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TO	Paula Dunnigan	Cleveland	DATE YOUR LETTER
FROM	R.K. Hinderer	Akron - D/0020, 5-H	DATE THIS LETTER 2-25-83

Pilot Pipe Study

This report is very poorly written, making it difficult to determine precisely what was done. This greatly affects the ability to appreciate the significance of the data.

It appears that pipes were filled with water and pressurized. Subsequently, they appear to have been immersed in one of several chemicals. While the stated intent is to mimic soil conditions, this can hardly be construed as real world conditions.

The data on page 3 shows that two or more of the chemicals penetrated both plastic and metal pipes. In the case of metal pipe, migration of chemicals could increase in areas having aggressive waters or more acid soils which could corrode the pipe or joints. Such corrosion would serve as a mechanism for the penetration of chemicals via the production of pinhole or micropores.

It is also interesting to note from page 3 that higher levels of 1,1,1-trichloroethane and gasoline were found in the metal pipe than in the PVC pipe. In fact, no gasoline was found in the PVC pipe as opposed to its migration into metal pipe. This indicates that PVC pipe performs favorably compared to metal pipe.

Phase II Pipe Study

This report notes that the solvents cause the PVC pipe to fail. While we do not believe that these tests represent real world conditions, such failure would serve as a safety mechanism. Failure of the pipe would, in effect, prevent human exposure, as would any main break. However, since such hypothesized failures of underground PVC water systems have never been reported, we believe that this points out the unrealistic nature of these tests.

Conclusions

Any system, plastic or metal, has the potential for migration of chemicals; however, we believe that these studies do not represent real world conditions. Situations posing any potential for migration are extremely rare, but would pose similar concerns for both metal and plastic pipes. It is only common sense to not build residential distribution systems through a hazardous waste dump or a chemical plant.


R. K. Hinderer

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1914 S. STREET. SACRAMENTO, CALIFORNIA 95814 • 916-447-2946

November 29, 1982

Leonardini and Fathy
400 Capitol Mall
Suite 221
Sacramento, CA 95814

ATTN: Mr. Raymond J. Leonardini

RE: Results of Pipe Study

Dear Mr. Leonardini:

Enclosed is the report of the Pilot Pipe Study. Included are the Protocol, material data sheets, and analytical results. Concentrations for gasoline, GC/MS, are approximate.

If you have any questions, please contact us. Thank you for your continued business.

Sincerely,

ANLAB

Roger A. Elliott

RAE:lk
Encl.

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1914 S STREET, SACRAMENTO, CALIFORNIA 95814 • 916-447-2946

November 29, 1982

Leonardini and Fathy
400 Capitol Mall, Suite 221
Sacramento, CA 95814

ATTN: Mr. Raymond J. Leonardini

-- ABSTRACT --

PILOT PIPE STUDY

Three plastic water supply pipes: polyvinylchloride (PVC), polyethylene (PE), and polybutylene (PB), were exposed to selected compounds to determine permeability. Copper pipe was included as a quality control sample. The exposure chemicals were: 1,2-Dichloropropane; 1,1,1-Trichloroethane; Chlordane (72% formulation diluted 1:100 v:v in water); Chevron Super-Unleaded Gasoline; and Tap Water as a quality control blank. Exposure time was one week.

Results indicate that PVC is permeated by 1,2-Dichloropropane and 1,1,1-Trichloroethane; PE and PB were permeated by 1,2-Dichloropropane, 1,1,1-Trichloroethane, and Gasoline. In addition, results of the control samples indicate that several compounds leach into the water from the pipe material; sealants, glues, joining compounds, flux, etc. The data indicates that as the compounds permeate the pipe they also extract and carry with them other soluble compounds in the pipe material. Comparison of small quantities of leachate compounds to exposed pipes was not always possible due to necessary dilutions of the samples because of the high concentrations of other compounds.

Roger A. Elliott

RAE:lk

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November 29, 1982

Report #: 144682

Page One

Leonardini and Fathy
400 Capitol Mall, Suite 221
Sacramento, CA 95814

ATTN: Raymond J. Leonardini

Pilot Pipe Study

I. Introduction

The purpose for the pilot study was to apply chemicals to different pipe materials, "mimicking soil conditions", and analyzing the water samples in each pipe for any possible migration of applied compounds through each type of pipe. Any further studies could be based on the results of the pilot program.

Protocol for the actual set-up of the study was established through cooperative agreement between Anlab staff, Mr. Leonardini, and Mr. Leonardini's representatives. (Appendix A)

II. Protocol Data

A. Photographs -- Photographs of the various phases of the experiment were taken and have already been supplied.

B. Quality Control

1. An "Initial Tap Water" was collected and analyzed to determine if any of the respective compounds were present in the test water before treatment.

2. A "water control box" was used as a blank to determine if any compounds of interest leached naturally from the pipe, sealants, sand, etc.

3. Copper pipe was used in each box as an exposure control.

4. Each box was checked and kept filled during the entire exposure period.

5. EPA analytical protocol was strictly adhered to for the collection, preservation, and analysis of the test samples.

6. Blind replicate samples were sent to Radian Corp. for GC/MS confirmation.

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Page Two

a. 1,1,1-Trichloroethane and 1,2-Dichloropropane were analyzed by EPA Method #624, "Organics by Purge and Trap," using Gas Chromatography-Coulson Detection.

b. Chlordane was analyzed by EPA Method #608, "Organochlorine Pesticides and PCB's," using Gas Chromatography-Electron Capture Detection.

c. Gasoline was analyzed using EPA Method #624, "Purge and Trap," and hydrocarbon analyses, Supelco, by Gas Chromatography-Flame Ionization Detection (fingerprinting).

C. Material Data Sheets -- (See Appendix B)

D. Project Termination

The rubber silicon sealant did not seal against the compounds being used. Excessive leaking caused us to terminate the study at one week.

III. Analytical Data

A. Chemical Data Sheets -- (See Appendix C)

B. Anlab I.D. Codes

1. Pipe codes: "PV-W" = Polyvinylchloride - White; "PE-K" = Polyethylene - Black; "PB-KE" = Polybutylene - Black and Blue; "CC-C" = Copper.

2. Box Codes: "A" = 1,2-Dichloropropane; "B" = 1,1,1-Trichloroethane; "C" = Chlordane 8E; "D" = Super Unleaded Gasoline; "E" = Water control.

3. Code Use: Pipe-Color-Box; example, "PV-W-B" is Polyvinylchloride-White-Box B.

C. Pipe Volumes

1. All pipes contained 1400 ml to 2100 ml of water sample. Individual volumes are in Appendix D.

D. Analytical Results

1. "Test-Chemical" Results - ONLY

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The laboratory The liability of the laboratory is limited to the amount paid for this report
whom it is addressed and upon the condition that the client assumes all liability for the report



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Page Three

<u>Pipe/Sample</u>	<u>1,2-Dichloro- Propane, ppb</u>	<u>1,1,1- Trichloro- ethane, ppb</u>	<u>Chlordane ppb</u>	<u>Gasoline, ppm (by total area)</u>
Initial Control	None Detected	None Detected	None Detected	None Detected
PV-W	0.98	2.2 ^C	None Detected	None Detected ^C
PV-W(E)	None Detected	None Detected ^C	None Detected	None Detected ^C
PE-K	1,800	46,000 ^C	None Detected	120 ^C
PE-K(E)	None Detected	None Detected ^C	None Detected	None Detected ^C
PB-KE	310	25,000 ^C	None Detected	78 ^C
PB-KE(E)	20 ^{*C}	None Detected ^C	None Detected	None Detected ^C
CC-C	None Detected	4.6 ^{1C}	None Detected	0.59 ^{1C}
CC-C(E)	None <u>Detected</u>	None <u>Detected^C</u>	None <u>Detected</u>	None <u>Detected^C</u>
Detection Limit	0.30	0.25	0.1	0.05

*There is no explanation of this anomylous result in a control sample. There may have been contamination. This result was confirmed by GC/MS. We have rigorously looked at contamination possibilities and no explanation is available.

^CConfirmed by GC/MS.

¹This result is possibly due to a pinhole or crack in the copper pipe or soldered joints. Each exposure box contained ten (10) soldered joints.

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2. GC/MS results - By Pipe Type* (1)

a. Polyvinylchloride Pipe

<u>Compound, ppb</u>	1,1,1-	Water
	<u>Trichloroethane</u> <u>Exposure Box - B</u>	<u>Control Box - E</u>
Chloroform	230	30
Tetrahydrofuran	11,000	4.9
2-Butanone	5	10
Methylpentanone	170	None Detected
Toluene	360	None Detected
Dichloromethane	None Detected	280
Acetone	None Detected	26

<u>Gasoline, ppm</u>	<u>Exposure Box - D</u>	<u>Control Box - E</u>
Butane	None Detected	None Detected
Heptane	None Detected	None Detected
Benzene	None Detected	None Detected
Toluene	1 - 5	1 - 5
Octane	None Detected	None Detected
Xylenes	None Detected	None Detected
Trimethyl Benzenes	None Detected	None Detected
Tetramethyl Benzenes	None Detected	None Detected
Ethylbenzene	None Detected	None Detected

*Exposure compounds confirmed. See Section D.1., Page 3.

- (1) Some compounds may not have been detected in the exposure pipe samples that were found in the control samples, due to sample dilution.

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b. Polyethylene Pipe

<u>Compound, ppb</u>	<u>Trichloroethane Exposure Box - B</u>	<u>Water Control Box - E</u>
Ethylchloride	5200	None Detected
1,2-Dichloroethane	4500	None Detected
Trichloroethylene	70	None Detected
Benzene	300	None Detected
Methylpyrole	280	None Detected
Dichloromethane	None Detected	100
Chloroform	None Detected	26
Acetone	None Detected	2.2
Tetrahydrofuran	None Detected	90
2-Butanone	None Detected	200

<u>Gasoline, ppm</u>	<u>Exposure Box - D*</u>	<u>Control Box - E</u>
Butane	100	None Detected
Heptane	None Detected	None Detected
Benzene	100	None Detected
Toluene	100	1 - 5
Octane	None Detected	None Detected
Xylenes	100	None Detected
Trimethylbenzenes	20 - 100	None Detected
Tetramethylbenzenes	20 - 100	None Detected
Ethylbenzene	100	None Detected

*In addition, the following compounds were found in the exposure pipe that was not in the gasoline: methylethylbenzene, cyclopentane, dihydroindene, and dimethylethylbenzene.

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Page Six

2. GC/MS

c. Polybutylene Pipe

<u>Compound, ppb</u>	<u>Trichloroethane Exposure Box - B</u>	<u>Water Control Box - E</u>
Dichloromethane	None Detected	10
Chloroform	None Detected	47
Acetone	None Detected	130

<u>Gasoline, ppm</u>	<u>Exposure Box - D*</u>	<u>Control Box - E²</u>
Butane	100	
Heptane	None Detected	None Detected
Benzene	100	None Detected
Toluene	100	None Detected
Octane	None Detected	None Detected
Xylenes	100	None Detected
Trimethylbenzenes	100	None Detected
Tetramethylbenzenes	100	None Detected
Ethylbenzene	100	None Detected

²No gasoline components detected.

*In addition, the following compounds were found in the exposed pipe which were not in the gasoline: Methylethylbenzene, cyclopentane, Dihydroindene, and Dimethylethylbenzene.

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d. Copper Pipe

<u>Compound, ppb</u>	<u>Trichloroethane Exposure Box - B</u>	<u>Water Control Box - E</u>
2-Butanone	640	None Detected
1-Chloropentene	30	None Detected
Toluene	80	None Detected
Dichloromethane	None Detected	57
Chloroform	None Detected	26

<u>Gasoline, ppm</u>	<u>Exposure Box - D*</u>	<u>Control Box - E²</u>
Butane	None Detected	None Detected
Heptane	None Detected	None Detected
Benzene	None Detected	None Detected
Toluene	10	None Detected
Octane	None Detected	None Detected
Xylenes	10	None Detected
Trimethylbenzenes	None Detected	None Detected
Tetramethylbenzenes	None Detected	None Detected
Ethylbenzene	None Detected	None Detected

²No gasoline compounds detected; no others detected.

*In addition, methylethylbenzene was found which was not a part of the gasoline.

DATA CERTIFIED BY Roger Elliott

REPORT APPROVED BY Ken Nambo

ANLAB/T. Ikesaki

lk

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October 5, 1982

PILOT PIPE STUDY

PHASE I

Assemble pipe chambers. Pressurize the pipes to approx. 40 psi (working conditions). Wait 48 hrs. and check for any signs of water leaks in the pipe structures. After the sealants are cured, fill each box with water to demonstrate a sealed chamber.

PHASE II

After the chambers are leak-free, they are then filled with fresh water, as are the pipes. Measure approximate flush volume through the pipes. The chambers are left overnight and checked for leaks, after which the chambers are emptied and dried.

PHASE III

Fill each chamber with "washed" sand. Label each box uniquely and label each type of pipe uniquely. Collect an initial water sample and preserve as a control sample. Fill and pressurize the pipes to working conditions. Saturate each chamber with its prospective compound or formulation 2/. Each chamber to be sealed with silicon rubber and a wire security tag, to be attached at two places on the lid. Contact time shall be one week, after which the water from each pipe type will be collected, marked for identification, analyzed, and volume measured 3/.

PHASE IV

The pipes will be flushed and refilled to operating conditions. The lids will be opened and chambers refilled (where required) with their respective compounds, to saturation. The procedure will be the same as in Phase III except a two-week exposure time will elapse.

PHASE V

All samples from the pipes will be analyzed for their respective compounds. In addition, they will be compared to: (a) the initial water control; (b) a standard of the original compound or formulation; (c) the control box "E" samples. From this data, it will be determined if any of these compounds are

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PILOT PIPE STUDY (cont'd)
October 5, 1982

present and if any other compounds (either from the formulations or the structural materials) have entered the water from or through the pipe.

PHASE VI - APPENDIX

- A. All stages of work will be photographed.
- B. Complete pipe descriptions will be recorded, including manufacturer if possible.
- C. Sections of each pipe will be kept for material evidence.
- D. Final disposition of all sand, compounds and samples to be done by Anlab.
- E. Daily checks to be made of each chamber for its intactness and for any leaks.
- F. Several checks to be made during each contact time that the chamber remains at saturation and appropriate solutions are added if needed.

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<u>1/</u>	<u>Pipe Material</u>	<u>Lab Identification</u>
	Polyvinyl chloride - white	PV-W
	Polybutylene - Black	PB-K
	Polybutylene - Blue	PB-E
	Polyethylene - Black	PE-K

<u>2/</u>	<u>Box Label</u>	<u>Compound</u>	<u>Conc.</u>
	A	1,2-Dichloropropane	100%
	B	1,1,1-Trichloroethane	100%
	C	Chlordane-8E	1% formulation
	D	Super Unleaded Gasoline	100%
	E	Tap Water	100%
	F	Spare	

3/ Analyses of compounds will follow EPA protocol where applicable.

<u>Compound</u>	<u>EPA Method No.</u>
Chlordane	608
1,2-Dichloropropane	624
1,1,1-Trichloroethane	624
Gasoline	624

Tom Ikesaki
 Thomas I. Ikesaki
 Laboratory Director

TII:lk

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MATERIAL DATA SHEETS

The written data found on the side of each pipe was carefully recorded and checked for accuracy.

Polyvinylchloride Pipe (Lab Code PVW) White, rigid.

Pipe Code: Extruded Plastic Co. NSF-pw 3/4" IPS
SC-40-80PSI @ 73°F PVC 1120 ASTM D1785-75

Polyethylene Pipe (Lab Code PEK) Black, coiled.

Pipe Code: Westflex Series 80 3/4" Polyethylene
80 PSI 6-82 B-15

Polybutylene Pipe (Lab Code PBK) Black, coiled*.

Pipe Code: 3/4" Westflex 250 PSI Polybrute PB2110
SDR9 Water Service Tubing NSF-pw-SE-W-C-248-79

Polybutylene Pipe (Lab Code PBE) Blue, coiled*.

Pipe Code: 3/4" CTS Westflex Polybrute PB-2110 250 psi
SDR-9 ASTM-D-2666 Water Service Tubing
NSF-PW-S-B-27 10-81

Copper Pipe (Lab Code CCC) Copper, rigid.

Pipe Code: 3/4" - TYPE L - Made in U.S.A. - Phelps Dodge

* Both blue and black were used in each box.

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CHEMICAL DATA SHEETS

1,1,1-Trichloroethane, (Stabilized), Technical Grade,
 $C_2H_3Cl_3$, F.W.133.4, Lot 217621, 20L, Cat. #W509-1, J.T. Baker
Chemical Co., Phillipsburg, NJ 08865

1,2-Dichloropropane, 99%, Toxic!Irritant!Flammable!,
F.W. 112.99, $CH_3CH(Cl)CH_2Cl$, b.p. 95-96°, n_D^{20} 1.4384, d 1.156,
Lot No. EJ 0921DJ, Cat. #D7,218-2, 4kg, Aldrich Chemical Co.,
Inc., Milwaukee, WI 53233

Super Unleaded Gasoline, Chevron, Inc.

Chlordane 8E, Lilly Miller, Insecticide, Termites (Subterranean),
Active Ingredients: *Chlordane, technical... 72.3%; Petroleum
distillate... 21.5%; Inert Ingredients... 6.2%, *Equivalent to 43.38%
Octachloro-4,7-Methanotetrahydroindane and 28.92% related compounds,
Net Contents: 1/2 gallon, The Chas. H. Lilly Co., Portland, Oregon
97218, EPA Est 802-OR-1, EPA Reg. No. 802-71

Water, Sacramento City Public Water, from tap.

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PIPE CAPACITY/VOLUME

PV-W-A	2000 ml
PE-K-A	1600
PE-KE-A	1600
CC-C-A	1600

PV-W-B	2000
PE-K-B	1600
PE-KE-B	1600
CC-C-B	1600

PV-W-C	2000
PE-K-C	2100
PB-KE-C	1600
CC-C-C	1800

PV-W-D	2000
PE-K-D	1600
PE-KE-D	1600
CC-C-D	1600

PV-W-E	2000
PE-K-E	2000
PB-KE-E	1400
CC-C-E	1600

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January 10, 1983

Leonardini & Fathy
400 Capitol Mall, Suite 221
Sacramento, CA 95814

ATTN: Raymond J. Leonardini

RE: Phase II Pipe Study

Enclosed are the results for the Phase II Pipe Study. Included are the daily ambient temperatures and material data sheets.

Results are grouped according to exposure barrel and are presented in tabular form.

Sample identification codes indicate the water sample collected from a particular pipe, barrel and exposure period. Interpretation of the code is as follows:

Pipe Material

Code

Polyvinylchloride
Polybutylene
Polyethylene
Copper

PV
PB
PE
CC

Exposure Material

Barrel Code

1,1-Dichloroethylene and
1,2-Dichloroethane
Trichloroethylene
Dinoseb, Dicamba and
2,4-D
Chlordane, technical
Lindane

1
2

3
4
5

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Leonardini & Fathy
January 10, 1983
Page Two

<u>Exposure Interval</u>	<u>Code</u>
One week prior to exposure	0
First week of exposure	1
Second week of exposure	2
Third week of exposure	3

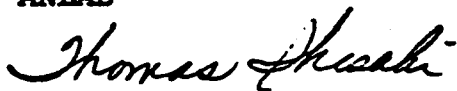
The identification code is written as follows: "Pipe Material - Barrel - Exposure Interval". For example, water collected from the copper pipe at the second week of exposure from trichloroethylene exposure material would be labeled "CC-2-2".

There were several instances in which the water samples from polyvinylchloride pipe could not be collected. It appears that the submerged joints of the PVC have come apart and lost some of its structural rigidity. For these cases the annotation "*" appears.

Please contact us as to an appointment so that we can review the data with you and send samples for GC-MS confirmation.

Very truly yours,

ANLAB



Thomas I. Ikesaki
Director

TII:lk
Encl.

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REPORT OF PHASE II PIPE STUDY

Experimental Protocol

Five metal barrels were assembled by others and connected to the existing water tap. Each barrel contained a four-foot section of potable water pipe made of polyvinylchloride, polybutylene, polyethylene and copper. The pipes used were excess from the original pilot study; therefore, all of the pipe manufacturing codes are the same.

Each of the pipes was filled with tap water and left for one week. Checks were made for leaks and intactness of the system. No exposure chemicals were in the barrels at this time. The water samples collected from this checking period were analyzed as "control blanks".

At the end of the observation period, each barrel was filled to approximately one-third capacity with the selected exposure chemical(s) (See Attachment #1). Each pipe was then re-pressurized with tap water and left for the next exposure period. Daily checks were made to ensure constant chemical volume. Barrels number one and number two had sand added in order to duplicate the pilot study. Daily high and low temperatures of Sacramento were taken from a local newspaper (See Attachment #2) for possible kinetics use.

Material data sheets were taken from the product labels and are in Attachment #3.

E.P.A. analytical protocol was used in the collection and analysis of the test samples.

In addition to the control blank samples, water from the copper pipe was used as an "exposure control sample". Also analyzed were duplicates and spikes.

Analytical Methodology

The following analytical methods were incorporated for the detection of the exposure chemicals:

E.P.A. Method #624, "Organics by Purge and Trap" using a Coulson detector.

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**E.P.A. Method #608, "Organo-Chlorine Pesticides and PCBs"
using an electron-capture detector.**

**E.P.A. Method #615, "Chlorinated Herbicides" using diazo-
methane derivatization and electron-capture detection.**

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Analytical Results - By Barrel

A. Barrel #1

	<u>Sample I.D.</u>	<u>1,1-Dichloroethylene Conc., ppm</u>	<u>1,1-Dichloroethane Conc., ppm</u>
Week "0"	CC10	N.D.	N.D.
	PV10	N.D.	N.D.
	PB10	N.D.	N.D.
	PE10	N.D.	N.D.
Week "1"	CC11	N.D.	N.D.
	PV11	*	*
	PB11	820	3,200
	PE11	820	1,300
Week "2"	CC12	N.D.	N.D.
	PV12	*	*
	PB12	2,100	4,600
	PE12	1,600	3,900
Week "3"	CC13	N.D.	N.D.
	PV13	*	*
	PB13	970	2,900
	PE13	2,600	6,500
Detection Limit		0.001	0.001

*No data available, pipe failure (See cover page).

This report is applicable only to the sample received by the laboratory. The liability of the laboratory is limited to the amount paid for this report. This report is for the exclusive use of the client to whom it is addressed and upon the condition that the client assumes all liability for the further distribution of the report or its contents.

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B. Barrel #2

	<u>Sample I.D.</u>	<u>Trichloroethylene Conc., ppm</u>
Week "0"	CC20	N.D.
	PV20	N.D.
	PB20	N.D.
	PE20	N.D.
Week "1"	CC21	N.D.
	PV21	N.D.
	PB21	1,200 **
	PE21	430
Week "2"	CC22	N.D.
	PV22	110
	PB22	390
	PE22	510
Week "3"	CC23	N.D.
	PV23	*
	PB23	470
	PE23	390
Detection Limit		0.001

**This sample had free-flowing Trichloroethylene in the pipe at collection.

*No data available, pipe failure (See cover page).

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C. Barrel #3

	<u>Sample I.D.</u>	<u>2,4-D Conc., ppb</u>	<u>Banvel-D Conc., ppb</u>	<u>Dinoseb Conc., ppb</u>
Week "0"	CC30	N.D.	N.D.	N.D.
	PV30	N.D.	N.D.	N.D.
	PB30	N.D.	N.D.	N.D.
	PE30	N.D.	N.D.	N.D.
Week "3"	CC33	N.D.	N.D.	N.D.†
	PV33	*	*	*
	PB33	N.D.	N.D.	N.D.
	PE33	N.D.	N.D.	N.D.
	Detection Limit	1.0	10	1.0

*No data available, pipe failure (See cover page).

20734023

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D. Barrel #4

	<u>Sample I.D.</u>	<u>Chlordane Conc., ppb</u>
Week "0"	CC40	N.D.
	PV40	N.D.
	PB40	N.D.
	PE40	N.D.
Week "3"	CC43	N.D.
	PV43	N.D.
	PB43	N.D.
	PE43	N.D.
Detection Limit		0.1

20734024



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E. Barrel #5 ¹

	<u>Sample I.D.</u>	<u>Lindane Conc., ppb</u>
Week "0"	CC50	N.D.
	PV50	N.D.
	PB50	N.D.
	PE50	N.D.
Week "3"	CC53	33*
	PV53	12
	PB53	34
	PE53	15

Detection Limit 0.01

¹ This experiment is being repeated. Additional data points are also being obtained at seven (7) weeks.

*This is likely not cross-contamination as this sample was collected and analyzed prior to the others.

DATA CERTIFIED BY Roger A. Elliott

REPORT APPROVED BY Ken Namls

ANLAB/T. Ikesaki

lk

20734025

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SAMPLING INTERVALS

<u>Barrel #</u>	<u>Sampling Interval</u>	<u>Exposure Substances</u>
1	One week intervals for three weeks	1,2-Dichloroethane and 1,1-Dichloroethylene
2	One week intervals for three weeks	Trichloroethylene
3	At three weeks only	Dinoseb, Banvel-D and 2,4-D
4.	At three weeks only	Chlordane, technical
5	At three weeks only	Lindane

20734026

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AMBIENT TEMPERATURES (°F) *

<u>Date</u>	<u>High</u>	<u>Low</u>
11/23/82	57	46
11/24/82	57	45
11/25/82	48	43
11/26/82	50	46
11/27/82	55	44
11/28/82	57	52
11/29/82	52	48
11/30/82	56	50
12/1/82	57	44
12/2/82	53	44
12/3/82	61	45
12/4/82	59	44
12/5/82	53	47
12/6/82	52	49
12/7/82	57	44
12/8/82	61	40
12/9/82	61	39
12/10/82	57	39
12/11/82	60	38
12/12/82	50	40
12/13/82	46	37
12/14/82	47	43
12/15/82	55	46
12/16/82	60	47
12/17/82	63	50

*Taken from "The Sacramento Bee".

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MATERIAL DATA SHEET*

1,2-Dichloroethane...99+%, Lot #1223BJ, Aldrich Chemical Company, Inc., Milwaukee, WI 53233

1,1-Dichloroethylene (Vinylidene Chloride)...99%, Inhibited with 200 ppm hydroquinone monomethylether, Lot #0613JJ, Aldrich Chemical Company, Inc., Milwaukee, WI 53233

Trichloroethylene, stabilized, epichlorhydrin free, 100%, Lot #134623, Preservative-Diisopropylamine 0.004%, J.R. Baker Chemical Co., Phillipsburg, NJ 08865

49'er Gold Strike Weed Killer; 2,4-D plus Banvel-D; Active ingredients...Dimethylamine salt of Dicamba (equivalent to 2.1% 3,6-Dichloro-o-anisic acid) 2.5%, Dimethylamine salt of related compounds 0.4%, Dimethylamine salt of 2,4-D (equivalent to 13.3% 3,6-Dichlorophenoxy acetic acid) 16.0%; Inert ingredients 81.1%; Banvel-D Velsicol Chemical Corporation

Dow General Weed Killer, oil soluble, water emulsifiable contact herbicide; active ingredient, Dinoseb (2-sec-butyl-4,6-dinitrophenol) 55%, Inert ingredients 34%; Lot #WP810904-48, The Dow Chemical Company and Subsidiaries, Midland, MI 48640, U.S.A.

Gold Crest, C-100, Emulsifiable concentrate; Active ingredients, technical grade chlordane 72.0% (equivalent to 43.2% Octachloro-4,7-methanotetrahydroindane and 28.8% related compounds), petroleum distillates 21.0%, Inert ingredients 7.0%; Velsicol Chemical Corporation, 341 East Ohio Street, Chicago, Illinois 60611

Lindane 20 Miscible, Insecticide; Active ingredients, Lindane (gamma isomer of benzene hexachloride) 20.00%, Xylene 54.50%; inert ingredients 25.50%, Code 30296, F6002 54, FMC Corporation, Agricultural Chemical Group; Philadelphia, PA; Fresno, CA; Richmond, CA; Yakima, WA

*Taken from Product Label.

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