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CANNON AIR FORCE BASE,

NEW MEXICO

STORAGE TANK MANAGEMENT PLAN

FINAL REPORT

SEPTEMBER 1992

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Submitted to:

27th CES/CEV
Cannon AFB, NM 88103

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SECURITY INSTRUCTIONS/RECORD OF CHANGES/ANNUAL REVIEW

1. The proper title of this document is the 27 Fighter Wing Storage Tank Management Plan.

2. This document is UNCLASSIFIED but is designated "For Official Use Only", and should be handled accordingly.

3. The provisions of AFR 55-30, Operations Security (OPSEC) and AFM 100-45, Communications Security Policies, Procedures and Instructions (COMSEC) are not applicable to this document.

RECORD OF CHANGES

CHANGE NUMBER	DATED	DATE POSTED	POSTED BY

RECORD OF ANNUAL REVIEW

REVIEWED BY	DATE REVIEWED	REMARKS

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DEFINITIONS

AAFES	Army and Air Force Exchange Services.
AFOSH	Air Force Occupational Safety and Health.
AFR	Air Force Regulation.
Ancillary equipment	Any device including but not limited to, piping, fittings, flanges, valves and pumps associated with the tank system.
Atmospheric tank	A tank designed to operate at pressures from atmosphere through 0.5 psi, measured at the top of the tank.
Bare Steel Tank	A steel tank that has no protection to prevent Corrosion.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (SUPERFUND).
CFR	Code of Federal Regulations.
Cathodic Protection	A method to prevent tank corrosion which utilizes electrical current flow.
Corrosion	An electrochemical change in metal (usually oxidation results in rusted weakened areas or holes).
Dip	Method of ascertaining the amount of fluid in tanks. A graduated dip stick is entered into a tank. The wetted number of inches and fractions is converted to gallons by use of an inch to gallons conversion chart prepared for that tank.
Dipstick or Gauge Stick	A stick that is marked off at specific intervals used to measure product (and water) levels in underground storage tanks.
Electrolyte	A non-metallic electric conductor, such as soil and/or water, in which current is carried by the movement of ions.
USEPA	U.S Environmental Protection Agency.
EPC	Environmental Protection Committee.

Five-Gallon Proving Can	A container marked at the level where, when filled, it will have exactly five gallons of material.
Hazardous Waste	Any waste that is reactive, corrosive, ignitable, toxic or on the Hazardous Waste Listing. Radioactive waste is regulated under separate guidance. Wastes not found on the Hazardous Waste Listing, which are burned for heat, recycled or reclaimed, are not considered hazardous wastes.
Interstitial	The space between two structures, i.e., between the tank and secondary containment.
Low Pressure Tank	A tank designed to withstand internal pressure above 0.5 psig but not greater than 15 psig, measured at the top of the tank.
Manifold Tank System	A system of tanks interconnected by piping.
NIOSH	National Institute for Occupational Safety and Health.
NMED	New Mexico Environmental Division.
NMED-USTR	New Mexico Environmental Division/Underground Storage Tank Regulations.
OEHL, USAF	U.S. Air Force Occupational and Environmental Health Laboratory.
Operator	Any person in control of, or having responsibility for, the daily operation of the underground storage tank.
OSHA	Occupational Safety and Health Administration.
Owner	The individual who owns a tank used to store or dispense a regulated substance. "Owner" applies to owners of tanks taken out of service after 1974 or tanks which were in operation after 8 November 1974.
Regulated Substance	Any substance defined in Section 101(14) of CERCLA, but not including any substance regulated as a hazardous waste under Subtitle C of RCRA; or petroleum, including crude oil or any fraction thereof which is liquid at 60° Fahrenheit and 14.7 pounds per square inch absolute pressure. The list of CERCLA hazardous substances, also

published in April 4, 1985 Federal Register (50 FR 13546), is included in Appendix A.

Release	Any spill, leak, emission, discharge, escape, leach or disposal from an underground storage tank into groundwater, surface water or soils.
RCRA	Resource Conservation and Recovery Act, as amended by the 1984 Hazardous and Solid Waste Amendments.
Reportable Quantity	The amount of substance that, if spilled, can have a harmful impact on the environment and must be reported to the National Response Center. The RQ's are listed in 40 CFR 117 and 40 CFR 302.
Secondary Containment System	The construction of an impervious barrier between the tank and the environment. Barriers include an external liner, a vault or pit lined with an impervious liner or concrete, a double-walled tank and equivalent site-specific devices.
Tank System	The tank and associated ancillary equipment and containment system.
UST: Underground Storage Tank	Any tank, or combination of tanks, including associated underground pipes, which contains regulated substances, and is 10 percent or more beneath the surface of the ground.

Exemptions from the UST definition are:

(1) Farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes.

(2) Tanks used for storing heating oil for consumptive use on the premises where stored. (Not exempt from NMED/USTR)

(3) Septic tanks.

(4) Pipeline facilities subject to other Federal regulation (see 40 CFR 280.12).

(5) Surface impoundments, pits, ponds, or lagoons.

(6) Stormwater or wastewater collection systems.

(7) Flow-through process tanks.

(8) Liquid traps or associated gathering lines directly related to oil or gas production or gathering operations.

(9) Storage tanks situated in an underground area if the storage tank is situated upon or above the surface of the floor.

(10) Any pipe connected to tanks described above in items 1-9.

Vadose Zone — The zone below the ground surface but above the groundwater table.

I. INTRODUCTION

The purpose of this Storage Tank Management Plan is to familiarize Base personnel with Federal, State and County requirements for the management of underground regulated storage tanks. The plan discusses regulatory requirements, Air Force Guidance, and the responsibilities of various Base organizations. The plan was prepared within the scope of the Resource Conservation and Recovery Act as amended in 1984, and the New Mexico Underground Storage Tank Regulations.

II. BACKGROUND

The Resource Conservation and Recovery Act (RCRA), originally passed in 1976, was amended in 1984. These amendments included provisions to regulate storage tanks. An increasing number of incidents of environmental contamination resulting from underground and aboveground storage tank leaks necessitated regulations. As estimated by the American Petroleum Institute, between 40 to 70 percent of the underground tanks in the United States are leaking now, or will be leaking within a few years.

Materials leaking from tanks can create safety, health, and environmental hazards. Soil, groundwater, and surface water contamination that is not quickly detected may cause significant environmental damage. Groundwater contamination is of special concern since over one-half of the U.S. population relies on groundwater for potable water. A contaminated aquifer is very difficult and expensive to restore. The Subtitle I underground storage tank provisions of the RCRA amendments include requirements for: notification to designated State or local agencies; an interim prohibition on the installation of unprotected tanks; the development of technical standards for new and existing tanks; requirements for leaking tanks; and new enforcement authority to compel compliance with the requirements.

Several of these enforcement authorities are outlined below:

A. EPA may issue an administrative order requiring compliance or may commence a civil action for appropriate relief if EPA determines that the facility is in violation of any Subtitle I requirement.

B. A violator who fails to comply with a compliance order shall be liable for a civil penalty of up to $25,000 for each day of continued non-compliance.

C. A facility operator that fails to notify or falsely notifies EPA of underground storage tanks shall be subject to a penalty of up to $10,000 per tank.

D. Facilities that fail to comply with any of the technical standards developed by EPA or violates the interim prohibition provisions, shall be subject to civil penalties of up to $10,000 per tank for each day of violation.

The 1984 Amendments also allow EPA to promulgate regulations for taking corrective action and compensating third parties for bodily injury and property damage caused by leaks. Finally, the EPA may authorize State UST programs, provided that the State program is at least as stringent as the Federal program and provides for adequate enforcement.

The State of New Mexico's Environmental Division (ED) has enacted Underground Storage Tank Regulations that apply to the storage of petroleum products used for transportation and to the storage of hazardous waste. These regulations have adopted 40 CFR 280.20 through 40 CFR 280.53 and 40 CFR 280.70 through 40

CFR 280.111 for construction, operating, release detection, release reporting, closure, and financial responsibility requirements. The regulations also include UST registration requirements, remediation procedures, and installer certification requirements.

III. TANK APPLICABILITY AND EXEMPTIONS

A. FEDERAL

1. APPLICABILITY

a. Underground storage tanks and integral piping containing petroleum products and/or hazardous substances regulated under CERCLA, the volume of which, including the volume of the integral piping, is ten percent or more beneath the surface of the ground.

b. All UST systems installed prior to December 1988 and still in service and UST systems removed from service after 1 Jan 1974 that remain in the ground.

2. EXEMPTIONS

a. Hazardous wastes regulated under RCRA.

b. Indoor tank systems with impervious floors containing no free liquids.

c. Tank systems and sumps that serve as a part of a secondary containment system.

d. Farm or residential tanks less than 1,100 gallons storing motor fuel for noncommercial use.

e. Tank systems used for storing heating oil for consumptive use on the premises where stored;

f. Septic tanks, sumps, used oil tanks, bulk storage and hydraulic lift reservoirs.

g. Storm and wastewater collection systems.

h. Flow-through process tanks.

i. Storage tanks in an underground area situated on or above the floor surface.

j. Surface impoundments, pits, ponds, or lagoons.

B. NEW MEXICO

a. As above

IV. UNDERGROUND STORAGE TANK NOTIFICATION AND REQUIREMENTS

A. FEDERAL

1. Notify the State's regulatory agency regarding the number, size, area, type, location and use of <u>all</u> existing UST systems (except those taken out of operation on or before 1 Jan 1974).

2. New tanks installed after 8 May 1986 must be reported within 30 days of installation.

3. Appropriate notification forms are available through 27 CES/CEV, Ext. 2739 (refer to Appendix C).

4. Underground storage tanks currently on record with New Mexico Environmental Division (NMED) are listed in Appendix D.

B. NEW MEXICO

1. All existing facilities will be registered by 14 July 1988.

2. New facilities will be registered 30 days prior to tank installation, except for emergency replacements.

3. Substantially modified or replaced UST systems will require notification within 30 days prior to the notification of replacement.

4. UST system abandonment or sale will require notification within 30 days prior to abandonment or sale.

5. Notification of a spill or release that exceeds 25 gallons or causes a sheen on surface water will be made within 24 hours of discovery by telephone. Written notification of the spill or release and any remedial action taken must be delivered to the NMED within 7 days of the incident.

V. UST OPERATING REQUIREMENTS

A. FEDERAL

1. Overfill and spill controls must be provided.

2. Corrosion protection systems must be operated continuously.

3. Cathodic protection systems must be tested within six months of installation and every three years thereafter; impressed current cathodic systems must be inspected every 60 days.

4. Records must be maintained on all UST inspections at the UST site or at a readily available location and are to include the following:

   a. the results of the last three impressed current cathodic protection system inspections;

   b. the results of the last two cathodic protection system inspections;

   c. a corrosion expert's analysis of site corrosion potential, if corrosion protection is not used;

   d. documentation of operation of corrosion protection equipment;

   e. documentation of UST system repairs;

   f. the results of any sampling, testing, or monitoring must be maintained for one year;

   g. all performance claims pertaining to release detection equipment must be maintained for five years from the date of installation;

   h. documentation of release detection equipment maintenance must be maintained for one year after the service work is completed;

   i. results of the site investigation conducted at permanent closure.

B. NEW MEXICO

1. As above

VI. RELEASE DETECTION FOR PETROLEUM UST SYSTEMS

A. FEDERAL

1. UST systems that meet the requirements for new UST systems in 40 CFR 280.20 or 40 CFR 280.21 and the monthly inventory control requirements by the inventory method or the manual tank gauging method in 40 CFR 280.43 may use tank tightness testing at least every five years until December 22, 1998, or until ten years after the tank is installed or upgraded under 40 CFR 280.21, whichever is later.

2. UST systems that do not meet the requirements in 40 CFR 280.20 or 40 CFR 280.21 may use the above release detection methods until December 22, 1998, at which time the UST system must be upgraded or permanently closed under 40 CFR 280.71.

3. Release detection may consist of one or a combination of the following methods:

   a. inventory control and manual tank gauging;

   b. tank tightness testing;

   c. automatic tank testing;

   d. automatic tank gauging;

   e. vapor monitoring (method presently in use);

   f. groundwater monitoring;

   g. vadose zone monitoring.

4. Release detection must be applied to all existing UST systems by 1993 and is to be applied to all UST systems upon installation.

B. NEW MEXICO

1. As above.

C. Cannon AFB Leak Detection System

Underground storage tanks and piping onbase use the Tracer Tight Leak Detection System. The Tracer System uses a tracer to detect leaks from piping and tanks. The tracer is added to the fuel stored in the tank or pipe. Tracer vapors are released into the soil at the location of a leak. Air samples are taken monthly from the sample ports and are analyzed by chromatographic analysis. A complete description of the Tracer System is included in Appendix F.

The Tracer System was installed on all-inservice underground petroleum storage tanks in June 1990 at Cannon AFB. All underground storage tanks identified in Appendix D have the Tracer System installed.

VII. UPGRADING OF EXISTING UST SYSTEMS

A. FEDERAL

1. All existing underground storage tanks must comply with either the UST system performance standards for new installations under Section 280.20, the upgrading requirements below, or be permanently closed by December 22, 1998.

   Underground storage tanks constructed of steel must be upgraded to meet one of the following requirements:

   a. A tank may be upgraded by internal lining if within 10 years after lining and every five years afterwards the lined tank is internally inspected.

   b. A tank may be upgraded by cathodic protection if the cathodic protection system is designed by a corrosion expert, impressed current systems are designed to allow monitoring of current operating status, and the cathodic protection system is operated and maintained in accordance with Section 280.31.

   c. The tank is constructed of steel/fiberglass-reinforced plastic composite.

   d. The tank is installed at a non-corrosive location as determined by a corrosion expert and proper records are maintained for the service life of the tank.

   e. The tank construction and corrosion protection are determined by the implementing agency to be designed to prevent a release in a manner that is no less protective of human health and the environment than any of the above methods of upgrade.

2. New UST systems must comply with the following:

   a. The UST system must be protected from corrosion in accordance with a nationally recognized association's code of practice or by an independent laboratory.

   b. Spill and overfill prevention equipment must be used to prevent releases associated with product transfer to the UST system. Spill prevention equipment must prevent release of the product when the transfer hose is detached from the fill pipe and overfill prevention equipment. The overfill prevention equipment must automatically stop the flow into the tank when the tank is 95% full or restrict the flow or set off an alarm when the tank becomes 90% full. The tank does not require spill and overfill prevention equipment when

the UST system is filled by transfer of 25 gallons or less at one time.

c. Certification of installation must be provided by one of the following methods:

a. the installer has certification by the tank and piping manufacturers;

b. the installer has been certified or licensed by the implementing agency;

c. a registered professional engineer (with education/experience in UST installation) inspects and certifies the installation;

d. the installation has been inspected and approved by the implementing agency;

e. all work listed in the manufacturer's installation checklist has been approved;

f. another method which is no less protective of human health and the environment that complies with paragraph 2(d) above.

B. NEW MEXICO

1. As above.

VIII. CLOSURE/POST CLOSURE

A. FEDERAL

1. A permanently closed underground tank must be emptied and cleaned of accumulated sludges. The tank must be removed from the ground or filled with an inert solid material. A site assessment shall be conducted to determine the extent of any contamination. Corrective action must be initiated in accordance with Subpart F of 40 CFR 280 if contamination is found.

2. The closure plan, closure activities, cost estimates for closure, and financial responsibility for tank systems must meet the requirements specified in Subparts C and H of 40 CFR 280.

3. When a UST system is removed from service for less than three months and regulated substances remain in the tank, the owner/operator must continue O&M and release detection systems and comply with release reporting requirements.

4. When a UST system is removed from service for a period of three to twelve months and regulated substances remain in the tank, the owner/operator must continue O&M and release detection. The vents should remain open and all other lines should be capped.

5. A UST must be permanently closed when it is removed from service for longer than 12 months if it does not meet the requirements for new UST systems in 40 CFR 280.20 or the upgrade requirements in 40 CFR 280.21, although the spill and overflow requirements do not have to be met.

6. The owner/operator must notify the implementing agency at least 30 days prior to closure.

7. UST systems closed prior to 22 December 1988 may be directed by the implementing agency to be closed in accordance with Subpart G of 40 CFR 280.

B. NEW MEXICO

a. As above.

IX. HAZARDOUS WASTE UST REGULATIONS

Regulations on new and existing interim status and permitted tank systems address specific requirements with regard to management, design and installation, release detection and response, and other pertinent standards. These requirements are different from those for petroleum related USTs.

Specific requirements are addressed in 40 CFR 280.42, Subpart J of 40 CFR 264, Subpart J of 40 CFR 265, and 40 CFR 270.16. Established standards will be incorporated into all plans associated with hazardous waste storage in USTs when appropriate.

The major requirements for hazardous waste USTs are:

1. Secondary containment with interstitial monitoring (for most tank systems);

2. Design and installation standards;

3. Inspections;

4. Monitoring requirements;

5. Operating controls and practices to prevent spills and provide leak response actions;

6. Closure plans; and

7. Special requirements for ignitable, reactive, or incompatible wastes.

X. CORRECTIVE ACTION FOR PETROLEUM UST SYSTEMS

The New Mexico ED Underground Storage Tank Regulations describe the required remedial response in the event of a spill or release from an UST system that:

a. is of unknown volume or is greater than 25 gallons where the depth to groundwater is 100 feet or less;

b. is of unknown volume or is greater than 100 gallons in all other areas;

c. has reached or threatens to reach ground or surface water;

d. has left a sheen on surface water;

e. when directed to initiate corrective action by the New Mexico ED.

The section is provided as a notice that stringent corrective action is required by the State following a spill or release from an UST system.

XI. CERTIFICATION OF TANK INSTALLERS

Part XIV of the New Mexico ED Underground Storage Tank Regulations provides for the certification of tank installers. All contractors and individuals who install or repair UST systems are required to receive certification from the State. This section is provided as a notice that certification, consisting of a written and an on-site field examination, is required to install or repair UST systems in New Mexico.

Hazardous Substance	CASRN
Methane, tetrachloro-	56235
Methane, tetranitro-	509148
Methane, tribromo-	75252
Methane, trichloro-	67663
Methane, trichlorofluoro-	75694
Methanesulfonic acid, ethyl ester	62500
Methanethiol	74931
Methanesulfenyl chloride, trichloro-	594423
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,4,7,7a-tetrahydro-	76448
Methanoic acid	64186
4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-.	57749
Methanol	67561
Methapyrilene	91805
Methomyl	16752775
Methoxychlor	72435
Methyl alcohol	67561
2-Methylaziridine	75558
Methyl bromide	74839
1-Methylbutadiene	504609
Methyl chloride	74873
Methyl chlorocarbonate	79221
Methyl chloroform	71556
4,4-Methylenebis(2-chloroaniline)	101144
2,2'-Methylenebis(3,4,6-trichlorophenol)	70304
3-Methylcholanthrene	56495
Methylene bromide	74953
Methylene chloride	75092
Methylene oxide	50000
Methyl ethyl ketone	78933
Methyl ethyl ketone peroxide	1338234
Methyl hydrazine	60344
Methyl iodide	74884
Methyl isobutyl ketone	108101
Methyl isocyanate	624839
2-Methyllactonitrile	75865
Methylmercaptan	74931
Methyl methacrylate	80626
N-Methyl-N'-nitro-N-nitrosoguanidine	70257
Methyl parathion	298000
4-Methyl-2-pentanone	108101
Methylthiouracil	56042
Mevinphos	7786347
Mexacarbate	315184
Mitomycin C	50077
Monoethylamine	75047
Monomethylamine	74895
Naled	300765
5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-	20830813
Naphthalene, 2-chloro-	91203
Naphthalene, 2-chloro-	91587
1,4-Naphthalenedione	130154

Hazardous Substance	CASRN
2,7-Naphthalenedisulfonic acid,3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	72571
Naphthenic acid	1338245
1,4-Naphthoquinone	130154
1-Naphthylamine	134327
2-Naphthylamine	91598
alpha-Naphthylamine	134327
beta-Naphthylamine	91598
2-Naphthylamine, N,N-bis(2-chloroethyl)-	494031
alpha-Naphthylthiourea	86884
Nickel ††	7440020
NICKEL AND COMPOUNDS	
Nickel ammonium sulfate	15699180
Nickel carbonyl	13463393
Nickel chloride	7718549 37211055
Nickel cyanide	557197
Nickel(II) cyanide	557197
Nickel hydroxide	12054487
Nickel nitrate	14216752
Nickel sulfate	7786814
Nickel tetracarbonyl	13463393
Nicotine and salts	54115
Nitric acid	7697372
Nitric oxide	10102439
p-Nitroaniline	100016
Nitrobenzene	98953
Nitrogen dioxide	10102440 10544726
Nitrogen(II) oxide	10102439
Nitrogen(IV) oxide	10102440 10544726
Nitroglycerine	55630
Nitrophenol (mixed)	25154556
m-	554847
o-	88755
p-	100027
p-Nitrophenol	100027
2-Nitrophenol	88755
4-Nitrophenol	100027
NITROPHENOLS	
2-Nitropropane	79469
NITROSAMINES	
N-Nitrosodi-n-butylamine	924163
N-Nitrosodiethanolamine	1116547
N-Nitrosodiethylamine	55185
N-Nitrosodimethylamine	62759
N-Nitrosodiphenylamine	86306
N-Nitrosodi-n-propylamine	621647
N-Nitroso-N-ethylurea	759739
N-Nitroso-N-methylurea	684935
N-Nitroso-N-methylurethane	615532
N-Nitrosomethylvinylamine	4549400
N-Nitrosopiperidine	100754
N-Nitrosopyrrolidine	930552
Nitrotoluene	1321126
m-	99081
o-	88722
p-	99990
5-Nitro-o-toluidine	99558

Hazardous Substance	CASRN
5-Norbornene-2,3-dimethanol,1,4,5,6,7,7-hexachloro, cyclic sulfite.	115297
Octamethylpyrophosphoramide	152169
Osmium oxide	20816120
Osmium tetroxide	20816120
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	145733
1,2-Oxathiolane,2,2-dioxide	1120714
2H-1,3,2-Oxazaphosphorine,2-[bis(2-chloroethyl) amino] tetrahydro-2-oxide.	50180
Oxirane	75218
Oxirane, 2-(chloromethyl)-	106898
Paraformaldehyde	30525894
Paraldehyde	123637
Parathion	56382
Pentachlorobenzene	608935
Pentachloroethane	76017
Pentachloronitrobenzene	82688
Pentachlorophenol	87865
1,3-Pentadiene	504609
Phenacetin	62442
Phenanthrene	85018
Phenol	108952
Phenol, 2-chloro-	95578
Phenol, 4-chloro-3-methyl-	59507
Phenol, 2-cyclohexyl-4,6-dinitro	131895
Phenol, 2,4-dichloro-	120832
Phenol, 2,6-dichloro-	87650
Phenol, 2,4-dimethyl-	105679
Phenol, 2,4-dinitro-	51285
Phenol 2,4-dinitro-6-(1-methylpropyl)	88857
Phenol, 2,4-dinitro-6-methyl-, and salts	534521
Phenol, 4-nitro-	100027
Phenol, pentachloro-	87865
Phenol, 2,3,4,6-tetrachloro-	58902
Phenol, 2,4,5-trichloro-	95954
Phenol, 2,4,6-trichloro-	88062
Phenol, 2,4,6-trinitro-, ammonium salt	131748
Phenyl dichloroarsine	696286
1,10-(1,2-Phenylene)pyrene	193395
Phenylmercuric acetate	62384
N-Phenylthiourea	103855
Phorate	298022
Phosgene	75445
Phosphine	7803512
Phosphoric acid	7664382
Phosphoric acid,diethyl p-nitrophenyl ester	311455
Phosphoric acid, lead salt	7446277
Phosphorodithioic acid, O,O-diethyl S-methylester	3288582
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester.	298022
Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.	60515
Phosphorofluoridic acid,bis(1-methylethyl)ester	55914
Phosphorothioic acid,O,O-diethyl O-(p-nitrophenyl) ester	56382
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297972
Phosphorothioic acid, O,O-dimethyl O-[p-[(dimethylamino)-sulfonyl]phenyl] ester.	52857

Hazardous Substance	CASRN
1,2-Benzenedicarboxylic acid, dimethyl ester	131113
1,2-Benzenedicarboxylic acid, di-n-octyl ester	117840
1,3-Benzenediol	108463
1,2-Benzenediol,4 [1-hydroxy-2-(methylamino)ethyl]	51434
Benzenesulfonic acid chloride	98099
Benzenesulfonyl chloride	98099
Benzenethiol	108985
Benzidine	92875
1,2-Benzisothiazolin-3-one,1,1-dioxide, and salts	81072
Benzo(a)anthracene	56553
Benzo(b)fluoranthene	205992
Benzo(k)fluoranthene	207089
Benzo(j,k) fluorene	206440
Benzoic acid	65850
Benzonitrile	100470
Benzo(ghi)perylene	191242
Benzo(a)pyrene	50328
3,4-Benzopyrene	50328
p-Benzoquinone	106514
Benzotrichloride	98077
Benzoyl chloride	98884
1,2-Benzphenanthrene	218019
Benzyl chloride	100447
Beryllium ††	7440417
BERYLLIUM AND COMPOUNDS	
Beryllium chloride	7787475
Beryllium dust	7440417
Beryllium fluoride	7787497
Beryllium nitrate	13597994 7787555
alpha - BHC	319846
beta - BHC	319857
gamma - BHC	58899
delta - BHC	319868
2,2'-Bioxirane	1464535
(1,1'-Biphenyl)-4,4' diamine	92875
(1,1'-Biphenyl)-4,4' diamine,3,3' dichloro-	91941
(1,1'-Biphenyl)-4,4' diamine,3,3' dimethoxy-	119904
(1,1'Biphenyl)-4,4'-diamine,3,3'-dimethyl-	119937
Bis(2-chloroethoxy) methane	111911
Bis (2-chloroethyl) ether	111444
Bis(2-chloroisopropyl) ether	108601
Bis(chloromethyl) ether	542881
Bis(dimethylthiocarbamoyl) disulfide	137268
Bis(2-ethylhexyl)phthalate	117817
Bromine cyanide	506683
Bromoacetone	598312
Bromoform	75252
4-Bromophenyl phenyl ether	101553
Brucine	357573
1,3-Butadiene, 1,1,2,3,4,4-hexachloro-	87683
1-Butanamine, N-butyl-N-nitroso-	924163
Butanoic acid, 4-[bis(2-chloroethyl)amino]benzene	305033
1-Butanol	71363

Hazardous Substance	CASRN
2-Butanone	78933
2-Butanone peroxide	1338234
2-Butenal	123739 4170303
2-Butene, 1,4-dichloro-	764410
Butyl acetate	123864
iso-	110190
sec-	105464
tert-	540885
n-Butyl alcohol	71363
Butylamine	109739
iso-	78819
sec-	513495
sec-	13952846
tert-	75649
Butyl benzyl phthalate	85687
n-Butyl phthalate	84742
Butyric acid	107926
iso-	79312
Cacodylic acid	75605
Cadmium ††	7440439
Cadmium acetate	543908
CADMIUM AND COMPOUNDS	
Cadmium bromide	7789426
Cadmium chloride	10108642
Calcium arsenate	7778441
Calcium arsenite	52740166
Calcium carbide	75207
Calcium chromate	13765190
Calcium cyanide	592018
Calcium dodecylbenzene sulfonate	26264062
Calcium hypochlorite	7778543
Camphene, octachloro-	8001352
Captan	133062
Carbamic acid, ethyl ester	51796
Carbamic acid, methylnitroso-,ethyl ester	615532
Carbamide, N-ethyl-N-nitroso-	759739
Carbamide, N-methyl-N-nitroso-	684935
Carbamide, thio-	62566
Carbamimidoselenoic acid	630104
Carbamoyl chloride, dimethyl-	79447
Carbaryl	63252
Carbofuran	1563662
Carbon bisulfide	75150
Carbon disulfide	75150
Carbonic acid, dithalium (I) salt	6533739
Carbonochloridic acid, methyl ester	79221
Carbon oxyfluoride	353504
Carbon tetrachloride	56235
Carbonyl chloride	75445
Carbonyl fluoride	353504
Chloral	75876
Chlorambucil	305033
CHLORDANE (TECHNICAL MIXTURE AND METABOLITES).	
Chlordane	57749

Hazardous Substance	CASRN
Chlordane, technical	57749
CHLORINATED BENZENES	
CHLORINATED ETHANES	
CHLORINATED NAPHTHALENE	
CHLORINATED PHENOLS	
Chlorine	7782505
Chlorine cyanide	506774
Chlornaphazine	494031
Chloroacetaldehyde	107200
CHLOROALKYL ETHERS	
p-Chloroaniline	106478
Chlorobenzene	108907
4-Chloro-m-cresol	50507
p-Chloro-m-cresol	59507
Chlorodibromomethane	124481
1-Chloro-2,3-epoxypropane	106898
Chloroethane	75003
2-Chloroethyl vinyl ether	110758
Chloroform	67663
Chloromethyl methyl ether	107302
beta-Chloronaphthalene	91587
2-Chloronaphthalene	91587
2-Chlorophenol	95578
o-Chlorophenol	95578
4-Chlorophenyl phenyl ether	70057232
1-(o-Chlorophenyl)thiourea	5344821
3-Chloropropionitrile	542767
Chlorosulfonic acid	7790945
4-Chloro-o-toluidine, hydrochloride	3165933
Chlorpyrifos	2921882
Chromic acetate	1066304
Chromic acid	11115745 7738945
Chromic acid, calcium salt	13765190
Chromic sulfate	10101538
Chromium ††	7440473
CHROMIUM AND COMPOUNDS	
Chromous chloride	10049055
Chrysene	218019
Cobaltous bromide	7789437
Cobaltous formate	544183
Cobaltous sulfamate	14017415
Coke Oven Emissions	N.A.
Copper ††	7440508
COPPER AND COMPOUNDS	
Copper cyanide	544923
Coumaphos	56724
Creosote	8001589
Cresol(s)	1319773
m-	108394
o-	95487
p-	106445
Cresylic acid	1319773
m-	108394
o-	95487
p-	106445
Crotonaldehyde	123739 4170303
Cumene	98828

Hazardous Substance	CASRN
Cupric acetate	142712
Cupric acetoarsenite	12002038
Cupric chloride	7447394
Cupric nitrate	3251238
Cupric oxalate	5893663
Cupric sulfate	7758987
Cupric sulfate ammoniated	10380297
Cupric tartrate	815827
CYANIDES	
Cyanides (soluble cyanide salts), not elsewhere specified	57125
Cyanogen	460195
Cyanogen bromide	506683
Cyanogen chloride	506774
1,4-Cyclohexadienedione	106514
Cyclohexane	110827
Cyclohexanone	108941
1,3-Cyclopentadiene, 1,2,3,4,5,5-hexachloro-	77474
Cyclophosphamide	50180
2,4-D Acid	94757
2,4-D Esters	94111
	94791
	94804
	1320189
	1928387
	1928616
	1929733
	2971382
	25168267
	53467111
2,4-D, salts and esters	94757
Daunomycin	20830813
DDD	72548
4,4' DDD	72548
DDE	72559
4,4' DDE	72559
DDT	50293
4,4' DDT	50293
DDT AND METABOLITES	
Decachloroctahydro-1,3,4-metheno-2H-cyclobuta[c,d]-pentalen-2-one	143500
Diallate	2303164
Diamine	302012
Diaminotoluene	95807
	25376458
	496720
	823405
Diazinon	5333415
Dibenz[a,h]anthracene	53703
1,2:5,6-Dibenzanthracene	53703
Dibenzo[a,h]anthracene	53703
1,2:7,8-Dibenzopyrene	189559
Dibenz[a,i]pyrene	189559
1,2-Dibromo-3-chloropropane	96128
Dibutyl phthalate	84742
Di-n-butyl phthalate	84742
Dicamba	1918009
Dichlobenil	1194656
Dichlone	117806
S-(2,3-Dichloroallyl) diisopropylthiocarbamate	2303164
3,5-Dichloro-N-(1,1-dimethyl-2-propynyl)benzamide	23950585

Hazardous Substance	CASRN
Dichlorobenzene (mixed)	25321226
1,2-Dichlorobenzene	95501
1,3-Dichlorobenzene	541731
1,4-Dichlorobenzene	106467
m-Dichlorobenzene	541731
o-Dichlorobenzene	95501
p-Dichlorobenzene	106467
DICHLOROBENZIDINE	
3,3'-Dichlorobenzidine	91941
Dichlorobromomethane	75274
1,4-Dichloro-2-butene	764410
Dichlorodifluoromethane	75718
Dichlorodiphenyl dichloroethane	72548
Dichlorodiphenyl trichloroethane	50293
1,1-Dichloroethane	75343
1,2-Dichloroethane	107062
1,1-Dichloroethylene	75354
1,2-trans-Dichloroethylene	156605
Dichloroethyl ether	111444
2,4-Dichlorophenol	120832
2,6-Dichlorophenol	87650
2,4-Dichlorophenoxyacetic acid, salts and esters	94757
Dichlorophenylarsine	696286
Dichloropropane	26638197
1,1-Dichloropropane	78999
1,3-Dichloropropane	142289
1,2-Dichloropropane	78875
Dichloropropane - Dichloropropene (mixture)	8003198
Dichloropropene	26952238
2,3-Dichloropropene	78886
1,3-Dichloropropene	542756
2,2-Dichloropropionic acid	75990
Dichlorvos	62737
Dieldrin	60571
1,2:3,4-Diepoxybutane	1464535
Diethylamine	109897
Diethylarsine	692422
1,4-Diethylene dioxide	123911
N,N'-Diethylhydrazine	1615801
O,O-Diethyl S-[2-(ethylthio)ethyl]phosphorodithioate	298044
O,O-Diethyl S-methyl dithiophosphate	3288582
Diethyl-p-nitrophenyl phosphate	311455
Diethyl phthalate	84662
O,O-Diethyl O-pyrazinyl phosphorothioate	297972
Diethylstilbestrol	56531
1,2-Dihydro-3,6-pyridazinedione	123331
Dihydrosafrole	94586
Diisopropyl fluorophosphate	55914
Dimethoate	60515
3,3'-Dimethoxybenzidine	119904
Dimethylamine	124403
Dimethylaminoazobenzene	60117
7,12-Dimethylbenz(a)anthracene	57976
3,3'-Dimethylbenzidine	119937
alpha,alpha-Dimethylbenzylhydroperoxide	80159
3,3-Dimethyl-1- (methylthio) 2-butanone,O-[(methylamino)carbonyl] oxime	39196184
Dimethylcarbamoyl chloride	79447

Hazardous Substance	CASRN
1,1-Dimethylhydrazine	57147
1,2-Dimethylhydrazine	540738
O,O-Dimethyl O-p-nitrophenyl phosphorothioate	298000
Dimethylnitrosamine	62759
alpha, alpha-Dimethylphenethylamine	122098
2,4-Dimethylphenol	105679
Dimethyl phthalate	131113
Dimethyl sulfate	77781
Dinitrobenzene (mixed)	25154545
m-	99650
o-	528290
p-	100254
4,6-Dinitro-o-cresol and salts	534521
4,6-Dinitro-o-cyclohexylphenol	131895
Dinitrophenol	25550587
2,5-	329715
2,6-	573568
2,4-Dinitrophenol	51285
Dinitrotoluene	25321146
3,4-Dinitrotoluene	610399
2,4-Dinitrotoluene	121142
Dinoseb	88857
Di-n-octyl phthalate	117840
1,4-Dioxane	123911
DIPHENYLHYDRAZINE	
1,2-Diphenylhydrazine	122667
Diphosphoramide, octamethyl-	152169
Dipropylamine	142847
Di-n-propylnitrosamine	621647
Diquat	85007
	2764729
Disulfoton	298044
2,4-Dithiobiuret	541537
Dithiopyrophosphonic acid, tetraethyl ester	3689245
Diuron	330541
Dodecylbenzenesulfonic acid	27176870
Endosulfan	115297
alpha-Endosulfan	959988
beta-Endosulfan	33213659
ENDOSULFAN AND METABOLITES	
Ensodulfan sulfate	1031078
Endothall	145733
Endrin	72208
Endrin aldehyde	7421934
ENDRIN AND METABOLITES	
Epichlorohydrin	106898
Epinephrine	51434
Ethanal	75070
Ethanamine, 1,1-dimethyl-2-phenyl-	122098
Ethanamine, N-ethyl-N-nitroso-	55185
Ethane, 1,2-dibromo-	106934
Ethane, 1,1-dichloro-	75343
Ethane, 1,2-dichloro-	107062
Ethane, 1,1,1,2,2,2-hexachloro-	67721
Ethane, 1,1'-[methylenebis(oxy)]bis[2-chloro-	111911
Ethane, 1,1'-oxybis-	60297
Ethane,1,1'-oxybis[2-chloro-	111444
Ethane, pentachloro-	76017

Hazardous Substance	CASRN
Ethane, 1,1,1,2-tetrachloro-	630206
Ethane, 1,1,2,2-tetrachloro-	79345
Ethane, 1,1,2-trichloro-	79005
Ethane, 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)-	72435
1,2-Ethanediylbiscarbamodithioic acid	111546
Ethanenitrile	75058
Ethanethioamide	62555
Ethanol, 2,2'-(nitrosoimino)bis-	1116547
Ethanone, 1-phenyl-	98862
Ethanoyl chloride	75365
Ethenamine, N-methyl-N-nitroso	4549400
Ethene, chloro-	75014
Ethene, 2-chloroethoxy	110758
Ethene, 1,1-dichloro-	75354
Ethene, 1,1,2,2-tetrachloro-	127184
Ethene, trans- 1,2-dichloro-	155605
Ethion	563122
Ethyl acetate	141786
Ethyl acrylate	140885
Ethylbenzene	100414
Ethyl carbamate (Urethan)	51796
Ethyl cyanide	107120
Ethyl 4,4'-dichlorobenzilate	510156
Ethylene dibromide	106934
Ethylene dichloride	107062
Ethylene oxide	75218
Ethylenebis(dithiocarbamic acid)	111546
Ethylenediamine	107153
Ethylenediamine tetraacetic acid (EDTA)	60004
Ethylenethiourea	96457
Ethylenimine	151564
Ethyl ether	60297
Ethylidene dichloride	75343
Ethyl methacrylate	97632
Ethyl methanesulfonate	62500
Famphur	52857
Ferric ammonium citrate	1185575
Ferric ammonium oxalate	2944674 55488874
Ferric chloride	7705080
Ferric dextran	9004664
Ferric fluoride	7783508
Ferric nitrate	10421484
Ferric sulfate	10028225
Ferrous ammonium sulfate	10045893
Ferrous chloride	7758943
Ferrous sulfate	7720787 7782630
Fluoroacetic acid, sodium salt	62748
Fluoranthene	206440
Fluorene	86737
Fluorine	7782414
Fluoroacetamide	640197
Formaldehyde	50000
Formic acid	64186
Fulminic acid, mercury(II)salt	628864

Hazardous Substance	CASRN
Fumaric acid	110178
Furan	110009
Furan, tetrahydro-	109999
2-Furancarboxaldehyde	98011
2,5-Furandione	108316
Furfural	98011
Furfuran	110009
D-Glucopyranose, 2-deoxy-2-(3-methyl-3-nitrosoureido)-	18883664
Glycidylaldehyde	765344
Guanidine, N-nitroso-N-methyl-N'-nitro	70257
Guthion	86500
HALOETHERS	
HALOMETHANES	
Heptachlor	76448
HEPTACHLOR AND METABOLITES	
Heptachlor epoxide	1024573
Hexachlorobenzene	118741
Hexachlorobutadiene	87683
HEXACHLOROCYCLOHEXANE (all isomers)	608731
Hexachlorocyclohexane (gamma isomer)	58899
Hexachlorocyclopentadiene	77474
1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo,endo-1,4,5,8-dimethanonaphthalene	72208
1,2,3,4,10,10-Hexachloro-6,7-epoxy-1,4,4a,5,6,7,8,8a-octahydro-endo, exo-1,4,5,8-dimethanonaphthalene	60571
Hexachloroethane	67721
Hexachlorohexahydro-endo,endo-dimethanonaphthalene	465736
1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4,5,8-endo,endo-dimethanonaphthalene.	465736
1,2,3,4,10-10-Hexachloro-1,4,4a,5,8,8a,-hexahydro-1,4:5,8-endo, exo-dimethanonaphthalene.	309002
Hexachlorophene	70304
Hexachloropropene	1888717
Hexaethyl tetraphosphate	757584
Hydrazine	302012
Hydrazine 1,2-diethyl-	1815801
Hydrazine, 1,1-dimethyl-	57147
Hydrazine, 1,2-dimethyl-	540738
Hydrazine, 1,2-diphenyl-	122667
Hydrazine, methyl-	60344
Hydrazinecarbothioamide	79196
Hydrochloric acid	7647010
Hydrocyanic acid	74908
Hydrofluoric acid	7664393
Hydrogen cyanide	74908
Hydrogen fluoride	7664393
Hydrogen phosphide	7803512
Hydrogen sulfide	7783064
Hydroperoxide, 1-methyl-1-phenylethyl-	80159
Hydrosulfuric acid	7783064
Hydroxydimethylarsine oxide	75605
2-Imidazolidinethione	96457
Indeno(1,2,3-cd)pyrene	193395
Iron dextran	9004664
Isobutyl alcohol	78831

Hazardous Substance	CASRN
Isocyanic acid, methyl ester	624839
Isophorone	78591
Isoprene	78795
Isopropanolamine dodecylbenzenesulfonate	42504461
Isosafrole	120581
3(2H)-Isoxazolone, 5-(aminomethyl)-	2763964
Kelthane	115322
Kepone	143500
Lasiocarpine	303344
Lead ††	7439921
Lead acetate	301042
LEAD AND COMPOUNDS	
Lead arsenate	7784409 7645252 10102484
Lead chloride	7758954
Lead fluoborate	13814965
Lead fluoride	7783462
Lead iodide	10101630
Lead nitrate	10099748
Lead phosphate	7446277
Lead stearate	7428480 1072351 56189094 52652592
Lead subacetate	1335326
Lead sulfate	15739807 7446142
Lead sulfide	1314870
Lead thiocyanate	592870
Lindane	58899
Lithium chromate	14307358
Malathion	121755
Maleic acid	110167
Maleic anhydride	108316
Maleic hydrazide	123331
Malononitrile	109773
Melphalan	148823
Mercaptodimethur	2032657
Mercuric cyanide	592041
Mercuric nitrate	10045940
Mercuric sulfate	7783359
Mercuric thiocyanate	592858
Mercurous nitrate	10415755 7782867
Mercury	7439976
MERCURY AND COMPOUNDS	
Mercury, (acetato-O)phenyl-	62384
Mercury fulminate	628864
Methacrylonitrile	126987
Methanamine, N-methyl-	124403
Methane, bromo-	74839
Methane, chloro-	74873
Methane, chloromethoxy-	107302
Methane, dibromo-	74953
Methane, dichloro-	75092
Methane, dichlorodifluoro-	75718
Methane, iodo-	74884
Methane, oxybis(chloro-	542881

Hazardous Substance	CASRN
Methane, tetrachloro-	56235
Methane, tetranitro-	509148
Methane, tribromo-	75252
Methane, trichloro-	67663
Methane, trichlorofluoro-	75694
Methanesulfonic acid, ethyl ester	62500
Methanethiol	74931
Methanesulfenyl chloride, trichloro-	594423
4,7-Methano-1H-indene, 1,4,5,6,7,8,8-heptachloro-3a,3,7,7a-tetrahydro-	76448
Methanoic acid	64186
4,7-Methanoindan, 1,2,4,5,6,7,8,8-octachloro-3a,4,7,7a-tetrahydro-.	57749
Methanol	67561
Methapyrilene	91805
Methomyl	16752775
Methoxychlor	72435
Methyl alcohol	67561
2-Methylaziridine	75558
Methyl bromide	74839
1-Methylbutadiene	504609
Methyl chloride	74873
Methyl chlorocarbonate	79221
Methyl chloroform	71556
4,4-Methylenebis(2-chloroaniline)	101144
2,2'-Methylenebis(3,4,6-trichlorophenol)	70304
3-Methylcholanthrene	56495
Methylene bromide	74953
Methylene chloride	75092
Methylene oxide	50000
Methyl ethyl ketone	78933
Methyl ethyl ketone peroxide	1338234
Methyl hydrazine	60344
Methyl iodide	74884
Methyl isobutyl ketone	108101
Methyl isocyanate	624839
2-Methyllactonitrile	75865
Methylmercaptan	74931
Methyl methacrylate	80626
N-Methyl-N'-nitro-N-nitrosoguanidine	70257
Methyl parathion	298000
4-Methyl-2-pentanone	108101
Methylthiouracil	56042
Mevinphos	7786347
Mexacarbate	315184
Mitomycin C	50077
Monoethylamine	75047
Monomethylamine	74895
Naled	300765
5,12-Naphthacenedione, (8S-cis)-8-acetyl-10-[3-amino-2,3,6-trideoxy-alpha-L-lyxo-hexopyranosyl)oxy]-7,8,9,10-tetrahydro-6,8,11-trihydroxy-1-methoxy-	20830813
Naphthalene, 2-chloro-	91203
Naphthalene, 2-chloro-	91587
1,4-Naphthalenedione	130154

Hazardous Substance	CASRN
2,7-Naphthalenedisulfonic acid,3,3'-[(3,3'-dimethyl-(1,1'-biphenyl)-4,4'-diyl)-bis(azo)]bis(5-amino-4-hydroxy)-tetrasodium salt.	72571
Naphthenic acid	1338245
1,4-Naphthoquinone	130154
1-Naphthylamine	134327
2-Naphthylamine	91598
alpha-Naphthylamine	134327
beta-Naphthylamine	91598
2-Naphthylamine, N,N-bis(2-chloroethyl)-	494031
alpha-Naphthylthiourea	86884
Nickel ††	7440020
NICKEL AND COMPOUNDS	
Nickel ammonium sulfate	15699180
Nickel carbonyl	13463393
Nickel chloride	7718549 37211055
Nickel cyanide	557197
Nickel(II) cyanide	557197
Nickel hydroxide	12054487
Nickel nitrate	14216752
Nickel sulfate	7786814
Nickel tetracarbonyl	13463393
Nicotine and salts	54115
Nitric acid	7697372
Nitric oxide	10102439
p-Nitroaniline	100016
Nitrobenzene	98953
Nitrogen dioxide	10102440 10544726
Nitrogen(II) oxide	10102439
Nitrogen(IV) oxide	10102440 10544726
Nitroglycerine	55630
Nitrophenol (mixed)	25154556
m-	554847
o-	88755
p-	100027
p-Nitrophenol	100027
2-Nitrophenol	88755
4-Nitrophenol	100027
NITROPHENOLS	
2-Nitropropane	79469
NITROSAMINES	
N-Nitrosodi-n-butylamine	924163
N-Nitrosodiethanolamine	1116547
N-Nitrosodiethylamine	55185
N-Nitrosodimethylamine	62759
N-Nitrosodiphenylamine	86306
N-Nitrosodi-n-propylamine	621647
N-Nitroso-N-ethylurea	759739
N-Nitroso-N-methylurea	684935
N-Nitroso-N-methylurethane	615532
N-Nitrosomethylvinylamine	4549400
N-Nitrosopipendine	100754
N-Nitrosopyrrolidine	930552
Nitrotoluene	1321126
m-	99081
o-	88722
p-	99990
5-Nitro-o-toluidine	99558

Hazardous Substance	CASRN
5-Norbornene-2,3-dimethanol,1,4,5,6,7,7-hexachloro, cyclic sulfite.	115297
Octamethylpyrophosphoramide	152169
Osmium oxide	20816120
Osmium tetroxide	20816120
7-Oxabicyclo[2.2.1]heptane-2,3-dicarboxylic acid	145733
1,2-Oxathiolane,2,2-dioxide	1120714
2H-1,3,2-Oxazaphosphorine,2-[bis(2-chloroethyl) amino] tetrahydro-2-oxide.	50180
Oxirane	75218
Oxirane, 2-(chloromethyl)-	106898
Paraformaldehyde	30525894
Paraldehyde	123637
Parathion	56382
Pentachlorobenzene	608935
Pentachloroethane	76017
Pentachloronitrobenzene	82688
Pentachlorophenol	87865
1,3-Pentadiene	504609
Phenacetin	62442
Phenanthrene	85018
Phenol	108952
Phenol, 2-chloro-	95578
Phenol, 4-chloro-3-methyl-	59507
Phenol, 2-cyclohexyl-4,6-dinitro	131895
Phenol, 2,4-dichloro-	120832
Phenol, 2,6-dichloro-	87650
Phenol, 2,4-dimethyl-	105679
Phenol, 2,4-dinitro-	51285
Phenol 2,4-dinitro-6-(1-methylpropyl)	88857
Phenol, 2,4-dinitro-6-methyl-, and salts	534521
Phenol, 4-nitro-	100027
Phenol, pentachloro-	87865
Phenol, 2,3,4,6-tetrachloro-	58902
Phenol, 2,4,5-trichloro-	95954
Phenol, 2,4,6-trichloro-	88062
Phenol, 2,4,6-trinitro-, ammonium salt	131748
Phenyl dichloroarsine	696286
1,10-(1,2-Phenylene)pyrene	193395
Phenylmercuric acetate	62384
N-Phenylthiourea	103855
Phorate	298022
Phosgene	75445
Phosphine	7803512
Phosphoric acid	7664382
Phosphoric acid,diethyl p-nitrophenyl ester	311455
Phosphoric acid, lead salt	7446277
Phosphorodithioic acid, O,O-diethyl S-methylester	3288582
Phosphorodithioic acid, O,O-diethyl S-(ethylthio), methyl ester.	298022
Phosphorodithioic acid, O,O-dimethyl S-[2(methylamino)-2-oxoethyl] ester.	60515
Phosphorofluoridic acid,bis(1-methylethyl)ester	55914
Phosphorothioic acid,O,O-diethyl O-(p-nitrophenyl) ester	56382
Phosphorothioic acid, O,O-diethyl O-pyrazinyl ester	297972
Phosphorothioic acid, O,O-dimethyl O-[p-[(dimethylamino)-sulfonyl]phenyl] ester.	52857

Hazardous Substance	CASRN
Phosphorus	7723140
Phosphorus oxychloride	10025873
Phosphorus pentasulfide	1314803
Phosphorus sulfide	1314803
Phosphorus trichloride	7719122
PHTHALATE ESTERS	
Phthalic anhydride	85449
2-Picoline	109068
Plumbane, tetraethyl-	78002
POLYCHLORINATED BIPHENYLS (PCBs)	1336363 12674112 11104282 11141165 53469219 12672296 11097691 11096825
POLYNUCLEAR AROMATIC HYDROCARBONS	
Potassium arsenate	7784410
Potassium arsenite	10124502
Potassium bichromate	7778509
Potassium chromate	7789006
Potassium cyanide	151508
Potassium hydroxide	1310583
Potassium permanganate	7722647
Potassium silver cyanide	506616
Pronamide	23950585
1-Propanal, 2,3-epoxy-	765344
Propanal, 2-methyl-2-(methylthio)-,O-[(methylamino) carbonyl]oxime.	116063
1-Propanamine	107108
1-Propanamine, N-propyl-	142847
Propane, 1,2-dibromo-3-chloro-	96128
Propane, 2-nitro-	79469
Propane,2,2'-oxybis(2-chloro-	108601
1,3-Propane sultone	1120714
Propanedinitrile	109773
Propanenitrile	107120
Propanenitrile, 3-chloro-	542767
Propanenitrile, 2-hydroxy-2-methyl-	75865
1,2,3-Propanetriol, trinitrate-	55630
1-Propanol, 2,3-dibromo-, phosphate (3:1)	126727
1-Propanol, 2-methyl-	78831
2-Propanone	67641
2-Propanone, 1-bromo	598312
Propargite	2312358
Propargyl alcohol	107197
2-Propenal	107028
2-Propenamide	79061
Propene, 1,3-dichloro-	542756
1-Propene, 1,1,2,3,3,3-hexachloro-	1888717
2-Propenenitrile	107131
2-Propenenitrile, 2-methyl-	126987
2-Propenoic acid	79107
2-Propenoic acid, ethyl ester	140885
2-Propenoic acid, 2-methyl-, ethyl ester	97632
2-Propenoic acid, 2-methyl-, methyl ester	80626
2-Propen-1-ol	107186
Propionic acid	79094

Hazardous Substance	CASRN
Propionic acid, 2-(2,4,5-trichlorophenoxy)-	93721
Propionic anhydride	123626
n-Propylamine	107108
Propylene dichloride	78875
Propylene oxide	75569
1,2-Propylenimine	75558
2-Propyn-1-ol	107197
Pyrene	129000
Pyrethrins	121299 121211 8003347
4-Pyridinamine	504245
Pyridine	110861
Pyridine,2-[(2-(dimethlyamino)ethyl)-2-thenylamino]	91805
Pyridine, hexahydro-N-nitroso-	100754
Pyridine,2-methyl-	109068
Pyridine, (S)-3-(1-methyl-2-pyrrolidinyl)-, and salts	54115
4(1H)-Pyrimidinone, 2,3-dihydro-6-methyl-2-thioxo-	56042
Pyrophosphoric acid, tetraethyl ester	107493
Pyrrole, tetrahydro-N-nitroso-	930552
Quinoline	91225
RADIONUCLIDES	
Reserpine	50555
Resorcinol	108463
Saccharin and salts	81072
Safrole	94597
Selenious acid	7783008
Selenium ††	7782492
SELENIUM AND COMPOUNDS	
Selenium dioxide	7446084
Selenium disulfide	7488564
Selenium oxide	7446084
Selenourea	630104
L-Serine, diazoacetate (ester)	115026
Silver ††	7440224
SILVER AND COMPOUNDS	
Silver cyanide	506649
Silver nitrate	7761888
Silvex	93721
Sodium	7440235
Sodium arsenate	7631892
Sodium arsenite	7784465
Sodium azide	26628228
Sodium bichromate	10588019
Sodium bifluoride	1333831
Sodium bisulfite	7631905
Sodium chromate	7775113
Sodium cyanide	143339
Sodium dodecylbenzene sulfonate	25155300
Sodium fluoride	7681494
Sodium hydrosulfide	16721805
Sodium hydroxide	1310732
Sodium hypochlorite	7681529 10022705
Sodium methylate	124414
Sodium nitrite	7632000

Hazardous Substance	CASRN
Sodium phosphate, dibasic	7558794 10039324 10140655
Sodium phosphate, tribasic	7601549 7785844 10101890 10361894 7758294 10124568
Sodium selenite	10102188 7782823
4,4'-Stilbenediol, alpha,alpha'-diethyl-	56531
Streptozotocin	18883664
Strontium chromate	7789062
Strontium sulfide	1314961
Strychnidin-10-one, and salts	57249
Strychnidin-10-one, 2,3-dimethoxy-	357573
Strychnine and salts	57249
Styrene	100425
Sulfur hydride	7783064
Sulfur monochloride	12771083
Sulfur phosphide	1314803
Sulfur selenide	7488564
Sulfuric acid	7664939 8014957
Sulfuric acid, dimethyl ester	77781
Sulfuric acid, thallium(I) salt	7446186 10031591
2,4,5-T	93765
2,4,5,-T acid	93765
2,4,5-T amines	2008460 6369966 6369977 1319729 3813147
2,4,5-T esters	93798 2545597 61792072 1928478 25168154
2,4,5-T salts	13560991
TDE	72548
1,2,4,5-Tetrachlorobenzene	95943
2,3,7,8-Tetrachlorodibenzo-p-dioxin(TCDD)	1746016
1,1,1,2-Tetrachloroethane	630206
1,1,2,2-Tetrachloroethane	79345
Tetrachloroethylene	127184
2,3,4,6-Tetrachlorophenol	58902
Tetraethyldithiopyrophosphate	3689245
Tetraethyl lead	78002
Tetraethyl pyrophosphate	107493
Tetrahydrofuran	109999
Tetranitromethane	509148
Tetraphosphoric acid, hexaethyl ester	757584
Thallic oxide	1314325
Thallium ††	7440280
THALLIUM AND COMPOUNDS	
Thallium(I) acetate	563688
Thallium(I) carbonate	6533739
Thallium(I) chloride	7791120
Thallium(I) nitrate	10102451

Hazardous Substance	CASRN
Thallium(III) oxide	1314325
Thallium(I) selenide	12039520
Thallium(I) sulfate	7446186 10031591
Thioacetamide	62555
Thiofanox	39196184
Thiomidodicarbonic diamide	541537
Thiomethanol	74931
Thiophenol	108985
Thiosemicarbazide	79196
Thiourea	62566
Thiourea, (2-chlorophenyl)-	5344821
Thiourea, 1-naphthalenyl-	86884
Thiourea, phenyl-	103855
Thiram	137268
Toluene	108883
Toluenediamine	95807 25376458 496720
Toluene diisocyanate	823405 584849 91087 25471625
o-Toluidine hydrochloride	636215
Toxaphene	8001352
2,4,5-TP acid	93721
2,4,5-TP acid esters	32534955
1H-1,2,4-Triazol-3-amine	61825
Trichloron	52686
1,2,4-Trichlorobenzene	120821
1,1,1-Trichloroethane	71556
1,1,2-Trichloroethane	79005
Trichloroethene	79016
Trichloroethylene	79016
Trichloromethanesulfenyl chloride	594423
Trichloromonofluoromethane	75694
Trichlorophenol	25167822
2,3,4-Trichlorophenol	15950660
2,3,5-Trichlorophenol	933789
2,3,6-Trichlorophenol	933755
2,4,5-Trichlorophenol	95954
2,4,6-Trichlorophenol	88062
3,4,5-Trichlorophenol	609198
2,4,5-Trichlorophenol	95954
2,4,6-Trichlorophenol	88062
2,4,5-Trichlorophenoxyacetic acid	93765
Triethanolamine dodecylbenzenesulfonate	27323417
Triethylamine	121448
Trimethylamine	75503
sym-Trinitrobenzene	99354
1,3,5-Trioxane, 2,4,6-trimethyl-	123637
Tris(2,3-dibromopropyl) phosphate	126727
Trypan blue	72571
Unlisted Hazardous Wastes	
Characteristic of Ignitability	
Characteristic of Corrosivity	
Characteristic of Reactivity	
Characteristic of EP Toxicity	
Arsenic	
Barium	

Hazardous Substance	CASRN
Cadmium	
Chromium	
Lead	
Mercury	
Selenium	
Silver	
Endrin	
Lindane	
Methoxychlor	
Toxaphene	
2,4-D	
2,4,5-TP	
Uracil, 5 [bis(2-chloroethyl)amino]-	66751
Uracil mustard	66751
Uranyl acetate	541093
Uranyl nitrate	10102064 36478769
Vanadic acid, ammonium salt	7803556
Vanadium(V) oxide	1314621
Vanadium pentoxide	1314621
Vanadyl sulfate	27774135
Vinyl acetate	108054
Vinyl chloride	75014
Vinylidene chloride	75354
Warfarin	81812
Xylene (mixed)	1330207
m-	108383
o-	95476
p-	106423
Xylenol	1300716
Yohimban-16-carboxylic acid 11,17-dimethoxy-18-[(3,4,5-trimethoxybenzoyl)oxy]-, methylester	50555
Zinc††	7440666
ZINC AND COMPOUNDS	
Zinc acetate	557346
Zinc ammonium chloride	52628258 14639975 14639986
Zinc borate	1332076
Zinc bromide	7699458
Zinc carbonate	3486359
Zinc chloride	7646857
Zinc cyanide	557211
Zinc fluoride	7783495
Zinc formate	557415
Zinc hydrosulfite	7779864
Zinc nitrate	7779886
Zinc phenolsulfonate	127822
Zinc phosphide	1314847
Zinc silicofluoride	16871719
Zinc sulfate	7733020
Zirconium nitrate	13746899
Zirconium potassium fluoride	16923958
Zirconium sulfate	14644612
Zirconium tetrachloride	10026116

Hazardous Substance	CASRN
2-Amino-1-methyl benzene †	95534
4-Amino-1-methyl benzene †	106490
2-Ethoxyethanol †	110805
Ethylene glycol monoethyl ether †	110805
o-Toluidine †	95534
p-Toluidine †	106490

† These hazardous substances have been added to CERCLA Section 101(14) since May 25, 1983 (51 FR 34535)

†† no reporting of releases of this hazardous substance is required if diameter of the pieces of the solid metal released is equal to or exceeds 100 micrometers (0.004 inches)

††† the reportable quantity for asbestos is limited to friable forms only

APPENDIX B

USAF UST PROGRAM STRATEGY SUMMARY

APPENDIX B
Air Force UST Program Strategy Summary

1. Background -

   1984 RCRA Amendments cover USTs.
   Federal sovereignty waived.
   Civil penalties up to $25,000/day/violation.

2. Scope -
   Applies to all CONUS, territorial, and possessional Bases.
   Applies to all underground storage tanks containing Subtitle C & I substances if 10 percent of tank volume and associated piping is below ground.

3. Responsibility -

Policy Development	AF/LEEV
Program Execution	MAJCOM/DE
Technical Assistance	AFES/DEM
	AFES/DEV
State Program Information	AFRCE
Tank Design	AF/LEEE

4. Implementation -

   Current and future requirements will be funded with MAJCOM O & M or MCP monies.
   DERA funds are available for tanks abandoned prior to 1 Jan 1976 (UST requirements will compete with other IRP projects).

5. Surveys/Inventories/Reporting -

   Minimum information required is age, size, type (material), location, and product(s) stored plus any additional State or local requirements.
   Pre-1974 tanks are to be addressed as part of the IRP, however, it is unnecessary to reopen/amend Phase I/II reports.

6. Immediate and increased attention to leak detection is necessary.
   EPC provides review and oversight of inventory procedures.
   Determinations are to be made at the local level.
   Aboveground tanks should be considered in any replacement/new installation.

7. New Tank Design/Construction Criteria -

   HQ USAF/LEEE will review and modify existing tank standards and designs.
   Contracts for tank system design should require evaluation of leak detection technologies and incorporate the appropriate technology in the system design.

APPENDIX C

UNDERGROUND STORAGE TANK NOTIFICATION FORM
UNDERGROUND STORAGE TANK INSPECTION REPORT
UNDERGROUND STORAGE TANK CLOSURE WORKSHEET
UNDERGROUND STORAGE TANK REMOVAL ACKNOWLEDGEMENT

FOR TANKS IN **NM**	RETURN COMPLETED FORM TO	New Mexico Environmental Improvement Division Ground Water/Hazardous Waste Bureau P.O. Box 968 (505) 827-2933 Santa Fe, NM 87504 (505) 827-2918	STATE USE ONLY I.D. Number Date Received

GENERAL INFORMATION

Notification is required by Federal law for all underground tanks that have been used to store regulated substances since January 1, 1974, that are in the ground as of May 8, 1986, or that are brought into use after May 8, 1986. The information requested is required by Section 9002 of the Resource Conservation and Recovery Act, (RCRA), as amended.

The primary purpose of this notification program is to locate and evaluate underground tanks that store or have stored petroleum or hazardous substances. It is expected that the information you provide will be based on reasonably available records, or, in the absence of such records, your knowledge, belief, or recollection.

Who Must Notify? Section 9002 of RCRA, as amended, requires that, unless exempted, owners of underground tanks that store regulated substances must notify designated State or local agencies of the existence of their tanks. Owner means—

(a) in the case of an underground storage tank in use on November 8, 1984, or brought into use after that date, any person who owns an underground storage tank used for the storage, use, or dispensing of regulated substances, and

(b) in the case of any underground storage tank in use before November 8, 1984, but no longer in use on that date, any person who owned such tank immediately before the discontinuation of its use.

What Tanks Are Included? Underground storage tank is defined as any one or combination of tanks that (1) is used to contain an accumulation of "regulated substances," and (2) whose volume (including connected underground piping) is 10% or more beneath the ground. Some examples are underground tanks storing: 1. gasoline, used oil, or diesel fuel, and 2. industrial solvents, pesticides, herbicides or fumigants.

What Tanks Are Excluded? Tanks removed from the ground are not subject to notification. Other tanks excluded from notification are:

1. farm or residential tanks of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes;
2. tanks used for storing heating oil for consumptive use on the premises where stored;
3. septic tanks;
4. pipeline facilities (including gathering lines) regulated under the Natural Gas Pipeline Safety Act of 1968, or the Hazardous Liquid Pipeline Safety Act of 1979, or which is an intrastate pipeline facility regulated under State laws;
5. surface impoundments, pits, ponds, or lagoons;
6. storm water or waste water collection systems;
7. flow-through process tanks;
8. liquid traps or associated gathering lines directly related to oil or gas production and gathering operations;
9. storage tanks situated in an underground area (such as a basement, cellar, mineworking, drift, shaft, or tunnel) if the storage tank is situated upon or above the surface of the floor.

What Substances Are Covered? The notification requirements apply to underground storage tanks that contain regulated substances. This includes any substance defined as hazardous in section 101 (14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), with the exception of those substances regulated as hazardous waste under Subtitle C of RCRA. It also includes petroleum, e.g., crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure (60 degrees Fahrenheit and 14.7 pounds per square inch absolute).

Where To Notify? Completed notification forms should be sent to the address given at the top of this page.

When To Notify? 1. Owners of underground storage tanks in use or that have been taken out of operation after January 1, 1974, but still in the ground, must notify by May 8, 1986. 2. Owners who bring underground storage tanks into use after May 8, 1986, must notify within 30 days of bringing the tanks into use.

Penalties: Any owner who knowingly fails to notify or submits false information shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or for which false information is submitted.

INSTRUCTIONS

Please type or print in ink all items except "signature" in Section V. **This form must by completed for each location containing underground storage tanks.** If more than 5 tanks are owned at this location, photocopy the reverse side, and staple continuation sheets to this form.

Indicate number of continuation sheets attached ☐

I. OWNERSHIP OF TANK(S)

Owner Name (Corporation, Individual, Public Agency, or Other Entity)

Street Address

County

City | State | ZIP Code

Area Code | Phone Number

Type of Owner *(Mark all that apply ☒)*

☐ Current ☐ State or Local Gov't ☐ Private or Corporate

☐ Former ☐ Federal Gov't (GSA facility I.D. no. _____) ☐ Ownership uncertain

II. LOCATION OF TANK(S)

(If same as Section 1, mark box here ☐)

Facility Name or Company Site Identifier, as applicable

Street Address or State Road, as applicable

County

City (nearest) | State | ZIP Code

Indicate number of tanks at this location ☐

Mark box here if tank(s) are located on land within an Indian reservation or on other Indian trust lands ☐

III. CONTACT PERSON AT TANK LOCATION

Name (If same as Section I, mark box here ☐) | Job Title | Area Code | Phone Number

IV. TYPE OF NOTIFICATION

☐ Mark box here only if this is an amended or subsequent notification for this location.

V. CERTIFICATION (Read and sign after completing Section VI.)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete.

Name and official title of owner or owner's authorized representative	Signature	Date Signed

CONTINUE ON REVERSE SIDE

Owner Name (from Section I) _____ Location (from Section II) _____ Page No. ____ of ____ Pages

VI. DESCRIPTION OF UNDERGROUND STORAGE TANKS (Complete for each tank at this location)

Tank Identification No. (e.g., ABC-123), or Arbitrarily Assigned Sequential Number (e.g., 1,2,3...)	Tank No.	Tank No.	Tank No.	Tank No.	Tank No.
1. Status of Tank *(Mark all that apply ☒)*					
Currently in Use	☐	☐	☐	☐	☐
Temporarily Out of Use	☐	☐	☐	☐	☐
Permanently Out of Use	☐	☐	☐	☐	☐
Brought into Use after 5/8/86	☐	☐	☐	☐	☐
2. Estimated Age (Years)					
3. Estimated Total Capacity (Gallons)					
4. Material of Construction *(Mark one ☒)*					
Steel	☐	☐	☐	☐	☐
Concrete	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
5. Internal Protection *(Mark all that apply ☒)*					
Cathodic Protection	☐	☐	☐	☐	☐
Interior Lining (e.g., epoxy resins)	☐	☐	☐	☐	☐
None	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
6. External Protection *(Mark all that apply ☒)*					
Cathodic Protection	☐	☐	☐	☐	☐
Painted (e.g., asphaltic)	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic Coated	☐	☐	☐	☐	☐
None	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
7. Piping *(Mark all that apply ☒)*					
Bare Steel	☐	☐	☐	☐	☐
Galvanized Steel	☐	☐	☐	☐	☐
Fiberglass Reinforced Plastic	☐	☐	☐	☐	☐
Cathodically Protected	☐	☐	☐	☐	☐
Unknown	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
8. Substance Currently or Last Stored in Greatest Quantity by Volume *(Mark all that apply ☒)*					
a. Empty	☐	☐	☐	☐	☐
b. Petroleum					
Diesel	☐	☐	☐	☐	☐
Kerosene	☐	☐	☐	☐	☐
Gasoline (including alcohol blends)	☐	☐	☐	☐	☐
Used Oil	☐	☐	☐	☐	☐
Other, Please Specify	_____	_____	_____	_____	_____
c. Hazardous Substance	☐	☐	☐	☐	☐
Please Indicate Name of Principal CERCLA Substance	_____	_____	_____	_____	_____
OR Chemical Abstract Service (CAS) No.	_____	_____	_____	_____	_____
Mark box ☒ if tank stores a mixture of substances	☐	☐	☐	☐	☐
d. Unknown	☐	☐	☐	☐	☐
9. Additional Information (for tanks permanently taken out of service)					
a. Estimated date last used (mo/yr)	/	/	/	/	/
b. Estimated quantity of substance remaining (gal.)	_____	_____	_____	_____	_____
c. Mark box ☒ if tank was filled with inert material (e.g., sand, concrete)	☐	☐	☐	☐	☐

Environmental Improvement Division
Underground Storage Tank Bureau
Prevention/Inspection Section
1190 St. Francis Drive
Santa Fe, New Mexico 87503

(505) 827-0216

INSPECTION REPORT

DATE	CASE NUMBER	OPENING CONFERENCE TIME

INSPECTION TYPE: ☐ COMPLIANCE ☐ REINSPECTION ☐ TANK CLOSURE ☐ INSTALLATION ☐ REPAIR ☐ COMPLAINT ☐ MODIFICATION

Facility Name	Facility No.	Phone No.
1.		
Address		ZIP Code

Owner Name	Owner No.	Phone No.
2.		
Address		ZIP Code

Facility Operator	Phone No.
3.	
Address	ZIP Code

Contractor Name	Phone No.
4.	
Address	ZIP Code

TANK NO.	SIZE	CONTENTS	INSTALLATION DATE	TANK CONSTRUCTION	PIPING CONSTRUCTION	TANK RELEASE DETECTION	PIPING RELEASE DETECTION	TANK STATUS

SITE MAP

DISTRIBUTION: WHITE - Owner CANARY - Operator C-3 PINK - USTB GOLDENROD - Supervisor Office

		Yes	No	Unk.	N/A
1. All applicable tanks on site are registered.	1.				
2. Proper notification was made for the following:	2.				
a. Closure	a.				
b. Installation	b.				
c. Modification	c.				
d. Repair	d.				
3. Tanks closed properly.	3.				
4. Tanks installed properly.	4.				
5. Tanks repaired/modified properly.	5.				
6. Release detection — tanks:	6.				
a. Inventory records combined with annual tank tightness testing	a.				
b. Manual tank gauging	b.				
c. Automatic tank gauging	c.				
d. Vapor monitoring	d.				
e. Ground water monitoring	e.				
f. Interstitial monitoring	f.				
7. Release detection — piping.	7.				
8. Certified tank installers.	8.				
9. All required records are maintained.	9.				
10. Evidence of release/spill.	10.				

COMMENTS:

CLOSING CONFERENCE:	DATE	TIME
Compliance Officer's Signature	Date	

On-site Representative's Signature Date

DISTRIBUTION: WHITE - Owner CANARY - Operator PINK - USTB GOLDENROD - Compliance Officer

TANK CLOSURE WORKSHEET
(COMPLETE AFTER CLOSURE)

Tank Owner_____ Phone_____
Mailing Address_____
Tank Address_____
Contractor Name_____Phone_____
Address_____
Contractor Name_____Phone_____
Address_____

Tank Closure Date_____ # of Tanks Closed_____
****

I. Tank Closure Initial Procedures (check measures complied with):
- ____Obtain recommended safety equipment for all personnel
- ____Contact Fire Marshall or other fire officials
- ____Bond or ground equipment
- ____Drain product from piping and tank
- ____Disconnect, then cap or remove piping
- ____Remove all residual product from tank
- ____Excavate to tank top
- ____Remove all tank fixtures
- ____Properly purge or inert tank of all flammable vapors using approved method
- ____Continually monitor for explosive vapors while tank is being removed

II. Tank Removal
- ____Create vent hole
- ____Excavate tank using all safety precautions
- ____Clean and inspect tank
- ____Check excavation for evidence of leaks and notify EID and other proper authorities if leak is found
- ____Check vapor levels in tank before transporting
- ____Dispose of tank in approved manner

Tank disposal location_____
City State
How did you assess site for leakage?_____
Closure report kept at_____
NOTE: Immediately report any evidence of leakage to EID at 827-0188

I hereby state that the above information is correct

_____
Signature of owner or contractor performing work
****

FOR EID USE ONLY
Notification Received_____ Approved By_____
Inspection Date_____ Inspector_____

New Mexico Health and Environment Department

GARREY CARRUTHERS
Governor

DENNIS BOYD
Secretary

MICHAEL J. BURKHART
Deputy Secretary

RICHARD MITZELFELT
Director

Date:_____

TO:_____
_____
_____

RE: Underground storage tank removal at the following address:
_____
_____
_____

Dear_____:
Thank you for your closure notification received on _____.
_____Your closure notification was complete.
_____Your notification was incomplete. You must call or write us and give us the following information_____
_____.

Allowing 30 days after notification as required in Section 801.B of the New Mexico UST regulations, you may proceed with closure on or after_____. Please inform this office of an exact date for the tank pull when you have made final arrangements. A member of the inspection/prevention staff may be in touch may be in touch with you regarding an inspection at the time of closure. When carrying out a tank closure, you must:

-NOTIFY US AT (505)827-0188 WITHIN 24 HOURS IF THERE IS ANY INDICATION THAT THE TANKS HAVE LEAKED.
-Notify the local fire marshall ahead of time.
-Comply with the enclosed regulations Part VIII Out-of-Service UST Systems and Closure.
-Comply with the enclosed API Publication 1604.
-Fill out and return the Tank Closure Checklist when the tanks are pulled and disposed of properly.
-Complete and send in the enclosed Tank Registration form within 30 days of removing the tanks, indicating the tanks are permanently out of use. Otherwise you will continued to be assessed fees for the tanks.

Thank you for complying with our regulations. Please contact me at 827-2910 if you have any questions.

Sincerely,

Thomas J. Crespin
Program Manager, Inspection/Prevention Section
Underground Storage Tank Bureau
Enclosures:closure packet
cc:_____
_____

APPENDIX D

LIST OF UNDERGROUND STORAGE TANKS AND LOCATIONS

APPENDIX D. UNDERGROUND STORAGE TANK UPDATE

The following is a list of all registered underground storage tanks compiled from estate records at Cannon AFB. The underground storage tank list includes all UST locations that have been documented, removal dates for USTs, and contents of documented tanks. A positive identification of each accessible tank location, including the abandoned locations, was attempted by siting the fill and vent pipes. Those tanks positively identified are indicated.

The appendix is divided into three sections: a list of all registered USTs located at Cannon AFB, a list of USTs removed, and a list of registered USTs.

UNDERGROUND TANK STATISTICS

Tanks registered in 1988		
A.	Tanks suggested for replacement with aboveground vaults	27
B.	Large tanks with no anticipated replacement	6
C.	Waste oil tanks with no replacement	2
D.	Tanks removed since 1988	10
E.	Tanks to be removed in FY92	4
	TOTAL	49
Inactive Tanks		
A.	Tanks removed and verified	6
B.	Tanks removed but not verified	20
C.	Tanks scheduled for removal in FY92	5
D.	Tanks requiring further investigation by outside contract	23
E.	Tanks requiring further investigation by Civil Engineering Squadron	6
F.	Tanks identified for backhoe exploration	2
G.	Tanks not required to be registered	7
	TOTAL	69
USTs found nonexistent of above ground through records review and personnel interviews		10
Total tanks listed prior to FY91		128
Total tanks added in FY91		5
Total tanks listed at Cannon AFB		133

UNDERGROUND STORAGE TANKS

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
10	500 gal	1962	DF-2	Yes	In service for generators. Visually identified. 1 probe.
11	N/N	N/N	N/N	No	Building demolished
13	N/N	1943	DF-2	No	Building demolished
21	2000 gal	1943	DF-2	Removed	Building demolished. Tank verified gone.
51	500 gal	N/N	N/N	No	No drawings
55	500 gal	N/A	N/A	No	Drawings available. UST added to list.
104	N/A	N/A	N/A	Removed	The only UST found at this site was an oil-water separator.
108	2000 gal	1943	DF-2	Removed	Building replaced. Tanks removed during MC project for new hangars during FY88.
111	N/A	N/A	DF-2	Removed	Removed by TO 90-9010
112	N/A	N/A	N/A	Removed	Removed by TO 90-9010
116	550 gal	1964	DF-2	Removed	Tank was removed during construction of Weapons Release Shop.
121	2000 gal	1943	DF-2	Removed	Building replaced, tanks removed during MC project for new hangars during FY88.
129	200 gal	1943	DF-2	Yes	Visually identified. Not active. 1 probe. Asphalt paving.
130	500 gal	N/A	DF-2	Yes	In use for Heat Shop. 1 probe.
131	N/A	N/A	N/A	Non-existent	No drawings.
135	500 gal	1956	DF-2	Yes	In use for generation on flightline status. 1 probe.
140	1500 gal	1953	DF-2	Removed	Removed during construction of AGS Parts Store.
159	N/A	N/A	N/A	Non-existent	No drawings.

UNDERGROUND STORAGE TANKS
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
162	N/A	1955	Water	Removed	Removed during construction of AGS Parts Store.
163	1500 gal	1953	N/A	Removed	Removed during construction of AGS Parts Store.
164	500 gal	N/A	N/A	N/A	Tank is in a vault not considered an underground tank.
170	2000 gal	1943	DF-2	Yes	Not in service. 1 probe. Asphalt paving over tank.
181	550 gal	1943	DF-2	Yes	Not in service. 1 probe. Asphalt paving over tank.
182	2000 gal	1971	Mogas	Yes	Tank in service
182	2000 gal	1971	DF-2	Yes	Tank in service
186	2000 gal	N/A	Mogas	Non-existent	Duplicate entry
186	2000 gal	N/A	DF-2	Non-existent	Duplicate entry
185	4000 gal	1943	DF-2	Yes	Not in service. 1 probe. Asphalt paving over tank.
187	6000 gal	N/A	JP-4	Yes	Tank in service
192	N/A	N/A	N/A	Removed	Jan 91 during electrical upgrade. No soil sample.
216	250 gal	N/A	DF-2	Yes	In use for generator. 1 probe.
305	500 gal	N/A	DF-2	Removed	Removed by 90-9010
310	750 gal	N/A	DF-2	Removed	Removed by 90-9010
316	550 gal	N/A	DF-2	Removed	Removed Dec 88
325	N/A	N/A	N/A	Non-existent	The only tank here is for H_2O.
327	N/A	N/A	N/A	No	Visually identified. The vent pipe exists. Tank under sidewalk.
335	N/A	N/A	N/A	No	Visually identified. The tank is an oil/water separator.
354	500 gal	1956	N/A	No	Visually identified. Not in service.
358	500 gal	1977	Solvents	Removed?	From dead file.

UNDERGROUND STORAGE TANKS
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
360	300 gal	N/A	DF-2	Non-existent	As-builts do not show tank.
368	10000 gal	1963	Mogas	Yes	Tank in service. 2 probes.
368	10000 gal	1963	Mogas	Yes	Tank in service. 2 probes.
368	10000 gal	1963	Mogas	Yes	Tank in service. 2 probes.
368	150 gal	N/A	Used Oil	Yes	Tank in service.
374	10000 gal	N/A	Mogas	Removed	Removed Dec 88.
374	5000 gal	1963	Mogas	Removed	Removed Nov 91.
374	5000 gal	1963	DF-2	Removed	Removed Nov 91. 376A tanks were misidentified as 374 (Mogas and DF-2).
380	560 gal	1953	DF-2	Removed	Removed by 90-9010. Filled with sand.
390	2000 gal	N/A	POL Sump	Removed	Removed Jan 91.
392*	500 gal	1958	Mogas	No	In service.
392*	500 gal	1958	JP-4	No	In service.
392*	500 gal	1958	JP-4	No	In service.
392*	500 gal	1958	JP-4	No	In service.
442	N/A	N/A	N/A	No	Visually identified.
443	8500 gal	N/A	DF-2	Removed	Removed in FY86 during gymnasium expansion.
494	100 gal	1982	Used Oil	No	In service. Visually identified.
494	100 gal	1982	Used Oil	No	In service. Visually identified.
494	500 gal	1982	Used Oil	Yes	In service. Visually identified.
502	4000 gal	1955	DF-2	Removed	Removed Dec 88.
552	4000 gal	1955	DF-2	Removed	Removed Dec 88.
553	4000 gal	1955	DF-2	Removed	Removed Dec 88.
554	4000 gal	1955	DF-2	No	Building demolished.
582	2000 gal	1956	N/A	No	Not in service.
600	500 gal	N/A	DF-2	Yes	Tank in service for generators. 1 probe.
602	4000 gal	1943	DF-2	No	Building demolished.
618	4000 gal	1942	DF-2	No	Building demolished.
652	4000 gal	1955	DF-2	No	Building demolished.
682	N/A	N/A	N/A	No	Tank needs to be located and removed.
723	500 gal	1956	N/A	No	Building demolished.

UNDERGROUND STORAGE TANKS
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
728	1000 gal	1971	DF-2	Yes	Tank in service for generators. 1 probe.
782	2000 gal	1943	DF-2	Removed	Building demolished.
785	--- gal	N/A	N/A	No	Converted to natural gas, site survey required.
799	530 gal	1957	DF-2	Removed	Verified removed by 90-9010.
836	420 gal	1954	DF-2	Removed	Building demolished.
840	N/A	N/A	N/A	Non-existent	See tank files.
918	2000 gal	1942	DF-2	No	Building demolished.
921	2000 gal	1942	DF-2	No	Building demolished.
933	2000 gal	1942	DF-2	No	Building demolished.
937	2000 gal	1942	DF-2	No	Building demolished.
955	2000 gal	1942	DF-2	No	Building demolished.
957	1000 gal	1942	DF-2	No	Building demolished.
958	550 gal	1942	DF-2	No	Building demolished.
1400	7000 gal	1965	DF-2	Yes	Tank in service at hospital. 2 probes. Use for generators and back-up heat supply.
1400	200 gal	N/A	DF-2	Yes	Use for generator at hospital. 2 probes.
1402	500 gal	N/A	Mogas	Yes	Tank in service. 1 probe.
1995	N/A	1943	DF-2	No	Building demolished.
1996	500 gal	1956	N/A	No	Building demolished.
1998	500 gal	1956	N/A	No	Building demolished.
1999	N/A	1042	DF-2	Yes	Building demolished.
2105	1000 gal	N/A	DF-2	Yes	In service. 1 probe.
2110	550 gal	1956	DF-2	Yes	In service. 1 probe.
2110	550 gal	N/A	Mogas	No	Not in service.
2112	N/A	N/A	N/A	No	Not in service.
2201	N/A	N/A	N/A	No	Building demolished.
2202	N/A	N/A	N/A	No	Building demolished.
2203	N/A	N/A	N/A	No	Building demolished.
2204	N/A	N/A	N/A	No	Building demolished.

UNDERGROUND STORAGE TANKS
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
2270	250 gal	1970	Diesel	Yes	In service for generators. 1 probe.
2276	500 gal	1961	DF-2	Yes	In service for Heat Shop.
2276	500 gal	1963	DF-2	Removed	Removed in FY76.
2280	1000 gal	1972	DF-2	No	Out of service.
2282	500 gal	1984	DF-2	Yes	In service for generators. 1 probe.
2285	1000 gal	1972	DF-2	Yes	In service for generators. 1 probe.
2300	550 gal	1953	DF-2	Yes	Removed by 90-9010.
2300	250 gal	1961	DF-2	Yes	In service for generator. 1 probe.
2302	550 gal	1953	DF-2	Removed	Removed in FY89. No soil sample.
2302	250 gal	1961	DF-2	Yes	In service for generators. 1 probe.
2306	550 gal	N/A	DF-2	Yes	In service for generators. 1 probe.
2309	2500 gal	N/A	JP-4	Removed	Removed Mar 89.
Landfill 5	1500 gal	1960	DF-2	Non-existent	See UST file.
2313	626 gal	1974	DF-2	Removed	Removed by 90-9010.
2328	3000 gal	1974	DF-2	Removed	Removed in FY89. No soil samples.
2330	700 gal	1968	DF-2	Removed	Removed in FY89. No soil samples.
2340	250 gal	1970	DF-2	Yes	In service for generators. 1 probe.
3025	250 gal	1970	DF-2	Yes	In service for generators. 1 probe.
3038	500 gal	N/A	DF-2	Yes	In service for water well No. 9.
3050	500 gal	N/A	DF-2	Yes	In service. 1 probe.
3060	500 gal	N/A	DF-2	Yes	In service. 1 probe.
3121	1000 gal	N/A	DF-2	Yes	In service.
3121	1000 gal	N/A	Mogas	Yes	In service.

UNDERGROUND STORAGE TANKS
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
3121	550 gal	N/A	DF-2	Yes	In service.
4028	20000 gal	N/A	Used Oil	Removed	Removed Dec 88.
4028	500 gal	N/A	DF-2	Removed	Removed Dec 88.
4028	500 gal	N/A	DF-2	---	Above ground tank.
4048	500 gal	N/A	DF-2	Yes	In service for generators. 1 probe.
5114	100 gal	N/A	Oil/Water	No	In service.
5038	500 gal	N/A	DF-2	Yes	In service for generators. 1 probe.
5059	300 gal	N/A	DF-2	No	In service.

NOTES: *According to New Mexico UST Bureau, these transfer tanks are not regulated and can be removed from the registration list.

REGISTERED USTs

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
10 Comm Building	500 gal	1962	DF-2	Yes	Visually identified. In service for generator. 1 probe.
129	2000 gal	1943	DF-2	Yes	Not in service; emptied. Note 1
130 Fire Department	500 gal	N/A	DF-2	Yes	In use for heat shop. 1 probe. Note 2
135 Base Ops	500 gal	1956	DF-2	Yes	In use for generator. On flightline side. 1 probe. Note 2
170 Hangar	2000 gal	1943	DF-2	Yes	Not in service. Emptied. Note 1
181 Mobility Office	550 gal	1943	DF-2	Yes	Not in service. Emptied. Note 1
182	2000 gal	1971	Mogas	Yes	Tank in service.
182	2000 gal	1971	DF-2	Yes	Tank in service.
These two tanks are for flightline refueling.					
185 Old boiler plant	4000 gal	1943	DF-2	Yes	Not in service. Emptied. Note 1
187	6000 gal	N/A	JP-4	Yes	Tank in service.
This tank is also for flightline refueling.					
216 POL Offices	250 gal	N/A	DF-2	Yes	In use for generator. 1 probe. Note 2
368	10000 gal	1963	Mogas	Yes	Tank in service for AAFES. 2 probes.
368	10000 gal	1963	Mogas	Yes	Tank in service for AAFES. 2 probes.
368	10000 gal	1963	Mogas	Yes	Tank in service for AAFES. 2 probes.
368	150 gal	N/A	Used Oil	Yes	Tank in service for AAFES.

REGISTERED USTs
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
392 = POL fuel receiving stand.					
392	500 gal	1958	Mogas	Yes	In service. Note 1
392	500 gal	1958	JP-4	Yes	In service.
392	500 gal	1958	JP-4	Yes	In service.
392	500 gal	1958	JP-4	Yes	In service.
494	500 gal	1982	Used Oil	Yes	In service, ID'd.
Note: Auto Hobby Shop waste oil tank.					
600	500 gal	N/A	DF-2	Yes	Tank in service for generators. 1 probe. Note 2
CBPO for command post.					
728	1000 gal	1971	DF-2	Yes	Tank in service for generators. 1 probe. Note 2
RAPCON Building					
1400	7000 gal	1965	DF-2	Yes	Tank in service at Hosp. with 2 probes. Used for generators and back up heat. Note 2
1400	200 gal	N/A	DF-2	Yes	For one generator at Hosp. with 2 probes. Note 2
1402	500 gal	N/A	Mogas	Yes	Tank in service for Golf Course, behind Hosp. with 1 probe. Note 2
2105	1000 gal	N/A	DF-2	Yes	In service for Heat Shop. 1 probe. Note 2
Munitions Area					
2110	550 gal	1956	DF-2	Yes	In service for Heat Shop. 1 probe. Note 2
Munitions Area					
2270	250 gal	1970	Diesel	Yes	In service for generators. 1 probe. Note 2
2276	500 gal	1961	DF-2	Yes	Heat, Note 1

REGISTERED USTs
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
2282	500 gal	1984?	DF-2	Yes	Fiberglass tank and spill tank with one probe, for generator.
2285	1000 gal	Mar 1972	DF-2	Yes	Fiberglass tank and spill tank with one probe, for generator.
2300	250 gal	1961	DF-2	Yes	In service for generator, 1 probe. Note 2
2302	250 gal	1961	DF-2	Yes	In service for generators, 1 probe. Note 2
2306	550 gal	N/A	DF-2	Yes	In service for generators. 1 probe. Note 2
2340	250 gal	Oct 1970	DF-2	Yes	In service for generators. 1 probe. Note 2
3025	250 gal	Oct 1970	DF-2	Yes	In service for generators. 1 probe. Note 2
3038	500 gal	N/A	DF-2	Yes	In service for water well No. 8. Probe ? Note 2
3050	500 gal	N/A	DF-2	Yes	Fiberglass tank and spill tank with one probe, for generator.
3060	500 gal	N/A	DF-2	Yes	Fiberglass tank and spill tank with one probe. For generator.

REGISTERED USTs
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REGULATED	REMARKS
NOTE: The three tanks at 3121 are in service at Melrose Range.					
3121	1000 gal	N/A	DF-2	Yes	In service. Note 2
3121	1000 gal	N/A	Mogas	Yes	In service. Note 2
3121	550 gal	N/A	DF-2	Yes	Heat in service. Note 2
4048	500 gal	N/A	DF-2	Yes	In service for generators. 1 probe. Note 2
5038	500 gal	N/A	DF-2	Yes	In service for generators. 1 probe. Note 2

NOTES

1. The USTs labeled 92 are scheduled for removal in 1992.
2. ABA or AB means replace with aboveground.
3. Fees were paid on inactive USTs that still contained fuel.
4. Tanks registered in 91 that have already been removed are not listed.

USTs REMOVED

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REMARKS
111	N/A	N/A	DF-2	Removed Dec 91 under project 90-9010. Soil tests taken.
112	N/A	N/A	N/A	Removed Dec 91 under project 90-9010. Soil tests taken.
192	N/A	N/A	N/A	Removed Jan 91 during upgrade electrical; no soil tests taken.
305	550 gal	N/A	DF-2	Removed Dec 91 under project 90-9010. Soil tests taken.
310	1000 gal	N/A	Mogas	Removed Dec 91 under project 90-9010. Soil tests taken.
316	550 gal	N/A	DF-2	Removed Dec 88 under project 86-0071. No soil tests taken.
374	10000 gal	N/A	Mogas	Removed Dec 88 under project 86-0071. No soil tests taken.
376a	5000 gal	1963	Mogas	Removed Dec 91 under project 90-9010. Soil tests taken.
376b	5000 gal	1963	Diesel	Removed Dec 91 under project 90-9010. Soil tests taken.
380	560 gal	1953	DF-2	Removed Dec 91 under project 90-9010. Soil tests taken. Full of sand & H_2O.
390	2000 gal	N/A	POL Sump	Removed 14 Jan 91.
502	4000 gal	1955	DF-2	Removed Dec 88 under project 86-0071. No soil tests taken.
552	4000 gal	1955	DF-2	Verified removed. Under project 86-0071. No soil tests taken.
553	4000 gal	1955	DF-2	Verified removed. Under project 86-0071. No soil tests taken.
799	530 gal	1957	DF-2	Verified removed by project 90-9010. Soil tests taken.
2300	550 gal	1953	DF-2	Heat tank removed Nov 91 under 90-9010. Soil tests taken.

USTs REMOVED
(Continued)

BLDG NO.	CAPACITY	INSTALLED	CONTENTS	REMARKS
2302	550 gal	1953	DF-2	Removed Mar 89 in house. No soil tests taken.
2327	500 gal	1974	DF-2	Removed Dec 91 under project 90-9010. Soil tests taken.
2328	3000 gal	1974	DF-2	Removed Mar 89 in house. No soil tests taken.
2330	700 gal	1968	DF-2	Removed Mar 89 in house. No soil tests taken.
4028	2000 gal	N/A	Used Oil	Removed Dec 88 under project 86-0071. No soil tests taken.
4028	20000 gal	1965?	Used Oil	Removed Dec 88 under project 86-0071. No soil tests taken.

APPENDIX E

PRODUCTION INVENTORY REVIEW

AND RECORDKEEPING FORMS

AND INSTRUCTIONS

Source: More About Leaking Underground Storage Tanks: A Background Booklet for the Chemical Advisory. Environmental Protection Agency, Office of Toxic Substances, October 1984.

APPENDIX E. PRODUCTION INVENTORY REVIEW AND RECORDKEEPING FORMS AND INSTRUCTIONS

A. Recordkeeping and Reporting

As stated in the Air Force UST Program Strategy of October 1, 1985, Appendix B, careful inventory control is an essential part of the tank management program. Accurate recordkeeping is the basis for inventory control. All associated personnel must keep records on any tank management activities. As part of the inventory review procedures, inventory received, inventory used, and other data must be recorded daily and kept on file. The inventory should be reconciled daily. Inventory review is discussed in the next section.

B. Inventory Review

Symptoms of leaks can be observed if careful inventory monitoring of the stored substance is used. Leaks cannot be directly detected or measured, but monitoring can be a helpful tool to determine where there is a strong possibility of a leak.

The inventory method requires consistent, accurate recordkeeping and inventory procedures and is not recommended for detecting small leaks. Temperature and pressure fluctuations and erroneous dipstick readings can affect volume readings and falsely indicate a leak where none exists or leaks can go undetected. These factors must be considered in inventory procedures. However, it is a simple way to detect large leaks. Recommended methods and forms are included in this Appendix.

Items used in inventory review include:

1. Dipstick or gauge stick.

2. The appropriate inches-to-gallons conversion chart for specific tank dimensions.

3. A 5-gallon proving can (for metered dispensing pumps).

4. Recordkeeping forms. The forms used will depend on the tank-to-meter-to-dispenser hookups (Exhibit E-1). For example, the inventory review for a manifolded tank system (a tank system with a number of tanks interconnected by piping) would use all three recordkeeping forms: Manifolded Tank System Recording Sheet (Exhibit E-2), Dispensing Meter Recording Sheet (Exhibit E-3), and Inventory Review Sheet and Instructions (Exhibit E-4).

C. Inventory Review for Tanks with Metered Dispensing Pumps

Before starting the review, test the accuracy of the pump meter by dispensing exactly five gallons of tank substance, according to the pump meter,

Exhibit E-1

Tank Hookups and the Appropriate Inventory Review Forms

POSSIBLE TANK/DISPENSING METER/DISPENSER HOOKUPS	APPROPRIATE INVENTORY REVIEW FORMS			
	DISPENSING METER RECORDING SHEET	MANIFOLDED TANK SYSTEM RECORDING SHEET	INVENTORY REVIEW SHEET FOR TANKS WITH METERED DISPENSING PUMPS	INVENTORY REVIEW SHEET FOR TANKS WITHOUT METERED DISPENSING FORMS
Single tank without dispensing meter				x
Single tank with single dispensing meter	x		x	
Single tank with multiple dispensing meters	x		x	
Custom Blending: 2 tanks, 2 dispensing meters, 1 dispenser	x		x	
Customer Blending: 2 tanks, multiple dispensing meters and dispensers	x		x	
Manifolded Tanks: multiple interconnected tanks, multiple dispensing meters	x	x	x	
Manifolded Tanks, Custom Blending	x	x	x	

Exhibit E-2 (Sheet of)

MANIFOLDED TANK SYSTEM RECORDING SHEET

Manifolded Tank System I.D. Number _____ Type of Fuel _____

Day*	Date	Physical Inventory Measurements	Tank # 1	Tank # 2	Tank # 3	Tank # 4	Tank # 5	Tank # 6	Tank # 7	Tank # 8	Line F** Totals
		A. Opening stick (gals.) (Yesterday's line E)									
		B. Deliveries (gals.)									
		C. Total of fuel in tank (A+B)									
		D. Closing stick (inches)									
		E. Closing stick (gals.)									
		F. Fuel gone from tank (gals.) (C-E)									
		A. Opening stick (gals.) (Yesterday's line E)									
		B. Deliveries (gals.)									
		C. Total of fuel in tank (A+B)									
		D. Closing stick (inches)									
		E. Closing stick (gals.)									
		F. Fuel gone from tank (gals.) (C-E)									
		A. Opening stick (gals.) (Yesterday's line E)									
		B. Deliveries (gals.)									
		C. Total of fuel in tank (A+B)									
		D. Closing stick (inches)									
		E. Closing stick (gals.)									
		F. Fuel gone from tank (gals.) (C-E)									

* Days should be numbered consecutively (1 - 31 as appropriate) for each day of the month.
** Transfer Line F totals to the correct Inventory Review Sheet for this Tank System.

Exhibit E-3
DISPENSING METER RECORDING SHEET
[FOR TANKS WITH METERED DISPENSING PUMPS]

(Sheet of)

Tank No. _____

or, if manifolded tanks, tank system no. _____ Type of Fuel _____

Day	Date	Meter Recordings in Gallons	Meter # 1	Meter # 2	Meter # 3	Meter # 4	Meter # 5	Meter # 6	Meter # 7	Meter # 8	Line I** Totals
		G. Today's Closing Meter									
		H. Yesterday's Closing Meter									
		I. Gallons Dispensed (G-H)									
		G. Today's Closing Meter									
		H. Yesterday's Closing Meter									
		I. Gallons Dispensed (G-H)									
		G. Today's Closing Meter									
		H. Yesterday's Closing Meter									
		I. Gallons Dispensed (G-H)									
		G. Today's Closing Meter									
		H. Yesterday's Closing Meter									
		I. Gallons Dispensed (G-H)									
		G. Today's Closing Meter									
		H. Yesterday's Closing Meter									
		I. Gallons Dispensed (G-H)									

* Day should be numbered consecutively (1 - 31, as appropriate) for each day of the month.
** Transfer Line I totals to Column 8 of Inventory Review Sheet.

Inventory Review Sheet for Tanks with Metered Dispensing Pumps

TANK NO. _____

DISPENSING METER NO(S). _____
OR TANK SYSTEM NO(S). _____
IF MANIFOLDED TANKS. _____

PROVING CAN _____
METER CHECK

PART A

	Dipstick Inventory								
Column 1	Dipstick Inventory Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10
Date	Opening Dipstick Inventory (gallons)	Deliveries (in gallons)	Total (Column 2) plus (Column 3)	Closing Dipstick Inventory (inches)	Closing Dipstick Inventory (gallons)	Gone from Tank (Column 4) minus (Column 6)	Meter Sales* (gallons)	Column 8 less than (-) or greater than (+) Column 7	Columns 7 & 8: Subtract Smaller from Larger
.									
.									
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.									

* Transferred from line I of Dispenser Meter Recording Sheet.

PART B.

1. Number of Minuses (-) in Column 9, PART A. . . . . _____
2. Cumulative number of minuses recorded for previous 30-day period(s) copy from Line 3, PART B of preceeding 30-day sheet, or enter zero (0) if currently the first period. . . . . _____
3. Add Lines 1 and 2. . . . . _____
4. Action Numbr from table for Tanks With Metered Dispensing Pumps. . . . . _____
5. Is Line 3 greater than Line 4? YES____ NO____
   If "YES", conclude that daily inventories are short. If "NO", continue with inventory to complete 1-year evaluation.

Instructions for Completing the Inventory

Review Sheet

Part A: To be completed each day; preferably at about the same time, i.e., before closing or opening every day. Dipstick and meter readings must be taken together while pump(s) is (are) closed.

Write in the columns, as numbered:

1. The date.

2. The opening dipstick inventory in gallons. This number should be the same as the previous day's closing dipstick inventory in Column 6. If it is not, the cause of the difference must be resolved.

3. The day's deliveries (in gallons).

4. The sum of Column 2 plus Column 3 -- the total of fuel in tank after deliveries and prior to any dispensing.

5. The closing dipstick reading in inches.

6. The closing dipstick reading converted to gallons from tank chart.

7. Gone from tank -- gallons of fuel leaving the tank since last dipstick inventory.

8. The day's sales (in gallons).

9, 10. If Column 8 is less than Column 7, enter a minus (-) in Column 9 to show that the closing dipstick inventory is "short" (shows an underage) compared to deliveries and sales. Also, subtract Column 8 from Column 7 and enter the difference in Column 10.

9, 10. If Column 8 is larger than Column 7, enter a plus (+) in Column 9 to show that the closing dipstick inventory is "over" (shows an overage). Also, subtract Column 7 from Column 8, and enter the difference in Column 10.

9, 10. If Column 8 is equal to Column 7, enter a zero (0) in Column 9 to show that the closing dipstick inventory is neither over or short. Place a zero (0) in Column 10.

Part B: To be completed at the end of each 30-business-day period.

Step 1. Count the total number of minuses (-) in Column 9 of Part A and enter on Line 1.

Instructions for Completing the Inventory

Review Sheet

(Continued)

2. On Line 2, write the cumulative number of short daily inventories that occurred during the previous 30-day period(s) (this is the number in line 3, Part B of the previous 30-day inventory sheet).

3. Add lines 1 and 2 and enter the total on line 3.

4. Enter on line 4 the critical value shown in Table 1 for the current 30-day period.

5. Compare lines 3 and 4. If line 3 is greater than line 4, a continuing daily loss is presumed to exist.

into a five-gallon proving can. If there is a difference between the meter reading and the volume of substance in the can, the meter is inaccurate and must be calibrated.

Dipstick measurements must be taken daily and readings recorded according to the following procedure:

1. Lower the dipstick straight down into the bottom of the tank without damaging the bottom.

2. Water-finding paste can be applied to the bottom of the stick to indicate if water is leaking into the tank. A change in paste color indicates the presence of water.

3. Take a reading from the stick and convert it from inches to gallons. Use the correct chart for the tank's diameter and length (modified if a lining has been installed or repaired).

4. Record the information on the recordkeeping forms.

Review the inventory results. Summarize a 30-day inventory in Part B of the Inventory Review Sheet (IRS). The number of days when shortages occur is compared to the action number in Table E-1. The number of shortage days each month are totaled and each monthly total added cumulatively for a 12-month period. If the number of shortage days exceeds the action number over time, a daily loss may be occurring from theft, recordkeeping errors, inaccurate meters, delivery errors, or leaks in the tank or piping.

D. Inventory Review for Tanks without Metered Dispensing Pumps

The difficulty with inventory of nonmetered pumps is determining the actual amount of substance pumped from a tank. The inventory must be based on dipstick readings alone.

Necessary Equipment:

1. A dipstick or gauge stick.

2. The appropriate inches-to-gallons conversion chart.

Follow the same dipstick measurement procedures as in paragraph C.

A dipstick measurement must be taken and recorded before and after each withdrawal.

Determine the loss between withdrawals and record on the Inventory Review Chart (Exhibit E-5). An increase in the contents of the tank between withdrawals indicates a reading or calculation error, water leaking into the tank, or a temperature or pressure fluctuation.

Table E-1. Action Numbers for Tanks with Metered Dispensing Pumps

30-Day Period[1]	Action Number[2]
1st	20
2nd	37
3rd	54
4th	69
5th	85
6th	101
7th	117
8th	133
9th	149
10th	165
11th	180
12th	196

[1]Thirty-business-day inventory period.

[2]Cumulative count of short (-) daily inventories. Enter approximate number on Inventory Review Sheet (Part B, Line 4).

Exhibit E-5
Inventory Review Chart for Tanks Without Metered Dispensing Pumps

Withdrawal or Fill		Dipstick Reading:				Loss Between Withdrawls (1)	Total Loss	Action Number (2)	Is There A Leak? (3)	
		(Inches)		(Gallons)						
Number Start	Date	Before XX	After	Before XX	After	XX	XX	XX	Yes XX	No XX
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										

(1) Gallons after last withdrawal or fill minus gallons before this withdrawal or fill.
(2) From Action Number Table for Tanks without metered pumps.
(3) There is a leak if the total loss for the given number of withdrawals and fills is greater than the action number.

Determine the total loss by adding the present loss between withdrawals to the last recorded loss.

Compare the total loss with the action number in Table B-2 and if loss exceeds the appropriate action number, a problem and possible leak exists.

E. Automatic Inventory Systems

Some automatic systems electronically check tank content level continuously, record delivery amounts, and check for leaks or other losses.

F. Accounting Systems of the American Petroleum Institute

The American Petroleum Institute in Publication 1621, Recommended Practice for Bulk Liquid Stock Control at Retail Outlets, recommends inventory control. The necessity of establishing and using an adequate accounting system, not only for inventory, but for liability management, cannot be over-stressed. Even a very simple system may be adequate to control inventory of bulk liquid stock. But it is of the utmost importance that it be used every day.

At a minimum, the system should clearly show each day the following information for each grade or type of bulk liquid product.

1. A record of all bulk liquid receipt (i.e., delivery invoices).

2. A record of all bulk liquid sales (obtained from the fuel dispensers).

3. A record of bulk liquid used other than that sold.

4. A daily reconciliation between sales, use, receipt, and inventory-on-hand.

Many different accounting systems are available. Most supplying oil companies will advise their operators as to the proper accounting procedures to be used, including the use of suitable accounting forms and where they may be obtained (a sample daily gasoline inventory record is included as Exhibit E-6).

Once the operator has adopted a system, he or she should use it conscientiously and according to the instructions. In some cases, the circumstances of an individual operation may be such that after a reasonable period of use, the system can be simplified without impairing its purpose or augmented to provide additional necessary information. However, to be of full value, the system, no matter how it is modified, must be used daily.

Table E-2. Action Numbers for Tanks without Metered Dispensing Pumps

Withdrawal Number	Action Number
1st	14
2nd	20
3rd	25
4th	29
5th	32
6th	35
7th	38
8th	40
9th	43
10th	45
11th	47
12th	49

Exhibit E-6

SAMPLE DAILY GASOLINE INVENTORY RECORD

At least weekly, review the past week's daily inventory records.

A	B	C	D	E	F	G
Product	Opening Physical Inventory -	Sales +	Receipts =	Inventory Balance	Closing Physical Inventory	Over (Short)
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
_____	_____	_____	_____	_____	_____	_____
Total	_____	_____	_____	_____	_____	_____

F

CLOSED INVENTORY STICK READING

Tank	Feet	Inches	Product	Gallons
1	_____	_____	_____	_____
2	_____	_____	_____	_____
3	_____	_____	_____	_____
4	_____	_____	_____	_____
5	_____	_____	_____	_____
6	_____	_____	_____	_____
7	_____	_____	_____	_____
8	_____	_____	_____	_____

Initiated by_____

Date_____

NOTE: FORWARD CLOSING PHYSICAL INVENTORY F TO OPENING PHYSICAL INVENTORY B ON NEXT DAY'S RECORD.

APPENDIX F

TRACER TITE LEAK DETECTION SYSTEM

Tracer Research Corporation

TAC/LDMS REV. 1

TECHNICIAN PROCEDURES FOR

Tracer Tight™

LEAK DETECTION MONITORING SYSTEMS

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APPENDIX A: EXAMPLE PROBE INSTALLATIONS 20

The procedures necessary for the Tracer Tight™ method of underground storage tank leak detection fall into the following four categories:

I) Introduction of tracer into the tank
II) Installation of sampling probes
III) Site Mapping
IV) Sampling
V) Installation of leak detection hose

I) INTRODUCTION OF TRACER (performed 3 to 4 weeks prior to testing)

Before installing the tracer carefully determine where the tanks are located and draw a map view of the tanks and associated piping as described in Section III. With the completed map decide which tracer should go into which tank. Always use alternating tracers in tanks. This is true even if the tanks are manifolded.

Check the fill cap to make sure it forms a leak proof seal against the filler adaptor. The adaptor should be screwed in tight and be properly sealed. DO NOT INOCULATE THE TANK UNTIL A SEAL IS ASSURED.

Prepare the inoculation kit twenty feet away from the tank. This will prevent tracer contamination of the tank pit in the case of an accidental discharge of tracer. The kit includes a valve cap, tracer canister, vinyl tubing, paper towel and an information sheet that will filled out after the tank has been inoculated.

Before attaching the tubing to the valve cap, check for a cork gasket inside the screw fitting on the tubing. A black rubber gasket should also be present inside the valve cap. Unscrew the valve stem on the valve cap to avoid puncturing the tracer canister before you are ready to inoculate the tank. Attach the tubing to the valve cap. Ensure that the tubing makes a secure seal against the cork gasket and the valve cap.

Screw the tracer canister into the valve cap. If you hear tracer suddenly escaping, unscrew the valve stem until the hissing stops.

Drop the weighted end of the tubing into the tank. Continue until you feel slack in the tubing indicating the tank bottom.

Place the canister upside down (valve cap down) into the fill pipe. Keeping the tracer canister inside the fill pipe will assure that any leakage from the cap or canister goes into the tank. If you are unable to fit the canister in the fill pipe, move 5 to 6 feet away from the tank to begin dispensing. Be sure that the weighted end of the tubing remains on the bottom of the tank.

Screw the valve stem into the tracer canister to begin dispensing tracer into the tank. The canister should empty itself within 30-40 second. You will hear this happen as the hissing of the tracer leaving the canister slows and stops. If the dispenser does not empty within 30-40 seconds, be patient, some canisters take longer.

When the canister is empty, unscrew the valve stem. Install any additional canisters onto the valve cap and dispense additional tracer as necessary. Set the spent canister aside. place the paper towel around the fill pipe opening and wipe the tubing away from you toward the fill pipe as you pull the tubing from the tank. All product brought up with the tubing should be allowed to drip back into the tank or be contained in the paper towel. At the end of the tubing, catch the weight in the paper towel and cup the paper towel around the weight.

Place the paper towel an the weight into the plastic bag. Remove the tubing and the spent canister from the valve cap and place the remainder of the tubing and the canister into the plastic bag. Set the valve cap aside for future use. Seal the plastic bag and dispense of it at least 50 feet away from the tank area.

Replace the fill cap, access cover and move on to the next tank.

Be sure and note the date and the time that the tanks were inoculated and which tracer went into which tank. The best way to do this is to fill out the form that is included in the inoculation kit. Forward the information on the form to Tracer Research Corporation so tank testing can be scheduled. In addition, note any thing unusual about the tank, fill, pumps or any problems that you had during the inoculation process.

***Please view the attached *Tracer Inoculation of Tanks* video tape. This tape is a step-by-step illustration of the process involved for inoculating tanks with the tracer chemical.

II) INSTALLATION OF SAMPLING PROBES

The first task is to determine where probes must be installed. Appendix A contains example probe installation drawings for various sized tanks. These drawings should be used as a general guide for the placement of probes. It is very likely that the dimensions of most tanks will vary to some degree from those that are represented in the drawings. The only rule that needs to be followed is that each part of the tank be within ten feet laterally of a sampling probe. See Figure 1 for an example. Remember that any piping associated with the tank must be tested. Therefore all piping must also be within ten feet of a probe. Before installing any probes, make a map of the area as described in Section III. Mark the locations where the probes are to be installed and check to make sure that the entire tank and piping system is covered by a ten foot radius from each probe. Mark the probe locations on the ground. Obtain utility clearance or digging permit. Check for electrical lines, fuel and vent pipelines to the tank, gas lines, telephone and water lines. After clearance has been obtained the probes can be installed. The best place to install probes is generally on the center line between adjacent tanks or 6 to 9 inches beyond the maximum diameter of single tanks along the side. Place probes along the piping approximately 12 inches to one side of the pipe. If the exact pipe location can not be determined, drive probes carefully by hand to a depth no greater than 18 inches along the expected pipeline path.

Probe Installation

The installation of probes around tanks is done one of two ways depending whether the tank area is paved or covered with bare soil.

Pavement Cover

Probes are installed through concrete or asphalt by first drilling a 1.5 inch diameter hole through the pavement. Next drive to a depth of 6 feet, a steel pilot probe made from 3/4 inch pipe having a chisel point with side perforations. Verify the

Example sphere of Influence for Sampling Probes

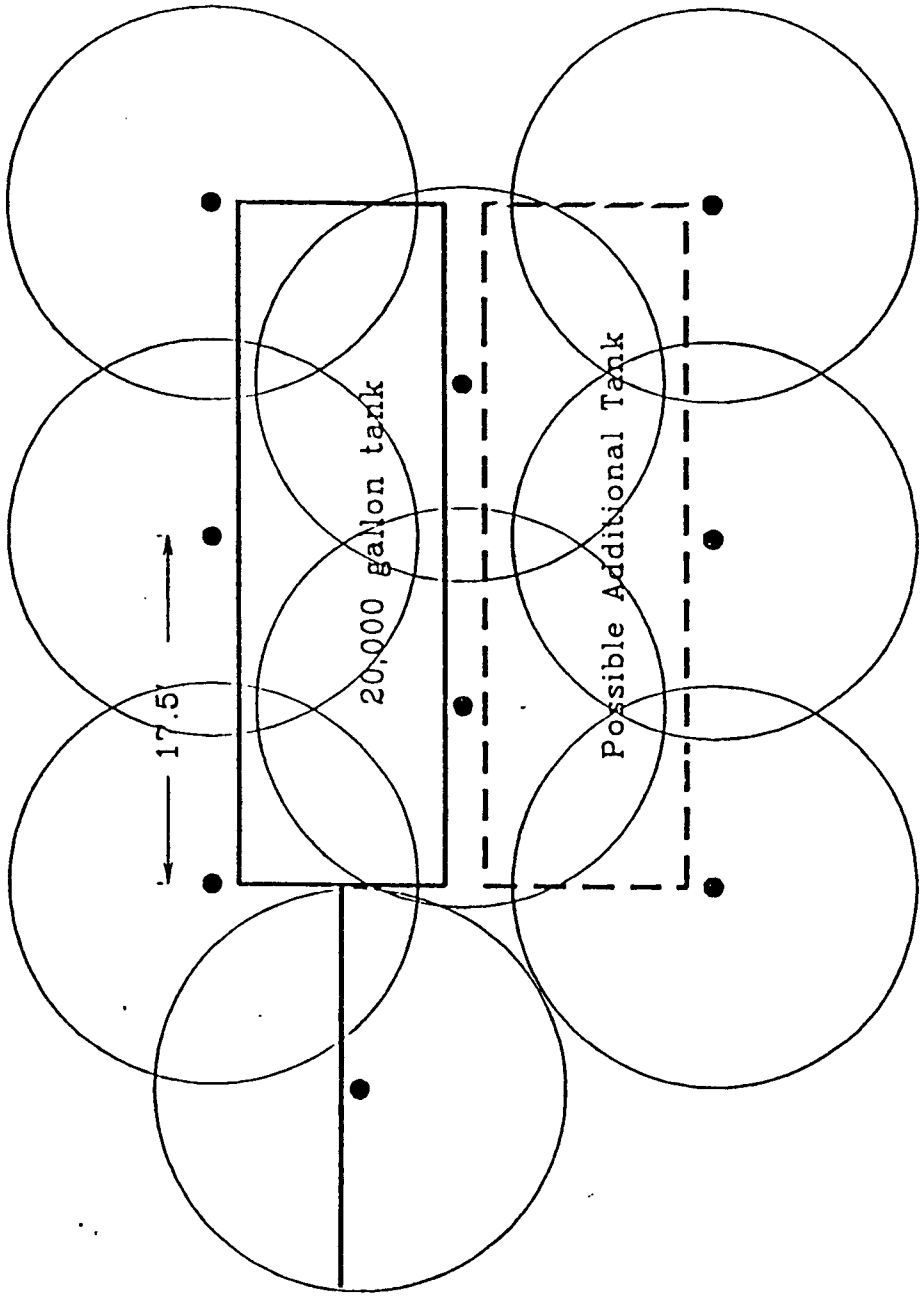
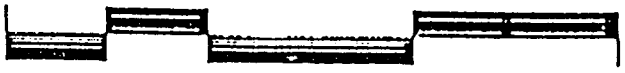


Figure 1

EXPLANATION

● Sample Probe Location



Scale (feet)

0 5 10 20 30

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permeability by attaching the vacuum pump and measuring the vacuum pressure obtained by the pump. If water is collected or the vacuum is greater than 10 inches of mercury, the hole must be relocated or placed at a shallower depth and retested. No probes should draw greater than 10 inches of mercury. After the pilot probe is removed, a six foot probe made of 3/4 inch schedule 40 PVC is inserted. Insure the PVC probe is not plugged by inserting a 1/2 inch diameter steel rod through the PVC pipe to the maximum depth of the hole. The top end of the probe is finished with a PVC pipe to male pipe adaptor, a cast coupling and a specially designed aluminum cap with an "O" ring seal (see Figure 2). Before pushing the PVC probe all the way into the ground,place a bead of polyurethane sealing compound around the outside diameter of the cast coupling and remove the aluminum cap. Push the probe the rest of the way into the ground so that the cap will be flush or just below the surface. Wipe clean any sealing compound from the top of the coupling. Stamp the identifying probe number in the aluminum cap. No two probes at the same tank site may have the same number. The caps should be numbered sequentially starting at 001. The finished probe should appear as in Figure 3. Record the number of each probe at its location on the scale map.

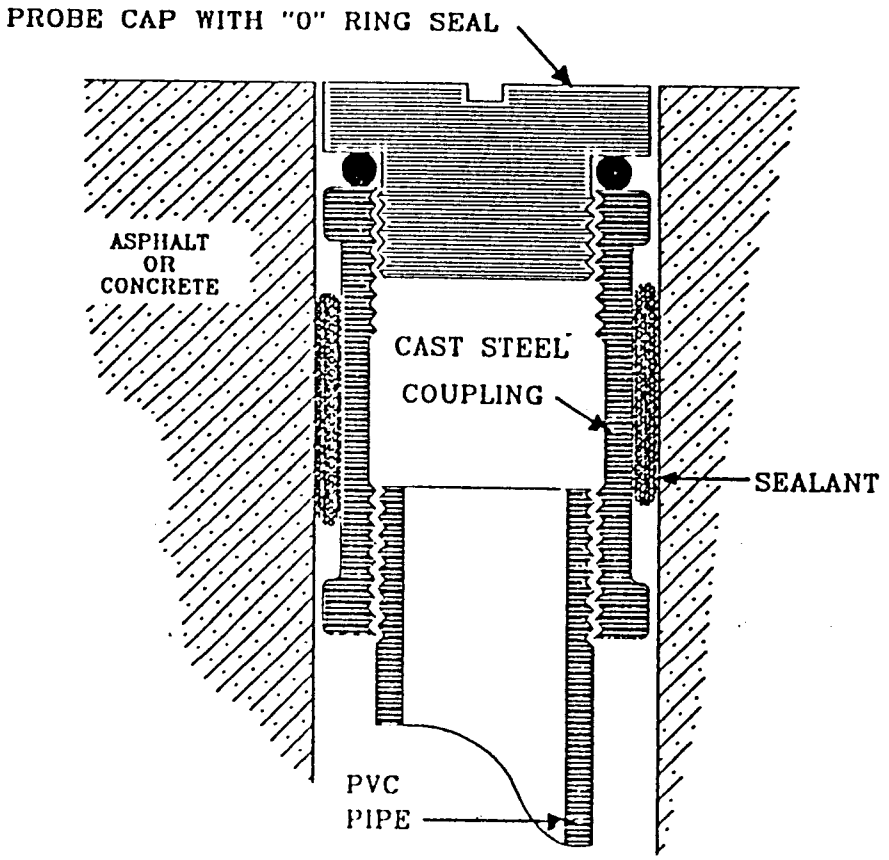
Soil Cover

Probes that are installed in areas of soil cover must have a concrete pad or monument poured around the top of the probe. Without the concrete pad, probes are easily lost. Install the probe using the same procedure described above except no sealant is used. Insert the 6 foot PVC probe until it is flush with the surface of the soil. Excavate a 12 inch diameter circle that is approximately 3" deep around the top of the probe. Cover the aluminum cap threads and slot with electrical tape and pour concrete into the hole. When finished, the aluminum cap will be flush with the finished surface. See Figure 4 for an example. Stamp the cap with the identifying number as described above. Mark the number of the probe on the scale drawing.

Once all the probes have been installed, check the location of each probe on the map (maps) to make sure that they have been correctly plotted. Make sure that no two probes have the same number. Copy the maps to the required files and forward one copy to Tracer Research Corporation.

Figure 2

Detail of Sampling Probe Installation



Example Probe Installation

System Diagram
Asphalt or Concrete

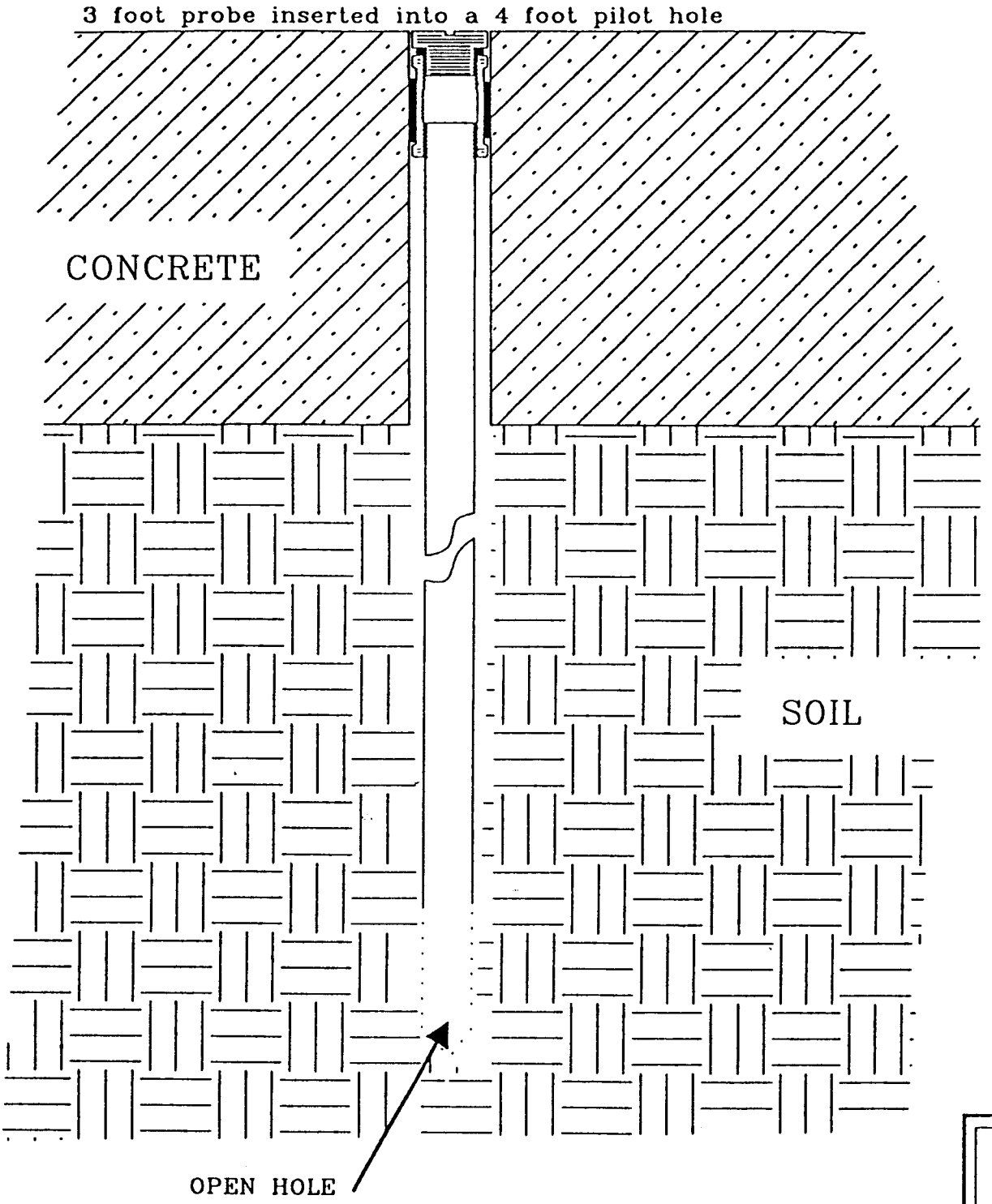
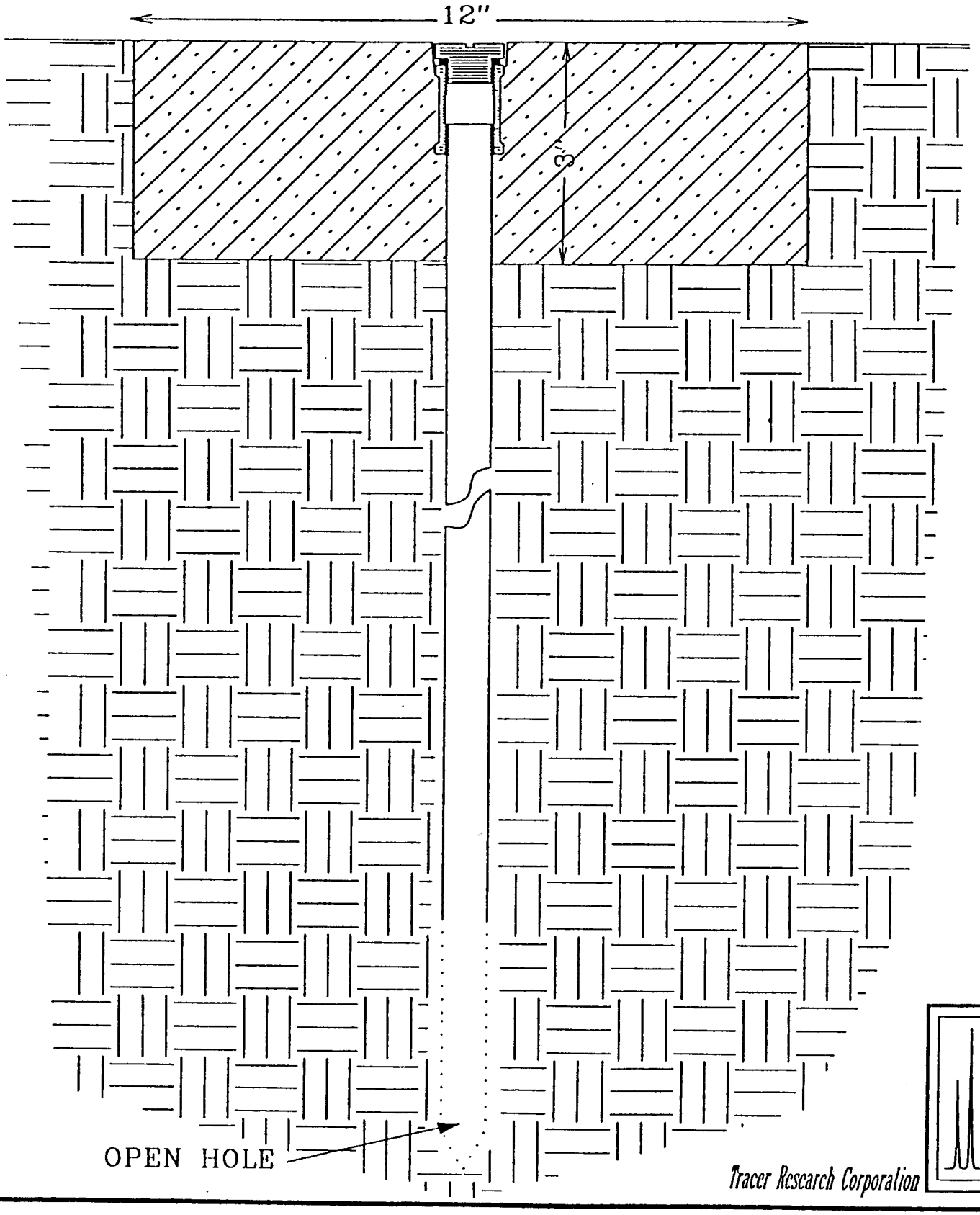


FIGURE 3

Tracer Research Corporation

Figure 4
Example Probe Installation
System Diagram

3 foot probe inserted into a 4 foot pilot hole
with concrete poured around the top



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III) SITE MAPPING

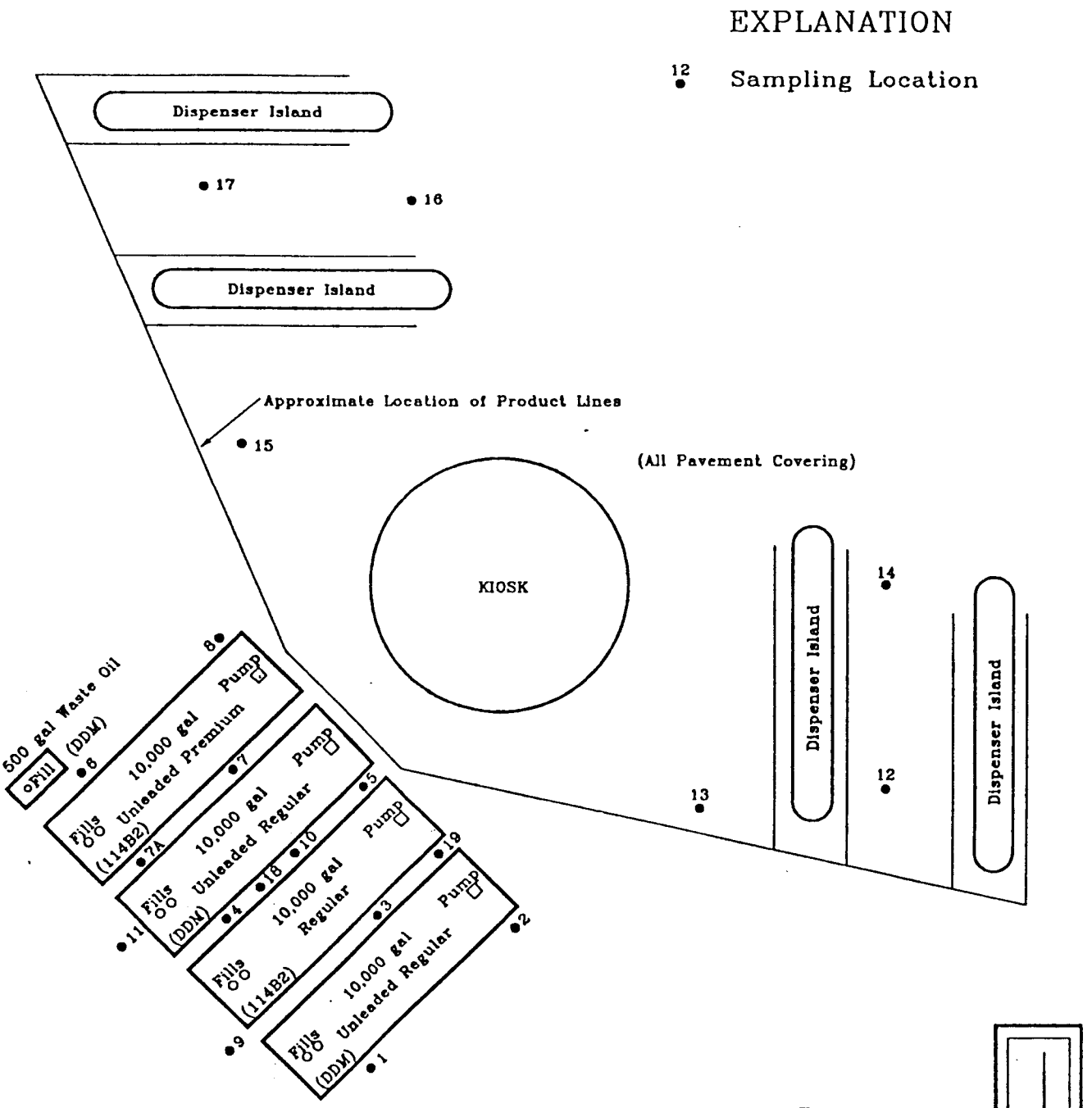
One of the most important responsibilities of anyone conducting a leak detection investigation is site mapping. Each site must have a scale map that includes or depicts all of the following features:

1) Date
2) Address or location
3) Tank owner or group responsible for tank
4) Outline of tanks
5) Location of piping (inferred if not known)
6) Location of pumps or pump islands
7) Tank fill pipe
8) Tank Manholes
9) Tank vent
10) Sample probe locations with numbers
11) Tank size and product (labeled within tank outline)
12) Tracer installed in each tank (labeled within tank outline)
13) Bar scale
14) North arrow
15) Nearby buildings or other significant surface features
16) Indication of soil and/or pavement covering

Figure 5 is an example map of a typical gas station.

FIGURE 5
Example Tank Map

DATE: 12/12/89
ADDRESS: EZ-Serve
114 S. Stone
Tucson, AZ



IV) SAMPLING

Sampling is done with a Tracer Research Corporation supplied vacuum pump. Sampling is slightly different for leak detection than it is for monthly monitoring. Leak detection requires that each individual probe be sampled separately. Monthly monitoring is done by compressing the air from up to four probes into one sample tube.

Leak Detection Sampling

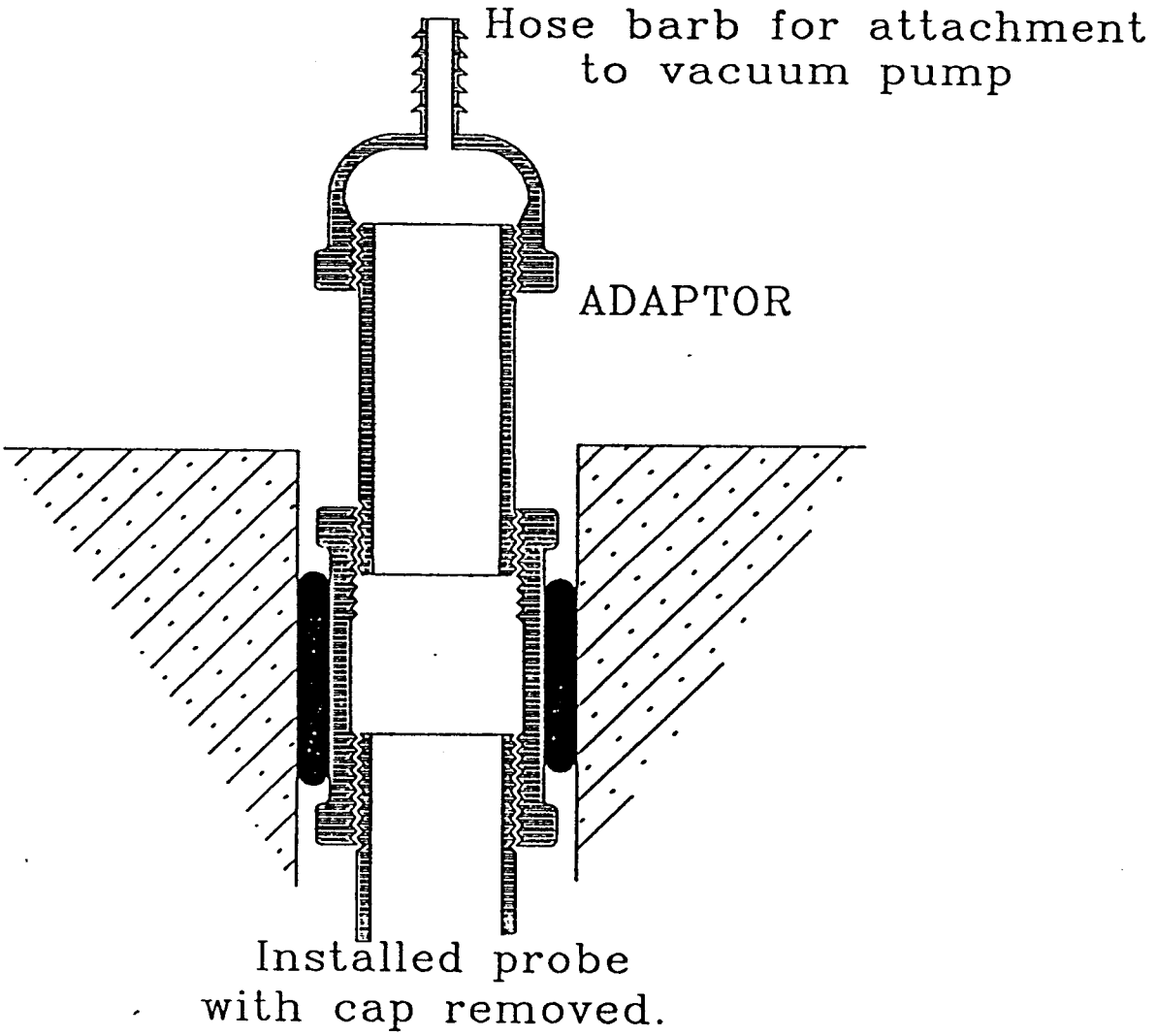
Before using any sample tubes they must be checked for integrity. Check the sample tube for integrity by the following procedure. Depress one of the schrader valves and observe a hiss as the pressure contained in the unused tube is released. If there is no pressure in the sampling tube, return it unused. With the adaptor attached to the pump and above ground, turn on the vacuum pump. Set the pressure relief manifold of the vacuum pump to the full pressurization setting. Allow the pump to evacuate for a few seconds. Press the sampling tube to the tire chuck. Depress the schrader valve on the opposite end and allow the sample tube to purge for ten seconds. Release the valve and allow the tube to fill to full pressure. Full pressure should be at least 50 psi. Quickly disengage the sampling tube from the tire chuck. After the tube is disconnected from the pump, release the contents by depressing the schrader valve while listening for a hiss of escaping air. If the expected hiss is not heard it probably means that the schrader valve at the fill end did not open during filling. Depress it manually then repeat the filling procedure and verify that the tube is holding a sample, after which, a sample can be collected. Repeat this procedure before taking each sample.

Before sampling at any site, take a sample of above ground air for a pump blank. After checking the sample tube for integrity as described in the above procedure, take a sample of above ground air with the adaptor attached to the pump. Remember to replace the protective valve caps.

Samples are taken from individual probes by first attaching an adaptor to the previously installed probe with the cap removed. Figure 6 shows the adaptor attachment to a probe. The adaptor is attached to the vacuum pump with a short length of poly tubing. Silicone tubing is used to adapt from the hose barb on the adaptor and vacuum pump to the poly tubing. CHECK THE SAMPLE TUBE FOR INTEGRITY. After connecting the adaptor to the probe, turn on the vacuum pump. Set the pressure relief manifold of the vacuum pump to the full pressurization setting. Allow the pump to evacuate the probe for approximately 30 seconds. Remember that the vacuum reading on the pump should be less than 10 inches of mercury. Press the sampling tube to the tire chuck. Depress the schrader valve on the opposite end and allow the sample tube to purge for ten seconds. Release the valve and allow the tube to fill to full pressure. Full pressure should be at least 50 psi. Quickly disengage the sampling tube from the tire chuck and replace the protective end caps. Sample all tubes in duplicate. On the *Sample Log and Chain of Custody Form*, note the sampling location (from the tank map), the date, time, sample tube number, vacuum and pressure. Note anything unusual about the sampling in the comments field of the form. An example form is included as Figure 7. Disconnect the pump from the probe and move to the next sampling location. When

FIGURE 6

Sampling Adaptor for Probes



SAMPLE LOG AND CHAIN OF CUSTODY FORM

Project #	Location:

Sampling Location	Date	Time	Sample Tube No.	Vacuum	Pressure	Comments	Received	Analyzed

Unused Sample Containers Returned:

Sampled by:	Shipped by:	Received for Laboratory by:
Phone No.:	Phone No.: Date:	Date:

finished, make sure that the form is entirely filled out and send the sample tubes, the top sheet of the form and a map of the sampling locations to Tracer Research Corporation via an overnight courier. Make sure and note which tube contains the pump blank for each site. Be sure to return any tubes that failed the integrity test and any unused sample tubes. Note the unused tubes on the form. Keep for your files a copy of the sampling location map and the bottom sheet of the form.

Monthly Monitoring Sampling

Monthly monitoring samples differ from leak detection samples in that up to four probes may be condensed into one sample tube. Remember to take an air sample as a pump blank at each site before sampling. Determine which probes will be collected together. Up to four probes can be put into each tube with a minimum of one sample tube per tank. The sample pump has a pressure relief manifold with four settings: low pressure (12-14 psi), medium pressure (24-28 psi), high pressure (36-48 psi) and full pressure (50-60 psi). Determine which valve position corresponds to the above pressure settings. As described above, CHECK THE INTEGRITY OF THE SAMPLING TUBE and verify that the sample tube will fill from the sampling pump and hold pressure. Allow the pump to purge the probe for 30 seconds with the pump set at the low pressure setting, press the sample tube to the tire chuck and purge the sample tube for 10 seconds. Release the valve and allow the tube to pressurize to the low pressure setting and quickly disengage the tube from the chuck. Move the adaptor the second location. Set the pump to the medium pressure setting. Allow the probe to purge for 30 seconds. Press the tube to the tire chuck and allow the tube to pressurize to the medium release pressure. DO NOT ALLOW THE SAMPLE TUBE TO PURGE BY DEPRESSING THE SCHRADER VALVE. Quickly disengage the tube from the pump. Move to the third location and repeat with the pump set at the high pressure setting. Finally, move to the fourth location and repeat with the pump set at the full pressure setting. If less than four probes are going to be collected in a sample tube use the following settings:

1 Probe: Full pressure
2 Probes: Medium pressure and Full Pressure
3 Probes: Low Pressure, Medium Pressure and High Pressure

Fill out the *Sample Log and Chain of Custody Form* with the required information. Note that each tube will use as many lines on the form as the number of probes that were sampled. Take all samples in duplicate. When finished, make sure that the form is entirely filled out and send the sample tubes, the top sheet of the form and a map of the sampling locations to Tracer Research Corporation via an overnight courier. Be sure to return any tubes that failed the integrity test and any unused sample tubes. Note the unused tubes on the form. Keep for your files a copy of the sampling location map and the bottom sheet of the form.

The sample tubes will be analyzed by Tracer Research Corporation. When the analysis is complete the base will immediately be appraised of the results. If further sampling is required for leak location or characterization, a sampling plan will be determined by

Tracer Research Corporation and the base. With the information from the original and characterization sampling, Tracer Research Corporation will generate a report that contains a certification for the tanks that were not leaking and an explanation of the leakage detected from the other tanks.

Record Keeping

It will be the responsibility of the base to keep the following records:

1) Date and time that tanks were inoculated with tracer.
2) Maps with all the information outlined in section III.
3) A copy of the *Sample Log and Chain of Custody Form.*
4) A copy of all reports generated by Tracer Research Corporation.

Tracer Research Corporation will be responsible for keeping a copy of all items listed above and all of the raw data from the analyses.

V) INSTALLATION OF LEAK DETECTION HOSE

LONG TRANSFER PIPELINES UNDER PAVEMENT

The LDMS for long pipelines that are under asphalt or concrete consists of a long series of probes placed on 25 foot centers along the pipe. The installation procedure is the same as described above for tanks. In this case, however, because of the long distances involved, it is critically important to first mark the physical location of the pipe on the ground using a pipe locator and markers. DO NOT RELY ON MAPS OR APPROXIMATE SIGHTINGS. Errors of more than seven feet can not be tolerated. Once marked, obtain a digging permit or utility clearance for the entire pipeline. Mark the locations and probe number on the ground where the probes are to be installed. The best place to install probes is generally 12 inches to the side of the pipe. Install all probes using the procedure described above for tanks under pavement. If the pipeline or the water table is very shallow, short, 18 to 24 inch long probes may be used along the entire pipeline. Make the pilot hole 1 to 2 feet deeper than the PVC probe. Stamp each cap with the identifying number. The caps should be numbered sequentially starting at P001 and the number of each probe written on the appropriate place on the scale map. Note the "P" prefix for probes that are installed for pipeline testing. If two probes accidentally receive the same number, add letters, A, B, C, etc. to distinguish them.

TRANSFER LINES UNDER SOIL

Pipeline that is under soil cover is tested with a permeable hose that is buried adjacent to the pipeline. The first step is to precisely locate the pipeline and show its location on a scale map. The hose will be buried in a ditch that is approximately 2 feet deep and approximately 2 feet from the pipeline to avoid hitting the pipe with the digging equipment. As with long pipeline under pavement, the line must be located and the physical location marked on the ground every 25 feet. Next obtain utility clearance or digging permit for the entire line. Because of the high probability of hitting a utility during ditching operations this is critically important. Find out how to turn off water, gas

and fuel in the area in case a problem occurs. After preparations are complete, dig the trench. When finished with the trench, lay the permeable hose in the trench and cover with approximately 4" of pea gravel. Backfill the rest of the trench with the soil that was removed while digging the trench. See Figure 8 for a cross-sectional drawing of the trench with the hose installed.

UTILITY BOX PLACEMENT

Sample access stations along the permeable hose are made with concrete utility boxes. The boxes are installed as shown in Figures 9 and 10. In most cases each end of the permeable hose will terminate in a concrete utility box. The utility boxes serve two purposes. They provide access to the hose for sampling and maintenance, and they mark the location of the piping long after the trench lines have been obscured by grass, etc. The hoses must be maintained by blowing them free of water in the event that they become filled with water during rainy periods when surface flooding occurs. If tracer is detected in the hose it must be checked by probing along the pipe to find the source of the tracer. At these times it is essential to know the location of the hose. Therefore it is handy to have a box at both ends of the hose even though a box is only needed at one end for sampling. The following rules are given for box placement.

1) One box every 400 feet on long stretches uninterrupted by pavement.
2) A box at both ends of hose increments 50 feet or greater.
3) A box at every "T" intersection of hose.

Figure 11 gives a sample of a typical box layout at a complex pipe/pavement location.

UTILITY BOX AND HOSE MARKING

The hoses will be routinely sampled only at one end. This end will terminate in a box marked "S" for sample. The other end of the hose will terminate in a box marked only with its number in the sequence. Numbering will begin at one end of the pipeline and all boxes will be numbered in one sequence. Sample box numbers will be preceded with the letter "S" and access-only box numbers will have no letter preceding them. Mistakes in the numbering system will be fixed by putting letter after the box numbers.

Each Hose increment that is sampled as a unit is given a number. The hose increments will be numbered in sequence beginning at one end of the transfer line. A metal tag with the number stamped into it will be used to mark each hose.

HOSE PLUGS AND CONNECTIONS

Hose pieces can be connected using standard plastic, barbed hose couplings with hose clamps. All ends of the hose will remain closed with plastic plugs to avoid unnecessary entry of water. The end of the hose used for routine sampling will be plugged but not clamped. Hose ends not used routinely will be closed with a plug that is clamped.

Figure 8
Leak Detection Hose Installation System Diagram

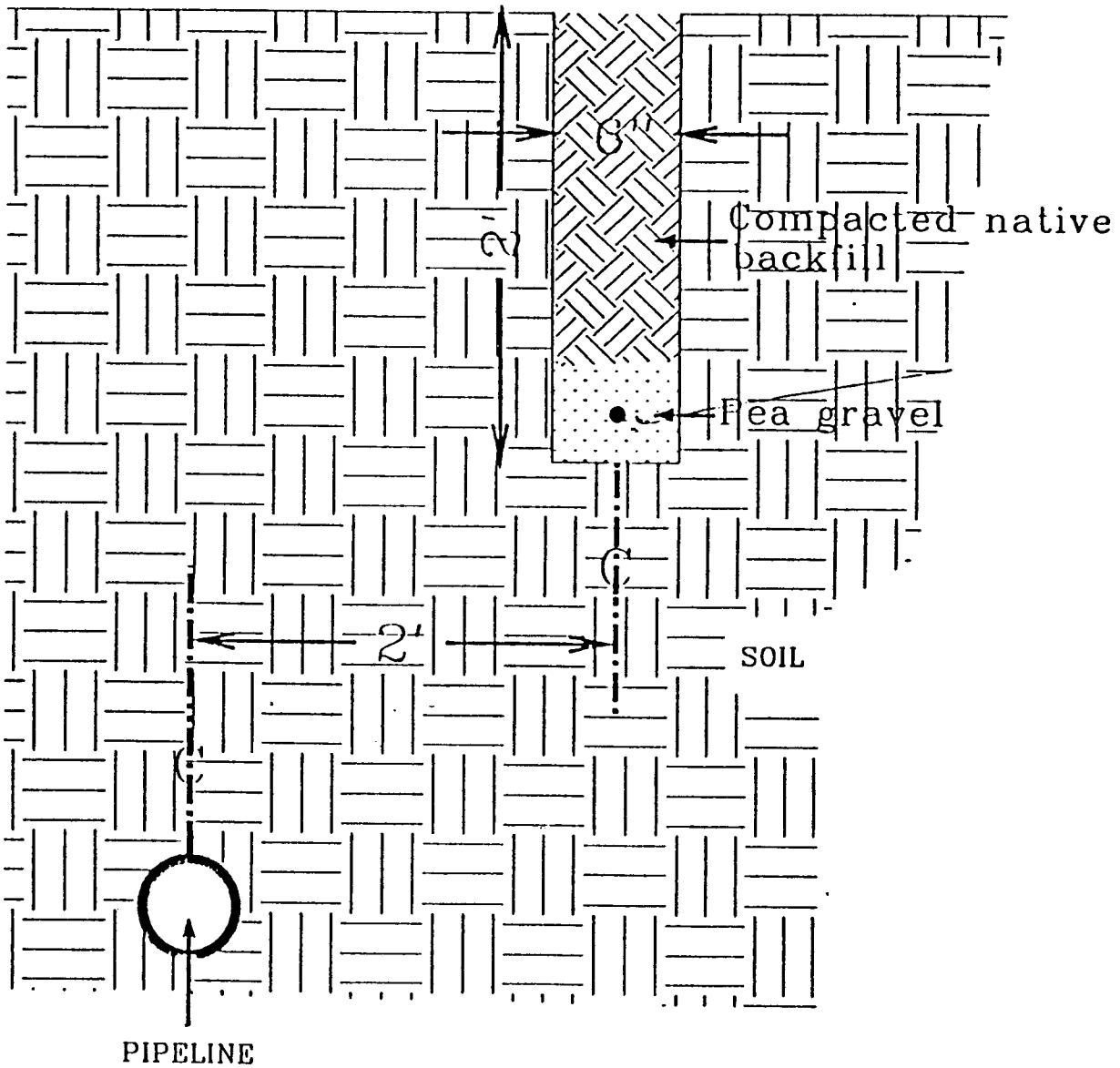


Figure 9
Sample Access Station For Leak Detection Hose

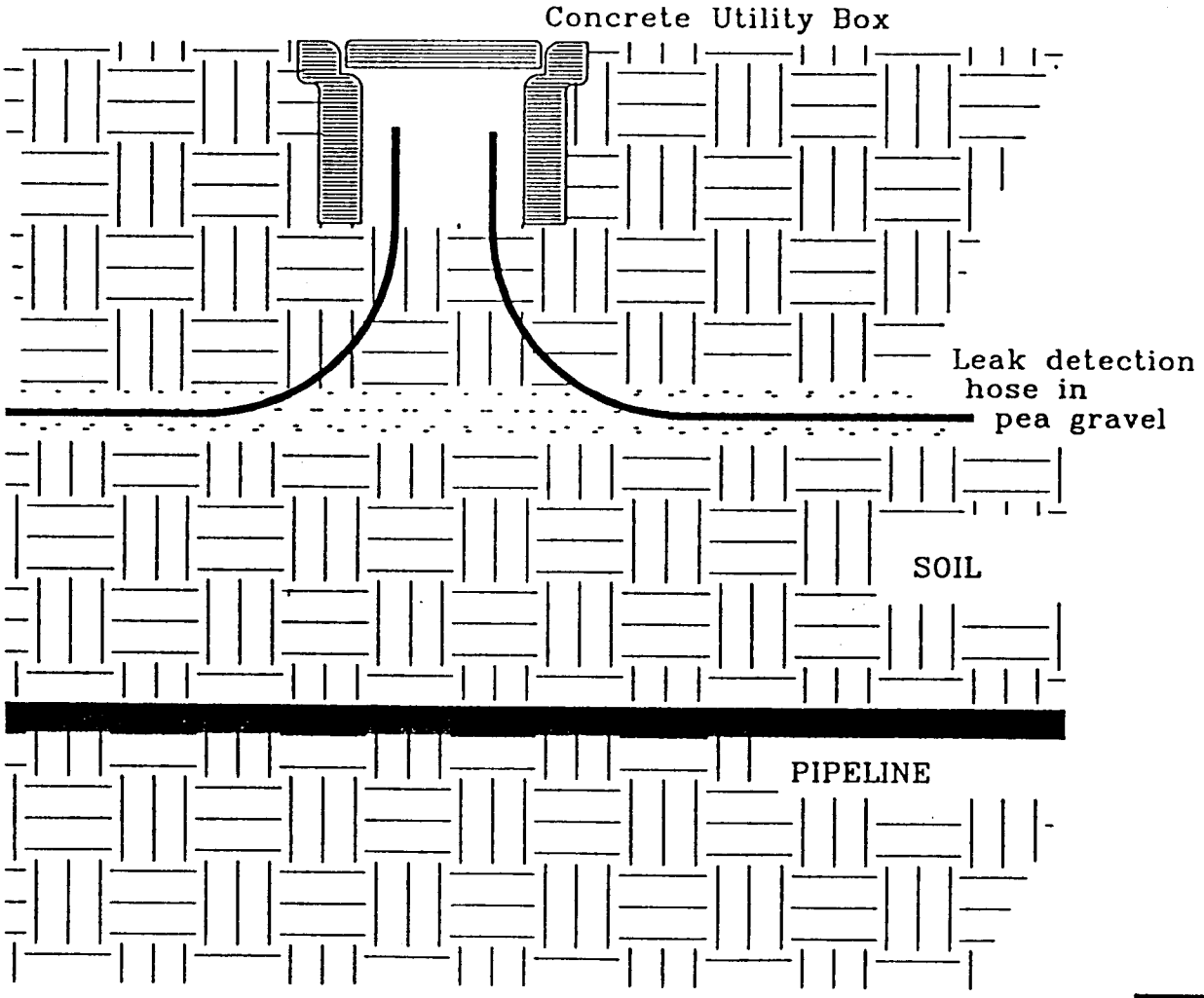


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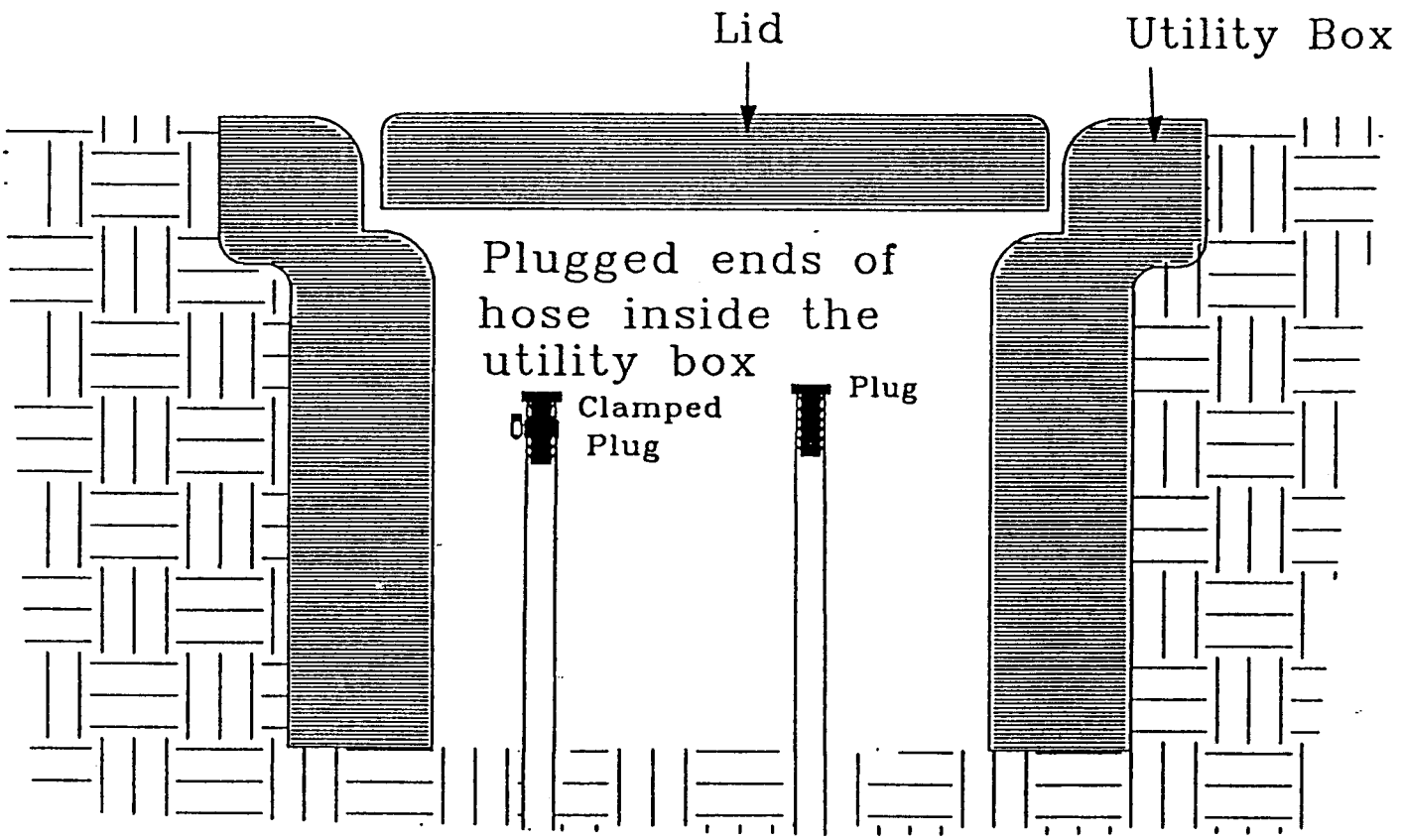
Figure 10
Leak Detection Hose Sample Access Station Detail



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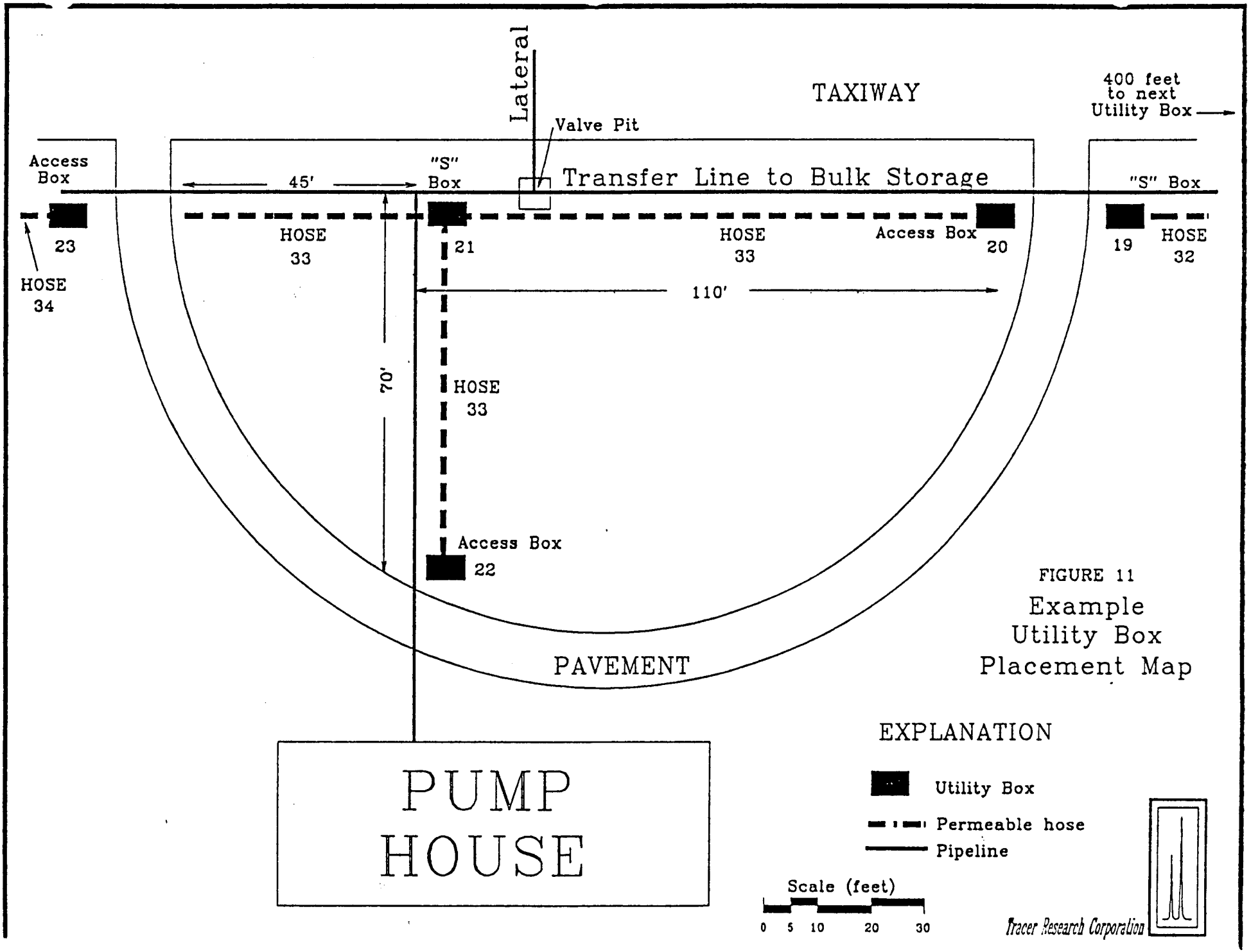
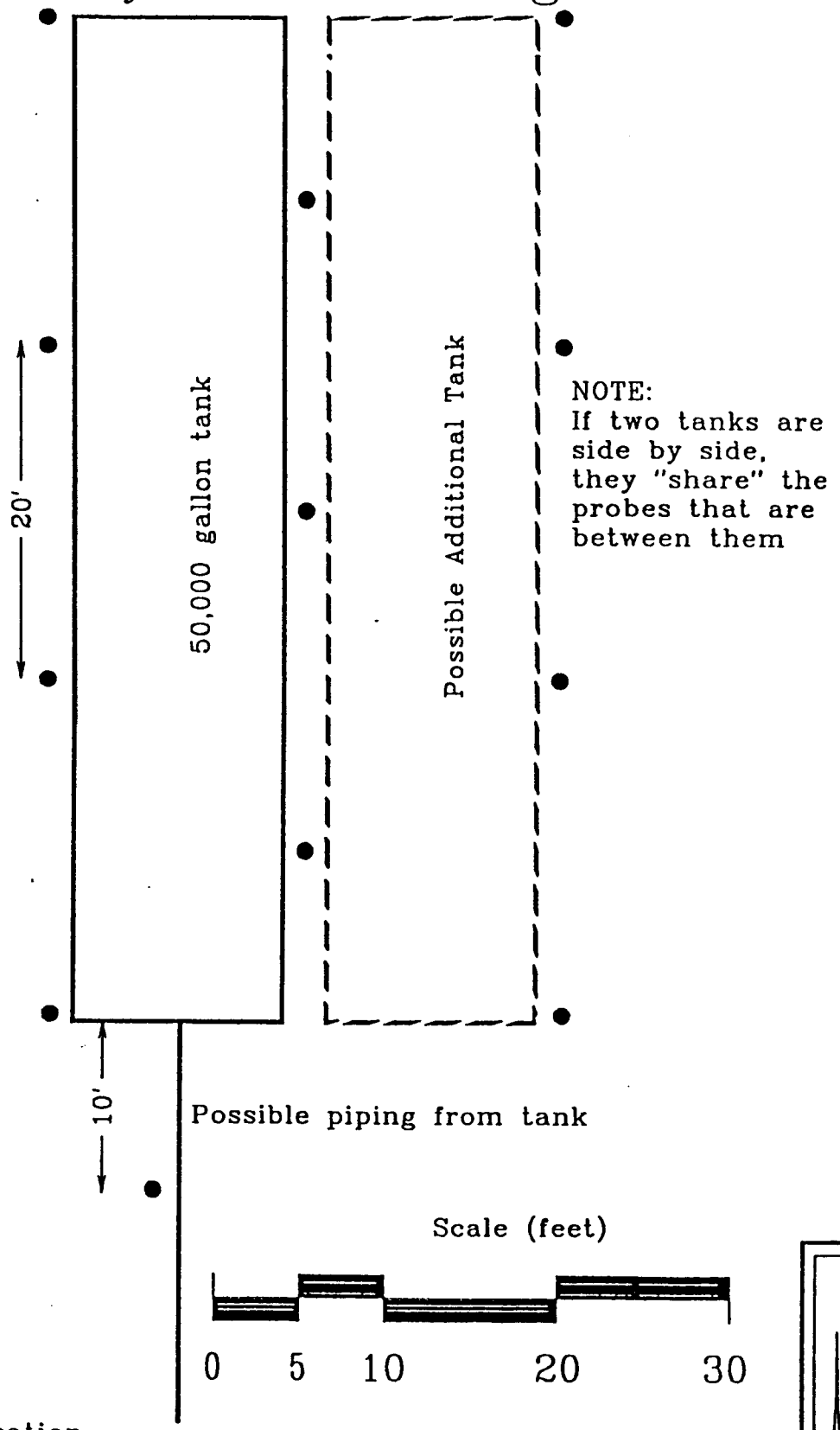


FIGURE 11
Example Utility Box Placement Map

APPENDIX A: EXAMPLE PROBE INSTALLATIONS

Example 50,000 Gallon Tank Probe Installation System Drawing



EXPLANATION

● Sample Probe Location

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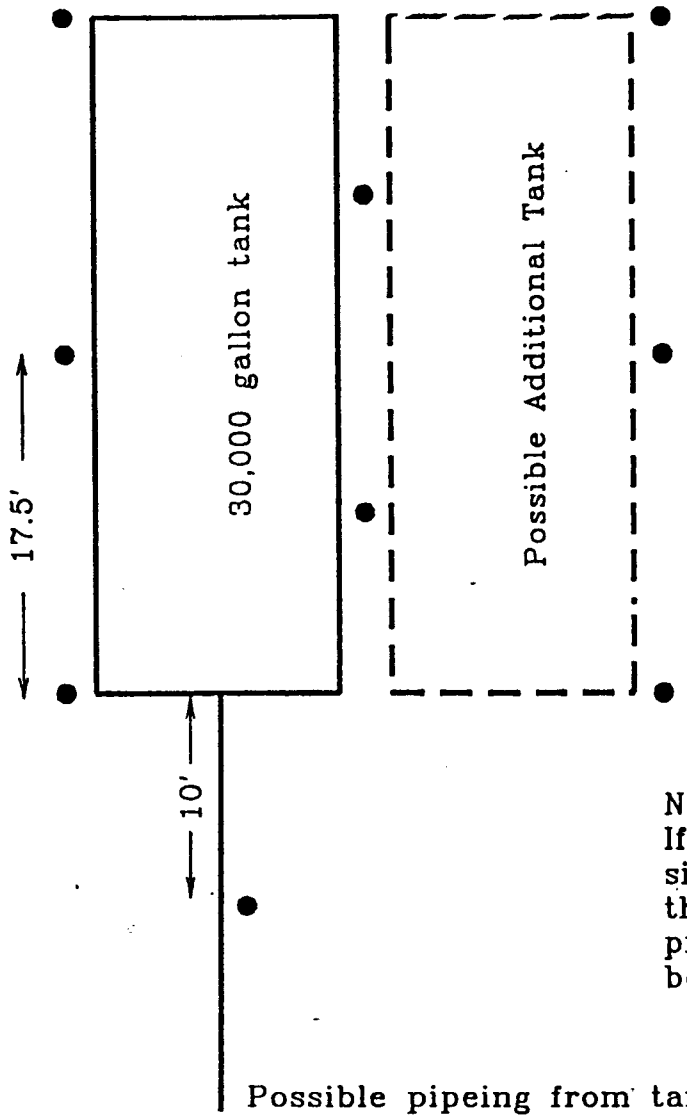
Example 30,000 Gallon Tank Probe Installation System Drawing



NOTE:
If two tanks are side by side, they "share" the probes that are between them

EXPLANATION

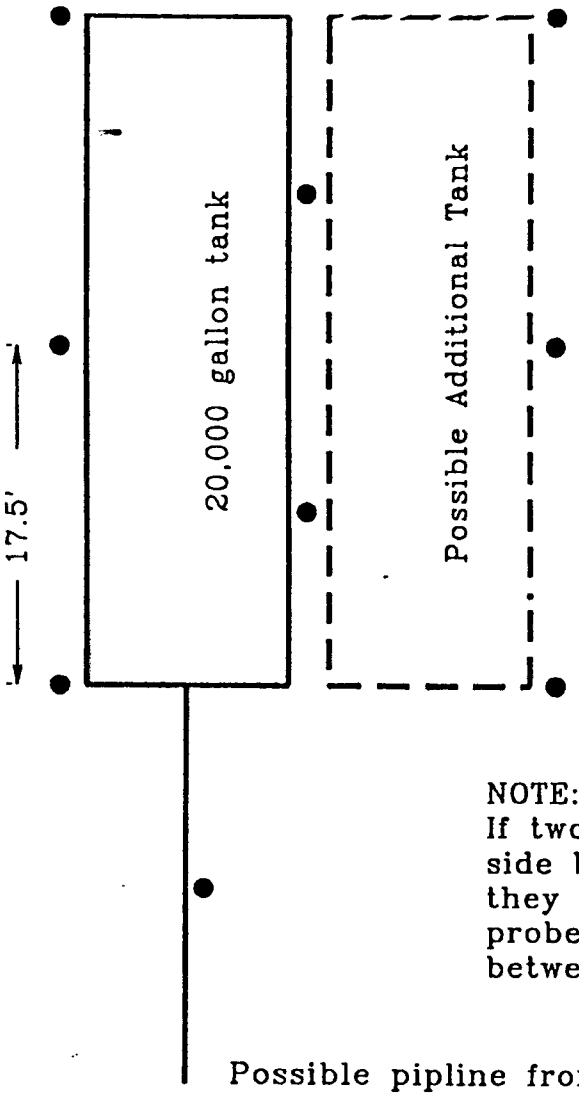
● Sample Probe Location

Scale (feet)

0 5 10 20 30

Tracer Research Corporation

Example 20,000 Gallon Tank Probe Installation System Drawing



NOTE:
If two tanks are side by side, they "share" the probes that are between them

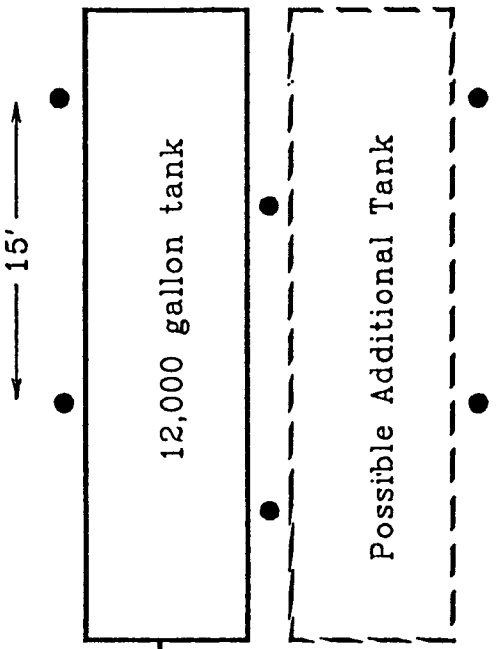
EXPLANATION

● Sample Probe Location

Scale (feet)

Tracer Research Corporation

Example 12,000 Gallon Tank Probe Installation System Drawing



NOTE:
If two tanks are side by side, they "share" the probes that are between them

Possible piping from tank

EXPLANATION

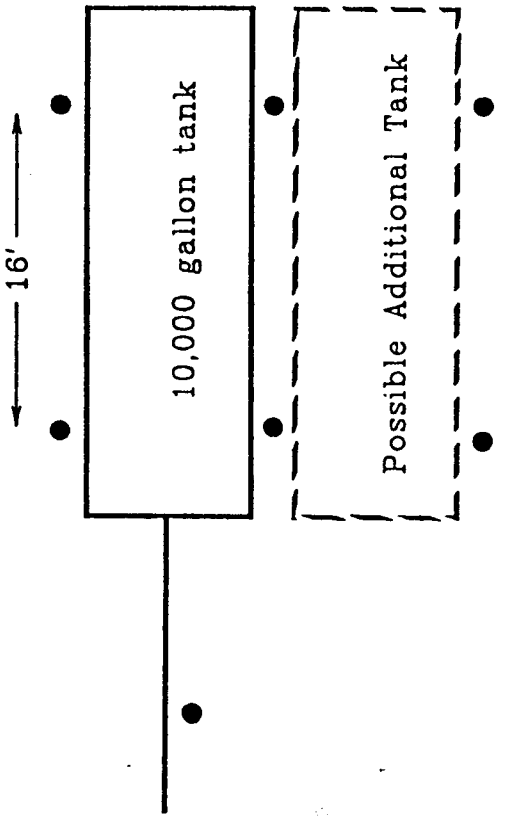
● Sample Probe Location

Scale (feet)

0 5 10 20 30

Tracer Research Corporation

Example 10,000 – 8,000 Gallon Tank Probe Installation System Drawing



NOTE:
If two tanks are side by side, they "share" the probes that are between them

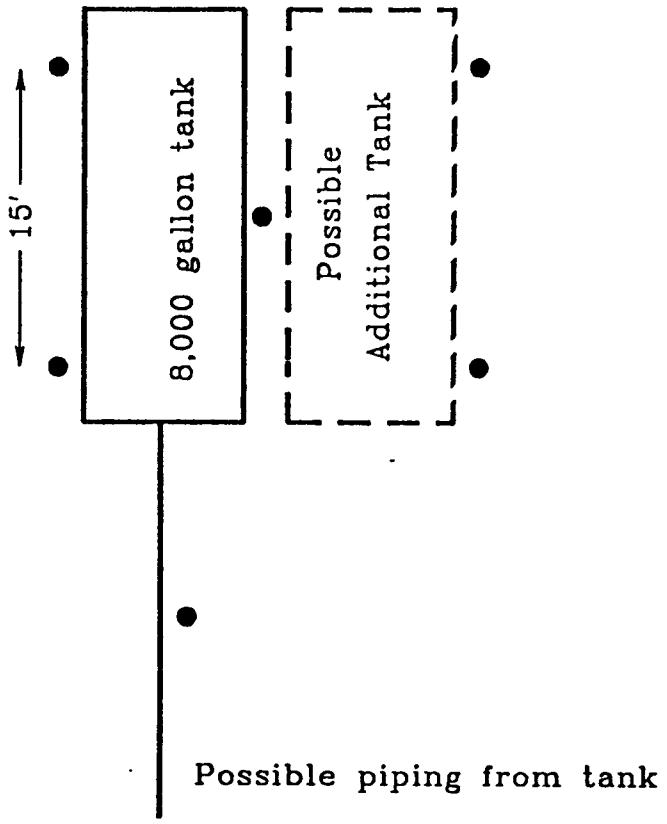
EXPLANATION

● Sample Probe Location

Scale (feet)

Tracer Research Corporation

Example <8,000 – 1,000 Gallon Tank Probe Installation System Drawing



NOTE:
If two tanks are side by side, they "share" the probes that are between them

EXPLANATION

● Sample Probe Location

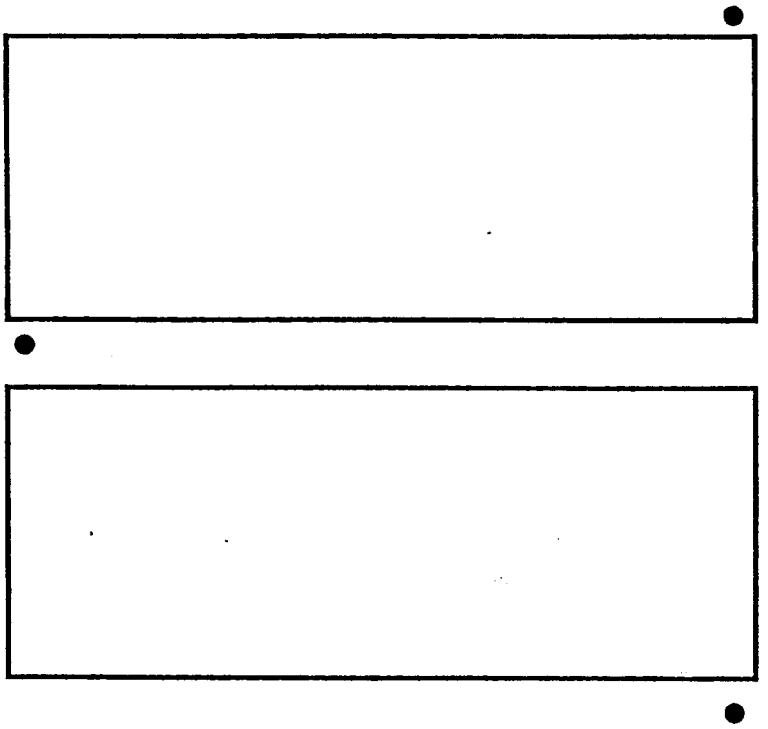
Scale (feet)

Tracer Research Corporation

Example <1,000 Gallon Tank Probe Installation System Drawing

(no scale)

Be certian that any piping from the tank is within 10 feet of a sampling probe



EXPLANATION

● Sample Probe Location

NOTE:
If two tanks are side by side, they "share" the probes that are between them

Tracer Research Corporation

APPENDIX G

LOCATIONS AND CAUSES OF UST LEAKS

APPENDIX G. LOCATIONS AND CAUSES OF UST LEAKS

A. Leak Detection

Leak detection is the primary concern in the management of existing underground storage tanks. Leaks can occur in different areas of the system and for different reasons.

B. Location of Release

1. The EPA Office of Underground Storage Tanks conducted a survey of State reports on UST leaks in August 1986. According to the survey, approximately 43 percent of those identifying the source of the leak identified the "tank" as the location of the release, while 18 percent identified the "piping." Another 13 percent said the location of the release was either the "tank or piping," or "both the tank and piping." These data are in Figure G-1. The large number of releases from pipes suggests that any leak control system must address both piping and tanks.

2. Overfills appear to represent a significant portion of the releases, yet pose very different problems from those associated with releases from underground storage systems. When an overfill occurs, for example, the volume released from underground tank systems is difficult to identify and clean up.

C. Cause of Release

Figure G-2 of the 1986 survey presents the specified causes for subsurface tank releases. Structural failure is the most commonly specified cause, followed by corrosion, loose fittings, improper installation, and natural phenomena, many of which (e.g., "leak") are not specific enough to clearly characterize the leak. So while corrosion and structural failure are both significant causes, the frequency of these causes could not be estimated with certainty.

D. Causes of Structural Failures

1. The survey reported that there were a total of 158 failure incidents with explanatory comments pertaining to structural failure. Causes cited for structural failure incidents included vehicle hit pump, high water table lifted tank, rupture caused by excavation, rupture due to excessive air pressure during tank tightness test, external load caused by vehicular traffic, frost damage, and pipe hit by snow plow. Based on these comments, structural failure can occur due to a variety of specific causes. The comments also support the above finding that relatively few of the structural failure incidents involve corrosion-related problems.

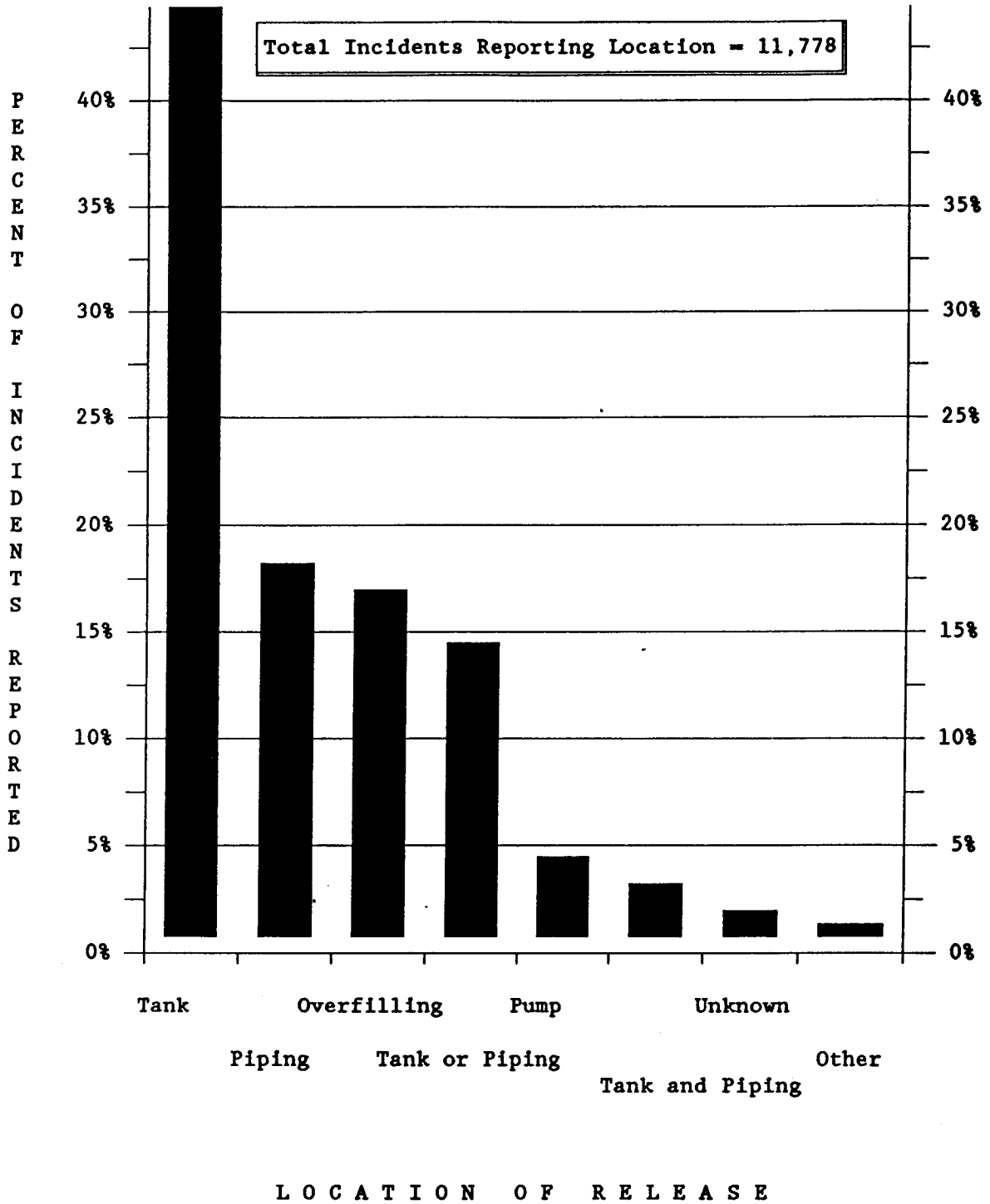


Figure G-1. Location of Release

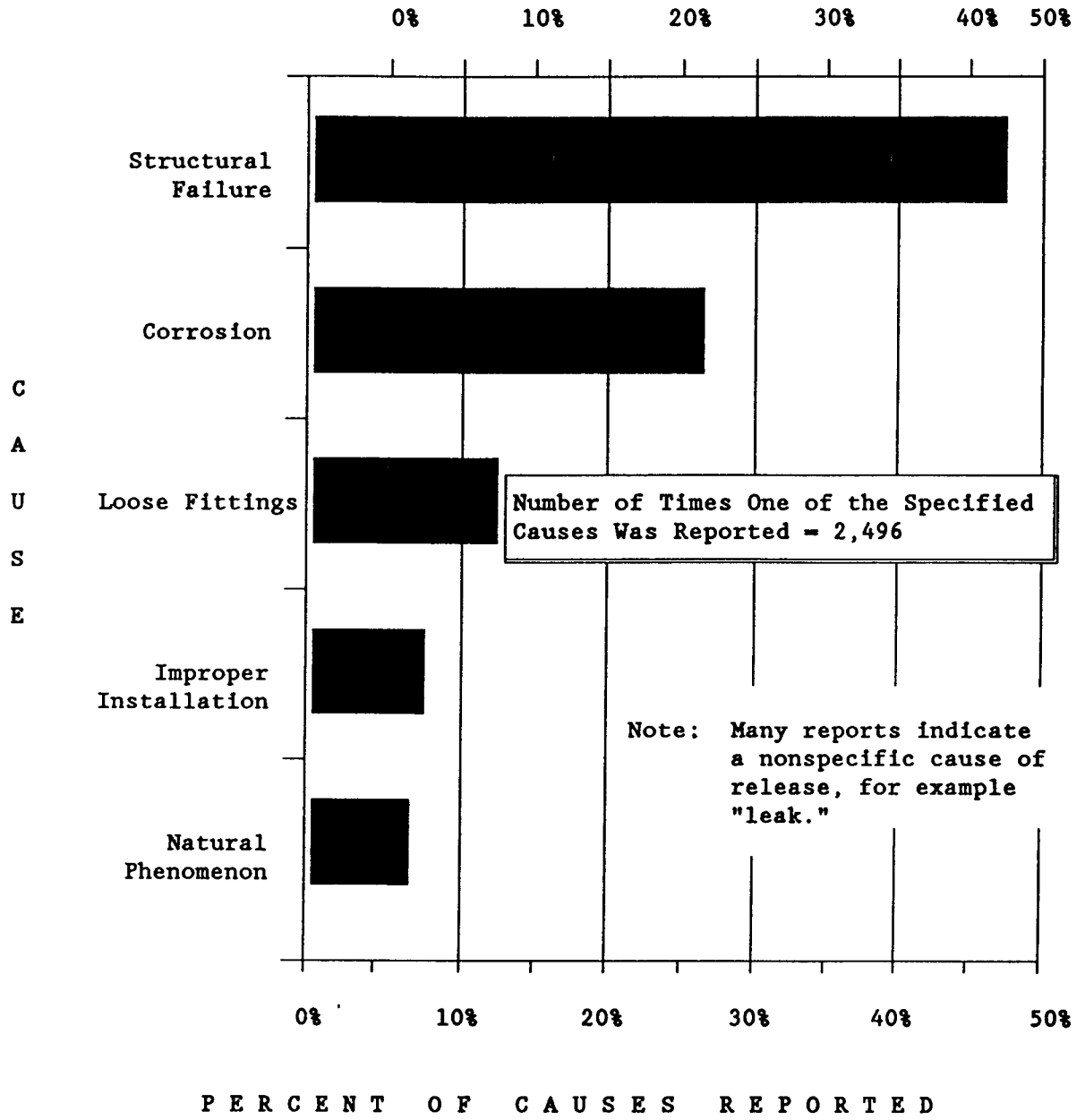


Figure G-2. Cause of Release

2. More than half of the comments indicated that the structural failure occurred in the piping, about 30 percent involved the tank, and 15 percent involved the supply line, 22 percent involved pipe fittings, and nine percent involved the vent pipe.

E. Causes of Corrosion

1. As explained in The Interim Prohibition: Guidance for Design and Installation of Underground Tanks, August 1986, corrosion is the breakdown of metal into its original state - an ore. Oxygen and moisture hasten this process which can result in rust areas and, finally, a hole in the tank.

2. Corrosion can be accelerated underground, depending on soil conditions and tank characteristics. It can occur over an entire surface or in localized spots. If scratched or damaged, metal can corrode very quickly in localized spots.

3. There are several types of corrosion shown in Table G-1. Galvanic corrosion occurs where an electric current flows from the surface of a metallic structure (tank) into the surrounding environment (soil). Briefly, the corrosion cell, as demonstrated in Figure G-3, must have 1) an anode, where the current leaves the tank; 2) a cathode, where current reenters the tank or piping; and 3) soil, an electrolyte used to conduct the current. Also the anode and cathode must be made of dissimilar metals. Galvanic corrosion (Figures G-4 and G-5) can be external or internal. Internal corrosion may be accelerated by damage from dipsticks, impacts from increased product loads, and evaporation and condensation.

4. Stray currents from other direct current power systems, such as subway systems or gas distribution systems may cause corrosion in tanks. The stray currents flow from the source, through the underground path of least resistance, and back to the source. If a tank is in the path, corrosion can occur at the point the current leaves the tank or piping.

F. Other Causes

Improper installation and design is another cause of tank leaks. Scratches or damage to the tank can induce leaking through corrosion or cracks in the tank wall. Improper backfilling may cause undue strains and eventual failure. Absent or inadequate hold-down straps may allow uplifting of the tank, due to a high water table, and subsequent failure.

G. Section Summary

In conclusion, numerous factors can contribute to an early or eventual tank leak. A program to minimize damage from tank leaks must address a variety of causes of structural failure and failures due to corrosion. A comprehensive leak control program must include the piping and the pumps as well as the tank.

Table G-1. Corrosion Types: Causes and Cures

Corrosive Types	Causes	Cures
Galvanic	1. Occurs when dissimilar metals are connected by an electrolyte.	1. Insulate dissimilar metals one from another.
	2. Occurs when structural pipe or tank joins to different soil types.	2. Insulate structure from soils.
	3. Dissimilarities on the surface of the pipe.	3. Close adherence to correct manufacturing procedures.
	4. Differential aeration of the soil around the pipe.	4. Thoroughly tamp backfill to one foot above the pipe.
	5. Backfilling with mixed stratified layers (local corrosion).	5. Control backfill material. (Backfill with homogenous material)
Stray Currents	Direct current is discharged from the pipe wall. (Other sources of current near underground structures with the ground as part of their circuit.)	Must be defined for each specific instance.
Stress Corrosion	Points of concentrated stress near areas of uniform stress in the presence of an electrolyte.	Reduce number and magnitude of concentrated stress areas in the tank and pipeline.
Biochemical	Bacteria in the soil affecting the concentration of ions in the electrolyte.	Thoroughly tamp backfill to one foot above the structure Remove all deleterious materials from the backfill.
Direct Chemical Attack	Chemicals directly attacking the structures (i.e., road salt).	Seal the surface from infiltration.

FIGURES FOR ILLUSTRATIVE PURPOSES ONLY. THEY ARE NOT INTENDED FOR USE AS CONSTRUCTION DRAWINGS

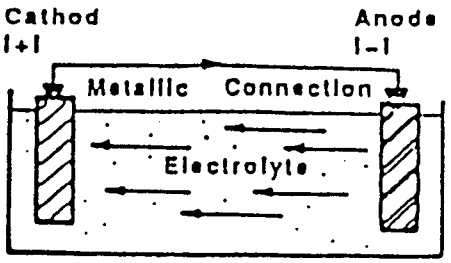


Figure G-3. Galvanic Cell

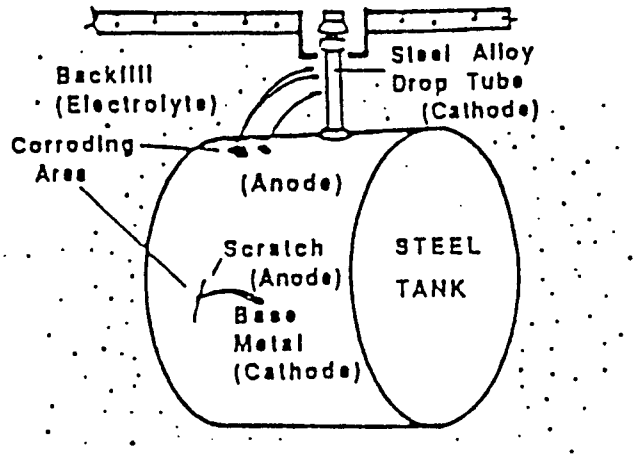


Figure G-4. Galvanic Corrosion on an Underground Tank System

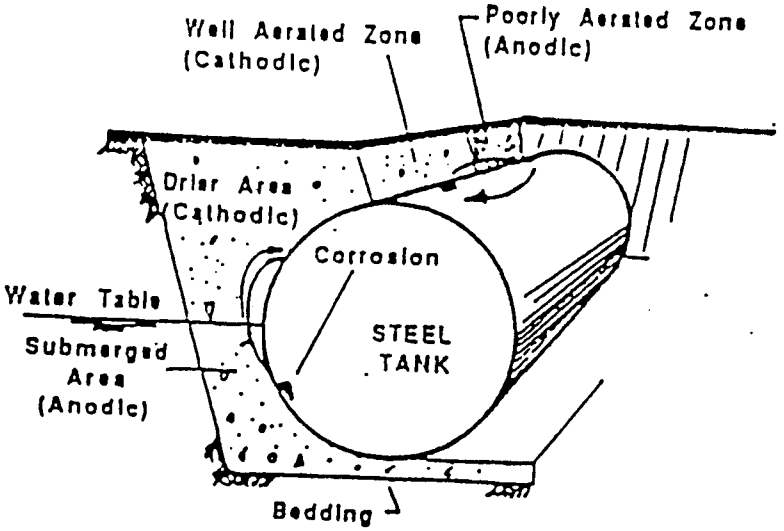


Figure G-5. Galvanic Corrosion Caused by Differences in Soil Aeration and Moisture

APPENDIX H

PRELIMINARY SITE ASSESSMENT

APPENDIX H.

PRELIMINARY SITE ASSESSMENT

If a leak is suspected, further site assessment may be necessary. A checklist is included as Exhibit H-1.

1. Obtain the necessary site maps for utility conduits, sewer lines, subsurface structures, and topographic conditions as well as data on subsurface soil and hydrogeologic conditions.

2. Visually inspect the surface area around the tank for the following:

   a. Confirmation of any surface environmental or mechanical signs of leakage.

   b. Signs of ground settlement, expansion, or other movement.

   c. Signs of recent excavation or surface change from traffic loads.

   d. Soft spots in asphalt indicative of solvent action from liquids or vapors leaking from tanks or pipes.

   e. Any other possible sources of contamination such as landfills or other burial sites, natural background contaminants, spills from tank refilling or dispensing or other operations in the vicinity, and improper substance disposal on the ground or in drains.

3. Plot all surface information on a site sketch.

4. Visually inspect subsurface structures in the area (e.g., manholes, tunnels) if possible, and if safety and health factors allow it.

5. Plot all known potential surfaced and subsurface receptors on the site sketch (e.g., utility conduits, sewer lines, trenches, wells).

6. Visually inspect the tank, if possible. If the substance is to be removed from the tank, record volume, presence of water, and other pertinent data.

7. Based on the data in the site sketch, test for substance vapors with a gas indicator beginning on the surface at the nearest, most likely source, and work outward. A probe driven into the ground around the tank (avoiding piping paths), then removed, will allow easier vapor detection and indicate possible contaminant sources and flow distribution. Record data on the site sketch.

8. Summarize preliminary data in a site assessment report and determine additional testing and monitoring requirements.

Item		Completed
1.	Tank Survey checklist completed	_____
2.	Topographic maps	_____
3.	Underground utility maps	_____
4.	Soil and hydrogeologic data	_____
5.	Surface Inspection:	
	a. Environmental or mechanical signs of leaks	_____
	b. Signs of ground settlement or movement	_____
	c. Any recent excavations	_____
	d. Surface changes from traffic loads	_____
	e. Other possible contamination sources	_____
	f. Soft spots in asphalt	_____
6.	Results of subsurface structure inspections (e.g., manholes, sewers, utility tunnels, basements)	_____
7.	Potential subsurface receptors (e.g., utility conduits, trenches, sewer lines, wells, depressions)	_____
8.	Results of visual tank inspections	_____
9.	Vapor testing results	_____
10.	Hazard ranking results	_____
11.	Inventory data	_____
12.	Temperature and pressure factors considered	_____
13.	All data plotted on site sketch	_____

Exhibit H-1. Site Assessment Checklist

APPENDIX I

ENVIRONMENTAL AND MECHANICAL SIGNS OF A LEAK

APPENDIX I. ENVIRONMENTAL AND MECHANICAL SIGNS OF A LEAK

Environmental Signs

Operators of tanks should also be aware of obvious mechanical and environmental signs of leakage. These signs, if recognized, can alert the operator that a leak may be occurring.

1. Odors of petroleum products in the soil near the tank may indicate leakage, but may also occur from surface spills.

2. Odors or presence of petroleum products in underground structures (sewers, basements, tunnels, etc.) may indicate tank leaks.

3. Stressed or dying plant life around the tank may indicate leaks.

4. The presence of petroleum products in surrounding water wells may indicate leaks.

5. The presence of a sheen from petroleum products on surface waters may indicate tank leaks.

6. Suspected liquids in excavations, cuts, or on natural slopes may indicate tank leaks.

Mechanical Signs

1. Hesitation in the dispensing pump may indicate tank leakage or be due to a leaking valve or vapor lock in warm weather.

2. Irregular flow and a rattling sound in the pump system indicates the influx of air into the system possibly through a loose fitting or pipe leak.

3. In a submerged pumping system a pipe leak may be detected by meter spin without dispensing.

APPENDIX J

TANK REPAIR

APPENDIX J.

TANK REPAIR

A. Steel Tanks

1. Unprotected steel and coated steel tanks:

   a. Coat tanks with a material such as coal tar epoxy, urethane, or resin. Asphalt paints do not meet the requirements of the regulations (Interpretive Rules, 51 CFR Vol. 51 No. 108, page 20418).

   b. Coating prevents currents from flowing from the tank to the soil and prevents corrosion.

2. Cathodic protection:

   a. An impressed current system is one where the AC current from the site system is converted to DC current by a rectifier. The current flows to a metal anode from the rectifier, through the soil to the tank, and back to the rectifier. Corrosion is prevented but a continuous power source is required.

   b. A sacrificial anode system induces current flow from the anode to the tank. The anode corrodes rather than the tank. No external power source is necessary. Anodes must be removed and replaced as necessary. See Figure J-1.

3. Steel tanks that are removed for improvement or repair will require the installation of a secondary containment device and tank tests before the tank is put back into operation.

4. Steel Tank Repair:

   a. After the tank is emptied completely, including all vapors, and after the tank is thoroughly cleaned, line the interior with compatible coating.

   b. API does not recommend lining of tanks with open seams more than three inches long, perforations greater than 1 1/2 inches in diameter, or greater than five perforations per square foot of surface area.

      Underground tanks may be relined in situ or after removal from the ground. Adequate surface preparation is necessary prior to relining. Sandblasting of metal tanks and thorough tank cleaning are the minimum surface preparations generally needed prior to relining. Tanks in poor structural condition should not be relined.

   c. Test tanks after repairing.

FIGURES ARE FOR ILLUSTRATIVE PURPOSES ONLY. THEY ARE NOT INTENDED FOR USE A CONSTRUCTION DRAWINGS.

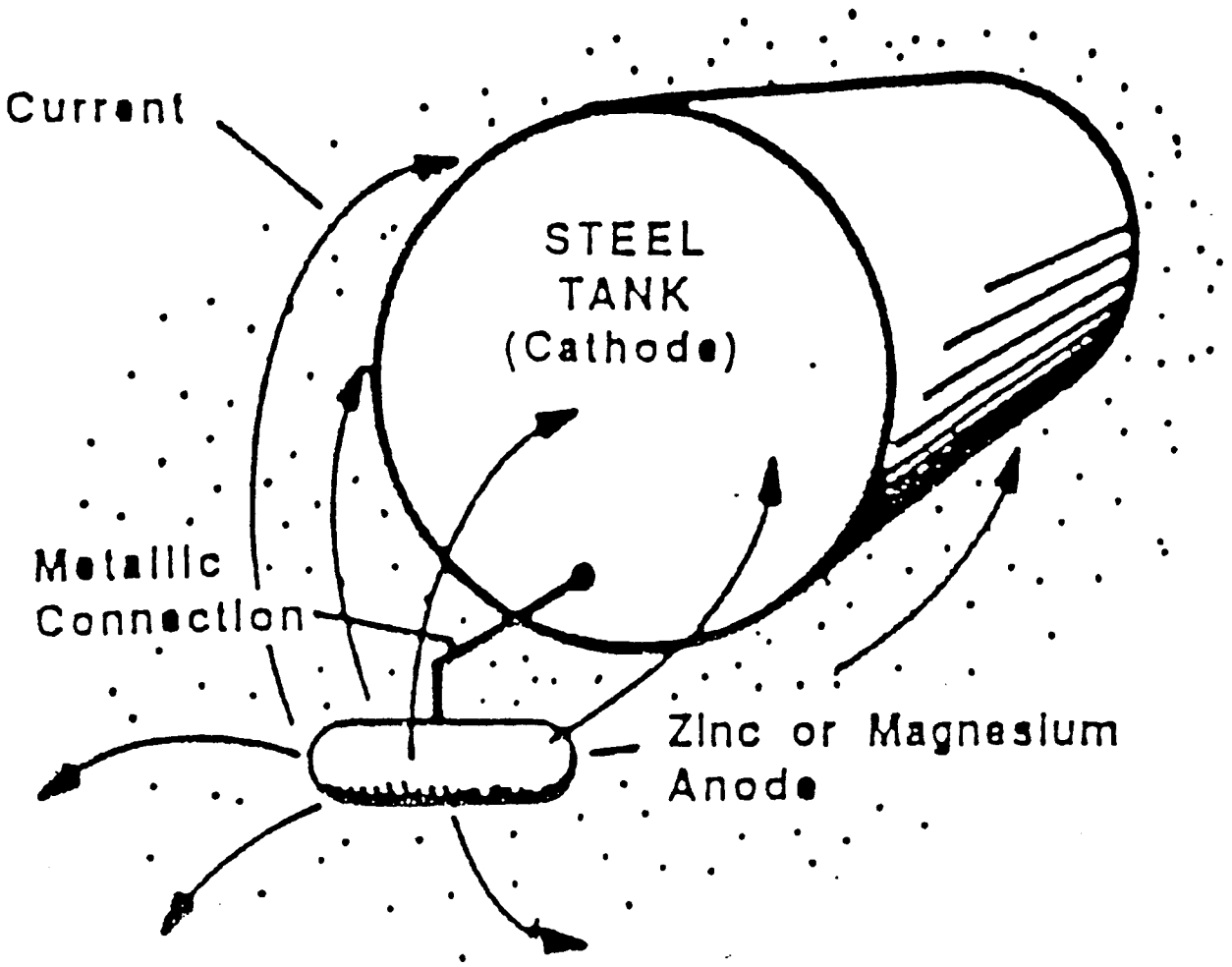


Figure J-1. Cathodic Protection by the Sacrificial Anode Method

B. Fiberglass Tanks

1. Line with a compatible substance.

2. External corrosion protection is not necessary.

3. Test tank after repairing.

The installation of a steel deflection plate at the bottom of the tank at a point directly below the opening where inventory readings are taken can provide protection from damage and corrosion. The plate must be a minimum of 1/8 inch thick and one foot by one foot. Mark the openings on the outside of the tank that are specifically for dipstick readings.

D. Piping

1. Replace with corrosion resistant piping like fiberglass-reinforced plastic (FRP).

2. Cathodic protection can be installed.

3. All pipes must be tested after repair or replacement.

E. Secondary Containment System

1. Systems must be designed, installed, and operated to prevent stored substances from migrating to the soil, groundwater, or surface water throughout the life of the tank and be capable of detecting and collecting stored substances.

2. Containment features must be:

(a) Constructed or lined with materials that are compatible with the stored substance and must have adequate strength and thickness to prevent failure due to pressure gradients, climatic conditions, and daily stress.

(b) Situated on a base that provides support; resistance to pressure gradients around the system; and prevention of failure due to settlement, compression, or uplift.

(c) Provided with a leak detection system that will detect any releases from the tank or the secondary containment system.

(d) Sloped or designed to remove liquids.

3. Systems must include at least one containment device such as a liner, a vault, a double-walled tank, or an approved equivalent device.

4. External liner systems must be able to contain 100 percent of the capacity of the largest tank within the liner, designed to prevent

precipitation entry, be free of cracks and gaps, and be able to prevent lateral and vertical migration.

5. Vault systems must be designed or operated to contain 100 percent of the largest tank within the vault; designed to prevent precipitation entry; have chemically resistant water stops at the joints; have an impermeable, substance-compatible interior coating or lining to prevent migration of substances into the concrete; and have an exterior moisture barrier.

6. Double-walled tanks must be able to contain any releases from the inner tank, be protected from corrosion if constructed of metal, and be provided with a leak detection system.

APPENDIX K

RECOMMENDED PUBLICATIONS

STANDARDS AND PRACTICES CITED IN THE UST RULE

American National Standards Institute (ANSI) Standards

Standard B31.3	Petroleum refinery piping
Standard B31.4	Liquid petroleum transportation piping systems

American Petroleum Institute (API) Recommended Practices

Publication 1604	Removal and disposal of used underground storage tanks
Publication 1615	Installation of underground petroleum storage systems
Publication 1621	Recommended practice for bulk liquid stock control at retail outlets
Publication 1626	Storing and handling ethanol and gasoline-ethanol blends at distribution terminals and service stations.
Publication 1627	Storaged and handling of gasoline-methanol/co-solvent blends at distribution terminals and service stations
Publication 1631	Recommended practice for interior lining of existing steel underground storage tanks
Publication 1632	Cathodic protection of underground storage tanks and piping systems
Publication 2200	Repairing crude oil, liquid petroleum gas, and product pipelines
Publication 2015	Cleaning petroleum storage tanks

American Society of Testing and Materials (ASTM) Standards

D4021-86	Standard specification for reinforced plastic tanks for petroleum products

Association for Composite Tanks (ACT) Specifications

ACT 100	Specification for the fabrication of FRP clad underground storage tanks

CERCLA Program

CERCLA (40 CFR 302)	Hazardous substances and reportable quantities list (40 CFR 302.4)

National Association of Corrosion Engineers (NACE) Recommended Practices

RP-01-69	Control of external corrosion on submerged metallic piping systems
FP-02-85	Control of external corrosion on metallic buried, partially buried, or submerged liquid storage systems

National Fire Protection Association (NFPA) Standards

Publication 385	(See section on transfer procedures)
Standard 30	Flammable and combustible liquids code

National Institute for Occupational Safety and Health (NIOSH) Criteria

Criteria for a recommended standard -- working in confined spaces

National Leak Prevention Association (NLPA) Standards

Standard 631	Spill prevention, minimum 10-year life extension of existing steel underground tanks by lining, without the addition of cathodic protection

Petroleum Equipment Institute (PEI) Recommended Practices

RP 100-86	Recommended practices for installation of underground liquid storage systems

Steel Tank Institute (STI) Standards

STI (1983)	Specification for STI-P3 system of external corrosion protection of underground steel storage tanks
STI (----)	Standard for dual wall underground storage tanks

Underwriters Laboratories (UL) Standards

UL 58	Standard for steel underground tanks for flammable and combustible liquids
UL 567	Pipe connectors for flammable and combustible and LP gas
UL 971	UL-listed non-metal pipe
UL 1316	Standard for glass-fiber reinforced plastic underground storage tanks for petroleum products
UL 1746	Corrosion protection systems for underground storage tanks

ULC 107	Glass fiber reinforced plastic pipe and fittings for flammable liquids
UL CAN-4-G03.1-M85	Standards for galvanic corrosion protection systems for underground tanks for flammable and combustible liquids
UL CAN-4-S603-M85	Standard for steel underground tanks for flammable and combustible liquids
UL CAN-4-S615-M83	Standard for reinforced plastic underground tanks for petroleum products
UL CAN-4-S631-M84	Isolating bushings for steel underground tanks protected with coatings and galvanic systems
UL CAN-4-S633-M81	Flexible underground hose connectors

SOURCE LIST FOR UST CODES AND STANDARDS

American Petroleum Institute (API)
Publications Department
1220 L Street, NW
Washington, DC 20037
(202) 682-8375

American National Standards (ANSI)
Attention: Sales Department
1430 Broadway
New York, NY 10018
(212) 354-3300

American Society for Testing Materials (ASTM)
Publications Department
1916 Race Street
Philadelphia, PA 19103
(215) 299-5400

Association for Composite Tanks (ACT)
108 N. State Street, Suite 720
Chicago, IL 60602
(800) 368-2105

National Association of Corrosion Engineers (NACE)
Publications Department
P.O. Box 218340
Houston, TX 77218
(713) 492-0535

National Fire Protection Association, Inc. (NFPA)
Publications Department
Batterymarch Park
Quincy, MA 02269
(800) 344-3555

National Institute for Occupational Safety and Health
4676 Columbia Parkway
Cincinnati, OH 54226
(513) 533-8287, FTS 684-8287

National Leak Protection Association (NLPA)
4090 Rosehill Avenue
Cincinnati, OH 45229
(800) 543-1838

Petroleum Equipment Institute (PEI)
Publications Department
P.O. Box 2380
Tulsa, OK 74101
(918) 743-9941

Steel Tank Institute (STI)
P.O. Box 4020
Northbrook, IL 60065
(312) 498-1980

Underwriter Laboratories (UL)
Publications Department
333 Pfingsten Road
Northbrook, IL 60062
(312) 272-8800

Underwriter Laboratories of Canada (ULC)
7 Crouse Road
Scarborough, Ontario MIR 3A9
(416) 757-3611

APPENDIX L

TANK REMOVAL

AND

CORRECTIVE ACTION

APPENDIX L.

TANK REMOVAL AND CORRECTIVE ACTION

Tank Replacement/Removal

1. If it has been determined that the tank must be removed, remove tank contents, including vapors, and clean tank.

2. Isolate tank and necessary piping if part of a tank system.

3. Excavate and remove the leaking tank and/or piping and dispose of any contaminated soil in accordance with Federal, State, and local regulations and OPLAN 19-1 Spill Prevention and Response (SPR) Plan. Dispose of the tank and piping through the Defense Reutilization and Marketing Office (DRMO).

Initial Response and Corrective Action

1. Coordinate with regulatory agencies and Air Force organizations on Installation Restoration Program procedures to prohibit the spread of contamination (if necessary).

2. Construct interceptor trenches lined with an impervious barrier and install pumps to collect the contaminant.

3. If properly installed at the appropriate depth, recovery wells will create a cone of depression that will allow the migration of the contaminant to a well equipped with a pump for contaminant removal.

4. Floating filter buoys, skimmers, pumps, and other devices can be employed for contaminant containment and collection in recovery structures.

5. Groundwater contaminated with volatile substances from wells should be aerated and filtered (possibly treated), and returned to the ground after testing of contaminant levels. Nonvolatile liquids must be filtered or skimmed.

6. When tracing liquids in unconfirmed aquifers, consider the following:

   a. Most combustibles and flammables float on the water table and generally move with groundwater.

   b. Groundwater flows through previous subsurface layers toward lower elevations at varying rates.

   c. Groundwater may be confined and flow extremely slowly.

   d. The water table will vary in depth depending on the rate of discharge and surface and vadose zone conditions.

e. Groundwater flow can be contrary to the ground surface slope or surface drainage direction.

f. Most flammables and combustibles can move without the aid of groundwater via capillary action and vapor movement.

7. Remove and dispose of contaminated soil.

Contaminant Removal from Subsurface Structures (e.g., Basements, Tunnels)

1. For small quantities of contaminants that are volatile, ventilation and evaporation may be adequate for primary removal. Absorb unevaporated liquid, properly containerize, label, and dispose of. Decontaminate the area by flushing with water or nonhazardous, biodegradable detergents while maintaining vapor limits through ventilation.

2. For small quantities of nonvolatile contaminants, evaporation is ineffective. Pick up liquids by pumping, bailing, or absorbing. Properly dispose of and decontaminate the area if necessary in accordance with all pertinent regulations. Follow the same procedure for large quantities.

3. For large quantities of volatiles, ventilating vapors from evaporation may not be sufficient to reduce vapors to safe levels. Utilize all safety equipment and precautions and bail or pump the contaminant into proper containers. Absorb any remaining contaminant and decontaminate if necessary in accordance with all pertinent regulations.

4. For contaminant removal from utility conduit, consult the utility operator for procedures and techniques.

5. For contaminant removal from sewers:

   a. If possible, divert the affected sewer flow to an oil/water separator and skim the contaminant off the surface.

   b. Establish a skimming device somewhere on the stream flow for collection of contaminants. If flow is not turbulent, a type of boom can trap contaminants floating on the surface where they can be recovered by skimmer pumps or absorbants. Weir boards can be used in more turbulent flow to trap contaminants.

APPENDIX M

RESPONSIBILITIES

APPENDIX M.

RESPONSIBILITIES

Responsibilities

The United States Air Force (USAF) as a user of underground storage tanks is subject to regulatory requirements and is responsible for the proper management of these tanks. The responsibilities described in this section are based on current regulations and Air Force UST Program Strategy (Appendix B).

The responsibilities of various Air Force Organizations are outlined below:

1. HQ USAF/LEEV: Provides directives implementing USAF responsibilities.

2. USAF Occupational and Environmental Health Laboratory (OEHL): Provides technical assistance and reports sample analysis of suspected contaminated soils.

3. Air Force Regional Civil Engineering (AFRCE): Provides coordination between the installation UST management plans.

4. HQ ACC/CEV: Provides implementation guidance and reviews and approves installation UST management plans.

5. HQ ACC/CEO: Provides technical assistance in determining appropriate detection systems and retrofitting for existing tanks.

6. HQ ACC/CEE: Provides design and construction criteria for new underground storage tanks.

7. 27th Fighter Wing (27th FW/CC):

   a. Commander (CC): Ensures that personnel and material resources are made available to support implementation of this plan by the 27th FW and assigned tenant organizations.

   b. Public Affairs (PA):

      (1) Conducts semiannual briefing, at appropriate wing/group-staff meetings. The PA office must be notified about UST problems/incidents by involved agencies and Base units.

      (2) Coordinates information with Civil Engineering, Logistics, Judge Advocate, Disaster Preparedness, and other appropriate organizations for preparing an initial news release on the situation. All news releases will be coordinated with, and approved for release by, the Combat Support Group Commander.

(3) Is the only agency that should be releasing information to civilian news media concerning UST incidents/accidents. Should any media representative contact any Base agency other than PA, such contacts will be referred to PA without comment on the incident/accident.

(4) Establishes a news media center. Should any news media arrive at Cannon AFB, Security Police gate guards will detain them until a PA representative can act as an escort.

(5) In cooperation with appropriate Base agencies, works through all available media outlets to keep the onbase/offbase community informed of what is being done about any UST incident/accident. This will include follow-up after any incident/accident. Information will include, if available and releasable, the type of material involved, the short-term hazards, measures being taken to rectify the situation, and any long-term dangers or hazards.

(6) Prepares a news release about the Base Underground Storage Tank Management Plan. The release will cover the operation of the program and will be used both for internal and external purposes.

c. Chief of Safety (SE):

(1) Assists in implementation of required safety procedures, according to OSHA, AFOSH, and NIOSH standards.

(2) Participates in inspection of underground storage tanks.

(3) Provides semiannual briefing in support of training requirements.

d. Chief, Fuels Management Branch (LGSF):

Supervises plan implementation by subordinate elements. All testing will be done in accordance with recommended procedures.

8. Chief, Defense Reutilization and Marketing Office (DRMO):

a. Coordinates the disposal of removed underground storage tanks and contaminated soils.

b. Identifies disposal and transportation contractors. Ensures that disposal contractors have EPA identification numbers, permits, and interim status for the types of materials to be received, if required.

c. Advises the EPC and Base agencies on procedures that will result in disposal of abandoned tanks and contaminated soils at minimum cost.

d. Prepares, uses, and files manifests for contractor shipments if necessary.

9. USAF Hospital:

a. Commander (SG): Supervises plan implementation by subordinate elements.

b. Bioenvironmental Engineer:

(1) Supports Environmental Coordinator in identifying potentially leaking or leaking underground storage tanks.

(2) Conducts environmental investigations per AFR 19-7 and Phase II responsibilities under Installation Restoration Program to confirm, verify, and/or delineate contamination from actual or suspected tank releases. Responsibilities include developing sampling plans, obtaining samples, and coordinating with USAF OEHL for sample analysis. Notify appropriate Base agencies of data interpretation when results are received.

10. 27th Support Group (SG):

a. Commander (CC): As Group Commander, is responsible for the overall implementation and management of this plan.

(1) Notifies and reports UST activities to the EPA and the designated State agency.

(2) Supervises plan implementation by subordinate elements.

b. Commander, 27th Civil Engineering Squadron: Supervises plan implementation by subordinate elements.

(1) Chief, Engineering Branch (CEE): Ensures that the design of new tanks complies with EPA and State Standards before tank is put into operation.

(2) Chief, Fire Protection Branch (CEF):

(a) Advises and assists Base organizations on fire safety procedures for underground storage tanks.

(b) Provides support in the selection and installation of testing and maintenance devices.

(3) Chief, Environmental Planning Branch (CEV):

(a) Develops and maintains an understanding of Federal and State UST regulations. Notifies appropriate Base organizations of changes in UST regulations.

(b) Informs appropriate Base personnel which underground storage tanks are to be managed in accordance with present and future regulations in Title 40 CFR Part 280.

(c) Acts as central point of inquiry and liaison between Base, Air Combat Command Headquarters, and Federal and State environmental regulatory agencies.

(d) Develops and maintains an understanding of USAF operations that deal with underground storage tanks.

(e) Acts as a central point of inquiry and advice for other Base personnel regarding UST site restoration and monitoring procedures.

(f) Reports to Air Force and Federal and State environmental agencies on UST incidents/accidents in accordance with AFR 19-8 and the Base Spill Response Plan, Plan 19-1.

(g) Maintains an inventory of tanks onbase. The inventory notification form to be submitted to the State for new tank installations is in Appendix C.

(h) Updates the list of all underground storage tanks including location, size, contents, dates of use (if applicable), and regulatory status.

(i) Notifies Federal and State environmental agencies of the existence of newly discovered underground storage tanks and the installation of new tanks at least 30 days prior to the start of installation of new tanks, and immediately for newly discovered underground storage tanks.

(j) Identifies and acts to correct, through established procedures, areas of regulatory noncompliance.

(k) Requests, when necessary, analytical testing of potentially contaminated soils, underground storage tanks, and/or the surrounding environment when the contents or the properties of the contents are in question and cannot otherwise be determined.

(l) Maintains a central file on UST analytical data.

(m) If leaks are indicted or suspected, conducts the preliminary Site Assessment for each tank, ensures pretesting/monitoring considerations on testing and monitoring methods.

(4) Liquid Fuels (CEOUL):

(a) Maintain leak detection system for detecting releases from tanks.

(b) Maintain records on environmental monitoring results, suspected leaks, and corrective actions. Leak detection data must include, at a minimum, all instrument readings/measurements, and inspection data.

(c) Take immediate action to stop releases when they are discovered. Refer to Spill Response Plan, Plan 19-1.

(d) Close tanks if necessary to prevent leaks and if action taken, such as repairs, has been proven to be inadequate.

11. Tank Operators:

The identification of leaking underground storage tanks is the responsibility of all Base personnel, but most specifically the tank users and operators. Cooperation is necessary to ensure the protection of Base personnel, the general public, and the environment. A list of USTs is included in Appendix D.

Tank Operators must:

a) Support the Environmental Coordinator in identifying USTs and the potential for or occurrence of leaks.

b) Give immediate and maximum emphasis to leak detection. See Appendix I, Environmental and Mechanical Signs of a Leak.

c) Maintain a leak detection system, inventory control system, or comparable system for detecting releases from tanks.

d) Maintain records on all tank management activities including inventory control, tank testing data and results, environmental monitoring results, suspected leaks, and corrective actions. Leak detection data must include, at a minimum, all instrument readings and measurements, and maintenance and inspection data.

e) Take immediate action to stop releases when they are discovered. Refer to Spill Response Plan, Plan 19-1.

f) Take immediate corrective action in response to releases.

g) Notify CEO and CEV of all releases from tanks as soon as they are discovered.

h) Close tanks if necessary to prevent leaks and if actions taken, such as repairs, have proven inadequate.

i) Upon request of State regulatory agency, and after coordination through Environmental Planning Branch (CEV), operator must:

(1) Furnish information relating to tanks and their associated equipment contents.

(2) Permit agency to conduct monitoring and testing of tanks and surrounding soils, air, surface water, or groundwater.

(3) Permit agency to inspect and copy all records relating to tanks.

(4) Permit agency to inspect and obtain samples of regulated substances contained in tanks.