Original Comments 151-160

Index to Rulemaking File Underground Storage Tank Regulations Title 23, Waters Division 3, Water Resources Control Board Chapter 16, Underground Storage Tank Regulations <u>1985</u>

#151 ts

Products Research & Chemical Corporation
RESEARCH AND DEVELOPMENT LABORATORIES
2820 Empire Avenue
Burbank, California 91504
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Glendale, California 91209
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PRC

October 18, 1984

State Water Resources Control Board
P. O. Box 100
Sacramento, CA 95801

Attn: Mr. Harold Singer
Division of Technical Services

Dear Mr. Singer:

Following are our comments to the proposed subchapter 16, Regulations for Storage of Hazardous Substances, chapter 3, title 23, California Administrative Code. We request that these comments become part of the rulemaking file to be submitted to the Office of Administrative Law.

Section 2611 Exemptions

We believe that emergency tanks intended to accomodate extraordinary occurrences should be exempted from the provisions of this subchapter. The chemical process industry commonly uses underground tanks, located and controlled to capture run-off from sudden and unexpected releases of hazardous substances as a method of protecting the environment. The high cost of complying with the monitoring requirements of this subchapter would serve as a strong disincentive to the use of this very valuable method of protecting the ground water.

These emergency tanks usually are empty and only contain hazardous substances on rare occasions, usually several years apart. When they are used,they are emptied within a few hours. Therefore, there is not a significant risk of contaminating the ground water from the use of these emergency tanks.

In order to assure the safety of these emergency tanks, it might be possible to register them and require that releases of hazardous substances into them be reported.

Section 2620 definitions

"Existing Underground Tank"

This definition includes "any underground tank which has contained a hazardous substance in the past and as of January 1, 1984 had the physical capability of being used again". This is inconsistent with the definition of "underground storage tank" which is limited to a container "which is used for the storage of hazardous substances".

Received DTS
OCT 23 1984

The requirement to apply the provisions of this subchapter to tanks based on past useage or speculative possible future use is not necessary to accomplish the purposes of this regulation. This inclusion of potential use is not authorized by statute. Section 25280 of the Health and Safety Code defines "underground storage tank" by present tense use only.

"Tank"
The definition of tank is unclear because size is not limited. Although common sense would lead to the assumption that a one pint can would not be defined as a tank, and a 5 gallon pail would not, it is unclear at exactly what size a container becomes a tank.

"Existing Underground Tank" and "New Underground Tank"
These definitions are unclear because they fail to address a large category of undergound tanks, those which are currently physically in place, being used for non-hazardous substance storage and therefore not within the scope of this subchapter, and which at a later date begin to be used for hazarous substance storage.

We suggest that the definition of "existing underground tanks" be modified so that underground containers which are used for storage of non-hazardous substances and which otherwise meet the definition of "underground storage tank", and which at a future date begin to be used for the storage of hazardous substances, at that date would become "existing underground tanks".

Article 7. Closure Requirements
Section 2672 "Permanent Closure Requirements"
Subsection (b) specifies the requirements for removal of underground storage tanks and includes in paragraph (4) the requirements for removal for reuse. Subsection (c) specifies the requirements for closure inplace but is unclear because it fails to describe the requirements for closure in place by the method of reuse. This method of closure in place is a very important method. It would provide the ability to change the use of existing underground tanks to the storage of non-hazardous substances, thereby protecting the ground water from any possible future contamination, and yet making economically efficient use of the equipment.

Sections 2642, 2643, 2644, 2645, 2646 and 2647
The Health and Safety Code, section 25284.1 specifies in subsection (b) several "alternative" monitoring methods. In the herein referenced sections of the subchapter, the alternative methods are all required to be implemented. The statute only authorizes these as alternatives, not as multiple requirements.

Sincerely yours,

Melvin B. Young
Government Regulations Administrator

MBY:cid

151-B

Products Research & Chemical Corporation

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November 26, 1984

State Water Resources Control Board
P. O. Box 100
Sacramento, CA 95801

Attn: Mr. Harold Singer
Division of Technical Services

Dear Mr. Singer:

Following are our comments to the revised proposed subchapter 16, Regulations for Storage of Hazardous Substances, chapter 3, title 23, California Administrative Code, Dated Nov. 9, 1984. We request that these comments become a part of the rule making file to be submitted to The Office of Administrative Law.

Section 2611 Exemptions

Emergency tanks intended to accomodate extraordinary occurances should be exempted from the provisions of this subchapter. These tanks are located and controlled to capture run-off from sudden and unexpected releases of hazardous substances. They are usually empty and only contain hazardous substances on extremely rare occasions and for very short periods. Therefore, rather than being a significant risk of contaminating the ground water, these tanks are an important factor in protecting the ground water.

The use of a variance for these tanks is not applicable because a variance is for an "alternative method of construction or monitoring" [2681 (a)]. A variance also involves a large administrative burden, costly both to the Board and to the applicant. A total exemption from the provisions of subchapter 16 is the most appropriate method of avoiding unecessary permitting and monitoring of these tanks.

Section 2620 Definitions

"Existing Underground Tank" The definition includes "any underground tank which has contained a hazardous substance in the past and as of January 1, 1984 had the physical capability of being used again". The requirement to apply the provisions of this subchapter to tanks based on past or possible future use is not necessary to accomplish the purposes of the statute and is not authorized by statute. Section 25280 of The Health and Safety Code defines "underground storage tank" by present tense useage only.

We suggest that the definition of "existing underground tank" be modified so that underground containers which as of January 1, 1984 were used for the storage of non-hazardous substances and which otherwise meet the definition of "underground storage tank" and which at a future date begin to be used for the storage of hazardous substances, at that date would become "existing underground tanks".

Section 2672 "Permanent Closure Requirements"

With existing underground tanks, the most certain method of accomplishing the purposes of the statute is permanent closure. However, section 2672 fails to provide for the most effective method of permanent closure. Frequently, in an expanding chemical process operation, new tanks are added. When the operator plans to add a tank for a non-hazardous substance, it would be advantageous instead, to add a tank according to the requirements of section 2635, transfer a hazardous substance to it from an existing tank, clean the existing tank, and use it for storage of the non-hazardous substance. However, in order to make this a viable option, it is necessary that this practice be acceptable as a permanent closure of the existing tank.

Section 2643 Underground Storage Tank Testing

Subsection (b) specifies that tank testing methods shall be "capable of detecting a release of a hazardous substance at a rate of 0.05 gallons per hour or less". This requirement is unclear because the exact capability is not identified, but could be interpreted as any release at less than 0.05 gallons per hour.

We believe that the intent was actually to specify "0.05 gallons per hour or more".

Subsection (h) states that tanks "containing flammable or combustible liquids shall not be pressure tested using air or other gases".

The use of tank testing as a monitoring alternative will be necessary in many facilities in which there is not adequate access for drilling for vadose zone or groundwater monitoring. The most reliable available method of tank testing is gas pressure testing.

The potential fire hazard of pressurizing tanks containing flammable or combustible liquids can be avoided more satisfactorily by changing subsection (h) to read "using air or other oxygen containing gases".

Yours truly,
Products Research & Chemical Corp

Melvin B. Young
Government Regulations Administrator

MBY/cid

151-C HS

Products Research
& Chemical Corporation
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January 9, 1985

RECEIVED
JAN 15 1985
DIVISION OF WATER QUALITY

State Water Resources Control Board
Division of Water Quality
P. O. Box 100
Sacramento, CA 95801-0100

Gentlemen:

Following are our comments to the revised proposed subchapter 16, regulations for Storage of Hazardous Substances, Chapter 3, Title 23, California Administrative Code, dated December 28, 1984. We request that these comments become a part of the rulemaking file to be submitted to the Office of Administrative Law.

Section 2611 Exemptions

Emergency tanks intended to accomodate extraordinary occurances should be exempted from the provisions of this subchapter. The chemical process industry commonly uses underground tanks located and controlled to capture run-off from sudden and unexpected releases of hazardous substances as a method of protecting the environment. The high cost of complying with the monitoring requirements of this subchapter would serve as a disincentive to the use of this very valuable method of protecting the gound water.

These emergency tanks are normally empty and contain hazardous substances on rare occasions only, usually several years apart. When they are used, they are emptied within a few hours. Therefore, rather than being a significant risk of contaminating the ground water, the use of these tanks is an important factor in protecting the ground water from contamination.

The use of a variance for these tanks is not applicable because a variance is for an "alternative method of construction or monitoring" [2681 (a)]. An exemption from the provisions of subchapter 16 is the most appropriate method of avoiding the unnecessary regulating of these tanks.

Yours truly,

Received DTS
JAN 15 1985

Melvin B. Young
Government Regulations Administrator

MBY/cid

FUELING COMPONENTS GROUP
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TELEPHONE (513) 870-3100

#152 HS

19 October 1984

State of California
State Water Resources Control Board
Paul R. Bonderson Building
P.O. Box 100
Sacramento, California 95801

Attention: Harold Singer
Division of Technical Services

Re: PROPOSED REGULATIONS GOVERNING UNDERGROUND STORAGE OF HAZARDOUS SUBSTANCES, TO BE CODIFIED IN SUBCHAPTER 16 OF CHAPTER 3, TITLE 23, CALIFORNIA ADMINISTRATIVE CODE (23 CAC SECTION 2610-2704)

My comments relate in particular to Section 2635 Sections (f) and (g).

In subparagraph (3) we believe an acceptable automatic shut off device should not be required to "stop" the flow completely since it is desirable to drain the hose into the underground tank. We believe one acceptable, simple means of providing overfill protection and shut off can be done with a float vent valve. If a valve is installed in the tank vent line with Stage I vapor recovery (or without), the flow will be slowed giving an indication to the person doing the tank filling that the tank is near full. With proper sizing of this float vent valve this can be accomplished, providing sufficient ullage space to allow the driver time to realize he has attempted to overfill the underground tank and more than adequate capacity to drain the hose into the tank. This is accomplished when the valve seats and vapors can only escape through a calibrated orifice to allow approximately 3.5 GPM of liquid flow from the transport into the underground tank. If this is used a very simple system results with few moving parts.

I am enclosing a copy of a typical ball float vent valve system which is shown in the OPW Brochure OPS-84. The system shown in Figure 1 corresponds to the OPW A-7 Stage I Vapor Recovery System. The Stage I vapor recovery portion of this has been approved by the California Air Resources Board (a copy of Air Resources Board Certification G-70-2-G is attached). This system using a ball float valve has also been approved in other parts of the U.S. for overfill protection and we believe this type system allowing for a simple, trouble-free overfill protection should be allowed in both Paragraphs (f) and (g) referred to above.

Thank you for the opportunity to comment on your proposed rulemaking.

Very truly,

Glenn E. Moore

Glenn E. Moore
Vice President - Engineering

Received DTS
OCT 23 1984

jm
Enclosures

State of California
AIR RESOURCES BOARD

Executive Order G-70-2-G

Relating to the Modification of the Certification of the OPW Model A-7 2 Point Vapor Recovery System for Underground Storage Tanks at Gasoline Service Stations.

WHEREAS, the Air Resources Board (the "Board") has established, pursuant to Sections 39600, 39601, and 41954 of the Health and Safety Code, certification procedures for systems designed for the control of gasoline vapor emissions displaced during the filling of underground tanks at service stations ("Phase I vapor recovery systems") in its "Certification Procedures for Gasoline Vapor Recovery Systems at Service Stations" as last amended December 4, 1981 (the "Certification Procedures"), incorporated by reference in Section 94001 of Title 17, California Administrative Code;

WHEREAS, the Board has established, pursuant to Sections 39600, 39601, and 41954 of the Health and Safety Code, test procedures for determining compliance of Phase I vapor recovery systems with emission standards in its "Test Procedures for Determining the Efficiency of Gasoline Vapor Recovery Systems at Services Stations" as last amended September 1, 1982 (the "Test Procedures"), incorporated by reference in Section 94000 of Title 17, California Administrative Code;

WHEREAS, Dover Corporation/OPW Division ("OPW") has applied for certification to add optional components, for the purpose of overfill protection, to the certification of the existing OPW Model A-5 Phase I vapor recovery system. The modified system, referred to as an OPW Model A-7 Phase I vapor recovery system, incorporates an OPW Model 233 VM Extractor S/A, and an OPW Model 53 VM Float Vent Valve.

WHEREAS, the OPW Model A-7 Phase I vapor recovery system has been evaluated pursuant to the Board's Certification Procedures and Test Procedures;

WHEREAS, Section VIII-A of the Certification Procedures provides that the Executive Officer shall issue an order of certification if he or she determines that a vapor recovery system conforms to all of the requirements set forth in Sections I through VII;

WHEREAS, I find that the OPW Model A-7 Phase I vapor recovery system conforms with all the requirements set forth in Sections I through VII of the Certification Procedures and is at least 95 percent efficient when connected to a vapor tight cargo tank equipped with compatible fittings for all installations except those service stations equipped with Red Jacket and Healy Phase II vapor recovery systems.

NOW THEREFORE, IT IS HEREBY ORDERED that the certification, Executive Order G-70-2-F, issued on July 14, 1981 for the OPW Model A-5 Phase I vapor recovery system (Exhibit 1), is hereby modified to allow the optional use of the OPW Model A-7 Phase I vapor recovery system on underground gasoline storage tanks at service stations except those service stations equipped with Red Jacket and Healy Phase II vapor recovery systems. The system is shown in Exhibit 3; interchangeable equipment between the OPW Models A-5 and A-7 vapor recovery systems is shown in Exhibit 2.

IT IS FURTHER ORDERED that the use of pressure-vacuum valve shall require the prior approval of the local fire chief and that the tanks and piping shall comply with the appropriate General Industry Safety Orders and in particular the provisions of Articles 144, 145, and 146 thereof.

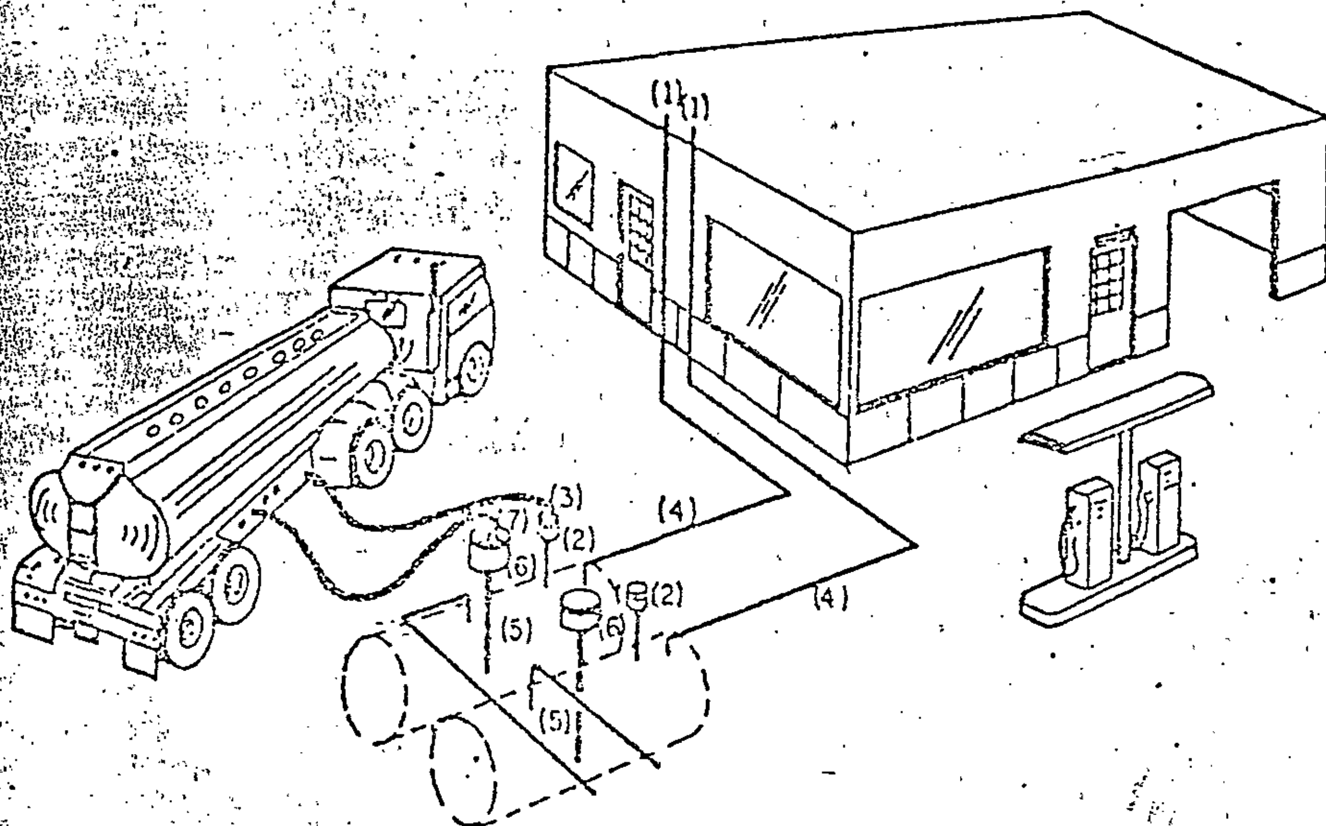
IT IS FURTHER ORDERED that compliance with the applicable certification requirements and rules and regulations of the Division of Measurement Standards, the Office of the State Fire Marshal, and the Division of Occupational Safety and Health of the Department of Industrial Relations is made a condition of this certification.

IT IS FURTHER ORDERED that the system certified hereby shall in actual use return to the delivery tanks a minimum of 95 percent by weight of the gasoline vapors displaced from the underground storage tank. Compliance with this criterion shall be a condition of this certification and if not met shall constitute grounds for the revocation, suspension, or modification of this certification

IT IS FURTHER ORDERED that any alteration of the equipment, parts, design, or operation of the configurations certified hereby, is prohibited, and deemed inconsistent with this certification, unless such alteration has been approved by the undersigned or the Executive Officer's designee.

Executed at Sacramento, California this 14 day of Apr, 1984.

James D. Boyd
Executive Officer



PARTS LIST

(1) VAREC 2010-811 P/V Valve (Optional)

(2) OPW 1611-AV3" Dry break with an OPW 1711T or OPW 1711TK Locking cap.

(3) OPW 1711-V3" Elbow.

(4) 2" Vent pipe.

(5) Aluminum drop tube (extend to within 6" bottom of tank).

(6) OPW 61AS Adapter or OPW 633T Adapter

(7) OPW 60 Elbow or OPW 60T Elbow

Note: Vent pipes may be manifolded.

EXECUTIVE ORDER G-70-2-G

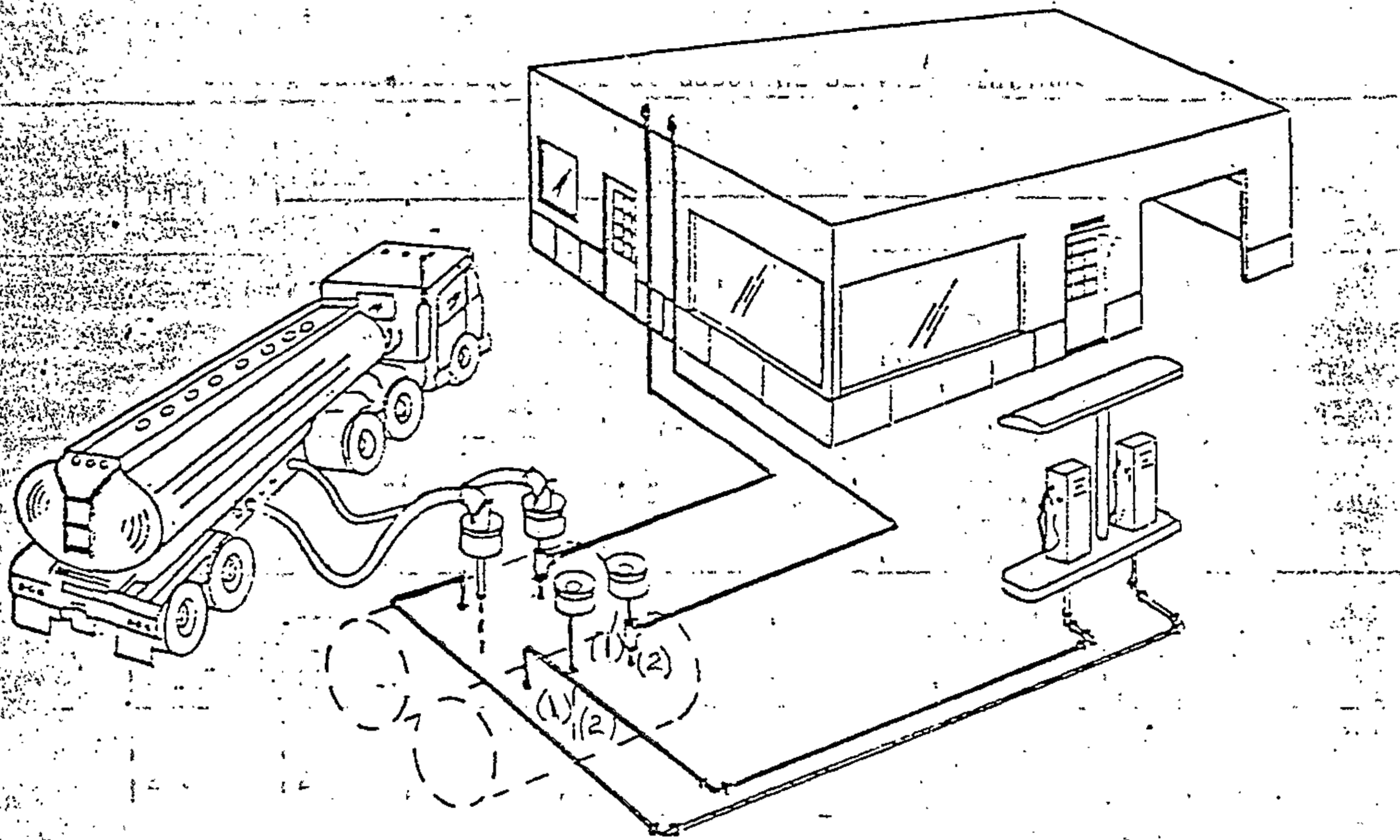
EXHIBIT 1

OPW SYSTEM A TYPE 5
VAPOR RECOVERY SYSTEM

EXHIBIT 2

Equipment Approved for Use as Interchangeable with the OPW System A Type 5 and A-7 Vapor Recovery Systems For Underground Storage Tanks at Gasoline Service Stations

Manufacturer	Fill Tube	Dust Caps		Adaptors		Elbows		Pressure Vacuum Relief Valve
		Fill	Vapor	Fill	Vapor	Fill	Vapor	
OPW	61 T	62 634 TT 62 TT	1711 TK 1711 T	61 AS 633 T	1611 AV3	60 60 T	1711 V3 1711 VP 1711 VT	95 UTE
Universal	723	731 FT 732 FT	0612 VC	724 S 727	0611 V3			46
EBW	782	777 775	304	778 776	300			802
McDonald	245	268C 267C		236 W 268 A 267 A				
N. I.		64-4 32-4	611-Vr3		A611 DB			
Emco-Wheaton	A20 Sh-63	A 39 A 29 A 49	A 82 491521 A97 A99	A 30 A 50	A 76		F 77	A 84
Andrews	TF	54 FPC 54 LC 162 LC	400 DC-L	54 AG 161 AS		56 TFR		
Varec								2010-81
Evertite				97 A		99 C		
Parker-Hannifin							F 223(A) F 225	
York-Serv, Inc.				*101* *102*				
Pomeco				121				



PARTS LIST

(1) OPW 233VM Extractor S/A.
(2) OPW 53VM Float Vent Valve.

Note: All other acceptable components are listed on Exhibit 1 and Exhibit 2.

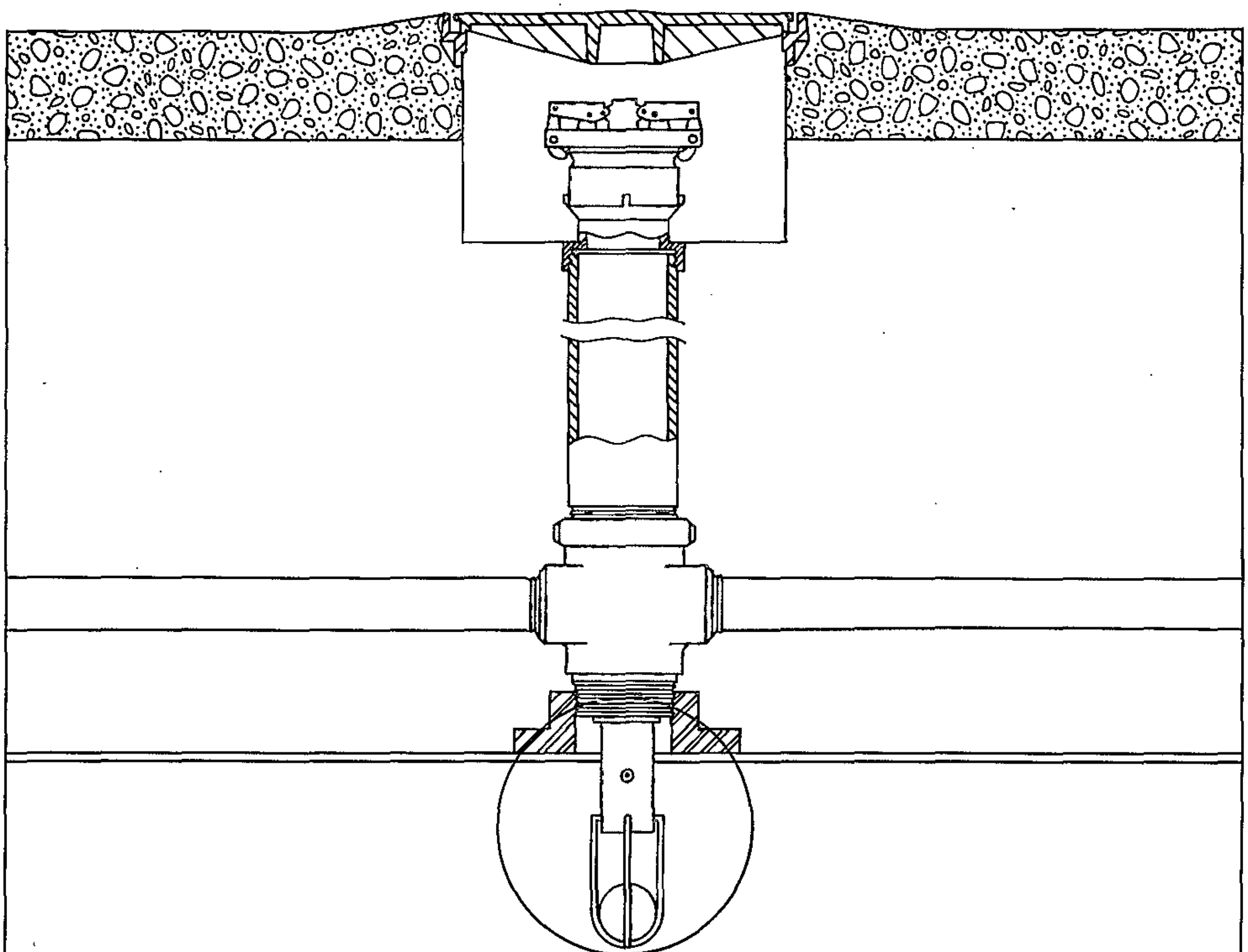
The OPW Model A-7 Phase I vapor recovery system is not approved for use at service stations equipped with Red Jacket or Healy Phase II vapor recovery systems.

Executive Order G-70-2-G
EXHIBIT 3
OPW MODEL A-7
PHASE 1 VAPOR RECOVERY SYSTEM

Brochure OPS-84
June 1984

OPW®

Overfill Prevention Systems



The 'Heart' of the System

The OPW® Overfill Systems... How They Work

Petroleum marketers have been challenged to reduce the possibility of fuels getting into the soil and aquifers. One way that fuel can reach the underground is by accidental overfilling during a product drop.

The OPW overfill prevention system is designed to reduce the flow rate into the underground tank when there is approximately 100 gallons of ullage available. This slowing of the flow rate to approximately 3.5 gallons per minute can be observed by the transport operator who shuts off the necessary valves and stops the product drop.

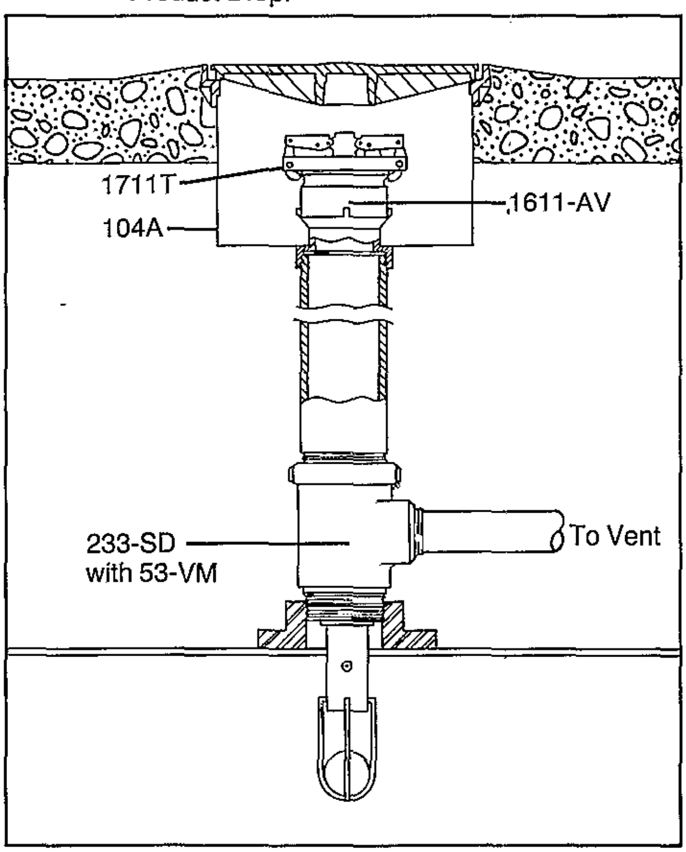
The heart of the OPW overfill system is the patented OPW 53-VM Float Vent Valve. This float valve has a stainless steel ball which seats tightly against a specially designed valve seat, cutting off the flow of vapors to the Stage I vapor recovery system, or the tank vent. When the valve is seated vapors escape only through an orifice calibrated to allow approximately 3.5 gallons a minute of liquid flow from the transport into the underground tank. The time before actual overflow is dependent upon several conditions such as size of tank, amount of liquid in the tank truck, underground tank size, and the depth to which the float vent valve is inserted into the tank. Under typical conditions in a 10,000 gallon underground tank, the time from float vent valve closure to overflow is greater than 30 minutes.

After float vent valve closure and transport tank valve shut off, the delivery hose must be drained into the underground tank. Liquid connection can be removed after pressure relieves through vent hole.

The OPW 53-VM float vent valve extractor related mounting hardware can be installed in several configurations shown below. In all cases, it is recommended that an OPW extractable fitting be installed for the following reasons:

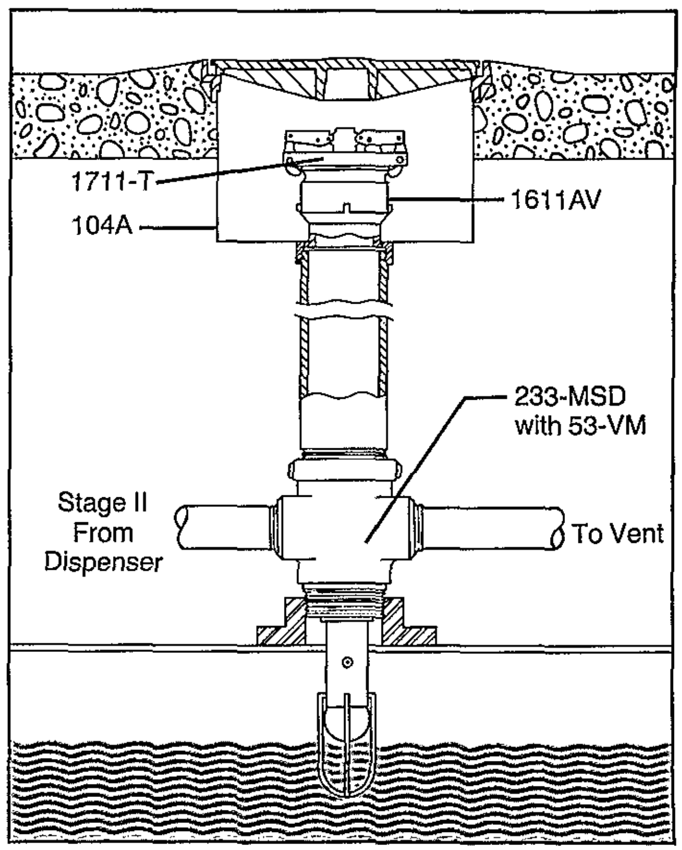
1. To allow the valve to be removed and a plug installed for tank tightness testings.
2. To allow the valve to be removed for tank servicing activities.

Figure 1: Stage I Vapor Recovery And Separate Product Drop.



This shows a system where Stage II vapor recovery is not required and utilizes the OPW 1611-AV for Stage I vapor recovery mounted above a 233-SD (includes OPW 53-VM). Access is readily available to the 53-VM for extraction.

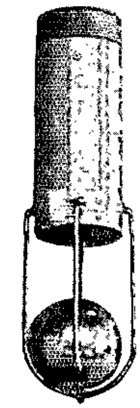
Figure 2: Combined Stage I And Stage II Vapor Connection.



This illustration shows an OPW 233-MS (including the OPW 53-VM) with a 1611-AV adaptor for Stage I vapor recovery. The manifolded vent lines provide one connection for the vent and the other connection for the Stage II vapor recovery fitting if required.

NOTICE: OPW Overfill Systems Should only Be Used on Gravity Drop Systems.
DO NOT Use Where Pump Off Unloading is Used.

The "Heart" of the OPW Overfill System



The heart of the OPW Overfill System is the patented 53-VM Float Vent Valve. This valve is superior to other valves because of its stainless steel ball float and specially designed coated seat which helps eliminate valve hang up due to corrosion.

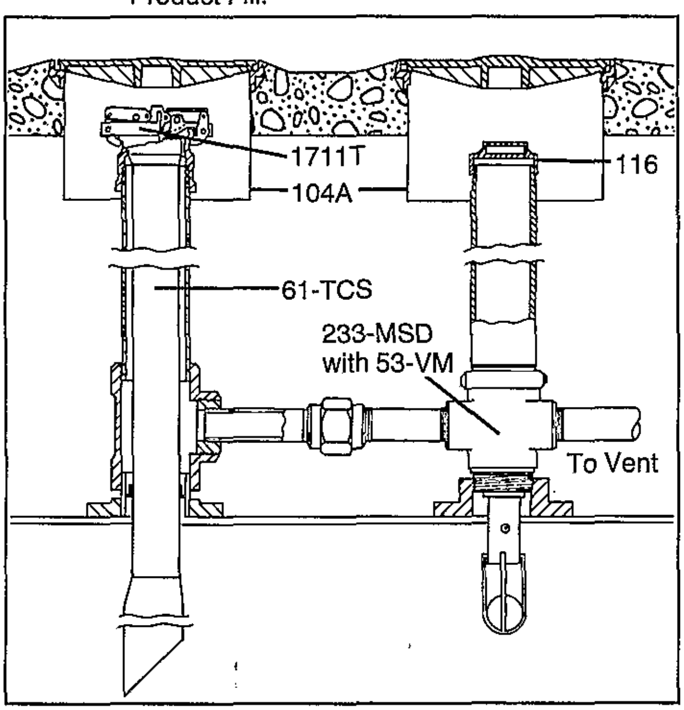
The OPW 53-VM is designed with a specially calibrated orifice which controls the vapor venting to a known range. This feature allows the system to be consistently reliable for overfill protection.

Features and Benefits

Advantages of the **OPW OVERFILL SYSTEM**

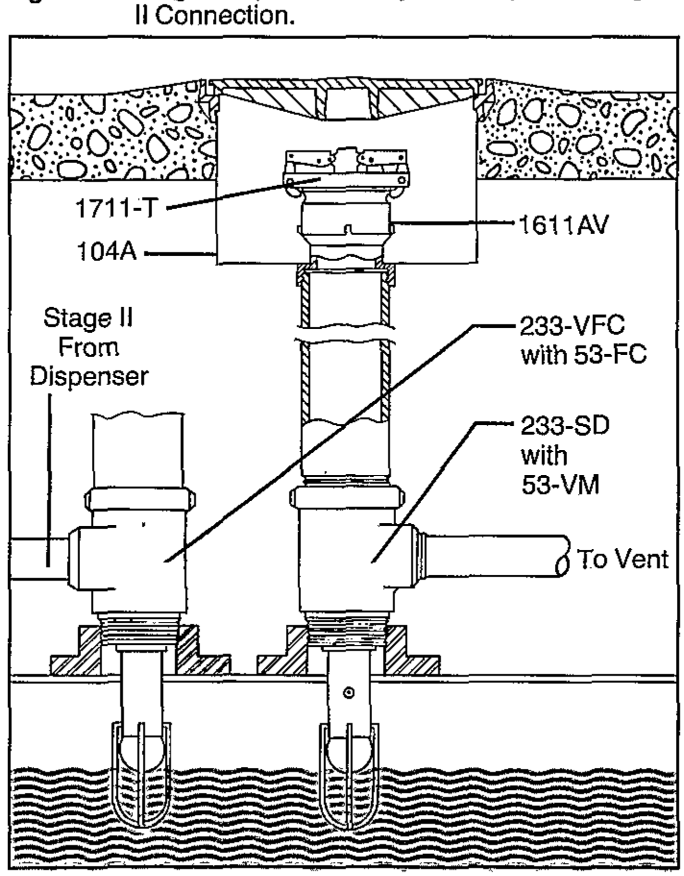
1. ***Reliable Proven Concept.*** The basic concept has been proven in numerous applications to prevent product contamination.
2. ***Corrosion Resistance.*** The OPW float vent valve is coated with a fuel resistant polymeric material to resist corrosion and valve hang up.
3. ***Ease of Servicing.*** The float vent valve assembly can be easily withdrawn eliminating the need to dig to the tank for service. Allows tank to be plugged for testing.
4. ***Product Line Flexibility.*** The various OPW float vent valves and extractor fittings assemblies can be combined to meet various piping requirements and/or system operating characteristics.
5. ***Adaptable.*** Many tanks are already equipped with OPW extractor assemblies and therefore overfill prevention can be achieved by installing the OPW 53-VM-0060 calibrated orifice valve assembly.
6. ***Ease of Testing.*** With use of OPW Overfill Systems, the extractors are easily plugged for testing.

Figure 3: Coaxial Stage I Vapor Recovery And Product Fill.



This shows an overfill protection for co-axial system. It shows the OPW 233-MSD (including the OPW 53-VM) used with co-axial Stage I vapor recovery. An OPW seal is used to close off the co-axial vapor return line from the tank through the co-axial drop tube. All vapors for Stage I vapor recovery are returned through the 53-VM and connecting pipe hence to the co-axial tight fill elbow. An extractor is used with this system so access is readily available to the slowdown valve. The normal breathing vent line is also connected through this fitting.

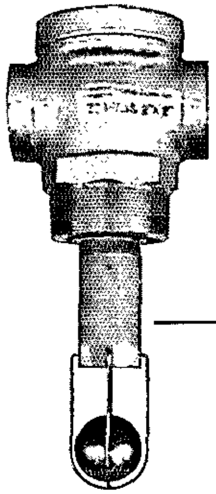
Figure 4: Stage I Vapor Recovery With Separate Stage II Connection.



This illustration shows a separate tank connection for the Stage II inlet but utilizing an OPW 233-SD extractor (including a 53-VM). The OPW 233-VFC (including an OPW 53-FC) is shown on the Stage II connection.

NOTICE: OPW Overfill Systems Should only Be Used on Gravity Drop Systems.
DO NOT Use Where Pump Off Unloading is Used.

Overfill Prevention Components



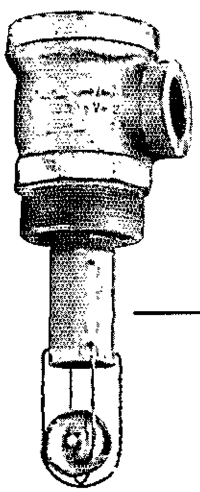
233-MSD-2422
Valve/Extractor Assembly

233VM
4" × 2" × 2" "Cross"

53VM
Float Vent Valve

OPW 61-TCS-4"

Drop tube with seal used with Co-axial Vapor Recovery System *if using float valve permits usage* of parts of existing systems.



233-SD-0100
Extractor Assembly

233V
4" × 2" "Tee"

53-VM
Float Vent Valve

Vapor Seal with clamp (to be attached after determining seal location.)

OPW® Vapor Valve Extractor Assemblies	Vapor Valve/Extractor Assemblies Consisting of:				
	Float Vent Valves		*Extractor*		*Cage*
	53FC-0046 (No Hole)	53VM-0060 (Calibrated Orifice)	233V-4420 4" × 2" 'Tee'	233VM-4422 4" × 2" × 2" 'Cross'	H8932
233VFC-6065	●		●		●
233SD-0100		●	●		●
233MSD-2422		●		●	●

OPW® Float Vent Valves are Covered Under Patent No. 3,736,950

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NOTICE
OPW products should be used in compliance with applicable federal, state and local laws and regulations. Product selection should be based on physical specifications *and limitations* and compatability with the environment and material to be handled. OPW MAKES NO WARRANTY OF FITNESS FOR A PARTICULAR USE.

Fueling Components Group
DOVER CORPORATION / OPW DIVISION
9393 Princeton-Glendale Road
P.O. Box 405003 • Cincinnati, Ohio 45240-5003
Telephone 513/870-3100

#153 HS

Agricultural Council of California

REPRESENTING FARMER COOPERATIVES
SINCE 1919

STATE WATER RESOURCES CONTROL BOARD
PROPOSED UNDERGROUND TANK REGULATIONS
October 23, 1984

This written testimony regarding the adoption of draft regulations governing underground storage of hazardous substances is submitted by Lucinda Chipponeri, Governmental Relations Specialist for the Agricultural Council of California, P.O. Box 1712, Sacramento, 95808. The Agricultural Council is a private association representing farmer-owned bargaining, marketing, processing and service cooperatives. Because cooperatives are comprised of individual farmers, this association is interested in both production agriculture and activities related to the processing of food and fiber. The Agricultural Council of California is concerned about three aspects of the draft regulations: 1) the on-farm exemption, 2) the exclusion of a farm definition and 3) the cost impact of the regulations on private industry.

Section 2611(3) states the on-farm exemption: "Underground storage tanks that are located on a farm and only store motor vehicle fuel which is used only to propel vehicles used primarily for agricultural purposes." The section also defines "vehicles": "Vehicles used primarily for agricultural purposes is meant to include non-licensed vehicles and vehicles utilized in the production of agriculture at the farm site." This definition includes all non-licensed farm vehicles (such as tractors, harvestors, etc.) but excludes licensed pick-up trucks. The use of the word "and" in the definition means a vehicle must meet two criteria: 1) it must be non-licensed <u>and</u> 2) utilized in the production of agriculture at the farm. The Agricultural Council feels that licensed vehicles, particularly pick-up trucks, must be included in the definition of vehicles used primarily for agricultural purposes.

Received DTS
OCT 23 1984

A pick-up is vital to the daily production of agriculture. It is the main source of transportation a farmer relies on. Uses of pick-ups include, but are not limited to, crop and animal inspection, supervision of farm workers in the fields, irrigation, hauling, and/or pulling implements of husbandry and hauling supplies to and from ranches, farms and stores.

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Visalia
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San Joaquin

The on-farm exemption in Assembly Bill 1362, Section 25280(m)(2) states: "Tanks which are located on a farm and store motor vehicle fuel which is used only to propel vehicles used primarily for agricultural purposes." This language is appropriate and should be used in the proposed regulations. If the State Water Resources Control Board is compelled to define "vehicles used primarily for agricultural purposes," then the Agricultural Council asks the following amendment be made: Vehicles used primarily for agricultural purposes is meant to include non-licensed vehicles or vehicles utilized in the production of agriculture." The Agricultural Council believes the legislative intent included licensed and non-licensed vehicles used primarily for agricultural purposes.

Section 2611(3) does not define "farm". For purposes of clarification and consistency among local agencies, the Agricultural Council asks that the following definition be included in the final regulations before implementation: A farm is any place from which $1,000 or more of agricultural products were sold or normally would have been sold during the calendar year. This definition is in accordance with a 1975 agreement among the U.S. Department of Agriculture, the Office of Management and Budget and the Bureau of Census.

In conclusion, the Agricultural Council believes the implementation of Assembly Bill 1362 and the adoption of the SWRCB proposed regulations are likely to have a significant adverse economic impact on small business. For instance, California cotton ginners that store motor vehicle fuel underground estimate the average cost of compliance at $10,000 per tank. The statewide fiscal impact is estimated at $1 million. The local agencies implementing the program will have some discretion as to the appropriate compliance methods and the timing for implementation of these methods. This discretion should take into account the limited resources available to many small businesses. The delicate balance between the health risk assessment and economics can be achieved. Water quality and the general public health must be protected, but small businesses must also be allowed to feasibly operate.

#154

HS

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TELEPHONE
(415) 552-7272

October 23, 1984

HAND-DELIVERED

State Water Resources Control Board
Post Office Box 100
Sacramento, CA 95801

Attn: Harold Singer
Division of Technical Services

Re: Comments on proposed regulations governing underground storage of hazardous substances.

Dear Mr. Singer:

These comments are submitted by MPC Containment Systems, Ltd., a manufacturer of high performance secondary containment liner systems. This letter states our general comments, and an attachment to the letter contains proposed amendments to the draft regulations.

Summary

These comments focus on the issue of the required strength and integrity of membrane liners in secondary containment systems or in conjunction with underground storage of motor vehicle fuels. In their current form, the regulations add nothing to the general statutory mandate that such secondary containment systems be capable of storing the hazardous substance "for the period of time necessary for recovery" or, in the case of motor vehicle fuels, intercept and direct a leak to a monitoring system, provide early leak protection, and protect ground water. The Legislature clearly expected administrative interpretation of these general terms. About such regulatory substance, the statutory terms provide no guidance to local officials, tank owners or operators, installers, fabricators, or the general public.

The use of inadequate or inappropriate liner material could result in the release of hazardous material into the ground with potential contamination of water

Received DTS
OCT 23 1984

supplies. It is essential that the regulations provide and define criteria to ensure that liners utilized in such systems fulfill the general statutory mandates. The Legislature delegated this authority to the State Water Resources Control Board, and accordingly it is the State Board's regulations which must provide the needed information for all affected parties.

These comments suggest a number of specific criteria, including permeability and suitability. Suitability relates to such properties as volume swell, change in elongation, brittleness, rate of transport and rate of solubility. We respectfully request that the Agency staff develop specific testing methodologies and standards for inclusion in the regulations.

In the attached proposed amendments, we have defined criteria (permeability, swell, elongation, brittleness, transport, and solubility), and we have proposed specific test methodologies and standards for the criteria of permeability. For the remaining criteria, we have set up proposed language for the test methodologies and standards without indicating specific numbers. We will supply you with our view of the methodologies and standards relative to these remaining criteria in the next few days.

The Need for Criteria

The statutory provisions concerning the nature of secondary containment systems are stated in terms which are not defined by the statute, resulting in a statement of general guidance by the Legislature which was intended to be specifically defined through the current rule-making. Health and Safety Code section 25284(a)(2) provides simply that secondary containment be capable of storing the hazardous substance "for the maximum anticipated period of time necessary for the recovery of any released hazardous substance." In the case of systems related to the installation of certain specified single-walled tanks for storage of motor vehicle fuel, such secondary systems must (1) intercept and direct the leak to a monitoring well; (2) provide early leak detection and response; and

(3) protect the groundwater from releases. (Section 25284(a)(7).)

Terms such as "time necessary for . . . recovery" and "protect the groundwater" are general statements of legislative intent which on their face defer to the expertise of the specified regulatory body, in this case the State Water Resources Control Board. The Legislature recently declared that its intent in enacting the chapter was "to establish orderly procedures that will ensure that newly constructed underground storage tanks meet appropriate standards . . . ." (1984 Stats. ch. 1038, sec. 1; AB 3565.) The general statutory language standing without administrative interpretation would clearly fail to "establish orderly procedures" or ensure that storage facilities meet "appropriate standards." Thus, regulations which fail to provide guidance in this area violate the intent of the Legislature in passing the law.

The draft regulations in their current form do not provide sufficient guidance. Section 2631(c) merely repeats the statutory language; the statutory terms of "time necessary for the recovery" of the released substance is restated in the regulations in terms of "time sufficient to allow detection and recovery." Subsections 2633(b) and (d) which treat similar systems in the context of motor vehicle fuel storage refer the reader back to the same general statements. These provisions do not constitute the guidance the Legislature clearly intended, and are facially incomplete since they restate the standard in the same conceptual term (time) without providing any new parameters at the administrative level.

It is unlikely that the Board could make a precise determination which was expressed in terms of units of time. As was indicated in your proposed Statement of Reasons, there are substantial uncertainties as to the actual duration of detection, recovery, and clean-up under actual field conditions. Given the enormous variety of tank installations, alarm system configurations, and secondary containment systems, it is impossible to establish one number which would represent the maximum period of time. Some detection may occur immediately. Under certain worst case, but definitely possible conditions, detection could be substantially delayed.

For example, a typical motor vehicle fuel installation may consist of three 10,000 gallon tanks in a bed of sand or gravel. Small, undetected leaks in these tanks could result in the slow saturation of large portions of the sand adjacent to the liner membrane. If the membrane were unsuitable for the stored material or relatively permeable, the fuel would pass through the membrane without ever triggering the alarm. This condition could exist for a substantial period of time before enough fluid accumulated to set off the alarm system. Alternatively, it is quite possible that the alarm system would not function and that other available testing methods would not indicate the leak. Given these uncertainties, other criteria than simple time must be utilized to establish liner capabilities which meet the general statutory mandate of allowing ample time for detection and clean-up and protection of groundwater.

A precise definition of liner capability is also necessary to ensure that the statute is enforceable and to protect both tank owners and the general public from the liabilities associated with faulty installations which must be removed later at great expense after the release into groundwater supplies has already occurred. The entire purpose of this regulatory exercise is to ensure (1) that tanks which are installed will not leak; and (2) that owners and operators of tanks which leak be required to take corrective measures and be subject to civil and criminal penalties. Neither goal is possible without the clear definition of what constitutes a legal installation. In the case of liners, there is simply no way that a liner membrane manufacturer, a liner fabricator, a tank installer, or a tank owner or operator can relate terms such as "time necessary for recovery" or "protection of groundwater" to specific products. Similarly, local officials, especially in small jurisdictions, have no way of dealing with those terms, and absent specific guidance from this Board, no way of evaluating the suitability of the specific material proposed. Finally, absent specific standards, prosecution by a district attorney or a deputy attorney general becomes problematic.

The creation of specific criteria such as permeability, volume swell, change in elongation, brittleness, etc. addresses these problems. Such determinations would carry out the intent of the Legislature that "appropriate standards" be developed. All parties involved in the installation of facilities would know in advance the applicable performance criteria for liners. Local officials, perhaps unfamiliar with the details of the regulations (an occurrence likely to occur more often than not in smaller jurisdictions), would simply be able to look through applications to determine if the necessary certifications were present. Finally, enforcement would become easier where specific standards permitted quick factual determinations of compliance. It is much easier, for example, to prosecute a drunk driver where there is a specific standard for intoxication than where the complex and subjective question of drunkenness must be relitigated in each situation.

Proposed Criteria

Permeability. Permeability is the rate of transfer of a volatile material over time and distance. Obviously, it is essential that membrane liners in secondary containment systems possess relatively low rates of permeability. As indicated above, either a slow leak or a problem with the leak detection system could result in a situation where a relatively permeable membrane would allow the release of the stored substance into adjacent groundwater.

Such a situation is far from hypothetical. For example, the three tanks in a typical gasoline station installation could leak 3.6 gallons per day without such leaks showing up in typical tank testing procedures. If such a slow leak were distributed relatively evenly throughout the liner installation (perhaps by difusion in the sand adjacent to the tanks), the amount of liquid would equal .4 ounces per square foot. There are a number of liner membranes available on the market which have a permeability of greater than .4 ounces per square foot, and if these liners were used in the installation, the leaking material would be steadily released without ever setting off an alarm.1/

In order to set a substantial margin of safety, we have proposed in the attached amendments a permeability standard of .25 ounces per square foot per 24 hours. We will attempt to provide a more refined number in the next few days for your consideration, but some definition is obviously necessary. Note that we have eliminated the thickness parameter from the proposed standards since it is the ultimate performance which is of concern in these regulations, not the particular thickness of the material selected for a given installation.

Suitability. As indicated above, applicable statutory provisions require that secondary containment contain the stored material for a specific period of time, protect groundwater, and in the case of non-motor vehicle fuel installations, be constructed so as to "prevent structural weakening as a result of contact with any released hazardous substance." (Section 25284(a)(2) and (7).) Impermeability in and of itself is insufficient to fill the statutory mandate. Substances which are relatively impermeable may interact with the stored substance in such a way as to lose their structural integrity and leak. For example, many liner materials swell when placed in contact with motor vehicle fuels. Such swelling may initially appear to reduce permeability. However, the swelling may also indicate impending problems with the integrity of the material. Swelling decreases density, increases porosity

---

1. Per NFPA 329, each 10,000 gallon tank could leak 0.05 gallons/hour without detection by standard tank leak measuring devices. Thus 3 X (.05 X 24 hrs.) = 3.6 gal./day. [(3.6 gal./day) ÷ (34' X 34')] X 128 oz./gal. = .398 oz./ft.^{2}/day.

which in turn increases the possibility that the liquid phase of the stored material will pass through the membrane. Other proposed parameters relative to suitability are:

- -- Change in elongation, that is, increase or decrease in the elastimer characteristics of the membrane;
- -- Brittleness and/or change in hardness of the membrane;
- -- Rate of transport of the liquid phase of the material through the membrane; and
- -- Rate of solubility of the membrane in the containment fluid.

Taken together, these criteria address the statutory mandate that any secondary containment system which includes a membrane liner maintain its integrity when placed in contact with a stored substance. Please note that we have proposed that testing parameters for suitability be expressed in percentage terms. Again, this is to equalize test results from material of varying thicknesses.

Liner seams. The proposed regulations also require that seam strength relate to the strength of the parent material. This addresses the problem of liners which are fabricated or installed using adhesive material which creates seams of inferior strength, permeability, and suitability for the proposed installation.

Installation. Improper installation may result in a secondary containment system which contains leaks at the outset. If these leaks are substantial, they may allow substantial leaks from primary containment systems to go undetected. Our proposed amendments include the requirement that liner manufacturers or fabricators be associated either directly or indirectly with the installation.

Thank you for the opportunity to submit these comments. We will supply additional material relating to the issues raised in these comments as soon as we obtain it. If you have any questions, please do not hesitate to call us.

Sincerely,

SHUTE, MIHALY & WEINBERGER

Marc B. Mihaly

MARC B. MIHALY

Attorneys for MPC Containment Systems, Ltd.

MBM:ad
Enc.

PROPOSED AMENDMENTS TO SECTION 2620 (Definitions)

"Membrane liner" means any membrane sheet material fabricated into a system for secondary containment.

"Membrane manufacturer" means the company which processes the constituent polymers into membrane sheet from which the membrane liner is fabricated into a system for secondary containment.

"Membrane liner fabricator" means the company which converts the liner membrane sheeting into a system for secondary containment.

PROPOSED AMENDMENTS TO SECTION 2631

2631. Construction Standards for New Underground Storage Tanks.

(a) Primary and secondary levels of containment shall be required for all new underground tanks used for the storage of hazardous substances as defined in Article 2.

(b) All primary containers shall be product-tight.

(c) All secondary containers shall be constructed of materials of sufficient thickness, density, and composition to contain the hazardous substance for a period of ~~at-least-twice-the maximum-anticipated~~ time sufficient to allow detection and recovery of leakage from the primary container. Systems for secondary containment utilizing membrane liners shall merit the following additional requirements:

(1) The membrane liner shall have a permeability factor of 0.25 ounces or less per square foot per 24 hours. Such permeability shall constitute the maximum rate of the transport of the hazardous substance proposed for storage over time pursuant to the procedures outlined in ASTM-D 814 or the equivalent.

(2) The membrane liner shall be suitable for containment of the hazardous substance proposed for storage which may leach from or escape the primary containment system. Such suitability is present if and only if the membrane liner material meets the following standards:

(A) Volume swell: after a period of emersion per ASTM ______ for ______ hours the volume swell shall not exceed ______ percent of the original liner membrane material thickness, and weight loss of the liquid phase shall not exceed ______ percent.

(B) Change in elongation: the maximum change in elongation per ASTM ______ after ______ hours of emersion in the stored substance shall not exceed plus or minus ______ percent of the original elongation.

(C) Brittleness: The liner membrane material Shore A hardness after ______ hours of emersion in the hazardous substance per ASTM ______ shall not change plus or minus ______ percent of the original hardness.

(D) Rate of transport: The rate of transport through the membrane liner material of the hazardous substance per ASTM after a period of hours shall not exceed percent by weight.

(E) Rate of solubility: The rate of solubility of the liner membrane material in the hazardous substance fluid per ASTM for hours shall not exceed percent by weight.

(3) The liner seam strength shall be equal to the seam strength of the parent material when tested in accordance with ASTM procedure 751.

(4) The liner shall be installed under the supervision of a representative of the membrane manufacturer or membrane liner fabricator, or a contractor certified by such manufacturer or fabricator.

(d) The secondary container shall have the ability to contain the following volumes:

(1) at least 100 percent of the volume of the primary container where only one primary container is within the secondary container;

(2) in the case of multiple primary containers within a single secondary container, the secondary container shall be large enough to contain 150 percent of the volume of the largest primary container placed in it, or 10 percent of the aggregate internal volume of all primary containers in the storage facility, whichever is greater.

(e) If the storage facility is open to rainfall, then the secondary container must be able to accommodate the volume of the twenty-four (24) hour-one hundred (100) year storm in addition to that required in subsections (d) and (e) of this section.

(f) Volume requirements for a secondary container which consists of the pore space in backfill placed around the primary container shall be 110 percent of that required in Sections 2631(d) and (e). The available pore space in the secondary container backfill shall be determined using appropriate engineering methods.

PROPOSED AMENDMENTS TO SECTION 2633

2633. Construction Standards for New Motor Vehicle Fuel Tanks.

(a) This section specifies alternate construction standards for new tanks which only contain motor vehicle fuels. This section may be utilized by permit applicants in lieu of Section 2631. If this section is used in lieu of Section 2631, then the monitoring standards specified in Section 2634 shall be used in lieu of those specified in Section 2632.

(b) Primary containers for the underground storage of motor vehicle fuel shall consist of product-tight tanks constructed of fiberglass reinforced plastic cathodically protected steel, or steel clad with glass fibre reinforced plastic and installed in conjunction with the secondary containment system described in Section 2633(d) and (c).

(c) Primary containers used for the underground storage of motor vehicle fuel and constructed of materials other than those specified in Section 2633(b) shall be subject to the requirements of Section 2631.

(d) The secondary container shall be demonstrated to achieve the integrity and compatibility criteria of Section 2631(c) of this article. Systems for secondary containment utilizing membrane liners shall meet the following additional requirements:

(1) The liner membrane material shall have the permeability factor specified in section 2631(c)(1) as tested against ASTM [or S.A.E.] Reference Fuel _____.

(2) The liner membrane material shall be suitable for containment of the motor vehicle fuel in that such material shall meet the criteria set forth in section 2631(c)(2)(A) through (E) and 2631(c)(3) as tested against ASTM [or S.A.E.] Reference Fuel _____.

(3) The liner has been installed under the supervision of a representative of the membrane manufacturer or membrane liner fabricator, or a contractor certified as such manufacturer or fabricator.

(e) The lead interception and detection system (secondary container) and the response plan shall preclude the contact of any leaked hazardous substance with groundwater. At a minimum the lead interception and detection system shall be above the highest anticipated groundwater. Proof that the secondary container and response plan will protect groundwaters must be demonstrated by the permit applicant to the satisfaction of the local agency. The demonstration shall consider the following:

(1) The volume of the secondary container;

(2) The depth from the bottom of the secondary container to the highest anticipated level of groundwater;

(3) The nature of the unsaturated soils under the secondary container and their ability to absorb contaminants or allow vertical movement of contaminants;

(4) The effect of any infiltration on the movement of any leak of hazardous substance; and,

(5) The nature and timing of the response plan to clean up the hazardous substances which have been discharged from the primary container.

(f) Pressurized piping systems that include an automatic, continuously operating pressure loss detector and flow restriction device are exempt from the secondary container requirements of the article. This detector shall be connected to a visual or audible alarm system unless it provides at least a 50 percent reduction from normal flow rates.

PROPOSED AMENDMENTS TO SECTION 2711
(Permit Application and Information)

This amendment proposes to insert an additional subsection after 2711(b)(7) as follows:

> (8) In the case of new tanks installed with systems for secondary containment utilizing membrane liners, a certification by the membrane liner manufacturer that the membrane liner meets the standards set forth in section 2633(c)(1),(2), and (3), or if applicable, section 2633(d)(1) and (2).

Subsections 2711(b)(8) through (11) would be renumbered as appropriate.

THRIFTY OIL CO.

John E. Elgin, Senior Vice President–Finance

January 17, 1985

Mr. Michael A. Campos
Executive Director
State Water Resources Control Board
901 P Street
Sacramento, CA 95801

Re: Regulation of Underground Storage of Hazardous Substances

Dear Mr. Campos:

Prior to offering some specific comments with respect to the latest draft of the proposed regulations governing the underground storage of hazardous substances ("Regulations"), I would like to take this opportunity to express our appreciation for the manner in which you, your staff and the Board have conducted themselves during the course of this rulemaking. Your collective willingness to sincerely listen and respond to the comments from impacted parties is both noted and deeply appreciated. Regretably, this is in stark contrast to my experience with most government agencies who pay little or no attention to comments received during public hearings.

Thrifty strongly endorses the daily reconciliation of storage tank inventories with deliveries and sales. Not only is it environmentally prudent, it simply makes good business sense from the standpoint of inventory control. We are concerned, however, that the allowable Measurement and Throughput Errors specified in §2641(c)(5) are unrealistically low. This excessive strictness will result in a disproportionate number of false alarms and, accordingly, jeopardize the effectiveness of the entire program.

10000 Lakewood Boulevard, Downey, California 90240 (213) 923-9876 (714) 522-3244

For purposes of daily reconciliation, the Throughput Error is virtually meaningless. Dividing California's average gasoline sales of a 915 million gallons/month by the estimated 133,300 motor vehicle fuel storage tanks[1] produces average sales of 6,900 gallons/tank/month. This computes to an average daily throughput of 230 gallons. Utilizing the proposed throughput error factor of 0.15% produces a daily allowable Throughput Error of 0.3 gallons. Realistically, this is a meaningless allowance. Yet, it would appear to represent the average, rather than an atypical, situation.

The Measurement Error, as provided in Table 4.2, appropriately increases with the size of the storage tank. However, the 4,000 gallon increments are too large and should be decreased. Further, the table unfairly stops at a tank size of 12,000 gallons. Thrifty has a significant number of tanks in excess of 12,000 gallons ranging to 20,000 gallons.

The variance in Measurement Error with tank size can be significant. For example, a 3/4" stick reading error in a 12,000 gallon tank could produce an error of 120 gallons whereas the same error in a 20,000 gallon tank could produce an error of 169 gallons. Finally, as a general comment, the Allowable Measurement Error for each range of tank sizes should be increased slightly.

More specifically, our recommendations are as follows:

<u>Throughput Error</u> - Increase from 0.15% to 1.0%. Assuming average daily throughput of 230 gallons as computed above, this would still provide a typical Throughput Error of less than 2½ gallons/day.

****

[1] Fiscal Impact Statement, Table 1.1, Number of motor vehicle fuel storage tanks equals 70% x 190,400 = 133,280.

Measurement Error - Revise Table 4.2 as set forth below to provide for more realistic Allowable Measurement Errors, smaller increments and a range of up to 20,000 gallons.

SWRCB PROPOSAL PER 12/28/84 DRAFT		PROPOSED REVISION	
Tank Size	Allowable Measurement Error	Tank Size	Allowable Measurement Error
0 - 3,999	25	0 - 4,999	50
4,000 - 7,999	50	5,000 - 7,499	75
8,000 - 11,999	75	7,500 - 9,999	100
12,000 +	100	10,000 - 12,499	120
		12,500 - 14,999	140
		15,000 - 17,499	160
		17,500 - 19,999	180
		20,000 +	200

Adoption of the recommendations set forth above will provide inventory reconciliation standards which, while stringent, are possible to attain if a company is willing to make a major effort to upgrade its inventory reconciliation procedures. At Thrifty, we are convinced that manual record-keeping will no longer be adequate and are developing special computer software to meet the challenge posed by these Regulations. However, even with computerization, without the changes recommended herein, we doubt that an unacceptably high number of costly false alarms could be avoided. It is important that false alarms be kept at a tolerable level so that each exceedance always receives the vigorous and thorough investigation it deserves.

I thank you for your time and consideration in this matter

Best regards,

John E. Elgin

John E. Elgin

JEE/kck

155-C

COMMENTS

Thank you for considering more efficient and practical methods to monitor leaks from underground storage tanks. I would propose that in Monitoring Alternatives #5 (Inventory Reconciliation, Tank Testing and pipeline leak Detectors) the Throughput error should be modified to .5% rather than the .15% proposed. This margin for error together with the measurement error should provide enough margin for error even with low throughput tanks. Too many variables, none related to a leak, may account for variances.

Thank you.

PLEASE PRINT

The signing of this form is voluntary. Any person may attend this meeting whether or not they sign this form.

NAME/TITLE ROBERT T. FLESH

REPRESENTING THRIFTY OIL CO

ADDRESS 10000 LAKEWOOD BLVD DOWNEY, CA 90240

Wish to Speak

Yes ______ *No* X ______ *If Necessary* ______

Agenda Item(s) ______

______

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STATE WATER RESOURCES CONTROL BOARD

#155-B

PLEASE PRINT

The signing of this form is voluntary. Any person may attend this meeting whether or not they sign this form.

NAME/TITLE ROBERT T. FLESH

REPRESENTING THRIFTY OIL CO

ADDRESS 10000 LAKEWOOD BLVD DOWNEY, CA 90240

Wish to Speak

Yes ____ No X ____ If Necessary ____

Agenda Item(s) ____

Estimated Time for Testimony ____

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STATE WATER RESOURCES CONTROL BOARD

Nov 27, 1984

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THRIFTY OIL CO.

CORRECTED COPY

John E. Elgin, Senior Vice President–Finance

October 22, 1984

Mr. Harold Singer
Division of Technical Services
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801

RE: Proposed Regulations Governing Underground Storage of Hazardous Substances

Dear Mr. Singer:

I am writing to express Thrifty Oil Co.'s ("Thrifty") serious concern over the impact the proposed regulations regarding underground storage of hazardous substances, if adopted as written, would have on private industry. In particular, the impact on independent gasoline marketers, such as Thrifty, already seriously weakened by intense market pressures over the past two years, would be devastating.

Thrifty operates approximately 300 high volume, self-serve gasoline stations. Each station utilizes state-of-the-art gasoline dispensing equipment and has approximately four underground storage tanks. Its high volume, no frills marketing approach is typical of today's modern, self-serve independent operator. Independents, in general, and Thrifty, in particular, utilize the most efficient means to make gasoline available to consumers at low prices. As competitive pricing is their principal marketing tool, independent gasoline marketers maintain a constant downward pressure on gasoline prices. Accordingly, the consumer is well served by the Independent's presence in the marketplace.

If there is any doubt regarding the beneficial pricing influence of Independents, consider the 1982 report of the Federal Trade Commission, "Mergers in the Petroleum Industry," which stated:

> "Where independents could be assured of sufficient supplies, they could offer lower prices and thereby pressure leading majors to lower prices to remain competitive." (p. 289)

Received DTS
OCT 2 9 1984

10000 Lakewood Boulevard, Downey, California 90240 (213) 923-9876 (714) 522-3244

Over the past two and one-half years, the independent sector has undergone drastic changes. Traditional sources of independent supply have vanished as evidenced by the bankruptcy filings of independent refiners Powerine, Paramount and Marlex. These failures combined with inadequate operating margins have forced a substantial number of independents to close their stations.

Consequently, the major oil companies have increased their dominance in the marketplace at the expense of Independents. The National Petroleum News Factbook Issues for 1982 and 1983 reveal that during this period the number of independent gasoline retail outlets in the state of California fell 25% from 1182 to 883. This decrease of 299 independent stations was offset by an increase of 294 major stations from 11,466 to 11,760 during the same period. This trend has continued in 1984. Clearly, the independent sector has already suffered significant erosion.

While Thrifty, as well as all responsible petroleum marketers, is sincerely concerned about the dangers of underground pollution and water contamination, the regulations, as proposed, would result in the elimination of those independent marketers which still remain. In fact, more than one representative of a major oil company has commented to me privately that this (elimination of Independents) is the one positive aspect of the proposed regulations. If the independent sector vanishes, the ultimate loser is the California consumer who will surely pay more, no doubt considerably more, for his/her gasoline purchases.

Based on a thorough review of the proposed regulations and estimates received from drilling contractors with respect thereto, Thrifty's compliance with the proposed regulations within the stated time frame is practically impossible and prohibitively expensive. The total cost for Thrifty's 1,400 tanks would approximate $13 million. These costs approximate $10,000 per tank and are virtually identical to those set forth in the Fiscal Impact Statement. There is no means by which Thrifty, or any other Independent, could fund an undertaking of this magnitude. Thrifty would be forced to either close its stations or turn them over to the Majors.

The proposed regulations are simply not cost effective by any conceivably reasonable criteria. The Fiscal Impact Study estimates initial costs for private industry at $1.8 billion. Annual costs are pegged at $940 million. Assuming that this cost is passed on to consumers, as most likely will be the case, it is equivalent to a new gasoline tax of 9¢/gallon! The hue and public outcry resulting from such a proposal would be deafening and never ending.

Fortunately, there are much more reasonably-priced means available for improving the public's protection from underground storage leaks. Thrifty would propose that the board give serious consideration to adopting a program which contained the following key elements:

- Daily reconciliation of storage tank inventories with deliveries and sales
- Reasonable action steps in the event daily reconciliation suggests a possible leak
- Installation of underground piping leak detection systems
- Annual testing based upon a tank's type and age
- Secondary containment for replacements and new tank installations
- Record-keeping requirements and random inspections to ensure compliance
- Extended compliance timetable for Independents

A program such as that outlined above would provide significant improvement in industry's monitoring of its underground storage. This, in turn, would ensure faster responses in the event a problem should develop. Mandated secondary containment for replacements and new tank installations would insure reduced exposure in years to come.

There would still be significant cost. The Fiscal Impact Study suggested that secondary containment would result in $70 million/year in additional costs for new underground storage tanks. Other features of this proposal would probably raise the cost to $100 million. Any clean-up costs would, of course, be in addition to this figure. While extremely high, these are costs which are reasonable in light of the seriousness of the problem at hand and thus, probably acceptable to industry.

In closing, I reiterate that the Board's proposed regulations, if enacted, would almost assuredly destroy the independent gasoline marketing sector. On an overall basis the cost to industry, and ultimately, consumers would be staggering -- 9¢/gallon on an annual basis. Nevertheless, Thrifty acknowledges that this is a problem which must be addressed. Accordingly, we have tendered a responsible proposal which would provide for a significant reduction in the potential exposure from the underground storage of hazardous substances at a cost which industry, and the public, could afford.

I thank you for your time and consideration in this matter and would be most willing to provide any additional information or answer any questions which you may have.

Sincerely,

John E. Elgin

John E. Elgin

JEE/kck

#155

THRIFTY OIL CO.

John E. Elgin, Senior Vice President-Finance

October 22, 1984

Mr. Harold Singer
Division of Technical Services
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801

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10000 Lakewood Boulevard. Downey, California 90240 (213) 923-9876 (714) 522-3244

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I thank you for your time and consideration in this matter and would be most willing to provide any additional information or answer any questions which you may have.

Sincerely,

John E. Elgin

John E. Elgin

JEE/kck

PLEASE PRINT

The signing of this form is voluntary. Any person may attend this meeting whether or not they sign this form.

NAME/TITLE MICHAEL CHAN DIV. SAFETY SUPR

REPRESENTING SAFEWAY STORES, BROOKSIDE DIVISION

ADDRESS BROOKSIDE DIVISION OAKLAND CA 94660

Wish to Speak

Yes ______ No ✓ If Necessary ______

Agenda Item(s) ______

Estimated Time for Testimony ______

Other Comments on Back of this Card ☑

STATE WATER RESOURCES CONTROL BOARD

COMMENTS #156 A

WE MAINTAIN STANDBY FUEL REQUIREMENT AS MANDATED BY THE P.U.C. INITIATED BY THE O.PEC OIL CRISIS. WE WILL USE THE DIESEL FUEL STORED UNDERGROUND FOR OUR BOILERS ONLY IN THE EVENT OF UTILITY DIST. ELECTRICAL BLACKOUTS. CURRENTLY, WE VISUALLY INSPECT THE LEVEL ON A WEEKLY BASIS. TO DATE, WE HAVE NOT HAD ANY LEAKS.

WE ASK THAT THIS METHOD BE ACCEPTABLE AS A MONITORING METHOD IN LIEU OF EXTENSIVE AND EXPENSIVE WELLS AND DEVICES.

#156A

Oct 23

OVER FOR COMMENTS

Oct 23

#156B

Michael Chan Sue

Safeway Stores

written comments

Undergr Tanks for

altern fuel source

use in event of electy

outage gas shortage

(415) 944-4496

back of comment

card

COMMENTS

Program for tank testing as outlined

- in proposal much to costly

Will put a great many people out of the business

J. Hacker

PLEASE PRINT

The signing of this form is voluntary. Any person may attend this meeting whether or not they sign this form.

NAME/TITLE J A FISCHER

REPRESENTING J A FISCHER INC

ADDRESS PO BOX 391 VISALIA

Wish to Speak

Yes ______ *No* ______ *If Necessary* ✓

Agenda Item(s) ______

______

Estimated Time for Testimony ______

Other Comments on Back of this Card ☑

STATE WATER RESOURCES CONTROL BOARD

#158

PLEASE PRINT

The signing of this form is voluntary. Any person may attend this meeting whether or not they sign this form.

NAME/TITLE PAUL R. PIERSON OWNER

REPRESENTING SIERRA DRILLING CO.

ADDRESS 2220 JEANINE DRIVE MODESTO, CA 95355
PHONE (209) 524-0746

Wish to Speak

Yes ________ No ________ If Necessary ________

Agenda Item(s) SEE ATTACHED NOTE

Estimated Time for Testimony ________

Other Comments on Back of this Card ☐

STATE WATER RESOURCES CONTROL BOARD

10-23-84

I WOULD LIKE TO OFFER MY EXPERTISE AS A DRILLING AGENCY WITH EIGHT YEARS OF GEOTECHNICAL DRILLING EXPERIENCE. IF THE BOARD OR STAFF HAS QUESTIONS ON PROCEDURES OR COSTS FOR THE DRILLING OF MONITORING WELLS I FEEL THAT THEY NEED CORRECT INFORMATION. AS I SAT IN THE MEETING TODAY I FOUND THE DRILLING COSTS OUT OF LINE WITH THE CURRENT FEE SCHEDULES FOR MY COMPANY AND MY COMPETITORS.

THANK YOU

Paul Pierson

SIERRA DRILLING CO
OWNER

COMMENTS TURNED IN AT OCTOBER 23, 1984, UNDERGROUND TANK HEARING

Michael Chan
Division Safety Supervisor
Safeway Stores
Brookside Division
Oakland, CA 94660

We maintain standby fuel requirement as mandated by the P.U.C. initiated by the OPEC oil crisis. We will use the diesel fuel stored underground for our boilers only in the event of utility district electrical blackouts. Currently, we visually inspect the level on a weekly basis. To date, we have not had any leaks. We ask that this method be acceptable as a monitoring method in lieu of extensive and expensive wells and devices.

J. A. Fischer
J. A. Fischer, Inc.
P. O. Box 391
Visalia, California

Program for tank testing as outlined in proposal much too costly: Will put a great many people out of the business.

Paul R. Pierson
Sierra Drilling Company
2220 Jeanine Drive
Modesto, CA 95355
(209) 524-0746

I would like to offer my expertise as a drilling agency with eight years of geotechnical drilling experience. If the Board or staff has questions on procedures or costs for the drilling of monitoring wells I feel that they need correct information. As I sat in the meeting today I found the drilling costs out of line with the current fee schedules for my company and my competitors.

CAPITOL OFFICE
STATE CAPITOL
SACRAMENTO, CA 95814
(916) 445-7632

DISTRICT OFFICE
785 CASTRO STREET
SUITE C
MOUNTAIN VIEW, CA 94041
(415) 961-6031

ADMINISTRATIVE ASSISTANT
BETSY BLAIS

116-org
WDN
Copies - BD
WGP
Clinton
H. Singer
159 B

Assembly California Legislature

BYRON D. SHER
ASSEMBLYMAN, TWENTY-FIRST DISTRICT

COMMITTEES
CHAIRMAN
CRIMINAL LAW AND PUBLIC SAFETY
NATURAL RESOURCES
TRANSPORTATION
UTILITIES AND COMMERCE
JOINT LEGISLATIVE COMMITTEE ON PRISONS (VICE-CHAIRMAN)

November 26, 1984

Carole A. Onorato, Chairwoman
Water Resources Control Board
901 P Street
Sacramento, Ca 95814

Dear Carole:

I am writing to you and to the board members to briefly comment upon the staff recommendations for revisions to the draft regulations promulgated by the board at its October 23, 1984, hearing.

My comments are as follows:

1. Sec. 2641 - monitoring alternatives

   As mentioned in my testimony on October 23, I hope that the board will remain steadfast in its opposition to use of simple inventory reconciliation as a means of monitoring motor vehicle fuel tanks. Experience has shown that this method does not accurately detect leaks which might occur. So-called "dip stick" measurement has been used for some time and has clearly failed to prevent serious leaks from entering the groundwater.

2. Sec. 2641c(8)

   The definition of "small business" should be revised downwards. As presently drafted the definition would postpone effective monitoring requirements for a large number of tank owners and operators who were originally intended to be covered under the law.

Thank you for the opportunity to comment on these regulations.

Sincerely,

Byron

BYRON D. SHER
Assemblyman, 21st District

BDS:jmk

Comments By Sher 11/27/84 159-D

PROPOSED AMENDMENTS TO SECTION 2711
(Permit Application and Information)

This amendment proposes to insert an additional subsection after 2711(~~b~~ a)(~~7~~ 5) as follows:

(~~8~~ 6) In the case of new tanks installed with systems for secondary containment utilizing membrane liners, a certification by the membrane liner material manufacturer that the membrane liner meets the standards set forth in section~~s~~ 2631(c)~~(1), (2)~~ and (j)(1) and (2), or if applicable, section~~s~~ 2633(~~d~~ e)(1) and (2); and a certification by the membrane liner fabricator that the membrane liner meets the standards set forth in section~~s~~ 2631(c)~~(3)~~ and (j)(3)

Subsections 2711(b)(~~8~~ 7) through (11) would be renumbered as appropriate.

#160

State of California

Memorandum

To :

Date :

From : STATE WATER RESOURCES CONTROL BOARD

Subject : Goodrich Oil -

Testimony only

Oct 23, 1984 - Robert Short

Nov 27, 1984 Robert Short

Original Comments 161-170

Index to Rulemaking File Underground Storage Tank Regulations Title 23, Waters Division 3, Water Resources Control Board Chapter 16, Underground Storage Tank Regulations 1985

~~# ~~ ~~-~~ ~~#~~
#161 - 164

State of California

Memorandum

To :

Date :

From : STATE WATER RESOURCES CONTROL BOARD

Subject: Testimony only -

161. Geo Sec — Rick Jirsa
Oct 23

162. El Dorado County Env. Health
Oct. 23 — Ron Duncan
Nov. 27 — Ron Duncan

163. California Service Station Council
Oct 23/Nov 27 — Jim Campbell
Oct 23/Nov 27 — Fred Naglestad

164. Kern County Health Department
Oct 23 — Richard Casagrande

COMMENTS OF THE CALIFORNIA
MUNICIPAL UTILITIES ASSOCIATION

Regarding Proposed
California Administrative Code
Title 23 Waters
Chapter 3 Water Resources Control Board
Subchapter 16 Underground Storage Tank Regulations

My name is Ron Davis and I am the Assistant Executive Director of the California Municipal Utilities Association (CMUA) which represents 50 of California's electric and water municipal utilities. I want to thank the Water Resources Control Board (Board) for this opportunity to express our opinion regarding the draft regulations for underground storage tanks that are before the Board today. I would also like to commend the staff for their consideration in working towards a more workable compromise throughout these proceedings. However, CMUA still has several concerns with the draft regulations.

<u>Definition for "Substantially beneath the surface of the ground"</u>

CMUA strongly believes that the Board should retain the staff's original intention of defining 'substantially beneath the surface of the ground' to mean 'at least 50%'. Health and Safety Code Section 25280(m) defines an "Underground storage tank" as 'any one or combination of tanks, ... which is substantially or totally beneath the surface of the ground.' This language illustrates that the clear intent of the Legislature was to address those tanks that are either completely under the surface of the ground or tanks which have the majority of their physical structure under the surface of the ground. Under no stretch of the imagination can the word 'substantially' be defined as only 10% as the staff is now proposing. CMUA recommends that the Board retain the staff's original figure of 50% and adopt the definition as otherwise amended in the draft regulations as follows:

> <u>"Substantially beneath the surface of the ground" means that at least 50 percent of the tank volume, including connected piping, is below the ground surface.</u>

<u>Section 2642(c)(3) regarding Daily Visual Inspections</u>

Section 2642(c)(3) requires daily visual inspections as part of the visual monitoring program outlined in Section 2642(c). The Health and Safety Code does not require nor advocate daily visual inspections. Moreover, public agencies, which intend to implement the requirements contained within the proposed regulations with in-house personnel, would be hard pressed to visually monitor tanks on a daily basis. Labor contracts require weekends and legal holidays be provided to public employees. Therefore, a requirement for daily visual inspections would run contrary to those labor contracts. CMUA recommends, as has been done in other parts of the proposed regulations (see new section

2632(c)(1)(B)), that the following language be inserted into new section 2642(c)(3) in the first sentence after the word 'daily':

> '...except on weekends and recognized state and/or federal holidays,...'.

This amendment would make new section 2642(c)(3) consistent with the rest of the proposed regulations regarding daily visual inspections.

New section 2681(b)(5) regarding Categorical Variances

New section 2681(b)(5) would require as part of an application for a categorical variance 'A list including names and addresses of all persons who may be affected by or may be interested in the variance request.' Determining 'all persons who may be affected or may be interested' in a request for a categorical variance would be virtually impossible. Therefore, it is recommended that new section 2681(b)(5) be amended to state:

> When ascertainable a list including names and addresses of all persons who may be affected by or may be interested in the variance request.

New section 2681(g) regarding public hearings

New section 2681(g) requires that 'The State Board shall hold at least two public hearings in different areas of the state...'. In order to assure that the appropriate, affected parties are notified, this section should be amended to require that the public hearings occur in areas that will be directly affected by the request for a categorical variance. Therefore, CMUA respectfully suggests the following amendment:

> The State Board shall hold at least two public hearings in different affected areas of the state....

New section 2632(c)(1)(B) regarding Daily Visual Inspections

CMUA strongly supports the staff's inclusion of language in new section 2632(c)(1)(B) and elsewhere that daily visual inspections should be performed on business days only and not on weekends and recognized state and/or federal holidays, as proposed in earlier draft versions of the regulations.

Sincerely,

Ron Davis
Assistant Executive Director
California Municipal Utilities Association

166

DEPARTMENT OF THE AIR FORCE
REGIONAL CIVIL ENGINEER, WESTERN REGION (AFESC)
630 SANSOME STREET - ROOM 1316
SAN FRANCISCO, CALIFORNIA 94111

NOV 26 1984

REPLY TO ATTN OF: ROV (Farrel/556-0882)

SUBJECT: Comments on Underground Tank Regulations, California Administrative Code, Title 23, Chapter 3, Subchapter 16.

TO: State of California Water Resources Control Board
Paul R. Bonderson Building
901 P St., P.O. Box 100
Sacramento, California 95801
Attn: Carole A. Onorato, Chairwoman

1. We have reviewed the final Draft Underground Tank Regulations as revised in accord with public comments. We are generally in agreement with the regulatory approach as refined, and were especially pleased to note the inclusion of section 2641(8)(A)(iii), Interim Alternate Monitoring as it applies to governmental agencies.

2. Although it would appear that section 2641(8)(A)(iii) will assist in our efforts to establish funding and comply with the existing tank regulations within an acceptable time-frame, we would like to discuss, and establish, a Memorandum of Understanding (MOU) with the State Board. Such a MOU would help establish a uniform timely approach to compliance and would provide a written management plan to measure Air Force progress. Prior to further discussion, we offer a draft schedule of compliance, as per the telecon discussion between Mr. Harold Singer of your staff, and our Mr. David Farrel:

- Establish an approved inventory reconciliation (or alternate monitoring) method for each underground tank and operationalize the method no later than 1 July 1985.

- By 1 July 1985, initiate a program to test the integrity of each existing underground tank, and complete the testing within 12 months.

- Upon completion of the testing program, and no later than 1 July 1988, establish alternative monitoring and leak detection methods as necessary, and otherwise comply with the provisions of Assembly Bill 1362 as directed in the final regulations.

3. Your input into an expanded and refined MOU, in the form of a round-table discussion, would certainly be welcomed. Please advise Mr. Farrel or the undersigned at (415)556-6439 at your earliest convenience.

4. Thank you for the opportunity to comment on your proposed regulations, and for your formal consideration of our rather unique constraints.

Phillip E. Lammi

PHILLIP E. LAMMI, Chief
Environmental Planning Division

cc: HQ MAC/DEE
ATC/DEV
SAC/DEV/JAM
TAC/DEEV
2852ABG/JA

A visual monitoring frequency of weekly instead of the proposed daily requirement is also very adequate in our opinion to discover any possible leaks and clean them up before they get outside the secondary container.

These comments were not submitted for your first hearing because we did not believe the definition of underground tank included tanks in vaults and basements that met the secondary container requirements of the local Hazardous Material Storage Ordinance.

Sincerely yours,

Glenn Affleck

Hewlett-Packard
Glenn Affleck
Technical Regulations Manager

GA/cf

167-

HEWLETT PACKARD

3000 Hanover Street, Palo Alto, California, Telephone 415 857-1501, TWX 910 373 1267
Mail Address: P. O. Box 10301, Palo Alto, California 94303-0890

November 21, 1984

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801

RE: Proposed regulations governing underground storage of hazardous substances to be codified in subchapter 16 of Chapter 3, Title 23, California Administrative Code

Dear Board Members:

Hewlett-Packard embarked upon a program to replace all our underground waste chemical tanks shortly after the 1981 discovery of a chemical leak from an underground tank at Fairchild in Santa Clara County. All our underground tanks now have been replaced with tanks in vaults or basements where we can visually identify any tank leaks and take corrective action before any hazardous material contacts the soil. These installations reflect the new tank construction standards of secondary containment that are now part of the Santa Clara County Hazardous Material Storage ordinances.

We strongly support visual monitoring as a proven, reliable way to monitor these tanks in secondary containers which allow access to inspect the tank.

In the case of a flat bottomed tank resting on a pad or directly on the surface of a secondary container we still think visual monitoring will reveal any tank leaks. If a leak develops in the concealed area between the tank and the pad or secondary container, the liquid will leak into the area where it is visable before it ever goes through the secondary container.

Your proposed regulation requires alterative monitoring, in addition to visual, for these types of installations. This is an unnecessary requirement that goes beyond anything proposed by the engineering experts involved in developing the construction and monitoring standards for the Santa Clara Hazardous Material Storage Ordinance.

#168

State of California | Resources Agency of California

Memorandum

To: Ed Anton, Chief
Division of Technical Services
State Water Resources Control Board
901 "P" Street
Sacramento, CA 95814

Date: November 21, 1984

From: California Regional Water Quality Control Board—Santa Ana Region
6809 INDIANA AVENUE, SUITE 200, RIVERSIDE, CA 92506 8-632-4130

Subject: COMMENTS ON THE NOVEMBER 9, 1984 DRAFT OF THE UNDERGROUND TANK REGULATIONS

Following are comments of the Santa Ana Regional Board with respect to the second draft of the Underground Tank Regulations which was published on November 9, 1984. Please consider the following questions and comments, in the light, that regional board training will be necessary to implement or explain to local agencies how these regulations will be implemented.

1. The definition of substantially beneath the surface of the ground has been changed from 50% to a 10% below the surface. Questions regarding the expansion of the number of tanks now requiring permits should be addressed and communicated to persons who did not formally register tanks considering they were not "underground".

2. Section 2633(f) the leak interception detection system is indicated to be above the highest "perennial ground water elevation". This seems to be confusing in that the ground water fluctuation may not occur on a perennial basis but on a historic basis. (The amount of hydrological study necessary to determine a perennial ground water elevation may be significant).

3. Section 2634(d)(3) the use of the term "indirect method" might be better indicated to be "alternative method". The alternatives listed for detection of possible leaks from motor fuel tanks are stated further in the regulations.

4. The Section 2634 (e)(2) the amount of loss or gain in a underground tank, and the calculation of that loss or gain is difficult to follow considering that the potential for leakage may be significant if the throughput of the tank is high.

5. The Section 2635(b)(1) seems to differ from the construction requirements for motor fuel tanks under Section 2633.

6. Section 2643(d) requires the testing to be done by personnel who have received training. Will training be provided or required of local agencies and regional board personnel?

Received DTS

NOV 26 1984

7. Section 2641(3)(E) requires testing to be done on a yearly basis. This appears to be in conflict with testing under Section 2671(d) which requires quarterly testing and the general requirements for testing of a underground tank on a 3-year basis. Could these apparent ambiguities be clarified?

8. Section 2641(c)(4)(ii)(on Page 4.21) this requires a determination of hydrologic connection to ground water which has a potential beneficial use. It is very difficult to examine a site specific problems of ground water and determine hydrologic connection without an extensive and exhaustive, not to mention expensive hydrological study. This may be a major concern of persons who are using this alternative.

9. Section 2641(c)(7)(b)(ii) requires testing to be done on a 5-day week basis. The liquid level measurement at the beginning and ending of each period shall be performed by the same person. This appears to ensure job protection to any person measuring tank levels in that if they leave in the middle of a testing period records are then incomplete and cannot be used. It is suggested that a provision be added that if a different person conducts a test, they must certify that the beginning and ending calculations have been reviewed by the original tester.

10. Section 2641(d)(2) states that in areas where ground water is recharged the monitoring must be done by other than the ground water method on a monthly basis. What is meant by "other than ground water" monitoring? Is this vadose zone monitoring?

11. Section 2644(c) requires daily monitoring to be done whenever there is imput or withdrawals. How would this work for a remotely located tank where automatic withdrawals are made?

12. Section 2644(e)(4) requires the volume to be temperature corrected if necessary. How is this to be done if continuous temperature monitoring is not included? Will beginnning and ending temperatures be recorded at some time? Is temperature recording covered in another section?

13. Section 2648(m) the surface seals for vapor wells must be completed below a free water zone, but not extend below the top of the tank. This should be explained by the use of a diagram or some sort of appendix to explain the practical application of this particular requirement.

14. Section 2648(p) the water levels measurements in ground water wells within the 5 miles of the site are required in this section. It appears significantly impractical in a Southern California area with a high number of water wells need to be located and measurements obtained to sample all wells. This may result in ground water elevation being mapped at an extremely greater level than there presently done throughout the State of California. The cost of this determination would seem to be excessive.

15. Section 2648(p)(4) this requires a boring to be converted to a ground water monitoring well if ground water is encountered. Is this practical considering that the size of the hole may be different in order to extract water for monitoring purposes. This would however, save considerable cost in the construction of borings and water monitoring wells.

16. Section 2671(d) requires underground tanks to be inspected every 3 months if a temporary closure exists. This seems to conflict with the 1-year or 3-year inspections of existing active tanks and should possibly be checked to allow temporary closure to be checked according to a time schedule submitted by the person purposing that kind of an operation.

17. Section 2682(e) requires a Regional Board to hold hearings within 60 days after receiving a complete variance application. The time limit allowed for other local agencies to join the application appears to be confusing and may impinge upon the notice requirements for the public hearing by regional board. Could this matter be checked to clarify the scheduling of these hearings?

These are preliminary comments that are intended to be helpful but not necessary to reopen the proposals for further modification. Thank you for considering these comments.

James W. Anderson

JAMES W. ANDERSON
Executive Officer

JWA:kyb

State of California

1. ECA
2. HS

Memorandum

168-13

To : Ed Anton, Chief
Division of Technical Services
P. O. Box 100
Sacramento, CA 95801

Date: January 11, 1985

From : **California Regional Water Quality Control Board—Santa Ana Region**
6809 INDIANA AVENUE, SUITE 200, RIVERSIDE, CA 92506 (ATSS) 632-4130

Subject: COMMENTS ON THE DECEMBER 28, 1984, DRAFT OF SUBCHAPTER 16 UNDERGROUND TANK REGULATIONS

The following comments are provided with respect to the December 28th draft of the proposed regulations for underground tanks.

1. Section 2633 (f):

   Allows the local agency to waive certain construction standards. Isn't a waiver only allowed on a site specific case by the Regional Board?

2. Section 2640:

   Requires owners of underground storage tanks to implement an alternative monitoring system. Is this section modified at all by Section 2610 (b) where written contract with an operator is involved?

3. Section 2640(b):

   Allows ground water to be the primary source of monitoring if the water does not have actual or potential beneficial use. Would this be allowed if the unused ground water has hydrologic continuity with usable ground water?

4. Section 2641(b):

   Allows the local agency to provide a variance for monitoring alternatives. Is this not the prerogative of the Regional Board under site specific variance requirements?

5. Section 2641 (C.4. Aiii):

   Uses the term "perennial ground water." Also, this section uses the term anticipated ground water level. Since ground water levels do not flow in or rise and fall in the same manner that streams do, is it correct to use levels on a perennial basis? This section also provides for waivers by the local agency rather than the Regional Board.

Received DTS

JAN 14 1985

6. Section 2641 [C.7.B.iv. (at the top of page 4.23)]:

   Should this correctly read "an unauthorized release shall be assumed to have occurred"?

7. Section 2647(d):

   If perforations of the casing are at the ground surface, would this not allow surface drainage to enter the well? It appears that no perforations above the seal should be allowed.

8. Section 2648:

   Is this section in conflict with Section 2641(d.3.)? In Section d.3., ground water for a monitoring system for multiple tanks is required to be within 1,000 feet of all tanks, where as in this section, they are required to be within 500 feet of the facility.

9. Section 2652(d):

   Requires the submittal of reports to the local agency and the Regional Board as specified by "a responsible agency." Is the responsible agency defined somewhere in these regulations?

10. Section 2672 (Subsection C.4.):

    Is such a notice, as required in this section, a recordable notice pursuant to the recording acts?

11. Section 2681(f):

    Allows the State Board to remand an application to the Regional Board. Will the appropriate fee be also remanded, or will a new fee be required?

12. Section 2682:

    Requires the Regional Board to determine sites specific variances for construction and monitoring. In other sections noted above, local agencies were allowed to rule on variances. Are these two sections (or more) correctly interpreted or should they be excluded?

13. Section 2682(e):

    Requires the Regional Board to hold a hearing on the alternatives within sixty (60) days after receiving a complete variance application. This sixty day period appears to be too short to allow evaluation by the local agencies or others interested in the hearing, and an opportunity for comment in hearing presentations. Is there a way to extend the date for hearing on alternatives and still allow adequate notice?

14. Section 2682(f):

Requires the Regional Board to notify the applicant and local agencies of the decision. This section should include the State Water Resources Control Board, so that decisions of one Regional Board can be evaluated and monitored by the State Board.

15. Section 2712(d):

Requires the local agency to issue permits while Section 2712(g) requires an inspection three (3) years prior to renewal of the permit. This would appear burdensome to attempt to inspect tanks within the first two (2) years of the permit, and then on the third year inspect for purposes of renewal. There appears to be some conflict in these two sections. In addition, Section 2712(c) requires retention of records for three years on a five year permit, which may lead to destruction of records when they should be maintained during the permit life and at least one year following renewal.

16. Section 2714(b):

This requires local agencies, the State Board, or Regional Board to determine the confidentiality. This could create some confusion in the determination of trade secrets. What happens if one agency does say the material is confidential, and one doesn't? Shouldn't the local agency make the determination with the potential for appeal to the Regional Board or State Board?

Thank you for considering these comments. I hope that some of the questions are helpful and could be ironed out at the time these matters are adopted.

James W. Anderson

JAMES W. ANDERSON
Executive Officer

JWA:nao

11/26 - Orig Alpa SAB #169

CC-BL

WGP

Auton

STATE CAPITOL
SACRAMENTO, CALIFORNIA 95814
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POST OFFICE BOX 12760
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SAN LUIS OBISPO, CALIFORNIA 93406

California State Senate

SEAL OF THE SENATE OF THE STATE OF CALIFORNIA
LEGIS

KENNETH L. MADDY
SENATOR, FOURTEENTH DISTRICT

COMMITTEES:
FINANCE
GOVERNMENTAL ORGANIZATION
HEALTH AND WELFARE (VICE CHAIRMAN)

JOINT COMMITTEE ON THE REVISION OF THE PENAL CODE (CHAIRMAN)
JOINT LEGISLATIVE AUDIT COMMITTEE (VICE CHAIRMAN)
JOINT COMMITTEE ON THE ARTS
JOINT COMMITTEE ON MEDI-CAL OVERSIGHT
JOINT COMMITTEE ON REFUGEE RESETTLEMENT, AND IMMIGRATION

SELECT COMMITTEE:
AUBURN DAM PROJECT
BUSINESS DEVELOPMENT
GOVERNMENTAL EFFICIENCY
RURAL ISSUES

November 20, 1984

Orig to Legal for hearing rec.
cc: Maddy file

Carole A. Onorato, Chairwoman
Water Resources Control Board
Post Office Box 100
Sacramento, California 95801

Dear Ms. ~~Onorato~~ Carole:

Enclosed you will find correspondence received by my Fresno office concerning implementation of A.B. 1362, the Underground Storage of Hazardous Substances Act.

Kindly request this information be added to the testimony presented at the public hearing scheduled for Tuesday, November 27, 1984, at 10 a.m. in the Sacramento Community Convention Center.

Thank you for your consideration to this request.

Sincerely,

Ken

KENNETH L. MADDY
State Senator

jd

Enclosures

11/30 - Orig Wpa #169-2

cc-Bd
WGP
Autore

orig legal
cc Mall file

STATE CAPITOL
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California State Senate

KENNETH L. MADDY
SENATOR, FOURTEENTH DISTRICT

COMMITTEES:
- FINANCE
- GOVERNMENTAL ORGANIZATION
- HEALTH AND WELFARE (VICE CHAIRMAN)

- JOINT COMMITTEE ON THE REVISION OF THE PENAL CODE (CHAIRMAN)
- JOINT LEGISLATIVE AUDIT COMMITTEE (VICE CHAIRMAN)
- JOINT COMMITTEE ON THE ARTS
- JOINT COMMITTEE ON MEDI-CAL OVERSIGHT
- JOINT COMMITTEE ON REFUGEE RESETTLEMENT AND IMMIGRATION

SELECT COMMITTEE:
- AUBURN DAM PROJECT
- BUSINESS DEVELOPMENT
- GOVERNMENTAL EFFICIENCY
- RURAL ISSUES

November 27, 1984

Carole A. Onorato, Chairwoman
Water Resources Control Board
Post Office Box 100
Sacramento, California 95801

Dear Carole:

Enclosed you will find further correspondence received by my Fresno office concerning implementation of A.B. 1362, the Underground Storage of Hazardous Substances Act.

Kindly request this additional information be added to the testimony to be presented today at the public hearing in Sacramento.

Thank you for your consideration to this request.

Sincerely,

Ken

KENNETH L. MADDY
State Senator

jd

Enclosures

#178

JOHN R. BELL
GENERAL CONTRACTOR
License No. 250206 B-1

November 20, 1984

Senator Ken Maddy
1060 Fulton Mall, #1310
Fresno, California 93721

I write to you to oppose the regulations proposed by the State Water Resources Control Board for implementing the provisions of Bill 1362 concerning the underground storage of hazardous materials. These proposed regulations go far beyond the jurisdiction granted to the Board by Bill 1362.

I suggest you see to it that this Board not become a law unto itself and that serious consideration be given to alternatives that have been presented to the Board by operators of underground storage facilities.

Yours truly,

John R. Bell

John R. Bell

3086 EAST BEHYMER AVENUE, CLOVIS, CALIFORNIA 93612 -:- PHONE (209) 299-6450

NOV 21 REC'D

#179

7700 NORTH VAN NESS BOULEVARD FRESNO, CALIFORNIA 93711

November 16th, 1984

Senator Ken Maddy
1060 Fulton Mall #1310
Fresno, Calif. 93721

Dear Senator Maddy:

The small business owners are in need of your understanding and assistance once again.

My area of concern this time is directed towards the possibility of the regulations that the State Water Resources Control Board may implement because of the passage of the Underground Storage of Hazardous Substances Act, bill #1362.

As I feel certain you understand, we cannot afford more regulations of dubious value and of an expensive nature. Many of us in business today are having a very difficult time keeping the doors open, the employees paid, and meeting our other costs. As I read the numbers there are 83 million people working in non government jobs versus 79 million getting government checks.

Your help in controlling any unnecessary rules and costs in any and all areas will be most appreciated and may help us stay viable as a profit producing tax paying entity.

Sincerely yours,

Gordon T. Knott

Gordon T. Knott, President

GTK/sm

(209) 439-2928

#180

SUNMET

H.P. Metzler & Sons
5286 S. Del Rey Avenue
P.O. Box 509
Del Rey, California 93616
Phone (209) 445-1574

November 21, 1984

The Honorable Ken Maddy
1060 Fulton Mall, #1310
Fresno, CA 93721

RE: ADOPTION OF PROPOSED REGULATIONS GOVERNING UNDERGROUND STORAGE OF HAZARDOUS SUBSTANCES BY THE STATE OF CALIFORNIA WATER RESOURCE CONTROL BOARD

Dear Ken:

It has been recently brought to my attention that the CA. Water Resource Control Board is considering passage of new regulations, that would require the installation of leak detection devices for underground full storage tanks. The proposed leak detection devices and methods proposed by the Board would be very expensive for us to comply with. The cost would be especially burdensome at this time, considering the state of the farm economy, but the worst effect would be long term. If these requlations are passed into law; growers like us would be forced, in some cases, to abandon our storage facilities rather than comply and make us more dependent on the major refineries and their distributors for a reliable, competitively priced supply of fuel.

I am in favor of protecting our environment, however I feel a more reasonable and less costly plan is needed. I solicit your effort to get involved in this issue and voice your opposition to the proposed regulations.

Sincerely,

Dennis

Dennis K. Metzler

DKM/jl

GROWERS - SHIPPERS - DEHYDRATORS
Peaches - Plums - Nectarines - Grapes - Apples

NOV 26 REC'D

Wonder Valley Ranch Resort

#181

Western Camps, Inc.

November 20, 1984

Senator Ken Maddy
California State Senate
1060 Fulton Mall, #1310
Fresno, CA 93721

Dear Senator Maddy

It has recently been brought to my attention that certain regulations are being proposed by the State Water Resources Control Board in order to implement Bill 1362 regarding monitoring underground storage of hazardous substances. It is my understanding that the Board's proposed regulations are going beyond the original intent of the original bill and imposing controls which will be difficult, if not impossible, to meet.

The proposed regulations include the cleaning up of "historical releases" and requiring expensive monitoring methods for tanks over a year old. They also call for a six-month implementation instead of the originally intended five-year time-frame.

I would greatly appreciate your help in seeing that these regulations remain in the context originally intended by Bill 1362. The expense incurred to businesses like mine if the proposed regulations are implemented could be great.

Thank you, Senator Maddy, for your time and effort in this matter.

Sincerely

Jerrold Siegel

Jerrold Siegel
Vice President

JS:jj

Wonder Valley W Brand of Western Hospitality

Box 71 Star Route Sanger, California 93657 Telephone (209) 787-2551

NOV 23 REC'D

#182

KOVAC EQUIPMENT CO.

Case

PHONE 441-1122 • P.O. BOX 2527 • 2708 E. JENSEN AVE.
FRESNO, CALIFORNIA 93745

November 16, 1984

State Senate
Ken Maddy
1060 Fulton Mall #1310
Fresno, Ca 93721

Subject: Adoption of proposed regulations governing underground storage of hazardous substances by the State of Calif. Water Resource Control Board.

Dear Mr. Maddy,

We are concerned about the above regulation and how it will affect our business. We are a small tractor dealership with underground diesel fuel and gasoline storage tanks located on our property. Several years ago these tanks were purchased and installed. All the necessary permits and inspections were made to insure we complied with current regulations.

The financial impact of $100,000.00 to $200,000.00 clean up of a "historical release" would be devastating to our business.

It is also our concern that the regulations should not go beyond the jurisdiction granted to the Board by Bill 1362 or its intent.

Sincerely,

Phillip Terry

Phillip Terry
Secretary/Treasurer
PT/dr

12/3 - org - Olpost #169-C

STATE CAPITOL
SACRAMENTO, CALIFORNIA 95814
(916) 445-9600

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(209) 667-3781

POST OFFICE BOX 12760
864 OSOS STREET, #C
SAN LUIS OPISPO, CALIFORNIA 93406

California State Senate

cc - Bd
WGP
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KENNETH L. MADDY
SENATOR, FOURTEENTH DISTRICT

COMMITTEES:
FINANCE
GOVERNMENTAL ORGANIZATION
HEALTH AND WELFARE (VICE CHAIRMAN)
JOINT COMMITTEE ON THE REVISION OF THE PENAL CODE (CHAIRMAN)
JOINT LEGISLATIVE AUDIT COMMITTEE (VICE CHAIRMAN)
JOINT COMMITTEE ON THE ARTS
JOINT COMMITTEE ON MEDI-CAL OVERSIGHT
JOINT COMMITTEE ON REFUGEE RESETTLEMENT AND IMMIGRATION

SELECT COMMITTEE:
AUBURN DAM PROJECT
BUSINESS DEVELOPMENT
GOVERNMENTAL EFFICIENCY
RURAL ISSUES

November 28, 1984

This should go to legal file

Carole A. Onorato, Chairwoman
Water Resources Control Board
Post Office Box 100
Sacramento, California 95801

Dear Carole:

Enclosed you will find further correspondence received by my Fresno office concerning implementation of A.B. 1362, the Underground Storage of Hazardous Substances Act.

Kindly request this additional information be added to the testimony presented yesterday at the public hearing in Sacramento.

Thank you for your consideration to this request.

Sincerely,

Ken

KENNETH L. MADDY
State Senator

jd

Enclosure

STATE CAPITOL
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California State Senate

SEAL OF THE SENATE OF THE STATE OF CALIFORNIA
LEGIS

KENNETH L. MADDY
SENATOR, FOURTEENTH DISTRICT

#169-DHS
Copies to: WGP, ECA

COMMITTEES:
FINANCE
GOVERNMENTAL ORGANIZATION
HEALTH AND WELFARE (VICE CHAIRMAN)
JOINT COMMITTEE ON THE REVISION OF THE PENAL CODE (CHAIRMAN)
JOINT LEGISLATIVE AUDIT COMMITTEE (VICE CHAIRMAN)
JOINT COMMITTEE ON THE ARTS
JOINT COMMITTEE ON MEDI-CAL OVERSIGHT
JOINT COMMITTEE ON REFUGEE RESETTLEMENT AND IMMIGRATION
SELECT COMMITTEE:
AUBURN DAM PROJECT
BUSINESS DEVELOPMENT
GOVERNMENTAL EFFICIENCY
RURAL ISSUES

December 6, 1984

Carole A. Onorato, Chairwoman
Water Resources Control Board
Post Office Box 100
Sacramento, California 95801

Dear Carole:

Enclosed you will find further correspondence received by my Fresno office concerning implementation of A.B. 1362, the Underground Storage of Hazardous Substances Act.

Kindly request this additional information be added to the testimony presented on November 27, 1984, at the public hearing in Sacramento.

Thank you for your consideration to this request.

Sincerely,

Ken

KENNETH L. MADDY
State Senator

jd

Enclosure

Received DTS
DEC 17 1984

JAN 17 1985 org wqa

169-E

STATE CAPITOL
SACRAMENTO, CALIFORNIA 95814
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FRESNO, CALIFORNIA 93711
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(209) 667-3781

POST OFFICE BOX 12760
864 OSOS STREET, #C
SAN LUIS OBISPO, CALIFORNIA 93406

California State Senate

CAO

cc - BL
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Mac
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Kms

KENNETH L. MADDY
SENATOR, FOURTEENTH DISTRICT

COMMITTEES:
FINANCE
GOVERNMENTAL ORGANIZATION
HEALTH AND WELFARE (VICE CHAIRMAN)
JOINT COMMITTEE ON THE REVISION OF THE PENAL CODE (CHAIRMAN)
JOINT LEGISLATIVE AUDIT COMMITTEE (VICE CHAIRMAN)
JOINT COMMITTEE ON THE ARTS
JOINT COMMITTEE ON MEDI-CAL OVERSIGHT
JOINT COMMITTEE ON REFUGEE RESETTLEMENT AND IMMIGRATION
SELECT COMMITTEE:
AUBURN DAM PROJECT
BUSINESS DEVELOPMENT
GOVERNMENTAL EFFICIENCY
RURAL ISSUES

January 14, 1985

Carole A. Onorato, Chairwoman
Water Resources Control Board
Post Office Box 100
Sacramento, California 95801

Dear Carole:

Enclosed you will find further correspondence received by my Fresno office concerning implementation of A.B. 1362, the Underground Storage of Hazardous Substances Act.

Kindly request this additional information be added to the testimony presented at the public hearing in Sacramento.

Thank you for your consideration in this request.

Sincerely,

Ken Maddy

KENNETH L. MADDY
State Senator

jd

Enclosure

NOV 15 REC'D

#170

Baggie Farms, Inc.

6382 EAST NORTH AVENUE, FRESNO, CALIFORNIA 93725
OFFICE PHONE 209-486-7330

November 9, 1984

The Honorable Ken Maddy
1060 Fulton Mall #1310
Fresno, Ca 93721

Dear Senator:

The recent passage of the Underground Storage of Hazardous Substances Act ("Act") is the most important California legislation in the last twenty-five years. It will operationally and financially affect anyone owning and/or operating a storage tank used for storing fuel, solvents, oil, etc. Even more important are the proposed regulations ("regs") prepared by the State Water Resources Control Board implemeting this act. In my opinion, and in the opinion of various associations such as California Independent Oil Marketers Association (CIOMA), and Western Oil and Gas Assocciation (WOGA), the proposed regs go far beyond the jurisdiction granted to the Board by the Act.

The proposed regs as they now stand would likely cause enormous expenditures threaten the survival of many farmers who own and/or operate underground tanks.

My concern is that the regs should not go beyond the jurisdiction granted to the Board by Bill-1362 or its intent. The financial impact of a $100,000.00 to $200,000.00 clean-up of "historical release" would have a great impact on our business.

Will you please emphasize the importance of the Board's consideration of the analysis and alternatives presented by CIOMA, WOGA, California Manufacturers Assocation and others.

I am sure you will agree that the requirements for testing and monitoring existing tanks are onerous. While we all are concerned that we maintain a safe and clean environment, we believe these measures go beyond those needed to accomplish this. Some requirements are redundant. If adopted as proposed, the costs to taxpayers, as well as to individuals and businesses directly affected, will be substantial.

Sincerely yours,

BAGGIE FARMS INC.

George

~~George~~ Bagdasarian
President

Original Comments 171-180

Index to Rulemaking File Underground Storage Tank Regulations Title 23, Waters Division 3, Water Resources Control Board Chapter 16, Underground Storage Tank Regulations **1985**

NOV 16 REC'D
171

Byron Jackson Pump Division

2730 WEST WHITESBRIDGE ROAD, FRESNO, CALIFORNIA 93706 • (209) 264-5938

BORG WARNER

November 14, 1984

Ken Maddy
1060 Fulton Mall, #1310
Fresno, CA 93721

Dear Mr. Maddy,

I have just become aware of the regulations which have been proposed by the State Water Resources Control Board which ostensibly implement the Underground Storage of Hazardous Substances Act. In my opinion these proposed regulations go far beyond the intent of the Act, and if put into effect will cause unnecessary hardship and great monetary sacrifice at our Freasno facility and to numerous other businesses in your jurisdiction.

I implore your diligent efforts toward direction of the Water Resources Control group in a more logical and equitable reaction to the requirements of the Underground Storage of Hazardous Substances Act. You have shown an admirable capacity to represent the best interests of all of your constituents in the past, and I have no reason to doubt your desire to represent our interests in this matter.

Yours truly,

George M. Droke
George M. Droke
Plant Manager
GD/lmd

#1172

NOV 19 REC'D

November 15, 1984

State Senate
Ken Maddy

Sir,

I have great concern. that the Water Resources Control Board definitely seems to be going far beyond the intent of the "Underground Storage of Hazardous Substances Act", Bill 1362.

They are blatantly and arrogantly proposing regulation far beyond the stated language and jurisdiction granted the Board. It seems to be typical of state agencys to become over zealous and make their own interpretations of what the Legislature enacted.

It is a presumptive attempt to usurp the power and authority of the Legislature which is supposed to represent the will of the people. It is an example of a state agency setting itself up as over-riding the wishes of the people as in the "Act", making interpretations and regulations to implement, not the "Act" - as written but the attitude of the agency. Such action is extremely dangerous and a real threat to a democratic society.

I would think that you too, would be incensed by the demonstrated attitude in forcing the "proposed regulations" as presented by the "State Water Resources Control

Board"

How did you vote on the "Act" and what was your understanding of the intent of the "Act" as you voted? What are your feelings about the "regulations" as developed by the Water Resources Board? Do you believe that the proposed "regs" carry out the "intent" or do you believe they are excessive?

Please send me a copy of the "Act" as passed and a copy of the adopted regulations that will implement, regulate and enforce the "Act".

Thank you,

Helen L. Hawley
260 W. Caruthers Av.
Caruthers, Ca. 93609

11-20-84 ordered AB 1362 for above

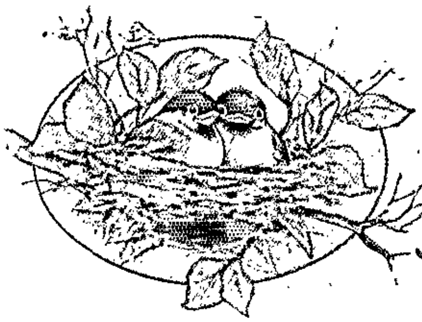
CAILLIER
25831 CHERRY HILL DR.
BORON, CA 93516
PHONE (714) 762-6692

BORON, CA
NOV 21
PM
1984
93516

State Water Resources Control Board
Paul R. Bonderson Bldg.
901 "P" Street
P.O. Box 100
Sacramento, Cal.
95801

attn:
Water Resources
Board Hearing

#173



State Water Resources
Control Board

Items # 7. & 8.

If the board is going to adopt regulations over every underground level storage tank in California that has some type of what they term to be hazardous materials, then surely they should uphold a petition to stop the polution of San Francisco Bay. Otherwise, this looks as though the board puts favoritism on large companys, and taxes, fees, and regulates only those small individuals who can't afford a public fight against these measures.

Let California clean up it's big messes before it starts looking for small ones.

K. D. Caillier

Received DTS
NOV 26 1984

DON KOEPP
800 SOUTH VICTORIA
VENTURA CA 93009 26PM

Western Union Mailgram

4-0535285331 11/26/84 ICS IPMRNCZ CSP SACB
8056542438 MGMS TDRN VENTURA CA 273 11-26 0718P EST

HB
#174

STATE WATER RESOURCES CONTROL BOARD
4TH FLOOR EXECUTIVE OFFICE
901 P ST
SACRAMENTO CA 95814

Received DYS
NOV 2 8 1984

ED ANTON

ON NOVEMBER 20TH 1984 WE RECEIVED THE LATEST DRAFT OF YOUR REGULATIONS IMPLEMENTING THE UNDERGROUND HAZARDOUS MATERIALS STORAGE TANKS REGULATIONS THESE REGULATIONS WILL BE PRESENTED TO YOUR BOARD ON NOVEMBER 27TH 1984 FOR YOUR APPROVAL AND ADOPTION

OVER 50 PERCENT OF THE REGULATIONS HAVE BEEN REWRITTEN SINCE THE CLOSE OF THE COMMENT PERIOD AND MAJOR CHANGES HAVE BEEN MADE ON THE CONSTRUCTION STANDARDS FOR NEW TANKS AND MONITORING REQUIREMENTS FOR EXISTING TANKS CURSORY REVIEW REVEALS THAT MANY IMPROVEMENTS HAVE BEEN MADE IN THE REGULATIONS BUT SOME PROBLEMS MAY STILL EXIST

ONE PROBLEM NOT ADDRESSED IS THAT NO PERFORMANCE STANDARDS HAVE BEEN ADOPTED FOR LEAK DETECTORS ON PRESSURE PIPING SYSTEMS AT MOTOR VEHICLE FUEL FACILITIES CURRENTLY AVAILABLE PRESSURE PIPING LEAK DETECTORS CAN ALLOW UP TO 24,000 GALLONS PER YEAR OF GASOLINE TO ESCAPE UNDETECTED INTO OUR GROUND WATER RESOURCES IN VENTURA COUNTY EXPERIENCE SHOWS THAT THESE TYPES OF LEAKS OCCUR AND ARE A VALID THREAT TO GROUND WATER RESOURCES

ANOTHER CONCERN IS THAT THE INITIAL FEE OF 5500 DOLLARS THAT YOUR BOARD WOULD CHARGE A LOCAL AGENCY UNDER SECTION 2690 IF ADDITIONAL STANDARDS WERE REQUESTED AT A LATER DATE IF WE UNCOVER OTHER PROBLEMS IN THE REGULATIONS AFTER THEY ARE ADOPTED YOUR FEE WOULD PRECLUDE OUR ABILITY TO REQUEST CHANGES IN THE REGULATIONS IN ORDER TO PROTECT GROUND WATER RESOURCES WE SUGGEST THAT THE FEE BE DROPPED

URGENTLY REQUEST THAT YOU NOT ADOPT THESE DRAFT REGULATIONS AT YOUR NOVEMBER 27TH 1984 MEETING UNTIL THE ABOVE ISSUES ARE ADEQUATELY ADDRESSED

DON KOEPP DIRECTOR
VENTURA COUNTY ENVIRONMENTAL HEALTH DEPT.

19:20 EST

MGMCOMP

5241 (R 7/82)

#175 HS

Weyerhaeuser Company

Cottage Grove, Oregon 97424

November 15, 1984

State Water Resources Control Board
P.O. Box 100
Sacramento, California 95801

Attn: Harold Singer
Division of Technical Services

Gentlemen:

Enclosed for your reference is a letter we submitted on October 26, 1984, concerning the proposed Sub-chapter 16 regulations.

We request that the letter be made part of the record of the November 27, 1984 Public Hearing/Board Meeting considering adoption of these regulations.

Thank you for your assistance in this matter.

Sincerely,

WEYERHAEUSER COMPANY

Dan M. Morgan

Dan M. Morgan,
Environmentalist

DMM/sl
enc: 1
cc: Jerry Bollen - Spr

Received DTS

NOV 20 1984

Weyerhaeuser Company

P.O. Box 275
Springfield, Oregon 97477
A/C 503 · 746-2511

October 26, 1984

State Water Resources Control Board
P. O. Box 100
Sacramento, California 95801

Attn: Harold Singer
Div. of Technical Services

Gentlemen:

Thank you for the opportunity to comment on the proposed Subchapter 16 regulations concerning design, construction and operation of underground storage tanks storing hazardous materials.

We have reviewed the comments submitted to the Board by the CMA. We agree entirely with these comments and sincerely hope that you will modify the rules accordingly.

In addition, we are concerned that the proposed rules treat all underground tanks the same, regardless of size, age, location or relative toxicity of the contents. It seems absurd to us to require extensive groundwater and vadose zone monitoring for a small gasoline tank, for example. We do agree that these measures may be justified in cases of an acutely toxic waste. In many cases, however, level monitoring with recordkeeping and notification requirements should be sufficient to protect groundwater damage.

Weyerhaeuser Company operates 11 facilities in California with a combined total of 35 underground fuel storage tanks. We are greatly concerned about the cost to operate these tanks under the proposed regulations. We estimate the per tank cost for the first year as follows:

3 wells and monitoring equipment - $30,000/tank
($100/ft @ 100' in S. Calif.)

1 test bore & analysis - $22,000

Vadose zone monitoring - $20,000

Level Monitoring - $5,000 per year

TOTAL - $73,000 or more first year per tank

Tank Inventory: (1) 300 gal; (2) 500 gal; (9) 1,000 gal; (6) 3,000 gal; (4) 5,000 gal; (11) 10,000 gal; (1) 15,000 gal; (1) 30,000 gal.

This is a total cost of $2,555,000 or more to be born by our California facilities to monitor all tanks regardless of size. Clearly this is an exorbitant expense when compared to the small increment in protection gained over a level monitoring program.

The expense is similarily excessive to replace these tanks with above-ground units:

Abandon each tank:

Cleaning-------------$3,300
Slant Bore & Test---$6,000
Filling-------------$1,000

Sub Total $10,300

New Above-Ground Tank
(average cost)----------$20,000

TOTAL COST PER TANK: $30,300

TOTAL COST FOR 35 TANKS: $1,060,500

We hope that you will give these matters careful consideration and urge you to modify the proposed rules as suggested by the CMA.

Sincerely,

Dan M. Morgan

DAN M. MORGAN
ENVIRONMENTALIST

DMM/pa

cc: Jerry Bollen (11)
Floyd Smith (Alameda, Cal.)
Mike Zarate, John Catlin, Rich Memmer (Anaheim, Cal.)
Dar Rosito (Colton, California)
Douglas Amsden, Peter Kwoon (Dublin, California)
Dave Wardel (La Puente, California)
Rudy Espinoza (Modesto, California)
Bob Reese (Ontario, California)
Russell Asp (Salinas, California
George Gutman (Santa Ana, California)

(cont'd)

cc: (continued)

Paul J. Sauro (Santa Paula, California)
Margie Friday (Vacaville, California)
Dave Nicholson (CH 3D 23)
Walter G. Paulson (CH 3 K 26)
Ray G. Westenhouse (WTC 1 B 34)

PERFORMANCE PROFILE OF

CONTINUOUS ELECTRONIC LEAK DETECTION

MALLORY COMPONENTS
DIVISION, EMHART INDUSTRIES, INC.

The understanding of the reliability of continuous electronic leak detection equipment has perhaps been misunderstood by legislators, regulators and users in as much as continuous detection is a relatively new concept. By way of background, the initial emphasis in the United States for continuous detection systems emulated from three different governmental agenices: The first being the United States Coast Guard which was concerned with detecting spills upon navigable waterways. Second was the National Oceanographic and Atmospheric Administration which was concerned with detecting maritime spills outside of their three mile limit. The third was the Environmental Protection Agency which was concerned with detecting visible spills on inland waterways. The attempt to establish reliable detectors for these applications has generally been considered to be a failure. What has transpired since these efforts took place, which was in the mid to late 1970's, can only be reflected through the eyes of this company and its efforts on behalf of establishing reliable leak detectors. However, I am certain that other companies within this industry will have similar stories to tell.

As a result of the unsuccessful attempts mentioned above, the Mallory Components Division of Emhart Industries, Inc. began a feasibility study regarding the development of underground leak detection systems. At that time (1978), very little was known about migration of underground toxic substances. However, through extensive testing, by acquiring inputs from various governmental agencies and by dealing with independent hydrologists and geologists, it was established that underground leaks could be reliably detected with properly configured equipment. Mallory tests in this regard substantiated this opinion. Accordingly, a full blown effort was launched to meet the needs of this industry. It is important to point out that the design of Mallory's equipment was from the direct inputs of the eventual users, i.e., major oil companies, chemical manufacturers and industrial corporations. Without detailing all of the background, it should be pointed out that since this effort has been launched, there have been literally thousands of successful installations made throughout the United States to a very broad cross-section of customers. In total, this company has now logged over 10 million hours of in-place operation for its leak detection equipment. In fairness, it must be mentioned at the outset of this effort that there were certain deficiences of product design which became apparent to this company. However, in every case these problems were dealt with quickly and correctly and are considered to be remedied within all present designs. Perhaps the best indication of these product improvements emulates from the fact that most of our customers continue to purchase our product on a routine and regular basis.

Over and above that, it is this corporation's policy to maintain continuing testing operations on all of its products in actual in-field conditions. Combining the total of in-field installations and company testing yields a failure mode of less than 1/10th of 1% of all products manufactured and installed. Installations of a more recent nature over the last year have exhibited a failure mode of less than 1/10th of 1%. While I cannot speak for other manufacturers of leak detection equipment, I think it important to point out that Mallory and its affiliated companies have been involved in the electronics business for over 60 years manufacturing products which manifest themselves in everything from radios to space shuttles, from automobiles to weapons systems and from computers to telecommunications systems. Accordingly, we are well positioned to understand what creates electrical and electronic failures and design accordingly.

Most instrumentation suffers from what is known as "infant mortality" which means that if the product is going to fail, in most cases it will fail early in its life cycle. Again, speaking only for this company, it should pointed out that every piece of instrumentation shipped has been tested under accelerated conditions for a minimum of 100 hours, thus weeding out the early failures which might occur. These tests are conducted in concert with required incoming, in-process and quality assurance checks which are conducted on a routine basis. In addition, all products are manufactured under controlled conditions to prevent static sensitive electronic devices from becoming damaged by electrostatic discharge. Of perhaps even more importance is the fact that this equipment has successfully detected leaks from underground storage facilities by a wide variety of users including oil companies, airports, trucking terminals, semiconductor houses, public utilities and the like. It should be pointed out that we would not always be informed of a leak in that this is not the type of information that most people are wanting to broadcast, however, throughout all of the millions of hours of in-field operation, we have never been informed that our equipment has ever failed to detect a leak or spill.

USE OF MONITORING WELLS

FOR DETECTION OF LIQUID HAZARDOUS MATERIALS

Prepared by

Raymond J. Andrejasich

Chief Engineer

Pollulert Systems

Mallory Components Group

a division of Emhart Corporation

USE OF MONITORING WELLS

FOR DETECTION OF LIQUID HAZARDOUS MATERIALS

SUMMARY

- Deep or shallow inspection wells can monitor for the presence of liquid hazardous materials.

- Monitoring wells for the groundwater table should be considered as a secondary means for hydrocarbon detection.

- Vadose zone monitoring wells are desireable as a primary monitoring method.

- Proper installation and site preparation guidelines can insure product detection in the vadose zone.

- Mathematical calculations or computer modeling can enhance the effectiveness of inspection wells.

- Hydraulic conductivity and soil compaction will enhance the effectiveness of monitoring wells.

USE OF MONITORING WELLS

FOR DETECTION OF LIQUID HAZARDOUS MATERIALS

Inspection or monitoring wells to detect the presence of liquid hazardous materials can be placed into 2 categories and analyzed accordingly:

1. Wells which extend below the level of the groundwater table.

2. Wells which do not extend to the groundwater table, but are in the unsaturated zone, sometimes referred to as the vadose zone.

The information contained herein has been provided by various authorities and is footnoted accordingly.

1. WELLS EXTENDING BELOW THE WATER TABLE (ACQUIFER)

The position of the water table at any one location is revealed by the level to which water rises in that particular well. The water table is usually an undulating surface that conforms in a general way to the topography of the land. The water table fluctuates seasonally, rising during rainy seasons and falling during dry periods.

"The movement of hydrocarbons downward to contact the water table usually is the most hazardous possible result of a spill on land. The degree of risk depends on the nature of the groundwater system and the extent to which it is used."[1]

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[1] The Migration of Petroleum Products in the Soil and Ground-Water, American Petroleum Institute Publication No. 4149, Washington, 1972, p. 9.

"When free hydrocarbon reaches the capillary fringe and if the volume is large enough, it first forms a layer of increasing thickness under the influence of further descending hydrocarbon. This exerts a hydrostatic pressure depressing the groundwater surface. Gravitational forces act to restore the initial water level and cause the oil pancake to move out laterally in the same direction as the groundwater (Figure 1). As shown in the inset circle, the thickness of product in the well is greater than in the adjacent formation."[2]

"This occurs because the layer of mobile product in the capillary zone is some distance above the water table. When this product encounters the open space in a well bore, it "pours" in and accumulates on the water surface. As it accumulates, its weight begins to depress the water surface. It continues to thicken until the top of the oil in the well is level with the top of the oil in the mobile layer in the acquifer. Consequently, any estimate of the total spill volume based on the oil thickness in wells will result in a considerable overestimate."[3]

A mathematical derivation of this phenomena is Shown in Figure 2, along with references. Because of this phenomena of magnification

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[2] Protection of Groundwater from Oil Pollution, CONCAWE Water Pollution Special Task Force No. 11, Publication No. 3/79, 1979, p. 15.

[3] Underground Spill Cleanup Manual, American Petroleum Equipment Institute Publication No. 1628, Washington, 1980, p. 11.

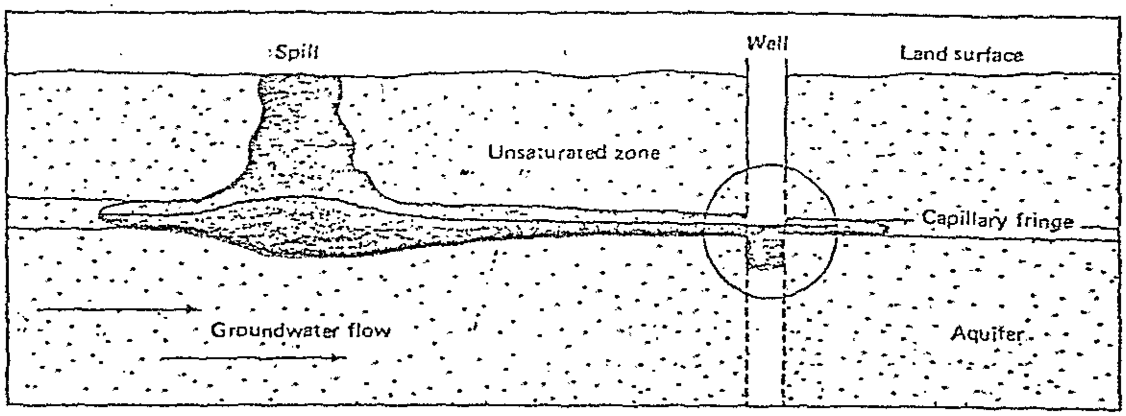
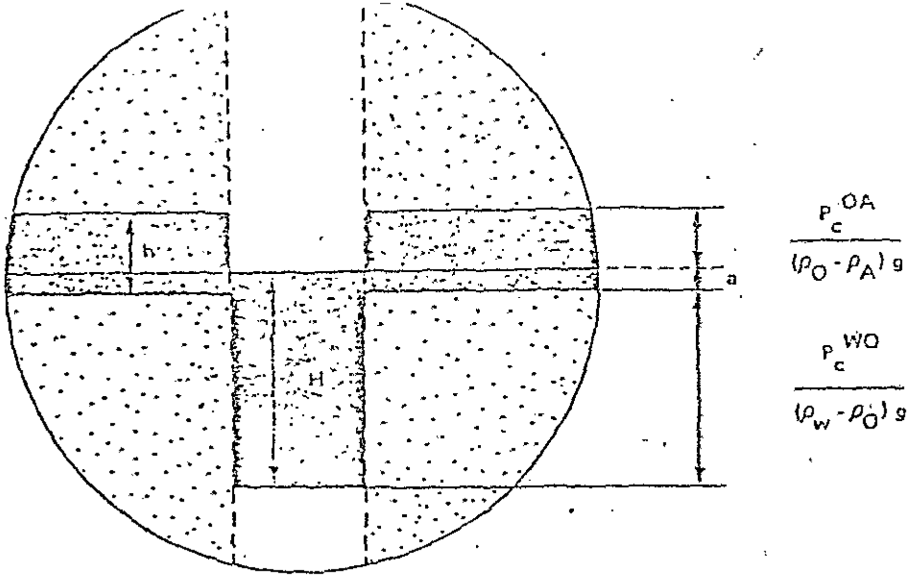

Spill
Well
Land surface
Unsaturated zone
Capillary fringe
Groundwater flow
Aquifer

Figure 1



Elementary considerations on the capillary pressures show that the oil layer thickness (H) measured in a borehole is generally different from the thickness (h) of the oil layer above the water table. For example, when the free oil layer (a) is relatively thin, but still continuous, it follows:

$$\frac{H}{h} \approx \frac{H-a}{h-a} = \frac{P_c^{WO}}{P_c^{OA}} \times \frac{(\rho O - \rho A)\,g}{(\rho W - \rho O)\,g} \approx 4\,\frac{P_c^{WO}}{P_c^{OA}}$$

in which P_c^{WO} and P_c^{OA} : pressure differences (capillary pressures) between water and oil and between oil and air respectively,

ρW, ρO, ρA : density of water, oil and air

g : acceleration due to gravity.

Although values of P_c^{WO} and P_c^{OA} can be determined by experiment or from published data (Reference 3), more often than not $P_c^{WO} \approx P_c^{OA}$ *from which follows that H may be roughly four times h.* Hence, any attempt to estimate the volume of oil spilled by multiplying the area of free oil on the water table by the thickness of the oil layer observed in a well will result in an overestimate being obtained.

REFERENCES

1. Williams, D.E. and Wilder, D.G. (1971). Gasoline Pollution of a ground-water Reservoir. A Case History. Groundwater, 9 (6), 50-56.
2. Zilliox, L. and Muntzer, P. (1975). Effect of Hydrodynamic Processes on the Development of Groundwater Pollution. Progress in Water Technology, 7, (3/4), 561-568.
3. Van Dam, J. (1967). The Migration of Hydrocarbons in a Water-bearing Stru In: The Joint Problems of the Oil and Water Industries, by Hepple, P., ed Proc. Symposium, held at Brighton, 18-20 January 1967. The Institute of Petroleum, 55-96.

Figure 2

or amplification in the monitoring well, it is a good secondary approach for detection of hydrocarbons on the water table. As stated in Figure 1, the magnification of the oil in the groundwater well would be roughly four times the actual thickness floating on the water table.

Figure 3 shows how a groundwater monitoring well, down gradient from an underground tank, would detect a leak.

2. WELLS IN THE UNSATURATED ZONE (VADOSE ZONE)

The need to detect hydrocarbons before they reach the water table has drawn interest to vadose (unsaturated) zone monitoring. "The vadose zone is the geological profile from the ground surface to the upper surface of the principal water bearing strata. The water bearing strata is also referred to as groundwater or saturated zone. The term "vadose zone" is preferable to the often used term "unsaturated zone" for this region because saturated conditions are frequently present. The term "zone of aeration" is also often used as a synonym for vadose zone."[4]

Oil spilled on undisturbed ground will tend to simply move downward, under the force of gravity, while spreading laterally to some degree. The rate of movement depends on the viscosity of the hydrocarbon and the permeability of the soil. If the spill is a point

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[4] "Constraints and Categories of Vadose Zone Monitoring Devices," Groundwater Monitoring Review, Winter, 1984, p. 26.

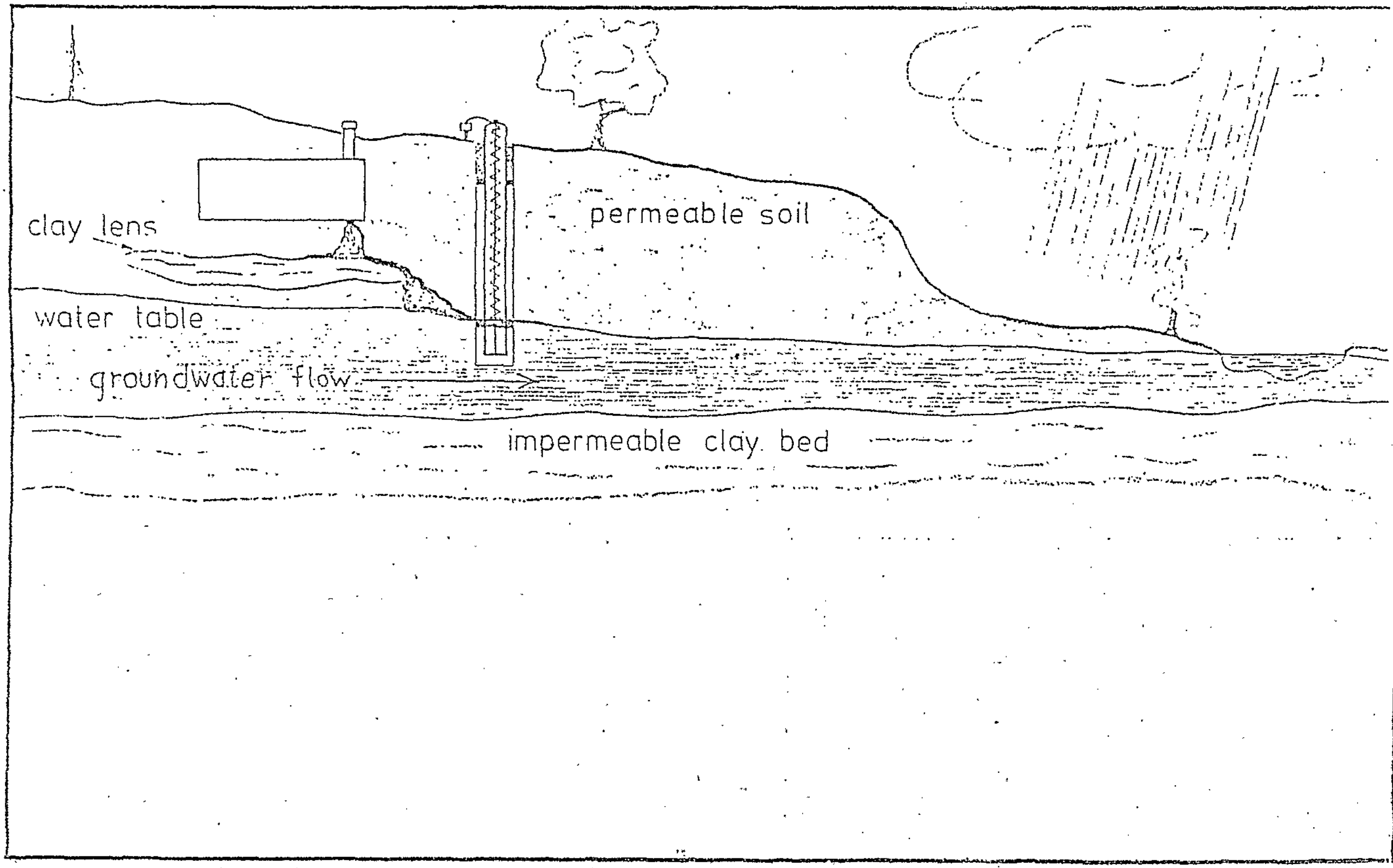

clay lens
water table
groundwater flow
permeable soil
impermeable clay bed

Figure 3

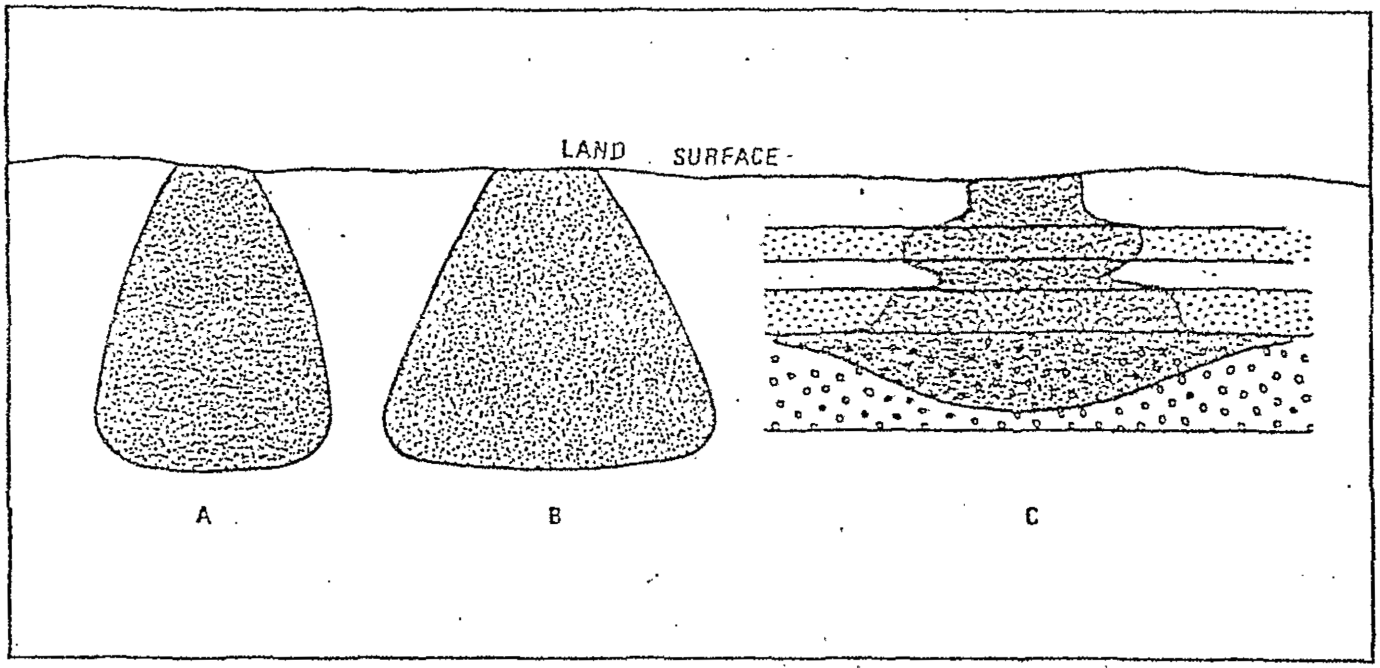
source, as in the case of a leaky underground tank, the general shape of the area of passage is a cone, modified by the nature of the soil layers the hydrocarbon passes through (Figure 4).

In the case of wells placed in the proximity of buried, underground storage tanks, the permeability of the surrounding soil must be taken into account. "In a highly permeable stratum, the penetration of the hydrocarbon is mainly vertical; in a less permeable stratum, the capillary forces play a much larger role and the penetration is more horizontal. The vertical progression may be arrested if an impermeable layer exists in the path of the hydrocarbon."[5]

An ideal way to monitor the sites of buried underground hydrocarbon storage tanks is to have the monitoring wells located in the same cavity or excavation in which the tanks were installed as shown in Figure 5. If a leak were to occur in one of the tanks, the product would move vertically until the concrete slab used for tiedowns is reached. The concrete slab can be considered an impermeable bed or lens, so that the product would have a tendency to spread laterally until it reaches immobile saturation, or if the leak continues, until it reaches and enters one of the monitoring wells.

If a concrete slab was not used in the installation, the product would still have a tendency to move laterally when the bottom of the excavation was reached, although some vertical penetration would

[5] Protection of Groundwater from Oil Pollution, CONCAWE Water Pollution Special Task Force No. 11, Publication No. 3/79, 1979, p. 15.



GENERALIZED SHAPES OF SPREADING CONES AT IMMOBILE SATURATION

A – HIGHLY PERMEABLE, HOMOGENEOUS SOIL
B – LESS PERMEABLE, HOMOGENEOUS SOIL
C – STRATIFIED SOIL WITH VARYING PERMEABILITY

REFERENCES

1. American Petroleum Institute (API) (1972). The Migration of Petroleum Products in the Soil and Groundwater. Principles and Countermeasures. API Publication No. 4149, p. 8.

2. CONCAWE Water Pollution Special Task Force No. 11. (1979). Protection of Groundwater from Oil Pollution. Report No. 3/79 p. 12.

Figure 4

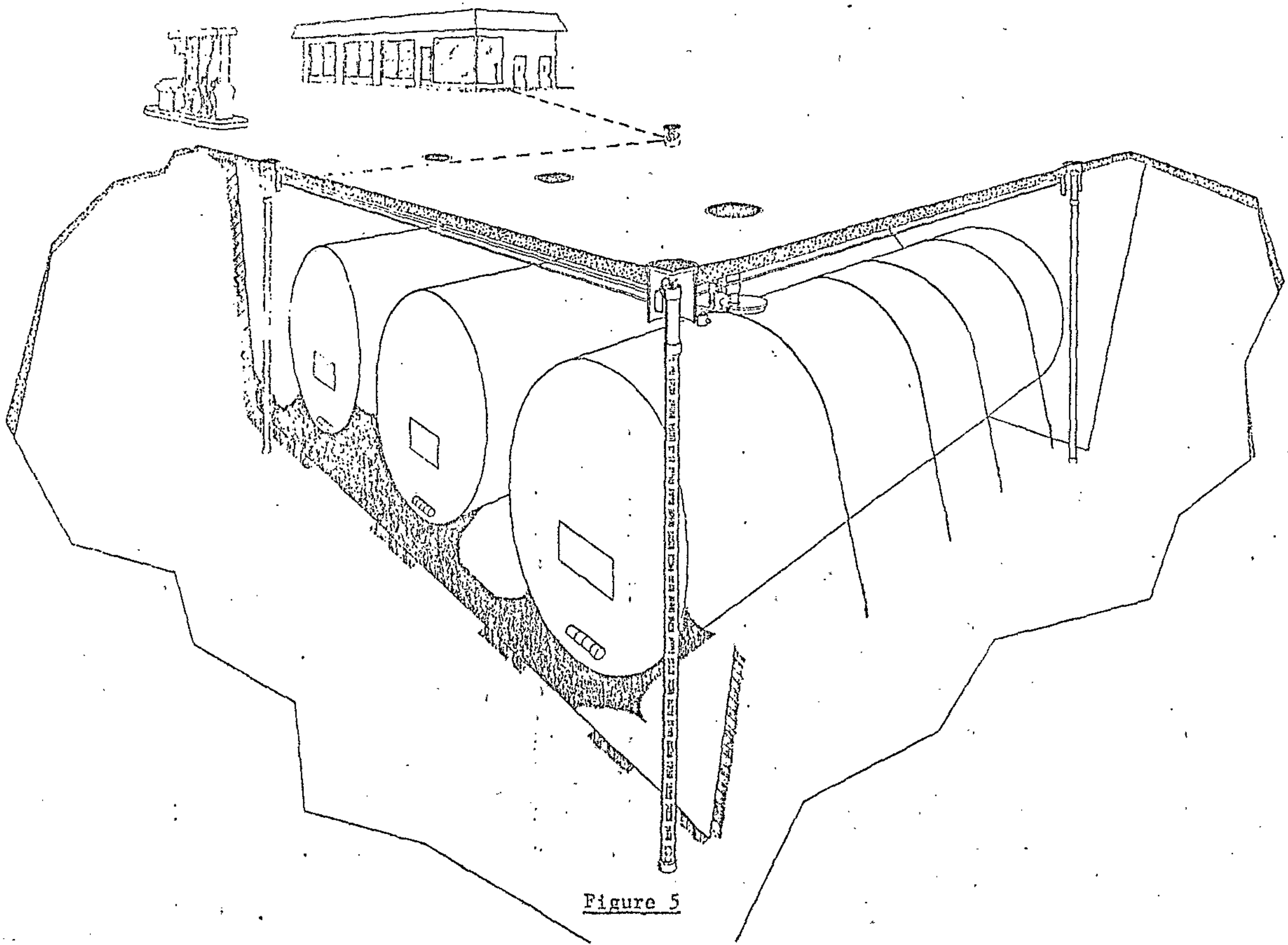


Figure 5

continue in this case. "SPILLED OIL COMMONLY MIGRATES ALONG ARTIFICIAL FILLS, SUCH AS PIPELINE TRENCHES, FOUNDATION FILLS, AND UTILITY CONDUITS, IN A MANNER SOMEWHAT RELATED TO ITS BEHAVIOR IN NATURAL SOILS. SUCH EXCAVATIONS OFTEN ARE BACKFILLED WITH MATERIAL MORE PERMEABLE THAN THAT REMOVED. THESE EXCAVATIONS CONSEQUENTLY OFFER A MIGRATION ROUTE OF MINIMUM RESISTANCE, AND ANY FLUID WILL TEND TO MOVE ALONG THEM MORE RAPIDLY THAN THROUGH NATURAL SOILS."[6]

These claims can be further substantiated by analyzing the industry standards when tanks are installed. "Backfill below, around and above tanks should be clean, noncorrosive porous material, such as clean washed sand or gravel for steel tanks and, for FRP (fiberglass reinforced plastic) tanks, must be in accordance with manufacturer's specification."[7]

"Fiberglass reinforced plastic (FRP) tanks should be installed using bedding and backfill of either pea gravel or stone/gravel crushings. If pea gravel is used, it must be clean naturally rounded aggregate with a mix of particle sizes with diameters not less than 1/8 of an inch or more than 3/4 of an inch. If stone/

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[6] The Migration of Petroleum Products in the Soil and Groundwater, American Petroleum Institute Publication No. 4149, Washington, 1972, p. 9.

[7] Installation of Underground Petroleum Storage Systems, American Petroleum Institute Publication No. 1615, Washington, 1979, p. 4.

gravel crushings are used, they should be washed and free flowing, with angular particle sizes not less than 1/8 of an inch nor more than 1/2 of an inch."[8]

With these facts in mind, please reference the tables in Figure 6, giving representative values of hydraulic conductivity (often refered to as permeability). The numbers show that the least resistance to the movement of liquids would be in coarse, medium or fine gravel. The best situation would be if the excavation were made in clay, as its permeability value would classify it as an impermeable lens, so that at the transition interface between the gravel and the clay, the only movement of leaking product would be in a lateral direction, towards the monitoring wells.

The next closest porous substance to gravel, as shown on the table, is sand. Sand has a permeability of 1/10 to 1/4 that of gravel, so that even in a gravel/sand interface, the lateral movement will be considerably greater in the gravel than the vertical movement in the sand. In the case of underground leaks, this would insure that the migrating product would reach the inspection well(s) located within the confines of the burial cavity. The product migration and penetration of spilled product into the soil is a function of the volume discharged. The vertical component is due to gravity while the horizontal component is due to capillarity. For

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[8] Recommended Practices for Underground Storage of Petroleum, New York State Department of Environment Conservation, Albany, New York, 1984, p. 31.

Representative Values of Hydraulic Conductivity

(after Morris and Johnson, 1967)

Material	Hydraulic Conductivity, m/day ft/day	m/day	Type of Measurement[a]
Gravel, coarse	490	150	R
Gravel, medium	890	270	R
Gravel, fine	1,500	450	R
Sand, course	150	45	R
Sand, medium	40	12	R
Sand, fine	8.2	2.5	R
Silt	0.62	0.08	H
Clay	0.00066	0.0002	H
Sandstone, fine-grained	0.66	0.2	V
Sandstone, medium-grained	10	3.1	V
Limestone	3	0.94	V
Dolomite	0.0033	0.001	V
Dune sand	66	20	V
Loess	0.26	0.08	V
Peat	19	5.7	V
Schist	0.66	0.2	V
Slate	0.00026	0.00008	V
Till, predominantly sand	1.6	0.49	R
Till, predominantly gravel	100	30	R
Tuff	0.66	0.2	V
Basalt	0.033	0.01	V
Gabbro, weathered	0.66	0.2	V
Granite, weathered	4.6	1.4	V

[a]H is horizontal hydraulic conductivity, R is a repacked sample, and V is vertical hydraulic conductivity.

FIGURE 6

a major leak the capillary forces play a much larger role than gravity and the soil penetration is more horizontal. In a small leak this penetration will be more vertical.

While the mathematics of hydraulic conductivity prove that properly installed monitoring wells will contact and collect spilled product, it is recommended that good business practices be considered in areas where soil permeability is very high. For example, underground tanks should never be left to "free float" in sandy excavations as settling and other hydraulic pressures will cause the tank to shift and possibly rupture. Normally, tiedowns and concrete slabs are used to provide stability which further serves to channel spilled product towards the monitoring wells.

CONCLUSION

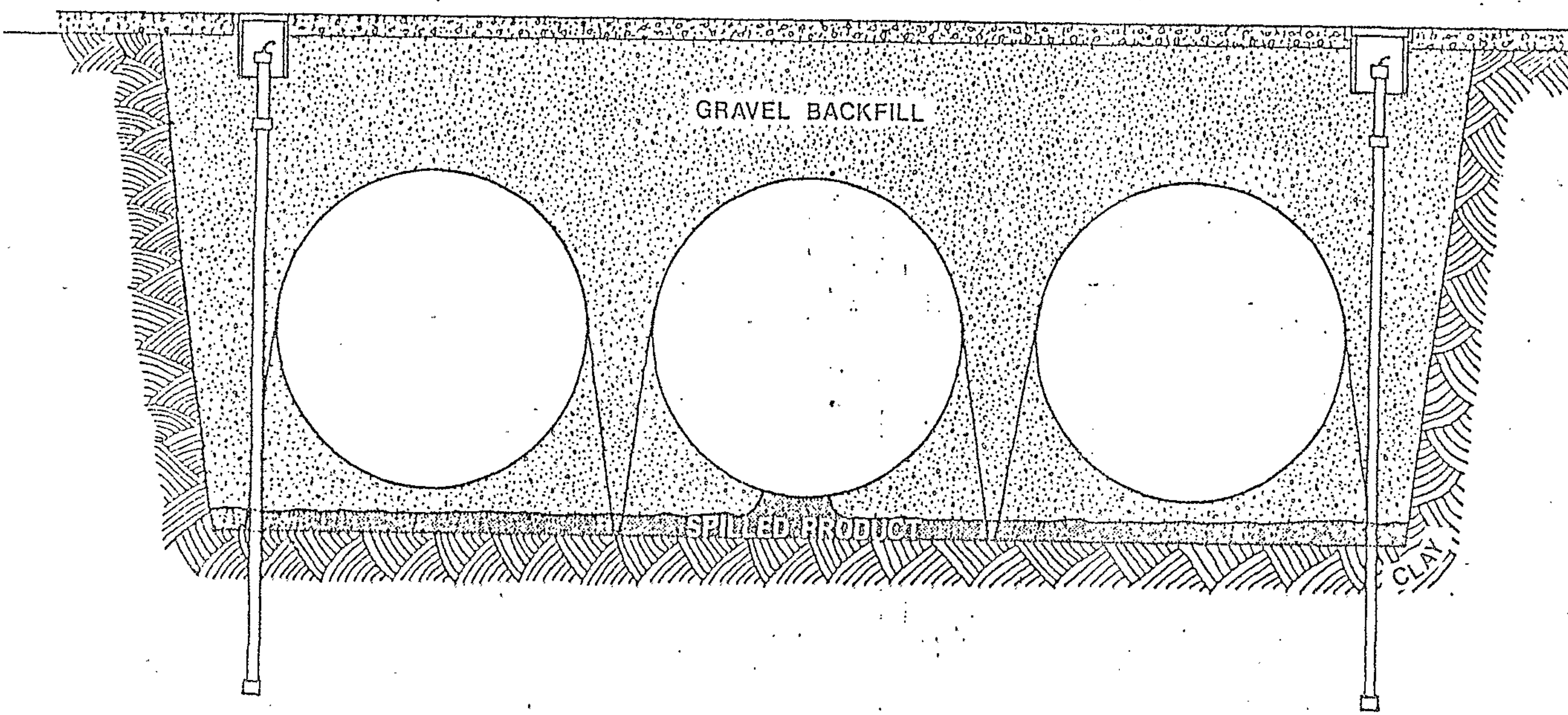
The use of wells to monitor for hydrocarbons on the water table should continue to be used as a secondary means to detect hydrocarbon leaks. Such wells would also serve double-duty as they could then be used with pumps to form cones of depression to contain the leaking product until recovery operations could be put into effect.

The primary methods of monitoring should be in the vadose zone in order to detect the hydrocarbon leak as close to the point source as possible. Monitoring in the vadose zone requires that each installation be evaluated individually, in a retrofit situation. When the geology of the area and the mechanics of the tank installation are considered, it will insure that the leaking products will find their way into the monitoring wells before they reach the water table.

If a concrete slab was used in the tank installation, it would act as an impermeable layer, inhibiting vertical movement and forcing lateral movement to the wells.

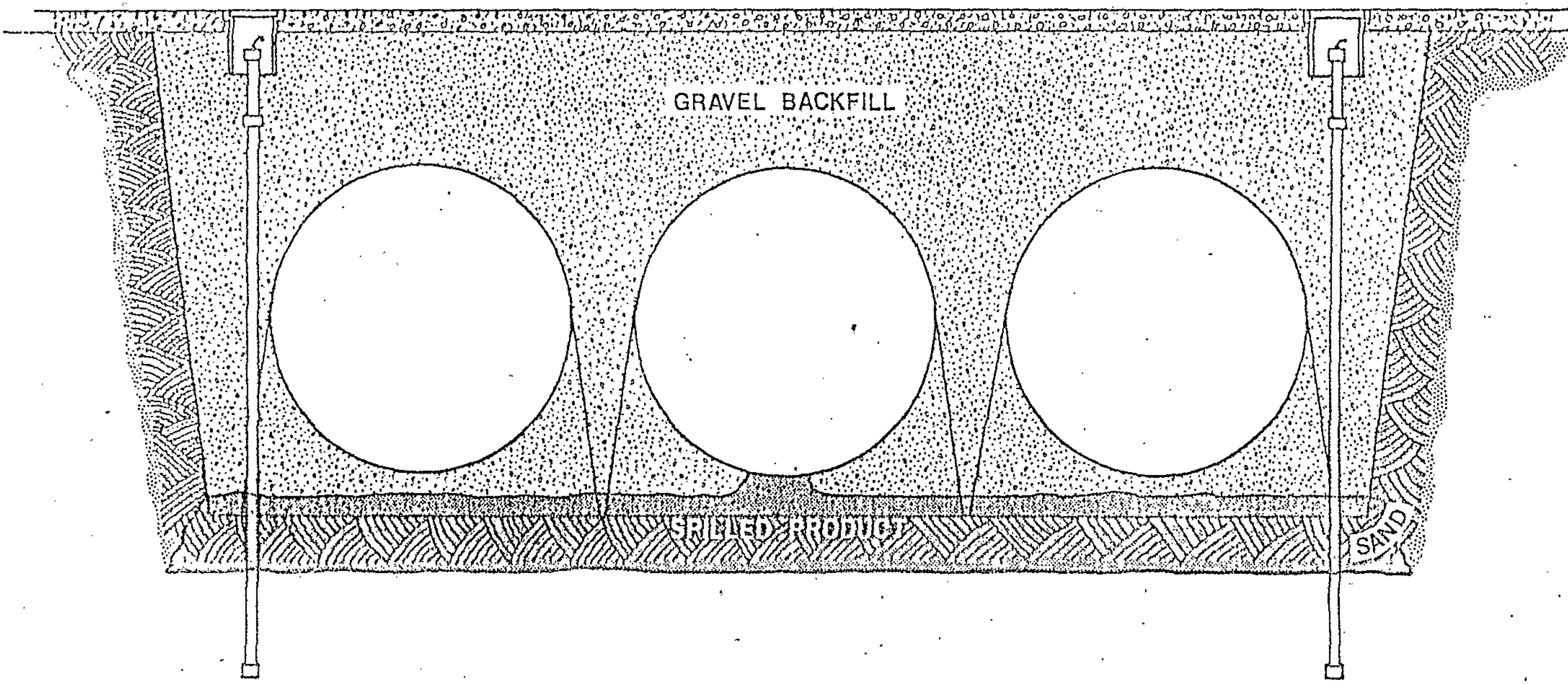
What if the installation did not use a concrete slab for the tank tiedowns? The next best situation is where the tank excavation is in a clay soil, and no concrete slab exists (Figure 7). Again, the monitoring wells extend several feet below the gravel/clay excavation interface. Using the values from the permeability table mentioned previously, the clay soil is considered to be a continuous impermeable layer, and again would inhibit vertical movement of the leaking hydrocarbon and force the lateral movement towards the wells.

The least desirable situation is shown in Figure 8. Here the excavation is in sandy soil and no concrete slab or other impervious barrier exists. Looking at the permeability values of gravel versus sand, the mobility of the hydrocarbon in the gravel backfill will be 3.5 to 10 times faster than in sand. Figure 8



CLAY SOIL, GRAVEL BACKFILL

FIGURE 7



SANDY SOIL, GRAVEL BACKFILL

FIGURE 8

The maximum depth of penetration can be estimated from the following formula:

$$D = \frac{1000\ V}{A \times R \times k}$$

where D = Maximum depth of penetration, m
V = Volume of infiltration oil, m^3
A = Area of infiltration at surface, m^2
R = Retention capacity of soil, in litres per cubic metre (l/m^3)

"k" is an approximate correction factor for various oil viscosities

k = 0.5 for low viscosity petroleum products, e.g. gasoline
k = 1.0 for kerosine, gasoil and products with similar viscosities
k = 2 for more viscous oils such as light fuel oil.

Typical values for retention capacities of porous soils are given below:

Typical Values for Retention Capacities of Porous Soils are given below (ref. 9)

Soil	R Oil Retention Capacity l/m^3
Stone, coarse gravel	5
Gravel, coarse sand	8
Coarse sand, mdium sand	15
Medium sand, fine sand	25
Fine sand, silt	40

REFERENCES

1. CONCAWE (1974). Oil Spill Clean-up Manual. CONCAWE Rep. No. 4/74, The Hague.

Figure 9

depicts such a situation, where the vertical movement of the leaking product is moving laterally in the more permeable gravel backfill, towards the monitoring wells. Refering back to Figure 4, we see the same situation depicted in Example C, where product is passing through stratified soil with varying permeability.

Finally, one must address the detection time of monitoring wells. The rate of movement of leaking product will be a function of the size of the leak, and the residual saturation of the tank backfill.

The residual saturation is defined as the minimum content which a fluid has to attain in order to move in a porous medium (or alternatively, the threshold below which it is no longer able to move). It is a non-dimensional parameter, and can be expressed as retention capacity R. Figure 9 gives the mathematical formula for determining retention capacity, as well as typical values for various types of soil.

Let us take an example and plug in the values in the formula in Figure 9. Assume a leak rate of 2 gallons/day of gasoline:

Accumulation in 1 day $\doteq$ 2 gallons = 0.008 m^3

Accumulation in 1 week = 14 gallons = 0.053 m^3

Accumulation in 1 month = 420 gallons = 1.59 m^3

Accumulation in 1 year = 5040 gallons = 19.08 m^3

The above accumulations would be the volumes of infiltration (V). Assume an area of infiltration (A) of 1 m^2 (point source tank leak) and compare the penetration depth of soils composed of stones and course gravel against fine sand to silt type soils. Following are the calculated results:

DEPTH PENETRATION

Time Period	Stone, Coarse Gravel	Fine Sand, Silt
1 day	3.2 meters (10.5 ft.)	0.4 meters (1.3 ft.)
1 week	21.2 meters (69.6 ft.)	2.7 meters (8.7 ft.)
1 month	636 meters (2086.7 ft.)	79.5 meters (260.8 ft.)
1 year	7632 meters (25,040.6 ft.)	954 meters (3130.1 ft.)

Again, notice the large difference in depth of penetration, because of the increased mobility of product in gravel versus sand. These calculations show that when spilled product travels through gravel and hits sand, which is less porous, a form of barrier is created and increased horizontal migration will take place. The less permeable the barrier, the greater the horizontal movement.

The use of wells for monitoring for hazardous chemicals is fast becoming an accepted discipline. Combining geology, hydrology, and computer technology, several groups are attempting to carry the state-of-the-art one step further by mathematically defining the many variables involved in groundwater modeling. These basic coefficients are then measured in the field for a given geographical location and then inputted into a personal computer using special software. The software gives a two or three-dimensional display of the movement of hazardous products through the vadose zone and on the groundwater. Figures 10 and 11 show a two-dimensional display of a ficticious spill and the spread of the plume over a

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---------------------------RANDOM WALK---------------------------

    ///////////BASIC TRANSPORT COEFFICIENTS\\\\\\\\\\\

         TRANSMISSIVITY (GPD/FT) =  50000  GPD/FT
         STORAGE COEFFICIENT    =  .01
         HYDRAULIC CONDUCTIVITY =  1000  GPD/SQ.FT.
         POROSITY =  .2
         LONGITUDINAL DISPERSIVITY=  20
         TRANSVERSE DISPERSIVITY (FT)= 5
         RETARDATION COEFFICIENT =  1.2  FT
         REGIONAL X FLOW (FT/DAY) =  1
         REGIONAL Y FLOW (FT/DAY)=  1

    /////////////////////////\\\\\\\\\\\\\\\\\\\\\\\\\\\\


   //////////////////////PARTICLES\\\\\\\\\\\\\\\\\\\\\\


         PARTICLES IN A RECTANGLE.
            COORDINATS:
            LOWER LEFT CORNER (X,Y) =  0 , 0  FT
            UPPER RIGHT CORNER (X,Y) =  100 , FT
            NUMBER OF PARTICLES =  10

      TOTAL SYSTEM PARTICLES =  10
    \\\\\\\\\\\\\\\\\\\\\\/////////////////////////
///////////////////////PARTICLE MAPPING\\\\\\\\\\\\\\\\\\\\\\
       MAP WINDOW LOCATION
     LOWER-LEFT COORDINATES =  0 , 0 FT
       UPPER-RIGHT COORDINATES =  100 , 100 FT
       CELL SIZE (CDX,CDY) = 100 , 100 FT

       SIMULATION TIME =  0  DAYS
          0
     ____!____!
100!      4    6
  0!      0    0

       (-1:PUMPING WELL, -2:INJECTION WELL)

    \\\\\\\\\\\\\\\\\\\\///////////////////////////
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Figure 10

and compare the penetration depth of soils composed of stones and course gravel against fine sand to silt type soils. Following are the calculated results:

DEPTH PENETRATION

Time Period	Stone, Coarse Gravel	Fine Sand, Silt
1 day	3.2 meters (10.5 ft.)	0.4 meters (1.3 ft.)
1 week	21.2 meters (69.6 ft.)	2.7 meters (8.7 ft.)
1 month	636 meters (2086.7 ft.)	79.5 meters (260.8 ft.)
1 year	7632 meters (25,040.6 ft.)	954 meters (3130.1 ft.)

Again, notice the large difference in depth of penetration, because of the increased mobility of product in gravel versus sand. These calculations show that when spilled product travels through gravel and hits sand, which is less porous, a form of barrier is created and increased horizontal migration will take place. The less permeable the barrier, the greater the horizontal movement.

The use of wells for monitoring for hazardous chemicals is fast becoming an accepted discipline. Combining geology, hydrology, and computer technology, several groups are attempting to carry the state-of-the-art one step further by mathematically defining the many variables involved in groundwater modeling. These basic coefficients are then measured in the field for a given geographical location and then inputted into a personal computer using special software. The software gives a two or three-dimensional display of the movement of hazardous products through the vadose zone and on the groundwater. Figures 10 and 11 show a two-dimensional display of a ficticious spill and the spread of the plume over a

	0		200		400		600		800		1000
1000	0	0	0	0	0	0	0	0	0	0	0
900	0	0	0	0	0	0	0	0	0	0	0
800	0	0	0	0	0	0	0	0	0	0	0
700	0	0	0	0	0	0	0	0	0	0	0
600	0	0	0	0	0	2	0	2	0	0	0
500	0	0	0	0	2	1	2	2	0	0	0
400	0	0	2	3	3	1	0	0	0	0	0
300	0	0	3	5	3	2	0	0	0	0	0
200	0	1	5	3	1	0	0	0	0	0	0
100	3	4	2	0	0	0	0	0	0	0	0
0	5	2	1	0	0	0	0	0	0	0	0

(-1:PUMPING WELL, -2:INJECTION WELL)

\\///////////////////////////////

PRESENT SIMULATION TIME = 600 DAYS

INCREMENTAL SIMULATION TIME = 120 DAYS

DMAX = 100 FT

NP= 60

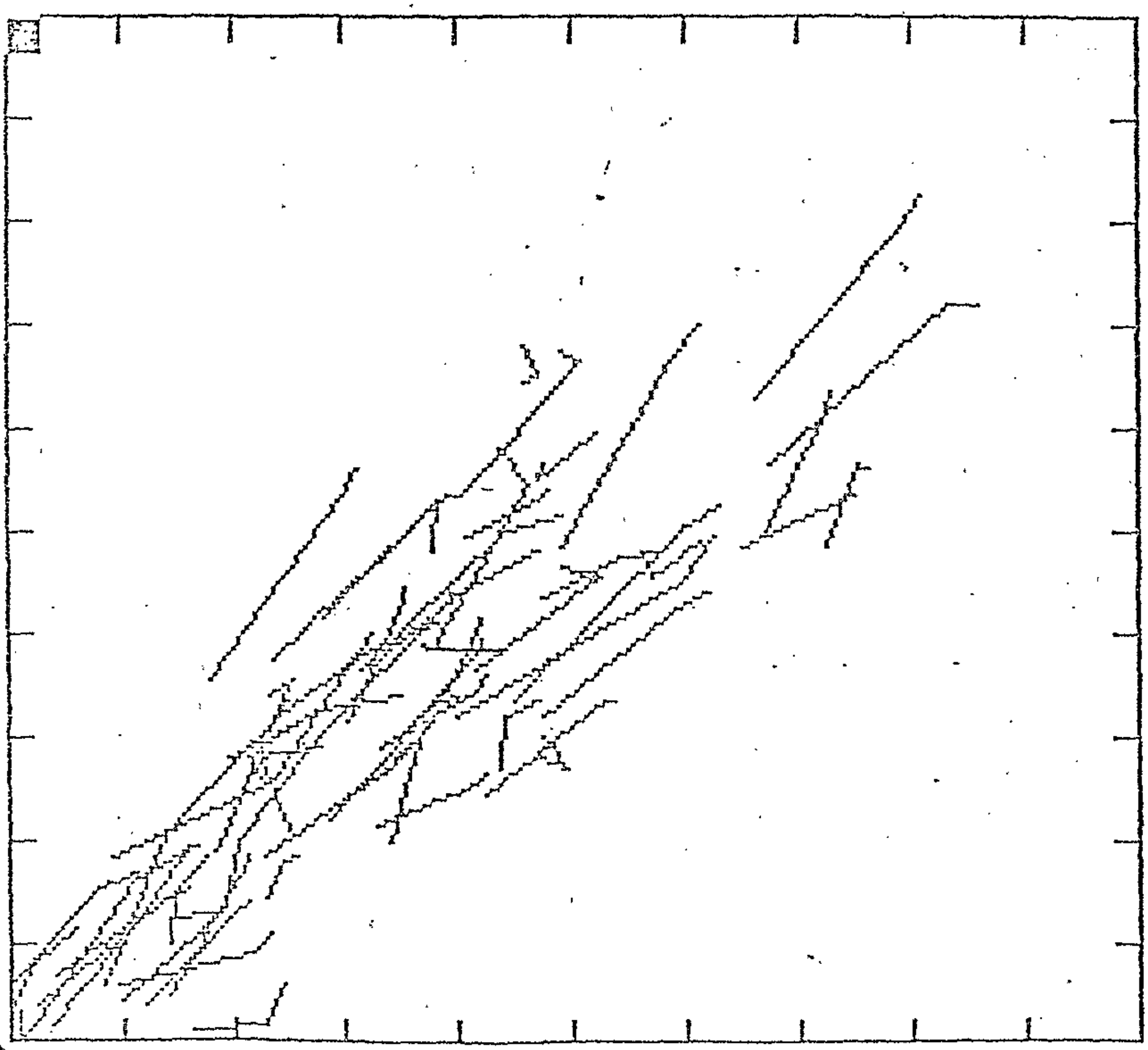


Figure 11

No.	Author(s)	Contact Address	Model Name (Last Update)	Model Description	Model Processes	IGWMC Key
1	S.W.Ahlstrom H.P.Foote R.J.Serne	J.F.Washburn Battelle Pacific NW Labs P.O. Box 999 Richland, WA 99352	MMT-DPRW (1976)	To predict transient, three-dimensional movement of radionuclides and other contaminants in saturated/unsaturated aquifer systems	advection dispersion diffusion adsorption decay chemical reactions ion exchange dissolution precipitation	0780
2	R.G.Baca	Rockwell Hanford Operations P.O. Box 250 Richland, WA 99352	FECTRA (1977)	A two-dimensional, vertical model to simulate steady or unsteady transport for a given velocity field in saturated or unsaturated porous media	advection dispersion diffusion adsorption decay	0790
3	H.C.Burkholder M.O.Cloninger W.V.Demier G.Jansen P.J.Liddell J.F.Washburn	Natl. Energy Software Center* Argonne Natl. Laboratory 9700 S. Cass Avenue Argonne, IL 60439 Tel: 312/972-7250	GETOUT (1979)	To predict migration of radionuclides to biosphere using a steady-state, homogeneous, isotropic, saturated model of the geosphere	advection dispersion diffusion adsorption ion exchange decay	2080
4	L.A.Davis	Waste and Land Systems, Inc. 1501 Lemay Ave., Ste.207 Ft. Collins, CO 80524	SEEPV (1980)	A transient flow model to simulate vertical seepage from a tailings impoundment, including saturated/unsaturated modeling of impoundment with liner, and underlying aquifer	advection	2890
5	J.O.Duguid M.Reeves	G.T.Yeh Oak Ridge Natl. Lab. Environmental Sciences Division Oak Ridge, TN 37830 Tel: 615/574-7285	Dissolved Constituent Transport Code (1976)	Transient, two-dimensional model for calculation of vertical solute transport through porous media with given velocity field	advection dispersion diffusion adsorption decay	2590
6	G.R.Dutt M.J.Shaffer W.J.Moore	Bureau of Reclamation U.S. Dept. of Interior 715 S. Tyler, Suite 201 Amarillo, TX 79101	Salt Transport in Irrigated Soils (1976)	A transient one-dimensional, vertical simulation of solute transport in the unsaturated zone, coupled with a chemistry model	ion exchange reactions	2950
7	D.R.Friedrichs C.R.Cole R.C.Arnett	D.R.Friedrichs Battelle Pacific NW Labs P.O. Box 999 Richland, WA 99352 Tel: 509/376-8628/8451	PCP (1977)	An advective transport model which calculates times of travel and paths along an unconfined aquifer by given potential surface	advection	2110
8	S.K.Gupta K.K.Tanji J.N.Luthin	Univ. of California at Davis Land, Air & Water Resour. Water Science & Engineering Section Davis, CA 95616 Tel: 916/752-0453	DAVIS/FE3D (1975)	Three-dimensional, unsteady model for prediction of piezometric head and salt transport in large, natural, multi-aquifer basins	advection diffusion	1590

Figure 12

USE OF MONITORING WELLS

FOR DETECTION OF LIQUID HAZARDOUS MATERIALS

ACKNOWLEDGEMENTS

Figure 6 courtesy of Thomas A. Prickett and Associates, #8 Montclair, Urbana, IL 61806

Figure 10, 11 courtesy of Thomas A. Prickett and Associates

Figure 12 courtesy of the International Groundwater Modeling Center, Holcomb Research Institute, Butler University, Indianapolis, IN 46208

#176 8

MINUTES OF THE BOARD OF SUPERVISORS
OF SAN BERNARDINO COUNTY, CALIFORNIA

October 29, 1984

FROM: FAZLE RAB QUADRI, Senior Executive Analyst
Board of Supervisors Government Relations

SUBJECT: COUNTY POSITION ON PENDING STATE REGULATIONS

RECOMMENDATION: Submit opposition, support, or amendment, as recommended below, to draft regulations implementing AB 1362 relating to underground storage of hazardous material.

BACKGROUND: I. Assembly Bill 1362 chaptered in law during the last legislation session requires the state to develop implementing regulations. These regulations will have direct operational and cost impact of San Bernardino County as the local enforcement agency in the management of hazardous materials.

EPWA-EHS expresses the following concerns and makes appropriate recommendations to protect the health, safety and environment as well as address technical requirements, compliance capabilities and costs.

ARTICLE 1

Section 2611. Clarification of exemptions for Counties or Cities with ordinances adopted prior to January 1, 1984.

Section 2611(5). Delete -- Storage of hazardous waste stored at a transfer/storage disposal facility presents as much threat to groundwater as any other tank and, therefore, must be called upon to meet monitoring and construction standards.

Section 2611(b). Add -- Definition of sump, separator, and separator sumps which are not considered underground tanks for the purpose of this ordinance.

cc: Fazle Rab Quadri
Environmental Hlth.
CAO
File

Received DTS
NOV 26 1984

Action of the Board of Supervisors

APPROVED BOARD OF SUPERVISORS
COUNTY OF SAN BERNARDINO

MOTION X X X MOTION SECOND
1 2 3 4 5

MARTHA M. SEKERAK, CLERK OF THE BOARD
BY Esther Hockenbraugh

DATED: October 29, 1984

14-9507-000
Rev. 10/81

ITEM 48

(CONT'D)

ARTICLE 2

Section 2620. Motor vehicle fuel should be defined by constituents of produce, not according to use.

ARTICLE 3

Section 2633(f). Specific threshold limits must be added. Some leak detection will allow 1-1/2 to 3 gpm leak before flow restriction or shutdown occurs which would result in a substantial release over a period of time.

Section 2634(c). Because of high initial costs of permanently installed monitoring systems and the unknown reliability, local government should be allowed to set its own monitoring guidelines, taking into consideration depth to groundwater and contents of vessel. Periodic testing could be performed by qualified testing firms.

Section 2634(c). Monitoring systems must be checked and calibrated semi-annually because of unknown reliability of such systems.

ARTICLE 4

Section 2640(g). Groundwater assurance well can provide a conduit through which hazardous substance may flow and enter groundwater. Drilling through impervious layers or drilling to substantial depth may nullify use of vadose zone wells because groundwater may be contaminated through assurance wells before vadose wells at 30' to 50' can detect contaminants.

It is strongly suggested that Section 2640(g) be deleted.

Section 2642(d). Product-tight testing is expensive. The beneficial aspects of yearly tests must be balanced against the costs. Both vadose zone monitors and tank tests should not be required to detect leaks. Testing on a two to three year basis should be considered. Logging of yearly reports and monitoring by local agencies will increase personnel cost resulting in higher fees.

ARTICLE 4 (CONT'D)

Section 2644(e)(3)(A). The possibility exists here that a highly contaminated sample near a leaking tank may be compromised by other samples from non-leaking tanks at the same site. Decision to composite samples should be made on site-per-site basis.

Section 2644. Add -- Background samples are needed to make determination of site contamination versus natural hydrocarbon in soil.

Section 2645(h). Local agencies should be given power to determine whether continuous, weekly, or monthly monitoring is justified dependent on tank construction and environmental factors.

Section 2647. Delete -- See Section 2640(g).

ARTICLE 5

Section 2651. Any release from a primary container must be reported to a local agency so that mitigation and repair measures can be approved.

ARTICLE 6

Section 2661. Evidence shall demonstrate to the satisfaction of the local agency that no significant contamination of soil or groundwater has taken place. Such evidence shall be demonstrated by appropriate soil samples or other approved techniques.

II. Oppose Articles 8, 9, & 10 because these articles allow the state to impose surcharges on local activities and to levee fees for administrative variance based on local need. This is inconsistent with the original intention of AB 1362.

ARTICLE 8

Section 2682. Site-specific variance should be made at the local level by local agencies.

ARTICLE 9

Section 2691. Delete -- Local agencies must have the capability to address local considerations without bearing an undue financial burden.

ARTICLE 10

Section 2711(c). San Bernardino County is opposed to Section 2711(c) as it would impose a State surcharge on local government activities. Section 2711(c) is also in direction opposition to California Health and Safety code, Chapter 6.7, Section 25288, which exempts those cities, counties, or cities and counties, which adopted an ordinance prior to January 1, 1984.

#177

GeoResearch

211 East Ocean Boulevard
Long Beach, California 90802
Phone (213) 437-8117
(209) 252-9252

Received DTS
NOV 21 1984

Mr. Harold Singer
State of California
Water Resources Control Board
Technical Services
Underground Tank Program
901 P Street
Sacramento, California 95814

November 19, 1984

Subject: Response to Draft underground tank storage regulations

Dear Mr. Singer:

My comment refers to section 2648 on page 4.75 No. T regarding the qualification of field personnel for the logging of borings, sample collection, and field supervision. Although our firm utilizes registered engineers and geologists for both field work and field supervision tasks, we also have qualified ground-water hydrologists to perform these tasks. These are individuals with advanced degrees (at least a Masters of Science) in hydrology from our country's foremost universities and who possess extensive field experience in all types of ground-water and soil contamination investigations. Our ground-water hydrologists, are trained using the uniform soil classification system but beyond that, our entire profession has been dedicated to ground-water related, especially ground-water contamination, investigations. Our only short coming is that our degrees state Masters of Science in hydrology rather than geology or engineering thereby preventing our timely registration in one of these categories. These individuals are much more qualified to perform and supervise the types of work described in this section of the regulation than registered engineers or geologists who do not have practical experience in ground-water and contamination investigations. We believe our ground-water hydrologists are well qualified to perform contamination investigations related to underground tanks after all, the main purpose of the regulation is to protect our states major source of drinking water.

My proposal to the Water Resources Control Board is that in addition to individuals you have qualified that professional ground-water hydrologists with a minimum of 5 years experience, and trained in the uniform soil classification be also included in this section of the regulation.

Thank you very much for reviewing and considering my comments.

Sincerely,

Michael M. Mooradian

Michael M. Mooradian
Principal

County of San Bernardino
BOARD OF SUPERVISORS
San Bernardino County Center
385 North Arrowhead Avenue
San Bernardino, CA 92415-0110

SAN BERNARDINO CALIF. NOV 20 '84
U.S. POSTAGE 17
PB METER 660844

MR HAROLD SINGER
STATE WATER RESOURCES CONTROL BOARD
P O BOX 100
SACRAMENTO CA 95801

SAN BERNARDINO CALIF. NOV 20 '84
U.S. POSTAGE 03
PB METER 660844

NOV 26 REC'D
#178

JOHN R. BELL
GENERAL CONTRACTOR
License No. 250205 B-1

November 20, 1984

Senator Ken Maddy
1060 Fulton Mall, #1310
Fresno, California 93721

I write to you to oppose the regulations proposed by the State Water Resources Control Board for implementing the provisions of Bill 1362 concerning the underground storage of hazardous materials. These proposed regulations go far beyond the jurisdiction granted to the Board by Bill 1362.

I suggest you see to it that this Board not become a law unto itself and that serious consideration be given to alternatives that have been presented to the Board by operators of underground storage facilities.

Yours truly,

John R. Bell

John R. Bell

3086 EAST BEHYMER AVENUE, CLOVIS, CALIFORNIA 93612 -:- PHONE (209) 299-6450

#179

7700 NORTH VAN NESS BOULEVARD FRESNO, CALIFORNIA 93711

November 16th, 1984

Senator Ken Maddy
1060 Fulton Mall #1310
Fresno, Calif. 93721

Dear Senator Maddy:

The small business owners are in need of your understanding and assistance once again.

My area of concern this time is directed towards the possibility of the regulations that the State Water Resources Control Board may implement because of the passage of the Underground Storage of Hazardous Substances Act, bill #1362.

As I feel certain you understand, we cannot afford more regulations of dubious value and of an expensive nature. Many of us in business today are having a very difficult time keeping the doors open, the employees paid, and meeting our other costs. As I read the numbers there are 83 million people working in non government jobs versus 79 million getting government checks.

Your help in controlling any unnecessary rules and costs in any and all areas will be most appreciated and may help us stay viable as a profit producing tax paying entity.

Sincerely yours,

Gordon T. Knott

Gordon T. Knott, President

GTK/sm

(209) 439-2928

#180

SUNMET

H.P. Metzler & Sons
5286 S. Del Rey Avenue
P.O. Box 509
Del Rey, California 93616
Phone (209) 445-1574

November 21, 1984

The Honorable Ken Maddy
1060 Fulton Mall, #1310
Fresno, CA 93721

RE: ADOPTION OF PROPOSED REGULATIONS GOVERNING UNDERGROUND STORAGE OF HAZARDOUS SUBSTANCES BY THE STATE OF CALIFORNIA WATER RESOURCE CONTROL BOARD

Dear Ken:

It has been recently brought to my attention that the CA. Water Resource Control Board is considering passage of new regulations that would require the installation of leak detection devices for underground full storage tanks. The proposed leak detection devices and methods proposed by the Board would be very expensive for us to comply with. The cost would be especially burdensome at this time, considering the state of the farm economy, but the worst effect would be long term. If these requlations are passed into law; growers like us would be forced, in some cases, to abandon our storage facilities rather than comply and make us more dependent on the major refineries and their distributors for a reliable, competitively priced supply of fuel.

I am in favor of protecting our environment, however I feel a more reasonable and less costly plan is needed. I solicit your effort to get involved in this issue and voice your opposition to the proposed requlations.

Sincerely,

Dennis

Dennis K. Metzler

DKM/jl

GROWERS - SHIPPERS - DEHYDRATORS
Peaches - Plums - Nectarines - Grapes - Apples

Original Comments 181-190

Index to Rulemaking File Underground Storage Tank Regulations Title 23, Waters Division 3, Water Resources Control Board Chapter 16, Underground Storage Tank Regulations **1985**

Union Oil Company of California

NICK PORTER
DBA UNION OIL
P.O. Box 698
Redding, Calif. 96099

UNION 76

REDDING CALIF.
DEC - 7 '84
U.S. POSTAGE
0.20
PB METER
1364170

Harold Singer
Water Quality Control Board
Division of Technical Services
P. O. Box CA
Sacramento, CA
95801

NOV 26 REC'D

#181

Wonder Valley Ranch Resort

Western Camps, Inc.

November 20, 1984

Senator Ken Maddy
California State Senate
1060 Fulton Mall, #1310
Fresno, CA 93721

Dear Senator Maddy

It has recently been brought to my attention that certain regulations are being proposed by the State Water Resources Control Board in order to implement Bill 1362 regarding monitoring underground storage of hazardous substances. It is my understanding that the Board's proposed regulations are going beyond the original intent of the original bill and imposing controls which will be difficult, if not impossible, to meet.

The proposed regulations include the cleaning up of "historical releases" and requiring expensive monitoring methods for tanks over a year old. They also call for a six-month implementation instead of the originally intended five-year time-frame.

I would greatly appreciate your help in seeing that these regulations remain in the context originally intended by Bill 1362. The expense incurred to businesses like mine if the proposed regulations are implemented could be great.

Thank you, Senator Maddy, for your time and effort in this matter.

Sincerely

Jerrold Siegel

Jerrold Siegel
Vice President

JS:jj

Wonder Valley Brand of Western Hospitality

Box 71 Star Route Sanger, California 93657 Telephone (209) 787-2551

#182

KOVAC EQUIPMENT CO.

PHONE 441-1122 • P.O. BOX 2527 • 2708 E. JENSEN AVE.
FRESNO, CALIFORNIA 93745

November 16, 1984

State Senate
Ken Maddy
1060 Fulton Mall #1310
Fresno, Ca 93721

Subject: Adoption of proposed regulations governing underground storage of hazardous substances by the State of Calif. Water Resource Control Board.

Dear Mr. Maddy,

We are concerned about the above regulation and how it will affect our business. We are a small tractor dealership with underground diesel fuel and gasoline storage tanks located on our property. Several years ago these tanks were purchased and installed. All the necessary permits and inspections were made to insure we complied with current regulations.

The financial impact of $100,000.00 to $200,000.00 clean up of a "historical release" would be devastating to our business.

It is also our concern that the regulations should not go beyond the jurisdiction granted to the Board by Bill 1362 or its intent.

Sincerely,

Phillip Terry

Phillip Terry
Secretary/Treasurer
PT/dr

MHC
WGP
~~C. J. [illegible]~~
Hal Singer

#183 [illegible]
#5

UNDERGROUND TANK REGULATIONS

SYNOPSIS:

Some motor vehicle fuel tanks would be subject to lesser requirements than other tanks under the regulations as proposed (see page 3.1 Section 2630(b) of Article III).

Because telephone company emergency engines are not motor vehicles the regulations that apply to retail gasoline service stations would not apply to telephone company tanks. Pacific Bell has approximately 625 tanks that would cost rate payers a minimum of $2,000 each ($1,250,000.00 total) to retrofit. The company seeks to change the definition of motor vehicle fuel tank to include emergency engine fuel tanks, which would include other utilities, hospitals and safety organizations such as police and fire departments.

PACIFIC TELESIS POSITION - AMEND

RATIONALE:

The proposed underground tank regulations are primarily designed to prevent contamination of the ground and ground water by intercepting hazardous and toxic waste before the waste escapes containment.

Extending the exception intended for gasoline service stations to telephone company emergency engine fuel tanks is consistent with the purpose of the regulations.

The proposed regulation distorts the statutory language. "Tanks for motor vehicle fuels" is the language used in the enabling statute (Chapter 1038 of 1984 Sections 2529(a)(7) and 2529(b)(3) of the Health and Safety Code).

The proposed regulations change the statutory wording "tanks for motor vehicle fuels" to "motor vehicle fuel tanks" thereby changing the meaning from the contents of the tank to what the contents of the tank are used for. This is clear from the definition used in the regulation:

> "'Motor vehicle fuel tank' means a tank that contains a product which is intended to be used primarily to fuel motor vehicles."

Adding the below amendment will include tanks used to fuel stationary engines used for standby emergency power.

SUGGESTED AMENDMENT:

On page 2.1 of the proposed regulations after line 17 insert:

> "This definition includes tanks used to fuel stationary internal combustion engines for the purpose of providing standby power to service facilities including, but not limited to, hospitals, utilities and safety organizations."

CONTACTS:

Gregg Cook (916) 325-7943
Tom Moulton (916) 325-7573

BUILDING OWNERS AND MANAGERS ASSOCIATION
OAKLAND/EAST BAY

1419 BROADWAY #229
OAKLAND, CALIFORNIA 94612

PHONE 893-6780

Orig - OCC
Copies - MAC
WGP
~~EGA~~
~~LM. Fulton~~
2-HS

#184

October 31,1984

Mr. Michael A. Campos
Executive Director
State Water Resources Control Board
901 P Street
Sacramento, CA 95801

Re: Proposed Regulations Covering Underground Storage of Hazardous Substances

Dear Mr. Campos:

Per enclosed photo copy of letter received this date from Elmer Johnson, Executive Vice President of Building Owners & Managers Association of San Francisco, BOMA of Oakland/East Bay wishes to express their concern on behalf of their membership re the above captioned proposed regulation.

We request that we be given time to work with our building owners and managers in our area and then combine our findings with the other associations so we can at least have the opportunity to impute our views.

We also request that we be mailed the regulations in their revised form as soon as they are available.

Very truly yours,

George E. Valentine

George E. Valentine, CPM,RPA
Executive Secretary/Treasurer

GEV:h
encl.

Received DTS
NOV 6 1984

BUILDING OWNERS & MANAGERS ASSOCIATION OF SAN FRANCISCO • 690 MARKET ST. SAN FRANCISCO, CA 94104 • 362-8567

BOMA

October 30, 1984

Mr. Michael A. Campos
Executive Director
State Water Resources Control Board
901 P Street
P.O. Box 100
Sacramento, California 95801

Dear Mr. Campos:

Re: Proposed Regulations Governing Underground Storage of Hazardous Substances

Pursuant to our October 22nd letter to Mr. Harold Singer (copy attached), Building Owners and Managers Association of San Francisco respectfully requests that we be granted at least 60 days to study and evaluate the proposed hazardous substance storage regulations. In view of the fact that we never received notice of the proposed regulations and public hearing, we trust that you will grant us our request.

Hundreds of office buildings throughout the State could be affected by the State Water Resources Control Board's proposed regulations, and it is vital that we be given the opportunity to determine the potential impact to the members of our Association.

We want to be sure that we have the opportunity to participate fully in the drafting of these regulations.

Thank you for your consideration.

Sincerely,

ELMER G. JOHNSON
Executive Vice President

EGJ:lt

cc: Linda Stockdale Brower, Director
Office of Administrative Law
BOMA - Los Angeles
BOMA - South Bay
BOMA - Oakland
BOMA - Orange County
BOMA - San Diego

#185 H3

Landells Aviation

69873 Silver Moon Trail · Desert Hot Springs, California 92240
Phone (619) 329-6338

November 30, 1984

State Water Resources Control Board
Paul R. Bonderson Building
901 P Street
Sacramento, Ca. 95801.

Attention: Mr. Harold Singer
Technical Staff

Re: Underground Storage Tanks

Dear Mr. Singer:-

Having attended your hearing and board meeting of November 27, 1984 I wish to voice my concern regarding the proposed new regulations for underground storage tanks.

Please take the following suggestions into consideration with your study group:

1. The tank registration law is a very BIG first step. Keep the intent of co-operation and the law rolling, but do not lose sight of the financial and logistical problems for the majority of tank users, mainly the "small business" people.

2. For leak detection start with the method now being utilized by most tank owners, which is inventory reconciliation. This method will at least get the program started and under some control.

3. We have underground tanks, as fuel is our lifeline. We also have another lifeline, a water well. We need both, and are very concerned about possible leakage. We do not intend to pay for our fuel to contaminate our water or anyone elses.

I feel that if common sense is applied the program will work.

Respectfully,

Palm Springs Aviation, Inc.
dba: Landells Aviation

J.D. Landells
J.D. Landells
President.

Received DTS
DEC 6 1984

c.c. Assemblyman Byron Sher
Mrs. Carole Onorato

ARTHUR H. & JEAN STEFFENSEN
PUBLIC ACCOUNTANTS
7469 S. CEDAR AVENUE
FRESNO, CALIF. 93725
PHONE 266-2997

DEC RECD
#186

11/19/84

KEN MADDY

1060 FULTON MALL, #1310
FRESNO, CA 93721

Dear Mr. Maddy:

We are concerned about the proposed regs that go far beyond the jurisdiction granted to the Board by the recent passage of the Underground Storage of Hazardous Substances Act. We feel that the regs should not go beyond the jurisdiction granted to the Board by Bill 1362 or its intent.

The financial impact on small business and the individuals with underground storage tanks.if the proposed regs were put into effect would be a great injustice.

Thank you for your time and concern in the above matter.

Very truly yours,

Jean Steffensen

#187

DEC 07 1984

T-ECH
2 HS

CALIFORNIA SOCIETY OF PROFESSIONAL ENGINEERS

1005 - 12TH STREET SUITE H SACRAMENTO, CALIFORNIA 95814 TELEPHONE (916) 442-1041

NATIONAL SOCIETY OF PROFESSIONAL ENGINEERS FOUNDED 1934

November 29, 1984

Michael Campos, Executive Director
Water Resources Control Board
1416 Ninth Street
P.O. Box 100
Sacramento, CA 95814

Dear Mr. Campos:

The California Society of Professional Engineers recognizes the necessity of establishing regulations to control leakage of hazardous materials from underground storage facilities in conformity with legislation AB 1362 (Sher).

CSPE expresses a concern, however, regarding the application of a standard set of regulations to all locations and conditions. CSPE respectfully suggests that in the interest of good economy, monitoring and control regulations be tempered to the specific site conditions and potential for
2 adverse effects on the water transport. For example, a low population desert location which might have no adverse effects on water transport would be subject to a different set of controls and monitoring procedures than would be another site with a high potential for contamination of the environment. Thus, the principle of "Engineered Storage" might be applied to diverse sites leading to a considerable economic savings while still preserving the integrity of the environment.

Sincerely yours,

George P. Hanna, Jr.

George Hanna, Jr., PE, Chairman
CSPE Hazardous Waste Committee

cc: Assemblyman Byron Sher
Ram Singh, PE, President
Orville Paul, PE, Vice President North
Members of the Hazardous Waste Committee

Received DIS
DEC 12 1984

#/88 HS

EXXON COMPANY, U.S.A.
P.O. BOX 4388-HOUSTON, TEXAS 77210-4388

MARKETING DEPARTMENT
RETAIL BUSINESS
REAL ESTATE & ENGINEERING

November 21, 1984

Mr. Harold Singer
Division of Technical Service
State Water Quality Control Board
P. O. Box 10
Sacramento, CA 95801

Re: Proposed Underground Tank Regulations
dated November 9, 1984

Dear Mr. Singer:

Please consider the following as Exxon Company, USA comments on the November 9, 1984 proposed Subchapter 16 regulations for underground tank storage of hazardous substances.

Exxon supports the comments submitted by the Western Oil and Gas Association ("WOGA"). In addition to the WOGA comments, Exxon believes there is a need to revise Article 4, Section 2644 "Inventory Reconcillation". As written, the requirement to deliver motor fuel into a storage tank during a period of "no tank....withdrawals" or to take before and after retail meter readings will have the effect of shutting down a service station for approximately 1/2 hour. The shutting down of a retail facility will inconvenience the motoring public and cause a loss of revenue for the small businessman operating the facility.

We agree with the objective to verify that the delivery bulk hauler has unloaded the full quantity which will be entered into the inventory reconcillation calculations. Exxon has conducted inventory reconcillations at some 7,000 locations annually over the past five years and offers the following three alternative procedures which are taken from the Exxon "Driver's Guide for Operating Delivery Motor Vehicles":

Received DTS

DEC 12 1984

Page 5-4; procedure #9:
Alternative #1

Always ask the customer to visually check the liquid level in each truck tank compartment against the capacity marker. This verification of quantities by the customer is still encouraged and permitted even when vapor recovery is required. Any discrepancy should be noted on the delivery manifest by both the customer and you. (If local laws require dry line calibration of compartments, the customer should check liquid levels before compartment emergency valves are opened.) Make sure the customer closes and latches all dome covers after checking the liquid level. Failure to close the dome covers will render the vapor recovery system inoperative and will result in violation of EPA regulations.

Page 5-8; procedure #25:
Alternative #1 (con't)

Make sure the compartments involved in the delivery are completely empty. Invite the customer to verify receipts by opening the dome covers and having him visually check the compartments for complete drainage. Dome covers can be opened after unloading even where vapor recovery is required, as no appreciable amount of vapor is lost. Or, if the customer prefers, he can verify receipts:

Alternative #2

- by watching the last of the product flow through the sight glass gauge in the tight-fill elbow while the unloading valve is still open.

Alternative #3

- or, after unloading hoses are disconnected, by momentarily cracking open compartment unloading valves to see that there is no product flow from the compartments. Always place a bucket under the valve being cracked open to catch any drippings.

We appreciate the opportunity to comment on the proposed regulations and are prepared to provide additional input as required

Sincerely,

S. D. Curran

SDC:vks

bcc: R. R. Eaton
G. S. Hagy, Shell Oil Company

188 B

Recvd.

JAN 17 1985

Orig - Anton CC: MAC, Deputies, MM

1/18 - Hrg.

EXXON COMPANY, U.S.A.
P.O. BOX 4388-HOUSTON, TEXAS 77210-4388

MARKETING DEPARTMENT
RETAIL BUSINESS
REAL ESTATE & ENGINEERING

January 16, 1985

Mr. Michael A. Campos
Executive Director
State Water Resources Control Board
Division of Water Quality
Paul R. Bonderson Building
901 P Street
Sacramento, California 95801-0100

Received DTS
JAN 17 1985

RE: Proposed Regulations Governing Underground Storage of Hazardous Substances

Honorable Board Members:

Exxon Company, U.S.A., submits the following comments to the proposed regulations (revised and published on January 3, 1985) to be considered for adoption at the January 18, 1985, Special Board Meeting.

Exxon supports comments made by the Western Oil and Gas Association (WOGA). Of special significance is the need for adequate public comment time, an inconsistency with state legislation and the manner in which the proposed regulations usurp local community rights which were provided for in state legislation.

We do not agree that the recent Board revisions incorporated in the current proposal address comments received nor could they be anticipated from the original text, as stated in the State Water Resources Control Board transmittal letter dated January 3, 1985. For example, the proposal addresses less than 50% of the WOGA comments submitted. Also, of some 4,000 printed lines contained in the text of the proposal, some 40% contained recent revisions. To address all comments and incorporate significant revisions, there is a need for the Board to provide adequate review time and the necessary public hearings.

The proposed regulations contain inconsistencies with state legislation. For example, on page 6.10, Section 2663(a) a new addition is the vacuum testing of a tank after any repair. While Assembly Bill 3781 provides for a requirement, "to determine whether the interior-coating process has bonded to the wall of a tank." vacuum testing is not a valid test for this purpose. Attached is a letter from Tankology, a company which specializes in tank testing using a vacuum system. The letter states that, "an unbonded area of even a square foot would not deflect or distort under vacuum," and, "the expoxy (liner) itself would not rupture." Another requirement in the proposal to certify the material and lining process meets this legislative requirement. Therefore, the vacuum testing requirement should be deleted.

TANKNOLOGY
16900-107 Ave.
P.O. Box 2405
Edmonton, Alberta T5J 2S1
TELEX 037-3336
PHONE (403) 483-3506

April 6, 1984

Mr. Paul Meli
Bridgeport Chemicals
2610 North East 5 Avenue
Pompaneau Beach, Fla. 33064

Dear Mr. Meli:

Thank you for your telephone call expressing interest in Tanknology's Vacutect System for detecting leaks in underground fuel storage tanks. The enclosed brochures present a general overview of the process and equipment we employ. At the present time we are providing the testing service out of our Edmonton, Alberta facility using our personnel. We have operated in California under contract during the past year and are presently negotiating with companies in the United States who wish to operate on both a national and a regional level using their own operating personnel. The major advantage to this mode is the reduction in travel since the equipment will be based in each major city and deployed as required to best serve that area.

The brochure indicates that the process is one wherein an instrumented probe is lowered into the bottom of the tank via the 4 inch fill pipe. An umbilical cable extends from the probe to the computer in the testing vehicle. The cable entry to the tank is sealed using an inflatable double acting seal. The probe is a stainless steel cylinder 2 inches in diameter and 20 inches in length which contains a hydrophone, a pressure (absolute) sensor, and a water level detector.

A vacuum pumping system, which is in a compartment on the side of the vehicle, is connected to the tank vent line.

The operators console now indicates the absolute pressure at the tank bottom. This is the sum of the ambient air pressure and of the head of the liquid in the tank. e.g. if the tank contains 8 feet of fuel, its pressure head is 3 P.S.I.G.

The Pressure in the ullage above the fuel (the tank does not have to be filled for our test) is incrementally reduced to the point where outside air will be forced in through a hole in the tank. If the hole is at the bottom of the tank we would reduce the ullage pressure by just over 3 PSI.

As air enters the tank through a leak, bubbles are formed. The bubble increases in size until its bouyancy overcomes the surface tension of the fluid. At this point it detaches from the tank wall and as it rises it undergoes a volume pulsation of constant frequency. The frequency is inversely proportioned to the size of the hole or fault, thereby providing some indication of the magnitude of the leak. This oscillation or pulsation is not to be confused with bubble repetition rate which increases as the delta P across the hole.

The proposed regulations unreasonably and totally usurps local community programs, which was not the intent of state legislation. For example, Santa Clara County HMMP's are no longer valid since arbitrary revisions have been made (e.g., requirements for ground water deeper than 45 feet have been revised to 50 feet and there now is a 100 feet ground water depth criteria). Of significance, the accepted Santa Clara vadose or ground water monitoring is now an and. This represents arbitrary rulemaking, with no experience available to justify the actions.

There is a need to develop reasonable regulations and protect the nations ground water. If regulations are not reasonable they will be difficult to implement and not accomplish their stated purpose. As a result, time and experience is needed to develop these regulations, and we believe the State Water Resources Control Board should expend the effort necessary to fully address all issues on behalf of the public.

Sincerely,

S. D. Curran

SDC:jm

*2941g

If there is a leak in the tank it may be detected in fifteen to thirty minutes or whatever time is required to produce the necessary pressure reduction in the ullage. If the tank is located above the water table the above mentioned bubble signature is the prime indicator that the tank is unsound.

In a great many installations the tank may be located in a high water table. If the leak is situated where there is saturation of the back fill, air and water will be drawn in through the fault. At the commencement of the test, the water level sensor indicates (at the operators console) the amount of water present. If water is present, the operator is alerted and the test may be extended to about two hours. The sensor detects and prints out the changes in water level every minute. This is the secondary mode by which leaks are detected.

It will be noted then, that tank dimensional changes are of no consequence in the Vacutect system, nor is it affected by trapped air, barometric fluctuations nor by the most critical parameter - temperature. Further, the process is not defeated by changes in the hydrostatic balance (water versus fuel) which can and do baffle volumetric loss and hydrostatic testing methods.

The Vacutect process has been developed and refined over the past several years by Athabasca Research Corporation Ltd. and is available through a wholly owned subsidiary, Tanknology Ltd. Our operators participate in an intensive training program at our dedicated test installation, classrooms, and "hands on" experience in the field.

To date the majority of our work is in the United States, where we have contracted in the Chicago area, and on the west coast from Los Angeles to Vancouver, B.C.

This description indicates what the Vacutect System is designed to do. In the San Jose area some confusion is evident in that there is a requirement to test the epoxy linings of repaired tanks using a slight vacuum with the empty tank. Our test equipment would be able to develop this vacuum in the tank and would safely reduce the pressure by the required 5.5 inches of mercury, however it will require from 20 to 60 minutes of continuous pumping (depending on the tank size). If the pumping is now discontinued and the vacuum is maintained for the "required one minute" this will prove only that there is no large leak in the tank. A small leak, in the absence of fluid would not significantly alter the indicated internal pressure. Also this test would not provide any indication of the strength, cure, or bonding of the epoxy coating.

In the event that a large hole existed in a tank it would not be possible to draw the vacuum since the rate of pressure reduction is a function of the pump size and we would be unable "to keep up" with the incoming air.

If a tank has been relined with epoxy, and assuming that a hole of .125" in the steel shell had been overlooked and not patched, the external pressure that will be applied to the epoxy will amount to a total of .033 pounds. This pressure is too insignificant to affect the epoxy coating in any way.

Let us again assume a half inch diameter hole that had not been plugged prior to epoxy coating. Under a vacuum of 5.5 inches Hg the total pressure on that area of epoxy would be only .54 lbs. which would be insufficient to flex the coating.

Yesterday, I received a call from Mr. Jim Campbell who represents the California Service Station Assoc. He had been given the impression that the application of a vacuum would cause a pealing away of a poorly bonded coating. I advised Mr. Campbell that this was not possible and that an unbonded area of even a square foot would not deflect or distort under vacuum. If a poorly bonded coating exists in the area immediately surrounding an unplugged hole in the steel shell, the differential pressure across the epoxy (inside to outside) might cause a slight flexing of the epoxy. The epoxy itself would not rupture and upon return to normal pressure or when the tank is eventually filled with product there would be no indication of the flexure.

I have suggested to Peter Jones, in San Jose, that the tank could be put under simple air pressure (3 lbs.) as per the first part of the post coating test and then filled with product for the final leak test using our Vacutect system. I am not convinced that he recognizes the advantages.

If the franchised applicators of the epoxy coating have reason to suspect that some area may not have a perfect bond they can readily test that area locally by applying a common suction cup (3" to 4" diameter such as used on some car top carriers) to the suspect area. The cup can be moistened with glycerine to ensure that is excludes all air and thereby maximizes the pull.

In summary:

1. A vacuum test on an empty tank provides no useful information on the bonding of the epoxy coating.

2. A vacuum test carried out after the tank is refilled with product will provide a final test on the integrity of both the steel shell and the new coating.

3. The Vacutect will prove the integrity of the sealing of the hatch cover.

As previously mentioned we are negotiating with people in the States who are interested in purchasing the company and marketing the patented technology right across the country. This will be superior to our present limited operating mode where we have to send our operators and equipment out of the Edmonton plant.

If your further interest extends to some form of participation in this process or the company, we would be pleased to discuss it at length, since we have no firm commitments on its sale as of this date.

Yours sincerely,

T. Edwin Adams,
President.

TEA:dg
Enc.

#189 HS

Union Oil
2340 Wyndham Lane
P. O. Box 698
Redding, CA 96001
December 6, 1984

Harold Singer
Water Quality Control Board
Division of Technical Services
P. O. Box CA 95801

Dear Sir:

The proposed regulations governing underground storage of hazardous substances, such as motor fuel, are not functional in northern California.

They do not take into consideration the small businesses with 1,000 gallons and smaller storage. For example, we have small "mom and pop" retail and grocery stores in outlying areas. They generally are located off the major highways and provide food and fuel for small farmers and ranchers in the rural areas. These outlets sell anywhere from 2,000 to 9,000 gallons per month. These proposed laws are cost prohibitive for these type of people. It would be a hardship to these areas if these retail stores were forced to close.

I feel that the proposed laws should exempt the existing storage tanks 1,000 gallons and smaller.

Possibly new tanks, 1,000 gallons and smaller, installed after this law goes into effect should have some type of inventory control that could be audited by the state to insure that the tanks are not leaking.

Sincerely yours,

Nick Porter

Nick Porter
Union Oil Distributor

cc: Honorable Gene Chapie
Congressman
Honorable Stan Statham
Assemblyman

Received ...

DEC 10 1984

12/7 #190 org ~~WG~~ Anton
cc - Bd
Singer
W Q P

LES H. COHEN & ASSOCIATES
1121 L Street, Suite 508, Sacramento, CA 95814 ■ (916) 441-7011

November Thirtieth
Nineteen Eighty-Four

Ms. Carole A. Onorato, Chairwoman
and Members, Water Resources
Control Board
901 P Street
Sacramento, California 95814

Dear Madam Chair and Members:

The attached material you may have already seen. But the letter from Modoc County Supervisor, Lesley Chace may have arrived too late to be included in the records for the previous hearing on Ocotober 23, 1984.

I would appreciate it if this material would be a matter of record in connection with the implementation of AB 1362.

Warm personal regards,

Les

LES H. COHEN

LHC:lrb

cc: Lesley J. Chace, Modoc County Supervisor

Received DTS
DEC 10 1984

Original Comments 191-200

Index to Rulemaking File Underground Storage Tank Regulations Title 23, Waters Division 3, Water Resources Control Board Chapter 16, Underground Storage Tank Regulations **1985**

#191

October 22, 1984

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801

RE: Public Comments Regarding Adoption of Proposed Regulations Covering Underground Storage of Hazardous Substances

The Modoc County Board of Supervisors want to go on record as supporting legislation to protect the groundwater of the State of California. However, we strongly oppose recent legislation implementing regulations to control Underground Storage of Hazardous Substances because of its impact on Modoc County and other rural counties in the State of California.

Modoc County has discussed, in depth, the issue of underground spills of hazardous substances. There is no evidence that any underground spills have occured in recent years. Also, we feel strongly that with the limited number of underground tanks in Modoc County other methods, rather than costly and frequent monitoring, can be established to safeguard our water originating in these Rural Counties. The estimated number of underground tanks in Modoc County was 170 as of May, 1984 and included home heating oil tanks (now excluded from monitoring regulations).

The proposed regulations would require Modoc County to charge excessively high permit fees to cover costs for administrating the program. We propose charging approximately $150 per tank annually. This will significantly increase problems in a high unemployment County of California. Gasoline tank owners in local gas stations and bulk plants will be forced to lay-off employees, limit hours of service and limit pay rates for employees.

A large percentage of tanks in Modoc County are owned by government agencies including: County of Modoc, City of Alturas, Modoc County Schools, USFS, BLM and CDF. Private industry will have to bear the cost of monitoring and administration of these government tanks if Modoc County is going to operate a cost-effective State mandated program.

Additionally, there are no monitoring companies located in Modoc County. We are aware that such companies are operating in the Sacramento area. However this is 300 miles from Alturas and Modoc County. No feasability study has been conducted to determine costs in contracting with a monitoring company, however, with the distance involved we would speculate that this would place an additional and very costly burden on all tank owners.

There has been discussion regarding allowing smaller rural counties to enter Joint Powers agreements for administration of implementation of permit programs for underground storage tanks storing hazardous substances. This would not be a cost effective method for counties to initiate because of many of the reasons stated above.

Thank you for allowing Modoc County to submit this testimony for your public hearing on Tuesday, October 23rd. Modoc County Board of Supervisors will assist, in any way possible, in implementation of regulations to safeguard California's water however we cannot support regulations that unduly burden private industry or the taxpayers of Modoc County.

Sincerely,

MODOC COUNTY BOARD OF SUPERVISORS

Lesley

(Mrs.) Lesley J. Chace
Supervisor Third District

Les – I thought you might like a copy of this

191-B

JOHN B. LAXAGUE
Cedarville

MELVIN "Andy" ANDERSON
Alturas

LESLEY CHACE
Alturas

M.W. "Mickey" JONES
Alturas

JOHN L. COULSON
Tulelake

MODOC COUNTY

Board of Supervisors

MAXINE MADISON
County Clerk
and
Clerk of the
BOARD OF SUPERVISORS
Box 131
ALTURAS, CALIFORNIA 96101
(916) 233-2215

May 18, 1984

Member Counties
Northern California Supervisors Ass'n.
P.O. Box 463
Redding, CA 96099

Dear Supervisors;

AB 1362 (Underground Storage of Hazardous Substances) has caused much discussion in the rural counties in the past few weeks. There is some confusion and uncertainty, and inconsistency in who should be appointed as the designated agency and how to implement this legislation.

I am very concerned about this State mandated local program and the ability for our county to cover all program costs with the permit fee. Initial evaluation shows that with our very limited number of underground storage tanks and the unreasonable amount of money we would need to charge it would still be impossible for us to recover all program costs.

Modoc County Board of Supervisors have not taken any action yet regarding this, however this is an agenda item for our May 21st Board meeting to request some assistance from our legislators.

I have already discussed AB 1362 and the several other Assembly-Senate bills with Assemblyman Stan Statham and Senator Ray Johnson and expressed my concerns.

I will propose to the Modoc County Board of Supervisors that we request the legislature to consider an exemption from implementation of this program in the rural counties until the guidelines have been clearly outlined and programs are well established in the larger counties where significant problems occur with the storage of hazardous substances.

Secondly, I feel that there is a need for some subvention funding (in a similar way to the Air Pollution subvention funding) to help the rural counties implement their programs. To substantiate this request, we will send a cost analysis for our program to our legislators.

#192 NOV 23 REC'D

GENTZ
Construction Co.
GEN. ENGINEERING CONTRACTORS
FRESNO

3220 W. Belmont Ave. • P.O. Box 4347, Fresno, Calif. 93744-4347
Phone (209) 275-1361
License No. 257817

November 26, 1984

State Senate
Ken Maddy
1060 Fulton Mall, #1310
Fresno, California 93721

Subject: Adoption of Proposed Regulations Governing Underground Storage Tanks

Gentlemen:

It has come to this company's attention that the subject regulations are about to be adopted. As the proposed regulations are going to cause heavy expenditures on the private business sector, it seems rather counter-productive that the corrective measures and new controls must be implemented in six months, rather than the five years the state impact study recommended. Business in California is only now beginning to recover from several years of financial precariousness. Large unbudgeted expenditures on an immediate and short term basis would have serious financial implications.

The proposed six month compliance period leaves no time to develop other alternative solutions. Some of the proposed measures have not even been field tested yet!

Apparently the State Water Resources Control Board is expanding the scope of the Hazardous Substances Act to cover past "unauthorized releases," while this company's understanding is the "act" is designed to monitor and detect problems now and in the future.

This company is as interested in protecting the environment as you in the legislature are, however, it makes no sense whatsoever to kill off the business and individual that will pay for this program.

You are strongly urged to carefully review the proposed State Water Resources Control Board regulations and really determine if the legislatures intent hasn't been carried far beyond its original scope. Let's redirect the board's activities to the jurisdiction to which it was intended rather than the carte-blanc power it seems to believe it has.

Very truly yours,

GENTZ CONSTRUCTION CO.

John Gentz
President-Manager

JG:FI:jr

#193

HYDRO-FLUENT, INC.

Subsurface Monitoring Technology

December 12, 1984

Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801-100

Attn: Mr. Harold Singer

Subject: Underground Tank Monitoring Program
Case History
Transamerica Delaval
Vernon, California

Dear Mr. Singer:

Although I was unable to attend the public hearings on the Water Resources Control Board guidelines for implementation of the underground tank monitoring legislation, it has come to my attention that some misconceptions may exist with respect to the cost of implementing a continuous electronic underground tank monitoring system. Therefore I am enclosing a case history of the investigation, design and installation of a monitoring system for Transamerica Delaval in Vernon, California.

SCOPE

The subsurface monitoring investigation consisted of the following tasks.

A. Preliminary Investigation

1. Review available ground water reports geologic maps and construction plans to determine ground water depth and subsurface conditions.
2. Conduct site reconnaissance to locate tanks, piping and appurtenant structures.
3. Analyze the field and review data and prepare a report pertaining to:
   a. existing soil and ground water characteristics;
   b. leak detection system design and installation specifications.
4. Submit report for approval by cognizant agency.

B. Leak Detection System Installation

1. Layout the locations of the subsurface leak detection devices in accordance with the report specifications.
2. Install subsurface soil gas wells by slant drilling techniques where applicable.
3. Supervision by certified engineering geologist to evaluate whether past leakage of the tanks has occurred. A Sierra Monitors combustible gas detector and Draeger tubes were used to determine the presence of motor fuel vapors.
4. Install a flush-mounted, access box at each well location.

1162 N. Kraemer Place • Anaheim, California 92806 • 714/632-6751

B. Leak Detection System Installation (con't)

5. Install a combustible gas sensor in each well at a depth of 12 feet.
6. Connect the sensor to a LeakAlert alarm panel.
7. Provide start-up and testing services for the leak detection system.

FACILITY DESCRIPTION

Type of Facility - Light Manufacturing.

Location - The site is located at 3211 Fruitland Avenue, directly northwest of the intersection of Fruitland and Alcoa Avenues.

Surface Improvements - The underground storage tanks are located south of the main building. A gasoline pump and service island are situated above the tanks. Adjacent to the service island a concrete pad overlies the tank excavation with asphaltic concrete paving comprising the remainder of the parking area.

Underground Storage Tanks

Layout - The two gasoline storage tanks are situated side by side with the long axis parallel to Fruitland Avenue. The tanks are both 8000 gallon capacity and reportedly measure 8 feet in diameter by 22 feet long. The location and configureation of the tanks are shown on the Plot Plan, Figure 1.

Construction - The tanks are reportedly of standard cylindrical steel construction with an exterior bituminous coating.

Contents - Both tanks contain unleaded gasoline.

FIELD EXPLORATION

Magnetometer Reconnaissance - A Schonstedt Instrument Company Model GA-52B Magnetic Locator was used to approximately locate the underground tanks, piping and other subsurface structures. Since the magnetometer does not detect nonmagnetic materials such as copper, brass, aluminum, plastic, wood, etc., the survey does not locate all subsurface obstructions at the site.

Ground Water Exploratory Boring - On the basis of discussions with the City of Vernon personnel, review of available ground water data, and inspection of nearby water wells ground water was determined to be at depths below the surface of greater than 45 feet and therefore no ground water boring was required.

SUBSURFACE CONDITIONS

Soil Description - The site is underlain by alluvium of Recent Age. The alluvium consists of mixtures of sand, silt and clay with sand representing the predominant grain size. The alluvium is present to depths in excess of 200 feet. Two to five feet of fill overlies the alluvium at the site and consists of a clayey sand with isolated bricks, concrete and asphalt fragments.

Ground Water - During discussions with personnel of the nearby Alcoa plant it was indicated that three borings have recently been drilled to depths of 90 feet within 2000 feet of the subject site. These borings did not encounter ground water. In addition, ground water contour maps for 1983 compiled by the Los Angeles County Flood Control District indicate that the ground water surface in the vicinity of the site is approximately 230 feet below the surface.

MONITORING SYSTEM

General Description - The subsurface monitoring system at the subject site is intended to detect the presence of combustible vapors in the soils adjacent to and below the tanks. As a consequence, it is not necessary to detect a concentration of liquid product in a ground water well. This is particularly significant for areas with deep ground water and granular soils, where liquid tank leakage would not disperse laterally toward ground water wells located at the periphery of the tanks. However, vapors are laterally dispersive and can be readily detected in soil gas wells. The components include subsurface soil gas wells, access boxes, combustible vapor sensors, and a LeakAlert alarm panel.

System Components

Soil Vapor Wells - A two inch diameter PVC soil vapor well, perforated from 5 to 20 feet below the surface, was installed vertically, as shown on the Plot Plan, Figure 1. A graded sand pack was placed around the perforated section of each well and native backfill was placed around the solid section. A concrete encasement was contructed to seal the probe from surface infiltration and to provide a base for an electric access box. Details of the probe installation are presented in Details A and B, Figures 2 and 3.

Soil Vapor Sensors - A remote, long-life metal-oxide semiconductor (MOS) capable of sensing many combustible and toxic gases, and organic vapors was installed in each soil vapor well. The sensor leads are sheatherd in PVC and all connections are watertight.

Alarm Systems - The alarm system consists of a Model LA series LeakAlert manufactured by Universal Sensors and Devices, Inc. All the components, except the sensors, are housed inside a NEMA type 4 enclosure. Each channel is independently controlled with a single PC board module. Each PC board is equipped with a green LED power on indicator, and a red LED alarm indicator. Both LED indicators are visible from outside the electronic enclosure. Each PC board is also equipped with an alarm setpoint trimpot, and a push button switch to test the electronic circuit. Interfaces between the sensors and the electronic control modules are facilitated with FM certified Zener safety barriers.

When the signal of a given channel exceeds its preset level, then its red alarm LED will be activated to indicate the alarm status. In addition to the visible indicator, an audio buzz alarm will sound to alert the leak status. A switch is provided to silence the buzz alarm when needed.

COST SUMMARY

The costs for the investigation, design and installation of the monitoring systems are outlined below.

Preliminary Investigation		
1. Review and design		$ 240.00
2. Site reconnaissance		180.00
3. Report preparation		152.00
	Subtotal	572.00

COST SUMMARY (con't)

System Installation	
1. Drill and install wells	540.00
2. Equipment and supplies	
Soil gas wells (2)	220.00
Combustible gas sensors (2)	1050.00
Alarm box	1195.00
3. Electrical installation	400.00
4. Concrete cutting & removal	1100.00
5. Startup and testing	240.00
6. Certification report preparation	320.00
Subtotal	5065.00
TOTAL	$ 5637.00

I hope this information will clarify any questions you may have with respect to the cost of continuous monitoring. Despite the claims that continuous monitoring is an exorbitant expense, I believe that continuous systems which can fulfill the intent of the legislation can be designed and installed with reasonable cost effectiveness. In addition, as you can see, the major cost of the system are the electronic components. As more systems are introducedand the technology advances, the electronic costs will decrease due to competition and production efficiency improvements.

We appreciate the opportunity of providing you with this information. If you have any questions, please call.

Very truly yours,

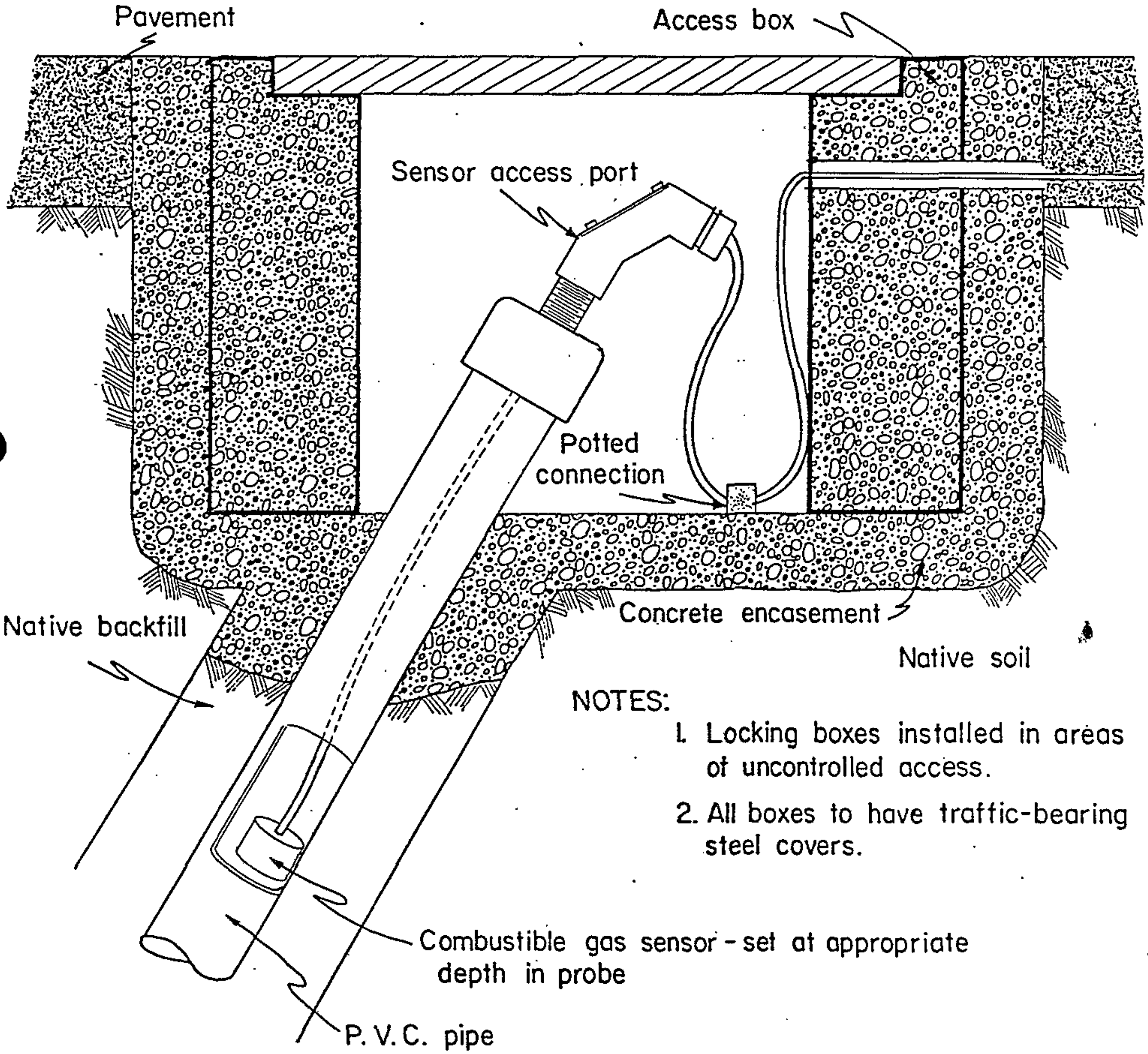
HYDRO-FLUENT,INC.

Grayson R. Walker
President
RCE 29807

John F. Dablow III
Executive Vice President
CEG 1032

GRW;JFD/daw

DETAIL B, TYPICAL SOIL VAPOR PROBE INSTALLATION

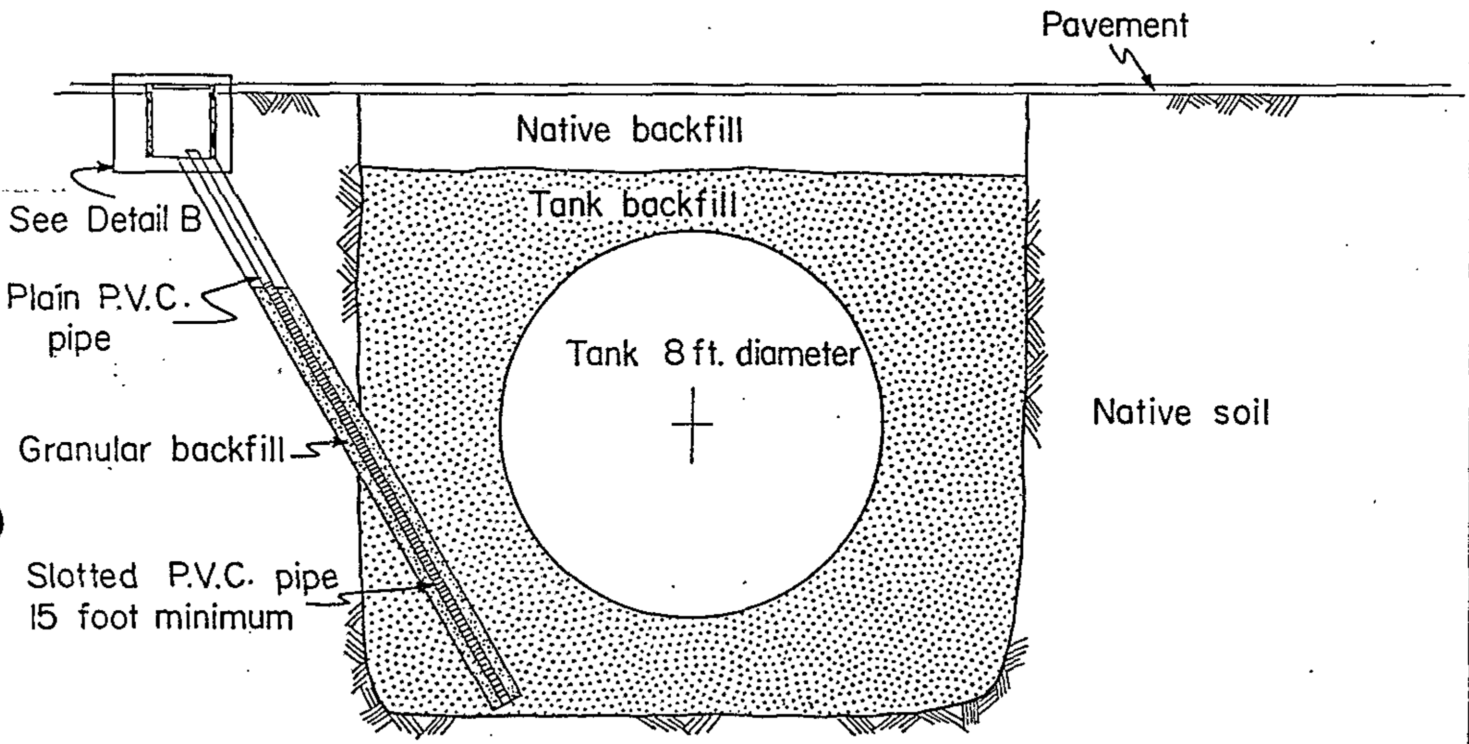


NOTES:

1. Locking boxes installed in areas of uncontrolled access.
2. All boxes to have traffic-bearing steel covers.

HYDRO-FLUENT, INC. geology • engineering • construction	Barksdale Control		
	By: D.M.H.	Drawing Date: 8/7/84	
	Project No: 1130-01	Date: Aug. 24, 1984	Figure No: 3

DETAIL A, TYPICAL MONITORING PROBE INSTALLATION

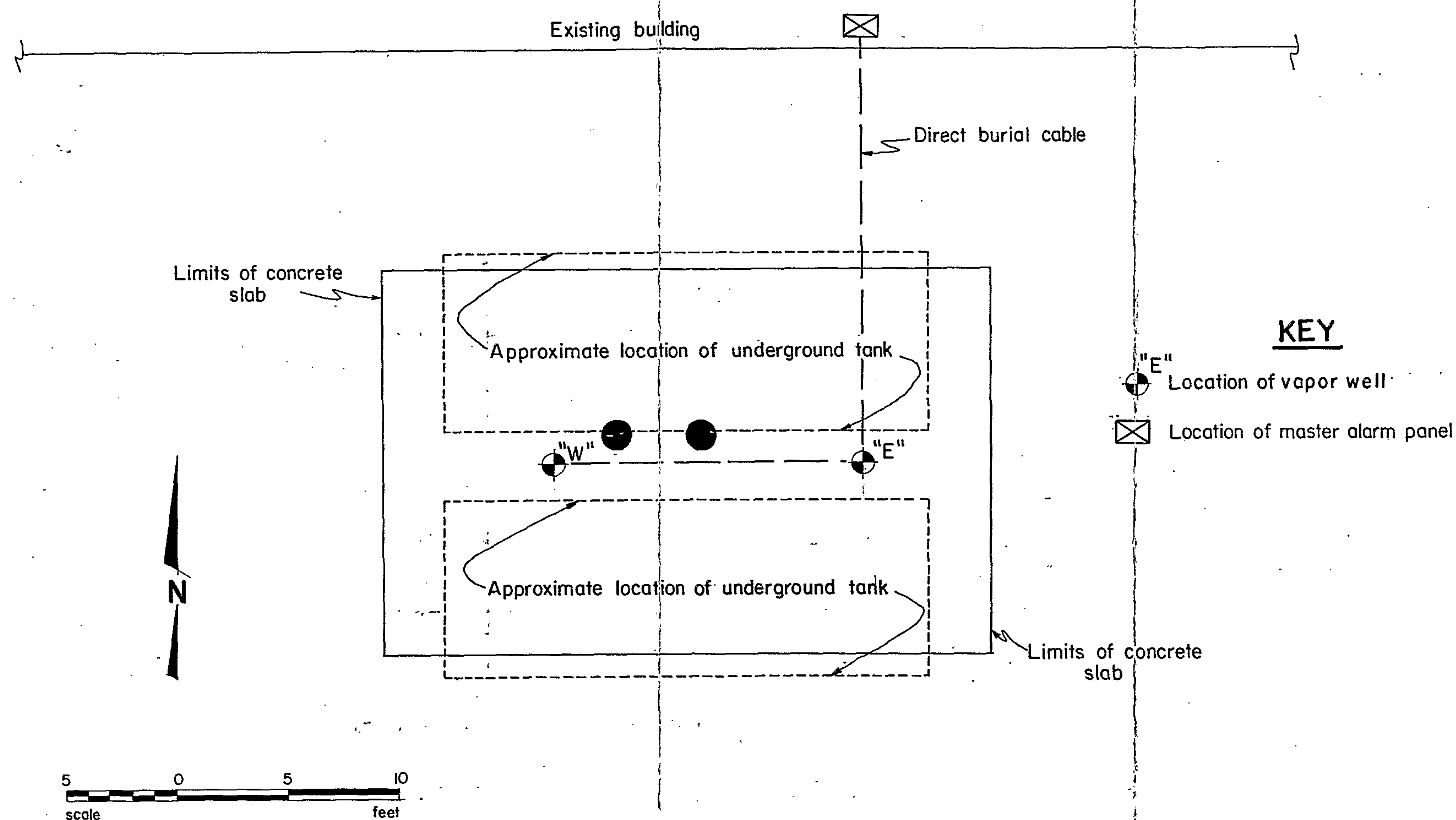


NOTES:

1. Probe may be placed vertical to 45 degrees from vertical depending upon spacial limitations.
2. Probe to be constructed of 2-inch, schedule 40 P.V.C. pipe. Connections to be flush-threaded with no glue.
3. Probes to be installed with locking boxes in areas of uncontrolled access.

HYDRO-FLUENT, INC. geology • engineering • construction	Barksdale Control	
	By: D.M.H.	Drawing Date: 8/7/84
	Project No: 1130-01	Date: Aug. 24, 1984 — Figure No: 2

WELL LOCATION PLAN

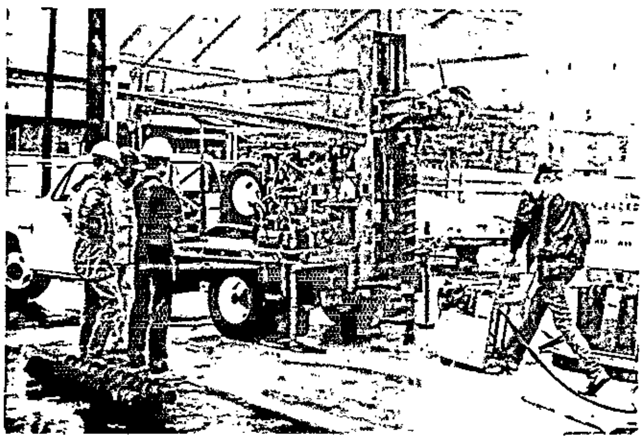


HYDRO-FLUENT, INC. geology • engineering • construction	Barksdale Control 3211 Fruitland Avenue, Vernon	
	Project No.: 1130-01	Figure No.: 1

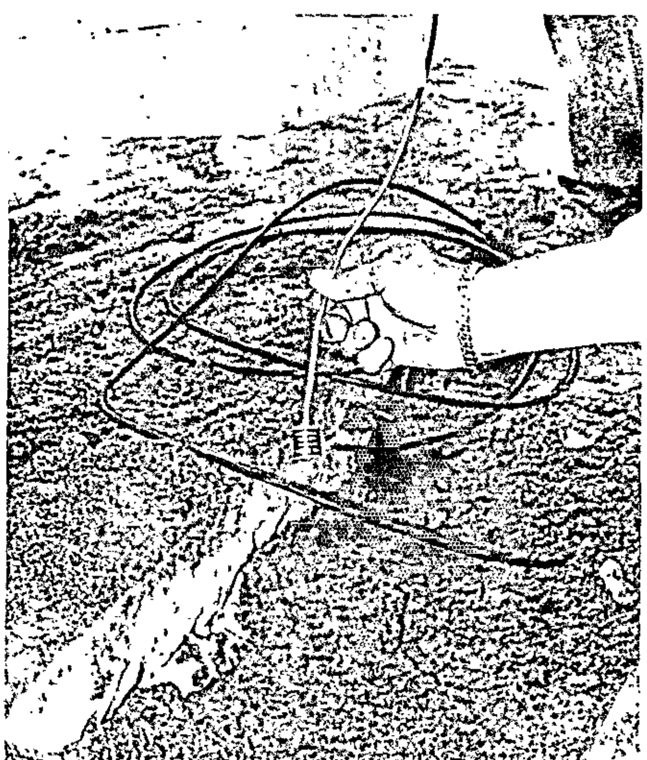
BARKSDALE

PLANT NEWS — Transamerica Delaval — OCTOBER 1984

Barksdale Leads The Way In Vernon



Sub-surface leak detection.



Protection Of Our Ground Water . . .

Barksdale is proud to be the first company in Vernon to comply with two new State laws (AB 1362, Sher and AB 2013, Cortese) which regulate underground storage tanks containing hazardous substances. These laws, together with the stringent new regulatory guidelines that have been set up by the city of Vernon, are designed to protect our ground water from being accidentally polluted. All companies must register their underground storage tanks and install a system which can detect leakage of hazardous substances.

Lloyd Nelson, who has the responsibility of hazardous materials control at Barksdale, worked closely with the construction contractors, Hydro-Fluent, Inc. of Anaheim, to develop and install a sub-surface leak detection and monitoring system. Two holes were drilled, liners were inserted and two soil gas probes were lowered into place, each one in close proximity to a gasoline storage tank. The 24 hour monitoring sensors are connected to an alarm control box. According to Lloyd, "The whole project went very smoothly." Plans are also in the works for adding a graph recorder to the system which will give us a 24 hour visual check. The system will be inspected regularly by the city of Vernon.

Being the first in Vernon, our installation has attracted the attention of other companies in our area. Many have already been out to view the project in order to formulate plans of their own.

#194 HS

MESA DISTRIBUTING CO., INC.

December 20, 1984

Mr. Harold Singer
State Water Resources Control Board
Division of Technical Services
P.O. Box 100
Sacramento, CA 95801

Re: AB 1362 proposed underground storage tank leak monitoring regulations

Dear Mr. Singer:

We need regulations to ensure detection and proper response to leaks from underground storage tanks. We totally support efforts like those behind AB 1362, which will promote a safe and clean environment; these efforts are both desirable and necessary.

However, the requirements proposed in AB 1362 go far beyond what is needed to accomplish the objectives in maintaining a clean and safe environment. Neither the people nor their concerns for a clean environment are served by regulations that require redundant and unnecessary measures.

Inventory reconciliation and regular testing which are now required provide a monitoring system that enable quick detections.

Additionally AB 1362 fails to adequately address the primary causes of leaks: Poor construction and improper installation of underground tanks. What we need are stronger requirements for the type and construction of the tanks used for underground storage, and stronger regulations on how these tanks must be installed.

Mesa Distributing Co., Inc. wishes to go on record in opposition of AB 1362.

Sincerely,

MESA DISTRIBUTING CO., INC.

Ron Cady

Ron Cady
Executive Vice President

Received DTS
DEC 28 1984

MILLER
LITE
LOWENBRAU
MEISTER BRAU
MILWAUKEE BEST
HEINEKEN
AMSTEL
LABATT'S
CORONA
MICKEY'S MALT

7598 TRADE STREET • P.O. BOX 26540 • SAN DIEGO, CA 92126 • (619) 695-0200

State of California

Memorandum

To : Chief, Division of Water Quality
State Water Resources Control Board
Sacramento

Date : January 7, 1985

a. AS

From : **California Regional Water Quality Control Board**
San Diego Region
6154 Mission Gorge Road — Suite 205, San Diego, Calif. 92120

Subject: SHER BILL REGULATIONS
SPECIAL BOARD MEETING - JANUARY 18, 1985

I am forwarding comments on proposed Subchapter 16 which the San Diego Regional Board received from Mr. Cady of Mesa Distributing Company.

Ladin H. Delaney

LADIN H. DELANEY
Executive Officer

Enclosure

PWM:bcs

Received DTS
JAN 14 1985

MESA DISTRIBUTING CO., INC.

RECEIVED
DEC 27 1984
SAN DIEGO REGIONAL
WATER QUALITY CONTROL BOARD

December 20, 1984

Councilwoman Harriett M. Stockwell
California Regional Water Quality Control Board
San Diego Region
6154 Mission Gorge Road
Suite 205
San Diego, CA 92120

Re: AB 1362 proposed underground storage tank leak monitoring regulations

Dear Councilwoman Stockwell:

We need regulations to ensure detection and proper response to leaks from underground storage tanks. We totally support efforts like those behind AB 1362, which will promote a safe and clean environment; these efforts are both desirable and necessary.

However, the requirements proposed in AB 1362 go far beyond what is needed to accomplish the objectives in maintaining a clean and safe environment. Neither the people nor their concerns for a clean environment are served by regulations that require redundant and unnecessary measures.

Inventory reconciliation and regular testing which are now required provide a monitoring system that enable quick detections.

Additionally AB 1362 fails to adequately address the primary causes of leaks: Poor construction and improper installation of underground tanks. What we need are stronger requirements for the type and construction of the tanks used for underground storage, and stronger regulations on how these tanks must be installed.

Mesa Distributing Co., Inc. wishes to go on record in opposition of AB 1362.

Sincerely,

MESA DISTRIBUTING CO., INC.

Ron Cady

Ron Cady
Executive Vice President

7598 TRADE STREET • P.O. BOX 26540 • SAN DIEGO, CA 92126 • (619) 695-0200
SAN DIEGO, CA 92126 • (619) 695-0200

STATE OF CALIFORNIA GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

6154 Mission Gorge Road
(Mail: Suite 205/Enter: Suite 106)
San Diego, California 92120—1939
Telephone: (619) 265-5114

January 7, 1985

Mr. Ron Cady
Mesa Distributing Company, Inc.
P. O. Box 26540
San Diego, California 92126

Dear Mr. Cady:

I received your comments dated December 20, 1984, on proposed regulations to implement the Sher Bill, Assembly Bill 1362. The Sher Bill went into effect in January of 1984.

The State Water Resources Control Board will hold a Special Board Meeting in Sacramento on January 18, 1985, to review changes to the proposed regulations (Subchapter 16, Chapter 3, Title 23 of the California Administrative Code). I am forwarding your letter to the State Board for consideration at that meeting. You may contact the State Board at (916) 324-1262 to receive a copy of the proposed regulation.

Thank you for your participation.

Very truly yours,

Ladin H. Delaney

LADIN H. DELANEY
Executive Officer

cc: Members, San Diego Regional Water Quality Control Board
Division of Water Quality, State Water Resources Control Board, Sacramento

PWM:bcs

Received DIS

JAN 14 1985

#195

ENVIRONMENTAL MANAGEMENT

ROBERT J. PENDOLEY
DIRECTOR

SOLANO 1850 COUNTY

COURTHOUSE
580 TEXAS STREET
FAIRFIELD, CALIFORNIA 94533-6376
PHONE (707) 429-6561

355 Tuolumne Street
Vallejo, CA 94590
PH: (707) 553-5251

ENVIRONMENTAL HEALTH SERVICES DIVISION

December 14, 1984

State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801

Attn: Technical Services Division

Re: Draft Underground Tank Regulations

Honorable Members of the Board:

Solano County adopted an ordinance for regulation of underground storage of hazardous materials. This ordinance was adopted prior to January 1, 1984. Even though we are not required to enforce the regulations which will be adopted by the State Board, these regulations have a very significant influence upon the delivery of our program within this County. This influence has compelled us to attend the workshops and hearings, including the latest Board hearing on November 27, 1984.

We are currently in the process of developing our guidelines which shall be incorporated into our ordinance. We shall utilize the State Regulations as the nucleus for our guidelines. We believe that this approach is beneficial in two ways: First, it will provide coordination and consistency in the regulation of underground tanks between this County and our neighboring counties; Second, it permits us to utilize the resources of technical information and personnel which the State Board has at its' disposal.

We reviewed the November 9, 1984, edition of the draft, "Underground Tank Regulations", and we believe that this latest edition is a considerable improvement over earlier versions. The language throughout the regulations has been clarified. Unnecessary language has been eliminated and some requirements were strengthened. There are, however, two aspects of the regulations which we think the Board should consider modifying or eliminating before the regulations are adopted.

The first area of concern involves the use of monitoring number 1, page 4.16, "Tank Testing". We feel that tank testing, even on a monthly basis, fails to provide continuous monitoring of the tank. A tank test can only reveal whether a tank is leaking at that time. Should a leak develop after the tank has been tested, the operator of the tank may be unaware of the leak for as long as 30 days, or until the tank is again tested. This could result in significant loss of product and a potential for groundwater contamination. We recommend that tank testing not be used as an alternative by itself. Tank testing should be used in conjunction with inventory reconciliation and with some type of groundwater monitoring or vadose monitoring scheme.

Our second area of concern pertains to the use of monitoring alternative number 5, page 4.22. This monitoring alternative requires the use of inventory reconciliation, tank testing and pipeline leak detectors. Our experience within the past few months has convinced us that this type of monitoring, which the petroleum industry currently uses, has been ineffective in the detection of leaks before large quantities of product are lost into the underground environment. This issue was presented to the Board by a representative of Assemblyman Sher's office at the November 27, 1984, hearing. At that hearing the Board commented that the inventory reconciliation required by the regulations was much more rigid than what industry had been using. Combining this requirement with the requirement that the statements submitted by the tank operator/owner shall be made under penalty of perjury, this alternative should be effective in assuring early leak detection. We feel that this particular alternative fails to provide a continuous monitoring scheme which would detect leaks which are too small to be indicated on inventory reconciliation. This could result in significant quantities of product being lost into the environment. We concur with Assemblyman Sher's representative to the effect that, should the Board adopt this monitoring alternative without modification, they should examine the effectiveness of this alternative on an annual basis.

Our principal objective in this program is to assure public health and safety through the protection of groundwaters within this County from contamination by hazardous chemicals stored in underground tanks. Our second objective is to be consistent with the requirements of our surrounding counties. Unless we obtain modification of these two alternatives in the "Underground Tank Regulations", we may be compelled to provide requirements which shall be significantly different and, in some cases, more stringent than our surrounding counties. This type of inconsistency is frustrating for the regulated community.

We look forward to receiving a copy of the final draft or the adopted regulations when they become available.

Sincerely yours,

Brian J. Zamora, Director

BJZ/CKC/nc

#197

TWIN CITIES EQUIPMENT RENTALS

Division of S. and J. Rentals Inc.

253 Colusa Avenue • Yuba City, CA 95991

(916) 671-1030

December 12, 1984

Honorable Wally Herger
1469 Butte House Road
Yuba City, CA 95991

Dear Assemblyman Herger:

As a small business owner in your district, I am very concerned about the impact of regulations being considered by the State Water Resources Control Board to implement the Sher bill (AB 1362), Underground Storage Tanks.

I own and operate a rental yard where I meet the needs of homeowners, recreationists, contractors, and business people by supplying everything from cement mixers, rototillers and compressors to forklifts, backhoes and trucks. An on-site fuel supply is imparative to assuring the quality of fuel to avoid repair and down time on my machinery as well as to meet public and worker safety regulations and general consumer demand.

While there are some provisions made for small business in the current draft of regulations, with expensive well drilling and sophisticated technology mandated for everyone with groundwater above 100-feet (that's 40 percent of the state) we still face monitoring requirements totaling as much as $15,000 or more. We are able to meet the stringent regulations levels set for inventory reconciliation and feel the standard set in the law will be met by use of that single monitoring method. The level of hazard posed by my tank does not warrant the intensive measures designed to meet large tanks pumping thousands of gallons. Detailed technological standards also threaten to subject small business to the equipment/installation victimization suffered in the vapor-recovery mandate. ? BASIS ?

We feel the State Water Resources Control Board members are being forced to push through regulations which do not satisfy them or the hundreds of private enterprise people who have been at each hearing because of the Dec. 31 deadline for implementation.

We urge you to speak for small business and inform the Board of your support for use of inventory reconcilliation as the sole monitoring method for tanks of 2,000 gallons or less with annual volumes of 20,000 gallons or less. And we ask you to give highest priority to legislative action to afford the Board more time to insure that we receive good, workable regulations.

We very much recognize our responsibility for monitoring our underground tanks and have a great personal stake in assuring the integrity of the state's groundwater. We ask only for a cooperative and judicious framework by which to proceed. We hope you can and will lend your support for small business.

Thank you,

Brent Skousen

Brent D. Skousen
Vice President

BDS/cs

#796

DEC 24 1984 ~~org alpa~~

SACRAMENTO OFFICE
State Capitol
Sacramento, CA 95814
(916) 445-7298

DISTRICT OFFICE
1521 Butte House Rd. - Suite C
Yuba City, CA 95991
(916) 673-2201

DISTRICT OFFICE
2505 The Esplanade
Suite 2
Chico, CA 95926
(916) 891-1671

Assembly
California Legislature

WALLY HERGER
ASSEMBLYMAN, THIRD DISTRICT

COMMITTEES
Agriculture
Natural Resources
Water, Parks & Wildlife

Select Committees
Economic Problems in
Timber & Related Industries
Victim Restitution
The Auburn Dam

Joint Committee on Fairs
Allocation and Classification

Member Rural Caucus

HS

December 19, 1984

Mrs. Carole A. Onorato, Chairwoman
State Water Resources Control Board
P. O. Box 100
Sacramento, California 95814

Dear ~~Mrs. Onorato~~: Carole

Attached is a letter from one of my constituents, Mr. Brent Skousen. Mr. Skousen outlines a problem that many of our small businesses are facing, with regards to the implementation of AB1362 (Sher), pertaining to underground storage tanks.

I believe he has expressed some legitimate concerns, that warrant consideration from the appropriate state agencies involved. I would appreciate your reviewing Mr. Skousen's letter, and providing me with some suggestions as to how to rectify the difficulties he has outlined. My hope is that we might be able to solve any implementation problems administratively.

If you should have any questions regarding our concerns, please feel free to contact me. I appreciate your consideration in this matter, and look forward to hearing from you in the near future.

Sincerely,

Wally

WALLY HERGER
Assemblyman, Third District

WH:dec
cc: Mr. Brent D. Skousen
Twin Cities Equipment Rentals
253 Colusa Avenue
Yuba City, California 95991

Received DTS

DEC 26 1984

12/21/84

#178

#198

Enclosed you will find copies of constituent letters to me concerning the adoption of proposed regulations governing undergroud storage tanks.

I want you to be advised of the problems.

SENATOR ROSE ANN VUICH

For Your Information

Compliments of
SENATOR ROSE ANN VUICH
California Legislature

SUNMET

H.P. Metzler & Sons
5286 S. Del Rey Avenue
P.O. Box 509
Del Rey, California 93616
Phone (209) 445-1574

RECEIVED NOV 26 1984

November 21, 1984

The Honorable Rose Ann Vuich
120 West Tulare
Dinuba, CA 93618

RE: ADOPTION OF PROPOSED REGULATIONS GOVERNING UNDERGROUND STORAGE OF HAZARDOUS SUBSTANCES BY THE STATE OF CALIFORNIA WATER RESOURCE CONTROL BOARD

Dear Rose Ann:

It has been recently brought to my attention that the CA. Water Resource Control Board is considering passage of new regulations that would require the installation of leak detection devices for underground full storage tanks. The proposed leak detection devices and methods proposed by the Board would be very expensive for us to comply with. The cost would be especially burdensome at this time, considering the state of the farm economy, but the worst effect would be long term. If these requlations are passed into law; growers like us would be forced, in some cases, to abandon our storage facilities rather than comply and make us more dependent on the major refineries and their distributors for a reliable, competitively priced supply of fuel.

I am in favor of protecting our environment, however I feel a more reasonable and less costly plan is needed. I solicit your effort to get involved in this issue and voice your opposition to the proposed regulations.

Sincerely,

Dennis

Dennis K. Metzler

DKM/jl

Received DTS

DEC 24 1984

GROWERS - SHIPPERS - DEHYDRATORS
Peaches - Plums - Nectarines - Grapes - Apples

Dear For Response

Byron Jackson Pump Division

2730 WEST WHITESBRIDGE ROAD, FRESNO, CALIFORNIA 93706 • (209) 264-5938

BORG WARNER

November 14, 1984

RECEIVED NOV 15 1984

Rose Ann Vuich
120 West Tulare
Dinuba, CA 93618

Dear Ms. Vuich,

I have just become aware of the regulations which have been proposed by the State Water Resources Control Board which ostensibly implement the Underground Storage of Hazardous Substances Act. In my opinion these proposed regulations go far beyond the intent of the Act, and if put into effect will cause unnecessary hardship and great monetary sacrifice at our Freasno facility and to numerous other businesses in your jurisdiction.

I implore your diligent efforts toward direction of the Water Resources Control group in a more logical and equitable reaction to the requirements of the Underground Storage of Hazardous Substances Act. You have shown an admirable capacity to represent the best interests of all of your constituents in the past, and I have no reason to doubt your desire to represent our interests in this matter.

Yours truly,

George M. Droke

George M. Droke
Plant Manager
GD/lmd

RECEIVED NOV 20 1984

7700 NORTH VAN NESS BOULEVARD FRESNO, CALIFORNIA 93711

November 16th, 1984

Rose Ann Vulch
120 West Tulare
Dinuba, Ca. 93618

Dear Assemblywoman Vulch:

The small business owners are in need of your understanding and assistance again.

My area of concern this time is directed towards the possibility of the regulations that the State Water Resources Control Board may implement because of the passage of the Underground Storage of Hazardous Substances Act, bill #1362.

As I feel certain you understand, we cannot afford more regulations of dubious value and of an expensive nature. Many of us in business today are having a very difficult time keeping the doors open, the employees paid, and meeting our other costs. As I read the numbers there are 83 million people working in non government jobs versus 79 million getting government checks.

Your help in controlling any unnecessary rules and costs in any and all areas will be most appreciated and may help us stay viable as a profit producing tax paying entity.

Sincerely yours,

Gordon T. Knott

Gordon T. Knott, President

GTK/sm

(209) 439-2928

RECEIVED NOV

KOVAC EQUIPMENT CO.

CASE

PHONE 441-1122 • P.O. BOX 2527 • 2708 E. JENSEN AVE.
FRESNO, CALIFORNIA 93745

November 16, 1984

Rose Ann Vuich
120 W. Tulare
Dinuba, Ca 93618

Subject: Adoption of proposed regulations governing underground storage of hazardous substances by the State of Calif. Water Resource Control Board.

Dear Ms. Vuich,

We are concerned about the above regulation and how it will affect our business. We are a small tractor dealership with underground diesel fuel and gasoline storage tanks located on our property. Several years ago these tanks were purchased and installed. All the necessary permits and inspections were made to insure we complied with current regulations.

The financial impact of $100,000.00 to $200,000.00 clean up of a "historical release" would be devastating to our business.

It is also our concern that the regulations should not go beyond the jurisdiction granted to the Board by Bill 1362 or its intent.

Sincerely,

Phillip Terry

Phillip Terry
Secretary/Treasurer
PT/dr

Wonder Valley Ranch Resort

Western Camps, Inc.

November 20, 1984

RECEIVED NOV 26 1984

Senator Rose Ann Vuich
California State Senate
120 West Tulare
Dinuba, CA 93618

Dear Senator Vuich

It has recently been brought to my attention that certain regulations are being proposed by the State Water Resources Control Board in order to implement Bill 1362 regarding monitoring underground storage of hazardous substances. It is my understanding that the Board's proposed regulations are going beyond the original intent of the original bill and imposing controls which will be difficult, if not impossible, to meet.

The proposed regulations include the cleaning up of "historical releases" and requiring expensive monitoring methods for tanks over a year old. They also call for a six-month implementation instead of the originally intended five-year time-frame.

I would greatly appreciate your help in seeing that these regulations remain in the context originally intended by Bill 1362. The expense incurred to businesses like mine if the proposed regulations are implemented could be great.

Thank you, Senator Vuich, for your time and effort in this matter.

Sincerely

Jerrold Siegel

Jerrold Siegel
Vice President

JS:jj

Wonder Valley W Brand of Western Hospitality

Box 71 Star Route Sanger, California 93657 Telephone (209) 787-2551

RECEIVED NOV 26 1984

JOHN R. BELL

GENERAL CONTRACTOR

License No. 250205 B-1

November 20, 1984

Senator Rose Ann Vuich
120 West Tulare Street
Dinuba, California 93618

I write to you to oppose the regulations proposed by the State Water Resources Control Board for implementing the provisions of Bill 1362 concerning the underground storage of hazardous materials. These proposed regulations go far beyond the jurisdiction granted to the Board by Bill 1362.

I suggest you see to it that this Board not become a law unto itself and that serious consideration be given to alternatives that have been presented to the Board by operators of underground storage facilities.

Yours truly,

John R. Bell

John R. Bell

3086 EAST BEHYMER AVENUE, CLOVIS, CALIFORNIA 93612 -:- PHONE (209) 299-6450

GENTZ
Construction Co.
GEN. ENGINEERING CONTRACTORS
FRESNO

RECEIVED NOV 27 19[illegible]

3220 W. Belmont Ave. • P.O. Box 4347, Fresno, Calif. 93744-4347
Phone (209) 275-1361
License No. 257817

November 26, 1984

Rose Ann Vuich
120 West Tulare
Dinuba, California 93618

Subject: Adoption of Proposed Regulations Governing Underground Storage Tanks

Gentlemen:

It has come to this company's attention that the subject regulations are about to be adopted. As the proposed regulations are going to cause heavy expenditures on the private business sector, it seems rather counter-productive that the corrective measures and new controls must be implemented in six months, rather than the five years the state impact study recommended. Business in California is only now beginning to recover from several years of financial precariousness. Large unbudgeted expenditures on an immediate and short term basis would have serious financial implications.

The proposed six month compliance period leaves no time to develop other alternative solutions. Some of the proposed measures have not even been field tested yet!

Apparently the State Water Resources Control Board is expanding the scope of the Hazardous Substances Act to cover past "unauthorized releases," while this company's understanding is the "act" is designed to monitor and detect problems now and in the future.

This company is as interested in protecting the environment as you in the legislature are, however, it makes no sense whatsoever to kill off the business and individual that will pay for this program.

You are strongly urged to carefully review the proposed State Water Resources Control Board regulations and really determine if the legislatures intent hasn't been carried far beyond its original scope. Let's redirect the board's activities to the jurisdiction to which it was intended rather than the carte-blanc power it seems to believe it has.

Very truly yours,

GENTZ CONSTRUCTION CO.

John Gentz
President-Manager

JG:FI:jr

Enclosed is a staff analysis of these bills, supplied to me by Senator Ray Johnson's office.

I am asking that your Board of Supervisors support our request for any assistance that you feel necessary in implementation of this program.

Assemblyman Statham indicated his willingness in co-operating with rural counties on this issue and needs information regarding your counties costs as soon as possible.

Sincerely,

Lesley J. Chace

Lesley J. Chace, Supervisor
Modoc County Board of Supervisors

Enc.

cc: Nor Cal Supervisors Association
Butte County Board of Supervisors
Glenn County Board of Supervisors
Lassen County Board of Supervisors
Plumas County Board of Supervisors
Shasta County Board of Supervisors
Siskiyou County Board of Supervisors
Tehama County Board of Supervisors
Trinity County Board of Supervisors
Assemblyman Stan Statham
Senator Ray Johnson
Senator Jim Nielson
CSAC
RCRC

Mesa
DISTRIBUTING CO., INC.

SAN DIEGO, CA
PM
26 DEC
1984

YEAR OF THE OCEAN
WAVE OF THE FUTURE
1984 - 1985

Mr. Harold Singer
State Water Resources Control Board
Division of Technical Services
P.O. Box 100
Sacramento, CA 95801

7598 TRADE STREET, BOX 26540, SAN DIEGO, CA 92126

JAN 9 1985 I.CAO #199

RCC

RESEARCH CONSULTANT CONSORTIUM

Ed Auton ~~2 WGP~~ 2 copies

P.O.Box 584, San Francisco 94101 (415) 386-8449

C. Wilson 2 copies
all BM's recd
Pkg - also per
Mr Winston
Copies were delivered
to Merksamer & Duffy

January 8, 1985

MRS. CAROLE A. ONORATO, Chairwoman
State Water Resources Control Board
Post Office Box 100
Sacramento, California 95801

Dear Mrs. Onorato:

Thank you and your staff for so quickly remedying the complaints by getting the current draft proposals for Underground Tank Regulations--Title 23--to us so promptly. Such sensitivity in a public agency is praiseworthy.

As you are aware, throughout the long process of developing these regulations my colleagues and I have been very vocal in espousing the utilization of new technology and more specifically, vapor monitoring in the backfill area of tanks. At the same time we have maintained the majority of our contact through your staff and we have provided them with the most recent scientific literature in this regard.

However, all of our input has apparently fallen on deaf ears--possibly because our client, Genelco, Inc., has a device to monitor vapors in the backfill area. As a result, I have taken the liberty of providing you with copies of the literature we have previously submitted to your staff. I hope you will have an opportunity to peruse it prior to the January 18 meeting. At that time we will present Dr. Glenn M. Thompson, President, Tracer Research Corp., Tucson, Ariz., one of the authors of the enclosed material, Mr. James Levine, an engineer with whom I am sure you are familiar, and at least one other independent engineer-scientist who is familiar with hydrocarbon plume propogation in the unsaturated (vadose) zone. Possibly these gentlemen will be able to explain the technology in a manner that is more acceptable to your staff than our previous efforts.

Our major concern, at this juncture, centers around what we feel is the dangerous procedure of drilling an unprecedented number of wells through the aquafer. Both our files and yours contain incident reports of ground water pollution as a direct result of monitoring wells acting as a conduit of pollutants. This is dangerous to the very resource your agency is mandated to protect.

Further, we wonder if any of the Regional Water Quality Boards would have issued a drilling permit for a well down gradient from a potential pollutant site, such as a filling station? This is what these draft regulations is mandating. We are not being argumentative, the important thing today is the protection of our ground water through the PROPER monitoring of underground tanks.

We are quick to acknowledge the place of monitoring wells, but that place is only in an environment where there has already been a leak, as a measure of the extent of pollution...NOT AS AN ONGOING MONITORING DEVICE! Prior to the development of vapor monitoring technology wells were the only means of monitoring ground water pollution. TODAY <u>POTENTIAL</u> POLLUTION CAN BE DISCOVERED THROUGH VAPOR MONITORING and the horrendous damages of that pollution can be mitigated. Damages that could extend far beyond our precious ground water and into the body politic, if that pollution is trtansported through conduits mandated by an appointed government body.

RCC

Our fervent hope is that your board will amend your staff recommendations for such indiscriminate drilling of wells as outlined in the subject draft regulations and move into the new technological age with a strong emphasis on vapor monitoring.

With best regards,

Frank H. Winston

FRANK H. WINSTON
Chairman and C.E.O.

FHW:r

encls.

199

ADVANCED
INDUSTRIAL
DESIGNS INC.

October 22, 1984

State Of California
Water Resources Control Board
Division of Technical Services
901 P St.
Sacramento, Ca. 95814

Dear Sirs:

I would like to take this opportunity to commend those members of the Board actively engaged in writing the Regulations Draft. Efforts to safeguard the environment are long overdue.

There are several areas of pertinent technological advancements in which I have aquired expertise. For the past two years I have been investigating vadose vapor sensing technologies. Although my investigations centered on hardware development, I have aquired significant insight into sub-surface hydrocarbon transport phenomenon.

Attached are copies of four Investigations which are consistant in their findings. These investigations contain consistant data which will corroborate all stated comments.

The Investigations are:

1. "Soil Sentry Effectiveness in Controlled Soil Conditions"--- Advanced Industrial Designs Inc.
2. "A Monitoring and Removal Program for Leaked Propane Gas in the Vadose Zone"--- Geriagty and Miller
3. "Demonstration of Soil Gas Sampling as a Tool to Aid in Defining the Distribution of Subsurface Contamination by Volatile Organic Compounds" ---Glenn M. Thompson Ph.D.
4. " Soil Gas Studyof Volatile Organic Contaminents above a portion of the TCE Contaminated Aquifer" ---Dr. Glenn M. Thompson

Comments are referenced by the pertainent section number of the Draft Regulations.

2640,c
Expensive analytical and slant drilled samples of a site are not necessary. Vadose investigations would reveal accurate site history.

2642, f
A Leak of .05 gph should not be tolerated. The currently used test procedures are conducted over much too short a time span.

CONTINUED

33 COTTINI WAY, SANTA CRUZ, CA 95060 • (408) 425-5895

ADVANCED
INDUSTRIAL
DESIGNS INC.

2644,a
Same comment as 2640,c
2645, b, 2
The five feet constraint on Vadose monitoring feasibility is not necessary. All investigations to date demonstrate that the effectiveness of aspirated Vadose monitoring systems increases as the water table rises. This increase is independent of soil composition.
2646, d
Same comments as 2645, b, 2

If I can be of any further service, please do not hesitate to contact me.

Sincerely,

Reinhard Hanselka
President and Principle Engineer

33 COTTINI WAY, SANTA CRUZ, CA 95060 • (408) 425-5895

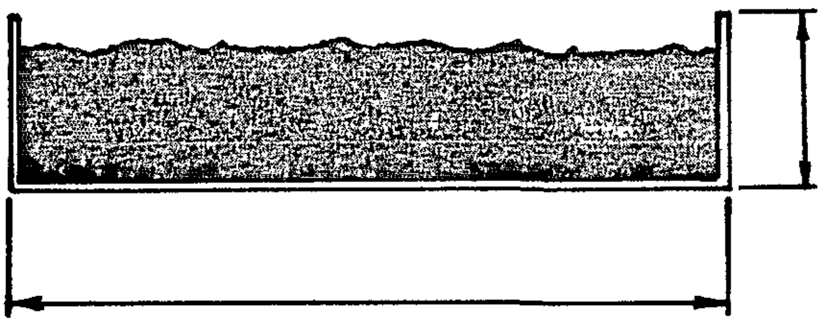
ADVANCED INDUSTRIAL DESIGNS
33 Cottini Way
Santa Cruz, CA 95060
(408) 425-5895

GENELCO

SOIL SENTRY

A. The purpose of this investigation is to determine the effectiveness of the device in a controlled soil condition.

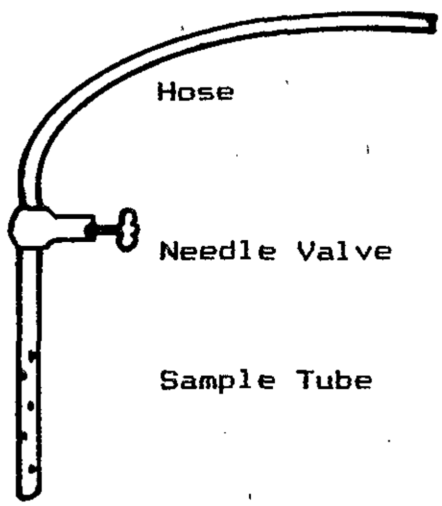
B. Apparatus and test procedure



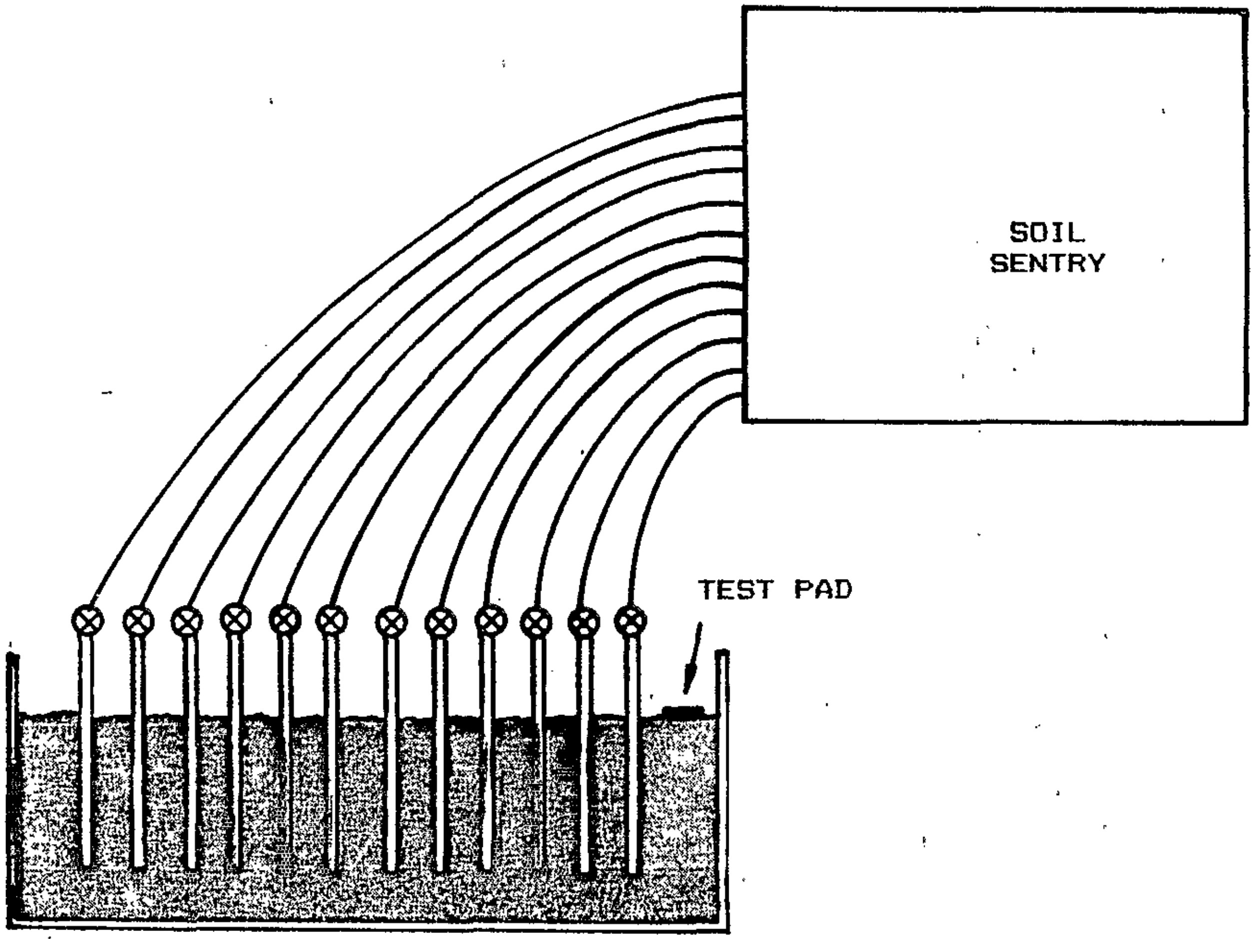
Test Box

4' x 1' x 1'

5/8 plywood



C.



1. Soil

   a. 50% clay
      50% sand
         at 15% moisture
            50% moisture
               saturated at water table

2. Chemicals

   a. Acetone
   b. Gasoline (reg)
   c. Gasoline (unlead)
   d. Methylene Chloride
   e. Tri-chloroethylene (TCE)

3. Temperature

   45 deg. F - 78 deg. F

4. Procedure

   a. Soil was renewed after each chemical test.
   b. Sensor was initiated.
   c. 10 ml of test solution was placed on the test pad.
   d. Test completed when all sensors register leak or 5 days.

ADVANCED INDUSTRIAL DESIGNS
33 Cottini Way
Santa Cruz, CA 95060
(408) 425-5895

5. Data

a. 15% moisture — Acetone

Day 1 - Initiation & sample placement
Day 2 - Sensors 1, 2, 3, 4
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

b. 50% moisture — Acetone

Day 1 - Initiation
Day 2 - Sensors - all
Day 3 - -------
Day 4 - -------
Day 5 - -------

c. 15% moisture — Gasoline (reg)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

d. 50% moisture — Gasoline (reg)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7,
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

e. 15% moisture — Gasoline (unlead)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

f. 50% moisture — Gasoline (unlead)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4, 5
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

g. 15% moisture — Methylene Chloride

Day 1 – Initiation
Day 2 – Sensors 1, 2, 3, 4
Day 3 – Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 – Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Day 5 – Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

h. 50% moisture — Methylene Chloride

Day 1 – Initiation
Day 2 – Sensors 1, 2, 3, 4, 5
Day 3 – Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Day 4 – Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 – -------

i. 15% moisture — TCE

Day 1 – Initiation
Day 2 – Sensors 1, 2, 3, 4
Day 3 – Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 – Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Day 5 – Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

j. Sample tube material was changed from PVC to PVDF due to compatability problems with Methylene Chloride.

k. Water table saturated — Gasoline (unleaded)

Day 1 – Initiation
Day 2 – Sensors 1, 2, 3, 4
Day 3 – Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 4 – -------
Day 5 – -------

6. Conclusion

Device performed as claimed. Sensitivity was equal with all solvents triggering response.

Robert Hasen

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SOIL GAS STUDY OF VOLATILE ORGANIC CONTAMINANTS ABOVE A PORTION OF THE TCE CONTAMINATED AQUIFER IN THE SOUTHWEST PART OF TUCSON, ARIZONA

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ABSTRACT

An investigation of volatile organic contaminants in the unsaturated zone soil gas above a known TCE contamination plume was conducted in Tucson on February 2, 1983. The purpose of the study was to test soil gas sampling as an investigative technique for subsurface contamination problems and test methodology for performing gas sampling.

Halocarbons were measured in the atmosphere above ground, in the soil gas at depths of 10, 20, 50, and 90 ft below land surface, and in the groundwater at the site. Seven compounds were measured. TCE, CCl_4, PCE, and CCl_3H showed gradients that increased in concentration toward the water table, indicating a subsurface or water-table source. F-11, TCA, and methylene chloride showed decreasing concentration with depth indicating a possible atmospheric origin.

All of the compound detected in the soil gas at 10 ft were detected in the groundwater as well at 100 ft proving the basic value of the method for remote detection of groundwater contamination. If horizontal and vertical gradients are measured, the method can provide information about source and proximity of contamination.

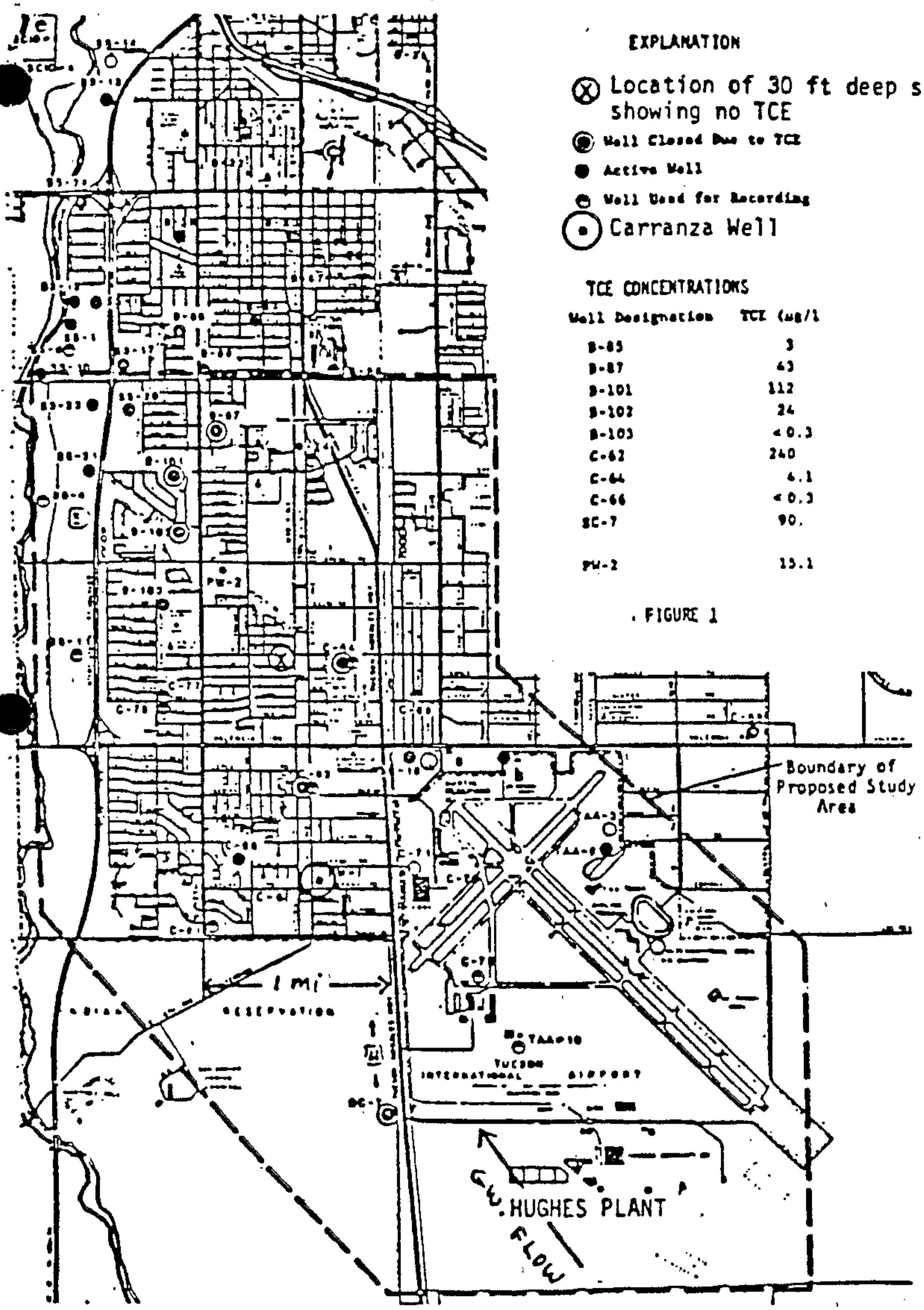
An experiment to investigate the concentration of volatile halocarbons in the soil gas above a portion of the TCE contaminated Tucson aquifer was initiated on February 2, 1983. The purpose of the experiment was to learn what factors affect the soil-gas concentration of a contaminant emanating from the water table and to evaluate methods of sampling the soil gas and groundwater. Soil-gas sampling is potentially the best investigative technique for volatile organic compounds in groundwater because of the low cost and speed of the measurement in comparison to drilling to the water table for each data point.

LOCATION

The site is located at the Carranza residence at 7019 South 6th Street in Tucson. The property is directly downgradient (northwest) of the Hughes Aircra Company plant (Figures 1 and 2) which is known to be a major source of TCE contamination in the groundwater. There is a domestic well on the property contaminated with over 500 ppb of TCE indicating that the Carranza property is over the contaminated groundwater plume. Because of the proximity of the site to the contamination source, it is logical that the TCE has moved under the study area with the groundwater flow and has diffused upward from the water table through the soil in the gas phase.

FIELD SAMPLING METHOD

Soil gas is collected from a drive-point screen driven or buried in the ground at the desired depth. The gas is collected by pumping the soil gas out of the ground and through a sample container by means of a vacuum pump (Figure



EXPLANATION

⊗ Location of 30 ft deep soil-gas measurement showing no TCE

Well Closed Due to TCE

Active Well

Well Used for Recording

Carranza Well

TCE CONCENTRATIONS

Well Designation	TCE (ug/l
B-85	3
B-87	43
B-101	112
B-102	24
B-103	< 0.3
C-62	240
C-64	4.1
C-66	< 0.3
SC-7	90.
PW-2	15.1

FIGURE 1

Figure 1. Map showing contaminated wells in southwest part of Tucson and locatic of study site (Carranza well) relative to Hughes Plant, a known source of TCE contamination in the groundwater.

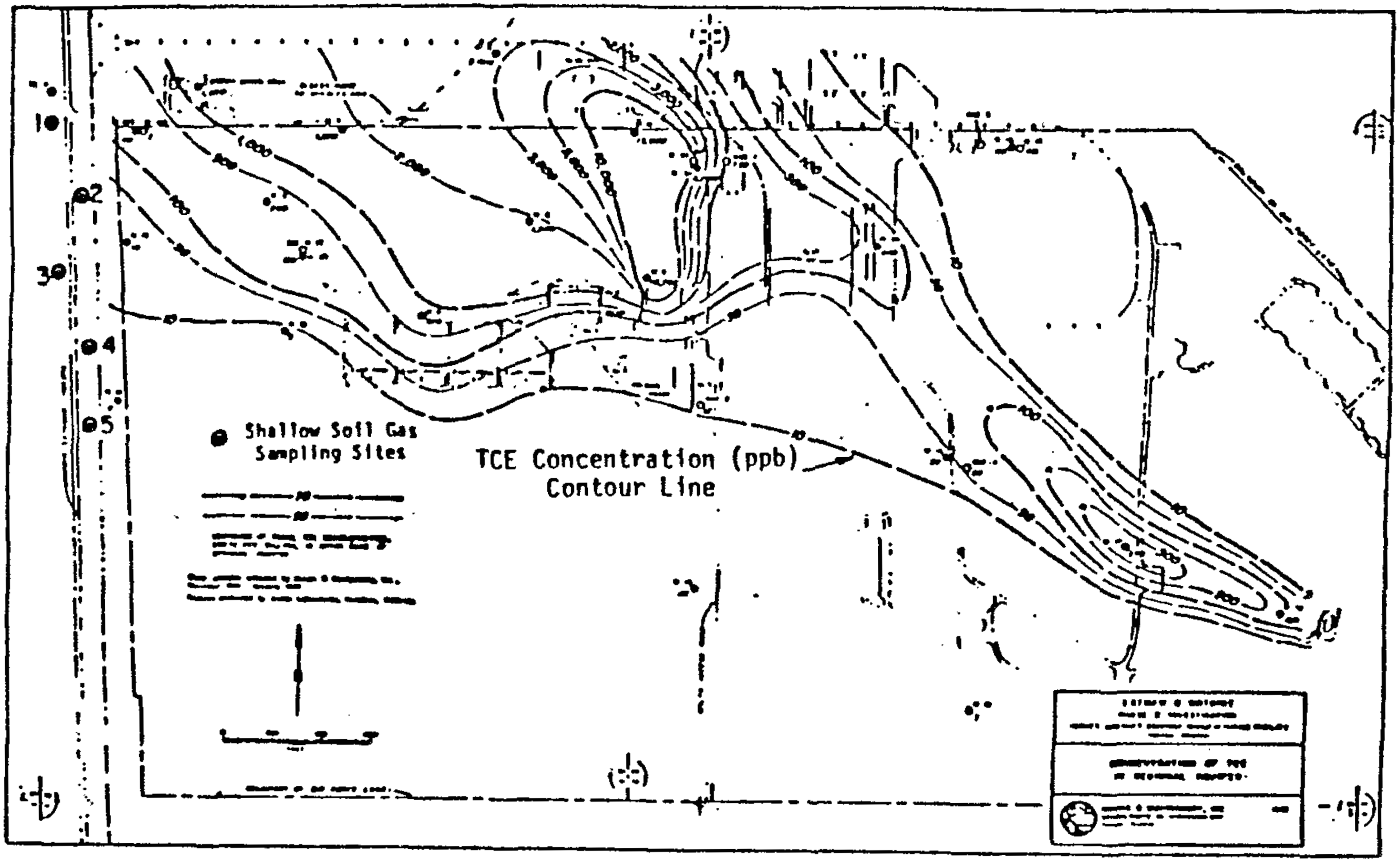


Figure 2. Map showing TCE plume originating from Hughes Plant.

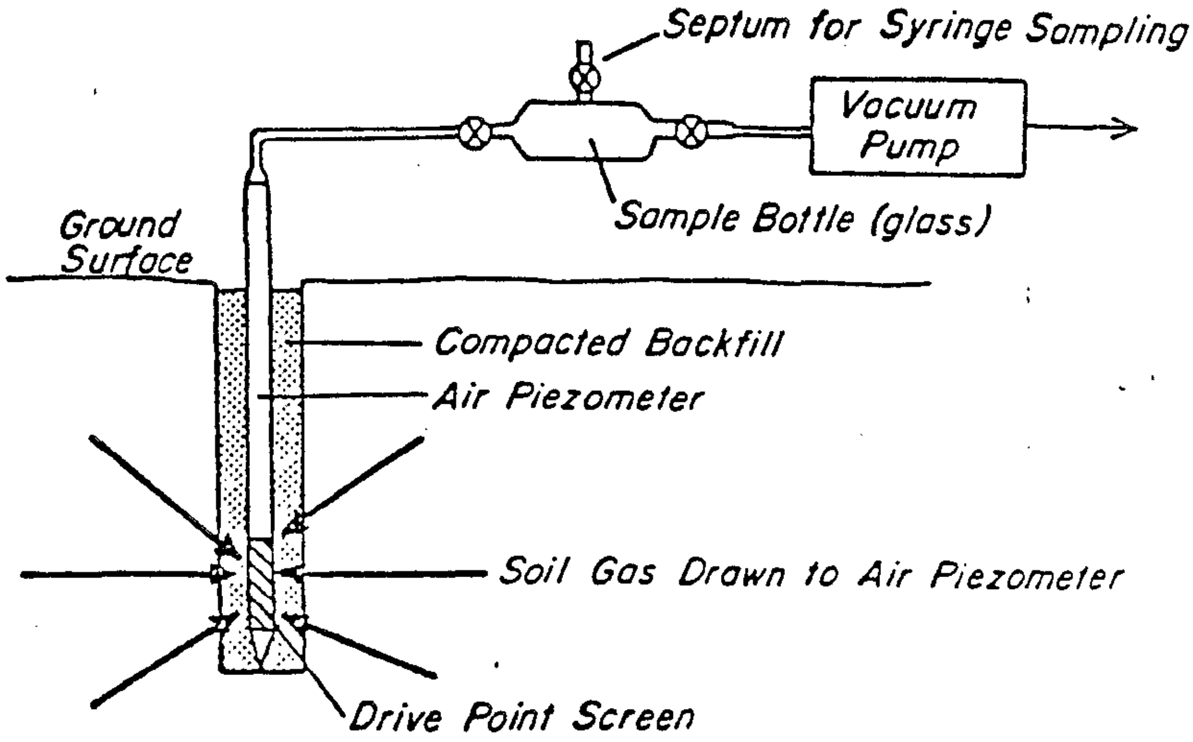


Figure 3. Schematic drawing of soil-gas sampling system.

A gas sample is periodically collected in a syringe from the sample bottle in the evacuation line and analyzed in the field. The field analysis is critical to the method in order to determine when a representative sample has been obtained and to direct the investigation as it progresses.

A hollow stem auger was used to drill the access hole. Soil-gas samples were collected at various depths through an air piezometer lowered down the center of the auger. Generally, the work proceeded as follows. The auger hole was advanced to the desired depth, and the air piezometer which consisted of a standard 30" drive-point screen on 1-1/4" steel pipe was lowered to the bottom of the hole and either driven with a 150 lb hammer or backfilled to bury the screen in the bottom of the hole. Burying the screen by driving it was initially assumed to be the best approach. This approach rarely worked, however. Oftentimes rocks prevented the screen from being driven more than a few inches. In the clayey soils where the screen would drive easily, no air could be drawn through the screen because all of the holes were effectively clogged with clay. In one instance where the screen was driven, the steel pipe broke while it was being pulled back out. The backfilling method was generally more successful. This entailed refilling the hole with drill cuttings to a depth of about five ft above the top of the screen, and pressing the soil down around the screen with the vertical hydraulic drive mechanism of the auger.

Water sampling was attempted with a positive displacement, low-volume sampling pump. The sampling pump which is 1.5 inches in diameter fit easily down the center of the auger flights. The pump, however, would not function properly in the extremely muddy water inside the auger tube. Essentially, the only water sample collected came up inside the drive-point sampler after it hac penetrated the top foot of the water table. This was considered to be the most important sample for this study because of our particular interest in collecting water from the top of the water-table surface.

After the piezometer was in place, the soil gas was pumped at 5 to 20 L/mi for a period of 30 to 50 minutes with analyses being made as frequently as possible during this period. The series of measurements were needed to determi if uncontaminated air was being drawn into the sample from above ground. If surface air is being drawn down the borehole, the contaminant concentration will show a decrease after about five minutes of pumping when the surface air reaches the piezometer screen. If there is no open connection to the surface, the concentrations will remain constant for at least 50 minutes of pumping. Two examples that illustrate the behavior described are given below:

SAMPLE A		SAMPLE B	
3.9×10^{-3} μg TCE/L	7 minutes	3.3×10^{-3} μg TCE/L	5 minutes
2.3×10^{-3} μg TCE/L	18 minutes	3.3×10^{-3} μg TCE/L	11 minutes
2.9×10^{-3} μg TCE/L	30 minutes	3.5×10^{-3} μg TCE/L	25 minutes
2.4×10^{-3} μg TCE/L	40 minutes	3.5×10^{-3} μg TCE/L	40 minutes
		3.4×10^{-3} μg TCE/L	55 minutes

Sample A, soil gas collected at a depth of 25 ft below ground shows air leakag down the borehole. Sample B, soil gas collected from a depth of 50 ft in the same location using the technique described above, represents a sample collect with no air leakage, thus the contaminant level remained nearly constant for t entire sampling period. This ability to know if air is being drawn from above is extremely important to the problem of collecting meaningful data in vadose gas sampling programs because undetected air leakage can easily cause 100% err in a sample measurement.

All of the TCE measurements were made in the field using conventional laboratory equipment mounted in a vehicle and operated from a generator. A Varian 3700 series gas chromatograph and Hewlett Packard integrator were the principal equipment items. The gas chromatograph was modified with a Nafion tube dryer to remove water, thus allowing direct injection of either soil gas or water. The practical detection limit for TCE by this method is 0.1 μg/L in water or 1×10^{-4} μg/L in soil gas. The analysis time is the same for either water or soil gas typically taking about ten minutes if no more than five to ten compounds are present in the sample. Figures 4, 5, and 6 show representative chromatograms of soil gas, air, and groundwater, respectively.

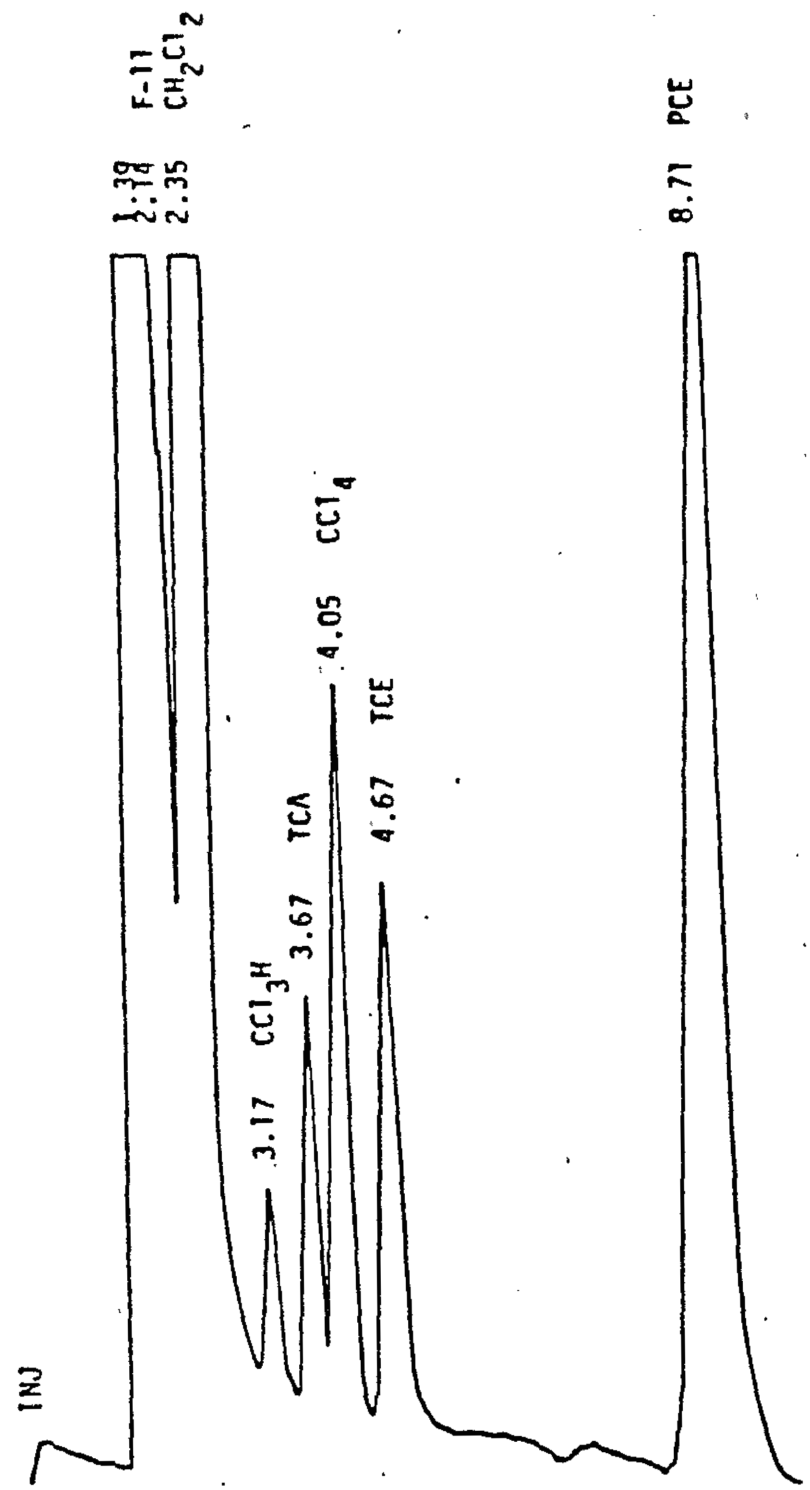


Figure 4. 2 cc soil gas from 25 ft horizon, 2/2/82, Carranza property.

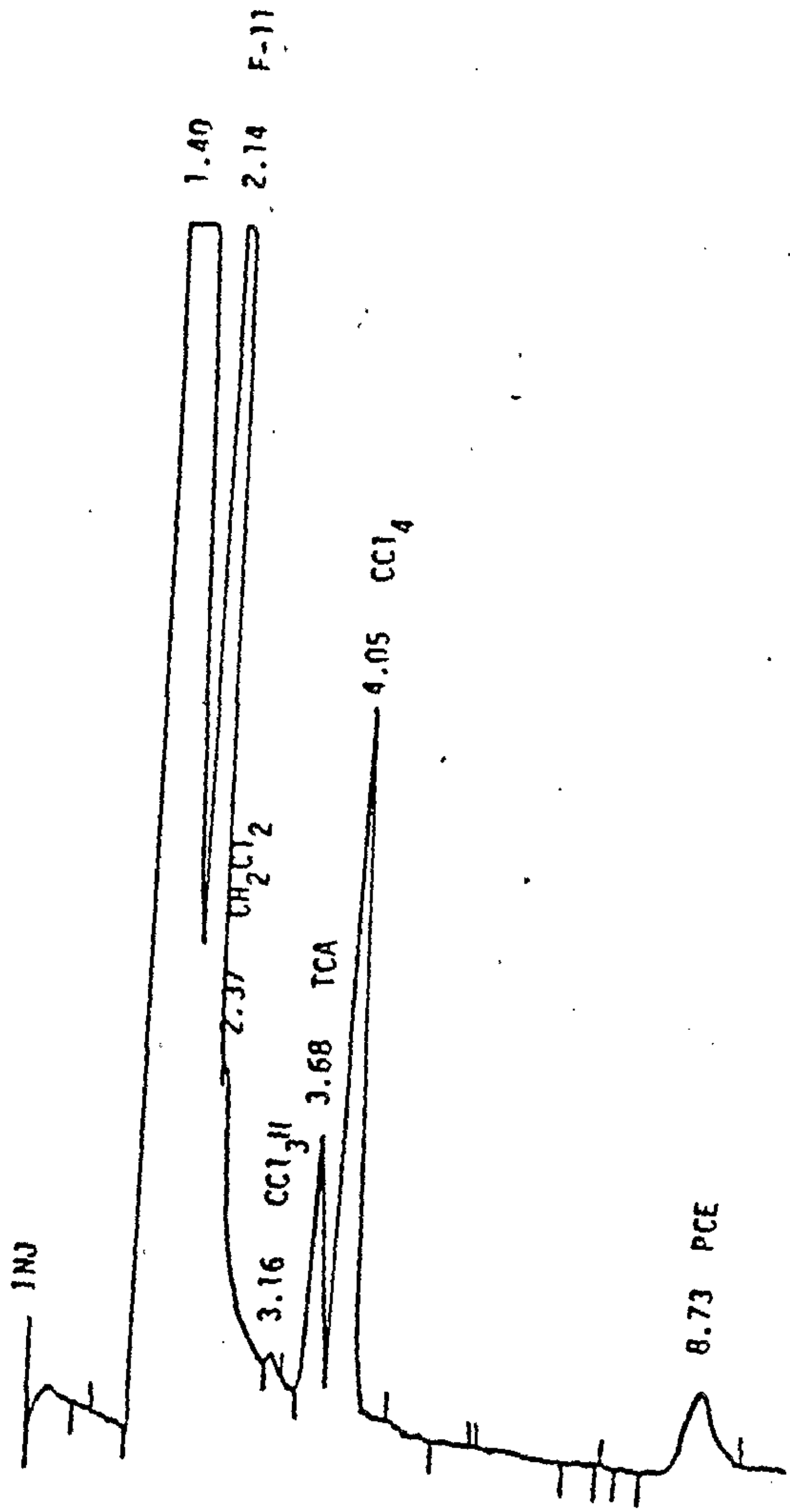


Figure 5. 2 cc air above ground, 2/2/83, Carranza property.

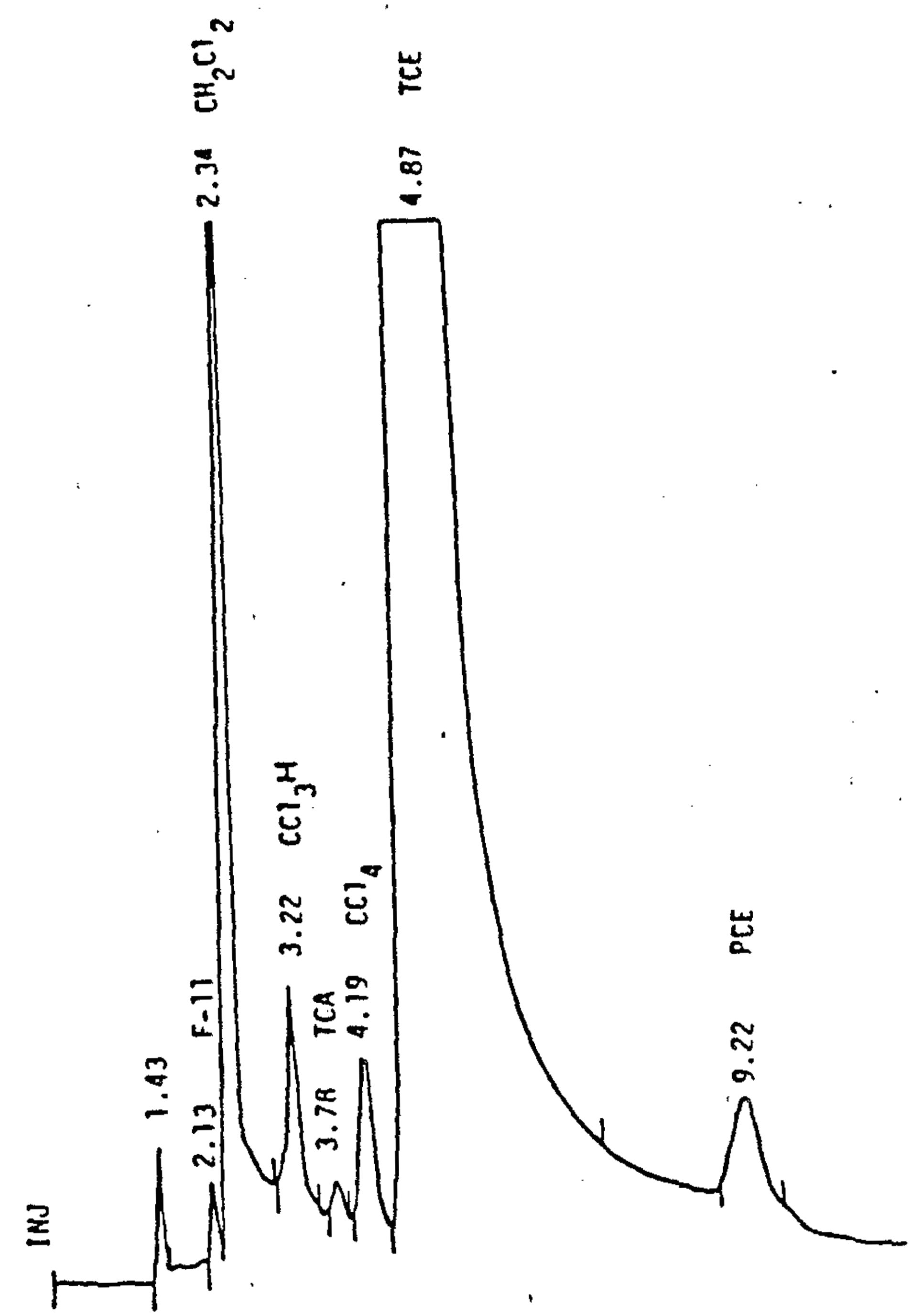


Figure 6. 5 µL water from Carranza well, 3/7/83.

RESULTS AND DISCUSSION

Seven compounds were identified in the soil gas and in groundwater. These were:

trichlorofluoromethane (F-11)
methylene chloride (CH_2Cl_2)
chloroform (CCl_3H)
1,1,1 trichloroethane (TCA)
carbon tetrachloride (CCl_4)
trichloroethylene (TCE)
perchloroethylene (PCE)

The approximate depth and concentration observed for these compounds in the soil gas and in the groundwater are given in Table 1.

In the case of CCl_3H, CCl_4, TCE and PCE, the concentration increased with depth down to the water table. For F-11, TCA, and CH_2Cl_2, the reverse trend was observed, the soil-gas concentration was greatest near the surface. The contamir concentration from two samples of groundwater is provided in Table 1. The first sample "water table surface" is water that was bailed from the first water to flow into the auger hole. The Carranza well is a domestic well (about 300 ft away) that intercepts approximately the upper six ft of the water table. Both samples are included for comparison. The "Carranza sample" is probably a better representative of the local water but the "water table" sample is probably a better sample for comparing relative concentrations of contaminants across the surface of the water table, i.e., the air-water partitioning coefficient undergr

The data are most easily interpretable for TCE because the groundwater concentration is high enough to produce a strong gradient from the water table to the ground surface. There is no TCE in the atmosphere (free air) and the source is clearly from the groundwater. The partitioning coefficient, K_w

TABLE 1. Concentration data for atmospheric and subsurface halocarbons at the Carranza property, 7019 South 6th Avenue, Tucson, Arizona, February 2, 1983.

		F-11	CH_2Cl_2	CCl_3H	TCA	CCl_4	TCE	PCE
AIR ABOVE GROUND[a]		0.004	0.005	-	0.01	0.01	-	0.00
SOIL MATERIAL	SOIL GAS							
SILT, SAND GRAVEL	10 ft	0.007	1	0.007	0.02	0.008	0.006	0.01
	25 ft	0.006	0.2	0.009	0.01	0.009	0.02	0.04
CLAY	50 ft	0.005	0.1	0.03	0.001	0.09	0.03	1
SAND SILT CLAY	90 ft	0.004	0.08	0.3	0.001	2	9	5
WATER TABLE SURFACE[b]	100 ft	0.003	2	1	-	0.1	142	0.0
CARRANZA WELL	100 - 106 ft	0.009	6	1	0.1	0.2	558	0.2

[a] Concentrations expressed in μg/L gas ± 20% (one standard deviation).

[b] Concentrations expressed in μg/L water ± 20%.

($K_w = \frac{\text{gas phase concentration}}{\text{aqueous concentration}}$), observed for TCE across the water-table surface is approximately 0.06. The equilibrium K_w measured in the laboratory in a sealed vessel containing only water and air is approximately 0.25. A lower K_w value would be expected in the field because of the problem of transporting the solute by diffusion through the aquifer material to the water-table surface where the gas-phase concentration is established. Thus equilibrium is probably never achieved, assuming that diffusion and escape through the unsaturated sediment is too rapid to allow the soil-gas concentrations to reach equilibrium above the water-table surface.

The other compounds that showed increasing concentration with depth in the unsaturated zone, chloroform, carbon tetrachloride, and PCE also appear to have a subsurface source. However, in these cases the groundwater concentration at the site appears not high enough to be the principal source for most of the gas observed in the soil. Lateral diffusion from a nearby higher contamination source is a more plausible explanation. Clearly, a horizontal gradient would have to be measured to determine if lateral diffusion was a principal factor in producing the gas concentrations observed. An influx of contaminated runoff into the subsurface from a nearby wash might also be a plausible explanation for the lower level contaminants observed at this site.

The F-11, TC4, and the methylene chloride showed decreasing concentrations with depth indicating an atmospheric source, yet the subsurface concentrations were higher than the concentrations in the atmosphere. This seemingly paradoxical situation occurs quite commonly for atmospheric halocarbons in the subsurface, often making their concentration in groundwater near recharge areas several times higher than would be expected for water in equilibrium with the atmosphere from which they are derived. This phenomena has been demonstrated by Russell and

Thompson (1983) to occur naturally as a result of sorption-desorption mechanisr occurring in the three phase soil-water-air system. Even though the natural processes can be responsible for anomalously high halocarbon concentrations in groundwater, this mechanism should be invoked with caution in areas where subsurface dumping of contaminants has occurred.

CONCLUSIONS

In every case where halocarbons could be measured in the soil gas, they were detectable in the groundwater. In the case of TCE which showed high concentration in the groundwater, the soil-gas component appeared to be derived from the contaminated groundwater immediately below the sampling site. The groundwater appears to be the source because the concentration ratio measu between the soil gas and the water-table surface corresponded reasonably well to our expectations which are based on laboratory measurements of the gas/liqu partitioning coefficient, K_w.

For chloroform, carbon tetrachloride, and PCE, a subsurface source appear likely because the highest concentrations were measured near the water table but the groundwater immediately below the gas sampling location appears to be too low to be the main contributor of contaminants to the soil gas. Lateral movement in the gas phase from a nearby source could have produced the profile observed. More sampling locations along a horizontal transect would be needed to verify this hypothesis.

The ease of collecting soil-gas samples coupled with sensitivity of the measurement technique indicates that the gas sampling method will be useful in contaminant investigations. The method may provide a rapid survey techniqu for determining the approximate areal extent of a subsurface contamination problem. If the vertical and horizontal soil-gas profiles can be developed.

considerable information about the source of contamination may also be derived. The soil-gas measurement at the very least could provide a far more effective substitute for conventional "soil sampling" as a technique for locating volatile contaminants in the unsaturated zone.

REFERENCES

Russell, A. D., and G. M. Thompson. 1983. "Mechanisms leasing to enrichment of atmospheric fluorocarbons CCl_3F and CCl_2F_2 in ground water." Water Resources Research, p 57, February.

DEMONSTRATION OF SOIL-GAS SAMPLING AS A TOOL TO AID IN DEFINING THE DISTRIBUTION OF SUBSURFACE CONTAMINATION BY VOLATILE ORGANIC COMPOUNDS

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ABSTRACT

A study was undertaken to demonstrate the value of soil-gas measurements as an aid to determining the overall distribution of volatile contaminants in the subsurface. The study entailed three soil borings from the land surface down to a depth of a few feet below the water table and one transect of shallow (3.5 ft deep) soil-gas samples collected across a known plume of TCE in the groundwater. In the borings, soil gas and soil samples were collected a various intervals down to the water. Water samples were collected at the top of the water table. Depth to water in all four areas ranged from 25 ft to 30 ft. Two borings were over areas of known contaminat by CH_2Cl_2, F-113, TCA, TCE, and PCE. One boring was in a control area of no known contamination. In both borings over the contaminated areas, contamina from all the chemicals could be detected in the three ft to five ft depth range, and all concentrations increased down to the water table. At the cor area, only traces of the contaminants were detected in the soil gas and wate and no trends or gradients were evident. The trace amounts may in part have been due to equipment contamination from measurements at the previous two sites. Samples at the shallow soil-gas transect were collected through 1/2- steel pipes driven into the ground by hand. TCE was detected in the soil ga at all sites above the plume and not detected in the uncontaminated areas or both sides of the plume. All measurements were made in the field by gas chromatography. The equipment is capable of measuring two samples of air or water every eight minutes. The detection limits for most contaminants is about 0.001 µg/L in air and 0.1 µL/L in water.

In conclusion the soil-gas sampling coupled with the rapid field analysi appears to have good potential as a tool to aid in rapidly defining the distribution of subsurface contamination by volatile organic compounds.

INTRODUCTION

The purpose of this work is to demonstrate the value of soil-gas measurements in studies of subsurface contamination by volatile organic contaminants. Virtually all industrial chemicals used as solvents that have become groundwater contaminants are present to varying degrees in the soil gas as well as in the groundwater by virtue of their high vapor pressure and low aqueous solubility. Measurement of the contaminants in the soil gas provides information about the overall subsurface distribution that is normally overlooked in most contaminant investigations. In additio the soil-gas sampling technique is normally faster than groundwater samplin because soil gas is normally more accessable than the groundwater itself. Consequently, soil-gas sampling may function as a remote sensing technique to delineate groundwater contamination.

In this work, four sites were investigated on the Plant property. At Sites 1 and 2 contaminant profiles were measured in the soil gas down throu the unsaturated zone to, and including, the groundwater. The purpose of the study at these sites was to show the relationship or the distribution of the contaminants between the soil gas and the groundwater in areas of known groundwater contamination. The third site at a location upgradient from the contamination was selected as a control to show soil-gas distribution at an uncontaminated site. The fourth site consisted of a transect of shallow (3.5 ft deep) soil-gas samples collected across a small plume of TCE contaminated groundwater. This site was selected to test the ability of the method to locate contaminated groundwater by means of shallow soil-gas measurements. The results of the investigation at each site are discussed individually in the following sections. The investigation at Site 1 was performed on June 23, 1983. The investigations at Sites 2, 3, and 4 were performed on the following day, June 24, 1983.

SAMPLING PROCEDURE

Gas samples from Sites 1, 2, and 3 were collected through a drive-poi screen attached to 1-1/4 inch pipe. A bore hole was advanced to the desir depth with a hollow flight auger. A soil sample was collected with a spli spoon driven approximately 18 inches through the open end of the auger int undisturbed soil. After withdrawing the split spoon, a hole approximately 1-1/2 inches in diameter remained. The drive point was inserted into the hole left by the split spoon and the auger was reversed to drop the cuttin above the top of the drive-point screen. The cuttings were tamped down making a seal of 6 to 12 inches of packed soil above the screen. A glass flow-through sample bottle having a valve at each end and a septum seal fo syringe access was placed in line between the 1-1/4 inch soil-gas pipe and a vacuum pump used to withdraw soil gas. Soil gas was pumped for two minu then the glass sample bottle was sealed and removed from the line for imme analysis in the field.

Water samples were collected from the same bore holes by lowering a b through the hollow stem of the auger immediately after the auger intercept water. The water samples were bottled, then analyzed in the field.

The shallow soil-gas samples collected in the transect along the park lot at Building 10 were collected through small pipes (1/2 inch X 4 feet) into the ground by hand. Soil gas was pumped from the pipe by means of a peristaltic pump for a period of 30 seconds. The soil gas was sampled fro the pump line directly with a glass syringe and injected into the gas chro in the field. The field analytical equipment was capable of measuring two of air or water every eight minutes. The detection limit for all of the compounds measured except CH_2Cl_2 were 0.001 µg/L in air and 0.1 µg/L in water. The detection limits for CH_2Cl_2 were 0.01 µg/L and 1.0 µg/L in ai and water, respectively.

RESULTS AND DISCUSSION

SITE 1

The results from all of the analyses at Site 1 are given in Table 1 The confidence intervals shown represent one standard deviation. In the of the above-ground air samples, the large standard deviation is due to fact that some of the samples were collected in the morning and some in late afternoon. The large deviations represent changes in air quality probably attributable to chemical vapor releases in the surrounding area The highest values were measured in the late afternoon.

The chemical concentrations in the above-ground air are higher than the soil gas of the top few feet. This suggests that the atmospheric ch concentrations presented here are not representative of the long-term av because the atmospheric gases can permeate quite readily through the upp few feet of soil given a time frame of a week or more.

All of the contaminants, without exception, increase in concentrati downward in the soil This distribution demonstrates unequivocally that there is a subsurface source of the chemicals. The depth to the water t at this site was 25 ft. With the exception of TCE, all of the chemical concentrations (mass per unit volume of gas or liquid) are higher in the soil gas than in the groundwater. As an aide to understanding the inte the field data, the behavior or distribution of each chemical in a simp gas-liquid system must be known. This parameter is known as the gas/li distribution coefficient. This coefficient is simply a measure of the

TABLE 1. Chemical Data for Site 1.

SAMPLE	CH_2Cl_2	F-113	TCA	TCE	PCE
Air above Ground (5)[a]	0.7 ± 0.6[b]	0.08 ± 0.07	0.01 ± 0.01	(<0.001)[c]	0.002 ± 0
Soil Gas 2 ft (1)	0.1	0.004	0.003	0.003	0.002
Soil Gas 3.5 ft (1)	3	0.3	0.03	0.01	(<0.001
Soil Gas 11 ft (2)	340 ± 33	33 ± 3	0.6 ± 0.3	0.4 ± 0.3	-
Soil Gas 14 ft (2)	11,000 ± 40	1700 ± 140	11 ± 4	2 ± 0.7	23
Soil Gas 20 ft (2)	12,000 ± 1300	1800 ± 360	13 ± 2	3 ± 0.5	23
Water (5) (Field Meas.)	1500 ± 150	81 ± 26	12 ± 2	16 ± 8	15
Water (HLA Lab Analysis)		95	12	27	

[a] (5) number of samples analyzed.

[b] All analyses expressed as μg/L of gas or liquid, confidence limits are one standard deviation.

[c] Parantheses indicate "none detected".

concentration ratio of the chemical at equilibrium in a closed system containing only water and air. These ratios were measured in this study for the compounds of interest, and are listed in Table 2. The distribution ratio varies with temperature but is independent of concentration at values below the solubility limit for the chemical. This value is generally proportional to aqueous solubility for a nonpolar compound that does not react with water.

Several points can be noted with regard to the contaminant distribution at Site 1:

1) The relative proportions of compounds in the gas phase correspond roughl to predictions based on the gas-liquid partitioning coefficients. The least soluble contaminant, F-113, shows the greatest proportion in the gas phase and the most soluble, TCE, has partitioned the least into the gas phase. Thus aqueous solubility is probably a major factor effecting the gas-liquid distribution of the chemicals observed at Site 1.

2) The soil-gas concentrations are not in equilibrium with the groundwater concentrations, and with the exception of TCE, the gradient favors more transfer from the soil gas to the groundwater.

3) Depending on the depth distribution of contamination below the water table, the proponderance of the CH_2Cl_2 and F-113 is likely to still exist in the soil gas. More groundwater measurements with depth are needed to ver this point.

<u>SITE 2</u>

Soil-gas measurements at Site 2 (depth to water, 23 ft) also showed contaminant concentrations increasing downward into the soil (Table 3). And like at Site 1, indicate a subsurface source for the contaminants. However, unlike Site 1, the concentration gradient across the water table soil-gas

TABLE 2. Concentration ratio for contaminants at equilibrium in an air-wat system at 25°C.

COMPOUND	$C_{AIR} : C_{H_2O}$
CH_2Cl_2	2.7 : 1
F-113	4 : 1
TCA	1 : 2
TCE	1 : 3
PCE	1 : 2.3

TABLE 3. Chemical Data for Site 2.

SAMPLE	CH_2CL_2	F-113	TCA	TCE	PCE
Air above Ground (1)	0.1	0.2	(<0.001)	(<0.001)	(<0.001)
Soil Gas 5 ft (4)	1.5 ± 0.8	3.5 ± 0.1	0.14 ± 0.08	0.01 ± 0	0.45 ± 0.2
Soil Gas 15 ft (2)	170 ± 23	71 ± 6	2 ± 1	0.60 ± 0.14	5.0 ± 0
Soil Gas 20 ft (4)	190 ± 100	100 ± 32	4.0 ± 1.8	0.9 ± 0.1	6 ± 6
Water (Field Meas.)	29 ± 5	65 ± 13	120 ± 29	0.6 ± 0.3	0.1 ± 0.1
Water (HLA Lab Analysis)		70	100	0.50	

interface indicates that F-113 and TCA are moving from the water into the soil gas whereas the remainder have the opposite gradient and thus are mov from the soil gas into the water.

The only speculation that might be appropriate from the data at Site is that contaminants may have been introduced into the subsurface at diffe times or places. The distribution of compounds relative to each other is clearly not directly a function of their solubility characteristics as app to be the case at Site 1. If they had all been introduced at once in the same system, the differences in their distribution should vary more predic as a function of their physical properties. However, at Site 2 the distri cannot be so simply explained suggesting that other variables, both tempor or spatial, may be involved. More groundwater samples will have to be collected at depth to determine if the major mass of contamination is abov or below the water at Site 2.

SITE 3

Site 3 (depth to water, 24 ft) is located at a point upgradient from the contamination at the Plant. The purpose of the investigation at this site was to show what the soil-gas data looked like in an area where there was no contamination. The results are given in Table 4. Only two gas sam were analyzed from this site because one or two attempts to collect gas fa due to clogging of the drive-point screen in the soil.

The results show only traces of contaminants and no trends or gradier are evident. In fact the trace levels of chemicals observed at this Site probably represent carryover or equipment contamination from the samples measured at the previous site where relatively high level contamination ex Only three gas bottles were on hand and each one had to be reused at each

TABLE 4. Chemical Data for Site 3.

SAMPLE	CH_2Cl_2	F-113	TCA	TCE	PCE
Air above Ground (1)	0.1	0.004	0.003	(<0.001)	0.0(
Soil Gas 10 ft (1)	0.02	0.04	0.003	0.001	0.0!
Soil Gas 25 ft (2)	0.09 ± 0.01	0.01 ± 0.01	0.001 ± 0	0.001 ± 0.001	0.005 ±
Water (1) (Field Meas.)	(<1.0)	0.3	0.2	(<0.1)	0.'
Water (HLA Lab Analysis)		ND	ND	ND	

Because this site investigation was started at the end of the last day there was no time to redo samples or make a special effort to clean the glassware or the sampling equipment before making the measurements. However, most of the concentrations observed here are two or more orders of magnitude lower than were observed at the contaminated sites and thus are not likely to crea misleading results on a typical production-oriented day. In order to get positive results near the detection limits, a system employing analysis of known blanks would have been used.

SITE 4

A transect of shallow soil-gas samples were collected at Site 4 across a known TCE plume where the depth to water was 30 ft. The results of all th gas analyses are presented in Table 5. A comparison of the TCE soil-gas data from this study with the groundwater TCE concentrations taken from a previous study are shown in Figure 1. The results show that TCE was detect every place over the plume, and was not detected over the noncontaminated wa on both sides of the plume. However, the high concentration observed in the soil gas is not located exactly over the peak groundwater contamination area The soil-gas peak and the groundwater high are separated laterally by about 75 ft.

The fact that the soil-gas concentrations are not proportional to the groundwater concentrations is probably due to variations in the air permeability of the shallow soil. The soil at this site was particularly soft, requiring only two or three hammer blows (with a 10 lb sledge) per foo to drive the pipe. The soil at the point where the high concentration was measured was noticeably harder, thus contaminants at this point were probably better protected from dilution by atmospheric air.

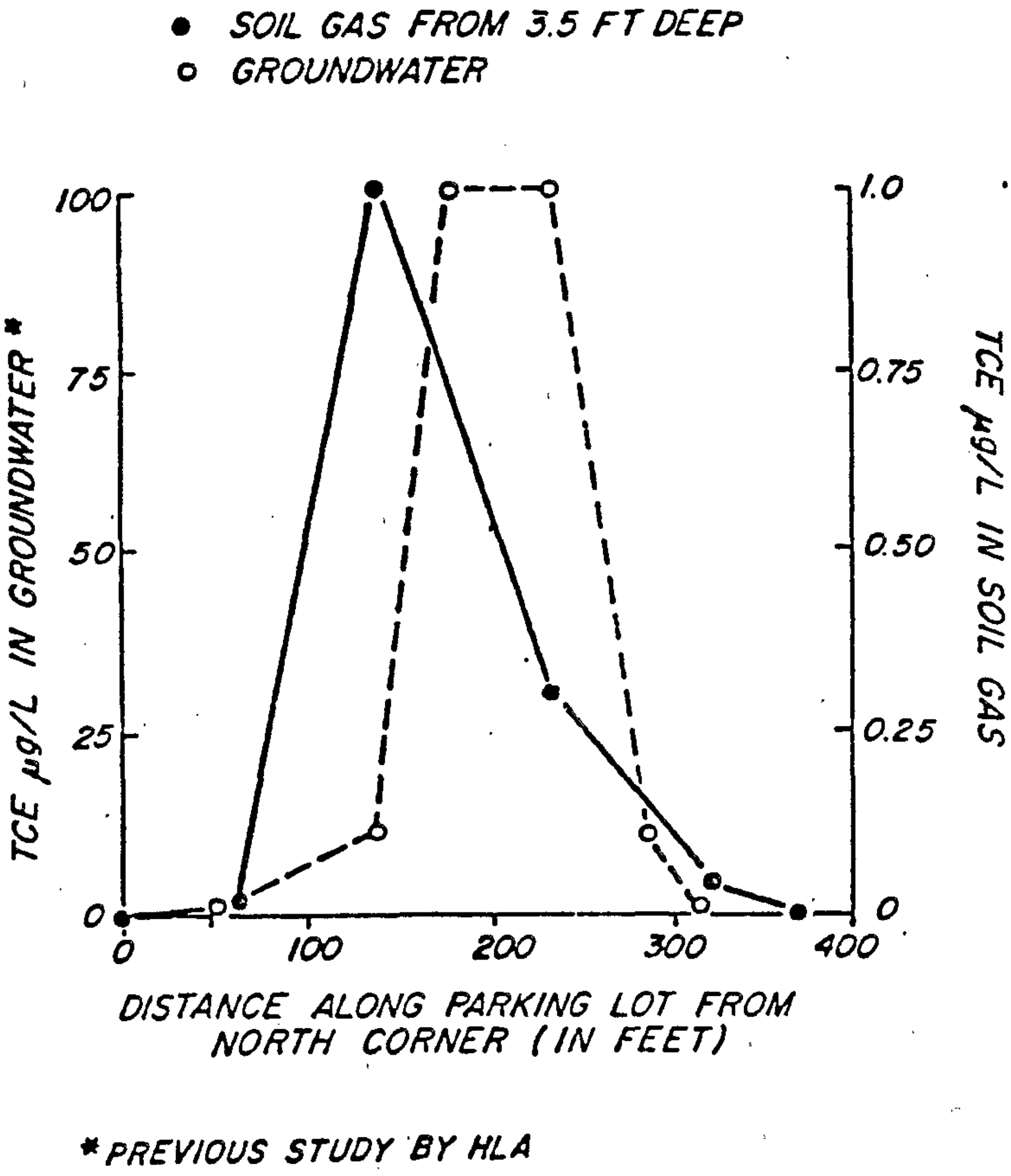


FIGURE 1. Soil-gas transect across TCE plume.

TABLE 5. Shallow soil-gas transect across TCE plume at NE side of the parking lot.

Distance from North Corner of Parking Lot	CH_2Cl_2	F-113	TCA	TCE	PCE
#1 0 ft	0.06	0.006	0.001	(<0.001)	0.001
#2 65 ft*	0.02	0.05	1.0	0.01	0.004
#3 145 ft*	0.04	0.004	0.002	1.0	0.003
#4 236 ft*	0.04	0.01	0.003	0.3	(<0.001)
#5 325 ft*	0.02	0.3	2.0	0.03	0.002
#6 375 ft	(<0.01)	2.0	8.0	(<0.005)	0.04

* Sample location above previously determined TCE plume.

Soil-gas samples in this study were collected over a depth interval c 3.0 to 3.5 ft. In view of the ease of pounding pipe into the ground in th area, any subsequent study should be performed using longer pipe that may more definitive results. Ten ft lengths of pipe could have been used near as easily as the four ft lengths, and probably would have given more accur results. In this study, about 15 minutes was required at each transect location to drive the pipe, collect and analyze two samples, and remove th pipe.

EFFECTS DUE TO SOIL TYPE

As noted previously, soil samples were collected as part of the gas sampling process. The soil samples were examined in hand samples and the observations for each boring are shown in Figure 2. No correlation could be made between the shape of the soil-gas contaminant profile and the prop of the soil.

CONCLUSIONS

The techniques employed in this study or demonstration showed the following points:

1) Subsurface contamination by volatile contaminants produces a concentrat gradient in the soil gas that decreases in a direction away from the major source or body of contamination.

2) All of the groundwater contaminants in this study were detectable and distinguishable from atmospheric levels of the same contaminants at a soil depth of 3 to 5 ft.

3) A vertical profile of contaminant concentrations in the soil gas down through the unsaturated zone and in groundwater through contaminated portion of the aquifer is probably the most sensitive and rapid method of

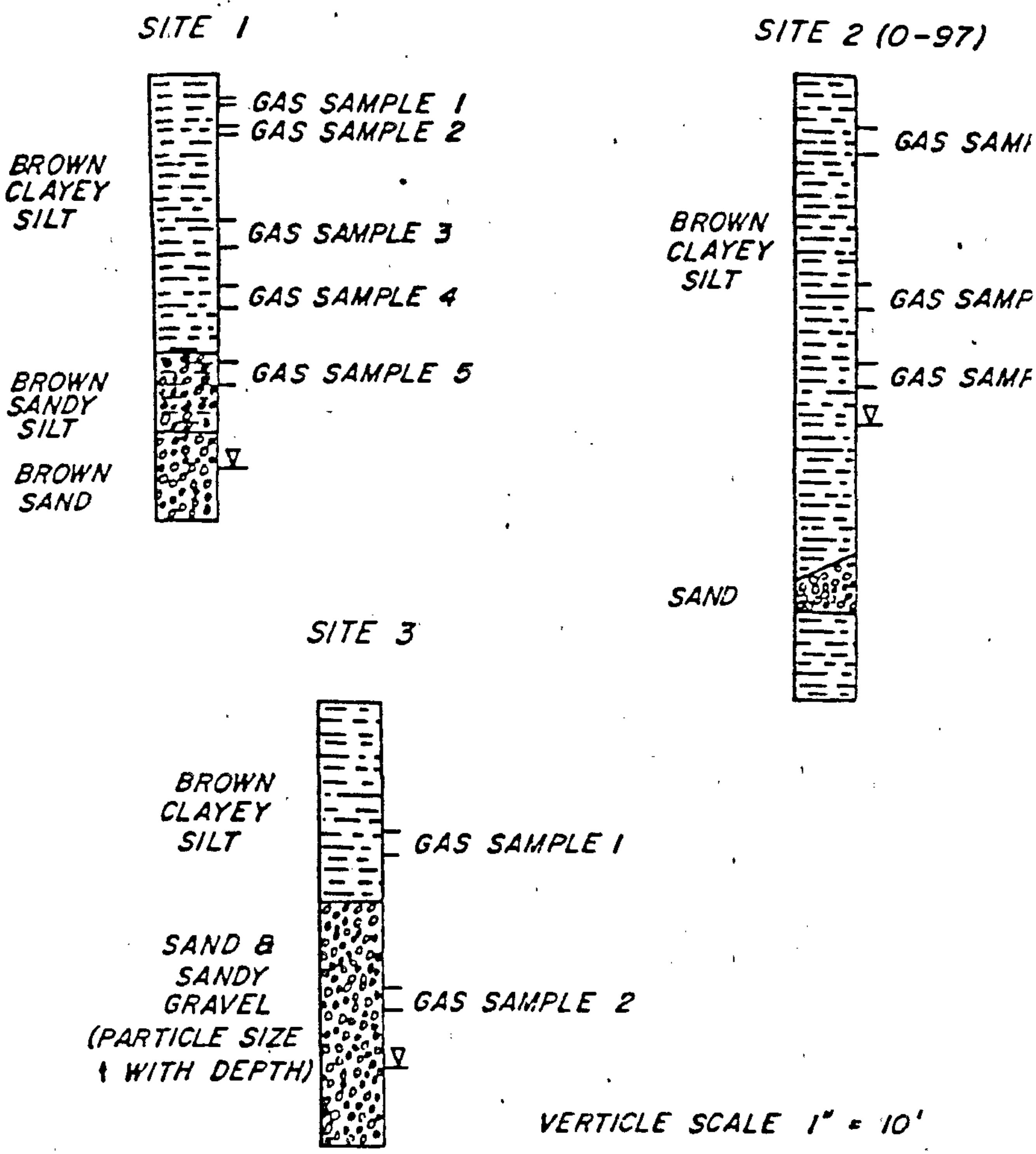


FIGURE 2. Soil Profiles at Sites 1, 2, and 3.

assessing the overall distribution of a contaminant in the subsurface. A transect of such profiles would serve to obtain horizontal directional gra(
as well.

4) The vertical profiles measured on the second day of this study require(
2.5 to 3.0 hrs to drill, collect samples, analyze the samples, and backfil
the hole.

5) The shallow soil-gas transect which analyzed soil gas from a depth of 3.0 to 3.5 ft appears to be a viable way of locating subsurface contaminat
The technique is particularly useful for TCE because the ambient backgroun
of TCE in the atmosphere is virtually not measurable, thus the trace concentration observed in the soil gas are significant. Soil-gas samples collected at a depth of 10 ft would probably give better correlation of so
contamination levels with groundwater contamination levels.

A MONITORING AND REMOVAL PROGRAM FOR LEAKED PROPANE GAS IN THE VADOSE (UNSATURATED) ZONE: A CASE STUDY*

Thomas Lobasso, Jr. and Andrew J. Barber
Geraghty & Miller, Inc., Syosset, New York

The loss of petroleum products through leaking tanks and distribution systems is one of the most common and widespread occurrences of subsurface contamination in the United States. Many of these incidences are spotlighted by the media and draw much public attention. Although many types of product recovery systems have evolved, earth scientists would agree that even the most advanced systems cannot remove all of the product trapped within the soil grains or rock fractures. Problems can occur due to lighter fractions separating from residual product, causing accumulations of vapors in the subsurface. Increased attention is being turned toward the role of gases in the unsaturated zone in incidents of hydrocarbon contamination. The following case history details the techniques used to delineate and remove a body of gaseous hydrocarbons from the unsaturated zone.

Field Investigation

Two leaks from a buried natural gas distribution system resulted in gas plumes under a residential area. The gas, predominantly propane, spread through an unsaturated zone composed of unconsolidated glacial materials and reach the water table where some of the gas dissolved in the ground water. Approximately one and a half years after the discovery and

*Proceedings from The Conference on the Characterization and Monitoring of the Vadose (Unsaturated) Zone: National Water Well Association: December 1983, Las Vegas, Nevada.

repair of the major leak, a subsurface investigation was begun utilizing specialized sampling procedures and protocols to determine the extent and dynamics of the plume in both the saturated and unsaturated zone. The results of the investigation revealed the second leak and were later used to design and implement a gas removal program.

A propane monitoring program in the vadose zone was initiated based on several assumptions; (1) propane has a greater density than air, 1.83 grams at 25°C and one atmosphere, and would migrate downward from the pipeline leak (4 feet below land surface) until it reached the saturated zone, (2) propane with an aqueous solubility of 65 mg/L (Merck, 1960), would dissolve into the ground-water system as the gas plume made contact with the water table, and (3) the remaining undissolved gas would blanket the water table surface. Presumably, propane gas can move in either direction between the saturated and unsaturated zones, depending on the relative concentrations in each zone.

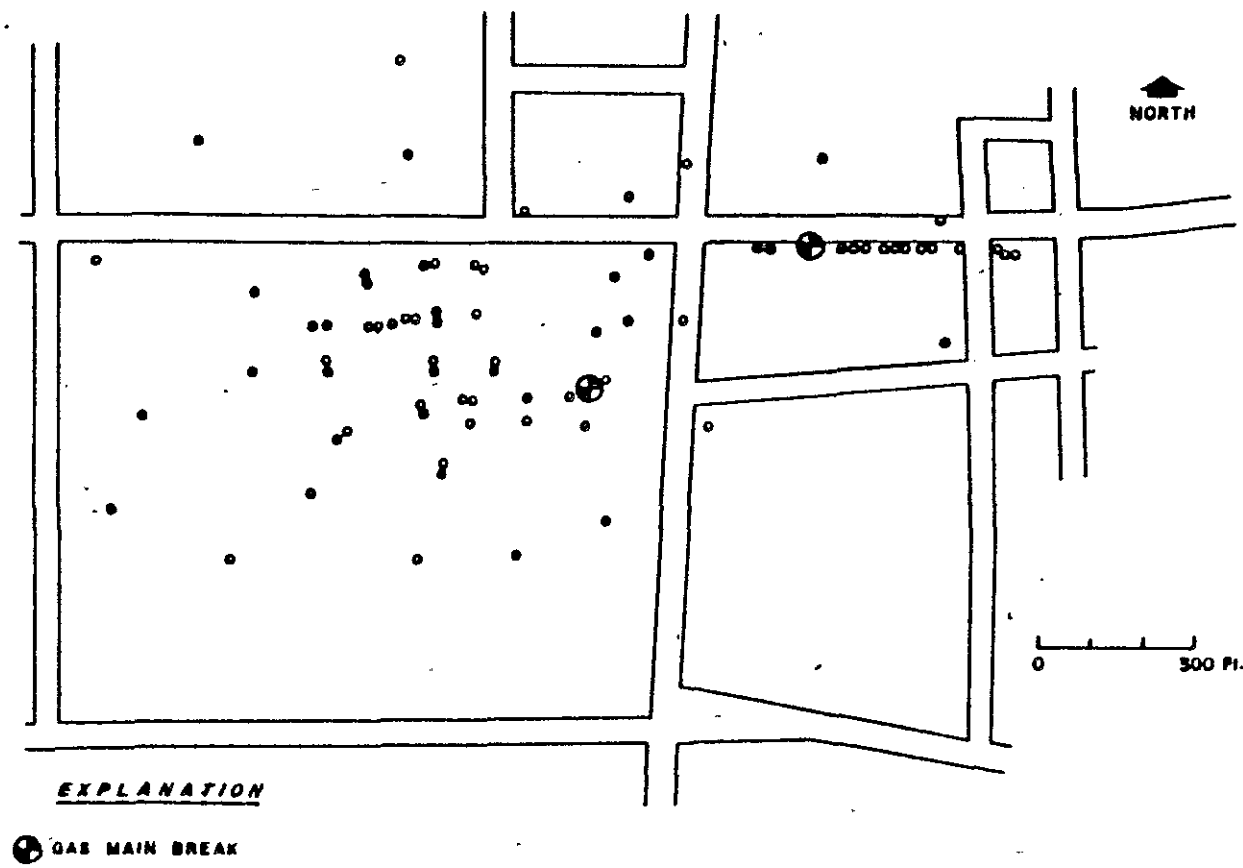
Saturated Zone Investigation

A field investigation of the saturated zone was first undertaken to determine the extent of the dissolved propane in the ground-water system. The ground-water investigation, which continued concurrently with the investigation of the unsaturated zone, included the installation of monitoring wells designed to provide (1) geologic information, (2) ground-water samples to determine the impact of dissolved propane on the ground-water system and to approximate the location of the gaseous propane (undissolved) within the unsaturated zone, and (3) water levels to determine local hydraulic gradients and general direction of ground-water flow. Gas chromatographic analyses of ground-water samples collected from the monitoring wells indicated the general extent of propane contamination in the saturated zone. These results in turn provided the rationale for the location and design of gas monitoring wells in the unsaturated zone.

Unsaturated Zone Investigation

The investigation in the vadose zone began with the installation of 20 small-diameter wells screened directly above the water table. After samples of the soil atmosphere (soil-air samples) were collected and analyzed, it was apparent that additional monitoring points would be required to further define the extent of gaseous propane in the subsurface. Figure 1 shows the location of the propane-monitoring wells as well as the location of the gas-main leaks. To monitor the presence of gaseous propane vertically within the soil profile, well clusters (two or more adjacent wells screening successive depths) were installed at some of the locations. The vertical monitoring data was necessary to later maximize the removal of gas during the cleanup phase.

The monitoring wells were installed by the air rotary drilling method and were constructed of 2-inch (I.D.) PVC casing and screen. To install well casings and screens an oversize diameter borehole (6-inch) was first drilled. The drill cuttings were collected at 5-foot intervals and logged for geologic interpretation. Once the desired depths were reached, the well casing and screen was installed. The annular space surrounding the well screen was backfilled with graded sand slightly larger in grain size



LOCATION OF PROPANE MONITORING WELLS

Figure 1

than the screen openings (0.02 inches) to prevent fine soil particles from entering the well. The space directly above the screened interval was filled with bentonite clay and cement to seal the well and prevent surface runoff from entering.

One quarter-inch (I.D.) tubing was installed in each well which extended downward into the well screen approximately two-thirds the distance from ground surface to the water table. The tubing protruded through an air-tight well cap at ground surface and was used for collection of soil-air with vacuum equipment.

During early phases of the field investigation, it was necessary to have real-time analyses of hydrocarbon content in soil gases. The immediate results helped to guide the drilling program, and allowed us to establish a protocol for gas sampling once the wells were in place.

The two instruments used for this work were an organic vapor analyzer (OVA) and an explosimeter. The OVA is a portable instrument that can measure hydrocarbons in air in the range of 0.2-1,000 parts per million (vol./vol.). The explosimeter is less sensitive; it measures gas as a percentage of the lower explosive limit (LEL) and percent by volume. The explosive limit of propane is 2.37 to 9.5 percent by volume in air (Merck, 1960).

Monitoring wells and borings to be sampled were left closed and undisturbed for at least 24 hours. At the time of sampling, a diaphragm pump or peristaltic pump was connected to the 1/4-inch (I.D.) polyethylene tubing that is permanently in place and extends downward to the sampling zone.

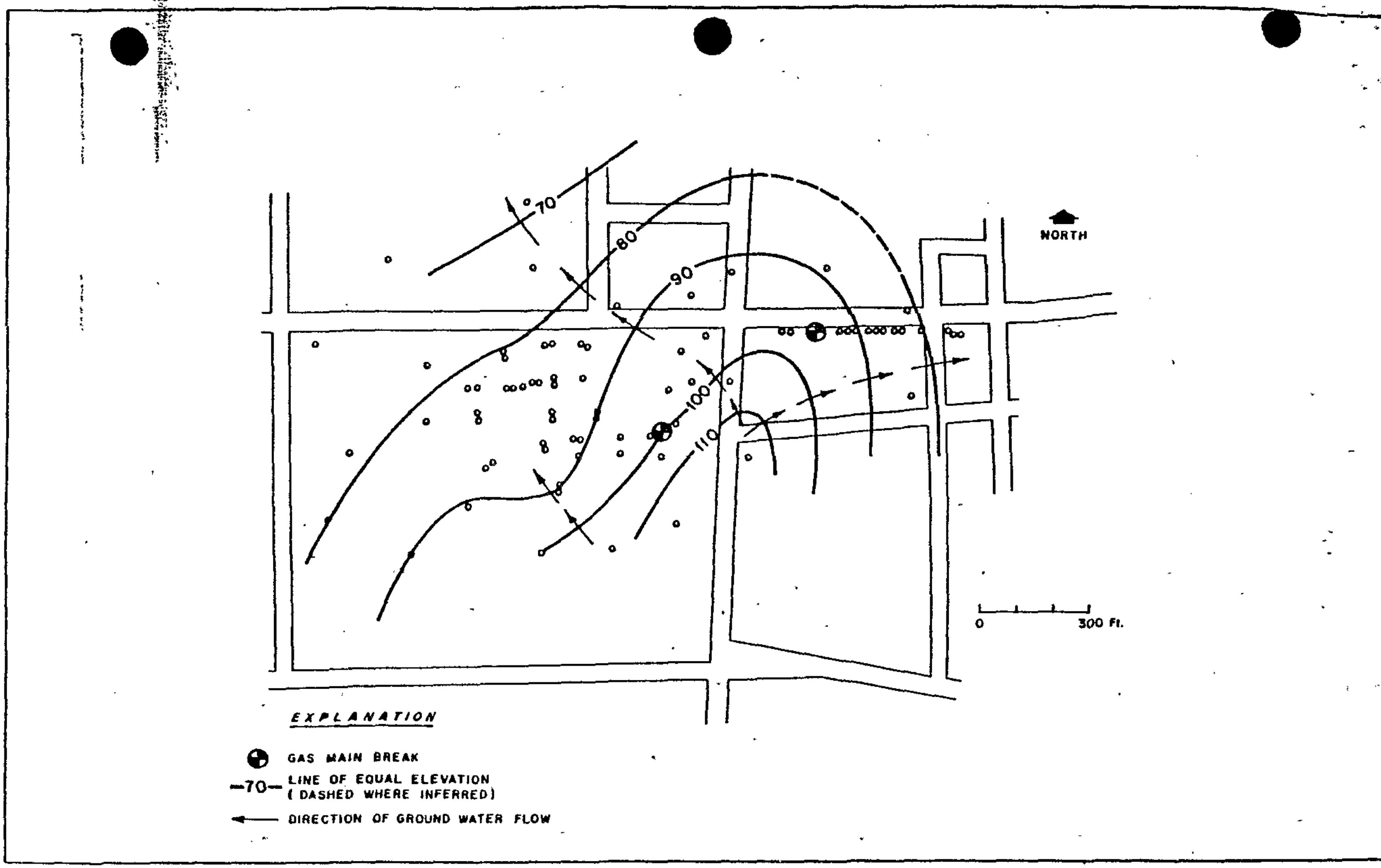
Field experiments with the OVA showed that a constant hydrocarbon reading occurred after five minutes of pumping at approximately one liter per minute. Subsequently, all routine samples were taken into air bags after removal of several liters of gas. The pump was disconnected after sampling and allowed to flush with fre. air.

Results of the Hydrogeologic Investigation and Soil-Air Sampling Program

The study area is underlain by 50 to 100 feet of unconsolidated glacial material, consisting of till with occasional stratified and unstratified silts, sands, and gravels. These deposits are underlain by crystalline bedrock.

The water table occurs within the unconsolidated deposits at depths ranging from 20 to 30 feet below land surface. The surface of the water table slopes northward and eastward, generally conforming to the topography of the area (Figure 2). Ground water in the water-table zone moves in a northern and eastern direction.

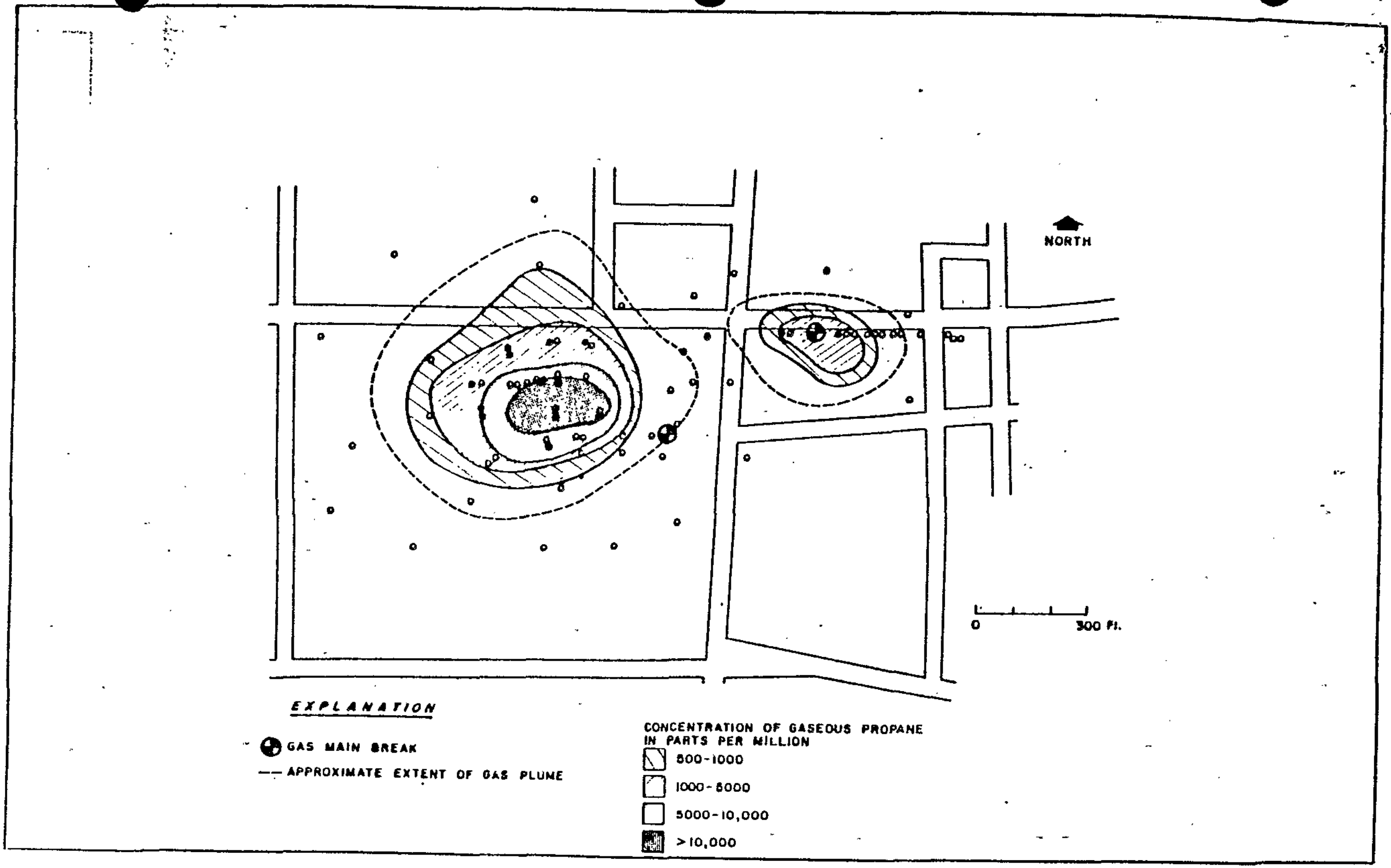
The results of propane analyses in soil-air samples from the vadose zone are shown in Figure 3. Propane plumes resulted from gas main breaks at the two locations shown. This figure shows propane concentrations of samples drawn from wells that are screened in the middle and lower part of the unsaturated zone (15-30 feet). Concentration contour lines have been superimposed on the study area.



WATER TABLE CONTOURS

(Feet above mean sea level)

Figure 2



CONCENTRATION OF PROPANE IN THE MIDDLE TO LOWER UNSATURATED ZONE (15'-30')
(BEFORE GAS REMOVAL OPERATIONS)

Figure 3

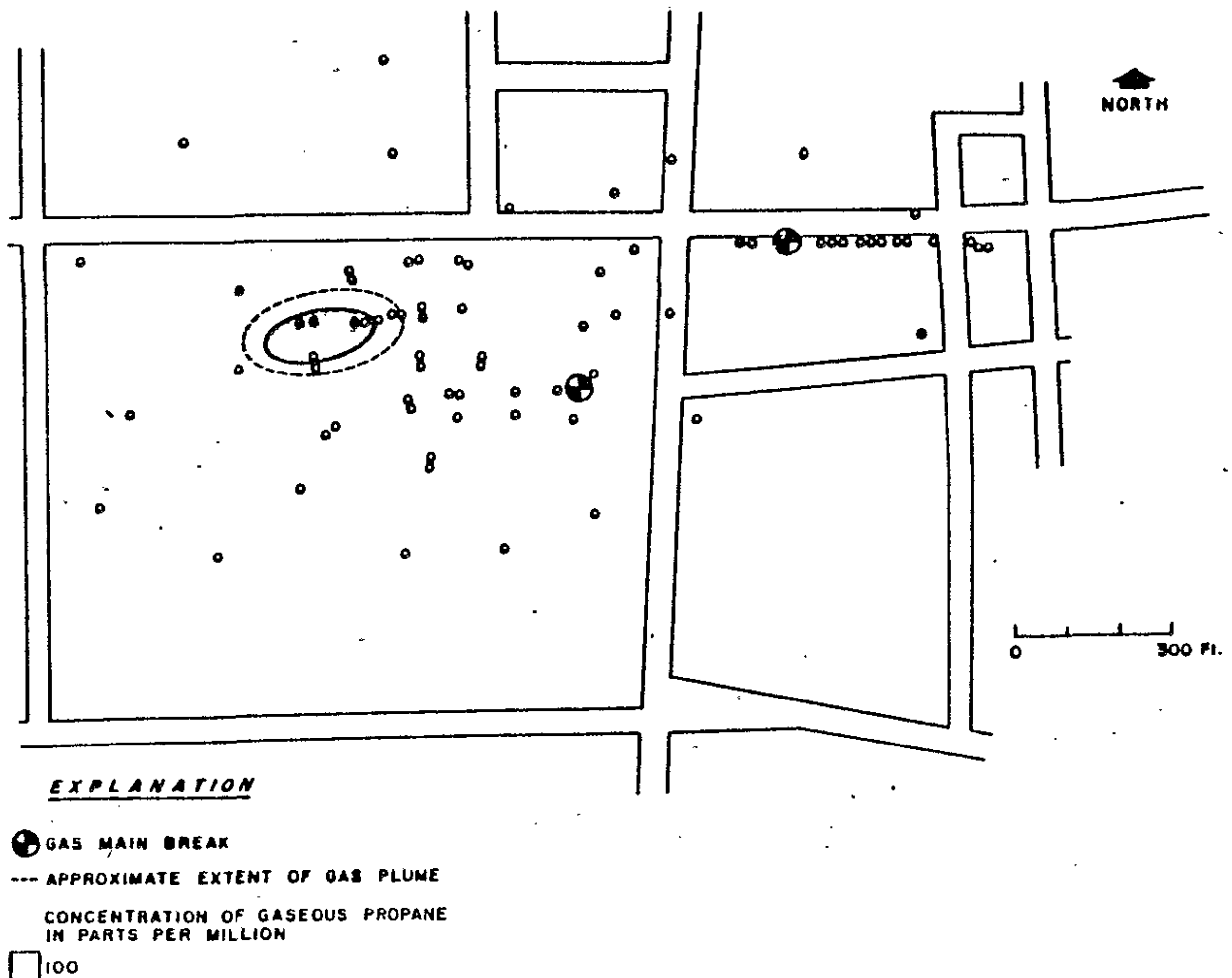
Propane concentrations in soil-air samples collected from wells screening the upper to middle unsaturated zone during the same time are shown on Figure 4. Comparison of Figure 3 and Figure 4 shows that the propane in soil-air is predominantly in the deeper part of the unsaturated zone.

It was noted that the area of highest concentration of propane (>10,000 ppm (vol./vol.)) in the larger plume was 200 feet north and downgradient from the gas main break indicating that the gas had migrated from the point of origin. Neither dissolved nor gaseous propane was detected in the subsurface at monitoring points upgradient from the known source. It should be noted that the smaller plume is still centered on the second gas main break, indicating that this break occurred more recently and the gas had not yet migrated. In fact, the second gas main leak had remained undetected until our soil-air survey had been completed.

Propane Removal Program

Before a full-scale gas removal system was initiated, several pilot studies were conducted to determine if propane could be removed from the vadose zone, and if so, how effectively. A plan was developed to utilize vacuum through the monitoring wells to evacuate the gas plume.

After researching several recovery methods, such as attaching small vacuum devices (diaphragm and peristaltic pumps) to the wells, the most feasible and effective method appeared to be the use of aspiration devices or eductors. Eductors 'd easily be attached to the wells and moved to



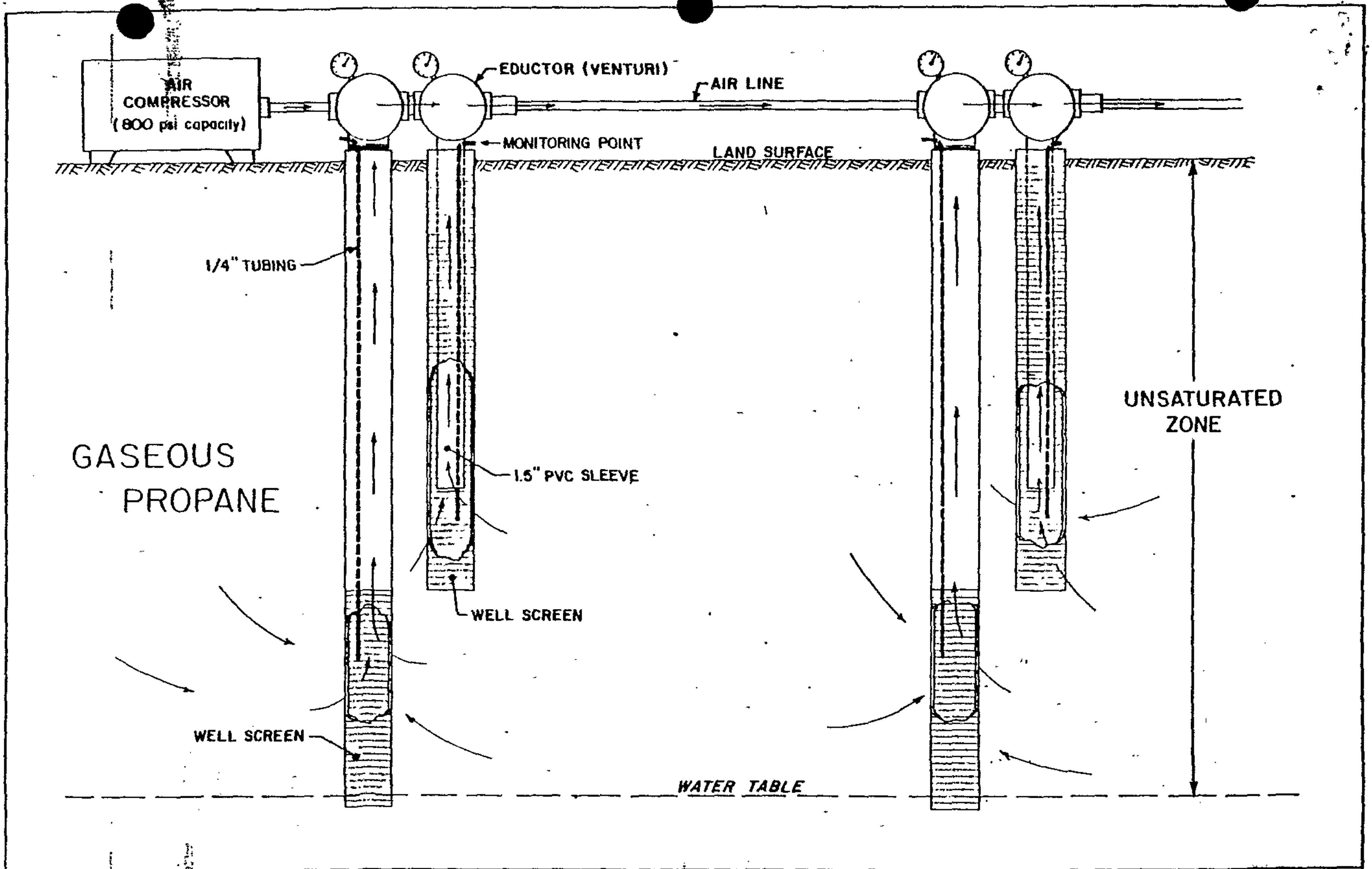
CONCENTRATION OF PROPANE IN THE UPPER TO MIDDLE UNSATURATED ZONE (0'–15')
(BEFORE GAS REMOVAL OPERATIONS)

Figure 4

other wells, if necessary, and several (up to 10) could be connected to one air compressor and operated at the same time. Figure 5 shows the propane removal system in a cross-sectional view. Compressed air passing through the venturi produces a vacuum inside the well casing and draws gases out of pore spaces of the unsaturated soils. The gases are evacuated from the ground and discharged into the atmosphere. The high rate of discharge from the air compressor was expected to dilute the propane to concentrations below 5 percent of the LEL.

Pumping tests were conducted to determine the change in propane concentrations over time in the removal wells and in nearby observation wells. The system was alternately pumped for 24 hours and then shut down for 24 hours to allow propane concentrations to reach equilibrium in the well casing. Soil air samples were collected and analyzed by gas chromatography before each pumping cycle began. Results of the pumping test showed a decline to 10 percent of the original propane levels after the first 48-hour cycle. Propane concentrations were observed to rise to 50 to 70 percent of their original levels by the end of the 4th to 6th pumping cycle, then decline after subsequent pumping cycles. Similar trends were observed in observation wells surrounding the pumping wells. This information indicated that the gas plume is highly mobile in the subsurface and that it was possible to remove propane, if only locally, by aspiration.

A full-scale recovery program began with the addition of recovery wells in areas of highest propane concentration. These wells, along with existing monitoring wells within the plume, were fitted with venturi de-



CROSS-SECTIONAL VIEW OF PROPANE REMOVAL SYSTEM

Figure 5

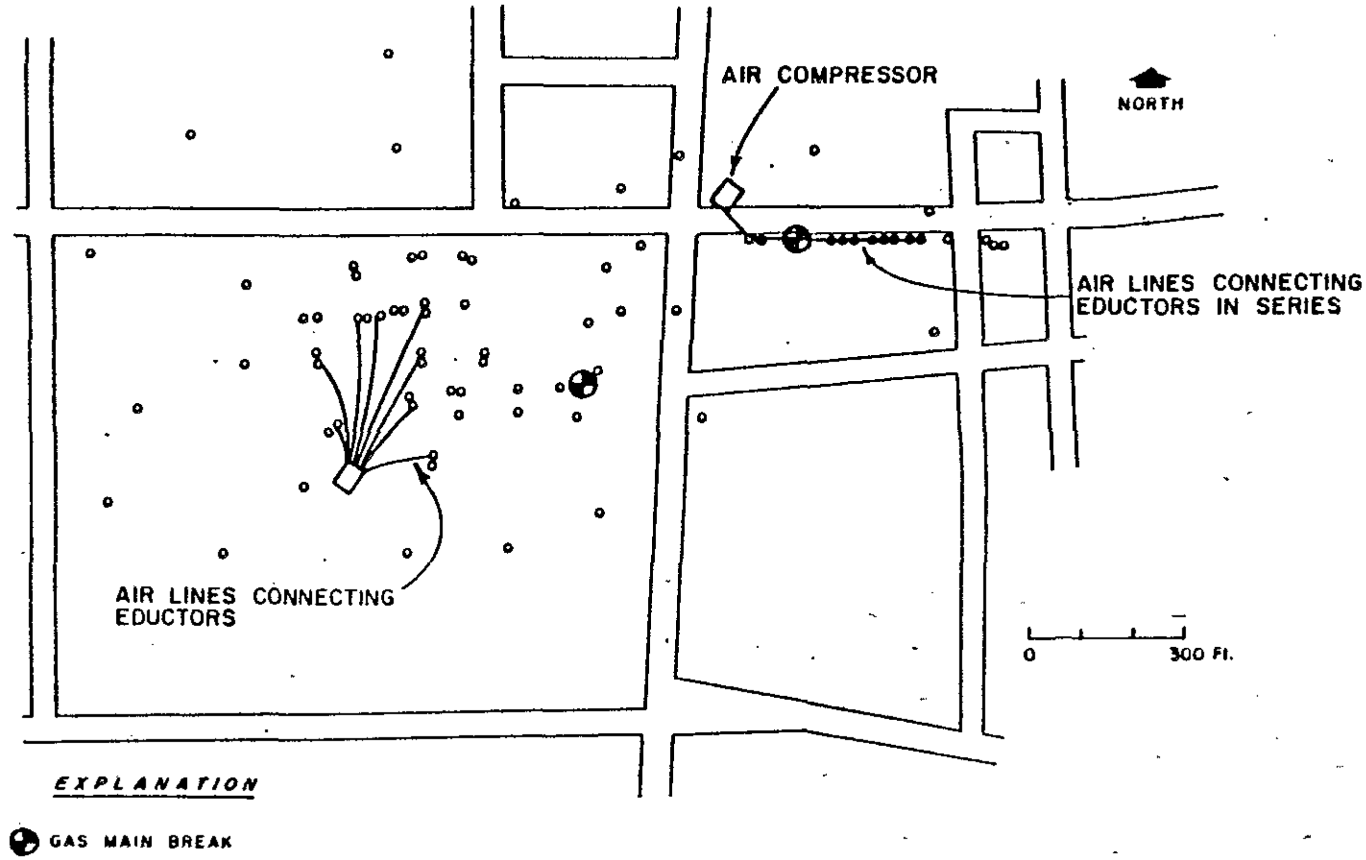
vices and connected in series or independently to a single air compressor. Figure 6 shows the airline cr figuration. Pressures of 50 to 90 pounds per square inch were maintaine ch well head causing the pressure in the well casing to decline to ap..oximately '8 atmospheres. The system was operated 12 hours per day for 6 days a week and was allowed to recover for 48 to 72 hours every two weeks so that a round of soil-air samples could be collected and analyzed to monitor removal progress. The results of these analyses indicated that the recovery system decreased the overall concentration of propane in the subsurface. After three months of aspiration, concentrations were reduced to trace amounts.

Summary and Conclusions

The tested propane gas which is heavier than air, traveled downward through the unsaturated zone until reaching the water table. A portion of the gas dissolved into the saturated zone but the bulk of the remaining gas blanketed the lower portion of the vadose zone 15-30 feet below land surface.

The major gas plume traveled 200 feet downgradient from the gas main break between the time the leak was repaired and the subsurface investigation began (approximately 1-1/2 years). A smaller gas plume was discovered near a second gas main break which had remained undetected until the time of the subsurface investigation.

The results of a study to determine the extent of propane in the saturated zone were helpful in "fingerprinting" the extent and location of the



TYPICAL AIR LINE CONFIGURATIONS USED DURING THE PROPANE REMOVAL PROGRAM **Figure 6** gas plume in the unsaturated zone and formed the basis for the design and location of gas removal wells.

Pilot testing of specialized gas sampling methods and protocols was carried out to insure that soil-gas samples were representative of actual conditions in the unsaturated zone and that consistent and reproducible analytical results were obtained.

As a safety precaution it was necessary to continuously monitor propane in the atmosphere during all phases of the field investigation and cleanup operation. Several explosimeters and organic vapor analyzers were helpful in this regard.

Reference

Merck & Company, Inc., 1960; The Merck Index of Chemicals and Drugs, pp. 859.

JAN 9 1985 1. CAO 199

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January 8, 1985

MRS. CAROLE A. ONORATO, Chairwoman
State Water Resources Control Board
Post Office Box 100
Sacramento, California 95801

Dear Mrs. Onorato:

Thank you and your staff for so quickly remedying the complaints by getting the current draft proposals for Underground Tank Regulations--Title 23--to us so promptly. Such sensitivity in a public agency is praiseworthy.

As you are aware, throughout the long process of developing these regulations my colleagues and I have been very vocal in espousing the utilization of new technology and more specifically, vapor monitoring in the backfill area of tanks. At the same time we have maintained the majority of our contact through your staff and we have provided them with the most recent scientific literature in this regard.

However, all of our input has apparently fallen on deaf ears--possibly because our client, Genelco, Inc., has a device to monitor vapors in the backfill area. As a result, I have taken the liberty of providing you with copies of the literature we have previously submitted to your staff. I hope you will have an opportunity to peruse it prior to the January 18 meeting. At that time we will present Dr. Glenn M. Thompson, President, Tracer Research Corp., Tucson, Ariz., one of the authors of the enclosed material, Mr. James Levine, an engineer with whom I am sure you are familiar, and at least one other independent engineer-scientist who is familiar with hydrocarbon plume propogation in the unsaturated (vadose) zone. Possibly these gentlemen will be able to explain the technology in a manner that is more acceptable to your staff than our previous efforts.

2646

Our major concern, at this juncture, centers around what we feel is the dangerous procedure of drilling an unprecedented number of wells through the aquafer. Both our files and yours contain incident reports of ground water pollution as a direct result of monitoring wells acting as a conduit of pollutants. This is dangerous to the very resource your agency is mandated to protect.

Further, we wonder if any of the Regional Water Quality Boards would have issued a drilling permit for a well down gradient from a potential pollutant site, such as a filling station? This is what these draft regulations is mandating. We are not being argumentative, the important thing today is the protection of our ground water through the PROPER monitoring of underground tanks.

We are quick to acknowledge the place of monitoring wells, but that place is only in an environment where there has already been a leak, as a measure of the extent of pollution...NOT AS AN ONGOING MONITORING DEVICE! Prior to the development of vapor monitoring technology wells were the only means of monitoring ground water pollution. TODAY <u>POTENTIAL</u> POLLUTION CAN BE DISCOVERED THROUGH VAPOR MONITORING and the horrendous damages of that pollution can be mitigated. Damages that could extend far beyond our precious ground water and into the body politic, if that pollution is trtansported through conduits mandated by an appointed government body.

FRCC

Our fervent hope is that your board will amend your staff recommendations for such indiscriminate drilling of wells as outlined in the subject draft regulations and move into the new technological age with a strong emphasis on vapor monitoring.

With best regards,

FRANK H. WINSTON
Chairman and C.E.O.

FHW:r

encls.

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VIRGINIA RASMUSSEN
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CRETCHEN POULSON
Field Representative

Delivered
Cy-Dwp
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Assembly
California Legislature

BILL BRADLEY
ASSEMBLYMAN, SEVENTY-SIXTH DISTRICT
MEMBER OF THE ASSEMBLY RURAL CAUCUS

COMMITTEES
CONSUMER PROTECTION AND TOXIC MATERIALS
EDUCATION
LOCAL GOVERNMENT
UTILITIES AND COMMERCE

January 17, 1985

Mr. Michael A. Campos
Executive Director
State Water Resources Control Board
Division of Water Quality
P. O. Box 100
Sacramento, CA 95801-0100

Dear Mr. Campos:

Re: Special Board Meeting
January 18, 1985 at 10:00 a.m.

Reference is made to your Special Board Meeting to discuss changes to the proposed regulations governing underground storage of hazardous substances.

I would like to call your attention to Section 2621. Additional Definitions, page 2.8, the word "Substantially" is in conflict with 10 percent.

I hope the final product will still exempt farm people.

Sincerely,

BILL BRADLEY
Assemblyman, 76th District

BB:ly

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P.O.Box 584, San Francisco 94101 (415) 386-8449

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cc BMS Reed
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With best regards,

FRANK H. WINSTON
Chairman and C.E.O.

FHW:r

encls.

1:44

ADVANCED
INDUSTRIAL
DESIGNS INC.

October 22, 1984

State Of California
Water Resources Control Board
Division of Technical Services
901 P St.
Sacramento, Ca. 95814

Dear Sirs:

I would like to take this opportunity to commend those members of the Board actively engaged in writing the Regulations Draft. Efforts to safeguard the environment are long overdue.

There are several areas of pertinent technological advancements in which I have aquired expertise. For the past two years I have been investigating vadose vapor sensing technologies. Although my investigations centered on hardware development, I have aquired significant insight into sub-surface hydrocarbon transport phenomenon.

Attached are copies of four Investigations which are consistant in their findings. These investigations contain consistant data which will corroborate all stated comments.

The Investigations are:

1. "Soil Sentry Effectiveness in Controlled Soil Conditions"--- Advanced Industrial Designs Inc.
2. "A Monitoring and Removal Program for Leaked Propane Gas in the Vadose Zone"--- Geriagty and Miller
3. "Demonstration of Soil Gas Sampling as a Tool to Aid in Defining the Distribution of Subsurface Contamination by Volatile Organic Compounds" ---Glenn M. Thompson Ph.D.
4. " Soil Gas Studyof Volatile Organic Contaminents above a portion of the TCE Contaminated Aquifer". ---Dr. Glenn M. Thompson

Comments are referenced by the pertainent section number of the Draft Regulations.

2640,c
Expensive analytical and slant drilled samples of a site are not necessary. Vadose investigations would reveal accurate site history.

~~2642, f~~
A Leak of .05 gph should not be tolerated. The currently used test procedures are conducted over much too short a time span.

CONTINUED

33 COTTINI WAY, SANTA CRUZ, CA 95060 • (408) 425-5895

2644,a
Same comment as 2640,c
2645, b, 2
The five feet constraint on Vadose monitoring feasibility is not necessary. All investigations to date demonstrate that the effectiveness of aspirated Vadose monitoring systems increases as the water table rises. This increase is independent of soil composition.
2646, d
Same comments as 2645, b, 2

If I can be of any further service, please do not hesitate to contact me.

Sincerely,

Reinhard Hanselka
President and Principle Engineer

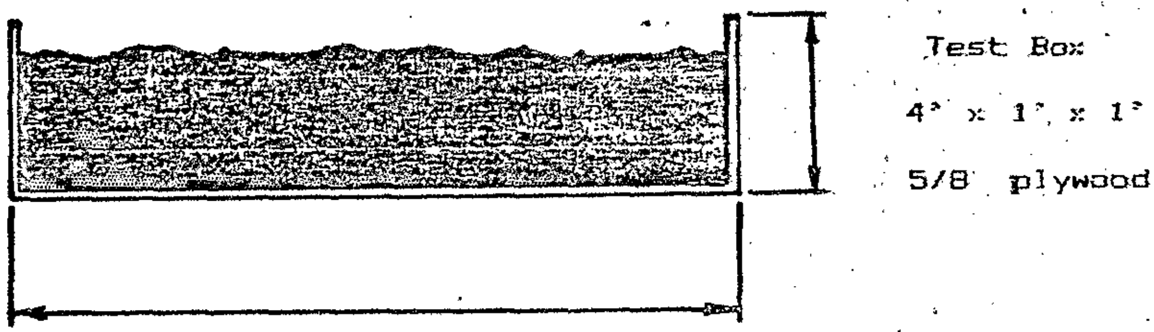
INDUSTRIAL
DESIGNS
33 Cottini Way
Santa Cruz, CA 95060
(408) 425-5895

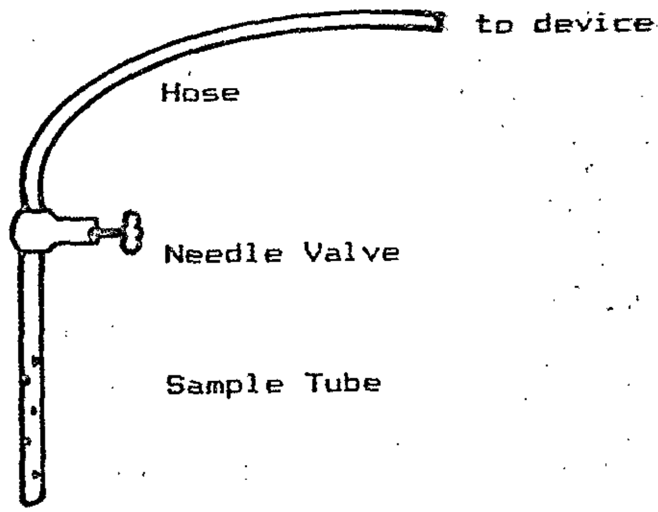
GENELCO

SOIL SENTRY

A. The purpose of this investigation is to determine the effectiveness of the device in a controlled soil condition.

B. Apparatus and test procedure





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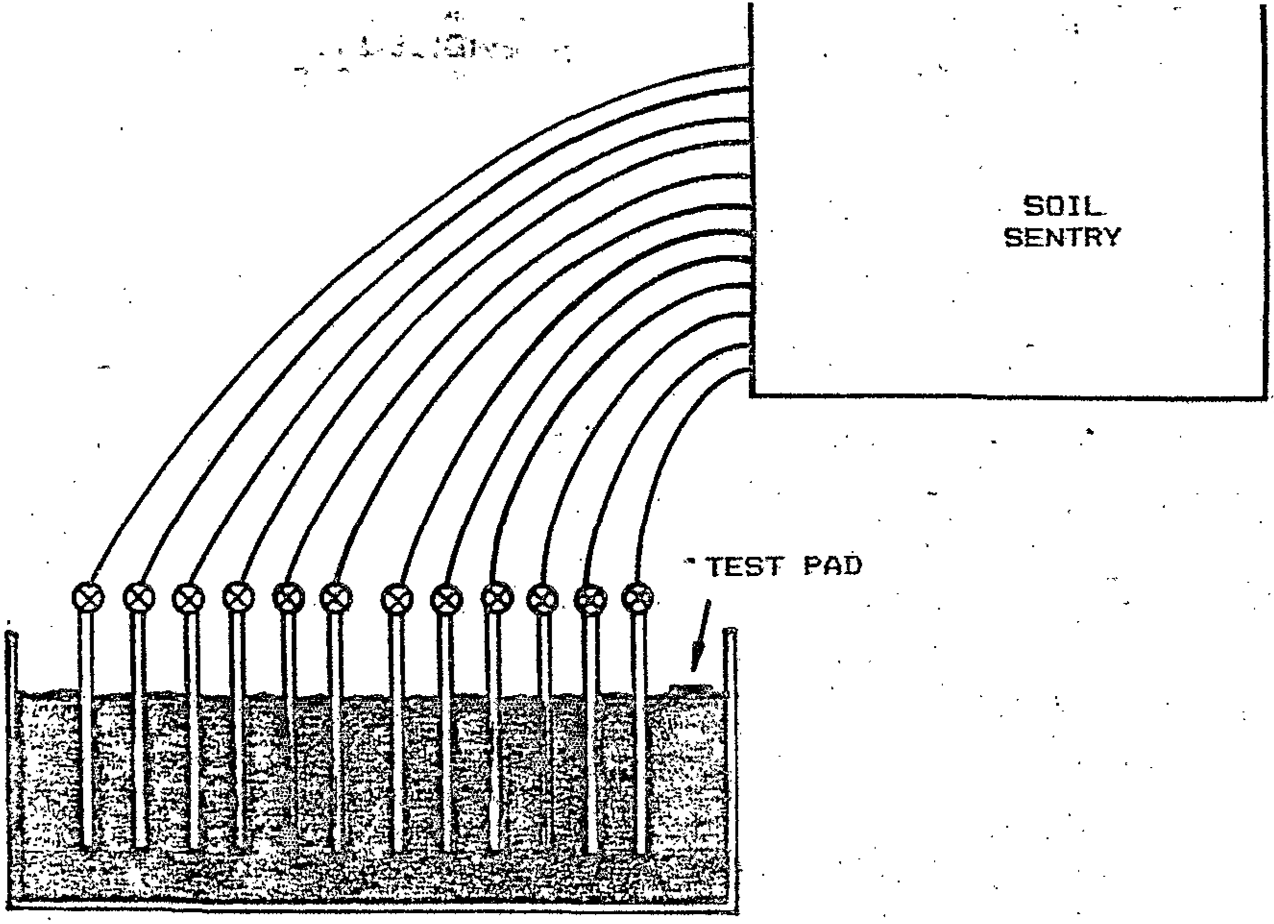

1. Soil

   a. 50% clay
      50% sand
         at 15% moisture
            50% moisture
               saturated at water table

2. Chemicals

   a. Acetone
   b. Gasoline (reg)
   c. Gasoline (unlead)
   d. Methylene Chloride
   e. Tri-chloroethylene (TCE)

3. Temperature

   45 deg. F - 78 deg. F

4. Procedure

   a. Soil was renewed after each chemical test.
   b. Sensor was initiated.
   c. 10 ml of test solution was placed on the test pad.
   d. Test completed when all sensors register leak or 5 days.

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5. Data

a. 15% moisture — Acetone

Day 1 - Initiation & sample placement
Day 2 - Sensors 1, 2, 3, 4
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

b. 50% moisture — Acetone

Day 1 - Initiation
Day 2 - Sensors - all
Day 3 - -------
Day 4 - -------
Day 5 - -------

c. 15% moisture — Gasoline (reg)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

d. 50% moisture — Gasoline (reg)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7,
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

e. 15% moisture — Gasoline (unlead)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

f. 50% moisture — Gasoline (unlead)

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4, 5
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

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g. 15% moisture Methylene Chloride

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
Day 5 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

h. 50% moisture Methylene Chloride

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4, 5
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 5 - -------

i. 15% moisture TCE

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7
Day 4 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10
Day 5 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12

j. Sample tube material was changed from PVC to PVDF due to compatability problems with Methylene Chloride.

k. Water table saturated Gasoline (unleaded).

Day 1 - Initiation
Day 2 - Sensors 1, 2, 3, 4
Day 3 - Sensors 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Day 4 - -------
Day 5 - -------

6. Conclusion

Device performed as claimed. Sensitivity was equal with all solvents triggering response.

Robert Hansen

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SOIL GAS STUDY OF VOLATILE ORGANIC CONTAMINANTS ABOVE A PORTION OF THE TCE CONTAMINATED AQUIFER IN THE SOUTHWEST PART OF TUCSON, ARIZONA

By

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MARCH 8, 1983

ABSTRACT

An investigation of volatile organic contaminants in the unsaturated zone soil gas above a known TCE contamination plume was conducted in Tucson on February 2, 1983. The purpose of the study was to test soil gas sampling as an investigative technique for subsurface contamination problems and test methodology for performing gas sampling.

Halocarbons were measured in the atmosphere above ground, in the soil gas at depths of 10, 20, 50, and 90 ft below land surface, and in the groundwater at the site. Seven compounds were measured. TCE, CCl_4, PCE, and CCl_3H showed gradients that increased in concentration toward the water table, indicating a subsurface or water-table source. F-11, TCA, and methylene chloride showed decreasing concentration with depth indicating a possible atmospheric origin.

All of the compound detected in the soil gas at 10 ft were detected in the groundwater as well at 100 ft proving the basic value of the method for remote detection of groundwater contamination. If horizontal and vertical gradients are measured, the method can provide information about source and proximity of contamination.

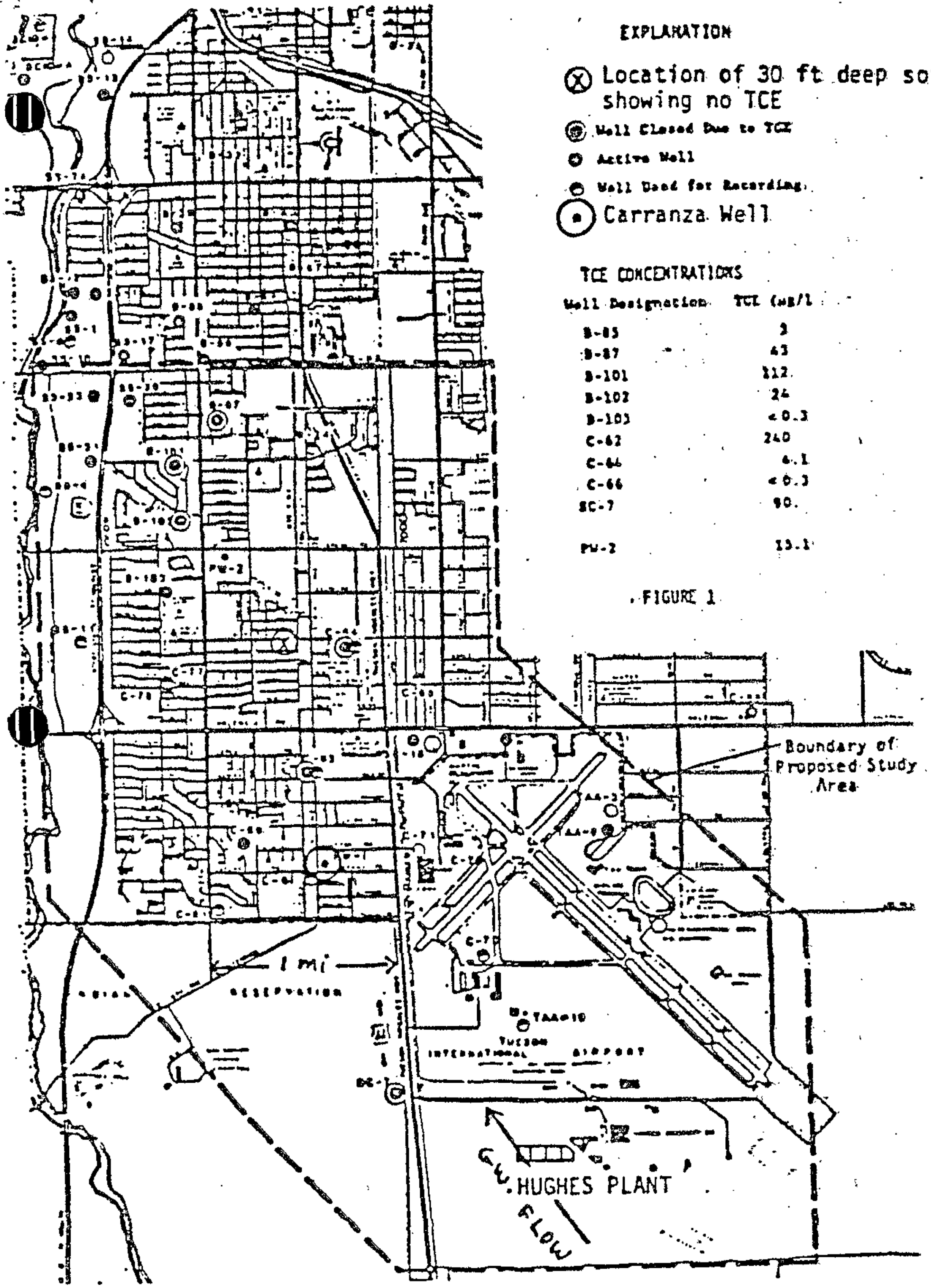
An experiment to investigate the concentration of volatile halocarbons in the soil gas above a portion of the TCE contaminated Tucson aquifer was initiated on February 2, 1983. The purpose of the experiment was to learn what factors affect the soil-gas concentration of a contaminant emanating from the water table and to evaluate methods of sampling the soil gas and groundwater. Soil-gas sampling is potentially the best investigative technique for volatile organic compounds in groundwater because of the low cost and speed of the measurement in comparison to drilling to the water table for each data point.

LOCATION

The site is located at the Carranza residence at 7019 South 6th Street in Tucson. The property is directly downgradient (northwest) of the Hughes Aircra Company plant (Figures 1 and 2) which is known to be a major source of TCE contamination in the groundwater. There is a domestic well on the property contaminated with over 500 ppb of TCE indicating that the Carranza property is over the contaminated groundwater plume. Because of the proximity of the site to the contamination source, it is logical that the TCE has moved under the study area with the groundwater flow and has diffused upward from the water table through the soil in the gas phase.

FIELD SAMPLING METHOD

Soil gas is collected from a drive-point screen driven or buried in the ground at the desired depth. The gas is collected by pumping the soil gas out of the ground and through a sample container by means of a vacuum pump (Figure



Well Designation	TCE (ug/l)
B-85	3
B-87	43
B-101	112.
B-102	24
B-103	<0.3
C-62	240
C-64	6.1
C-66	<0.3
SC-7	90.
PW-2	15.1

Figure 1. Map showing contaminated wells in southwest part of Tucson and locatic of study site (Carranza well) relative to Hughes Plant, a known source of TCE contamination in the groundwater.

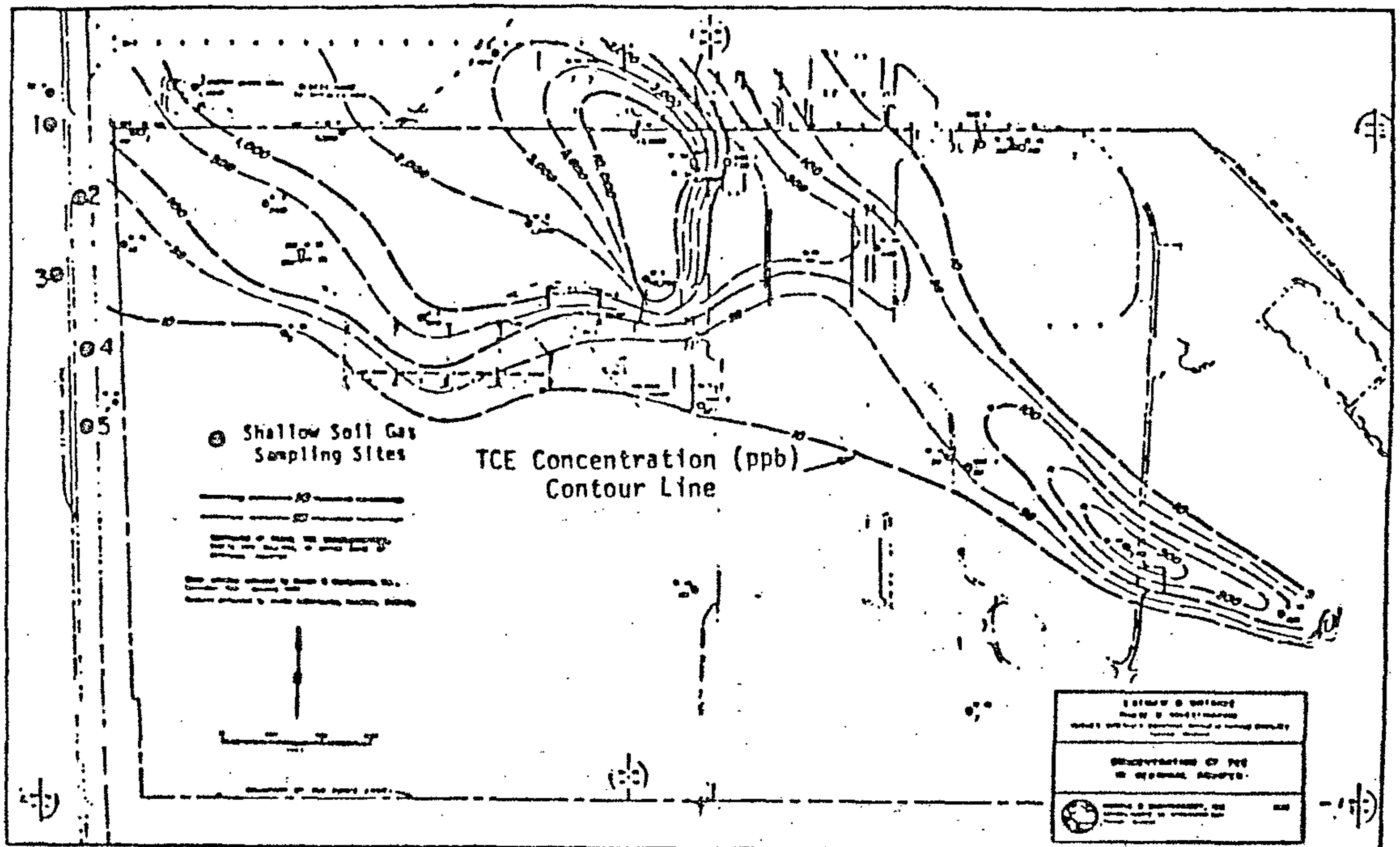


Figure 2. Map showing TCE plume originating from Hughes Plant.

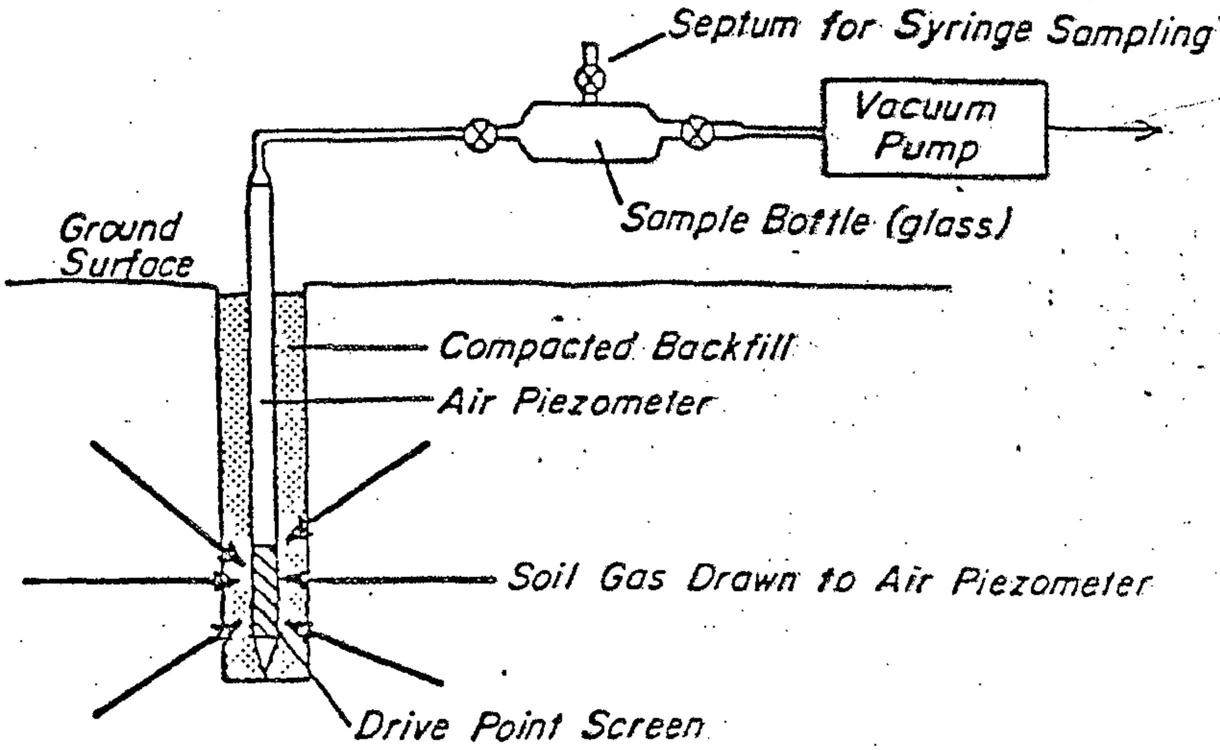


Figure 3. Schematic drawing of soil-gas sampling system.

A gas sample is periodically collected in a syringe from the sample bottle in the evacuation line and analyzed in the field. The field analysis is critical to the method in order to determine when a representative sample has been obtained and to direct the investigation as it progresses.

A hollow stem auger was used to drill the access hole. Soil-gas samples were collected at various depths through an air piezometer lowered down the center of the auger. Generally, the work proceeded as follows. The auger hole was advanced to the desired depth, and the air piezometer which consisted of a standard 30" drive-point screen on 1-1/4" steel pipe was lowered to the bottom of the hole and either driven with a 150 lb hammer or backfilled to bury the screen in the bottom of the hole. Burying the screen by driving it was initially assumed to be the best approach. This approach rarely worked, however. Oftentimes rocks prevented the screen from being driven more than a few inches. In the clayey soils where the screen would drive easily, no air could be drawn through the screen because all of the holes were effectively clogged with clay. In one instance where the screen was driven, the steel pipe broke while it was being pulled back out. The backfilling method was generally more successful. This entailed refilling the hole with drill cuttings to a depth of about five ft above the top of the screen, and pressing the soil down around the screen with the vertical hydraulic drive mechanism of the auger.

Water sampling was attempted with a positive displacement, low-volume sampling pump. The sampling pump which is 1.5 inches in diameter fit easily down the center of the auger flights. The pump, however, would not function properly in the extremely muddy water inside the auger tube. Essentially, the only water sample collected came up inside the drive-point sampler after it hac penetrated the top foot of the water table. This was considered to be the most important sample for this study because of our particular interest in collecting water from the top of the water-table surface.

After the piezometer was in place, the soil gas was pumped at 5 to 20 L/mi for a period of 30 to 50 minutes with analyses being made as frequently as possible during this period. The series of measurements were needed to determi if uncontaminated air was being drawn into the sample from above ground. If surface air is being drawn down the borehole, the contaminant concentration will show a decrease after about five minutes of pumping when the surface air reaches the piezometer screen. If there is no open connection to the surface, the concentrations will remain constant for at least 50 minutes of pumping. Two examples that illustrate the behavior described are given below:

SAMPLE A		SAMPLE B	
3.9×10^{-3} µg TCE/L	7 minutes	3.3×10^{-3} µg TCE/L	5 minutes
2.3×10^{-3} µg TCE/L	18 minutes	3.3×10^{-3} µg TCE/L	11 minutes
2.9×10^{-3} µg TCE/L	30 minutes	3.5×10^{-3} µg TCE/L	25 minutes
2.4×10^{-3} µg TCE/L	40 minutes	3.5×10^{-3} µg TCE/L	40 minutes
		3.4×10^{-3} µg TCE/L	55 minutes

Sample A, soil gas collected at a depth of 25 ft below ground shows air leakag down the borehole. Sample B, soil gas collected from a depth of 50 ft in the same location using the technique described above, represents a sample collect with no air leakage, thus the contaminant level remained nearly constant for t entire sampling period. This ability to know if air is being drawn from above is extremely important to the problem of collecting meaningful data in vadose gas sampling programs because undetected air leakage can easily cause 100% err in a sample measurement.

All of the TCE measurements were made in the field using conventional laboratory equipment mounted in a vehicle and operated from a generator. A Varian 3700 series gas chromatograph and Hewlett Packard integrator were the principal equipment items. The gas chromatograph was modified with a Nafion tube dryer to remove water, thus allowing direct injection of either soil gas or water. The practical detection limit for TCE by this method is 0.1 μg/L in water or 1×10^{-4} μg/L in soil gas. The analysis time is the same for either water or soil gas typically taking about ten minutes if no more than five to ten compounds are present in the sample. Figures 4, 5, and 6 show representative chromatograms of soil gas, air, and groundwater, respectively.

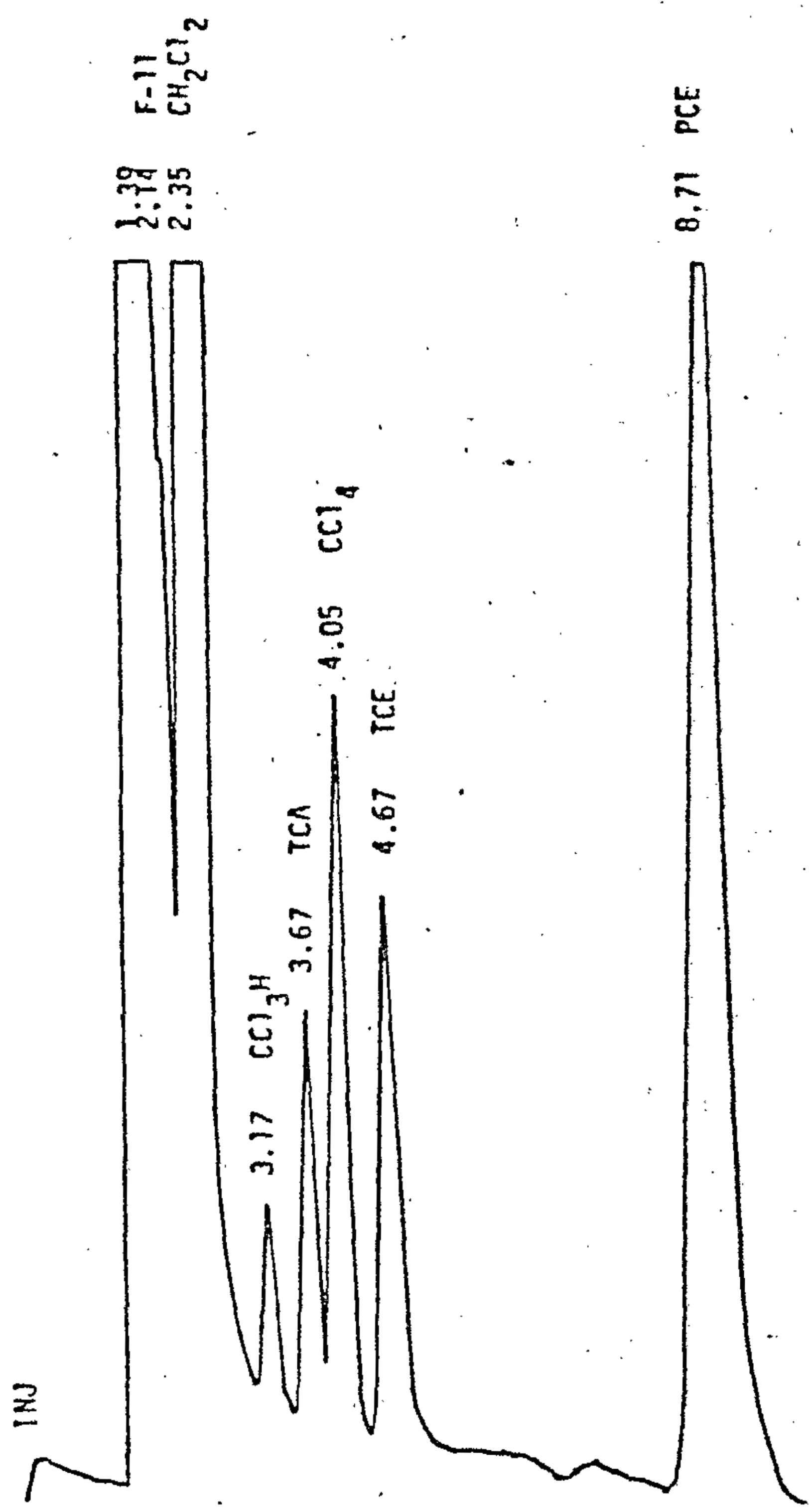


Figure 4. 2 cc soil gas from 25 ft horizon, 2/2/82, Carranza property.

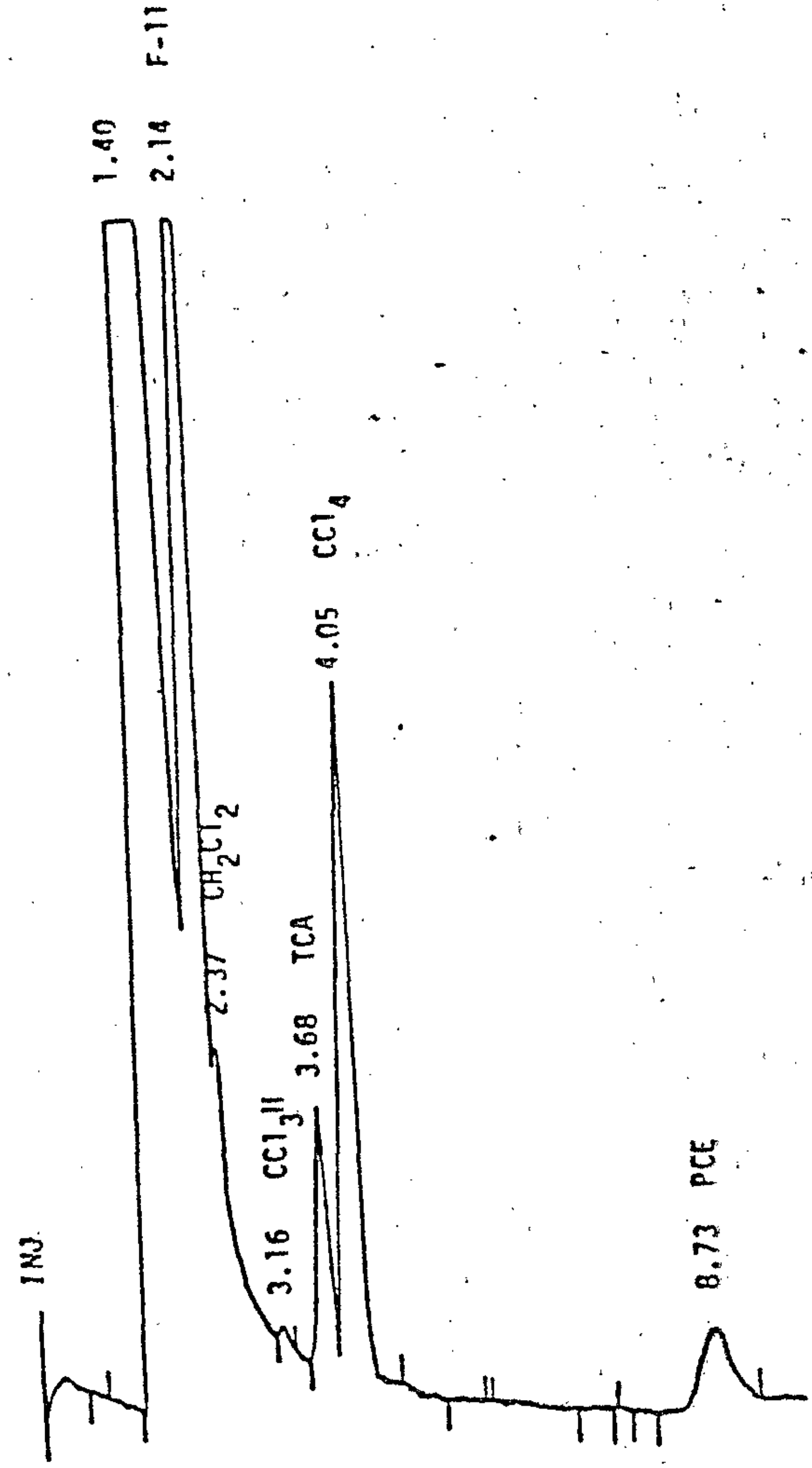


Figure 5. 2 cc air above ground, 2/2/83, Carranza property.

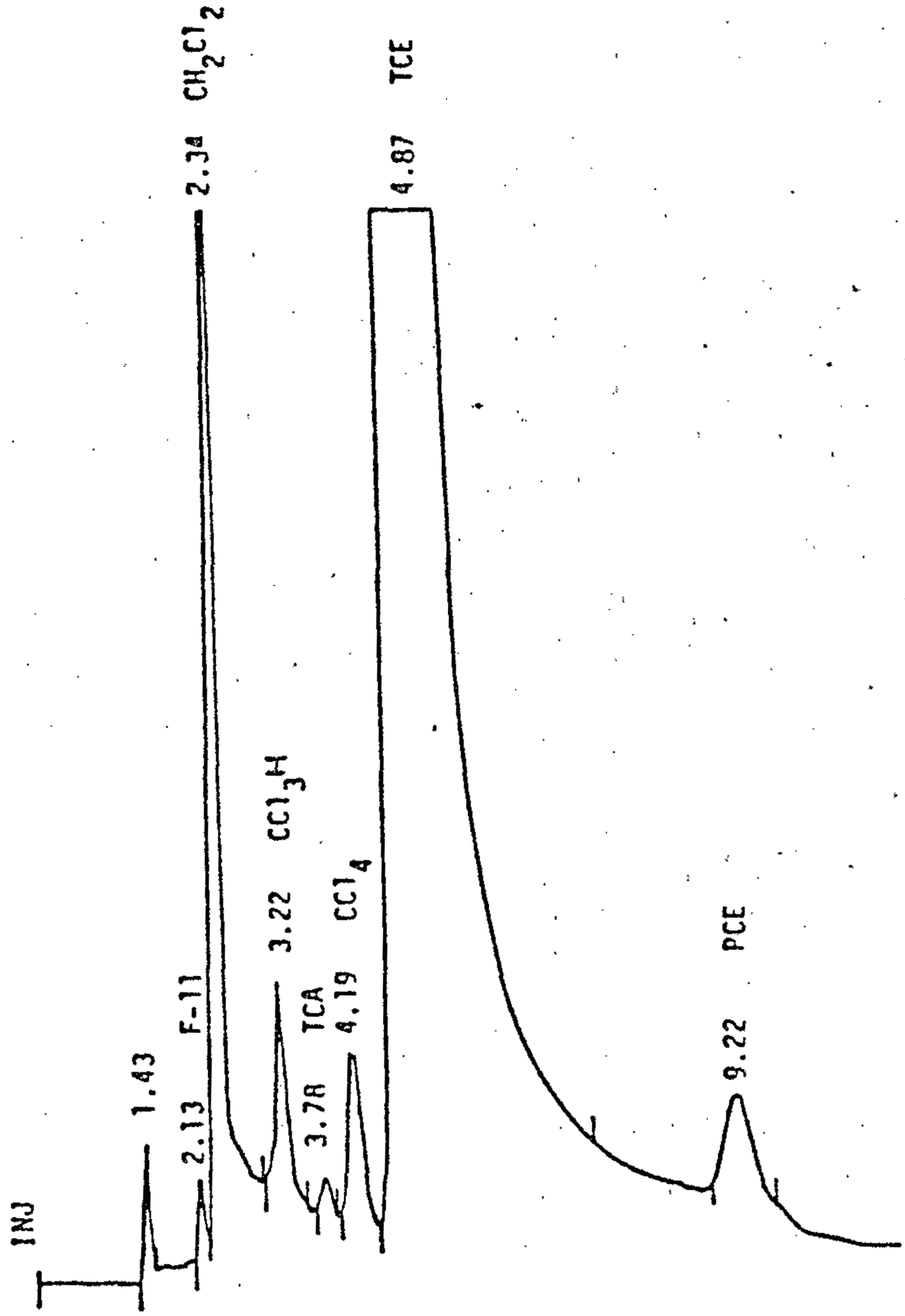


Figure 6. 5 µL water from Carranza well, 3/7/83.

RESULTS AND DISCUSSION

Seven compounds were identified in the soil gas and in groundwater. These were:

trichlorofluoromethane (F-11)
methylene chloride (CH_2Cl_2)
chloroform (CCl_3H)
1,1,1 trichloroethane (TCA)
carbon tetrachloride (CCl_4)
trichloroethylene (TCE)
perchloroethylene (PCE)

The approximate depth and concentration observed for these compounds in the soil gas and in the groundwater are given in Table 1.

In the case of CCl_3H, CCl_4, TCE and PCE, the concentration increased with depth down to the water table. For F-11, TCA, and CH_2Cl_2, the reverse trend was observed, the soil-gas concentration was greatest near the surface. The contamir concentration from two samples of groundwater is provided in Table 1. The first sample "water table surface" is water that was bailed from the first water to flow into the auger hole. The Carranza well is a domestic well (about 300 ft away) that intercepts approximately the upper six ft of the water table. Both samples are included for comparison. The "Carranza sample" is probably a better representative of the local water but the "water table" sample is probably a better sample for comparing relative concentrations of contaminants across the surface of the water table, i.e., the air-water partitioning coefficient undergr

The data are most easily interpretable for TCE because the groundwater concentration is high enough to produce a strong gradient from the water table to the ground surface. There is no TCE in the atmosphere (free air) and the source is clearly from the groundwater. The partitioning coefficient, K_w

TABLE 1. Concentration data for atmospheric and subsurface halocarbons at the Carranza property, 7019 South 6th Avenue, Tucson, Arizona, February 2, 1983.

		F-11	CH_2Cl_2	CCl_3H	TCA	CCl_4	TCE	PCE
AIR ABOVE GROUND[a]		0.004	0.005	-	0.01	0.01	-	0.00
SOIL MATERIAL	SOIL GAS							
SILT, SAND GRAVEL	10 ft	0.007	1	0.007	0.02	0.008	0.006	0.01
	25 ft	0.006	0.2	0.009	0.01	0.009	0.02	0.04
	50 ft	0.005	0.1	0.03	0.001	0.09	0.03	1
CLAY								
SAND SILT CLAY	90 ft	0.004	0.08	0.3	0.001	2	9	5
WATER TABLE SURFACE[b]	100 ft	0.003	2	1	-	0.1	142	0.0
CARRANZA WELL	100 - 106 ft	0.009	6	1	0.1	0.2	558	0.2

[a] Concentrations expressed in µg/L gas ± 20% (one standard deviation).

[b] Concentrations expressed in µg/L water ± 20%.

(K_w = $\frac{\text{gas phase concentration}}{\text{aqueous concentration}}$), observed for TCE across the water-table surface is approximately 0.06. The equilibrium K_w measured in the laboratory in a sealed vessel containing only water and air is approximately 0.25. A lower K_w value would be expected in the field because of the problem of transporting the solute by diffusion through the aquifer material to the water-table surface where the gas-phase concentration is established. Thus equilibrium is probably never achieved, assuming that diffusion and escape through the unsaturated sediment is too rapid to allow the soil-gas concentrations to reach equilibrium above the water-table surface.

The other compounds that showed increasing concentration with depth in the unsaturated zone, chloroform, carbon tetrachloride, and PCE also appear to have a subsurface source. However, in these cases the groundwater concentration at the site appears not high enough to be the principal source for most of the gas observed in the soil. Lateral diffusion from a nearby higher contamina ion source is a more plausible explanation. Clearly, a horizontal gradient wou d have to be measured to determine if lateral diffusion was a principal facto in producing the gas concentrations observed. An influx of contaminated runof int the subsurface from a nearby wash might also be a plausible explanation for he lower level contaminants observed at this site.

The F-11, TC4, and the methylene chloride showed decreasing concentrations with depth indicating an atmospheric source, yet the subsurface concentrations were higher than the concentrations in the atmosphere. This seemingly paradoxi situation occurs quite commonly for atmospheric halocarbons in the subsurface, often making their concentration in groundwater near recharge areas several tim higher than would be expected for water in equilibrium with the atmosphere from which they are derived. This phenomena has been demonstrated by Russell and

Thompson (1983) to occur naturally as a result of sorption-desorption mechanism occurring in the three phase soil-water-air system. Even though the natural processes can be responsible for anomalously high halocarbon concentrations in groundwater, this mechanism should be invoked with caution in areas where subsurface dumping of contaminants has occurred.

CONCLUSIONS

In every case where halocarbons could be measured in the soil gas, they were detectable in the groundwater. In the case of TCE which showed high concentration in the groundwater, the soil-gas component appeared to be derived from the contaminated groundwater immediately below the sampling site. The groundwater appears to be the source because the concentration ratio measu between the soil gas and the water-table surface corresponded reasonably well to our expectations which are based on laboratory measurements of the gas/liqu partitioning coefficient, K_w.

For chloroform, carbon tetrachloride, and PCE, a subsurface source appear likely because the highest concentrations were measured near the water table but the groundwater immediately below the gas sampling location appears to be too low to be the main contributor of contaminants to the soil gas. Lateral movement in the gas phase from a nearby source could have produced the profile observed. More sampling locations along a horizontal transect would be needed to verify this hypothesis.

The ease of collecting soil-gas samples coupled with sensitivity of the measurement technique indicates that the gas sampling method will be useful in contaminant investigations. The method may provide a rapid survey techniqu for determining the approximate areal extent of a subsurface contamination problem. If the vertical and horizontal soil-gas profiles can be developed.

considerable information about the source of contamination may also be derived. The soil-gas measurement at the very least could provide a far more effective substitute for conventional "soil sampling" as a technique for locating volatile contaminants in the unsaturated zone.

REFERENCES

Russell, A. D., and G. M. Thompson. 1983. "Mechanisms leasing to enrichment of atmospheric fluorocarbons CCl_3F and CCl_2F_2 in ground water." Water Resou Research, p 57, February.

DEMONSTRATION OF SOIL-GAS SAMPLING AS A TOOL TO AID IN DEFINING THE DISTRIBUTION OF SUBSURFACE CONTAMINATION BY VOLATILE ORGANIC COMPOUNDS

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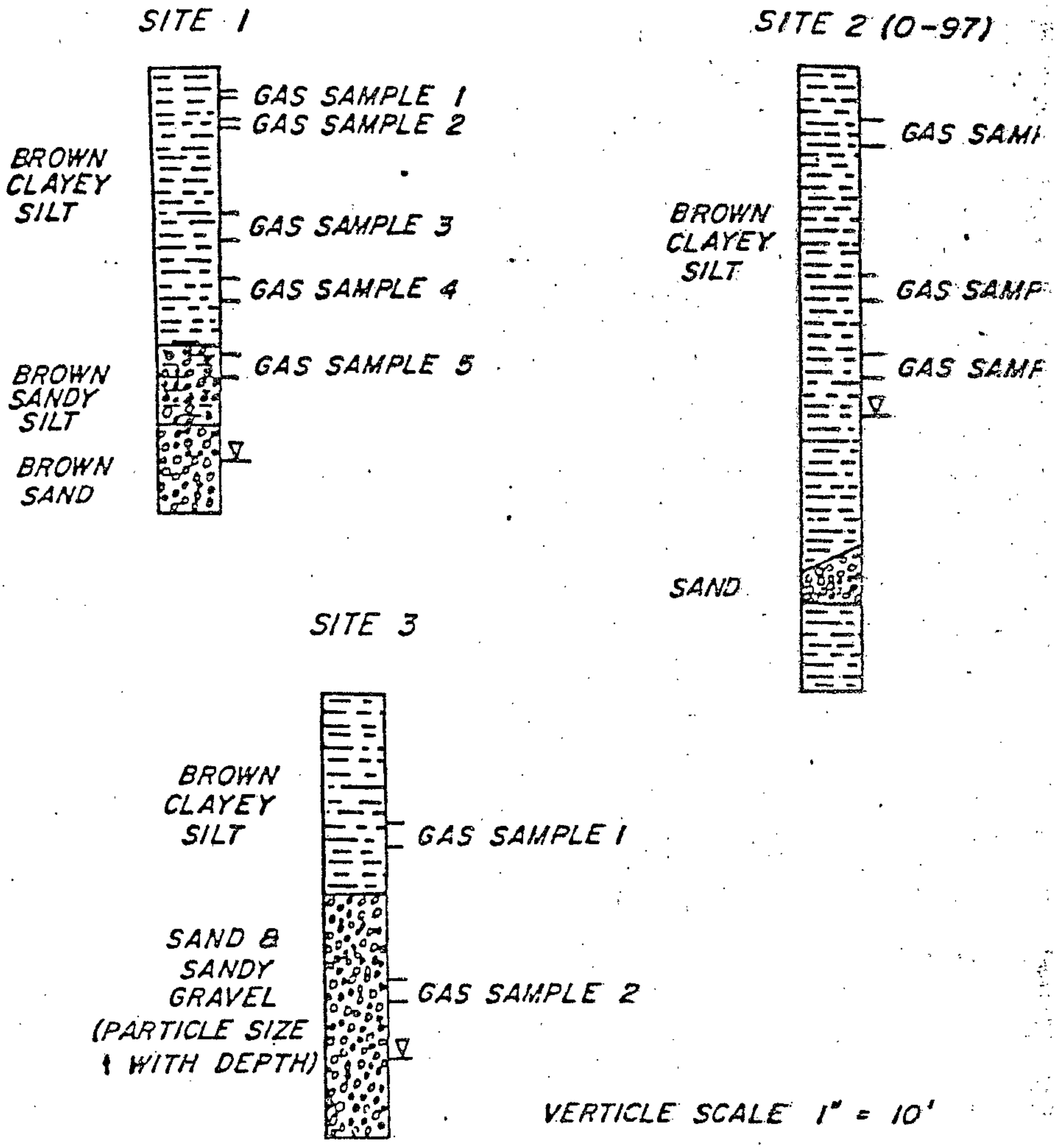

FIGURE 2. Soil Profiles at Sites 1, 2, and 3.

assessing the overall distribution of a contaminant in the subsurface. A transect of such profiles would serve to obtain horizontal directional gra as well.

4) The vertical profiles measured on the second day of this study require 2.5 to 3.0 hrs to drill, collect samples, analyze the samples, and backfil the hole.

5) The shallow soil-gas transect which analyzed soil gas from a depth of 3.0 to 3.5 ft appears to be a viable way of locating subsurface contaminat The technique is particularly useful for TCE because the ambient backgroun of TCE in the atmosphere is virtually not measurable, thus the trace concentration observed in the soil gas arc significant. Soil-gas samples collected at a depth of 10 ft would probably give better correlation of so contamination levels with groundwater contamination levels.

A MONITORING AND REMOVAL PROGRAM FOR LEAKED PROPANE GAS IN THE VADOSE (UNSATURATED) ZONE: A CASE STUDY*

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Geraghty & Miller, Inc., Syosset, New York

The loss of petroleum products through leaking tanks and distribution systems is one of the most common and widespread occurrences of subsurface contamination in the United States. Many of these incidences are spotlighted by the media and draw much public attention. Although many types of product recovery systems have evolved, earth scientists would agree that even the most advanced systems cannot remove all of the product trapped within the soil grains or rock fractures. Problems can occur due to lighter fractions separating from residual product, causing accumulations of vapors in the subsurface. Increased attention is being turned toward the role of gases in the unsaturated zone in incidents of hydrocarbon contamination. The following case history details the techniques used to delineate and remove a body of gaseous hydrocarbons from the unsaturated zone.

Field Investigation

Two leaks from a buried natural gas distribution system resulted in gas plumes under a residential area. The gas, predominantly propane, spread through an unsaturated zone composed of unconsolidated glacial materials and reach the water table where some of the gas dissolved in the ground water. Approximately one and a half years after the discovery and

*Proceedings from The Conference on the Characterization and Monitoring of the Vadose (Unsaturated) Zone: National Water Well Association: December 1983, Las Vegas, Nevada.

repair of the major leak, a subsurface investigation was begun utilizing specialized sampling procedures and protocols to determine the extent and dynamics of the plume in both the saturated and unsaturated zone. The results of the investigation revealed the second leak and were later used to design and implement a gas removal program.

A propane monitoring program in the vadose zone was initiated based on several assumptions; (1) propane has a greater density than air, 1.83 grams at 25°C and one atmosphere, and would migrate downward from the pipeline leak (4 feet below land surface) until it reached the saturated zone, (2) propane with an aqueous solubility of 65 mg/L (Merck, 1960), would dissolve into the ground-water system as the gas plume made contact with the water table, and (3) the remaining undissolved gas would blanket the water table surface. Presumably, propane gas can move in either direction between the saturated and unsaturated zones, depending on the relative concentrations in each zone.

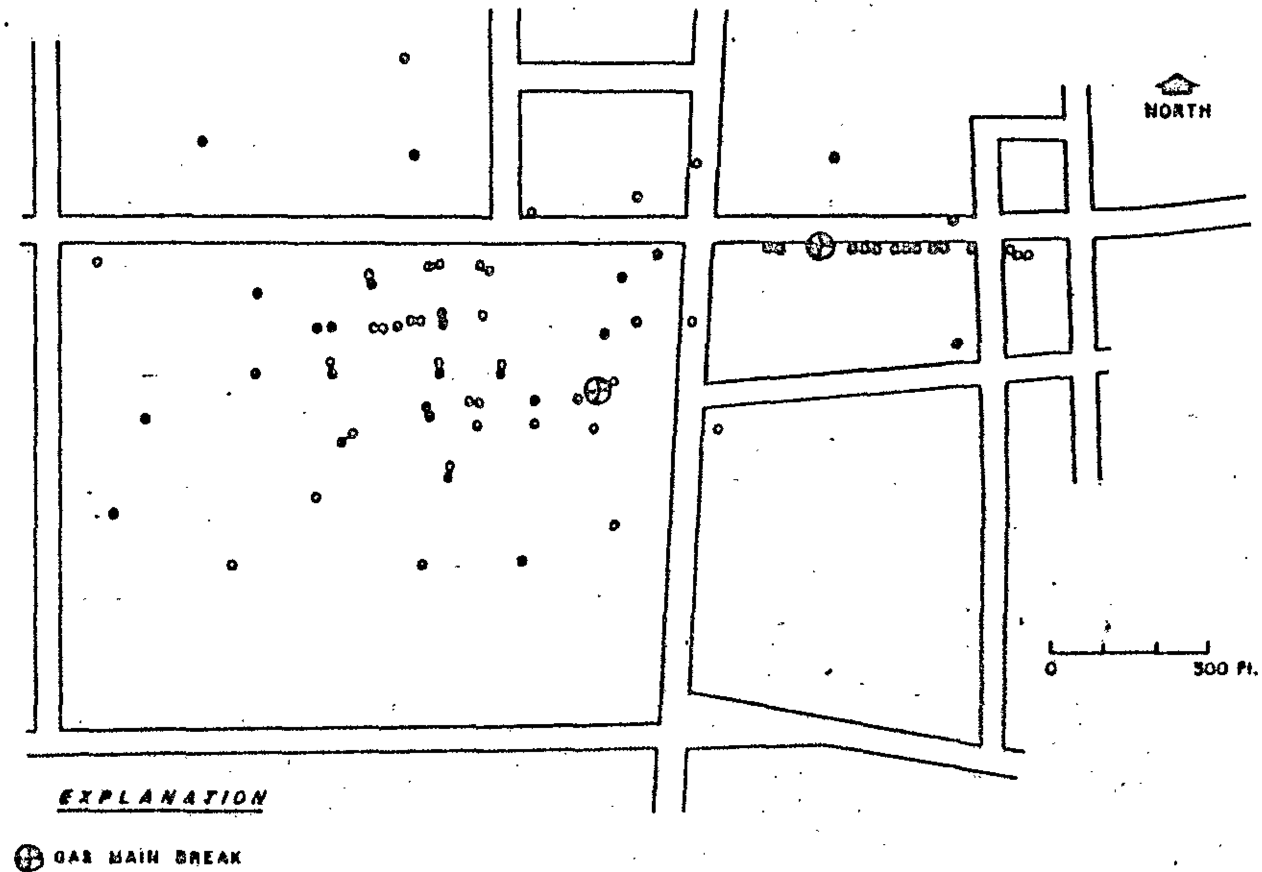
Saturated Zone Investigation

A field investigation of the saturated zone was first undertaken to determine the extent of the dissolved propane in the ground-water system. The ground-water investigation, which continued concurrently with the investigation of the unsaturated zone, included the installation of monitoring wells designed to provide (1) geologic information, (2) ground-water samples to determine the impact of dissolved propane on the ground-water system and to approximate the location of the gaseous propane (undissolved) within the unsaturated zone, and (3) water levels to determine local hydraulic gradients and general direction of ground-water flow. Gas chromatographic analyses of ground-water samples collected from the monitoring wells indicated the general extent of propane contamination in the saturated zone. These results in turn provided the rationale for the location and design of gas monitoring wells in the unsaturated zone.

Unsaturated Zone Investigation

The investigation in the vadose zone began with the installation of 20 small-diameter wells screened directly above the water table. After samples of the soil atmosphere (soil-air samples) were collected and analyzed, it was apparent that additional monitoring points would be required to further define the extent of gaseous propane in the subsurface. Figure 1 shows the location of the propane-monitoring wells as well as the location of the gas-main leaks. To monitor the presence of gaseous propane vertically within the soil profile, well clusters (two or more adjacent wells screening successive depths) were installed at some of the locations. The vertical monitoring data was necessary to later maximize the removal of gas during the cleanup phase.

The monitoring wells were installed by the air rotary drilling method and were constructed of 2-inch (I.D.) PVC casing and screen. To install well casings and screens an oversize diameter borehole (6-inch) was first drilled. The drill cuttings were collected at 5-foot intervals and logged for geologic interpretation. Once the desired depths were reached, the well casing and screen was installed. The annular space surrounding the well screen was backfilled with graded sand slightly larger in grain size



LOCATION OF PROPANE MONITORING WELLS

Figure 1

than the screen openings (0.02 inches) to prevent fine soil particles from entering the well. The space directly above the screened interval was filled with bentonite clay and cement to seal the well and prevent surface runoff from entering.

One quarter-inch (I.D.) tubing was installed in each well which extended downward into the well screen approximately two-thirds the distance from ground surface to the water table. The tubing protruded through an air-tight well cap at ground surface and was used for collection of soil-air with vacuum equipment.

During early phases of the field investigation, it was necessary to have real-time analyses of hydrocarbon content in soil gases. The immediate results helped to guide the drilling program, and allowed us to establish a protocol for gas sampling once the wells were in place.

The two instruments used for this work were an organic vapor analyzer (OVA) and an explosimeter. The OVA is a portable instrument that can measure hydrocarbons in air in the range of 0.2-1,000 parts per million (vol./vol.). The explosimeter is less sensitive; it measures gas as a percentage of the lower explosive limit (LEL) and percent by volume. The explosive limit of propane is 2.37 to 9.5 percent by volume in air (Merck, 1960).

Monitoring wells and borings to be sampled were left closed and undisturbed for at least 24 hours. At the time of sampling, a diaphragm pump or peristaltic pump was connected to the 1/4-inch (I.D.) polyethylene tubing that is permanently in place and extends downward to the sampling zone.

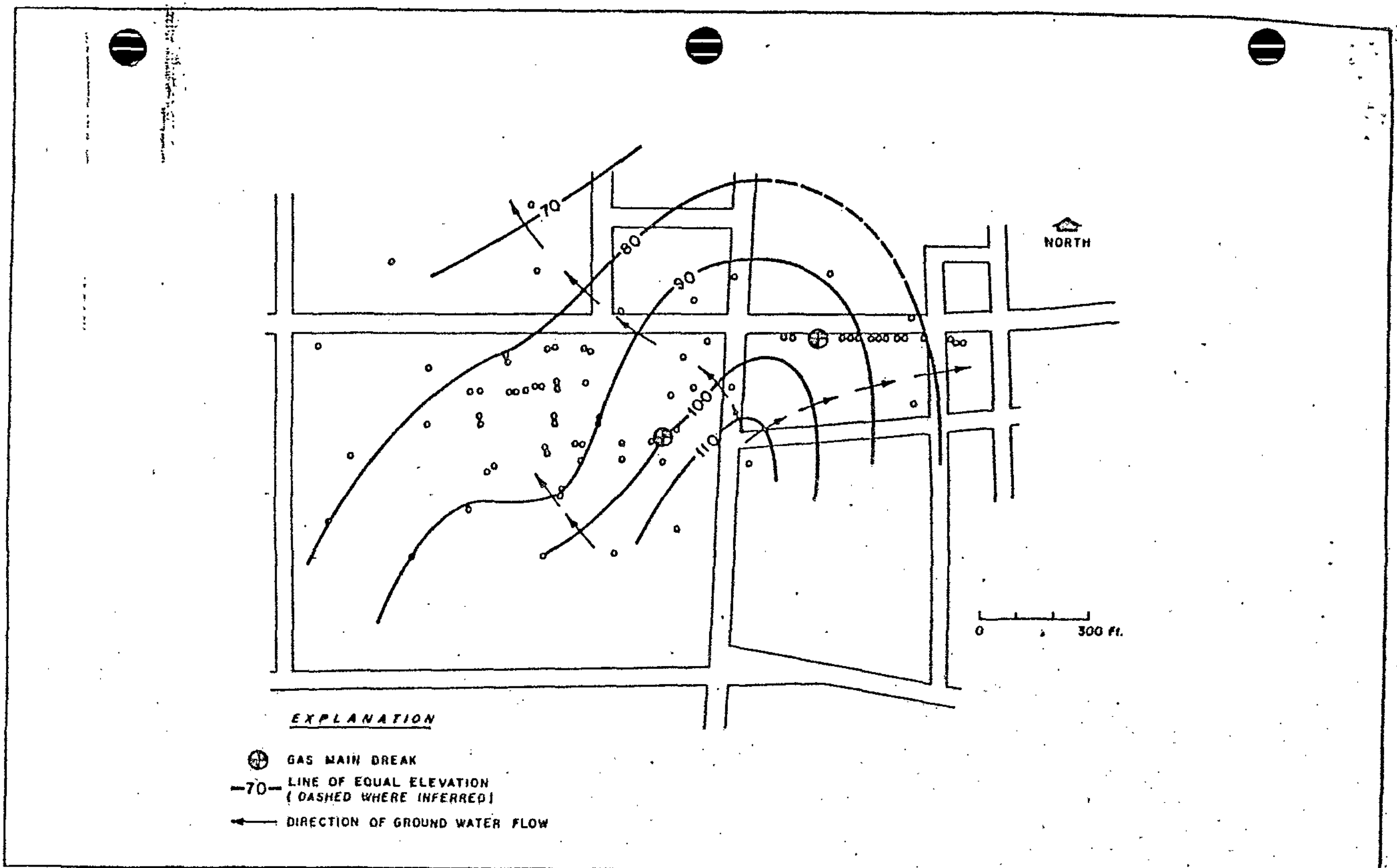
Field experiments with the OVA showed that a constant hydrocarbon reading occurred after five minutes of pumping at approximately one liter per minute. Subsequently, all routine samples were taken into air bags after removal of several liters of gas. The pump was disconnected after sampling and allowed to flush with fre air.

Results of the Hydrogeologic Investigation and Soil-Air Sampling Program

The study area is underlain by 50 to 100 feet of unconsolidated glacial material, consisting of till with occasional stratified and unstratified silts, sands, and gravels. These deposits are underlain by crystalline bedrock.

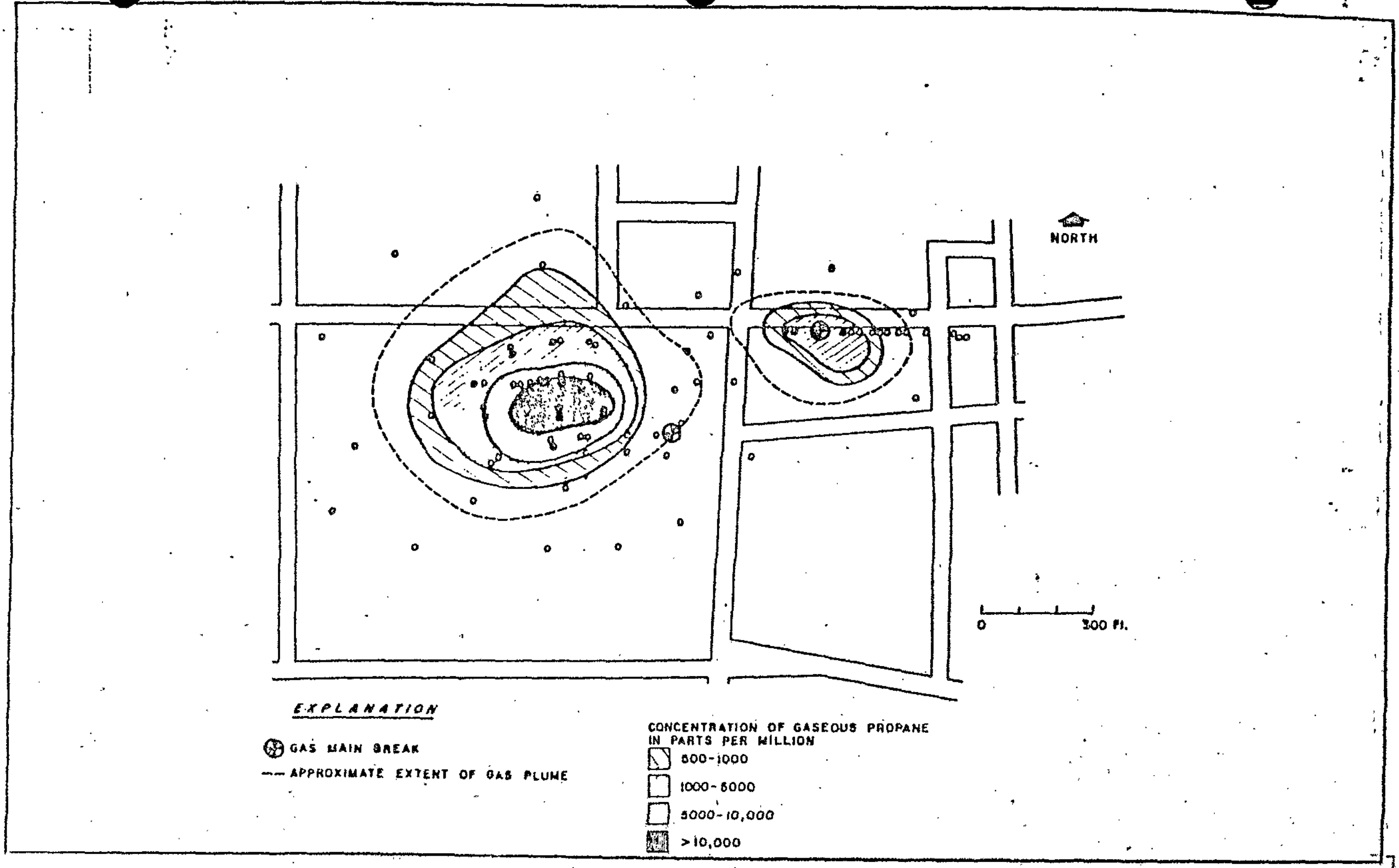
The water table occurs within the unconsolidated deposits at depths ranging from 20 to 30 feet below land surface. The surface of the water table slopes northward and eastward, generally conforming to the topography of the area (Figure 2). Ground water in the water-table zone moves in a northern and eastern direction.

The results of propane analyses in soil-air samples from the vadose zone are shown in Figure 3. Propane plumes resulted from gas main breaks at the two locations shown. This figure shows propane concentrations of samples drawn from wells that are screened in the middle and lower part of the unsaturated zone (15-30 feet). Concentration contour lines have been superimposed on the study area.



WATER TABLE CONTOURS
(Feet above mean sea level)

Figure 2



CONCENTRATION OF PROPANE IN THE MIDDLE TO LOWER UNSATURATED ZONE (15'–30')
(BEFORE GAS REMOVAL OPERATIONS)

Figure 3

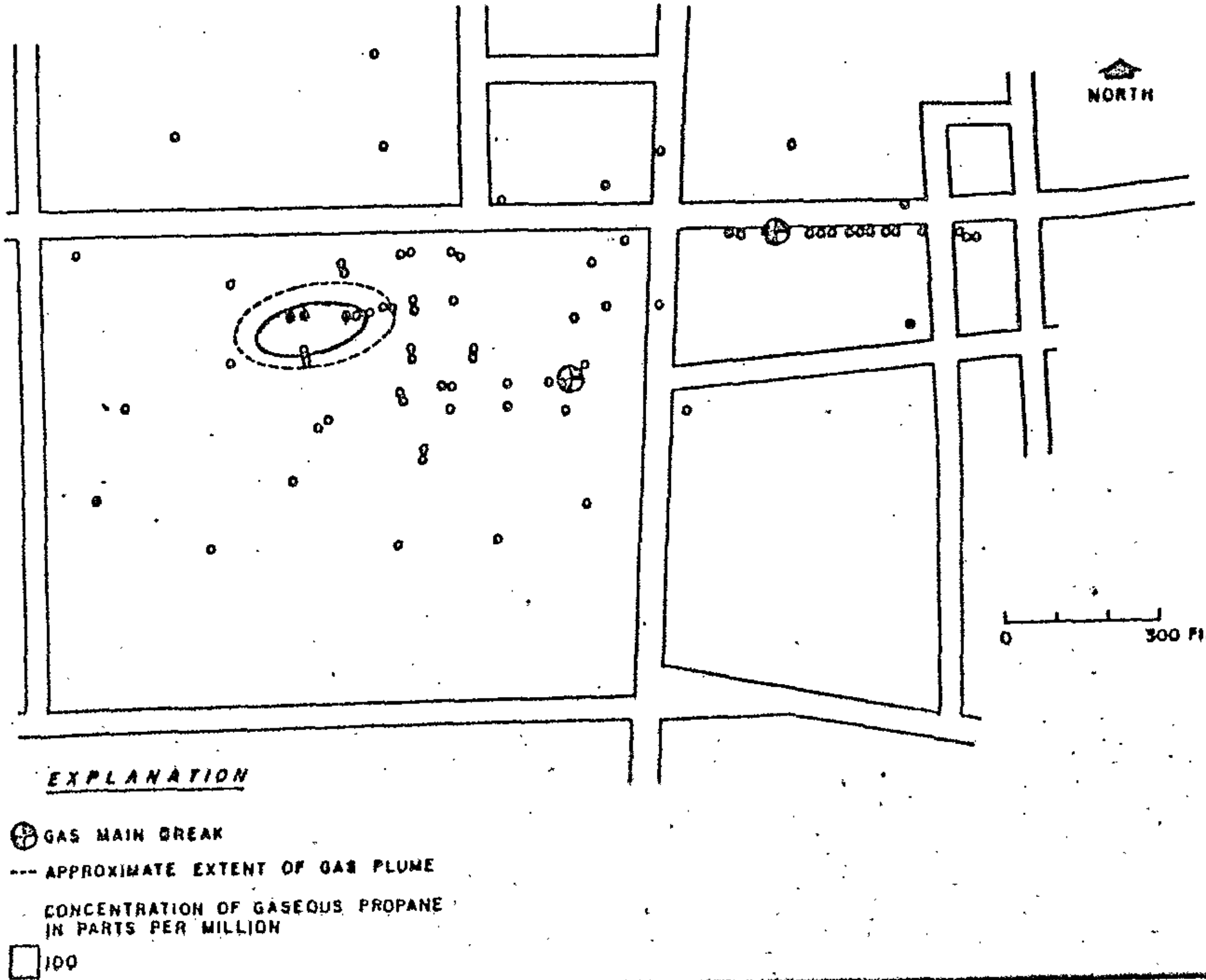
Propane concentrations in soil-air samples collected from wells screening the upper to middle unsaturated zone during the same time are shown on Figure 4. Comparison of Figure 3 and Figure 4 shows that the propane in soil-air is predominantly in the deeper part of the unsaturated zone.

It was noted that the area of highest concentration of propane (>10,000 ppm (vol./vol.)) in the larger plume was 200 feet north and downgradient from the gas main break indicating that the gas had migrated from the point of origin. Neither dissolved nor gaseous propane was detected in the subsurface at monitoring points upgradient from the known source. It should be noted that the smaller plume is still centered on the second gas main break, indicating that this break occurred more recently and the gas had not yet migrated. In fact, the second gas main leak had remained undetected until our soil-air survey had been completed.

Propane Removal Program

Before a full-scale gas removal system was initiated, several pilot studies were conducted to determine if propane could be removed from the vadose zone, and if so, how effectively. A plan was developed to utilize vacuum through the monitoring wells to evacuate the gas plume.

After researching several recovery methods, such as attaching small vacuum devices (diaphragm and peristaltic pumps) to the wells, the most feasible and effective method appeared to be the use of aspiration devices or eductors. Eductors 'd easily be attached to the wells and moved to



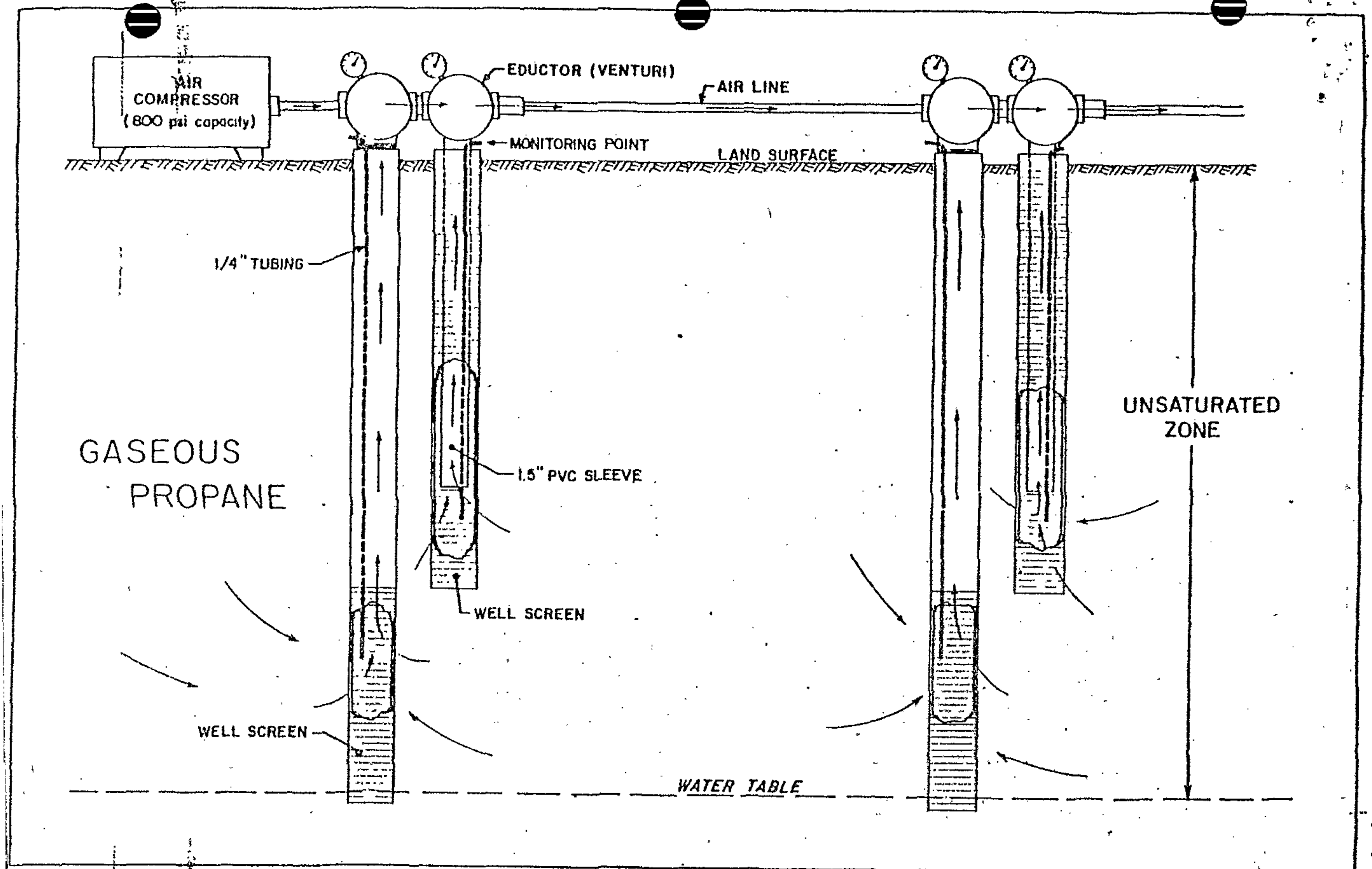
CONCENTRATION OF PROPANE IN THE UPPER TO MIDDLE UNSATURATED ZONE (0'–15')
(BEFORE GAS REMOVAL OPERATIONS)

Figure 4

other wells, if necessary, and several p to 10) could be connected to one air compressor and operated at the s time. Figure 5 shows the propane removal system in a cross-sectional view. Compressed air passing through the venturi produces a vacuum inside the well casing and draws gases out of pore spaces of the unsaturated soils. The gases are evacuated from the ground and discharged into the atmosphere. The high rate of discharge from the air compressor was expected to dilute the propane to concentrations below 5 percent of the LEL.

Pumping tests were conducted to determine the change in propane concentrations over time in the removal wells and in nearby observation wells. The system was alternately pumped for 24 hours and then shut down for 24 hours to allow propane concentrations to reach equilibrium in the well casing. Soil air samples were collected and analyzed by gas chromatography before each pumping cycle began. Results of the pumping test showed a decline to 10 percent of the original propane levels after the first 48-hour cycle. Propane concentrations were observed to rise to 50 to 70 percent of their original levels by the end of the 4th to 6th pumping cycle, then decline after subsequent pumping cycles. Similar trends were observed in observation wells surrounding the pumping wells. This information indicated that the gas plume is highly mobile in the subsurface and that it was possible to remove propane, if only locally, by aspiration.

A full-scale recovery program began with the addition of recovery wells in areas of highest propane concentration. These wells, along with existing monitoring wells within the plume, were fitted with venturi de-



CROSS-SECTIONAL VIEW OF PROPANE REMOVAL SYSTEM

Figure 5

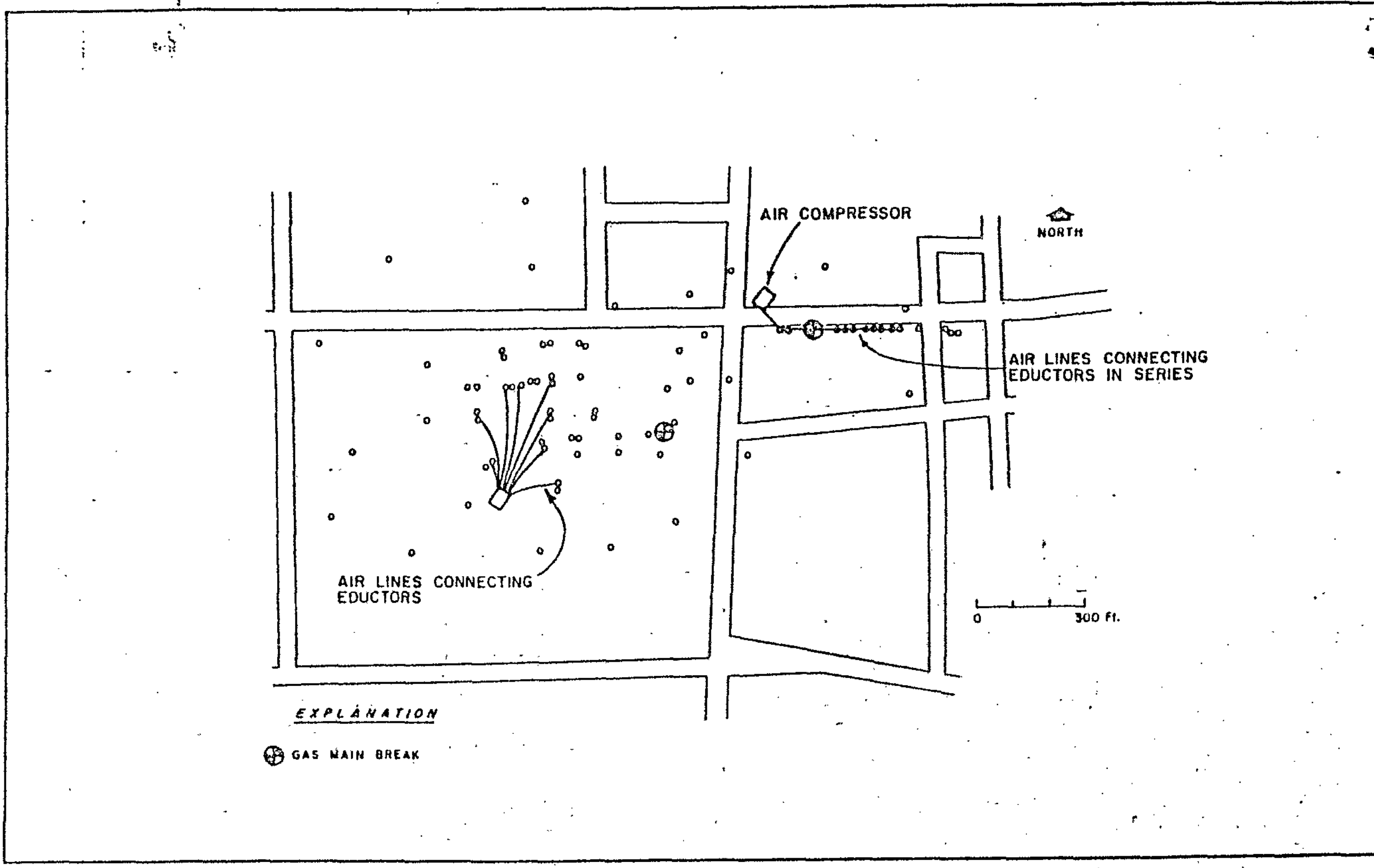
vices and connected in series or independently to a single air compressor. Figure 6 shows the airline cc figuration. Pressures of 50 to 90 pounds per square inch were maintained ch well head causing the pressure in the well casing to decline to ap..oximately 8 atmospheres. The system was operated 12 hours per day for 6 days a week and was allowed to recover for 48 to 72 hours every two weeks so that a round of soil-air samples could be collected and analyzed to monitor removal progress. The results of these analyses indicated that the recovery system decreased the overall concentration of propane in the subsurface. After three months of aspiration, concentrations were reduced to trace amounts.

Summary and Conclusions

The tested propane gas which is heavier than air, traveled downward through the unsaturated zone until reaching the water table. A portion of the gas dissolved into the saturated zone but the bulk of the remaining gas blanketed the lower portion of the vadose zone 15-30 feet below land surface.

The major gas plume traveled 200 feet downgradient from the gas main break between the time the leak was repaired and the subsurface investigation began (approximately 1-1/2 years). A smaller gas plume was discovered near a second gas main break which had remained undetected until the time of the subsurface investigation.

The results of a study to determine the extent of propane in the saturated zone were helpful in "fingerprinting" the extent and location of the



TYPICAL AIR LINE CONFIGURATIONS USED DURING THE PROPANE REMOVAL PROGRAM **Figure 6** gas plume in the unsaturated zone and formed the basis for the design and location of gas removal wells.

Pilot testing of specialized gas sampling methods and protocols was carried out to insure that soil-gas samples were representative of actual conditions in the unsaturated zone and that consistent and reproducible analytical results were obtained.

As a safety precaution it was necessary to continuously monitor propane in the atmosphere during all phases of the field investigation and cleanup operation. Several explosimeters and organic vapor analyzers were helpful in this regard.

Reference

Merck & Company, Inc., 1960; The Merck Index of Chemicals and Drugs, pp. 859.

TABLE OF CONTENTS

ABSTRACT

A study was undertaken to demonstrate the value of soil-gas measurements as an aid to determining the overall distribution of volatile contaminants in the subsurface. The study entailed three soil borings from the land surface down to a depth of a few feet below the water table and one transect of shallow (3.5 ft deep) soil-gas samples collected across a known plume of TCE in the groundwater. In the borings, soil gas and soil samples were collected a various intervals down to the water. Water samples were collected at the top of the water table. Depth to water in all four areas ranged from 25 ft to 30 ft. Two borings were over areas of known contaminat by CH_2Cl_2, F-113, TCA, TCE, and PCE. One boring was in a control area of no known contamination. In both borings over the contaminated areas, contamina from all the chemicals could be detected in the three ft to five ft depth range, and all concentrations increased down to the water table. At the cor area, only traces of the contaminants were detected in the soil gas and wate and no trends or gradients were evident. The trace amounts may in part have been due to equipment contamination from measurements at the previous two sites. Samples at the shallow soil-gas transect were collected through 1/2- steel pipes driven into the ground by hand. TCE was detected in the soil ga at all sites above the plume and not detected in the uncontaminated areas or both sides of the plume. All measurements were made in the field by gas chromatography. The equipment is capable of measuring two samples of air o water every eight minutes. The detection limits for most contaminants is about 0.001 µg/L in air and 0.1 µL/L in water.

In conclusion the soil-gas sampling coupled with the rapid field analysis appears to have good potential as a tool to aid in rapidly defining the distribution of subsurface contamination by volatile organic compounds.

INTRODUCTION

The purpose of this work is to demonstrate the value of soil-gas measurements in studies of subsurface contamination by volatile organic contaminants. Virtually all industrial chemicals used as solvents that have become groundwater contaminants are present to varying degrees in the soil gas as well as in the groundwater by virtue of their high vapor pressure and low aqueous solubility. Measurement of the contaminants in the soil gas provides information about the overall subsurface distribution that is normally overlooked in most contaminant investigations. In additio the soil-gas sampling technique is normally faster than groundwater samplin because soil gas is normally more accessable than the groundwater itself. Consequently, soil-gas sampling may function as a remote sensing technique to delineate groundwater contamination.

In this work, four sites were investigated on the Plant property. At Sites 1 and 2 contaminant profiles were measured in the soil gas down throu the unsaturated zone to, and including, the groundwater. The purpose of the study at these sites was to show the relationship or the distribution of the contaminants between the soil gas and the groundwater in areas of known groundwater contamination. The third site at a location upgradient from the contamination was selected as a control to show soil-gas distribution at an uncontaminated site. The fourth site consisted of a transect of shallow (3.5 ft deep) soil-gas samples collected across a small plume of TCE contaminated groundwater. This site was selected to test the ability of the method to locate contaminated groundwater by means of shallow soil-gas measurements. The results of the investigation at each site are discussed individually in the following sections. The investigation at Site 1 was performed on June 23, 1983. The investigations at Sites 2, 3, and 4 were performed on the following day, June 24, 1983.

SAMPLING PROCEDURE

Gas samples from Sites 1, 2, and 3 were collected through a drive-poi screen attached to 1-1/4 inch pipe. A bore hole was advanced to the desir depth with a hollow flight auger. A soil sample was collected with a spli spoon driven approximately 18 inches through the open end of the auger int undisturbed soil. After withdrawing the split spoon, a hole approximately 1-1/2 inches in diameter remained. The drive point was inserted into the hole left by the split spoon and the auger was reversed to drop the cuttin above the top of the drive-point screen. The cuttings were tamped down making a seal of 6 to 12 inches of packed soil above the screen. A glass flow-through sample bottle having a valve at each end and a septum seal fo syringe access was placed in line between the 1-1/4 inch soil-gas pipe and a vacuum pump used to withdraw soil gas. Soil gas was pumped for two minu then the glass sample bottle was sealed and removed from the line for imme analysis in the field.

Water samples were collected from the same bore holes by lowering a b through the hollow stem of the auger immediately after the auger intercept water. The water samples were bottled, then analyzed in the field.

The shallow soil-gas samples collected in the transect along the park lot at Building 10 were collected through small pipes (1/2 inch X 4 feet) into the ground by hand. Soil gas was pumped from the pipe by means of a peristaltic pump for a period of 30 seconds. The soil gas was sampled fro the pump line directly with a glass syringe and injected into the gas chro in the field. The field analytical equipment was capable of measuring two of air or water every eight minutes. The detection limit for all of the compounds measured except CH_2Cl_2 were 0.001 μg/L in air and 0.1 μg/L in water. The detection limits for CH_2Cl_2 were 0.01 μg/L and 1.0 μg/L in ai and water, respectively.

RESULTS AND DISCUSSION

SITE 1

The results from all of the analyses at Site 1 are given in Table 1 The confidence intervals shown represent one standard deviation. In the of the above-ground air samples, the large standard deviation is due to fact that some of the samples were collected in the morning and some in late afternoon. The large deviations represent changes in air quality probably attributable to chemical vapor releases in the surrounding area The highest values were measured in the late afternoon.

The chemical concentrations in the above-ground air are higher than the soil gas of the top few feet. This suggests that the atmospheric ch concentrations presented here are not representative of the long-term av because the atmospheric gases can permeate quite readily through the upp few feet of soil given a time frame of a week or more.

All of the contaminants, without exception, increase in concentrati downward in the soil This distribution demonstrates unequivocally that there is a subsurface source of the chemicals. The depth to the water t at this site was 25 ft. With the exception of TCE, all of the chemical concentrations (mass per unit volume of gas or liquid) are higher in the soil gas than in the groundwater. As an aide to understanding the inte the field data, the behavior or distribution of each chemical in a simp gas-liquid system must be known. This parameter is known as the gas/li distribution coefficient. This coefficient is simply a measure of the

TABLE 1. Chemical Data for Site 1.

SAMPLE	CH_2Cl_2	F-113	TCA	TCE	PCE
Air above Ground (5)[a]	0.7 ± 0.6[b]	0.08 ± 0.07	0.01 ± 0.01	(<0.001)[c]	0.002 ± 0
Soil Gas 2 ft (1)	0.1	0.004	0.003	0.003	0.002
Soil Gas 3.5 ft (1)	3	0.3	0.03	0.01	(<0.001
Soil Gas 11 ft (2)	340 ± 33	33 ± 3	0.6 ± 0.3	0.4 ± 0.3	-
Soil Gas 14 ft (2)	11,000 ± 40	1700 ± 140	11 ± 4	2 ± 0.7	23
Soil Gas 20 ft (2)	12,000 ± 1300	1800 ± 360	13 ± 2	3 ± 0.5	23
Water (5) (Field Meas.)	1500 ± 150	81 ± 26	12 ± 2	16 ± 8	15
Water (HLA Lab Analysis)		95	12	27	

[a] (5) number of samples analyzed.

[b] All analyses expressed as μg/L of gas or liquid, confidence limits are one standard deviation.

[c] Parantheses indicate "none detected".

concentration ratio of the chemical at equilibrium in a closed system containing only water and air. These ratios were measured in this study for the compounds of interest, and are listed in Table 2. The distribution ratio varies with temperature but is independent of concentration at values below the solubility limit for the chemical. This value is generally proportional to aqueous solubility for a nonpolar compound that does not react with water.

Several points can be noted with regard to the contaminant distribution at Site 1:

1) The relative proportions of compounds in the gas phase correspond roughl to predictions based on the gas-liquid partitioning coefficients. The least soluble contaminant, F-113, shows the greatest proportion in the gas phase and the most soluble, TCE, has partitioned the least into the gas phase. Thus aqueous solubility is probably a major factor effecting the gas-liquid distribution of the chemicals observed at Site 1.

2) The soil-gas concentrations are not in equilibrium with the groundwater concentrations, and with the exception of TCE, the gradient favors more transfer from the soil gas to the groundwater.

3) Depending on the depth distribution of contamination below the water table, the proponderance of the CH_2Cl_2 and F-113 is likely to still exist in the soil gas. More groundwater measurements with depth are needed to ver this point.

SITE 2

Soil-gas measurements at Site 2 (depth to water, 23 ft) also showed contaminant concentrations increasing downward into the soil (Table 3). And like at Site 1, indicate a subsurface source for the contaminants. However unlike Site 1, the concentration gradient across the water table soil-gas

TABLE 2. Concentration ratio for contaminants at equilibrium in an air-wat system at 25°C.

COMPOUND	$C_{AIR} : C_{H_2O}$
CH_2Cl_2	2.7 : 1
F-113	4 : 1
TCA	1 : 2
TCE	1 : 3
PCE	1 : 2.3

TABLE 3. Chemical Data for Site 2.

SAMPLE	CH_2CL_2	F-113	TCA	TCE	PCE
Air above Ground (1)	0.1	0.2	(<0.001)	(<0.001)	(<0.001)
Soil Gas 5 ft (4)	1.5 ± 0.8	3.5 ± 0.1	0.14 ± 0.08	0.01 ± 0	0.45 ± 0.2
Soil Gas 15 ft (2)	170 ± 23	71 ± 6	2 ± 1	0.60 ± 0.14	5.0 ± 0
Soil Gas 20 ft (4)	190 ± 100	100 ± 32	4.0 ± 1.8	0.9 ± 0.1	6 ± 6
Water (Field Meas.)	29 ± 5	65 ± 13	120 ± 29	0.6 ± 0.3	0.1 ± 0.1
Water (HLA Lab Analysis)		70	100	0.50	

interface indicates that F-113 and TCA are moving from the water into the soil gas whereas the remainder have the opposite gradient and thus are mov from the soil gas into the water.

The only speculation that might be appropriate from the data at Site is that contaminants may have been introduced into the subsurface at diffe times or places. The distribution of compounds relative to each other is clearly not directly a function of their solubility characteristics as app to be the case at Site 1. If they had all been introduced at once in the same system, the differences in their distribution should vary more predic as a function of their physical properties. However, at Site 2 the distri cannot be so simply explained suggesting that other variables, both tempor or spatial, may be involved. More groundwater samples will have to be collected at depth to determine if the major mass of contamination is abov or below the water at Site 2.

SITE 3

Site 3 (depth to water, 24 ft) is located at a point upgradient from the contamination at the Plant. The purpose of the investigation at this site was to show what the soil-gas data looked like in an area where there was no contamination. The results are given in Table 4. Only two gas sam were analyzed from this site because one or two attempts to collect gas fa due to clogging of the drive-point screen in the soil.

The results show only traces of contaminants and no trends or gradier are evident. In fact the trace levels of chemicals observed at this Site probably represent carryover or equipment contamination from the samples measured at the previous site where relatively high level contamination e› Only three gas bottles were on hand and each one had to be reused at each

TABLE 4. Chemical Data for Site 3.

SAMPLE	CH_2Cl_2	F-113	TCA	TCE	PCE
Air above Ground (1)	0.1	0.004	0.003	(<0.001)	0.0[illegible]
Soil Gas 10 ft (1)	0.02	0.04	0.003	0.001	0.0[illegible]
Soil Gas 25 ft (2)	0.09 ± 0.01	0.01 ± 0.01	0.001 ± 0	0.001 ± 0.001	0.005 ± [illegible]
Water (1) (Field Meas.)	(<1.0)	0.3	0.2	(<0.1)	0.[illegible]
Water (HLA Lab Analysis)		ND	ND	ND	

Because this site investigation was started at the end of the last day there was no time to redo samples or make a special effort to clean the glassware or the sampling equipment before making the measurements. However, most of the concentrations observed here are two or more orders of magnitude lower than were observed at the contaminated sites and thus are not likely to crea misleading results on a typical production-oriented day. In order to get positive results near the detection limits, a system employing analysis of known blanks would have been used.

SITE 4

A transect of shallow soil-gas samples were collected at Site 4 across a known TCE plume where the depth to water was 30 ft. The results of all th gas analyses are presented in Table 5. A comparison of the TCE soil-gas data from this study with the groundwater TCE concentrations taken from a previous study are shown in Figure 1. The results show that TCE was detecte every place over the plume, and was not detected over the noncontaminated wa on both sides of the plume. However, the high concentration observed in the soil gas is not located exactly over the peak groundwater contamination area The soil-gas peak and the groundwater high are separated laterally by about 75 ft.

The fact that the soil-gas concentrations are not proportional to the groundwater concentrations is probably due to variations in the air permeability of the shallow soil. The soil at this site was particularly soft, requiring only two or three hammer blows (with a 10 lb sledge) per foo to drive the pipe. The soil at the point where the high concentration was measured was noticeably harder, thus contaminants at this point were probably better protected from dilution by atmospheric air.

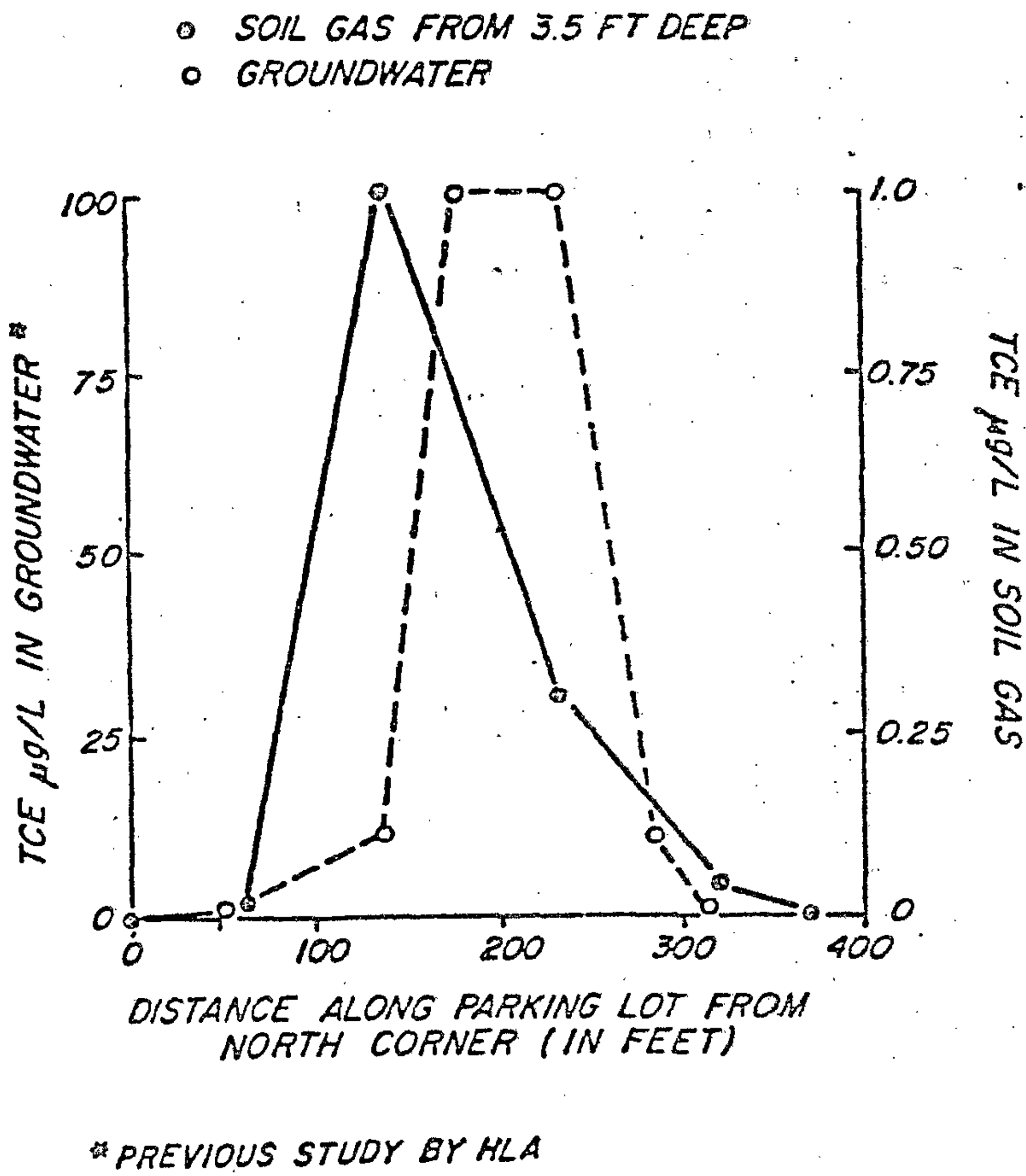


FIGURE 1. Soil-gas transect across TCE plume.

TABLE 5. Shallow soil-gas transect across TCE plume at NE side of the parking lot.

Distance from North Corner of Parking Lot	CH_2Cl_2	F-113	TCA	TCE	PCE
#1 0 ft	0.06	0.006	0.001	(<0.001)	0.001
#2 65 ft*	0.02	0.05	1.0	0.01	0.004
#3 145 ft*	0.04	0.004	0.002	1.0	0.003
#4 236 ft*	0.04	0.01	0.003	0.3	(<0.001)
#5 325 ft*	0.02	0.3	2.0	0.03	0.002
#6 375 ft	(<0.01)	2.0	8.0	(<0.005)	0.04

* Sample location above previously determined TCE plume.

Soil-gas samples in this study were collected over a depth interval c
3.0 to 3.5 ft. In view of the ease of pounding pipe into the ground in th area, any subsequent study should be performed using longer pipe that may more definitive results. Ten ft lengths of pipe could have been used near as easily as the four ft lengths, and probably would have given more accur results. In this study, about 15 minutes was required at each transect location to drive the pipe, collect and analyze two samples, and remove th pipe.

EFFECTS DUE TO SOIL TYPE

As noted previously, soil samples were collected as part of the gas sampling process. The soil samples were examined in hand samples and the observations for each boring are shown in Figure 2. No correlation could be made between the shape of the soil-gas contaminant profile and the prop of the soil.

CONCLUSIONS

The techniques employed in this study or demonstration showed the following points:

1) Subsurface contamination by volatile contaminants produces a concentrat gradient in the soil gas that decreases in a direction away from the major source or body of contamination.

2) All of the groundwater contaminants in this study were detectable and distinguishable from atmospheric levels of the same contaminants at a soil depth of 3 to 5 ft.

3) A vertical profile of contaminant concentrations in the soil gas down through the unsaturated zone and in groundwater through contaminated portion of the aquifer is probably the most sensitive and rapid method of

Original Comments 201-211

Index to Rulemaking File Underground Storage Tank Regulations Title 23, Waters Division 3, Water Resources Control Board Chapter 16, Underground Storage Tank Regulations **1985**

#201

ROSS ANDRESS
1495 LUPINE DRIVE
SANTA ROSA, CA 95401
(707) 545-6689

Janury 18, 1985

Honorable Members, State Water Resources Control Board:

It isn't every day that individual citizens, business operators, and government bodies have the opportunity to interact in the legislative process where the public welfare is at stake.

Recently Assembly Bill 1803 was inacted. AB 1803 requires all water utilities that get their water from under ground sources to submit water samples to approved laboratories for analysis. The laboratories are searching for chemical contamination of all types.

The logic for AB 1803 and the current legislation which requires testing of underground storage tanks is sound and the reasons are easy to understand - LET US SEE WHAT PROBLEMS WE HAVE. Both regulations also address monitoring to protect against further problems.

Of the methods being considered for detection and monitoring leaks in underground storage tanks, one issue has prompted me to speak out. That issue is the difference between the merits of drilling a test hole and inventory control.

I am a homeowner and operate a small business in Sonoma County. Our county recently received the distinction of making the EPA Super Fund list because of diesel fuel being found in the drinking water within a concentrated area of our county. The source is apparently unknown.

Who is monitoring the inventory of what ever tank is leaking ?

We also have gasoline being detected in drinking water in Graton and a creek in Santa Rosa. The same question arises: Who is monitoring the inventory ?

I think every underground tank should be tested. I realize the expense of such tests are not a pittance but all business' have some responsiblity, including mine.

I offer the following sinario: If a gas station owner through inventory monitoring realizes that he or she has a leak of 3 gallons per day, he or she only has to go to a neighboring station and purchase 3 gallons of gas and pour it into their own tank to make up the leakage. At $1.50 per gallon times 3 gallons per day times 365 days a year their annual cost of covering up a leak is $1,642.50. When this amount is weighed against the cost of replacing a leaking tank, clean up of the surrounding area, and legal fees I feel the temptation of cover up is too great.

Let's keep the ball rolling. I urge you on behalf of the people that could not attend today's procedings to take into consideration the above sinario before you make your final and critical determination on this issue.

Sincerely,

Ross Andress

Ross Andress

#202

STATE OF CALIFORNIA Aug - DWQ GEORGE DEUKMEJIAN, *Governor*

DEPARTMENT OF FOOD AND AGRICULTURE

JAN 17 1985

1220 N Street
Sacramento
95814

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Board members
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January 16, 1985

Mr. Michael A. Campos
Executive Director
State Water Resources
Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95801-0100

Dear Mr. Campos

Subject: January 18, 1985 Notice of Intent to Adopt Regulations Governing Underground Storage of Hazardous Substances

The Department of Food and Agriculture appreciates the opportunity to comment on your agency's proposed underground storage tank regulations developed pursuant to AB 1362. A provision of concern to weights and measures officials is found in Article 4, Section 2644(6) which provides in part (Page 4.40):

> "Underground storage tank input meters shall be calibrated within the accuracy required for meters used for wholesale transactions in California. Meters for underground storage tank withdrawals shall be calibrated within the accuracy required for meters used for retail sales transactions in California. Meters shall be approved for use by the county department of weights and measures or by a person licensed by the county department of weights and measures."

The exact scope of this requirement is unclear as to the following areas:

- Restricting storage tank withdrawal meters to the accuracy requirement for retail meters does not take into consideration the use of wholesale meters as an output device. This is very possible if the product in the storage tanks was to be loaded into a truck or trailer, for example.

  To cover this situation, the regulations should be reworded as follows (Page 4.40):

  > Underground storage tank input and withdrawal meters shall comply with the tolerances as set forth in the California Administrative Code, Title 4, Chapter 9, Subchapter 9, "Tolerances and Specifications for Commercial Weighing and Measuring Devices".

° Requiring meters to be approved by the county department of weights and measures is incorrect, if you mean type approval as required by Business and Professions Code, Division 5, Chapter 5. This responsibility is assigned to the Director of Food and Agriculture. Additionally, the county does not license persons to approve (or inspect) meters. The Department does register repairpersons as defined in Business and Professions Code, Division 5, Chapter 5.5. If the intent of this regulation is to have the local weights and measures officials or a registered repairperson inspect all input and withdrawal meters, we suggest the following language modification (Page 4.40):

> Meters shall be inspected by the county department of weights and measures or a device repairman as defined in the California Business and Professions Code, Division 5, Chapter 5.5.

We appreciate the opportunity to comment on your regulations.

Sincerely

Hans Van...

for Clare Berryhill
Director
445-7126

203

TERA

January 18, 1985

Donald G. McEdwards,PhD,P.E.
TERA Corporation
2150 Shattuck Avenue
Berkeley, California 94704

State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, Ca. 95801-0100

Subject: Comments on the December 18, 1984 Draft Tank Regulations

The following brief comment is submitted for your consideration in the adoption of the proposed underground tank regulations.

The sections of interest are two subsections of Section 2641 entitled Monitoring Alternatives (for existing tanks):

2641(c)(3)(A) (monitoring alternative 3)

"...this alternative shall not be approved if first ground water ... has actual or potential beneficial use (domestic, municipal, agricultural, or industrial supply) or is hydraulically connected to ground and surface water which has actual or potential beneficial uses."

and

2441(d)(4)(A) (monitoring alternative 4)

"...this alternative shall not be approved if any of the following conditions exist:

... (ii) The ground water proposed for monitoring has actual or potential uses (domestic, municipal, industrial, or agricultural supply) or is hydraulically connected to ground or surface water which has actual or potential beneficial uses ... "

Comment:

Monitoring alternatives 3 and 4 are false alternatives by virtue of restricting their application to those instances wherein the ground water has no present or future use and wherein it is not connected to ground or surface water that has present or future use. To employ alternatives 3 and 4 the applicant must show to the satifaction of the local agency that the ground water is not now nor ever will be used - for anything "beneficial" - and that it is hydraulically isolated from useable ground and surface water.

We do not belive that local agencies would go on record as agreeing that the ground water in question has no present or future beneficial use, etc. , and that if they should be so inclined, the task of documenting such a case would be prohibitive to the applicant.

In addition, one wonders about the utility and cost effectiveness of monitoring, on a weekly basis, hydraulically isolated ground water having no present or future beneficial use.

We belive that alternatives 3 and 4 would be viable monitoring alternatives if the restrictive language regarding beneficial use is deleted. At present they are not viable options and serve only to falsely lengthen the list of monitoring alternatives.

We hope that these comments will be of use to you and your staff.

Very Truly Yours,

Donald G. McEdwards

Donald G. McEdwards
Senior Project Hydrogeologist

#204

STATEMENT OF ROBERT P. STEARNS, PRESIDENT
SCS ENGINEERS, LONG BEACH, CA

BEFORE THE

CALIFORNIA WATER QUALITY CONTROL BOARD HEARING
ON PROPOSED UNDERGROUND TANK REGULATIONS

January 18, 1985

The following is a statement I planned to personally deliver before the Board this morning. However, airport weather conditions have prevented my timely arrival.

My name is Robert P. Stearns and I am a registered civil engineer and President of SCS Engineers, a Long Beach consulting environmental engineering firm. I have carefully reviewed the proposed Underground Tank Regulations and wish to offer comments regarding vadose zone monitoring as an alternative to permanent groundwater monitoring wells for detecting releases for existing underground tanks. Specifically, I believe vadose zone monitoring can be considered a perferred method for achieving the monitoring objectives stated in Article 2640, Subsection (c), of the proposed regulations, "to detect unauthorized releases <u>before</u> groundwater is affected." I have added the emphasis.

SCS Engineers, since its founding in 1970, has performed vadose zone monitoring for gaseous hydrocarbons emanating from several hundred former organic waste disposal sites and sanitary landfills throughout California and the country.

In most instances, these monitorings were performed in response to federal RCRA requirements for classifying such land disposal sites as either "open dumps" or sanitary landfills. RCRA requirements are, simply stated, that methane (a common hydrocarbon) concentrations in the subsoil at the waste disposal site property line may not exceed 5% by volume (the lower explosive limit for methane in air).

Federal and state guidelines for evaluating a disposal sites' conformance with the classification criteria called for installation of subsurface monitoring probes installed in the vadose zone on and adjacent to the disposal site property boundary. Many confirmed instances exist for subsurface migration of landfill gas (LFG) several hundred feet laterally from such disposal sites through a wide range of soil conditions.

The subsurface monitoring probes are relatively simple and inexpensive to install. They involve a small diameter (1/2 to 1-inch diameter) perforated PVC pipe either placed in a drilled bore hole or in some cases installed with a manual device. The latter device, sometimes referred to as a "bar punch", is used to provide a small diameter (typically 1-2 inch diameter) hole in the surface of the ground to a depth of perhaps 2 to 2-1/2 feet for monitoring purposes.

Using the latter method, a portable instrument is used to test for the presence of hydrocarbons in the soil. This method is routinely used by our gas utility companies to determine if there are subsurface leaks of hydrocarbons from utility gas pipelines.

Considering the potential life-threatening fire and explosive hazards associated with leaking underground utility pipelines (which are under pressure), and the similar hazards posed by migrating LFG, confirmation of subsurface movements of hydrocarbons and suitability of vadose monitoring for gaseous hydrocarbons should not be in question.

There are several instrument manufacturers who supply instrumentation for semi-permanent installation at the site location (in this case, at a location of underground storage tanks), that will intermittently or continuously monitor for hydrocarbon and other gases in the vadose zone. I believe these techniques can provide us with the earliest possible warning of a leak from underground tanks.

In gaseous form, all gases diffuse in all directions towards zones of lower concentration. Laws of physics tell us that if I were to release a small capsule containing a gaseous hydrocarbon in the hearing room, and if the room were perfectly sealed, within a finite period of time, those hydrocarbons would be uniformly distributed throughout the entire room. The same laws govern dispersion of gases released into underground soils from a leaking tank, as the liquid volatilizes.

Combined with sensitive instruments, a very small quantity of volatile liquid discharged to the vadose zone (for our example from an underground tank), would quickly distribute to a fairly large area around the tank location. Considering a fairly small leak, the instruments should identify the presence of this material in the soil long before the material in liquid form would reach the ground water table, and find its way to a ground water monitoring well.

Contrast this approach to the apparent emphasis Alternative Monitoring Methods 2 and 4 contained in Table 4.1 of the proposed regulations. These rely upon measured levels of the contaminant reaching the ground water, then migrating with ground water to a discrete monitoring well point for subsequent sampling and collection for laboratory analysis.

There are the difficulties with placing monitoring wells appropriately to intercept ground water containing the contaminant.

I am reminded of a project my firm performed for the U.S. Environmental Protection Agency in the mid-1970's, the purpose of which was to leachate and monitor leachate plumes from landfills known to be leaching contaminants into the ground water. We installed many monitoring wells, the locations and depths of which were selected to reflect recommendations of competent hydrogeologists.

I can assure you that that experience taught me a important lesson, selecting the proper location of a monitoring well to intercept a plume of contaminants is not an easy task. When I compare intercepting the plume from a landfill which may cover an area of many acres with a plume from a single underground tank or a group of tanks, I get concerned about our ability to properly locate 1 or 2 monitoring wells and to rely on those wells to warn us of a contamination problem. Vadose zone monitoring can identify the problem long before ground water is affected.

I mentioned the inexpensive cost of installing monitoring probes in the vadose zone. Installing a properly designed ground water monitoring well could range from $50 to $70 per foot or installed depth. Actual placement of the monitoring wells could require several exploratory borings to identify groundwater depth and gradient, and subsurface soil conditions. We typically install subsurface vadose zone monitoring probes for from $2 to $4 per foot. Obviously you can install many vadose zone monitoring probes for the same investment as one would make in a single ground water monitoring well. The more sampling points provides an improved monitoring system.

This will allow us to be more certain that the smallest leak from our underground tanks will be detected that much earlier for remedial action. Identification would occur long before any of the material had a chance to reach ground water and at a much cheaper cost to the owner. Thus, I believe vadose zone monitoring should be emphasized with a corresponding de-emphasis on ground water monitoring in the regulations.

Specifically, and again referring to Table 4.1, I urge the Board to consider the following changes:

- Monitoring Alternative 2 and 4 - Utilize vadose zone monitoring techniques rather than ground water monitoring to accomplish the stated objectives of the monitoring program.

- Alternative 5 - Add a requirement for vadose zone monitoring to this alternative.

A final comment regarding the numerous ground water monitoring wells which appear to be mandated by the proposed regulations. I am concerned with the management of the integrity and sealing of abandoned monitoring wells. Soil has excellent cleansing properties. Our surface waters, are purified by filtering thru soils and mingle with ground water. Numerous monitoring wells open a pathway from the surface directly to groundwater. I am concerned about the number of wells that may not be properly installed, or adequately sealed at the surface to prevent direct movement of contaminants from the surface to the ground water.

With time, many monitoring wells will be abandoned. There will be administrative costs associated with proper closure. Can we be assurred that all these monitoring wells will be properly sealed when they are no longer needed?

Thank you for consideration of my comments.

#205

KAEMPEN TECHNOLOGY, INC.

3202 LARKSTONE DRIVE • ORANGE, CALIFORNIA 92669 • (714) 532-5787

Jan. 5, 1985

Mr. Harold Singer
State Water Resources Control Board
Division of WAter Quality
P.O. Box 100
Sacramento, Calif. 95801 - 0100

Received DTS
JAN 17 1985

Dear Mr. Singer:

I am enclosing a copy of the letter and enclosures sent to Mr. Campos.

I sin cerely hope you will seriously consider my recommendation to put some teeth in the Section 2635 which makes it rather specific that underground tanks meet a performance rather than a "design" or "manufacturing" tandard. I am also enclosing communications I have had with UL President Bono, as well as their replies.

What I hope will happen is that there will be a listing mark for a composite tank that meets the performance standards of 1316 while also providing secondary containment, namely a separate PERFORMANCE STANDARD for double wall underground tanks. The performance standard should actually be written in as the California Construction Standard (but that might be too drastic), namely: "the primary and secondary containers of a double wall non-metallic or double wall steel tank shall be each able to resist for one minute a pressure of 25 PSI and a negative pressure (vacuum) of -5.75 PSI without structural failure of leakage, and shall be able to resist , without structural degradation exceeding 30% of the original tank wall strength, 16 test solutions (which shall include all fuels, acids, alkalies, salt solutions and distilled water) for a period of 120 days." This is basically what a 1316 single wall tank must be able to do.

It may be that the State of California, rather than Underwriters' Laboratories, Inc. would be better qualified to establish and direct the testing, labeling and listing operation of the double-wall underground storage tanks that are deemed suitable for long term storage of "hazardous" liquids.

The listing mark should identify the liquid to be stored in the underground tank, and not assume that one type of tank is suited for underground storage , regardless of the liquid chemical property. We must face the fact that corrosion is the culprit and anything that can corrode will leak. It is not enough that one detect whether the inner wall leaks: one should also know whether the outer wall remains leak-proof as long or longer.

Thankyou for your attention to this matter.
Sincerely,

Charley E. Kaempen

C. E. Kaempen

#205 HS

JAN 14 1985

Orig - ED ANTON
copies - MAC, WGF

KAEMPEN & ASSOCIATES

REINFORCED PLASTICS ENGINEERING

3202 LARKSTONE DRIVE • ORANGE, CALIFORNIA 92669 • (714) 532-5787

January 5, 1985

Mr. Michael A. Campos
Executive Director
State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, Calif. 95801 - 0100

Copys to Victoria L. Gallagher, Div. of Environmental Health
Dept. of Health Services, San Diego.

Dear Sir:

This letter is written to warn you and your staff of very serious defects in the recent draft dated Dec. 28, 1984 relating to UNDERGROUND TANK REGULATIONS. I was sent a copy by Victoria Gallagher and after careful review I wish to make the following comment followed by a specific recommendation.

COMMENT: THE GUT PORTION OF THE DRAFT IS SECTION 2635 TITLED "General Construction Standards".

This is identified as page 3.38 of the "DRAFT" copy.

THIS PORTION IS AMBIGUOUS AND WILL LEAD TO HARMFUL AND DAMAGING CONSEQUENCES FOR THE GENERAL PUBLIC AS WELL AS TO OWNERS AND OPERATORS OF UNDERGROUND STORAGE TANKS WHO CAN AND WILL BE MISLED BY UNSCRUPULOUS AND/OR INCOMPETENT MANUFACTURERS AND SELLERS OF UNDERGROUND STORAGE TANKS.

FACT: UNDERWRITERS' LABORATORIES, INC. CURRENTLY OBSERVES A DOUBLE STANDARD FOR QUALIFYING, LISTING AND LABELING UNDERGROUND STORAGE TANKS:

- SINGLE WALL STEEL TANKS ARE LISTED UNDER "UL SUBJECT 58" WHICH U.L. PRESIDENT BONO STATES IS A "Manufacturing" Standard BECAUSE STEEL TANKS ARE AN "old" PRODUCT AND THUS DO NOT NEED TO MEET ANY TESTING CRITERIA FOR STRUCTURAL COMPETENCE OR CORROSION RESISTANCE. In other words, if it is "old", has been in use for decades as a product and is made entirely of steel THE STEEL UNDERGROUND STORAGE TANK DOES NOT NEED TO MEET A "PERFORMANCE" STANDARD, that is, a standard based upon a published set of rigidly controlled and observed tests.

Received DTS

JAN 14 1985

- SINGLE WALL NON_METALLIC UNDERGROUND STORAGE TANKS ARE LISTED UNDER "UL SUBJECT 1316" WHICH IS A "PERFORMANCE STANDARD" THAT REQUIRES THE TANK TO BE SUBJECTED TO AN EXTENSIVE SERIES OF STRUCTURAL TESTS AND THE TANK MATERIAL TO BE SUBJECTED TO 6 MONTH LONG CHEMICAL TESTING TO DETERMINE IF THE STRUCTURAL MATERIAL CAN RESIST WITHOUT SERIOUS DETERIORATION 16 TEST SOLUTIONS, INCLUDING STRONG ACIDS, ALKALINE AND SALT SOLUTIONS AS WELL AS ALL KNOWN FUELS.

- UNDERWRITERS' LABORATORIES, INC. REFUSES TO ESTABLISH "PERFORMANCE STANDARDS" FOR STEEL UNDERGROUND STORAGE TANKS.

- IT SHOULD NOT MATTER WHAT THE UNDERGROUND TANK IS MADE FROM SO LONG AS THE UNDERGROUND TANK MEETS AN ESTABLISHED SET OF PERFORMANCE STANDARDS FOR STRUCTURAL COMPETENCE AND RESISTANCE TO CHEMICAL DETERIORATION PRODUCED BY EITHER THE TANK INTERNAL OR EXTERNAL ENVIRONMENT TO WHICH THE TANK MATERIAL IS EXPOSED.

- THE ENTIRE OBJECT OF THE PROPOSED REGULATIONS IS TO REMEDY A SITUATION PRINCIPALLY CAUSED BY THE USE OF SINGLE WALL STEEL UNDERGROUND STORAGE TANKS WHICH HAVE BEEN LISTED AND LABELED FOR YEARS BY UNDERWRITERS' LABORATORIES INC. AND WHICH HAVE MET THE REQUIREMENTS ESTABLISHED BY NFPA 30 GUIDELINES.

- IF THE PROPOSED REGULATIONS DO NOT DIRECTLY OUTLAW THE CULPRIT (STEEL UNDERGROUND STORAGE TANKS) AT LEAST THEY SHOULD INSIST UPON A UNIFORM "PERFORMANCE STANDARD" , i.e. meeting test requirements suchaas those already established by Underwriters Laboratories, Inc. for Non-metallic Underground Tanks in their "SUBJECT 1316". In other words, if the underground storage tank doesn't meet a performance standard it should not be permitted to be used.

- A DOUBLE-WALL UNDERGROUND STORAGE TANK IS STRUCTURALLY DIFFERENT IN MANY WAYS FROM A SINGLE-WALL UNDERGROUND STORAGE TANK AND IF TO BE PERMITTED FOR USE IN CALIFORNIA SHOULD MEET "PERFORMANCE STANDARDS" ESTABLISHED BY UNDERWRITERS" LABORATORIES,INC. OR SOME OTHER "NATIONALLY RECOGNIZED INDEPENDENT TESTING ORGANIZATION".

- THE EXISTING BIAS AND DOUBLE STANDARD POSITION TAKEN BY UNDERWRITERS' LABORATORIES INC. CONCERNING LISTING AND LABELING OF UNDERGROUND STORAGE TANKS SHOULD NOT BE PERMITTED BY CALIF.

RECOMMENDATION:

THE WORDING OF SECTION 2635 SHOULD BE CHANGED TO READ AS PRESENTED IN THE ATTACHED EXHIBIT "A", with specific attention given to (1), (2), (5) and (6) of sub-paragraph (b). These are referred to in the "DRAFT" of December 28, 1984 pages 3.38, 3.39, 3.40 , 3.41, 3.42.

I am enclosing as EXHIBIT "B" certain information and data that may assist you and your staff, and in particular Mr. Harold Singer, in evaluating my comments and recommendations.

I am not alone in believing that a UL listing of a "composite" double-wall tank comprising a fiberglass coated steel tank such as made by JOOR is a step backward, since the tank cannot meet the performance standards for strength and corrosion resistance established by UL Subject 1316. In fact, we in the industry do not know what, if any, performance standards have to be met if the primary container is of steel. Do we have to repeat the fact that we wouldn't have the problem if a steel tank was competent. Lem McManus, Vice President of Engineering, at Marathon Oil, as well as the Hinchman report, certify that at least 30% of all leaking underground tanks are due to internal corrosion.

The key words or phrases I wish to call attention to are

"PERFORMANCE STANDARDS" and "Listing and Labeling Service"

If care is given to the language I suggest, there will certainly be less ambiguity and consequent confusion concerning safe and adequate storage of hazardous liquids, such as gasoline.

APPENDIX EXHIBIT "C" calls attention to the interesting designation of Gasoline as Flammable but not toxic, whereas ethyl alcohol, which is consumed by millions of Americans, is considered not only flammable, but also toxic. Does the petroleum industry know something we don't? If Gasoline is not toxic, why is it a hazardous substance we have to be concerned about storing?

Thankyou for your attention to this matter.

Yours very truly,

Charles E. Kaempen

Charles E. Kaempen
President

cc: V. Gallagher; H. Singer

COMMUNICATION TO STATE WATER RESOURCES CONTROL BOARD JAN 5, 1985
EXHIBIT "A"

#205

2635. General Construction Standards

(a) The following sections shall apply to all primary and secondary containers including leak interceiption and detection systems.

(b) Primary containers and double-walled underground storage tanks shall be designed and constructed to comply with all of the following:

(1) Cathodically protected steel tanks, steel tanks clad with glass fibre-reinforced plastic, and glass fibre-reinforced thermosetting resin tanks shall be fabricated and designed to meet performance standards developed and published by a nationally recognized independent testing organization. Applicable performance standards shall include, but not be limited to the primary container able to resist without structural failure or deformation a pressure of 25 PSI and a vacuum negative pressure of -5 psi for a period not less than 30 seconds and the secondary container able to resist a pressure of 15 PSI and a negative pressure of - 5 PSI for a period not less than 15 seconds. Additional design standards shall include, but are not limited to, those provided in Appendix I.

(2) Underground storage tanks shall be factory tested for durability and chemical compatibility with the hazardous substances to be stored as well as with the soil type and the environment surrounding the exterior surface of the primary container prior to release for shipment and installation. The factory tests will be performed by the manufacturer and comply with published test procedures prepared by an independent testing organization which provides listing and labeling service to the underground tank manufacturer.

GENERAL CONSTRUCTION STANDARDS (CONTINUED)

2635. (Continued)

(b) (Continued)

(2) (Continued)

Acceptable methods for determining durability and chemical compatibility of the primary container material with the hazardous substances are provided in Appendix I.

(3) TEXT IDENTICAL TO DRAFT OF DEC. 28, 1984

(4) The outer surface of primary containers of steel as well as the outer surface of a steel secondary container comprising a double-walled underground storage tank shall be protected from deterioration due to chemical reaction of the soil or environmental constituents surrounding and in contact with the outer surface of the primary and secondary steel containers. Selection of the type of protection to be employed shall be based upon a published performance standard prepared by a nationally recognized independent testing organization, such as Underwriters' Laboratories, Inc. or upon a published recommendation from a registered corrosion engineer having an engineering degree from an accredited college or university. All steel tank surfaces covered by a plastic coating, a corrosion resistant plating, a fiberglass-reinforced thermosetting resin laminate or other materials approved and listed and recommended by a listing and label service provided by a nationally recognized independent testing organization shall be holiday tested immediately prior to installation to insure the corrosion resistant steel surface cover is impermeable and free of holes and fractures.

2635. General Construction Standards (Continued)

(b) (Continued)

(5) All primary containers and double-walled underground storage tanks shall be installed according to the installation instructions published and provided by the manufacturer of the primary container and the manufacturer of the double-walled underground storage tank. The installation instructions shall meet requirements established by a nationally recognized independent testing organization when the primary container or double-walled underground storage tank bears a listing mark and label. Primary containers and double-walled underground storage tanks which do not bear a listing mark or label shall be installed according to best and most recent engineering practice involving the installation of underground storage tanks.

(6) All underground storage tanks shall be tested, before being put into service, in accordance with published test procedures provided by the tank manufacturer and which meet with applicable sections of NFPA 30 Fire Code as well as with recommendations of a nationally recognized independent testing organization. The ASME code stamp or the Listing Mark of Underwriters' Laboratories, Inc. (UL) or any other nationally recognized independent testing organization shall be evidence of compliance with this requirement.

2635. General Construction Standards (Continued)

(b) (Continued)

(7) Before being covered, enclosed or placed in use, all single-wall underground storage tanks and piping shall be tested for tightness to insure the tanks and piping are leak proof prior to being put into service. The leak test of the tanks shall require hydrostatically or aerostatically pressurizing the underground tanks for at least 30 minutes to a pressure not less than 3 PSI (20.68 k Pa) and not more than 5 PSI (34.48 k Pa). The leak test shall require no loss of pressure during the test period of 30 minutes. The leak test shall be witnessed and certified by an official from the local agency that provides approval of the tank installation. Pressure piping connected to the underground storage tanks shall be hydrostatically tested to 150 percent of the maximum anticipated pressure of the system or pneumatically tested to 110 percent of the maximum anticipated pressure of the system. Tests of the pressure piping shall be performed independently of leak tests performed on the underground tanks to insure the tanks are not subjected to the high pipe pressures. The leak test of all pressure piping shall be for a period of at least 10 minutes at a pressure not less than 5 PSI (34.48 k Pa) and shall be witnessed and certified by an official from the local agency. Double-walled underground storage tanks shall be subjected to a leak test of both the primary and secondary container in accordance with recommendations published by the manufacturer and identical to the pressurizing modes, pressure ranges and test periods required by single-wall underground storage tanks.

2635. General Construction Standards (Continued)

(b) (Continued)

(8) TEXT IDENTICAL TO TEXT DRAFT OF DEC. 28, 1984

(9) TEXT IDENTICAL TO DRAFT OF DEC. 28, 1984

(c) TEXT IDENTICAL TO DRAFT OF DEC. 28, 1984

****

IT IS HEREBY RECOMMENDED THAT THE FOLLOWING TEXT BE SUBSTITUTED FOR THE TEXT SHOWN IN PAGE 3.9 OF DRAFT DATED DEC. 28, 1984 :

SECTION 2631. Construction Standards for New Underground Storage Tanks

(n) Double-walled underground storage tanks which satisfy the performance standards established for double-walled underground storage tanks and which bear the ASME Code Stamp or the Listing Mark of Underwriters' Laboratories, Inc. or any other nationally recognized independent testing organization shall be evidence of compliance with the construction standards of Section 2631 (b), Section 2631 (c) and Section 2635 (b) of this article and to fulfill the volumetric requirements for secondary containment specified in Section 2631 (e) (1) of this article.

Adopt new section to read:

2635. General Construction Standards

(a) The following sections shall apply to all primary and secondary containers including leak interception and detection systems.

(b) Primary containers and double-walled underground storage tanks shall be designed and constructed to comply with all of the following:

(1) Cathodically protected steel tanks, steel tanks clad with glass fibre-reinforced plastic, and glass fibre plastic tanks shall be fabricated and designed to meet performance standards developed and published by a nationally recognized independent testing organization or be listed by the testing organization. Applicable design standards shall include, but are not limited to, those provided in Appendix I.

SEE TEXT CHANGES EXHIBIT "A"

(2) Underground storage tanks shall be tested by the manufacturer or an independent testing organization for durability and chemical compatibility with the hazardous substances to be stored using recognized

SEE TEXT CHANGES EXHIBIT "A"

engineering practices for materials testing. Acceptable methods for determining durability and chemical compatibility with the hazardous substances are provided in Appendix I.

(3) ~~(A)~~ Except for steel underground storage tanks a ~~0.25-inch thick steel~~ wear plate (striker plate) shall be centered under all accessible openings of the underground storage tank. The plate shall be constructed of steel or, if the steel is not compatible with the hazardous substance stored, a material resistant to the stored hazardous substance. The width of the plate shall be at least 9 inches wide and have an area of 1 square-foot or be equal to the area of the accessible opening or guide tube, whichever is larger. The thickness of the steel plate shall be at least 0.053 inch (1.35 mm) and those constructed of other materials (as required) shall be of sufficient thickness to provide equivalent protection. The plate shall be rolled to the contours of the tank and bonded or seam welded in place. ~~and have a minimum area equal to the opening or a guide tube, whichever is smaller~~

OK

SEE TEXT CHANGES EXHIBIT "A"

(4) Single-wall primary containers of steel and the outer surface of double-walled underground storage tanks constructed of steel, with or without coatings, shall be protected by ~~either~~ a properly installed, maintained, and monitored cathodic protection system. ~~With or without coatings or listed corrosion resistant materials, non-metallic reinforced plastic coatings, composites, or equivalent systems, which have been checked using electrical holiday testing~~ Selection of the type of protection to be employed shall be based on a certification listing by a nationally recognized, independent testing organization or the judgment of a registered corrosion engineer or a National Association of Corrosion Engineers (NACE) accredited corrosion specialist taking into account the corrosion history of the area. underground storage tanks with listed corrosion-resistant materials, non-metalic reinforced plastic coatings, composites, or equivalent systems shall be holiday tested immediately prior to installation.

~~When cathodic protection is selected, the system shall be designed by a registered corrosion engineer or a NACE corrosion specialist or in accordance with the certification listing, whichever is applicable. The cathodic protection system shall be initially tested by a registered corrosion engineer or NACE corrosion specialist.~~

~~Monitoring of~~ The cathodic protection system shall be ~~re~~inspected under the direction of a registered corrosion engineer or NACE corrosion specialist at the frequency specified in the certification or in accordance with the schedule prescribed by the system designer, but no less than semi-annually.

~~Vaulted~~ Underground storage tanks in a vault and not backfilled are exempted from the requirements of this subsection.

SEE TEXT CHANGES EXHIBIT "A"

(5) All primary containers and double-walled tanks underground storage shall be installed according to the manufacturer's written recommendations or, if no written recommendations exist, best engineering practice.

(6) ~~(2)~~ All underground storage tanks shall be tested before being put into service in accordance with

SEE TEXT CHANGES EXHIBIT "A"

the applicable sections of the Code under which they were built. The ASME code stamp, ~~API monogram,~~ or the Listing Mark of Underwriters Laboratories, Incorporated, (UL) or any other nationally recognized independent testing organization shall be evidence of compliance with this requirement. ~~guaranteed by the manufacturer to be product tight prior to leaving the factory~~

SEE TEXT CHANGES EXHIBIT "A"

(7) ~~(3)~~ Before being covered, enclosed, or placed in use, ~~following installation~~ all underground storage tanks and piping shall be tested for tightness ~~either~~ hydrostatically or with air pressure at not less than 3 pounds per square-inch (20.68 k Pa) and not more than 5 pounds per square-inch (34.48 k Pa). ~~Pressure piping shall be tested according to the requirements specified in Section 3-7.1 of NFPA 30, Flammable and Combustible Liquids Code.~~ Pressure piping shall be hydrostatically tested to 150 percent of the maximum anticipated pressure of the system, or pneumatically tested to 110 percent of the maximum anticipated pressure of the system, but not less than 5 pounds per square inch (34.48 kPa) gauge at the highest point of the system. This test shall be maintained for a sufficient time

to complete visual inspection of all joints and connections, but for at least 10 minutes. In lieu of the bove, a est using accepted engineering practices shall be used. Acceptable test methods for testing pipelines are provided in Appendix I. Double-walled underground storage tanks are exempt from the requirements of this section provided that the annular space is monitored using either pressure or vacuum testing. ~~in accordance with standards and procedures set forth in Article 4~~

(8) When required by the local agency, all underground storage tanks shall be equipped with an overflow protection system which includes the following elements:

OK

(A) A spill catchment basin which surrounds the fill pipe and prevents the inflow of the hazardous substance into the subsurface environment. A level sensing device that continuously monitors and indicates the liquid level in the tank and either (B) or (C) ~~(2) or (3)~~ or both;

(B) An audible or visual alarm system triggered by

EXHIBIT "B"

COPIES OF DATA AND COMMUNICATIONS THAT QUALIFY C. E. KAEMPEN AS AN AUTHORITY IN THE SUBJECT OF UNDERGROUND STORAGE TANKS:

1. COPY OF UL LABEL EARNED AFTER 8 YEAR TEST AND DEVELOPMENT PROGRAM ESTABLISHED BY UNDERWRITERS' LABORATORIES INC. AND PERFORMED BY C. E. KAEMPEN AND HIS COMPANY KAEMPEN INDUSTRIES, INC. APPROXIMATELY 100 TANKS INSTALLED IN WESTERN US, INCLUDING 6 DIESEL FUEL TANKS AT UNIV. OF CALIFORNIA, BERKLEY, CALIF. AND 3 DIESEL FUEL TANKS (12000 GAL) AT LOMA LINDA UNIVERSITY , ALL OF WHICH ARE STILL IN SERVICE AFTER TEN YEARS.

2. COPY OF LISTING OF KAEMPEN UNDERGROUND TANKS UNDER FILE MH 8781 WHICH MET PERFORMANCE STANDARDS ESTABLISHED BY UNDERWRITERS' LABORATORIES WHICH WERE MORE SEVERE THAN CURRENT PERFORMANCE STANDARDS OF UL SUBJECT 1316. PICTURES OF TANKS AND FACILITIES CONSTRUCTED BY C. E. KAEMPEN 1973-1974

3. COPY OF UL TEST REPORT FILE MH 8781 (OWNED BY CHARLES E. KAEMPEN) AND COMMUNICATION CERTIFYING LISTING OF THIS SINGLE WALL TANK. TESTS PERFORMED WERE MORE SEVERE THAN NOW REQUIRED BY UL SUBJECT 1316.

4. COPY OF LETTER FROM UL TO KAEMPEN DATED SEPT.19, 1978 OUTLINING THE TEST PROGRAM ESTABLISHED BY UUNDERWRITERS' LABORATORIES TO QUALIFY A NON-METALLIC DOUBLE-WALL UNDERGROUND TANK. NOTE THAT THESE TESTS ESTABLISH PERFORMANCE STANDARDS FOR DOUBLE WALL UNDERGROUND TANKS THAT SHOULD BE REQUIRED OF UNDERGROUND TANKS REGARDLESS OF MATERIAL FROM WHICH MADE.

5. COPY OF LETTER FROM UNDERWRITERS LABORATORIES INC. TO KAEMPEN DATED OCTOBER 11, 1982 ILLUSTRATING THE FACT THAT KAEMPEN MADE APPLICATION FOR DOUBLE WALL NON-METALLIC (COMPOSITE) UNDERGROUND STORAGE TANKS (THE KAEMPEN DOUBLE-WALL DESIGN IS PATENTED)

6. COPY OF LETTER SENT TO UNDERWRITERS' LABORATORIES BY KAEMPEN DATED SEPT. 26, 1984

7. COPY OF LETTER SENT TO UL PRESIDENT BONO DATED DEC. 3, 1984

8. COPY OF LETTER FROM UL IN REPLY TO KAEMPEN LETTER OF DEC. 3, 1984

9. BIOGRAPHICAL DATA ON DR. CHARLES E. KAEMPEN

MH8781

Underwriters' Laboratories, Inc.

UL ® LISTED

KAEMPEN

NON METALLIC UNDERGROUND TANK

FOR PETROLEUM PRODUCTS ONLY

CONSULT LOCAL AUTHORITIES BEFORE COVERING THIS TANK

DATE TESTED: **TANK NO.**

Guide EGHX. July 6, 1973 MH8781.
Tanks, Underground Flammable Liquid.

Kaempen Industries, Inc., Orange, Calif. 92669

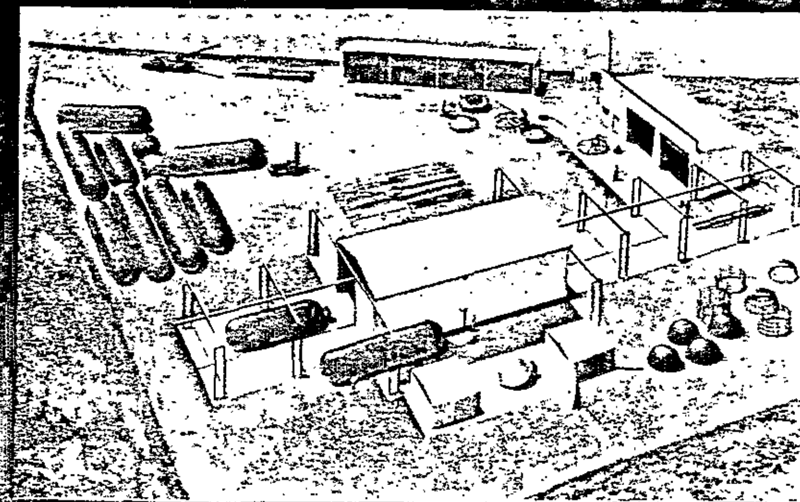
Nonmetallic tanks for petroleum products only.

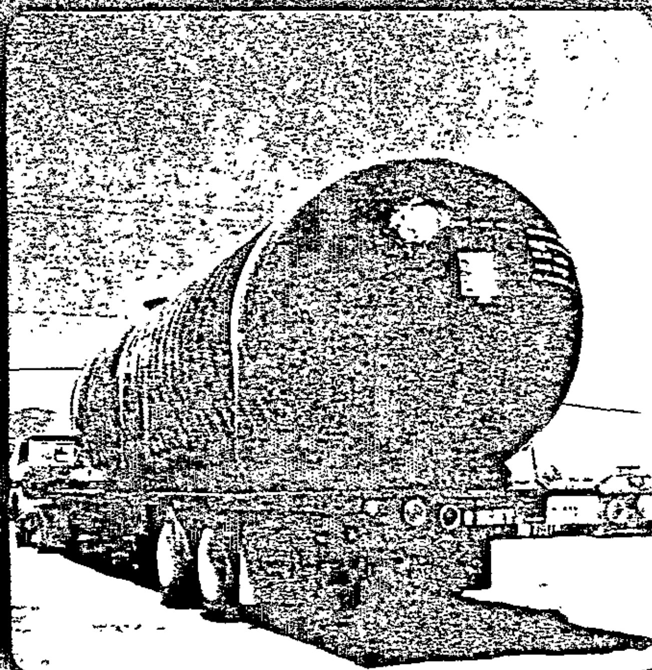
3202 Larkstone Dr.

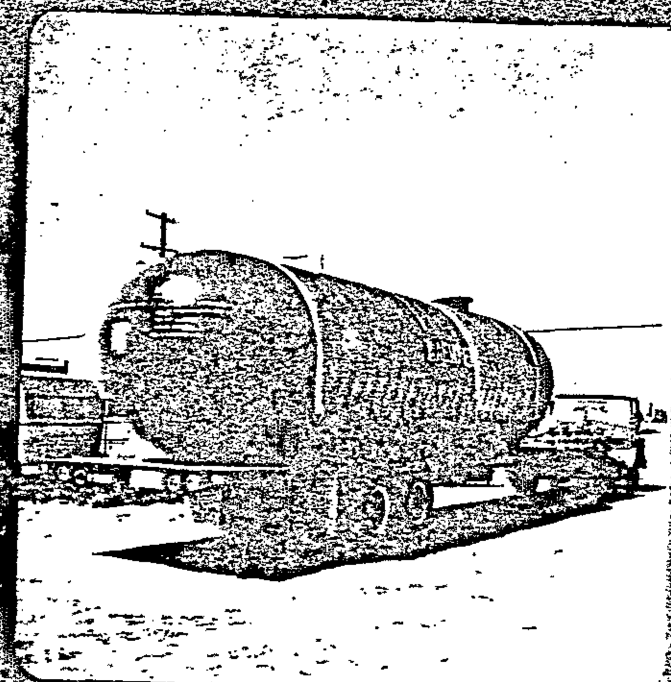
→→ LOOK FOR THE LISTING MARK ←←

The Listing Mark of Underwriters' Laboratories, Inc. is the only method provided by Underwriters' Laboratories, Inc. to identify products produced under its Listing and Follow-up Service. See General Information Card of above guide designation.

PRINTED IN U.S.A. This card is issued by Underwriters' Laboratories, Inc. ®







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UNDERWRITERS' LABORATORIES, INC.
333 PFINGSTEN ROAD · NORTHBROOK, ILLINOIS 60062
an independent, not-for-profit organization testing for public safety

MH8781 July 20, 1973

Kaempen Industries, Inc.
3202 Larkstone Drive
Orange, California 92667

Attention: Dr. C. E. Kaempen

Subject: Nonmetallic Underground Storage Tanks

Gentlemen:

This is to confirm that we have established a Listing for your company under our Follow-Up Service covering nonmetallic tanks intended for the underground storage of petroleum products only. Such tanks are made with capacities of 4, 6, 8, 10 and 12,000 gallons (cylindrical) and 2000 gallons (spherical).

We understand that this confirmation is requested in order that you may pass on to interested parties verification of Listing for specific size tanks. In this regard, it should be noted that the Listing Mark of Underwriters' Laboratories, Inc. on the product is the only method provided by Underwriters' Laboratories, Inc to identify Nonmetallic Underground Flammable Liquid Tanks which have been produced under our Follow-Up Service Program. The Listing Mark should provide sufficient identification for interested inspection authorities.

Very truly yours,

J A Cedervall

J. A. CEDERVALL
Associate Managing Engineer
Casualty and Chemical
Hazards Department

JAC:CF

UNDERWRITERS' LABORATORIES, INC.

CHICAGO · NORTHBROOK, ILL. · MELVILLE, N.Y. · SANTA CLARA, CALIF.

an independent, not-for-profit organization testing for public safety

File MH8781
Project 70NK6808A

June 27, 1973

REPORT

on

NONMETALLIC UNDERGROUND TANKS FOR PETROLEUM PRODUCTS

Kaempen Industries, Inc.
Orange, California

D E S C R I P T I O N

PRODUCT COVERED:

Glass-fiber reinforced-plastic tanks for the underground storage of petroleum products.

GENERAL:

These are cylindrical horizontal and spherical tanks designed for the underground storage of petroleum products at atmospheric pressure. They are fabricated and hand lamination of filament wound glass fiber reinforcing and a polyester resin. The cylindrical tanks are made in one design having capacities of 4, 6, 8, 10, or 12,000 gals.

Spherical tanks of 2000 gal capacity are essentially two heads joined together. Materials of construction are identical to the cylindrical tanks.

For shape and capacities refer to ILL. 1.

INSTALLATION:

The tanks are intended to be installed in accordance with the manufacturer's instructions, and with the Flammable and Combustible Liquids Code, NFPA No. 30, and the Standard for the Installation of Oil Burning Equipment, NFPA No. 31 of the National Fire Protection Association. A copy of the installation instructions (per ILL. 2) accompanies each tank.

MARKING:

1. Listee's name and address in combination with the Laboratories' Listing Mark (described below) is printed on a form of rice paper or sheet metal, which is laminate into the top surface of the tank. (Label Code No. 58-5-1).

UNDERWRITERS' LABORATORIES, INC.

R

LISTED
NONMETALLIC UNDERGROUND TANK FOR
PETROLEUM PRODUCTS ONLY

Consult Local Authorities Before Covering This Tank

TEST RECORD NO. 1

SAMPLES:

The investigation included physical, chemical, and aging tests. Due to the size of the product and the specialized testing involved, the physical tests of the complete tank assembly were witnessed at the manufacturer's facilities. For the chemical and aging tests, the manufacturer provided sections cut from a previously fabricated tank and these were subjected to tests at the Laboratories' facilities. Tests were conducted on the 12,000 gal size to cover the small tanks also. Of the two constructions involved, the butt-wound construction was tested to also cover the half-width overlap construction.

PIPE FITTING TORQUE TEST:

METHOD

With a sample of the tank partially buried, the 4 in. size pipe fittings in the top of the tank were subjected to a torque applied through 4 in. pipe installed in the fittings. Following the test, the assembly was checked for leakage using 5 psig air pressure.

RESULTS

Each of the fittings withstood a torque of 3800 in.-lb. There was no evidence of cracking, splitting, or failure of bond between the tank and fittings, and no leakage was observed.

PIPE FITTING STRENGTH TEST:

METHOD

With the tank secured in position, a force of 400 lb was applied in 50 lb increments at the end of a 5 ft section of pipe installed in a tank fitting. The force was applied in the direction of the longitudinal axis of the tank. The test was then repeated using a second fitting, with the force applied transverse to the longitudinal axis. The tank was checked for leakage before and after the test, using 5 psig air pressure.

RESULTS

There was no apparent damage, and the leakage test showed no evidence of failure of the fittings.

EARTH LOAD TEST:

METHOD

The tank was installed in a test cell, and back-filled with pea gravel, such that there was 3 ft of cover over the tank top. Shell deflections were observed at both the top and bottom of the tank.

RESULTS

There was no apparent damage to the tank, and negligible deflection. The subsequent leakage test showed no indication of failure of the tank.

UNEQUALLY SUPPORTED TANK TEST:

METHOD I

The tank was installed in the test cell such that the midsection of the tank was unsupported (area approx 40 percent of tank length and 2/3 of tank width). The tank was back-filled to a depth of 3 ft above the top of the tank. The tank was then filled with water and deflections of the tank shell recorded. (100 TON LOAD)

RESULTS I

There was no apparent damage to the tank and the deflection observed was approx 3/4 in. The subsequent leakage test showed no indication of failure of the tank.

METHOD II

The tank was installed in the test cell such that it was supported along the bottom at the center (void at each end was approx 20 percent of tank length and 2/3 of tank width). The tank was back-filled as described for Method I, filled with water, and the shell deflections recorded.

THESE TESTS WERE PERFORMED SIMULTANEOUSLY WITH OF TANK UNSUPPORTED C.2.1

RESULTS II

There was no apparent damage to the tank and the deflection observed was approx 1/4 in. The subsequent leakage test showed no indication of failure of the tank.

CONCENTRATED LOAD TEST:

METHOD

With the tank installed in the test cell, a concentrated load was applied to the fill over the center of the tank through an 18 by 20 in. load bearing plate. The plate was loaded so as to simulate a load of at least 23,300 lb.

RESULTS

There was no apparent damage to the tank and the maximum deflection observed was 13/32 in. The subsequent leakage test showed no indication of failure of the tank.

EXTERNAL HYDROSTATIC PRESSURE TEST:

METHOD

An empty tank was installed in the test cell, anchored as recommended by Installation Instructions, and back-filled with pea gravel. The area around the tank was then flooded so as to raise the water level in the pit up to 3 ft above the top of the tank. The tank was left under these conditions for 24 hr. PERFORMED OCT 1970

A second sample was subjected to a vacuum equivalent to the average external pressure which would result with a buried tank flooded to a height 3 ft above the tank top, (equivalent vacuum for 8 ft diameter tank is 6.13 in. Hg). At the end of the 24 hr period an additional vacuum of 5.31 in. Hg (total vacuum 11.44 in. Hg) was imposed for 1 min.
PERFORMED JAN 1973 AFTER CHEMICAL AGE TESTS

RESULTS

There was no apparent permanent damage to the tank; although there was noticeable oil-canning. The subsequent leakage test showed no indication of failure of the tank.

WATER LOAD TEST:

METHOD

The tank was set with pea gravel extending not more than 12 in. up on the end caps and surrounding the tank level from this point. With no other support, the tank was filled with water for a period of 1 hr and examined for any apparent damage.

RESULTS

The tank sustained the load with no apparent damage. The subsequent leakage test showed no evidence of failure.

LEAKAGE TEST:

METHOD

The tank that had previously been subjected to earth load, concentrated load, water load, unequally supported tank, and external hydrostatic pressure tests were checked for leakage with air at a pressure of 5 psig, using a soap solution around all fittings and the entire surface.

RESULTS

There was no evidence of leakage.

INTERNAL PRESSURE TEST:

METHOD

An empty tank was placed on the ground with no additional support and subjected to an internal pressure of 25 psig for a period of one minute. The tank was observed to determine whether it could safely contain this load of five times test pressure of 5 psig which is used in checking for leakage during production.

RESULTS

There was no rupture of the tank.

LIFT FITTING STRENGTH TEST:

METHOD

The fitting used for lifting and moving the tank was subjected to a load of twice that imposed by normal lifting of an empty tank.

RESULTS

A load of approx 6800 lb (twice the empty weight of a 12,000 gal tank) was applied to the lifting lug. Examination indicated no physical damage to tank or lift lug. Subsequent leakage test at 5 psig indicated no damage to tank shell.

IMPACT TEST:

METHOD

A sample tank was subjected to impacts from a 12 lb steel ball swung on a 6 ft tether. The vertical height above the impact point was varied from 10 to 72 in. with no two impacts at the same point on the tank. This test was conducted on both the shell and heads of the tank, on and adjacent to the inner steel rings.

RESULTS

There was nno rupture of the shell or head and no breaking of pieces or puncture through the shell or head when impacted at 10, 20, 30, 40, 50, 60, or 72 in.

Appendix A

ACCELERATED AIR-OVEN AGING TESTS (ASHLAND RESIN):

METHOD

Test samples were subjected to accelerated air-oven aging for 30, 90 and 180 days at a temperature of 70 C (158 F). In order to determine any degradation of the materials to air-oven aging, flexural strength and Izod impact strength were determined on specimens cut from the aged samples and these values were compared with values obtained on unaged specimens. The flexural strength and Izod impact strength (using notched specimens) were determined in accordance with ASTM Test Procedures D790-71 (Method I, Procedure A) and D256-72A (Method A), respectively. The flexural strength tests were conducted with the outside surface up and the span used for all specimens was 2.0 in. The crosshead speed was 0.05 in. per minute.

RESULTS

The results are tabulated in Table I.

IMMERSION TESTS AT 100 F (ASHLAND RESIN):

METHOD

Test samples were immersed for 30, 90 and 180 days in premium leaded gasoline, unleaded regular gasoline, No. 2 Fuel Oil, ASTM Reference Fuel C, benzene, distilled water, sodium chloride solution (saturated), dilute sulfuric acid (pH = 3), nitric acid (5 percent by weight), hydrochloric acid (5percent), dilute sodium hydroxide (pH = 12), sodium hydroxide (5 percent), and sodium carbonate - sodium bicarbonate solution (pH = 10). The liquids were maintained at 100 F (38 C) throughout the test periods.

In order to determine any degradation of the materials in the various environments, flexural strength and Izod impact strength were determined in specimens prepared from the immersed samples, and these values were compared with values obtained on unaged specimens. The test procedures are given above under the heading "Accelerated Air-Oven Aging Tests (Ashland Resin)". In addition, the samples were weighed before and after the test exposure, and the percent change in weight was calculated. In order to minimize any "edge effect," all of the edges of the 5 by 9 in. test samples were coated with polyester resin by the manufacturer, and the specimens were cut from the test samples after the exposures, avoiding using the edges.

RESULTS

The results are tabulated in Table I.

NOTE: UNDERLINED VALUES SHOWED IMPROVED RATHER THAN LESS STRENGTH AFTER 6 MONTHS EXPOSURE.
CEK

TABLE I

RESULTS OF EXPOSURE TESTS (ASHLAND RESIN)

	Average Flexural Strength, PSI	Percent of Original Flexural Strength	Average Izod Impact, Ft-Lb Per In.	Percent of Original Izod Impact Strength	Change in Weight, Percent
As Received	18927	-	25.37	-	
After Air-Oven Aging at 158 F (70 C)					
30 Days	32404	171	23.51	93	-
90 Days	13588	72	21.62	85	-
180 Days	28030	148	25.46	100	-
After Immersion in No. 2 Fuel Oil at 100 F (38 C)					
30 Days	21915	116	21.18	83	+0.13
90 Days	14554	77	25.30	100	+0.24
180 Days	21867	116	23.58	93	0.00
After Immersion in Premium Leaded Gasoline at 100 F (38 C)					
30 Days	39780	210	19.71	78	+0.09
90 Days	25698	136	14.84	58	+0.15
180 Days	19289	102	28.58	113	+0.52
After Immersion in Unleaded Regular Gasoline at 100 F (38 C)					
30 Days	39453	208	20.08	79	+0.09
90 Days	17673	93	18.50	73	+0.09
180 Days	28039	148	21.51	85	+0.10

IDENTIFICATION TESTS:

METHODS

Specific Gravity - Specimens of the (Ashland resin) material were weighed first in air and then in distilled water at a temperature of 23 C (73 F). From the weight of the specimens and their loss of weight in water, the specific gravities were calculated.

Ash Content - Weighed specimens of the (Ashland resin) material were placed in previously ignited and weighed porcelain crucibles and burned off in a hood using a Meker burner. The specimens were then ignited in a muffle furnace at 800 C (1472 F) until constant weight was reached, cooling in a calcium chloride desiccator between weighings. The percent ash was then calculated.

Qualitative Infrared ANalysis - An infrared spectrum of the Ashland resin was obtained by means of an infrared spectrophotometer. Instrument settings used in obtaining the spectrum were recorded in the appropriate section of the spectrum record.

RESULTS

Specific Gravity - The average specific gravity was found to be 1.50, ranging from 1.45 to 1.54.

Ash Content - The average ash content was found to be 38.6 percent, ranging from 34.4 to 42.3 percent.

Qualitative Infrared Analysis - The infrared spectrum obtained is considered representative of the resin of the samples. The recorded spectrogram is attached to the file copy of this memorandum and is dated December 26, 1972.

UNDERWRITERS LABORATORIES INC.
333 PFINGSTEN ROAD · NORTHBROOK, ILLINOIS 60062

an independent, not-for-profit organization testing for public safety

September 19, 1978

MH8781
78NK8347

Kaempen and Associates
3202 Larkstone Drive
Orange, CA 92669

Attention: Mr. C. E. Kaempen

Subject: Nonmetallic Underground Storage Tanks For Petroleum Products

Gentlemen:

We have completed our preliminary investigation under Project 78NK8347, established to review information regarding fabrication processes, materials and installation instructions covering your new nonmetallic glass reinforced plastic underground storage tank.

We have reviewed all of the information provided, including your proposed re-test program which is dated August, 1978. We are not in total agreement with the test program you have proposed, and therefore are providing our recommendations on the test program that we feel should be followed in order to fully evaluate the new design. The program is discussed below.

A. Leakage Test

We agree with the proposed test in which the annular air space is pressurized to 5 psi. However, we feel the inner tank structure should be subjected to a similar test prior to adding the outer secondary tank structure. This would be consistent with the Quality Control Tests described on page iii under Fabrication Procedures. The second test on the outer structure will then normally be repeated following the load tests. No leakage would be permitted during any of the tests. Note that if the alternate method is used, the air pressure should be 5 psi, not 1 psi.

B. Water Load Test

To be conducted as proposed, which is in agreement with requirements in our Subject 1316 Outline.

C. Internal Hydrostatic Strength Test

To be conducted as follows, in accordance with your proposal:

1. Subject the unsupported tank to a hydrostatic pressure of 25 psi for a period of 1 minute:

a) Apply pressure to the inner primary tank structure for 1 minute.

b) Subsequently interconnect the annular space surrounding the primary inner tank structure with the inner tank and thereby subject the secondary outer tank structure to a hydrostatic pressure of 25 psi for 1 minute.

2. Both the primary and secondary tank shell structures are to withstand the pressure without rupture.

D. External Hydrostatic Pressure Test

This test should be conducted in accordance with requirements in our Subject 1316 Outline. If the tank is to be installed in a pit, it should be buried with 7 feet of cover rather than 3 feet, since your installation instructions refer to a 7 foot maximum burial depth.

If you desire to conduct this test aboveground, the method outlined as an alternate should be followed; however, the vacuum will be 9.68 in. Hg held for 24 hr. After the 24 hr. test, the additional vacuum of 5.3 in. Hg is to be applied for 1 minute. Please note that this test, conducted aboveground, is a 48 hr. test. The first 24 hrs. the tank is to be filled with water, and during the second 24 hrs. the vacuum is applied. The first half of this test is required since this tank is lighter than the original tank and therefore the resultant buoyancy force against the holddown straps will be greater than during the previous test.

	Average Flexural Strength, PSI	Percent of Original Flexural Strength	Average Izod Impact, Ft-Lb Per In.	Percent of Original Izod Impact Strength	Change in Weight, Percent
After Immersion in ASTM Reference Fuel C at 100 F (38 C)					
30 Days	19605	104	23.38	92	+0.20
90 Days	23483	124	21.70	86	+0.23
180 Days	39561	209	25.94	102	+0.32
After Immersion in Benzene at 100 F (38 C)					
30 Days	20894	110	18.51	73	+2.69
90 Days	17498	92	16.86	66	+13.19
180 Days	3584	19	8.50	34	+11.69
After Immersion in Distilled Water at 100 F (38 C)					
30 Days	15682	83	19.54	77	+0.44
90 Days	21350	113	22.59	89	+0.55
180 Days	35815	189	19.26	76	+0.62
After Immersion in Sodium Chloride Solution (Saturated) at 100 F (38 C)					
30 Days	16040	85	25.56	101	+0.31
90 Days	17208	91	29.78	117	+0.32
180 Days	26112	138	21.94	86	+0.37
After Immersion in Sodium Carbonate-Sodium Bicarbonate Solution (pH = 10) at 100 F (38 C.)					
30 Days	16682	88	22.62	89	+0.32
90 Days	27605	146	20.24	80	+0.38
180 Days	33711	178	24.16	95	+0.41

	Average Flexural Strength, PSI	Percent of Original Flexural Strength	Average Izod Impact, Ft-Lb Per In.	Percent of Original Izod Impact Strength	Change in weight, Percent
After Immersion in Dilute Sodium Hydroxide (pH = 12) at 100 F (38 C)					
30 Days	21314	113	25.44	100	+0.41
90 Days	20981	111	21.37	84	+0.54
180 Days	30973	164	22.53	89	+0.78
After Immersion in Sodium Hydroxide (5 Percent) at 100 F (38 C)					
30 Days	16617	88	18.02	71	-0.05
90 Days	13263	70	17.80	70	-0.15
180 Days	22508	119	15.62	62	+0.35
After Immersion in Dilute Sulfuric Acid (pH = 3) at 100 F (38 C)					
30 Days	14411	76	21.29	84	+1.26
90 Days	14059	74	22.01	87	+1.50
180 Days	35987	190	18.29	72	+1.17
After Immersion in Nitric Acid (5 Percent) at 100 F (38 C)					
30 Days	15228	80	23.97	94	+0.30
90 Days	14726	78	19.86	78	+0.30
180 Days	15746	83	17.15	68	+0.45
After Immersion in Hydrochloric Acid (5 percent) at 100 F (38 C)					
30 Days	17082	90	29.02	114	+0.57
90 Days	17676	93	24.10	95	+0.25
180 Days	19308	102	19.63	77	+0.26

E. Impact Test

To be conducted as proposed, which is in agreement with requirements in our Subject 1316 Outline.

F. Unequally Supported Tank Test

To be conducted as follows, in accordance with your proposal:

1. When an underground tank is installed, the contour of excavation may be such that the tank is only partially supported along the bottom.

2. To enable measurement and observation of any distortions of the unsupported tank structure when subjected to loads produced by faulty installation or loss of supporting fill material, the tank is supported such that the tank bottom contacting supporting structure is approximately 12 inches above a smooth ground-level horizontal test surface.

3. Two supports are spaced apart a distance equal to 40 percent of the tank length. Each support shall contact the tank bottom approximately two-thirds of the tank width and 30 percent of the tank length so that the unsupported void area under the mid-portion of the tank is approximately 40 percent of the tank length and the supported portion at each end of the tank is approximately 30 percent of the tank length.

4. Fill the tank with water and determine shell deflection. Examine for evidence of damage.

5. Repeat test with tank supported at the center only. (Void under each end is to be approximately 20 percent of its length and two-thirds of its width.)

G. Earth Load Test

This test should be conducted in accordance with requirements in our Subject 1316 Outline, except that the tank should be buried with 7 feet of cover rather than 3 feet. While this test was conducted successfully with the original submittal of the single wall tank, the results are not applicable in view of the 7 foot maximum burial depth referred to in the installation instructions.

H. Concentrated Load Test

We propose to conduct this test in accordance with the alternate test recommendation described in your Appendix II.

I. Pipe Fitting Torque Test, Pipe Fitting Strength Test, and Lift Fitting Strength Test

To be conducted in accordance with requirements in our Subject 1316 Outline.

J. Accelerated Air-Oven Aging Tests, Immersion Tests, and Low Temperature Tests (Impact)

We agree that the air-oven aging, immersion, and low temperature tests will not be required. This is on the basis that except for the 30 mil. thick vinyl ester liner on the inner surface of the heads and inner shell, the resin used for the heads and both tank shells is Ashland Chemical Co. Aropol L-543 (same as previously investigated under the designation Aropol L-475-21-543). However, this also anticipates that results of the identification tests discussed below show substantial agreement with data recorded during the previous tests. In the event such agreement is not apparent, additional tests on the resin may be required.

K. Identification Tests

Specific gravity, ash content, and qualitative infrared analysis of specimens taken from the inner shell, the ribs, the heads, and the outer shell will be obtained, as described in our Subject 1316 Outline. For these tests, we should be provided with several specimens of each of these parts, which are to be cut from the tank following completion of the physical tests.

* * * * *

It is anticipated that the cost for this investigation as described above will not exceed $4220.00. An application form, in duplicate, is enclosed to cover the work. The cost limit is based upon having the physical tests conducted at your plant, and witnessed by an engineer from this office, with not more than 10 days time required out of office. The tests will be conducted on the 12,000 gallon size, and will be considered to cover the smaller sizes providing all have the same diameter and thickness of shells and heads.

When you are ready to proceed with this project please return the original of the application, properly executed, together with your check for the specified preliminary deposit. Please note that the application shows the same address for the "Applicant," "Listee" and "Manufacturer." If this is not correct in any way, please do not alter the application but notify this office and we will make the appropriate changes.

At the time the application is returned, we should be provided with a complete set of drawings showing the construction details, fitting sizes, and other details appropriate for each size of tank.

In order to complete our Credit Department's files, please fill in the information requested on the attached "Client Credit Information Sheet" and return with the executed application.

This completes our work scheduled under Project 78NK8347, which is being terminated with this letter. If you should have any additional questions or comments, please do not hesitate to contact the undersigned.

Very truly yours,

Ronald R. Czischke

RONALD R. CZISCHKE
Project Engineer
Casualty and Chemical
Hazards Department

Reviewed by:

J. A. Cedervall

J. A. CEDERVALL
Associate Managing Engineer
Casualty and Chemical
Hazards Department

RRC:jh

5

UNDERWRITERS LABORATORIES INC.

333 PFINGSTEN ROAD · NORTHBROOK, ILLINOIS 60062

an independent, not-for-profit organization testing for public safety

October 11, 1982

Kaempen and Associates
Mr. Charles E. Kaempen
3202 Larkstone Drive
Orange, CA 92669

Our Reference: MH8781

Subject: Nonmetallic Underground Storage Tanks For Petroleum Products - Double Wall Design

Dear Mr. Kaempen:

In response to your letter of September 21, 1982, we are enclosing a set of applications to cover a preliminary investigation of the subject tank design. This letter and enclosed applications are intended to supercede and supplement those dated September 1, 1982 which were transmitted by the undersigned. Please refer to such letter as to the intent of such investigation and also for the investigation required to conduct the same.

Should you wish to submit a particular tank design for investigation leading toward possible Listing and Follow-Up Service, please read the enclosed application forms carefully, have the original dated and signed in the usual manner and return it along with your company check for the preliminary deposit specified on the application. The preliminary review does not anticipate any testing and would be concluded with a Letter Report.

It is understood that your application will constitute your agreement not to use the name of Underwriters Laboratories Inc., any abbreviation thereof, or symbol therefor, nor to permit such use by others, in connection with the release, publication, or other dissemination, of the information obtained under this application, unless specifically authorized in writing by Underwriters Laboratories Inc.

Very truly yours,

Steven C. Slowik

STEVEN C. SLOWIK
Associate Project Engineer
Casualty and Chemical
Hazards Department

Reviewed by:

John J. Hawley

JOHN J. HAWLEY
Engineering Group Leader
Casualty and Chemical
Hazards Department

SCS:sy

Letter 10-7-82

SCS
10-11-82

APPLICATION FOR PRELIMINARY INVESTIGATION

To: Underwriters Laboratories Inc.

Return to Address Indicated
- XX 333 Pfingsten Road, Northbrook, Ill. 60062
- ☐ 1285 Walt Whitman Rd., Melville, L. I., N. Y. 11747
- ☐ 1655 Scott Blvd., Santa Clara, Cal. 95050
- ☐ 2602 Tampa East Blvd., Tampa, Florida 33619

Please Do Not Write in Spaces Below

Applicant File No. MH8781
Project No. ______ Dept C&CH
C.C. No. EGHX
Accepted by ______ Date ______
Acknowledged by ______

1. We (the "Applicant") make application to Underwriters Laboratories Inc. ("UL") for Preliminary Investigation of ***Nonmetallic Underground Storage Tank For Petroleum Products (Double Wall)***
(Product Name, Catalog Number, etc.)

(hereinafter sometimes referred to as the "product").

2. It is agreed that the sole purpose of this investigation is to obtain information in relation to UL's requirements with the intention that the Applicant will subsequently submit a product of this type to UL for investigation, Listing, Classification, or Recognition (as appropriate) and Follow-Up Service.

3. Your letter dated 10-11-82 from S. C. Slowik transmitting this Application is incorporated herein by reference to the extent that it is not inconsistent with this Application and establishes the scope and nature of work contemplated under this Application.

4. It is understood that the total charges under this Application shall consist of charges for engineering services plus advances and reimbursible expenses. A Preliminary Deposit of $ 300.00 accompanies this Application to be credited against the total charges.

5. Charges for engineering services are made at current billing rates for time devoted to the project by engineering, technical and support personnel and shall not exceed the Cost Limit of $ 600.00, unless authorized in writing by the Applicant.

6. Advances and reimbursible expenses directly identified with the project are charged independently of the Cost Limit. Such items include, but are not necessarily limited to, the following: Travel expenses; carrier, communications and special equipment charges; materials, energy and fuel; services of outside contractors or facilities; charges for photographs, drawings, reproductions and printing; and charges for preparation of extra copies of Reports.

7. This Application covers one examination, one set of tests, or other activity pertaining to the scope of the work outlined in the transmittal letter referred to in paragraph 3. In the event of further examination or tests of improved or additional samples or other unanticipated work a new Application with a new Cost Limit and Preliminary Deposit may be required. This Application does not cover the separate investigation of components of the product when such components are of a category Listed, Classified or Recognized by UL.

8. It is understood that our obligation for all charges accruing under this Application continues in full force and effect irrespective of the results of the investigation. Charges are due and payable without discount upon completion of the work, and upon presentation of invoices. In case of extensive or long-continued investigation, it is understood that invoices may be rendered monthly. Any unexpended portion of the Preliminary Deposit is to be returned upon completion of the work or at UL's discretion applied against unpaid charges in our account.

9. It is understood that any report issued by UL will not indicate acceptability of the product for Listing, Classification or Recognition by UL, and we agree that any such report will not be used to convey the impression that the product has been or is eligible to be Listed, Classified or Recognized by UL.

10. We agree that the name of Underwriters Laboratories Inc., any abbreviation thereof, or any symbol therefor shall not be used on or in connection with the product unless and until specifically authorized by UL as a result of establishment of appropriate Follow-Up Services and that the report shall not be used for any purpose other than that set forth in paragraph 2.

11. We agree that use of UL's name or symbol in connection with products which are not Listed, Classified or Recognized by UL or that the use of the information developed for any purpose other than that contemplated by this Application would mislead the public, and that breach of this contract in this respect could not adequately be compensated for in money damages. For these and other reasons we agree that, in the event of the violation of any of the terms and conditions of this Application, a temporary injunction may be issued at the instance of UL restraining us from further dissemination of the information or any reference to UL in any manner unless specifically authorized by UL, and any other relief which may be deemed appropriate. The granting or issuance of such temporary injunction shall not affect the right of UL to compensatory and punitive damages for the breach of this contract and shall be in addition to, and not in lieu of, any other rights and remedies provided by this contract.

EWK:sy

Applicant Please Do Not Modify Application

12. We agree that UL and its employees and agents shall have no obligation or liability for damages, including but not limited to consequential damages, arising out of or in connection with the use, or inability to use, the information resulting from this investigation. Accordingly, we agree to hold UL harmless and to defend and indemnify UL against any claim, loss, expense, cost, liability or damage, including reasonable attorney's fees, arising out of any use or misuse by us of UL's name or symbol or data and other information derived either directly or indirectly from this investigation or arising out of any violation by us of the terms and conditions of this Agreement.

13. We recognize that samples of products subjected to UL's examination and test program may be damaged or completely destroyed. Samples will be returned to us unless completely destroyed during the investigation or unless we specify in writing that they be junked or disposed of otherwise. Samples returned to us are to be insured for a nominal value unless our shipping notice or other documents accompanying the sample when received by UL specifies otherwise. We agree that UL is not responsible for damage to or loss of submitted samples while in transit.

14. We agree that UL in performing its functions in accordance with its objects and purposes does not assume or undertake to discharge any responsibility of the Applicant to any other party or parties. We recognize that the opinions and findings of UL represent its judgment given with due consideration to the necessary limitations of practical operation and in accordance with its objects and purposes and agree that UL does not warrant or guarantee the correctness of its opinions or that its findings will be recognized or accepted.

15. We recognize that many tests specified in the requirements of UL are inherently hazardous and agree that UL neither assumes nor accepts any responsibility for any injury or damage to our property or personnel that may occur during or as the result of tests, wherever performed, whether performed in whole or in part by the Applicant or UL, and whether or not any equipment, facility or personnel for or in connection with the test is furnished by the Applicant or UL, except when such injury or damage results solely from negligence on the part of UL's personnel.

16. It is recognized that, as an independent not-for-profit organization testing for public safety, UL will from time-to-time notify the public concerning products then or previously marketed, which its investigations and tests disclose are extremely dangerous and unsuspectedly hazardous.

17. UL will refrain, without the Applicant's prior authorization in writing, from voluntarily disclosing to third parties secret information which is obtained by UL in confidence from the Applicant and which is not already known to UL, already available to the public or subsequently acquired from other sources.

Applicant Kaempen and Associates
3202 Larkstone Drive, Orange, CA 92669
(Typed company name and address)

By ______________________ Date ______________
(Signature of Proprietor, Partner, or Auth. Officer — (Give title)

______________________ Applicant P. O. No. ______________
(Typed name of individual signing for company)

Applicant's Rep. Charles E. Kaempen To be executed not later than December 1, 1982

SPECIAL NOTES

1. Please instruct your shipping department to prepay carrier charges on samples and to mark packages PREPAID to avoid duplication of payment on delivery. Show value of samples on bill of lading or shipping document if other than nominal value insurance is desired on return of samples. Send bill of lading promptly for attention of Receiving Department, Underwriters Laboratories Inc. and show name of engineer with whom you have been dealing.

2. The check for Preliminary Deposit should be issued in the name of the company or individual submitting the application. In the event that the check is issued by a party other than the applicant, a letter from the signer of the check should accompany the application and should waive all rights to and interest in the benefits of the investigation conducted under the application.

UNDERWRITERS LABORATORIES INC.

333 PFINGSTEN ROAD NORTHBROOK, ILLINOIS 60062

an independent, not-for-profit organization testing for public safety

September 1, 1982

Kaempen Industries Inc.
Mr. Charles E. Kaempen
3011 S. Shannon
Santa Ana, CA 92704

Our Reference: MH8781

Subject: Nonmetallic Underground Storage Tanks for Petroleum Products

Dear Mr. Kaempen:

This letter is in response to your letter of July 16, 1982. With this letter we are enclosing a current copy of the Outline of Proposed Investigation for Glass Fiber Reinforced Plastic Underground Storage Tanks for Petroleum Products. While this will give you the basic information as to the investigation that would be anticipated, the specific investigation of any tank may vary, depending upon the design and construction employed.

Please note that these are tentative requirements used as a guide in our investigation of products of this type, and that no published Standard is available at this time. Details concerning materials and method of fabrication are not covered and our evaluation of a particular design is based upon performance during the various tests described. As of this date, the only nonmetallic tanks that we have Listed are formed of glass fiber reinforced polyester.

With reference to the earth load and external hydrostatic pressure tests, the requirements are based on a 3 ft depth of cover. If your tank is intended for a burial depth in excess of 3 ft, these tests would be modified accordingly.

As you will recall, the investigation includes physical exposure, and aging tests. Due to the size of the product and the specialized testing involved, it is anticipated that physical tests on the complete tank assembly would be conducted using facilities provided by the manufacturer.

These tests would probably be set up and run using one sample of a given size. More than one tank would be preferable, however, since otherwise a considerable amount of time can be lost in setting up the various tests. Such tests would be witnessed by an engineer from our Northbrook Office. The exposure and aging tests would be conducted at the UL Northbrook Office.

Depending upon your design, it may be possible that tests conducted on one size could be extended to similar smaller sizes without a complete series of additional tests. This would be true particularly if the diameter, wall thickness and other structural particulars remain unchanged. We would need further details in that regard before this can be definitely determined.

Should you wish to submit a particular tank design for investigation leading toward possible Listing and Follow-Up Service, it will be necessary to first conduct a preliminary review of drawings and specifications of your new tank design. The cost for this work is anticipated not to exceed $600.00, and applications to initiate this review are enclosed. A detailed description and drawings of your new tank design are required for this preliminary investigation. The preliminary review does not anticipate any testing and would be concluded with a Letter Report.

It is understood that your application will constitute your agreement not to use the name of Underwriters Laboratories Inc., any abbreviation thereof, of symbol therefore, nor to permit such use by others, in connection with the release, publication, or other dissemination, of the information obtained under this application, unless specifically authorized in writing by Underwriters Laboratories Inc.

The cost of the Listing investigation would normally be approximately $7500.00. This cost limit anticipates one diameter size and design of tank, one resin and glass system and one manufacturing facility being submitted, and a maximum of 5 days Out-Of-Office Engineering time for one engineer to visit your facility and witness the physical tests noted in our

Outline. It does not include the travel expenses for the engineer, or the costs you personally incur for the setting up and conducting the physical tests. Also, if you are submitting more than one diameter size, resin and glass system, or manufacturing facility, or if it requires more than five days for an engineer to witness the physical tests, it will be necessary to modify the above cost limit accordingly. This investigation would normally take 6 to 9 months to complete. Data which has been generated for you in the past will be used as much as possible to waive physical and exposure tests.

Very truly yours,

Steven C. Slowik

STEVEN C. SLOWIK
Associate Project Engineer
Casualty and Chemical
Hazards Department

Reviewed by:

John J. Hawley

JOHN J. HAWLEY
Engineering Group Leader
Casualty and Chemical
Hazards Department

SCS:gz

KAEMPEN & ASSOCIATES

REINFORCED PLASTICS ENGINEERING

3202 LARKSTONE DRIVE • ORANGE, CALIFORNIA 92669 • (714) 532-5787

September 26, 1984

Chairman of Board of Directors
Chief Executive Officer
Underwriters' Laboratories, Inc.
333 Pfingsten Road
Northbrook, Ill. 60062

Dear Sir:

I am enclosing a copy of the letter I sent today to Mr. John Hawley with whom I have a professional relationship of 14 years and who is perhaps the world expert on the subject of non-metallic underground storage tanks.

In order not to compromise his professional position or put him in a position of controvery I am copying you the correspondence I have with him concerning what is becoming a very serious question: Who is going to pay the costs resulting from leaking underground steel tanks?

There was a feature on 60 Minutes recently and increasing concern about handling wastes resulting from clean up of gasoline impregnated soil, etc.

I have not given this subject any publicity and do not intend to: my recommendation is strictly at this time directed only to UL and its management.

But I have, since 1964, been astonished at the continuing practice of encouraging (by label and listing service) installation of underground tanks which , when they corrode and leak, can cause such serious and expensive damage. UL is a leader in promoting safety: for this reason, and no other, I appeal again to do the public and others a basic important service:

> ESTABLISH RECOMMENDATIONS THAT EVERY UNDERGROUND STORAGE TANK SHOULD MEET REGARDLESS OF MATERIAL FROM WHICH IT IS MADE.

Just as an electrical conductor is best made of metal, so non-corroding articles should be non-metallic. Let's start using and specifying materials for service they are best suited.

I would appreciate your reply to this letter if not your agreement.

Thankyou.

Yours very truly,

Charles E. Kaempen

Charles E. Kaempen

KAEMPEN & ASSOCIATES

REINFORCED PLASTICS ENGINEERING

3202 LARKSTONE DRIVE • ORANGE, CALIFORNIA 92669 • (714) 532-5787

September 26, 1984

Mr. John Hawley/ John A. Cedervall

Casualty and Chemical Hazards Dept.
Underwriters" Laboratories, Inc.
333 Pfingsten Road
Northbrook, Ill. 60062

Dear John:

As you doubtless are aware the subject of "responsibility" concerning damage resulting from leaking underground storage tanks is "heating up" and I'm writing to you as a friend and supporter of Underwriters' Laboratories Inc., and its continuing program to help the public and the users of underground tanks obtain the best that technology can provide.

I am enclosing some copies of data I think bears on what I have to say: U.L. SHOULD CEASE TO LIST AND LABEL STEEL UNDERGROUND STORAGE TANKS.

Now that UL KNOWS that leaking steel underground storage tanks have caused and continue to cause incredible damage to water supplies and public health it must take, AS SOON AS POSSIBLE, action to disassociate its label and listing procedure with tanks that UL knows can corrode, leak and do harm to the environment. Cathodic protection does not prevent corrosion of steel from the inside according to Lem McManus, VP of Engineering of Marathon Oil Co., Findley, Ohio who is the world expert on internal corrosion (also the OC Hinchman study confirms this fact). All the propaganda from the Steel Tank Institute to the contrary, steel tanks are no longer suitable as underground storage containers because they leak. A fiberglass shell on the outside of steel is frequently ruptured during shipment and handling and cannot be inspected by holiday detectors since sparks only go the shortest distance. Chevron of Calif. learned this and refuses to use FRP coated steel for this reason.

If UL continues to list and label underground steel tanks knowing such tanks CAN and DO corrode and leak, it will be akin to putting itself in the position John Manville had when it was finally proven that asbestos was hazardous: UL would become a defendant in every single instance where a leaking underground steel tank has been found to produce damage. It (the liability) will go beyond the user to the "approval authority" upon whom the user relied. Obviously the entire premise of UL existence is "public safety"; need I say more?

I think you know that I have a good reputation with UL and the endeavor to make better underground storage tanks. You recall I took your admonition to make a composite underground tank tough enough you could hit it with a fireman pick ax and not destroy its ability to serve as a pressure tank (since so much damage was being done by handlers and installing contractors to FRP tanks). You also know I installed the first double-wall underground tank (used only for water to certify safely its competence as a storage tank) in Houston in 1977 and I am still awaiting the new specifications prepared by UL for double-wall secondary containment type underground composite storage tanks (which I hope you will send me .... i.e. the specifications and tests required of Owens Corning and Xerxes and others who make underground FRP tanks.)

For this reason I want you to know that I am suspicious of even other FRP tank fabricators: perhaps they want to make UL the "fall guy" in the event even their tanks don't serve as they should. I will not reveal which company, but it is a fact I can support with expert witness that making underground tanks without an impermeable flexible liner (as I recommend such as by use of a reinforced vinyl ester with 10% elongation property) and relying upon chopped strand construction only, produces tank shells that fail 10% of the time immediately after testing to a 6PSI vacuum .....failure is by pin hole leaking which requires internal sealing when the tank is double wall. In other words, I am still suspicious of the sealing integrity of chopped strand mat or chopped fiberglass: sealing relies upon manually working out air and the production process is thus far from satisfactory, despite the fact the shell is thick and rugged. The flexible liner, backed by the tightly woven 6 oz. glass fabric has proven to remain perfectly tight after 10 years of service in such places as University of Berkley and Loma Linda Univ. and Chevron station in Temple City, Calif.

Perhaps it is time for UL to really consider withdrawing its listing and label service on ALL underground storage tanks : at least it would spare the laboratory from being blamed for certifying a product meets a standard that is no longer easy to define: "the underground tank shall have secondary containment and shall never leak".

I want to reiterate the point I made in my last letter to you and to UL : I DON'T THINK IT IS DEFENSIBLE FOR UL TO HAVE A DOUBLE STANDARD ABOUT UNDERGROUND STORAGE TANKS: ALL LISTED TANKS SHOULD BE ABLE TO MEET THE SAME REQUIREMENTS FOR STRENGTH AND CORROSION RESISTANCE REGARDLESS OF THE MATERIAL FROM WHICH THEY ARE MADE.

If in future UL runs into legal problems, I want you to be able to refer to my admonition , suggestion and hopefully useful advice. Twenty years with this subject makes me somewhat expert.

Sincerely, Charles E. Kaempen

C. E. Kaempen

cc: Chairman of Board UL
Encl.: Copies

KAEMPEN TECHNOLOGY, INC.

3202 LARKSTONE DRIVE • ORANGE, CALIFORNIA 92669 • (714) 532-5787

December 3, 1984

Mr. J. A. Bono
President
Underwriters' Laboratories, Inc.
333 Pfingsten Road
Northbrook, Illinois 60062

References: Letter dated August 22, 1983 Bono to Kaempen

Letter dated August 23, 1983 Hawley to Kaempen

Letter dated Sept. 26, 1983 Hawley to Kaempen

Letter dated Oct. 25, 1984 Hawley to Kaempen with enclosure dated Oct. 12, 1984 Re; *Secondary Containment Underground Storage Ta*

Letter dated Oct. 26, 1984 Bono to Kaempen

Letter dated Nov. 28, 1983 from Owens Corning Market Manager, Edward C. Nieshoff to Mr. Bob Harris of Underwriters' Lab, Inc.

SUBJECT: A REQUEST THAT UNDERWRITERS' LABORATORIES, INC. ESTABLISH A UNIFORM PERFORMANCE STANDARD FOR ALL DOUBLE WALL UNDERGROUND STORAGE TANKS THAT MEET THE REQUIREMENTS FOR CORROSION PROTECTION ESTABLISHED IN SECTION 2-3.3 OF NFPA 30.

Dear Mr. Bono:

This letter refers to the subject matter of the above referenced letters which were written in response to my letters expressing concern that certain events have conspired to place UL in a position of attempting to justify the establishment of a double standard concerning the underground storage of flammable liquids per requirements established by NFPA 30 Fire Code.

Kaempen Technology, Inc. is a Louisiana corporation newly established to organize and direct the manufacture of non-metalli underground storage tanks which meet the requirements established by UL for double-wall composite (glass-reinforced thermosetting resin) tanks not only as regards construction specifications, but also as regards test and performance specifications.

My first request, therefore, is to receive the appropriate literature and forms by which we may make application for Listing and Labling service of Double Wall Composite Underground Storage Tanks suitable for storing petroleum products including alcohol blends (gasahol).

My second request is that Underwriters' Laboratories, Inc. give particular attention to paragraph 1 of Mr. Nieshoff's letter (referenced above) to Mr. Bob Harris of UL, and to paragraph 2 of Mr. Hawley's letter to me dated September 26, 1983.

The reason for referring to these paragraphs is that UL is on record as distinguishing between what they term a "CONSTRUCTION STANDARD", aptly defined by Mr. Hawley as "a standard written around widely used equipment that has been accepted by inspection authorities and covered by nationally accepted coded and Standards for a number of years", SUCH AS U.L. SUBJECT 58., and a "PERFORMANCI STANDARD" , again defined by Underwriters' Laboratories, Inc. (Hawley and Killoren) as "a standard written on the basis of the body of performance information compiled (from test programs developed by UL to satisfy the intent of new codes and standards as regards new products not previously anticipated or covered by such codes and standards)", SUCH AS UL SUBJECT 1316.

THE PRINCIPAL SUBJECT I WISH TO ADDRESS IN THIS LETTER IS A VERY URGENT REQUEST THAT UNDERWRITERS LABORATORIES RECOGNIZE THAT A DOUBLE WALL UNDERGROUND STORAGE TANK IS, BY UL DEFINITION, A "NEW PRODUCT" AND AS SUCH, SHOULD BE REQUIRED TO CONFORM TO A "PERFORMANCE STANDARD" SUCH AS UL SUBJECT 1316.

I shall not, in this letter, elaborate on the incredible number of engineering differences between a single wall and double wall underground structure, or on the many disadvantages that characteriz a double-wall steel tank, compared to a double-wall composite tank.

Which brings me to my third request, which is to refer to paragraph 4 of Mr. Nieshoff's letter to Mr. Harris. For some very strange reason, Underwriters' Laboratories, Inc. has allowed the use of the word "COMPOSITE" to identify steel tanks which are coated with fiberglass. The use by Joor and others to give, in their advertisements and literature the impression that a steel tank covered with fiberglass makes it a "COMPOSITE" tank is not only incorrect but unethical. As any member of the Society of Plastics Industry , Inc., can tell you, especially those of us who belong to the Reinforced Plastics/Composites Institute or who subscribe tc ASTM Journal of COMPOSITES, use of the word "COMPOSITE" these davs is more meaningful than the standard Webster Dictionary definition of "a compound" or that which is made up of various parts or elements. The word "Composite" , when referring to a material of construction is, without any question or ambiguity, defined as "fiber reinforcements surrounded by a bonding matrix".

In the common modern parlance of technology relating to materials, the word "COMPOSITE" does not imply a coating, but the basic structural material from which the composite product is made.

The U.S. Air Force Wright Patterson facility in Dayton, Ohio was the first to use the word composite extensively to refer to high performance fiber-reinforced materials, usually made from tensioned continuous filament reinforcements surrounded by a hardenable bonding matrix. I am enclosing copies from several sources, including the US Patent Office where this word commonly refers to the principal structural material, and not only a coating.

The UL Listing should , in the case of fiberglass coated steel tank: be specific in stating the tank structure is just that: a two-ply structure of firberglass and steel. Unless the load bearing structure is at least 75% by weight or volume comprised of fiber-reinforced matrix it is a misleading statement to assert that the UL tank is "COMPOSITE" or can be called a "COMPOSITE TANK".

Again, since the DOUBLE WALL UNDERGROUND TANK FOR STORAGE OF FLAMMABLE LIQUIDS is emerging as a new product, this is the time to not only clarify the situation concerning what tests should be met not only to qualify the underground tank but also as to what to call it. Just as the word Non-metallic has been used to describe fiberglass (a true composite material) for all intents and purposes , I think a careful review of the exact wording placed on the UL label must be made. It is what UL allows the tank to be called on the label that becomes the common parlance in the industry.

I think it is also just adding to the confusion to keep making exceptions for underground storage: UL should establish a single standard for the double wall tank (which has been legislated by public pressure to counter corrosion leaks) and identify it as being suitable for storage of all petroleum containing liquids commonly used by aircraft, boats and automobiles. A second category should be established for acid-containing hazardous wastes and chemicals, since codes other than NFPA 30 are now coming into force. If NFPA 30 codes had been properly established in the first place, we wouldn't have the current problem of environmental pollution from leaking petroleum storage tanks. But those of us in NACE were ignored when we pointed out that composite technolo(has made it possible not only to replace metals in aircraft and spacecraft, but also in many common structures such as pressure vessels, pressure pipe and tanks.

Finally, I Want to be on record as violently disagreeing with the UL definition of a double-wall tank as promulgated in its October 12, 1984 bulletin. I object specifically as follows:

1. The bulletin subject is "Secondary Containment Undergrou Storage Tanks" and very obviously has been prepared under pressure to reconcile different parts of the industry. What should have been made clear, from the beginning, is that a double wall tank IS A NEW PRODUCT WHICH WILL REQUIRE THE ESTABLISHMENT OF NEW PERFORMANCE STANDARDS (By U.L. own definition per Hawley)

2. A "wrapped tank" is presumed to be equivalent in performance to a double wall tank as regards secondary containment. This is patent nonsense:secondary containment is a euphemism for a double wall , two-wall, or multiple wall containment system, most easily understood when termed a "Double-wall Tank". Most especially, the same nonsense continues: if the tank is steel, there need be no "performance" standards with regard to corrosion resistance or physical strength to be met by the tank. A wrapped tank is still a single-wall tank and should require fabrication and performance specifications to be met. The idea that the so-called "COMPOSITE" tank is not a wrapped steel tank, and thus qualifies as a "non-metallic" tank (which nearly every composite material is in fact), is misleading and patently unethical if not illegal from a warranty point of view.

3. There is no objection to the portion of the definition of a double wall tank as "two tanks in one provided with a means for monitoring the annulus for a leak in either vessel"; what IS objectionable, is that UL refus to acknowledge that, by its own definition, the double wall underground tank IS A NEW PRODUCT AND THUS MUST MEET NEW PERFORMANCE STANDARDS. What is further objectionable, is the stated requirement that in order to obtain a UL Listing Mark, NO PERFORMANCE STANDARD must be met by the double wall steel tank or the double-wall "composite" (fiberglass wrapped steel tank), but that the fiberglass double-wall underground tank must meet the performance requirements established for the 1316 tank; that is, both the inner and outer tanks must be able to withstand a vacuum of -6 PSI and a pressure of 25 PSI as well as resist for 6 months without structural deterioration as many as 16 test solutions, many containing acids, salt solutions, etc.

4. U.L. proposes to establish a new "NON-PERFORMANCE" type standard concerning corrosion protection, when a standard for such corrosion protection has already been established as 1316.

KAEMPEN & ASSOCIATES

REINFORCED PLASTICS ENGINEERING

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PROFESSIONAL RESUME

CHARLES E. KAEMPEN
3202 Larkstone Drive
Orange, Calif. 92669

DATE BEGIN	DATE END	COMPANY AND DUTIES
Oct 1950	Oct 1952	SAAB AIRCRAFT COMPANY, LINKOPING,SWEDEN Structural Analysis and Design of Fuselage, Empennage and Engine Housing Structures and Controls
Oct 1952	Dec 1956	SIKORSKY HELICOPTER DIV. UNITED AIRCRAFT CORP.,Bridgeport Conn. Detailed Engineering Design and Analysis of Military and Commercial Helicopters, Including Design of Fuselage, Engine Mounting, Fuel and Control Systems. Worked directly with Dr. Igor Sikorsky in preliminary design of first turbine powered helicopters & taught maintenance & overhaul of Military helicopters
Jan 1957	Oct 1960	MISSILE DIVISION OF NORTH AMERICAN AVIATION, Downey, CAlifornia (Now the Space Systems Group of Rockwell International) Advanced Design Research in military ballistic missile systems, lunar base systems, lunar and planetary manned mission systems, including detail desig of boosters, payloads, operations, human factors and costs. Gave the firs paper on how to perform a manned lunar mission using space rendezvous AFTER escape from Earth (Oct. 1960);
Oct. 1960	Mar 1961	AMERICAN SPACE TRANSPORT COMPANY, INC. Seal Beach, California President and Founder; Presentations to NASA and military agencies about urgency and capability to beat Russia to the moon with a manned lunar mission
April 1961	Oct 1963	HUGHES GROUND SYSTEMS GROUP Hughes Aircraft Company, Fullerton,Ca Weapons & Space Systems Analyst
Oct. 1963	June 1964	NORTHRUP SPACE LABS, Hawthorne, Ca.

Dr. CHARLES E. KAEMPEN

PRESIDENT , KAEMPEN & ASSOCIATES

Dr Charles E. Kaempen is the inventor of the tensioned filament composite material known as "TENSORITE" as well as the equipment and processes used to make Tensorite pipe and tank products. These inventions and discoveries are the subject of patents granted to Dr. Kaempen by the United States and many foreign governments, including Mexico.

In 1964 Dr. Kaempen organized one of the first filament winding pipe companies to meet API Specifications for non-metallic oil field line pipe.

In 1973, after an eight year period of development, Dr. Kaempen began the manufacture and installation of the first filament wound non-metallic underground storage tanks to be listed with Underwriters' Laboratories, Inc.

In 1975 Dr. Kaempen developed and successfully tested the first filament wound double-wall underground pipe.

In 1977 the first double-wall Kaempen non-metallic underground storage tank was installed in Houston, Texas.

In 1978 Dr. Kaempen developed the first filament wound pressure vessel to meet the requirements of ASME Section X of the Boiler and Pressure Vessel Code.

In 1979 Dr. Kaempen designed equipment and developed manufacturing processes for making Tensorite pipe which meets all applicable standards established by API, ANSI, AWWA and ASME concerning pipe for use in transport of water, chemicals and liquid petroleum products.

In 1980 Dr. Kaempen invented and developed the equipment and processes to manufacture on site large above ground double-wall filament wound storage tanks with capacities from 10,000 to 500,000 barrels, diameters to 300 feet and heights to 42 feet.

In 1982 invented and patented a composite mechanical coupling and pipe joint to enable mechanical coupling of high pressure pipe (to 6000 PSI)

The one encouraging bit of information noted in the October 12, 1984 bulletin was the four sentence announcement on page 3 under the heading "LISTING MARK" which states that a new Listing Mark will identify tanks provided with secondary containment capabilities. I welcome the news that UL will establish a special Standard (Listing Mark) for double wall tanks and that the new standard will not be merely a "Construction" or "Manufacturing" standard that does not require the double wall tanks to be tested according to uniform physical and chemical resistant criteria as is the current practice with Subject 58 tanks

I also wish to advise UL through this letter that I will vigorously oppose the establishment of a double standard: one for steel and one for glass-fiber-reinforced plastic ESPECIALLY AS THE NEW UL STANDARD RELATES TO DOUBLE WALL UNDERGROUND TANKS WHICH POSSESS THE CORROSION PROTECTION REQUIRED OF NFPA 30 AND OTHER EMERGING STATE AND FEDERAL EPA LAWS CONCERNING CONTAINMENT OF HAZARDOUS LIQUIDS.

THE NEW STANDARD FOR DOUBLE WALL UNDERGROUND TANKS FOR THE STORAGE OF FUEL AND HAZARDOUS LIQUIDS MUST BE A PERFORMANCE STANDARD SUCH AS UL 1316 AND NOT A "PRODUCTION STANDARD" SUCH AS UL 58 WHICH IS NOW, FOR ALL INTENTS AND PURPOSES OBSOLETE IN USA.

My position on this matter remains exactly the same as I expressed to you in the fourth paragraph of my letter to you dated August 13, 1983 and more recently expressed in the next to last paragraphs in my letters to you and Mr. Hawley dated Sept.26,84.

The new requirements for secondary containment systems, can best be met by new underground storage tanks having a double wall construction. Such multiple-wall underground storage tanks should, regardless of the material of construction, meet the same performance criteria concerning corrosion resistance and physical strength. In particular, such double wall tanks should possess an inner and outer tank which can, when tested together as a double wall structure, resist a vacuum of at least -5.75 PSI and a pressure of at least 25 PSI and have an annular space surrounding the primary inner tank at least equal to one inch to permit adequate direct monitoring and measurement of any liquid contained within the annulus. Such tanks should also resist withou failure being placed on a level surface and filled , first with liquid only in the inner tank; second with liquid in both tanks and finally, with liquid in only the annular space. Such tests could be done on the job site or at the manufacturing site to qualify the tanks for structural and leak-free competence. A 5PSI aerostatic test in these three modes is not as severe, but would also be recommended as the minimum job site or fabrication site tes for any size double wall underground storage tank regardless of whether it is steel, fiberglass or any other structural material.

Thankyou for your kind attention to this matter and the courtesy of your reply.

cc: Hawley

UNDERWRITERS LABORATORIES INC.
333 PFINGSTEN ROAD · NORTHBROOK, ILLINOIS 60062
an independent, not-for-profit organization testing for public safety

December 19, 1984

Kaempen Technology, Inc.
Dr. C. E. Kaempen
3202 Larkstone Drive
Orange, CA 92669

Our Reference: Subject 58

Subject: Underground Storage Tanks

Gentlemen:

This is in reply to your December 3, 1984 letter addressed to Mr. J. A. Bono.

In response to the third paragraph of your letter, we will be pleased to send Application Forms for a preliminary investigation upon receipt of drawings, a detailed bill of materials, and the address at which the tanks are to be constructed.

We do not understand your concern over our use of the word "Composite" to identify a tank which is in fact constructed of different and distinct elements. Putting semantics aside, such a tank is, in fact, a composite. What we choose to call a tank has absolutely no bearing on its performance, on our test program, or most certainly on ethics. If the tank is not truly either a steel tank or a nonmetallic tank, what would you suggest we call it? Keep in mind, that terms such as "Coated" or "Clad" will refer to UL 58 tanks provided with a supplementary coating for corrosion protection only. Such coating will not be expected to provide any strength, as is the case with currently Listed composite tanks.

Apparently, you are confused regarding Underwriters Laboratories Inc.'s position on secondary containment. Our basic premise is that any method of providing secondary containment shall have provision for monitoring the space between the containments. A complete (360°) double-wall tank has this provision, and a wrapped-tank has the same provision for that portion which is wrapped (normally the lower 90 percent or so). Some state inspection authorities insist upon the 360° wrap, whereas others prefer the 330° wrap. We have a responsibility to consider both constructions. We agree that all such secondary containment tanks represent new constructions, and our October 12, 1984 Bulletin describes the steps which we take to evaluate each option.

We disagree with your statement that UL 58 is obsolete. A steel tank built to UL 58 specifications is a reliable vessel for the underground storage of fuels from the standpoint of strength. UL 58 was never intended as a specification for corrosion protection, since such protection was addressed by the nationally recognized installation code (NFPA 30). Since NFPA 30 was recently revised in that regard, UL has been asked to write a corrosion protection Standard for UL 58 type tanks. Such a Standard is in process, and as soon as it is adopted, our Listing Mark for steel tanks will state whether such tanks have a UL recognized protection provided or additional protection is to be provided, prior to installation. This will make it easier for the inspection authority to determine if the conditions now specified in NFPA 30 have been properly met.

In examining past correspondence, we feel that we have addressed the matter of evaluating steel tanks versus nonmetallic tanks. We will certainly try to comment on any additional views you may have.

Very truly yours,

John J. Hawley

JOHN J. HAWLEY
Assistant Managing Engineer
Casualty and Chemical
Hazards Department

Reviewed by:

EWKilloren

E. W. KILLOREN
Managing Engineer
Casualty and Chemical
Hazards Department

JJH:rd

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JUROE, DAVID JASON
Marriage, Family & Child Counselor,
b. Sept. 5, 1927, Des Moines, IA; s. Herman David and Esther (McClintock) Juroe; father, Herman D. Juroe engineered first railroad over Andes Mtns. in So. Amer.; Ph.D., Newport Internatl. Univ., 1978-79; Th.M., Eastern Baptist Theological Seminary, 1960; BD, Eastern Baptist Theological Seminary, 1952-55; BA, Houghton Coll., 1945-52; m. Bonnie Buzzell, Feb. 15, 1975; children: James, b. 1952; Judith, b. 1953; Janice, b. 1955; Julia, b. 1962; Jonathan, b. 1963; Wendy, b. 1964; Christy, b. 1967. Career: sr. pastor, Manayunk Baptist Ch., Philadelphia, PA, 1955-57; sr. pastor, Northfield Baptist Ch., Livingston, NJ, 1957-63; dir., Beth Sar Shalom, Wash., D.C., 1963-67; prof., Old Testament Studies, Capitol City Seminary, Wash., D.C., 1963-67; mng. editor, Christian Freedom Found., NY & L.A., 1967-75; licensed psychotherapist, Yorba Park Med. Group, 1975—; also conducts seminars and lectures on family living before schools, churches and civic clubs (many firms, clubs, etc.); lectr., Newport Univ., Psychotherapy and Counseling Procedures. Recipient: several speaking awards before civic or service clubs; Minister of the Year Award; Livingston, NJ, Livingston, NJ Ministerium, 1962. Mem.: Rotary Club of Orange, 1977—; Amer. Guild of Hypnotherapists, 1978—; Calif. Assn. of Marriage & Family Therapists, 1981; mem., Bd. of Behavioral Sci. Inst., 1978—; affiliate staff, Chapman Gen. Hosp. Staff, Orange, 1981; pres., New Jersey Baptist Ministers Counsil, 1963. Author of numerous articles in Applied Christianity and Christian Economics mags., 1971-75; Money, How to Spend Less and Have More, 1981; co-author: The Work Trap, 1979. Mil.: T/5, U.S. Paratroopers, 11th Airborne Div., 1946-48. Republican. Protestant, sr. minister. Rec.: sports, photography, traveling. Res.: 563 Kensington Rd., Orange 92669; Office: Yorba Park Med. Group, 2501 E. Chapman Ave., Orange 92669.

K

KABACK, AARON DAVE (aka) DAVE AARON
Video Tape Recording Company President
b. Oct. 13, 1942, Mt. Clements, MI; s. Bernard Robert and Roseabell (Nodler) Kaback; div.; children: Beverly, b. 1966; Kathy, b. 1968; Jason, b. 1976; Martin, b. 1978. Career: exec., Hub Furniture Stores, Compton, Baldwin Park, Alhambra, So. Gate (CA), 1968-71; retail sales, Sears, Roebuck & Co., Covina, 1971-72; Frank Shore Glass Co., gen. mgr., So. El Monte, CA, 1977-80; created Star Video Recording Service, June 1979. Awards: Video editors Hall of Fame Award, 1980; Internation Kung-Fu Assns. Video Camera Mans Natl. Award, 1980; Voted Video Camera Man of the Year, Internation Gourmet Chefs 5, Dec. 1980; voted All Amer. Photographer, Rowland Hts. Jr. San Gabriel Valley Football Assn., 1979. Mem.: founder, Valley Skiplanders, 1975-81; Natl. Video News Clipping Assn., v.p. 1980—. Co-inventor, Audio-Whizz. Mil.: Pfc., AUS, Expert Rifleman; U.S. Army Marksman .45 pistol. Rec.: chess, video, bowling, volleyball, mental games. Office: Star Video Co., P.O. Box 8571, Rowland Heights 91748.

KADZIELSKI, MARK ANTHONY
Lawyer
b. July 1, 1947, Cleveland, OH; s. Karl Aloysius and Ann Therese (Krol) Kadzielski; uncle, John Cardinal Krol, Archbishop of Philadelphia; AB, magna cum laude, John Carroll Univ., 1968; JD, Univ. of Penn., 1976; Ph.D., candidate in Amer. Hist., Univ. of Penn.; m. Marilyn Elizabeth Manis, Dec. 17, 1977; children: John Joseph, b. 1979. Career: assoc. dir., Grad. Housing and Asst. dean of the Faculty of Arts and Scis., Univ. of Penn., 1974-76; atty., Lawler, Felix & Hall, L.A., 1976-78; atty., Buchalter, Nemer, Fields, Chrystie & Younger, 1978—; also prof. of law, Univ. of W. L.A. Sch. of Law, 1980—; academic counselor, UWLA Sch. of Law, 1978—. Mem.: ABA; Amer. Soc. for Legal History; Fed. Bar Assn.; Town Hall of Calif., secty. of Sect. on Legislation and Adminstrn. of Justice; L.A. Co. Bar Assn., mem. Editorial Bd. of the L.A. Lawyer; Calif. State Bar, v.-chmn. Committee on the History of Law in Calif. Author of four major articles and numerous book reviews in the ABAJ. Mil.: Capt., USAR, awarded, Order of the Soc. of the Cincinnati and Distinguished Military Grad. Independent. Roman Catholic. Res.: 14641 Ostego St., Sherman Oaks 91403; Office: Weissburg & Aronson, 2049 Century Park East, Los Angeles 90067.

KAEMPEN, CHARLES EDWARD
President, Tensorite International Inc.,
b. Mar. 10, 1927, Quincy, IL; s. Charles Herman and Margo Mary (Gochicoa) Kaempen; BS, Univ. IL, 1950; MSc., Internatl. Acad. of Astronautics, Paris, 1960; DSc., Internatl. Acad. of Astronautics, 1964; post grad., USC, 1957-59; m. Inger Nystrom, Aug. 5, 1951; children: Charles Robert, b. 1952; Donald Michael, b. 1955; Annette Earline, b. 1957; Laura Inger, b. 1972. Career: pres., Tensorite Internatl. Inc., Fountain Valley, 1980—; pres., Kaempen Industries, Inc., Santa Ana, 1969-80; sr. research engr., Baker Oil Tools, Inc., L.A., 1968-69; pres., Amer. Space Transport Co., Fullerton, 1964-68; lunar systems analyst, Northrop Space Lab, Hawthorne, 1963-64; staff sci., Hughes Aircraft Ground Systems, Fullerton, 1961-63; space mission analyst, Rockwell Internatl., Downey, 1957-61; group leader preliminary design, Sikorsky Helicopter, Stratford, CT, 1952-57; designer, SAAB Aircraft Co., Linkoping, Sweden, 1950-52; cons. to Govs. Office, Wyo. re.: Future Indsl. and Indsl. Developments relevant to State of Wyo., 1963-65. Chmn., Internatl. Astronautical Congress, 1964, Warsaw. Mem.: Amer. Soc. of Mech. Engrs., 1980; Amer. Geophysical Union, 1967; Internatl. Astronautical Fedn., 1960; fellow, Amer. Inst. Aeronautics and Astronautics, 1958; Natl. Assn. Corrosion Engrs., 1969; Soc. of Aerospace Materials and Processes, 1969; AF&AM, 1955. Holder of patents and technical papers on reinforced plastics given in US and foreign countries; inventions relate to advanced high pressure composite filament wound pipe, tank and structures. Mil.: AUS 94th Field Artillery Battalion, 1944-47. Republican. Protestant. Rec.: writing, public speaking, mountain climbing. Res.: 3202 Larkstone Dr., Orange 92669; Office: Tensorite International Inc., 3011 S. Shannon, Santa Ana 92704.

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Director, Counseling Associates of Encino
b. Oct. 22, 1940, Glendale, CA; s. Lawrence Elbert and Theresa S. (Helfend) Kagan; MA, Calif. State Univ., Northridge, 1974; BA, UCLA, 1962; Ph.D. program, Univ. for Humanistic Studies, —; children: Kathy Ann, b. 1964; Stacy Anne, b. 1967. Career: dir., Counseling Assocs. of Encino, 1978—; dir., San Fernando Valley Psychotherapy Information and Referral Service, 1978—; acting dir., Amer. Inst. of Family Rels., Woodland Hills Branch, 1978; dir., COntinuing Edn., Evaluation & Training Inst., L.A., 1979-80; also lectr., family counseling, educational psychology dept., Cal. State Univ., Northridge; oral examination commnr., Calif. Bd. of Behavioral Sci. Examiners, 1981. BA degree awarded with highest honors from UCLA, 1962; Master's Thesis: Female Sexuality, accepted with honors, Calif. State Univ., Northridge, 1973. Mem.: Calif. Assn. of Marriage and Family Counselors; Amer. Assn. of Marriage and Family Therapists; So. Calif. Psychotherapy Affiliation; Sierra Club; Natl. Health Fedn. Democrat. Jewish. Rec.: hiking, camping. Res.: 4821 Beeman Ave., No. Hollywood 91607; Office: Counseling Assocs. of Encino, 16200 Ventura Blvd., Suite 323, Encino 91436.

KAGIN, SOLOMON STEPHEN
President,
Real Gas and Electric Company, Inc.
b. May 16, 1946, Des Moines, IA; s. Arthur Meyer and Henrietta (Spitz) Kagin; attended S.F. Art Inst., 1968-69; Brooks Inst., 1966-68; Ill. Inst. of Tech., 1964-66; m. Lorraine Gooseman, 1976; children: Jeremiah, b. 1976. Career: pres., founding shareholder, Real Gas & Electric Co., Inc., Guerneville, CA, 1979—, Santa Rosa 1975—; also founding dir., 1st v.p., AWEA, 1973. Mem.: Amer. Wind Energy Assn.; Electric & Gas Industries Assoc.; Calif. Solar Energy Industries Assn.; Solar Energies Industries Assn.; Better Business Bureau; Amer. Natl. CofC; Sonoma Co. CofC; Assn. of Energy Engrs.; No. Coast Solar Bldrs. Assn. Author, publ., A Buyer's Guide To Wind Power, 1978; patent holder, Sine-Sync Inverter, 1980. Jewish. Rec.: photography. Office: Real Gas & Electric Company, 278 Barham Ave., Santa Rosa 95401.

KAHAN, JOSEPH
Structural Engineer
b. Aug. 7, 1931, Bucharest, Romania, nat. 1968; s. Chaim and Sabina (Roller) K.; B.S., Civil Engring, Hydraulic constrn., Polytechnic Inst. of Bucharest, 1950; M.S., City Coll. of N.Y., 1968; grad. Prestressed Concrete Inst., 1971; Univ. Calif. Ext., S.F., 1975; married; one child. Career: Structural Designer to Sr. Structural Designer, Central Design Inst. for Chem. Indus., Bucharest, 1955-63; Structural Project Engr. in U.S., 1963—; Baskam & Chester, Consulting Engrs., Hicksville, L.I., N.Y., 1963-70; I. C. Cantor, N.Y.C., 1970-74; Singmaster & Breyer (Indsl. & chem. process engrs.), N.Y.C., 1974-75; Fluor Utah Inc., (Indsl. & mining contr., cons. engrs.), San Mateo, Ca. 1975-76; C. F. Braun & Co. Engrs. (Petrochem. cons. engrs. & contr.), Alhambra 1976-77; Burns & Roe, Pacific Inc. (Indsl. & power plant engrs., contr.), Los Angeles, 1977-78; Holmes & Narver, Inc., Engineers, Constructors, Orange, 1978—. Designer, gen. contractor, contemporary res., L.I., N.Y., 1973-74. Mem. Alumni Assn., City Coll. of New York, Am. Soc. of Civil Engrs. Res. 337 S. Silverbrook Dr., Anaheim 92807. Office: Holmes & Narver Inc., Engineers, Constructors, 999 Town & Country Rd., Orange 92668.

KAHN, EDWIN WALTER
Construction Company President
b. June 3, 1922, Pittsburgh, PA; s. Theodore and Helen Henrietta (Meyers) Kahn; BS, UC Berkeley, 1948; m. Arleen Rudolph, Dec. 23, 1951; children: Gregory, b. 1952; Julie, b. 1955; David, b. 1956. Career: civil engr., Gen. Engring. Service Co., L.A., 1948-50; chief structural designer, 1950-54; partner, Pollack-Kahn & Assocs., L.A., 1954-56; partner, Mogil-Kahn Constrn. Co., L.A., 1956-60; pres., Kahn Constrn. Co., L.A., 1960—; also cons. civil engr., 1948—. Mem.: Amer. Soc. of Civil ENgrs.; Amer. Concrete Inst.; Town Hall of Calif.; L.A. World Affairs Council; Inter-Amer. Soc.; Natural Hist. Museum Alliance; Smithsonian Assocs.; Air Force Assn.; Aircraft Owners & Pilots Assn.; Cousteau Soc.; Varsity Club, UCLA; Mason; Scottish Rite; Shriner. Mil.: Lt., USAAF, pilot instr., 1942-45. Rec.: flying, traveling, camping. Res.: 13029 Mindanao Way, Apt. 3, Marina del Rey 90291; Office: Kahn Constrn. Co., 1535 6th St., Suite 105, Santa Monica 90401.

KAHN, KENNETH
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, ROBERT STEVEN, theatre critic, advt. sales rep.; b. New a., Nov. 3, 1947; s. Michael Joseph and Anna Marie J.; student Inst. Computer Mgmt., Pitts., 1965, Electronic ' Programming Inst., West Covina, Calif., 1968-69. Jr. programmer Pascoe Steel Corp., Pomona, Calif., 1968-72; ion adminstrn. dept. Occidental Life Ins. Co., Los Angeles, data processing mgr. Carpet Town, Inc., Los Angeles, *advt. sales rep. Data-Boy mag., 1980—. State co-chmn.* nan Rights Advs., 1978; 3d v.p. Stonewall Democratic Club, eles, 1978-80. Theatre critic Showcase Mag., 1973-76, n, Newspaper, 1976-77, Encore newspaper, 1977, Civic Star r, 1977-78, Data-Boy mag., 1978—. Home: 1348 N Curson Los Angeles CA 90046

ONALD ANDREW, med. facilities adminstr.; b. Chgo., 934; s. Andrew Anthony and Arielle Donna (LaVoy) J.; s. State U., 1956-58; m. Ruth Catherine Brunette, June 7, dren—Andrew John, Pamela Ruth. Painting and decorating , Chgo., 1956-59; *painter, glazier Stanford U., 1959-67,* ice coordinator, inspector, 1967-71, maintenance supr., work measurement analyst, 1975-76, asst. ops. mgr., facilities projects mgr., 1977-79, asso. dir. facilities Med. 979—. Served with USAF, 1952-56. Mem. Am. Mgmt. .n. Phys. Plant Adminstrs., Pacific Coast Assn. Phys. Plant , Democrat. Roman Catholic. Club: Elks. Office: Stanford :nter Room E002 Stanford CA 94305

HRISTIAN LEROY, fin. and engring. cons.; b. Kenosha, 4, 1928; s. Harald Christian and Gertrude Emma (Schulz) Engring., Johns Hopkins U., 1950; *M.S. in Fin. and Econs.*, 953, Ph.D., 1955; m. Mary Lorraine Nathe, Oct. 22, 1954; Paul, Ann. Engr., Johnson Mfg. Co., Balt., 1946-50; ashier fgn. dept. Bank Am., Internat., N.Y.C., 1950-55; t and fin. engr. ARCO, Los Angeles, also dir. adminstrn. esearch Corp., Pasadena, Calif., 1955-60; propr. Fin. Cons., West Covina, Calif., 1960—. Mem. adv. and youth Angeles County Dist. Atty., 1965—; pres. West Covina 1965-67, 81-82, Republican Assembly San Gabriel-Pomona 71-73; advisor Nat. Commn.-Youth in Action, 1976—, Nat. mmn., 1981—. Recipient numerous awards for civic fem. Am. Inst. Econ. Research, Nat. Assn. Accountants, try Engrs., West Covina C. of C. (dir., Ambassador of Yr. nan Catholic. Home: 3133 Sunset Hill Dr West Covina CA ce: 652 Sunset Suites 208-215 West Covina CA 91790

, LARRY, engr.; b. Borger, Tex., May 11, 1955; s. Dane Audrey Maxine J.; B.S., Tex. A&M U., 1978; m. Rebecca nitt, Dec. 30, 1977. Product planning and devel. engr. Research, College Station, Tex., 1976-77; partner :ven Cons., College Station, 1977-78; acctg. coordinator :h div. Honeywell, Salt Lake City, 1978-80, product 1980, field sales engr., 1980—. Republican. Methodist. . Home: 826 E Scirlein Sandy UT 84070 Office: 400 Dr Salt Lake City UT 84115

MANUEL J., univ. ofcl.; b. Havana, Cuba, Dec. 26, 1948; .S., 1961, naturalized, 1967; s. Manuel L. and Elena O. ., Emporia State U., 1970, M.S., 1972; Ph.D., So. Ill. U., obin Read, Oct. 2, 1976. Program officer Lilly Endowment ; 1974-76; prin. investigator So. Ill. U. Research Project on :ms., Carbondale, 1976-77; asso. dir. Multicultural Edn. ill. Edn., U. N.Mex., 1977-78, prof., dir. Latin Am. n edn., 1978—; exec. dir. Border Jr. Coll. Consortium, :. Jr. Coll., 1977—. Bd. dirs. All Faiths Receiving Home, lbuquerque Opera Theater, 1979—. Served to 1st. lt. U.S. 3-76. Mem. Am. Edn. Research Assn., Pi Gamma Mu. 0 Artesanos Ct NW Albuquerque NM 87107 Office: Latin ms in Edn U N Mex Albuquerque NM 87131

ELAINE, counselor/cons.; b. Phila., Feb. 22, 1939; d. Sol Zitman; student Pa. State U., 1956-58; B.A., Temple U., ., Calif. State U., 1977; children—Douglas, Stephen, Tchr. English, Sayre Jr. High Sch., Phila. Public Schs., hr. English and history Beth Rifloh Pvt. Day Sch., Balt., gmt. cons., trainer Sandra Winston Assos., Palos Verdes, 5—; counselor Career Planning Center and Mid-Life ig Beach City Coll., 1977-78, instr. in assertion tng. coll. dir. program devel. Univance Career Centers, Inc., Los 178-80; pvt. practice counseling and consulting, 1980—; ienter, various classes, UCLA Extension, coordinator vel. Career Planning Program, 1980—. Pres. Palos Verdes /, 1974-76, chairperson, lectr. Speaker's Bur., 1977—; chpt. Nat. Women's Polit. Caucus, 1973, 78; bd. dirs. lt Edn. Programs, Palos Verdes, Calif., 1974—, cert. coll. life counselor, Calif.; cert. tchr., Pa. Mem. Calif. nd Guidance Assn., *Calif.* Career Guidance Assn., Nat. ile Execs., Am. Soc. Tng. and Devel., Phi Kappa Phi. 3 Via Barri Palos Verdes Estates CA 90273 Office: 24222 Blvd Suite B Torrance CA 90505

, EVAN MORGAN, physician; b. Soda Springs, Idaho, 306; s. Ellis and Ida (Sarver) K.; B.S. with distinction, 327; M.D., Harvard, 1930; m. Lois Louise Lynch, Oct. 2, en—Ellis N., Alvin E. Intern Los Angeles County Hosp., ...

Co., Soda Springs. Mem. Idaho Bd. Med. Examiners, 1937-39. Mem. Idaho Senate, Bear River Interstate Compact Commn., 1965-67, Idaho Water Resource Bd., 1967-69. Served to comdr. USNR, 1942-45. Mem. Phi Beta Kappa. Club: Arid (Boise, Idaho). Contbr. articles to profl. jours. Research in carcinoma of the prostate. Co-developer Caulk-Kackley transurethral resectoscope, 1934; active nat. sponsor for creation of U.S. Grayslake (Idaho) Nat. Wildlife Refuge. Home: 2323 Ellis Ave Boise ID 83702

KADARKAY, ARPAD ANDREW, educator; b. Kesztolc, Hungary, Dec. 20, 1934; s. Arpad and Paula (Hertlik) K.; came to U.S., 1963, naturalized, 1969; B.A., U. B.C. (Can.), 1963; M.A., UCLA, 1965; Ph.D., U. Calif. at Santa Barbara, 1971; m. Leone Marshall, June 24, 1961; children—Andrea, Marcella, Arpad Andrew. Teaching asst. U. Calif. at Santa Barbara, 1965-67, lectr., 1970-71, asst. prof. polit. sci., 1976-78; asso. prof. U. Puget Sound, Tacoma, Wash., 1979—; asst. prof. Occidental Coll., Los Angeles, 1971-75; mem. adv. bd. Am. Bibliog. Center, 1978—. Served with Hungarian Air Force, 1954-56. Internat. Research and Exchange fellow, 1969-70, 80—. Mem. Am. Polit. Sci. Assn., Am. Legal and Polit. Philosophy Assn. Contbr. articles to profl. jours. Home: 6712 Topaz Ct SW Tacoma WA 98498 Office: U Puget Sound Tacoma WA 98416

KADEY, FREDERIC LIONEL, JR., geologist; b. Toronto, Ont., Can., June 21, 1918; s. Frederic Lionel and Catherine (Davies) K.; came to U.S., 1925, naturalized, 1944; B.S., Rutgers U., 1941; M.A., Harvard, 1947; m. Brenda Boocock, Oct. 7, 1950; children—Brenda Catherine, Frederic Lionel III. Teaching fellow Harvard, 1946-47; field geol. asst. Sinclair Oil Co., Casper, Wyo., 1946; petrographer U.S. Steel Corp. Research Center, Pitts., 1947-51; mineralogist Johns-Manville Corp. Research Center, Manville, N.J., 1951-66, chief fillers research sect., 1966-71, research asso. geology, 1971-72, exploration mgr. internat. div., Denver, 1972-73, exploration mgr. mining group, 1973—. Pres., Chester Twp. (N.J.) Taxpayers Assn., 1957-61; mem. Chester Twp. Bd. Edn., 1961-68, pres., 1965-67. Served with AUS, 1941-45. Decorated Croix de Guerre. Fellow AAAS; mem. Am. Inst. Profl. Geologists (pres. N.Y. sect. 1967-68), Am. Inst. Mining Engrs. (chmn. program com. indsl. minerals div. 1969, chmn. Hal Williams Hardinge award com. 1975—), Soc. Mining Engrs. (dir. 1977—, chmn. indsl. materials div. 1977-78, program chmn. 1980-81), Mineral Soc. Am., N.Y. Acad. Sci., Nat. Def. Exec. Res., Alpha Sigma Phi. Republican. Episcopalian (vestryman). Patentee perlite processing. Contbr. articles to profl. jours. Home: 7653 S Rosemary Circle Englewood CO 80112 Office: Johns-Manville Corp Ken-Caryl Ranch Denver CO 80217

KADIN, MARSHALL EDWARD, hematopathologist; b. Milw., July 19, 1939; s. George and Mildred (Goldberg) K.; B.A., Northwestern U., 1961, M.D., 1965; m. Martha LuClare Hutchinson, June 15, 1980. Intern, Milw. County Gen. Hosp., 1966, resident in pathology Barnes Hosp., Washington U., St. Louis, 1967-68; NIH fellow in surg. pathology Stanford (Calif.) U., 1969-70; fellow in clin. hematology U. Calif., San Francisco, 1972-73, asst. prof. medicine, clin. pathology and research asso. Cancer Research Inst., 1974-77; asso. prof. pathology and lab. medicine U. Wash., Seattle, 1977—, adj. asso. prof. medicine, 1981—; asso. Fred Hutchinson Cancer Center, Seattle, 1980—. Served to maj. M.C., U.S. Army, 1970-72. Decorated Bronze Star; diplomate Am. Bd. Pathology. Mem. Soc. for Hematopathology, Am. Assn. for Cancer Research, Am. Soc. Hematology, Am. Soc. Cytology, Internat. Acad. Pathology, Acad. Clin. Lab. Physicians and Scientists, Phi Beta Kappa. Republican. Jewish. Contbr. articles to profl. jours.; editor: (with Sam Newcom) Diagnosis and Management of Hematologic Malignancies, 1981. Home: 5711 61st St NE Seattle WA 98115 Office: Dept Lab Medicine SB 10 Univ of Wash Seattle WA 98195

KADLECEK, JAMES, state senator; b. Sterling, Colo., Aug. 18, 1937; student Colo. State Coll., 1955-58; m. Linda Kadlecek; children—James, Kathryn. Engaged in real estate, constrn. bus.; mem. Colo. Senate from dist. 28, 1974—; mem. Colo. Gov.'s Com. on Higher Edn. Mem. Rocky Mountain Corp. for Public Broadcasting; bd. dirs. Greeley Concerts Assn. Mem. Colo. Homebuilders, Colo. Realtors, Greeley C. of C. (past dir.). Democrat. Club: Kiwanis. Office: PO Box 926 Greeley CO 80631*

KADO, CLARENCE ISAO, molecular biologist; b. Santa Rosa, Calif., June 10, 1936; s. James Y. and Chiyoko Kado; B.Sc., U. Calif., Berkeley, 1959, Ph.D., 1964; m. Barbara M. Kawahara, June 30, 1963; children—Deborah M., Diana M. Research asst. Virus Lab., U. Calif., Berkeley, 1960-64, NIH postdoctoral fellow, 1964-67, asst. research biochemist, 1967-68; asst. *prof. dept. plant pathology U. Calif. Davis*, 1968-72, asso. prof., 1972-76, prof., 1976—. Recipient Bronze medal for virus research WHO, 1968; NATO sr. fellow, 1974-75; NIH grantee, 1968-81; Am. Cancer Soc. grantee, 1969-73. Mem. AAAS, N.Y. Acad. Sci., Am. Phytopath. Soc., Genetic Soc. Am., Am. Soc. for Microbiology, Am. Soc. Biol. Chemists, Sigma Xi. Clubs: Fedn. Fly Fishers, Fly Fishers Davis (dir., pres.). Author: Principles and Techniques in Plant Virology, 1972; contbr. articles to profl. jours. Home: 1106 Villanova Dr Davis CA 95616 Office: Dept Plant Pathology U Calif Davis CA 95616

KADZIELSKI, MARK ANTHONY, lawyer; *b. Cleve., July 1, 1947;* s. Karl Aloysius and Ann Therese (Krol) K.; A.B. magna cum laude, John Carroll U., Cleve., 1968; J.D., U. Pa., 1976; m. Marilyn Elizabeth Manis, 1977; 1 son, John Joseph. Admitted to Calif. bar, 1976, since practiced in Los Angeles; atty. firm Weissburg & Aronson, 1981—; acad. counselor U. West Los Angeles Law Sch., 1978—, prof. law, 1980—; sec. sect. legislation and adminstrn. of justice Town Hall Calif., 1977-81, v.p., 1981—. Served as officer USAR. Mem. Am. Bar Assn., State Bar Calif. (chmn. history of law com. 1981—), Am. Soc. Legal History, Los Angeles County Bar Assn., Fed. Bar Assn., Alpha Sigma Nu, Phi Alpha Theta. Author Articles in field. Articles editor Los Angeles Lawyer, 1981—. Address: 2049 Century Park East Suite 3200 Los Angeles CA 90067

KAELKE, MARYLOU LOUISE, crisis intervention specialist; b. Youngstown, Ohio, Jan. 3, 1945, d. Ralph Myers and Mary Lucille (DeCarlo) Bloomingdale; A.B. in Psychology, Ariz. State U., 1968, M.Counseling, 1975. Detention supr. Maricopa County Juvenile Probation Dept., Phoenix, 1967-68, counselor Concentrated Employment Program, 1968-70, counselor Upward Bound, 1972; counselor, tchr. Bur. Indian Affairs, Sacaton, Ariz., 1972-73, Police Dept., Scottsdale, Ariz., 1977—; also lectr. Task force, steering com. severely mentally disturbed; grief workshop Interfaith Counseling Service; bd. student-faculty relations; bd. dirs. Tempe (Ariz.) Boys and Girls Club; liaison bd. dirs. Camelback Mental Health Center, Scottsdale. Mem. Am. Personnel and Guidance Assn., Am. Psychol. Assn., Nat. Employment Counselors Assn., Am. Bus. Women's Assn., Animal Welfare League, Fraternal Order Police Aux., Soc. Prevention Cruelty to Animals, Psi Chi, Phi Lambda Theta. Clubs: Daughters of Diana, Tau Kappa Epsilon Aux. (v.p.). Office: 3739 Civic Center Plaza Scottsdale AZ 85251

Argonne (Ill.) Nat. Lab., 1955-72, Westinghouse Electric Corp., Madison, Pa., 1972-74, C.F. Braun & Co., Murray Hill, N.J., 1974-77, TRW, Inc., Redondo Beach, Calif., 1977-80, Basic Tech., Inc., Manhattan Beach, Calif., 1980—; lectr. heat transfer U. So. Calif. Served with USNR, 1943-44. Mem. Am. Soc. Chem. Engring., Am. Nuclear Soc., Sigma Xi, Phi Lambda Upsilon. Jewish. Editor Advanced in Enhanced Heat Transfer, 1979; also profl. proc.; contbr. articles to profl. jours. Home: 20939 Anza Ave Apt 370 Torrance CA 90503 Office: 806 Manhattan Beach Blvd Manhattan Beach CA 90266

KAEMPEN, CHARLES EDWARD, mfr. fiberglas pipe and tanks; b. Quincy, Ill., Mar. 10, 1927; s. Charles H. and Margo (Gochicoa) K.; *student Stanford, 1945-46, Mexico City Coll., 1946-47; B.S., U. Ill.*, 1950; postgrad. U. So. Calif., 1957-59; D.Sc., Internat. Inst. Astron., Paris, 1964; m. Inger Margarete Nystrom, Aug. 5, 1951; children—Charles Robert, Donald Michael, Annette Earline, Laura Inger. Sr. designer Saab Aircraft Co., Linkoping, Sweden, 1950-52; design analyst Sikorsky Helicopter, United Aircraft, Stratford, Conn., 1952-56; space mission analyst N.Am. Rockwell, Downey, Calif., 1957-60; staff scientist Hughes Aircraft, Fullerton, Calif., 1961-63; lunar systems analyst Northrop Space Lab., Hawthorne, Calif., 1963-64; pres. Am. Space Transport Co., Tustin, Calif., 1964-66; transport systems analyst Dashaveyor Co., Venice, Calif., 1966-67; pres. Kaempen & Assos., Fullerton, 1967-68; sr. research engr. Baker div. Baker Oil Tools, Inc., Los Angeles, 1968-69; pres. Kaempen Industries, Inc., Santa Ana, Calif., 1969-80, Tensorite Internat. Inc., Fountain Valley, Calif., 1980—. Served with AUS, 1944-47. Fellow Am. Inst. Aeros. and Astronautics; mem. Am. Astronautical Soc. (sr.), Am. Geophys. Union, Internat. Astronautical Fedn. (mem. spl. sessions 1960—, chmn. 1964-65), ASME, Soc. Plastics Industries. Republican. Lutheran. Mason. Patentee in field. Home: 3202 Larkstone Dr Orange CA 92669 Office: 3011 Shannon Way Santa Ana CA 92704

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KAISER, E(DGAR) F(OSBURGH), business exec.; b. Spokane, Wash., July 29, 1908; s. Henry J. and Bessie (Fosburgh) K.; student U. Cal., 1927-30, L.H.D. 1969, LL.D., U. Portland, Pepperdine Coll. Mills Coll.; m. Sue Mead, Aug. 24, 1932; children—Carlyn, Becky, Gretchen, Edgar Fosburgh, Henry Mead, Kim John. Constrn. supt. natural gas line Kan. to Tex., 1930-32; shift supt. Boulder Dam, Nev. 1932-33; adminstrn. mgr. Columbia Constrn. Co., Bonneville (Ore.) Dam, 1934-38, Consol. Builders, Inc., Grand Coulee Dam, Wash. 1938-41; v.p., gen. mgr. Ore. Shipbldg. Corp. and Kaiser Co., Inc. Portland, Ore., and Vancouver, 1941-45; pres., dir. Kaiser Motors Corp., 1945-56; chmn., dir. affiliated Kaiser cos. and subsidiaries including Kaiser Industries Corp., Kaiser Steel Corp., Kaiser Aluminum & Chem. Corp., Kaiser Cement & Gypsum Corp., Kaiser Aerospace & Electronics Corp., Kaiser Broadcasting Corp., Kaiser Engrs., Inc.; chmn., pres. Nat. Steel & Shipbldg. Co. Mem. Symphony Orch. Assn., San Francisco Opera Co. Vice pres. bd. dirs. Oakland-Alameda County Coliseum; bd. dirs. Oakland Mus. Assn. vice chmn., trustee Stanford Research Inst.; trustee San Francisco Bay Council; chmn., bd. dirs. Kaiser Found. Hosps., Kaiser Found. Health Plan, Inc.; trustee, bd. dirs. numerous schs. and orgns. Recipient numerous awards and honors. Mem. Am. Ordnance Assn., Am. Soc. C.E., Soc. Naval Architects and Marine Engrs., Assn. U.S. Army. Clubs: Automobile Old Timers, Arlington, Bohemian, Claremont Country, Commonwealth of Cal., Marco Polo, 1925 F Street, Pacific-Union, Seattle Yacht, Beavers, Moles, Internat. Home: Lafayette CA 94549 Office: 300 Lakeside Dr Oakland CA 94604

KAISER, HARRY DEAN, county ofcl.; b. nr. Custer, S.D., Au[illegible] 1930; s. Tobias Harry and Elizabeth (Cullum) K.; grad. high sc[illegible] Rancher, Mule Creek, Wyo., 1946-54, 57-63; bookkeeper, Berman Lumber Co., Newcastle, Wyo., 1954-57; radio operator Police Dept. Newcastle, 1963-64, treas. Weston County, Newcastle, 1964 . Treas., Weston County Predatory Animal Bd., 1964-71, Weston County Emergency Council, 1970-71, Northeastern Wyo. Recreation Camp, Newcastle, 1965 . Bd. dirs. Weston County United Fund. Wyo. Arthritis Found. Mem. Wyoming County Treas.'s Assn. (pres. 1968, 69), Wyoming County Ofcls. Assn. (bd. dirs. 1968, 69). Lion. Home: 120 6th Av Newcastle WY 82701 Office: PO Box 57[illegible] Newcastle WY 82701

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(8th Edition—1968-69)

A BIOGRAPHICAL DIRECTORY OF EMINENT LIVING LEADERS IN SCIENCE RESEARCH, INDUSTRIAL, GOVERNMENTAL, AND EDUCATIONAL SCIENTIFIC FIELDS IN THE UNITED STATES AND CANADA

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KABARA, JON JOSEPH (PH.D.), Prof. of Chem., Univ. of Detroit, Detroit, Mich. 48221. Home Add.: [illegible] Thorncliffe, Southfield, Mich. 48075. PHARMACOLOGY; BIOCHEMISTRY; CLINICAL PHARMACOLOGY; CLINICAL BIOCHEMISTRY. b.: Chicago, Ill., Nov. 26, 1926. s.: John S. and Mary (W[illegible]) K. Edn.: B.S., St. Mary's Coll., 1948; M.S., Univ. of Miami, 1950; Ph.D., Univ. of Chicago, [illegible] Ginger Christie, Dec. 17, 1948. c.: [illegible] Mary Katherine; Sheila Jon; Patricia [illegible] of Biochem. Rsch., Univ. of Detroit, [illegible] Prof., ibid., 1960-65; Prof., [illegible] Dean, Mich. Coll. of Osteopathic Med., [illegible] Pos.: Pres., Detroit Physiol. Soc., Mem.: [illegible] Soc.; N.Y. Acad. of Sci.; Detroit Physiol. [illegible] Anal. Chem.; Brit. Biochem. Soc.; [illegible] Soc.; Am. Assn. for Adv. of Sci.; Am. Soc. Clin. Pathol.; Albert Magnus Guild; Am. Assn. Clin. Chemists; Am. Oil Chem. Soc.; Soc. for Expt. Biol. and Med.; Fed. European Biochem. Soc.; Alpha Epsilon Delta; Sigma Xi; Sigma Pi. Contbrng. Author: Liquid Scintillation Counting, 1958; Drugs Affecting Lipid Metabolism, 1961; Methods of Biochemical Analysis, 1962; Advances in Lipid Research, Vol. 3, [illegible] Contbr. to: Proc., Soc. Expt. Biol. and Med.; Jour. Lab. Clin. Med.; Fed. Proc.; Trans. Am. Phys. Soc.; Proc., Am. Assn. Cancer Rsch.; Chem. and Engrng. News; Jour. Neurochem.; Biochem. Jour.; Biochem. Jour. Gen. Int.; Lipids; Toxicon; Microchem. Jour.; Jour. Am. Oil Chem. Soc.; Biochem. Pharmacol.; Anal. Biochem.; Life Scis. Gen. Int.: Sigma Pi Founders Award, 1964; Alpha Epsilon Delta's Leo E. Bress Award for Educator of the Year, 1963; Mich. Acad. of Arts, Sci. and Letters Scientist of the Year, 1965; Mt. Sinai Fellowship, Univ. of Miami, Dept. of Microbiology, 1950-51; Damon Runyon Cancer Fellowship, Univ. of Miami, Dept. of Bacteriol., 1949-50. Areas of Rsch.: Brain Cholesterol Metabolism, [illegible] Pharmacology; Snake Venom Research; [illegible] Lipids on Macromolecules.

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KABISCH, WILLIAM THOMAS (PH.D.), [illegible] Officer, Am. Assn. for the Adv. of Sci., [illegible] Massachusetts Ave., N.W., Wash., D.C. 20[illegible] Add.: 600 McNeill Rd., Silver Spring, [illegible] HUMAN ANATOMY; HISTOLOGY. [illegible] A.S.).

KAC, MARK (DR.), Rockefeller Univ., New York, N.Y. 10021.

KACSER, CLAUDE (PH.D.), Assoc. Prof. of Physics, Univ. of Md., College Park, Md. 20742. PHYSICS. b.: Paris, France, Apr. 13, 1934. Edn.: B.A., Oxford Univ., 1955; Ph.D., ibid., 1959. Exp.: Rsch. Fellow, Magdalen Coll., England, 1958-62; Instr. in Physics, Princeton Univ., 1959-61; Asst. Prof. in Physics, Columbia Univ., 1962-64; Asst. Prof. of Physics, Univ. of Md., 1964-67; Assoc. Prof. of Physics, Univ. of Md., 1967---. Mem.: Am. Physical Soc.; Am. Assn. Physics Tchrs. Author: Introduction to the Special Theory of Relativity, 1967. Contbr. to: Physical Rev.; Rev. of Mod. Physics; Physical Rev. Letters; Il Nuovo Cimento; Jour. of Math. Physics; Proc. of Royal Soc. of London. Areas of Rsch.: Theoretical Elementary Particle Physics; The Three Body Problem in Elementary Particle and Nuclear Physics.

KADE, CHARLES FREDERICK, JR. (PH.D.), Vice Pres., Johnson and Johnson Internatl., New Brunswick, N.J. 08903. Home Add.: Butler Pike, R.D. No. 4, Norristown, Pa. 19401. RESEARCH DIRECTOR-PHARMACEUTICALS. b.: Sheboygan, Wis., Apr. 4, 1914. s.: Charles F. and Glenore J. (Baltz) K. Edn.: B.A., Carleton Coll., 1936; M.S., N. Dak. Agric. Coll., 1938; Ph.D., Univ. of Ill., 1941. m.: Marjorie L. Matheson, June 15, 1946. c.: Kristina Mary; Roslyn Glenore; Charlotte Matheson; Heidi Ann; Charles Frederick, III, James Martin. Exp.: Dir., Biochem. Rsch., Fred Stearns and Co., Detroit, Mich., 1943-47; Assoc. Chem., Sterling-Winthrop Rsch. Inst., Rensselaer, N.Y., 1947-49; Dir., Dir. of Med. Scis., McNeil Labs., Inc., 1949-60; Vice Pres., Dir. of Rsch., McNeil Labs., Inc., Fort Washington, Pa., 1960-66; Vice Pres., Johnson and Johnson Internatl., New Brunswick, N.J., 1967---.

[illegible]

KAEMPEN, CHARLES EDWARD (D.SC.), Consult. and Pres., Am. Space Transport Co., Fullerton, Calif. 92634. Home Add.: 3202 Larkstone Dr., Orange, Calif. 92667. MATERIALS AND PROCESSES; PLASTICS MANUFACTURING; PRODUCT DEVELOPMENT; CORPORATE MANAGEMENT. b.: Quincy, Ill., Mar. 10, 1927. s.: Charles Herman and Margo Mary (Gochicoa) K. Edn.: B.S., Univ. of Ill., 1950; Post Grad., Univ. of Southern Calif., 1959; M.Sc., Astronautics, Internatl. Acad. of Astronautics, Paris, 1960; D.Sc., ibid., 1964. m.: Inger Nystrom, Aug. 4, 1951. c.: Charles Robert; Donald Michael; Annette Earline. Exp.: Designer, S.A.A.B. Aircraft Co., Linkoping, Sweden, 1950-52; Stress Analyst, Sikorsky, United Aircraft, Stratford, Conn., 1952-56; Rsch. Specialist, North Am. Aviation, Downey, Calif., 1957-60; Pres., C.E. Kaempen & Associates, 1960-61; Project Mgr., Hughes Aircraft, Fullerton, Calif., 1961-63; Systems Analyst, Northrop Space Lab., Huntsville, Ala., 1963-64; Pres. and Dir., Am. Space *Transport Co., Inc., Fullerton, Calif., 1964---. Hon. Pos.:* Chmn., Am. Astronautical Soc.; Chmn., Special Session, 11th Internatl. Astronautical Cong., Stockholm, 1960; NASA Consult., DOD Launch Vehicle Com., 1961; Chmn., Aerospace Ind. Com., Wyo. Space Day, 1963; Mem., Gov. Sci. Advisory Bd., Wyo., 1963; Special Senate Repr., Foreign Technol., 1964-65. Mem.: Assoc. Fellow, Am. Inst. of Aeronautics and Astron.; Soc. of Aerospace Materials and Processes; Natl. Assn. of Corrosion Engrs.; Am. Geophysical Union; Soc. for Adv. of Mgt.; Am. Soc. of Profl. Engrs.; Soc. for Adv. of Sci.; Am. Astronautical Soc.; Am. Soc. of Mining Engrs.; Am. Helicopter Soc.; Toastmasters Internatl. Contbr. to: Proc., XIth and XVth Internatl. Astron. Cong.; Proc., Natl. Conf. on Mil. Electronics, Feb., 1963. Serv. Rec.: U.S. Army, 1944-47. Gen. Int.: Originator and Patentee of the In-Transit Rendezvous Concept of Space Travel and Transport; Inventor of Elastomer-Steel Tanks; Inventor of Explosive Welding of Super-Strength Metals; Inventor of Filament-Wound Elastomer Wheels, Hose and Insulators. Areas of Rsch.: Applications of Reinforced Elastalon to Subterranean and Superterranean Structures; Advanced City Systems; Civil and Military Defense.

[illegible]

[illegible] 1967 Co-Chmn., Symp. [illegible] Catheter Delta Grant [illegible] Planned and Set up [illegible] Rsch.; Economic Development [illegible]

KAHLE, HERMANN A. (MR.), Vice-Pres., Engrng., Fear Ctr., Inc., P.O. Box 6719, Cleveland, Ohio [illegible] Chagrin Falls, [illegible] ELECTRICAL ENGINEERING. b.: Godesberg, Germany, Apr. 4, 1922. s.: Dr. Karl and Helene [illegible] K. Edn.: B.S., Phys., Univ. of Goettingen, [illegible] Inst. of Technol., Darmstadt, [illegible] ibid., 1950. m.: Gerda Rec[illegible] Apr. 11, 1945. c.: Dieter; Evi; Rudolf. Exp.: Rsch. Engr., Hartmann/Braun, Frankfurt, Germany, [illegible] Engr., N.H. Zimmer, ibid., 1952-53 [illegible] Holloman Missile Test Ctr., Holloman AFB, N.M., 19[illegible]-55; Vice-Pres., Engrng., Fear [illegible] Inc., Cleveland, Ohio, 1955---. Mem.: Inst. of Elec. and Electron. Engrs. Contbr. to: Am. Inst. Elec. Engrs. Trans.; Pechema Monographien; [illegible] Naturwissenschaften.

KAHLENBERG, RICHARD NASH (PH.D.), Pres., Kahlenberg [illegible], Inc., P.O. Box 3318, Sarasota, Fla. [illegible] Marine Coatings, Inc., Sarasota, Fla. [illegible] Home Add.: 746 Siesta Dr., Sarasota, Fla. [illegible] PHARMACEUTICAL ORGANIC CHEM[illegible] (See Vol. 5-L.A.S.).

KAHN, [illegible] (PH.D.), Tech. Adv., Organic [illegible] Home Add.: 1702 Glenn Ave., [illegible] ORGANIC CHEMISTRY [illegible] Sioux Falls, S. Dak., May [illegible] and Mildred L. (Wood) K. Edn.: [illegible]; Ph.D., Purdue Univ., 19[illegible] March 21, 1953. c.: [illegible] Doug[illegible] Exp.: Rsch. Chem., [illegible] Chem. Co., Plastics Div., Springfield, Mass., 1941-47; Rsch. Engr., Battelle Mem. Inst., Columbus, Ohio, 1947-54; Asst. Div. Chief, ibid., 1954-[illegible]; Chief, ibid., 1960---. Hon. Pos.: [illegible] Sect. of Am. Chem. Soc. Mem.: Am. Chem. Soc.; Sigma Xi; Phi Lambda Upsilon. Contbr. to: Ind. Engr. Chem., Jour. Org. Chem., Jour. [illegible] Data. Areas of Rsch.: Low-Temperature Lignite Tar; Utilization of Organic [illegible]; Organic Peroxides; Organic Phosphorus Compounds; Anti-oxidants; Analysis of Organic Compounds; [illegible] Chromatography; Heterocyclics; Radiation Chemistry; Gas Chromatography; Infrared [illegible]; Nuclear Magnetic Resonance Spectroscopy; Thermal Analysis of Organic Compounds; High Resolution Mass Spectrometry; Rosin Acids; Fats and Oils.

KAHN, [illegible] FREDERICK (PH.D.), Faculty, New Sch. for Social Rsch., 66 W. 12th St., N.Y.C., N.Y. [illegible] Psychologist, N.Y. League for the Hard of Hearing, [illegible] W. 23rd St., N.Y.C., N.Y. 1001[illegible] [illegible] St., Stamford, Conn. [illegible] (See Vol. 5-L.A.S.).

KAHN, [illegible] (M.D.), Obstetrician, Gynecologist, [illegible] Queens [illegible] N.Y. 1142[illegible] [illegible] Smithtown, L.I., N.Y. [illegible] GYNECOLOGY; FEMALE [illegible] N.Y., N.Y., Sept. [illegible] Sci., N.Y. Univ., [illegible] Faith [illegible] Brooklyn, N.Y., 193[illegible] [illegible] Amsterdam Hosp., [illegible] Obs. and Gyn. [illegible] 1944-47; Asst. Attg. [illegible] 1947-49; Adj. in Obs. and Gyn., ibid., 1949-[illegible]; Attg. Obstetrician and Gynecologist, Dept. of Hosps., Sydenham Hosp., N.Y., N.Y., 1954-[illegible]; Attg. Obstetrician and Gynecologist, ibid., 195[illegible] of the Female Sterility Clinic and [illegible] Gynecological Specialty Clinics, ibid., 1950---; [illegible] to the Gynecological Serv., Sydenham Hosp. [illegible]; In Chg., Hysterography and [illegible] ibid., 1950---. Mem.: Am. Med. [illegible] Med. Soc., N.Y. Co. Med. [illegible] Med. Soc., Founding Fellow, Am. Coll. of Obs. and Gyn.; Internatl. Coll. of Surgs.; Am. Soc. for the Study of Sterility; Am. Assn. for Maternal and Infant Hlth.; Internatl. Fertility Assn.; Pan-Am. Cancer Cytol. Soc.; Am. Assn. for Adv. of Sci.; N.Y. Acad. of Sci.; Am. Soc. of Abdominal Surgs.; Med. Jurisprudence Soc. of N.Y.; Am. Geriatrics Soc.; Young Men's Christian Assn. Contbr. to: Am. Jour. of Obs. and Gyn., Obs. and Gyn.; Fertility and Sterility; [illegible] Med., Am. Jour. of Surg. Serv. Rec.: U.S. Army, 1942-[illegible]. Areas of Rsch.: Development of New and Improved [illegible] Gynecological Instruments and Techniques [illegible] Female Infertility and Sterility; The Problem of Treating Severe Primary, Recurrent Menstrual [illegible] of Pregnancy Loss in New York City, in Cooperation with the Department of Health, Bureau of Vital Statistics.

KAHN, JACK HENRY (PH.D.), Asst. Chf., Declassification [illegible], U.S. Atomic Energy Comm., Oak Ridge, Tenn. [illegible] Home Add.: 103 Dartmouth Cir., [illegible] Tenn. 37830. PHYSICS. (See Vol. 5-L.A.S.).

[illegible] (DR.), Prof. Emer. of [illegible] Dermatol., Univ. Mich. Med. Ctr., [illegible] 48104. Home Add.: 2[illegible] Mich. 48105. SPROLOGY [illegible]

COMMUNICATION TO STATE WATER RESOURCES CONTROL BOARD JAN 5 1985

EXHIBIT "C"

350. Formaldehyde, Methanal (T,F,S)
351. Formic acid, Methanoic acid (T,C)
352. Fulminate of mercury, Mercuric cyanate (T,P)
353. *FURADAN, NIA 10,242, Carbofuran; 2,3-Dihydro-2,2-dimethyl-7-benzofuranylmethylcarbamate (T)
354. Furan, Furfuran (T,F,P)

NOT TOXIC? →

355. Gasoline (F)
356. *GB, O-Isopropyl methyl phosphoryl fluoride (T)
357. Glutaraldehyde (T,I,S)

SEE DEFINITION OF WORD "TOXIC"

358. Glycerolmonolactate trinitrate (P)
359. Glycol dinitrate, Ethylene glycol dinitrate (P)
360. Gold fulminate, Gold cyanate (P)
361. Guanidine nitrate (F,P)
362. Guanyl nitrosaminoguanylidene hydrazine (P)
363. Guthion; O,O-Dimethyl-S-4-oxo-1,2,3-benzotriazin-3(4H)-ylmethyl phosphorodithioate (T)
364. Hafnium (F)
365. Heptachlor; 1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methanoindene (T)
366. n-Heptane (and isomers) (T,F)
367. 1-Heptene (and isomers) (T,F)
368. Hexadecyltrichlorosilane (T,C)
369. Hexaethyl tetraphosphate, HETP (T)
370. Hexafluorophosphoric acid (T,C)
371. Hexamethylenediamine; 1,6-Diaminohexane (T,I)
372. n-Hexane (and isomers) (T,F)
373. 1-Hexene (and isomers) (T,I,F)
374. n-Hexylamine, 1-Aminohexane (and isomers) (T,I,F)
375. Hexyltrichlorosilane (T,C)
376. *Hydrazine, Diamine (T,I,F)
377. Hydrazine azide (T,P)
378. Hydrazoic acid, Hydrogen azide (T,I,P)
379. Hydriodic acid, Hydrogen iodide (T,C)
380. Hydrobromic acid, Hydrogen bromide (T,C)
381. Hydrochloric acid, Hydrogen chloride, Muriatic Acid (T,C)
382. *Hydrocyanic acid, Hydrogen cyanide (T,F)
383. *Hydrofluoric acid, Hydrogen fluoride (T,C)
384. Hydrofluosilicic acid, Fluosilicic acid (T,C)
385. Hydrogen peroxide (T,C,F,P)
386. *Hydrogen selenide (T,I,F)
387. *Hydrogen sulfide (T,I,F)
388. Hypochlorite compounds (T,C,F)
389. Indium (T)
390. Indium compounds (T)
391. Iodine monochloride (T,C)
392. Isooctane; 2,2,4-Trimethylpentane (T,F)
393. Isooctene (mixture of isomers) (T,F)
394. Isopentane, 2-Methylbutane (T,F)
395. Isoprene, 2-Methyl-1,3-butadiene (T,I,F,P)

308. *DOWICIDE 7, Pentachlorophenol, PCP (T)
309. *DYFONATE, Fonofos, O-Ethyl-S-phenylethyl phosphonodithioate (T)
310. *Endosulfan, THIODAN; 6,7,8,9,10,10-Hexachloro- 1,5,5a,6,9,9a-hexahydro-6,9-methano-2,4,3-benzo-dioxathiepin-3-oxide (T)
311. *Endothal, 7-Oxabicyclo [2.2.1]heptane-2,3-dicarboxylic acid (T)
312. *Endothion, EXOTHION, S-[(5-Methoxy-4-oxo-4H-pyran-2-yl)-methyl] O,O-dimethyl phosphorothioate (T)
313. *Endrin; 1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4,4a,5,6,7,8,8a-octahydro-1,4-endo-endo-5,8-dimethanonaphthalene (T)
314. Epichlorohydrin, Chloropropylene oxide (T,I,F)
315. *EPN; O-Ethyl O-para-nitrophenyl phenyphosphonothioate (T)
316. *Ethion, NIALATE; O,O,O',O'-Tetraethyl-S,S-methylenediphosphorodithioate (T)
317. Ethyl acetate (T,I,F)
318. Ethyl alcohol, Ethanol (T,F) ← PRESENT IN FDA APPROVED LIQUORS SOLD IN USA
319. Ethylamine, Aminoethane (T,I,F)
320. Ethylbenzene, Phenylethane (T,I,F)
321. Ethyl butyrate, Ethyl butanoate (I,F)
322. Ethyl chloride, Chloroethane (T,I,F)
323. Ethyl chloroformate, Ethyl chlorocarbonate (T,C,F)
324. *Ethyldichloroarsine, Dichloroethylarsine (T,I)
325. Ethyldichlorosilane (T,C,F)
326. Ethylene cyanohydrin, beta-Hydroxypropionitrile (T)
327. Ethylene diamine (T,I,S)
328. Ethylene dibromide, 1,2-Dibromoethane (T,I)
329. Ethylene dichloride, 1,2-Dichloroethane (T,I,F)
330. *Ethyleneimine, Aziridine, EI (T,F)
331. Ethylene oxide, Epoxyethane (T,I,F,P)
332. Ethyl ether, Diethyl ether (F,P)
333. Ethyl formate (T,I,F)
334. Ethyl mercaptan, Ethanethiol (T,F)
335. Ethyl nitrate (F,P)
336. Ethyl nitrite (F,P)
337. Ethylphenyldichlorosilane (T,C)
338. Ethyl propionate (I,F)
339. Ethyltrichlorosilane (T,I,F)
340. *Fensulfothion, BAYER 25141, DASANIT, O,O-Diethyl-O-[4-(methylsulfinyl)phenyl] phosphorothioate (T)
341. *Ferric arsenate (T,I)
342. Ferric chloride, Iron (III) chloride (T,C)
343. *Ferrous arsenate, Iron arsenate (T)
344. *Fluoboric acid, Fluoroboric acid (T,C)
345. Fluoride salts (T)
346. *Fluorine (T,C,F)
347. *Fluoroacetanilide, AFL 1082 (T)
348. *Fluoroacetic acid and salts, Compound 1080 (T)
349. *Fluorosulfonic acid, Fluosulfonic acid (T,C)

66196. Storage.
"Storage" means the containment of hazardous waste at an off-site hazardous waste facility for periods greater than 72 hours or the containment at an on-site hazardous waste facility for periods greater than 60 days in such a manner as not to constitute disposal.

66200. Strong Oxidizer.
"Strong oxidizer" means a substance that can supply oxygen to a reaction and cause a violent reaction, or sustain a fire when in contact with a flammable or combustible material in the absence of air.

66204. Strong Sensitizer.
"Strong sensitizer" means a substance which will cause on normal living tissue, through an allergic or photodynamic process, a hypersensitivity which becomes evident on reapplication of the same substance.

66208. Toxic.
"Toxic" means capable of producing injury, illness, or damage to humans, domestic livestock or wildlife through ingestion, inhalation or absorption through any body surface.

66210. Trailer.
"Trailer" means a vehicle designed for carrying persons, property or waste on its own structure and for being drawn by a motor vehicle and so constructed that no part of its weight rests upon any other vehicle.

NOTE: Authority cited: Sections 208, 25150 and 25168.1, Health and Safety Code. Reference: Sections 25163(d), 25168, 25168.2, 25168.3 and 25169.1, Health and Safety Code.
HISTORY:
1. New section filed 10-6-81 as an emergency; effective upon filing (Register 81, No. 42). A Certificate of Compliance must be transmitted to OAL within 120 days or emergency language will be repealed on 2-3-82.
2. Certificate of Compliance transmitted to OAL 2-2-82 and filed 3-8-82 (Register 82, No 11).

66212. Transfer Station.
"Transfer station" means any facility where hazardous wastes are transferred from one vehicle to another or where hazardous wastes are stored or consolidated before being transported elsewhere.

66214. Transporter.
"Transporter" means "Hauler".

NOTE: Authority cited: Sections 208, 25150 and 25168.1, Health and Safety Code. Reference: Sections 25163(d), 25168, 25168.2, 25168.3 and 25169.1, Health and Safety Code.
HISTORY:
1. New section filed 10-6-81 as an emergency; effective upon filing (Register 81, No. 42). A Certificate of Compliance must be transmitted to OAL within 120 days or emergency language will be repealed on 2-3-82.
2. Certificate of Compliance transmitted to OAL 2-2-82 and filed 3-8-82 (Register 82, No. 11).

66216. Treatment.
"Treatment" means any method, technique or process designed to change the physical, chemical or biological character or composition of any hazardous waste.

66220. Treatment Facility.
"Treatment facility" means any facility at which hazardous waste is subjected to treatment or where a resource is recovered from a hazardous waste.

206 HS

Siskiyou County
DEPARTMENT OF AGRICULTURE

EDMOND W. HALE
AGRICULTURAL COMMISSIONER AND
SEALER OF WEIGHTS AND MEASURES

MAIN OFFICE — (916) 842-3531, EXT. 280

BRANCH OFFICE - TULELAKE (916) 667-5310

525 SO. FOOTHILL DRIVE
YREKA, CALIFORNIA 96097

January 15, 1985

TO: State Water Resources Control Board
Division of Water Quality

FROM: Edmond W. Hale

SUBJECT: Proposed regulations governing underground storage of hazardous substances

This letter requests the deadline for written comments regarding the adoption of regulations governing underground storage of hazardous substances be extended for 30 days.

We received the proposed regulations on January 7th, and have not had sufficient time to make comments.

The regulations impose a massive workload on local weights and measures departments and should be changed. If adopted the requirements may prove to be unworkable.

Thank you for your consideration.

c: Patti Jackson, Supervisor Dist. 4
David Gravenkamp, Director of Public Works

Received DTS

JAN 18 1985

207 HS

XERXES CORPORATION | CENTURY FIBERGLASS™ HEIL PROCESS EQUIPMENT™ SFRP® STORAGE TANKS

January 17, 1985

STATE WATER RESOURCES
CONTROL BOARD
Division of Water Quality
Paul R. Bonnerson Building
901 "P" Street
Sacramento, CA 95801

Dear Sir/Madam:

I am responding to the State of California regulation for hazardous substance, underground storage tanks, specifically Subchapter 16, underground tank regulation of Chapter 3 of Title 23 of the California Administrative code, article 2661 repair evaluation paragraph C2A. This legislation requires that the interior diameter of fiberglass tanks must be measured and that if the cross section is compressed more than 1% of the original diameter, then the tank shall not be certified and shall not be returned to service.

Xerxes Corporation takes exception to the one percent (1%) deflection change. This value was not solicited by this company nor does it reflect the design requirements for fiberglass tanks.

Xerxes requests that the legislation be immediately changed to state that up to a two percent (2%) maximum deflection change is acceptable for Xerxes fiberglass tanks.

If you have any questions, please contact me.

Sincerely,

Rob Clapp

Rob Clapp
Director of Engineering

Received DTS
JAN 18 1985

CORPORATE OFFICE/7901 XERXES AVENUE SOUTH, MINNEAPOLIS, MINNESOTA 55431-1253 • PHONE (612) 887-1890

208 HS

CITY OF SANTA ANA
FIRE DEPARTMENT
1439 SO. BROADWAY
SANTA ANA, CALIFORNIA 92707

January 14, 1985

State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95801-01100

Dear Sirs:

Regarding the draft on Underground Tank Regulations, C.A.C. Title 23 Waters, Chapter 3, Sub-Chapter 16, the Santa Ana Fire Department makes the following recommendation:

> Article 6 states the requirements for "allowable repairs," but does not clearly state the requirements the testing of such repaired tanks before going back into service. It is recommended that the Board writes into Article 6 the same tests required by Underwriters Laboratories, Inc. In their April 23, 1984, letter on subject 58,1316 - Lining of Underground Storage Tanks. Appendix B, Physical Tests of Tank, of that letter is attached for your consideration.

The Santa Ana Fire Department appreciates the opportunity to comment on the proposed draft before your Board.

Sincerely,

WILLIAM J. REIMER, FIRE CHIEF

JAMES A. MONTGOMERY, DEPUTY CHIEF
DIRECTOR, TECHNICAL AND SUPPORT
SERVICES

JAM/BH:ty

Received DTS

JAN 18 1985

A P P E N D I X B

TEST PROGRAM FOR EVALUATING THE STRUCTURAL SUITABILITY OF TANK-LINING SYSTEMS

PHYSICAL TESTS OF TANK:

METHOD

Using a tank selected by the manufacturer and judged by UL to meet the criteria outlined in the manufacturer's instructions, the following test and examination are to be conducted.

Note: The tank selected will become the basis for judging the acceptability of future tanks for the lining process.

1. The tank is to be inspected by a representative of UL's engineering staff and a detailed description of the tank's physical condition recorded.

2. The tank is then to be prepared by the manufacturers personnel and lined in accordance with the lining instructions.

3. A 5-psig (34.5-kPa) leakage and 5.3-inch (135-mm) Hg vacuum test are then to be performed, exactly as they are conducted during an actual lining procedure.

4. The tank is then to be tested for voids and holidays.

5. After the buried tank has been lined, the thank is to be excavated and placed at ground level for visual examination of the exterior.

6. The excavation is to be prepared for anchoring the tank as required.

7. The tank is to be repositioned in the excavation and anchored (tied down) to prevent float-out.

8. The tied-down tank is to be recovered with back fill material to grade and the entire excavation flooded for a 24 hours.

9. At the end of the 24-hour flooded condition, a vacuum of 5.3 inch (135 mm) Hg is to be applied for 1 minute to simulate an additional external pressure equivalent of 6-feet (1.83-m) of water.

10. Unless a metal deflector plate is provided to protect the area under the fittings from a dipstick, an impact test is to be conducted on the interior of the tank. A 2-pound (901-g) steel sphere is to be dropped from a height equal to the tank diameter so as to impact the area under the fitting opening.

RESULTS

As a result of the tests, there shall be no damage to the tank as evidence by cracking, buckling, or deformation. The tank is again to be tested for voids or holidays. In addition, there shall be no cracking of the lining material.

#209

ACORN Equipment
RENTAL & SALES

4470 N. Blackstone Ave., • Fresno, CA 93726 • (209) 222-3091

December 18, 1984

Honorable Ken Maddy
5987 State Capitol
Sacramento, CA 95814

Dear Senator:

As a small business owner in your district, I am very concerned about the impact of regulations being considered by the State Water Resources Control Board to implement the Sher bill (AB 1362) - Underground Storage Tanks.

I own and operate a rental yard where I meet the needs of homeowners, contractors and business people by supplying everything from Air compressors to Rototillers to Waterwagons. An on-site fuel supply is imperative to assuring the quality of fuel to avoid repair and down time on my machinery as well as to meet public and worker safety regulations and general consumer demand.

While there are some provisions made for small business in the current draft of regulations, with expensive well drilling and sophisticated technology mandated for everyone with groundwater above 100-feet (that's 40 percent of the state) we still face monitoring requirements totaling as much as $15,000 or more. We are able to meet the stringent regulation levels set for inventory reconciliation and feel the standard set in the law will be met by use of that single monitoring method. The level of hazard posed by my tank does not warrant the intensive measures designed to meet large tanks pumping thousands of gallons. Detailed technological standards also threaten to subject small business to the equipment/installation victimization suffered in the vapor-recovery mandate.

We feel the State Water Resources Control Board members are being forced to push through regulations which do not satisfy them or the hundreds of private enterprise people who have been at each hearing because of the Dec. 31 deadline for implementation.

We urge you to speak for small business and inform the Board of your support for use of inventory reconciliation as the sole monitoring method for tanks of 4,000 gallons or less with annual volumes of 20,000 gallons or less. And we ask you to give highest priority to legislative action to afford the Board more time to insure that we receive good, workable regulations.

We very much recognize our responsibility for monitoring our underground tanks and have a great personal stake in assuring the integrity of the state's groundwater. We ask only for a cooperative and judicious framework by which to proceed. We hope you can and will lend your support for small business.

Thank you,

Brett Fox

Brett Fox

BF/klb

#210 JAN 15 1985 1-ECA 2-HS

JAN 15 1985

Memorandum

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD • CENTRAL VALLEY REGION

3201 S Street Sacramento, California 95816 Phone: 445-0270

TO: Michael A. Campos
Executive Director
SWRCB

FROM: William H. Crooks
Executive Officer

Copies - MAC
Board
WGP
ECA
OCC

DATE: 14 January 1985

SIGNATURE: W. H. Crooks

SUBJECT: ADOPTION OF REGULATIONS GOVERNING UNDERGROUND STORAGE OF HAZARDOUS SUBSTANCES

We support the above proposed regulations and changes in Subchapter 16 of the Administrative Code. Their adoption on 18 January will allow those charged with their implementation to move forward effectively.

Received by

JAN 16 1985

SANTA MONICA AREA CHAMBER OF COMMERCE

JAN 17 1985

1. CAO
2. alpa

#211

January 11, 1985

The Honorable
Richard Katz, Assemblyman
9140 Van Nuys Boulevard #109
Panorama City, California 91402

Dear Assemblyman Katz:

We have recently become aware of State regulations concerning "Underground Storage Containers of Toxic Hazardous Materials."

By local government estimates, we alone have a minimum of some two hundred Santa Monica businesses directly affected by this measure and state agencies advise us that costs to meet storage container/ administration fees will exceed $4,000-$6,000 per tank and/or business. An extreme economic hardship on small businesses in particular.

We understand that you too have great concern for the survival of small business and the small business owner...the backbone of our society. Because of this, we wish to request your support for the State Water Resources Control Board recommendation that the business community be assisted through the economic crisis/fiscal impact of this regulation by supporting a compliance-time extension of at least one year from the initial deadline of July, 1985. The business community thanks you for your consideration.

Sincerely,

Jerry Jackson
Executive Vice President

JJ:ja
cc: Jon Jalili, City Manager, Santa Monica
Stan Scholl, Director, General Services, Santa Monica
Martin Gottlieb, President, Santa Monica Chamber of Commerce
Tom Nitti, Chairman, Santa Monica Legislative Committee
Walter McHendry, Chairman, Santa Monica Industrial Committee

10 YEARS ACCREDITED

SANTA MONICA AREA CHAMBER OF COMMERCE

January 11, 1985

The Honorable Byron Sher, Assemblyman
785 C Castro Street
Mountain View, California 94041

Dear Assemblyman Sher:

We have recently become aware of State regulations concerning "Underground Storage Containers of Toxic Hazardous Materials".

By local government estimates, we alone have a minimum of some two hundred Santa Monica businesses directly affected by this measure and state agencies advise us that costs to meet storage container/ administration fees will exceed $4,000-$6,000 per tank and/or business. An extreme economic hardship on small businesses in particular.

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Sincerely,

Jerry Jackson
Executive Vice President

JJ:ja

cc: Jon Jalili, City Manager, Santa Monica
Stan Scholl, Director, General Services, Santa Monica
Martin Gottlieb, President, Santa Monica Chamber of Commerce
Tom Nitti, Chairman, Santa Monica Legislative Committee
Walter McHendry, Chairman, Santa Monica Industrial Committee

ACCREDITED

#2/3 DH

MARRAN COMPANY

20621 REEF LANE
HUNTINGTON BEACH, CA 92646

714-962-5025

May 20, 1985

David Holtry
Division of Water Quality
State Water Resources Control Board
P.O. Box 100
Sacramento, CA 95801-0100

Ref: Section 2621

Gentlemen:

Due to the geographic remoteness of the listed nationally recognized independent testing organizations, please include one from California that has National stature i.e.

The Los Angeles City
Department of Building & Safety
Electrical Testing Laboratory

Very Truly Yours,

Randy Hurst

Randy Hurst

Received DTS
MAY 24 1985

#214 DH

RESOURCE DEVELOPMENT SERVICES

May 20, 1985

David Holtry
Division of Water Quality
State Water Resources Control Board
P.O. BOX 100
Sacramento, CA 95801-0100

Dear Mr. Holtry:

I am writing to you about the changes in the underground storage tank regulations.

My remarks are in regards to Section 2645 (J).

I am sure that any relaxation of the methods mandated for the detection of leaking material will lead to the lack of detection of any substances in some cases.

As an example, I talked to a man two days ago that intends to buy a portable Gas Chromatagraph so he could do feild analysis by sticking probes into the ground. There is no analyses that he could do that is even a quarter as sensitive as an EPA method. When I asked him about sensistivity of his equipment, he explained to me that if the leak was big enough, he'd probably catch it.

EPA Method 602 is the most common method for detection of gasoline in soil or water. The method requires purge and trap and certain other detectors that are not portable. These features with a GC generate data in the parts per billion range. The portable units as well as methods known as liquid/liquid methods are not reliable even down to parts per million and then it's a judgedment call.

The difference in the detection levels could make the difference between catching a small leak and larger one.

So, I urge the Board not allow any striking of the words "EPA approved methods or" "methods of" "presion and accuracy that are".

The OAL must be made to understand that EPA methods are the accepted, most accurate ways to acheive data worth having, and that's what we are all looking for, right? The law has come this far why make the results invalid by using second rate data.

Sincerely,

Ross Andress

Received DTS
MAY 23 1985

(707) 545-6689 · 1495 LUPINE DRIVE · SANTA ROSA, CALIFORNIA 95401