-	ND	30300	0
6A	2-Nitrophenol	ND	11000	ND	ND	ND	0	-	ND	30300	50
7A	4-Nitrophenol	ND	7300	ND	ND	ND	0	-	ND	30300	0
8A	p-Chloro-m-cresol	ND	9100	ND	ND	ND	0	-	ND	30300	56
9A	Pentachlorophenol	ND	11000	ND	ND	ND	0	-	ND	30300	0
10A	Phenol	1470000	4500	1470000	1800000	ND	0	-	ND	30300	0
11A	2,4,6-Trichlorophenol	ND	8200	ND	ND	ND	0	-	ND	30300	94

* Large extract final volume resulted in a concentration below the instrument detection limit for spiked compounds.

302015

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 23, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8172	RESOURCE ENGINEERING	RES28804	TES13A	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen Added ug/kg	% Recov
1B	Acenaphthene	ND	5700000	ND	ND	ND	0	-	4980	30300	109
2B	Acenaphthylene	ND	11000000	ND	ND	ND	0	-	ND	30300	123
3B	Anthracene	ND	5700000	ND	ND	ND	0	-	10300	30300	108
4B	Benzidine	ND	1.3+08	ND	ND	ND	0	-	ND	30300	0.
5B	Benzo(a)anthracene	ND	24000000	ND	ND	ND	0	-	10500	30300	83
6B	Benzo(a)pyrene	ND	7600000	ND	ND	ND	0	-	15800	30300	125
7B	Benzo(b)fluoroanthene	ND	15000000	ND	ND	ND	0	-	23400	30300	97
8B	Benzo(ghi)perylene	ND	12000000	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	11000000	ND	ND	ND	0	-	ND	30300	160
10B	bis(2-Chloroethoxy)methane	ND	16000000	ND	ND	ND	0	-	ND	30300	85
11B	bis(2-Chloroethyl) ether	ND	17000000	ND	ND	ND	0	-	ND	30300	90
12B	bis(2-Chloroisopropyl)ether	ND	17000000	ND	ND	ND	0	-	ND	30300	112
13B	bis(2-Ethylhexyl)phthalate	ND	30000000	ND	ND	515	0	-	ND	30300	80
14B	4-Bromophenyl phenyl ether	ND	5700000	ND	ND	ND	0	-	ND	30300	129
15B	Butyl benzyl phthalate	ND	30000000	ND	ND	ND	0	-	ND	30300	81
16B	2-Chloronaphthalene	ND	5700000	ND	ND	ND	0	-	ND	30300	109
17B	4-Chlorophenyl phenyl ether	ND	13000000	ND	ND	ND	0	-	ND	30300	115
18B	Chrysene	ND	7600000	ND	ND	ND	0	-	18300	30300	94
19B	Dibenzo(a,h)anthracene	ND	30000000	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	5700000	ND	ND	ND	0	-	ND	30300	104
21B	1,3-Dichlorobenzene	ND	5700000	ND	ND	ND	0	-	ND	30300	100
22B	1,4-Dichlorobenzene	ND	13000000	ND	ND	ND	0	-	ND	30300	103
23B	3,3'-Dichlorobenzidine	ND	51400000	ND	ND	ND	0	-	ND	30300	43
24B	Diethyl phthalate	ND	30000000	ND	ND	ND	0	-	ND	30300	120
25B	Dimethyl phthalate	ND	30000000	ND	ND	ND	0	-	ND	30300	111
26B	Di-n-butyl phthalate	ND	30000000	ND	ND	ND	0	-	ND	30300	145
27B	2,4-Dinitrotoluene	ND	17000000	ND	ND	ND	0	-	ND	30300	60
28B	2,6-Dinitrotoluene	ND	5700000	ND	ND	ND	0	-	ND	30300	73
29B	Di-n-octyl phthalate	ND	30000000	ND	ND	ND	0	-	ND	30300	128
30B	1,2-Diphenylhydrazine	ND	30000000	ND	ND	ND	0	-	ND	30300	93
31B	Fluoranthene	ND	6600000	ND	ND	ND	0	-	17400	30300	18.
32B	Fluorene	ND	5700000	ND	ND	ND	0	-	7350	30300	99

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 23, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8172	RESOURCE ENGINEERING	RES28804	TES13A	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
33B	Hexachlorobenzene	ND	5700000	ND	ND	ND	0	-	ND	30300	118
34B	Hexachlorobutadiene	ND	2700000	ND	ND	ND	0	-	ND	30300	112
35B	Hexachlorocyclopentadiene	ND	30000000	ND	ND	ND	0	-	ND	0	-
36B	Hexachloroethane	ND	4800000	ND	ND	ND	0	-	6350	30300	84
37B	Indeno(1,2,3-c,d)pyrene	ND	14000000	ND	ND	ND	0	-	ND	0	-
38B	Isophorone	ND	6600000	ND	ND	ND	0	-	ND	30300	92
39B	Naphthalene	ND	4800000	ND	ND	ND	0	-	5180	30300	115
40B	Nitrobenzene	ND	5700000	ND	ND	ND	0	-	ND	30300	80
41B	N-Nitrosodimethylamine	ND	30000000	ND	ND	ND	0	-	ND	0	-
42B	N-Nitrosodi-n-propylamine	ND	30000000	ND	ND	ND	0	-	ND	30300	82
43B	N-Nitrosodiphenylamine	ND	5700000	ND	ND	ND	0	-	ND	30300	108
44B	Phenanthrene	ND	16000000	ND	ND	ND	0	-	41000	30300	72
45B	Pyrene	ND	5700000	ND	ND	ND	0	-	13400	30300	24
46B	1,2,4-Trichlorobenzene	ND	5700000	ND	ND	ND	0	-	ND	30300	104
	Benzyl alcohol	ND	30000000	ND	ND	ND	0	-	ND	30300	41
	Benzaldehyde	ND	30000000	ND	ND	ND	0	-	ND	30300	72
	Catechol	ND	30000000	ND	ND	ND	0	-	ND	30300	0[illegible]
	Benzoic acid	ND	30000000	ND	ND	ND	0	-	ND	30300	0[illegible]

A Recovery normally low using EPA Protocol Method 625.

B Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

C Recovery low due to sample matrix interference.

002015

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 23, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide/PCB Compounds - GC/MS Analysis Data (QR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8172	RESOURCE ENGINEERING	RES28804	TES13A	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1P	Aldrin	ND	5700000	ND	ND	ND	0	-	ND	30300	103
2P	Alpha-BHC	ND	30000000	ND	ND	ND	0	-	ND	30300	124
3P	Beta-BHC	ND	13000000	ND	ND	ND	0	-	ND	30300	48
4P	Gamma-BHC	ND	30000000	ND	ND	ND	0	-	ND	30300	112
5P	Delta-BHC	ND	9400000	ND	ND	ND	0	-	ND	30300	34
6P	Chlordane	ND	30000000	ND	ND	ND	0	-	ND	60600	85
7P	4,4'-DDT	ND	8500000	ND	ND	ND	0	-	ND	30300	56
8P	4,4'-DDE	ND	17000000	ND	ND	ND	0	-	ND	30300	90
9P	4,4'-DDD	ND	14000000	ND	ND	ND	0	-	ND	30300	65
10P	Dieldrin	ND	7600000	ND	ND	ND	0	-	ND	30300	87
11P	Endosulfan I	ND	30000000	ND	ND	ND	0	-	ND	30300	133
12P	Endosulfan II	ND	30000000	ND	ND	ND	0	-	ND	30300	225*
13P	Endosulfan sulfate	ND	17000000	ND	ND	ND	0	-	ND	30300	70
14P	Endrin	ND	30000000	ND	ND	ND	0	-	ND	30300	79
15P	Endrin aldehyde	ND	30000000	ND	ND	ND	0	-	ND	30300	84
16P	Heptachlor	ND	5700000	ND	ND	ND	0	-	ND	30300	7*
17P	Heptachlor epoxide	ND	6600000	ND	ND	ND	0	-	ND	30300	134
18P	PCB-1242	ND	1.1+08	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	1.1+08	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	91000000	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	1.1+08	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	1.1+08	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	ND	1.1+08	ND	ND	ND	0	-	ND	30300	53
24P	PCB-1016	ND	1.1+08	ND	ND	ND	0	-	ND	0	-
25P	Toxaphene	ND	30000000	ND	ND	ND	0	-	ND	0	-

* Recovery normally variable using EPA Protocol Method 625.

002016

ETC ENVIRONMENTAL TESTING and CERTIFICATION

January 24, 1986

TABLE 2: METHOD PERFORMANCE DATA

Surrogate Recovery Soil- GC/MS Data (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

K8172

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount Added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION				
Toluene-D8	.250	102	50	160
Bromofluorobenzene	.250	102	50	160
1,2-Dichloroethane-D4	.250	107	50	160
ACID FRACTION				
Phenol-D5	100	160 ***	20	140
2-Fluorophenol	100	75	20	140
2,4,6-Tribromophenol	100	63	10	140
*BASE/NEUTRAL FRACTION***				
Nitrobenzene-D5	50	0	20	140
2-Fluorobiphenyl	50	0	20	140
Terphenyl-D14	50	0	20	150

* *WB EPA Control Limits.*
** See Comments.
*** Recovery variable due to sample matrix interference.

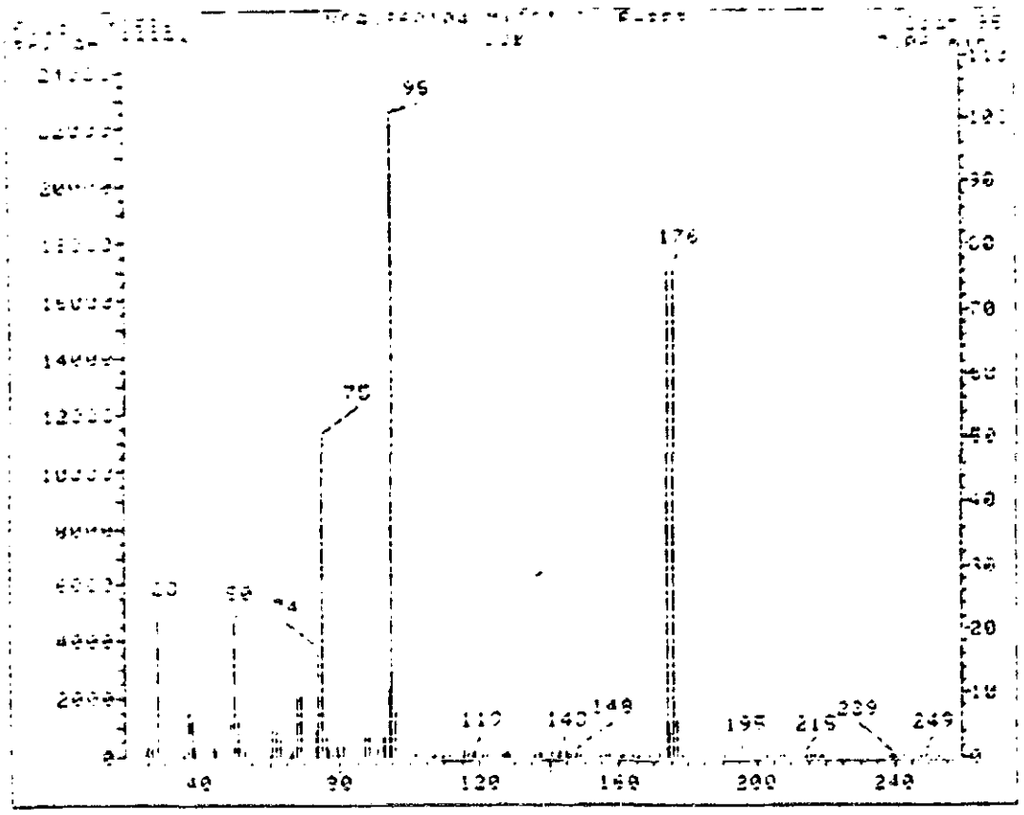


TABLE 2: METHOD PERFORMANCE DATA (QP01)

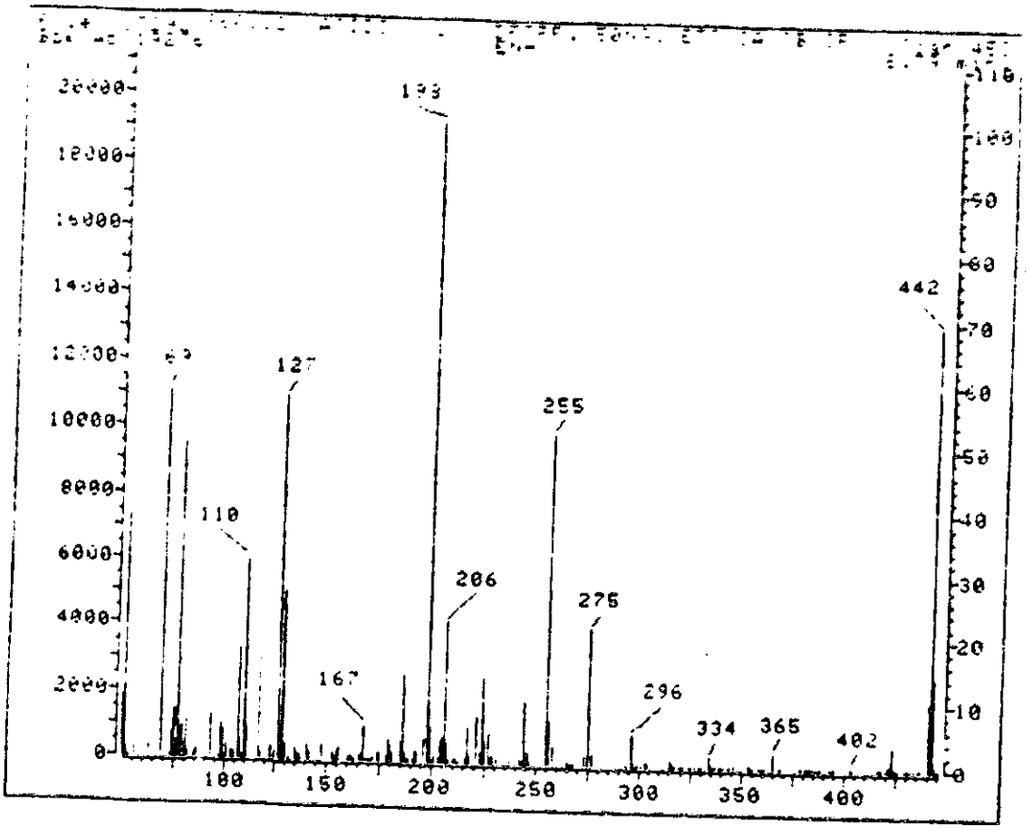
GC MS Tuning Data - Bromofluorobenzene (PFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	20.88	20.88	Ok
75	30-60% of mass 95	49.93	49.93	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.92	6.92	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	76.10	76.10	Ok
175	5-9% of mass 174	5.06	6.65	Ok
176	95-100% of mass 174	76.69	100.79	Ok
177	5-9% of mass 176	5.71	7.45	Ok

Injection Date: 01/04/86 Analyst: Denise M Simons
Injection Time: 17:24 Processor: Pearl Trout
Run No: >M0596 QC Batch: QV 4216
Spectrum No: 95 Samples: K8089, K8091, K8172, K8793, K8797, K4357, K8[illegible]

1/8/86

002018



002019

TABLE 2: METHOD PERFORMANCE DATA (QR22)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Acids Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	38.00	38.00	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	57.47	57.47	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	56.72	56.72	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	5.50	5.50	Ok
275	10-30% of mass 198	21.10	21.10	Ok
365	Greater than 1% of mass 198	2.47	2.47	Ok
441	0-100% of mass 443	10.57	74.46	Ok
442	Greater than 40% of mass 198	69.12	69.12	Ok
443	17-23% of mass 442	14.19	20.53	Ok

Injection Date: 01/12/86
Injection Time: 14:32
Run No: >J7292
Spectrun No: 453

Analyst: [illegible]
Processor: [illegible]
QC Batch: QA 4253
Samples: Calib. Stds, K4127 A-S, QC4253A, K5296, K4174, K8172, K8172AR, K5972

5 1/16/86

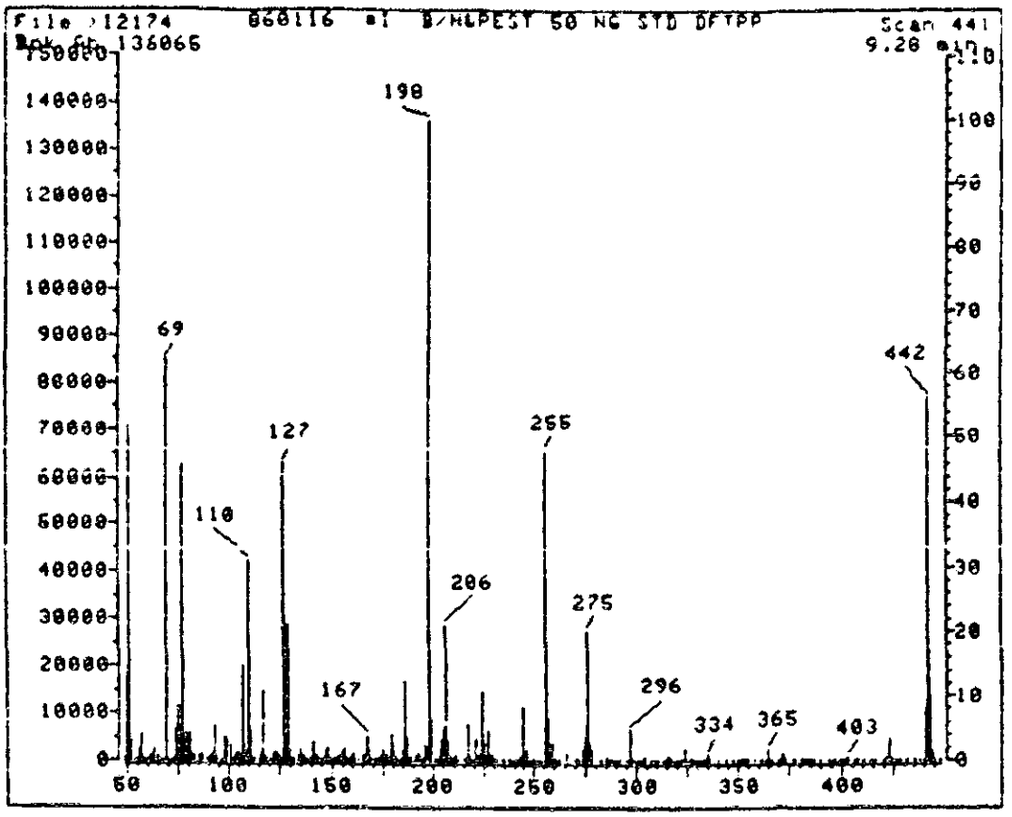


TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	51.86	51.86	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	62.15	62.15	Ok
70	Less than 2% of mass 69	.17	.27	Ok
127	40-60% of mass 198	46.07	46.07	Ok
197	Less than 1% of mass 198	.51	.51	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.31	6.31	Ok
275	10-30% of mass 198	20.04	20.04	Ok
365	Greater than 1% of mass 198	1.82	1.82	Ok
441	0-100% of mass 443	8.24	82.38	Ok
442	Greater than 40% of mass 198	56.03	56.03	Ok
443	17-23% of mass 442	10.00	17.84	Ok

Injection Date: 01/17/86 Analyst: [illegible]
Injection Time: 06:08 Processor: [illegible]
Run No: >12174 QC Batch: QB4253
Spectrun No: 441 Samples: K4174, K8172, K5972, K592[illegible] K8889, K8895, K5801

JBS 1/22/86

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Methodology for GC/MS Analysis of Priority Pollutant Compounds

The methods employed in the GC/MS analysis for priority pollutants are established EPA methods. Rigid compliance with the instrument parameters and performance criteria of the published methods was achieved. In some cases, the precise amounts of sample used and the sample handling procedures vary with the complexity of the sample matrix. Qualitative identification of the priority pollutants was performed using the relative retention times, the relative abundance of three characteristic ions and the abundance ratios. The entire mass spectrum was reviewed to confirm each identification. Quantitative analysis of detected compounds was performed by using a response factor generated by a major characteristic ion of the specific compound and an internal standard.

Compounds, in addition to those on the priority pollutant list, were identified through a computer-aided search of the NBS-EPA spectra library. After review the identifications are included in a separate tabulation and labelled "tentatively identified".

Volatile Priority Pollutant Compounds

For the analysis of Volatile priority pollutants in a solid matrix, a modified version of EPA Method 624 was used. The modification can be be summarized as follows: 1-3 gm of the solid sample are weighed into a 15 ml Hypo vial. The vial is sealed immediately with a teflon-backed silicone septum. A solution containing 3 internal standards is injected through the septum onto the sample. The vial is attached to the Purge and Trap sampler in series with a 5 ml organic-free water trap. The sample vial is heated at 80 degrees Centigrade for 20 minutes. An inert gas sweeps the volatile organic compounds through the water trap onto a sorbent column where they are trapped. When the purge cycle is complete, the sorbent column is heated and backflushed with helium to desorb the purgeable organic compounds onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable mixture. The separated purgeable components are then identified and quantitated using a computerized mass spectrometer.

Acid, Base/Neutral and Pesticide Priority Pollutant Compounds

For the analysis of the Acid, Base/Neutral and Pesticide priority pollutants in a complex solid matrix, the EPA-EMSL sludge method was used (Protocol for Referee Analysis of Semi-Volatile Organic Priority Pollutants in Municipal and Industrial Waste Treatment Sludge, EPA Contract 68-03-2625, June 16, 1980). The method can be summarized as follows: A 80 ml sample is adjusted to a pH greater than 11 with aqueous NaOH. The pH adjusted sample is then extracted with methylene chloride using repetitive sediment extraction aided by a high speed homogenizer. The extract is separated by centrifugation and transferred by pipette. The sample is then acidified to a pH less than 2 and the extraction process is repeated with fresh methylene chloride. The first extract, containing the base/neutral extractable compounds, is cleaned with silica gel, dried and concentrated to a 1 ml final volume. Gel permeation chromatography is used to clean the extract containing the acid extractable compounds. This extract is dried and concentrated to a final 1 ml volume. Each extract is injected into a GC/MS instrument configured for the analysis of that specific fraction.

Summary of Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories". EPA-600/4-79-019, March 1979,
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/001-R, October 1979;
- the recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979; updated on October 26, 1984).
- "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980;
- "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983;
- Organic Analysis: Multi-media, Multi Concentration-IFB WA84-A267; and
- Dioxin Analysis:Soil/Sediment Matrix; Multi-Concentration, Selected Ion Monitoring with Jar Extration Procedure-IFB WA84-A002

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used.

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of 13 samples consists of 9 customer samples (at a maximun), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors vary greater than 25%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.

- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Three surrogate compounds are added to each sample in the batch for Acid analysis.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on decafluorotriphenylphosphine (DFTPP) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of standards composed of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3 concentrations and using five internal standards for quantitation.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples.
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve.
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique, a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 independent reference standard;
- 4 Calibration standards (processed using the sample preparation method);
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

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Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing.

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 30 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate anaylses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preparation method); and
- 2 Procedural Blanks.

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices),
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known refernece QC sample for at least each 100 samples analyzed.

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch.

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- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample.

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon backround must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/- 15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$-2,3,7,8-TCDD as internal standard and $^{37}Cl_4$-TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples. The method blank is also dosed with the internal standard and surrrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:

  a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak.

  b. The 320/322 ratio is within the range of 0.67 to 0.87.

  c. Ions 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.

  d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.

  e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:

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. the 320/324 ratio should be 1.58 +/- 0.16

. the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.
- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.
- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractoer is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person(s) breaking the Shuttle seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician; and
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The records show for each link in this process:

- the person with custody; and
- the time and date each person accepted or relinquished custody.

Appendix A

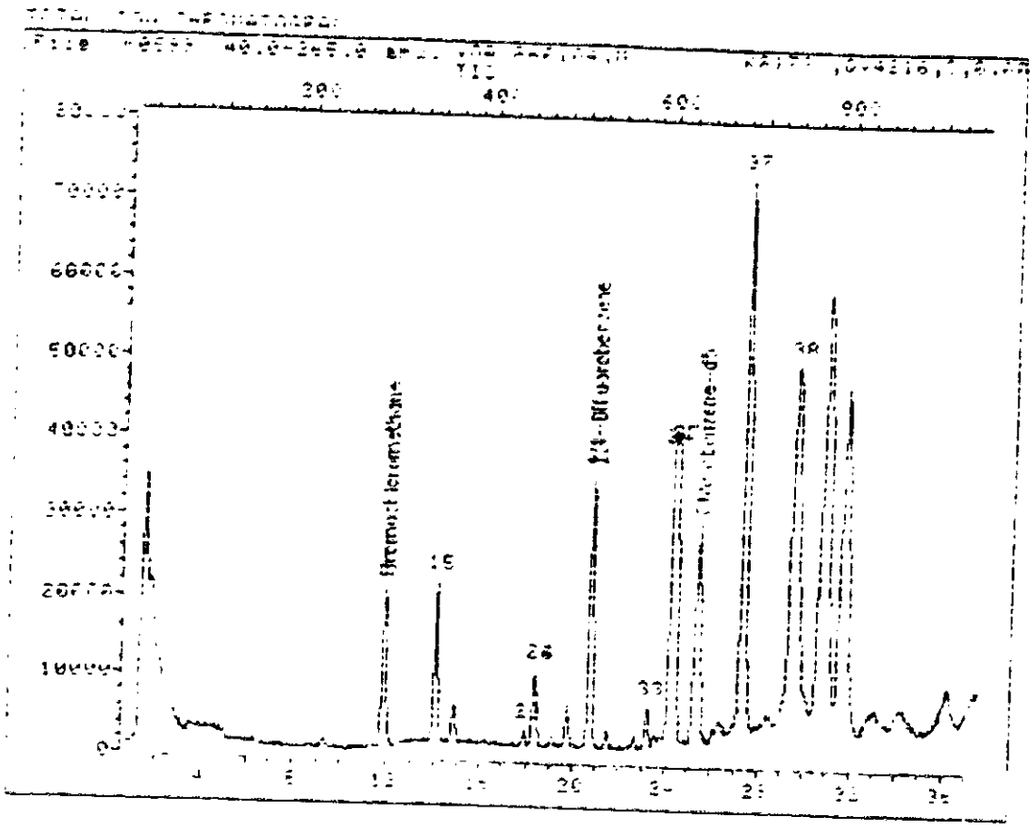
Mass Spectral Data for Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.

002027



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[illegible]

[illegible]

[illegible]

Last Calibration: [illegible]

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Quant Time: [illegible]

[illegible]

002028

[illegible]

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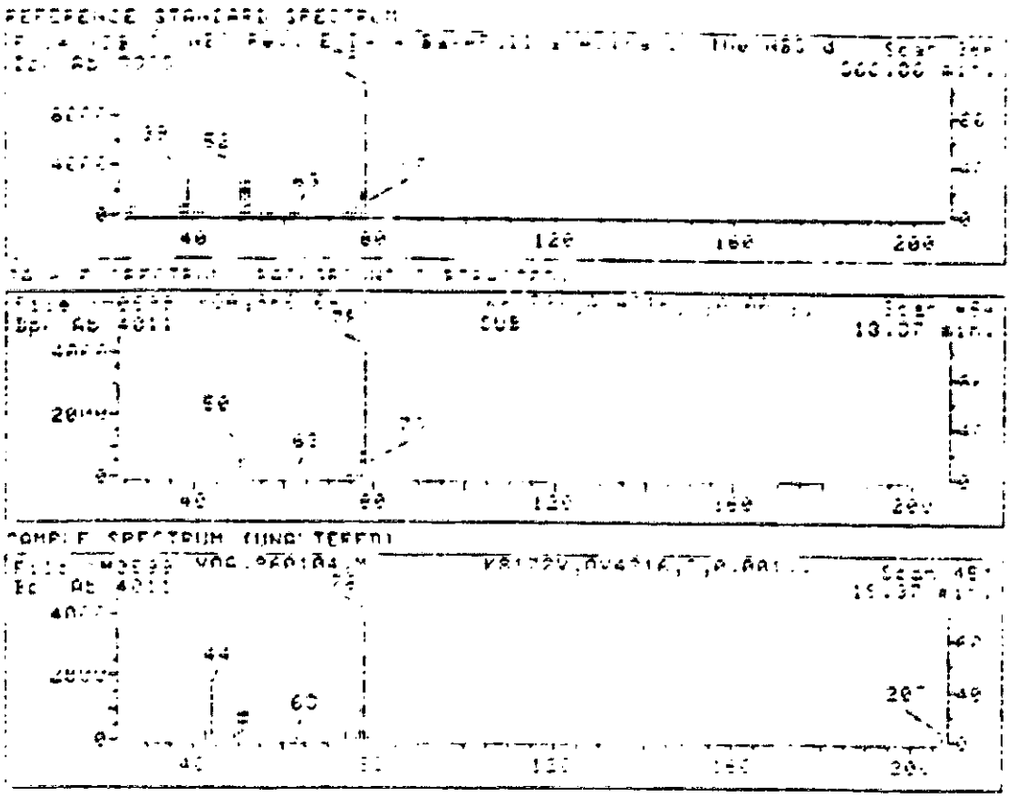
Name: [illegible]
[illegible]

[illegible]
[illegible]le: Volatile Priority Pollutant ID FILE
[illegible]ast Calibration: 860104 21:26

	Compound		R.T.	Scans	Area	Conc	Units	q
[illegible]	*[illegible]methane		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]-Dichloroethane-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
(2)	*1,4-Difluorobenzene		20.74	51[illegible]	1[illegible]2189	250.00	NG	9[illegible]
[illegible]	Trichloroethylene		[illegible]	[illegible]	[illegible]	~~[illegible]~~	~~[illegible]~~	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	~~[illegible]~~	~~[illegible]~~	[illegible]
[illegible]	*Chlorobenzene-[illegible]		[illegible]	[illegible]	[illegible]	250.00	NG	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	~~[illegible]~~	~~[illegible]~~	[illegible]
[illegible]	Tetrachloroethylene		[illegible]	[illegible]	[illegible]	43.50	NG	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Toluene		[illegible]	[illegible]	[illegible]	[illegible]	NG	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]-Bromofluorobenzene	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	NG	[illegible]

[illegible]

20220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120
160
200
40
80
120
160
200
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80
120
160
200

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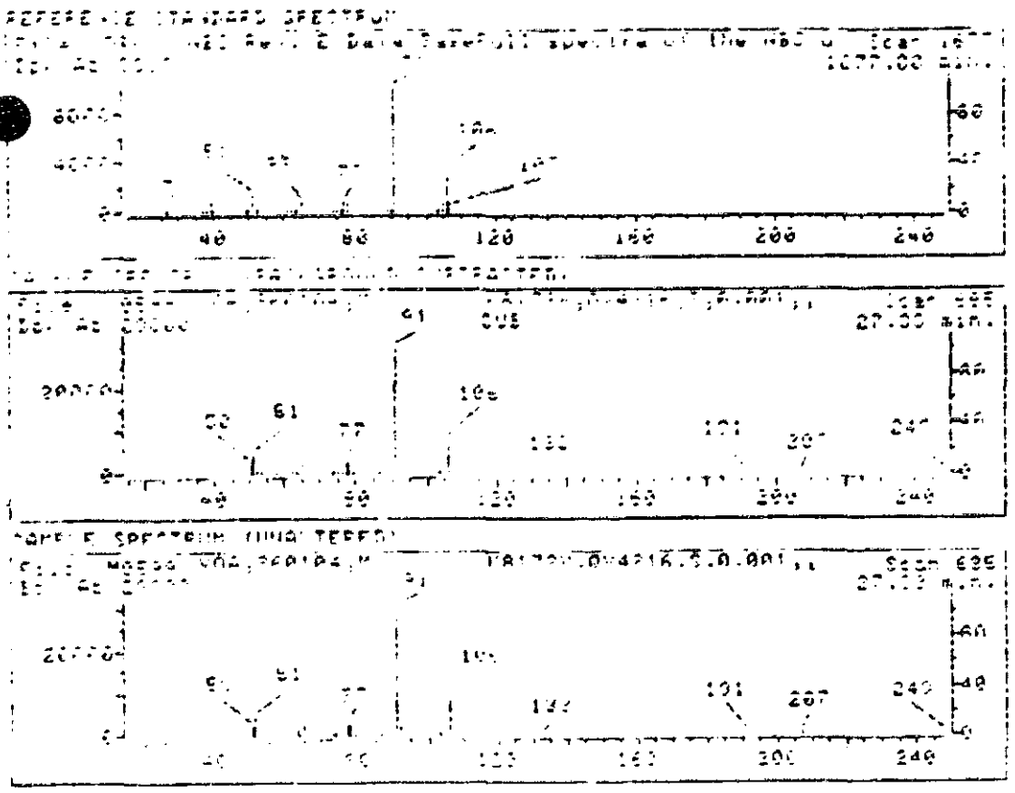
[illegible]

002030



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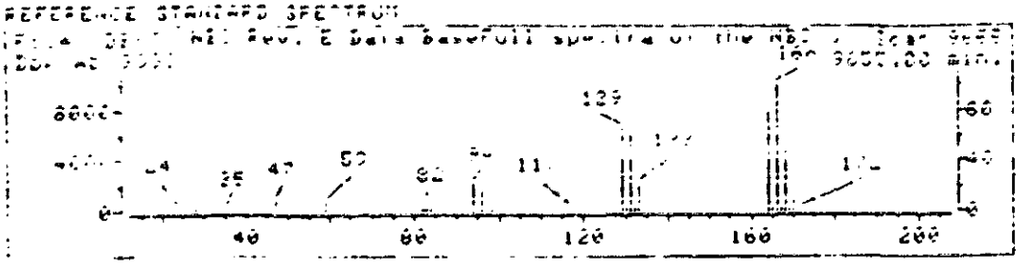
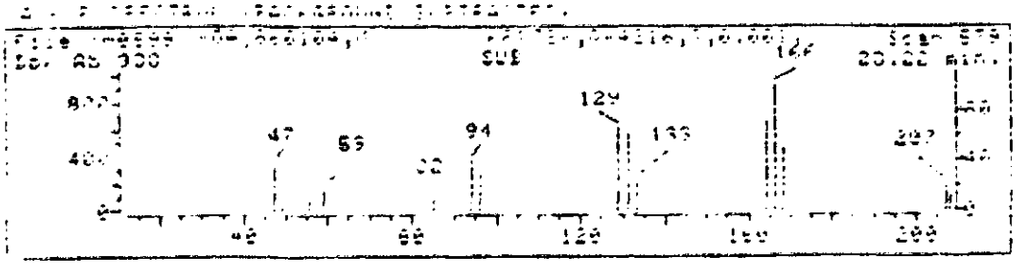
Name: [illegible]
Mass: [illegible]
Plant Time: [illegible]
Injected at: [illegible]

Compound No: [illegible]
Compound Name: Eth Chenzene
Scan Number: [illegible]
Retention Time: 2[illegible] min.
Area: [illegible]
Concentration: [illegible]
[illegible]

002031

REFERENCE STANDARD SPECTRUM





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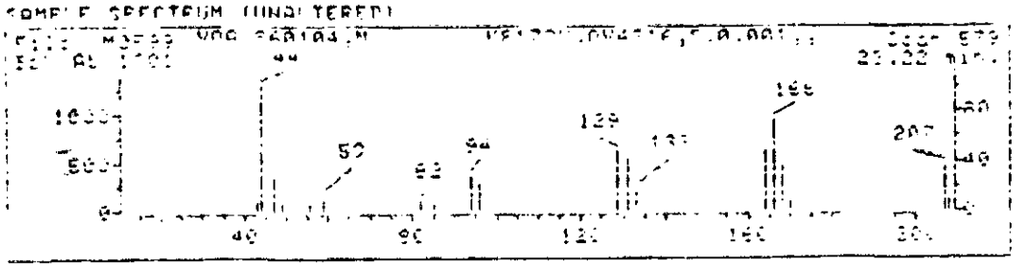

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Compound No: [illegible]
Compound Name: Tetrachloroethylene
Scan Number: [illegible]
Retention Time: [illegible] min.
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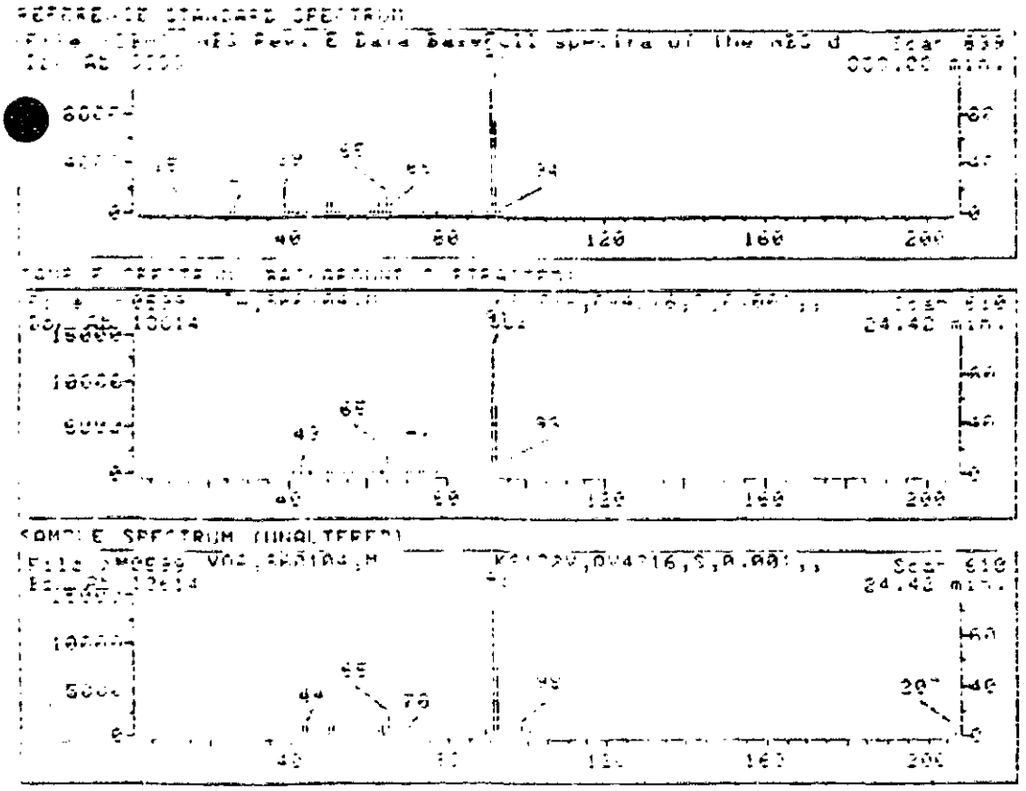
Concentration: [illegible] NG
Quantile: [illegible]

002032



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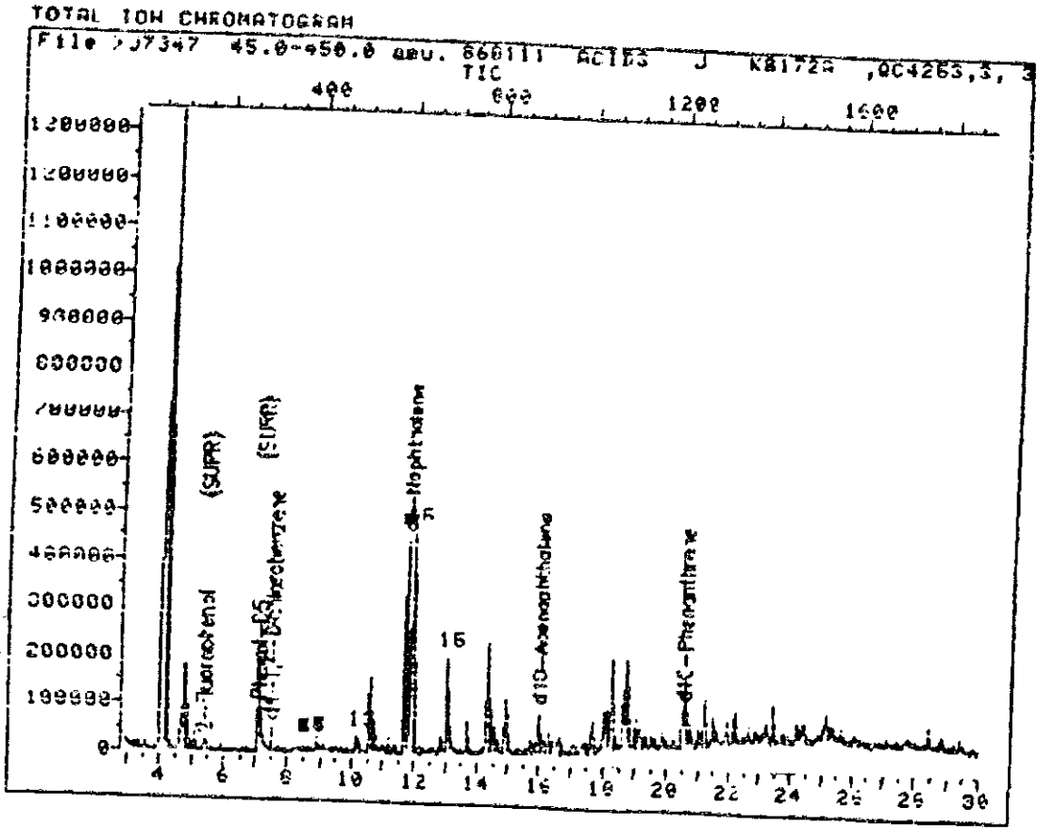
Compound Name: Toluene
Peak Number: [illegible]
Retention Time: 24.42 min.
Area: [illegible]
Concentration: [illegible] ng
[illegible]: [illegible]

002033

TOTAL ION CHROMATOGRAM



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Name: 860111 ACIDS J
Misc: KB172A ,QC4253,S, 3.31,10

Id File: JACID::US
Title: PP/ACID IDFILE
Last Calibration: 860113 08:47

Operator ID: TM0526
Quant Time: 860114 07:29
Injected at: 860114 06:52

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RTI #55

QUANT REPORT

Operator ID: TMA526 Quant Rev: 4 Quant Time: 860114 07:29
Output File: ^J7347::AQ Injected at: 860114 06:52
Data File: >J7347::HP Dilution Factor: 1.00
Name: 860111 ACIDS .1
Misc: KB12VA ,QC4253,S, 3.31,10 RTI #55

ID File: JACID::HS
Title: PP/ACID IDFILE
Last Calibration: 860113 08:47

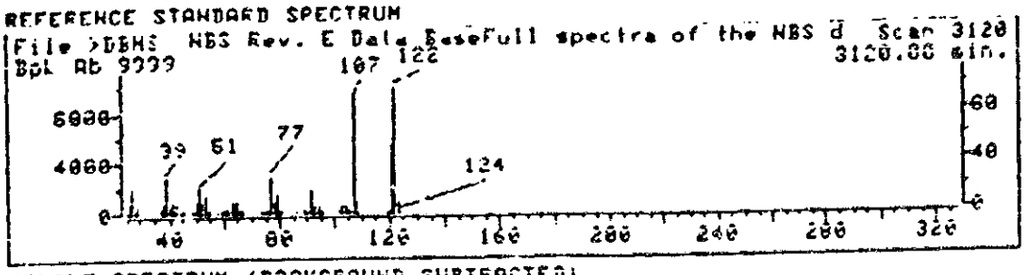
	Compound		R.T.	Scan#	Area	Conc.	Units	Q
1)	*d4-1,4-Dichlorobenzene		7.45	314	17741	40.00	UG/ML	87
3)	2-Fluorophenol	(SURR)	5.36	168	2186	7.52	UG/ML	88
4)	2-Methylphenol		8.47	385	4433	~~19.19 UG/ML~~		94
4)	2-Methylphenol		8.94	418	5341	~~14.68 UG/ML~~		73
5)	4-Methylphenol		8.47	385	4433	~~12.60 UG/ML~~		85
5)	4-Methylphenol		8.94	418	5341	~~15.06 UG/ML~~		56
6)	o-Cresol		8.47	385	4433	~~12.74 UG/ML~~		85
6)	o-Cresol		8.94	418	5341	~~15.35 UG/ML~~		56
7)	m+p-Cresols		8.47	385	4433	~~13.36 UG/ML~~		85
7)	m+p-Cresols		8.94	418	5341	~~16.70 UG/ML~~		56
9)	Phenol		7.09	289	175780	486.87	UG/ML	38
10)	Phenol-D5	(SURR)	7.08	288	5522	15.97	UG/ML	65
11)	*d8-Naphthalene		11.70	610	112217	40.00	UG/ML	92
13)	2,4-Dimethylphenol		10.18	504	17233	16.35	UG/ML	93
15)	4-Chlorophenol		11.90	624	75809	~~106.68 UG/ML~~		70
15)	4-Chlorophenol		13.02	702	44804	~~43.85 UG/ML~~		52
18)	*d10-Acenaphthalene		15.96	907	39066	40.00	UG/ML	74
24)	*d10-Phenanthrene		20.49	1222	58314	40.00	UG/ML	97

* Compound is ISTD

CB
1-15-86.

25) 952. = 6.3 ug/ml
2,4,6-Tribromophenol

REFERENCE STANDARD SPECTRUM



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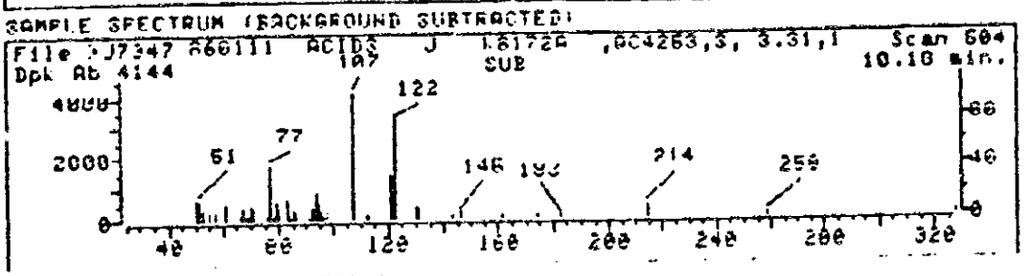
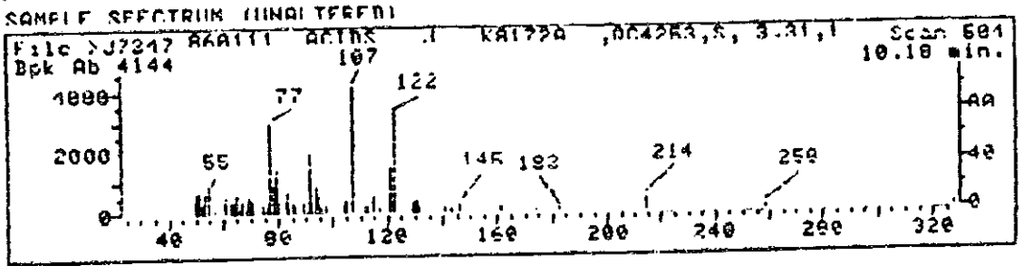


SAMPLE SPECTRUM (UNSUBTRACTED)



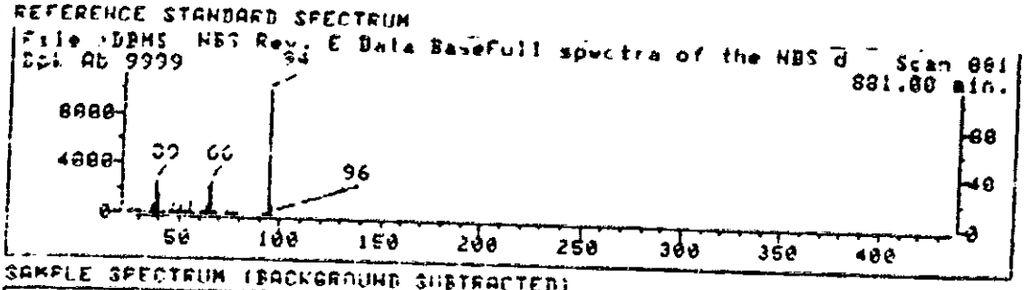
Data File: >J7347::117
Name: A60111 ACIDS J
Misc: K81720 ,QC4253,S, 3.31,10
Quant Time: A60114 07:29
Injected at: A60114 06:59

Compound No: 13
Compound Name: 2,4-Dimethylphenol
Scan Number: 504
Retention Time: 10.18 min.
Area: 17233
Concentration: 16.35 UG/ML
q-value: 93

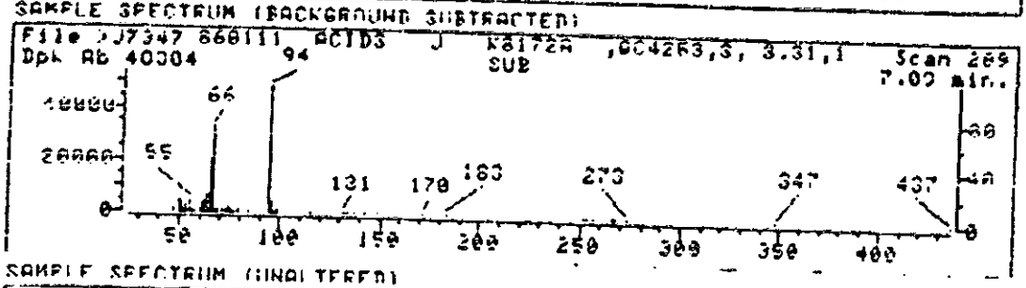
ATI #55

002036

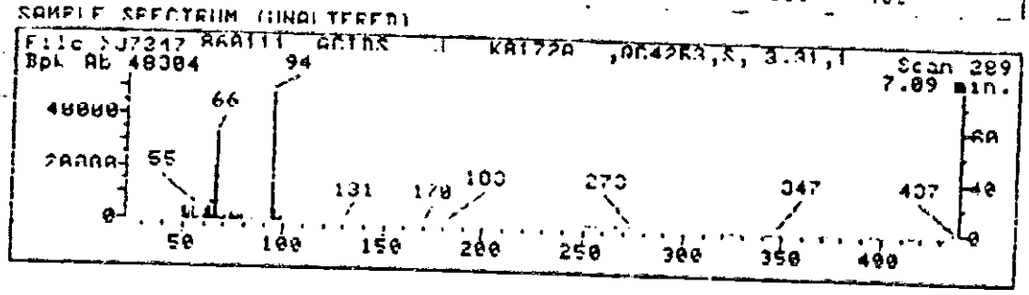
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



SAMPLE SPECTRUM (UNALTERED)



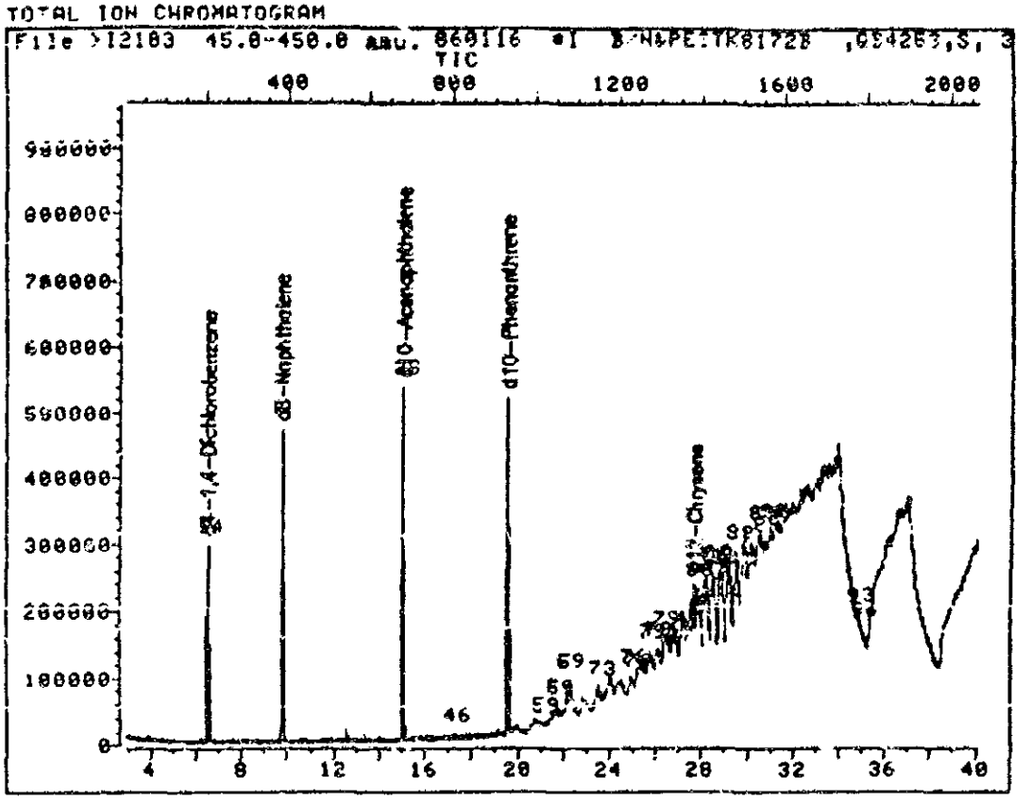
Data File: J17347::117
Name: 860111 ACIDS J
Misc: KB172A ,DC4253,S, 3.31,10
Quant Time: 860114 07:29
Injected at: 860114 06:52

AT: #55

Compound No: 9
Compound Name: Phenol
Scan Number: 289
Retention Time: 7.09 min.
Area: 175280
Concentration: 486.87 UG/ML
q-value: 38

002037

TOTAL ION CHROMATOGRAM



002038

Data File: >I2183::U6
Name: 860116 #I B/N&PEST
Misc: K8172B ,QB4253,S, 3.31,10000 BTL#20

Id File: IBNP::US
Title: B/N+PEST ID FILE .... FOR I 850326
Last Calibration: 860117 08:49

Operator ID: DS4712
Quant Time: 860118 10:31
Injected at: 860118 09:48

QUANT REPORT

Operator ID: DS4212
Output File: ^I2183::AQ
Data File: >I2183::U6
Name: 860116 #I B/N&PEST
Misc: KB172B .QR4253.S, 3.31.10000

Quant Rev: 5
Quant Time: 860118 10:31
Injected at: 860118 09:48
Dilution Factor: 1.00

BTL#20

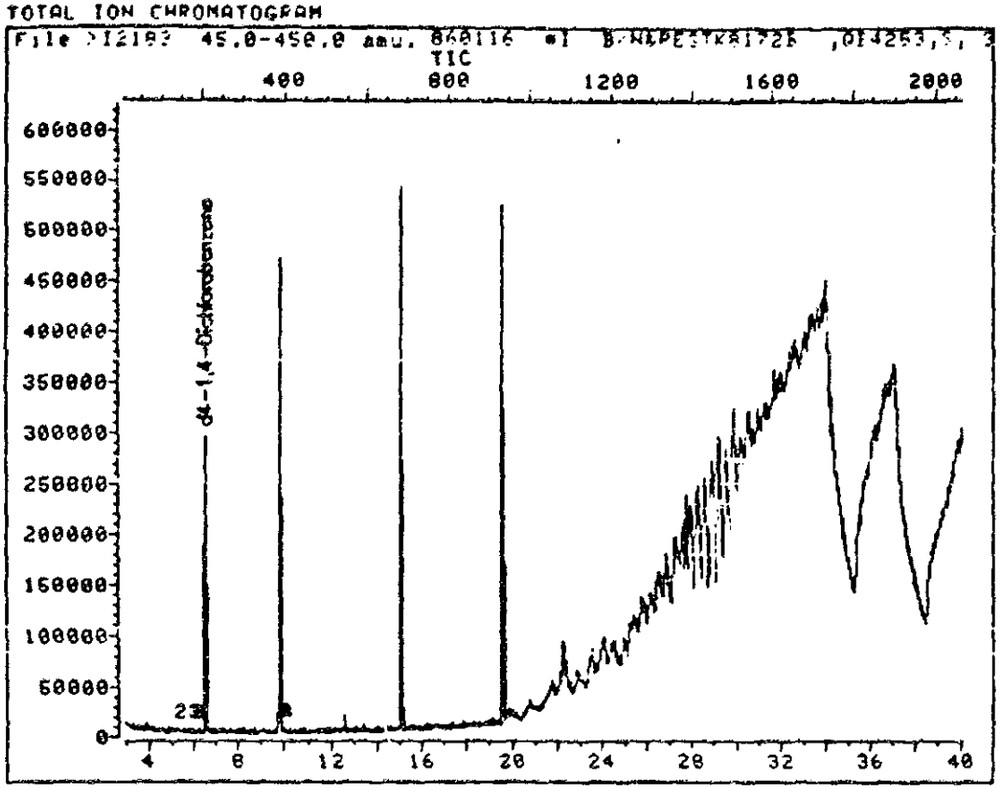
ID File: IBNP::US
Title: B/N+PEST ID FILE .... FOR I 850326
Last Calibration: 860117 08:49

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	6.48	201	92567	40.00	UG/ML	99
14)	bis(2-Chloroisopropyl)ether	6.48	201	5625	~~10.82~~	~~UG/ML~~	97
19)	*d8-Naphthalene	9.71	382	470690	40.00	UG/ML	94
34)	*d10-Acenaphthalene	15.01	679	279885	40.00	UG/ML	91
38)	Dimethyl phthalate	15.01	679	51036	~~5.25~~	~~UG/ML~~	68
46)	Fluorene	17.78	806	1341	~~.14~~	~~UG/ML~~	80
53)	*d10-Phenanthrene	19.50	930	554840	40.00	UG/ML	99
59)	Di-n-butyl phthalate	21.13	1021	1084	~~.08~~	~~UG/ML~~	1
59)	Di-n-butyl phthalate	21.26	1056	1094	~~.08~~	~~UG/ML~~	1
59)	Di-n-butyl phthalate	22.21	1081	2460	~~.19~~	~~UG/ML~~	16
70)	*d12-Chrysene	27.66	1383	131274	40.00	UG/ML	100
73)	Endosulfan I	23.53	1154	1569	~~6.03~~	~~UG/ML~~	44
76)	Endrin	24.88	1229	1327	~~3.98~~	~~UG/ML~~	41
76)	Endrin	25.07	1240	2393	~~7.10~~	~~UG/ML~~	67
79)	Endrin aldehyde	25.71	1275	1650	~~3.16~~	~~UG/ML~~	48
79)	Endrin aldehyde	26.01	1292	2006	~~3.84~~	~~UG/ML~~	61
79)	Endrin aldehyde	26.34	1310	4675	~~8.99~~	~~UG/ML~~	46
86)	Chrysene	28.49	1429	3334	~~.95~~	~~UG/ML~~	52
86)	Chrysene	28.54	1432	2215	~~.43~~	~~UG/ML~~	58
87)	3,3'-Dichlorobenzidine	26.99	1346	1320	~~1.79~~	~~UG/ML~~	60
88)	bis(2-Ethylhexyl)phthalate	27.84	1393	7945	~~2.23~~	~~UG/ML~~	87
88)	bis(2-Ethylhexyl)phthalate	28.47	1428	5863	~~1.64~~	~~UG/ML~~	52
88)	bis(2-Ethylhexyl)phthalate	28.78	1445	4877	~~1.37~~	~~UG/ML~~	49
89)	Di-n-octyl phthalate	29.50	1485	2601	~~.66~~	~~UG/ML~~	41
89)	Di-n-octyl phthalate	30.53	1542	5198	~~1.31~~	~~UG/ML~~	21
89)	Di-n-octyl phthalate	30.72	1552	15426	~~3.89~~	~~UG/ML~~	94
90)	Benzo(b)fluoroanthene	30.91	1563	3116	~~1.29~~	~~UG/ML~~	57
91)	Benzo(k)fluoranthene	30.91	1563	3116	~~1.42~~	~~UG/ML~~	59
92)	Benzo(a)pyrene	30.91	1563	3116	~~1.47~~	~~UG/ML~~	58
93)	Indeno(1,2,3-c,d)pyrene	34.83	1779	1846	~~.70~~	~~UG/ML~~	89
94)	Dibenzo(a,h)anthracene	34.99	1788	1317	~~.61~~	~~UG/ML~~	78

* Compound is ISTD

BT 1/21/86.

TOTAL ION CHROMATOGRAM



002040

Data File: >I21B3::U6
Name: 860116 #1 B/N&PEST
Misc: K8172B ,QB4253,S, 3.31,10000

BTL#20

Id File: PK::US
Title: Hexachlorophene
Last Calibration: 860122 09:16

Operator ID: DS4712
Quant Time: 860122 09:19
Injected at: 860118 09:48

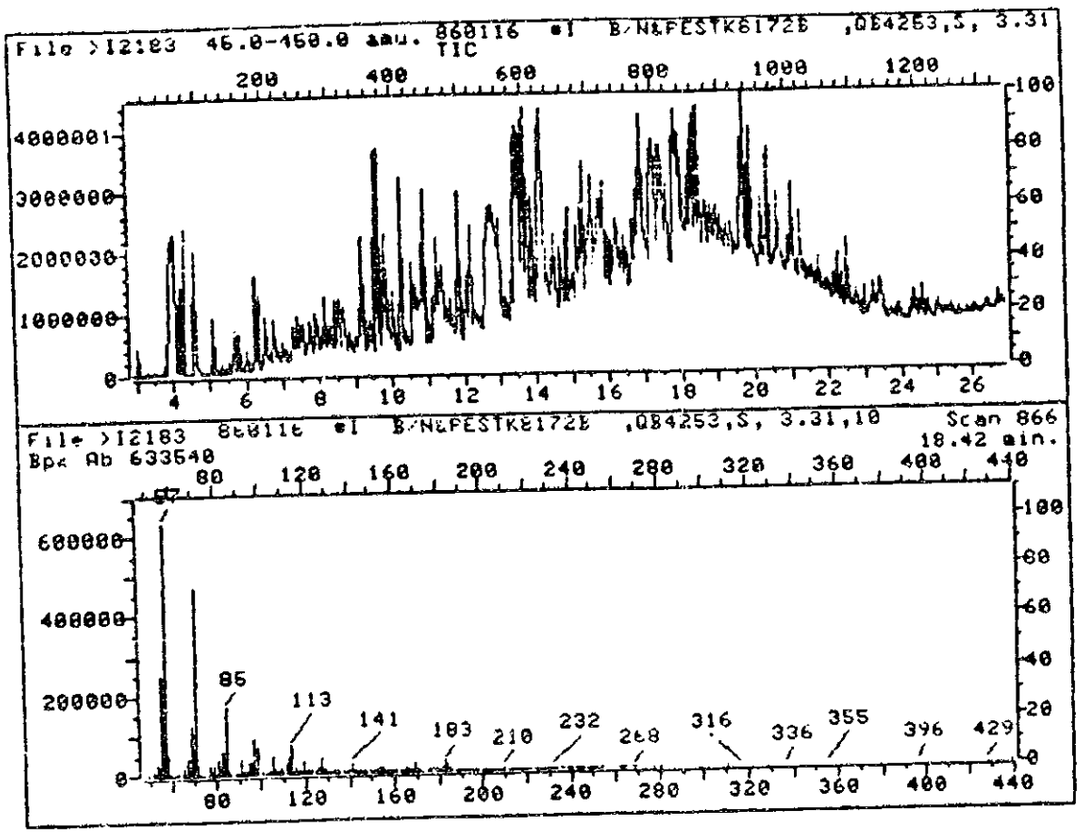
QUANT REPORT

Operator ID: DS4712 Quant Rev: 5 Quant Time: 860122 09:19
Output File: I12183::AQ Injected at: 860118 09:48
Data File: >I2183::U6 Dilution Factor: 1.00
Name: 860116 #I B/N&PEST
Misc: K81728 ,QB4253,S, 3.31,10000 BTL#20

ID File: PK::US
Title: Hexachlorophene
Last Calibration: 860122 09:16

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	6.48	201	92567	40.00	UG/ML	99
2)	Benzaldehyde	5.36	138	214	.07	~~UG/ML~~	86
3)	Benzyl alcohol	5.96	172	206	.15	~~UG/ML~~	91
3)	Benzyl alcohol	6.16	183	275	.20	~~UG/ML~~	70
4)	Catechol	9.96	396	177	.10	UG/ML	57
4)	Catechol	10.08	403	159	.09	~~UG/ML~~	69
5)	Benzoic acid	9.91	393	198	.11	~~UG/ML~~	81

* Compound is ISTD



002042

MS data file header from : >I2183

Sample: 860116 #1 B/N&PEST Operator: DS4712 GENERAL 1/17/86 13:20
BTL#20
Misc : K8172B ,QB4253,S, 3.31,10
Sys. #: 1 MS model: 96 SW/HW rev.: CA ALS # : 0
Method file: BNPI Tuning file: MTI001 No. of extra records: 1
Source temp.: 265 Analyzer temp.: 245 Transfer line temp. : 280

Chromatographic temperatures :	35.	60.	320.	320.	320.
Chromatographic times, min. :	.0	0.0	14.0	24.0	24.0
Chromatographic rate, deg/min:	30.0	8.0	0.0	0.0	0.0

:GR,,1

See Comments page

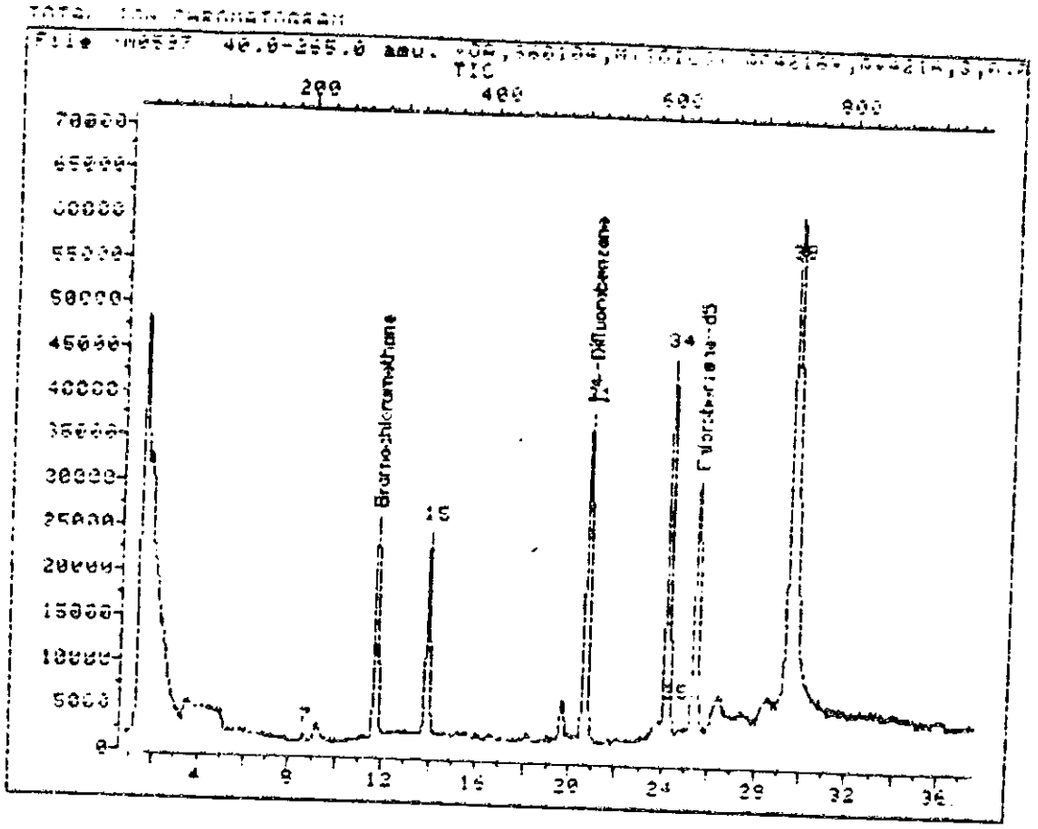
:AL,,2

Appendix C1

GC/MS Subsidiary Data

002043

TOTAL ION CHROMATOGRAM



Data File: >M0587::U4
Name: VOA,860104,M(SOILS)
Misc: UC4216U,UV4216,S,0.01,0.01, UC BLANK

Id File: MVOA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860104 21:26

Operator ID: DS4212
Quant Time: 860105 00:52
Injected at: 860104 18:07

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QUANT REPORT

Operator ID: [illegible]
Output File: [illegible]M0587::AQ
Data File: [illegible]M0587::U4
Name: [illegible]A,860104,M(SOILS)
Misc: [illegible],[illegible]4216,5,0.01,0.01, [illegible] BLANK

Quant Rev: 4 Quant Time: 860105 [illegible]
Injected at: 860104 18:[illegible]
Dilution Factor: [illegible] 1.[illegible]

ID File: [illegible]A::US
Title: Volatile Priority Pollutant ID File
Last Calibration: 860104 21:26

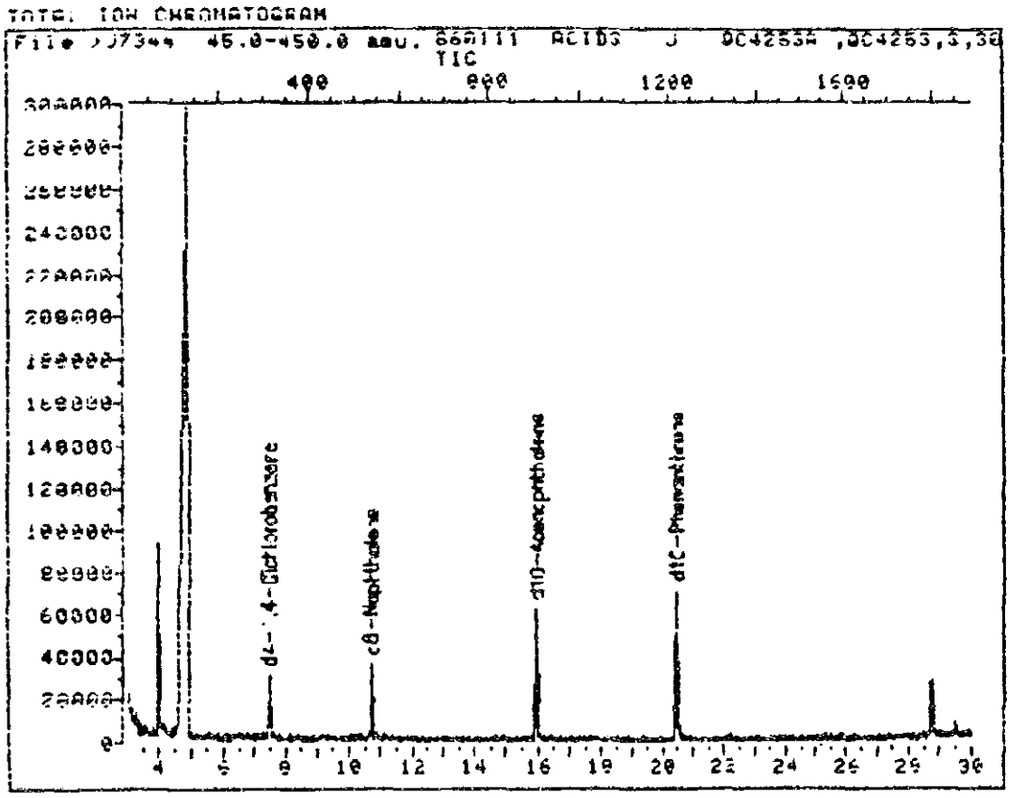
	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*Bromochloromethane		11.70	282	48949	250.00	NG	9[illegible]
2)	Methylene chloride		8.59	202	1321	~~[illegible]~~	~~NG~~	[illegible]
15)	1,2-Dichloroethane-D4	(SURR)	13.90	339	43303	26[illegible].39	NG	9[illegible]
1[illegible]	*1,4-Difluorobenzene		20.[illegible]9	514	167[illegible]8	250.00	NG	[illegible]
30)	*Chlorobenzene-d5		25.42	636	110392	250.00	NG	9[illegible]
31)	2-Chloroethylvinyl ether		20.69	514	43[illegible]02	155.31	NG	[illegible]
34)	Toluene-D8	(SURR)	24.22	605	191464	25[illegible].03	NG	9[illegible]
35)	Toluene		24.41	610	1484	~~1.96~~	~~NG~~	[illegible]
38)	p-Bromofluorobenzene	(SURR)	29.49	741	95965	245.47	NG	9[illegible]

* Compound is [illegible]

OT 1/6/85

002045

TOTAL ION CHROMATOGRAM



Data File: >J7344::U2
Name: 860111 ACIDS J
Misc: QC4253A ,QC4253,S,30.00,10

ATL #52

Id File: JACID::US
Title: PP/ACID IDFILE
Last Calibration: 860113 08:42

Operator ID: TM0576
Quant Time: 860114 05:17
Injected at: 860114 04:40

002046

QUANT REPORT

Operator ID: TM0576
Output File: ^J7344::AQ
Data File: >J7344::U7
Name: 860111 ACIDS .1
Misc: QL4251A ,QC4253,S,30.00,10

Quant Rev: 4
Quant Time: 860114 05:17
Injected at: 860114 04:40
Dilution Factor: 1.00

ATI #52

ID File: JACID::US
Title: PP/ACID IDFILE
Last Calibration: 860113 08:47

Compound	R.T.	Scan#	Area	Conc	Units	Q
1) *d4-1,4-Dichlorobenzene	7.46	310	15138	40.00	UG/ML	94
11) *d8-Naphthalene	10.68	535	49892	40.00	UG/ML	93
18) *d10-Acenaphthalene	15.94	902	39451	40.00	UG/ML	91
24) *d10-Phenanthrene	20.45	1217	86859	40.00	UG/ML	96

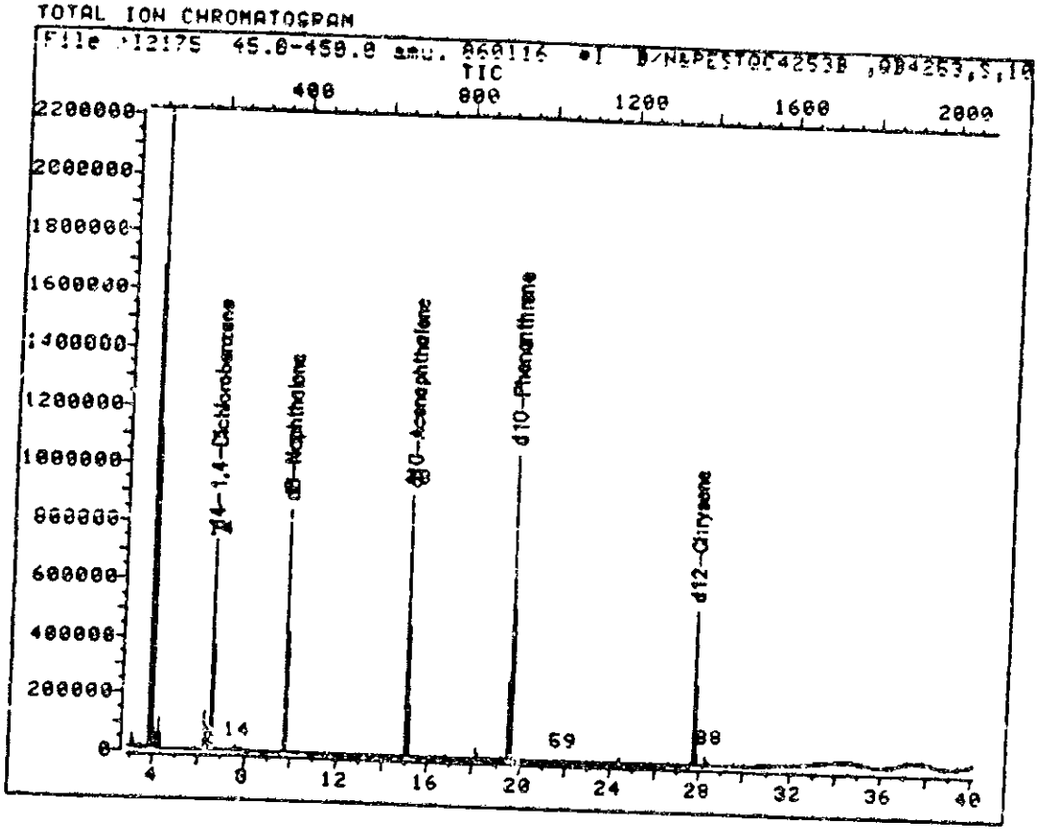
* Compound is ISTD

CA
1-15-86

3) ND
10) ND
25) ND.

0024

TOTAL ION CHROMATOGRAM



Data File: >I2175::US
Name: 860116 #I B/N&PEST
Misc: QC4253B ,QB4253,S,~~10.00~~,10
30 [illegible] 01/22/86

Id File: IBNP::US
Title: B/N+PEST ID FILE .... FOR I 850326
Last Calibration: 860117 08:49

Operator ID: DS4712
Quant Time: 860117 08:51
Injected at: 860117 06:41

BTL#12

002048

QUANT REPORT

Operator ID: DS4712
Output File: ^I2175::AQ
Data File: >I2175::US
Name: 860116 #I B/N&PEST
Misc: QC4253B ,QB4253,S,~~10.00~~,10
30 JT 1/26/86

Quant Rev: 5 Quant Time: 860117 08:50
Injected at: 860117 06:41
Dilution Factor: 1.00

BTL#12

ID File: IBNP::US
Title: B/N+PEST ID FILE .... FOR I 850326
Last Calibration: 860117 08:49

	Compound	R.T.	Scan#	Area	Conc	Units	Q
1)	*d4-1,4-Dichlorobenzene	6.47	202	248808	40.00	UG/ML	99
14)	bis(2-Chloroisopropyl)ether	6.49	203	13804	~~9.88~~	~~UG/ML~~	91
14)	bis(2-Chloroisopropyl)ether	7.52	261	1237	~~.89~~	~~UG/ML~~	99
19)	*d8-Naphthalene	9.70	383	912968	40.00	UG/ML	93
34)	*d10-Acenaphthalene	15.00	680	461600	40.00	UG/ML	91
38)	Dimethyl phthalate	15.00	680	80735	~~5.04~~	~~UG/ML~~	71
53)	*d10-Phenanthrene	19.49	932	1153313	40.00	UG/ML	98
59)	Di-n-butyl phthalate	21.76	1059	6312	~~.23~~	~~UG/ML~~	99
70)	*d12-Chrysene	27.64	1389	602644	40.00	UG/ML	100
88)	bis(2-Ethylhexyl)phthalate	28.25	1423	25298	1.54	UG/ML	93

* Compound is ISTD

JT 1/26/86

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

002050

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 47285 ETC Job # K8172

Date Sealed 12-6-85 By: M. Ickstadt

Company: RESOURCE ENGINEERING

Facility/Site:

Address: 3000 RICHMOND AVE.
HOUSTON, TX 77098

Attn.: CHRIS ITIN

Phone: ( )

SAMPLE IDENTIFICATION

Facility: RES288-04 (Facility/Site Code) EVAPORATION SYSTEM (Optional Sample Point Descriptions)

Sample Point: T-XXXES13a (Source Code (from below) / Your Sample Point ID (left justify)) 851217 (Start Date (YY/MM/DD)) Start Time (2400 hr. clock) Elapsed Hours (composite)

Source Codes

Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys. (C) Other (X)

Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Filt. (Y/N)	SAMPLER Observations	LAB Observations
1	E	500mL	BAKED	EXTRACTABLE			✓
2	F	40mL	BAKED	VOA			✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) JOHN BINS Date: 12/9/85 Time: 6:30 PM
Signature: John Bins Seal #: 0047285 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) JOHN BINS Date: 12/19/85 Time: 5:30 PM
Signature: John Bins Seal #: 0047286 Intact: YES

ETC USE ONLY Opened By: R. Anderson Date: 12/20/85 Time: 11:00

Seal #: 47286 Condition: INTACT

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # K8172

Sample Point [T] [XBAIES1 B1C4 1]
Source Code — Sample Point I.D.

FIELD PROCEDURES

PURGE DATE (YY MM DD)	START PURGE (2400 Hr Clock)	ELAPSED HRS	WATER VOL. IN CASING (Gallons)	VOLUME PURGED (Gallons)

SAMPLING METHOD: SAMPLING TROWEL

Sampler Type [ ] A-Submersible Pump B-ISCO C-Bladder Pump D-Dipper/Bottle E-Bailer F-Scoop/Shovel X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon B-Metal C-PVC D-Plastic X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon B-Tygon C-Polyethylene D-Silicon X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Preservative

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____

Depth to Ground water (ft) _____

Groundwater Elevation (ft msl) _____

Well Depth (ft) _____

Sample Depth (non-well) (ft) 0.0 - 2.0

1st	(STD)	1st	umhos/cm at 25° C				
2nd	(STD)	2nd	umhos/cm at 25 °C				
3rd	(STD)	3rd	umhos/cm at 25 °C				
4th	(STD)	4th	umhos/cm at 25 °C				

Sample Temp (°C) _____ Turbidity (NTU) _____

FIELD COMMENTS

Sample Appearance: MOIST OILY SLUDGE BLACK IN COLOR 0-6"

Weather Conditions: _____

Other: HNU READING OF 20ppm VOLATILE ORGANICS IN HOLE

EPA ~~SPE~~ SPLIT # SD2-6A

RESPIRATORS WORN AT THIS SAMPLE LOCATION

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: JOHN BINS (Print) Employer: RESOURCE ENGINEERING INC

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

12/14/85 (Date) John Bins (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/4/86 SHIFT
FRACTION VOA (soils) dilns)
INSTRUMENT M
TUNE FILE APCI02
SEQUENCE FILE DSM, RRM
METHOD FILE VOAM
ID FILE MVOA
ANALYST(S) Dan K. M[illegible]
Brenda [illegible]
SUPERVISOR [illegible]
BATCH #'s QV4216

STANDARD	CONC PPM	LOT NO.	LOT VOL.
PBFB	50	12157	1
Istd	25	12066	10
Surrog	25	12019	10
ABC/SCWA	18	12141	10, 5, 30
omp chlorotoluene	18	11852	5, 10, 30

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACC		DATE	1/4/86
WIP		BY	[illegible]

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
p BFB	7M0586	1 µl	.		L00008	OK 17:24	
QC4216V	7M0587		6			OK 10 µl HPC [illegible] MEOH (QC blank + [illegible])	
QC4216VS	7M0588		7		COORD	5 µl ABC/SCWA [illegible]	
QC4216VS	7M0589		8		COORD	10 µl	
QC4216VS	7M0590		9			20:24 30 µl	
p-BFB	7M0591					OK 21:26	
K8558VS	7M0592	.005	1	1/200	OK	~~NG~~	
K8558V	7M0593		2		OK QC ONLY	~~NG~~ 1/10 AS soil	
K8559V	7M0594		3		QC ONLY	~~NG~~ rr 1/10 ~~to dilute~~	
K8559VR	7M0595		4		QC ONLY	~~NG~~ rr 1/10 ~~to dilute~~	soil .19
K8560V	7M0596	0.001	5	1/100		NG rr 1/10 gm AS soil	
K8089V	7M0597	0.002	6	1/500		OK	
K8091V	7M0598	0.001	7	1/1000	OK	~~NG rr 1/500 to dilute~~	
K8172V	7M0599		8			OK	
K8485V	7M0600		9			NG rr 1/20 to dilute	
K8407V	7M0601	0.005	10	1/200		NG 1/10 gm as soil	
QC4216VS	7M0602	0.01	1		7:31	OK 5 µl stdo + 10 µl MEOH	
p-BFB	7M0603					OK 8:34	
K8793V	7M0604	.001	1	1:100	OK	Rerun for benzene + toluene	1:5000
K8797V	7M0605	.02	2	1:500	NOT	Run	
QC4216V	7M0606	.01	1		OK	Position check	
(R) K8793V	7M0607	.0002	2	1:5000	OK	(RA)	
K8485V	7M0608	.05	3	1:20	NG	Rerun as soil 19 ok	
K8797V	7M0609	.002	4	1:500	OK		
K4357V	7M0610	.00005	6	1:100,000	OK		

ETC FORM #102

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/5/86 SHIFT
FRACTION VOA
INSTRUMENT M
TUNE FILE APEI03
SEQUENCE FILE RPM
METHOD FILE VOAM
ID FILE MVOA
ANALYST(S) R. Mad
SUPERVISOR [signature]
BATCH #'s QV4216

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
See Pg. #1			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS V/N
K8889V	7M0611	0001	7	1:1000		OK	1

ETC FORM 9102

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
† K4174	12865	3.05	10.0	10.0	PP/CRB/PST/RB
+ K8172	12847	3.31	10.0	10.0	(impo/on)
★ K5472	12884	30.04	10.0	10.0	
K5926	12921	30.26	10.0	10.0	
K8889	12883	30.21	10.0		PP/BN Bn+1
K8895	↓	30.08	10.0		↓ Bn+1
∅ K5801	12122	12.17	10.0		PP/BN
QC 4253			10.0	10.0	
K4174	S	3.30	10.0	10.0	
K8172	R	3.25	10.0	10.0	

QC Batch # 4253

Analysis PP/BN
PP/ACID

1-4

Matrix Soil

Turnaround Normal

Date 12/31/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

∅ Repeat of QC 4197.

★ Rescheduled from QC 4243 - Sample is biphasic, analysis to be done on soil (K5472) portion.

† Refer to QC 4228 Samples to be redone using 30 grams.

POSSIBLE LOW SURROGATE RECOVERY DUE TO ~~[illegible]~~ MATRIX INTERENCE DURING EXTRACTION. WHO 1-3-86

1.0 ml Aliquots taken from all samples

QC UPD

FRACTION	SPIKE Amt (ml)	Conc. (µg/ml)	Lot #
BN	1.0	100	12098
ACID	1.0	100	11825
Aroclor 1260	1.0	100	12097
PEST	1.0	100/200	12059
Spec #930 BN spike	1.0	100	12137
Semi-VOA	→		

SURROGATE Amt. (ml)	Conc. (µg/ml)	Lot #
1.0	BN: 50	12093
	ACID: 100	

Set-up: [illegible] 1-2-86

UPD/Supervisor: [illegible] 1/6/86

BN Conc.: [illegible] 1-3-86 Acid Conc.: [illegible] 1-3-86

Spike/Surr. Verified: [illegible] 1/2/86

ETC FORM #110

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/11/96 SHIFT
FRACTION Acid
INSTRUMENT J
TUNE FILE MTJ001
SEQUENCE FILE JH11
METHOD FILE ACID F
ID FILE IACID
ANALYST(S) J Hendel
SUPERVISOR [signature]
BATCH #'s GA4275, GA4255, GA4253, GA4258

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	960113
WIP	[initials]	BY	[initials]

STANDARD	CONC PPM	LOT NO	LOT VOL.
Int. Std	400	12,008	100 [illegible]
Acid Cal Std I	1	12,020	
Acid cal Std II		12,021	
Acid cal Std III		12,022	
o,m,p-Cresols	60	12,053	
o,m,p-Cresols	100	12,052	
o,m,p-Cresols	300	12,051	
HSLPP Acids	60	12,177	
HSLPP Acids	100	12,178	
HSLPP Acids	300	12,179	
Spec #460 For P-Chlorophenol	60	11951	
Spec #460 "	100	11950	
Spec #460 "	300	11949	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP 50ng Std	>J7292						
Acid cal Std III	J7293		1				
Acid cal Std II	J7294		2				
Acid cal Std I	J7295		3				
o,m,p Cresols; 300ppm	J7296		4				
o,m,p Cresols; 100ppm	J7297		5				
o,m,p Cresols; 60ppm	J7298		6				
HSLPP Acid; 300ppm	J7299		7				
HSLPP Acid; 100ppm	J7300		8				
HSLPP Acid; 60ppm	J7301		9				
Spec #460; 300ppm	J7302		10				
Spec #460; 100ppm	J7303		11				
Spec #460; 60ppm	J7304		12				
DFTPP 50ng Std	J7305		13				
GC4275AS	J7306		14				
K7991AS	J7307		15				
GC4275A	J7308		16			Act1 PA	Y
J8451A	J7309		17				
J6299A	J7310		18			Act1 PA	Y
K7990A	J7311		19				
K7990AR	J7312		20				
K7984A	J7313		21				
K7991A	J7314		22				
K6903A	J7315		23			Do not Process	
K8892A	J7316		24			Act1 PA	Y

ETC FORM #102

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 11/26 SHIFT
FRACTION Acid
INSTRUMENT J
TUNE FILE
SEQUENCE FILE
METHOD FILE
ID FILE
ANALYST(S) J Hindel
SUPERVISOR Rich Albert
BATCH #'s GA4275, GA4255, GA4253, GA4258

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8893A	>J7317		25				
K8894A	J7318		26			Acid PA	Y
QC4255AS	J7319		27			~~Acid~~	~~Y~~
K7735AS	J7320		28	1:3 => Sample leaked by S.P.			
QC4255A	J7321		29			Acid PA	Y
K7738A	J7322		30				
K7738AR	J7323		31	1:2 => Sample leaked by S.P.			
K8562A	J7324		32	1:4 => Sample leaked by S.P.			
K8564A	J7325		33	1:2 => Sample leaked by S.P.			
K8203A	J7326		34				
DFTPP 50ng std	J7327		35				
Acid cal std II	J7328		36				
K7739A	J7329		37				
K8370A	J7330		38	1:2 => Sample leaked by S.P.		Acid PA	Y
K8688A	J7331		39				
K8440A	J7332		40				
K1716A	J7333		41				
K1718A	J7334		42				
K1719A	J7335		43				
K8937A	J7336		44	1:2 => Sample leaked by S.P.			
K1680A	J7337		45				
K4547A	J7338		46				
K7731A	J7339		47				
K7734A	J7340		48				
K6403A	J7341		49	1:2 => Sample leake by S.P.			

ETC FORM #102

002057

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/11/90 SHIFT
FRACTION Acs
INSTRUMENT J
TUNE FILE
SEQUENCE FILE
METHOD FILE
ID FILE
ANALYST(S) J Hindel
SUPERVISOR Rich Albert
BATCH #'s GA4275, GA4255, GA4256, GA4258

STANDARD	CONC PPM	LOT NO	LOT VOL

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K7737A	>J7342		50				
K4174AS	J7343		51				
GC4253A	J7344		52				
K5926A	J7345		53				
K4174A	J7346		54				
K8172A	J7347		55				
K8172AR	J7348		56				
K5772A	J7349		57				
DFTPP-50ng std	J7350		58				
Acid cal std II	J7351		59				
GC4258A	J7352		60			Act1 PA	Y
K8890A	J7353		61	1:100			
K8890AR	J7354		62	1:100			
K8891A	J7355		63	1:100			
K8890A	J7356		64	1:50			
K8891A	J7357		65	1:50			

ETC FORM #102

002058

ETC LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol (ml) BN	Extract Vol (ml) ACID	Comments
+ K4174	12865	3.05	10.0	10.0	PP/CRG/PST, PCB
+ K8172	12847	3.31	10.0	10.0	Completed
★ K5972	12884	30.04	10.0	10.0	
K5926	12921	30.26	10.0	10.0	↓ ✓
K8889	12883	30.21	10.0		PP/BN
K8895	↓	30.08	10.0		↓
¢ K5801	12122	12.17	10.0		PP/BN
QC 4253			10.0	10.0	
K4174	S	3.30	10.0	10.0	
K8172	R	3.25	10.0	10.0	

QC Batch # 4253

Analysis PP/BN
PP/ACID

Matrix soil

Turnaround Normal

Date 12/31/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

¢ Repeat of QC 41?

★ Rescheduled from QC 4243 - Sample is biphasic, analysis to be done on soil portion. (K5972)

+ Refer to QC 4228 Samples to be redone using 30 grams.

POSSIBLE LOW SURROGATE RECOVERY DUE TO ~~[illegible]~~ MATRIX INTERFERENCE DURING EXTRACTION. WHO 1-3-86

1.0 ml Aliquots taken from all samples

QC UPD m/

FRACTION	SPIKE Amt (ml)	SPIKE Conc. (ug/ml)	SPIKE Lot #
BN	1.0	100	12098
ACID	1.0	100	11825
Arochlor 1260	1.0	100	12097
PEST	1.0	100/200	12059
Spec #930 BN Spike	1.0	100	12137
Semi-VOA	→		

SURROGATE Amt. (ml)	Conc. (ug/ml)	Lot #
1.0	BN: 50 ACID: 100	12093

Set-up: [signature] 1-3-86

UPD/Supervisor: [signature] 1/6/86

BN Conc.: [signature] 1-3-86 Acid Conc.: [signature] 1-3-86

Spike/Surr. Verified: [signature] 1/2/86

ETC FORM #110

002059

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE Jan 16th 1986 SHIFT
FRACTION B/N
INSTRUMENT #1
TUNE FILE MT I 001
SEQUENCE FILE MV16
METHOD FILE BNPI
ID FILE I BNP
ANALYST(S) [illegible]

SUPERVISOR [illegible]
BATCH #'s Q34253, Q34322

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ	KU	DATE	Jan. 17th 1986
WIP		BY	KU

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Std. IV	150	12112	
B/N III	200	11906	
B/N II	100	12185	
B/N I	60	12110	
Aniline	300	12046	
Aniline	100	12047	
Aniline	60	12048	
Spec #930	300	12138	
Spec. #930	100	12139	
Spec. #930	60	12140	
DFTPP	25	11972	
Int Std	400	12008	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP - 50ng std	>I2163				I00381		
Std. IV 150ppm	>I2164		1		I00381		
B/N std. Std. III 200ppm	>I2165		2		I00382		
B/N std. Std. II; 100ppm	>I2166		3			HR1260	
B/N std. Std. I 60ppm	>I2167		4				
Aniline std; 300ppm	>I2168		5				
Aniline std; 100ppm	>I2169		6				
Aniline std. 60ppm	>I2170		7				
Spec #930 std. 300ppm	>I2171		8				
Spec. #930 std. 100ppm	>I2172		9				
Spec #930 std. 60ppm	>I2173		10				
DFTPP-50NG std.	>I2174		11			OK	
QC4253B	>I2175		12			PCBSCR PB	Y
K4174BS	>I2176		13			HR1260	
K5926B	>I2177		14			PCBSCR	
K5801B	>I2178		15	1:5			
K8895B	>I2179		16			PB	Y
K5472B	>I2180		17			PCBSCR	
K8889B	>I2181		18			PB	Y
K4174B	>I2182		19			PCBSCR	
K8172B	>I2183		20	1:1000	~~I00382~~ I00383	PCBSCR	
K8172BR	>I2184		21	1:1000		PCBSCR	
QC4322BS	>I2185		22			HR1260	
L0325BS	>I2186		23			HR1260	
DFTPP - 50NG std.	>I2187		24			OK	

ETC FORM 8102

002060

Technical Report

for

RESOURCE ENGINEERING

ATTENTION: CHRIS ITIN

3000 RICHMOND AVENUE

HOUSTON, TX 77098

EVAPORATION SYSTEM

SAMPLE # ES13D

002061

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8173	RESOURCE ENGINEERING	RES28804	TES13D	B51217		

Denis C. K. Lin, Ph.D.
Vice President
Research and Operations

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002062

Introduction

This report contains the analytical results on your sludge sample, TES13D 85/12/17. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your sample are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (i.e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your sample and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the sample are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Priority Pollutants

The priority pollutant compounds and elements are listed with their NPDES (National Pollution Discharge Elimination System) numbers, and the Method Detection Limit (MDL) published in the Federal Register. When a compound or element is present below its published MDL it is reported as BMDL (Below Method Detection Limit). When a compound or element is not present at any detectable concentrations it is reported as ND (Not Detected). MDL's for non-aqueous matrices are based on USEPA published MDL's but are adjusted as per sample weight. Matrix spike and replicate analyses, where included, were performed on samples randomly chosen within each quality assurance batch and are therefore not necessarily spikes and replicates of this report's sample. Surrogate compound recovery data and instrument calibration data are included in the Method Performance Data Tables.

002063

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 7, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds – GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8173	RESOURCE ENGINEERING	RES28804	TES13D	851217		

NPDES Number	Compound (Acrolein and Acrylonitrile values are screen only.)	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen. Added ug/kg	QC Matrix Spike: % Recov
1V	Acrolein	ND	500	ND	ND	ND	4000	90	ND	4000	126
2V	Acrylonitrile	ND	500	ND	ND	ND	400	99	ND	400	81
3V	Benzene	ND	22	ND	ND	ND	90.0	105	ND	90.0	92
4V	bis(Chloromethyl)ether	ND	50	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	24	ND	ND	ND	90.0	114	ND	90.0	91
6V	Carbon tetrachloride	ND	14	ND	ND	ND	90.0	103	ND	90.0	89
7V	Chlorobenzene	ND	30	ND	ND	ND	90.0	101	ND	90.0	93
8V	Chlorodibromomethane	ND	16	ND	ND	ND	90.0	107	ND	90.0	90
9V	Chloroethane	ND	50	ND	ND	ND	90.0	96	ND	90.0	91
10V	2-Chloroethylvinyl ether	ND	50	ND	ND	ND	90.0	180.	ND	90.0	196.
11V	Chloroform	ND	8.0	ND	ND	ND	90.0	100	ND	90.0	96
12V	Dichlorobromomethane	ND	11	ND	ND	ND	90.0	101	ND	90.0	91
13V	Dichlorodifluoromethane	ND	50	ND	ND	ND	90.0	104	ND	90.0	84
14V	1,1-Dichloroethane	ND	24	ND	ND	ND	90.0	100	ND	90.0	96
15V	1,2-Dichloroethane	ND	14	ND	ND	ND	90.0	100	ND	90.0	95
16V	1,1-Dichloroethylene	ND	14	ND	ND	ND	90.0	101	ND	90.0	90
17V	1,2-Dichloropropane	ND	30	ND	ND	ND	90.0	101	ND	90.0	92
18V	cis-1,3-Dichloropropylene	ND	25	ND	ND	ND	90.0	100	ND	90.0	81
19V	Ethylbenzene	ND	36	ND	ND	ND	90.0	98	ND	90.0	97
20V	Methyl bromide	ND	50	ND	ND	ND	90.0	103	ND	90.0	97
21V	Methyl chloride	ND	50	ND	ND	ND	90.0	98	ND	90.0	78
22V	Methylene chloride	BMDL	14	1.13	ND	64.5	90.0	63	430	90.0	0.
23V	1,1,2,2-Tetrachloroethane	ND	35	ND	ND	ND	90.0	121	ND	90.0	113
24V	Tetrachloroethylene	ND	21	ND	ND	ND	90.0	103	ND	90.0	96
25V	Toluene	ND	30	ND	ND	ND	90.0	102	ND	90.0	100
26V	1,2-Trans-dichloroethylene	ND	8.0	ND	ND	ND	90.0	101	ND	90.0	94
27V	1,1,1-Trichloroethane	ND	19	ND	ND	ND	90.0	102	ND	90.0	96
28V	1,1,2-Trichloroethane	ND	25	ND	ND	ND	90.0	110	ND	90.0	92
29V	Trichloroethylene	ND	9.5	ND	ND	ND	90.0	96	ND	90.0	90
30V	Trichlorofluoromethane	ND	50	ND	ND	ND	90.0	99	ND	90.0	87
31V	Vinyl chloride	ND	50	ND	ND	ND	90.0	99	ND	90.0	88
18V	trans-1,3-Dichloropropylene	ND	50	ND	ND	ND	90.0	98	ND	90.0	92

A Recovery normally variable using EPA Protocol Method 624.

B Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 9, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8173	RESOURCE ENGINEERING	RES28804	TES13D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg.	Second ug/kg.	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1A	2-Chlorophenol	ND	110	ND	ND	ND	0	-	ND	4400	82
2A	2,4-Dichlorophenol	ND	90	ND	ND	ND	0	-	ND	4400	94
3A	2,4-Dimethylphenol	ND	90	ND	183	ND	0	-	ND	4400	88
4A	4,6-Dinitro-o-cresol	ND	800	ND	ND	ND	0	-	ND	4400	61
5A	2,4-Dinitrophenol	ND	1400	ND	ND	ND	0	-	ND	4400	55
6A	2-Nitrophenol	ND	120	ND	ND	ND	0	-	ND	4400	90
7A	4-Nitrophenol	ND	80	ND	ND	ND	0	-	ND	4400	99
8A	p-Chloro-m-cresol	ND	100	ND	ND	ND	0	-	ND	4400	120
9A	Pentachlorophenol	ND	120	ND	ND	ND	0	-	ND	4400	135
10A	Phenol	236	50	ND	ND	ND	0	-	236	4400	193
11A	2,4,6-Trichlorophenol	ND	90	ND	ND	ND	0	-	ND	4400	102
	Catechol	ND	333	ND	ND	ND	0	-	ND	4400	1.
	Benzoic acid	ND	330	ND	ND	ND	0	-	ND	4400	29

A Variability in Replicate results due to non-homogenous nature of sample matrix.

B Recovery low due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8173	RESOURCE ENGINEERING	RES28804	TES13D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1B	Acenaphthene	ND	63	ND	ND	ND	0	-	ND	4400	78
2B	Acenaphthylene	ND	120	ND	ND	ND	0	-	ND	4400	109
3B	Anthracene	BMDL	63	ND	ND	ND	0	-	51.9	4400	99
4B	Benzidine	ND	1500	ND	ND	ND	0	-	ND	4400	40
5B	Benzo(a)anthracene	ND	260	ND	ND	ND	0	-	ND	4400	102
6B	Benzo(a)pyrene	ND	83	ND	ND	ND	0	-	ND	4400	85
7B	Benzo(b)fluoroanthene	ND	160	ND	ND	ND	0	-	ND	4400	100
8B	Benzo(ghi)perylene	ND	140	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	120	ND	ND	ND	0	-	ND	4400	83
10B	bis(2-Chloroethoxy)methane	ND	180	ND	ND	ND	0	-	ND	4400	66
11B	bis(2-Chloroethyl) ether	ND	190	ND	ND	ND	0	-	ND	4400	109
12B	bis(2-Chloroisopropyl)ether	ND	190	ND	ND	ND	0	-	ND	4400	71
13B	bis(2-Ethylhexyl)phthalate	ND	330	ND	ND	ND	0	-	ND	4400	213
14B	4-Bromophenyl phenyl ether	ND	63	ND	ND	ND	0	-	ND	4400	137
15B	Butyl benzyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	146
16B	2-Chloronaphthalene	ND	63	ND	ND	ND	0	-	ND	4400	44
17B	4-Chlorophenyl phenyl ether	ND	140	ND	ND	ND	0	-	ND	4400	49
18B	Chrysene	ND	83	ND	ND	ND	0	-	ND	4400	108
19B	Dibenzo(a,h)anthracene	ND	330	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	93
21B	1,3-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	90
22B	1,4-Dichlorobenzene	ND	150	ND	ND	ND	0	-	ND	4400	92
23B	3,3'-Dichlorobenzidine	ND	550	ND	ND	ND	0	-	ND	4400	0
24B	Diethyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	52
25B	Dimethyl phthalate	BMDL	330	ND	ND	ND	0	-	52.9	4400	94
26B	Di-n-butyl phthalate	BMDL	330	ND	ND	ND	0	-	85.3	4400	177
27B	2,4-Dinitrotoluene	ND	190	ND	ND	ND	0	-	ND	4400	47
28B	2,6-Dinitrotoluene	ND	63	ND	ND	ND	0	-	ND	4400	36
29B	Di-n-octyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	108
30B	1,2-Diphenylhydrazine	ND	330	ND	ND	ND	0	-	ND	4400	0
31B	Fluoranthene	BMDL	73	ND	ND	ND	0	-	35.8	4400	123
32B	Fluorene	ND	63	ND	ND	ND	0	-	ND	4400	64

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8173	RESOURCE ENGINEERING	RES28804	TES13D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov a	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
33B	Hexachlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	133
34B	Hexachlorobutadiene	ND	30	ND	ND	ND	0	-	ND	4400	87
35B	Hexachlorocyclopentadiene	ND	330	ND	ND	ND	0	-	ND	0	-
36B	Hexachloroethane	ND	53	ND	ND	ND	0	-	ND	4400	22c
37B	Indeno(1,2,3-c,d)pyrene	ND	160	ND	ND	ND	0	-	ND	0	-
38B	Isophorone	ND	73	ND	ND	ND	0	-	ND	4400	62
39B	Naphthalene	ND	53	ND	ND	ND	0	-	ND	4400	119
40B	Nitrobenzene	ND	63	ND	ND	ND	0	-	ND	4400	127
41B	N-Nitrosodimethylamine	ND	330	ND	ND	ND	0	-	ND	0	-
42B	N-Nitrosodi-n-propylamine	ND	330	ND	ND	ND	0	-	ND	4400	140
43B	N-Nitrosodiphenylamine	75.1	63	ND	ND	ND	0	-	75.1	4400	30
44B	Phenanthrene	ND	180	ND	ND	ND	0	-	ND	4400	127
45B	Pyrene	ND	63	ND	ND	ND	0	-	ND	4400	125
46B	1,2,4-Trichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	77
	Benzaldehyde	ND	330	ND	ND	ND	0	-	ND	4400	48
	Benzyl alcohol	BMDL	330	88.6	227	ND	0	-	51.1	4400	37

b Reagent Blank. Spiked Blank cannot be performed for this sample matrix.

S Recovery normally variable using EPA Protocol Method 625.

C Recovery variable due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide/PCB Compounds - GC/MS Analysis Data (QR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8173	RESOURCE ENGINEERING	RES28804	TES13D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov a	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1P	Aldrin	ND	63	ND	ND	ND	0	-	ND	4400	44
2P	Alpha-BHC	ND	330	ND	ND	ND	0	-	ND	4400	39
3P	Beta-BHC	ND	150	ND	ND	ND	0	-	ND	4400	117
4P	Gamma-BHC	ND	330	ND	ND	ND	0	-	ND	4400	77
5P	Delta-BHC	ND	100	ND	ND	ND	0	-	ND	4400	14.
6P	Chlordane	ND	330	ND	ND	ND	0	-	ND	8800	41
7P	4,4'-DDT	ND	93	ND	ND	ND	0	-	ND	4400	0.
8P	4,4'-DDE	ND	190	ND	ND	ND	0	-	ND	4400	70
9P	4,4'-DDD	ND	160	ND	ND	ND	0	-	ND	4400	76
10P	Dieldrin	ND	83	ND	ND	ND	0	-	ND	4400	68
11P	Endosulfan I	ND	330	ND	ND	ND	0	-	ND	4400	78
12P	Endosulfan II	ND	330	ND	ND	ND	0	-	ND	4400	0.
13P	Endosulfan sulfate	ND	190	ND	ND	ND	0	-	ND	4400	42
14P	Endrin	ND	330	ND	ND	ND	0	-	ND	4400	32
15P	Endrin aldehyde	ND	330	ND	ND	ND	0	-	ND	4400	35
16P	Heptachlor	ND	63	ND	ND	ND	0	-	ND	4400	0.
17P	Heptachlor epoxide	ND	73	ND	ND	ND	0	-	ND	4400	56
18P	PCB-1242	ND	1200	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	1200	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	1000	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	1200	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	1200	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	ND	1200	ND	ND	ND	0	-	ND	4400	90
24P	PCB-1016	ND	1200	ND	ND	ND	0	-	ND	0	-
25P	Toxaphene	ND	330	ND	ND	ND	0	-	ND	0	-

a Recovery normally variable using EPA Protocol Method 625.

b Reagent Blank. Spiked Blank cannot be performed for this sample matrix.

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery Soil - GC/MS Data (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8173	RESOURCE ENGINEERING	RES28804	TES13D	85121		0

Compound	Amount added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION				
Toluene-D8	.250	86	50	160
p-Bromofluorobenzene	.250	96	50	160
1,2-Dichloroethane-D4	.250	89	50	160
ACID FRACTION				
Phenol-D5	100	74	20	140
2-Fluorophenol	100	85	20	140
2,4,6-Tribromophenol	100	101	10	140
BASE/NEUTRAL FRACTION				
Nitrobenzene-D5	50	75	20	140
2-Fluorobiphenyl	50	78	20	140
Terphenyl-D14	50	76	20	150

* IPS EPA Control Limits

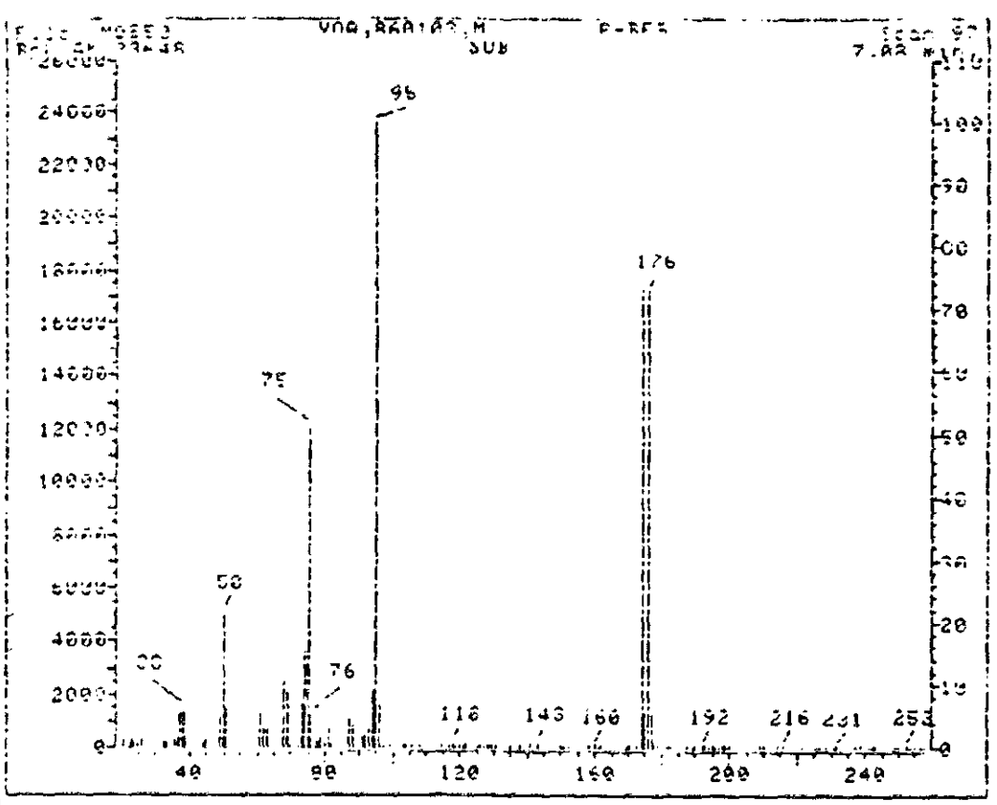

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.56	21.56	Ok
75	30-60% of mass 95	51.15	51.15	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.39	7.39	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	73.03	73.03	Ok
175	5-9% of mass 174	5.59	7.66	Ok
176	95-101% of mass 174	73.02	100.05	Ok
177	5-9% of mass 176	5.98	8.18	Ok

Injection Date: 01/03/86 Analyst: [signature]
Injection Time: 09:03 Processor: P.R. [signature]
Run No: >M0550 QC Batch: GK4206
Spectrum No: 97 Samples: K8171, K8173, K8484, ~~K8477~~ K4174, ~~K8470~~, K8173

1-4

1-4

Ky 1/6/86

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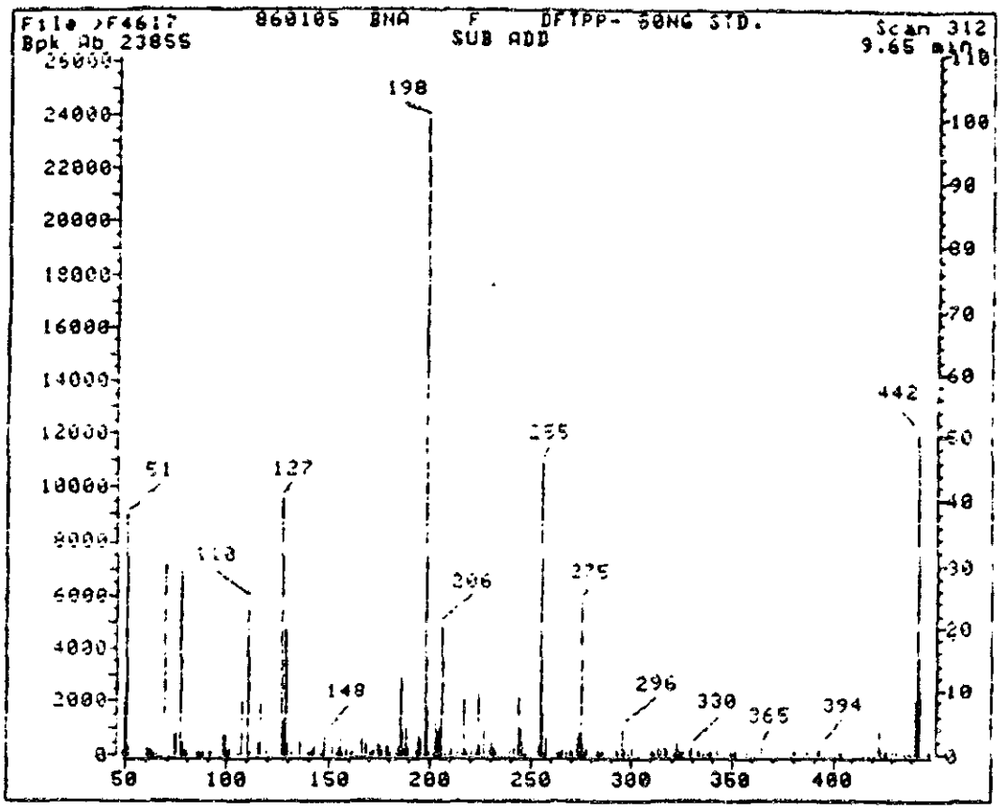

TABLE 2: METHOD PERFORMANCE DATA .QR23

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for ~~Base/Neutral~~ Acid Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	37.49	37.49	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	29.90	29.90	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	40.19	40.19	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.93	6.93	Ok
275	10-30% of mass 198	24.59	24.59	Ok
365	Greater than 1% of mass 198	1.31	1.31	Ok
441	0-100% of mass 443	8.34	85.48	Ok
442	Greater than 40% of mass 198	50.23	50.23	Ok
443	17-23% of mass 442	9.76	19.43	Ok

Injection Date: 01/06/86 Analyst: [illegible]
Injection Time: 07:46 Processor: [illegible]
Run No: >F4617 QC Batch: QA 4228 K8175
Spectrun No: 312 Samples: K8174, K8173, ~~K8176~~, K8171, I8439, K8176, K8484, K8485

K. Baker 1/9/86

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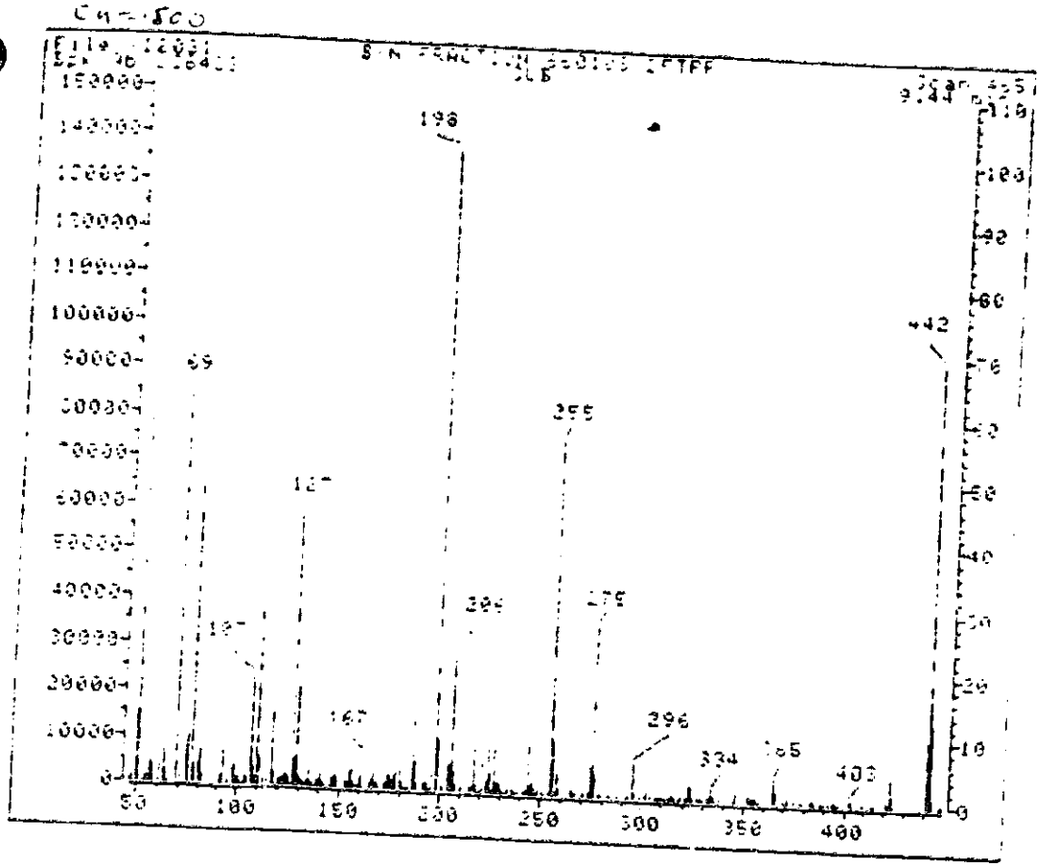

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphosphine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	58.00	58.00	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	60.38	60.38	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	42.20	42.20	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.65	7.65	Ok
275	10-30% of mass 198	26.44	26.44	Ok
365	Greater than 1% of mass 198	3.90	3.90	Ok
441	0-100% of mass 443	10.20	78.74	Ok
442	Greater than 40% of mass 198	69.01	69.01	Ok
443	17-23% of mass 442	12.96	18.78	Ok

Injection Date: 01/08/86
Injection Time: 18:27
Run No: >I2031
Spectrum No: 465

Analyst: Pearl Trant.
Processor: J. Handel, D. Simons
QC Batch: QB4228
Samples: J8434B, K8484B, K8485B, K8171B, K8173B, K8174B, K8175B, K8176B, K3246B, J8204B - J2208B

1/25/86

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Methodology
for
GC/MS Analysis of Priority Pollutant Compounds

The methods employed in the GC/MS analysis for priority pollutants are established EPA methods. Rigid compliance with the instrument parameters and performance criteria of the published methods was achieved. In some cases, the precise amounts of sample used and the sample handling procedures vary with the complexity of the sample matrix. Qualitative identification of the priority pollutants was performed using the relative retention times, the relative abundance of three characteristic ions and the abundance ratios. The entire mass spectrum was reviewed to confirm each identification. Quantitative analysis of detected compounds was performed by using a response factor generated by a major characteristic ion of the specific compound and an internal standard.

Compounds, in addition to those on the priority pollutant list, were identified through a computer-aided search of the NBS-EPA spectra library. After review the identifications are included in a separate tabulation and labelled "tentatively identified".

Volatile Priority Pollutant Compounds

For the analysis of Volatile priority pollutants in a solid matrix, a modified version of EPA Method 624 was used. The modification can be be summarized as follows: 1-3 gm of the solid sample are weighed into a 15 ml Hypo vial. The vial is sealed immediately with a teflon-backed silicone septum. A solution containing 3 internal standards is injected through the septum onto the sample. The vial is attached to the Purge and Trap sampler in series with a 5 ml organic-free water trap. The sample vial is heated at 80 degrees Centigrade for 20 minutes. An inert gas sweeps the volatile organic compounds through the water trap onto a sorbent column where they are trapped. When the purge cycle is complete, the sorbent column is heated and backflushed with helium to desorb the purgeable organic compounds onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable mixture. The separated purgeable components are then identified and quantitated using a computerized mass spectrometer.

Acid, Base/Neutral and Pesticide Priority Pollutant Compounds

For the analysis of the Acid, Base/Neutral and Pesticide priority pollutants in a complex solid matrix, the EPA-EMSL sludge method was used (Protocol for Referee Analysis of Semi-Volatile Organic Priority Pollutants in Municipal and Industrial Waste Treatment Sludge, EPA Contract 68-03-2625, June 16, 1980). The method can be summarized as follows: A 80 ml sample is adjusted to a pH greater than 11 with aqueous NaOH. The pH adjusted sample is then extracted with methylene chloride using repetitive sediment extraction aided by a high speed homogenizer. The extract is separated by centrifugation and transferred by pipette. The sample is then acidified to a pH less than 2 and the extraction process is repeated with fresh methylene chloride. The first extract, containing the base/neutral extractable compounds, is cleaned with silica gel, dried and concentrated to a 1 ml final volume. Gel permeation chromatography is used to clean the extract containing the acid extractable compounds. This extract is dried and concentrated to a final 1 ml volume. Each extract is injected into a GC/MS instrument configured for the analysis of that specific fraction.

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

Summary of Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA-600/4-79-019, March 1979;
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/001-R, October 1979;
- the recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979; updated on October 26, 1984);
- "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980;
- "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983;
- Organic Analysis: Multi-media, Multi Concentration-IFB WA84-A267; and
- Dioxin Analysis:Soil/Sediment Matrix; Multi-Concentration; Selected Ion Monitoring with Jar Extration Procedure-IFB WA84-A002

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used.

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of 13 samples consists of 9 customer samples (at a maximun), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors vary greater than 25%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.

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- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Three surrogate compounds are added to each sample in the batch for Acid analysis.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on decafluorotriphenylphosphine (DFTPP) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of standards composed of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3 concentrations and using five internal standards for quantitation.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples.
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve.
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique, a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 independent reference standard;
- 4 Calibration standards (processed using the sample preparation method);
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

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Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing.

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 30 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate anaylses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preparation method); and
- 2 Procedural Blanks.

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices);
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known refernece QC sample for at least each 100 samples analyzed.

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch.

- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample.

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon backround must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/- 15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$-2,3,7,8-TCDD as internal standard and $^{37}Cl_4$-TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples. The method blank is also dosed with the internal standard and surrrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:

  a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak.

  b. The 320/322 ratio is within the range of 0.67 to 0.87.

  c. Ions 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.

  d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.

  e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:

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. the 320/324 ratio should be 1.58 +/- 0.16

. the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.
- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.
- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractoer is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person(s) breaking the Shuttle seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician; and
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The records show for each link in this process:

- the person with custody; and
- the time and date each person accepted or relinquished custody.

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Appendix A

Mass Spectral Data for Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.

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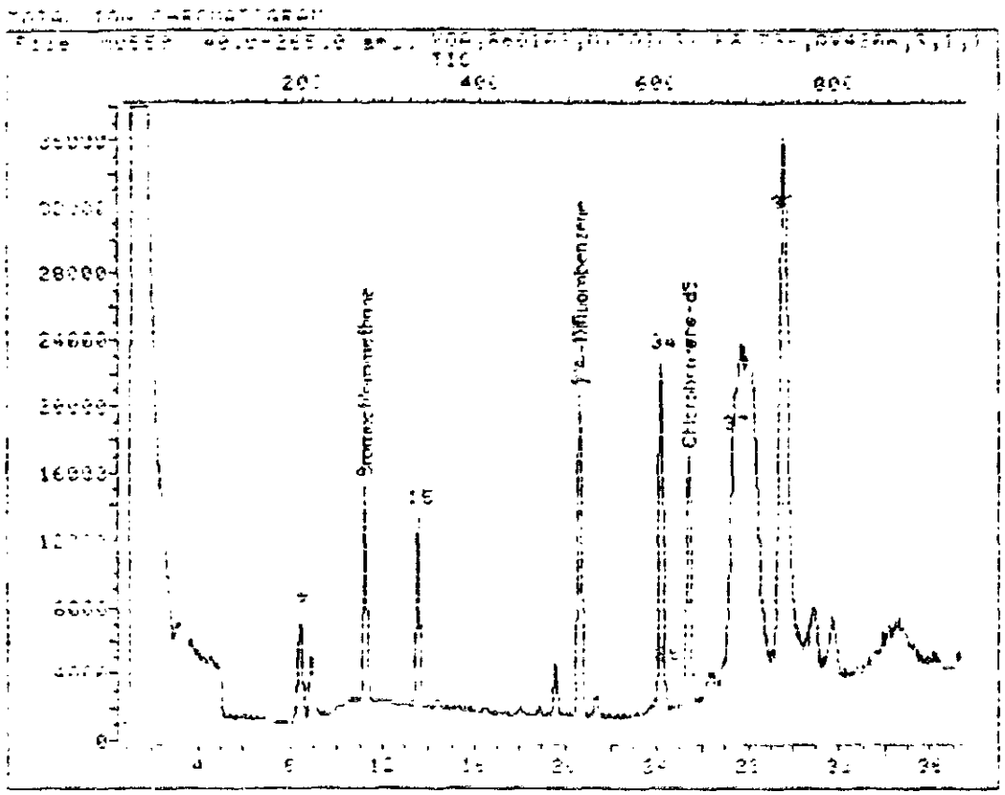


Data File: [illegible]
Name: [illegible]
Misc: [illegible]

Method: [illegible]
Title: Volatile Priority Pollutant [illegible]
Last Calibration: [illegible]

Operator ID: [illegible]
Quant Time: [illegible]
Injected at: [illegible]

002080

QUANT REPORT

Operator ID: [illegible]
Output File: [illegible]
Data File: [illegible]
Name: [illegible],860103,M(SOILS)
Misc: [illegible]

Quant Rev: 4 Quant Time: 860103 12:[illegible]
Injected at: 860103 16:52
Dilution Factor: 1.00

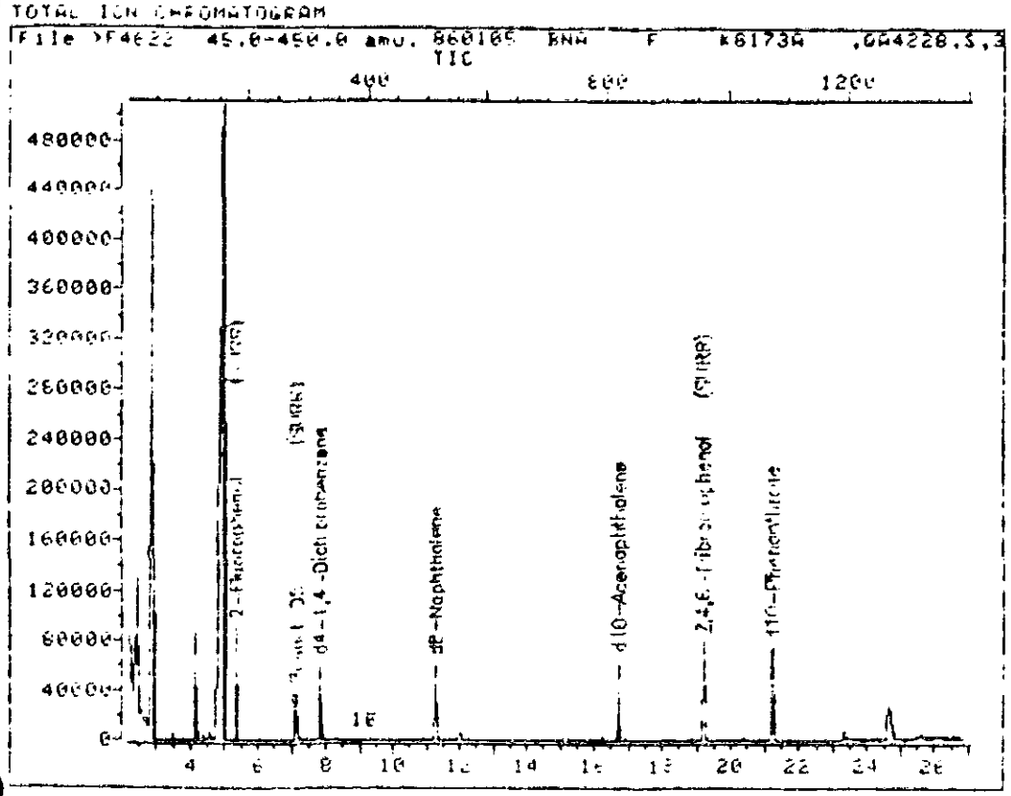
ID File: [illegible]
Title: Volatile Priority Pollutant ID File
Last Calibration: 860102 19:03

Compound		R.T.	Scan#	Area	Conc	Units	q
1) *Bromochloromethane		11.25	269	23586	250.00	NG	9[illegible]
2) Methylene chloride		8.46	192	20262	~~[illegible]~~	~~NG~~	~~[illegible]~~
16) 1,2-Dichloroethane-D4	(SURR)	13.57	329	22089	227.04	NG	8[illegible]
17) *[illegible]		[illegible]	[illegible]	[illegible]	250.00	NG	99
30) *Chlorobenzene-d5		25.44	635	59765	250.00	NG	99
~~31) [illegible]~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~NG~~	1[illegible]
34) Toluene-D8	(SURR)	24.23	604	98245	214.50	NG	93
~~35) Toluene~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~NG~~	89
~~37) Ethylbenzene~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~NG~~	92
38) n-Bromofluorobenzene	(SURR)	[illegible]	240	61195	239.10	NG	99

* Compound is ISD

002081

TOTAL ION CHROMATOGRAM



Data File: >F4622::U3
Name: 860105 BNA F
Misc: K8173A ,QA4228,S,30...0,1

BTL427

Id File: FACID::US
Title: PP ACID IDFILE...INST. F
Last Calibration: 860106 1.:33

Operator ID: JH2180
Quant Time: 860106 14:20
Injected at: 860106 10:45

002082

QUANT REPORT

Operator ID: JH2180 Quant Rev: 4 Quant Time: 860106 14:20
Output File: F4622::AQ Injected at: 860106 10:45
Data File: >F4622::U3 Dilution Factor: 1.00
Name: 860105 BNA F
Misc: W31734 ,QH4223,S,30.00,1 BTL427

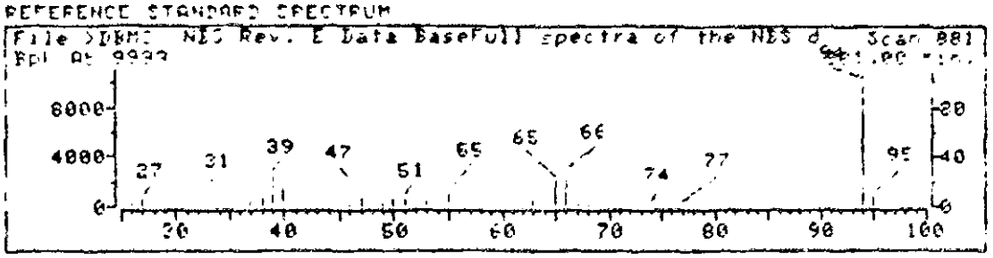
ID File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		7.81	318	33909	40.00	UG/ML	9
3)	2-Fluorophenol	(SUPR)	5.33	178	45935	84.56	UG/ML	9
8)	Phenol		7.15	281	4722	7.08	UG/ML	9
9)	Phenol-D5	(SURR)	7.17	280	45077	74.11	UG/ML	9
10)	*d8-Naphthalene		11.25	512	74562	40.00	UG/ML	9
16)	o-Cresol		9.01	386	687	~~.88 UG/ML~~		10
17)	m+p-Cresols		9.01	386	687	~~.82 UG/ML~~		10
18)	*d10-Acenaphthalene		16.65	819	44449	40.00	UG/ML	9
24)	*d10-Phenanthrene		21.21	1074	119239	40.00	UG/ML	9
25)	2,4,6-Tribromophenol	(SURR)	19.15	958	41236	100.86	UG/ML	94

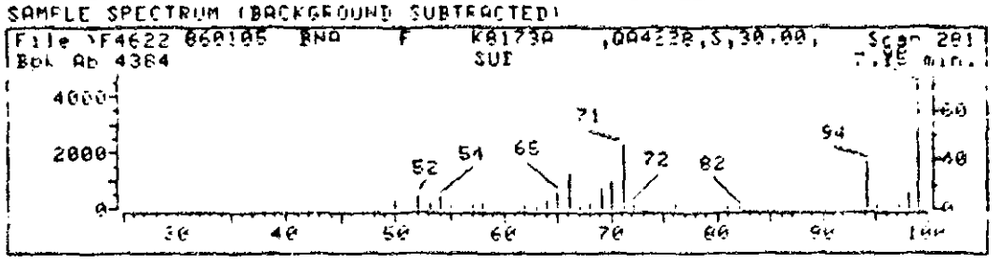
* Compound is ISTD

C02083

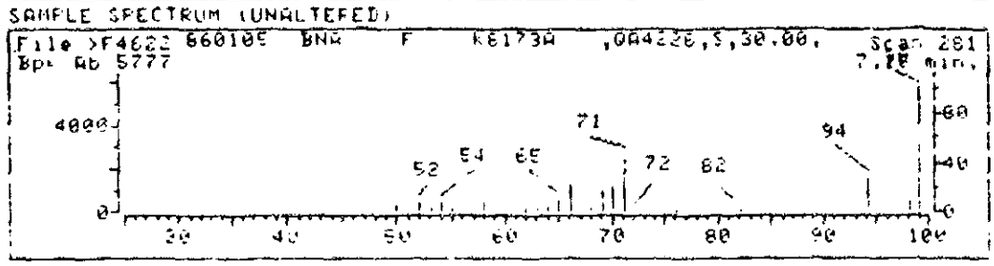
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



SAMPLE SPECTRUM (UNALTERED)

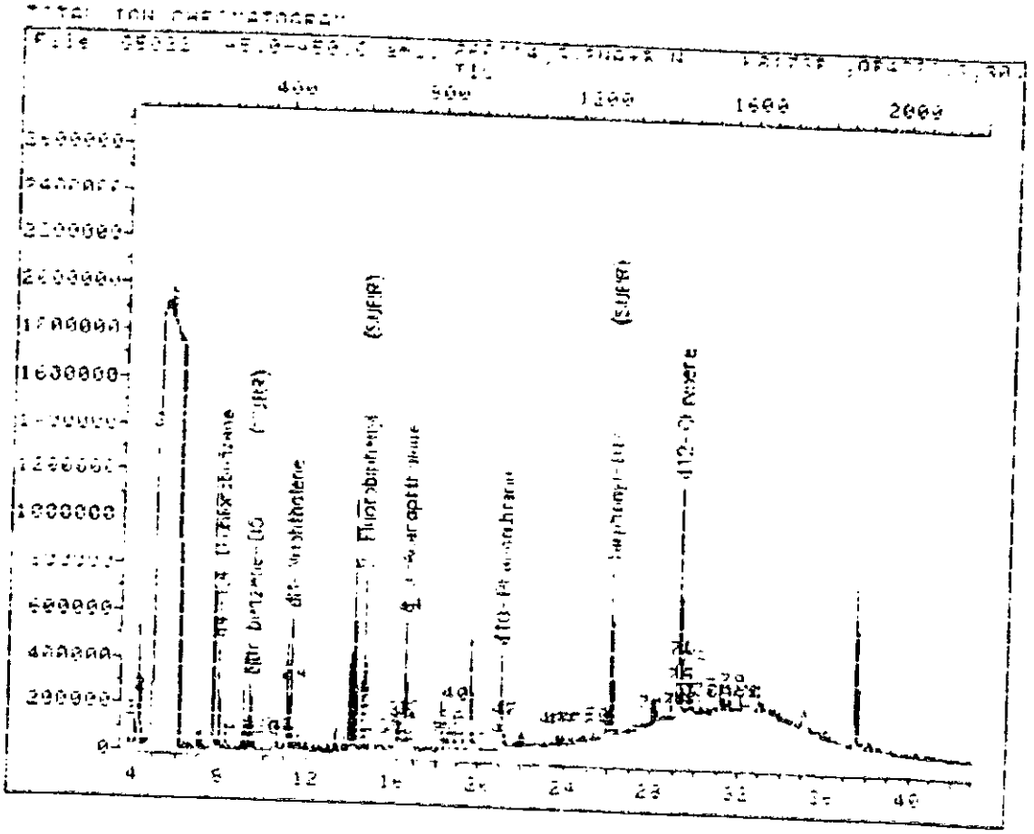


Data File: >F4622::U3
Name: 860105 BNA F
Misc: K8173A ,QA4226,5,30.00,1
Quant Time: 860106 14:20
Injected at: 860106 10:45

Compound No: 6
Compound Name: Phenol
Scan Number: 281
Retention Time: 7.15 min.
Area: 4722
Concentration: 7.08 UG/ML
q-value: 79

BTL427

002084



Data File: [illegible]
Name: 860114,G,BNA+B.N
Misc: [illegible]

Id File: GBNP::05
Title: B/N EXTRACTION [illegible]
Last Calibration: 860119 [illegible]

Operator ID: [illegible]
Quant Time: 860116 [illegible]
Injected at: 860116 [illegible]

BTL#23

002085

QUANT REPORT

Operator ID: [illegible]
Output File: [illegible]
Data File: [illegible]
Name: 861114,6,BNA+BN
User: [illegible]

Quant Seq: [illegible]
Quant Time: 861116 [illegible]
Injected at: 861116 16:43
Dilution Factor: [illegible]

HP1#2[illegible]

ID File: GC/MS::US
Title: [illegible] ID-FILE
Last Calibration: 861115 18:0[illegible]

	Compound		R.T.	Scan#	Area	Conc	Units	Q
1	*d4-1,4-Dichlorobenzene		7.90	238	188606	40.00	UG/ML	99
2	~~N-Nitrosodimethylamine~~		~~3.43~~	~~9~~	~~[illegible]~~	~~.24~~	~~UG/ML~~	11
[illegible]	~~N-Nitrosomethylethylamine~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~1.12~~	~~UG/ML~~	11
[illegible]	~~Methyl methanesulfonate~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	[illegible]
[illegible]	~~N-Nitrosodimethylamine~~		~~5.90~~	~~103~~	~~2566~~	~~.84~~	~~UG/ML~~	1
[illegible]	Benzyl alcohol		8.41	266	18118	1.53	UG/ML	[illegible]
[illegible]	Nitrobenzene-D5	(SURR)	9.35	320	247003	37.64	UG/ML	[illegible]
[illegible]	*d8-Naphthalene		11.20	474	782142	40.00	UG/ML	[illegible]
[illegible]	2-Fluorobiphenyl	(SURR)	14.[illegible]	61[illegible]	[illegible]	39.10	UG/ML	[illegible]
[illegible]	~~N-Nitrosodimethylamine~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	[illegible]
[illegible]	~~Isophorone~~		~~10.81~~	~~[illegible]~~	~~[illegible]~~	~~.22~~	~~UG/ML~~	[illegible]
[illegible]	~~Naphthalene~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	~~[illegible]~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~.41~~	~~UG/ML~~	[illegible]
[illegible]	~~Naphthalene~~		~~11.26~~	~~422~~	~~[illegible]~~	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	*d10-Acenaphthalene		16.49	721	384805	40.00	UG/ML	100
[illegible]	~~Dimethyl phthalate~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	~~Diethyl phthalate~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~UG/ML~~	65
[illegible]	Dimethyl phthalate		16.[illegible]	712	18[illegible]	1.59	UG/ML	[illegible]
[illegible]	~~Dimethyl phthalate~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	Acenaphthylene		[illegible]	[illegible]	[illegible]	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	Acenaphthylene		16.19	[illegible]	[illegible]	~~[illegible]~~	~~UG/ML~~	81
[illegible]	Acenaphthylene		16.64	[illegible]	[illegible]	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	2,6-Dinitrotoluene		16.26	708	3308	~~[illegible]~~	~~UG/ML~~	66
[illegible]	Acenaphthene		[illegible]	[illegible]	[illegible]	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	Diethyl phthalate		18.19	814	5188	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	Diethyl phthalate		18.49	833	4761	~~.41~~	~~UG/ML~~	[illegible]
[illegible]	Fluorene		18.13	813	18196	~~.92~~	~~UG/ML~~	[illegible]
[illegible]	Fluorene		18.[illegible]	[illegible]	[illegible]	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	N-Nitrosodiphenylamine		18.65	842	14718	2.25	UG/ML	94
[illegible]	*d10-Phenanthrene		20.9[illegible]	[illegible]	[illegible]	40.00	UG/ML	100
[illegible]	Phenanthrene		21.05	976	21004	1.56	UG/ML	97
[illegible]	Anthracene		21.05	976	21004	~~1.56~~	~~UG/ML~~	[illegible]
[illegible]	Di-n-butyl phthalate		23.27	1098	38436	2.56	UG/ML	98
[illegible]	Di-n-butyl phthalate		2[illegible].55	1116	2654	~~[illegible]~~	~~UG/ML~~	[illegible]
[illegible]	Fluoranthene		24.70	1180	15042	1.08	UG/ML	95
[illegible]	Fluoranthene		25.34	1216	18391	~~[illegible]~~	~~UG/ML~~	93
[illegible]	Pyrene		24.70	1180	15042	~~[illegible]~~	~~UG/ML~~	95
[illegible]	Pyrene		25.34	1216	18391	.23	UG/ML	[illegible]
[illegible]	Beta-BHC		21.35	935	2561	~~[illegible]~~	~~UG/ML~~	34
[illegible]	*d12-Chrysene		29.16	1278	963809	40.00	UG/ML	100
[illegible]	Terphenyl-d14	(SURR)	26.04	1255	893168	38.00	UG/ML	100
[illegible]	Butyl benzyl phthalate		27.77	1351	8111	~~[illegible]~~	~~UG/ML~~	87
[illegible]	Benzo(a)anthracene		29.10	1475	3570	~~.13~~	~~UG/ML~~	88

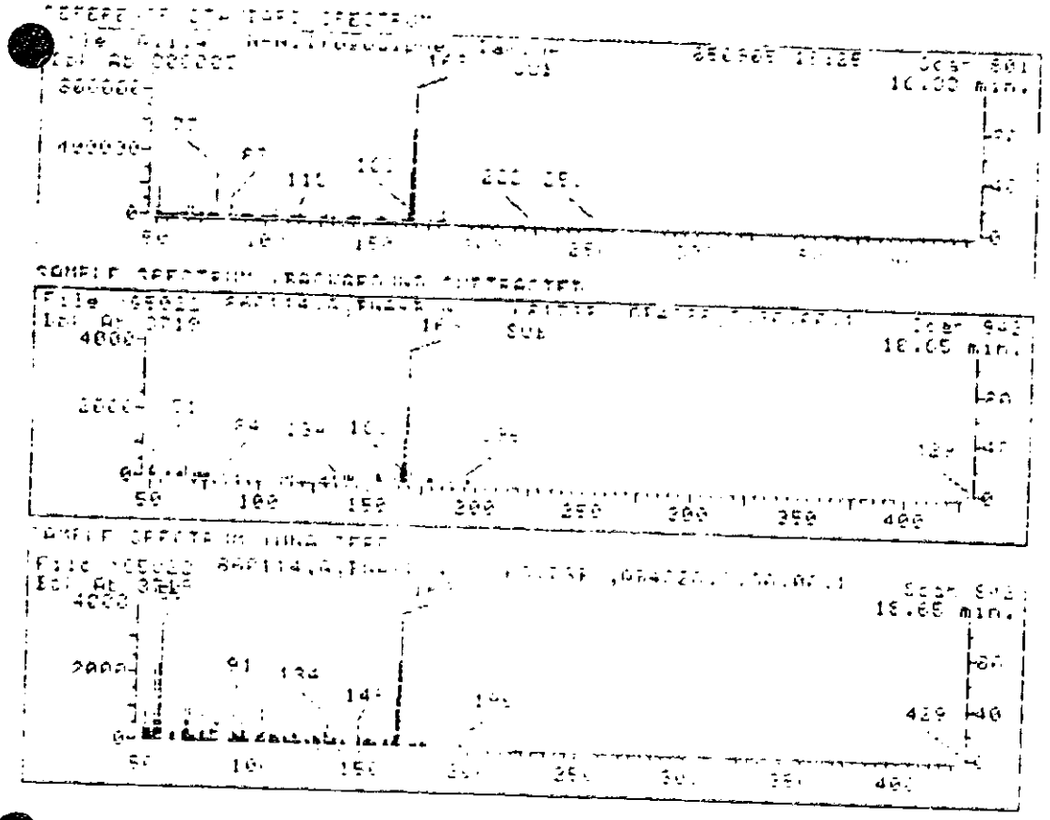
1/17/86

	Compound	R.T.	Scan#	Area	Conc	Units	q
(5)	Benzo(a)anthracene	29.21	1431	11508	[illegible]	[illegible]	89
(6)	Chrysene	[illegible]	1425	[illegible]	[illegible]	[illegible]	[illegible]
(6)	Chrysene	29.21	1431	11508	[illegible]	[illegible]	96
(78)	bis(2-Ethylhexyl)phthalate	28.99	1419	10204	[illegible]	[illegible]	47
(78)	bis(2-Ethylhexyl)phthalate	29.64	1455	23150	1.17	UG/ML	[illegible]
	bis(2-Ethylhexyl)phthalate	[illegible]	[illegible]	126175	6.40	UG/ML	[illegible]
(78)	bis(2-Ethylhexyl)phthalate	30.31	1492	2859	[illegible]	[illegible]	91
(79)	Di-n-octyl phthalate	30.82	1520	12859	[illegible]	[illegible]	95
(79)	Di-n-octyl phthalate	30.92	1526	10852	[illegible]	[illegible]	92
(79)	Di-n-octyl phthalate	31.54	1560	42914	1.25	UG/ML	94
(79)	Di-n-octyl phthalate	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Benzo(k)fluoranthene	32.28	1601	5511	[illegible]	[illegible]	[illegible]
(71)	benzo(k)fluoranthene	32.28	1601	5511	[illegible]	[illegible]	98

* Compound is 1511

1/18/86

002087



Data File: [illegible]
Name: [illegible]
Time: [illegible]
Event Time: [illegible]
Injected at: [illegible]

Compound No: [illegible]
Compound Name: [illegible]
Scan Number: [illegible]
Retention Time: [illegible] min.
Area: [illegible]
Concentration: [illegible]
q-value: [illegible]

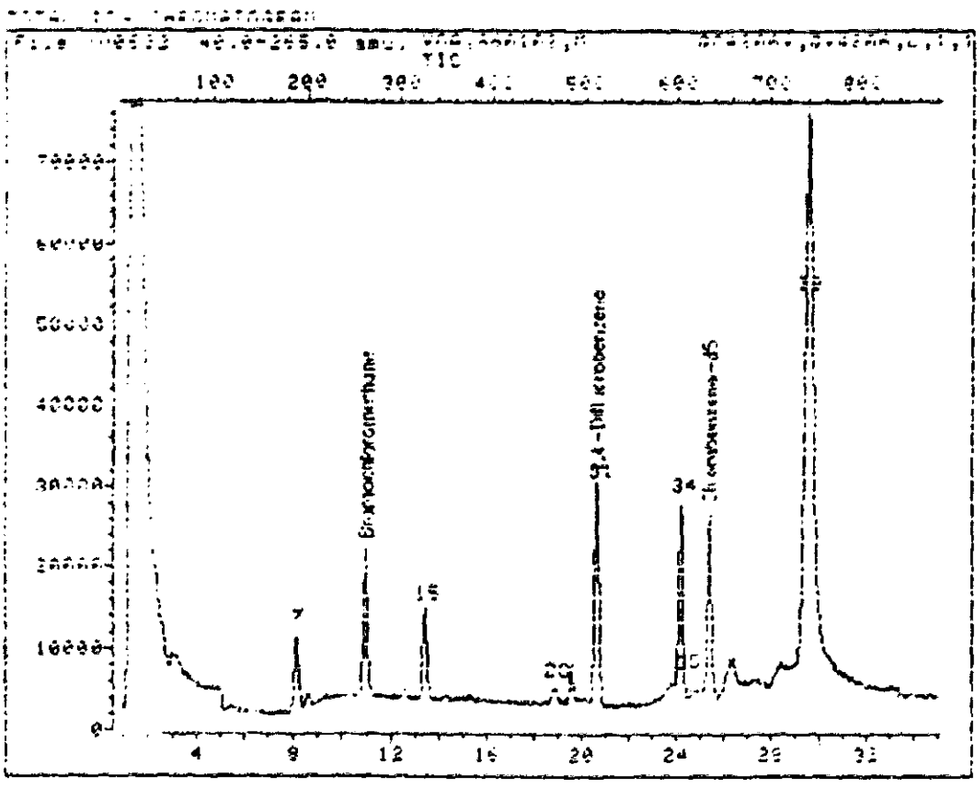
FIG. [illegible]

002083

Appendix C1

GC/MS Subsidiary Data

002089



Data File: [illegible]
Name: [illegible],M
Misc: [illegible] BLANK

Id File: [illegible]
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 86[illegible]02 19:[illegible]

Operator ID: [illegible]
Quant Time: 86[illegible]02 19:08
Injected at: 86[illegible]02 15:[illegible]

002090

QUANT REPORT

Operator ID: 054712
Output File: CMU532::AQ
Data File: MU532::03
Name: VOA,860102,M
Misc: [illegible] S [illegible] BLANK

Quant Rev: 4 Quant Time: [illegible]
Injected at: 860102 15:09
Dilution Factor: 1.0

ID File: MUVA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

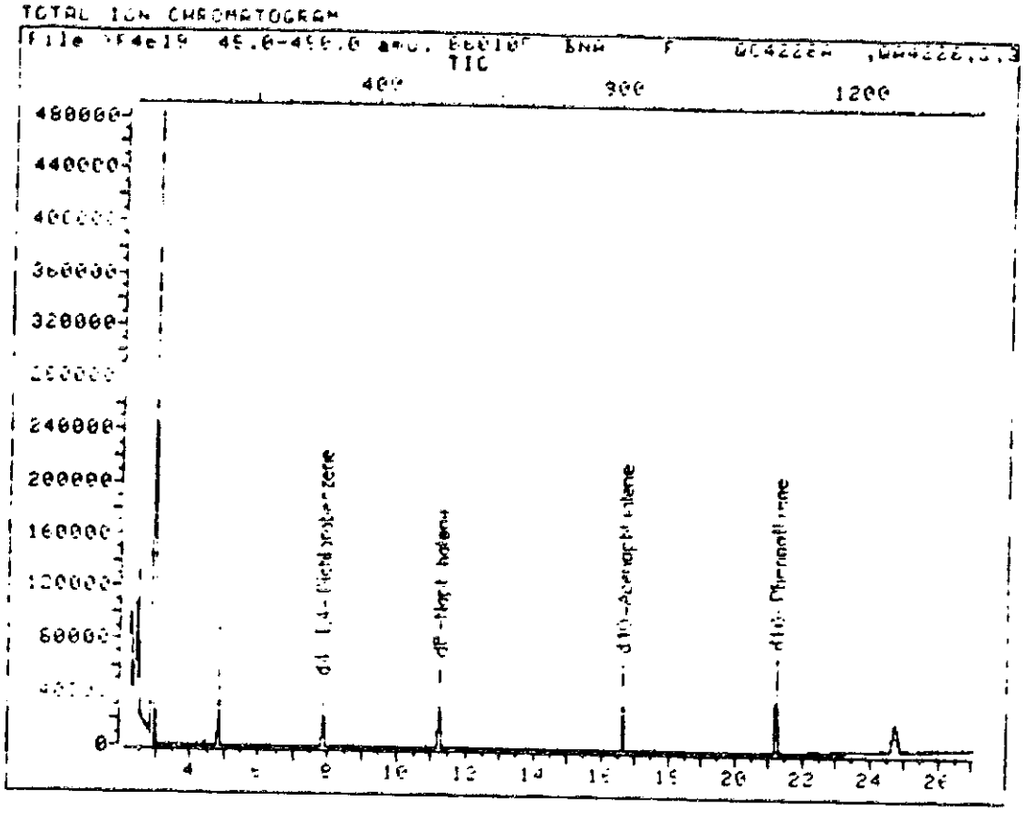
	Compound		R.T.	Scan#	Area	Conc	Units	%
1)	*Bromochloromethane		10.96	263	34271	250.00	NG	9[illegible]
2)	Methylene chloride		8.09	139	29651	64.46	NG	[illegible]
15)	1,2-Dichloroethane-D4	(SURR)	13.40	326	23094	159.72	NG	[illegible]
12)	*1,4-Difluorobenzene		20.61	512	132[illegible]62	250.00	NG	[illegible]
28)	~~bis(Chloromethyl)ether~~		~~13.83~~	~~466~~	~~[illegible]~~	~~184.75~~	~~NG~~	100
30)	*Chlorobenzene-d5		25.38	635	87605	250.00	NG	[illegible]
31)	~~2-Chloroethylvinyl ether~~		~~20.65~~	~~513~~	~~34[illegible]~~	~~159.42~~	~~NG~~	100
34)	Toluene-D8	(SURR)	24.18	604	108741	161.92	NG	[illegible]
35)	~~Toluene~~		~~24.37~~	~~609~~	~~2228~~	~~2.[illegible]~~	~~NG~~	96
38)	p-Bromofluorobenzene	(SURR)	29.[illegible]	[illegible]	6244[illegible]	166.46	NG	[illegible]

* Compound is ISTD

PMM

002091

TOTAL ION CHROMATOGRAM



Data File: >F4619::U3
Name: 860105 BNA F
Misc: QC4222A ,QA4222,3,3,,01,,

Id File: FACID::US
Title: PP-ACID IDFILE...INST. F
Last Calibration: 860106 11:33

Operator ID: JH2180
Quant Time: 860106 14:02
Injected at: 860106 08:40

002092

QUANT REPORT

Operator ID: JH2180 Quant Rev: 4 Quant Time: 860106 14:02
Output File: F4619::AQ Injected at: 860106 08:40
Data File: >F4619::U3 Dilution Factor: 1.00
Name: 860105 BNA F
Misc: [illegible] ,[illegible] [illegible]

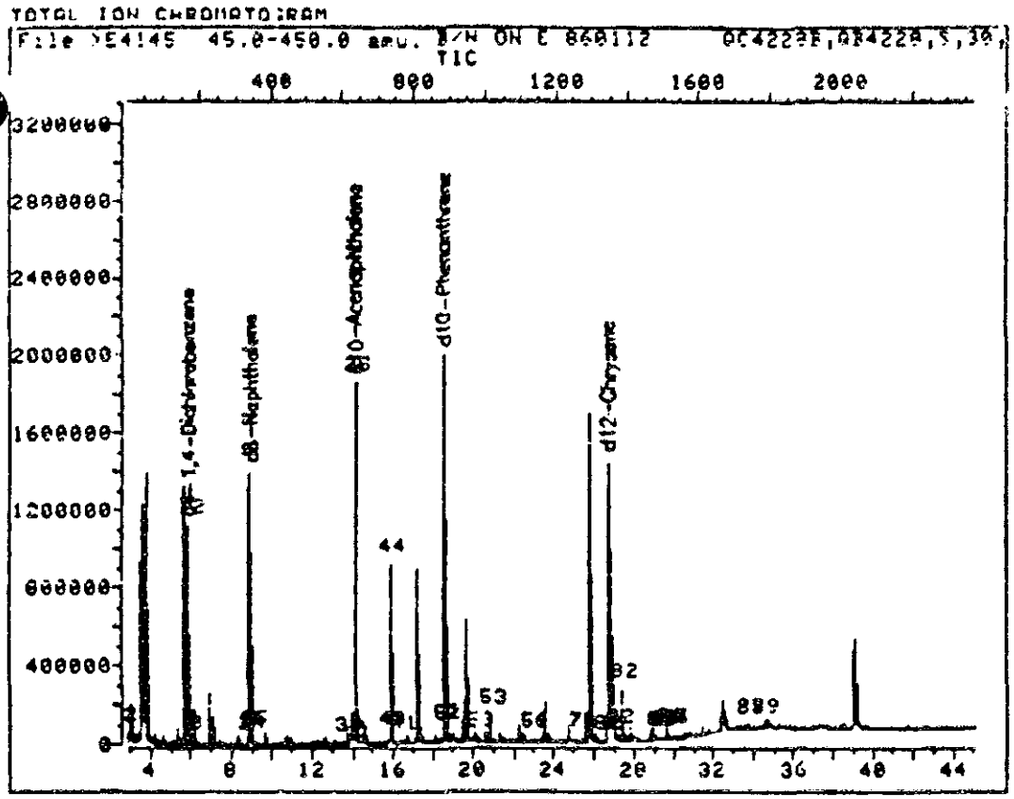
ID File: FACID::US
Title: PP/ACID IDFILE ..INST. F
Last Calibration: [illegible]

	Compound	R.T.	Scan#	Area	Conc	Units	Q
1)	*d4-1,4-Dichlorobenzene	7.80	319	33041	40.00	UG/ML	
10)	*d8-Naphthalene	11.[illegible]	[illegible]	[illegible]	[illegible]	UG/ML	
18)	*d10-Acenaphthalene	16.63	617	45053	40.00	UG/ML	
24)	*d10-Phenanthrene	21.2[illegible]	1075	99903	40.00	UG/ML	

* Compound is ISTD

002093

TOTAL ION CHROMATOGRAM



Data File: >E4145::U5
Name: B/N ON E 860112
Misc: QC4228B,QB4228,S,30,1 BTL# 6

Id File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 850326
Last Calibration: 860113 11:36

Operator ID: WW9928
Quant Time: 860113 11:38
Injected at: 860113 03:14

002094

QUANT REPORT

Operator ID: WW9928 Quant Rev: 5 Quant Time: 860113 11:38
Output File: ^E4145::AQ Injected at: 860113 03:14
Data File: >E4145::US Dilution Factor: 1.00
Name: B/N ON E 860112
Misc: QC42288,QB4228,S,30,1 BIL# 6

ID File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 850326
Last Calibration: 860113 11:36

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	5.85	169	368447	40.00	UG/ML	99
2)	~~N-Nitrosodimethylamine~~	~~2.93~~	~~4~~	~~2426~~	~~474.52~~	~~UG/ML~~	100
3)	~~Benzyl alcohol~~	~~6.26~~	~~192~~	~~8613~~	~~.51~~	~~UG/ML~~	
12)	~~bis(2-Chloroisopropyl)ether~~	~~5.89~~	~~169~~	~~13746~~	~~5.07~~	~~UG/ML~~	
17)	*d8-Naphthalene	8.88	340	1775324	40.00	UG/ML	
~~24)~~	~~1,2,4-Trichlorobenzene~~	~~8.81~~	~~336~~	~~3674~~	~~.28~~	~~UG/ML~~	
~~29)~~	~~Naphthalene~~	~~8.95~~	~~343~~	~~4887~~	~~.13~~	~~UG/ML~~	
29)	*d10-Acenaphthalene	14.09	634	1378682	40.00	UG/ML	
~~33)~~	~~Dimethyl phthalate~~	~~13.61~~	~~607~~	~~3385~~	~~.09~~	~~UG/ML~~	
~~35)~~	~~Dimethyl phthalate~~	~~14.09~~	~~634~~	~~243961~~	~~6.17~~	~~UG/ML~~	6
~~35)~~	~~2,6-Dinitrotoluene~~	~~14.09~~	~~634~~	~~172607~~	~~16.52~~	~~UG/ML~~	5
~~40)~~	~~Diethyl phthalate~~	~~19.79~~	~~730~~	~~22463~~	~~.97~~	~~UG/ML~~	93
~~41)~~	~~Fluorene~~	~~16.43~~	~~766~~	~~1269~~	~~.03~~	~~UG/ML~~	81
~~44)~~	~~N-Nitrosodiphenylamine~~	~~19.85~~	~~733~~	~~5786~~	~~.25~~	~~UG/ML~~	90
47)	*d10-Phenanthrene	18.55	885	2866028	40.00	UG/ML	98
~~51)~~	~~Phenanthrene~~	~~18.60~~	~~888~~	~~10194~~	~~.18~~	~~UG/ML~~	94
~~52)~~	~~Anthracene~~	~~18.60~~	~~888~~	~~10194~~	~~.18~~	~~UG/ML~~	92
~~53)~~	~~Di-n-butyl phthalate~~	~~20.23~~	~~980~~	~~9854~~	~~.16~~	~~UG/ML~~	92
~~53)~~	~~Di-n-butyl phthalate~~	~~20.84~~	~~1014~~	~~182206~~	~~2.99~~	~~UG/ML~~	97
~~54)~~	~~Fluoranthene~~	~~22.98~~	~~1130~~	~~3422~~	~~.06~~	~~UG/ML~~	93
~~56)~~	~~Pyrene~~	~~22.98~~	~~1130~~	~~3422~~	~~.06~~	~~UG/ML~~	93
64)	*d12-Chrysene	26.68	1343	1855287	40.00	UG/ML	100
~~78)~~	~~Butyl benzyl phthalate~~	~~25.35~~	~~1268~~	~~4469~~	~~.14~~	~~UG/ML~~	79
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~26.58~~	~~1337~~	~~1391~~	~~.03~~	~~UG/ML~~	94
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~27.15~~	~~1369~~	~~4389~~	~~.10~~	~~UG/ML~~	87
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~27.33~~	~~1379~~	~~234144~~	~~5.34~~	~~UG/ML~~	93
~~83)~~	~~Di-n-octyl phthalate~~	~~29.12~~	~~1480~~	~~7817~~	~~.14~~	~~UG/ML~~	94
~~83)~~	~~Di-n-octyl phthalate~~	~~29.41~~	~~1496~~	~~1286~~	~~.02~~	~~UG/ML~~	88
~~83)~~	~~Di-n-octyl phthalate~~	~~29.64~~	~~1509~~	~~4568~~	~~.08~~	~~UG/ML~~	80
~~84)~~	~~Benzo(b)fluoranthene~~	~~29.89~~	~~1523~~	~~3362~~	~~.10~~	~~UG/ML~~	82
~~85)~~	~~Benzo(k)fluoranthene~~	~~29.89~~	~~1523~~	~~3362~~	~~.11~~	~~UG/ML~~	81
~~86)~~	~~Benzo(a)pyrene~~	~~29.89~~	~~1523~~	~~3362~~	~~.11~~	~~UG/ML~~	82
~~87)~~	~~Indeno(1,2,3-cd)pyrene~~	~~33.67~~	~~1735~~	~~8825~~	~~.29~~	~~UG/ML~~	92
~~88)~~	~~Dibenzo(a,h)anthracene~~	~~33.71~~	~~1737~~	~~7886~~	~~.31~~	~~UG/ML~~	91
~~89)~~	~~Benzo(ghi)perylene~~	~~33.67~~	~~1735~~	~~8825~~	~~.35~~	~~UG/ML~~	94
~~89)~~	~~Benzo(ghi)perylene~~	~~34.40~~	~~1776~~	~~8380~~	~~.33~~	~~UG/ML~~	92

* Compound is ISTD

NO PCB's Found.

1/16/86

00209 5

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

002096

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No 47285 ETC Job # K8173

Date Sealed 12-6-85 By M. Ickstadt

Company: RESOURCE ENGINEERING

Facility/Site:

Address: 3000 RICHMOND AVE
HOUSTON, TX 77098

Attn.: CHRIS ITIN

Phone: (713) 520-9900

SAMPLE IDENTIFICATION

Facility: RES288-04 (Facility/Site Code) EVAPORATION SYSTEM (Optional Sample Point Descriptions)

Sample Point: T-X8dES13d (Source Code (from below) / Your Sample Point ID (left justify)) 851217 (Start Date (YY/MM/DD)) (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes

Well	(W)	Outfall	(O)	Bottom Sediment	(B)	Surface Impoundment	(I)	Leachate Collection Sys	(C)	Other	
Soil	(S)	River/Stream	(R)	Generation Point	(G)	Treatment Facility	(T)	Lake/Ocean	(L)	Specify	

SHUTTLE CONTENTS

BOTTLE				ANALYSIS	SAMPLER		LAB
No	Type	Size	Preserv.		FWL (Y/N)	Observations	Observations
1	E	500mL	BAKED	EXTRACTABLE			✓
2	F	40mL	BAKED	VOA			✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) JOHN BINS Date: 12/9/85 Time: 6:30 PM
Signature: John Bins Seal #: 0047285 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) JOHN BINS Date: 12/19/85 Time: 5:30 PM
Signature: John Bins Seal #: 0047286 Intact: YES

ETC USE ONLY Opened By: [signature] Date: 12/20/85 Time: 11:00
Seal #: 47286 Condition: INTACT

002097

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # K8173

Sample Point [1] [N3XE5 3D]
Source Code — Sample Point I.D.

FIELD PROCEDURES

PURGE DATE (YY MM DD) | START PURGE (2400 Hr Clock) | ELAPSED HRS | WATER VOL. IN CASING (Gallons) | VOLUME PURGED (Gallons)

SAMPLING METHOD: HAND AUGER, AND CORE SAMPLER

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure/Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl)

Depth to Ground water (ft)

Groundwater Elevation (ft msl)

Well Depth (ft)

Sample Depth (non-well) (ft)

002098

1st	(STD) ph	1st	umhos/cm at 25°C spec. cond.	(other parameter)	value	units
2nd	(STD) ph	2nd	umhos/cm at 25°C spec. cond.	(other parameter)	value	units
3rd	(STD) ph	3rd	umhos/cm at 25°C spec. cond.	(other parameter)	value	units
4th	(STD) ph	4th	umhos/cm at 25°C spec. cond.	(other parameter)	value	units

Sample Temp (°C) | Turbidity NTU

FIELD COMMENTS

Sample Appearance: SOIL, BROWN SILTY CLAY 36"-40"

Weather Conditions:

Other: HNU READING 2.8 ppm

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: JOHN BINS (Print) Employer: RESOURCE ENGINEERING, INC.

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

12/19/85 John Bins
Date (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/2/86 SHIFT
FRACTION VOA
INSTRUMENT M
TUNE FILE APEI02
SEQUENCE FILE OSM
METHOD FILE VOAM
ID FILE MWA
ANALYST(S) Dennis Sun
Brenda Hawkins
SUPERVISOR [signature]
BATCH #'s QV4206

STANDARD	CONC PPM	LOT NO.	LOT VOL (µl)
pBFB	50	12151	1
Istd	25	12066	10
Surrog	25	12019	10
ABC/SCVOA	18	12141	5, 10, 30
o,m,p Chlorotoluene	18	11852	5, 10, 30

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	1/2/86
WIP		BY	DMJ

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
p-BFB	7M0531	1µl			200003	OK 13:37	
QC4206V	7M0532					OK 15:09 PLSV10 Vol	✓
QC4206VS	7M0533					5µl ABC/SCVOA, o,m,p, chlorotol	
QC4206VS	7M0534					10	
QC4206VS	7M0535				18:09	30	
p-BFB	7M0536				19:13	OK	
K8557VS	7M0537	1.0g				NG spl [illegible] no [illegible]	
K8557V	7M0538					OK	
K8558V	7M0539					Ng ~~OK~~ re-run 1/200	35, 36
K8558VR	7M0540					Ng ~~OK~~ re-run 1/200	66, 67
K8559V	7M0541					Ng ~~OK~~ re-run 1/200	
K8171V	7M0542					~~OK~~ Ng rerun conjoner	
K8173V	7M0543					Ng ~~OK~~	
K8174V	7M0544					~~OK~~	
K8175V	7M0545					OK	
K8176V	7M0546					OK	
(R) K8557VS	7M0547					OK	
QC4206VSh	7M0548	1g				OK 07:06	
p-BFB	7M0549	1µl				NG	
p-BFB	7M0550	1µl				OK 09:03	
(R) K8171V	7M0551	1.0g				OK	
(R) K8173VR	7M0552	1.0g				OK	
K8484V	7M0553	1.0g				OK	
K8471V	7M0554					OK	
K4174V	7M0555					OK PLSV10 PLSV10	✓

-002099

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/3/86 SHIFT
FRACTION VOA (50 ls)
INSTRUMENT M
TUNE FILE APEI02
SEQUENCE FILE DSM
METHOD FILE VOAM
ID FILE MVOA
ANALYST(S) Daniel M Simons

SUPERVISOR [signature]
BATCH #'s QV4206

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Refer to pg. 1 of 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8470V	>M0556	1g			L0008	OK	
(R) K8173V	>M0557	1g				Ng leaked	
QC4206V	>M0558					OK	
K8173V	>M0559	1g				OK	

ETC FORM #102

002100

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
* ~~K4174~~	~~12865~~	~~29.95~~			~~PP/GRG/PST/PCB~~ RESOXHLET AT 3.0 gr. MG 12/30
+ J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485	↓	29.27	1.0	1.0	
K8171	12847	30.00	1.0	1.0	PP/GRG/PST/PCB CMPD/BN
* ~~K8172~~		~~30.01~~			RESOXHLET AT 3.0 grams. MG 12/30
K8173		30.00	1.0	1.0	
K8174		30.01	1.0	1.0	
K8175		29.95	1.0	1.0	
K8176	↓	28.15	1.0	1.0	
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		Bn+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208	↓	30.10	1.0		
QC 4228			1.0	1.0	
~~K8173~~ ~~K8173~~ S		22.72	1.0	1.0	
K8174 B		~~20.38~~ 24.84	D.V. 12/27 1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

1-2 PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

002101

COMMENTS

Log 12847 Cmpd/BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

*K4174 } RESOXHLET AT 3.0 grams. MG 12/30
*K8172 }

+ F.V 5.0 ml a 1 ml Aliquot was packaged

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 ug/ml	12,098
ACID	1.0	100 ug/ml	11,825
Arochlor 1260	1.0	100 ug/ml	12,097
Pest	1.0	100/200 ug/ml	12,059
Spec #930 BN spike	1.0	100 ug/ml	12,157
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ug/ml ACID: 100 ug/ml	12,093

Set-up: L.M. Zok 12/27/85 J. Vajda 12-27-85 UPD/Supervisor: Mina Gandhi 1/2/88

BN Conc.: Andrea C Acid Conc.: L.M. Zok Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/5/86 SHIFT
FRACTION Acid; BNA
INSTRUMENT F
TUNE FILE MTF001
SEQUENCE FILE JHF
METHOD FILE AcidF; BNPF
ID FILE FAcid; FBNA
ANALYST(S) J Hendl
SUPERVISOR
BATCH #'s QC4159, QA4228

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Int Std	400	12,008	100 ul
B/N Cal std I		12,110	1 ml
B/N Cal std II		12,111	
B/N Cal std III		11,906	
Acid cal std I		12,020	
Acid cal std II		12,021	
Acid cal std III		12,022	
Spec #930	60	12,140	
Spec #930	100	12,139	
Spec #930	300	12,138	
DFTPP	25	11,972	

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO	JH 1/5	DATE	1/6
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP-60ng std	>F4595					OK	
B/N Cal std III	F4596		1				
B/N Cal std II	F4597		2				
B/N Cal std I	F4598		3				
Acid cal std III	F4599		4				
Acid cal std II	F4600		5				
Acid cal std I	F4601		6				
Spec #930; 300ppm	F4602		7				
Spec #930; 100ppm	F4603		8				
Spec #930; 60ppm	F4604		9				
DFTPP-50ng std	F4605		10			OK	
K8322CS	F4606		11				
QC4159C	F4607		12			BN HS Act1	Y
K8323C	F4608		13			BN HS Act1	Y
K8323CR	F4609		14				
K8320C	F4610		15			BN HS Act1	Y
K8322C	F4611		16			Act1	Y
K8321C	F4612		17			Act1	Y
K8325C	F4613		18			Act1	Y
K8324C	F4614		19			Act1	Y
GPC BLANK	F4615		20				
K8173AS	F4616		21				
DFTPP-50ng std	F4617		22			OK	
Acid cal std II	F4618		23			CBCHK-OK	
QC4228A	F4619		24				

ETC FORM #102

002102

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE _____
METHOD FILE _____
ID FILE _____
ANALYST(S) S. Hendle-R
SUPERVISOR _____
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174A	>F4620		25				
K8174AR	F4621		26				
K8173A	F4622		27				
KS 175A ~~K8176A~~	F4623		28				
K8171A	F4624		29				
J8439A	F4625		30				
K8176A ⇐	F4626		31				
K8484A	F4627		32				
K8485A	F4628		33				

002103

ETC FORM #102

ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
* ~~K4174~~	~~12865~~	~~29.93~~			~~PP/ORG/PST/PCB~~
+ J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485		29.27	1.0	1.0	
K8171	12847	30.00	1.0	1.0	PP/ORG/PST/PCB CMPD/BN
* ~~K8172~~		~~30.01~~			RESOXHLET AT 3.0 gram. MG 12/30
K8173		30.00	1.0	1.0	
K8174		30.01	1.0	1.0	
K8175		29.95	1.0	1.0	
K8176		28.15	1.0	1.0	
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		On+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208		30.10	1.0		
QC 4228			1.0	1.0	
27 ~~K8173~~ ~~K8173~~ S		22.72	1.0	1.0	
~~K8174~~ R		~~20.78~~ 24.84	1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

1-V PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

Log 12847 Cmpd/BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

AK 4174 } RESOXHLET AT 3.0 grams. MG 12/30
* K8172 }

+ F.V 5.0 ml a 1 ml Aliquot was packaged

MT 8501

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 µg/ml	12,098
ACID	1.0	100 µg/ml	11,825
Trochlo 1260	1.0	100 µg/ml	12,097
Pest	1.0	100/200 µg/ml	12,059
Spec #930	1.0	100 µg/ml	12,157
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 µg/ml ACID: 100 µg/ml	12,093

Set-up: L.M. 2nd 12/24/85 J. Vejda 12-27-85 UPD/Supervisor: Mona Gandhi 1/2/86

BN Conc.: Guido C 12/27/85 Acid Conc.: L.M. 2nd 12/31/85 Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC FORM 0110

002104

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/8/86 SHIFT
FRACTION B/N
INSTRUMENT I"
TUNE FILE MII001
SEQUENCE FILE MII
METHOD FILE BNPI.
ID FILE IBNP, ISPPJ*
ANALYST(S) MBrubley

SUPERVISOR [illegible]
BATCH #'s QB4228, QP0002, QP0007

*ID File for QC P0002 and QC P0007.
PLEASE INITIAL

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	Jan. 9th, 1986
WIP		BY	KV

STANDARD	CONC PPM	LOT NO.	LOT VOL.
INT. STD.	400	12008	
DFTPP	25	11972	
BN IV	150	12112	
BN III	200	11506	
BN II	100	12111	
BN I	60	12110	
HSCPP/BN III	300	11837	
" II	100	11838	
I	30	11839	
SPEC. 930 III	300	12138	
930 II	100	12139	
930 I	60	12140	
o,m,p-nitrotoluene III	500	11244	
II	300	11245	
I	100	11246	

by ISPPJ, CB-1/6: CBISPJ 115, 116, 117, 118.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP-50ng	>I2031		1	OK		Checked EMV ↓ to 1600.	
BN IV - 150ppm	>I2032		2		I00373		
BN III - 200ppm	>I2033		3				
BN II - 100ppm	>I2034		4			AR1260	
BN I - 60ppm	>I2035		5				
HSCPP/BN - 300ppm	>I2036		6				
HSCPP/BN - 100ppm	>I2037		7				
HSCPP/BN - 30ppm	>I2038		8				
SPEC. 930 - 300ppm	>I2039		9				
SPEC. 930 - 100ppm	>I2040		10				
SPEC. 930 - 60ppm	>I2041		11				
o,m,p-nitrotoluene 500ppm	>I2042		12				
o,m,p-nitrotoluene 300ppm	>I2043		13		I00374		
o,m,p-nitrotoluene 100ppm	>I2044		14				
DFTPP-50ng	>I2045		15	OK			
QC4183B	>I2046		16			QB4183	
QCP0002B	>I2047		17				
QCP0002BS	>I2048		18				
Lt. #2-3	>I2049		19			Lt. #2-3	
QCP0007B	>I2050		20				
QCP0007BS	>I2051		21				
Lt. #1	>I2052		22				
QCP0007B1	>I2053		23			QC1	
K4572B	>I2054		24	X10		QB4241	
K4583B	>I2055		25	X10		QB4241	

002105

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE see
METHOD FILE _____
ID FILE _____
ANALYST(S) M Barkley
SUPERVISOR Pearl Frank
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
see page			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K4585B	>I2056		26	X20	I00374	QB4241	
K4585BS	>I2057		27	X20		QB4241	
DFTPP-50ng	>I2058		28				
BN II - 100ppm	>I2059		29				
K7562B	>I2060		30	X5	I00375	QB4243	
K7559B	>I2061		31	X5		QB4243	
K7561B	>I2062		32	X5		QB4243	
K7551B	>I2063		33			QB4242	
K7553B	>I2064		34				
K7554B	>I2065		35				
K7545B	>I2066		36				
K7544B	>I2067		37				
K7550B	>I2068		38				
K7557B	>I2069		39				
K7556B	>I2070		40				
DFTPP-50ng	>I2071		41				
BN II - 100ppm	>I2072		42				
QC4228B	>I2073		43			PCBSCR	PB
K8173BS	>I2074		44			AR1260	
J8439B	>I2075		45			PCBSCR	
K8484B	>I2076		46				
K8485B	>I2077		47		I00376		
K8171B	>I2078		48				
K8173B	>I2079		49				
K8174B	>I2080		50				

002106

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
STRUMENT _____
NE FILE _____
SEQUENCE FILE per
METHOD FILE per
ID FILE _____
ANALYST(S) [illegible]
SUPERVISOR [illegible]
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
per page			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174BR	>I2081		51		I00376	pcBSRB	
K8175B	>I2082		52				
K8176B	>I2083		53				
DFTPP-50ng	>I2084		54				
BN II - 100ppm	>I2085		55				
K3246B	>I2086		56				
J2204B	>I2087		57				PB
J2205B	>I2088		58				
J2206B	>I2089		59				
J2207B	>I2090		60				
J2208B	>I2091		61				

ETC FORM #102

002107

Technical Report

for

RESOURCE ENGINEERING

ATTENTION: CHRIS ITIN

3000 RICHMOND AVENUE

HOUSTON, TX 77098

EVAPORATION SYSTEM

SAMPLE # ES15D

002108

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
KB174	RESOURCE ENGINEERING	RES28804	TES15D	851217		

Denis C. K. Lin, Ph.D.
Vice President
Research and Operations

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Introduction

This report contains the analytical results on your sludge sample, TES150 85/12/17. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your sample are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your sample and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the sample are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Priority Pollutants

The priority pollutant compounds and elements are listed with their NPDES (National Pollution Discharge Elimination System) numbers, and the Method Detection Limit (MDL) published in the Federal Register. When a compound or element is present below its published MDL it is reported as BMDL (Below Method Detection Limit). When a compound or element is not present at any detectable concentrations it is reported as ND (Not Detected). MDL's for non-aqueous matrices are based on USEPA published MDL's but are adjusted as per sample weight. Matrix spike and replicate analyses, where included, were performed on samples randomly chosen within each quality assurance batch and are therefore not necessarily spikes and replicates of this report's sample. Surrogate compound recovery data and instrument calibration data are included in the Method Performance Data Tables.

002110

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 7, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds - GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8174	RESOURCE ENGINEERING	RES28804	TES15D	851217		

NPDES Number	Compound (Acrolein and Acrylonitrile values are screen only.)	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen. Added ug/kg	QC Matrix Spike: % Recov
1V	Acrolein	ND	500	ND	ND	ND	4000	90	ND	4000	126
2V	Acrylonitrile	ND	500	ND	ND	ND	400	99	ND	400	81
3V	Benzene	ND	22	ND	ND	ND	90.0	105	ND	90.0	92
4V	bis(Chloromethyl)ether	ND	50	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	24	ND	ND	ND	90.0	114	ND	90.0	91
6V	Carbon tetrachloride	ND	14	ND	ND	ND	90.0	103	ND	90.0	89
7V	Chlorobenzene	ND	30	ND	ND	ND	90.0	101	ND	90.0	93
8V	Chlorodibromomethane	ND	16	ND	ND	ND	90.0	107	ND	90.0	90
9V	Chloroethane	ND	50	ND	ND	ND	90.0	96	ND	90.0	91
10V	2-Chloroethylvinyl ether	ND	50	ND	ND	ND	90.0	180*	ND	90.0	196*
11V	Chloroform	ND	8.0	ND	ND	ND	90.0	100	ND	90.0	96
12V	Dichlorobromomethane	ND	11	ND	ND	ND	90.0	101	ND	90.0	91
13V	Dichlorodifluoromethane	ND	50	ND	ND	ND	90.0	104	ND	90.0	84
14V	1,1-Dichloroethane	ND	24	ND	ND	ND	90.0	100	ND	90.0	96
15V	1,2-Dichloroethane	ND	14	ND	ND	ND	90.0	100	ND	90.0	95
16V	1,1-Dichloroethylene	ND	14	ND	ND	ND	90.0	101	ND	90.0	90
17V	1,2-Dichloropropane	ND	30	ND	ND	ND	90.0	101	ND	90.0	92
18V	cis-1,3-Dichloropropylene	ND	25	ND	ND	ND	90.0	100	ND	90.0	81
19V	Ethylbenzene	ND	36	ND	ND	ND	90.0	98	ND	90.0	97
20V	Methyl bromide	ND	50	ND	ND	ND	90.0	103	ND	90.0	97
21V	Methyl chloride	ND	50	ND	ND	ND	90.0	98	ND	90.0	78
22V	Methylene chloride	60.1	14	1.13	ND	64.5	90.0	63	430	90.0	0*
23V	1,1,2,2-Tetrachloroethane	ND	35	ND	ND	ND	90.0	121	ND	90.0	113
24V	Tetrachloroethylene	ND	21	ND	ND	ND	90.0	103	ND	90.0	96
25V	Toluene	ND	30	ND	ND	ND	90.0	102	ND	90.0	100
26V	1,2-Trans-dichloroethylene	ND	8.0	ND	ND	ND	90.0	101	ND	90.0	94
27V	1,1,1-Trichloroethane	ND	19	ND	ND	ND	90.0	102	ND	90.0	96
28V	1,1,2-Trichloroethane	ND	25	ND	ND	ND	90.0	110	ND	90.0	92
29V	Trichloroethylene	ND	9.5	ND	ND	ND	90.0	96	ND	90.0	90
30V	Trichlorofluoromethane	ND	50	ND	ND	ND	90.0	99	ND	90.0	87
31V	Vinyl chloride	ND	50	ND	ND	ND	90.0	99	ND	90.0	88
18V	trans-1,3-Dichloropropylene	ND	50	ND	ND	ND	90.0	98	ND	90.0	92

* Recovery normally variable using EPA Protocol Method 624.

* Spiked samples that contain compounds present at high levels do not provide valid matrix recovery data.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 9, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8174	RESOURCE ENGINEERING	RES28804	TES15D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg[a]	Second ug/kg[a]	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1A	2-Chlorophenol	ND	110	ND	ND	ND	0	-	ND	4400	82
2A	2,4-Dichlorophenol	ND	90	ND	ND	ND	0	-	ND	4400	94
3A	2,4-Dimethylphenol	ND	90	ND	183	ND	0	-	ND	4400	88
4A	4,6-Dinitro-o-cresol	ND	800	ND	ND	ND	0	-	ND	4400	61
5A	2,4-Dinitrophenol	ND	1400	ND	ND	ND	0	-	ND	4400	55
6A	2-Nitrophenol	ND	120	ND	ND	ND	0	-	ND	4400	90
7A	4-Nitrophenol	ND	80	ND	ND	ND	0	-	ND	4400	99
8A	p-Chloro-m-cresol	ND	100	ND	ND	ND	0	-	ND	4400	120
9A	Pentachlorophenol	ND	120	ND	ND	ND	0	-	ND	4400	135
10A	Phenol	ND	50	ND	ND	ND	0	-	236	4400	193
11A	2,4,6-Trichlorophenol	ND	90	ND	ND	ND	0	-	ND	4400	102
	Catechol	ND	333	ND	ND	ND	0	-	ND	4400	1[b]
	Benzoic acid	ND	330	ND	ND	ND	0	-	ND	4400	29

[a] Variability in Replicate results due to non-homogeneous nature of sample matrix.

[b] Recovery low due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8174	RESOURCE ENGINEERING	RES28804	TES15D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1B	Acenaphthene	ND	63	ND	ND	ND	0	-	ND	4400	78
2B	Acenaphthylene	ND	120	ND	ND	ND	0	-	ND	4400	109
3B	Anthracene	ND	63	ND	ND	ND	0	-	51.9	4400	99
4B	Benzidine	ND	1500	ND	ND	ND	0	-	ND	4400	40
5B	Benzo(a)anthracene	ND	260	ND	ND	ND	0	-	ND	4400	102
6B	Benzo(a)pyrene	ND	83	ND	ND	ND	0	-	ND	4400	85
7B	Benzo(b)fluoroanthene	ND	160	ND	ND	ND	0	-	ND	4400	100
8B	Benzo(ghi)perylene	ND	140	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	120	ND	ND	ND	0	-	ND	4400	93
10B	bis(2-Chloroethoxy)methane	ND	180	ND	ND	ND	0	-	ND	4400	96
11B	bis(2-Chloroethyl) ether	ND	190	ND	ND	ND	0	-	ND	4400	109
12B	bis(2-Chloroisopropyl)ether	ND	190	ND	ND	ND	0	-	ND	4400	71
13B	bis(2-Ethylhexyl)phthalate	ND	330	ND	ND	ND	0	-	ND	4400	213.
14B	4-Bromophenyl phenyl ether	ND	63	ND	ND	ND	0	-	ND	4400	137
15B	Butyl benzyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	146
16B	2-Chloronaphthalene	ND	63	ND	ND	ND	0	-	ND	4400	44
17B	4-Chlorophenyl phenyl ether	ND	140	ND	ND	ND	0	-	ND	4400	49
18B	Chrysene	ND	83	ND	ND	ND	0	-	ND	4400	108
19B	Dibenzo(a,h)anthracene	ND	330	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	93
21B	1,3-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	90
22B	1,4-Dichlorobenzene	ND	150	ND	ND	ND	0	-	ND	4400	92
23B	3,3'-Dichlorobenzidine	ND	550	ND	ND	ND	0	-	ND	4400	0c
24B	Diethyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	52
25B	Dimethyl phthalate	ND	330	ND	ND	ND	0	-	52.9	4400	94
26B	Di-n-butyl phthalate	ND	330	ND	ND	ND	0	-	85.3	4400	177.
27B	2,4-Dinitrotoluene	ND	190	ND	ND	ND	0	-	ND	4400	47
28B	2,6-Dinitrotoluene	ND	63	ND	ND	ND	0	-	ND	4400	38
29B	Di-n-octyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	108
30B	1,2-Diphenylhydrazine	ND	330	ND	ND	ND	0	-	ND	4400	0c
31B	Fluoranthene	ND	73	ND	ND	ND	0	-	35.8	4400	123
32B	Fluorene	ND	63	ND	ND	ND	0	-	ND	4400	64

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8174	RESOURCE ENGINEERING	RES28804	TES15D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov *	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
33B	Hexachlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	133
34B	Hexachlorobutadiene	ND	30	ND	ND	ND	0	-	ND	4400	87
35B	Hexachlorocyclopentadiene	ND	330	ND	ND	ND	0	-	ND	0	-
36B	Hexachloroethane	ND	53	ND	ND	ND	0	-	ND	4400	22c
37B	Indeno(1,2,3-c,d)pyrene	ND	160	ND	ND	ND	0	-	ND	0	-
38B	Isophorone	ND	73	ND	ND	ND	0	-	ND	4400	62
39B	Naphthalene	ND	53	ND	ND	ND	0	-	ND	4400	119
40B	Nitrobenzene	ND	63	ND	ND	ND	0	-	ND	4400	127
41B	N-Nitrosodimethylamine	ND	330	ND	ND	ND	0	-	ND	0	-
42B	N-Nitrosodi-n-propylamine	ND	330	ND	ND	ND	0	-	ND	4400	140
43B	N-Nitrosodiphenylamine	ND	63	ND	ND	ND	0	-	75.1	4400	30
44B	Phenanthrene	ND	180	ND	ND	ND	0	-	ND	4400	127
45B	Pyrene	ND	63	ND	ND	ND	0	-	ND	4400	125
46B	1,2,4-Trichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	77
	Benzaldehyde	ND	333	ND	ND	ND	0	-	ND	4400	48
	Benzyl alcohol	BMDL	330	88.6	227	ND	0	-	51.1	4400	37

A Reagent Blank. Spiked Blank cannot be performed for this sample matrix.

B Recovery normally calculate using EPA Protocol Method 625.

C Recovery variable due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide/PCB Compounds - GC/MS Analysis Data (QR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8174	RESOURCE ENGINEERING	RES28804	TES15D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov *	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1P	Aldrin	ND	63	ND	ND	ND	0	-	ND	4400	44
2P	Alpha-BHC	ND	330	ND	ND	ND	0	-	ND	4400	39
3P	Beta-BHC	ND	150	ND	ND	ND	0	-	ND	4400	117
4P	Gamma-BHC	ND	330	ND	ND	ND	0	-	ND	4400	77
5P	Delta-BHC	ND	100	ND	ND	ND	0	-	ND	4400	14.
6P	Chlordane	ND	330	ND	ND	ND	0	-	ND	8800	41
7P	4,4'-DDT	ND	93	ND	ND	ND	0	-	ND	4400	0.
8P	4,4'-DDE	ND	190	ND	ND	ND	0	-	ND	4400	70
9P	4,4'-DDD	ND	160	ND	ND	ND	0	-	ND	4400	76
10P	Dieldrin	ND	83	ND	ND	ND	0	-	ND	4400	68
11P	Endosulfan I	ND	330	ND	ND	ND	0	-	ND	4400	78
12P	Endosulfan II	ND	330	ND	ND	ND	0	-	ND	4400	0.
13P	Endosulfan sulfate	ND	190	ND	ND	ND	0	-	ND	4400	42
14P	Endrin	ND	330	ND	ND	ND	0	-	ND	4400	32
15P	Endrin aldehyde	ND	330	ND	ND	ND	0	-	ND	4400	35
16P	Heptachlor	ND	63	ND	ND	ND	0	-	ND	4400	0.
17P	Heptachlor epoxide	ND	73	ND	ND	ND	0	-	ND	4400	56
18P	PCB-1242	ND	1200	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	1200	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	1000	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	1200	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	1200	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	ND	1200	ND	ND	ND	0	-	ND	4400	90
24P	PCB-1016	ND	1200	ND	ND	ND	0	-	ND	0	-
25P	Toxaphene	ND	330	ND	ND	ND	0	-	ND	0	-

* Recovery normally variable using EPA Protocol Method 625.

@ Present Blank. Spiked Blank cannot be performed for this sample matrix.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 24, 1986

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery Soil - GC/MS Data (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8174	RESOURCE ENGINEERING	RES28804	TES15D	85121		0

Compound	Amount added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION				
Toluene-D8	.250	75	50	160
p-Bromofluorobenzene	.250	86	50	160
1,2-Dichloroethane-D4	.250	79	50	160
ACID FRACTION				
Phenol-D5	100	71	20	140
2-Fluorophenol	100	77	20	140
2,4,6-Tribromophenol	100	100	10	140
BASE/NEUTRAL FRACTION				
Nitrobenzene-D5	50	111	20	140
2-Fluorobiphenyl	50	51	20	140
Terphenyl-D14	50	27	20	150

* IPB 206 Control Limits

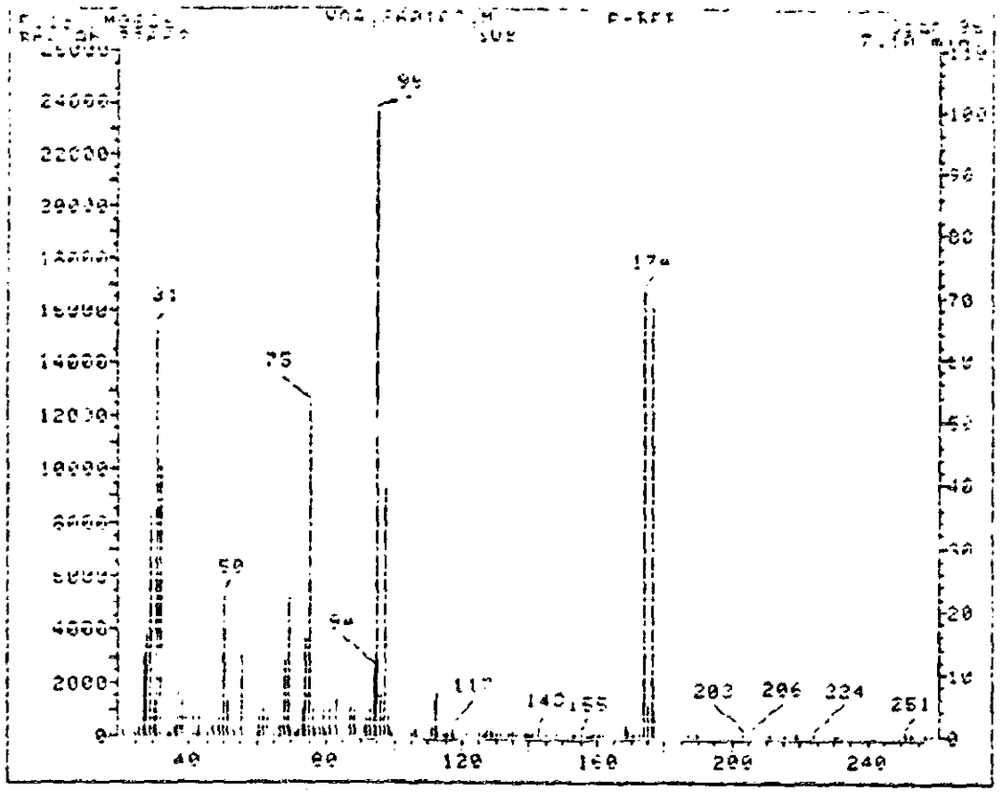

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	22.30	22.30	Ok
75	30-60% of mass 95	52.60	52.60	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.53	6.53	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	70.93	70.93	Ok
175	5-9% of mass 174	4.79	6.76	Ok
176	95-101% of mass 174	68.49	96.56	Ok
177	5-9% of mass 176	3.80	5.55	Ok

Injection Date: 01/02/86 Analyst: Derrick M Simons
Injection Time: 19:13 Processor: P. R. Rankin
Run No: >M0536 WC Batch: QV4206
Spectrum No: 96 Samples: K8557, K8171, K8174, K8175 1-4
K8176, K8173, K8484, ~~K8477~~ 10
K4174, ~~K8470~~ 10-4

1/6/86

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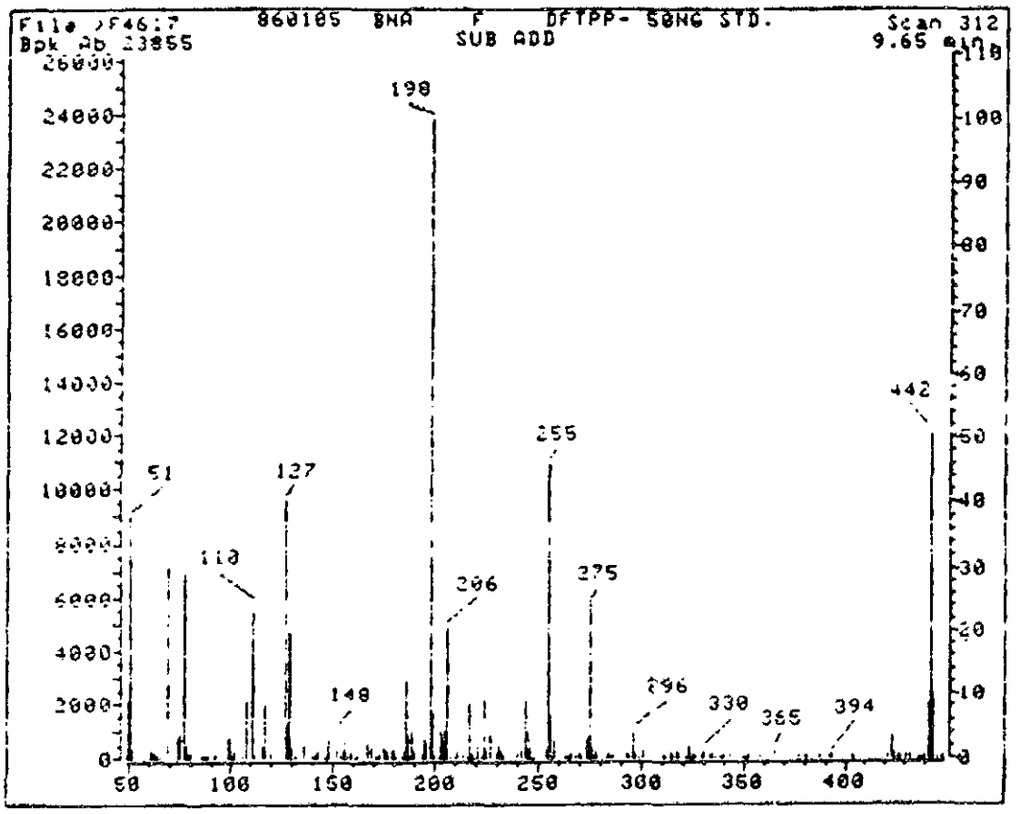

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for ~~Base/Neutral~~ Acid Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	37.49	37.49	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	29.90	29.90	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	40.19	40.19	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.93	6.93	Ok
275	10-30% of mass 198	24.59	24.59	Ok
365	Greater than 1% of mass 198	1.31	1.31	Ok
441	0-100% of mass 443	8.34	85.48	Ok
442	Greater than 40% of mass 198	50.23	50.23	Ok
443	17-23% of mass 442	9.76	19.43	Ok

Injection Date: 01/06/86 Analyst: [illegible]
Injection Time: 07:46 Processor: [illegible]
Run No: >F4617 QC Batch: QA4228 K8175
Spectrun No: 312 Samples: K8174, K8173, ~~K8176~~, K8171, I8439, K8176, K5484, K8485

K. Baker 1/9/86

002118

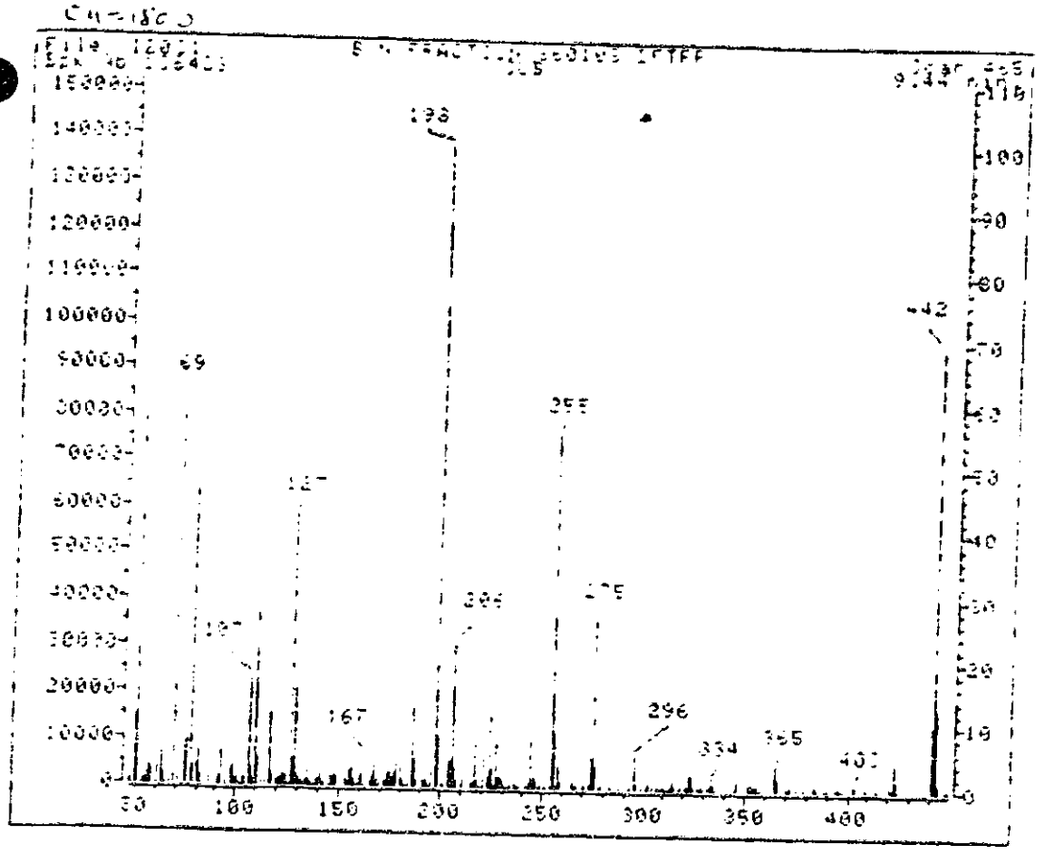

TABLE 2: METHOD PERFORMANCE DATA (DR27)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	58.00	58.00	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only	60.38	60.38	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	42.20	42.20	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.65	7.65	Ok
275	10-30% of mass 198	26.44	26.44	Ok
365	Greater than 1% of mass 198	3.90	3.90	Ok
441	0-100% of mass 443	10.20	78.74	Ok
442	Greater than 40% of mass 198	69.01	69.01	Ok
443	17-23% of mass 442	12.96	18.72	Ok

Injection Date: 01/08/86
Injection Time: 18:27
Run No: >12031
Spectrum No: 465

Analyst: Pearl Trant.
Processor: J. Herndl, D. Simons
QC Batch: QB4228
Samples: J84398, K84846, K84853, K81716, K81736, K81746, K81753, K81763, K32465, S82046-J22088

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L-002119

Methodology
for
GC/MS Analysis of Priority Pollutant Compounds

The methods employed in the GC/MS analysis for priority pollutants are established EPA methods. Rigid compliance with the instrument parameters and performance criteria of the published methods was achieved. In some cases, the precise amounts of sample used and the sample handling procedures vary with the complexity of the sample matrix. Qualitative identification of the priority pollutants was performed using the relative retention times, the relative abundance of three characteristic ions and the abundance ratios. The entire mass spectrum was reviewed to confirm each identification. Quantitative analysis of detected compounds was performed by using a response factor generated by a major characteristic ion of the specific compound and an internal standard.

Compounds, in addition to those on the priority pollutant list, were identified through a computer-aided search of the NBS-EPA spectra library. After review the identifications are included in a separate tabulation and labelled "tentatively identified".

Volatile Priority Pollutant Compounds

For the analysis of Volatile priority pollutants in a solid matrix, a modified version of EPA Method 624 was used. The modification can be be summarized as follows. 1-3 gm of the solid sample are weighed into a 15 ml Hypo vial. The vial is sealed immediately with a teflon-backed silicone septum. A solution containing 3 internal standards is injected through the septum onto the sample. The vial is attached to the Purge and Trap sampler in series with a 5 ml organic-free water trap. The sample vial is heated at 80 degrees Centigrade for 20 minutes. An inert gas sweeps the volatile organic compounds through the water trap onto a sorbent column where they are trapped. When the purge cycle is complete, the sorbent column is heated and backflushed with helium to desorb the purgeable organic compounds onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable mixture. The separated purgeable components are then identified and quantitated using a computerized mass spectrometer.

Acid, Base/Neutral and Pesticide Priority Pollutant Compounds

For the analysis of the Acid, Base/Neutral and Pesticide priority pollutants in a complex solid matrix, the EPA-EMSL sludge method was used (Protocol for Referee Analysis of Semi-Volatile Organic Priority Pollutants in Municipal and Industrial Waste Treatment Sludge, EPA Contract 68-03-2625, June 16, 1980). The method can be summarized as follows: A 80 ml sample is adjusted to a pH greater than 11 with aqueous NaOH. The pH adjusted sample is then extracted with methylene chloride using repetitive sediment extraction aided by a high speed homogenizer. The extract is separated by centrifugation and transferred by pipette. The sample is then acidified to a pH less than 2 and the extraction process is repeated with fresh methylene chloride. The first extract, containing the base/neutral extractable compounds, is cleaned with silica gel, dried and concentrated to a 1 ml final volume. Gel permeation chromatography is used to clean the extract containing the acid extractable compounds. This extract is dried and concentrated to a final 1 ml volume. Each extract is injected into a GC/MS instrument configured for the analysis of that specific fraction.

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

Summary of Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA-600/4-79-019, March 1979;
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/001-R, October 1979;
- the recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979; updated on October 26, 1984);
- "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980;
- "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983;
- Organic Analysis: Multi-media, Multi Concentration-IFB WA84-A267; and
- Dioxin Analysis: Soil/Sediment Matrix; Multi-Concentration; Selected Ion Monitoring with Jar Extration Procedure-IFB WA84-A002

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used.

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of 13 samples consists of 9 customer samples (at a maximun), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors vary greater than 25%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.

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- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Three surrogate compounds are added to each sample in the batch for Acid analysis.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on decafluorotriphenylphosphine (DFTPP) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of standards composed of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3 concentrations and using five internal standards for quantitation.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples.
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve.
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique, a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 independent reference standard;
- 4 Calibration standards (processed using the sample preparation method);
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

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Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 30 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate anaylses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preparation method); and
- 2 Procedural Blanks.

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices);
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known refernece QC sample for at least each 100 samples analyzed.

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch.

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- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample.

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon backround must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/- 15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$-2,3,7,8-TCDD as internal standard and $^{37}Cl_4$-TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples. The method blank is also dosed with the internal standard and surrrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:

  a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak.

  b. The 320/322 ratio is within the range of 0.67 to 0.87.

  c. Ions 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.

  d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.

  e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:

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. the 320/324 ratio should be 1.58 +/- 0.16

. the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.
- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.
- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractoer is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person(s) breaking the Shuttle seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician; and
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The records show for each link in this process:

- the person with custody, and
- the time and date each person accepted or relinquished custody.

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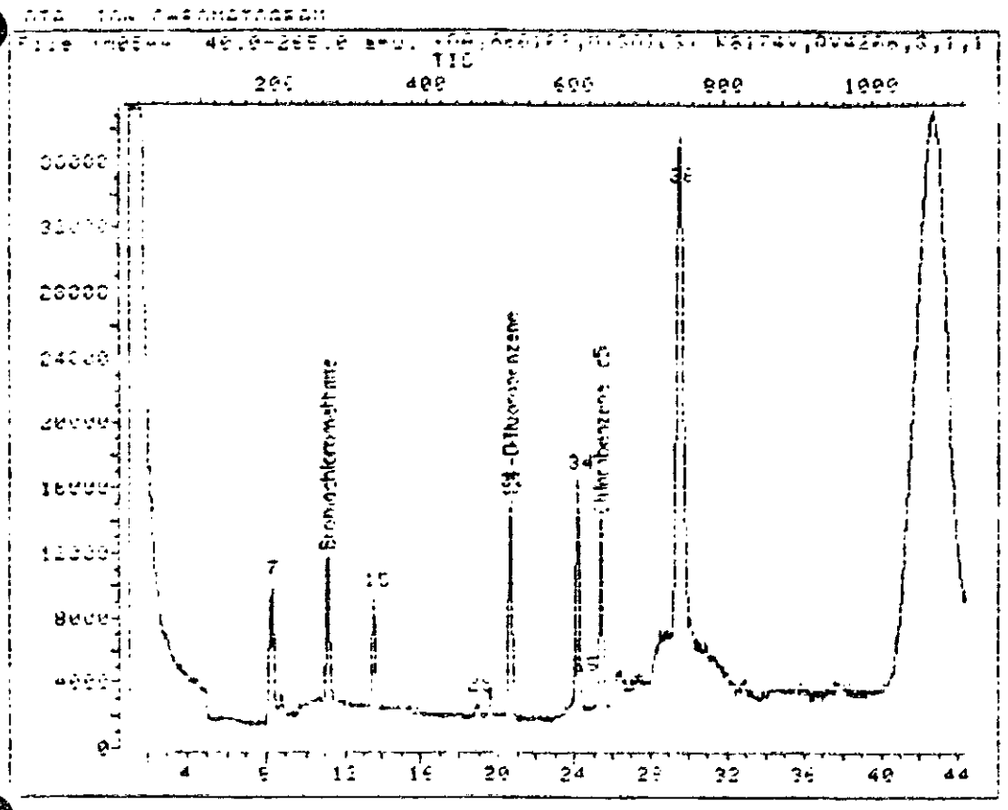
Appendix A

Mass Spectral Data for Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.



Data File: [illegible]
Name: [illegible]
Mass: [illegible]

IA File: [illegible]
Title: Volatile Priority Pollutant [illegible]
Last Calibration: [illegible]

Operator ID: [illegible]
Start Time: [illegible]
Injected at: [illegible]

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QUANT REPORT

Operator ID: DS4 12 Quant Rev: 4 Quant Time: 860103 03:47
Output File: ^M0544::AU Injected at: 860103 03:01
Data File: >M0544::U3 Dilution Factor: 1.00
Name: VOA,860102,M(SOIL)
Misc: [illegible]

ID File: MVOA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*Bromochloromethane		11.13	267	17401	250.00	NG	9
2)	Methylene chloride		8.[illegible]	194	29100	~~[illegible]~~	~~NG~~ -64.46	=1.14
15)	1,2-Dichloroethane-D4	(SURR)	13.53	329	14414	196.39	NG	8
17)	*1,4-Difluorobenzene		20.63	512	64628	250.00	NG	9
~~28)~~	~~bis(Chloromethyl)ether~~		~~18.88~~	~~467~~	~~2520~~	~~104.92~~	~~NG~~	10
30)	*Chlorobenzene-d5		25.40	635	47309	250.00	NG	9
~~31)~~	~~2-Chloroethylvinyl ether~~		~~20.67~~	~~513~~	~~17134~~	~~145.39~~	~~NG~~	10
34)	Toluene-D8	(SURR)	[illegible]	[illegible]	62990	[illegible]	NG	[illegible]
~~35)~~	~~Toluene~~		~~24.39~~	~~609~~	~~3193~~	~~[illegible].82~~	~~NG~~	90
38)	p-Bromofluorobenzene	(SURR)	29.42	740	43711	215.75	NG	98

* Compound is ISTD

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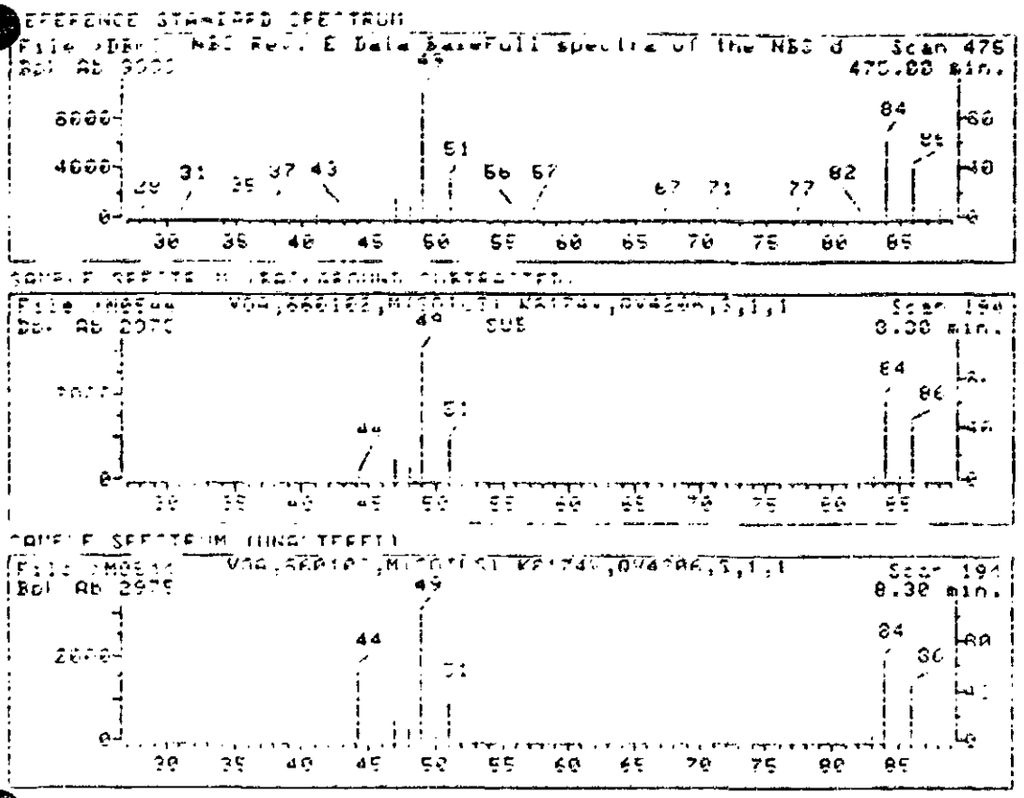

Data File: [illegible]
Name: [illegible]
Mass: [illegible]
Quant Time: [illegible]
Injected at: [illegible]

Compound No: [illegible]
Compound Name: [illegible]
Scan Number: 194
Retention Time: [illegible] min
Area: [illegible]
Concentration: [illegible] ng
q-value: [illegible]

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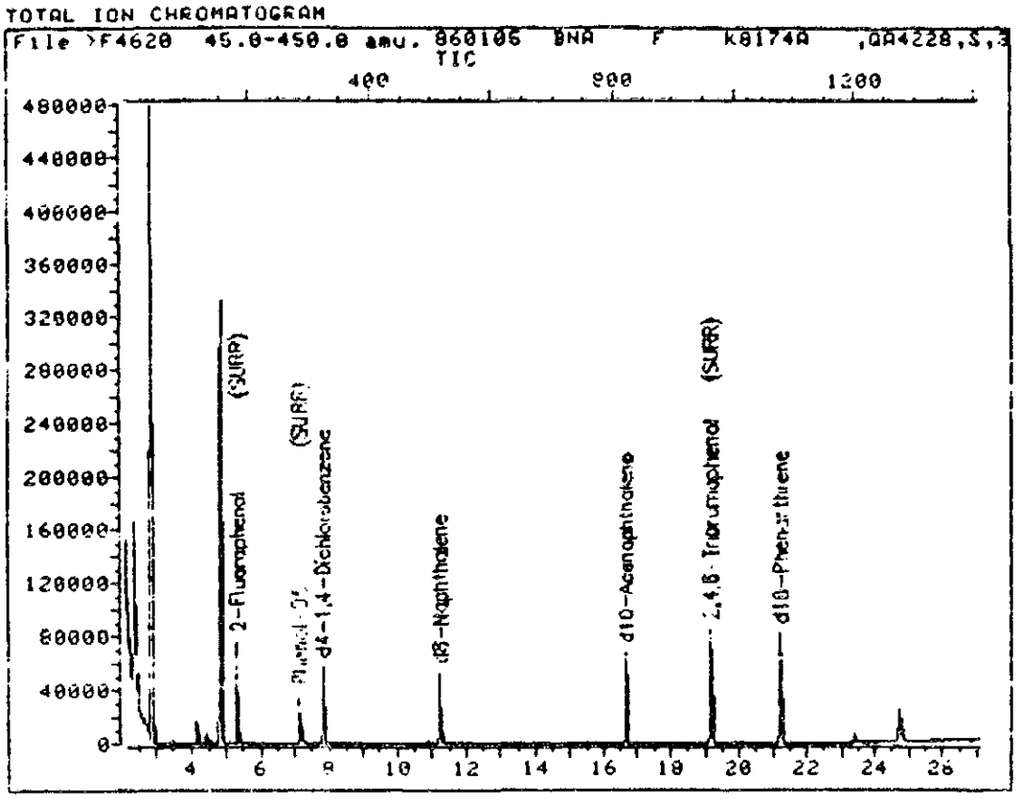
TOTAL ION CHROMATOGRAM



Data File: >F4620::U3
Name: 860106 BNA F
Misc: K8174A ,QA4228,S,30.01,1 BTL#25

Id File: FACID::U5
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

Operator ID: JH2180
Quant Time: 860106 14:06
Injected at: 860106 09:22

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QUANT REPORT

Operator ID: JH2190 Quant Re : 4 Quant Time: 860106 14:08
Output File: >F4620::AQ Injected at: 860106 09:22
Data File: >F4620::U3 Dilution Factor: 1.00
Name: 860105 BNA F
Misc: K8174A ,QA4225,5,30.01,. BTL#25

ID File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		7.81	320	34020	40.00	UG/ML	89
3)	2-Fluorophenol	(SURR)	5.32	180	41943	76.96	UG/ML	91
9)	Phenol-D5	(SURR)	.13	282	43156	70.72	UG/ML	98
10)	*d8-Naphthalene		11.23	513	72194	40.00	UG/ML	96
18)	*d10-Acenaphthalene		16.65	819	44854	40.00	UG/ML	94
24)	*d10-Phenanthrene		21.22	1077	118748	40.00	UG/ML	99
25)	2,4,6-Tribromophenol	(SURR)	19.15	960	41945	99.57	UG/ML	97

* Compound is ISTD

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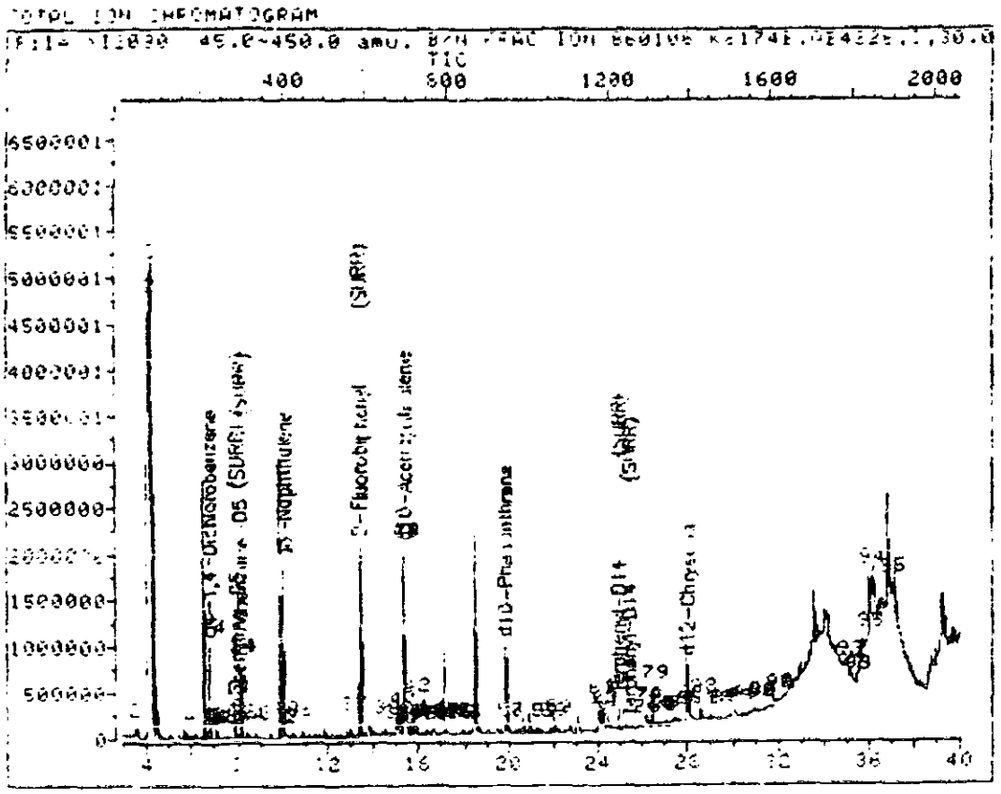

Data File: [illegible]
Name: B/N FRACTION 860108
Misc: K8174B.GB4228,[illegible]

BTL#50

Id File: IBNP::US
Title: B/N+PEST ID FILE .... FOR [illegible]
Last Calibration: 860109 18:45

Operator ID: JH2150
Quant Time: 860111 07:54
Injected at: 860111 07:11

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QUANT REPORT

Operator ID: JHC180 Quant Rev: 5 Quant Time: 860111 07:54
Output File: 12081.WK1 Injected at: 860111 07:11
Data File: 12081::US Dilution Factor: 1.00
Name: B/N FRACTION 860108
Misc: K81745,QB4228,S,30.01,1 BTL#50

ID File: IBNP::US
Title: B/N-PEST ID FILE .... FOR 1 850326
Last Calibration: 860108 13:45

	Compound		R.T.	Scan#	Area	Conc	Units	I
1)	*d4-1,4-Dichlorobenzene		6.75	216	148355	40.00	UG/ML	97
2)	N-Nitrosodimethylamine		3.42	31	2539	~~26.90~~	~~UG/ML~~ Dnc	100
2)	N-Nitrosodimethylamine		4.11	69	11029	~~116.85~~	~~UG/ML~~ Dnc	100
2)	N-Nitrosodimethylamine		4.16	72	7823	~~82.94~~	~~UG/ML~~ Dnc	100
4)	Benzaldehyde		5.85	166	4773	~~.62~~	~~UG/ML~~ Dnc	86
6)	Benzyl alcohol		7.11	236	20633	2.66	UG/ML	66
5)	Benzyl alcohol		7.26	244	1203	~~.15~~	~~UG/ML~~ Dnc	87
6)	Benzyl alcohol		7.31	247	1644	~~.21~~	~~UG/ML~~	82
7)	1,3-Dichlorobenzene		6.73	219	2892	~~.31~~	~~UG/ML~~ Dnc	0
8)	1,4-Dichlorobenzene		6.78	219	2891	~~.31~~	~~UG/ML~~ Dnc	0
9)	1,2-Dichlorobenzene		6.73	218	2891	~~.32~~	~~UG/ML~~ Dnc	0
13)	Nitrobenzene-D5	(SURR)	7.97	284	1195	~~.13~~	~~UG/ML~~ Dnc	4
13)	Nitrobenzene-D5	(SURR)	8.11	292	495276	55.67	UG/ML	7
14)	bis(2-Chloroisopropyl)ether		6.75	216	15145	~~6.60~~	~~UG/ML~~ Dnc	8
14)	bis(2-Chloroisopropyl)ether		7.90	280	2435	~~1.59~~	~~UG/ML~~ Dnc	66
14	bis(2-Chloroisopropyl)ether		8.11	292	6753	~~4.42~~	~~UG/ML~~ Dnc	8
19)	*d8-Naphthalene		10.02	399	1720542	40.00	UG/ML	97
20)	2-Fluorobiphenyl	(SURR)	13.38	585	1606825	25.35	UG/ML	97
21)	N-Nitrosodi-n-propylamine		6.97	226	1654	~~.13~~	~~UG/ML~~ Dnc	49
21)	N-Nitrosodi-n-propylamine		7.18	240	1918	~~.15~~	~~UG/ML~~ Dnc	54
21)	N-Nitrosodi-n-propylamine		8.11	292	116106	~~9.89~~	~~UG/ML~~ Dnc	8
23)	Nitrobenzene		6.73	326	4931	~~.24~~	~~UG/ML~~ Dnc	4
24)	Isophorone		8.46	311	5155	~~.16~~	~~UG/ML~~ Dnc	49
29)	1,2,4-Trichlorobenzene		9.93	393	7720	~~.53~~	~~UG/ML~~ Dnc	96
29)	1,2,4-Trichlorobenzene		10.61	431	1692	~~.12~~	~~UG/ML~~ Dnc	88
30)	Naphthalene		10.07	401	14256	~~.31~~	~~UG/ML~~ Dnc	96
34)	*d10-Acenaphthalene		15.36	695	1047076	40.00	UG/ML	91
37)	2-Chloronaphthalene		12.97	562	15471	~~.63~~	~~UG/ML~~ Dnc	48
38)	Dimethyl phthalate		14.49	646	43325	~~1.01~~	~~UG/ML~~ Dnc	7
38)	Dimethyl phthalate		15.36	695	183305	~~4.27~~	~~UG/ML~~ Dnc	70
38)	Dimethyl phthalate		15.70	714	37558	~~.87~~	~~UG/ML~~ Dnc	96
39)	Acenaphthylene		14.86	667	7313	~~.17~~	~~UG/ML~~ Dnc	92
40)	2,6-Dinitrotoluene		15.13	682	16572	~~1.95~~	~~UG/ML~~ Dnc	59
40	2,6-Dinitrotoluene		15.36	695	130198	~~15.32~~	~~UG/ML~~ Dnc	5
40)	2,6-Dinitrotoluene		15.50	703	1763	~~.21~~	~~UG/ML~~ Dnc	52
42)	Acenaphthene		15.81	720	5346	~~.16~~	~~UG/ML~~ Dnc	53
42)	Acenaphthene		16.10	736	1155	~~.03~~	~~UG/ML~~ Dnc	87
42)	Acenaphthene		16.40	753	1243	~~.04~~	~~UG/ML~~ Dnc	60
44)	2,4-Dinitrotoluene		15.76	695	130198	~~8.61~~	~~UG/ML~~ Dnc	53
44)	2,4-Dinitrotoluene		16.20	742	1711	~~.11~~	~~UG/ML~~ Dnc	6
45)	Diethyl phthalate		16.93	760	1101	~~.02~~	~~UG/ML~~ Dnc	9
45)	Diethyl phthalate		17.05	789	19180	~~.32~~	~~UG/ML~~ Dnc	97
45)	Diethyl phthalate		17.90	836	2856	~~.05~~	~~UG/ML~~ Dnc	8

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	Compound		R.T.	Scan#	Area	Conc	Units	
46)	Fluorene		17.00	786	5091	~~.10~~	UG/ML	81
46)	Fluorene		17.63	821	3899	~~.08~~	UG/ML	86
46)	Fluorene		17.72	826	2990	~~.06~~	UG/ML	89
51)	1,2-Diphenylhydrazine		16.62	765	6052	~~.09~~	UG/ML	94
51)	1,2-Diphenylhydrazine		18.24	855	1151	~~.02~~	UG/ML	54
53)	*d10-Phenanthrene		19.04	944	287470	40.00	UG/ML	93
57)	Phenanthrene		19.91	948	6874	~~.35~~	UG/ML	91
58)	Anthracene		19.91	948	6874	~~.34~~	UG/ML	93
59)	Di-n-butyl phthalate		21.51	1037	1885	~~.07~~	UG/ML	1
59)	Di-n-butyl phthalate		21.87	1057	3676	~~.15~~	UG/ML	33
59)	Di-n-butyl phthalate		22.11	1070	35844	~~1.42~~	UG/ML	93
60)	Fluoranthene		23.21	1136	2752	~~.17~~	UG/ML	73
61)	Benzidine		24.00	1175	1345	~~.84~~	UG/ML	100
61)	Benzidine		24.25	1189	1423	~~.89~~	UG/ML	100
61)	Benzidine		24.92	1226	4517	~~2.82~~	UG/ML	100
62)	Pyrene		24.20	1186	2752	~~.14~~	UG/ML	73
70)	*d12-Chrysene		28.00	1397	285438	40.00	UG/ML	100
73)	Endosulfan I		23.80	1164	1177	~~1.35~~	UG/ML	62
76)	Endrin		26.04	1288	1107	~~.90~~	UG/ML	58
77)	Endosulfan II		26.18	1296	1278	~~2.77~~	UG/ML	45
78)	4,4'-DDD		26.44	1295	1351	~~.22~~	UG/ML	56
78)	4,4'-DDD		26.79	1330	2270	~~.36~~	UG/ML	70
79)	Endrin aldehyde		26.20	1297	20437	~~12.29~~	UG/ML	41
79)	Endrin aldehyde		26.43	1310	21449	~~12.90~~	UG/ML	67
79)	Endrin aldehyde		26.96	1339	8647	~~5.20~~	UG/ML	
80)	4,4'-DDT		26.79	1330	2424	~~.58~~	UG/ML	
80)	4,4'-DDT		27.32	1359	1103	~~.26~~	UG/ML	92
82)	Terphenyl-D14	(SURR)	24.90	1225	253178	13.69	UG/ML	97
82)	Terphenyl-D14	(SURR)	25.40	1253	1125	~~.06~~	UG/ML	52
84)	Butyl benzyl phthalate		26.65	1322	2425	~~.28~~	UG/ML	78
85)	Benzo(a)anthracene		27.95	1394	2856	~~.36~~	UG/ML	75
85)	Benzo(a)anthracene		28.06	1400	4759	~~.59~~	UG/ML	74
86)	Chrysene		27.95	1394	2856	~~.37~~	UG/ML	85
86)	Chrysene		28.06	1400	4759	~~.61~~	UG/ML	78
88)	bis(2-Ethylhexyl)phthalate		28.60	1430	122661	~~17.93~~	UG/ML	94
88)	bis(2-Ethylhexyl)phthalate		29.32	1470	1754	~~.26~~	UG/ML	52
88)	bis(2-Ethylhexyl)phthalate		29.54	1482	2381	~~.35~~	UG/ML	51
89)	Di-n-octyl phthalate		30.21	1519	7509	~~.88~~	UG/ML	86
89)	Di-n-octyl phthalate		30.41	1530	17930	2.11	UG/ML	99
89)	Di-n-octyl phthalate		31.20	1574	20790	~~2.45~~	UG/ML	95
90)	Benzo(b)fluoroanthene		31.09	1568	3890	~~.74~~	UG/ML	83
90)	Benzo(b)fluoroanthene		31.17	1572	3068	~~.58~~	UG/ML	43
90)	Benzo(b)fluoroanthene		31.94	1615	2657	~~.50~~	UG/ML	57
91)	Benzo(k)fluoranthene		31.09	1568	3890	~~.85~~	UG/ML	82
91)	Benzo(k)fluoranthene		31.17	1572	3068	~~.51~~	UG/ML	44
91)	Benzo(k)fluoranthene		31.94	1615	2657	~~.44~~	UG/ML	59
92)	Benzo(a)pyrene		31.09	1568	3890	~~.77~~	UG/ML	83
92)	Benzo(a)pyrene		31.17	1572	3068	~~.61~~	UG/ML	46
92)	Benzo(a)pyrene		31.94	1615	2657	~~.53~~	UG/ML	58
93)	Indeno(1,2,3-c,d)pyrene		35.03	1785	7905	~~1.45~~	UG/ML	5
93)	Indeno(1,2,3-c,d)pyrene		35.35	1803	1220	~~.22~~	UG/ML	
93)	Indeno(1,2,3-c,d)pyrene		35.86	1831	1221	~~.22~~	UG/ML	1
94)	Dibenzo(a,h)anthracene		35.21	1795	8361	~~1.71~~	UG/ML	92
94)	Dibenzo(a,h)anthracene		36.02	1840	2127	~~.43~~	UG/ML	51
95)	Benzo(ghi)perylene		35.86	1831	1221	~~.25~~	UG/ML	76

11/7/86

	Compound	R.T.	Scan#	Area	Conc	Units	Q
95)	Benzo chl perylene	36.86	1886	15799	3.30	UG/ML	68

* Compound is ISTD

1/17/86

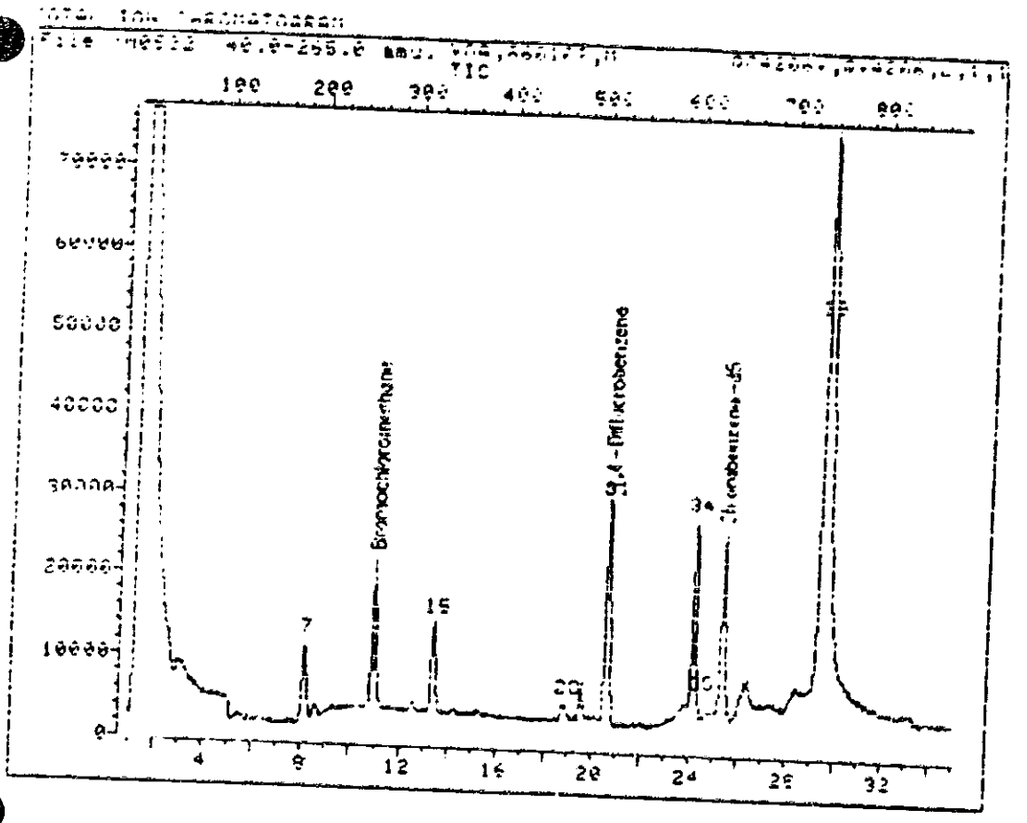
NO PCB's Found.

002135

Appendix C1

GC/MS Subsidiary Data

002136



Data File: [illegible]
Name: [illegible],861102,M
Misc: [illegible]

Id File: MUDA::US
Title: Volatile Priority Pollutant ID File
Last Calibration: 861102 19:03

Operator ID: DS4 12
Quant Time: 861102 19:08
Injected at: 861102 15:09

002137

QUANT REPORT

Operator ID: 054212 Quant Rev: 4 Quant Time: 860102 19:[illegible]
Output File: ^M0532::AQ Injected at: 860102 15:09
Data File: >M0532::03 Dilution Factor: 1.00
Name: VOA,860102,M
Misc: [illegible] BLANK

ID File: MVOA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

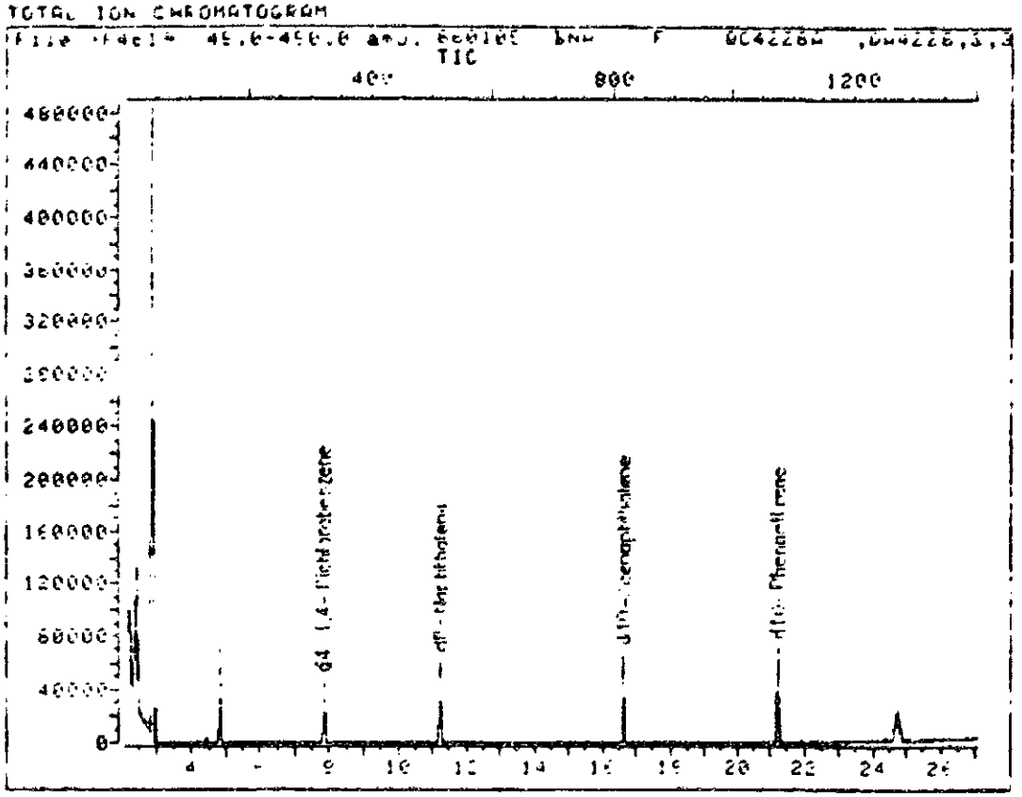
	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*Bromochloromethane		10.96	263	34271	250.00	NG	90
2)	Methylene chloride		8.09	189	29651	64.46	NG	9[illegible]
15)	1,2-Dichloroethane-D4	(SURR)	13.40	326	23094	159.77	NG	9[illegible]
12)	*1,4-Difluorobenzene		20.61	512	132[illegible]67	250.00	NG	9[illegible]
28)	~~bis(Chloromethyl)ether~~		~~13.83~~	~~466~~	~~[illegible]~~	~~194.75~~	~~NG~~	10
30)	*Chlorobenzene-d5		25.[illegible]8	635	87605	250.00	NG	[illegible]
31)	~~2-Chloroethylvinyl ether~~		~~20.65~~	~~513~~	~~34798~~	~~159.42~~	~~NG~~	10
34)	Toluene-D8	(SURR)	24.18	604	108741	161.97	NG	[illegible]
35)	~~Toluene~~		~~24.37~~	~~609~~	~~2228~~	~~2.95~~	~~NG~~	96
38)	p-Bromofluorobenzene	(SURR)	29.[illegible]2	238	62448	166.46	NG	99

PMN

* Compound is ISTD

002138

TOTAL ION CHROMATOGRAM



Data File: /F4619::U3
Name: 860105 BNA F
Misc: [illegible]

Id File: FACID::UE
Title: PF/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

Operator ID: JHD[illegible]
Quant Time: 860106 14:02
Injected at: 860106 08:40

002139

QUANT REPORT

Operator ID: JH2180
Output File: F4619::AQ
Data File: >F4619::U3
Name: 860105 BNA F
Misc: QC4228A ,QA4228,S,30.00,1

Quant Rev: 4 Quant Time: 860106 14:02
Injected at: 860106 08:40
Dilution Factor: 1.00

BTL#24

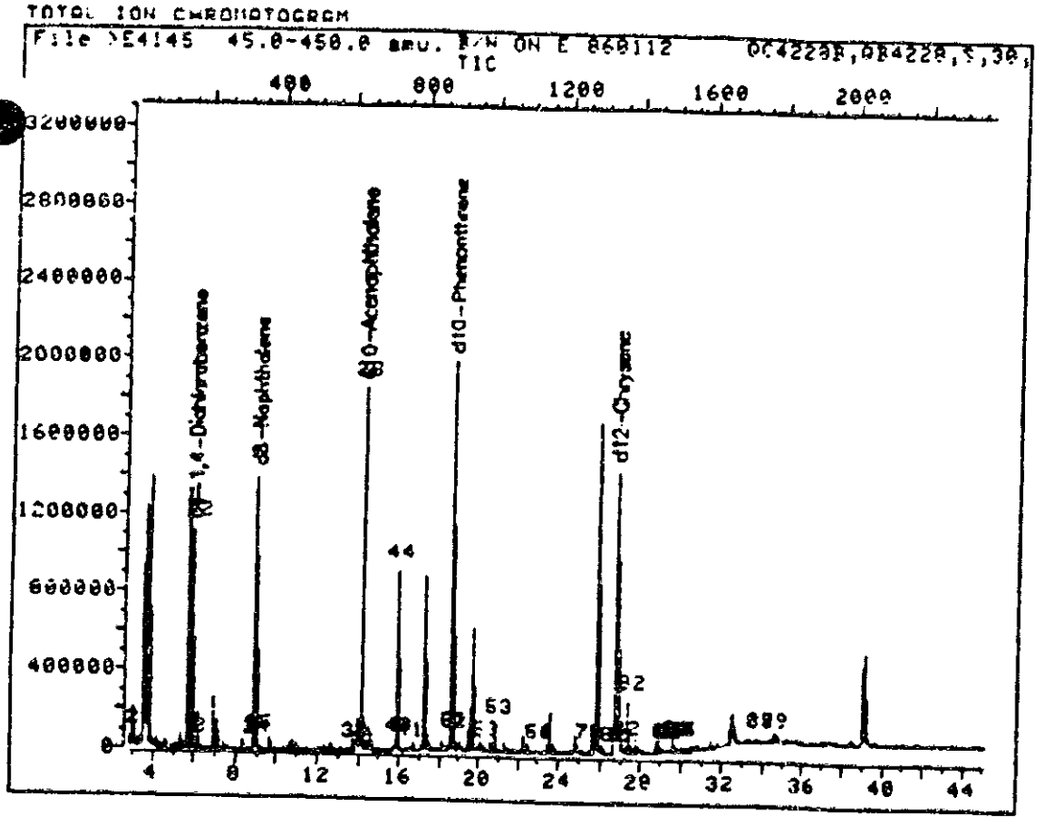
ID File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

	Compound	Rt.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	7.80	319	33041	40.00	UG/ML	8
10)	*d8-Naphthalene	11.22	512	74465	40.00	UG/ML	5
18)	*d10-Acenaphthalene	16.63	617	45053	40.00	UG/ML	6
24)	*d10-Phenanthrene	21.20	1075	99903	40.00	UG/ML	9

* Compound is ISTD

002140

TOTAL ION CHROMATOGRAM



Data File: >E4145::US
Name: B/N ON E 860112
Misc: QC4228B,QB4228,S,30,1

BTL# 6

Id File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 860326
Last Calibration: 860113 11:36

Operator ID: WW9928
Quant Time: 860113 11:38
Injected at: 860113 03:14

002141

QUANT REPORT

Operator ID: WW9928
Output File: ^E4145::AQ
Data File: >E4145::U5
Name: B/N ON E 860112
Misc: QC42288,QB4228,S,30,1

Quant Rev: 5

Quant Time: 860113 11:38
Injected at: 860113 03:14
Dilution Factor: 1.00

BIL# 6

ID File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 850326
Last Calibration: 860113 11:36

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	5.85	169	368447	40.00	UG/ML	99
2)	N-Nitrosodimethylamine	2.93	4	2426	474.92	UG/ML	100
3)	Benzyl alcohol	6.26	192	8613	.51	UG/ML	87
12)	bis(2-Chloroisopropyl)ether	5.89	169	13740	5.07	UG/ML	99
17)	*d8-Naphthalene	8.88	340	1775324	40.00	UG/ML	
24)	1,2,4-Trichlorobenzene	8.81	336	3674	.28	UG/ML	
29)	Naphthalene	8.93	343	4607	.13	UG/ML	
29)	*d10-Acenaphthalene	14.09	634	1378682	40.00	UG/ML	
33)	Dimethyl phthalate	13.61	607	3385	.09	UG/ML	
35)	Dimethyl phthalate	14.09	634	243981	6.17	UG/ML	
36)	2,6-Dinitrotoluene	14.09	634	172607	16.52	UG/ML	
40)	Diethyl phthalate	19.79	730	22463	.97	UG/ML	93
41)	Fluorene	16.43	768	1269	.05	UG/ML	81
44)	N-Nitrosodiphenylamine	19.85	733	5786	.25	UG/ML	90
47)	*d10-Phenanthrene	18.55	885	2866028	40.00	UG/ML	91
51)	Phenanthrene	18.60	888	10194	.18	UG/ML	94
52)	Anthracene	18.60	888	10194	.18	UG/ML	92
53)	Di-n-butyl phthalate	20.23	980	9854	.16	UG/ML	92
53)	Di-n-butyl phthalate	20.84	1014	187206	2.99	UG/ML	97
54)	Fluoranthene	22.98	1130	3422	.06	UG/ML	93
56)	Pyrene	22.98	1130	3422	.06	UG/ML	93
64)	*d12-Chrysene	26.68	1343	1855287	40.00	UG/ML	100
78)	Butyl benzyl phthalate	25.35	1268	4469	.14	UG/ML	79
82)	bis(2-Ethylhexyl)phthalate	26.58	1337	1391	.03	UG/ML	94
82)	bis(2-Ethylhexyl)phthalate	27.15	1369	4389	.10	UG/ML	87
82)	bis(2-Ethylhexyl)phthalate	27.33	1379	234144	5.34	UG/ML	93
83)	Di-n-octyl phthalate	29.12	1480	7817	.14	UG/ML	94
83)	Di-n-octyl phthalate	29.41	1496	1286	.02	UG/ML	88
83)	Di-n-octyl phthalate	29.64	1509	4568	.08	UG/ML	60
84)	Benzo(b)fluoranthene	29.89	1523	3362	.10	UG/ML	82
85)	Benzo(k)fluoranthene	29.89	1523	3362	.11	UG/ML	81
86)	Benzo(a)pyrene	29.89	1523	3362	.11	UG/ML	82
87)	Indeno(1,2,3-cd,e)pyrene	33.67	1735	8829	.29	UG/ML	92
88)	Dibenzo(a,h)anthracene	33.71	1737	2846	.31	UG/ML	91
89)	Benzo(ghi)perylene	33.67	1735	8025	.35	UG/ML	94
89)	Benzo(ghi)perylene	34.40	1776	8380	.33	UG/ML	92

* Compound is ISTD

NO PCB's Found.

1/16/86

002142

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

002143

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 47285 ETC Job # K8174

Date Sealed 12-6-85 By: M. Ickstadt

Company: RESOURCE ENGINEERING

Facility/Site:

Address: 3000 RICHMOND AVE.
HOUSTON, TX 77098

Attn.: CHRIS ITIN

Phone: (713) 520-9200

SAMPLE IDENTIFICATION

Facility: RES2881-P41 (Facility/Site Code) EVAPORATION SYSTEM (Optional Sample Point Descriptions)

Sample Point: T-ES15d (Source Code (from below) / Your Sample Point ID (left justify)) 85 12 17 (Start Date (YY/MM/DD)) (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes
Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys (C) Other (X)
Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	SAMPLER Observations	LAB Observations
1	E	500mL	BAKED	EXTRACTABLE			✓
2	F	40mL	BAKED	VOA			✓

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CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By (print) JOHN BINS Date: 12/9/85 Time: 6:30 PM
Signature: John Bins Seal #: 0047285 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By (print) JOHN BINS Date: 12/19/85 Time: 5:30PM
Signature: John Bins Seal #: 0047286 Intact: YES

ETC USE ONLY Opened By: [signature] Date: 12/20/85 Time: 11:00
Seal #: 47286 Condition: Intact

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # K8174

Sample Point [1] [ES 5d] (Source Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD) | START PURGE (2400 Hr Clock) | ELAPSED HRS | WATER VOL. IN CASING (Gallons) | VOLUME PURGED (Gallons)

SAMPLING METHOD: HAND AUGER AND CORE SAMPLER

Sampler Type [ ] A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel, X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon, B-Metal, C-PVC, D-Plastic, X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon, B-Tygon, C-Polyethylene, D-Silicon, X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ Procedure Proportions

FIELD MEASUREMENTS

Well Elevation (ft/msl) | Well Depth (ft)

Depth to Ground water (ft) | Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

002145

1st	(STD) pH	1st	umhos at 25°C spec. cond.	(other parameter)	value	units
2nd	(STD) pH	2nd	umhos at 25°C spec. cond.	(other parameter)	value	units
3rd	(STD) pH	3rd	umhos at 25°C spec. cond.	(other parameter)	value	units
4th	(STD) pH	4th	umhos at 25°C spec. cond.	(other parameter)	value	units

Sample Temp (°C) | Turbidity NTU

FIELD COMMENTS

Sample Appearance: DARK BROWN-RED SILTY CLAY WITH SLUDGE STREAKS ~~37~~" - ~~38~~" 33 - 39" J.B

Weather Conditions:

Other: ~~HNU READING 3ppm AT HOLE~~

~~RESTRAINTS WORN~~

EPA SAMPLE ~~SPLIT~~ SB # ~~SD3-36A~~ # SD4-36A

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: JOHN BINS (Print) Employer: RESOURCE ENGINEERING INC

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

12/19/85 John Bins (Date) (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/2/86 SHIFT
FRACTION VOA
INSTRUMENT M
TUNE FILE APEI02
SEQUENCE FILE DSM
METHOD FILE VOAM
ID FILE MWA
ANALYST(S) Dennis Simon
Brenda Hawkins
SUPERVISOR [signature]
BATCH #'s QV4206

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	1/2/86
WIP		BY	DMS

STANDARD	CONC PPM	LOT NO.	LOT VOL (µl)
pBFB	50	12151	1
Istd	25	12066	10
Sumog	25	12019	10
ABC/SCVSA	18	12141	5,10,30
o,m,p chlorotoluene	18	11852	5,10,30

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
p-BFB	7M0531	1µl			100003	OK 13:37	
QC4206V	7M0532					OK 15:05 PLSV10 Vol	✓
QC4206VS	7M0533					5µl ABC/SCVSA, o,m,p chlorotol	
QC4206VS	7M0534					10	
QC4206VS	7M0535				18:09	30	
p-BFB	7M0536				19-19	OK	
K8557VS	7M0537	1.0g				NG splatter no metal	
K8557V	7M0538					OK	
K8558V	7M0539					Ng ~~OK~~ re-run 1/200	
K8558VR	7M0540					Ng ~~OK~~ re-run 1/200	35,36
K8559V	7M0541					Ng ~~OK~~ re-run 1/200	66,67
K8171V	7M0542					~~OK~~ Ng rerun carryover	
K8173V	7M0543					Ng ~~OK~~	
K8174V	7M0544					~~OK~~	
K8175V	7M0545					OK	
K8176V	7M0546					OK	
(R) K8557VS	7M0547					OK	
QC4206VS	7M0548	1µl				OK 07:06	
p-BFB	7M0549	1µl				NG	
p-BFB	7M0550	1µl				OK 09:03	
(R) K8171V	7M0551	1.0g				OK	
K8173VR	7M0552	1.0g				OK	
K8484V	7M0553	1.0g				OK	
K8471V	7M0554					OK	
K4174V	7M0555					OK PLSV10 P10/10	✓

ETC FORM 8102

-002146

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/3/86 SHIFT
FRACTION VOA (soils)
INSTRUMENT M
TUNE FILE APEI02
SEQUENCE FILE DSM
METHOD FILE VOAm
ID FILE MVOA
ANALYST(S) Dennis M Simons

SUPERVISOR [signature]
BATCH #'s QV4206

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Refer to pg. 1 of 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8470V	>M0556	1g			1.0008	OK	
(R) K8173V	>M0557	1g				Unglashed	
QC4206V	>M0558					OK	
(R) K8173V	>M0559	1g				OK	

ETC FORM #102

002147

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
* ~~K4174~~	~~12865~~	~~29.95~~			~~PP/ORG/PST/PCB~~ RESOXHLET AT 3.0 gram MG 12/30
+ J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485	↓	29.27	1.0	1.0	↓
K8171	12847	30.00	1.0	1.0	PP/ORG/PST/PCB CMPD/BN
* ~~K8172~~		~~30.01~~			RESOXHLET AT 3.0 gram MG 12/30
K8173		30.00	1.0	1.0	
K8174		30.01	1.0	1.0	
K8175		29.95	1.0	1.0	
K8176	↓	28.15	1.0	1.0	↓
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		Bn+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208	↓	30.10	1.0		↓ ↓
QC 4228			1.0	1.0	
~~K8173~~ ~~K 81 7[illegible]3~~ S		22.72	1.0	1.0	
K 8174 R		~~20.38~~ 24.84	1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

002148

COMMENTS

Log 12847 Cmpd / BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

*K 4174 } RESOXHLET AT 3.0 gram MG 12/30
*K 8172 }

+ F.V 5.0 ml a.ml
Aliquot was packaged

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 ug/ml	12,098
ACID	1.0	100 ug/ml	11,825
Aroclor 1260	1.0	100 ug/ml	12,097
Pest	1.0	100/200 ug/ml	12,059
Spec #930 BN spike	1.0	100 ug/ml	12,137
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ug/ml ACID: 100 ug/ml	12,093

Set-up: L.M. Zok 12/27/85 J. Vejda 12-27-85 UPD/Supervisor: Marc Gaudin 1/2/85

BN Conc.: Gridie C 12/3/85 Acid Conc.: L.M. Zok 12/27/85 Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC FORM #110

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/6/86 SHIFT
FRACTION Acid; BNA
INSTRUMENT F
TUNE FILE MTF001
SEQUENCE FILE JHF
METHOD FILE Acid F; BNPF
ID FILE FAcid; FBNA
ANALYST(S) J. Hendl
SUPERVISOR
BATCH #'s QC4159, QA4228

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ	JH 1/5	DATE	1/6
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL
Int Std	400	12,008	100 ul
B/N Cal std I		12,110	1 ml
B/N Cal std II		12,111	
B/N Cal std III		11,906	
Acid cal std I		12,020	
Acid cal std II		12,021	
Acid cal std III		12,022	
Spec #930	60	12,140	
Spec #930	100	12,139	
Spec #930	300	12,138	
DFTPP	25	11,972	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP-60ng std	>F4595					OK	
B/N Cal std III	F4596		1				
B/N Cal std II	F4597		2				
B/N Cal std I	F4598		3				
Acid cal std III	F4599		4				
Acid cal std II	F4600		5				
Acid cal std I	F4601		6				
Spec #930; 300ppm	F4602		7				
Spec #930; 100ppm	F4603		8				
Spec #930; 60ppm	F4604		9				
DFTPP-50ng std	F4605		10			OK	
K8322CS	F4606		11				
QC4159C	F4607		12			BNHS Act1	Y
K8323C	F4608		13			BNHS Act1	Y
K8323CR	F4609		14				
K8320C	F4610		15			BNHS Act1	Y
K8322C	F4611		16			Act1	Y
K8321C	F4612		17			Act1	Y
K8325C	F4613		18			Act1	Y
K8324C	F4614		19			Act1	Y
GPC BLANK	F4615		20				
K8173AS	F4616		21				
DFTPP-50ng std	F4617		22			OK	
Acid cal std II	F4618		23			CBCHK-OK	
QC4228A	F4619		24				

ETC FORM 6102

002140

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE _____
METHOD FILE _____
ID FILE _____
ANALYST(S) J. Hewlle-RH
SUPERVISOR [signature]
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174A	>F4620		25				
K8174AR	F4621		26				
K8173A	F4622		27				
K8175A ~~K8176A~~	F4623		28				
K8171A	F4624		29				
J8439A	F4625		30				
K8176A	F4626		31				
K8484A	F4627		32				
K8485A	F4628		33				

002150

ETC FORM #102

TESTING and CERTIFICATION

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
* ~~K4174~~	~~12865~~	~~29.95~~			~~PP/ORG/PST/PCB~~
J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485		29.27	1.0	1.0	
K8171	12847	30.00	1.0	1.0	PP/ORG/PST/PCB CMPD/BN
* ~~K8172~~		~~30.01~~			RESOXHLET AT 3.0 grams MG 12/30
K8173		30.00	1.0	1.0	
K8174		30.01	1.0	1.0	
K8175		29.95	1.0	1.0	
K8176		28.15	1.0	1.0	
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		Bn+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208		30.10	1.0		
QC 4228			1.0	1.0	
~~K8173~~ K8173 S		22.72	1.0	1.0	
K8174 R		~~20.38~~ 24.84	B.V 12/27 1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

1-2 PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

Log 12847 Cmpd/BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

*K4174 } RESOXHLET AT 3.0 grams. MG 12/30
*K8172 }

+ F.V 5.0 ml a 1 ml Aliquot was packaged

MT 8501

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 ug/ml	12,098
ACID	1.0	100 ug/ml	11,825
Arochlor 1260	1.0	100 ug/ml	12,097
Pest	1.0	100/200 ug/ml	12,059
Spec #930 BN spike	1.0	100 ug/ml	12,157
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ug/ml ACID: 100 ug/ml	12,093

Set-up: L.M. Zak 12/20/85 J. Vejda 12-27-85 UPD/Supervisor: Marc Quaglia 1/2/86

BN Conc.: Gaudie C 12/30/85 Acid Conc.: L.M. Zak 1/3/86 Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC FORM 2110

002151

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/8/86 SHIFT
FRACTION B/N
INSTRUMENT "I"
TUNE FILE MTI001
SEQUENCE FILE MBI
METHOD FILE BNPI
ID FILE IBNP, ISPPJ*
ANALYST(S) M Barkley

SUPERVISOR Pearl Trawb
BATCH #'s QB4228, QP0002, QP0007

*ID File for QC P0002 and QCP0007.
PLEASE INITIAL

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	Jan. 9th 1986
WIP		BY	KV

6 ISTPJ, CB-file: CBISPJ

STANDARD	CONC PPM	LOT NO.	LOT VOL.
INT STD	400	12008	
DFTPP	25	11972	
BN IV	150	12112	
BN III	200	11906	
BN II	100	12111	
BN I	60	12110	
HSLPP/BN III	300	11837	
" II	100	11838	
I	30	11839	
SPEC. ~~903~~ 930 III	300	12138	
930 II	100	12139	
930 I	60	12140	
O,m,p-nitrotoluene III	500	11244	
II	~~400~~ 300	11245	
I	100	11246	

M5, M6, M7, M8.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP-50ng	>I2031		1	OW		-Lowered EMV ↓ to 1600.	
BN ~~IV~~ - 150ppm	>I2032		2		I00373		
BN III - 200ppm	>I2033		3				
BN ~~II~~ III 100ppm	>I2034		4			AR1260	
BN I - 60ppm	>I2035		5				
HSLPP/BN - 300ppm	>I2036		6				
HSLPP/BN - 100ppm	>I2037		7			for 2-Methylnaphthalene in IS005	
HSLPP/BN - 30ppm	>I2038		8			ID File.	
SPEC. 930 - 300ppm	>I2039		9				
SPEC. 930 - ~~300~~ 100ppm	>I2040		10				
SPEC. 930 - 60ppm	>I2041		11				
O,m,p-nitrotoluene 500ppm	>I2042		12		↓		
O,m,p-nitrotoluene 300ppm	>I2043		13		I00374		
O,m,p-nitrotoluene 100ppm	>I2044		14				
DFTPP-50ng	>I2045		15	OK			
QC4183B	>I2046		16			QB4183	
QCP0002B	>I2047		17				
QCP0002BS	>I2048		18				
Lt. #2-3	>I2049		19			Lt. #2-3	
QCP0007B	>I2050		20				
QCP0007BS	>I2051		21		"		
Lt. #1	>I2052		22				
QCP0007B1	>I2053		23			QC1	
K4572B	>I2054		24	X10		QB4241	
K4583B	>I2055		25	X10	↓	QB4241	

002152

ETC FORM 8102

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE ______ SHIFT ______
FRACTION ______
INSTRUMENT ______
TUNE FILE ______
SEQUENCE FILE see
METHOD FILE ______
ID FILE ______
ANALYST(S) [signature]
SUPERVISOR [signature]
BATCH #'s ______

(PLEASE INITIAL)

CURRENT CS05 STATUS	STANDARDS UPDATED
ACO	DATE
WI	BY

STANDARD	CONC PPM	LOT NO.	LOT VOL.
see page			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K4585B	>I2056		26	X20	I00374	QBY241	
K4585BS	>I2057		27	X20		QBY241	
DFTPP-50ng	>I2058		28				
BN II-100ppm	>I2059		29				
K7562B	>I2060		30	X5	I00375	QBY243	
K7559B	>I2061		31	X5		QBY243	
K7561B	>I2062		32	X5		QBY243	
K7551B	>I2063		33			QBY242	
K7553B	>I2064		34				
K7554B	>I2065		35				
K7545B	>I2066		36				
K7544B	>I2067		37				
K7550B	>I2068		38				
K7557B	>I2069		39				
K7556B	>I2070		40				
DFTPP-50ng	>I2071		41				
BN II-100ppm	>I2072		42				
QC4228B	>I2073		43			PCBSCR	PB
K8173BS	>I2074		44			AR1260	
J8439B	>I2075		45			PCBSCR	
K8484B	>I2076		46				
K8485B	>I2077		47		I00376		
K8171B	>I2078		48				
K8173B	>I2079		49				
K8174B	>I2080		50				

ETC FORM #102

002153

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE see
METHOD FILE _____
ID FILE _____
ANALYST(S) M Barkley

SUPERVISOR Pearl Trant
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
see page 1			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174BR	>I2081		51		I00376	pcB5cR	
K8175B	>I2082		52				
K8176B	>I2083		53				
DFTPP-50ng	>I2084		54				
BN II - 100ppm	>I2085		55				
K3246B	>I2086		56				
J2204B	>I2087		57				PB
J2205B	>I2088		58				
J2206B	>I2089		59				
J2207B	>I2090		60				
J2208B	>I2091		61				

ETC FORM #102

002154

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

RESOURCE ENGINEERING

ATTENTION: CHRIS ITIN

3000 RICHMOND AVENUE

HOUSTON, TX 77098

EVAPORATION SYSTEM

SAMPLE # ES17D

002155

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No	Company	Facility	Sample Point	Date	Time	Elapsed Hours
KB175	RESOURCE ENGINEERING	RES2880A	TES17D	B51217		

Denis C. K. Lin, Ph.D.
Vice President
Research and Operations

This Technical Report is an INSITE™ service generated by LODESTAR™ Data Management Software.

284 RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-5600

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002156

Introduction

This report contains the analytical results on your sludge sample, TES17D 85/12/17. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your sample are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (i.e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your sample and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the sample are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Priority Pollutants

The priority pollutant compounds and elements are listed with their NPDES (National Pollution Discharge Elimination System) numbers, and the Method Detection Limit (MDL) published in the Federal Register. When a compound or element is present below its published MDL it is reported as BMDL (Below Method Detection Limit). When a compound or element is not present at any detectable concentrations it is reported as ND (Not Detected). MDL's for non-aqueous matrices are based on USEPA published MDL's but are adjusted as per sample weight. Matrix spike and replicate analyses, where included, were performed on samples randomly chosen within each quality assurance batch and are therefore not necessarily spikes and replicates of this report's sample. Surrogate compound recovery data and instrument calibration data are included in the Method Performance Data Tables.

002157

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 7, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds – GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8175	RESOURCE ENGINEERING	RES28804	TES17D	851217		

NPDES Number	Compound (Acrolein and Acrylonitrile values are carbon only.)	Results: Sample Concen. ug/kg	Results: MDL ug/kg	QC Replicate: First ug/kg	QC Replicate: Second ug/kg	QC Blank and Spiked Blank: Blank Data ug/kg	QC Blank and Spiked Blank: Concen. Added ug/kg	QC Blank and Spiked Blank: % Recov	QC Matrix Spike: Unspiked Sample ug/kg	QC Matrix Spike: Concen. Added ug/kg	QC Matrix Spike: % Recov
1V	Acrolein	ND	500	ND	ND	ND	4000	90	ND	4000	126
2V	Acrylonitrile	ND	500	ND	ND	ND	400	99	ND	400	81
3V	Benzene	ND	22	ND	ND	ND	90.0	105	ND	90.0	92
4V	bis(Chloromethyl)ether	ND	50	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	24	ND	ND	ND	90.0	114	ND	90.0	91
6V	Carbon tetrachloride	ND	14	ND	ND	ND	90.0	103	ND	90.0	89
7V	Chlorobenzene	ND	30	ND	ND	ND	90.0	101	ND	90.0	93
8V	Chlorodibromomethane	ND	16	ND	ND	ND	90.0	107	ND	90.0	90
9V	Chloroethane	ND	50	ND	ND	ND	90.0	96	ND	90.0	91
10V	2-Chloroethylvinyl ether	ND	50	ND	ND	ND	90.0	180.	ND	90.0	196.
11V	Chloroform	ND	8.0	ND	ND	ND	90.0	100	ND	90.0	96
12V	Dichlorobromomethane	ND	11	ND	ND	ND	90.0	101	ND	90.0	91
13V	Dichlorodifluoromethane	ND	50	ND	ND	ND	90.0	104	ND	90.0	84
14V	1,1-Dichloroethane	ND	24	ND	ND	ND	90.0	100	ND	90.0	96
15V	1,2-Dichloroethane	ND	14	ND	ND	ND	90.0	100	ND	90.0	95
16V	1,1-Dichloroethylene	ND	14	ND	ND	ND	90.0	101	ND	90.0	90
17V	1,2-Dichloropropane	ND	30	ND	ND	ND	90.0	101	ND	90.0	92
18V	cis-1,3-Dichloropropylene	ND	25	ND	ND	ND	90.0	100	ND	90.0	81
19V	Ethylbenzene	ND	36	ND	ND	ND	90.0	98	ND	90.0	97
20V	Methyl bromide	ND	50	ND	ND	ND	90.0	103	ND	90.0	97
21V	Methyl chloride	ND	50	ND	ND	ND	90.0	98	ND	90.0	78
22V	Methylene chloride	221	14	1.13	ND	64.5	90.0	63	430	90.0	0.
23V	1,1,2,2-Tetrachloroethane	ND	35	ND	ND	ND	90.0	121	ND	90.0	113
24V	Tetrachloroethylene	ND	21	ND	ND	ND	90.0	103	ND	90.0	96
25V	Toluene	ND	30	ND	ND	ND	90.0	102	ND	90.0	100
26V	1,2-Trans-dichloroethylene	ND	8.0	ND	ND	ND	90.0	101	ND	90.0	94
27V	1,1,1-Trichloroethane	ND	19	ND	ND	ND	90.0	102	ND	90.0	96
28V	1,1,2-Trichloroethane	ND	25	ND	ND	ND	90.0	110	ND	90.0	92
29V	Trichloroethylene	ND	9.5	ND	ND	ND	90.0	96	ND	90.0	90
30V	Trichlorofluoromethane	ND	50	ND	ND	ND	90.0	99	ND	90.0	87
31V	Vinyl chloride	ND	50	ND	ND	ND	90.0	99	ND	90.0	88
18V	trans-1,3-Dichloropropylene	ND	50	ND	ND	ND	90.0	98	ND	90.0	92

A Recovery normally variable using EPA Protocol Method 624.

B Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 9, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8175	RESOURCE ENGINEERING	RES28804	TES17D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg[a]	Second ug/kg[a]	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen Added ug/kg	% Recov
1A	2-Chlorophenol	ND	120	ND	ND	ND	0	-	ND	4400	82
2A	2,4-Dichlorophenol	ND	96	ND	ND	ND	0	-	ND	4400	94
3A	2,4-Dimethylphenol	ND	96	ND	183	ND	0	-	ND	4400	88
4A	4,6-Dinitro-o-cresol	ND	850	ND	ND	ND	0	-	ND	4400	61
5A	2,4-Dinitrophenol	ND	1500	ND	ND	ND	0	-	ND	4400	55
6A	2-Nitrophenol	ND	130	ND	ND	ND	0	-	ND	4400	90
7A	4-Nitrophenol	ND	85	ND	ND	ND	0	-	ND	4400	99
8A	p-Chloro-m-cresol	ND	110	ND	ND	ND	0	-	ND	4400	120
9A	Pentachlorophenol	ND	130	ND	ND	ND	0	-	ND	4400	135
10A	Phenol	ND	53	ND	ND	ND	0	-	236	4400	193
11A	2,4,6-Trichlorophenol	ND	96	ND	ND	ND	0	-	ND	4400	102
	Catechol	ND	355	ND	ND	ND	0	-	ND	4400	1[b]
	Benzoic acid	BMDL	360	ND	ND	ND	0	-	ND	4400	29

[a] Variability in Replicate results due to non-homogenous nature of sample matrix.

[b] Recovery low due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K9175	RESOURCE ENGINEERING	RES28804	TES17D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1B	Acenaphthene	ND	63	ND	ND	ND	0	-	ND	4400	78
2B	Acenaphthylene	ND	120	ND	ND	ND	0	-	ND	4400	109
3B	Anthracene	ND	63	ND	ND	ND	0	-	51.9	4400	99
4B	Benzidine	ND	1500	ND	ND	ND	0	-	ND	4400	40
5B	Benzo(a)anthracene	ND	260	ND	ND	ND	0	-	ND	4400	102
6B	Benzo(a)pyrene	ND	83	ND	ND	ND	0	-	ND	4400	85
7B	Benzo(b)fluoroanthene	ND	160	ND	ND	ND	0	-	ND	4400	100
8B	Benzo(ghi)perylene	ND	140	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	120	ND	ND	ND	0	-	ND	4400	83
10B	bis(2-Chloroethoxy)methane	ND	180	ND	ND	ND	0	-	ND	4400	66
11B	bis(2-Chloroethyl) ether	ND	190	ND	ND	ND	0	-	ND	4400	109
12B	bis(2-Chloroisopropyl)ether	ND	190	ND	ND	ND	0	-	ND	4400	71
13B	bis(2-Ethylhexyl)phthalate	ND	330	ND	ND	ND	0	-	ND	4400	213
14B	4-Bromophenyl phenyl ether	ND	63	ND	ND	ND	0	-	ND	4400	137
15B	Butyl benzyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	146
16B	2-Chloronaphthalene	ND	63	ND	ND	ND	0	-	ND	4400	44
17B	4-Chlorophenyl phenyl ether	ND	140	ND	ND	ND	0	-	ND	4400	49
18B	Chrysene	ND	83	ND	ND	ND	0	-	ND	4400	108
19B	Dibenzo(a,h)anthracene	ND	330	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	93
21B	1,3-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	90
22B	1,4-Dichlorobenzene	ND	150	ND	ND	ND	0	-	ND	4400	92
23B	3,3'-Dichlorobenzidine	ND	550	ND	ND	ND	0	-	ND	4400	0
24B	Diethyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	52
25B	Dimethyl phthalate	ND	330	ND	ND	ND	0	-	52.9	4400	94
26B	Di-n-butyl phthalate	ND	330	ND	ND	ND	0	-	85.3	4400	177
27B	2,4-Dinitrotoluene	ND	190	ND	ND	ND	0	-	ND	4400	47
28B	2,6-Dinitrotoluene	ND	63	ND	ND	ND	0	-	ND	4400	38
29B	Di-n-octyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	108
30B	1,2-Diphenylhydrazine	ND	330	ND	ND	ND	0	-	ND	4400	0
31B	Fluoranthene	ND	73	ND	ND	ND	0	-	35.8	4400	123
32B	Fluorene	ND	63	ND	ND	ND	0	-	ND	4400	64

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8175	RESOURCE ENGINEERING	RES28804	TES17D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov a	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
33B	Hexachlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	133
34B	Hexachlorobutadiene	ND	30	ND	ND	ND	0	-	ND	4400	87
35B	Hexachlorocyclopentadiene	ND	330	ND	ND	ND	0	-	ND	0	-
36B	Hexachloroethane	ND	53	ND	ND	ND	0	-	ND	4400	22c
37B	Indeno(1,2,3-c,d)pyrene	ND	160	ND	ND	ND	0	-	ND	0	-
38B	Isophorone	ND	73	ND	ND	ND	0	-	ND	4400	62
39B	Naphthalene	ND	53	ND	ND	ND	0	-	ND	4400	119
40B	Nitrobenzene	ND	63	ND	ND	ND	0	-	ND	4400	127
41B	N-Nitrosodimethylamine	ND	330	ND	ND	ND	0	-	ND	0	-
42B	N-Nitrosodi-n-propylamine	ND	330	ND	ND	ND	0	-	ND	4400	140
43B	N-Nitrosodiphenylamine	ND	63	ND	ND	ND	0	-	75.1	4400	36
44B	Phenanthrene	ND	180	ND	ND	ND	0	-	ND	4400	127
45B	Pyrene	ND	63	ND	ND	ND	0	-	ND	4400	125
46B	1,2,4-Trichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	77
	Benzaldehyde	ND	333	ND	ND	ND	0	-	ND	4400	48
	Benzyl alcohol	BMDL	330	88.6	227	ND	0	-	51.1	4400	37

a Surrogate Blank. Spiked Blank cannot be performed for this sample matrix.

b Recovery normally variable using EPA Protocol Method 625.

c Recovery variable due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide/PCB Compounds - GC/MS Analysis Data (QR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8175	RESOURCE ENGINEERING	RES28804	TES17D	851217		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov *	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1P	Aldrin	ND	63	ND	ND	ND	0	-	ND	4400	44
2P	Alpha-BHC	ND	330	ND	ND	ND	0	-	ND	4400	39
3P	Beta-BHC	ND	150	ND	ND	ND	0	-	ND	4400	117
4P	Gamma-BHC	ND	330	ND	ND	ND	0	-	ND	4400	77
5P	Delta-BHC	ND	100	ND	ND	ND	0	-	ND	4400	14*
6P	Chlordane	ND	330	ND	ND	ND	0	-	ND	8800	41
7P	4,4'-DDT	ND	93	ND	ND	ND	0	-	ND	4400	0*
8P	4,4'-DDE	ND	190	ND	ND	ND	0	-	ND	4400	70
9P	4,4'-DDD	ND	160	ND	ND	ND	0	-	ND	4400	76
10P	Dieldrin	ND	83	ND	ND	ND	0	-	ND	4400	68
11P	Endosulfan I	ND	330	ND	ND	ND	0	-	ND	4400	78
12P	Endosulfan II	ND	330	ND	ND	ND	0	-	ND	4400	0*
13P	Endosulfan sulfate	ND	190	ND	ND	ND	0	-	ND	4400	42
14P	Endrin	ND	330	ND	ND	ND	0	-	ND	4400	32
15P	Endrin aldehyde	ND	330	ND	ND	ND	0	-	ND	4400	35
16P	Heptachlor	ND	63	ND	ND	ND	0	-	ND	4400	0*
17P	Heptachlor epoxide	ND	73	ND	ND	ND	0	-	ND	4400	56
18P	PCB-1242	ND	1200	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	1200	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	1000	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	1200	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	1200	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	ND	1200	ND	ND	ND	0	-	ND	4400	90
24P	PCB-1016	ND	1200	ND	ND	ND	0	-	ND	0	-
25P	Toxaphene	ND	330	ND	ND	ND	0	-	ND	0	-

* Recovery normally variable using EPA Protocol Method 625.

0 Pigment Blank. Spiked Blank cannot be performed for this sample matrix.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 24, 1986

TABLE 2: METHOD PERFORMANCE DATA
Surrogate Recovery Soil - GC/MS Data (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8175	RESOURCE ENGINEERING	RES28804	TES17D	85121		0

Compound	Amount added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION				
Toluene-D8	.250	80	50	160
p-Bromofluorobenzene	.250	89	50	160
1,2-Dichloroethane-D4	.250	83	50	160
ACID FRACTION				
Phenol-D5	100	82	20	140
2-Fluorophenol	100	87	29	140
2,4,6-Tribromophenol	100	102	10	140
BASE/NEUTRAL FRACTION				
Nitrobenzene-D5	50	118	20	140
2-Fluorobiphenyl	50	59	20	140
Terphenyl-D14	50	40	20	150

* IPS EPA Control Limits

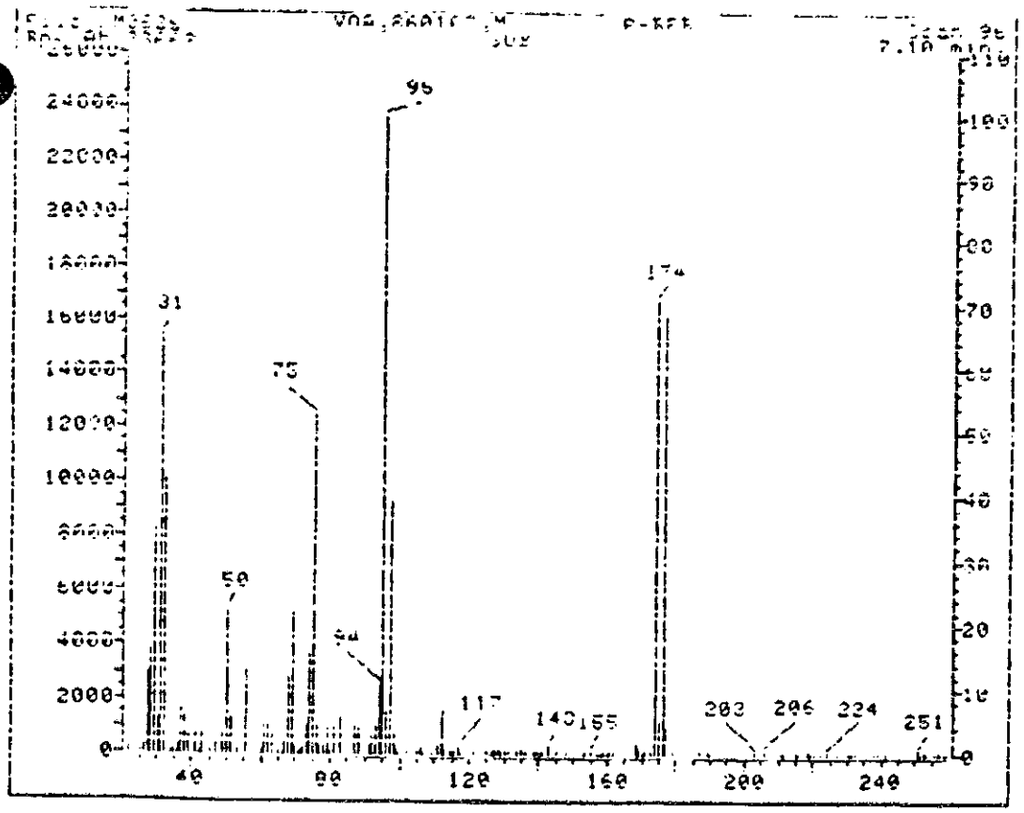

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	22.30	22.30	Ok
75	30-60% of mass 95	52.60	52.60	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	6.53	6.53	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	70.93	70.93	Ok
175	5-9% of mass 174	4.79	6.76	Ok
176	95-101% of mass 174	68.49	96.56	Ok
177	5-9% of mass 176	3.80	5.55	Ok

Injection Date: 01/02/86 Analyst: Derrick M Simons
Injection Time: 19:13 Processor: P. R. Rawlins
Run No: >M0536 WC Batch: QV4206
Spectrum No: 96 Samples: K8557, K8171, K8174, K8175 1-4
K8176, K8173, K8484, ~~K8477~~ (D)
K4174, ~~K8470~~ (D) 4

1/6/86

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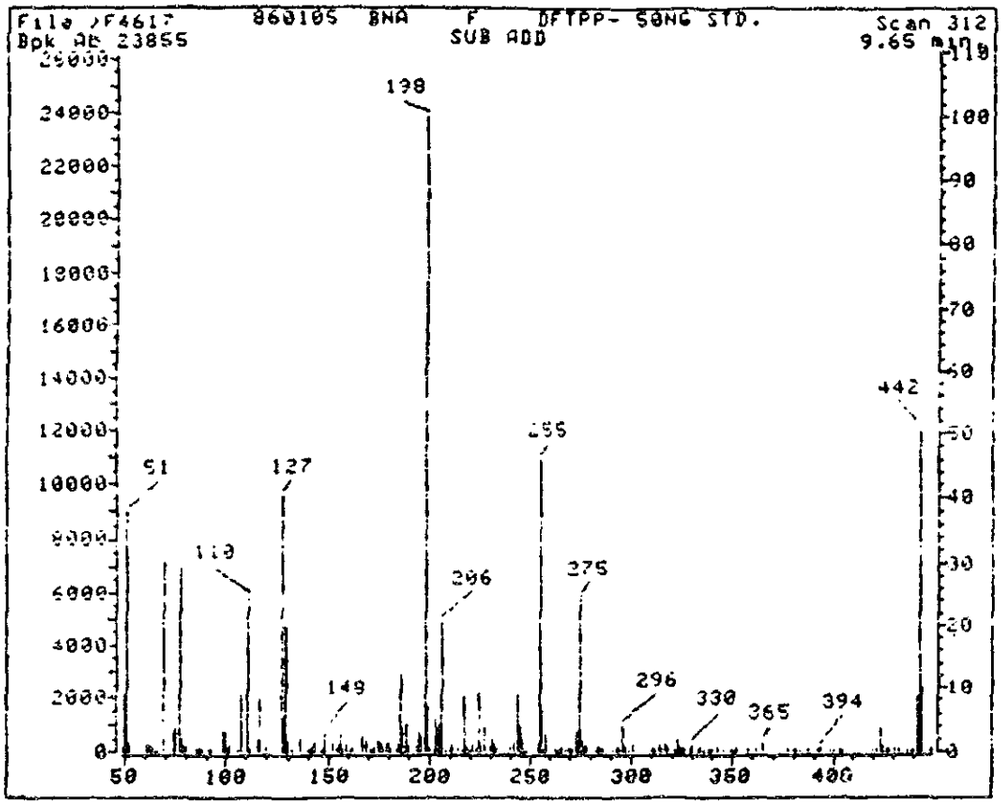

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for ~~Base~~/Neutral Acid Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	Appropriate Peak	Status
51	30-60% of mass 198	37.49	37.49	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	29.90	29.90	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	40.19	40.19	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.93	6.93	Ok
275	10-30% of mass 198	24.59	24.59	Ok
365	Greater than 1% of mass 198	1.31	1.31	Ok
441	0-100% of mass 443	8.34	85.48	Ok
442	Greater than 40% of mass 198	50.23	50.23	Ok
443	17-23% of mass 442	9.76	19.43	Ok

Injection Date: 01/06/86 Analyst: [illegible]
Injection Time: 07:46 Processor: [illegible]
Run No: >F4617 QC Batch: QA 4228 K8175
Spectrun No: 312 Samples: K8174, K8173, ~~K8176~~, K8171, T8439, K8176, K8484, K8485

K. Baker 1/9/86

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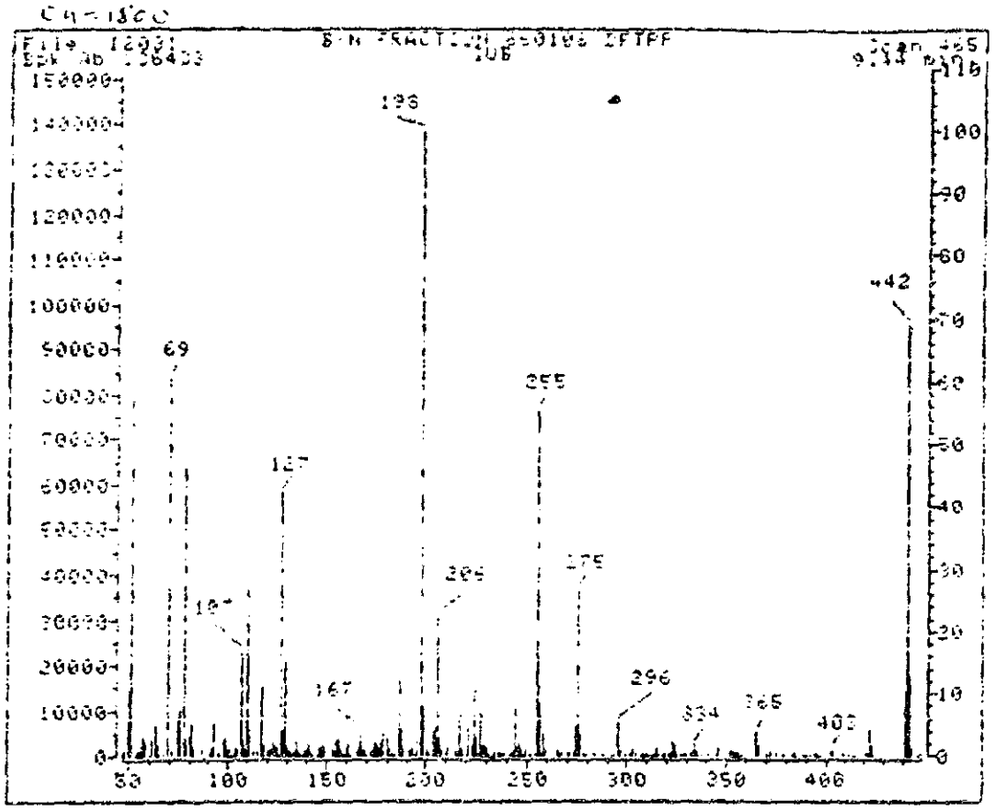

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Date - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	58.00	58.00	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	60.38	60.38	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	42.20	42.20	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.65	7.65	Ok
275	10-30% of mass 198	26.44	26.44	Ok
365	Greater than 1% of mass 198	3.90	3.90	Ok
441	0-100% of mass 443	10.20	78.74	Ok
442	Greater than 40% of mass 198	69.01	69.01	Ok
443	17-23% of mass 442	12.96	18.78	Ok

Injection Date: 01/08/86 Analyst: Pearl Traut.
Injection Time: 18:27 Processor: J. Herold, D. Simons
Run No: >12031 QC Batch: QB4228
Spectrum No: 465 Samples: J84396, K84848, K84851B, K81718, K81736, K81748, K81758, K81768, K32465, S82048-J22088

1/25/86

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Methodology
for
GC/MS Analysis of Priority Pollutant Compounds

The methods employed in the GC/MS analysis for priority pollutants are established EPA methods. Rigid compliance with the instrument parameters and performance criteria of the published methods was achieved. In some cases, the precise amounts of sample used and the sample handling procedures vary with the complexity of the sample matrix. Qualitative identification of the priority pollutants was performed using the relative retention times, the relative abundance of three characteristic ions and the abundance ratios. The entire mass spectrum was reviewed to confirm each identification. Quantitative analysis of detected compounds was performed by using a response factor generated by a major characteristic ion of the specific compound and an internal standard.

Compounds, in addition to those on the priority pollutant list, were identified through a computer-aided search of the NBS-EPA spectra library. After review the identifications are included in a separate tabulation and labelled "tentatively identified".

Volatile Priority Pollutant Compounds

For the analysis of Volatile priority pollutants in a solid matrix, a modified version of EPA Method 624 was used. The modification can be be summarized as follows: 1-3 gm of the solid sample are weighed into a 15 ml Hypo vial. The vial is sealed immediately with a teflon-backed silicone septum. A solution containing 3 internal standards is injected through the septum onto the sample. The vial is attached to the Purge and Trap sampler in series with a 5 ml organic-free water trap. The sample vial is heated at 80 degrees Centigrade for 20 minutes. An inert gas sweeps the volatile organic compounds through the water trap onto a sorbent column where they are trapped. When the purge cycle is complete, the sorbent column is heated and backflushed with helium to desorb the purgeable organic compounds onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable mixture. The separated purgeable components are then identified and quantitated using a computerized mass spectrometer.

Acid, Base/Neutral and Pesticide Priority Pollutant Compounds

For the analysis of the Acid, Base/Neutral and Pesticide priority pollutants in a complex solid matrix, the EPA-EMSL sludge method was used (Protocol for Referee Analysis of Semi-Volatile Organic Priority Pollutants in Municipal and Industrial Waste Treatment Sludge, EPA Contract 68-03-2625, June 16, 1980). The method can be summarized as follows: A 80 ml sample is adjusted to a pH greater than 11 with aqueous NaOH. The pH adjusted sample is then extracted with methylene chloride using repetitive sediment extraction aided by a high speed homogenizer. The extract is separated by centrifugation and transferred by pipette. The sample is then acidified to a pH less than 2 and the extraction process is repeated with fresh methylene chloride. The first extract, containing the base/neutral extractable compounds, is cleaned with silica gel, dried and concentrated to a 1 ml final volume. Gel permeation chromatography is used to clean the extract containing the acid extractable compounds. This extract is dried and concentrated to a final 1 ml volume. Each extract is injected into a GC/MS instrument configured for the analysis of that specific fraction.

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

Summary of
Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA-600/4-79-019, March 1979;
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/001-R, October 1979;
- the recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979; updated on October 26, 1984);
- "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980;
- "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983;
- Organic Analysis. Multi-media, Multi Concentration-IFB WA84-A267; and
- Dioxin Analysis:Soil/Sediment Matrix; Multi-Concentration; Selected Ion Monitoring with Jar Extration Procedure-IFB WA84-A002

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used.

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of 13 samples consists of 9 customer samples (at a maximun), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors vary greater than 25%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.

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- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Three surrogate compounds are added to each sample in the batch for Acid analysis.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on decafluorotriphenylphosphine (DFTPP) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of standards composed of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3 concentrations and using five internal standards for quantitation.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples.
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve.
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique, a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 independent reference standard;
- 4 Calibration standards (processed using the sample preparation method);
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

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Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 30 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate anaylses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preparation method); and
- 2 Procedural Blanks

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices);
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known refernece QC sample for at least each 100 samples analyzed.

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch.

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- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample.

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon backround must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/- 15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$-2,3,7,8-TCDD as internal standard and $^{37}Cl_4$-TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples. The method blank is also dosed with the internal standard and surrrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:

  a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak.

  b. The 320/322 ratio is within the range of 0.67 to 0.87.

  c. Ions 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.

  d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.

  e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:

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. the 320/324 ratio should be 1.58 +/- 0.16

. the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.
- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.
- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractoer is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person(s) breaking the Shuttle seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician; and
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The records show for each link in this process:

- the person with custody; and
- the time and date each person accepted or relinquished custody.

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Appendix A

Mass Spectral Data for Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.

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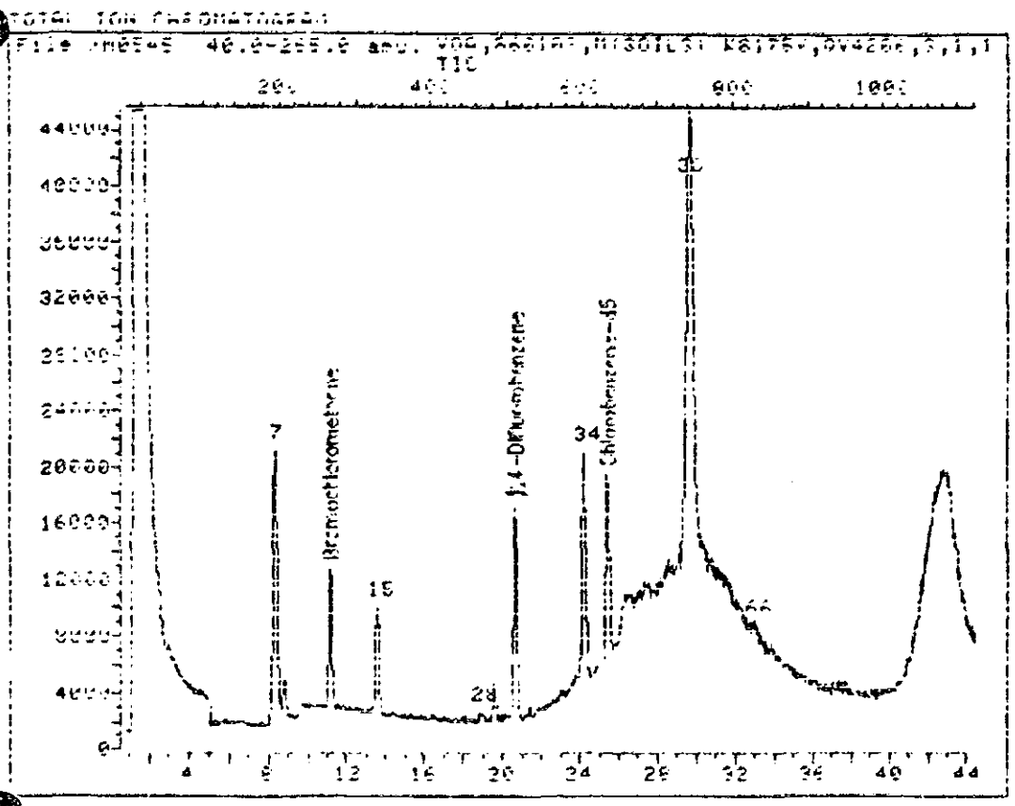

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Misc: [illegible]

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Title: Volatile Priority Pollutant ID File
Last Calibration: [illegible] 19:[illegible]

Operator ID: [illegible]
Quant Time: [illegible]
Injected at: [illegible]

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QUANT REPORT

Operator ID: [illegible] Quant Rev: 4 Quant Time: 860103 04:[illegible]9
Output File: [illegible]M0545::AW Injected at: 860103 03:53
Data File: [illegible]M0545::U5 Dilution Factor: 1.00
Name: [illegible],860102,M(SOIL5)
Misc: [illegible],[illegible],5,1,1

ID File: MVUA::U5
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

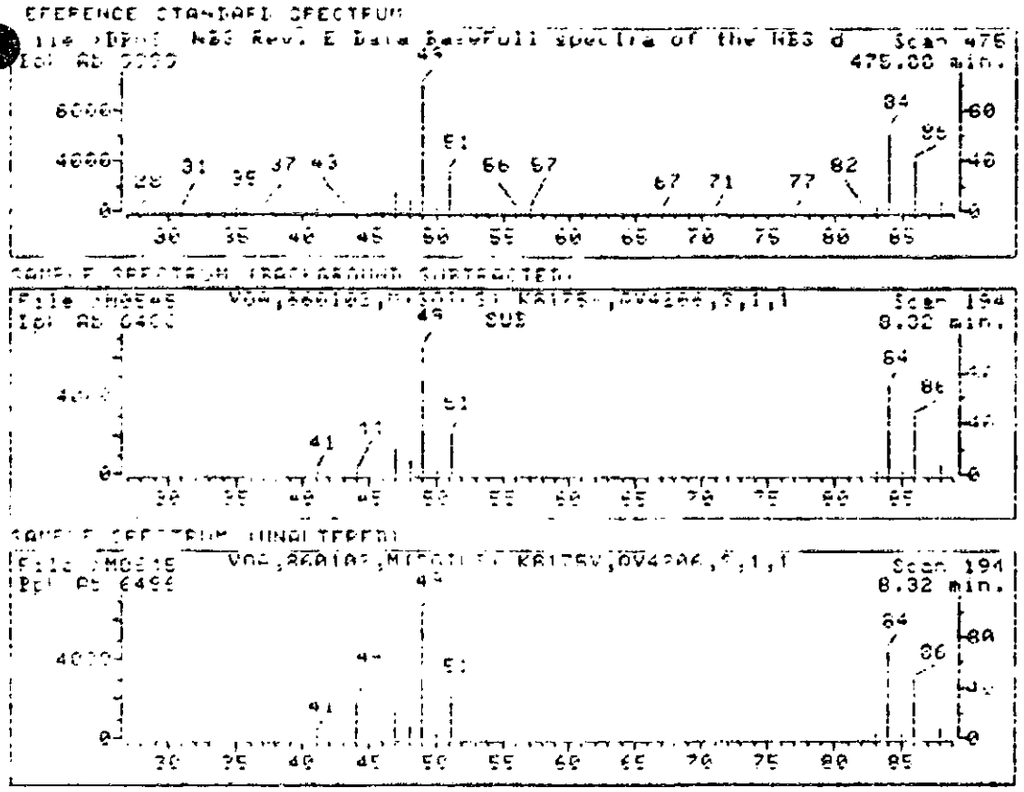
	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*Bromochloromethane		11.15	262	18025	250.00	NG	9
2)	Methylene chloride		8.32	194	69[illegible]65	[illegible]	NG-64.46 =	8
15)	1,2-Dichloroethane-D4	(SURR)	13.51	328	15735	206.40	NG	9
12)	*1,4-Difluorobenzene		20.65	512	20305	250.00	NG	9
28)	~~bis(Chloromethyl)ether~~		~~18.90~~	~~467~~	~~3381~~	~~129.00~~	~~NG~~	10
30)	*Chlorobenzene-d5		25.42	635	49590	250.00	NG	9
31)	~~2-Chloroethyl(vinyl)ether~~		~~20.65~~	~~512~~	~~[illegible]~~	~~[illegible]~~	~~NG~~	100
4)	Toluene-D8	(SURR)	24.71	624	[illegible]	[illegible]	NG	89
38)	p-Bromofluorobenzene	(SURR)	29.53	741	47462	273.49	NG	92
66)	~~o,m-Chlorotoluene~~		~~32.94~~	~~829~~	~~[illegible]~~	~~[illegible]~~	~~NG~~	81

* Compound is ISTD

PDN

.06

002175



Data File: [illegible]
Name: [illegible]
Misc: [illegible]
Quant Time: [illegible]
Injected at: [illegible]

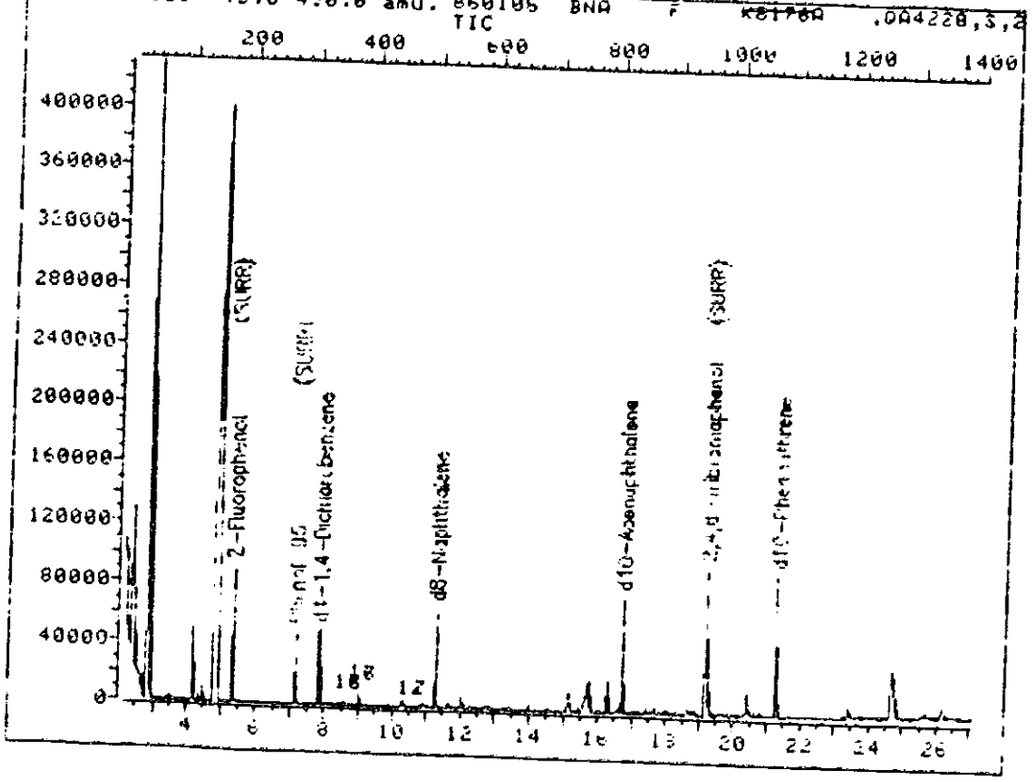
Compound No: 7
Compound Name: Methylene chloride
Scan Number: 194
Retention Time: [illegible] min.
Area: [illegible]
Concentration: [illegible] NG
q-value: [illegible]

002176

TOTAL ION CHROMATOGRAM

File >F4623 45.0-450.0 amu. 860105 BNA F K8175 .QA4228,S,2

TIC



Data File: >F4623::U3
Name: 860105 BNA F
Misc: ~~K8175A~~ K8175A ,QA4228,S,28.49,1
Id File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

Operator ID: JH2180
Quant Time: 860106 14:26
Injected at: 860106 11:19

BTL428

002177

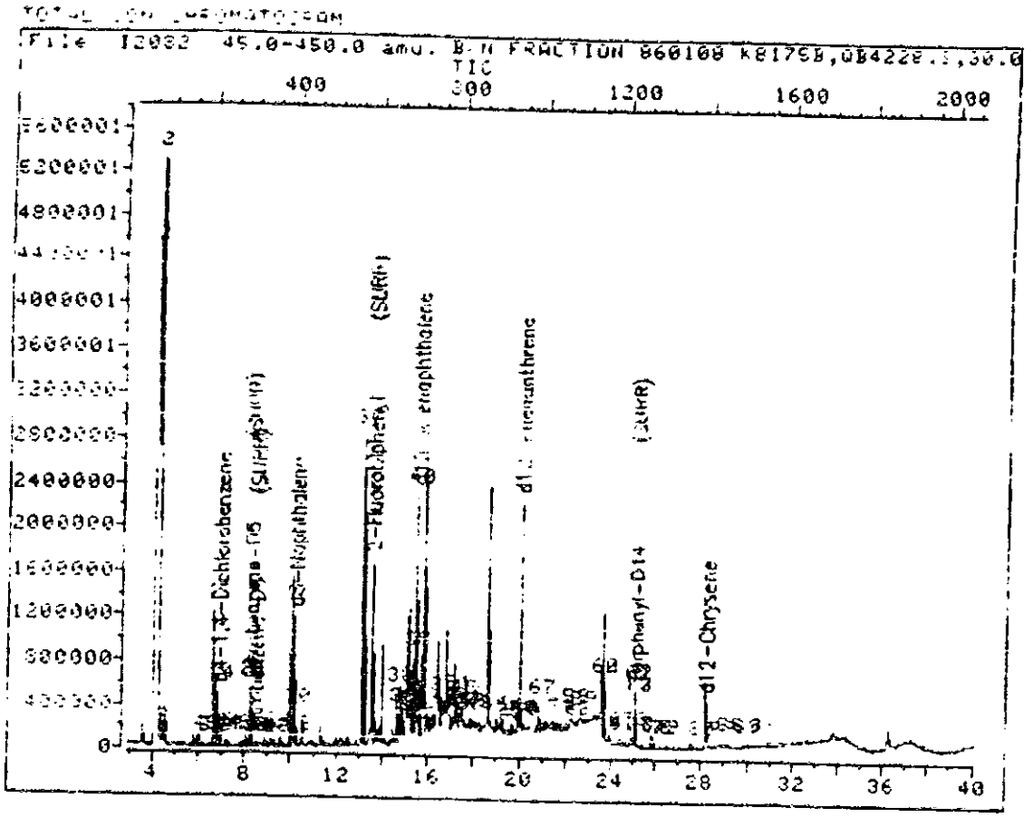
QUANT REPORT

Operator ID: JH2130 Quant Rev: 4 Quant Time: 860106 14:26
Output File: F4623::AQ Injected at: 860106 11:19
Data File: >F4623::U3 Dilution Factor: 1.00
Name: 860105 BNA F
Misc: ~~K8175H~~ K8175A ,QA4228,5,28.15,1 BTL423
ID File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		7.80	318	34458	40.00	UG/ML	9
3)	2-Fluorophenol	(SURR	5.32	178	48091	87.12	UG/ML	3
7)	Benzoic acid		10.78	486	533	.86	UG/ML	0
9)	Phenol-D5	(SURR)	7.13	280	50744	82.10	UG/ML	9
10)	*d8-Naphthalene		11.24	512	79178	40.00	UG/ML	5
12)	2,4-Dimethylphenol		10.46	468	689	~~.99 UG/ML~~		6
16)	o-Cresol		8.60	363	644	~~.77 UG/ML~~		100
16)	o-Cresol		8.99	385	5207	~~6.25 UG/ML~~		100
17)	m+p-Cresols		8.60	363	644	~~.72 UG/ML~~		100
17)	m+p-Cresols		8.99	385	5207	~~5.82 UG/ML~~		100
18)	*d10-Acenaphthalene		16.69	819	49188	40.00	UG/ML	96
[illegible])	*d10-Phenanthrene		21.27	1076	124042	40.00	UG/ML	99
[illegible])	2,4,6-Tribromophenol	(SURR)	19.18	959	44718	101.62	UG/ML	92

* Compound is ISTD

002178



Data File: I2082::U6
Name: B/N FRACTION 860108
Disc: K8175B,QB4228.5,30.01,1

BTL#52

Id File: IBN::US
Title: B/N+PEST ID FILE .... FOR I 850326
Last Calibration: 860109 18:45

Operator ID: [illegible]
Quant Time: 860111 09:32
Injected at: 860111 09:50

002179

QUANT REPORT

Operator ID: JH2180 Quant Rev: 5 Quant Time: 860111 09:32
Output File: 12082::AQ Injected at: 860111 08:50
Data File: 12082::U: Dilution Factor: 1.00
Name: B/N FRACTION 860108
Misc: K8175B,QB4228,S,30.01,1 BTL#52

ID File: IBNF::US
Title: B/N*PEST ID FILE .... FOR I 850326
Last Calibration: 860109 18:45

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		6.89	220	131959	40.00	UG/ML	97
2)	N-Nitrosodimethylamine		4.11	68	5960	~~118.85~~	~~UG/ML~~	100
2)	N-Nitrosodimethylamine		4.18	72	2341	~~46.68~~	~~UG/ML~~	100
2)	N-Nitrosodimethylamine		4.44	86	6925	~~138.11~~	~~UG/ML~~	100
4)	Benzaldehyde		5.95	170	4862	~~1.20~~	~~UG/ML~~	60
5)	bis(2-Chloroethyl) ether		6.25	187	1272	~~.31~~	~~UG/ML~~	60
5)	bis(2-Chloroethyl) ether		6.47	199	1110	~~.27~~	~~UG/ML~~	94
6)	Benzyl alcohol		7.22	241	19728	4.74	UG/ML	65
6)	Benzyl alcohol		7.60	262	771	~~.18~~	~~UG/ML~~	[illegible]
6)	Benzyl alcohol		7.96	282	2217	~~.53~~	~~UG/ML~~	65
7)	1,3-Dichlorobenzene		6.88	222	2571	~~.52~~	~~UG/ML~~	89
8)	1,4-Dichlorobenzene		6.88	222	2571	~~.51~~	~~UG/ML~~	86
9)	1,2-Dichlorobenzene		6.89	222	2571	~~.53~~	~~UG/ML~~	85
13)	Nitrobenzene-D5	(SURR)	8.23	297	279727	59.19	UG/ML	69
13)	Nitrobenzene-D5	(SURR)	8.45	309	1758	~~.37~~	~~UG/ML~~	63
14)	bis(2-Chloroisopropyl)ether		6.85	220	9117	~~11.22~~	~~UG/ML~~	95
14)	bis(2-Chloroisopropyl)ether		7.10	234	2773	~~3.41~~	~~UG/ML~~	67
14)	bis(2-Chloroisopropyl)ether		8.59	317	1957	~~2.41~~	~~UG/ML~~	94
19)	*d8-Naphthalene		10.14	403	1070428	40.00	UG/ML	99
20)	2-Fluorobiphenyl	(SURR)	13.50	590	1154071	29.26	UG/ML	98
21)	N-Nitrosodi-n-propylamine		7.37	249	1767	~~.22~~	~~UG/ML~~	64
21)	N-Nitrosodi-n-propylamine		8.23	297	61320	~~7.55~~	~~UG/ML~~	69
24)	Isophorone		8.45	309	1758	~~.10~~	~~UG/ML~~	58
24)	Isophorone		8.93	336	3348	~~.19~~	~~UG/ML~~	83
24)	Isophorone		9.34	359	7440	~~.41~~	~~UG/ML~~	76
25)	bis(2-Chloroethoxy)methane		9.20	351	1783	~~.16~~	~~UG/ML~~	54
25)	bis(2-Chloroethoxy)methane		10.28	411	1390	~~.13~~	~~UG/ML~~	64
30)	Naphthalene		10.19	406	12946	~~.45~~	~~UG/ML~~	98
34)	*d10-Acenaphthalene		15.48	700	1086061	40.00	UG/ML	94
37)	2-Chloronaphthalene		13.10	568	389751	~~16.21~~	~~UG/ML~~	42
38)	Dimethyl phthalate		14.61	652	206117	~~4.63~~	~~UG/ML~~	97
38)	Dimethyl phthalate		14.76	660	48593	~~1.09~~	~~UG/ML~~	44
38)	Dimethyl phthalate		15.33	692	401852	~~9.02~~	~~UG/ML~~	77
39)	Acenaphthylene		14.79	662	1111	~~.02~~	~~UG/ML~~	16
39)	Acenaphthylene		14.97	672	3354	~~.08~~	~~UG/ML~~	69
40)	2,6-Dinitrotoluene		15.03	675	21555	~~2.44~~	~~UG/ML~~	54
40)	2,6-Dinitrotoluene		15.26	688	12279	~~1.39~~	~~UG/ML~~	59
40)	2,6-Dinitrotoluene		15.48	700	133061	~~15.09~~	~~UG/ML~~	54
42)	Acenaphthene		15.57	722	1814	~~.05~~	~~UG/ML~~	76
44)	2,4-Dinitrotoluene		15.62	709	3087	~~.26~~	~~UG/ML~~	86
44)	2,4-Dinitrotoluene		16.23	742	6392	~~.41~~	~~UG/ML~~	65
45)	Diethyl phthalate		16.61	763	7318	~~.12~~	~~UG/ML~~	79
45)	Diethyl phthalate		17.17	794	29162	~~.47~~	~~UG/ML~~	94

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	Compound	R.T.	Scan#	Area	Conc	Units	
45)	Diethyl phthalate	17.42	808	16478	~~.26~~	~~UG/ML~~	78
46)	Fluorene	17.11	791	36543	~~.72~~	~~UG/ML~~	87
46)	Fluorene	17.74	826	27441	~~.54~~	~~UG/ML~~	94
46)	Fluorene	17.33	871	5886	~~.12~~	~~UG/ML~~	94
47)	4-Chlorophenyl phenyl ether	18.05	843	1126	~~.05~~	~~UG/ML~~	92
50)	N-Nitrosodiphenylamine	17.64	820	10427	~~.24~~	~~UG/ML~~	89
51)	1,2-Diphenylhydrazine	17.19	799	6493	~~.09~~	~~UG/ML~~	80
53)	*d10-Phenanthrene	19.99	951	2161910	40.00	UG/ML	99
57)	Phenanthrene	19.54	926	2855	~~.07~~	~~UG/ML~~	77
57)	Phenanthrene	20.05	954	17968	~~.42~~	~~UG/ML~~	92
57)	Phenanthrene	20.17	961	5123	~~.12~~	~~UG/ML~~	74
58)	Anthracene	19.54	926	2855	~~.07~~	~~UG/ML~~	77
58)	Anthracene	20.05	954	19689	~~.44~~	~~UG/ML~~	93
58)	Anthracene	20.17	961	7023	~~.15~~	~~UG/ML~~	72
59)	Di-n-butyl phthalate	21.65	1043	4422	~~.08~~	~~UG/ML~~	63
59)	Di-n-butyl phthalate	22.26	1077	100225	1.81	UG/ML	98
59)	Di-n-butyl phthalate	22.62	1097	5436	~~.10~~	~~UG/ML~~	15
60)	Fluoranthene	23.52	1147	1627	~~.04~~	~~UG/ML~~	50
60)	Fluoranthene	23.70	1157	2189	~~.05~~	~~UG/ML~~	78
61)	Benzidine	24.37	1194	1641	~~.47~~	~~UG/ML~~	00
61)	Benzidine	25.07	1233	7030	~~2.00~~	~~UG/ML~~	100
62)	Pyrene	23.52	1147	1627	~~.04~~	~~UG/ML~~	50
62)	Pyrene	23.70	1157	2189	~~.05~~	~~UG/ML~~	78
62)	Pyrene	25.07	1233	2509	~~.06~~	~~UG/ML~~	40
64)	Alpha-BHC	18.77	883	1288	~~.16~~	~~UG/ML~~	
65)	Beta-BHC	18.77	883	1288	~~.19~~	~~UG/ML~~	
67)	Delta-BHC	19.76	938	1244	~~.17~~	~~UG/ML~~	46
67)	Delta-BHC	20.82	997	3129	~~.43~~	~~UG/ML~~	84
68)	Heptachlor	22.35	1082	1284	~~.17~~	~~UG/ML~~	49
70)	*d12-Chrysene	28.17	1405	322811	40.00	UG/ML	100
73)	Endosulfan I	24.88	1222	2051	~~2.08~~	~~UG/ML~~	86
73)	Endosulfan I	25.06	1232	2573	~~2.61~~	~~UG/ML~~	55
73)	Endosulfan I	25.20	1240	1275	~~1.29~~	~~UG/ML~~	30
76)	Endrin	26.03	1286	1442	~~1.03~~	~~UG/ML~~	49
77)	Endosulfan II	25.06	1232	2573	~~4.94~~	~~UG/ML~~	56
77)	Endosulfan II	26.30	1301	1295	~~2.48~~	~~UG/ML~~	83
79)	Endrin aldehyde	25.83	1275	1442	~~.77~~	~~UG/ML~~	92
79)	Endrin aldehyde	26.37	1305	1872	~~1.00~~	~~UG/ML~~	63
82)	Terphenyl-D14 (SURR)	25.07	1233	416680	19.92	UG/ML	90
88)	bis(2-Ethylhexyl)phthalate	27.90	1390	1579	~~.20~~	~~UG/ML~~	97
88)	bis(2-Ethylhexyl)phthalate	28.77	1438	11900	1.54	UG/ML	98
88)	bis(2-Ethylhexyl)phthalate	29.16	1460	1139	~~.15~~	~~UG/ML~~	99
89)	Di-n-octyl phthalate	29.85	1498	2664	~~.28~~	~~UG/ML~~	93
89)	Di-n-octyl phthalate	30.57	1538	5819	~~.61~~	~~UG/ML~~	94

* Compound is ISTD

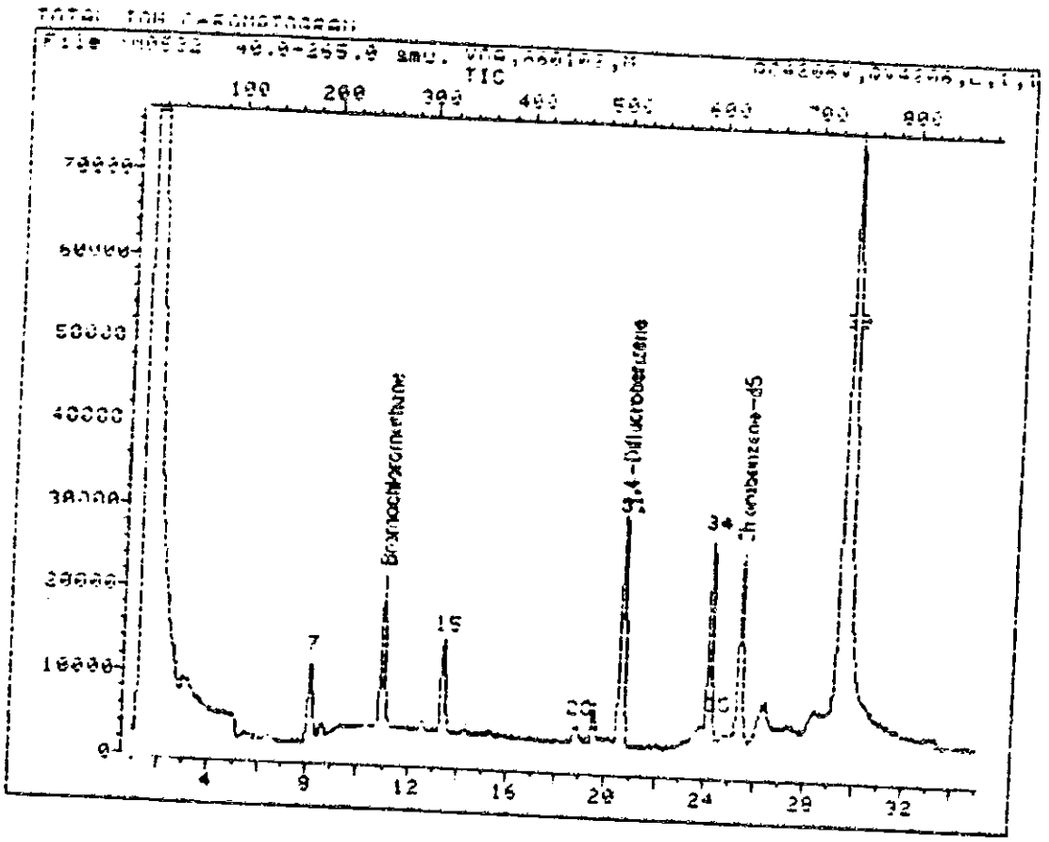
1/17/86

NO PCB's Found.

Appendix C1

GC/MS Subsidiary Data

002182



Data File: >M0532::U3
Name: VOA,860102,M
Misc: UL4206V,UV4206,L,I,1, UC BLANK

Id File: MVOA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

Operator ID: DS4712
Quant Time: 860102 19:08
Injected at: 860102 15:09

002183

QUANT REPORT

Operator ID: DS4712 Quant Rev: 4 Quant Time: 860102 19:[illegible]
Output File: ^M0532::AQ Injected at: 860102 15:09
Data File: ^M0532::U3 Dilution Factor: 1.[illegible]
Name: VOA,860102,M
Misc: [illegible],S,1,1, [illegible] BLANK

ID File: MVOA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

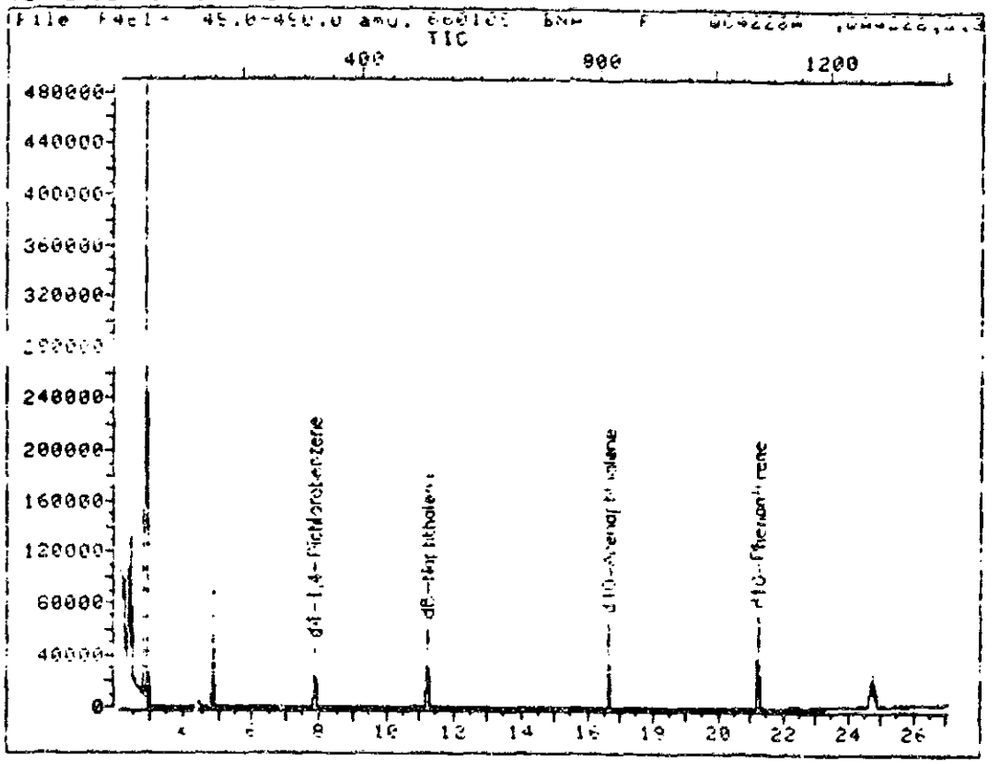
	Compound		P.T.	Scan#	Area	Conc	Units	q
1)	*Bromochloromethane		10.96	263	34271	250.00	NG	92
2)	Methylene chloride		8.09	189	29651	64.46	NG	[illegible]
15)	1,2-Dichloroethane-D4	(SURR)	13.40	326	23094	159.77	NG	[illegible]
12)	*1,4-Difluorobenzene		20.61	512	132067	250.00	NG	[illegible]
28)	~~bis(Chloromethyl)ether~~		~~18.83~~	~~466~~	~~[illegible]~~	~~184.75~~	~~NG~~	1[illegible]
30)	*Chlorobenzene-d5		25.38	635	87605	250.00	NG	[illegible]
31)	~~2-Chloroethylvinyl ether~~		~~20.65~~	~~513~~	~~34798~~	~~159.42~~	~~NG~~	1[illegible]
34)	Toluene-D8	(SURR)	24.18	604	108741	161.97	NG	[illegible]
35)	~~Toluene~~		~~24.37~~	~~609~~	~~2228~~	~~2.95~~	~~NG~~	[illegible]
38)	p-Bromofluorobenzene	(SURR)	29.37	738	62448	166.46	NG	99

PAN

* Compound is ISTD

002184

TOTAL ION CHROMATOGRAM



Data File: /F4619::U3
Name: 860105 BNA F
Disc: C[illegible]

Id File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

Operator ID: JH2180
Quant Time: 860106 14:02
Injected at: 860106 08:40

ET_#2

002185

QUANT REPORT

Operator ID: JH2180
Output File: F4619::HQ
Data File: >F4619::U3
Name: 860105 BNA F
Misc: QC4228- ,QA4228,3,30.00,1

Quant Rev: 4
Quant Time: 860106 14:02
Injected at: 860106 08:40
Dilution Factor: 1.00

BTL#24

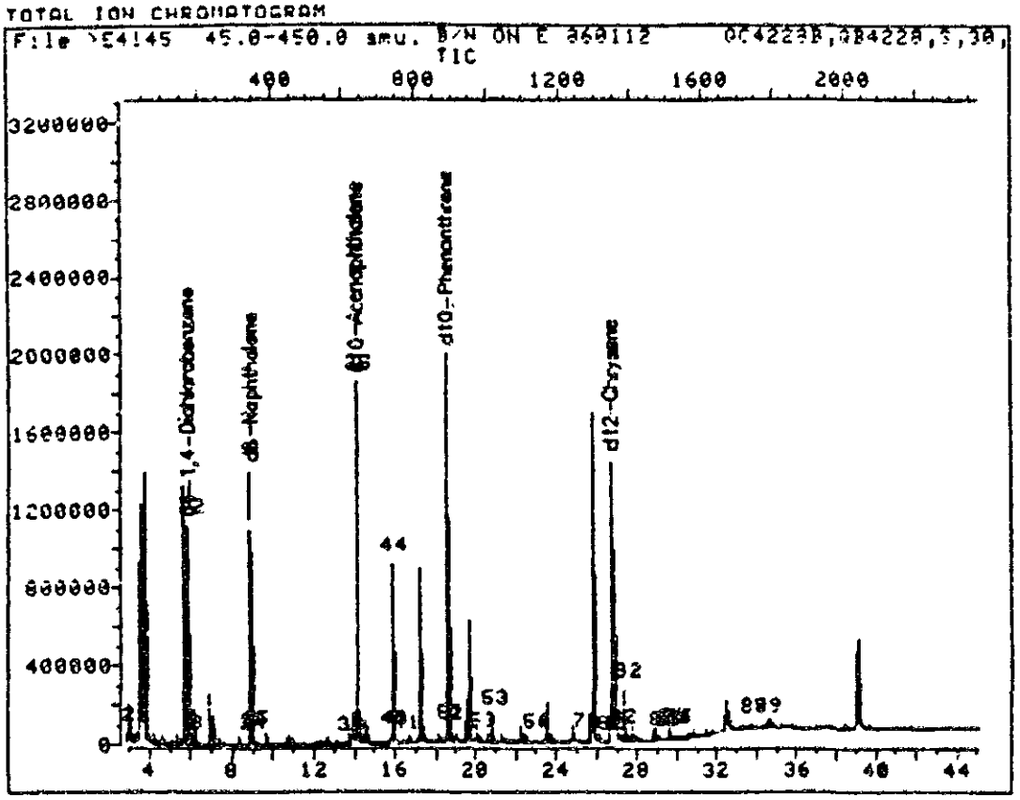
ID File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	7.80	319	33041	40.00	UG/ML	8
10)	*d8-Naphthalene	11.20	512	74465	40.00	UG/ML	5
18)	*d10-Acenaphthalene	16.63	817	45053	40.00	UG/ML	6
24)	*d10-Phenanthrene	21.20	1075	99903	40.00	UG/ML	9

* Compound is ISTD

002186

TOTAL ION CHROMATOGRAM



Data File: >E4145::U5
Name: B/N ON E 860112
Misc: QC4228B,QB4228,S,30,1 BTL# 6

Id File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 850326
Last Calibration: 860113 11:36

Operator ID: WW9928
Quant Time: 860113 11:38
Injected at: 860113 03:14

002187

QUANT REPORT

Operator ID: WW9928 Quant Rev: 5 Quant Time: 860113 11:38
Input File: ^E4145::AQ Injected at: 860113 03:14
Data File: >E4145::U5 Dilution Factor: 1.00
Name: B/N ON E 860112
Misc: QC4228B,QB4228,S,30,1 BTL# 6

ID File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 850326
Last Calibration: 860113 11:36

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	5.85	169	368447	40.00	UG/ML	99
2)	~~N-Nitrosodimethylamine~~	~~2.93~~	~~4~~	~~2426~~	~~474.52~~	~~UG/ML~~	~~100~~
3)	~~Benzyl alcohol~~	~~6.26~~	~~192~~	~~8613~~	~~.51~~	~~UG/ML~~	~~87~~
12)	~~bis(2-Chloroisopropyl)ether~~	~~5.85~~	~~169~~	~~13748~~	~~5.87~~	~~UG/ML~~	~~99~~
17)	*d8-Naphthalene	8.88	340	1775324	40.00	UG/ML	93
~~24)~~	~~1,2,4-Trichlorobenzene~~	~~8.81~~	~~336~~	~~3674~~	~~.28~~	~~UG/ML~~	~~9~~
~~25)~~	~~Naphthalene~~	~~8.95~~	~~343~~	~~4607~~	~~.13~~	~~UG/ML~~	~~9~~
29)	*d10-Acenaphthalene	14.09	634	1378682	40.00	UG/ML	9
~~33)~~	~~Dimethyl phthalate~~	~~13.61~~	~~607~~	~~3385~~	~~.09~~	~~UG/ML~~	~~7~~
~~35)~~	~~Dimethyl phthalate~~	~~14.09~~	~~634~~	~~243961~~	~~6.17~~	~~UG/ML~~	~~6~~
~~36)~~	~~2,6-Dinitrotoluene~~	~~14.09~~	~~634~~	~~172607~~	~~16.52~~	~~UG/ML~~	~~5~~
~~40)~~	~~Diethyl phthalate~~	~~15.79~~	~~730~~	~~22463~~	~~.97~~	~~UG/ML~~	~~9~~
~~41)~~	~~Fluorene~~	~~16.43~~	~~766~~	~~1269~~	~~.03~~	~~UG/ML~~	~~8~~
~~44)~~	~~N-Nitrosodiphenylamine~~	~~15.85~~	~~733~~	~~5786~~	~~.25~~	~~UG/ML~~	~~90~~
47)	*d10-Phenanthrene	18.55	885	2866028	40.00	UG/ML	98
~~[illegible]~~	~~Phenanthrene~~	~~18.60~~	~~888~~	~~10194~~	~~.18~~	~~UG/ML~~	~~94~~
~~[illegible]~~	~~Anthracene~~	~~18.60~~	~~888~~	~~10194~~	~~.18~~	~~UG/ML~~	~~92~~
~~53)~~	~~Di-n-butyl phthalate~~	~~20.23~~	~~980~~	~~9854~~	~~.16~~	~~UG/ML~~	~~92~~
~~53)~~	~~Di-n-butyl phthalate~~	~~20.84~~	~~1014~~	~~187206~~	~~2.99~~	~~UG/ML~~	~~97~~
~~54)~~	~~Fluoranthene~~	~~22.98~~	~~1130~~	~~3422~~	~~.06~~	~~UG/ML~~	~~93~~
~~56)~~	~~Pyrene~~	~~22.98~~	~~1130~~	~~3422~~	~~.06~~	~~UG/ML~~	~~93~~
64)	*d12-Chrysene	26.68	1343	1855287	40.00	UG/ML	100
~~78)~~	~~Butyl benzyl phthalate~~	~~25.55~~	~~1268~~	~~4469~~	~~.14~~	~~UG/ML~~	~~79~~
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~26.58~~	~~1337~~	~~1391~~	~~.03~~	~~UG/ML~~	~~94~~
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~27.15~~	~~1369~~	~~4509~~	~~.10~~	~~UG/ML~~	~~87~~
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~27.33~~	~~1379~~	~~234144~~	~~5.34~~	~~UG/ML~~	~~93~~
~~83)~~	~~Di-n-octyl phthalate~~	~~29.12~~	~~1480~~	~~7817~~	~~.14~~	~~UG/ML~~	~~94~~
~~83)~~	~~Di-n-octyl phthalate~~	~~29.41~~	~~1496~~	~~1286~~	~~.02~~	~~UG/ML~~	~~88~~
~~83)~~	~~Di-n-octyl phthalate~~	~~29.64~~	~~1509~~	~~4568~~	~~.08~~	~~UG/ML~~	~~80~~
84)	Benzo(b)fluoranthene	29.89	1523	3362	.10	UG/ML	82
~~85)~~	~~Benzo(k)fluoranthene~~	~~29.89~~	~~1523~~	~~3362~~	~~.11~~	~~UG/ML~~	~~81~~
~~86)~~	~~Benzo(a)pyrene~~	~~29.89~~	~~1523~~	~~3362~~	~~.11~~	~~UG/ML~~	~~82~~
~~87)~~	~~Indeno(1,2,3-c,d)pyrene~~	~~33.67~~	~~1735~~	~~8025~~	~~.29~~	~~UG/ML~~	~~92~~
~~88)~~	~~Dibenzo(a,h)anthracene~~	~~33.71~~	~~1737~~	~~7846~~	~~.31~~	~~UG/ML~~	~~91~~
~~89)~~	~~Benzo(ghi)perylene~~	~~33.67~~	~~1735~~	~~8025~~	~~.35~~	~~UG/ML~~	~~94~~
~~89)~~	~~Benzo(ghi)perylene~~	~~34.40~~	~~1776~~	~~8380~~	~~.33~~	~~UG/ML~~	~~92~~

* Compound is ISTD

NO PCB's Found.

DMS
1/16/86

002188

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle.

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

002189

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 47285 ETC Job # K8175

Date Sealed 12-6-85 By. M. Ickstadt

Company: RESOURCE ENGINEERING

Attn.: CHRIS ITIN

Facility/Site:

Phone: (713) 520-9900

Address: 3000 RICHMOND AVE.
HOUSTON, TX 77098

SAMPLE IDENTIFICATION

Facility: RES28B-1041 (Facility/Site Code) EVAPORATION SYSTEM (Optional Sample Point Descriptions)

Sample Point: T-ES17d (Source Code (from below) / Your Sample Point ID (left justify)) 85 12 17 (Start Date (YY/MM/DD)) (Start Time (2400 hr. clock)) (Elapsed Hours (composite))

Source Codes
Well (W) Outfall (O) Bottom Sediment (B) Surface Impoundment (I) Leachate Collection Sys (C) Other (X)
Soil (S) River/Stream (R) Generation Point (G) Treatment Facility (T) Lake/Ocean (L) Specify

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	SAMPLER Observations	LAB Observation
1	E	500mL	BAKED	EXTRACTABLE			✓
2	F	40mL	BAKED	VOA			✓

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) JOHN BINS Date: 12/9/85 Time: 6:30 PM
Signature: John Bins Seal #: 0047285 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) JOHN BINS Date: 12/19/85 Time: 5:30 PM
Signature: John Bins Seal #: 0047286 Intact: YES

ETC USE ONLY Opened By: [signature] Date: 12/20/85 Time: 11:00
Seal #: 47286 Condition: INTACT

002190

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # KB175

Sample Point [T] [ES1170] (Sample Code / Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD) | START PURGE (0400 hr Clock) | ELAPSED HRS | WATER VOL. IN CASING (Gallons) | VOLUME PURGED (Gallons)

SAMPLING METHOD: HAND AUGER AND CORE SAMPLER

Sampler Type [ ] A-Submersible Pump B-ISCO C-Bladder Pump D-Dipper/Bottle E-Bailer F-Scoop/Shovel X-Other _____ (SPECIFY OTHER)

Sampler Material [ ] A-Teflon B-Metal C-PVC D-Plastic X-Other _____ (SPECIFY OTHER)

Tubing Material [ ] A-Teflon B-Tygon C-Polyethylene D-Silicon X-Other _____ (SPECIFY OTHER)

Sample Composited [Y/N] _____ (Procedure/Properties)

FIELD MEASUREMENTS

Well Elevation (ft/msl) _____

Depth to Ground water (ft) _____

Groundwater Elevation (ft msl) _____

Well Depth (ft) _____

Sample Depth (non-well) (ft) _____

	pH	(STD)		spec. cond.	units at 25°C	(other parameter)	value	units
1st			1st					
2nd			2nd					
3rd			3rd					
4th			4th					

Sample Temp (°C) _____ Turbidity (NTU) _____

FIELD COMMENTS

Sample Appearance: DARK BROWN CLAY WITH SLUDGE

Weather Conditions: _____

Other: HNU READING 3PPM AT HOLE

RESPIRATORS WORN

EPA SAMPLE SPLIT # SD3-36A

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: JOHN BINS (Print) Employer: RESOURCE ENGINEERING INC

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols.

12/19/85 (Date) John Bins (Signature)

0021 91

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/2/86 SHIFT
FRACTION WA
INSTRUMENT M
TUNE FILE APCI02
SEQUENCE FILE DXM
METHOD FILE VOAM
ID FILE MWA
ANALYST(S) [illegible]
[illegible]
SUPERVISOR [illegible]
BATCH #'s QV4206

STANDARD	CONC PPM	LOT NO.	LOT VOL. (uL)
pBFB	50	12151	1
Istd	25	12066	10
Surrog	25	12019	10
ABC/SCVSA	18	12141	5,10,30
o,m,p Chlorotoluene	18	11852	5,10,30

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	1/2/86
WIP		BY	DMJ

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
p-BFB	7M0531	1 µl			100003	OK 13:37	
QC4206V	7M0532					OK 15:05 PLSV10	✓
QC4206VS	7M0533					5 µl ABC/SCVSA, o,m,p, chlorotol	
QC4206VS	7M0534					10	
QC4206VS	7M0535				18:09	30	
p-BFB	7M0536				19:13	OK	
K8557VS	7M0537	1.0g				NG 5 µl [illegible] no metal	
K8557V	7M0538					OK	
K8558V	7M0539					Ng ~~OK~~ re-run 1/200	
K8558VR	7M0540					Ng ~~OK~~ re-run 1/200	35,36
K8559V	7M0541					Ng ~~OK~~ re-run 1/200	66,67
K8171V	7M0542					~~OK~~ Ng rerun [illegible]	
K8173V	7M0543					Ng ~~OK~~	
K8174V	7M0544					OK	
K8175V	7M0545					OK	
K8176V	7M0546					OK	
(R) K8557VS	7M0547					OK	
QC4206VS	7M0548	1 µl				OK 07:06	
p-BFB	7M0549	1 µl				NG	
p-BFB	7M0550	1 µl				OK 09:03	
(R) K8171V	7M0551	1.0g				OK	
(R) K8173VR	7M0552	1.0g				OK	
K8484V	7M0553	1.0g				OK	
K8471V	7M0554					OK	
K4174V	7M0555					OK PLSV10 PLSV10	✓

ETC FORM #102

002192

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/3/86 SHIFT
FRACTION VOA (50 ls)
INSTRUMENT M
TUNE FILE APEI02
SEQUENCE FILE DSM
METHOD FILE VOAm
ID FILE MVOA
ANALYST(S) Dennis M Simons

SUPERVISOR [signature]
BATCH #'s QV4206

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Refer to pg 1 of 2			

NAME	DATA FILE	uL INJ	ALS #	OIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8470V	>M0556	1g			1.0008	OK	
(R) K8173V	>M0557	1g				ng leaked	
QC4206V	>M0558					OK	
(R) K8173V	>M0559	1g				OK	

002193

ETC FORM #102

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
~~K4174~~	~~12865~~	~~29.95~~			~~PP/ORG/PST/PCB~~ RESOXHLET AT 3.0 gr. MK 12/30
+ J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485	↓	29.27	1.0	1.0	
K8171	12847	30.00	1.0	1.0	PP/ORG/PST/PCB Cmpd/BN
* ~~K8172~~		30.01			RESOXHLET AT 3.0 grams MK 12/30
K8173		30.00	1.0	1.0	
K8174		30.01	1.0	1.0	
K8175		29.95	1.0	1.0	
K8176	↓	28.15	1.0	1.0	
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		BN+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208	↓	30.10	1.0		
QC 4228			1.0	1.0	
27 ~~K8173~~ K8173 S		22.72	1.0	1.0	
K8174 R		~~20.38~~ 24.84	D.V. 12/27 1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

1-2 PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

Log 12847 Cmpd/BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

*K4174 } RESOXHLET AT 3.0 grams. MK 12/30
*K8172 }

+ F.V 5.0 ml a 1 ml Aliquot was packaged

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 ug/ml	12,098
ACID	1.0	100 ug/ml	11,825
Aroclor 1260	1.0	100 ug/ml	12,097
Pest	1.0	100/200 ug/ml	12,059
SPEC #930 #1 SPIKE	1.0	100 ug/ml	12,137
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ug/ml ACID: 100 ug/ml	12,093

Set-up: L.M. Zyk 12/28/85 J. Vajda 12-27-85

BN Conc.: Judie C 12/27/85 Acid Conc.: L.M. Zyk 12/2/86

UPD/Supervisor: Marc Quaglia 1/2/88

Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC FORM #110

002194

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/5/86 SHIFT
FRACTION Acid; BNA
INSTRUMENT F
TUNE FILE MTF001
SEQUENCE FILE JHF
METHOD FILE Acid F; BNPF
ID FILE FAcid; FBNA
ANALYST(S) J Hendl
SUPERVISOR
BATCH #'s QC4159, QA4228

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Int Std	400	12,008	100 ml
B/N Cal std I		12,110	1 ml
B/N Cal std II		12,111	
B/N Cal std III		11,906	
Acid cal std I		12,020	
Acid cal std II		12,021	
Acid cal std III		12,022	
Spec #930	60	12,140	
Spec #930	100	12,139	
Spec #930	300	12,138	
DFTPP	25	11,972	

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ	JH 1/5	DATE	1/6
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP- 50ng std.	>F4595					OK	
B/N Cal std. III	F4596		1				
B/N Cal std. II	F4597		2				
B/N Cal std I	F4598		3				
Acid cal std III	F4599		4				
Acid cal std II	F4600		5				
Acid cal std I	F4601		6				
Spec #930; 300ppm	F4602		7				
Spec #930; 120ppm	F4603		8				
Spec #930; 60ppm	F4604		9				
DFTPP- 50ng std.	F4605		10			OK	
K8322CS	F4606		11				
QC4159C	F4607		12			BNHS Act1	Y
K8323C	F4608		13			BNHS Act1	Y
K8323CR	F4609		14				
K8320C	F4610		15			BNHS Act1	Y
K8322C	F4611		16			Act1	Y
K8321C	F4612		17			Act1	Y
K8325C	F4613		18			Act1	Y
K8324C	F4614		19			Act1	Y
GPC BLANK	F4615		20				
K8173AS	F4616		21				
DFTPP- 50ng std.	F4617		22			OK	
Acid cal std II	F4618		23			CBCHK-OK	
QC4228A	F4619		24				

ETC FORM 8102

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE _____
METHOD FILE _____
ID FILE _____
ANALYST(S) J. Hendle
SUPERVISOR _____
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174A	>F4620		25				
K8174AR	F4621		26				
K8173A	F4622		27				
K8175A ~~K8176A~~	F4623		28				
K8171A	F4624		29				
J8439A	F4625		30				
K8176A	F4626		31				
K8484A	F4627		32				
K8485A	F4628		33				

ETC FORM #102

002196

ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
* ~~K4174~~	~~12865~~	~~29.95~~			~~PP/ORG/PST/PCB~~
+ J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485		29.27	1.0	1.0	
K8171	12847	30.00	1.0	1.0	PP/ORG/PST/PCB CMPD/BN
* ~~K8172~~		~~30.01~~			RESOXHLET AT 3.0 grams MG 12/30
K8173		30.00	1.0	1.0	
K8174		30.01	1.0	1.0	
K8175		29.95	1.0	1.0	
K8176		28.15	1.0	1.0	
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		Bn+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208		30.10	1.0		
QC 4228			1.0	1.0	
127 ~~K8173~~ K8173 S		22.72	1.0	1.0	
K8174 R		~~10.38~~ 24.84 D.V. 12/27	1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

1-2 PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

Log 12847 Cmpd/BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

*K4174 } RESOXHLET AT 3.0 grams. MG 12/30
*K8172 }

+ F.V 5.0 ml a 1 ml Aliquot was packaged

MT 8501

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 ug/ml	12,098
ACID	1.0	100 ug/ml	11,825
Arochlor 1260	1.0	100 ug/ml	12,097
Pest	1.0	100/200 ug/ml	12,059
SPEC #930 #1 spike	1.0	100 ug/ml	12,137
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ug/ml ACID: 100 ug/ml	12,093

Set-up: L.M. Zyk 12/27/85 J. Vejda 12-27-85

UPD/Supervisor: Marc Quaglia 1/2/86

BN Conc.: Gridie C 12/30/85

Acid Conc.: L.M. Zyk 12/30/85

Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC FORM #110

002197

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/8/86 SHIFT
FRACTION B/N
INSTRUMENT "I"
TUNE FILE MTI001
SEQUENCE FILE MBI
METHOD FILE BNPI
ID FILE IBNP, ISPPJ*
ANALYST(S) M Barkley

SUPERVISOR Pearl Traub
BATCH #'s QB4228, QP0002, QP0007

*ID File for QC P0002 and QC P0007.
PLEASE INITIALS

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	Jan. 9th 1986
WIP		BY	KV

6 ISTPJ, CB-file: CBISPJ

STANDARD	CONC PPM	LOT NO.	LOT VOL.
INT STD.	400	12008	
DFTPP	25	11972	
BN IV	150	12112	
BN III	200	11906	
BN II	100	12111	
BN I	60	12110	
HSLPP/BN III	300	11837	
" II	100	11838	
I	30	11839	
SPEC. ~~903~~ 930 III	300	12138	
930 II	100	12139	
930 I	60	12140	
o,m,p-nitrotoluene III	500	11244	
II	~~100~~ 300	11245	
I	100	11246	

M5, M6, M7, M8.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP-50ng	>I2031		1	OW		-Lowered EMV ↓ to 1600.	
BN IV - 150ppm	>I2032		2		I00373		
BN III - 200ppm	>I2033		3				
BN II - 100ppm	>I2034		4			AR1260	
BN I - 60ppm	>I2035		5				
HSLPP/BN - 300ppm	>I2036		6				
HSLPP/BN - 100ppm	>I2037		7		for 2-Methylnaphthalene in ISPPJ		
HSLPP/BN - 30ppm	>I2038		8			ID File.	
SPEC. 930 - 300ppm	>I2039		9				
SPEC. 930 - ~~300ppm~~ 100ppm	>I2040		10				
SPEC. 930 - 60ppm	>I2041		11				
o,m,p-nitrotoluene 500ppm	>I2042		12		↓		
o,m,p-nitrotoluene 300ppm	>I2043		13		I00374		
o,m,p-nitrotoluene 100ppm	>I2044		14				
DFTPP-50ng	>I2045		15	OW			
QC4183B	>I2046		16			QB4183	
QCP0002B	>I2047		17				
QCP0002B5	>I2048		18				
Lt. #2-3	>I2049		19			Lt. #2-3	
QCP0007B	>I2050		20				
QCP0007B5	>I2051		21		"		
Lt. #1	>I2052		22				
QCP0007B1	>I2053		23			QC1	
K4572B	>I2054		24	X10		QB4241	
K4583B	>I2055		25	X10	↓	QB4241	

ETC FORM 6102

002198

ETC ENVIRONMENTAL TESTING AND CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE per
METHOD FILE per
ID FILE _____
ANALYST(S) [illegible]
SUPERVISOR [illegible]
BATCH #'s _____

STANDARD	CONC PPM	LOT NO.	LOT VOL.

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO		DATE	
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K4585B	>I2056		26	X20	I00374	QB4241	
K4585BS	>I2057		27	X20		QB4241	
DFTPP-50ng	>I2058		28				
BN II - 100ppm	>I2059		29				
K7562B	>I2060		30	X5	I00375	QB4243	
K7559B	>I2061		31	X5		QB4243	
K7561B	>I2062		32	X5		QB4243	
K7551B	>I2063		33			QB4242	
K7553B	>I2064		34				
K7554B	>I2065		35				
K7545B	>I2066		36				
K7544B	>I2067		37				
K7550B	>I2068		38				
K7557B	>I2069		39				
K7556B	>I2070		40				
DFTPP-50ng	>I2071		41				
BN II - 100ppm	>I2072		42				
QC4228B	>I2073		43			PCBSCR	PB
K8173BS	>I2074		44			AR1260	
J8439B	>I2075		45			PCBSCR	
K8484B	>I2076		46				
K8485B	>I2077		47		I00376		
K8171B	>I2078		48				
K8173B	>I2079		49				
K8174B	>I2080		50				

002199

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
ACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE see
METHOD FILE _____
ID FILE _____
ANALYST(S) [illegible]
SUPERVISOR [illegible]
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO	LOT VOL
see page			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174BR	>I2081		51		J00376	PCBSCR	
K8175B	>I2082		52				
K8176B	>I2083		53				
DFTPP-50ng	>I2084		54				
BN II - 100ppm	>I2085		55				
K3246B	>I2086		56				
J2204B	>I2087		57				PR
J2205B	>I2088		58				
J2206B	>I2089		59				
J2207B	>I2090		60				
J2208B	>I2091		61				

002200

ETC FORM #102

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Technical Report

for

RESOURCE ENGINEERING

ATTENTION: CHRIS ITIN

3000 RICHMOND AVENUE

HOUSTON, TX 77098

BACKROUND SOIL COMPOSITE

SAMPLE # S123

002201

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No	Company	Facility	Sample Point	Date	Time	Elapsed Hours
KB171	RESOURCE ENGINEERING	RES28804	SBS123	B51218		

Denis C. K. Lin, Ph.D.

Vice President
Research and Operations

This Technical Report is an INSITE℠ service generated by LODESTAR™ Data Management Software.

284 RARITAN CENTER PARKWAY • EDISON, NJ 08837 (201) 225-5600

TABLE OF CONTENTS

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Table 1: Results and Quality Assurance Data

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Methodology

QA Protocol

Report Appendices

Appendix A - Mass Spectral Data for Quantitated Compounds

Appendix C1 - GC/MS Subsidiary Data - Blank Chromatograms

Appendix E - Chain of Custody Forms

002202

Introduction

This report contains the analytical results on your soil sample, SBS123 85/12/18. It is designed to include comprehensive data from the entire analytical process in order to satisfy the needs of various levels of review.

The results obtained from your sample are presented in tabular format immediately following this introduction. Quality assurance data is tabulated along with the appropriate sample results for verification. Depending on the analyses ordered, the quality assurance data may include results from blank, spiked blank, spiked sample (i.e. matrix spike) and replicate sample as well as results from surrogate compound analyses. Quality assurance data for verification of proper instrument performance is also included where appropriate. The report appendices include the chain of custody record for your sample and, where appropriate, the gas chromatograms and mass spectra.

The procedures used in the analysis of the sample are described in this report's methodology section. All analytical procedures within our laboratory are performed within a strictly enforced Quality Assurance Protocol. A description of this Protocol is included in the report.

Results

Sample results, and associated quality assurance data, are always tabulated in one or more of this report's Quantitative Results Tables. The format of each table varies with the class of analysis.

Priority Pollutants

The priority pollutant compounds and elements are listed with their NPDES (National Pollution Discharge Elimination System) numbers, and the Method Detection Limit (MDL) published in the Federal Register. When a compound or element is present below its published MDL it is reported as BMDL (Below Method Detection Limit). When a compound or element is not present at any detectable concentrations it is reported as ND (Not Detected). MDL's for non-aqueous matrices are based on USEPA published MDL's but are adjusted as per sample weight. Matrix spike and replicate analyses, where included, were performed on samples randomly chosen within each quality assurance batch and are therefore not necessarily spikes and replicates of this report's sample. Surrogate compound recovery data and instrument calibration data are included in the Method Performance Data Tables.

002203

ENVIRONMENTAL TESTING and CERTIFICATION

JAN 7, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Volatile Compounds – GC/MS Analysis Data (QR01)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8171	RESOURCE ENGINEERING	RES28804	SBS123	851218		

NPDES Number	Compound (Acrolein and Acrylonitrile values are screen only.)	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1V	Acrolein	ND	500	ND	ND	ND	4000	90	ND	4000	126
2V	Acrylonitrile	ND	500	ND	ND	ND	400	99	ND	400	81
3V	Benzene	ND	22	ND	ND	ND	90.0	105	ND	90.0	92
4V	bis(Chloromethyl)ether	ND	50	ND	ND	ND	0	-	ND	0	-
5V	Bromoform	ND	24	ND	ND	ND	90.0	114	ND	90.0	91
6V	Carbon tetrachloride	ND	14	ND	ND	ND	90.0	103	ND	90.0	89
7V	Chlorobenzene	ND	30	ND	ND	ND	90.0	101	ND	90.0	93
8V	Chlorodibromomethane	ND	16	ND	ND	ND	90.0	107	ND	90.0	90
9V	Chloroethane	ND	50	ND	ND	ND	90.0	96	ND	90.0	91
10V	2-Chloroethylvinyl ether	ND	50	ND	ND	ND	90.0	180.	ND	90.0	196.
11V	Chloroform	ND	8.0	ND	ND	ND	90.0	100	ND	90.0	96
12V	Dichlorobromomethane	ND	11	ND	ND	ND	90.0	101	ND	90.0	91
13V	Dichlorodifluoromethane	ND	50	ND	ND	ND	90.0	104	ND	90.0	84
14V	1,1-Dichloroethane	ND	24	ND	ND	ND	90.0	100	ND	90.0	96
15V	1,2-Dichloroethane	ND	14	ND	ND	ND	90.0	100	ND	90.0	95
16V	1,1-Dichloroethylene	ND	14	ND	ND	ND	90.0	101	ND	90.0	90
17V	1,2-Dichloropropane	ND	30	ND	ND	ND	90.0	101	ND	90.0	92
18V	cis-1,3-Dichloropropylene	ND	25	ND	ND	ND	90.0	100	ND	90.0	81
19V	Ethylbenzene	ND	36	ND	ND	ND	90.0	98	ND	90.0	97
20V	Methyl bromide	ND	50	ND	ND	ND	90.0	103	ND	90.0	97
21V	Methyl chloride	ND	50	ND	ND	ND	90.0	98	ND	90.0	78
22V	Methylene chloride	ND	14	1.13	ND	64.5	90.0	63	430	90.0	0.
23V	1,1,2,2-Tetrachloroethane	ND	35	ND	ND	ND	90.0	121	ND	90.0	113
24V	Tetrachloroethylene	ND	21	ND	ND	ND	90.0	103	ND	90.0	96
25V	Toluene	ND	30	ND	ND	ND	90.0	102	ND	90.0	100
26V	1,2-Trans-dichloroethylene	ND	8.0	ND	ND	ND	90.0	101	ND	90.0	94
27V	1,1,1-Trichloroethane	ND	19	ND	ND	ND	90.0	102	ND	90.0	96
28V	1,1,2-Trichloroethane	ND	25	ND	ND	ND	90.0	110	ND	90.0	92
29V	Trichloroethylene	ND	9.5	ND	ND	ND	90.0	96	ND	90.0	90
30V	Trichlorofluoromethane	ND	50	ND	ND	ND	90.0	99	ND	90.0	87
31V	Vinyl chloride	ND	50	ND	ND	ND	90.0	99	ND	90.0	88
18V	trans-1,3-Dichloropropylene	ND	50	ND	ND	ND	90.0	98	ND	90.0	92

* Recovery normally variable using EPA Protocol Method 624.

* Spiked samples that contain compounds present at high levels do not provide valid spike recovery data.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 9, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Acid Compounds - GC/MS Analysis Data (QR02)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8171	RESOURCE ENGINEERING	RES28804	SBS123	851218		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg[a]	Second ug/kg[a]	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1A	2-Chlorophenol	ND	110	ND	ND	ND	0	-	ND	4400	82
2A	2,4-Dichlorophenol	ND	90	ND	ND	ND	0	-	ND	4400	94
3A	2,4-Dimethylphenol	ND	90	ND	183	ND	0	-	ND	4400	88
4A	4,6-Dinitro-o-cresol	ND	800	ND	ND	ND	0	-	ND	4400	61
5A	2,4-Dinitrophenol	ND	1400	ND	ND	ND	0	-	ND	4400	55
6A	2-Nitrophenol	ND	120	ND	ND	ND	0	-	ND	4400	90
7A	4-Nitrophenol	ND	80	ND	ND	ND	0	-	ND	4400	99
8A	p-Chloro-m-cresol	ND	100	ND	ND	ND	0	-	ND	4400	120
9A	Pentachlorophenol	ND	120	ND	ND	ND	0	-	ND	4400	135
10A	Phenol	ND	50	ND	ND	ND	0	-	236	4400	193
11A	2,4,6-Trichlorophenol	ND	90	ND	ND	ND	0	-	ND	4400	102
	Catechol	ND	333	ND	ND	ND	0	-	ND	4400	1[b]
	Benzoic acid	ND	330	ND	ND	ND	0	-	ND	4400	29

[a] Variability in duplicate results due to non-homogeneous nature of sample matrix.

[b] Recovery too low due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8171	RESOURCE ENGINEERING	RES28804	SBS123	851218		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1B	Acenaphthene	ND	63	ND	ND	ND	0	-	ND	4400	78
2B	Acenaphthylene	ND	120	ND	ND	ND	0	-	ND	4400	109
3B	Anthracene	ND	63	ND	ND	ND	0	-	51.9	4400	99
4B	Benzidine	ND	1500	ND	ND	ND	0	-	ND	4400	40
5B	Benzo(a)anthracene	ND	260	ND	ND	ND	0	-	ND	4400	102
6B	Benzo(a)pyrene	ND	83	ND	ND	ND	0	-	ND	4400	85
7B	Benzo(b)fluoroanthene	ND	160	ND	ND	ND	0	-	ND	4400	100
8B	Benzo(ghi)perylene	ND	140	ND	ND	ND	0	-	ND	0	-
9B	Benzo(k)fluoranthene	ND	120	ND	ND	ND	0	-	ND	4400	83
10B	bis(2-Chloroethoxy)methane	ND	180	ND	ND	ND	0	-	ND	4400	66
11B	bis(2-Chloroethyl) ether	ND	190	ND	ND	ND	0	-	ND	4400	109
12B	bis(2-Chloroisopropyl)ether	ND	190	ND	ND	ND	0	-	ND	4400	71
13B	bis(2-Ethylhexyl)phthalate	ND	330	ND	ND	ND	0	-	ND	4400	213[e]
14B	4-Bromophenyl phenyl ether	ND	63	ND	ND	ND	0	-	ND	4400	137
15B	Butyl benzyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	146
16B	2-Chloronaphthalene	ND	63	ND	ND	ND	0	-	ND	4400	44
17B	4-Chlorophenyl phenyl ether	ND	140	ND	ND	ND	0	-	ND	4400	49
18B	Chrysene	ND	83	ND	ND	ND	0	-	ND	4400	108
19B	Dibenzo(a,h)anthracene	ND	330	ND	ND	ND	0	-	ND	0	-
20B	1,2-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	93
21B	1,3-Dichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	90
22B	1,4-Dichlorobenzene	ND	150	ND	ND	ND	0	-	ND	4400	92
23B	3,3'-Dichlorobenzidine	ND	567	ND	ND	ND	0	-	ND	4400	0[c]
24B	Diethyl phthalate	ND	330	ND	ND	ND	0	-	ND	4400	52
25B	Dimethyl phthalate	ND	330	ND	ND	ND	0	-	52.9	4400	94
26B	Di-n-butyl phthalate	ND	330	ND	ND	ND	0	-	85.3	4400	177[e]
27B	2,4-Dinitrotoluene	ND	190	ND	ND	ND	0	-	ND	4400	47
28B	2,6-Dinitrotoluene	ND	63	ND	ND	ND	0	-	ND	4400	38
29B	Di-n-octyl phthalate	451	330	ND	ND	ND	0	-	ND	4400	108
30B	1,2-Diphenylhydrazine	ND	330	ND	ND	ND	0	-	ND	4400	0[c]
31B	Fluoranthene	ND	73	ND	ND	ND	0	-	35.8	4400	123
32B	Fluorene	ND	63	ND	ND	ND	0	-	ND	4400	64

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

BASE/NEUTRAL COMPOUNDS - GC/MS ANALYSIS DATA (QR03)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8171	RESOURCE ENGINEERING	RES28804	SBS123	851218		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov *	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
33B	Hexachlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	133
34B	Hexachlorobutadiene	ND	30	ND	ND	ND	0	-	ND	4400	87
35B	Hexachlorocyclopentadiene	ND	330	ND	ND	ND	0	-	ND	0	-
36B	Hexachloroethane	ND	53	ND	ND	ND	0	-	ND	4400	22c
37B	Indeno(1,2,3-c,d)pyrene	ND	160	ND	ND	ND	0	-	ND	0	-
38B	Isophorone	ND	73	ND	ND	ND	0	-	ND	4400	62
39B	Naphthalene	135	53	ND	ND	ND	0	-	ND	4400	119
40B	Nitrobenzene	ND	63	ND	ND	ND	0	-	ND	4400	127
41B	N-Nitrosodimethylamine	ND	330	ND	ND	ND	0	-	ND	0	-
42B	N-Nitrosodi-n-propylamine	ND	330	ND	ND	ND	0	-	ND	4400	140
43B	N-Nitrosodiphenylamine	ND	63	ND	ND	ND	0	-	75.1	4400	30
44B	Phenanthrene	ND	180	ND	ND	ND	0	-	ND	4400	127
45B	Pyrene	ND	63	ND	ND	ND	0	-	ND	4400	125
46B	1,2,4 Trichlorobenzene	ND	63	ND	ND	ND	0	-	ND	4400	77
	Benzaldehyde	ND	333	ND	ND	ND	0	-	ND	4400	48
	Benzyl alcohol	BMDL	330	88.6	227	ND	0	-	51.1	4400	37

A Reagent Blank. Spiked Blank cannot be performed for this sample matrix.

B Recovery normally variable using EPA Protocol Method 625.

C Recovery variable due to sample matrix interference.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

JAN 26, 1986

TABLE 1: QUANTITATIVE RESULTS and QUALITY ASSURANCE DATA

Pesticide/PCB Compounds - GC/MS Analysis Data (QR04)

Chain of Custody Data Required for ETC Data Management Summary Reports

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours
K8171	RESOURCE ENGINEERING	RES28804	SBS123	851218		

NPDES Number	Compound	Results		QC Replicate		QC Blank and Spiked Blank			QC Matrix Spike		
		Sample Concen. ug/kg	MDL ug/kg	First ug/kg	Second ug/kg	Blank Data ug/kg	Concen. Added ug/kg	% Recov *	Unspiked Sample ug/kg	Concen. Added ug/kg	% Recov
1P	Aldrin	ND	63	ND	ND	ND	0	-	ND	4400	44
2P	Alpha-BHC	ND	330	ND	ND	ND	0	-	ND	4400	39
3P	Beta-BHC	ND	150	ND	ND	ND	0	-	ND	4400	117
4P	Gamma-BHC	ND	330	ND	ND	ND	0	-	ND	4400	77
5P	Delta-BHC	ND	100	ND	ND	ND	0	-	ND	4400	14.
6P	Chlordane	ND	330	ND	ND	ND	0	-	ND	8800	41
7P	4,4'-DDT	ND	93	ND	ND	ND	0	-	ND	4400	0.
8P	4,4'-DDE	ND	190	ND	ND	ND	0	-	ND	4400	70
9P	4,4'-DDD	ND	160	ND	ND	ND	0	-	ND	4400	76
10P	Dieldrin	ND	83	ND	ND	ND	0	-	ND	4400	68
11P	Endosulfan I	ND	330	ND	ND	ND	0	-	ND	4400	78
12P	Endosulfan II	ND	330	ND	ND	ND	0	-	ND	4400	0.
13P	Endosulfan sulfate	ND	190	ND	ND	ND	0	-	ND	4400	42
14P	Endrin	ND	330	ND	ND	ND	0	-	ND	4400	32
15P	Endrin aldehyde	ND	330	ND	ND	ND	0	-	ND	4400	35
16P	Heptachlor	ND	63	ND	ND	ND	0	-	ND	4400	0.
17P	Heptachlor epoxide	ND	73	ND	ND	ND	0	-	ND	4400	56
18P	PCB-1242	ND	1200	ND	ND	ND	0	-	ND	0	-
19P	PCB-1254	ND	1200	ND	ND	ND	0	-	ND	0	-
20P	PCB-1221	ND	1000	ND	ND	ND	0	-	ND	0	-
21P	PCB-1232	ND	1200	ND	ND	ND	0	-	ND	0	-
22P	PCB-1248	ND	1200	ND	ND	ND	0	-	ND	0	-
23P	PCB-1260	ND	1200	ND	ND	ND	0	-	ND	4400	90
24P	PCB-1016	ND	1200	ND	ND	ND	0	-	ND	0	-
25P	Toxaphene	ND	330	ND	ND	ND	0	-	ND	0	-

* Recovery normally variable using EPA Protocol Method 625.

@ Reagent Blank. Spiked Blank cannot be performed for this sample matrix.

ETC ENVIRONMENTAL TESTING and CERTIFICATION

January 26, 1986

TABLE 2: METHOD PERFORMANCE DATA

Surrogate Recovery Soil- GC/MS Data (QR20)

Chain of Custody Data Required for ETC Data Management Summary Reports

K8171

ETC Sample No.	Company	Facility	Sample Point	Date	Time	Elapsed Hours

Compound	Amount Added ug	% Recovery	Control Limits *	
			Lower	Upper
VOLATILE FRACTION				
Toluene-D8	.250	78	50	160
Bromofluorobenzene	.250	89	50	160
1,2-Dichloroethane-D4	.250	82	50	160
ACID FRACTION				
Phenol-D5	100	72	20	140
2-Fluorophenol	100	84	20	140
2,4,6-Tribromophenol	100	99	10	140
BASE/NEUTRAL FRACTION				
Nitrobenzene-D5	50	153**	20	140
2-Fluorobiphenyl	50	64	20	140
Terphenyl-D14	50	31	20	150

* IFB EPA Control Limits.
** Recovery variable due to sample matrix interference.

- Three surrogate compounds are added to each sample in the batch for Base/Neutral analysis.
- Three surrogate compounds are added to each sample in the batch for Acid analysis.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on decafluorotriphenylphosphine (DFTPP) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of standards composed of either the Organic Acid or Base/Neutral Extractable Compounds at a minimum of 3 concentrations and using five internal standards for quantitation.

Analysis of Metals

All Samples

- New standards are prepared for each batch of samples.
- Normal calibration is performed using a blank sample and four standards that have been through the sample preparation procedure. A regression analysis is used to construct the calibration curve
- All EP Toxicity samples and all samples determined by furnace atomic absorption are calculated by the "method of additions".
- For each sample analysis that requires the use of the "method of additions" technique, a three point calibration is performed using U.S. EPA "Methods for Chemical Analysis of Water and Wastes, 1979". Results are obtained using linear regression analysis. Any regression with a coefficient of correlation below 0.990 is considered suspect, necessitating review of calibration data or sample re-analysis.
- In constructing the normal calibration curves the lowest concentration levels we use are values greater than or equal to 5 times the Instrumental Detection Limit (IDL).
- All calibration standards are analyzed in duplicate, at a minimum.
- Independent reference standards are used to check the accuracy of calibration standards.
- A check standard is analyzed every ten samples to validate the normal calibration curve.
- One customer sample out of every ten is analyzed in triplicate.

Homogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are homogeneous, the QC program is a minimum of 25% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 independent reference standard;
- 4 Calibration standards (processed using the sample preparation method);
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

002210

ETC ENVIRONMENTAL TESTING and CERTIFICATION

Summary of Quality Assurance/Quality Control Procedures (QA/QC)

ETC bases its quality assurance protocols on the following government guidelines:

- "Handbook for Analytical Quality Control in Water and Wastewater Laboratories", EPA-600/4-79-019, March 1979;
- National Enforcement Investigation Center Policies, and Procedures manual; EPA-330/9/79/001-R, October 1979;
- the recommended guidelines for EPA Methods 624 and 625. (Federal Register, December 3, 1979, updated on October 26, 1984);
- "Manual of Analytical Methods for the Analysis of Pesticides in Humans and Environmental Samples," EPA 600/8-80-038, June 1980;
- "Determination of 2,3,7,8-TCDD in Soil and Sediment" EPA, Region VII, Kansas City, September 1983;
- Organic Analysis: Multi-media, Multi Concentration-IFB WA84-A267; and
- Dioxin Analysis:Soil/Sediment Matrix; Multi-Concentration; Selected Ion Monitoring with Jar Extration Procedure-IFB WA84-A002

However, we have modified our protocols to provide a higher level of QA/QC than the guidelines require. For example, we analyze a higher than required number of quality control samples and we pay especially careful attention to the certification of the "reference standard" compounds we use in analysis. Below are listed the key QA/QC elements for the methods we used.

Analysis of Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry

- Each batch of 13 samples consists of 9 customer samples (at a maximun), one blank sample, one spiked blank, one spiked sample and one replicate sample. This amounts to a 30% quality control factor.
- Three surrogate compounds are added to each sample in the batch of 13.
- A blind quality control sample is introduced to the laboratory for analysis on a weekly basis.
- Each GC/MS is checked and retuned, if necessary, at the beginning of each day to ensure that its performance on bromofluorobenzene (BFB) meets the EPA criteria.
- A calibration curve for quantitation is prepared using a mixture of Volatile Organic Priority Pollutant "standards" at a minimum of 3 different concentrations and using a mixture of 3 internal standards at a constant concentration.
- The calibration curve is verified with a mixture of priority pollutant standards every day. If the response factors vary greater than 25%, the instrument must be recalibrated.

Analysis of Organic Compounds Extracted in Acid or Base/Neutral Solutions by Gas Chromatography/Mass Spectrometry

- Each batch of 20 samples consists of 16 customer samples (at a maximum), one blank sample, one spiked blank (for water matrices), one sample spiked with the priority pollutant standard mixture and a duplicate customer sample. This amounts to a 20% quality control factor.

002211

Methodology for GC/MS Analysis of Priority Pollutant Compounds

The methods employed in the GC/MS analysis for priority pollutants are established EPA methods. Rigid compliance with the instrument parameters and performance criteria of the published methods was achieved. In some cases, the precise amounts of sample used and the sample handling procedures vary with the complexity of the sample matrix. Qualitative identification of the priority pollutants was performed using the relative retention times, the relative abundance of three characteristic ions and the abundance ratios. The entire mass spectrum was reviewed to confirm each identification. Quantitative analysis of detected compounds was performed by using a response factor generated by a major characteristic ion of the specific compound and an internal standard.

Compounds, in addition to those on the priority pollutant list, were identified through a computer-aided search of the NBS-EPA spectra library. After review the identifications are included in a separate tabulation and labelled "tentatively identified".

Volatile Priority Pollutant Compounds

For the analysis of Volatile priority pollutants in a soil matrix, a modified version of EPA Method 624 was used. The modification can be be summarized as follows: 1-3 gm of the solid sample are weighed into a 15 ml Hypo vial. The vial is sealed immediately with a teflon-backed silicone septum. A solution containing 3 internal standards is injected through the septum onto the sample. The vial is attached to the Purge and Trap sampler in series with a 5 ml organic-free water trap. The sample vial is heated at 80 degrees Centigrade for 20 minutes. An inert gas sweeps the volatile organic compounds through the water trap onto a sorbent column where they are trapped. When the purge cycle is complete, the sorbent column is heated and backflushed with helium to desorb the purgeable organic compounds onto a gas chromatographic column. The gas chromatograph is temperature programmed to separate the purgeable mixture. The separated purgeable components are then identified and quantitated using a computerized mass spectrometer.

Acid, Base/Neutral and Pesticide Priority Pollutant Compounds

For the analysis of the Acid, Base/Neutral and Pesticide priority pollutants in a soil matrix, a modification of EPA Method 625 was used. The method can be summarized as follows: A 30 gm semi-wet soil sample is soxhlet extracted with a 1:1 mixture of acetone and hexane. The acetone is thermally stripped. The remaining hexane extract is diluted to 200 ml with methylene chloride and twice extracted with an aqueous NaOH solution followed by an extraction with deionized water. The methylene chloride extract is dried and concentrated to a 1 ml final volume. This concentrate is injected into a GC/MS instrument configured for the analysis of Base/Neutral priority pollutant compounds. The remaining aqueous extracts are combined and the pH adjusted to a value less than 2. The aqueous phase is serially extracted with 3 aliquots of methylene chloride. The methylene chloride extracts are dried, concentrated to a 1 ml final volume. The concentrate is injected into a GC/MS instrument configured for the analysis of acid extractable priority pollutant compounds.

002212

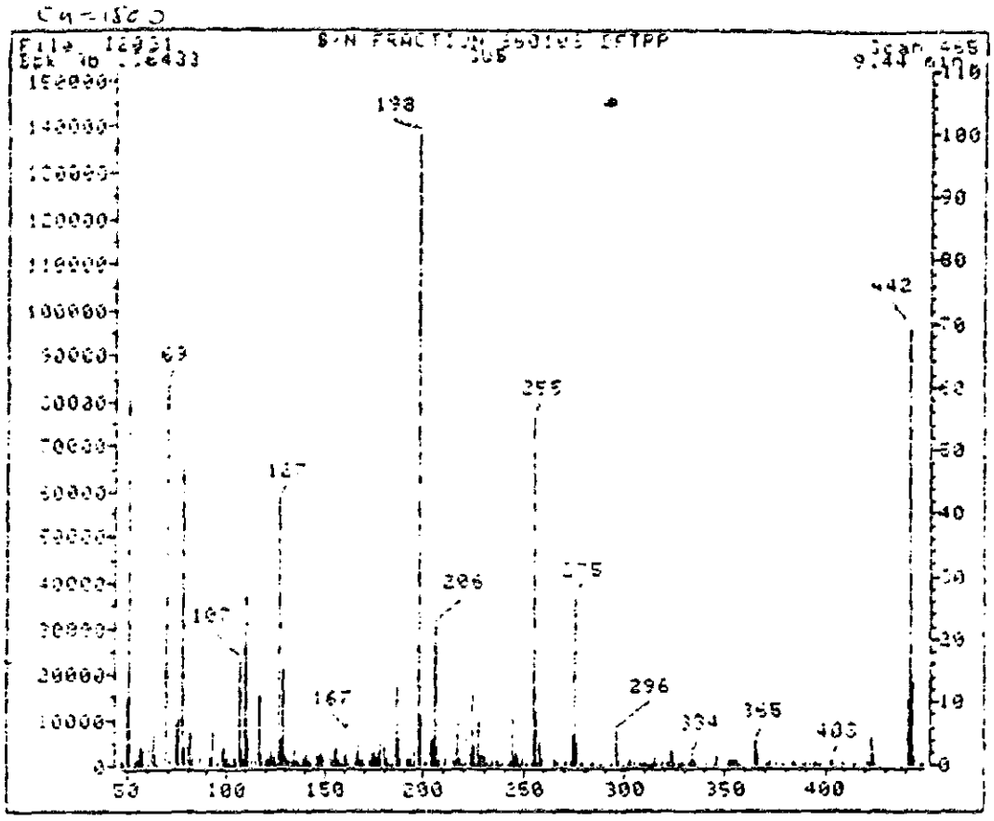

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for Base/Neutral Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	58.00	58.00	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	60.38	60.38	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	42.20	42.20	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	7.65	7.65	Ok
275	10-30% of mass 198	26.44	26.44	Ok
365	Greater than 1% of mass 198	3.90	3.90	Ok
441	0-100% of mass 443	10.20	78.74	Ok
442	Greater than 40% of mass 198	69.01	69.01	Ok
443	17-23% of mass 442	12.96	18.78	Ok

Injection Date: 01/08/86 Analyst: Pearl Traut
Injection Time: 18:27 Processor: J. Herald, D. Simons
Run No: >I2031 QC Batch: QB4228
Spectrum No: 465 Samples: J84398, K84848, K84858, K81716, K817[illegible], K81748, K81758, K81763, K32468, J82048-J22088

KB 1/25/86

002213

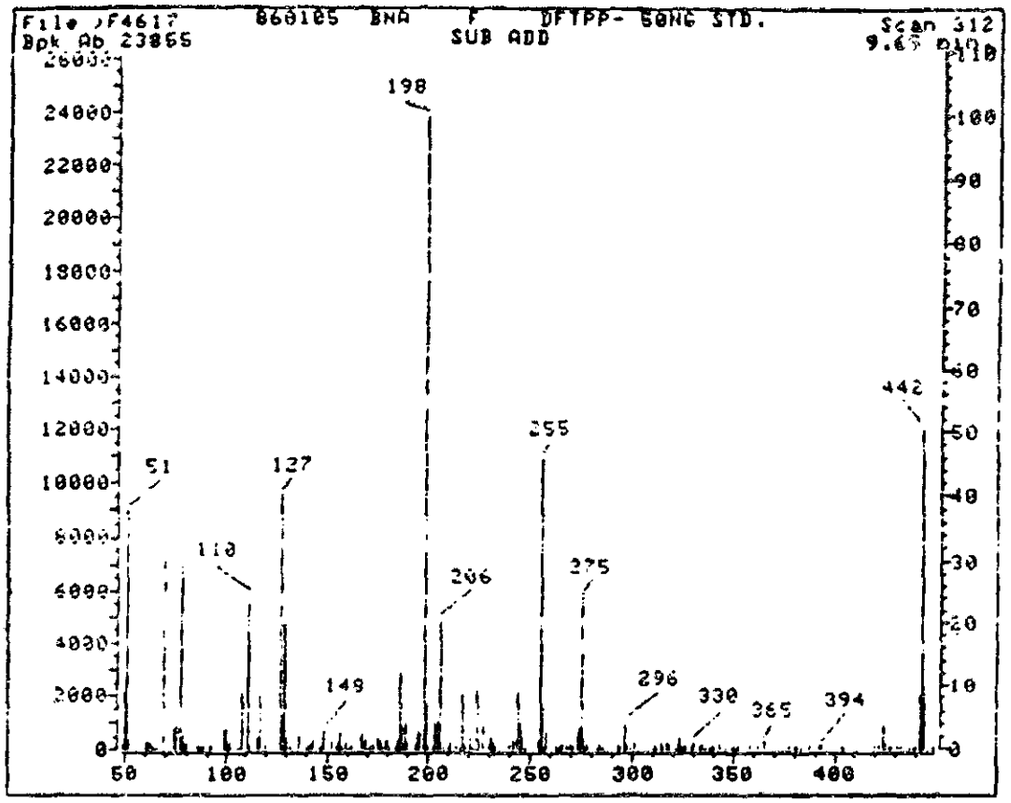

TABLE 2: METHOD PERFORMANCE DATA (QR23)

GC/MS Tuning Data - Decafluorotriphenylphospine (DFTPP) for ~~Base/Neutral~~ Acid Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
51	30-60% of mass 198	37.49	37.49	Ok
68	Less than 2% of mass 69	0.00	0.00	Ok
69	(reference only)	29.90	29.90	Ok
70	Less than 2% of mass 69	0.00	0.00	Ok
127	40-60% of mass 198	40.19	40.19	Ok
197	Less than 1% of mass 198	0.00	0.00	Ok
198	Base peak, 100% relative abundance	100.00	100.00	Ok
199	5-9% of mass 198	6.93	6.93	Ok
275	10-30% of mass 198	24.59	24.59	Ok
365	Greater than 1% of mass 198	1.31	1.31	Ok
441	0-100% of mass 443	8.34	85.48	Ok
442	Greater than 40% of mass 198	50.23	50.23	Ok
443	17-23% of mass 442	9.76	19.43	Ok

Injection Date: 01/06/86 Analyst: [illegible]
Injection Time: 07:46 Processor: [illegible]
Run No: >F4617 QC Batch: QA 4228 K8175
Spectrun No: 312 Samples: K8174, K8173, ~~K8176~~, K8171, J8439, K8176, K8484, K8485

K. Baker 1/9/86

002214

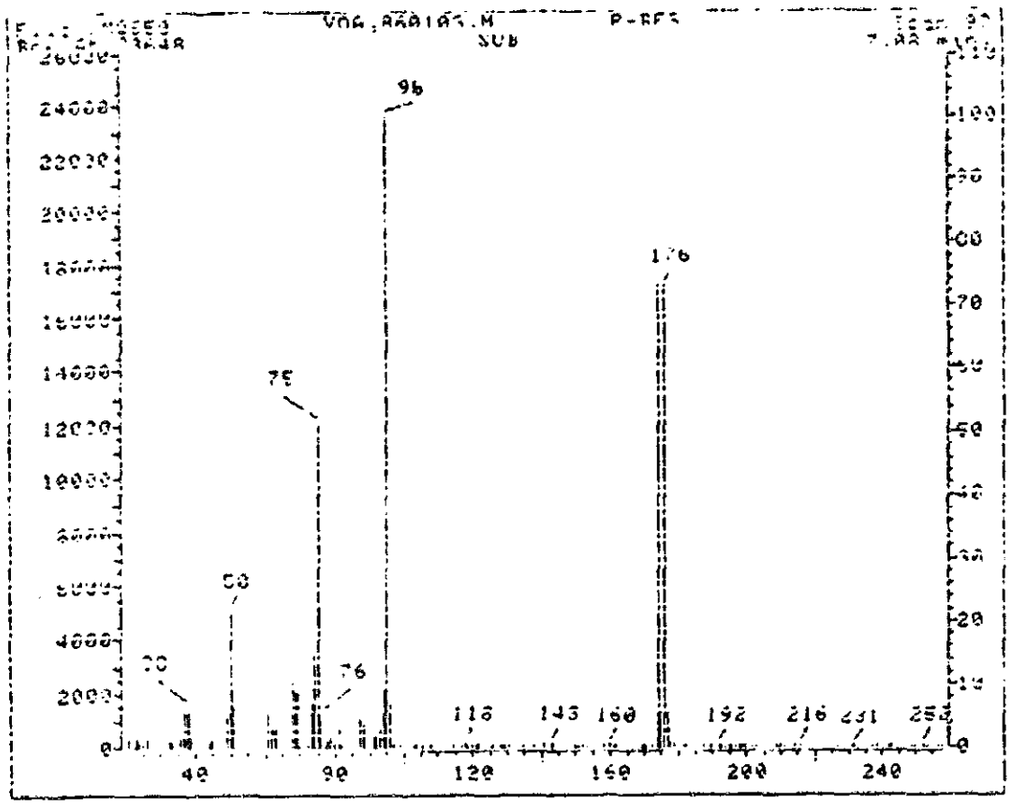

TABLE 2: METHOD PERFORMANCE DATA (QR21)

GC/MS Tuning Data - Bromofluorobenzene (BFB) for Volatiles Analysis

m/z	Ion Abundance Criteria	% Relative Abundance Base Peak	% Relative Abundance Appropriate Peak	Status
50	15-40% of mass 95	21.56	21.56	Ok
75	30-60% of mass 95	51.15	51.15	Ok
95	Base peak, 100% relative abundance	100.00	100.00	Ok
96	5-9% of mass 95	7.39	7.39	Ok
173	Less than 1% of mass 95	0.00	0.00	Ok
174	Greater than 50% of mass 95	23.03	23.03	Ok
175	5-9% of mass 174	5.59	7.66	Ok
176	95-101% of mass 174	23.02	100.05	Ok
177	5-9% of mass 176	5.98	8.18	Ok

Injection Date: 01/03/86 Analyst: [signature]
Injection Time: 09:03 Processor: P.R. [signature]
Run No: >M0550 WC Batch: G64206
Spectrum No: 97 Samples: K8171, K8173, K8484, ~~K8471~~ K4174, ~~K8472~~, K8173

1/6/86

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Heterogeneous Samples (except for Mercury analysis)

Samples are analyzed in batches of 30 or less. For batches in which the sample matrices are heterogeneous, the QC program is a minimum of 35% and consists of analyzing:

- 3 sets of triplicate analyses;
- 2 Replicate spikes;
- 1 Replicate independent reference standards;
- 4 Calibration standards (processed using the sample preparation method);
- 1 Procedural Blank;
- 4 Calibration standards (without sample preparation); and
- 1 Reagent Blank.

Analysis of Mercury

To analyze samples for mercury we group them by matrix in batches of 30 or less. Our QC program is a minimum of 30% and consists of analyzing:

- each of the 30 customer samples in duplicate;
- 3 sets of triplicate anaylses;
- 2 Replicate spikes;
- 2 Replicate independent reference standards;
- 10 Calibration standards (processed using the sample preparation method); and
- 2 Procedural Blanks.

Analysis of Pesticides, Herbicides and PCB's by Gas Chromatography

Pesticide, herbicide and PCB samples are grouped in batches of 16 customer samples or less according to the type of analysis to be performed. The QC program for each of these three types of analyses is a minimum of 20% and consists of analyzing:

- 1 procedural blank sample(a reagent blank is analyzed in the case of non-water matrices);
- 1 spiked blank sample (the spiked blank is eliminated in the case of non-water matrices);
- 1 replicate sample;
- 1 replicate spiked sample; and
- 1 known refernece QC sample for at least each 100 samples analyzed.

The instrument is calibrated each run with three standards, and checked every 10 samples.

Analysis of Cyanides, Phenols, Fluoride, Chloride, Nitrate and Nitrite

- All parameters are analyzed using a Technicon Autoanalyzer II GT.
- 3 calibration standards are analyzed at the beginning and end of each batch.

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- Each batch (up to 80 samples) consists of analyzing one blank, one spiked blank, one duplicate and spiked sample every 20 samples, and an EPA known reference sample.

Analysis of Total Organic Carbon (TOC)

TOC samples are analyzed on a daily basis with the number of samples analyzed per day dependent on the request for duplicate or quadruplicate analyses. The quality control program is designed to maintain the appropriate amount of QC and consists of the following elements:

- Daily instrument calibration
- One blank
- Standard recalibration every 10 samples
- Spiked samples at a low and high level
- Every sample is run in duplicate at a minimum

Analysis of Total Organic Halide (TOX)

- Blank reagent water for absolute carbon backround must contain less than 5 ug/l of halide (as chloride).
- Using a trichlorophenol standard, the mean adsorption efficiency must be within +/- 15% of the standard value.
- Calibration standards are run every 10 samples.
- Every sample is run in duplicate at a minimum.

Analysis of 2,3,7,8-TCDD (Dioxin) by GC/MS (SIM)

- Each sample is dosed with a known quantity of $^{13}C_{12}$-2,3,7,8-TCDD as internal standard and $^{37}Cl_4$-TCDD as surogate standard. The action limits for surrogate standard results is +/- 40% of the true value. Samples showing surrogate standard results outside of these limits are reextracted and reanalyzed.
- Two laboratory "method blanks" are run along with each set of 24 or fewer samples. The method blank is also dosed with the internal standard and surrrogate standard.
- At least one per set of 24 samples is run in duplicate to determine intralaboratory precision.
- Qualitative Requirements. The following are met in order to confirm the presence of native 2,3,7,8-TCDD:

  a. Isomer specificity must be demonstrated initially and verified once per 8-hour work shift. The verification consists of injecting a mixture containing TCDD isomers which elute close to 2,3,7,8-TCDD. The 2,3,7,8-TCDD must be separated from interferring isomers, with no more than 25% valley relative to the 2,3,7,8-TCDD peak.

  b. The 320/322 ratio is within the range of 0.67 to 0.87.

  c. Ions 320, 322, and 257 are all present and maximize together the signal to mean noise ratio must be 2.5 to 1 or better for all 3 ions.

  d. The retention time is equal (within 3 seconds) the retention time for the isotopically labeled 2,3,7,8-TCDD.

  e. At least one of the positives can be confirmed by obtaining partial scan spectra from mass 150 to mass 350. The partial scan guidelines are as follows:

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. the 320/324 ratio should be 1.58 +/- 0.16

. the 257/259 ratio should be 1.03 +/- 0.10

. the 194/196 ratio should be 1.54 +/- 0.15

- One sample is spiked with native 2,3,7,8-TCDD at a level of 1.0 PPB (for soil) for each set of 24 or fewer samples.
- In cases where no native 2,3,7,8-TCDD is detected, the actual detection limit is estimated and reported based on a signal to noise ratio of 2.5 to 1 at ions 320 and 322.
- For each sample, the internal standard is present with at least a 10 to 1 signal to noise ratio for both mass 332 and mass 334. Also, the internal standard 332/334 ratio must be within the range of 0.67 to 0.87.

Subcontractor QA/QC

Each subcontractoer is required to maintain an appropriate level of quality control. To insure this, each subcontractor is required to submit to ETC the quality control data for all analyses it performs. This data is kept on file at ETC. In general, the amount of quality control required is one duplicate sample with one spiked sample for every ten analyses.

Chain-of-Custody

The chain-of-custody procedure is part of our quality assurance protocol. We believe our chain-of-custody record fully complies with the legal requirements of federal, state and local government agencies and of the courts of law. The record covers:

- labeling of sample bottles, packing the Sample Shuttle and transferring the Shuttle under seal to the custody of a shipper;
- outgoing shipping manifests;
- the chain-of-custody form completed by the person(s) breaking the Shuttle seal, taking the sample, resealing the Shuttle and transferring custody to a shipper;
- incoming shipping manifests;
- breaking the Shuttle's reseal;
- storing each labeled sample bottle in a secured area;
- disposition of each sample to an analyst or technician; and
- the use of the sample in each bottle in a testing procedure appropriate to the intended purpose of the sample.

The records show for each link in this process:

- the person with custody; and
- the time and date each person accepted or relinquished custody.

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Appendix A

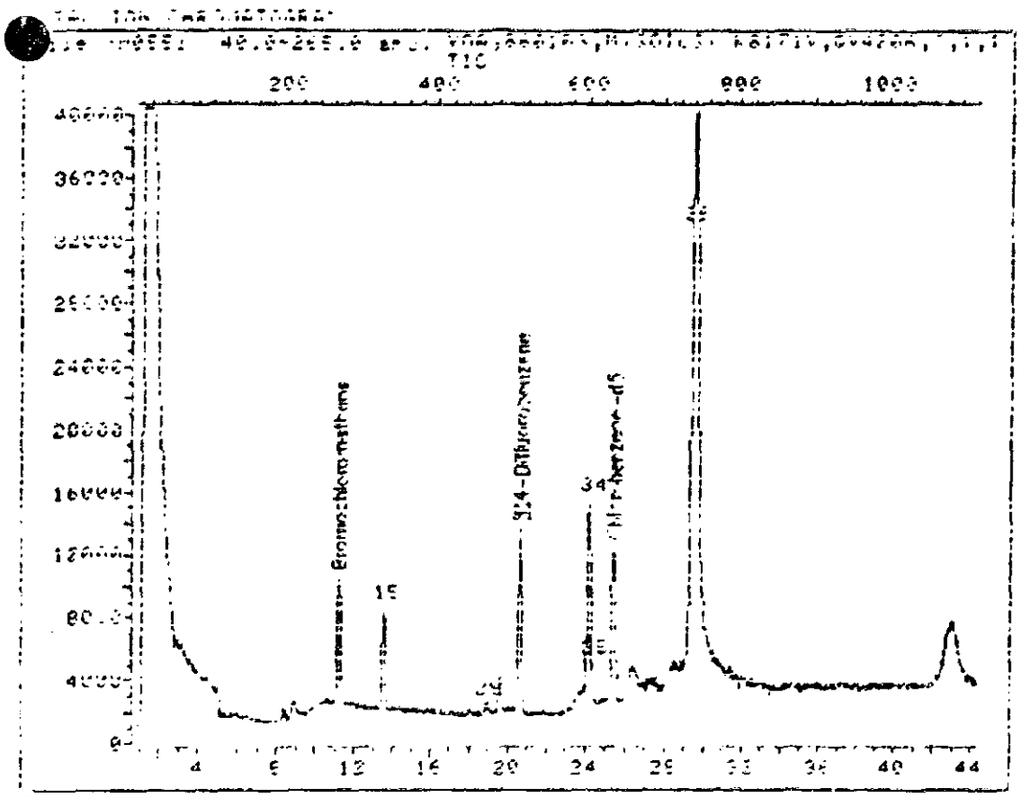
Mass Spectral Data for Quantitated Compounds

1) A total ion chromatogram for each sample analyzed by a GC/MS instrument.

2) A Quant. report used by the analyst to determine qualitative and quantitative results of the compounds present.

3) A mass spectrum and a reference spectrum for each priority pollutant compound detected in the sample.

002219



Data File: [illegible]
Name: [illegible]
Misc: [illegible]

Id File: [illegible]
Title: [illegible]
Last Calibration: [illegible]

Operator ID: [illegible]
Start Time: [illegible]
Injected at: [illegible]

002220

QUANT REPORT

Operator ID: 054717
Output File: ^M0551::A0
Data File: ^M0551::03
Name: UNA,860103,M(SOILS)
Misc: K81 [illegible]

Quant Rev: 4 Quant Time: 860103 10:25
Injected at: 860103 09:40
Dilution Factor: 1.00

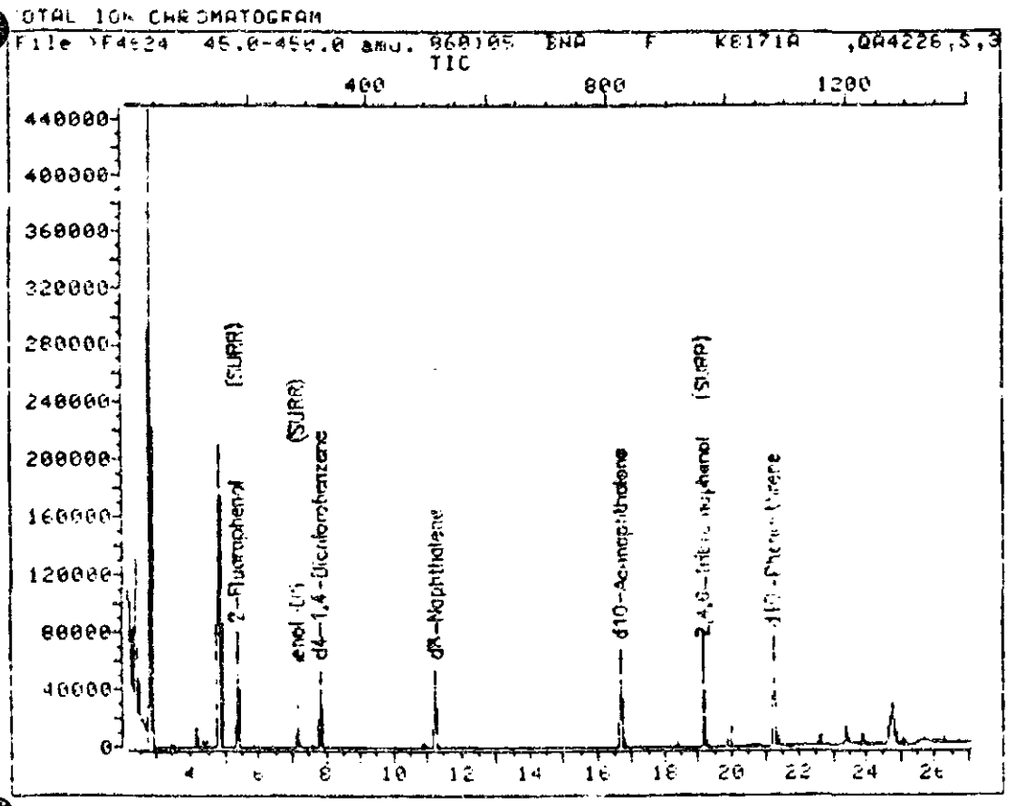
ID File: MUL[illegible]::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*Bromochloromethane		11.23	268	14903	250.00	NG	9[illegible]
15)	1,2-Dichloroethane-D4	(SURR)	13.[illegible]9	[illegible]29	1[illegible]	~~[illegible]~~	~~NG~~ ~~[illegible]~~	~~[illegible]~~
1[illegible])	*1,4-Difluorobenzene		20.65	511	56[illegible]4	250.00	NG 204.14	9[illegible]
~~28)~~	~~bis(Chloromethyl)ether~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~NG~~	1[illegible]
30)	*Chlorobenzene-d5		25.42	634	39431	250.00	NG	9[illegible]
~~31)~~	~~2-Chloroethylvinyl ether~~		~~20.69~~	~~512~~	~~16[illegible]~~	~~155.56~~	~~NG~~	1[illegible]
34)	Toluene-D8	(SURR)	24.21	603	58581	193.85	NG	9[illegible]
~~[illegible]~~	~~[illegible]~~		~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~NG~~	~~[illegible]~~
38)	p-Bromofluorobenzene	(SURR)	29.45	738	37648	222.95	NG	95

* Compound is ISTD

PM

002221



Data File: >F4624::U3
Name: 860105 BNA F
Misc: K8171A ,QA4226,5,30.00,1

BTL#29

Id File: FHCID::US
Title: PF ACID IDFILE...INST. F
Last Calibration: 860106 11:33

Operator ID: JH2180
Quant Time: 860106 14:34
Injected at: 860106 11:55

002222

QUANT REPORT

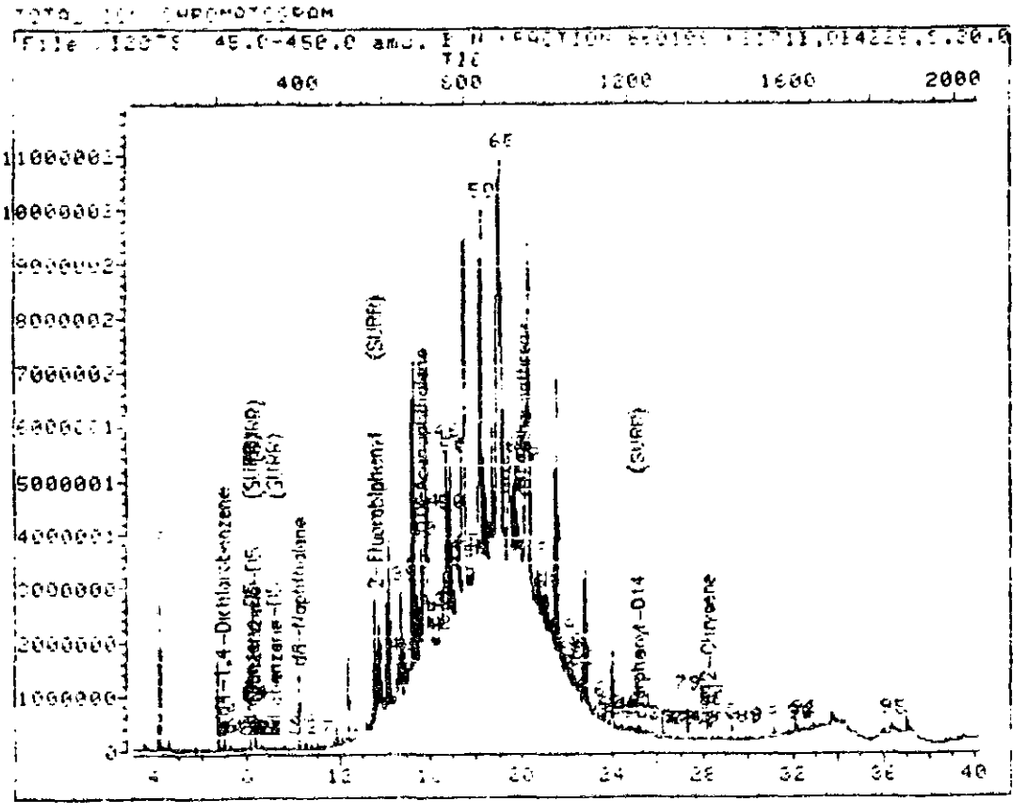
Operator ID: JH2180 Quant Rev: 4 Quant Time: 860106 14:34
Output File: ^F4624::AQ Injected at: 860106 11:55
Data File: >F4624::U3 Dilution Factor: 1.00
Name: 860105 BNH F
Misc: KS1714 ,QH4228,5,30.00,1 BTL#29

ID File: FACID::US
Title: PF/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

	Compound		R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene		7.81	319	32136	40.00	UG/ML	9
3)	2-Fluorophenol	(SURR)	5.31	178	43069	83.65	UG/ML	9
9)	Phenol-D5	(SURR)	7.14	261	43151	74.86	UG/ML	9
10)	*d8-Naphthalene		11.23	512	73075	40.00	UG/ML	9
18)	*d10-Acenaphthalene		16.65	818	44220	40.00	UG/ML	9
24)	*d10-Phenanthrene		21.22	1079	107339	40.00	UG/ML	9
25)	2,4,6-Tribromophenol	(SURR)	19.14	958	37723	99.06	UG/ML	9

* Compound is ISTD

00223



Data File: >I2078::US
Name: B/N FRACTION 860108
Misc: K8171B,QB4228,S.30.00,1

BTL#48

Id File: IBNF::US
Title: B/N+PEST ID FILE .... FOR I 850326
Last Calibration: 860109 18:45

Operator ID: KV0786
Quant Time: 860110 18:49
Injected at: 860110 18:01

002224

Operator [illegible]

Operator ID [illegible] Quant Rev. [illegible] Quant time [illegible]
Output File [illegible] Injected at [illegible]
Data file [illegible] US Dilution Factor 1.00
Name: [illegible] 860106
[illegible] Events

[illegible]
Title B/N-PEST LD FILE FOR I 850326
[illegible]

	Compound		R.T.	Scan#	Area	Conc	Units	Q
1)	1,4-Dichlorobenzene		6.91	213	120547	[illegible]	UG/ML	[illegible]
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	UG/ML	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		
7)	1,3-Dichlorobenzene		6.94	215	[illegible]	[illegible]	UG/ML	
8)	1,4-Dichlorobenzene		6.94	215	3195	[illegible]	UG/ML	
9)	1,2-Dichlorobenzene		6.94	215	[illegible]	[illegible]	UG/ML	
[illegible]	[illegible]	[illegible]	[illegible]	284	[illegible]	[illegible]	UG/ML	
13)	Nitrobenzene-D5	(SURR)	9.27	270	351661	[illegible]	UG/ML	
13)	Nitrobenzene-D5	(SURR)	9.19	340	20[illegible]	[illegible]	UG/ML	
14)	Bis(2-chloroisopropyl)ether		9.73	214	9857	[illegible]	UG/ML	
14)	Bis(2-chloroisopropyl)ether		7.16	227	5783	[illegible]	UG/ML	
[illegible]	[illegible]		8.29	290	5971	[illegible]		
17)	[illegible]		10.20	376	[illegible]	[illegible]		
20)	[illegible]	(SURR)	[illegible]	[illegible]	[illegible]	[illegible]	UG/ML	
21)	N-Nitrosodipropylamine		8.29	290	87373	[illegible]	UG/ML	
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]		
23)	Nitrobenzene		8.20	285	1150	[illegible]	UG/ML	
24)	Isophorone		8.64	309	36389	1.78	UG/ML	83
[illegible]	[illegible]		[illegible]	[illegible]	[illegible]	[illegible]	UG/ML	
[illegible]	2-Nitrotoluene		8.92	325	2165	[illegible]	UG/ML	70
[illegible]	[illegible]		9.01	330	2012	[illegible]	UG/ML	[illegible]
[illegible]	m-Nitrotoluene		11.06	445	1667	[illegible]	UG/ML	55
[illegible]	[illegible]		10.11	391	6440	[illegible]	UG/ML	
30)	Naphthalene		10.25	379	130894	4.[illegible]	UG/ML	95
34)	d10-Acenaphthalene		15.58	695	1107070	40.00	UG/ML	92
35)	Acenaphthylene		14.76	646	5564	[illegible]	UG/ML	[illegible]
38)	2,6-Dinitrotoluene		14.64	640	57754	[illegible]	UG/ML	[illegible]
40)	2,6-Dinitrotoluene		15.33	681	73457	[illegible]	UG/ML	60
40)	2,6-Dinitrotoluene		15.58	675	152242	[illegible]	UG/ML	[illegible]
41)	Acenaphthene		14.95	660	7787	[illegible]	UG/ML	[illegible]
42)	Acenaphthene		15.96	716	27240	[illegible]	UG/ML	[illegible]
42)	Acenaphthene		16.25	732	10232	[illegible]	UG/ML	[illegible]
44)	2,4-Dinitrotoluene		15.76	705	10804	[illegible]	UG/ML	[illegible]
44)	2,4-Dinitrotoluene		16.30	735	21482	[illegible]	UG/ML	21
44)	2,4-Dinitrotoluene		17.24	787	13566	[illegible]	UG/ML	[illegible]
45)	Diethyl phthalate		17.26	788	61309	[illegible]	UG/ML	[illegible]
45)	Diethyl phthalate		17.44	798	17876	[illegible]	UG/ML	[illegible]
45)	Diethyl phthalate		17.87	822	23398	[illegible]	UG/ML	65
46)	Fluorene		16.64	754	5339	[illegible]	UG/ML	70
50)	N-Nitrosodiphenylamine		16.82	764	5660	[illegible]	UG/ML	[illegible]
50)	N-Nitrosodiphenylamine		16.90	768	23910	[illegible]	UG/ML	
50)	N-Nitrosodiphenylamine		18.14	[illegible]	450249	[illegible]	UG/ML	51
51)	1,2-Diphenylhydrazine		16.90	768	52765	[illegible]	UG/ML	70
51)	1,2-Diphenylhydrazine		16.99	773	8385	[illegible]	UG/ML	60
55)	d10-Phenanthrene		20.12	947	1353809	40.00	UG/ML	70
57)	Phenanthrene		20.20	951	115354	4.20	UG/ML	86
58)	Anthracene		20.20	951	115354	[illegible]	UG/ML	84
59)	Di-n-butyl phthalate		21.06	1032	[illegible]	[illegible]	UG/ML	[illegible]

C0225

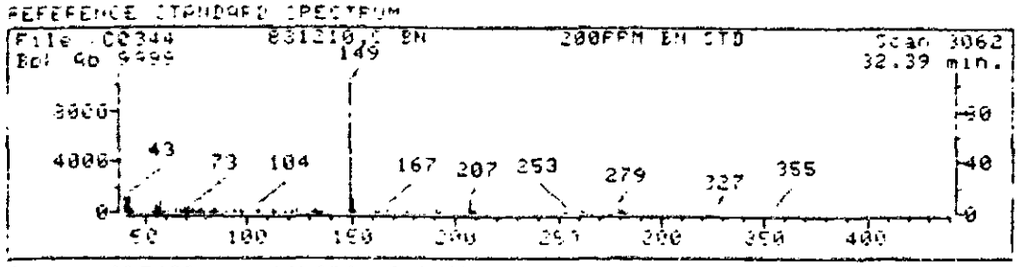
[illegible]	[illegible] Dibutyl Phthalate	[illegible]	1065	64576	[illegible] UG/ML	65
[illegible]	[illegible] anthene	24.81	1151	2200	[illegible] UG/ML	[illegible]
[illegible]	[illegible]	24.46	[illegible]	[illegible]	[illegible] UG/ML	[illegible]
[illegible]	1,1'-Biphenyl	24.85	1207	3203	[illegible] UG/ML	75
[illegible]	[illegible]	[illegible]	1143	14[illegible]	[illegible] UG/ML	[illegible]
[illegible]	Benzidine	23.11	1165	1717	[illegible] UG/ML	100
[illegible]	Benzidine	25.14	1225	4427	[illegible] UG/ML	100
[illegible]	Pyrene	[illegible]	1151	2200	[illegible] UG/ML	[illegible]
[illegible]	Pyrene	24.46	1167	[illegible]	[illegible] UG/ML	[illegible]
[illegible]	Pyrene	24.85	1207	3208	[illegible] UG/ML	[illegible]
[illegible]	Alpha-BHC	19.51	912	45183	[illegible] UG/ML	[illegible]
[illegible]	Alpha-BHC	17.73	975	10750	[illegible] UG/ML	53
[illegible]	Beta-BHC	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	Beta-BHC	17.51	710	50460	12.15 UG/ML	[illegible]
66)	Gamma-BHC	17.75	925	15090	3.60 UG/ML	[illegible]
66)	Gamma-BHC	19.62	800	2482	[illegible] UG/ML	[illegible]
[illegible]	[illegible]	19.51	[illegible]	50653	[illegible] UG/ML	[illegible]
[illegible]	Delta-BHC	[illegible]	[illegible]	[illegible]	[illegible] UG/ML	[illegible]
67)	Delta-BHC	[illegible]	718	25301	[illegible] UG/ML	[illegible]
67)	Delta-BHC	21.13	1003	1217	.27 UG/ML	[illegible]
68)	Heptachlor	21.22	1008	6597	1.46 UG/ML	[illegible]
[illegible]	Heptachlor	21.03	997	5511	1.15 UG/ML	[illegible]
68)	Heptachlor	[illegible]	[illegible]	3994	[illegible] UG/ML	[illegible]
70)	*Aldrin-Dieldrin	22.54	1081	3663	1.17 UG/ML	[illegible]
[illegible]	Endosulfan I	25.20	1276	103005	40.00 UG/ML	[illegible]
79)	Endosulfan II	25.41	1290	[illegible]	[illegible] UG/ML	[illegible]
[illegible]	[illegible]	26.82	1318	101	5.50 UG/ML	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] UG/ML	[illegible]
79)	Endrin aldehyde	[illegible]	12[illegible]	5277	[illegible] UG/ML	[illegible]
79)	Endrin aldehyde	27.16	1337	4076	3.07 UG/ML	54
[illegible]	4,4'-DDT	27.27	1344	14090	11.12 UG/ML	37
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible] UG/ML	[illegible]
82)	Methoxychlor	[illegible]	1360	15[illegible]	[illegible] UG/ML	[illegible]
[illegible]	Benzo(b)fluoranthene (50.0%)	22.14	1225	18409	15.70 UG/ML	93
[illegible]	[illegible]	23.30	1166	2352	[illegible] UG/ML	[illegible]
[illegible]	2,6-Dichlorobenzidine	[illegible]	1400	[illegible]	[illegible] UG/ML	[illegible]
88)	Bis(2-Ethylhexyl)Phthalate	28.26	1397	1151	[illegible] UG/ML	74
[illegible]	Bis(2-Ethylhexyl)phthalate	[illegible]	1330	16[illegible]	[illegible] UG/ML	46
88)	Bis(2-Ethylhexyl)phthalate	28.75	1420	[illegible]	[illegible] UG/ML	45
[illegible]	Di-n-octyl phthalate	28.63	1414	84677	[illegible] UG/ML	76
[illegible]	Di-n-octyl phthalate	29.51	1460	33108	[illegible] UG/ML	[illegible]
[illegible]	Di-n-octyl phthalate	30.02	1475	14727	2.73 UG/ML	94
90)	Benzo(b)fluoranthene	[illegible]	1527	72752	[illegible] UG/ML	[illegible]
[illegible]	Benzo(k)fluoranthene	22.19	1615	1300	[illegible] UG/ML	[illegible]
91)	Benzo(k)fluoranthene	22.19	1615	1300	24 UG/ML	68
[illegible]	Benzo(a)pyrene	22.39	1626	6835	4.60 UG/ML	[illegible]
92)	Benzo(a)pyrene	22.19	1615	1300	[illegible] UG/ML	[illegible]
[illegible]	Benzo(ghi)perylene	22.39	1626	6835	[illegible] UG/ML	[illegible]
[illegible]	Benzo(ghi)perylene	36.35	1847	3656	[illegible] UG/ML	[illegible]

* Compound is ISTD

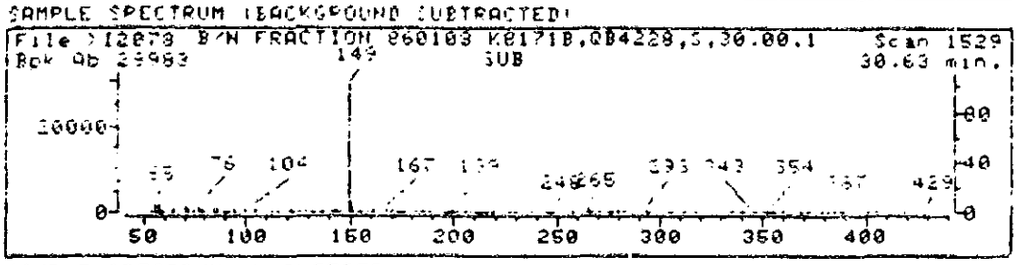
NO PCB's Found.

00226

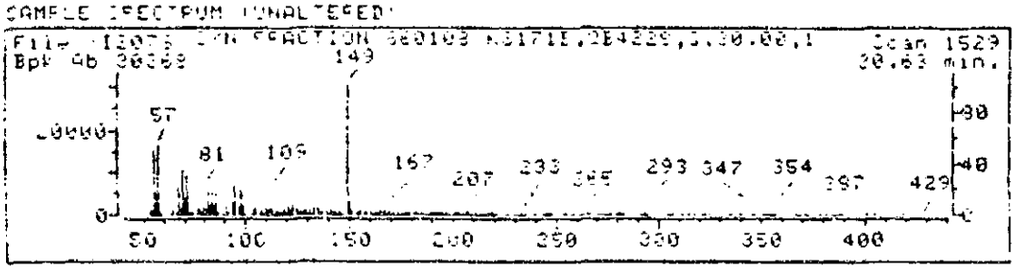
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



SAMPLE SPECTRUM (UNALTERED)



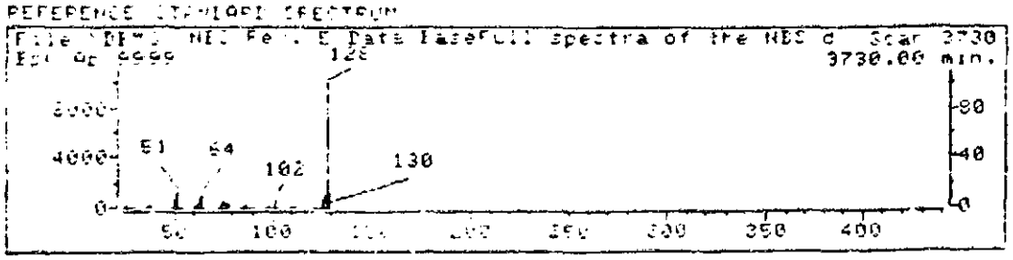
Data File: 12078::L5
Name: B/N FRACTION 860103
Misc: K8171B,QB4228,5,30.00,1
Quant Time: 860110 15:45
Injected at: 860110 18:01

Compound No: 99
Compound Name: Di-n-octyl phthalate
Scan Number: 1529
Retention Time: 30.63 min.
Area: 72953
Concentration: 13.54 UG/ML
q-value: 98

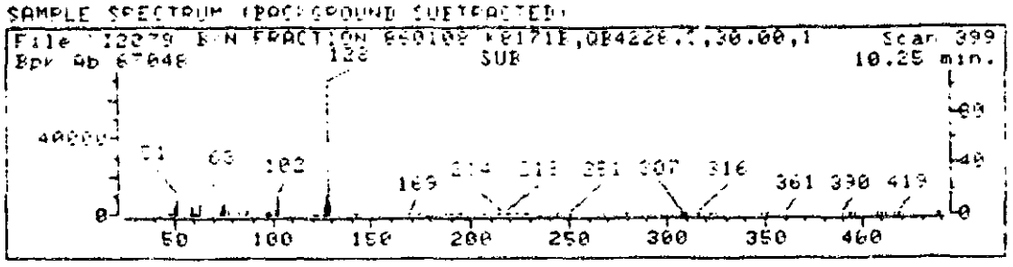
STL#48

002227

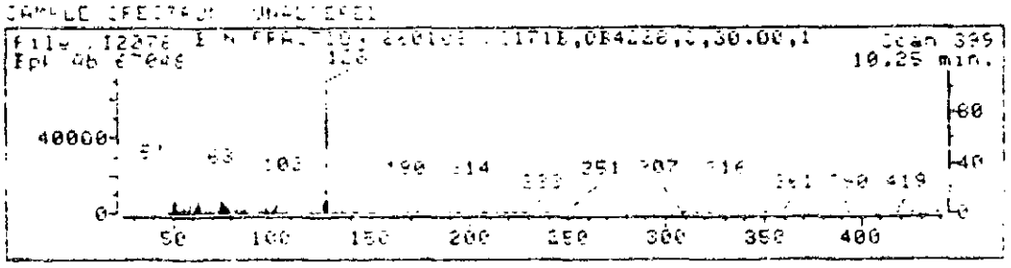
REFERENCE STANDARD SPECTRUM



SAMPLE SPECTRUM (BACKGROUND SUBTRACTED)



SAMPLE SPECTRUM UNALTERED



Data File: 12078::U5
Name: B/N FRACTION 860109
Misc: K8171B,QB4228,3,30.00,1
Quant Time: 860110 18:49
Injected at: 860110 18:01

BTL#48

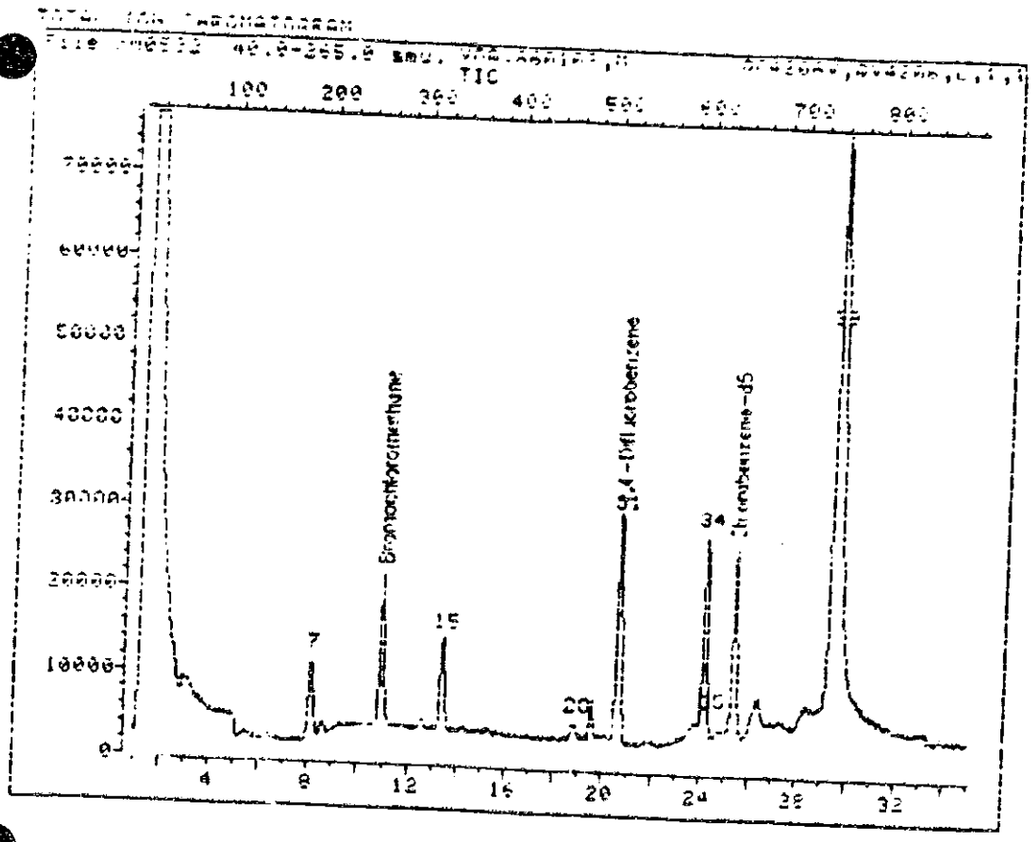
Compound No: 30
Compound Name: Naphthalene
Scan Number: 399
Retention Time: 10.25 min.
Area: 130894
Concentration: 4.04 UG/ML
q-value: 95

002228

Appendix C1

GC/MS Subsidiary Data

002229



Data File: [illegible]
Name: VUA,860102,M
Misc: [illegible] BLANK

Id File: MVUA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

Operator ID: DS4712
Quant Time: 860102 19:08
Injected at: 860102 19:09

002230

QUANT REPORT

Operator ID: 054212
Output File: ^MP532::AQ
Data File: ^MP532::03
Name: VOA,860102,M
Misc: [illegible],S,1,1, [illegible]

Quant Rev: 4
Quant Time: [illegible]
Injected at: 860102 15:09
Dilution Factor: 1.00

ID File: MVOA::US
Title: Volatile Priority Pollutant ID FILE
Last Calibration: 860102 19:03

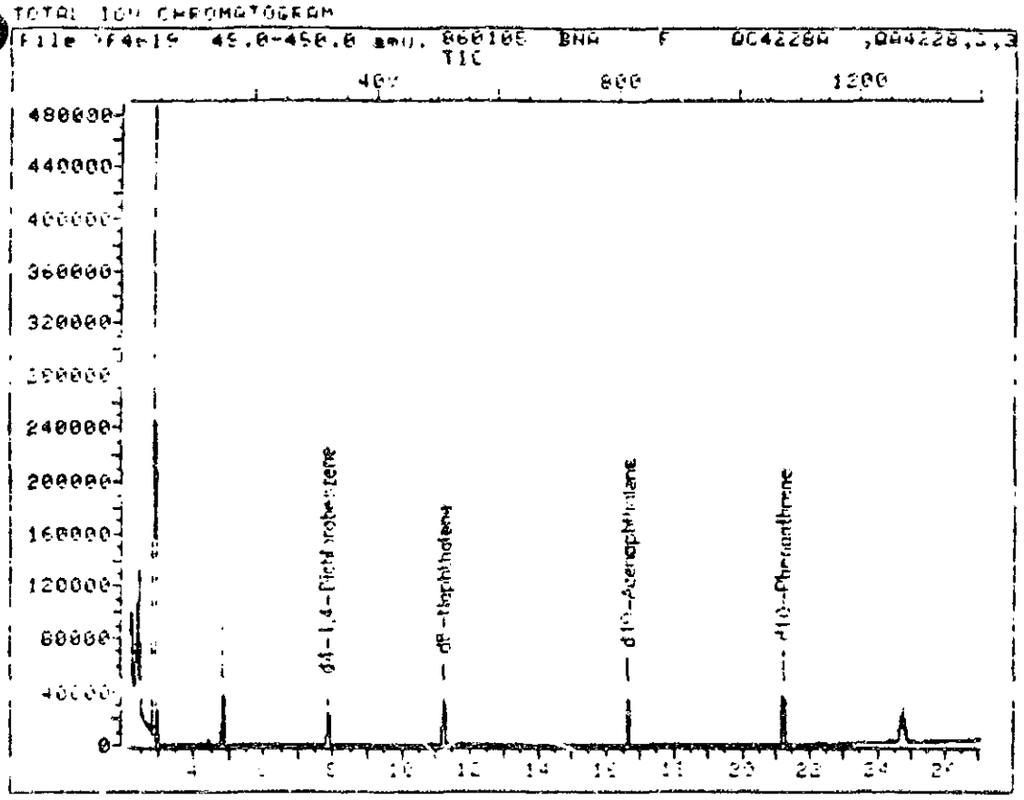
	Compound		R.T.	Scan#	Area	Conc	Units	
1)	*Bromochloromethane		10.96	263	34271	250.00	NG	[illegible]
2)	Methylene chloride		8.09	149	29651	64.46	NG	[illegible]
15)	1,2-Dichloroethane-D4	(SURR)	13.40	326	23094	159.77	NG	[illegible]
17)	*1,4-Difluorobenzene		20.61	512	132062	250.00	NG	[illegible]
28)	~~bis(Chloromethyl)ether~~		~~18.83~~	~~466~~	~~9096~~	~~184.75~~	~~NG~~	1[illegible]
30)	*Chlorobenzene-d5		25.38	635	87605	250.00	NG	[illegible]
31)	~~2-Chloroethylvinyl ether~~		~~20.65~~	~~513~~	~~34798~~	~~159.42~~	~~NG~~	1[illegible]
34)	Toluene-D8	(SURR)	24.18	604	108741	161.97	NG	99
35)	~~Toluene~~		~~24.37~~	~~609~~	~~2228~~	~~2.95~~	~~NG~~	96
38)	p-Bromofluorobenzene	(SURR)	29.[illegible]	738	62448	166.46	NG	99

* Compound is ISTD

PMM

002231

TOTAL ION CHROMATOGRAM



Data File: >F4619::U3
Name: 860106 BNA F
Misc: DC4228W ,QH4228,3,30.00,1

BTL#2-

Id File: FACID::U5
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

Operator ID: JH2180
Quant Time: 860106 14:02
Injected at: 860106 08:40

002232

QUANT REPORT

Operator ID: JH2160 Quant Rev: 4 Quant Time: 860106 14:02
Output File: F4619::AQ Injected at: 860106 08:40
Data File: >F4619::U3 Dilution Factor: 1.00
Name: 860105 BNA F
Misc: QC4223A ,CA4223,[illegible] STD#[illegible]

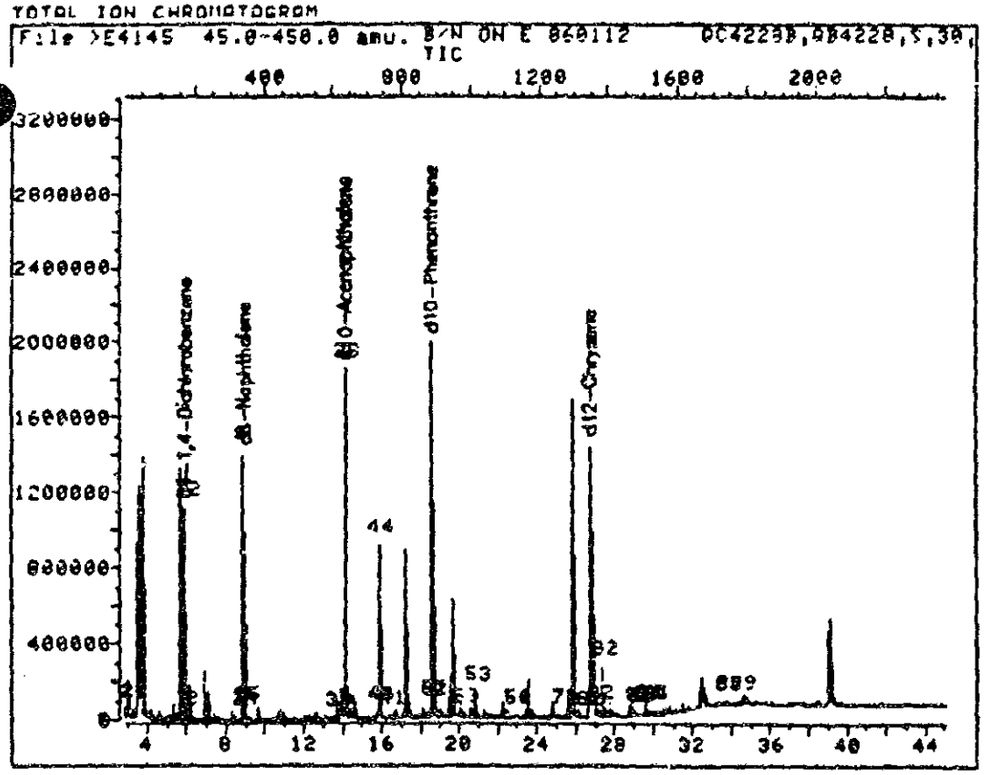
ID File: FACID::US
Title: PP/ACID IDFILE...INST. F
Last Calibration: 860106 11:33

	Compound	R.T.	Scan#	Area	Conc	Units	c
1)	*d4-1,4-Dichlorobenzene	7.80	319	33041	40.00	UG/ML	8
10)	*d8-Naphthalene	11.22	512	74465	40.00	UG/ML	4
18)	*d10-Acenaphthalene	16.63	617	45053	40.00	UG/ML	9
24)	*d10-Phenanthrene	21.21	1075	99903	40.00	UG/ML	9

* Compound is ISTD

002233

TOTAL ION CHROMATOGRAM



Data File: >E4145::US
Name: B/N ON E 860112
Misc: QC42288,QB4228,S,30,1

BTL# 6

Id File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 850326
Last Calibration: 860113 11:36

Operator ID: WW9928
Quant Time: 860113 11:38
Injected at: 860113 03:14

002234

QUANT REPORT

Operator ID: WW9928
Output File: ^E4145::AQ
Data File: >E4145::U5
Name: B/N ON E 860112
Misc: QC4228B,QB4228,S,30,1

Quant Rev: 5
Quant Time: 860113 11:38
Injected at: 860113 03:14
Dilution Factor: 1.00

BTL# 6

ID File: EBNP::US
Title: B/N+PEST ID FILE .... FOR E 850326
Last Calibration: 860113 11:36

	Compound	R.T.	Scan#	Area	Conc	Units	q
1)	*d4-1,4-Dichlorobenzene	5.85	169	368447	40.00	UG/ML	99
2)	~~N-Nitrosodimethylamine~~	~~2.93~~	~~4~~	~~2426~~	~~474.52~~	~~UG/ML~~	100
3)	~~Benzyl alcohol~~	~~6.26~~	~~192~~	~~8613~~	~~.51~~	~~UG/ML~~	87
12)	~~bis(2-Chloroisopropyl)ether~~	~~5.89~~	~~189~~	~~13740~~	~~5.07~~	~~UG/ML~~	90
17)	*d8-Naphthalene	8.88	340	1775324	40.00	UG/ML	
~~24)~~	~~1,2,4-Trichlorobenzene~~	~~8.81~~	~~336~~	~~3674~~	~~.28~~	~~UG/ML~~	
~~25)~~	~~Naphthalene~~	~~8.93~~	~~343~~	~~4807~~	~~.13~~	~~UG/ML~~	
29)	*d10-Acenaphthalene	14.09	634	1378682	40.00	UG/ML	
~~33)~~	~~Dimethyl phthalate~~	~~13.61~~	~~607~~	~~3385~~	~~.09~~	~~UG/ML~~	
~~35)~~	~~2,6-Dinitrotoluene~~	~~14.09~~	~~634~~	~~243961~~	~~6.17~~	~~UG/ML~~	
~~40)~~	~~Diethyl phthalate~~	~~14.09~~	~~634~~	~~172607~~	~~16.52~~	~~UG/ML~~	
~~41)~~	~~Fluorene~~	~~15.79~~	~~730~~	~~22483~~	~~.97~~	~~UG/ML~~	
~~44)~~	~~N-Nitrosodiphenylamine~~	~~16.43~~	~~768~~	~~1269~~	~~.05~~	~~UG/ML~~	81
47)	*d10-Phenanthrene	18.55	885	2866028	40.00	UG/ML	90
~~51)~~	~~Phenanthrene~~	~~18.60~~	~~880~~	~~10194~~	~~.18~~	~~UG/ML~~	94
~~52)~~	~~Anthracene~~	~~18.60~~	~~880~~	~~10194~~	~~.18~~	~~UG/ML~~	92
~~53)~~	~~Di-n-butyl phthalate~~	~~20.23~~	~~980~~	~~9854~~	~~.16~~	~~UG/ML~~	92
~~53)~~	~~Di-n-butyl phthalate~~	~~20.84~~	~~1014~~	~~182206~~	~~2.99~~	~~UG/ML~~	87
~~54)~~	~~Fluoranthene~~	~~22.90~~	~~1130~~	~~3422~~	~~.06~~	~~UG/ML~~	93
~~56)~~	~~Pyrene~~	~~22.90~~	~~1130~~	~~3422~~	~~.06~~	~~UG/ML~~	93
64)	*d12-Chrysene	26.68	1343	1855287	40.00	UG/ML	100
~~78)~~	~~Butyl benzyl phthalate~~	~~25.35~~	~~1268~~	~~4469~~	~~.14~~	~~UG/ML~~	79
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~26.58~~	~~1337~~	~~1391~~	~~.03~~	~~UG/ML~~	94
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~27.15~~	~~1369~~	~~4589~~	~~.10~~	~~UG/ML~~	87
~~82)~~	~~bis(2-Ethylhexyl)phthalate~~	~~27.33~~	~~1379~~	~~234144~~	~~5.34~~	~~UG/ML~~	93
~~83)~~	~~Di-n-octyl phthalate~~	~~29.12~~	~~1480~~	~~7817~~	~~.14~~	~~UG/ML~~	94
~~83)~~	~~Di-n-octyl phthalate~~	~~29.41~~	~~1496~~	~~1286~~	~~.02~~	~~UG/ML~~	88
~~83)~~	~~Di-n-octyl phthalate~~	~~29.64~~	~~1509~~	~~4568~~	~~.08~~	~~UG/ML~~	80
~~84)~~	~~Benzo(b)fluoranthene~~	~~29.89~~	~~1523~~	~~3362~~	~~.10~~	~~UG/ML~~	82
~~85)~~	~~Benzo(k)fluoranthene~~	~~29.89~~	~~1523~~	~~3362~~	~~.11~~	~~UG/ML~~	81
~~86)~~	~~Benzo(a)pyrene~~	~~29.89~~	~~1523~~	~~3362~~	~~.11~~	~~UG/ML~~	82
~~87)~~	~~Indeno(1,2,3-c,d)pyrene~~	~~33.67~~	~~1735~~	~~8825~~	~~.29~~	~~UG/ML~~	92
~~88)~~	~~Dibenzo(a,h)anthracene~~	~~33.71~~	~~1737~~	~~2846~~	~~.31~~	~~UG/ML~~	91
~~89)~~	~~Benzo(ghi)perylene~~	~~33.67~~	~~1735~~	~~8025~~	~~.35~~	~~UG/ML~~	94
~~89)~~	~~Benzo(ghi)perylene~~	~~34.40~~	~~1776~~	~~8380~~	~~.33~~	~~UG/ML~~	92

* Compound is ISTD

NO PCB's Found.

DMS
1/16/86

002235

Appendix E

Chain-of Custody Forms

1) A field Chain-of-Custody form (CC1) is included for all samples shipped by ETC shuttle

2) An in-house sample Chain-of Custody form is included for all samples not shipped by ETC shuttle.

3) Any additional Chain-of-Custody material provided by a client or by a client's sampling agent is also included.

4) A subcontractor's Chain-of-Custody form is included for any analytical work not performed within ETC's laboratory.

5) Analysis and Extraction Custody forms are included for the period the sample was in ETC's possession.

002236

ETC ENVIRONMENTAL TESTING and CERTIFICATION

CHAIN OF CUSTODY FORM (CC1)

Seal No. 47285 ETC Job # K8171

Date Sealed 12-6-85 By: M. Schstadt

Company: RESOURCE ENGINEERING

Facility/Site:

Address: 3000 RICHMOND AVE
HOUSTON, TX 77098

Attn.: CHRIS ITIN

Phone: (713) 520-9900

SAMPLE IDENTIFICATION

Facility: RES218181-014 (Facility/Site Code) BACKGROUND SOIL COMPOSITE (Optional Sample Point Descriptions)

Sample Point: S - BS123 (Source Code (from below) / Your Sample Point ID (left justify)) 851218 (Start Date (YY/MM/DD)) (Start Time (2400 hr clock)) (Elapsed Hours (composite))

Source Codes

Well	(W)	Outfall	(O)	Bottom Sediment	(B)	Surface Impoundment	(I)	Leachate Collection Sys.	(C)	Other	(X)
Soil	(S)	River/Stream	(R)	Generation Point	(G)	Treatment Facility	(T)	Lake/Ocean	(L)	Specify	

SHUTTLE CONTENTS

BOTTLE No	Type	Size	Preserv.	ANALYSIS	SAMPLER Fill (Y/N)	SAMPLER Observations	LAB Observations
1	E	500mL	BAKED	EXTRACTABLE			✓
2	F	40mL	BAKED	VOA			✓
1	TB	40mL	Gc/ms H_2O	TRIP BLANK			TB-bub
				* TRIP BLANK OPENED			
				ACCIDENTLY ON-SITE			
				NO ADDITIONAL DISTILLED			
				WATER ADDED			

CHAIN OF CUSTODY CHRONICLE

1. Shuttle Opened By: (print) JOHN BINS Date: 12/9/85 Time: 6:30 PM
Signature: John Bins Seal #: 00477285 Intact: YES

2. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

3. I have received these materials in good condition from the above person.
Name: Signature:
Date: Time: Remarks:

4. Shuttle Sealed By: (print) JOHN BINS Date: 12/19/85 Time: 5:30 PM
Signature: John Bins Seal #: 00477286 Intact: YES

ETC USE ONLY Opened By: R. Rivera Date: 12/20/85 Time: 11:00
Seal #: 47286 Condition: INTACT

002237

ETC ENVIRONMENTAL TESTING and CERTIFICATION

FIELD PARAMETER FORM (CC2)

ETC JOB # K8171

Sample Point S (Source Code) BS123 (Sample Point I.D.)

FIELD PROCEDURES

PURGE DATE (YY MM DD) | START PURGE (2400 Hr Clock) | ELAPSED HRS | WATER VOL. IN CASING (Gallons) | VOLUME PURGED (Gallons)

SAMPLING METHOD: TROWEL

Sampler Type: A-Submersible Pump, B-ISCO, C-Bladder Pump, D-Dipper/Bottle, E-Bailer, F-Scoop/Shovel — X-Other _____ (SPECIFY OTHER)

Sampler Material: A-Teflon, B-Metal, C-PVC, D-Plastic — X-Other _____ (SPECIFY OTHER)

Tubing Material: A-Teflon, B-Tygon, C-Polyethylene, D-Silicon — X-Other _____ (SPECIFY OTHER)

Sample Composited: YAN — EQUAL VOLUME COMPOSITE OF RET BS1, BS2, BS3a & BS3b (Procedure/Proportions)

FIELD MEASUREMENTS

Well Elevation (ft/msl) | Well Depth (ft)

Depth to Ground water (ft) | Sample Depth (non-well) (ft)

Groundwater Elevation (ft msl)

002238

1st	ph (STD)	1st	spec. cond.	umhos at 25°C	(other parameter)	value	units
2nd	ph (STD)	2nd	spec. cond.	umhos at 25°C	(other parameter)	value	units
3rd	ph (STD)	3rd	spec. cond.	umhos at 25°C	(other parameter)	value	units
4th	ph (STD)	4th	spec. cond.	umhos at 25°C	(other parameter)	value	units

Sample Temp (°C) | Turbidity NTU

FIELD COMMENTS

Sample Appearance: _____

Weather Conditions: _____

Other: _____

FILTERING: Use Chain of Custody (CC1) to indicate which bottles were filtered

Sampler: JOHN BINS (Print) Employer: RESOURCE ENGINEERING

I certify that sampling procedures were in accordance with applicable EPA state and corporate protocols

12/19/85 - John Bins

(Date) (Signature)

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/2/86 SHIFT
FRACTION VOA
INSTRUMENT M
TUNE FILE APCI02
SEQUENCE FILE DZM
METHOD FILE VOAM
ID FILE MVOA
ANALYST(S) Denise Sun
Brenda Hopkins
SUPERVISOR
BATCH #'s BV4206

STANDARD	CONC PPM	LOT NO.	LOT VOL (ml)
pBFB	50	12151	1
ISTD	25	12066	10
Surrog	25	12019	10
ABC/SGWA	18	12141	5,10,30
o,m,p chlorotoluene	18	11852	5,10,30

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	1/2/86
WIP		BY	DMJ

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
p-BFB	7M0531	1µl			100003	OK 13:37	
QC4206V	7M0532					OK 15:09 PLSVIP	✓
QC4206VS	7M0533					5µl ABC/SGWA, use [illegible]	
QC4206VS	7M0534					10	
QC4206VS	7M0535				18:09	30	
p-BFB	7M0536				19:13	OK	
K8557VS	7M0537	1.0g				NG splashes no metal	
K8557V	7M0538					OK	
K8558V	7M0539					NG re-run 1/100	
K8558VR	7M0540			1/100 methanol		NG re-run 1/100	35,36
K8559V	7M0541					NG re-run 1/100	
K8171V	7M0542					NG rerun composites	
K8173V	7M0543					NG	
K8174V	7M0544					OK	
K8175V	7M0545					OK	
K8176V	7M0546					OK	
(R) K8557VS	7M0547					OK	
QC4206VS	7M0548	1.0g				OK 07:06	
p-BFB	7M0549	1µl				NG	
p-BFB	7M0550	1µl				OK 09:03	
(R) K8171V	7M0551	1.0g				OK	
(R) K8173VR	7M0552	1.0g				OK	
K8484V	7M0553	1.0g				OK	
K8471V	7M0554					OK	
K4174V	7M0555					OK PLSVIP	✓

ETC FORM #102

002237

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/3/86 SHIFT
FRACTION VOA (Soils)
INSTRUMENT M
TUNE FILE APEI02
SEQUENCE FILE DSM
METHOD FILE VOAM
ID FILE MVOA
ANALYST(S) [signature]

SUPERVISOR [signature]
BATCH #'s QV4206

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Refer to pg. 1 of 2			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8470V	>M0556	1g			1.0008	OK	
(R) K8173V	>M0557	1g				Ng leached	
QC4206V	>M0558					OK	
(R) K8173V	>M0559	1g				OK	

ETC FORM #102

002240

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
* ~~K4174~~	~~12865~~	~~29.95~~			~~PP/ORG/PST/PCB~~ RESOXHLET AT 3.0 gram MG 12/30
+ J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485	↓	29.27	1.0	1.0	↓
K8171	12847	30.00	1.0	1.0	PP/ORG/PST/PCB CMPD/BN
* ~~K8172~~		~~30.01~~			RESOXHLET AT 3.0 grams MG 12/30
K8173		30.00	1.0	1.0	
K8174		30.01	1.0	1.0	
K8175		29.95	1.0	1.0	
K8176	↓	28.15	1.0	1.0	↓
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		BN+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208	↓	30.10	1.0		↓ ↓
QC 4228			1.0	1.0	
~~K8173~~ ~~K8173~~ S		22.72	1.0	1.0	
K8174 R		~~20.38~~ 24.84	1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

1-2 PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/87

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

002241

COMMENTS

Log 12847 Cmpd/BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

*K4174 } RESOXHLET AT 3.0 grams. MG 12/30
*K8172 }

+ F.V 5.0 ml a 1 ml Aliquot was packaged

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 ug/ml	12,098
ACID	1.0	100 ug/ml	11,825
Aroclor 1260	1.0	100 ug/ml	12,097
Pest	1.0	100/200 ug/ml	12,059
Spec #930 BN Spike	1.0	100 ug/ml	12,137
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ug/ml ACID: 100 ug/ml	12,093

Set-up: L.M. Zak 12/28/85 J. Vajda 12-27-85 UPD/Supervisor: Marc Quaglia 1/2/88

BN Conc.: Judie C 12/27/85 Acid Conc.: L.M. Zak 12/28/85 Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC FORM 9110

ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/5/86 SHIFT
FRACTION Acid; BNA
INSTRUMENT F
TUNE FILE MTF001
SEQUENCE FILE JHF
METHOD FILE AcidF; BNPF
ID FILE FAcid; FBNA
ANALYST(S) J Hendell
SUPERVISOR
BATCH #'s QC4159, QA4228

STANDARD	CONC PPM	LOT NO.	LOT VOL.
Int Std	400	12,008	100 ul
B/N Cal std I		12,110	1 ml
B/N Cal std II		12,111	↓
B/N Cal std III		11,906	↓
Acid cal std I		12,020	↓
Acid cal std II		12,021	↓
Acid cal std III		12,022	↓
Spec #930	60	12,140	↓
Spec #930	100	12,139	↓
Spec #930	300	12,138	↓
DFTPP	25	11,972	↓

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACO	JH 1/5	DATE	1/6
WIP		BY	

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP-60ng std.	>F4595					OK	
B/N Cal std III	F4596		1				
B/N Cal std II	F4597		2				
B/N Cal std I	F4598		3				
Acid cal std III	F4599		4				
Acid cal std II	F4600		5				
Acid cal std I	F4601		6				
Spec #930; 300ppm	F4602		7				
Spec #930; 100ppm	F4603		8				
Spec #930; 60ppm	F4604		9				
DFTPP-50ng std.	F4605		10			OK	
K8322CS	F4606		11				
QC4159C	F4607		12			BN HS Act1	Y
K8323C	F4608		13			BN HS Act1	Y
K8323CR	F4609		14				
K8320C	F4610		15			BN HS Act1	Y
K8322C	F4611		16			Act1	Y
K8321C	F4612		17			Act1	Y
K8325C	F4613		18			Act1	Y
K8324C	F4614		19			Act1	Y
GPC BLANK	F4615		20				
K8173AS	F4616		21				
DFTPP-50ng std.	F4617		22			OK	
Acid cal std II	F4618		23			CBCHK-OK	
QC4228A	F4619		24				

ETC FORM #102

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE _____
METHOD FILE _____
ID FILE _____
ANALYST(S) J-Hewlle-RW
SUPERVISOR [signature]
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174A	>F4620		25				
K8174AR	F4621		26				
K8173A	F4622		27				
K8175A ~~K8176A~~	F4623		28				
K8171A	F4624		29				
J8439A	F4625		30				
K8176A	F4626		31				
K8484A	F4627		32				
K8485A	F4628		33				

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ETC FORM 8102

TESTING and CERTIFICATION

LABORATORY CHRONICLE Sample Preparation Department

Sample Number	Log Link	Sample Weight (gm)	Extract Vol. (ml) BN	Extract Vol. (ml) ACID	Comments
* ~~K4174~~	~~12865~~	~~29.95~~			~~PP/ORG/PST/PCB~~ RESOXHLET AT 3.0 gram MG 12/30
J8439	12825	30.02	5.0	1.0	
K8484	12847	29.51	1.0	1.0	
K8485	↓	29.27	1.0	1.0	
K8171	12847	30.00	1.0	1.0	PP/ORG/PST/PCB CMPD/BN
* ~~K8172~~		~~30.01~~			RESOXHLET AT 3.0 gram MG 12/30
K8173		30.00	1.0	1.0	
K8174	✓	30.01	1.0	1.0	
K8175	✓	29.95	1.0	1.0	
K8176	↓	28.15	1.0	1.0	
K3246	11759	30.60	1.0		PP/BN
J2204	12890	31.01	1.0		Bn+15
J2205		30.16	1.0		
J2206		30.79	1.0		
J2207		30.24	1.0		
J2208	↓	30.10	1.0		
QC 4228			1.0	1.0	
~~K8173~~ K8173 S		22.72	1.0	1.0	
K8174 R		~~20.38~~ 24.84	D.V. 12/27 1.0	1.0	

QC Batch # 4228

Analysis PP/ACID

1-2 PP/BN

Matrix Soil

Turnaround Normal

Date 12/24/85

Extraction Method:

Sep. Funnel

Continuous

Soxhlet ✓

Other

COMMENTS

Log 12847 Cmpd/BN:
Benzyl Aldehyde
Benzoic Acid
Catechol (O-Hydroxybenzene)
- Spec Sheet #930
Benzyl Alcohol

*K4174 } RESOXHLET AT 3.0 gram. MG 12/30
*K8172 }

+ F.V 5.0 ml a 1 ml Aliquot was packaged

MT 8501

FRACTION	SPIKE Amt (ml)	Conc.	Lot #
BN	1.0	100 ug/ml	12,098
ACID	1.0	100 ug/ml	11,825
Aroclor 1260	1.0	100 ug/ml	12,097
Pest	1.0	100/200 ug/ml	12,059
Spec #930 Spike	1.0	100 ug/ml	12,137
Semi-VOA			

SURROGATE Amt. (ml)	Conc.	Lot #
1.0	BN: 50 ug/ml ACID: 100 ug/ml	12,093

Set-up: L.M. Zak 12/24/85 J. Vajda 12-27-85 UPD/Supervisor: Marc Quaglia 1/2/86

BN Conc.: Gustav C 12/30/85 Acid Conc.: L.M. Zak 12/30/85 Spike/Surr. Verified: Mina Gandhi 12/27/85

ETC FORM 8110

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE 1/8/86 SHIFT
FRACTION B/N
INSTRUMENT "I"
TUNE FILE MTI001
SEQUENCE FILE MBI
METHOD FILE BNPI
ID FILE IBNP, ISPPJ*
ANALYST(S) M Barkley

SUPERVISOR Pearl Traub
BATCH #'s QB4228, QP0002, QP0007

*ID File for QC P0002 and QCP0007.
(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	Jan. 9th 1986
WIP		BY	KV

STANDARD	CONC PPM	LOT NO.	LOT VOL.
INT STD	400	12008	
DFTPP	25	11972	
BN IV	150	12113	
BN III	200	11906	
BN II	100	12111	
BN I	60	12110	
HSLPP/BN III	300	11837	
" II	100	11838	
I	30	11839	
SPEC. ~~903~~ 930 III	300	12138	
930 II	100	12139	
930 I	60	12140	
o,m,p-nitrotoluene III	500	11244	
II	~~100~~ 300	11245	
I	100	11246	

to ISPPJ, CB-file: SRISPJ M5, M6, M7, M8.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
DFTPP-50ng	>I2031		1	OW		-Lowered EMV ↓ to 1600.	
BN IV - 150ppm	>I2032		2		I00373		
BN III - 200ppm	>I2033		3				
BN II - 100ppm	>I2034		4			AR1260	
BN I - 60ppm	>I2035		5				
HSLPP/BN - 300ppm	>I2036		6				
HSLPP/BN - 100ppm	>I2037		7		for 2-Methylnaphthalene in ISPPJ ID File.		
HSLPP/BN - 30ppm	>I2038		8				
SPEC. 930 - 300ppm	>I2039		9				
SPEC. 930 - ~~300~~ 100ppm	>I2040		10				
SPEC. 930 - 60ppm	>I2041		11				
o,m,p-nitrotoluene 500ppm	>I2042		12		↓		
o,m,p-nitrotoluene 300ppm	>I2043		13		I00374		
o,m,p-nitrotoluene 100ppm	>I2044		14				
DFTPP-50ng	>I2045		15	OW			
QC4183B	>I2046		16			QB4183	
QCP0002B	>I2047		17				
QCP0002BS	>I2048		18				
Lt. #2-3	>I2049		19			Lt. #2-3	
QCP0007B	>I2050		20				
QCP0007BS	>I2051		21		"		
Lt. #1	>I2052		22				
QCP0007B1	>I2053		23			QC1	
K4572B	>I2054		24	X10		QB4241	
K4583B	>I2055		25	X10	↓	QB4241	

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
ACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE _____
METHOD FILE _____
ID FILE _____
ANALYST(S) _____
SUPERVISOR _____
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K4585B	>I2056		26	X20	I00374	QB4241	
K4585BS	>I2057		27	X20		QB4241	
DFTPP-50ng	>I2058		28				
BN II - 100ppm	>I2059		29				
K7562B	>I2060		30	X5	I00375	QB4243	
K7559B	>I2061		31	X5		QB4243	
K7561B	>I2062		32	X5		QB4243	
K7551B	>I2063		33			QB4242	
K7553B	>I2064		34				
K7554B	>I2065		35				
K7545B	>I2066		36				
K7544B	>I2067		37				
K7550B	>I2068		38				
K7557B	>I2069		39				
K7556B	>I2070		40				
DFTPP-50ng	>I2071		41				
BN II - 100ppm	>I2072		42				
QC4228B	>I2073		43			PCB5CR	PB
K8173BS	>I2074		44			AR1260	
J8439B	>I2075		45			PCB5CR	
K8484B	>I2076		46				
K8485B	>I2077		47		I00376		
K8171B	>I2078		48				
K8173B	>I2079		49				
K8174B	>I2080		50				

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ETC ENVIRONMENTAL TESTING and CERTIFICATION

LABORATORY CHRONICLE: GC-MS Department

DATE _____ SHIFT _____
FRACTION _____
INSTRUMENT _____
TUNE FILE _____
SEQUENCE FILE see 1
METHOD FILE _____
ID FILE _____
ANALYST(S) M Barkly

SUPERVISOR Pearl Trant
BATCH #'s _____

(PLEASE INITIAL)

CURRENT CS05 STATUS		STANDARDS UPDATED	
ACQ		DATE	
WIP		BY	

STANDARD	CONC PPM	LOT NO.	LOT VOL.
see page 1			

NAME	DATA FILE	uL INJ	ALS #	DIL	TAPE #	SPECIALS (WRITE A-TYPE)	PLUS Y/N
K8174BR	>I2081		51		I00376	pcB55R	
K8175B	>I2082		52				
K8176B	>I2083		53				
DFTPP-50ng	>I2084		54				
BN II - 100ppm	>I2085		55				
K3246B	>I2086		56				
J2204B	>I2087		57				PB
J2205B	>I2088		58				
J2206B	>I2089		59				
J2207B	>I2090		60				
J2208B	>I2091		61				

ETC FORM #102

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APPENDIX 3C

MACRAY EQUILLIBRIUM MODEL CALCULATIONS

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MACKAY EQUILIBRIUM MODEL

The purpose of Mackay's equilibrium model is to use the physical characteristics of a substance to predict ultimate accumulation profiles in different environmental media. The environment comprises several compartments, each of which are assumed to be homogeneous and in dynamic equilibrium. Once at equilibrium, the fugacity or the escaping tendency of each chemical substance is equal within each compartment which enables one to calculate the concentration of each chemical substance within each compartment based on the substance's physical characteristics.

A convenient property of fugacity is that it is usually linearly related to concentration at low concentrations that normally apply to environmental contaminants. Thus, the fugacity-concentration relationship is

$$C = Fz$$

$$C_1/C_2 = Z_1/Z_2 = K_{12}$$

Where: C is concentration [mol/m^3]

f is fugacity [Pa]

Z is fugacity capacity [$mol\text{-}m^3/Pa$]

K_{12} is partition coefficient [dimensionless]

Once the relationship of concentration and fugacity capacity has been establish, the fugacity capacity of any chemical substance of interest needs to be calculated within each compartment of the environmental model.

The level I the Mackay Equilibrium Model is the simplest one in that equilibrium assumed to exist between the varoius median compartments. The major assumptions are that interphase transport rates are infinitely fast and that steady state conditions exist with no degredation reactions occurring. Only three to five compartments are allowable for the model to be somewhat accurate. The chosen compartments are air, water, soils, sediments, and biota.

Due to the assumption of low concentration, the fugacity capacity of air, i.e., Z_a, can be found from the ideal gas law as follows:

$$C = n/V = P/RT = f/RT = fZ_a$$

Where: $Z_a = 1/RT = 4.04 \times 10^{-4}$ [mol/m^{3}Pa]

f = P in the gas phase of low concentration

n = number of modes [mol]

V = Volume [m^3]

P = Pressure [Pa]

T = Temperature [K^3]

R = ideal gas constant 8.31 $\left[\frac{\text{Pa-m}^3/\text{mol-K}}{\text{mol K}}\right]$

Similarly, the rest of the heat capacities can be proven to have the following relationship:

$$Z\ (\text{water}) = Zw = 1/H \text{ or } C^s/p^s$$

$$\left.\begin{array}{l} Z\ (\text{soil}) = Z_s \\ Z\ (\text{sediment}) = Z_s \end{array}\right\rangle = K_{sw}\rho_s/H$$

$$Z\ (\text{biota}) = Z_f = K_{fw}\text{-}\rho_f/H$$

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Where:

C^s = aqueous solubility [mol/m^3]

p^s = vapor pressure [Pa]

H = Henney's law constant [Pa m^3/mol]

K_{sw} = Partition coefficient [l/kg]

ρ_s = soil density [Kg/l]

K_{fw} = bioconcentration factor [l/kg]

ρ_f = biota density [Kg/l]

Once the fugacity capacities of each chemical according to its physical properties have been calculated in each compartment, the environmental model is chosen, namely the volume proportion of each compartment, according to the location of the site.

In the case of Sheridan, the site is located in a rural area where the volume of each compartment is typically:

Air	6.0×10^9 [m^3]
Water	1×10^5 [m^3]
Soil	1.35×10^5 [m^3]
Sediment	5.0×10^3 [m^3]
Biota	0.1 [m^3]

Since the purpose of the model in this case is to show the relative concentration of the existing chemicals on a percentage basis, the mole sum of chemicals is chosen as 100; therefore:

$$M = \sum m_i = \sum c_i V_i = \sum f_i z_i V_i = f \sum z_i V_i$$

$$f = M / \sum z_i V_i$$

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Mackay Equilibrium Model Calculation

CHLOROFORM

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.916365
WATER	100000	0.00349	349	1.439E-07	0.0143856
SOIL	135000	0.012	1620	4.946E-07	0.0667758
SEDIMENT	5000	0.012	60	4.946E-07	0.0024732
BIOTA	0.1	0.013	0.0013	5.359E-07	5.359E-08
TOTAL			2426029		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

CHLOROFORM

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.916365
WATER	100000	0.00349	349	1.439E-07	0.0143856
SOIL	135000	0.012	1620	4.946E-07	0.0667758
SEDIMENT	5000	0.012	60	4.946E-07	0.0024732
BIOTA	0.1	0.013	0.0013	5.359E-07	5.359E-08
TOTAL			2426029		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

TETRACHLOROETHYLENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.915214
WATER	100000	0.00038	38	1.566E-08	0.0015663
SOIL	135000	0.0149	2011.5	6.142E-07	0.0829123
SEDIMENT	5000	0.00149	7.45	6.142E-08	0.0003071
BIOTA	0.1	0.0118	0.00118	4.864E-07	4.864E-08
TOTAL			2426057		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

TETRACHLOROETHYLENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.915214
WATER	100000	0.00038	38	1.566E-08	0.0015663
SOIL	135000	0.0149	2011.5	6.142E-07	0.0829123
SEDIMENT	5000	0.00149	7.45	6.142E-08	0.0003071
BIOTA	0.1	0.0118	0.00118	4.864E-07	4.864E-08
TOTAL			2426057		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

TRICHLOROETHYLENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.917065
WATER	100000	0.00108	108	4.452E-08	0.0044518
SOIL	135000	0.0136	1836	5.606E-07	0.0756798
SEDIMENT	5000	0.0136	68	5.606E-07	0.002803
BIOTA	0.1	0.025	0.0025	1.03E-06	1.03E-07
TOTAL			2426012		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

TRICHLOROETHYLENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.917065
WATER	100000	0.00108	108	4.452E-08	0.0044518
SOIL	135000	0.0136	1836	5.606E-07	0.0756798
SEDIMENT	5000	0.0136	68	5.606E-07	0.002803
BIOTA	0.1	0.025	0.0025	1.03E-06	1.03E-07
TOTAL			2426012		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

BENZENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.900265
WATER	100000	0.0018	180	7.418E-08	0.0074183
SOIL	135000	0.016	2160	6.594E-07	0.08902
SEDIMENT	5000	0.016	80	6.594E-07	0.003297
BIOTA	0.1	0.00936	0.000936	3.858E-07	3.858E-08
TOTAL			2426420		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

BENZENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.665E-08	99.900265
WATER	100000	0.0018	180	7.418E-08	0.0074183
SOIL	135000	0.016	2160	6.594E-07	0.08902
SEDIMENT	5000	0.016	80	6.594E-07	0.003297
BIOTA	0.1	0.00936	0.000936	3.858E-07	3.858E-08
TOTAL			2426420		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

XYLENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.663E-08	99.78503
WATER	100000	0.0014	140	5.763E-08	0.0057632
SOIL	135000	0.0363	4900.5	1.494E-06	0.2017312
SEDIMENT	5000	0.0363	181.5	1.494E-06	0.0074715
BIOTA	0.1	0.9	0.09	3.705E-05	3.705E-06
TOTAL			2429222.1		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

XYLENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.663E-08	99.78503
WATER	100000	0.0014	140	5.763E-08	0.0057632
SOIL	135000	0.0363	4900.5	1.494E-06	0.2017312
SEDIMENT	5000	0.0363	181.5	1.494E-06	0.0074715
BIOTA	0.1	0.9	0.09	3.705E-05	3.705E-06
TOTAL			2429222.1		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

TOLUENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.662E-08	99.712217
WATER	100000	0.0015	150	6.17E-08	0.0061703
SOIL	135000	0.0489	6601.5	2.012E-06	0.2715554
SEDIMENT	5000	0.0489	244.5	2.012E-06	0.0100576
BIOTA	0.1	0.016	0.0016	6.582E-07	6.582E-08
TOTAL			2430996		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

TOLUENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.662E-08	99.712217
WATER	100000	0.0015	150	6.17E-08	0.0061703
SOIL	135000	0.0489	6601.5	2.012E-06	0.2715554
SEDIMENT	5000	0.0489	244.5	2.012E-06	0.0100576
BIOTA	0.1	0.016	0.0016	6.582E-07	6.582E-08
TOTAL			2430996		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

1,1,1,TRICHLOROETHANE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.661E-08	99.671708
WATER	100000	0.00844	844	3.47E-07	0.0347042
SOIL	135000	0.051	6885	2.097E-06	0.2831022
SEDIMENT	5000	0.051	255	2.097E-06	0.0104853
BIOTA	0.1	0.0422	0.00422	1.735E-06	1.735E-07
TOTAL			2431984		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

1,1,1,TRICHLOROETHANE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.661E-08	99.671708
WATER	100000	0.00844	844	3.47E-07	0.0347042
SOIL	135000	0.051	6885	2.097E-06	0.2831022
SEDIMENT	5000	0.051	255	2.097E-06	0.0104853
BIOTA	0.1	0.0422	0.00422	1.735E-06	1.735E-07
TOTAL			2431984		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

ETHYLBENZENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.649E-08	98.953598
WATER	100000	0.00153	153	6.246E-08	0.0062458
SOIL	135000	0.182	24570	7.43E-06	1.0030074
SEDIMENT	5000	0.182	910	7.43E-06	0.0371484
BIOTA	0.1	0.0576	0.00576	2.351E-06	2.351E-07
TOTAL			2449633		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

ETHYLBENZENE

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.649E-08	98.953598
WATER	100000	0.00153	153	6.246E-08	0.0062458
SOIL	135000	0.182	24570	7.43E-06	1.0030074
SEDIMENT	5000	0.182	910	7.43E-06	0.0371484
BIOTA	0.1	0.0576	0.00576	2.351E-06	2.351E-07
TOTAL			2449633		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

PHENOL

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	4.494E-09	26.963283
WATER	100000	21.7	2170000	0.0002414	24.137923
SOIL	135000	31.4	4239000	0.0003493	47.152376
SEDIMENT	5000	31.4	157000	0.0003493	1.7463843
BIOTA	0.1	30.4	3.04	0.0003382	3.382E-05
TOTAL			8990003		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

PHENOL

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	4.494E-09	26.963283
WATER	100000	21.7	2170000	0.0002414	24.137923
SOIL	135000	31.4	4239000	0.0003493	47.152376
SEDIMENT	5000	31.4	157000	0.0003493	1.7463843
BIOTA	0.1	30.4	3.04	0.0003382	3.382E-05
TOTAL			8990003		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

2,4 DICHLOROPHENOL

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.726E-09	10.356755
WATER	100000	3.59	359000	1.534E-05	1.5338593
SOIL	135000	147.3	19885500	0.0006294	84.962561
SEDIMENT	5000	147.3	736500	0.0006294	3.1467615
BIOTA	0.1	147.2	14.72	0.0006289	6.289E-05
TOTAL			23405015		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

2,4 DICHLOROPHENOL

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	1.726E-09	10.356755
WATER	100000	3.59	359000	1.534E-05	1.5338593
SOIL	135000	147.3	19885500	0.0006294	84.962561
SEDIMENT	5000	147.3	736500	0.0006294	3.1467615
BIOTA	0.1	147.2	14.72	0.0006289	6.289E-05
TOTAL			23405015		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

PCB

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	5.3E-10	3.1797247
WATER	100000	0.00922	922	1.209E-08	0.0012094
SOIL	135000	527.2	71172000	0.0006916	93.361125
SEDIMENT	5000	527.2	2636000	0.0006916	3.4578195
BIOTA	0.1	922	92.2	0.0012094	0.0001209
TOTAL			76233014		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

PCB

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	5.3E-10	3.1797247
WATER	100000	0.00922	922	1.209E-08	0.0012094
SOIL	135000	527.2	71172000	0.0006916	93.361125
SEDIMENT	5000	527.2	2635000	0.0006916	3.4578195
BIOTA	0.1	922	92.2	0.0012094	0.0001209
TOTAL			76233014		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

PNA

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	7.634E-14	0.000458
WATER	100000	6.367	636700	1.203E-09	0.0001203
SOIL	135000	3780000	5.103E+11	0.0007143	96.428014
SEDIMENT	5000	3780000	1.89E+10	0.0007143	3.5714079
BIOTA	0.1	100	10	1.89E-08	1.89E-09
TOTAL			5.292E+11		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

Mackay Equilibrium Model Calculation

PNA

	VOLUME V^ (cm)*	Z** (mol/cmPa)	VZ	CONC. (mol/cm)	AMOUNT (% Dis.)
AIR	6E+09	0.000404	2424000	7.634E-14	0.000458
WATER	100000	6.367	636700	1.203E-09	0.0001203
SOIL	135000	3780000	5.103E+11	0.0007143	96.428014
SEDIMENT	5000	3780000	1.89E+10	0.0007143	3.5714079
BIOTA	0.1	100	10	1.89E-08	1.89E-09
TOTAL			5.292E+11		100

^Volume is based on rural environment
*cm=cubic meter
**Z=Fugacity capacities
Pa=Pascal

APPENDIX 3D

SAMPLING AND ANALYSIS PLAN

002216

SAMPLING AND ANALYSIS PLAN

FOR

SHERIDAN DISPOSAL SERVICE FIELD ACTIVITIES

SUBMITTED TO THE

ENVIRONMENTAL PROTECTION AGENCY REGION VI

AND THE

TEXAS DEPARTMENT OF WATER RESOURCES

BY THE

SHERIDAN DISPOSAL SERVICE STEERING COMMITTEE

SEPTEMBER 1985

288-04

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1.0 INTRODUCTION

This document provides a sampling and analysis plan for field investigations to be conducted at the Sheridan Disposal Service site in the fall of 1985. The field sampling program will be conducted in accordance with the Quality Assurance Project Plan previously submitted to the EPA. The primary goal of this sampling program will be to further characterize the 40-acre water evaporation system, commonly referred to as a "landfarm". In addition, sediment samples will be taken to further characterize Clarke Lake. The data quality objectives of the sampling plan are to:

1) Define the extent and mobility of heavy metal soil contamination in the "evaporation system" area.

2) Determine the presence of priority organic pollutants in the evaporation system area.

3) Evaluate the presence of any contamination in the 3-acre test plot used for TDWR land application studies in late 1975.

4) Measure priority pollutants in Clarke Lake sediments.

The analytical data obtained will also support risk assessment studies of the environmental effects of alternate remedial action scenarios. Following is a discussion of existing analytical data on these two areas, a description of sample locations, sample collection procedures, and recordkeeping and report procedures.

182200

2.0 HISTORICAL BACKGROUND DATA

Sampling locations were chosen to be consistent with past sampling programs. This will maximize the comparability of data from different sources. Available analytical data for both the evaporation system and Clarke Lake were reviewed in detail and evaluated for their significance in future testing plans.

2.1 Evaporation System - The evaporation system was conceived as a method for disposing of lagoon wastewaters. In March of 1975, the Texas Water Quality Board (TWQB), a predecessor of the Texas Water Commission (TWC), initiated studies on the potential for biodegradation of the impounded wastewater. Batch tests indicated 30% of the COD was biodegradable within 48 hours after exposure to activated sludge from an industrial wastewater treatment plant. Based upon the apparent biodegradability of the wastewater, the TWQB developed permit restrictions which required Sheridan Disposal Service (SDS) to follow a procedure and schedule for dewatering the lagoon, as required, through approved "land irrigation methods" using surrounding farmland owned by the Sheridans. From October through December of 1975, approximately 100,000 gallons of lagoon wastewater were applied to a three-acre test plot to determine the feasibility of "land irrigation" as a disposal method for lagoon wastewater. The pilot study was

conducted with the close cooperation of TWQB personnel. According to a TWQB report, the test results indicated an adverse impact upon vegetation which was explained by TWQB personnel as resulting from elevated concentrations of inorganic salts in the soil, particularly chlorides.

SDS began operating the evaporation system on May 17, 1976. The system was referred to as an "evaporation/rapid infiltration method of flood irrigation". From 1976 through 1984, more than 40 million gallons of wastewater were transferred from the lagoon impoundment to the evaporation system.

Table 1 presents a summary of available lagoon wastewater and soil leachate analytical data from the files of the TWQB and TDWR. The data indicate that the lagoon wastewater was acidic, with elevated concentrations of dissolved inorganic salts and organics. The heavy metals of possible concern were zinc, chromium, and copper. The TDWR did not make a detailed analysis of specific organic constituents.

The additional data is from laboratory soil leachate testing of the test plot and evaporation system areas collected by TDWR. The procedures for obtaining soil samples and conducting leachate tests were not standardized and the analytical results may not be directly comparable. The data indicates as the total amount of wastewater applied to the test plot increased, the soil leachate increased in acidity, total dissolved solids, and Total Organic Carbon (TOC) concentrations.

002263

TABLE 1

TWQB "Landfarm" Analytical Data

(values in mg/l except pH which is in standard units)

Constituent	10/75 Lagoon Wastewater	9/76 Lagoon Wastewater	Soil Leachate					
			10/75 Background Soil	11/6/75 Test Plot	12/12/75 Test Plot	6/21/76* "Landfarm"	8/11/76* "Landfarm"	8/30/76* "Landfarm"
pH	6.3-6.4	6.2	7.2	7.0	6.5	7.4	7.8	7.8
TDS	10,800-21,310	23,000	234	822	368	1312	1345	1830
Cl-	4,400-4500	5,000	3.5	54	36	248	278	160
TOC	-	>6,400	18	32	75	183	393	183
COD	27,980-29,730	33,700						
Pb	0.12-0.60	0.088						
Zn	3.25-5.10	0.39						
Ni	0.25-0.50	0.19						
Cr	0.22-2.27	-						
Cu	1.26-2.99	0.23						
BOD		7,000						

*Arithmetic mean from the two sampling points

RESOURCE ENGINEERING

Table 2 presents an analysis of leachate from a "background" soil sampled from an unspecified location in the evaporation system area by the TWQB in November of 1976. Again, however the leachability procedures for the test were not discussed in detail and the sample represents only one data point, therefore these data may not be representative. As discussed in a later section, the next phase of sampling will include an additional background sample which is to be analyzed for heavy metal leachability by an approved method.

Table 3 presents an analysis of inorganic soil constituents for samples collected from the evaporation system and "background" locations by the EPA FIT team in July of 1983. The mean background levels are used for comparison purposes in evaluating the significance of landfarm data. Only total zinc levels of the landfarm soil were significantly above mean background. Total copper, nickel, and lead levels were within sampling and analytical variance ranges of the mean background values. All of the inorganic soil constituents decreased with depth except for iron and soil ammonia levels which increased slightly.

Tables 4 and 5 present soil and water quality data obtained by Resource Engineering during the Spring of 1984. Oil and grease (O&G) was chosen as a general indicator of organic contamination. In all cases O&G concentrations decreased with increasing sample depth. The mean total lead values in the areas tested were 62.8 mg/kg with 90% confidence limits of ± 84 mg/kg. Although this value is above the 15

TABLE 2

TWQB Analytical Data on Background Soil Leachate

11/12/76

Constituent	Concentration in Leachate (ug/l)
Cd	<10
Pb	<50
Ni	30
Zn	20
Ba	200
Cr	<20
Mg	100
Cu	10
Hg	0.55
Ca	70
Na	0.98

,02286

TABLE 3

EPA FIT Team Sampling Analysis July 1983

Soil Constituent	Concentrations (ppm_w) Evaporation System Surface MF 0053	Evaporation System 4" Depth MF0054	Mean Ambient Background*
Aluminum	7,000	5,630	33,000
Chromium	19	7	36
Barium	125	40	300
Beryllium	0.5	0.25	0.6
Cobalt	6.67	2.5	7
Copper	17.5	5	14
Iron	1040	5870	15,000
Nickel	20	8	13
Manganese	241	183	290
Zinc	149	15.5	36
Boron	10	-	32
Vanadium	20	-	46
Arsenic	2	1	5.4
Selenium	0.2	-	0.39
Cadmium	0.15	-	<1
Lead	15	3	14
Ammonia	30	35	-

* Western United States average as referenced by EPA FIT Team.

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TABLE 4
Evaporation System Soil Composition
(REI data May 1984)

Sample Location	Depth (in.)	Oil & Grease mg/kg	Lead mg/kg	Zinc mg/kg
1	0-18	4,000	103	107
2	0-18	2,000	55	81
3	0-18	1,000	70	63
4	0-18	4,900	66	77
5	0-18	4,100	68	110
6	0-18	600	62	81
7	0-18	1,000	62	66
Dike (Comp)	N/A	22,100	121	60
8	0-6	7,800	188	145
	6-12	3,000	81	57
9	0-6	7,200	60	103
	6-12	3,800	47	52
10	0-6	8,500	56	100
	6-12	2,700	48	46
11	0-6	6,600	21	81
	6-12	2,900	10	60
12	0-6	6,100	5	61
	6-12	3,400	7	55
Mean	-	-	62.8	78
Standard Deviation	-	-	42.6	25.2

See Figure 2 for sample locations.

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TABLE 5

Lagoon and Evaporation System Water Quality

(REI data July 1984)

Parameter (mg/l)*	Sample No. Lagoon	WS2 (introduction)	WS7 (mid-point)	WS4 (final)
pH	5.4	6.9	7.4	7.6
Oil and Grease	640	129	125	74
TOC	7,130	2,958	1,413	1,180
Phenolics	13.84	5.12	1.06	0.92
COD	12,918	6,013	1,790	2,957
BOD	5,210	2,769	794	1,072
Cl	3,194	723	1,050	1,078
SO_4	<5	<5	<5	<5
TKN	85	430	72	134
TSS	768	780	1,777	528
As	<.01	<.01	<.01	<.01
Ba	<0.5	<0.5	<0.5	<0.5
Cu	0.20	0.02	0.04	0.03
Zn	1.07	0.02	0.03	0.01
Cr	0.28	<0.01	<0.01	<0.01
Cd	<0.01	<0.01	<0.01	<0.01
Hg	<0.005	<0.005	<0.005	<0.005
Ni	.13	0.1	<0.01	<0.01
Ag	<0.01	<0.01	<0.01	0.11
Se	<0.01	<0.01	<0.01	<0.01

* pH given in standard units, all others in mg/l

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mg/kg determined by the EPA FIT team analysis, it is within the normal background concentration of 2 to 200 mg/kg of lead in soils.[1] The approximate background concentration of leachable lead in soils is 0.05 to 10 mg/kg[1].

Lead mobility in soils is favored by low cation exchange capacity, acidic conditions, low clay content, anaerobic soil conditions and low soil organic matter content. Landfarm soil analysis conducted in the Spring of 1984 indicates that the soil's cation exchange capacity is 52-58 meq/100 gm, and the pH is in the alkaline range of 8.3-8.7. Soil boring analyses have indicated the soils have a substantial clay content. Chloride levels range from 835 mg/kg to 1223 mg/kg which is a moderately high concentration. These soil properties values indicate unfavorable conditions for lead mobility.

The mean concentration of zinc found in the evaporation system soil was 78 mg/kg ± 49 mg/kg based upon 90% confidence intervals. This is lower than the 149 mg/kg found in a surface sample by the EPA FIT team. The approximate background concentration range of zinc in soils is 10 to 300 mg/kg[1]. The range of concentrations of water leachable zinc in soils is from 2 to 30 mg/kg[1]. Zinc mobility in soils is favored by high calcium and magnesium concentrations, fine clay-size particle content and high chloride ion content. The calcium and magnesium content in the soil is unknown while the

clay content would inhibit mobility, the chloride levels would favor mobility. Overall zinc appears to be more mobile than lead in these soil conditions.

Table 5 gives a summary of water quality data for wastewater from the lagoon and landfarm system collected in July of 1984. The data indicate that wastewater treatment was occurring through biodegradation and/or volatilization mechanisms.

Oil and grease, phenolics, TOC, COD and BOD concentration levels all decreased when traced from the lagoon to the final evaporation system holding cell. Heavy metals were found only in trace quantities and consisted of chromium, nickel, and silver. Additionally, eight soil samples from the evaporation system were analyzed for polychlorinated biphenyls and no detectable levels were found. The heavy metals of interest, based on past analytical data are lead, zinc, nickel, and chromium. This is consistent with the wastes handled at the site.

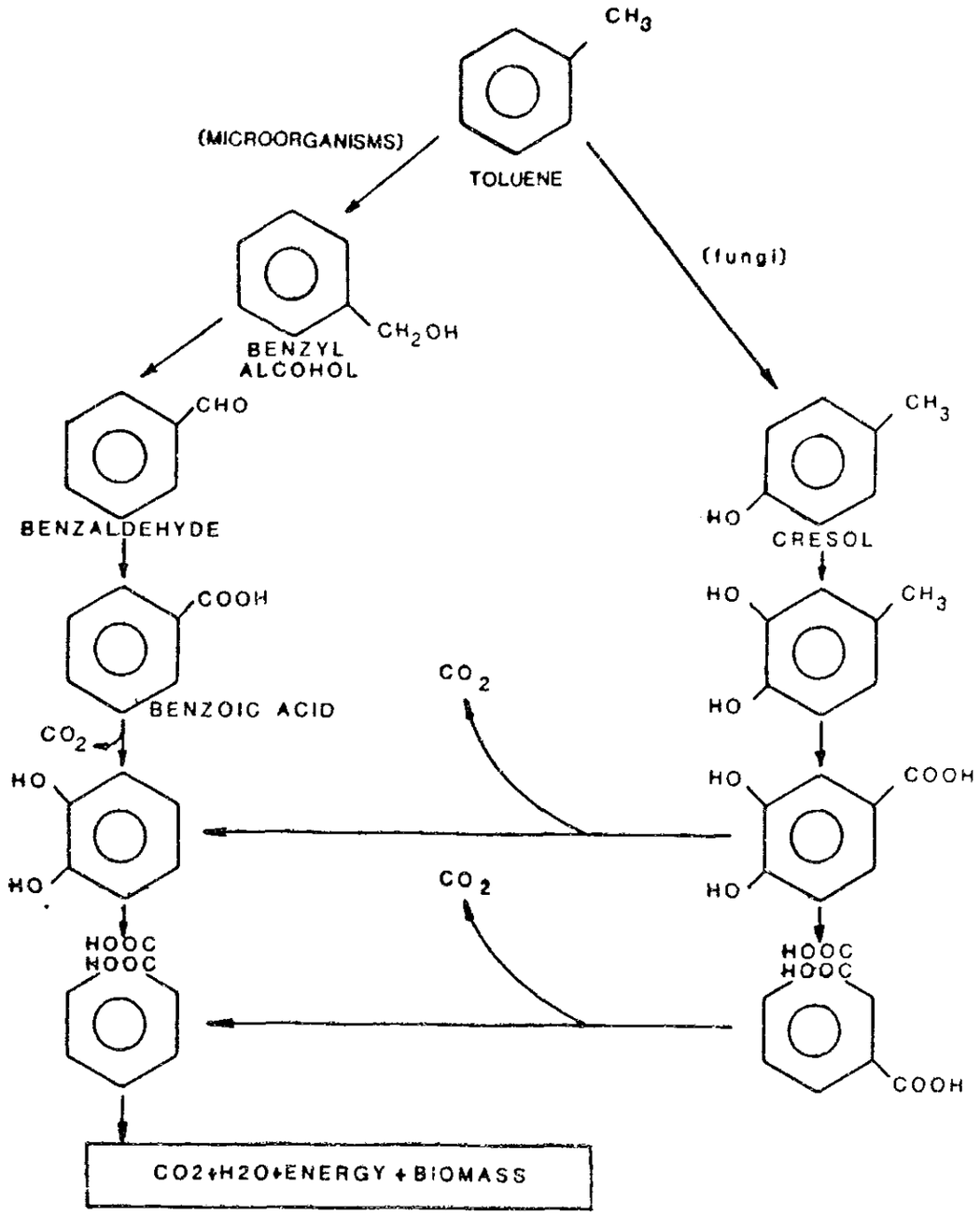
Although general screening tests (TOC, COD, BOD) have confirmed the presence of organics, specific compounds have not been identified in the evaporation system wastewater. It is reasonable to assume, however, that the organics were in solution equilibrium with those present in the sludge. The wastewater probably have contained trace amounts of aromatics

such as toluene, xylene, and ethylbenzene; chlorinated solvents such as trichloroethylene and tetrachloroethylene; phenols, and some straight chain hydrocarbons.

The EPA FIT team collected two "landfarm" soil samples for GC/MS analysis as part of their investigations in July of 1983. The samples contained only unidentified trace amount of hydrocarbons. The only significant result was an identified concentration of benzoic acid of 760 ppm.

Benzoic acid is a common chemical intermediate used in the synthesis of aromatic chemicals and is also used as a food preservative at levels up to 1000 ppm[4]. However, benzoic acid is also a natural biodegradation oxidation product of toluene.

Toluene is the major priority pollutant organic component of the sludge in the lagoon, while benzoic acid has not been identified as a chemical disposed at the site. Figure 1 is a schematic of the biodegradation breakdown path of toluene. If the analytical data collected by the EPA FIT team is valid, then significant biodegradation of a major contaminant has occurred in the evaporation system. This would support the observations that the evaporation system has functioned as a treatment system.



RESOURCE ENGINEERING INC.
ENVIRONMENTAL CONSULTANTS
HOUSTON, TEXAS

FIGURE 1

TOLUENE BIODEGRADATION PATHWAY

DRAWN BY:	DATE:	PROJECT NO.
N.L.J.	8-26-85	

REFERENCE 3

002203

2.2 Clarke Lake - Clarke Lake is actually a series of three shallow ponds formed by two man-made earthen dams in a natural drainage channel. The pond system holds approximately 60 acre feet of water and is located south of the lagoon and evaporation system.

In response to a complaint, the Texas Department of Water Resources (TDWR) found a fish kill in Clarke Lake in March, 1978. TDWR investigations determined that the probable cause was anaerobic conditions resulting from an overflow of wastewater from a damaged cell in the evaporation system. Initial sampling and analysis indicated COD levels of 5,000-6,000 mg/l and 2,000 to 2,500 mg/l TOC in Clarke Lake.

According to TDWR analysis, two weeks after the spill had occurred the lake waters had a dissolved oxygen content of 0.5 mg/l. TDWR personnel in reviewing the data considered the minimum level of dissolved oxygen necessary for maintaining a diverse ecosystem to be 2.0 mg/l. TDWR testing in May of 1978 indicated that the lake water had a COD level of 1600 mg/l. Batch testing with an activated sludge "seed" and adequate aeration indicated that the organics were biodegradable to below 500 mg/l COD within 24 hours. Although the organics were biodegradable under laboratory conditions, the rate of breakdown in the lake was apparently slower. TDWR monitoring indicated the lake system remained anaerobic through January of 1979.

At the request of the TDWR, Resource Engineering (REI) conducted an aquatic biota survey of the Clarke Lake system in September, 1984. The study showed that Clarke Lake was supporting an active and diverse aquatic ecosystem and had recovered from earlier anaerobic conditions. Measurements of dissolved oxygen levels indicated supersaturated conditions. These high levels were probably due to algae photosynthesis. GC/MS analysis of a water sample indicated no detectable levels of priority pollutants and found no significant non-priority organics present. The results of this analysis "demonstrate that no significant organic contamination representative of waste constituents managed at the facility are currently present in Clarke Lake" water. [12]

3.0 SAMPLE LOCATIONS

The sampling strategy for further investigations is based upon a review of the data summarized in Section 2.0. The sampling locations and analytical tests have been chosen to provide the maximum amount of data for further evaluation with minimized expenditure of time and resources.

3.1 Evaporation System - The evaporation system will be sampled as close as possible to sample points 8-12 sampled in May of 1984 by Resource Engineering (ref. Table 4 and Figure 2). Samples will be taken at the following depth intervals of 0-6", 6-12", 12-18" and 24-30". Sampling procedures are discussed in Section 4.1. The samples will be analyzed for oil and grease content and total metal concentrations of lead, zinc, nickel and chromium. Three samples will be chosen for Extraction Procedure Toxicity tests so that a correlation can be developed between total metal concentrations and EP toxicity leachable metal concentrations.

A field background sample will be collected from the western edge of the Sheridan property at the same approximate distance from the Brazos River as the center of the evaporation system area. The sample will be collected at the same depths and will serve as a background for comparison. The sample will be tested for the same indicator parameters as the evaporation system samples.

Slug for Figure 2

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Oil and grease has been chosen as a qualitative indicator for determining the relative level of organics in the soil. Based upon the results of oil and grease analyses, four samples will be analyzed for priority pollutants by GC/MS analysis. At least one of the samples will be a surface sample and two will be from the 24-30" depth. The samples chosen will be representative of the range of oil and grease results. This will allow a correlation to be made between oil and grease results and GC/MS analysis of priority pollutants.

In addition to priority pollutant analysis, each sample will be analyzed for biodegradation products of toluene, specifically benzyl alcohol, benzaldeayde, benzoic acid and catechol. Toluene has been identified as the major priority pollutant in the lagoon sludge. As discussed in the historical background data section, benzoic acid is the only significant organic contaminant identified by the EPA FIT Team testing of the "landfarm" area in July of 1983. This additional testing will provide information on the biodegradation of a major pollutant present in the lagoon and the evaporation system area. This information will be used in assessing migration rates and future health impacts of remedial actions in the risk assessment analysis.

3.2 Test Plot - A three acre plot was used from October through December of 1975 to study the feasibility of "land irrigation" as a disposal method for lagoon wastewater. The

site was located north and slightly west of the lagoon in a former truck garden. The site is separated from the evaporation system area.

Although only 100,000 gallons of wastewater were applied, the presence of contaminants were never determined. Considering that the wastewater loading rate on the test plot was at least an order of magnitude less than the evaporation system area, no significant contamination is expected. In order to investigate this hypothesis, samples will be taken at three locations in the test plot area. Two of the samples will be taken from 0 to 6" and the third location will be sampled at both the surface and at a depth of 6 to 12". The samples will be analyzed for total metal concentrations of lead, zinc, nickel and chromium as indicators of possible contamination.

3.3 Clarke Lake - Clarke Lake sediments will be sampled in order to determine if organic priority pollutants are present from a wastewater spill that occurred in 1978. The spill caused Clarke Lake to become anaerobic. Investigations in September of 1984 indicate that Clarke Lake has recovered and is supporting an active and diverse ecosystem. The sample locations are presented in Figure 2 and are as specified by EPA Region VI in recent negotiations. Each sample will be analyzed for organic priority pollutants using GC/MS.

4.0 SAMPLE COLLECTION

This section presents sampling procedures and their specific application to the Sheridan site along with site safety protocols, sample preservation and shipment procedures.

4.1 Procedures for Collecting Soil Samples - Soil samples will be collected utilizing a combination of trowel, auger and Shelby tube sampling techniques. The general sample procedure will be as follows:

Step 1 - Select the sampling point and record its location relative to available reference points in the field log book.

Step 2 - At the discretion of the sampling personnel, a wind barrier may be set up around the sampling point to prevent cross-contamination by windblown dust.

Step 3 - Remove the first 1/2" of soil and any surface debris such as rocks and vegetation.

Step 4 - Obtain a surface sample using a trowel and record all observations in the field log book.

Step 5 - The sample is then transferred and sealed in a 32 oz. amber glass collection jar.

Step 6 - Seal all sampling jars with evidence tape and immediately place in a cooler filled with ice packs.

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Step 7 - Record all necessary sample identification and chain of custody information before proceeding to the next sample.

Step 8 - Using a manual regular auger bit dig to within one inch of the next lower depth sampling zone.

Step 9 - With a manual planar auger bit remove any debris which has fallen in from the sides of the auger hole. This will help to minimize any cross-contamination from upper soils zones.

Step 10 - Auger cuttings will be collected and transferred to the lagoon.

Step 11 - Samples from the proper depth are then taken with a thin wall sampler. An intact core sample will insure minimum soil disturbance and cross-contamination.

Step 12 - All sampling equipment will be decontaminated between samples. Decontamination procedures will include:

1) First brush off sampling gear and wipe clean
2) A detergent wash
3) A tap water rinse
4) A distilled water rinse

Step 13 - The augering procedure is repeated until sufficient samples are collected at designated depths.

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Step 14 - The bore holes will be sealed to the surface with grout.

4.2 Procedures for Collecting Lake Sediments - Lake sediment samples will be collected using a Peterson dredge. The procedure for sampling is as follows:

Step 1 - Select the sampling point and record it location relative to available reference points in the field log book.

Step 2 - With a minimal disturbance of the lake sediments, hand drive the Peterson dredge at least 6" into the lake bottom.

Step 3 - Immediately transfer the sample to a collection jar and seal with evidence tape. The sample should then be stored in a cooler packed with ice.

Step 4 - Record all necessary sample identification and chain of custody information before proceeding to the next sample.

Step 5 - All sampling equipment will be decontaminated between samples. Decontamination procedures will include:

1) Wiping excess sediment off of sampling gear
2) A detergent wash

3) A tap water rinse

4) A distilled water rinse

4.3 Safety Protocol - The following are safety measures to be followed throughout this project:

- While samples are being collected from the evaporation system and Clarke Lake, personnel will wear modified level D protective equipment. This will include steel-toed rubber boots, neoprene gloves, hard hats, coveralls, and safety glasses. A full-face respiraton with organic vapor cartridges will be carried and used, if needed.

- Air monitoring will be conducted continucusly using an HNU photoionizating detector. Should a reading of 1 ppm be registered and maintained at anytime, respirators will be worn.

- The "buddy system" will be used at all times by all field personnel. No one is to perform field work alone.

- Contamination avoidance is of the utmost importance. Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do

not kneel on the ground or set equipment on the ground. Stay away from any waste drums. Protect equipment from contact by bagging.

- Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials in prohibited.

- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activities.

- Beards or other facial hair that interfere with respirator fit are prohibited.

- Medications and alcohol are prohibited during the conduct of field operations.

- During field operations where distance between personnel makes normal conversational communication impossible, two-way radios will be used. In the case of radio failure, emergency communications will be made via air horns, using a pre-determined code.

- Contaminated cleaning solutions and auger cuttings will be collected and transferred to the lagoon.

- To avoid any possible heat stress/dehydration while in the field a cooler of liquids will be accessible immediately off-site during all field activities.

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Laboratory personnel having direct contact with site samples will be required to use the following equipment as a minimum:

- Safety glasses or face shield
- Chemically protective inner and outer gloves
- Chemically protective apron or similar garment

Whenever possible, all analytical work should be done in a fume hood. When work cannot be performed in a hood, respirators with organic vapor cartridges must be available and must be worn when deemed necessary by the Laboratory Manager.

4.4 Sample Preservation and Shipment - All samples will be preserved by storage in ice chests at 4° C, consistent with Section 5.0 of the Quality Assurance Project Plan. Samples will be transported to the Resource Engineering laboratory on the day of collection. Samples for GC/MS analysis will be shipped using a overnight express delivery service. Shipping containers will contain labeling and chain-of-custody information as specified in Section 5.10 of the QA Project Plan.

5.0 ANALYTICAL PROCEDURES

Analytical procedures are consistent with Section 8.0 of the QA Project Plan and are summarized as follows:

Parameter	Procedure (Reference)
Soil Extraction	3010 Acid Digestion (5)
Lead	7420 AA Direct Aspiration (5)
Nickel	7520 AA Direct Aspiration (5)
Zinc	289.1 (6)
Chromium	7190 AA Direct Aspiration (5)
Oil & Grease	503 D (7)
GC/MS Priority Pollutants	8240, 8250 (5)

The oil and grease method is detailed in Attachment 1. Quality Assurance and Quality Control Guidelines are detailed in the QA Project Plan with the exception of oil & grease soil screening. Oil and grease results will be evaluated primarily for their usefullness as a qualitative indicator for organic compounds and not as an independent empirical result.

6.0 RECORD KEEPING AND REPORTING

6.1 Chain-of-Custody - All samples will follow a chain-of-custody procedure as documented in the QA Project Plan. At all times, samples will be under the secure custody of a single individual. If samples are delivered to the laboratory when appropriate personnel are not there to receive them, the samples will be locked within a designated area of the laboratory secure from tampering. The REI laboratory director will be responsible for the transfer of samples to other laboratories for analytical work which cannot be performed at the REI laboratory. He will also be responsible for maintaining laboratory log-in records and insuring that all samples are kept in proper storage prior to analysis.

6.2 Field Log Book - As detailed in the QA Project Plan, a field log book will be kept as a permanent record of field activities. The log book will be bound, with numbered pages, and all entries will be made in chronological order. The same log book will be used each time field sampling activities are performed at the site and will provide a chronological history of all sampling at the site. The log book will be completed in indelible ink without skipping any pages. Any errors will be crossed out and initialed. Recorded information will include as a minimum:

- Date
- Time
- Sample number
- Sample type
- Analyses to be performed
- Field data (pH, temperature, etc.)
- Field observations (sample odor or appearance, weather conditions, etc.)
- Names and affiliation of all personnel present
- Description of safety and personal protective equipment in use
- Photograph number associated with the event, as appropriate

6.3 Final Report - The final report will present analytical results of the sampling investigation and an evaluation of the data's significance. The QA Project officer will summarized the data validity in terms of the QA Project Plans objectives.

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002310

ATTACHMENT 1

503 OIL AND GREASE*

In the determination of oil and grease, an absolute quantity of a specific substance is not measured. Rather, groups of substances with similar physical characteristics are determined quantitatively on the basis of their common solubility in trichlorotrifluoroethane. "Oil and grease" is any material recovered as a substance soluble in trichlorotrifluoroethane. It includes other material extracted by the solvent from an acidified sample (such as sulfur compounds, certain organic dyes, and chlorophyll) and not volatilized during the test. It is important that this limitation be understood clearly. Unlike some constituents that represent distinct chemical elements, ions, compounds, or groups of compounds, oils and greases are defined by the method used for their determination.

The methods presented here are suitable for biological lipids and mineral hydrocarbons. They also may be suitable for most industrial wastewaters or treated effluents containing these materials, although sample complexity may result in either low or high results because of lack of analytical specificity. The method is not applicable to measurement of low-boiling fractions that volatilize at temperatures below 70°C.

1. Significance

Certain constituents measured by the oil and grease analysis may influence wastewater treatment systems. If present in excessive amounts, they may interfere with aerobic and anaerobic biological processes and lead to decreased wastewater treatment efficiency. When discharged in wastewater or treated effluents, they may cause surface films and shoreline deposits leading to environmental degradation.

A knowledge of the quantity of oil and grease present is helpful in proper design and operation of wastewater treatment systems and also may call attention to certain treatment difficulties.

2. Selection of Method

For liquid samples, three methods are presented: the partition-gravimetric method (A), the partition-infrared method (B), and the Soxhlet method (C). Method B is designed for samples that might contain volatile hydrocarbons that otherwise would be lost in the solvent-removal operations of the gravimetric procedure. Method C is the method of choice when relatively polar, heavy petroleum fractions are present, or when the levels of nonvolatile greases may challenge the solubility limit of the solvent. For low levels of oil and grease (< 10 mg/L), Method B is the method of choice because gravimetric methods do not provide the needed precision.

Method D is a modification of the Soxhlet method and is suitable for sludges and similar materials. Method E can be used in conjunction with Methods A, B, C, or D to obtain a hydrocarbon measurement in addition to, or instead of, the oil and grease measurement. This method separates hydrocarbons from the total oil and grease on the basis of polarity.

3. Sampling and Storage

Collect a representative sample in a wide-mouth glass bottle that has been rinsed with the solvent to remove any detergent film, and acidify in the sample bottle. Collect a separate sample for an oil and grease determination and do not subdivide in the laboratory. When information is required about average grease concentration over an extended period, examine individual portions collected at prescribed time intervals to eliminate losses of grease on sampling equipment during collection of a composite sample.

In sampling sludges, take every possible precaution to obtain a representative sample. When analysis cannot be made immediately, preserve samples with 1 mL conc HCl/80 g sample. Never preserve samples with $CHCl_3$ or sodium benzoate.

*Approved by Standard Methods Committee, 1985.

002311

ATTACHMENT 1

503 D. Extraction Method for Sludge Samples

1. General Discussion

a. Principle: Drying acidified sludge by heating leads to low results. Magnesium sulfate monohydrate is capable of combining with 75% of its own weight in water in forming $MgSO_4 \cdot 7H_2O$ and is used to dry sludge. After drying, the oil and grease can be extracted with trichlorotrifluoroethane.

b. Interference: See 503C.1*b*.

2. Apparatus

a. Extraction apparatus, Soxhlet.

b. Vacuum pump or other source of vacuum.

c. Extraction thimble, paper.

d. Grease-free cotton: Extract nonabsorbent cotton with solvent.

3. Reagents

a. Hydrochloric acid, HCl, conc.

b. Magnesium sulfate monohydrate: Prepare $MgSO_4 \cdot H_2O$ by overnight drying of a thin layer in an oven at 150°C.

c. Trichlorotrifluoroethane: See 503A.3*b*.

4. Procedure

In a 150-mL beaker weigh a sample of wet sludge, 20 ± 0.5 g, of which the dry-solids content is known. Acidify to pH 2.0 (generally, 0.3 mL conc HCl is sufficient). Add 25 g $MgSO_4 \cdot H_2O$. Stir to a smooth paste and spread on sides of beaker to facilitate subsequent removal. Let stand until solidified, 15 to 30 min. Remove solids and grind in a porcelain mortar. Add the powder to a paper extraction thimble. Wipe beaker and mortar with small pieces of filter paper moistened with solvent and add to thimble. Fill thimble with glass wool or small glass beads. Extract in a Soxhlet apparatus, using trichlorotrifluoroethane, at a rate of 20 cycles/h for 4 h. If any turbidity or suspended matter is present in the extraction flask, remove by filtering through grease-free cotton into another weighed flask. Rinse flask and cotton with solvent. Distill solvent from extraction flask in water at 70°C. Place flask on a water bath at 70°C for 15 min and draw air through it using an applied vacuum for the final 1 min. Cool in a desiccator for 30 min and weigh.

5. Calculation

$$\text{Oil and grease as \% of dry solids} = \frac{\text{gain in weight of flask, g} \times 100}{\text{weight of wet solids, g} \times \text{dry solids fraction}}$$

6. Precision

The examination of six replicate samples of sludge yielded a standard deviation of 4.6%.

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APPENDIX 3E

VOLUME OF POTENTIAL CONTAMINATION CALCULATIONS

002313

CALCULATIONS AND COMPUTATIONS

PROJECT: SHERIDAN DISPOSAL SERVICES SITE — SHEET 1 OF 2

SUBJECT: VOLUME OF POTENTIAL CONTAMINATION — JOB NO 282-04.04

COMPUTED BY: JB DATE 1/23/

CHECKED BY _____ DATE _____

SURFACE AREAS WERE CALCULATED FROM A 1984 SITE TOPOGRAPHICAL MAP PREPARED FROM AN AERIAL PHOTOGRAPH BY O'MALLEY + CLAY. THE TOPOGRAPHICAL MAP HAS A SCALE OF 1" = 100'. THE FOLLOWING SURFACE AREAS WERE DETERMINED USING A DIGITAL PLANIMETER:

LOCATION	ACRES	FEET²
LAGOON SURFACE AREA	12.3	~536,000
DIKE SURFACE AREA	17.1	~745,000
EVAPORATION SYSTEM AREA	42.2	~1,800,000

(1 ACRE = 43,560 ft²)

LAGOON SLUDGE

ASSUMPTIONS:

1) BASED ON PREVIOUS STUDIES SLUDGE HAS AN AVERAGE THICKNESS OF 3 FEET IN LAGOON

2) BASED ON BH #1 AND 2 AND CONE PENETROMETERS C-16, C-17 AND C-20 SLUDGE HAS INTRUDED INTO DIKE WITH A THICKNESS OF <1 TO 6'. ASSUME SLUDGE IS PRESENT IN 30% OF THE DIKE WITH AN AVERAGE THICKNESS OF 3'

LAGOON + DIKE SLUDGE =

$$\frac{536{,}000\ ft^2 \times 3\ ft}{27\ ft^3/yd^3} + \frac{(745{,}000 \times 0.3) \times 3\ ft}{27\ ft^3/yd}$$

$$= 59{,}556 + 24{,}833\ yd^3$$

SLUDGE $= 85{,}000\ yd^3 \pm 20\%$

002344

CALCULATIONS AND COMPUTATIONS

PROJECT: SHERIDAN DISPOSAL SERVICES SITE — SHEET 2 OF 2

JOB NO. 283-04-04

SUBJECT: VOLUME OF POTENTIAL CONTAMINATION — COMPUTED BY: SB DATE: ____

CHECKED BY: ____ DATE: ____

CONTAMINATED SOILS

ASSUMPTIONS

1) BASED ON RESULTS OF ANALYSIS OF ES #13 CONTAMINATED SOILS WOULD BE PRESENT TO A MAXIMUM DEPTH OF 3 FEET UNDER LAGOON SLUDGE

2) ESSENTIALLY ALL OF THE DIKE SOILS ARE CONTAMINATED SINCE FILTER CAKE AND DRUMS ARE A STRUCTURAL PART OF THE DIKE

TOTAL DIKE VOLUME

ASSUME FORMER MEAN GRADE OF 162.5 MSL
DIKE THICKNESS AVERAGES 8 FEET

$$745{,}000\ ft^2 \times 8\ ft\ \text{THICKNESS} \times \frac{1\ yd^3}{27\ ft^3} = \underline{220{,}740\ yd^3}$$

TOTAL DIKE VOLUME − SLUDGE CONTAMINATION

$$220{,}740 - 25{,}000 = \underline{195{,}000\ yd^3}$$

LAGOON CONTAMINATED SOILS

$$536{,}000\ ft^2 \times 3\ ft \times \frac{1\ yd^3}{27\ ft^3} = 59{,}555 \approx \underline{60{,}000\ yd^3}$$

EVAPORATION SYSTEM SOILS

MAXIMUM AMOUNT OF CONTAMINATED SOILS 50% OF TOTAL AREA TO 1' DEPTH

$$1{,}800{,}000\ ft^2 \times 0.5 \times 1 \times \frac{1\ yd^3}{27\ ft^3} = 33{,}333\ yd^3$$

$$\approx \underline{35{,}000\ yd^3}$$

REI

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