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HARDING LAWSON ASSOCIATES

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PHASE II FINAL REPORT
UNDERGROUND STORAGE TANK EVALUATIONS, NAVAL AIR STATION, MEMPHIS STATE OF TENNESSEE

HLA Job No. 2176,075.12

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I INTRODUCTION

Harding Lawson Associates (HLA) was contracted by the U.S. Navy to perform a two-phase project for the Identification (Phase I) and Evaluation (Phase II) of U.S. Navy underground storage tanks at the Naval Air Station (NAS) Memphis, Millington, Tennessee. This project developed as a result of the recent enactment of the U.S. Environmental Protection Agency (EPA) Regulations 40 CFR 280 (see Appendix A) which sets forth the specific requirements for notification and interim prohibition of underground storage tanks. The regulations apply to those facilities which contain "any substance defined in Section 101 (14) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, excluding hazardous wastes regulated under the Resource Conservation and Recovery Act (RCRA)," or which contain any petroleum derivative product. The State of Tennessee Department of Health and Environment (TDHE) will be developing a program for regulation of underground storage tanks, but in the interim is following the regulations and guidance provided in 40 CFR 280 and the November, 1984, amendments to the Resource Conservation and Recovery Act, Subtitle I, Sections 9001 through 9010. The EPA regulations required that all underground storage tanks be identified and registered by May 8, 1986 (see Description of Phase I Activities, A., below). This report contains

the results of the Phase II efforts to evaluate the NAS Memphis underground storage tanks (See Description of Phase II Activities, B., below).

A. Phase I Activities

The objective of the Phase I investigation was to locate existing underground storage tanks, including regulated and non-regulated tanks, and to provide an inventory detailing the approximate age, total capacity, materials of construction and utilization of each tank. This was accomplished through a site inspection at NAS Memphis between March 31, and April 4, 1986.

The tasks performed in the Phase I site investigation included interviewing personnel, reviewing plans, contract documents, and NAS Memphis facilities' specifications, and field inspections.

A total of ninety-one (91) underground storage tanks were located during Phase I. These included both tanks which required TDHE registration and those exempt from TDHE registration. There were a total of eighty-one (81) tanks which were registered with TDHE during Phase I of this study. Sixty-four (64) were in operation and seventeen (17) were not in operation. Underground storage tanks located at NAS Memphis contain the following hydrocarbon products:

- Subsurface Investigations

  - Install Ground-Water Monitoring Wells
  - Sample and Analyze Soil for Electrical Conductivity and/or Contamination

- Tank/Pipe Upgrading

  - Test
  - Retrofit with Interior Lining and/or Continuous Leak Detection
  - Replace

- Inventory Control Guidelines

II LEAK DETECTION/PREVENTION AND REMEDIAL TECHNOLOGY

The following section of this report presents various options, materials and procedures for tank integrity testing, tank replacement, interior and exterior protection, leak detection apparatus, inventory control and maintenance procedures, and ground-water monitoring systems. The technology discussed herein meets or exceeds current industry, and API/NFPA standards, and should be in accordance with the forthcoming EPA/TDHE underground storage tank regulations.

A. Tank Integrity Testing

Testing equipment and services are available for verifying the integrity of existing underground storage tanks and piping. The current technology for testing is based on quantitatively measuring leakage over an established time period. Tank testing used in conjunction with monitor wells and delineation drilling will help to define the magnitude and duration of any leakage.

The current industry standard for detection of leakage is 0.05 gallon per hour regardless of tank capacity. The following companies offer in-tank testing equipment and services which meet the prescribed standards of NFPA and API, and are widely used in the oil industry.

Testing, with results accurately determined within the prescribed detection limit, may be performed on tanks with capacities of 20,000 gallons or less. Tanks which have capacities greater than 20,000 gallons may also be tested, but the degree of accuracy diminishes with increasing volume.

Company	Equipment	Operating Description
Hunter Environmental Services, Inc. 115 DeWalt Ave. N.W., Suite 400 Canton, Ohio 44702 (800) 523-4370	Leak-Lokator LD-2000	Sensor probe is suspended in tank fluid. Measures changes in bouyancy (weight), compensates for temperature variation; tank-end deflection; evaporation. Also, tests piping. Meets NFPA 329 standards. Accurate to 0.05 gal/hr.
Heath Consultants, Inc. 100 Tosca Drive P. O. Box CS-200 Stoughton, MA 02072 (617) 344-1400	Petro Tite	Device operates on hydrostatic pressure test; sensitive to variances in temperature, tank-end deflection, type of liquid, and water table. Also, tests piping. Meets NFPA 329 Standards. Accurate to 0.05 gal/hr.

Section IV. B. and Appendices E-I of this report indicate which tanks should be integrity-tested.

B. Tank Replacement

Underground storage tanks which are over 20 years old have a high risk of leakage due to corrosion. HLA believes these tanks should be programmed for replacement. Recommendations for replacement are based

on site-specific conditions and good engineering practice. Appendices E through K indicate which of the existing tanks should be replaced.

According to current EPA regulations underground storage tanks installed after May 7, 1985, must be constructed of materials which will prevent releases of stored, regulated substances due to corrosion or structural failure (Refer to Appendix A). Table 1 gives a generic description of underground storage tank materials, advantages and disadvantages of each, and relative costs of various tank types. For fuel storage purposes, stainless steel, fiberglass reinforced plastic, fiberglass clad steel, coated double wall steel, and double wall fiberglass tanks are of primary interest.

Stainless steel tanks are compatible with petroleum products and possess relatively high structural strengths, depending upon which of the more than eighty (80) standard types of stainless steel is selected. However, stainless steel is subject to attack by corrosive chemicals and/or corrosive soils. According to EPA regulations, Appendix A, all stainless steel tanks must be installed with a cathodic protection system. Relative costs for stainless steel tanks range from medium to high depending on the grade of steel.

Table 1

GENERAL PROPERTIES OF MATERIALS USED FOR STORAGE TANKS AND PIPING

Structural Materials	Advantages	Disadvantages	Relative Cost
Carbon Steel	compatible with petroleum products but incompatible with corrosive chemicals	subject to attack by corrosive chemicals and corrosive soils	low
Stainless Steel	has better corrosion resistance than carbon steel and higher structural strength (There are more than 80 standard types of stainless steel and many special alloys).	lower grade steels (martensitic steels) are not suitable for reducing acid such as HCl.	Medium to high depending on grade of steel
Fiberglass	compatible with a wide range of petroleum and chemical products	lacks the structural strength and impact resistance of steel tanks	comparable to coated steel
Polyvinyl Chloride	excellent chemical resistance to acids, alkalis and gasoline	plastics have low structural strength and are less resistant to mechanical abuse than steels; generally not suited for the storage or handling of organic solvents such as benzene, carbon benzene, carbon tetrachloride and acetone	low
Concrete	generally good resistance to chemical attack; epoxy coatings often applied to concrete to increase chemical resistance	subject to cracking and spalling with changes in temperature such as during freeze/thaw cycles	high
Aluminum	excellent resistance to atmospheric conditions and compatible with mineral and organic acids	in pure state, has relatively low structural strength and generally not used in fabrication of tanks and pipes; alloys are available but costly	high
Steel Clad Fiberglass	has chemical resistance of fiberglass and structural strength of steel	relatively high cost	high
Linings and Coatings			
Alkyds	alkyd-phenolic and aklyd-silicones have good weather resistance and good to excellent resistance to gasoline, non-halogenated organic solvents and alcohols; may be applied to both the interior of tanks and pipes	incompatible with mineral acids, alkalis, chlorinated solvents, and organic acids	low
Epoxies	(include epoxyamine, epoxy-ester and epoxyphenolic). Excellent weather-resistance and excellent chemical resistance to gasoline, non-halogenated organic solvents, alkalis and mineral acids; may be applied to both interior and exterior of tanks and pipes	good to poor resistance to organic acids depending on the acid	low
Phenolic	excellent durability and excellent resistance to gasoline, non-halogenated organic solvents, and alcohols; may be applied to both interior and exterior of tanks and pipes	generally exhibits poor resistance to alkalis, mineral acids, chlorinated solvents, and organic acids	low
Wrappings			
Vinyl	good resistance to gasoline, non-halogenated solvents, alkalis and mineral acids; usually applied as loose wrappings around tanks and pipes	incompatible with chlorinated solvents, excellent to poor resistance to organic acids depending on the acid; wrappings usually not as effective as coatings because water often penetrates space between wrapping material and tank	low
Polyethylene	very good resistance to oxidizing acids and some organic acids and alkalis; usually applied as a loose wrapping around tanks and pipe	incompatible with gasoline and organic solvents, wrappings usually not as effective as coatings because water often penetrates space between wrapping material and tank	

Source: Chemical Engineers Handbood, Fifth Ed., 1973

Fiberglass reinforced plastic tanks offer compatibility with a wide range of petroleum and chemical products, and are resistant to electromagnetic changes. Therefore, fiberglass tanks eliminate external corrosion without the installation of specialized external equipment, i.e cathodic protection devices. However, fiberglass lacks the structural strength and impact resistance of stainless steel, and must be carefully designed and installed to prevent damage. Fiberglass tanks are comparable in cost to stainless steel tanks without cathodic protection.

Steel clad fiberglass tanks offer the advantages of the chemical resistance of fiberglass and the strength of steel. Tanks of this design and construction are relatively high in cost.

C. Interior Linings/Exterior Coatings

Alkyds, epoxies, and phenolics may be used to line the interiors and coat the exteriors of underground storage tanks and consequently increase the strength, durability and corrosion resistance of the tank. Each of these materials offers excellent resistance to gasoline, non-halogenated organic solvents and alcohol. Epoxies are also resistant to alkalis and mineral acids. These materials are compatible with fuels, low in relative cost and provide an additional level of confidence in tank integrity.

D. External Wrappings

Vinyl wrappings afford good resistance to gasoline non-halogenated solvents, alkalis, and mineral acids. Polyethylene wrappings offer very good resistance to oxidizing acids and some organic acids and alkalis. Vinyl and polyethylene materials are usually applied as loose wrappings around tanks and pipes. Both are susceptible to degradation by a variety of chemicals, organic solvents, and acids. Therefore, they are usually not as effective as external coatings.

E. Line Leak Detectors

Line leak detectors are easily installed on submerged turbine pumps and can detect piping leaks of 3 gallons per hour. If a leak of this magnitude should ocurr, the pumps automatically shutdown. Installation costs are minimal, if retrofit to an existing submerged turbine pump. Line leak detectors are available for purchase from the leading pump suppliers including Red Jacket Pumps and Gilbarco.

F. Cathodic Protection

External corrosion of underground storage tanks and piping can be caused by galvanic action which occurs when an electric current flows from the surface of the tank/piping into the surrounding soil.

Cathodic protection systems with sacrificial anodes operate on the principle of galvanic corrosion, which is the flow of current from a more electrically active metal to a less active metal. This causes the more active metal to corrode. Sacrificial anode systems installed to protect steel tanks usually consist of a magnesium or zinc rod (sacrificial anode) attached to the tank/piping. Because magnesium and zinc are more electrically active than steel, they will corrode more rapidly than the tank/piping. Impressed current cathodic protection systems operate by inducing an electrical current from an on-site power supply to flow to the tanks, and from the tank to the soil. Since the current flowing to the tank is greater than the current flowing to the soil, corrosion is prevented.

Routine performance monitoring and maintenance is required for both types of systems to adjust for varying conditions such as soil resistivity changes, tank system expansion, and lining or coating deterioration. It is also necessary to assure that the system is functioning properly.

The apparatus, installation, and maintenance of cathodic protection systems can be expensive, especially when compared to the quality of protection. For this reason, HLA does not recommended the use of cathodic protection systems.

G. Inventory Control

Special care must be exercised to hold product losses resulting from leaking underground storage tanks to a minimum so as to provide a safe environment for employees, customers and neighbors and to minimize environmental pollution. Inventory control is the optimal leak detection and prevention procedure. It provides an early warning signal of a tank or piping leak. Losses or gains from each day's inventory period must be averaged for each five consecutive readings or once a week. When any average record indicates a loss or gain which exceeds one percent of the tank capacity, or 50 gallons, whichever is greater, and the loss or gain is not explainable by spillage, temperature variations or other known causes, the owner should begin an investigation to identify the reason for the discrepancy.

Provided in Appendix B is API Publication No. 1621, Third Edition, recommended practice for bulk liquid stock control at retail outlets. The procedures contained in this report are applicable to the operations at Naval activities.

As a minimum, the inventory control system should provide the following information for each product type:

1. A record of each products receipts from delivery invoices.

2. A record of each products sales from fuel dispenser meter readings.

3. A record of each products use other than that sold, such as meter calibrations.

4. A physical inventory of the product in each tank.

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

Appendix 1 of the API publication shows a sample daily gasoline inventory record indicating the methodology used to calculate inventory gains or losses. Accounting forms similar to the U.S. Navy Exchange Form SS/163 shown in Appendix B can also be used to perform the calculations for tanks with metered dispensing pumps.

Tanks With Unmetered Dispensing Pumps

For those tanks with unmetered dispensing pumps such as the miscellaneous tanks shown in the activity appendices, inventory verification must be accomplished by taking dipstick readings before and after each withdrawal of fuel to quantify product used. The amount of product used is determined by converting the before and after measurements to gallons and taking the difference between the before and after measurements. The value is recorded on an appropriate accounting form as previously mentioned, and the inventory reconciliation can be completed using the procedures discussed in API Publication No. 1621.

Automatic Inventory Systems

In addition to the manual procedures for inventory verification described above, electronic recording devices are available for in-tank monitoring of fuel levels. The systems are principally composed of a main console and a number of auxillary probes. The probes are installed in the tanks and electrically connected to the main console. The system is capable of recording fuel volume changes of less than 0.1 percent, as well as correcting automatically for temperature variations, tank disturbances, and condensation volume. All data may be recorded on continuous chart paper for permanent recordkeeping. Appendix C provides additional data and information on these systems.

H. Ground-Water Monitoring

Phase II field assessments indicate that ground-water monitoring wells should be installed at those USN tank locations so designated in Appendices E through I. Criteria for recommending ground-water monitoring include leak/spill history, tank age, tank use, and sound engineering judgement.

In the event a leak should occur, ground-water monitoring will permit detection, thereby conserving fuel and reducing costs for product replacement and soil/aquifer restoration. Weekly sampling of the monitor wells for the presence of regulated substances is recommended.

HLA recommends that casing be no less than two (2) inches in diameter with screened or slotted completion. The depth of the well must extend below the base of the tank(s). A minimum of two (2) wells is required with location to be within 30 feet of the tank(s). Bulk storage/tank farm facilities may be permitted to locate monitor wells in upgradient/downgradient locations.

HLA also recommends that monitor wells should be constructed with four (4) inch Schedule 40 PVC pipe, screened or slotted completion, and capped with a bull plug or similar sealing device. Each well should be completed in the saturated zone. This construction will allow easy sampling and analysis, and accomodate most state of the art ground-water monitoring equipment.

III FIELD INVESTIGATIONS

The Phase II field investigation at NAS Memphis was conducted during the week of March 31, 1986.

Tasks performed at the site included personnel interviews, file reviews, field inspections and field tests on some cathodic protection systems. In addition, current inventory practices were reviewed and leak and spill histories, if any, for each of the tanks were noted.

Leak and spill data were collected to identify those locations that may require subsurface investigations for possible ground water and/or soil contamination; and to determine appropriate tank/piping leak mitigation recommendations. Inventory recordkeeping practices were noted to assess their compatibility with current industry standards.

Summary tables of the data collected during Phase I and Phase II field efforts are shown in Appendices E through L and are discussed in the following sections. Each of the appendices represents the type of stored fuel or tank function. HLA identified seven (7) major categories of fuel types/functions: aviation fuel (AVGAS) diesel fuel, fuel oil, jet propulsion fuel (JP-4, JP-5), motor fuel (MOGAS), waste oil, abandoned tanks and oil/water separators, which contain a variety of hydrocarbons.

A. AVIATION FUEL (AVGAS) TANKS

Twelve (12) aviation fuel (AVGAS) tanks were identified at NAS Memphis. Ten (10) of the tanks were part of an experimental hydro-pressurization loading and were subsequently used to store hazardous waste. They are now permanently abandoned in-place. These tanks, which did not require TDHE registration, will be discussed in a later section. The two (2) remaining AVGAS tanks (Numbers 303 and 1241) which are located at the Fuel Farm, Building N94, are temporarily out of service. These tanks were registered with TDHE as a part of the Phase I Study. The tanks are constructed of reinforced concrete and have steel piping systems. Each has a capacity of 25,000 gallons. According to Fuel Farm personnel the tanks are equipped with interior epoxy coatings. There is no external coating/lining or cathodic protection system. Refer to Appendix E and Plate 1 for additional data and locations.

Leak/Spill History

Fuel Farm personnel reported that there has been no history of leakage and/or spillage associated with these tanks.

Inventory Practices

No routine inventory is performed on tank Numbers 303 or 1241.

of the vehicle fueling facility. The diesel fuel is used to operate Navy vehicles only. The tank is gauged daily using the wetted tape method. Inventory reconciliation is also completed daily.

Recommendations

HLA recommends that NAS Memphis personnel gauge the eleven (11) operational tanks for product and water every fifteen (15) days at a minimum. In addition, records of product receipts should be maintained. Tank and piping replacement is also recommended for the tanks.

Estimated capital costs for tank and piping replacement for the eleven (11) tanks is $125,400.

C. FUEL OIL TANKS

Twenty (20) fuel oil tanks were located during the HLA field investigation. Sixteen (16) of the tanks are currently in operation, and four (4) are abandoned (Refer to Appendix G and Plate 1). The tanks supply fuel oil to power emergency generators, and powerhouse boilers. All of the fuel oil tanks were registered with the TDHE as a part of the Phase I study.

Leak/Spill History

According to NAS Memphis personnel, there have been no leaks or spills associated with these tanks. However, during the field investigation, evidence of minor spillage was observed at the No. 6 fuel oil tanks 1240, 1556, and 1557. It is probable that the surface accumulation of the No. 6 fuel oil (high viscosity) has occurred over a long period of time and is the result of the inventory process.

Inventory Practices

Eleven (11) of the sixteen (16) operational fuel oil tanks are inventoried on a bi-monthly basis. Tank volumes are measured using the gauge stick (wetted type) method and are checked for both product and water. The data are recorded on an inventory form, and the appropriate conversion factor for the tank size is used to convert to gallons of product on-hand. These volumes are compared with delivery receipts to determine monthly usage. The remaining five (5) operational tanks are not inventoried.

Recommendations

HLA recommends that NAS Memphis personnel guage each of the sixteen (16) operational tanks for product and water every fifteen (15) days at a minimum. Records of product receipts should be maintained for each tank. Tank and piping integrity testing is recommended for two (2) tanks. Pending results of the integrity tests, ground-water monitoring, tank and piping replacement may be advised. In addition, tank and piping replacement is recommended for eight (8) tanks. Tank and piping integrity testing costs are estimated to be $3,000.00 for the two (2) tanks. If ground-water monitoring is advised, monitor well installation costs will be approximately $3,000.00. Tank and piping replacement for these tanks would be $245,000.00.

Miscellaneous Recommendations

Evidence of minor spillage was observed at the No. 6 fuel oil tanks 1240, 1556 and 1557. HLA recommends that the associated contaminated soil be excavated and properly disposed of. Minor spillage during inventory processes should be prevented.

D. JET PROPULSION FUEL (JP-4, JP-5) TANKS

Six (6) underground storage tanks containing jet propulsion fuel (JP-4, JP-5) were identified and evaluated during the Phase II field investigation. The tanks were registered with the TDHE as a part of the Phase I study.

Four (4) tanks containing JP-4 are located at the fire fighting training school (AFFR). JP-4 is used to initiate fires at the training pads for the following reasons: low flash-point, burns less hot, and creates less air pollution than JP-5. JP-4 was the original mixture for fueling jet planes. It has been universally replaced by JP-5 which has a higher octane rating and viscosity.

The JP-4 tanks are constructed of steel and have iron piping. Tank numbers 1489, 1490, and 1491 have 1800 gallon capacities. Tank Number 1508 has a 5,000 gallon capacity (Refer to Appendix H and Plate 1).

The two (2) remaining jet fuel storage tanks numbers 336 and 337, contain JP-5 in a bulk storage system. Each of the tanks has a capacity of 420,000 gallons and is constructed of steel with associated steel piping. The tank lines enter a main manifold system

which transfers the JP-5 to a fuel loading station. Tank trucks routinely "pick-up" loads and transport the JP-5 to the aircraft service area, where the planes are refueled (Refer to Appendix H and Plate 1).

Leak/Spill History

There have been no reported leaks or spills associated with either the JP-4 or JP-5 tanks. According to AFFR personnel, the JP-4 tanks and lines are routinely monitored by the EPA. EPA personnel inspect the tank/piping system for signs of leakage and spillage, and collect water and soil samples for verification analysis. The JP-5 tanks/piping are checked daily via visual inspection for any obvious signs of leakage or spillage.

Inventory Practices

According to AFFR personnel, the JP-4 tanks are inventoried and reconciled on a weekly basis. The tanks are gauged by the wetted tape method using both fuel- and water-finding paste. On-hand volumes in gallons are determined by converting inches of fuel with the appropriate conversion factor. Each student has a weekly fuel expenditure sheet upon which he enters the volume used. These figures are summed and compared with on-hand volumes to determine any variance.

The JP-5 bulk storage tank system is equipped with in-line flow totalizers and fuel meters on the dispensing pumps. The volume of fuel dispensed is accurately recorded and compared to the delivery receipts and sales receipts to determine any gain or loss.

Recommendations

HLA recommends that NAS Memphis personnel gauge each tank for product and water every fifteen (15) days at an minimum. Records of product receipts should be maintained for each tank. Tank and piping integrity testing is recommended for the two (2) JP-5 fuel tanks. Pending results of the integrity tests, ground-water monitoring and/or tank and piping replacement may be advised. In addition, tank and piping replacement is recommended for the four (4) JP-4 fuel tanks.

Tank and piping integrity testing costs are estimated to be $3,000.00 for the two (2) JP-5 fuel tanks. If ground-water monitoring is advised, monitor well installation costs will be approximately $3,000.00. Estimated capital costs for tank and piping replacement for the four (4) JP-4 tanks is $62,000.00.

E. MOTOR FUEL (MOGAS) TANKS

Nineteen (19) motor fuel (MOGAS) storage tanks were located during the NAS Memphis field investigation. The tanks were registered with TDHE as a part of the Phase I Study. Eight (8) of the tanks are abandoned and will be discussed in Section L of this report.

Eight (8) of the eleven (11) operational tanks containing motor fuel are located at three separate vehicle fueling facilities. The Fuel Farm operates two facilities which provide fuel for Navy vehicles only. Tank Numbers 1242 and 1243 are 1,500 gallon tanks located at Building 94 (Fuel Farm office) and contain regular leaded and unleaded fuel. The fuel is dispensed through a loading island. Tanks Numbers 1249 and 1483 are located at a vehicle fueling island directly behind Building 375. The tanks have capacities of 4,250 and 8,000 gallons, respectively. The Naval Exchange operates a service station which supplies fuel to both private and Navy vehicles. Tank Numbers 1546, 1547, and 1617, which have capacities of 20,000, 20,000, and 10,000 gallons, respectively, are located at the exchange service station. The three (3) remaining tanks are located at Buildings N-12 and S-75. The N-11 and N-12 tanks are 55 gallon drums which supply fuel to gasoline sprinkler systems. The tanks at Building S-75 provide fuel for small engine operation at the Power Station (Refer to Appendix I and Plate 1 for additional data).

Leak/Spill History

A line-leak occurred at the Naval Exchange Service Station in late 1985. An estimated 5,000 gallons of fuel were lost to the ground. Tanks 1546, 1547, and 1617 and associated lines were integrity tested in March, 1986, to determine the source of the leak. The tanks passed the integrity testing. The piping was determined to be the source. The piping was repaired to correct the leak. No other leakage or spillage has been reported at or near the operational tanks.

Inventory Practices

Routine inventory using the wetted tape method is performed daily on each of the seven (7) vehicle fueling facility tanks. The conversion calculations and inventory reconciliation are also completed on a daily basis. NFPA standards are followed pursuant to allowable variances.

The MOGAS tanks located at Buildings N-12 and S-75 are not inventoried. They are refueled by Fuel Farm personnel on an "as-needed" basis.

Recommendations

HLA recommends that NAS Memphis personnel gauge each of the eleven (11) operational tanks for product and water every fifteen (15) days at a minimum. In addition, records of product receipts should be

maintained. Tank and piping replacement is recommended for the eight (8), vehicle fueling facility tanks. Tank and piping integrity testing is recommended for the other three (3) tanks.

Tank and piping integrity testing costs are estimated to be $4,500.00 for the three (3) tanks. Estimated capital costs for tank and piping replacement of the eight (8) vehicle fueling facility tanks is $170,000.00.

Miscellaneous Recommendations

As discussed above, a pipeline leak occurred at the Naval Exchange Service Station in late 1985 and was subsequently repaired. A comprehensive investigation to ascertain the appropriate remedial action is now underway. This investigation will include determination of the extent of ground-water/soil contamination, and recommended remedial actions.

F. OIL/WATER SEPARATORS

Fifteen (15) oil/water separators are currently in operation at NAS Memphis. These systems were registered with the TDHE during the Phase I part of this study. The separators, which are located at various locals on the station, range in capacity from 500 gallons to 20,000 gallons, are constructed of fiberglass, steel, and concrete, and range in age from four (4) to nine (9) years (Refer to Appendix J and Plate 1). The separators handle all types of fuels and waste oils, and primarily function to collect spillage and waste oil, and return the product for reuse or proper disposal.

Leak/Spill History

No Leakage or spillage has been reported.

Inventory Practices

Inventory of the fuels processed through oil/water separators is not maintained. Volumes, types, and disposition of the processed fuels varies. Fuels and/or waste oils are not stored in the oil/water separators.

Recommendations

Inventory of the fuels processed through oil/water separators is not feasible. Therefore, no action is required.

G. WASTE OIL TANKS

There are two (2) 550 gallon waste oil storage tanks located at Building S-9 and N-112, and one (1) 280 gallon waste oil storage tank located at Building S-341. These tanks were registered with TDHE as part of the Phase I Study. The 550 gallon tanks are constructed of fiberglass with galvanized steel piping. The 280 gallon tank is constructed of steel and has galvanized steel piping. Each of the tanks is enclosed in a concrete containment structure and is tied-down with wire rope. The tanks at Buildings S-9 and N-112, which are seven (7) years old, are used to collect Navy motor vehicle oils. The tank at S-341 (Exchange Automotive Repair Shop), which is six (6) years old, is used to temporarily store waste oil and lube grease collected from routine auto maintenance (refer to Appendix K and Plate 1).

Leak/Spill History

There has been no report of leaks or spills from these tanks.

Inventory Practices

Inventory is not performed on the waste oil tanks. The waste oil is collected in the tanks until the levels reach near-capacity. A private hauling contractor then pumps-out the used oil and removes it from the site.

Recommendations

HLA recommends that NAS Memphis personnel gauge each of the three (3) waste oil tanks for oil and water every fifteen (15) days at a minimum.

H. ABANDONED TANKS

Twenty-seven (27) abandoned underground storage tanks were identified for registration during the field investigation. These tanks will be discussed by the type of fuel which they originally contained. Seventeen (17) tanks were registered with TDHE as part of the Phase I Study. The remaining ten (10) tanks, which originally contained AVGAS, did not require TDHE registration. Refer to Appendix L for detailed data on specific tanks and to Plate 1 for locations.

There are ten (10) 25,000 gallon abandoned AVGAS tanks located at Building 94, the Fuel Farm office, which were installed approximately 40 years ago. According to Fuel Farm personnel, these tanks were installed as a part of the Aqua System Tank Farm, which operated by pressurizing the tanks and floating the fuels out of storage on the water surface to the piping. The water was removed by Aquatrap pits located near each set of fuel storage tanks. The fuel was then carried by pipeline to a truck fill stand.

The abandoned tanks have contained or still contain a variety of wastes, fuels and sludges. All of the stored wastes are RCRA regulated substances. According to NAS Memphis personnel, some of the materials presently stored in the tanks are classified as hazardous wastes by the EPA, and as such should be handled by the Hazardous Waste Coordinator. No formal abandonment procedures have been implemented.

Two (2) abandoned diesel fuel tanks are located at Buildings S-8 and S-75. The tanks have capacities of 500 and 280 gallons, respectively, and are constructed of steel. Contents of the tanks are unknown, as are the dates of abandonment. No formal abandonment procedures have been implemented.

Four (4) abandoned fuel oil tanks were identified during the field study. The 1,500 gallon tank located at Building N91 has subsequently been removed and properly disposed of. Tank Numbers 1244, 1245, and 1246 located at Building S-75 have capacities of 50,000, 25,000, and 25,000 gallons, respectively. According to available data in the Public Works Building, the tanks were abandoned in 1962 due to leakage. It is not known whether any fluids remain in the tanks or which abandonment techniques, if any, were employed.

Eight (8) abandoned motor fuel tanks were located at NAS Memphis. Three (3) tanks located at Building S-341, the original Navy Exchange Service Station, were abandoned by removing all fluids and filling with sand. The age and capacity of these tanks is unknown. The three (3) 10,000 gallon MOGAS tanks (Numbers 1565, 1566, and 1618), at Building 1564 the Exchange Annex, were abandoned in-place. According to Exchange personnel, the remaining fuels were removed. The tank located at Building N-6, which likely supplied fuel to a small engine or sprinkler system, was in-place and registered at the conclusion of Phase I. The tank has subsequently been removed and

disposed. A 500 gallon, steel MOGAS tank located at Building N-78 was abandoned due to suspected leakage. Method of tank abandonment and disposition of any remaining fuel is unknown.

Three (3) miscellaneous abandoned tanks were identified. A 500 gallon, steel tank located at Building 299 was abandoned by removing the remaining fluids and perforating the tank. A 5,000 gallon steel tank located at Building N-10 is abandoned in-place and still contains fluids of various types. Lastly, a steel tank of unknown capacity located near Building 1594 is abandoned in-place. The tank may contain waste oil. Method of abandonment for the tanks at N-10 and 1594 is unknown.

Miscellaneous Recommendations

Tanks 1244, 1245 and 1246 were reportedly abandoned in 1962 due to leakage. Three (3) or four (4) soil borings should be drilled and semi-continuously sampled around each tank. Each sample should be scanned with on HNU meter to determine the presence of hydrocarbon vapors. If significant hydrocarbon vapors are detected, it is recommended that the samples be analyzed for Benzene, Toluene and Xylene concentration and monitoring wells be installed. In addition, the extent of ground-water/soil contamination should be determined and an appropriate remedial action developed.

A MOGAS tank near Building N-78 was abandoned due to suspected leakage. Three (3) or four (4) soil borings should be drilled and semi-continuously sampled around and in the excavated tank area. The samples should be scanned for hydrocarbon vapors. Investigative and corrective steps should be followed as recommended above for tanks 1244, 1245 and 1246.

Recommendations

Tank removal is recommended for the twenty-seven (27) abandoned tanks.

IV CONCLUSIONS AND RECOMMENDATIONS

During HLA's Phase I and II investigation, NAS Memphis underground storage tanks were identified and evaluated. Storage tanks were divided into eight fuel/tank categories as follows:

- Aviation Fuel (AVGAS) Tanks
- Diesel Fuel Tanks
- Fuel Oil Tanks
- Jet Propulsion Fuel (JP-4, JP-5) Tanks
- Motor Fuel (MOGAS) Tanks
- Oil/Water Separators
- Waste Oil Tanks
- Abandoned Tanks

All recommendations are listed by activity and by building/structure number in Appendices E through K. These recommendations include installation of ground-water monitoring wells, tank/piping integrity testing/replacement, and inventory control. Recommendations were based on current operating procedures, leak/spill history, tank age, construction specifications, and tank farm size in accordance with criteria outlined in Section II of this report.

A. Soil Analysis

Underground storage tank corrosive failures increase with tank age and soil electrical conductivity. Soil analysis could provide information to further determine the condition of underground storage

tanks. Soil corrosivity data was not available for this investigation, it is recommended that soil samples be obtained and analyzed for electrical resistivity. Two (2) sampling points should be selected at each tank site.

B. Integrity Testing/Replacement

HLA has identified underground steel tank systems greater than 15 years old (excluding bulk storage tanks) to be at high risk of leakage and, therefore recommends that tank systems 16-20 years old be integrity tested. Waste oil tanks should not be included in the testing program as there are no acceptable underground tank integrity testing procedures for waste oil tanks. The two test methods considered appropriate are Hunter Leak-Locator, and Heath Petro Tite (Refer to Section III. A. of this report).

Steel tanks more than 20 years old are at even greater risk of leaking than those 16-20 years old. Therefore, depending on economic feasibility, tanks over 20 years old should be programmed for replacement over the next 3 to 6 years. As younger tanks approach the age of 16 years, they should be included in the testing and replacement programs. Since tanks and piping installed in the same soil will generally corrode at the same rate, tank replacement should always include piping replacement.

There are a variety of underground storage tank systems on the market. Fiberglass and Buffide coated steel represent non-corrosive tank materials. Buffide coated steel is structurally more sound, but damage to the exterior coating (i.e. during installation, etc.) could result in progressive corrosive failure. Special care during installation is required to prevent such damage. If Buffide coated piping is not available, steel piping would need cathodic protection to prevent corrosion. Since cathodic protection requires significant maintenance and repairs to maintain an effective protective system, HLA does not recommend this type of system. Fiberglass tanks and piping provide a non-corrosive system, but are subject to failure due to ground shifts. Ground shifts represent the least risk of tank failure, however. Double wall fiberglass tanks and piping with between-wall continuous leak detection systems are considered to be the best option for tank replacement and, HLA recommends that fiberglass systems be installed at all underground tank replacement locations. HLA further recommends that in instances where either underground storage tanks or above ground storage tanks are options, the above ground storage tanks should be installed.

C. In-Tank/Ground-Water Monitoring

Newly installed, substantially modified, or substantially repaired underground storage tanks which contain or will contain a RCRA regulated substance should be equipped with an in-tank monitoring

system, or have monitoring wells installed at an appropriate depth and location (Refer to Appendix A). HLA recommends the in-tank (between-wall) continuous monitoring option for all tank/piping systems which are or will be affected by those criteria.

Ground-water monitoring wells are recommended for those tank/piping systems which have leak or spill histories and pass integrity testing. Ground-water monitoring is also recommended for bulk storage tanks that are not scheduled for replacement. Should routine ground-water monitoring indicate the presence of hydrocarbons, the bulk storage tanks should be tested and/or replaced.

D. Tank Lining

Interior lining can extend the life of an existing underground storage tank. There are, however, a limited number of qualified contractors performing these services, and complications caused by an improper installation can be costly and disruptive to operations. Also, interior lining is guaranteed for only 10 years and piping upgrading still must be considered. For these reasons, HLA does not recommend this type of tank treatment for the U.S. Navy activities evaluated during this study.

E. Inventory Management

Close inventory management is essential for early detection of underground storage tank leakage. Product inventories should be taken

to verify balances on-hand and product record balances of inventories; to determine the variances between actual physical (on-hand) count and product record balances; to determine the causes of any differences; and to provide data for planning against recurrence of those differences.

U.S. Navy document, Stock Management, Part E: Physical Inventory prescribes that one-quarter of 1 percent is a reasonable and acceptable loss rate for non-volatile fuels such as diesel, fuel oil, Navy Special Blends, and JP-5. Allowable losses for volatile fuels, e.g. JP-4, MOGAS, AVGAS, etc., is one-half of 1 percent.

Inventory management at the NAS Memphis vehicle fueling facilities is conducted on a daily basis. All other tanks are inventoried either monthly or on an "as-used" basis. HLA recommends a minimum of bi-monthly physical inventory measurement for all tanks, including waste oil tanks. API Publication 1621, "Recommended Practice for Bulk Liquid Stock Control at Retail Outlets", summarizes the recommended inventory practices (see Appendix B).

It is not feasible to determine the quantity of fuel oil or diesel used in the operation of heaters and emergency generators each time the pumps are turned on; therefore special inventory control

procedures should be established for these tanks. Gauging fuel oil and diesel emergency generator tanks for product and water on a bi-monthly basis could provide early detection of leaks. In particular, gauging such tanks during extended periods of non-usage could be effective.

Some examples of the signs of leakage that may occur include: regular accumulation of water in the tank; inordinate amount of product used between gauging; product loss from heating oil tanks in summer months; and product loss from emergency diesel generator tanks when generators have not been used. The product dispensed from the numerous unmetered tanks must be gauged before and after product removal and receipt, and the inventory control guidelines for tanks with unmetered dispensing pumps discussed in Section II of this report should be followed. Metered tanks should have dispensed product inventoried following the procedures outlined in API Publication No. 1621, in conjunction with the Navy accounting form (Appendix B).

F. Tank Abandonment

Permanent Abandonment

Proper procedures for the closure and abandonment of underground storage tanks are necessary to protect the environment from contamination and to assure the future safety of the site.

Several factors must be taken into account when determining whether to abandon a tank in place or remove it for salvage, reuse or disposal. Some of the more important factors to consider are listed below:

- Age and condition of tank.
- Ease of tank removal which is affected by the burial depth of the tank and surrounding soil type.
- Future use of the site after abandonment.
- The proximity of other tanks or structures which may be affected by soil settlement or loss of lateral support after a tank has been removed.
- The proximity of a suitable disposal facility.
- Cost of available labor and equipment versus the salvage value or potential for reuse.

Detailed removal and abandonment procedures are provided in API Bullentin 1604, "Recommended Practice for Abandonment or Removal of Underground Service Station Tanks," (Appendix D). These procedures can also be followed for abandonment of underground storage tanks used for heating oil, emergency generator fuel, waste oil and the miscellaneous tanks identified at NAS Memphis during Phase I and II. API suggests approximately 4-inches of product remain in the tank abandoned in-place to assure saturated vapor space (a particular concern for flammable and combustible products).

The following are options for removal and/or reuse of underground storage tanks:

- Disposal at an authorized facility. (All transportation regulations concerning hazardous materials must be followed. Sufficient holes should be made in the removed tank(s) to render them unfit for further use).

- Sell as salvage material to scrap dealer. (Any tank(s) used to store hazardous materials are precluded from this option. Sufficient holes should be made in the removed tank(s) to render them unfit for further use).

- Reuse for underground storage. (Tank(s) must undergo a thorough internal cleaning and external/internal inspections.) Reused Tank(s) must adhere to the same EPA regulations as new tanks (Refer to Appendix A).

It should be noted that when dealing with hazardous or flammable substances during underground storage tank abandonment, adequate safety precautions should be applied to reduce or eliminate the possibility of explosion or fire or exposure to toxic liquids, vapors or dusts.

G. Summary

The criteria for remedial action recommendations are summarized in Table 2. The estimated cost of the major recommendations contained in Apendices E-L of this report are summarized in Table 3.

H. Pollution Control Reports

Pollution Control Reports and remedial action cost-estimations are included in Appendix M.

Table 2

CRITERIA FOR REMEDIAL ACTION RECOMMENDATIONS

Tank Age (Years)	Leak/Spill History	Recommendations			
		Test T/P	Test Results	Replace T/P	Ground-Water Monitoring
0 - 5	Y	Y	P	N	Y
			F	Y	N
	N	N		N	N
6 - 10	Y	Y	P	N	Y
			F	Y	N
	N	N		N	N
11 - 15	Y	Y	P	N	Y
			F	Y	N
	N	N		N	N
*16 - 20	Y	Y	P	N	Y
			F	Y	N
	N	Y	P	N	N
			F	Y	N
#20+	Y	N		Y	N
	N	N		Y	N

Note

* Tanks 16-20 years old are approaching their maximum useful lives and should be tested to verify integrity of the tank/piping system.

\# Tanks 20+ years old have spent their useful lives and should be replaced.

T/P - Tank/Piping
Y - Yes
N - No
P - Pass T/P integrity testing
F - Fail T/P integrity testing

Table 3

COST ESTIMATION SUMMARY

	Number	Costs
T/P Replacement	30	$ 1,513,368.00
T/P Testing	7	10,388.00
Soil Testing and Analysis	176	9,328.00
Ground-Water Monitoring	12	8,332.00
Total Costs		$ 1,536,752.00

Note: Amounts are subject to change depending on the results of tank integrity testing and the cost of replacement of tanks. An additional seven (7) tank replacements may be required, which could add as much as approximately $390,500.00 additional costs.

APPENDIX A

ENVIRONMENTAL PROTECTION AGENCY

UNDERGROUND STORAGE TANK REQUIREMENTS

EPA UNDERGROUND STORAGE TANKS REGULATIONS

(40 CFR 280; 50 FR 28742, July 15, 1985; Amended by 50 FR 46612, November 8, 1985; Corrected by 51 FR 13497, April 21, 1986)

PART 280—UNDERGROUND STORAGE TANKS

Sec.
280.1 Definition and exemptions.
280.2 Interim prohibition.
280.3 Notification requirements.

Authority: 42 U.S.C. §§ 6991, 6992, and 6996.

[Amended by 50 FR 46612, November 8, 1985]

§280.1 Definitions and exemptions.

[Amended by 50 FR 46612, November 8, 1985]

"Operator" means any person in control of, or having responsibility for, the daily operation of the underground storage tank.

"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 discontinuation of its use.

"Person" has the same meaning as provided in Section 1004(15) of the Resource Conservation and Recovery Act, as amended, except that such term includes a consortium, a joint venture, a commercial entity, and the United States Government.

"Regulated substance" means

(a) Any substance defined in Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (but not including any substance regulated as a hazardous waste under Subtitle C of the Resource Conservation and Recovery Act, as amended), and

(b) Petroleum, including 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).

"Release" means any spilling, leaking, emitting, discharging, escaping, leaching, or disposing from an underground storage tank into ground water, surface water, or subsurface soils.

"Underground storage tank" means any one or combination of tanks (including underground pipes connected thereto) which is used to contain an accumulation of regulated substances, and the volume of which (including the volume of the underground pipes connected thereto) is 10 per centum or more beneath the surface of the ground. Such term does not include any

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

(b) Tank used for storing heating oil for consumptive use on the premises where stored,

(c) Septic tank,

(d) Pipeline facility (including gathering lines):

(e) Regulated under the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. App. 1671, et. seq.), or

(f) Regulated under the Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. App. 2001, *et. seq.*), or

(g) Which is an intrastate pipeline facility regulated under State laws comparable to the provisions of law referred to in clause (e) and (f) of this definition,

(h) Surface impoundment, pit, pond, or lagoon,

(i) Storm water or waste water collection system,

(j) Flow-through process tank,

(k) Liquid trap or associated gathering lines directly related to oil or gas production and gathering operations, or

(l) Storage tank 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 undesignated floor.

(m) Any pipes connected to any tank which is described in paragraphs (a) through (l) of this section.

§280.2 Interim prohibition.

(a) Between May 7, 1985 and the effective date of the standards promulgated by the Administrator under section 9003(e) of the Hazardous

and Solid Waste Amendments of 1984, no person may install an underground storage tank for the purpose of storing regulated substances unless such tank (whether of single or double wall construction):

(1) Will prevent releases due to corrosion or structural failure for the operational life of the tank;

(2) Is cathodically protected against corrosion, constructed of noncorrosive material, steel clad with a noncorrosive material, or designed in a manner to prevent the release or threatened release of any stored substance; and

(3) The material used in the construction or lining of the tank is compatible with the substance to be stored.

(b) Notwithstanding paragraph (a) of this section, if soil tests conducted in accordance with ASTM Standard C57-78, or another standard approved by the Administrator, show that soil resistivity in an installation location is 12,000 ohm-cm or more (unless a more stringent standard is prescribed by the Administrator by rule), a storage tank without corrosion protection may be installed in that location during the period referred to in paragraph (a) of this section.

§280.3 Notification requirements.

[280.3 added by 50 FR 46612, November 8, 1985]

(a) On or before May 8, 1986, each owner of an underground storage tank currently in use must submit, in the form prescribed in Appendix I of this section, a notice of the existence of such tank to the State or local agency or department designated in Appendix II of this section to receive such notice.

(b) On or before May 8, 1986, each owner of an underground storage tank taken out of operation after January 1, 1974 (unless the owner knows that such tank has been removed from the ground) must submit, in the form prescribed in Appendix I of this section, a notice of the existence of such tank to the State or local agency or department designated in Appendix II of this section to receive such notice.

(c) Any owner who brings an underground storage tank into use after May 8, 1986, must, within 30 days of bringing such tank into use, submit, in the form prescribed in Appendix I of this section, a notice of the existence of such tank to the State or local agency or department designated in Appendix II of this section to receive such notice.

(d) In States where State law, regulations, or procedures require owners to use forms that differ from those set forth in Appendix I of this section to fulfill the requirements of this section, the State forms may be submitted in lieu of the forms set forth in Appendix I of this section. If a State requires that its form be used in lieu of the form presented in this regulation, such form must meet the requirements of Section 9002.

(e) Owners required to submit notices under paragraphs (a) through (c) of this section must provide notices to the appropriate agencies or departments identified in Appendix II of this section for each tank they own. Owners may provide notice for several tanks using one notification form, but owners who own tanks located at more than one place of operation must file a separate notification form for each separate place of operation.

(f) Notices required to be submitted under paragraphs (a) through (c) of this section must provide all of the information indicated on the prescribed form (or appropriate State form) for each tank for which notice must be given.

(g) Beginning on December 9, 1985 through June 8, 1987, any person who deposits regulated substances in an underground storage tank must make reasonable efforts to notify the owner or operator of such tank of the owner's obligations under paragraphs (a) through (c) of this section.
[280.3(g) corrected by 51 FR 13497, April 21, 1986]

(h) Beginning 30 days after the Administrator issues new tank performance standards pursuant to RCRA section 9003(e), any person who sells a tank intended to be used as an underground storage tank must notify the purchaser of such tank of the owner's notification obligations under paragraphs (a) through (c) of this section.

(i) Paragraphs (a) through (c) of this section do not apply to tanks for which notice was given pursuant to section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

Special Recommendations

If it is the intent of NAS Memphis personnel to permanently abandon Tanks 303 and 1241, then the abandonment procedures discussed in Appendix D of this report should be implemented. If the tanks are necessary to station operations, they should be replaced with double-wall fiberglass reinforced plastic tanks equipped with between-wall leak detection systems (Refer to Appendices E and M). Estimated capital costs for tank and piping replacement for Tanks 303 and 1241 are $122,600.00.

Additional Recommendations

Should tanks 303 and 1241 remain operational, HLA recommends that NAS Memphis gauge the tanks for product and water every fifteen (15) days at a minimum. Records of product receipts should be maintained for each tank.

B. DIESEL FUEL TANKS

Thirteen (13) operational diesel fuel tanks were located during the Phase I field investigation at NAS Memphis. Each of these tanks, which supply fuel to power emergency generators, were registered with the TDHE. Two (2) abandoned diesel tanks were registered with TDHE and will be discussed in a later section. Additionally, the 500 and 1,000 gallon tanks located at Buildings 753 and 771 respectively, which were in use at the time of the field study and registered with TDHE, have been removed by NAS Memphis personnel. Each of the remaining eleven (11) operational tanks supplies diesel to fuel emergency generators.

Refer to Appendix F and Plate 1 for the capacities, materials of construction, and locations of the tanks.

Leak/Spill History

There have been no reported leaks or spills associated with these tanks.

Inventory Practices

A routine inventory program is not maintained on the emergency generator diesel tanks. Fuel Farm personnel stick the tanks on an "as-needed" basis. Tank Number 301 located at the Fuel Farm is a part

APPENDIX I to §280.3

Notification for Underground Storage Tanks

FORM APPROVED
OMB NO. 2050-0049
APPROVAL EXPIRES 6-30-88

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

EPA Form 7530-1 (11-85)

Page 1

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)	☐	☐	☐	☐	☐

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APPENDIX II to §280.3

List of Agencies Designated to Receive Notifications

Alabama (EPA Form)
Alabama Department of Environmental Momt.
Ground Water Section/Water Division
1751 Federal Drive
Montgomery, Alabama 36130

Alaska (EPA Form)
Department of Environmental Conservation
Pouch O
Juneau, Alaska 99811
907/465-2653

American Samoa (EPA Form)
Executive Secretary
Environmental Quality Commission
Office of the Governor
American Samoan Government
Pago Pago, American Samoa 96799
Attention: UST Notification

Arizona (EPA Form)
Attention: UST Coordinator
Arizona Department of Health Services
Environmental Health Services
2005 N. Central
Phoenix, Arizona 85004

Arkansas (EPA Form)
Arkansas Department of Pollution Control and Ecology
P.O. Box 9583
Little Rock, Arkansas 72219
501/562-7444

California (State Form)
Ed Anton
California Water Resources Control Board
P.O. Box 100
Sacramento, California 95801
916/445-9552

Colorado (EPA Form)
Kenneth Mesch, Section Chief
Colorado Department of Health
Waste Management Division
Underground Tank Program
4210 East 11th Avenue
Denver, Colorado 80220
303/320-8333 Ext. 4364

Connecticut (State Form)
Hazardous Materials Management Unit
Department of Environmental Protection
State Office Building
165 Capitol Avenue
Hartford, Connecticut 06106

Delaware (State Form)
Division of Air and Waste Management
Department of Natural Resources and Environmental Control
P.O. Box 1401
89 Kings Highway
Dover, Delaware 19903
302/736-5409

District of Columbia (EPA Form)
Attention: UST Notification Form
Department of Consumer and Regulatory Affairs
Pesticides and Hazardous Waste Management Branch
Room 114
5010 Overlook Avenue, S.W.
Washington, D.C. 20032

Florida (State Form)
Florida Department of Environmental Regulation
Solid Waste Section
Twin Towers Office Building
2600 Blair Stone Road
Tallahassee, Florida 32301
904/487-4398

Georgia (EPA Form)
Georgia Department of Natural Resources
Environmental Protection Division
Underground Storage Tank Program
3420 Norman Berry Drive
Hapeville, Georgia 30354

Guam (State Form)
James B. Branch, Administrator
Guam Environmental Protection Agency
P.O. Box 2999
Agana, Guam 96910
Overseas Operator (Commercial Call 646-8863)

Hawaii (EPA Form)
Chief, Noise and Radiation Branch
Hawaii Department of Health
591 Ala Moana Boulevard
Honolulu, Hawaii 96801
808/548-4129

Idaho (EPA Form)
Underground Storage Tank Coordinator
Water Quality Bureau
Idaho Department of Health & Welfare
Division of Environment
450 W. State Street
Boise, Idaho 83720
208/334-4251

Illinois (EPA Form)
Underground Storage Tank Coordinator
Division of Fire Prevention
Office of State Fire Marshal
3150 Executive Park Drive
Springfield, Illinois 62703-4599

Indiana (EPA Form)
Division of Land Pollution Control, UST Program
Indiana State Board of Health
P.O. Box 7015
Indianapolis, Indiana 46207
317/243-5060

Iowa (State Form)
Iowa Department of Water, Air and Waste Management
900 East Grand
Des Moines, Iowa 50319
515/281-8692

[Appendix II]

Kansas (EPA Form)
Office of Environmental Geology
Kansas Department of Health & Environment
Forbes Field, Building 740
Topeka, Kansas 66620
913/862-9360 Ext. 221

Kentucky (State Form)
Natural Resources Cabinet
Division of Waste Management, Attention: Vicki Pettus
18 Reilly Road
Frankfort, Kentucky 40601
502/564-6716

Louisiana (State Form)
Patricia L. Norton, Secretary
Louisiana Department of Environmental Quality
P.O. Box 44066
Baton Rouge, Louisiana 70804
504/342-1265

Maine (State Form)
Attention: Underground Tanks Program
Bureau of Oil & Hazardous Material Control
Department of Environmental Protection
State House — Station 17
Augusta, Maine 04333
207/289-2651

Maryland (EPA Form)
Science and Health Advisory Group
Office of Environmental Programs
201 West Preston Street
Baltimore, Maryland 21201

Massachusetts (EPA Form)
UST Registry, Department of Public Safety
1010 Commonwealth Avenue
Boston, Massachusetts 02215
617/566-4500

Michigan (EPA Form)
Ground Water Quality Division
Department of Natural Resources
Box 30157
Lansing, Michigan 48909

Minnesota (State Form)
Underground Storage Tank Program
Division of Solid and Hazardous Wastes
Minnesota Pollution Control Agency
1935 West County Road, B-2
Roseville, Minnesota 55113

Mississippi (EPA Form)
Department of Natural Resources
Bureau of Pollution Control
P.O. Box 10385
Jackson, Mississippi 39209

Missouri (EPA Form)
Gordon Ackley, UST Coordinator
Missouri Department of Natural Resources
P.O. Box 176
Jefferson City, Missouri 65102

Montana (EPA Form)
Solid and Hazardous Waste Bureau
Department of Health and Environmental Science
Cogswell Building, Room B201
Helena, Montana 59620

Nebraska (EPA Form)
Nebraska State Fire Marshal
P.O. Box 94677
Lincoln, Nebraska 68509-4677

Nevada (EPA Form)
Attention: Underground Storage Tanks
Division of Environmental Protection
Department of Conservation and Natural Resources
Capitol Complex
201 S. Fall Street
Carson City, Nevada 89710
800/992-0900 Ext. 4670

New Hampshire (EPA Form)
Water Supply and Pollution Control Commission
Hazen Drive
P.O. Box 95
Concord, New Hampshire 03301
Attention: UST Registration
603/271-3503

New Jersey (State Form)
Underground Storage Tank Coordinator
Department of Environmental Protection
Division of Water Resources (CN-029)
Trenton, New Jersey 08625
609/292-0424

New Mexico (EPA Form)
New Mexico Environmental Improvement Division
Ground Water/Hazardous Waste Bureau
P.O. Box 968
Sante Fe, New Mexico 87504
505/827-2933 or 505/827-2918

New York (EPA Form)
Bulk Storage Section
Division of Water
Department of Environmental Conservation
50 Wolf Road, Room 326
Albany, New York 12233-0001
518/457-4351

North Carolina (EPA Form)
Division of Environmental Mgmt./Ground Water Section
Dept. of Natural Resources & Community Development
P.O. Box 27687
Raleigh, North Carolina 27611
919/733-5083

North Dakota (State Form)
Division of Hazardous Waste Mgmt. and Special Studies
North Dakota Department of Health
Box 5520
Bismarck, North Dakota 58502-5520

[Appendix II]

Northern Mariana Islands (EPA Form)
Chief
Division of Environmental Quality
P.O. Box 1304
Commonwealth of Northern Mariana Islands
Saipan, CM 96950
Overseas Operator: 6984
Cable Address: GOV. NMI Saipan

Ohio (State Form)
State Fire Marshal's Office, UTN
Department of Commerce
8895 E. Main Street
Reynoldsburg, Ohio 43068
State Hotline 800/282-1927

Oklahoma (EPA Form)
Underground Storage Tank Program
Oklahoma Corporation Comm.
Jim Thorpe Building
Oklahoma City, Oklahoma 73105

Oregon *
Underground Storage Tank Program
Hazardous and Solid Waste Division
Department of Environmental Quality
P.O. Box 1760
Portland, Oregon 97207
503/229-5788

Pennsylvania (EPA Form)
Pennsylvania Department of Environmental Resources
Bureau of Water Quality Management/Ground Water Unit
9th Floor, Fulton Building
P.O. Box 2063
Harrisburg, Pennsylvania 17120

Puerto Rico (EPA Form)
Director, Water Quality Control Area
Environmental Quality Board
Commonweaith of Puerto Rico
P.O. Box 11488
Santurce, Puerto Rico 00910
809/725-0717

Rhode Island (EPA Form)
UST Registration
Department of Environmental Management
204 Cannon Building
75 Davis Street
Providence, Rhode Island 02908
401/277-2234

South Carolina (State Form)
Attention: Susana Workman
Groundwater Protection Division
South Carolina Dept. of Health and Environmental Control
2600 Bull Street
Columbia, South Carolina 29201
803/758-5213

South Dakota (EPA Form)
Office of Water Quality
Department of Water and Natural Resources
Joe Foss Building
Pierre, South Dakota 57501

Tennessee (EPA Form)
Terry K. Cothron, Director
Division of Ground Water Protection
Tennessee Department of Health and Environment
150 Ninth Avenue, North
Nashville, Tennessee 37219-5404
615/741-7206

Texas (EPA Form)
Underground Storage Tank Program
Texas Water Commission
P.O. Box 13087
Austin, Texas 78711

Utah (EPA Form)
Kenneth L. Alkema
Division of Environmental Health
P.O. Box 45500
Salt Lake City, Utah 84145-0500

Vermont (State Form)
Underground Storage Tank Program
Vermont AEC/Waste Management Division
State Office Building
Montpelier, Vermont 05602
802/828-3395

Virginia (EPA Form)
Russell P. Ellison, III, P.G.
Virginia Water Control Board
P.O. Box 11143
Richmond, Virginia 23230-1143
804/257-6685

Virgin Islands (EPA Form)
205(J) Coordinator
Division of Natural Resources Management
14 F Building 111, Watergut Homes
Christianstead, St. Croix, Virgin Islands 00820

Washington (State Form)
Earl W. Tower, Supervisor
Department of Ecology, M/S PV-11
Management Division, Solid and Hazardous Waste
Olympia, Washington 98504-8711
206/459-6316

West Virginia (EPA Form)
Attention: UST Notification
Solid and Hazardous Waste/Ground Water Branch
West Virginia Department of Natural Resources
1201 Greenbriar Street
Charleston, West Virginia 25311

Wisconsin (State Form)
Bureau of Petroleum Inspection
P.O. Box 7969
Madison, Wisconsin 53707
608/266-7605

Wyoming (EPA Form)
Water Quality Division
Department of Environmental Quality
Herschler Building, 4th Floor West
122 West 25th Street
Cheyenne, Wyoming 82002
307/777-7781

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* May be using a State form. Owners should consult EPA to determine whether such form is in compliance with Section 9002.

[Appendix II]

Appendix III to §280.3

Statement for Shipping Tickets and Invoices

Note — A new Federal law (the Resource Conservation and Recovery Act (RCRA), as amended (PL 98-616), requires owners of certain underground storage tanks to notify designated State or local agencies by May 8, 1986 of the existence of their tanks. Notifications for tanks brought into use after May 8, 1986 must be made within 30 days. Consult EPA's regulations, issued on ___, 1985, to determine if you are affected by this law.

One-Time Notification Letter

Dear Customer: A new Federal law directs the Environmental Protection Agency (EPA) to develop a comprehensive regulatory program for underground storage tanks. As part of the new law, owners of certain underground tanks used to store petroleum or hazardous substances must notify designated State or local agencies of the existence of their tanks by May 8, 1986. This includes owners of tanks currently used to store such substances and owners of tanks taken out of operation after January 1, 1974, but still in the ground. Owners who bring tanks into use after May 8, 1986, must notify within 30 days.

The purpose of the notification program is to assist EPA and the States in locating and evaluating underground storage tanks. Enclosed is a copy of EPA's regulations concerning owners of underground storage tanks, and a notification form.

Please review the regulations to determine if you are affected by the notification requirements. A list of the addresses of the State or local agencies designated to receive the notifications is contained in the discussion to the regulations.

[Subtitle I, Sections 9001 through 9010 added by PL 98-616]

"Subtitle I—Regulation of Underground Storage Tanks

"DEFINITIONS AND EXEMPTIONS

"SEC. 9001. For the purposes of this subtitle—

"(1) The term 'underground storage tank' means any one or combination of tanks (including underground pipes connected thereto) which is used to contain an accumulation of regulated substances, and the volume of which (including the volume of the underground pipes connected thereto) is 10 per centum or more beneath the surface of the ground. Such term does not include any—

"(A) farm or residential tank of 1,100 gallons or less capacity used for storing motor fuel for noncommercial purposes,

"(B) tank used for storing heating oil for consumptive use on the premises where stored,

"(C) septic tank,

"(D) pipeline facility (including gathering lines) regulated under—

"(i) the Natural Gas Pipeline Safety Act of 1968 (49 U.S.C. App. 1671, et seq.),

"(ii) the Hazardous Liquid Pipeline Safety Act of 1979 (49 U.S.C. App. 2001, et seq.), or

"(iii) which is an intrastate pipeline facility regulated under State laws comparable to the provisions of law referred to in clause (i) or (ii) of this subparagraph,

"(E) surface impoundment, pit, pond, or lagoon,

"(F) storm water or waste water collection system,

"(G) flow-through process tank,

"(H) liquid trap or associated gathering lines directly related to oil or gas production and gathering operations, or

"(I) storage tank 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.

The term 'underground storage tank' shall not include any pipes connected to any tank which is described in subparagraphs (A) through (I).

"(2) The term 'regulated substance' means—

"(A) any substance defined in section 101(14) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (but not including any substance regulated as a hazardous waste under subtitle C), and

"(B) petroleum, including 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).

"(3) The term 'owner' means—

"(A) in the case of an underground storage tank in use on the date of enactment of the Hazardous and Solid Waste Amendments of 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 sustances, and

"(B) in the case of any underground storage tank in use before the date of enactment of the Hazardous and Solid Waste Amendments of 1984, but no longer in use on the date of enactment of such Amendments, any person who owned such tank immediately before the discontinuation of its use.

"(4) The term 'operator' means any person in control of, or having responsibility for, the daily operation of the underground storage tank.

"(5) The term 'release' means any spilling, leaking, emitting, discharging, escaping, leaching, or disposing from an underground storage tank into ground water, surface water or subsurface soils.

"(6) The term 'person' has the same meaning as provided in section 1004(15), except that such term includes a consortium, a joint venture, and a commercial entity, and the United States Government.

"(7) The term 'nonoperational storage tank' means any underground storage tank in which regulated substances will not be deposited or from which regulated substances will not be dispensed after the date of the enactment of the Hazardous and Solid Waste Amendments of 1984.

"NOTIFICATION

"SEC. 9002. (a) UNDERGROUND STORAGE TANKS.—(1) Within 18 months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984, each owner of an underground storage tank shall notify the State or local agency or department designated pursuant to subsection (b)(1) of the existence of such tank, specifying the age, size, type, location, and uses of such tank.

"(2)(A) For each underground storage tank taken out of operation after January 1, 1974, the owner of such tank shall, within eighteen months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984, notify the State or local agency, or department designated pursuant to subsection (b)(1) of the existence of such tanks (unless the owner knows the tank subsequently was removed from the ground). The owner of a tank taken out of operation on or before January 1, 1974, shall not be required to notify the State or local agency under this subsection.

"(B) Notice under subparagraph (A) shall specify, to the extent known to the owner—

"(i) the date the tank was taken out of operation,

"(ii) the age of the tank on the date taken out of operation,

"(iii) the size, type and location of the tank, and

"(iv) the type and quantity of substances left stored in such tank on the date taken out of operation.

"(3) Any owner which brings into use an underground storage tank after the initial notification period specified under paragraph (1), shall notify the designated State or local agency or department within thirty days of the existence of such tank, specifying the age, size, type, location and uses of such tank.

"(4) Paragraphs (1) through (3) of this subsection shall not apply to tanks for which notice was given pursuant to section 103(c) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980.

"(5) Beginning thirty days after the Administrator prescribes the form of notice pursuant to subsection (b)(2) and for eighteen months thereafter, any person who deposits regulated substances in an underground storage tank shall reasonably notify the owner or operator of such tank of the owner's notification requirements pursuant to this subsection.

"(6) Beginning thirty days after the Administrator issues new tank performance standards pursuant to section 9003(e) of this subtitle, any person who sells a tank intended to be used as an underground storage tank shall notify the purchaser of such tank of the owner's notification requirements pursuant to this subsection.

"(b) AGENCY DESIGNATION.—(1) Within one hundred and eighty days after the enactment of the Hazardous and Solid Waste Amendments of 1984, the Governors of each State shall designate the appropriate State agency or department or local agencies or departments to receive the notifications under subsection (a) (1), (2), or (3).

"(2) Within twelve months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984, the Administrator, in consultation with State and local officials designated pursuant to subsection (b)(1), and after notice and opportunity for public comment, shall prescribe the form of the notice and the information to be included in the notifications under subsection (a) (1), (2), or (3). In prescribing the form of such notice, the Administrator shall take into account the effect on small businesses and other owners and operators.

"RELEASE DETECTION, PREVENTION, AND CORRECTION REGULATIONS

"SEC. 9003. (a) REGULATIONS.—The Administrator, after notice and opportunity for public comment, and at least three months before

the effective dates specified in subsection (f), shall promulgate release detection, prevention, and correction regulations applicable to all owners and operators of underground storage tanks, as may be necessary to protect human health and the environment.

"(b) DISTINCTIONS IN REGULATIONS.—In promulgating regulations under this section, the Administrator may distinguish between types, classes, and ages of underground storage tanks. In making such distinctions, the Administrator may take into consideration factors, including, but not limited to: location of the tanks, soil and climate conditions, uses of the tanks, history of maintenance, age of the tanks, current industry recommended practices, national consensus codes, hydrogeology, water table, size of the tanks, quantity of regulated substances periodically deposited in or dispensed from the tank, the technical capability of the owners and operators, and the compatibility of the regulated substance and the materials of which the tank is fabricated.

"(c) REQUIREMENTS.—The regulations promulgated pursuant to this section shall include, but need not be limited to, the following requirements respecting all underground storage tanks—

"(1) requirements for maintaining a leak detection system, an inventory control system together with tank testing, or a comparable system or method designed to identify releases in a manner consistent with the protection of human health and the environment;

"(2) requirements for maintaining records of any monitoring or leak detection system or inventory control system or tank testing or comparable system;

"(3) requirements for reporting of releases and corrective action taken in response to a release from an underground storage tank;

"(4) requirements for taking corrective action in response to a release from an underground storage tank; and

"(5) requirements for the closure of tanks to prevent future releases of regulated substances into the environment.

"(d) FINANCIAL RESPONSIBILITY.—(1) As he deems necessary or desirable, the Administrator shall promulgate regulations containing requirements for maintaining evidence of financial responsibility as he deems necessary and desirable for taking corrective action and compensating third parties for bodily injury and property damage caused by sudden and nonsudden accidental releases arising from operating an underground storage tank.

"(2) Financial responsibility required by this subsection may be established in accordance with regulations promulgated by the Administrator by any one, or any combination, of the following: insurance, guarantee, surety bond, letter of credit, or qualification as a self-insurer. In promulgating requirements under this subsection, the Administrator is authorized to specify policy or other contractual terms, conditions, or defenses which are necessary or are unacceptable in establishing such evidence of financial responsibility in order to effectuate the purposes of this subtitle.

"(3) In any case where the owner or operator is in bankruptcy, reorganization, or arrangement pursuant to the Federal Bankruptcy Code or where with reasonable diligence jurisdiction in any State court of the Federal Courts cannot be obtained over an owner or operator likely to be solvent at the time of judgment, any claim arising from conduct for which evidence of financial responsibility must be provided under this subsection may be asserted directly against the guarantor providing such evidence of financial responsibility. In the case of any action pursuant to this paragraph such guarantor shall be entitled to invoke all rights and defenses which would have been available to the owner or operator if any action had been brought against the owner or operator by the claimant and which would have been available to the guarantor if an action had been brought against the guarantor by the owner or operator.

"(4) The total liability of any guarantor shall be limited to the aggregate amount which the guarantor has provided as evidence of financial responsibility to the owner or operator under this section. Nothing in this subsection shall be construed to limit any other State or Federal statutory, contractual or common law liability of a guarantor to its owner or operator including, but not limited to, the liability of such guarantor for bad faith either in negotiating or in failing to negotiate the settlement of any claim. Nothing in this subsection shall be construed to diminish the liability of any person under section 107 or 111 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 or other applicable law.

"(5) For the purpose of this subsection, the term 'guarantor' means any person, other than the owner or operator, who provides evidence of financial responsibility for an owner or operator under this subsection.

"(e) NEW TANK PERFORMANCE STANDARDS.—The Administrator shall, not later than three months prior to the effective date specified in subsection (f), issue performance standards for underground storage tanks brought into use on or after the effective date of such standards. The performance standards for new underground storage tanks shall include, but need not be limited to, design, construction, installation, release detection, and compatibility standards.

"(f) EFFECTIVE DATES.—(1) Regulations issued pursuant to subsection (c) and (d) of this section, and standards issued pursuant to subsection (e) of this section, for underground storage tanks containing regulated substances defined in section 9001(2)(B) (petroleum, including crude oil or any fraction thereof which is liquid at standard conditions of temperature and pressure) shall be effective not later than thirty months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984.

"(2) Standards issued pursuant to subsection (e) of this section (entitled 'New Tank Performance Standards') for underground storage tanks containing regulated substances defined in section 9001(2)(A) shall be effective not later than thirty-six months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984.

"(3) Regulations issued pursuant to subsection (c) of this section (entitled 'Requirements') and standards issued pursuant to subsection (d) of this section (entitled 'Financial Responsibility') for underground storage tanks containing regulated substances defined in section 9001(2)(A) shall be effective not later than forty-eight months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984.

"(g) INTERIM PROHIBITION.—(1) Until the effective date of the standards promulgated by the Administrator under subsection (e) and after one hundred and eighty days after the date of the enactment of the Hazardous and Solid Waste Amendments of 1984, no person may install an underground storage tank for the purpose of storing regulated substances unless such tank (whether of single or double wall construction)—

"(A) will prevent releases due to corrosion or structural failure for the operational life of the tank;

"(B) is cathodically protected against corrosion, constructed of noncorrosive material, steel clad with a noncorrosive material, or designed in a manner to prevent the release or threatened release of any stored substance; and

"(C) the material used in the construction or lining of the tank is compatible with the substance to be stored.

"(2) Notwithstanding paragraph (1), if soil tests conducted in accordance with ASTM Standard G57-78, or another standard approved by the Administrator, show that soil resistivity in an installation location is 12,000 ohm/cm or more (unless a more stringent standard is prescribed by the Administrator by rule), a storage tank without corrosion protection may be installed in that location during the period referred to in paragraph (1).

"APPROVAL OF STATE PROGRAMS

"SEC. 9004. (a) ELEMENTS OF STATE PROGRAM.—Beginning 30 months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984, any State may, submit an underground storage tank release detection, prevention, and correction program for review and approval by the Administrator. The program may cover tanks used to store regulated substances referred to in 9001(2)(A) or (B) or both. A State program may be approved by the

Administrator under this section only if the State demonstrates that the State program includes the following requirements and standards and provides for adequate enforcement of compliance with such requirements and standards—

"(1) requirements for maintaining a leak detection system, an inventory control system together with tank testing, or a comparable system or method designed to identify releases in a manner consistent with the protection of human health and the environment;

"(2) requirements for maintaining records of any monitoring or leak detection system or inventory control system or tank testing system;

"(3) requirements for reporting of any releases and corrective action taken in response to a release from an underground storage tank;

"(4) requirements for taking corrective action in response to a release from an underground storage tank;

"(5) requirements for the closure of tanks to prevent future releases of regulated substances into the environment;

"(6) requirements for maintaining evidence of financial responsibility for taking corrective action and compensating third parties for bodily injury and property damage caused by sudden and nonsudden accidental releases arising from operating an underground storage tank;

"(7) standards of performance for new underground storage tanks; and

"(8) requirements—

"(A) for notifying the appropriate State agency or department (or local agency or department) designated according to section 9002(b)(1) of the existence of any operational or non-operational underground storage tank; and

"(B) for providing the information required on the form issued pursuant to section 9002(b)(2).

"(b) FEDERAL STANDARDS.—(1) A State program submitted under this section may be approved only if the requirements under paragraphs (1) through (7) of subsection (a) are no less stringent than the corresponding requirements standards promulgated by the Administrator pursuant to section 9003(a).

"(2)(A) A State program may be approved without regard to whether or not the requirements referred to in paragraphs (1), (2), (3), and (5) of subsection (a) are less stringent than the corresponding standards under section 9003(a) during the one-year period commencing on the date of promulgation of regulations under section 9003(a) if State regulatory action but no State legislative action is required in order to adopt a State program.

"(B) If such State legislative action is required, the State program may be approved without regard to whether or not the requirements referred to in paragraphs (1), (2), (3), and (5) of subsection (a) are less stringent than the corresponding standards under section 9003(a) during the two-year period commencing on the date of promulgation of regulations under section 9003(a) (and during an additional one-year period after such legislative action if regulations are required to be promulgated by the State pursuant to such legislative action).

"(c) FINANCIAL RESPONSIBILITY.—(1) Corrective action and compensation programs financed by fees on tank owners and operators and administered by State or local agencies or departments may be submitted for approval under subsection (a)(6) as evidence of financial responsibility.

"(2) Financial responsibility required by this subsection may be established in accordance with regulations promulgated by the Administrator by any one, or any combination, of the following: insurance, guarantee, surety bond, letter of credit, or qualification as a self-insurer. In promulgating requirements under this subsection, the Administrator is authorized to specify policy or other contractual terms, conditions, or defenses which are necessary or are unacceptable in establishing such evidence of financial responsibility in order to effectuate the purposes of this subtitle.

"(3) In any case where the owner or operator is in bankruptcy, reorganization, or arrangement pursuant to the Federal Bankruptcy Code or where with reasonable diligence jurisdiction in any State court of the Federal courts cannot be obtained over an owner or operator likely to be solvent at the time of judgment, any claim arising from conduct for which evidence of financial responsibility must be provided under this subsection may be asserted directly against the guarantor providing such evidence of financial responsibility. In the case of any action pursuant to this paragraph such guarantor shall be entitled to invoke all rights and defenses which would have been available to the owner or operator if any action had been brought against the owner or operator by the claimant and which would have been available to the guarantor if an action had been brought against the guarantor by the owner or operator.

"(4) The total liability of any guarantor shall be limited to the aggregate amount which the guarantor has provided as evidence of financial responsibility to the owner or operator under this section. Nothing in this subsection shall be construed to limit any other State or Federal statutory, contractual or common law liability of a guarantor to its owner or operator including, but not limited to, the liability of such guarantor for bad faith either in negotiating or in failing to negotiate the settlement of any claim. Nothing in this subsection shall be construed to diminish the liability of any person under section 107 or 111 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 or other applicable law.

"(5) For the purpose of this subsection, the term 'guarantor' means any person, other than the owner or operator, who provides evidence of financial responsibility for an owner or operator under this subsection.

"(d) EPA DETERMINATION.—(1) Within one hundred and eighty days of the date of receipt of a proposed State program, the Administrator shall, after notice and opportunity for public comment, make a determination whether the State's program complies with the provisions of this section and provides for adequate enforcement of compliance with the requirements and standards adopted pursuant to this section.

"(2) If the Administrator determines that a State program complies with the provisions of this section and provides for adequate enforcement of compliance with the requirements and standards adopted pursuant to this section, he shall approve the State program in lieu of the Federal program and the State shall have primary enforcement responsibility with respect to requirements of its program.

"(e) WITHDRAWAL OF AUTHORIZATION.—Whenever the Administrator determines after public hearing that a State is not administering and enforcing a program authorized under this subtitle in accordance with the provisions of this section, he shall so notify the State. If appropriate action is not taken within a reasonable time, not to exceed one hundred and twenty days after such notification, the Administrator shall withdraw approval of such program and reestablish the Federal program pursuant to this subtitle.

"INSPECTIONS, MONITORING, AND TESTING

"SEC. 9005. (a) FURNISHING INFORMATION.—For the purposes of developing or assisting in the development of any regulation, conducting any study, or enforcing the provisions of this subtitle, any owner or operator of an underground storage tank (or any tank subject to study under section 9009 that is used for storing regulated substances) shall, upon request of any officer, employee or representative of the Environmental Protection Agency, duly designated by the Administrator, or upon request of any duly designated officer, employee, or representative of a State with an approved program, furnish information relating to such tanks, their associated equipment, their contents, conduct monitoring or testing, and permit such officer at all reasonable times to have access to, and to copy all records relating to such tanks. For the purposes of developing or assisting in the development of any regulation, conducting any study, or enforcing the provisions of this subtitle, such officers, employees, or representatives are authorized—

"(1) to enter at reasonable times any establishment or other place where an underground storage tank is located;

"(2) to inspect and obtain samples from any person of any regulated substances contained in such tank; and

"(3) to conduct monitoring or testing of the tanks, associated equipment, contents, or surrounding soils, air, surface water or ground water.

Each such inspection shall be commenced and completed with reasonable promptness.

"(b) CONFIDENTIALITY.—(1) Any records, reports, or information obtained from any persons under this section shall be available to the public, except that upon a showing satisfactory to the Administrator (or the State, as the case may be) by any person that records, reports, or information, or a particular part thereof, to which the Administrator (or the State, as the case may be) or any officer, employee, or representative thereof has access under this section if made public, would divulge information entitled to protection under section 1905 of title 18 of the United States Code, such information or particular portion thereof shall be considered confidential in accordance with the purposes of that section, except that such record, report, document, or information may be disclosed to other officers, employees, or authorized representatives of the United States concerned with carrying out this Act, or when relevent in any proceeding under this Act.

"(2) Any person not subject to the provisions of section 1905 of title 18 of the United States Code who knowingly and willfully divulges or discloses any information entitled to protection under this subsection shall, upon conviction, be subject to a fine of not more than $5,000 or to imprisonment not to exceed one year, or both.

"(3) In submitting data under this subtitle, a person required to provide such data may—

"(A) designate the data which such person believes is entitled to protection under this subsection, and

"(B) submit such designated data separately from other data submitted under this subtitle.

A designation under this paragraph shall be made in writing and in such manner as the Administrator may prescribe.

"(4) Notwithstanding any limitation contained in this section or any other provision of law, all information reported to, or otherwise obtained, by the Administrator (or any representative of the Administrator) under this Act shall be made available, upon written request of any duly authorized committee of the Congress, to such committee (including records, reports, or information obtained by representatives of the Evironmental Protection Agency).

"FEDERAL ENFORCEMENT

"SEC. 9006. (a) COMPLIANCE ORDERS.—(1) Except as provided in paragraph (2), whenever on the basis of any information, the Administrator determines that any person is in violation of any requirement of this subtitle, the Administrator may issue an order requiring compliance within a reasonable specified time period or the Administrator may commence a civil action in the United States district court in which the violation occurred for appropriate relief, including a temporary or permanent injunction.

"(2) In the case of a violation of any requirement of this subtitle where such violation occurs in a State with a program approved under section 9004, the Administrator shall give notice to the State in which such violation has occurred prior to issuing an order or commencing a civil action under this section.

"(3) If a violator fails to comply with an order under this subsection within the time specified in the order, he shall be liable for a civil penalty of not more than $25,000 for each day of continued noncompliance.

"(b) PROCEDURE.—Any order issued under this section shall become final unless, no later than thirty days after the order is served, the person or persons named therein request a public hearing. Upon such request the Administrator shall promptly conduct a public hearing. In connection with any proceeding under this section the Administrator may issue subpoenas for the attendance and testimony of witnesses and the production of relevant papers, books, and documents, and may promulgate rules for discovery procedures.

"(c) CONTENTS OF ORDER.—Any order issued under this section shall state with reasonable specificity the nature of the violation, specify a reasonable time for compliance, and assess a penalty, if any, which the Administrator determines is reasonable taking into account the seriousness of the violation and any good faith efforts to comply with the applicable requirements.

"(d) CIVIL PENALTIES.—(1) Any owner who knowingly fails to notify or submits false information pursuant to section 9002(a) shall be subject to a civil penalty not to exceed $10,000 for each tank for which notification is not given or false information is submitted.

"(2) Any owner or operator of an underground storage tank who fails to comply with—

"(A) any requirement or standard promulgated by the Administrator under section 9003;

"(B) any requirement or standard of a State program approved pursuant to section 9004; or

"(C) the provisions of section 9003(g) (entitled 'Interim Prohibition')

shall be subject to a civil penalty not to exceed $10,000 for each tank for each day of violation.

"FEDERAL FACILITIES

"SEC. 9007. (a) APPLICATION OF SUBTITLE.—Each department, agency, and instrumentality of the executive, legislative, and judicial branches of the Federal Government having jurisdiction over any underground storage tank shall be subject to and comply with all Federal, State, interstate, and local requirements, applicable to such tank, both substantive and procedural, in the same manner, and to the same extent, as any other person is subject to such requirements, including payment of reasonable service charges. Neither the United States, nor any agent, employee, or officer thereof, shall be immune or exempt from any process or sanction of any State or Federal court with respect to the enforcement of any such injunctive relief.

"(b) PRESIDENTIAL EXEMPTION.—The President may exempt any underground storage tanks of any department, agency, or instrumentality in the executive branch from compliance with such a requirement if he determines it to be in the paramount interest of the United States to do so. No such exemption shall be granted due to lack of appropriation unless the President shall have specifically requested such appropriation as a part of the budgetary process and the Congress shall have failed to make available such requested appropriations. Any exemption shall be for a period not in excess of one year, but additional exemptions may be granted for periods not to exceed one year upon the President's making a new determination. The President shall report each January to the Congress all exemptions from the requirements of this section granted during the preceding calendar year, together with his reason for granting each such exemption.

"STATE AUTHORITY

"SEC. 9008. Nothing in this subtitle shall preclude or deny any right of any State or political subdivision thereof to adopt or enforce any regulation, requirement or standard of performance respecting underground storage tanks that is more stringent than a regulation, requirement, or standard of performance in effect under this subtitle. .

"STUDY OF UNDERGROUND STORAGE TANKS

"SEC. 9009. (a) PETROLEUM TANKS.—Not later than twelve months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984, the Administrator shall complete a study of underground storage tanks used for the storage of regulated substances defined in section 9001(2)(B).

"(b) OTHER TANKS.—Not later than thirty-six months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984, the Administrator shall complete a study of all other underground storage tanks.

"(c) ELEMENTS OF STUDIES.—The studies under subsections (a) and (b) shall include an assessment of the ages, types (including methods of manufacture, coatings, protection systems, the compatibility of the construction materials and the installation methods) and locations (including the climate of the locations) of such tanks; soil conditions, water tables, and the hydrogeology of tank locations; the relationship between the foregoing factors and the likelihood of releases from underground storage tanks; the effectiveness and costs of inventory systems, tank testing, and leak detection systems; and such other factors as the Administrator deems appropriate.

"(d) FARM AND HEATING OIL TANKS.—Not later than thirty-six months after the date of enactment of the Hazardous and Solid Waste Amendments of 1984, the Administrator shall conduct a study regarding the tanks referred to in section 9001(1) (A) and (B). Such study shall include estimates of the number and location of such tanks and an analysis of the extent to which there may be releases or threatened releases from such tanks into the environment.

"(e) REPORTS.—Upon completion of the studies authorized by this section, the Administrator shall submit reports to the President and to the Congress containing the results of the studies and recommendations respecting whether or not such tanks should be subject to the preceding provisions of this subtitle.

"(f) REIMBURSEMENT.—(1) If any owner or operator (excepting an agency, department, or instrumentality of the United States Government, a State or a political subdivision thereof) shall incur costs, including the loss of business opportunity, due to the closure or interruption of operation of an underground storage tank solely for the purpose of conducting studies authorized by this section, the Administrator shall provide such person fair and equitable reimbursement for such costs.

"(2) All claims for reimbursement shall be filed with the Administrator not later than ninety days after the closure or interruption which gives rise to the claim.

"(3) Reimbursements made under this section shall be from funds appropriated by the Congress pursuant to the authorization contained in section 2007(g).

"(4) For purposes of judicial review, a determination by the Administrator under this subsection shall be considered final agency action.

"AUTHORIZATION OF APPROPRIATIONS

"SEC. 9010. For authorization of appropriations to carry out this subtitle, see section 2007(g).

Solid Waste Cleanup on Federal Lands in Alaska

Sec. 3. [Repealed by PL 96-482]

Sec. 4. (a) In order to demonstrate effective means of dealing with contamination of public water supplies by leachate from abandoned or other landfills, the Administrator of the Environmental Protection Agency is authorized to provide technical and financial assistance for a research program to control leachate from the Llangollen Landfill in New Castle County, Delaware.

(b) The research program authorized by this section shall be designed by the New Castle County areawide waste treatment management program, in cooperation with the Environmental Protection Agency, to develop methods for controlling leachate contamination from abandoned and other landfills that may be applied at the Llangollen Landfill and at other landfills throughout the Nation. Such research program shall investigate all alternative solutions or corrective actions, including—

(1) hydrogeologic isolation of the landfill combined with the collection and treatment of leachate;

(2) excavation of the refuse, followed by some type of incineration;

(3) excavation and transporation of the refuse to another landfill; and

(4) collection and treatment of contaminated leachate or ground water.

Such research progarm shall consider the economic, social, and environmental consequences of each such alternative.

(c) The Administrator of the Environmental Protection Agency shall make available personnel of the Agency, including those of the Solid and Hazardous Waste Research Laboratory (Cincinnati, Ohio), and shall arrange for other Federal personnel to be made available, to provide technical assistance and aid in such research. The Administrator may provide up to $250,000, of the sums appropriated under the Solid Waste Disposal Act, to the New Castle County areawide waste treatment management program to conduct such research, including obtaining consultant services.

(d) In order to prevent further damage to public water supplies during the period of this study, the Administrator of the Environmental Protection Agency shall provide up to $200,000 in each of fiscal years 1977 and 1978, of the sums appropriated under the Solid Waste Disposal Act for the operating costs of a counter-pumping program to contain the leachate from the Llangollen Landfill.

"Energy and Materials Conservation and Recovery

Sec. 32. (a) The Congress finds that—

(1) significant savings could be realized by conserving materials in order to reduce the volume or quantity of material which ultimately becomes waste;

(2) solid waste contains valuable energy and material resources which can be recovered and used thereby conserving increasingly scarce and expensive fossil fuels and virgin materials;

(3) the recovery of energy and materials from municipal waste, and the conservation of energy and materials contributing to such waste streams, can have the effect of reducing the volume of the municipal waste stream and the burden of disposing of increasing volumes of solid waste;

(4) the technology to conserve resources exists and is commercially feasible to apply;

(5) the technology to recover energy and materials from solid waste is of demonstrated commercial feasibility; and

(6) various communities throughout the nation have different needs and different potentials for conserving resources and for utilizing techniques for the recovery of energy and materials from waste, and Federal assistance in planning and implementing such energy and materials conservation and recovery program-

APPENDIX B

API PUBLICATION NO. 1621/NAVAL EXCHANGE INVENTORY ACCOUNTING FORM

Recommended Practice For Bulk Liquid Stock Control At Retail Outlets

PUBLICATION 1621
THIRD EDITION 1977

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005

Recommended Practice For Bulk Liquid Stock Control At Retail Outlets

Marketing Department

PUBLICATION 1621
THIRD EDITION 1977

American
Petroleum
Institute

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1. FOREWORD

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This bulletin supersedes and replaces the previous bulletin entitled, "Recommended Practice for Bulk Liquid Stock Control in Service Stations, January 1973 Edition, Reprinted July 1976."

2. INTRODUCTION AND PURPOSE

Any merchandising operation in which a commodity is handled in bulk is susceptible to stock or inventory losses. This problem becomes even more critical at retail outlets selling motor fuels since the principal bulk commodity handled is volatile. Thus, *special care* must be exercised to hold product losses to a minimum so as to provide a safe environment for the operator, employees, customers, and neighbors; to minimize air and water pollution; and to maximize profits.

The negative effect of product losses on profits needs no explanation. However, the operator should understand that he, as well as the owner of the underground storage and dispensing equipment, may be subject to financial penalties imposed by governmental agencies if product leakage causes contamination. He may also be liable for personal injuries and property damage resulting from hazardous conditions caused by product leakage as a result of his negligence. Further, the Occupational Safety and Health Administration (OSHA) requires the operator to maintain and reconcile inventory records. Several states have similar regulations which contain penalties for noncompliance.

The purpose of this bulletin, then, is to assist the operator in reducing his bulk stock losses, thereby achieving a high level of safety and pollution control while also maximizing profits. This bulletin describes and explains practices and procedures needed to achieve good bulk stock control since it is the basic method for recognizing unaccounted-for losses. This control is achieved through the *daily preparation and review* of inventory control records.

3. ACCOUNTING SYSTEMS

The necessity of establishing and using an adequate accounting system, not only for inventory, but for the business in general, cannot be overstressed. 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.

As 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 receipts (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, receipts, 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 Appendix A).

Once the operator has adopted a system, he 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.

4. SOURCES OF LOSSES

For the purpose of this discussion, losses are divided into two categories: those which are unavoidable because of the nature of the business and the characteristics of the liquid, and those which can be controlled and reduced by following appropriate stock control procedures.

5. UNAVOIDABLE LOSSES

Any business involving the handling of merchandise is subject to unavoidable stock losses. The operator of a retail gasoline outlet is even more subject to unavoidable stock loss because of the volatile nature of the liquid product he handles. A portion of the product in the storage tanks will vaporize and occupy the empty portion of the tank as a vapor-air mixture. When product is received, an equivalent volume of vapor-air mixture is forced out through the vents by the incoming product. Where vapor emission control equipment is in use, the vapor-air mixture is returned to the tank truck making the delivery.

Regardless of whether the storage system is or is not equipped with vapor emission control equipment, vapor-air mixture is seldom, if ever, expelled from underground tanks except during deliveries. The only other times when this condition could occur are when the vapor-air mixture expands as a result of an increase in temperature or when the barometric pressure changes.

The temperature of the ground around underground tanks does not vary appreciably from day to day. Even if underground product temperatures increase, vapor-air mixture normally will not be expelled from the vent because increased space is created whenever product is pumped from the tank during a sale to a customer. As a result, air is drawn into the tank rather than vapor-air mixture being forced out.

It is reasonable to conclude that vapor losses other than those which occur when deliveries are made to the underground tanks are so small that they could not be detected by ordinary gaging methods.

Differences in temperature between the product being delivered and the product already in the tank will cause a temperature change after delivery. If the temperature of the stored product drops, the volume will decrease, resulting in a shrinkage loss. Conversely, a rise in temperature results in product expansion.

Finally, the virtual impossibility of calibrating the meters of gasoline dispensers to achieve and maintain 100 percent accuracy should be recognized. Understanding this, the National Conference on Weights and Measures has established ± 7 cubic inches per 5 gallon measure (±0.6 percent) as the legal tolerance level of gasoline dispensing meters. Since meter calibration variances involve overages, as well as underages, customers, on balance, receive full measure (procedure for testing the accuracy of gasoline dispensing meters is described in Appendix B).

In addition to these normal losses, the operator should recognize that an apparent reduction of inventory will occur when a new outlet is opened or tanks and lines are repaired at an existing outlet and the dispensing pumps are then placed in operation. This is caused by the withdrawal of product necessary to fill the lines. The operator should gage the tanks and, if necessary, make an adjustment to his records. Neither the line fill nor the unavailable product in the tank below the suction stub should be considered lost since the product remains at the outlet and can be reclaimed or accredited as necessary.

6. MAGNITUDE OF NORMAL LOSS

The variances which have been discussed cannot be controlled by the operator, as they are inherent in the retail outlet operation and in the characteristics of the product handled. Data from a Treasury Department survey of regional differences between the volume of gasoline received and the volume dispensed at retail outlets showed that average geographic variances were within the range of +0.27 percent to −0.40 percent. In the aggregate, these variances are small enough to fall within the limits of good business operating overhead and should be considered as such by the operator.

It is apparent from the foregoing that a single or absolute figure cannot be developed to characterize the unavoidable losses of gasoline at specific retail outlets due to shrinkage, vaporization, meter calibration, and other causes. An operator should expect small variations in his inventory control. However, losses generally should not exceed one half of one percent (0.5 percent) or five gallons of every 1,000 gallons delivered. Any outlet operator whose losses exceed this amount when measured over extended periods of time should carefully examine his operating practices. Of even greater concern should be *sudden, unexplained variances from the established pattern or small but growing daily losses* (the steps to be taken when inventory records indicate an unexplained variance are outlined in Appendix C).

7. CONTROLLABLE LOSSES

The largest stock losses in a service station operation occur from practices and conditions which are within the operator's control. These include leaks, spills, theft, and product used on the premises. The larger the operation and the more persons employed, the more necessary it becomes to adhere rigidly to established procedures for good stock control if the business is to be successful.

7.1 LEAKAGE

Leaks can occur in dispensing equipment, underground piping, or tanks. Losses from this source can be reduced by proper product accountability, by regular inspection of the visible parts of the product handling system, and by the prompt recognition of symptoms which indicate leaks in the underground portion.

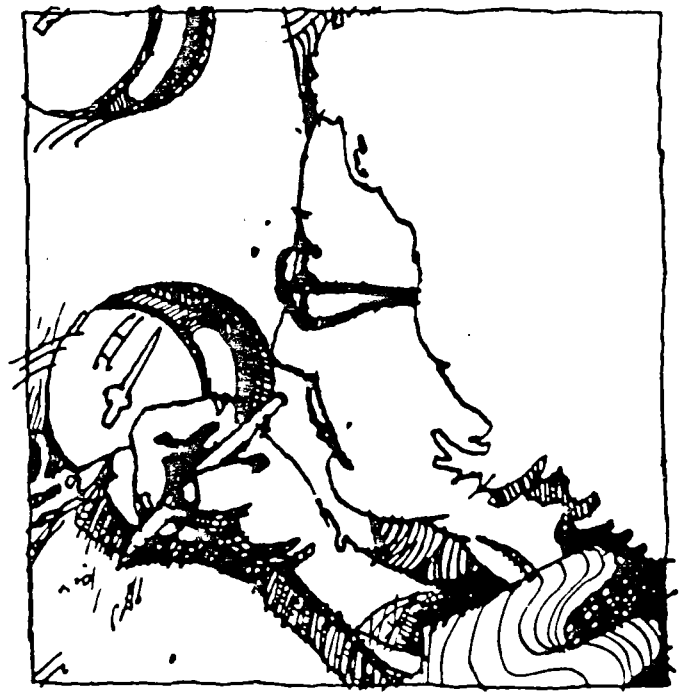
The dispensing equipment should be inspected at least once a week. If possible, this inspection should be made while the equipment is operating. Whereas, the operator might tighten a leaking connection, he should not attempt to correct a condition requiring extensive repair. Under no circumstances should electrical connections be broken or disconnected. If repairs or adjustments are required, the operator should immediately notify those responsible for maintenance of the equipment.

Evidence of leakage from buried equipment can be gathered from inventory control records and from abnormal operation of pumping equipment. Some of the more obvious symptoms of such leaks are:

1. Loss of product in a tank during periods when product is not dispensed usually indicates a leaking tank, but might also indicate an unaccounted-for withdrawal, theft, or extreme temperature change.
2. An unaccountable increase in water in an underground tank may be caused by a leak in the tank if the ground surrounding it is saturated. Under such circumstances, water may leak into the tank instead of product leaking out. The increase in water may also be caused by a leaking gage or fill cap, and these should be examined and made watertight, if necessary before concluding that the tank is at fault.
3. Increasing differences between the amount of product received and dispensed may indicate a meter calibration problem, theft, or a leak in tanks or piping. In this case, refer to Appendix C.
4. Where fill boxes are located remotely from the tanks, large differences appearing consistently between the amounts invoiced and the tank gages after deliveries may indicate a leak in the remote fill line. In such event, the line should be tested.
5. A hesitation in the delivery from a standard dispensing pump may indicate a leak in the suction piping, although such hesitation may also be caused by a leaking foot valve or, in warm weather, by vaporlock. Should this occur, the inventory control records may indicate whether the cause is mechanical or whether product is actually being lost.
6. In a remote pumping system, meter spin without product delivery may indicate a piping leak.
7. Gasoline odor in spaces below ground adjacent to the station may be evidence of underground leaks, whether in the tank or piping.

Should the operator observe any of the foregoing symptoms, he should immediately notify those responsible for maintaining the equipment. He should not attempt to correct the condition himself, as the operation may involve some hazard and may require special equipment. Further, in some locations, only specially licensed mechanics can work on station equipment.

If gasoline odors are detected in an off-property location or if there is evidence of leakage at the outlet, the local fire department and the owner(s) of underground storage and dispensing equipment should be notified immediately.



7.2 SPILLAGE

Spillage losses can occur during receipt of product if the truck hose connections are not properly made either at the truck or at the fill box. These connections should be observed by the operator at the beginning of the delivery and corrections made if necessary.

Inspection of the truck's compartments to be sure they are empty may prevent a spill caused by premature removal of the truck hose from the fill box when delivery is made from a calibrated compartment by gravity.

Care should be exercised to avoid overfilling the underground storage tanks. The "Proceduce for Receipt of Product," (page 6, 8.B) if followed, will prevent spillages from this source.

7.3 THEFT

Although loss through theft will not commonly occur, it must be considered. The accounting system must provide for periodic checks of purchases, sales, and inventories. If excessive variations of inventory are revealed by such checks, the facilities of the outlet and the operating procedures should be scrutinized closely. If this examination does not indicate the cause of the variation, the possibility of theft must be explored. The stock-inventory control system should be designed to take into consideration the fact that the normal causes for loss may be utilized to cover up fraudulent operations. Therefore, to prevent loss by theft, the operator must maintain a constant and careful watch over the operation of the system and immediately investigate any abnormal losses.

7.4 PRODUCT USED ON PREMISES

A careful record should be kept of all product dispensed for use on the premises or for the personal use of the operator and his employees. Such withdrawals must be properly accounted for if the stock control record is to show a true picture of inventory and losses.

Losses cannot be ascertained with any degree of accuracy without good gaging procedures and properly adjusted dispensing meters. The procedures for gaging (outlined in the following section), for meter checking (Appendix B), and the instructions for the proper use of the gage stick (Appendix D) are designed to assist the dealer in accurately accounting for his bulk liquid stock.

8. PROCEDURES FOR REDUCTION OF CONTROLLABLE LOSSES

The following procedures are recommended for use in maintaining an accurate inventory of bulk liquid product. It is recognized that the frequency of these procedures will vary when applied to the wide range of retail outlet operations dispensing motor fuel; but, adherence to the basic principle of maintaining a sound inventory control system will minimize losses and provide early detection of losses in excess of normal unavoidable losses.

A. Daily Procedures

1. At opening or closing of business:
   a. First, read all meter totalizers. If the outlet is operating on shifts, the incoming and outgoing shift supervisors should perform this duty together. If this is not practical, the incoming supervisor should make meter readings his first duty and should check any readings left him by the supervisor of the previous shift. If the outlet is closed at night, compare the opening reading with the previous closing reading.

b. Gage all tanks (detailed procedure is specified in Appendix D).

c. Check all tanks for water, compare with previous reading, and make necessary adjustment for any variation. An undetected change in the amount of water in the tank would change the level of the product and produce an erroneous reading (instructions for gaging for water are given in Appendix E).

d. Record all sales and other uses of product occurring during gaging period.

e. Prepare meter and tank reconciliation by product system, maintaining records in such a manner that trends over a period of time are easily discerned.

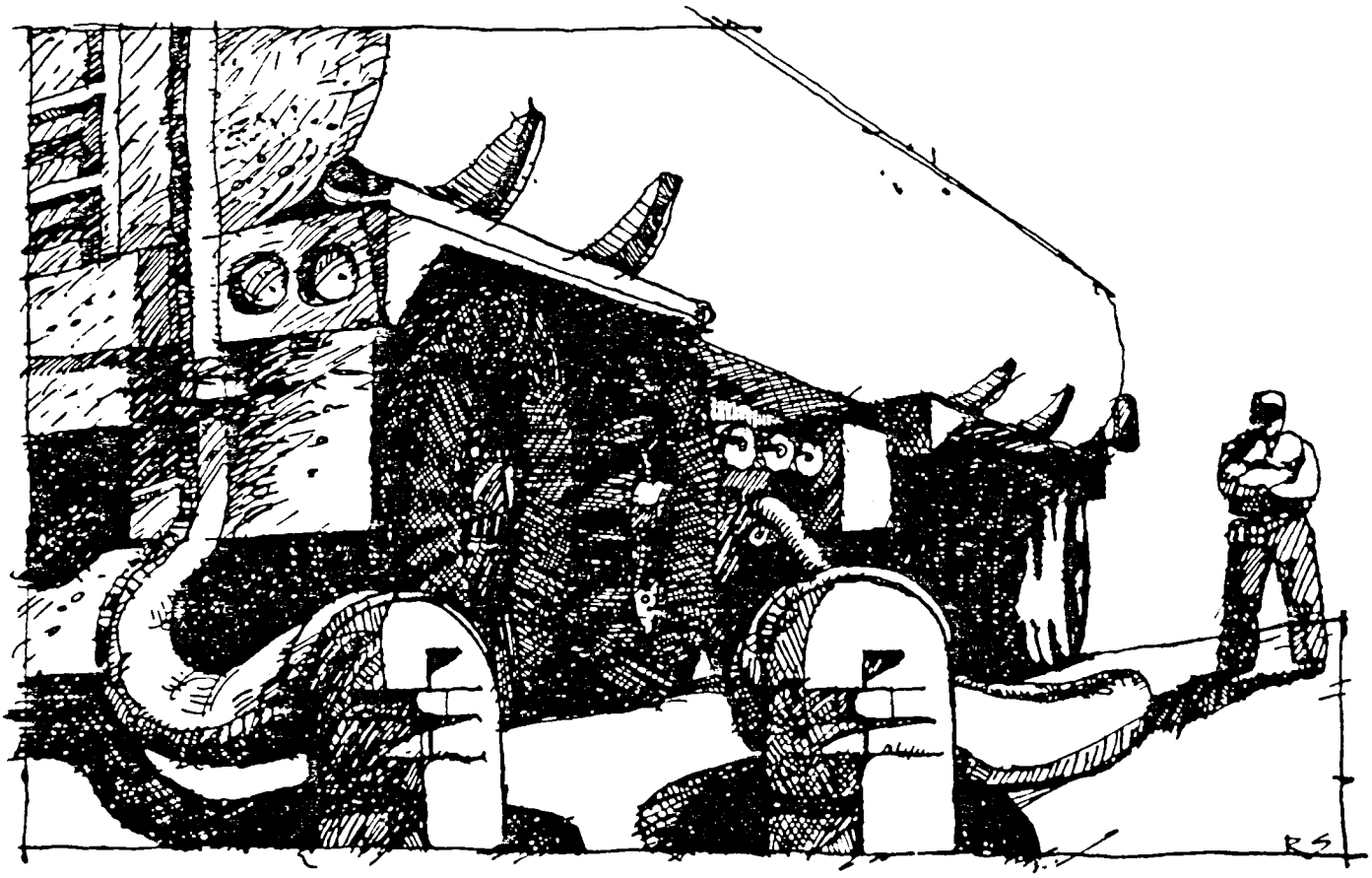
B. Procedure for Receipt of Product

1. Before and after delivery:

a. Although a few minutes might be saved in gaging tanks by limiting these procedures to those tanks involved with the anticipated receipt of product, it is recommended that all tanks be gaged. This will not only reveal any mistakes which might occur (dumping into wrong tanks, etc.) but will ensure accuracy when tanks are manifolded or when environmental requirements have necessitated a pressure/vacuum valve on the vents.

b. All gaging should be completed as simultaneously as possible and as soon after the delivery has been completed so as to avoid delaying the truck. Should variations be experienced with interconnected tanks, a second gage should then be taken at least a half hour later when the product level has equalized. A record should be kept of all gages, but the last and more accurate gage should be used for inventory purposes.

c. Check all tanks for water before and after delivery. If this has been done in the preceding 12 hours, it need not be repeated *before* accepting the delivery, but it should always be done *after* the tanks are filled. No supplier willfully delivers water, but bulk plant operations and procedures sometimes result in water reaching the vehicle tanks without the knowledge of the loader. An increase in the water level will result in an erroneous calculation of the amount



received unless the water is detected and the records adjusted accordingly.

d. Reinstall all fill and gage caps. The delivery truck operator will make his own hook-ups.

CAUTION—Due to many changes in storage and dispensing facilities during recent years as necessitated by environmental protection considerations, the outlet operator must thoroughly understand his particular system. It should be recognized that a pressure or vacuum may exist under certain conditions, in which case necessary precautions should be observed. Most supplying oil companies will advise their retailers concerning such precautions when requested.

2. After delivery:
   a. Make adjustments for variation in water level, if any.
   b. Make adjustments for transactions during the delivery, if any.
   c. Calculate amount of product received and compare with amount shown on the invoice.
   d. Make sure fill and gage caps are tight and locked, if required.
3. Night deliveries with station closed:
   a. The difference between the closing gages and the opening gages of those tanks which were filled should be compared with the amount shown on the invoice.
   b. The tanks should be checked for water at the opening of business following the delivery and adjustments made for any variation in water level from the previous day.
   c. Make sure fill and gage caps are tight and locked, if required.

C. Special Circumstances

Tanks should be checked for water after a thaw or heavy rain, as under these circumstances, w[illegible] may enter the tank through leaking fill or g[illegible] caps.

9. SUMMARY

Product losses can be controlled and reduced by following the procedures and methods described herein, coupled with the conscientious use of a suitable accounting system. Employees should be trained in these procedures and required to follow them. Whenever the trend in product variations significantly changes or exceeds that normally encountered in retail outlet operations, suitable corrective measures should be taken immediately and notification given to all concerned.

APPENDIX A

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

CLOSING INVENTORY STICK READINGS

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

Initialed by_____

Date_____

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

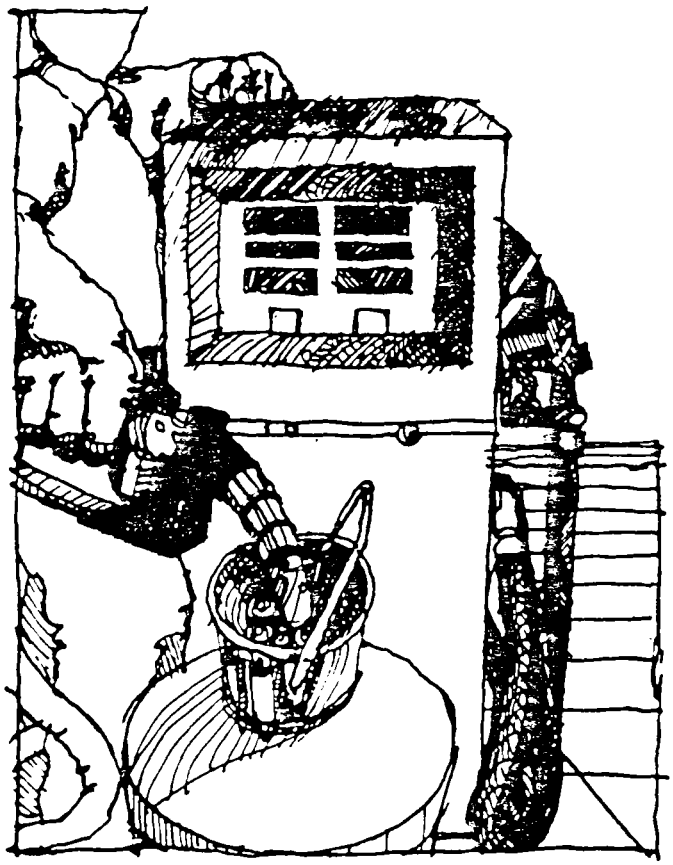
APPENDIX B

PROCEDURE FOR TESTING ACCURACY OF GASOLINE-DISPENSING METERS

EQUIPMENT

A proving can of 5-gallon capacity is the only special equipment required. The upper portion of this can consists of a neck approximately 4 inches in diameter having a sight glass with an adjacent scale graduated in cubic inches above and below a zero point. It indicates the number of cubic inches delivered by the meter greater or less than the amount indicated on the dispenser dial.

If local regulations require the station operator to periodically check the dispensing units, the local bureau of weights and measures should be consulted concerning the size and type of proving can to be used. Otherwise, a suitable can may be purchased from a reliable automotive equipment supplier. Each can should be checked for accuracy periodically and/or as may be required by local regulations.



PROCEDURE

1. Wet the can by filling with product to its full capacity, and return the product to the storage tank.
2. Refill the can to its capacity, as indicated by the dispenser, with the nozzle fully open (maximum filling rate).
3. Read on the graduated scale the number of cubic inches delivered greater or less than the quantity shown on the dispenser and note the difference.
4. Return the product in the can to storage.
5. Refill the can as in step 2, but with the nozzle partly closed to limit flow to approximately 5 gallons per minute.
6. Repeat steps 3 and 4.
7. If the quantity delivered in steps 2 or 5 varies by more than 7 cubic inches above or below the zero point, adjustment by a qualified pump mechanic should be arranged. The operator should not attempt to adjust the meter himself.
8. Note in the inventory record the changed meter readings caused by the delivery of the product used for the test, noting also whether the product was returned to storage or used for other purposes.
9. Keep records of calibrations to assist in reconciling inventory variations.

APPENDIX C

LEAK INVESTIGATION PROCEDURES

The following steps, as a minimum, should be taken in an expeditious manner when daily inventory records indicate excessive stock loss:

1. The records of inventory, receipts, and dispensing should be checked for error.
2. If no error is apparent, an independent calculation of apparent loss should be made by a qualified person starting from a point in time where the records indicate a no-loss condition.
3. If step 2 confirms an apparent loss, the readily accessible physical facilities on the premises should be carefully inspected for evidence of leakage and those responsible for the maintenance of the equipment should be notified immediately.
4. If step 3 does not disclose a leak, the dispensers used with the particular product involved with the apparent loss should be calibrated.
5. If step 4 does not explain the loss, the piping system between the storage tank and dispensers should be tested in an acceptable manner to determine if this segment of the system is leaking. If the tank has a remote fill and the variations occur at the time of deliveries, the remote fill line should also be tested (see item 4 under "Leakage").
6. If step 5 does not disclose a leak, the storage tank(s) should be tested in an acceptable manner to determine if there is a leak in the tank(s).
7. If steps 1 through 6 do not confirm the apparent loss, the daily inventory should be continued with a daily independent verification by a qualified person. Also, additional surveillance of the facility should be engaged to insure against unauthorized removal of product.

APPENDIX D

GAGING PROCEDURE FOR UNDERGROUND HORIZONTAL TANKS

EQUIPMENT

A pole made of varnished hardwood (maple) or other nonsparking material should be used. The pole should be long enough to reach the bottom of the tank (usually 6 feet to 10 feet), and should be about 1 inch wide by ¾ inch thick. The pole should not be warped. One side of the pole should be marked in inches with ⅛ inch subdivisions; the zero marking should be at the bottom or tip of the pole. If the pole is used for gaging gasoline or other volatile product, the side adjacent to the graduated side should be grooved every ⅛ inch in order to retard creepage.

The gage stick is used in conjunction with a calibration chart or charts furnished by the supplier. The chart shows the number of gallons for each inch on the gage stick. Each chart is calculated for a tank of particular dimensions and capacity, and the chart used must be the proper one for the tank being gaged.

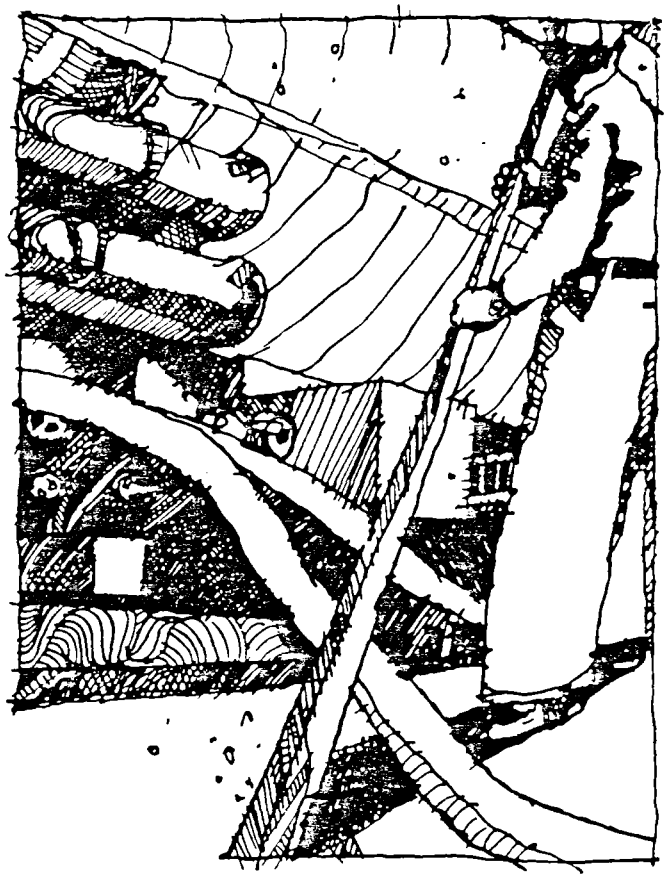
PROCEDURE

Insert the pole through the gage hole of the tank until the tip touches the tank bottom. The pole should be inserted at the same point in the gage hole each time a gage is taken and should be held in a vertical position. Be sure that it does not rest on a projection on the tank bottom. Withdraw the pole quickly to avoid creepage of the product, and read the product "cut" on the graduated scale to the nearest ⅛ inch. When gasoline or another volatile product is gaged, the reading adjacent to the "cut" on the grooved portion of the pole should be taken as the gage. Clean the pole at the "cut" by wiping with a cloth and repeat the procedure to check.

USE OF TANK CALIBRATION CHART

After gaging the tank, select the correct calibration chart and proceed as follows:

1. Read chart directly for all gages which are to the exact inch (tolerance plus or minus 1/16 inch).
2. For gages of ⅛ inch over or under the exact inch, proceed as follows:
   a. Read chart for exact inch gage on scale above and below actual stick-gage reading—for example, if stick gage reads 46½ inches, read chart at 46 inches and 47 inches.



   b. Subtract gallonage shown on scale at these two readings, i.e., for the 1,000 gallon tank (diameter 64 inches; length 72 inches):
      Chart reading at 47 in. = 789 gallons
      Chart reading at 46 in. = 771 gallons
      Subtracting = 18 gallons
   c. Multiply this gallonage by the fraction of an inch, i.e.:
      18 gallons times ½ = 9 gallons
   d. Add the gallonage shown on the chart for the lower whole inch gage and the gallons calculated by step (c); i.e.:
      Gallons at 46 inches = 771 gallons
      Gallons at ½ inch = 9 gallons
      Adding 780 gallons

Therefore, the tank gage of 46½ inches represents 780 gallons of product in the 1,000 gallon tank (diameter 64 inches; length 72 inches).

If a water gage (see Appendix E) has been taken, the quantity of water contained in the tank is determined by the same procedures. The total amount of water should be subtracted from the total amount of liquid in the tank (as determined in step d) to determine the net gallons of product contained.

NOTE: Underground tanks are fabricated as production items. The tank manufacturer supplies charts intended to be used for all tanks of the same nominal dimensions and capacities. Depending on the fabricating method, these tanks are likely to vary by a fraction of an inch in diameter or length. Therefore, the charts cannot be considered as absolutely accurate, although the amount of inaccuracy is usually too minute to be of consequence.

Some long tanks are equipped with a gage well at each end. These are installed for use if the tank settles unevenly with one end lower than the other. It is not necessary under ordinary circumstances to gage through both wells. It would be advisable, however, to check occasionally to determine that the product is approximately at the same level in both gage wells.

If the gage well is in the center of the tank, settlement will not affect the accuracy of the gage. But, if settlement occurs, the water will collect at the lower end, and a water gage taken at the center may not indicate the true condition.

To verify the accuracy of remote gages, tanks equipped with such devices should be periodically stick gaged.

APPENDIX E

WATER-GAGING PROCEDURE

A water-finding paste, which is unaffected by gasoline, but which will change color in water, is used to check for water at the bottom of storage tanks. Information on satisfactory paste may be obtained from the supplier.

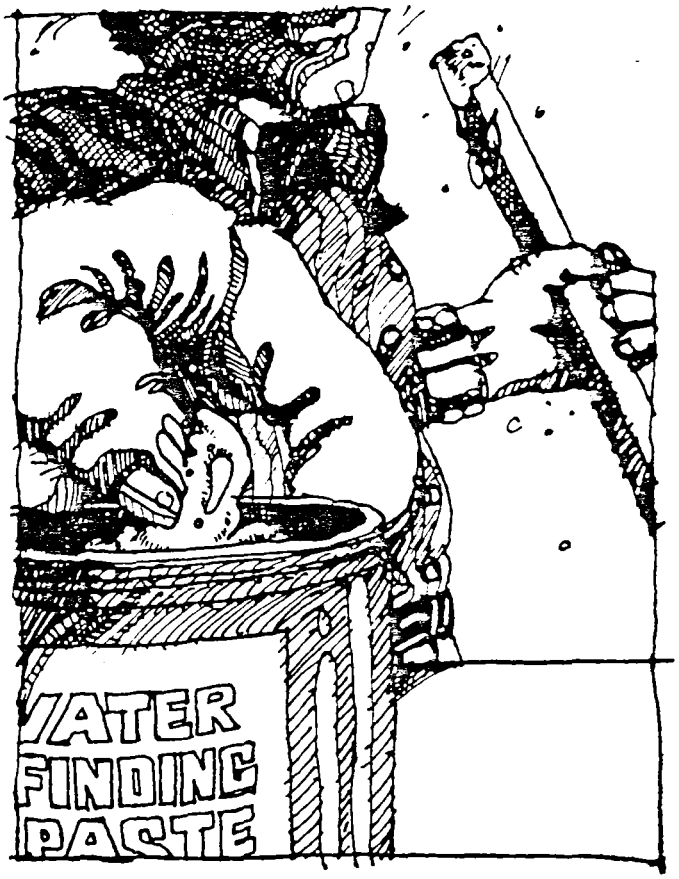
It is used as follows:

Coat the end of the gage stick on the graduated side with a light, even film of the paste for approximately 3 inches. Insert the pole through the gage hole until the pole reaches the bottom of the tank. Be sure that the pole is kept in a *vertical* position and that it does not rest on an obstruction or other projection on the tank bottom. Keep the pole in this position for the time specified for the product. Then withdraw it and read the water "cut" (as noted by change in color of the paste) on the graduated scale to the nearest 1/8 inch.

The immersion time for a water "cut" is approximately 10 seconds for light products such as gasoline and kerosene, and 20 to 30 seconds for heavier products. If the test shows more than 1/2 inch of water, arrangements should be made for its immediate removal and the supplier notified.

NOTE: Occasionally, a submerged and/or suction pump will deliver water with the product, but no water will show when the tank is checked. This usually indicates that the tank is not level and the water has accumulated at the low end away from the gage well.

Similarly, a suction pump may dispense water with the product when there is an underground suction line leak and a coinciding high water table. Such a condition must be checked out and corrected immediately.



Some long tanks are equipped with a gage well at each end and water may be found only under the lower end.

A tank equipped with only a center gage well may not show accumulated water if the tank is not level.

1-1400 — 10/80 — 10M
1-1400 — 5/83 — 5M
1-1400 — 1/84 — 3M
1-1400 — 7/84 — 5M
1-1400 — 1/85 — 5M

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005

AUTOMOTIVE SERVICE CENTER WORKSHEET

Form SS/163 (11-81)

4060

NAVY EXCHANGE AT:	EXCHANGE NO.	DATE	OPERATING DAY

DEPARTMENT J3 - FUEL

FULL SERVICE

PUMP METER READINGS

PUMP NO.	LEADED - REGULAR OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
5					
6					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(A1) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	NO LEAD - PREMIUM OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(A2) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	NO LEAD - REGULAR OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
5					
6					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(A3) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	DIESEL OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(A4) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	LIQUID PROPANE OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(A5) MONTH-TO-DATE				MO-TO-DATE	

SELF SERVICE

PUMP METER READINGS

PUMP NO.	LEADED - REGULAR OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
5					
6					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(B1) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	NO LEAD - PREMIUM OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(B2) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	NO LEAD - REGULAR OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
5					
6					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(B3) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	DIESEL OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
3					
4					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(B4) MONTH-TO-DATE				MO-TO-DATE	

PUMP NO.	KEROSENE OPENING	CLOSING	METERED	SELLING PRICE	VALUE
1					
2					
TOTAL METERED				TOTAL VALUE	
LESS CALIBRATION GAL.				LESS CALB. AND TRSFRS	
ADJ. TOTAL				ADJ. TOTAL	
(A6) MONTH-TO-DATE				MO-TO-DATE	

GASOLINE - TANK INVENTORY

TANK NO.	GALLONS OPENING	RECEIVED	CLOSING	TO-DAY OUT-GO	MO-TO-DATE
1					
2					
3					
4					
			TOTAL OUT-GO		
			LESS REMOVAL OF CONDENSATION		
			ADJUSTED TOTAL OUT-GO		
			TOTAL ADJUSTED METERED GAL.		
			DIFFERENCE		
			PERCENTAGE	%	%

DEPT. J-3 FUEL SALES

	TO-DAY	MONTH-TO-DATE
GROSS SALES	$	$

DEPT. J-4 PARTS, ACCESSORIES AND MOTOR OIL

	TO-DAY	MONTH-TO-DATE
* (C3) DEPT. J-4	$	$

DEPT. J-5 LABOR

	TO-DAY	MONTH-TO-DATE
C/1 LABOR SALES	$	$
C/2 REPLACEMENT PARTS INSTALLED	$	$
TOTAL DEPT. J-5 SALES	$	$

*DOES NOT INCLUDE MERCHANDISE INDICATED IN C2 ABOVE.

DIESEL - TANK INVENTORY

TANK NO.	GALLONS OPENING	RECEIVED	CLOSING	OUT-GO
1				
			TOTAL OUT-GO	
			LESS REMOVAL OF CONDENSATION	
			ADJUSTED TOTAL OUT-GO	
			MONTH-TO-DATE	

LIQUID PROPANE TANK INVENTORY

TANK NO.	GALLONS OPENING	RECEIVED	CLOSING	OUT-GO
1				
			TOTAL OUT-GO	
			ADJUSTED TOTAL OUT-GO	
			MONTH-TO-DATE	

KEROSENE TANK INVENTORY

TANK NO.	GALLONS OPENING	RECEIVED	CLOSING	OUT-GO
1				
			TOTAL OUT-GO	
			LESS REMOVAL OF CONDENSATION	
			ADJUSTED TOTAL OUT-GO	
			MONTH-TO-DATE	

FUEL COST

GRADE	COST $
LEADED - REGULAR	
NO LEAD - PREMIUM	
NO LEAD - REGULAR	
DIESEL	
LIQUID PROPANE	
KEROSENE	

NAME OF SUPPLIER

COMMENTS:

SIGNATURE, AUTOMOTIVE SERVICE CENTER MGR.	NAVY EXCHANGE OFFICER	DATE

APPENDIX C

AUTOMATIC INVENTORY SYSTEMS

Measures fuel inve accurately and auto tests tanks on dema

Loaded with features to improve management control

- **On-Demand Inventory Report**
  - *Gallons of Fuel*
  - *Inches of Fuel*
  - *Inches of Water*
  - *Temperature*
- **Automatic Delivery Report**
- **Leak Detect Reports**
- **Overfill Alarm**
- **Programmable alarms for**
  - *Sudden Loss*
  - *Low Inventory*
  - *High Water*
- **Single-tank leak detect capability**
- **Programmable automatic report times**
- **One system monitors up to 8 tanks**
- **New two-wire, factory-calibrated "smart" probes**
- **On-site & remote diagnostics**
- **Available with or without integral printer**
- **Handles manifolded tanks**
- **RS-232 interface**
- **Only need to specify tank diameters to order system**

Tightens inventory control

TLS-250 tightens inventory control by continuously monitoring the fuel in your underground tanks. It provides detailed reports on fuel volume and height, temperature, water level, and the time and date at the touch of a button.

This information, acquired automatically, can be used to speed shift changes by eliminating tank sticking and manual report filing; to reduce inventory errors and spot losses caused by theft, leaks or meter miscalibration; and to provide a means for sound inventory practice. In addition, data may be processed to provide automatic station reconciliation.

Improves fuel security, identifies possible leaks

TLS-250 features reports and alarms that add extra security to your station. Reports that confirm bulk delivery amounts automatically. A programmable high-level alarm to warn of overfill during bulk deliveries. And programmable low-fuel inventory and high water limit alarms. Plus, a sudden-loss alarm to detect rapid inventory changes caused by theft or a major tank failure during closed hours.

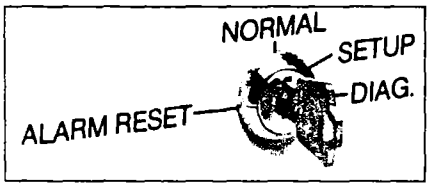
In addition, with the TLS you have the ability to monitor a single tank or all tanks in the system for product losses caused by small leaks. The leak detect routine is implemented when no dispensing is taking place and when no deliveries are being made. As a general practice, it is recommended that the system be set in its Leak Detect mode whenever the fueling facility is closed.

When operated in the Leak Detect mode, the TLS-250 is capable of sensing product loss from a tank of 0.2 gallons per hour or greater. The leak detect printout shows the cumulative change sensed in tank volume by hour. (See sample report on right-hand page.)

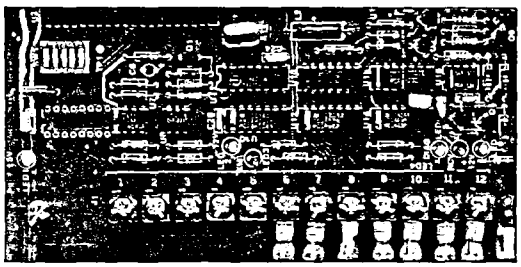
tory
natically...
nd!

A TLS-250 probe *is mounted permanently in each tank through either a 3" or 4" riser pipe. It operates on a capacitance principle to sense fuel height, and requires only a simple two-wire connection to the console. Probes are available in various lengths to suit standard tank sizes.*

A thermistor sensor *measures fuel temperature to provide temperature-compensated inventory data—for use by the leak detect system.*



1 ***By turning a key,*** *you select a TLS operating mode . . . "Normal" to monitor inventory or detect leaks. "Setup" to enter or review system and tank parameters. "Diagnostics" to check hardware and software. "Alarm Reset" to reset an alarm indication.*

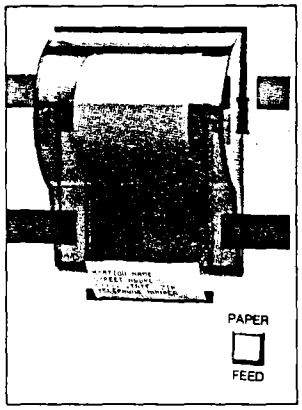


2 ***Six hardware diagnostic LEDs*** *mounted internally allow service people to check the system's status at a glance.*

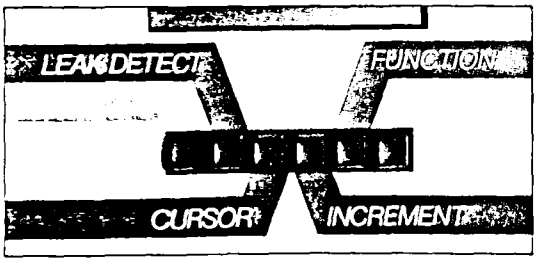
3 ***An easy-to-read 6 digit LCD shows:***

- *fuel and water height*
- *time*
- *fuel volume*
- *fuel temperature*
- *last delivery amount*
- *leak rate sensed*

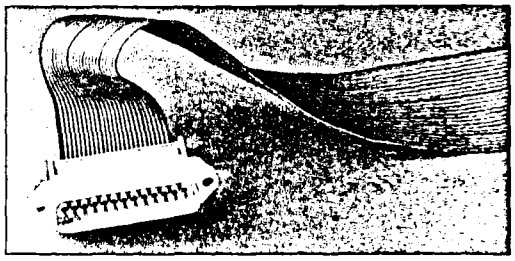
An electronic label identifies each display, selected by the function button.



4 ***The 20 column TLS printer*** *is simple to load, covered for paper protection. A variety of printed reports speeds shift changes, documents inventory, confirms deliveries, shows setup parameters, and provides leak detection data.*



5 ***Front-panel pushbuttons*** *let you profile TLS-250 with tank and system parameters and revise them as you need. The buttons also provide the means to review all inventory information, tank-by-tank, and call for printed reports.*



6 ***Through an RS-232 port,*** *TLS-250 interfaces with sophisticated electronic point-of-sale terminals to form an integrated station management system. And it can communicate to a headquarters location via telecommunications networks for fast inventory reporting and automatic reconciliation of station totals.*

A three-stage filter *helps to ensure measurement accuracy in all fuel tanks by separating water from the product.*

PRINTED REPORTS DOCUMENT INVENTORY STATUS, SPEED SHIFT CHANGES, IDENTIFY LOSSES!

Inventory Status Report provides detailed reports on fuel volume and height, temperature, water level, and the time and date at the touch of a button.

```
STATION NAME
STREET ADDRESS
CITY, STATE  ZIP
TELEPHONE NUMBER

JAN 1, 1985
9:30 AM

PRODUCT 1
  3731  GALLONS FUEL
 38.37  INCHES FUEL
   0.0  INCHES WATER
  78.7  DEGREES F

PRODUCT 2
   789  GALLONS FUEL
 12.77  INCHES FUEL
   3.8  INCHES WATER
  78.2  DEGREES F
```

Automatic Delivery confirms bulk delivery amounts adding extra security to your installation. And TLS-250 electronically stores the last 10 delivery reports for each tank.

```
PRODUCT 1
INVENTORY INCREASE

JAN 3, 1985
9:35 AM
  3731  GALLONS FUEL
  78.8  DEGREES F

JAN 3, 1985
9:47 AM
  9556  GALLONS FUEL
  78.8  DEGREES F

  5825  NET INCREASE
```

Leak Detect Report helps to spot inventory losses early—even small ones.

```
START LEAK MONITOR
- - - - - - - - - - -

DEC 21, 1984
11:00 PM

TANK 1
PREMIUM UNLEADED
  1180  GALLONS FUEL
 16.85  INCHES FUEL
   3.9  INCHES WATER
  55.2  DEGREES F

TANK 2
[illegible]AR LEADED
[illegible]ONS FUEL

 TNK1 TNK2 TNK3

      DEGREES F
55.2 59.0 53.5 60.1

       GALLONS

-0.0  0.0 -0.3  0.0
-0.1  0.0 -0.7  0.1
-0.1  0.0 -1.0  0.1
-0.1  0.1 -1.3  0.0
-0.2  0.0 -1.8  0.0
-0.2  0.0 -2.1  0.1

      DEGREES F
54.9 58.9 52.8 59.2

STOP LEAK MONITOR
DEC 22, 1984
5:00 AM

0.2 GPH TEST FAILED

TANK 3
REGULAR UNLEADED
 -0.35  GALLONS/HOUR
```

Optional

```
0.2 GPH TEST PASSED
```

Theft Alarm detects and warns you of a rapid change in inventory.

```
--- THEFT ALARM ----
PRODUCT 1
JAN 1, 1985
11:06 PM
```

Leak Alarm automatically alerts you to a major tank leak during closed hours.

```
---- LEAK ALARM ----
TANK 2
REGULAR UNLEADED
 -2.80  GALLONS/HOUR
```

Overfill Alarm warns you of a potential overfill during bulk deliveries.

```
---OVERFILL ALARM---
PRODUCT 1
JAN 9, 1985
9:08 AM
```

Low Limit Alarm can be set to a predetermined low fuel inventory.

```
--LOW LIMIT ALARM---
PRODUCT 2
JAN 7, 1985
7:33 AM
```

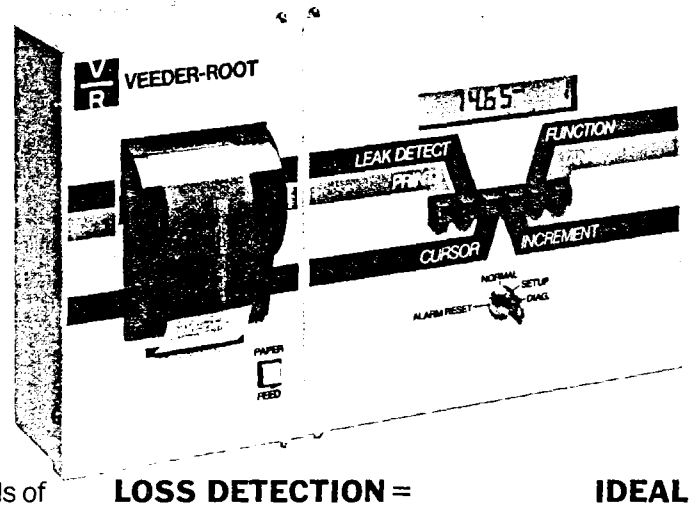
High Water Alarm can be preset to the desired high water limit.

```
--HIGH WATER ALARM--
PRODUCT 1
JAN 2, 1985
10:22 PM
```

Alarm History Report is an operational listing that includes the dates and times of the last three occurrences of each type of limit alarm for each tank.

TLS-250

A STEP AHEAD IN INVENTORY MANAGEMENT AND ENVIRONMENTAL PROTECTION!



TLS Systems meet the needs of today's station management with automatic inventory information. And they look to the future by being able to integrate with other devices to form sophisticated management systems.

TLS can interface with electronic cash registers, point-of-sale terminals, and/or data processing systems to provide detailed information on fueling transactions and inventories.

Information from TLS can also be transmitted via existing telecommunications networks to central management headquarters. This is especially important for multi-location convenience store chains, oil jobbers, major oil companies and unattended fueling sites where the convenience of remote polling, the speed of data collection and the reliability of information is of great significance.

Using this information, you are able to analyze station operations, plan fuel allocations and set bulk delivery schedules with greater ease and efficiency.

LOSS DETECTION = ENVIRONMENTAL PROTECTION

TLS not only addresses the need for tight inventory control for effective station management, but also provides a means of meeting environmental concerns over underground leaks.

Unexplained inventory losses, even small ones, may be leaks that can cause severe environmental damage. Inventory control records from TLS are the first step in spotting them. Then you can switch immediately to "Leak Detect" for a closer look. If the test confirms your suspicions, you can take action fast!

TLS-250 is a permanently installed, continuous monitoring device for underground fuel storage tanks. Unlike one-time tank tests that give you a status report on your tanks for only the day of the test, TLS provides inventory information as well as leak detection year round and at your convenience. In addition, while you pay hundreds of dollars for a one-time test only to end up with a single report, the money spent on TLS is a capital investment adding value to your operation while returning much-used operating information on a continual basis.

IDEAL FOR RETAIL AND PRIVATE FUELING OPERATIONS

Automated, continuous monitoring of fuel stored underground and the ability to spot leaks quickly has become critically important because of the high cost of fuel inventories and the growing concern for environmental protection. This is true not only for traditional retail fuel dealers, but also for the increasing number of private fueling operations in commercial, corporate and government fleets. Typical users of TLS-250 would be:

- Major oil companies
- Oil jobbers
- Convenience stores dispensing fuel
- Commercial, private and government fleet operators
- Other operations such as railroads and airports where fuel may be stored in underground tanks

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For complete information on TLS-250, contact your nearest Veeder-Root Distributor. Or call Veeder-Root at (203) 527-7201.

FIELD-PROGRAMMABLE SET-UP PARAMETERS MATCH TLS-250 TO YOUR STATION REQUIREMENTS

TLS-250 can be field-profiled to match station operating and layout requirements. Tank setup parameters include product label, tank capacities at ¼, ½, ¾ and full levels, diameter, tilt and manifolding information. In addition, limits for high water, overfill, low inventory and theft can be entered for each tank.

System setup parameters let you set three automatic inventory printout times, set start and stop times for automatic leak detect, and establish an external interface security code to prevent tampering. A security key lock lets you select "normal" operation, "setup" to enter or change system and tank parameters, or "diagnostics" to check the system's hardware and software.

And TLS "Remembers" Your System Parameters. After initial profiling, your individual system setup remains in CMOS memory with battery backup. Tilt, volume, manifolded tanks, alarm limits, three automatic report print times, automatic leak detect start/stop times, print header, tank labels, security code, and tank configuration are permanently stored until you decide to change them.

SPECIFICATIONS

Performance specifications listed below represent values that could be expected from a TLS-250 system if a perfectly cylindrical, calibrated (10' diameter, 10,000 gallon) tank was used.

Height of fuel	± 0.1"
Volume of fuel	± 15 gallons
Leak detect mode	± 0.1 gallon
Fuel temperature	± 1½°F
Time	± 1 minute/week

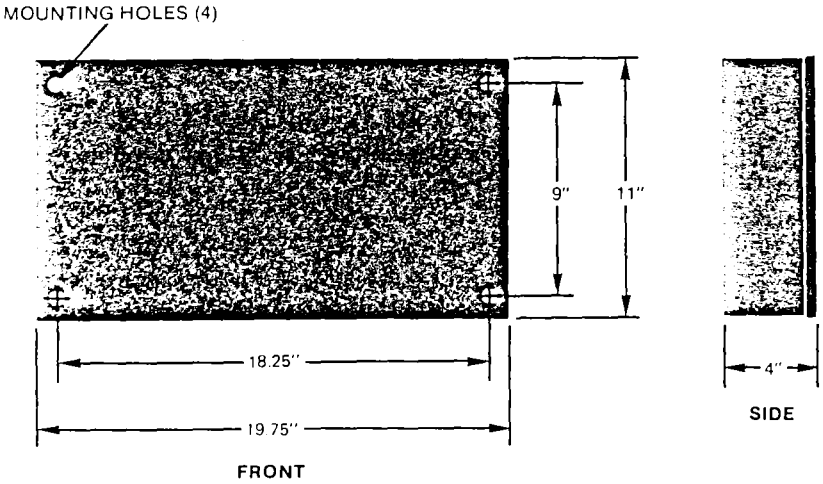
TO ORDER

When ordering a TLS-250 system, you need only to specify the probe length ("A" in dimension diagram below) and whether you desire the optional printer. See the TLS-250 price list for part numbers.

All other operating requirements are field-programmed and need not be specified at the time of purchase.

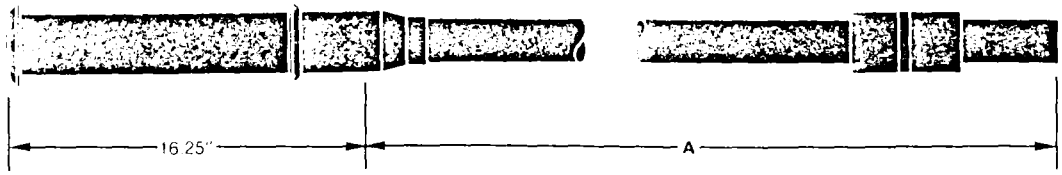
DIMENSIONS

CONSOLE



PROBE SIZES

A = LENGTH OF PROBE
7'6" (2.28 m)
8' (2.44 m)
9' (2.74 m)
10' (3.05 m)
10'6" (3.20 m)
11' (3.35 m)



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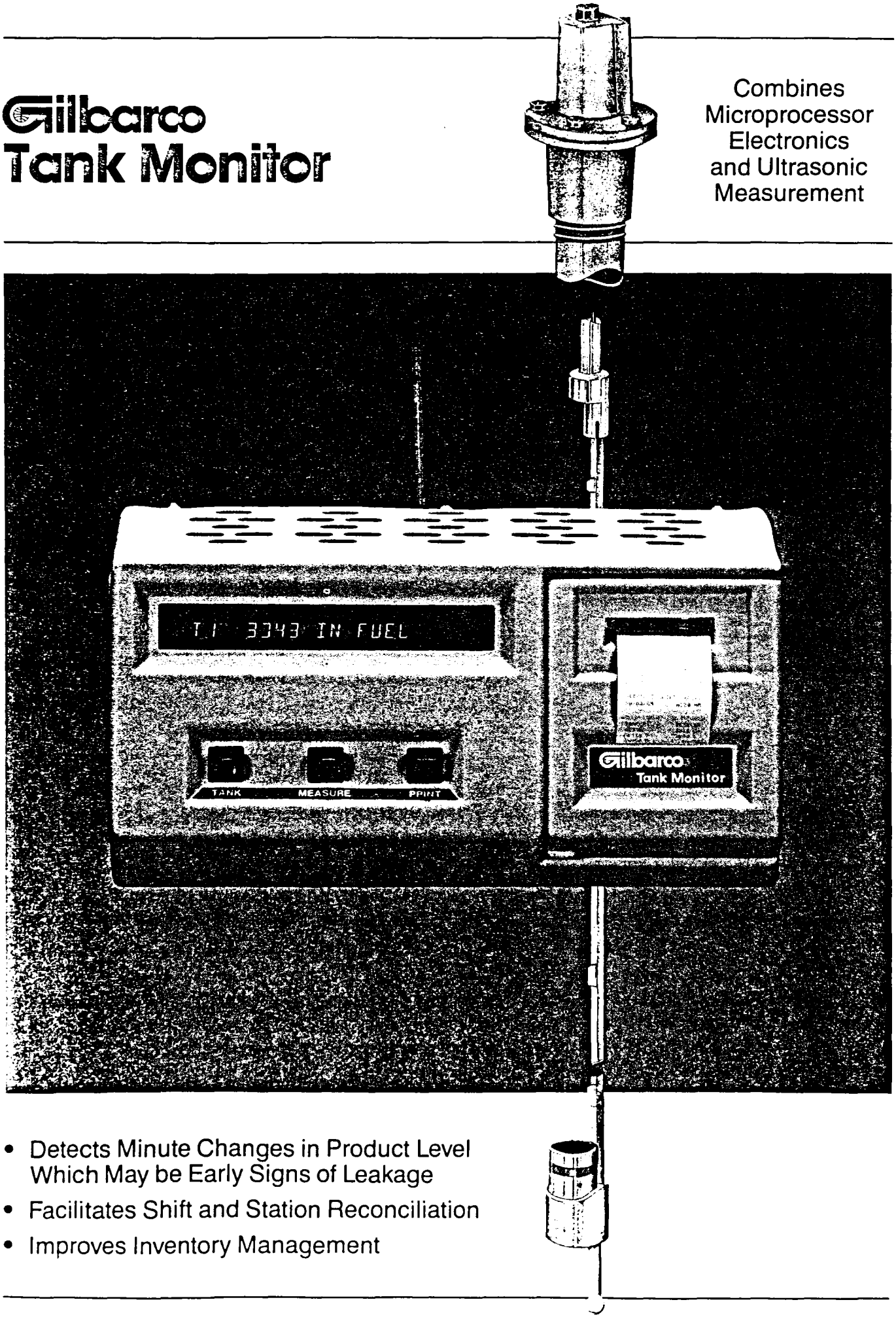
PETROLEUM PRODUCTS

70 SARGEANT STREET, HARTFORD, CT 06102 (203) 527-7201

A9 85

Gilbarco Tank Monitor

Combines Microprocessor Electronics and Ultrasonic Measurement



- Detects Minute Changes in Product Level Which May be Early Signs of Leakage
- Facilitates Shift and Station Reconciliation
- Improves Inventory Management

Gilbarco's Tank Monitor combines two state-of-the-art technologies—microprocessor electronics and ultrasonic measurement to alert you of critical tank conditions and assist in inventory tracking. Continuous in-tank monitoring detects minute changes in product levels which may be early signs of tank leakage.

Programmable alarms also alert you to conditions such as overfill, high water and low product to help avoid serious problems.

You can use information provided by Tank Monitor to simplify shift and station reconciliation. And, printed reports from the console can accompany formal reports as documentation of product readings.

Consisting of a probe with an ultrasonic transducer, coaxial connector cable and a wall-mounted console, the Tank Monitor can be installed in existing tank configurations or easily included in plans for new or upgraded sites.

The Gilbarco Tank Monitor—state of the art technology meeting the needs of advanced petroleum marketing and management.

Precision and Programming

Precision of reading specifications listed below represent values that could be expected in a properly installed and calibrated tank:

Height of Fuel: ± .1" (8,000 gallon tank = ±10 gallons)
Height of Water: ± .2"
Detection of Product Volume Change while in Shutdown Mode: ≥ .1 gallons/hour

Tank charts supplied with your order are factory programmed. Typical tank charts may vary by ±5%. To accomodate for these variations, the length of the tank can be adjusted in the field -10% to +15% in 0.1% increments by programming at the console. A second inaccuracy may also occur if the tank is installed at a tilt or pitch. The Tank Monitor can be adjusted in the field for differences in height due to the pitch.

The Tank Monitor is custom programmed on-site for alarm setpoints: high product, low product and high water. Alarm setpoints are monitored automatically 24 hours a day.

Features & Benefits

Early Detection
Precise volume readings during station shutdown can help you detect minute changes which may be early signs of leakage or pilferage. Early detection of these changes can help protect you and your customers.

If Tank Monitor indicates the possibility of a leak, you can implement your normal verification procedures or request a tank test to be sure.

Alarms
Tank Monitor is custom programmed on site for alarm setpoints. High product, low product and high water alarms are ready 24 hours a day to help alert you of potentially critical conditions inside your tanks. Provisions also exist for installation of a remote audio and visual alarm wired to the console.

Inventory Report
A printed Inventory Report provides detailed information for net volume, gross volume, gross height, water height and ullage upon request. This can be used for reconciliation with sales records and help you maintain proper fuel inventory.

Security
Tank monitor improves station security because operators can obtain tank readings without leaving the kiosk. Access to Tank Monitor's programming and manager modes is protected with keylock security.

In the event of power failure, Tank Monitor's data and programming is protected with a battery designed for a minimum of 72 hour back-up.

Records Deliveries
A Delivery Report enables you to quickly document the amount of fuel received for reconciliation with the driver's records. This report is generated automatically during operating or shutdown periods.

Interface
Compatible with standard RS-232C interface. ASCII coding, using recognized standard ANSI 3.28 protocol.

Built-In Diagnostics
In the event of a malfunction, built-in diagnostics help your local Authorized Service Contractor quickly identify and remedy problems. Tank Monitor's display will signal you of situations requiring a maintenance call, while its printed reports identify malfunction error.

Simple to Operate
Minimal operator training is required to use Tank Monitor. The 20-character alphanumeric vacuum fluorescent display features large, bright characters. One of five access keys and three buttons located directly below the display are the only controls you need.

Ultrasonic Measurement
An ultrasonic transducer inside each of your tanks provides accurate measurement. The transducer contains no moving parts and is less subject to long-term drift than many other in-tank measuring systems.

Automatic Shut Down Mode
Non-operating hours are monitored precisely, securely and automatically. During shut down, increases or decreases in product volume are reported automatically.

Tested & Approved
Tank Monitor has been thoroughly tested by the FCC and is U.L. Approved.

Tank Monitor Reports

SHUT-DOWN REPORT

SHUT-DOWN STARTED
08/08/84 9:34 AM

08/08/84 10:24 AM

TANK #1	REGULAR
BEG VOL	4193 G
END VOL	4193 G
CHANGE	0 G
WATER H	0.1 IN

TANK #.	
BEG VOL	4375 G
END VOL	4375 G
CHANGE	0 G
WATER H	0.1 IN

END OF REPORT

A B C GAS CO.
7300 W. FRIENDLY AVE.
GREENSBORO, N.C.

DELIVERY REPORT

TANK #2
DELIV START 08/16/85
4:04 PM
DELIV END 08/16/85
4:06 PM
DELIV 7171

END OF REPORT

INVENTORY REPORT

08/08/84 9:23 AM

PREVIOUS SHIFT REPORT
08/05/84 6:20 PM

TANK #1	REGULAR
NET V	4187 G
GROSS V	4193 G
GROSS H	23.73 IN
WATER H	0.1 IN
ULLAGE	3804 G

NET V	4365 G
GROSS V	4365 G
GROSS H	24.53 IN
WATER H	0.0 IN
ULLAGE	2832 G

ALARM CONDITIONS

08/08/84 2:25 PM

TANK #1
HI PROD ACTIVE
4:30 PM 24.6 IN

END OF REPORT

POWER UP AT
08/08/84 10:28 AM

POWER FAILED AT
08/08/84 10:25 AM

ALARM HISTORY

08/08/84 12:10 PM

06/12/84 4:53 PM
#1 HI WATER 3.1 IN

06/13/84 12:53 PM
#1 HI WATER 3.1 IN

06/14/84 12:09 PM
#1 HI WATER 3.1 IN

07/31/84 4:30 PM
#1 HI PROD 23.8 IN

END OF REPORT

PRODUCT STATUS REPORT
08/22/85 3:03 PM

TEMPERATURE-CORRECTED
CUMULATIVE GALLONS

HOUR	T1	T2	T3
00	BEG	BEG	BEG
01	0.0	0.0	-0.1
02	0.0	0.0	-0.2
03	0.0	0.0	-0.3
04	0.0	0.0	-0.4
05	0.0	0.0	-0.5
06	0.0	0.0	-0.7
07	0.0	0.0	-0.9
08	0.0	0.0	-0.9

END OF REPORT

Specifications

Capacity
Standard model monitors up to four tanks. Eight tank models also available.

Dot Matrix Printer
Uses metallic, moisture-resistant, high-quality report paper; 21 column.

Probe Installation
Standard 4" tank opening. Required individual 1/2" conduit run from each tank to junction box and a 1" master conduit from junction box to console. Probe installation recommended at center of tank.

Probe length varies according to tank diameter. Available in 68", 92", 104" and 122" lengths.

Power Input
115 or 220, 230, 240 VAC + 10, –15% 47-63 Hz, single phase.

Environment
Ambient; 104° (40°C) to 32°F (0°C) 0-95% humidity.

Configuration
One to eight tanks per console. Console may be located up to 400' (121 meters) from probes.

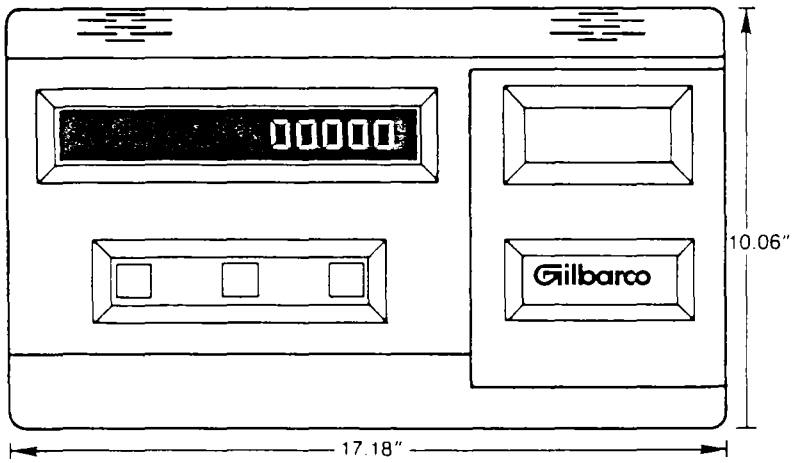
Console Dimensions
Height: 10.06" (25.55 cm)
Width: 17.18" (43.64 cm)
Depth: 5.8" (14.73 cm)

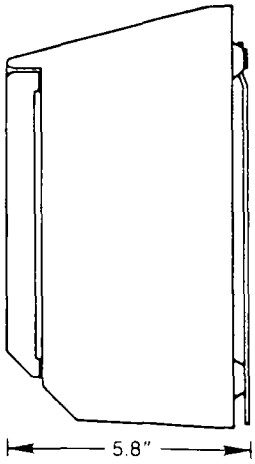
Console Weight
16.75 lbs. (6.75 kg)

Ordering Information
Purchase Orders should be accompanied by a Tank Monitor order form and Tank Charts. These are available from your Gilbarco distributor.

Product specifications are subject to possible modification.

Dimensions





Gilbarco
7300 W. Friendly Avenue
P.O. Box 22087
Greensboro, N.C. 27420 U.S.A.
Phone (919) 292-3011
USA Telex 574435

Distributed by:

APPENDIX D

API PUBLICATION NO. 1604 - TANK ABANDONMENT

Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks

API BULLETIN 1604
FIRST EDITION, MARCH 1981

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005

Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks

Marketing Department

API BULLETIN 1604
FIRST EDITION, MARCH 1981

American
Petroleum
Institute

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FOREWORD

This recommended practice provides a guide in the form of operating procedures which may be used for the abandonment, removal, storage, placed temporarily out of service, and sale of used underground tanks which have contained gasoline or other flammable liquids. Whereas this guide refers to service station features, the principles outlined may be applied to tanks used in other functions. Listed below are other available references which will provide additional guidance.

NFPA No. 30: Flammable and Combustible Liquids Code

NFPA No. 327: Standard Procedure for Cleaning or Safeguarding Small Tanks and Containers

NFPA No. 329: Underground Leakage of Flammable and Combustible Liquids

(Published by the National Fire Protection Association, 470 Atlantic Avenue, Boston, MA 02210)

API Publication 2013, Cleaning Mobile Tanks in Flammable or Combustible Liquid Service

API Publication 2015, Cleaning Petroleum Storage Tanks

API Publication 2015A, A Guide for Controlling the Lead Hazard Associated with Tank Entry and Cleaning (Supplement to API RP 2015)

Storage tanks which have stored flammable liquids should be handled with extreme care when abandoned, moved, or stored. This is particularly true of underground tanks at service stations which are most frequently used for the storage of motor fuel and for the storage of other flammable or combustible liquids such as crankcase drainings (which may contain some gasoline).

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Removal of Underground Tanks	2
Storage of Used Tanks	3
Sale or Reuse	3
Junking	4

Recommended Practice for Abandonment or Removal of Used Underground Service Station Tanks

1—TEMPORARILY OUT OF SERVICE

1.1 Underground tanks are considered "temporarily out of service" if they are idle but will be returned to service, are awaiting abandonment in place, or are awaiting removal.

1.2 Tanks temporarily out of service will be considered safe for the "temporary" period if they are treated as provided in 1.2.1 through 1.2.3.

1.2.1 Remove all flammable liquid with the exception of a sufficient quantity (approximately 4 inches) to assure a saturated vapor space.

1.2.2 Cap the fill pipe and gauge pipe and secure the tank against tampering. Cap the product lines at the service station island or elsewhere if the pumps are removed, or leave the pumps connected and locked. Turn off electric power to the pumps.

1.2.3 Leave the vent line open.

NOTE: This procedure is not intended to apply to tanks containing special fuels or to large installations, such as at airports where specific attention to the problems of corrosion, contamination, and preservation of quality is required.

2—ABANDONMENT IN PLACE

2.1 This guide provides a safe method for the abandonment of underground tanks in place to avoid the cost of removal. Abandonment in place is usually less costly than removal; however, it is not necessarily so when the proper procedures for abandoning tanks in place are carefully followed.

2.2 A determination of whether to abandon a tank in place or to remove it will depend upon the location, labor, materials, local regulations, availability of equipment, and the cost of each of these elements. Additional considerations include the length of service the equipment has provided and its reuse or salvage value. The federal Solid Waste Disposal Act places restrictions on disposal of hazardous materials such as tanks containing lead contaminants.

2.3 Tanks may be effectively and safely abandoned underground by following the steps in 2.3.1 through 2.3.8.

2.3.1 Drain and flush the piping into the tank.

2.3.2 Remove all flammable liquid which can be pumped out. It may be necessary to use a hand pump to remove the bottom few inches of product.

2.3.3 Dig down to the top of the tank.

2.3.4 Remove the fill (drop) tube. Disconnect the fill, gauge, and product lines. Cap or plug open ends of lines which are not to be used further. The vent line should remain connected until the tank is filled as outlined below.

2.3.5 Fill the tank to overflowing with water to purge off all product. As the level of the liquid rises, any remaining product will float on top of the water. When the floating product nears the fill opening, suspend filling, remove the floating product, and place it in a suitable container for proper disposal.

In the process of water-filling the tank, flammable vapors will be expelled through both the vent and fill openings, but primarily at the fill opening. Purged product may also flow out of the fill opening as tank overfilling is continued. The entire area of operation should therefore be considered hazardous and all necessary precautions should be taken to prevent ignition.

In some locations water may not be available or its use may be impractical because of low atmospheric temperatures or for other reasons. In such instances the vapors in the tank may be expelled by adding solid carbon dioxide or another inert gas as explained in 3.1.6.

2.3.6 After water has overflowed the tank, cut one or more large holes in the tank top. This can be accomplished with several blows from a back hoe. Pump out the water and dispose of it in accordance with local regulations. Drive several holes in the tank bottom with a ¾ or 1 inch rod.

2.3.7 Proceed to introduce a suitable, solid, inert material through the hole in the top of the tank.

2.3.7.1 Sand Fill. Sand will flow readily and is generally available. Any kind of sand is suitable if it is free of rocks, which might limit leveling-out in the tank. The sand may be introduced dry as long as it flows in freely. When the cone nears the tank top, the sand can be washed into the tank with a nominal amount of water and puddled to cause it to flow to the ends. The use of large amounts of water should be avoided since the tank might be filled with water before it is filled with sand.

2.3.7.2 Sand and Earth Fill. Almost complete filling can be achieved by using a combination of sand and earth as follows: (1) fill the tank with sand to approximately 80 percent of calculated capacity; (2) mix soil and water to make a free-flowing mud; and (3) pour the mixture into the tank opening and puddle until the tank is full and overflows the fill opening.

2.3.8 Disconnect and cap the vent line.

2.4 When underground tanks are abandoned in place, the owner of the tank should keep a permanent record of the tank location, the date of abandonment, and the method of conditioning the tank for abandonment.

2.5 It is a good business practice to inform property owners of the presence of abandoned underground tanks when properties are sold or at the termination of property leases. It may be desirable to obtain an acknowledgement or a release from the property owner.

3—REMOVAL OF UNDERGROUND TANKS

3.1 The safe removal of underground tanks can be accomplished by taking the steps described in 3.1.1 through 3.1.8.

3.1.1 Drain and flush the piping into the tank.

3.1.2 Remove all flammable liquid from the tank which can be pumped out. It may be necessary to use a hand pump to remove the bottom few inches of product.

3.1.3 Dig down to the top of the tank.

3.1.4 Remove the fill (drop) tube. Disconnect the fill, gauge, product, and vent lines. Cap or plug open ends of lines which are not to be used further.

3.1.5 Temporarily plug all tank openings, complete the excavation, and remove the tank, placing it in a secure location. Block the tank to prevent movement. Before undertaking degassing measures, it is normally necessary to remove the tank from the ground since product which may have previously leaked into the ground could reenter the tank. Extreme caution should be used during this procedure.

3.1.6 Remove flammable vapors. The tank should be conditioned by one of the methods described in 3.1.6.1. through 3.1.6.3, or as required by local codes, to ensure that no flammable vapors remain.

3.1.6.1 If water is available and there is a suitable means for disposal, the tank may be filled with water to expel vapors. While the tank is being filled with water, flammable vapors will flow out of the tank and may surround the area. Purged product may flow out of the tank if it overflows. Hence, observe all normal safety and pollution precautions regarding flammable liquids and vapors. When the tank is to be removed from the premises, the contaminated water should be removed and disposed of in accordance with local regulations.

3.1.6.2 If the method described in 3.1.6.1 is not practicable, the vapors in the tank may be made inert by adding solid carbon dioxide (dry ice) in the amount of 1.5 pounds per 100 gallons of tank capacity. The dry ice should be crushed and distributed evenly over the greatest possible area to secure rapid evaporation. Avoid skin contact with dry ice because it may produce burns. As the dry ice vaporizes, flammable vapors will flow out of the tank and may surround the area. Hence, observe all normal safety precautions regarding flammable vapors. Make sure that all of the dry ice has vaporized.

3.1.6.3 An alternate method is to ventilate the tank with air, using a small gas exhauster operated with compressed air (from the service station or from a portable compressor) or by other suitable means. The flow of air in through an opening near one end of the tank and the discharge of the vapor-air mixture out of an opening near the opposite end will quickly remove the vapor. The vapor concentration in the tank can be checked with a combustible gas indicator to determine when the tank is gas-free. While the tank is being ventilated, flammable vapor may flow into the surrounding atmosphere. Ignition sources should be eliminated from the immediate vicinity.

3.1.7 After the tank has been freed of vapors and before the tank is moved from the site, plug or cap all holes. Use screwed (boiler) plugs to plug any corrosion leak holes. One plug should have a ⅛-inch vent hole to prevent the tank from being subjected to an excessive pressure differential caused by extreme temperature changes.

3.1.8 Finally, the tank should be secured on a truck for

transportation to the disposal site. The tank should be secured so that the ⅛-inch vent hole is located at the uppermost point on the tank.

3.2 If a tank remains at the site overnight, or longer, additional vapor may be released from liquid held in the scale or sediment in the tank. Consequently, tanks should be removed from the premises as promptly as possible after these procedures have been completed.

4—STORAGE OF USED TANKS

4.1 Even though used tanks that have contained flammable liquids have been gas-freed at one time, they cannot be guaranteed to remain gas-free. Hydrocarbons are retained in crevices and under scale and are released over time. It is important, therefore, that tanks always be handled with due precautions in recognition of this condition.

4.2 The procedure outlined in 4.2.1 through 4.2.6 is recommended for storing tanks.

4.2.1 Used tanks should be stored in areas where they can be safeguarded, usually on the locked premises of a tank user familiar with the hazards or at another location where the general public will not have access. A fenced yard, apart from other facilities, is desirable.

4.2.2 If facilities are available for gas-freeing by water-flooding, gas inerting, or mechanical ventilation, it is desirable to gas-free tanks before they are stored. Observe all normal safety and pollution precautions regarding flammable liquids and vapors.

Tanks will become gas-free by natural ventilation if they are stored off the ground with all openings down and open for a protracted period. During this period of natural breathing, caused by temperature change, the vapors may be within their flammable limits. To assure safe operations, the condition of the tanks should be indicated by a label or sign, and unauthorized personnel should be prohibited from the area during this period.

4.2.3 During storage or preparation for storage, scale or sludge may be released from tanks which have contained leaded gasoline. Such scale or sludge must be handled with extreme caution and must be disposed of consistent with the requirements of the Solid Waste Disposal Act and local and state requirements.

4.2.4 Gas-free tanks may be safely stored with unplugged openings, but plugging of all openings is recommended to keep tank interiors clean.

4.2.5 In any of the foregoing cases where all tank openings are to be tightly plugged, screwed plugs should be used. In addition, one plug should have a ⅛-inch vent hole to prevent the tank from being subjected to an excessive pressure differential caused by extreme temperature changes.

4.2.6 The former contents and present vapor state of each tank, if known, or the gas-freeing treatment and date should be indicated by an appropriate label on the tank.

5—SALE OR REUSE

5.1 When tanks are sold for reuse, the purchaser should be given a very clear understanding of the former use and present condition of the tanks. It may or may not be necessary to test the tanks for flammable vapors or to gas-free them.

CAUTION: Tanks which previously contained leaded gasoline *must not be used* for the subsequent storage of food or liquids intended for animal or human consumption.

5.2 It is good business practice to use a bill of sale to transfer tank ownership, in which the purchaser will acknowledge and assume all liability related to the tank. Bills of sale should indicate the former use of the tank and carry the following warning regardless of the condition of the tank.

Tank Has Contained Leaded Gasoline
(or Flammable Liquid)*
Not Gas-Free
Not Suitable for Food or Drinking Water

5.3 The tank should be clearly marked with the same warning as the bill of sale in legible letters not less than 1 inch high, regardless of the condition of the tank.

* Use the applicable designation.

6—JUNKING

6.1 Tanks should be disposed of when they are no longer fit for the storage of flammable liquids or are considered junk. Whether sold to a junk or scrap dealer or discarded at an acceptable facility, sufficient holes should be made in tanks to render them unfit for further use.

6.2 When a tank is gas-free, it should be punctured with a pickax, chisel, or other heavy, sharp object, or many large holes may be drilled into it. When a tank is not gas-free, it should be filled with water until overflowing and punctured many times while full of water.

6.3 As an added precaution, regardless of the condition, the tanks should be labeled in legible letters with the following information:

Tank Has Contained Leaded Gasoline
(or Flammable Liquid)*
Not Gas-Free
Not Suitable for Food or Drinking Water

6.4 Prior to junking gasoline tanks, the latest applicable waste disposal regulations should be checked to determine if special attention or preparation is required.

* Use the applicable designation.

Order No. 804-16040

1-1400 — 3 81 — 1M
1-1400 — 10 83 — 1M
1-1400 — 7 84 — 1M
1-1400 — 6 85 — 1 5M

American Petroleum Institute
1220 L Street, Northwest
Washington, D.C. 20005

APPENDIX E

AVIATION FUEL TANKS

APPENDIX E

NAVAL AIR STATION
MEMPHIS, TENNESSEE

AVGAS TANKS

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
303	N94	44	25000	C/S	-	-	-	-	X	-	G
1241	N94	44	25000	C/S	Lining	-	-	-	X	-	G

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX F

DIESEL FUEL TANKS

APPENDIX F -1

Harding Lawson Associates

NAVAL AIR STATION
MEMPHIS, TENNESSEE

DIESEL TANKS

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
301	N94	42	7500	S/S	--	A	-	-	X	-	G
N1	N-1	44	50	S/S	U	U	-	-	X	-	G
N2	N-2	43	500	S/S	-	A	-	-	X	-	G
S237	S-237	33	550	S/S	-	A	-	-	X	-	G
S240A	S-240	33	110	S/S	U	U	-	-	X	-	G
S240B	S-240	33	110	S/S	U	U	-	-	X	-	G
S240C	S-240	33	110	S/S	U	U	-	-	X	-	G
348	348	25	250	S/S	-	A	-	-	X	-	G
378	378	21	500	S/S	-	A	-	-	X	-	G

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX F-2

NAVAL AIR STATION
MEMPHIS, TENNESSEE

DIESEL TANKS (CONT.)

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
383	383	21	500	S/S	-	A	-	-	X	-	G
890	890	29	300	S/S	-	A	-	-	X	-	G

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX G

FUEL OIL TANKS

APPENDIX G -1

Harding Lawson Associates

NAVAL AIR STATION
MEMPHIS, TENNESSEE

FUEL OIL TANKS

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
S89	S-89	43	2000	S/S	-	A	-	-	X	-	G
106	100	14	12000	S/S	IL	-	-	-	-	-	G
S159	S-159	43	500	S/S	-	-	-	-	X	-	G
107	100	14	12000	S/S	IL	-	-	-	-	-	G
114	100	12	1000	S/S	-	A	-	X	0	0	G
304	N94	44	100000	C/S	-	-	-	X	0	0	G
599	599	43	2000	S/S	-	-	-	-	X	-	G

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
0 = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX G-2

NAVAL AIR STATION
MEMPHIS, TENNESSEE

FUEL OIL TANKS (CONT.)

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
1239	N94	44	100000	C/S	-	-	-	-	X	-	G
1676	773	1	500	S/GS	-	-	-	-	-	-	G
1677	773	1	500	S/GS	-	-	-	-	-	-	G
1240	S-75	43	100000	C/S	-	-	-	-	X	-	G
1299A	S-75	1	7500	S/S	-	A	-	-	-	-	G
1299B	S-75	1	7500	S/S	-	A	-	-	-	-	G
1556	S-75	43	100000	C/S	-	-	-	-	X	-	G
1557	S-75	43	100000	C/S	-	-	-	-	X	-	G
1593	S-88	43	18000	S/S	-	A	-	-	X	-	G

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown
GS = Galvanized Steel

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX H

JET PROPULSION FUEL TANKS

APPENDIX H

NAVAL AIR STATION
MEMPHIS, TENNESSEE

JET PROPULSION FUEL

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Content	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
336	AR1	28	420000	S/S	Liner	A	JP-5	-	X	O	O	G
337	AR1	28	420000	S/S	Liner	A	JP-5	-	X	O	O	G
1489	AFFR	21	1800	S/I	-	-	JP-4	-	-	X	-	G
1490	AFFR	21	1800	S/I	-	-	JP-4	-	-	X	-	G
1491	AFFR	21	1800	S/I	-	-	JP-4	-	-	X	X	G
1508	AFFR	19	5000	S/I	-	-	JP-4	-	-	X	-	G

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX I

MOTOR FUEL TANKS

APPENDIX I

NAVAL AIR STATION
MEMPHIS, TENNESSEE

MOTOR FUEL TANKS

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
N11	N-11	33	55	S/S	U	U	U	-	X	-	G
N12	N-12	43	55	S/S	U	U	-	-	X	-	G
S75N	S-75	8	U	S/S	U	U	-	-	-	-	G
S75E	S-75	43	280	S/S	-	A	-	-	X	-	G
1242	N-94	42	15000	S/S	-	A	-	-	X	-	G
1243	N-94	42	15000	S/S	-	A	-	-	X	-	G
1249	375	39	4250	S/S	-	A	-	-	X	-	G
1482	375	22	8000	S/S	-	A	-	-	X	-	G
1546	758	17	20000	S/S	-	-	L	-	-	X	G
1547	758	17	20000	S/S	-	-	L	-	-	X	G
1617	758	12	10000	S/S	-	-	L	-	-	X	G

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX J

OIL/WATER SEPARATORS

APPENDIX J -1

NAVAL AIR STATION
MEMPHIS, TENNESSEE

OIL/WATER SEPARATORS

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Content	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
1620	N94	9	10000	F/F	-	-	M	-	-	-	-	-
1621	N126	9	10000	F/F	-	-	AV	-	-	-	-	-
1622	AR1	9	5000	F/F	-	-	JP-4	-	-	-	-	-
1623	AR1	9	5000	F/F	-	-	JP-4	-	-	-	-	-
1624	758	9	3000	F/F	-	-	M	-	-	-	-	-
1625	S-108	9	8000	F/F	-	-	FO6	-	-	-	-	-
1627	759	9	3000	F/F	-	-	M	-	-	-	-	-
1637	N-7	9	2000	S/S	-	-	WO	-	-	-	-	-
1639	775	7	700	S/S	-	-	WO	-	-	-	-	-
1647	S-341	6	2000	C/S	-	-	WO	-	-	-	-	-
1655	397	6	1000	C/I	-	-	WO	-	-	-	-	-

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

WO = Waste Oil
AV = Aviation Fuel
M = Motor Fuel
FO6 = No. 6 Fuel Oil
JP4 = Jet Propulsion Fuel No. 4

Note: All tanks/piping are steel unless otherwise indicated

NAVAL AIR STATION
MEMPHIS, TENNESSEE

OIL/WATER SEPARATORS (CONT.)

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Content	Leak/ Spill History	RECOMMENDATIONS Test T/P	Replace T/P	Ground-Water Monitoring	Inventory Control Program
1657	S-9	9	1500	C/I	-	-	WO	-	-	-	-	
1662	AFFR	9	20000	C/I	-	-	WO	-	-	-	-	
CBV-I	344	4	500	C/S	-	-	WO	-	-	-	-	
HS-II	N-114	4	1000	C/S	-	-	WO	-	-	-	-	

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

WO = Waste Oil
AV = Aviation Fuel
M = Motor Fuel
FU6 = No. 6 Fuel Oil
JP4 = Jet Propulsion Fuel No. 4

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX K

WASTE OIL TANKS

APPENDIX L

ABANDONED TANKS

APPENDIX L-1

NAVAL AIR STATION
MEMPHIS, TENNESSEE

ABANDONED TANKS

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Content	Leak/ Spill History	Recommendation
302	N94	30	25000	S/S	-	AV	V	-	Remove Tank
1244	S75	44	50000	C/S	-	-	FO	L	Remove Tank
1245	S75	44	25000	C/S	-	-	FO	L	Remove Tank
1246	S75	44	25000	C/S	-	-	FO	L	Remove Tank
1250	N94	43	25000	S/S	-	A	AV	-	Remove Tank
1251	N94	44	25000	S/S	-	A	AV	-	Remove Tank
1252	N94	44	25000	S/S	-	A	AV	-	Remove Tank
1253	N94	44	25000	S/S	-	A	AV	-	Remove Tank
1254	N94	44	25000	S/S	-	A	AV	-	Remove Tank
1255	N94	44	25000	S/S	-	A	AV	-	Remove Tank
1256	N94	44	25000	S/S	-	A	AV	-	Remove Tank

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown
FO = Fuel Oil
AV = Aviation Fuel

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX L-2

NAVAL AIR STATION
MEMPHIS, TENNESSEE

ABANDONED TANKS (CONT)

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Content	Leak/ Spill History	Recommendation
1257	N94	44	25000	S/S	-	A	AV	-	Remove Tank
1258	N94	44	25000	S/S	-	A	AV	-	Remove Tank
N6	N-6	44	500	S/S	U	U	M	-	Remove Tank
78	N-78	44	500	S/S	U	U	M	L	Remove Tank
N91	N91	42	1500	S/S	-	-	FO	-	Remove Tank
N10	N-10	U	5000	S/S	U	U	U	-	Remove Tank
299	299	36	500	S/S	U	U	U	-	Remove Tank

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

FO = Fuel Oil
M = Motor Fuel
AV = Aviation Fuel

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX L-3

NAVAL AIR STATION
MEMPHIS, TENNESSEE

ABANDONED TANKS (CONT)

Tank Number	Building Number	Age (Years)	Capacity (Gallons)	Const. MTL. T/P	Internal Protect.	External Protect.	Content	Leak/ Spill History	Recommendations
1594	1594	11	U	U/S	U	U	U	-	Remove Tank
S8	S8	43	500	S/S	U	U	D	-	Remove Tank
S 75W	575	43	280	S/S	U	U	D	-	Remove Tank
341 A	341	U	U	S/S	U	U	M	-	Remove Tank
341 B	341	U	U	S/S	U	U	M	-	Remove Tank
341 C	341	U	U	S/S	U	U	M	-	Remove Tank
1565	1564	17	10000	S/S	-	-	M	-	Remove Tank
1566	1564	17	10000	S/S	-	-	M	-	Remove Tank
1618	1564	12	10000	S/S	-	-	M	-	Remove Tank

Legend

L = Leak
SP = Spill
G = Gauge tanks for product and water every 15 days (minimum) and maintain records of product receipts
- = No Action Required
O = Action Pending Test Results
T/P = Tank/Piping
X = Action Required

C = Concrete
S = Steel
F = Fiberglass
I = Iron
A = Asphaltic
U = Unknown

D = Diesel Fuel
M = Motor Fuel

Note: All tanks/piping are steel unless otherwise indicated

APPENDIX M

POLLUTION CONTROL REPORTS

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT INFORMATION
EXHIBIT I INFORMATION (R

MEDIA: Solid Waste EFD: SODIV UIC: N00639
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Soil Sampling/Analysis +

FACILITY: Naval Air Station, Memphis, Tennessee
ADDRESS: Millington, Tennessee
AGENCY CONTACT: Janet Cook

FUND CMD: NAVFAC APPN: ERDI
STATUS: PP

INTERNATIONAL PROJECT NUMBER: _____

+COST OF POLLUTION CONTROL MEASURES IN THOUSANDS OF DOLLARS: 9.5 +

FY	DESIGN	FUNDED	CONSTR	FUNDED
87	.5	No	9.0	No

TOTAL COST: 9.5

+ AGENCY PROJECT SCHEDULE DATES +

DESIGN (START): ___ ___ ___
DESIGN (COMPLETION): ___ ___
CONSTR (START): ___ ___
CONSTR (COMPLETION): ___ ___
FINAL COMPLIANCE: ___ ___
REG FINAL COMPLIANCE: ___ ___

+CONGRESSIONAL AUTHORITY DATES: MCON+

(MO / YEAR)

SCHEDULED: ___ ___
REQUESTED: ___ ___
RECEIVED: ___ ___
35% DESIGN COMPLETION ___ ___

+ OTHER PCR DATES +

APPROVED: ___ ___
PREPARED: 8 86
REVISED: ___ ___

+ INFO FOR NEESA USE +

POLLUTANT CATEGORY HAZD
POLLUTANT SOURCE
CORRECTIVE ACTION
NAVFAC PROGRAM ELEMENT
EPA CODE NOP PCS
ACEL OCSC
PRIORITY ___
VARIOUS LOCATIONS No
MAJOR REVISION ___
LEGAL ACTION CODE ___
LEGAL CITATION _____

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT I INFORMATION

MEDIA: Solid Waste EFD: SODIV UIC: N00639
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Soil Sampling/Analysis +

1. PROBLEM STATEMENT

During evaluation of underground storage tanks at this activity, it was determined that soil sampling and anlaysis should be performed at all tank locations except where tanks have been removed or fluids have been removed and tanks backfilled with sand.

2. REMEDIAL ACTION

Soil sampling and analysis will verify that contamination has or has not occurred, as well as establish a baseline for comparison with future analyses.

3. APPLICABLE STANDARDS

40 CFR 280 - EPA Regulations which prohibit loss of fuels to the environment.

4. OTHER PCR INFORMATION

Deficiencies and evaluation criteria are presented in the Phase II Report.

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT INFORMATION
EXHIBIT I INFORMATION (R

MEDIA: Solid Waste EFD: SODIV UIC: N00639
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Integrity Testing +

FACILITY: Naval Air Station, Memphis, Tennessee
ADDRESS: Millington, Tennessee
AGENCY CONTACT: Janet Cook

FUND CMD: NAVFAC APPN: ERDI
STATUS: PP

INTERNATIONAL PROJECT NUMBER: _____

+COST OF POLLUTION CONTROL MEASURES IN THOUSANDS OF DOLLARS: 10.4 +

FY	DESIGN	FUNDED	CONSTR	FUNDED
87	.6	No	9.8	No

TOTAL COST: 10.4

+ AGENCY PROJECT SCHEDULE DATES +

DESIGN (START): ___ ___ ___
DESIGN (COMPLETION): ___ ___
CONSTR (START): ___ ___
CONSTR (COMPLETION): ___ ___
FINAL COMPLIANCE: ___ ___
REG FINAL COMPLIANCE: ___ ___

+CONGRESSIONAL AUTHORITY DATES: MCON+

(MO / YEAR)

SCHEDULED: ___ ___
REQUESTED: ___ ___
RECEIVED: ___ ___
35% DESIGN COMPLETION ___ ___

+ OTHER PCR DATES +

APPROVED: ___ ___
PREPARED: 8 86
REVISED: ___ ___

+ INFO FOR NEESA USE +

POLLUTANT CATEGORY HAZD
POLLUTANT SOURCE
CORRECTIVE ACTION
NAVFAC PROGRAM ELEMENT
EPA CODE NOP PCS
ACEL OCSC
PRIORITY ___
VARIOUS LOCATIONS No
MAJOR REVISION ___
LEGAL ACTION CODE ___
LEGAL CITATION _____

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT I INFORMATION

MEDIA: Solid Waste EFD: SODIV UIC: N00639
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Integrity Testing +

1. PROBLEM STATEMENT

During evaluation of underground storage tanks at this activity, it was determined that 7 tanks and associated external piping require immediate integrity testing. These tanks have either a leak/spill history or are at an age which requires testing to ensure integrity and reduce risk to the environment.

2. REMEDIAL ACTION

Tank/piping integrity testing will either verify that the system is sound or expose the tank(s) as an environmental risk, which would necessitate replacement.

3. APPLICABLE STANDARDS

40 CFR 280 - EPA Regulations which prohibit loss of fuels to the environment.

4. OTHER PCR INFORMATION

Deficiencies and evaluation criteria are presented in the Phase II Report.

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT INFORMATION
EXHIBIT I INFORMATION (R

MEDIA: Solid Waste EFD: SODIV UIC: N00639
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Monitoring Well Installation +

FACILITY: Naval Air Station, Memphis, Tennessee
ADDRESS: Millington, Tennessee
AGENCY CONTACT: Janet Cook

FUND CMD: NAVFAC APPN: ERDI
STATUS: PP

INTERNATIONAL PROJECT NUMBER: _____

+COST OF POLLUTION CONTROL MEASURES IN THOUSANDS OF DOLLARS: 8.8 +

FY	DESIGN	FUNDED	CONSTR	FUNDED
87	.5	No	8.3	No

TOTAL COST: 8.8

+ AGENCY PROJECT SCHEDULE DATES +

DESIGN (START): ___ ___ ___
DESIGN (COMPLETION): ___ ___
CONSTR (START): ___ ___
CONSTR (COMPLETION): ___ ___
FINAL COMPLIANCE: ___ ___
REG FINAL COMPLIANCE: ___ ___

+CONGRESSIONAL AUTHORITY DATES: MCON+

(MO / YEAR)

SCHEDULED: ___ ___
REQUESTED: ___ ___
RECEIVED: ___ ___
35% DESIGN COMPLETION ___ ___

+ OTHER PCR DATES +

APPROVED: ___ ___
PREPARED: 8 86
REVISED: ___ ___

+ INFO FOR NEESA USE +

POLLUTANT CATEGORY HAZD
POLLUTANT SOURCE
CORRECTIVE ACTION
NAVFAC PROGRAM ELEMENT
EPA CODE NOP PCS
ACEL OCSC
PRIORITY ____
VARIOUS LOCATIONS No
MAJOR REVISION ___
LEGAL ACTION CODE _
LEGAL CITATION _____

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT I INFORMATION

MEDIA: Solid Waste EFD: SODIV UIC: N00639
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Monitoring Well Installation +

1. PROBLEM STATEMENT

0001 During evaluation of underground storage tanks
0002 at this activity, it was determined that twelve
0003 monitoring wells should be installed, two
0010 around each of six tanks.
0020
0030
0040
0050

2. REMEDIAL ACTION

0001 Monitoring wells will identify the extent and
0002 magnitude of contamination.
0003
0010
0020
0030
0040
0050

3. APPLICABLE STANDARDS

0001 40 CFR 280 - EPA Regulations which prohibit
0002 loss of fuels to the environment.
0003
0010
0020
0030
0040
0050

4. OTHER PCR INFORMATION

0001 Deficiencies and evaluation criteria are
0002 presented in the Phase II Report.
0003
0010
0020
0030
0040
0050

SPECIAL PROJECT REQUEST
NAVFAC 11014/64 (REV. 5-74)
Supersedes NAVFAC 9-11014/64 (11-68)
S/N 0105-LF-003-4230

Appendix M - 1.7

STEP TWO SUBMISSION

1. ACTIVITY SNDL NO.:
ACTIVITY NAME AND LOCATION: Naval Air Station, Memphis, Tennessee
DATE SUBMITTED: August 1986

2. PROJECT NO.:
TITLE: Phase II, UGST Monitoring Well Installation

3. TYPE
a. [ ] MAINT./REPAIR b. [ ] MINOR CONSTRUCTION/ ALTERATION c. [ ] AIR CONDITIONING [X] EQUIPMENT INSTALLATION

4. DESCRIBE AND STATE FUNCTION OF FACILITY
Underground storage tanks which supply fuels for automobiles, ships, aircraft, emergency generators and heating and their associated external piping.

a. PROPERTY RECORD CARD NO.
b. NAVY CATEGORY CODE
c. BLDG. OR STRUCTURE NO.

5. WHAT IS THE EFFECT OF THIS PROJECT ON THE MISSION OF THE ACTIVITY?
Installation of monitoring wells will permit detection of contamination, thereby conserving fuel and reducing costs for product replacement and soil/aquifer restoration.

6. THE REQUIREMENT FOR THE FACILITY IS BASED ON:
a. [ ] A CHANGE IN MISSION b. [X] FULL-TIME CONTINUING NEED c. [ ] 3 TO 5 YEAR NEED d. [ ] LESS THAN 3 YEARS' NEED e. [ ] CURRENTLY REQUIRED LESS THAN 50% OF TIME f. [ ] RESERVED FOR FUTURE REQUIREMENTS

7a. EST. FUNDED COST	b. EST. PROJECT COST	c. EST. PLANNING COST	d. TOTAL FUNDS REQUESTED	e. EST. FACIL. REPL. COST
$ 8,300	$ 7,860	$ 470	$ 8,300	$

8. DATE FACILITY CONSTRUCTED: 20 + yrs. ago

9. IS FACILITY ON AN APPROVED BASIC FACILITY REQUIREMENTS LIST? *If "NO," how was need determined?*
[ ] YES [X] NO Result of in-depth assessment of condition

10. IS PROJECT LISTED ON ANNUAL INSPECTION SUMMARY? *If answer is "NO," and AIS is applicable, explain exclusion.*
[ ] YES [ ] NO [X] N.A.

11. DESCRIBE CONDITION TO BE CORRECTED, OR PROBLEM TO BE SOLVED WITH PROPOSED SOLUTION. *Attach additional description if necessary. ONE PAGE ONLY.*
Prevent and/or detect contamination of groundwater and soils.

12. WHY IS THE PROPOSED SOLUTION BEST – AND WHAT ALTERNATIVES WERE CONSIDERED?
Prevent and/or detect contamination of the environment by installing required monitoring wells where double walled FRP with between wall leak detection systems have not been installed.

13. WERE ANY NON-NAVY EXPERTS INVITED TO REVIEW THIS PROBLEM AND THIS SOLUTION? *Explain effect on solution.*
a. [X] YES b. [ ] NO
Review and study, which were based on state-of-the-art technology, resulted in the recommendation/solution.

14. HAS EFD DESIGN DIVISION REVIEWED SOLUTION? a. [ ] YES b. [X] NO

15. CAN ANOTHER FACILITY BE ECONOMICALLY ADAPTED FOR THIS FUNCTION? a. [ ] YES b. [X] NO

*16. CAN PROJECT BE FUNDED IN PHASES? *How? How many?*
a. [ ] YES b. [X] NO

*17. THIS PROJECT IS THE RESULT OF
a. [ ] INADEQUATE MAINTENANCE b. [X] FACILITY AGE c. [ ] DEFICIENT CONSTR. d. [ ] DEFICIENT DESIGN e. [ ] OTHER: _____

*18. HAS THIS SPECIFIC PROBLEM BEEN CORRECTED PREVIOUSLY?
a. [ ] YES b. [X] NO *When?*

HOW LONG WILL PROPOSED CORRECTIVE ACTION LAST? N/A YEARS

PZ 977

19. ARE COMPONENTS BEING INCREASED IN SIZE OR CAPACITY? *Explain the difference, including cost.*

a. [ ] YES b. [X] NO

20. ARE MATERIALS PROPOSED FOR USE THE SAME AS THOSE EXISTING? *If "NO," explain the difference, including cost.*

a. [ ] YES b. [X] NO

Installation of 12, 4-inch, schedule 40 PVC monitoring wells.

21. PROJECT IS PLANNED TO BE ACCOMPLISHED BY

a. [ ] STATION LABOR b. [X] CONTRACT

22. HAS A PROJECT EVER BEEN SUBMITTED FOR THE REPLACEMENT OF THIS OR SIMILAR FACILITIES? *Check and explain if "YES."*

a. [ ] YES b. [X] NO *When?*

23. ANTICIPATED SAVINGS IF PROJECT IS DONE THIS YEAR AS COMPARED TO A DEFERRAL OF ONE YEAR.

PROBABLE INCREASE IN PROJECT COST FOR ANY JUSTIFIABLE REASON	REDUCTION IN CURRENT MAINT. COST	REDUCTION IN CURRENT OPERATIONS COST
$ 9,200.00 inflation at 10 percent	$	$

JUSTIFY ANY SAVINGS INDICATED	WHAT IS PAY BACK PERIOD OF PROJECT? *(In years)*
The savings of $900.00 by avoiding inflation	N/A

WILL ACCOMPLISHMENT GENERATE REQUIREMENTS FOR ADDITIONAL M&O FUNDS OR PERSONNEL? a. [X] NO b. [ ] YES *Est. Ann.*

24. WHAT WOULD BE THE EFFECT OF DEFERRING THE PROJECT ONE YEAR?

Potential liability for pollution of the environment and violation of federal and state regulations.

*25. IF THE PROJECT IS NOT ACCOMPLISHED NOW, IN HOW MANY YEARS WILL THERE BE SERIOUS DAMAGE TO THE FACILITY AND/OR ITS CONTENTS OR IMPAIRMENT TO ESSENTIAL OPERATIONS? *Explain, include loss value to facility and/or contents.*

YEARS BEFORE SERIOUS DAMAGE OCCURS 0.

*26. HAS THE REDUCED UTILIZATION OF THIS SPECIFIC FACILITY AFFECTED A LARGE FACILITY SYSTEM OPERATION? *Explain.*

a. [ ] YES b. [X] NO BY HOW MUCH? _____%.

27. ARE THERE ANY OTHER FACTORS INVOLVED? *Check and explain.*

a. [ ] MORALE b. [X] HEALTH c. [X] PUBLIC RELATIONS d. [X] SAFETY e. [X] FIRE PROTECTION f. [ ] SECURITY g. [ ] OTHER

28. CERTIFICATION BY RESPONSIBLE OFFICER AT ACTIVITY: I am personally cognizant of the need for, the essentiality of, and the proposed method of accomplishment of this project and certify that the above information is correct, and that this project meets all criteria specified in OPNAVINST 11010.20 and subsequent changes thereto.

SIGNATURE	TITLE	DATE

29. EFD TECHNICAL VALIDATION *(If required) (see para 7303, OPNAVINST 11010.20C)*

SIGNATURE	TITLE	DATE

ENCLOSURES:

a. [X] ENGINEERING EST. *(NAVFAC 2417)* b. [ ] LOCATION PLAN(S) c. [ ] DRAWINGS d. [ ] PHOTOGRAPHS

**NOT applicable to Minor Construction, Alterations, or Equipment Installation*

end

NAVFAC 11013/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED: August 1986

SHEET 1 OF 1

ACTIVITY AND LOCATION: Naval Air Station

PROJECT TITLE: Underground Storage Tank - Phase II Monitoring Well Installation

CONSTRUCTION CONTRACT NO:

ESTIMATED BY: CIPM

STATUS OF DESIGN: [X] PED [ ] 30% [ ] 100% [ ] FINAL [ ] Other (Specify)

IDENTIFICATION NUMBER:

CATEGORY CODE NUMBER:

JOB ORDER NUMBER:

ITEM DESCRIPTION	QUANTITY		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
4-inch schedule 40 PVC Monitoring Wells,	12	ea.	655	7860	39.3	471.6	694.3	8,331
15 feet deep at 304, 1546, 1547, 1617, 336,								
and 337								

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT INFORMATION
EXHIBIT I INFORMATION (R

MEDIA: Solid Waste EFD: SODIV UIC: N00612
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Tank/Piping Replacement +

FACILITY: Naval Air Station, Memphis, Tennessee
ADDRESS: Millington, Tennessee
AGENCY CONTACT: Janet Cook

FUND CMD: ACTIVITY APPN: O&MN
STATUS: PP

INTERNATIONAL PROJECT NUMBER: _____

+COST OF POLLUTION CONTROL MEASURES IN THOUSANDS OF DOLLARS: 1513 +

FY	DESIGN	FUNDED	CONSTR	FUNDED
82	435	No	1078	No

TOTAL COST: 1513

+ AGENCY PROJECT SCHEDULE DATES +

DESIGN (START):		
DESIGN (COMPLETION):		
CONSTR (START):		
CONSTR (COMPLETION):		
FINAL COMPLIANCE:		
REG FINAL COMPLIANCE:		

+CONGRESSIONAL AUTHORITY DATES: MCON+

	(MO / YEAR)	
SCHEDULED:		
REQUESTED:		
RECEIVED:		
35% DESIGN COMPLETION		

+ OTHER PCR DATES +

APPROVED:		
PREPARED:	8	86
REVISED:		

+ INFO FOR NEESA USE +

POLLUTANT CATEGORY HAZD
POLLUTANT SOURCE
CORRECTIVE ACTION
NAVFAC PROGRAM ELEMENT
EPA CODE NOP PCS
ACEL OCSC
PRIORITY
VARIOUS LOCATIONS No
MAJOR REVISION
LEGAL ACTION CODE
LEGAL CITATION

ENVIRONMENTAL POLLUTION CONTROL REPORT (PCR)
PROPOSED PROJECT REPORT
EXHIBIT I INFORMATION

MEDIA: Solid Waste EFD: SODIV UIC: N00612
PROJECT NO.: S

+ PROJECT NAME: UGST PH II - Tank/Piping Replacement +

1. PROBLEM STATEMENT

During evaluation of underground storage tanks at this activity, it was determined that 30 tanks and associated external piping require immediate replacement due to age and/or leak-spill histories. Continued use will pose serious risk to the environment and loss of valuable product.

2. REMEDIAL ACTION

Replacement of tanks and associated piping will prevent further environmental degradation.

3. APPLICABLE STANDARDS

40 CFR 280 - EPA Regulations which prohibit loss of fuel to the environment and specify tank/piping construction, maintenance and monitoring requirements.

4. OTHER PCR INFORMATION

Deficiencies and evaluation criteria are presented in the Phase II Report.

SPECIAL PROJECT REQUEST
NAVFAC 11014/64 (REV. 5-74)
Supersedes NAVFAC 9-11014/64 (11-68)
S/N 0105-LF-003-4230

STEP TWO SUBMISSION

1. ACTIVITY SNDL NO.
ACTIVITY NAME AND LOCATION: Naval Air Station, Memphis, Tennessee
DATE SUBMITTED: August , 1986

2. PROJECT NO.
TITLE: Phase II, UGST Elevaluation/Remedial Action Recommendation

3. TYPE
a. [ ] MAINT./REPAIR b. [ ] MINOR CONSTRUCTION/ ALTERATION c. [ ] AIR CONDITIONING [X] EQUIPMENT INSTALLATION

4. DESCRIBE AND STATE FUNCTION OF FACILITY

Underground storage tanks which supply fuels for automobiles, ships aircraft, emergency generators, heating and their associated external piping.

a. PROPERTY RECORD CARD NO.
b. NAVY CATEGORY CODE
c. BLDG. OR STRUCTURE NO.

5. WHAT IS THE EFFECT OF THIS PROJECT ON THE MISSION OF THE ACTIVITY?

Replacement of tanks and associated external piping will prevent and/or halt environmental pollution. This will bring the activity into compliance with federal and state regulations.

6. THE REQUIREMENT FOR THE FACILITY IS BASED ON:
a. [ ] A CHANGE IN MISSION b. [X] FULL-TIME CONTINUING NEED c. [ ] 3 TO 5 YEAR NEED d. [ ] LESS THAN 3 YEARS' NEED e. [ ] CURRENTLY REQUIRED LESS THAN 50% OF TIME f. [ ] RESERVED FOR FUTURE REQUIREMENTS

7a. EST. FUNDED COST	b. EST. PROJECT COST	c. EST. PLANNING COST	d. TOTAL FUNDS REQUESTED	e. EST. FACIL. REPL. COST
$	$ 1,513,000	$	$	$

8. DATE FACILITY CONSTRUCTED: 20 + yrs. ago

9. IS FACILITY ON AN APPROVED BASIC FACILITY REQUIREMENTS LIST? *If "NO," how was need determined?*
[ ] YES [X] NO Result of in-depth assessment of condition.

10. IS PROJECT LISTED ON ANNUAL INSPECTION SUMMARY? *If answer is "NO," and AIS is applicable, explain exclusion.*
[ ] YES [ ] NO [X] N.A.

11. DESCRIBE CONDITION TO BE CORRECTED, OR PROBLEM TO BE SOLVED WITH PROPOSED SOLUTION. *Attach additional description if necessary, ONE PAGE ONLY.*

Prevent loss of fuels and thereby protect the soils and groundwater.

12. WHY IS THE PROPOSED SOLUTION BEST — AND WHAT ALTERNATIVES WERE CONSIDERED?

EPA regulations require that no leakage occur. Tanks/piping 20 years old or older are considered to be obsolete by current industry standards.

13. WERE ANY NON-NAVY EXPERTS INVITED TO REVIEW THIS PROBLEM AND THIS SOLUTION? *Explain effect on solution.*

a. [X] YES b. [ ] NO

Review and study, which were based on state-of-the-art technology, resulted in the recommendation/solution.

14. HAS EFD DESIGN DIVISION REVIEWED SOLUTION? a. [ ] YES b. [X] NO

15. CAN ANOTHER FACILITY BE ECONOMICALLY ADAPTED FOR THIS FUNCTION? a. [ ] YES b. [X] NO

*16. CAN PROJECT BE FUNDED IN PHASES? *How? How many?*
a. [ ] YES b. [X] NO

*17. THIS PROJECT IS THE RESULT OF
a. [ ] INADEQUATE MAINTENANCE b. [X] FACILITY AGE c. [ ] DEFICIENT CONSTR. d. [ ] DEFICIENT DESIGN e. [ ] OTHER: _____

*18. HAS THIS SPECIFIC PROBLEM BEEN CORRECTED PREVIOUSLY?
a. [ ] YES b. [X] NO *When?*

HOW LONG WILL PROPOSED CORRECTIVE ACTION LAST? 20 YEARS

PZ 977

19. ARE COMPONENTS BEING INCREASED IN SIZE OR CAPACITY? *Explain the difference, including cost.*

a. [ ] YES b. [X] NO

20. ARE MATERIALS PROPOSED FOR USE THE SAME AS THOSE EXISTING? *If "NO," explain the difference, including cost.*

a. [ ] YES b. [X] NO Replace steel tanks with double-walled fiberglass reinforced plastic tanks, and associated external piping with either steel or fiberglass piping.

21. PROJECT IS PLANNED TO BE ACCOMPLISHED BY

a. [ ] STATION LABOR b. [X] CONTRACT

22. HAS A PROJECT EVER BEEN SUBMITTED FOR THE REPLACEMENT OF THIS OR SIMILAR FACILITIES? *Check and explain if "YES."*

a. [ ] YES b. [X] NO *When?*

23. ANTICIPATED SAVINGS IF PROJECT IS DONE THIS YEAR AS COMPARED TO A DEFERRAL OF ONE YEAR.

PROBABLE INCREASE IN PROJECT COST FOR ANY JUSTIFIABLE REASON	REDUCTION IN CURRENT MAINT. COST	REDUCTION IN CURRENT OPERATIONS COST
$ 1,664,000 inflation at 10 percent	$	$

JUSTIFY ANY SAVINGS INDICATED	WHAT IS PAY BACK PERIOD OF PROJECT? *(In years)*
The savings of $151,000 by avoiding inflation	N/A

WILL ACCOMPLISHMENT GENERATE REQUIREMENTS FOR ADDITIONAL M&O FUNDS OR PERSONNEL? a. [X] NO b. [ ] YES *Est. Ann.*

24. WHAT WOULD BE THE EFFECT OF DEFERRING THE PROJECT ONE YEAR?

Potential liability for pollution of the environment and violation of federal and state regulations.

*25. IF THE PROJECT IS NOT ACCOMPLISHED NOW, IN HOW MANY YEARS WILL THERE BE SERIOUS DAMAGE TO THE FACILITY AND/OR ITS CONTENTS OR IMPAIRMENT TO ESSENTIAL OPERATIONS? *Explain, include loss value to facility and/or contents.*

YEARS BEFORE SERIOUS DAMAGE OCCURS 0.

*26. HAS THE REDUCED UTILIZATION OF THIS SPECIFIC FACILITY AFFECTED A LARGE FACILITY SYSTEM OPERATION? *Explain.*

a. [ ] YES b. [X] NO BY HOW MUCH? _____%.

27. ARE THERE ANY OTHER FACTORS INVOLVED? *Check and explain.*

a. [ ] MORALE b. [X] HEALTH c. [X] PUBLIC RELATIONS d. [X] SAFETY e. [X] FIRE PROTECTION f. [ ] SECURITY g. [ ] OTHER

28. CERTIFICATION BY RESPONSIBLE OFFICER AT ACTIVITY: I am personally cognizant of the need for, the essentiality of, and the proposed method of accomplishment of this project and certify that the above information is correct, and that this project meets all criteria specified in OPNAVINST 11010.20 and subsequent changes thereto.

SIGNATURE	TITLE	DATE

29. EFD TECHNICAL VALIDATION *(If required) (see para 7303, OPNAVINST 11010.20C)*

SIGNATURE	TITLE	DATE

ENCLOSURES:

a. [X] ENGINEERING EST. *(NAVFAC 2417)* b. [ ] LOCATION PLAN(S) c. [ ] DRAWINGS d. [ ] PHOTOGRAPHS

**NOT applicable to Minor Construction, Alterations, or Equipment Installation*

S/N 0105-LF-033-4230

NAVFAC 11013/7 (1-78)
Supersedes NAVDOCKS 2417 and 2417A

COST ESTIMATE

DATE PREPARED: August 7, 1986

SHEET 1 OF 1

ACTIVITY AND LOCATION: Naval Air Station, Memphis, Tennessee

CONSTRUCTION CONTRACT NO:

IDENTIFICATION NUMBER:

ESTIMATED BY: CIPM

CATEGORY CODE NUMBER:

PROJECT TITLE: Underground Storage Tank/Piping Replacement including between-wall leak detection system

STATUS OF DESIGN: [X] PED [ ] 30% [ ] 100% [ ] FINAL [ ] Other (Specify)

JOB ORDER NUMBER:

ITEM DESCRIPTION	QUANTITY		MATERIAL COST		LABOR COST		ENGINEERING ESTIMATE	
	NUMBER	UNIT	UNIT COST	TOTAL	UNIT COST	TOTAL	UNIT COST	TOTAL
25,000 gallon Double Wall FRP @ 303 and 1241	2	ea.	42,800	85,600	18,500	37,000	61,300	122,600
7,500 gallon Double Wall FRP @ 301	1	ea.	20,225	20,225	6,625	6,625	26,850	26,850
550 gallon Double Wall FRP @ S237, N1, N2, 378, 383, S159, S240A, S240B, S240C, 348, 890, N-12, S75E, N11	14	ea.	7,355	95,615	2,500	32,500	9,855	128,155
2,000 gallon Double Wall FRP @ S89, 599	2	ea.	11,500	23,000	3,000	6,000	14,500	29,000
18,000 gallon Double Wall FRP @ 1593	1	ea.	34,210	34,210	13,000	13,000	47,210	47,210
15,000 gallon Double Wall FRP @ 1242 and 1243	2	ea.	30,400	60,800	11,500	23,000	41,900	83,800
4,250 gallon Double Wall FRP @ 1249	1	ea.	15,150	15,150	3,575	3,575	18,725	18,725
8,000 gallon Double Wall FRP @ 1482	1	ea.	20,800	20,800	7,500	7,500	28,300	28,300
1,800 gallon Double Wall FRP @ 1489, 1491 and 1490	3	ea.	11,024	33,072	2,960	8,880	13,984	41,950
5,000 gallon Double Wall FRP @ 1508	1	ea	16,200	16,200	3,800	3,800	20,000	20,000
25,000 Double Wall FRP @ 100 ,000 gallon tanks (4 ea.) #'s: 1239, 1240, 1556, 1557	16	ea.	42,800	684,800	18,500	296,000	61,300	980,800