

GDS and Associates, AquaVats* and pH/TDS
Manhole Water Test Kits

1. GENERAL

- 1.001 This section is a cover sheet for the GDS and Associates, AquaVats* and pH/TDS Manhole Water Test Kits. This section is reproduced with permission of GDS and Associates.
- 1.002 Whenever this section is reissued the reason (s) for reissue will be listed in this paragraph.
- 1.003 The AquaVats* and pH/TDS Manhole Water Test Kits are designed and built for quick detection of possible pollutants in manhole water prior to pumping.
- 1.004 If corrections are required in the attached document, use Form E-3973 as described in Section 000-010-015.
- 1.005 If equipment design and/or manufacturing problems should occur, refer to Section SW 010-522-906 for procedures on filing an Engineering Complaint.

2. ORDERING PROCEDURE

- 2.001 The AquaVats* and pH/TDS Manhole Water Test Kits may be ordered via the Southwestern Inventory Management System (SWIMS).

3. REPAIR/RETURN

- 3.001 Paragraph 1.06 describes the GDS and Associates repair/return policy.

Attachment: GDS and Associates, Inc. AquaVats* and pH/TDS Manhole Water Test Kits

PROPRIETARY

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GDS & Associates AquaVats™ PRACTICES

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Section 1. General

Section 2. Materials

Section 3. Manhole & Vault Testing Procedures

Section 4. What to do if a Problem is found

1. GENERAL:

1.01 This section outlines the testing that is to be used before “dewatering” or pumping an underground vault or manhole, **why testing is conducted**, and the use of the GDS AquaVats™ Chemical Kit or the pH/TDS Meter Kit to test vault or manhole water for pollutants before discharge.

1.02 This section is being issued as an addendum to your procedures for testing and ventilating of manholes or vaults before entering either for new construction or maintenance.

1.03 This testing was created to assist utilities in complying with the EPA's Storm Water Pollution Prevention Plan (SWP3), and the Clean Water Act. Fully 30% of all pollutants that end up in the nation's surface water arrive as a result of storm water runoff. As natural drainage action occurs during and after a rainstorm, for instance, rainwater washes and travels over oil or chemical spill residue, through fertilized fields or stored toxic materials on its way to a underground vault manhole or river.

1.04 The GDS & Associates' AquaVats™ Field Test Kits—either the Chemical Kit or the pH/TDS Meter Kit, is recommended for all manhole or vault locations where water is present to determine if the manhole or vault can be pumped safely or if Company on-site remediation, or Vac-Truck removal is necessary. (If these are company options).

1.05 The AquaVats™ Program provides two test Kits. The larger Chemical Kit is designed to test for the following five common pollutants: Hydrocarbons, Lead, pH, TDS and Copper. *(These field tests were evaluated and compared to tests conducted in a laboratory—which usually means a 2 or 3 day delay—and were found to be very accurate.)* The Chemical Kit can be modified to test for any of fifty (50) different pollutants one might expect to find in any given geographical area based on site evaluations, drainage patterns, possible pollutant sources and a history of toxic spills. The Chemical Kit should be used in all areas where obvious pollutants are present. The pH/TDS Meter Kit is designed to be used in areas where problems are not expected to be encountered, i.e., newer subdivisions without manufacturing facilities or obvious pollutant sources. If either the pH or TDS tests conducted reveal readings that are too high or too low, additional investigation with the Chemical Kit is warranted before a Vac-Truck or on-site remediation is done. (If this is your company procedure).

If any of the Test Results for either kit are out of the specified Color or Numerical Readings that are marked for your area, you should contact your supervisor before proceeding.

GDS & Associates AquaVats™ PRACTICES

If all tests conducted and logged are within the color ranges and numerical readings set up for your area, **proceed with the water discharge into the sanitary sewer or storm drain system per company practice.** Care should be taken, however, not to disturb foreign objects or construction debris in the bottom of the manhole or vault during the "dewatering" process. The hose or pump should not make contact with this construction debris in the bottom of the manhole or vault. A "Construction Debris Suppression Bucket" should be used if this item is a standard product being used by your company—which will help insure that only water is being discharged. While research has shown that the majority of water in underground vaults is safe to discharge into sanitary sewers or storm drains, the opposite is often true for construction debris found in the bottom of a manhole or vault. When an inlet hose or submersible pump is placed in a vault or manhole, the kinetic action of pumping agitates the construction debris and suspends some of it in the discharging water. It follows that if the debris is polluted, and the debris enters the pump, the water is polluted. A Construction Debris Suppression Bucket prevents debris from reaching the pump, and/or being discharged or fouling the pump.

1.06 The GDS & Associates, Inc., AquaVats™ Chemical Kit, Reagent Reload Box or the pH/TDS Meter Kit and accessory items can be ordered from your Procurement Catalog utilizing normal ordering procedures, or from GDS & Associates, Inc., at 3107 N. Deer Run Road, Suite 12, Carson City, Nevada 89701. Phone (702) 884-4353. FAX (702) 884-2476.

1.07 If any problems occur, refer to your standard product procedures on filing an Engineering Complaint.

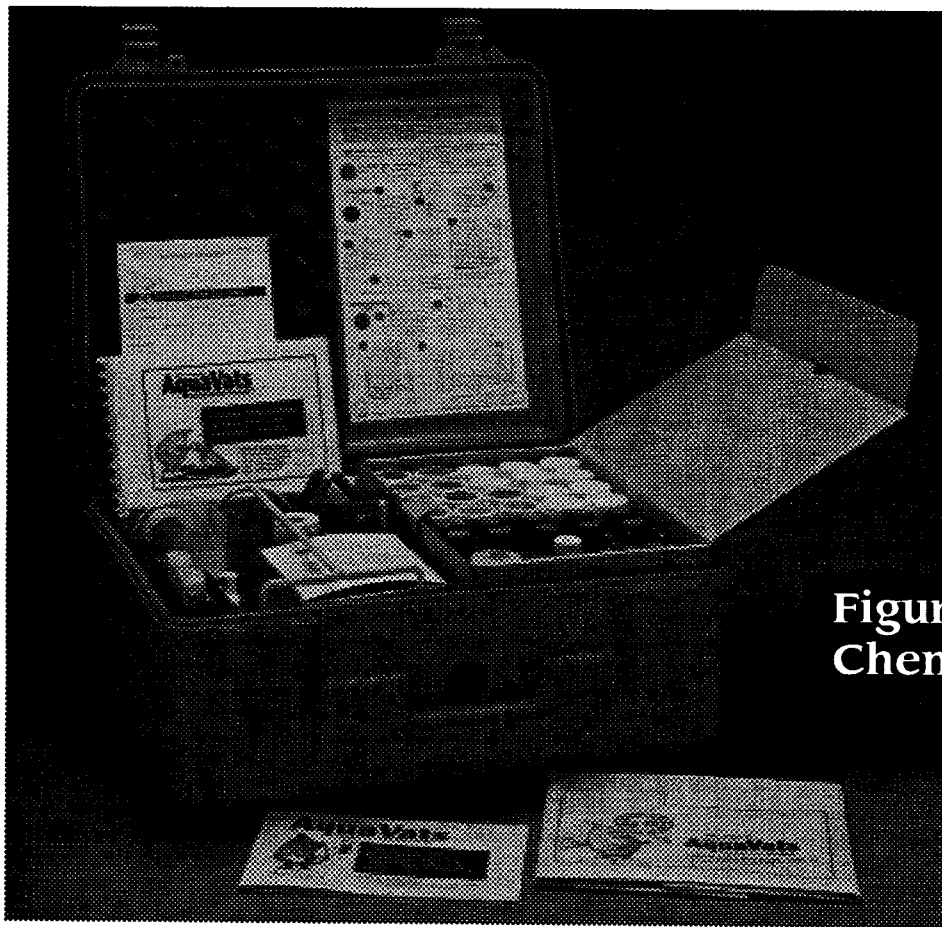
GDS & Associates AquaVats™ PRACTICES**2. MATERIALS**

2.01 All materials and safety items needed to conduct any and all of the tests are contained in the Chemical Kit. Safety items are not included in the pH/TDS Meter Kit. The Chemical Kit, shown here in figure 1., contains a steel Universal Stand, a washable TEFLON* Separatory Funnel, a Third Hand Clamp Utility, Ampoule Snapper, Lead and Copper Colorimetric Comparators, Syringe, Jeweler's Screwdriver, 25ml Graduated Cylinder, and one pH and one TDS Meter. The Kit also contains a User Log Book for logging test results, a laminated Aromatic Contamination in Water (ppm) Color Comparison Book for petroleum contamination, a laminated Chart with the pH and TDS Meter Calibration steps illustrated on one side and photos of the family of products used in the Copper, Lead and Hydrocarbon tests on the other side, a Instruction Booklet with complete instructions for all Tests, a complete Reagent Load with Recycling Shipping Bag and a Removable Laminated Field Chart in the Kit Lid that provides a step-by-step graphic

example of the hydrocarbon and lead tests. The Chemical Kit is transported in the Case 1550, an unbreakable, air-tight, water-tight copolymer structural resin case with a life-time guarantee.

The Case dimensions are a compact $20\frac{1}{2} \times 16\frac{3}{4} \times 8\frac{1}{2}$."

*TEFLON is a registered trademark of the Dupont Corporation, manufactured from virgin polyolefin film.



**Figure 1. AquaVats™
Chemical Kit & Contents**

2.02 GDS & Associates AquaVats™ PRACTICES

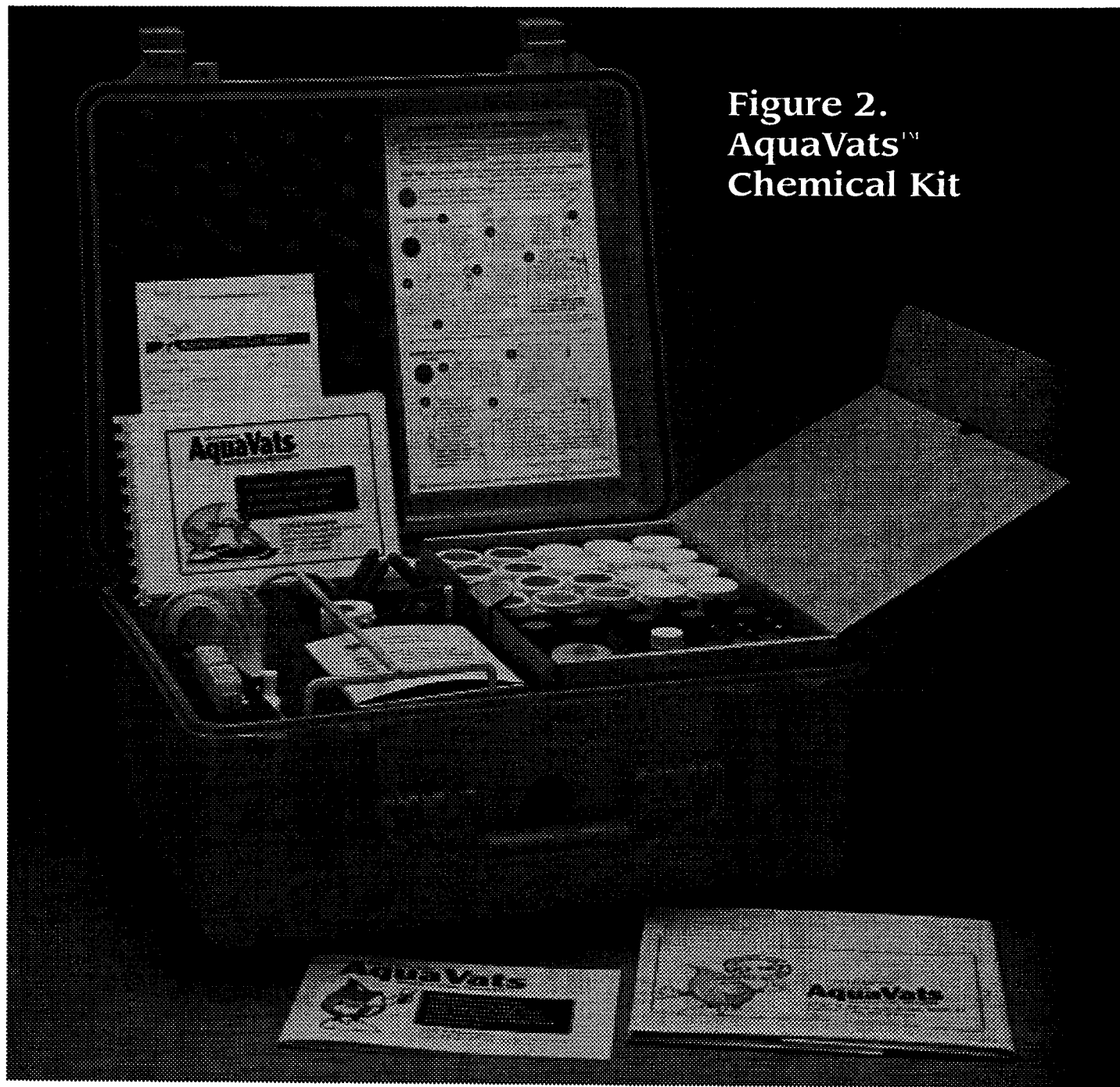


Figure 2.
AquaVats™
Chemical Kit

2.02. Shown above is the Chemical Kit, SSI# 701195372, a complete test kit for testing vault or manhole water prior to pumping. The kit contains all equipment needed to field test manhole water for Lead, pH, TDS, Copper and Hydrocarbons. To order replacement reagents, order SSI# 701195380, Kit test manhole water, AquaVats™ reagent reload box. The Chemical Kit and the Reagent Reload Box and accessory items can be ordered from your Procurement Catalog utilizing normal ordering procedures, or from GDS & Associates, Inc., at 3107 N. Deer Run Road, Carson City, Nevada 89701. Phone (702) 884-4353. FAX (702) 884-2476.

2.03 GDS & Associates AquaVats™ PRACTICES

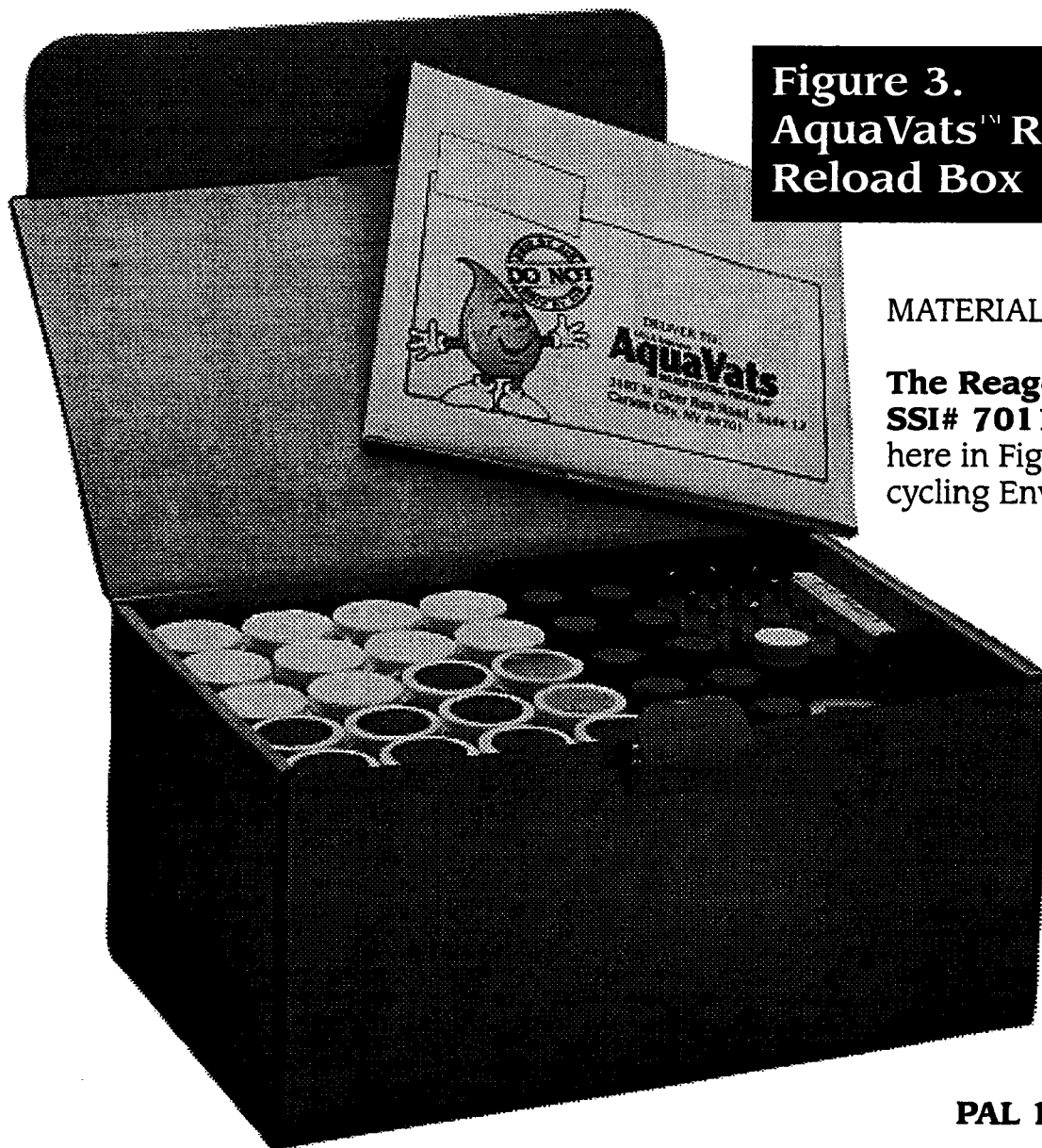


Figure 3.
AquaVats™ Reagent
Reload Box

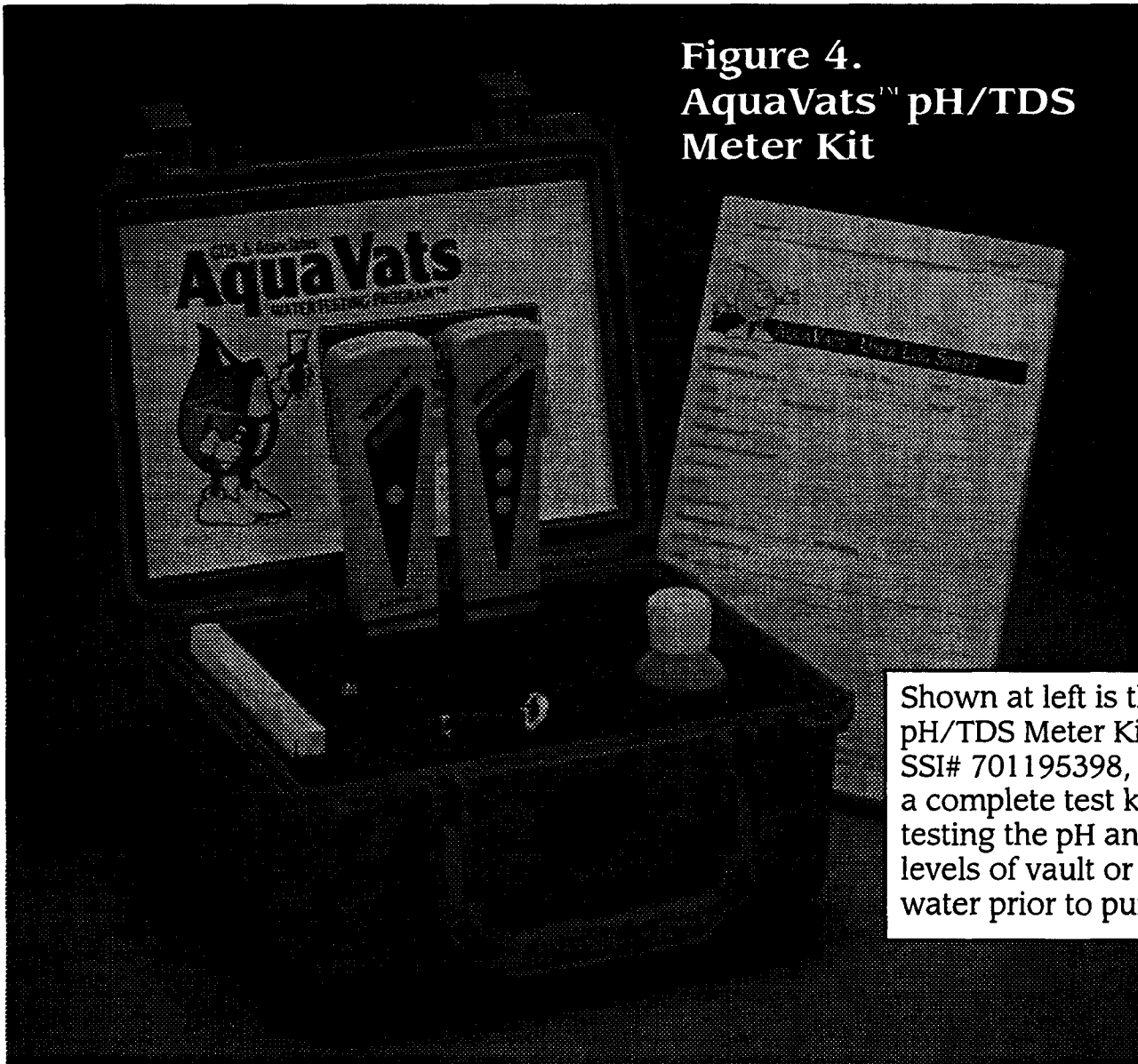
MATERIALS (2.03) Continued

The Reagent Reload Box,
SSI# 701195380, shown
here in Figure 3 with its Re-
cycling Envelope.

PAL 199501500

2.04 GDS & Associates AquaVats™ PRACTICES

Figure 4.
AquaVats™ pH/TDS
Meter Kit



Shown at left is the pH/TDS Meter Kit, SSI# 701195398, a complete test kit for testing the pH and TDS levels of vault or manhole water prior to pumping.

MATERIALS (2.04) Continued

The pH/TDS Meter Kit, shown here in figure 4, contains one TDS and one pH Meter, Calibration Solution Packets for calibrating the meters, a Jeweler's Screwdriver, A Bailer Sample Cup with Polypropylene Retrieval Line, and Decontamination Solution for cleansing of the Bailer. The Kit comes with a User Log Book for logging the results of all tests, a laminated Chart covering Calibration Procedures for both Meters, and an Instruction Booklet with complete instructions for both Tests. The pH/TDS Meter Kit is transported in the 1150, an unbreakable, air-tight, water-tight copolymer structural resin case with a life-time guarantee. The Case dimensions are a compact 9^{1/2} x 7^{1/2} x 4^{1/2}." All items in the pH/TDS Kit are replaceable. The pH/TDS Meter Kit and accessory items can be ordered from your Procurement Catalog utilizing normal procedures, or from GDS & Associates, Inc., at 3107 N. Deer Run Road, Carson City, Nevada 89701 Phone (702) 884-4353. FAX (702) 884-2476.

3.0 GDS & Associates AquaVats™ PRACTICES

3. MANHOLE AND VAULT TESTING PROCEDURES

3.01 A visual inspection of both the area around the manhole and the area within the manhole or vault is important to do first.

Outside the manhole inspect for:

- Corroded or damaged drums or tanks, leaking pipes or improperly closed valves or fittings
- Torn bags or bags exposed to water
- Broken or cracked dikes, walls or other physical barriers designed to prevent storm water from entering the manhole
- Windblown dry chemicals

Inside the manhole inspect for:

- Foul smell other than the musky smell of standing water
- Stains, debris or other unusual marks on the concrete such as corrosion
- Floatables
- Turbidity
- Oil sheen

All visual inspection observations should be entered into the Log before Proceeding with the AquaVats™ Tests.

3.02 pH METER—TEST INSTRUCTIONS

3.02 pH Testing

- a) **REMOVE CAP** and **PRESS "ON/OFF"** keypad button to **"ON"** to activate.
- b) **DIP THE ELECTRODE** into the sample.
(Never Dip Below the Color Band on the Bottom of the Tester)
- c) **STIR** once, let the display stabilize. **RECORD** in your Log.
- d) **PRESS "ON/OFF"** button to **"OFF"** to turn off tester. **REPLACE CAP.**

For a New Meter:

1. **Remove Plastic Strips** between batteries and contacts.
2. **Condition Unit:** * (This step is to be done before the unit is used the first time)
 - a) **REMOVE CAP** and **IMMERSE THE ELECTRODE** in tap water for one hour to activate the electrode.

(Do Not be alarmed if White Crystals are present, they will dissolve in tap water)

Calibrate Weekly:

- a) Open the packaged pH buffer solution (**No mixing is required**), **PRESS** the **"ON/OFF"** button to **"ON"**, and **PRESS** the **"CAL"** button to **"ON"** to enter calibration mode.
- b) **REMOVE CAP & IMMERSE ELECTRODE** into buffer solution, about 1/2 to 1 inch. **STIR** gently and **WAIT** 30 seconds for the display to **STABILIZE** on a reading on or near the value shown on the foil packaging. **LOG** the value in your Logbook. The display will flash during this step.
- c) **PRESS "HOLD/CON"** button to confirm and complete calibration.

IMPORTANT: If the number is greater than the value shown on the foil package, subtract the difference from all subsequent readings. (For instance, the buffer value is 7.0 and the reading is 7.3, subtract .3 from all subsequent readings.

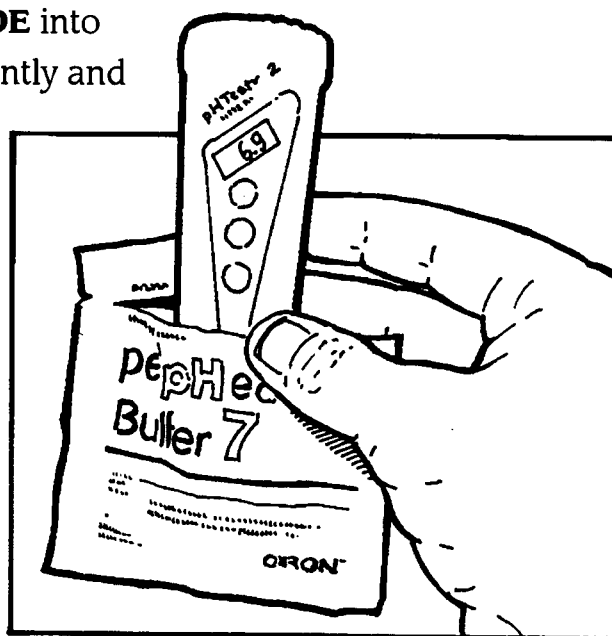


Figure 5. pH Meter in Calibration Buffer Packet

3.03 TDS METER—TEST INSTRUCTIONS

3.03 TDS Testing

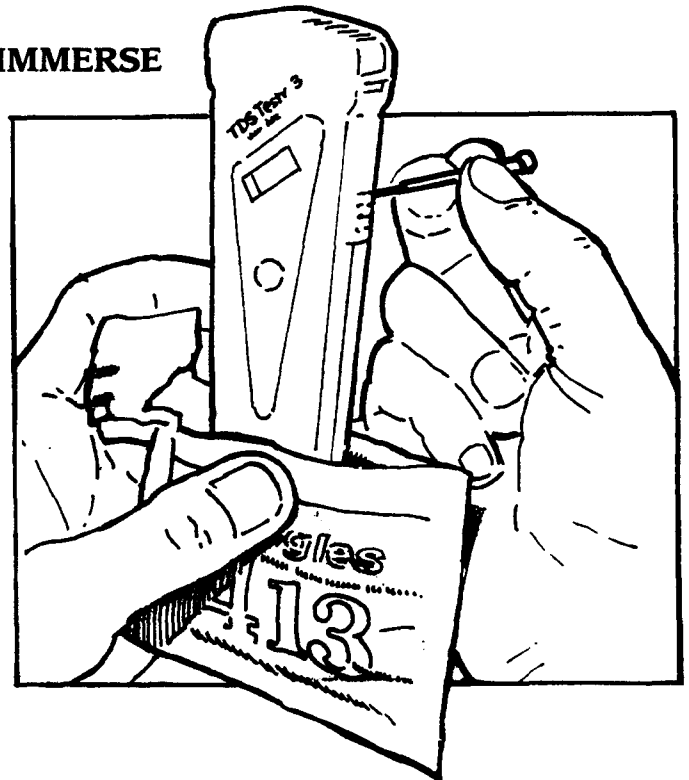
- (a) **REMOVE CAP** and **PRESS "ON/OFF"** button to **"ON"** to turn the unit on.
- (b) **DIP THE ELECTRODE END** into the test solution.
- (c) **ALLOW TIME** for the Automatic Temperature **COMPENSATION** to correct the readings for solution temperature changes.
- (d) **NOTE** the **FULL READING** once the display stabilizes, **LOG** results.
- (e) **PRESS "ON/OFF"** button to **"OFF"** to turn off tester. **REPLACE CAP.**

FOR A NEW METER: Remove plastic strips between batteries and contacts and immerse the electrode in alcohol for a few minutes to remove oils.

Calibrate Weekly:

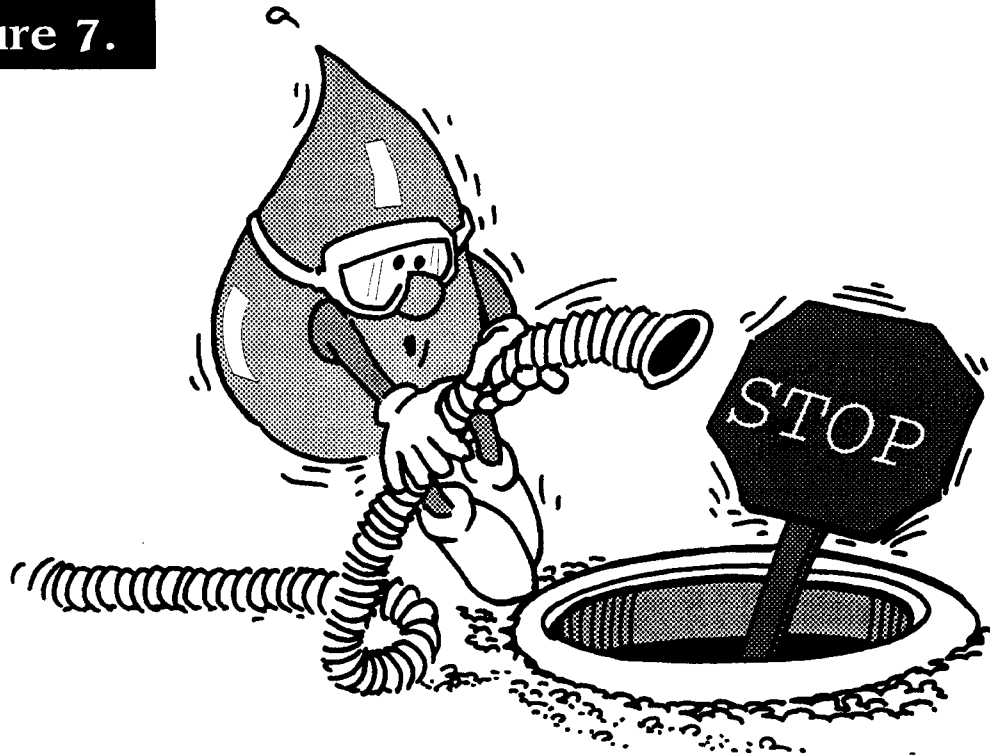
- (a) **USE** the supplied **CALIBRATION STANDARD SOLUTION PACKET** (1413microSiemens).
- (b) The Standard Solution is ready to use, **NO MIXING** is required.
RINSE THE ELECTRODE in water, then **IMMERSE METER** in the pouch and allow the meter to **STABILIZE**. Using the small screwdriver provided, **ADJUST THE TRIMMER** on the back of the unit until the display reads the same value as the standard (between 1410 and 1420 microSiemens).
- (c) **RINSE THE ELECTRODE** in water and proceed with the testing.

Figure 6. TDS Meter Calibration with Screwdriver and Calibration Standard.



3.04 AquaVats™ GENERAL SAFETY PRECAUTIONS

Figure 7.



Before Starting, set up work area per company practice and observe company approved safety procedures.

3.05 COPPER TEST INSTRUCTIONS

3.05 About Copper

Copper is an element found in the earth's crust and in seawater. It is an excellent conductor of electricity, an alloying metal (brass and bronze) and a catalyst for oxidation reactions. Copper is an important component of fungicides and insecticides.

Copper containing fungicides are used to control biological growths in the water supply. Concentrations in excess of 1 mg/L will impart a foul taste to water and can be toxic to fish.

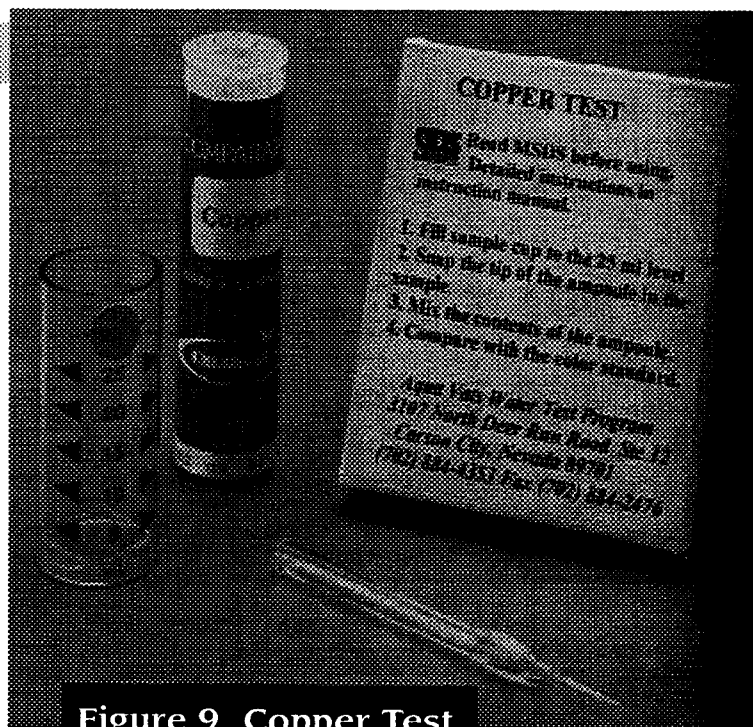


Figure 9. Copper Test

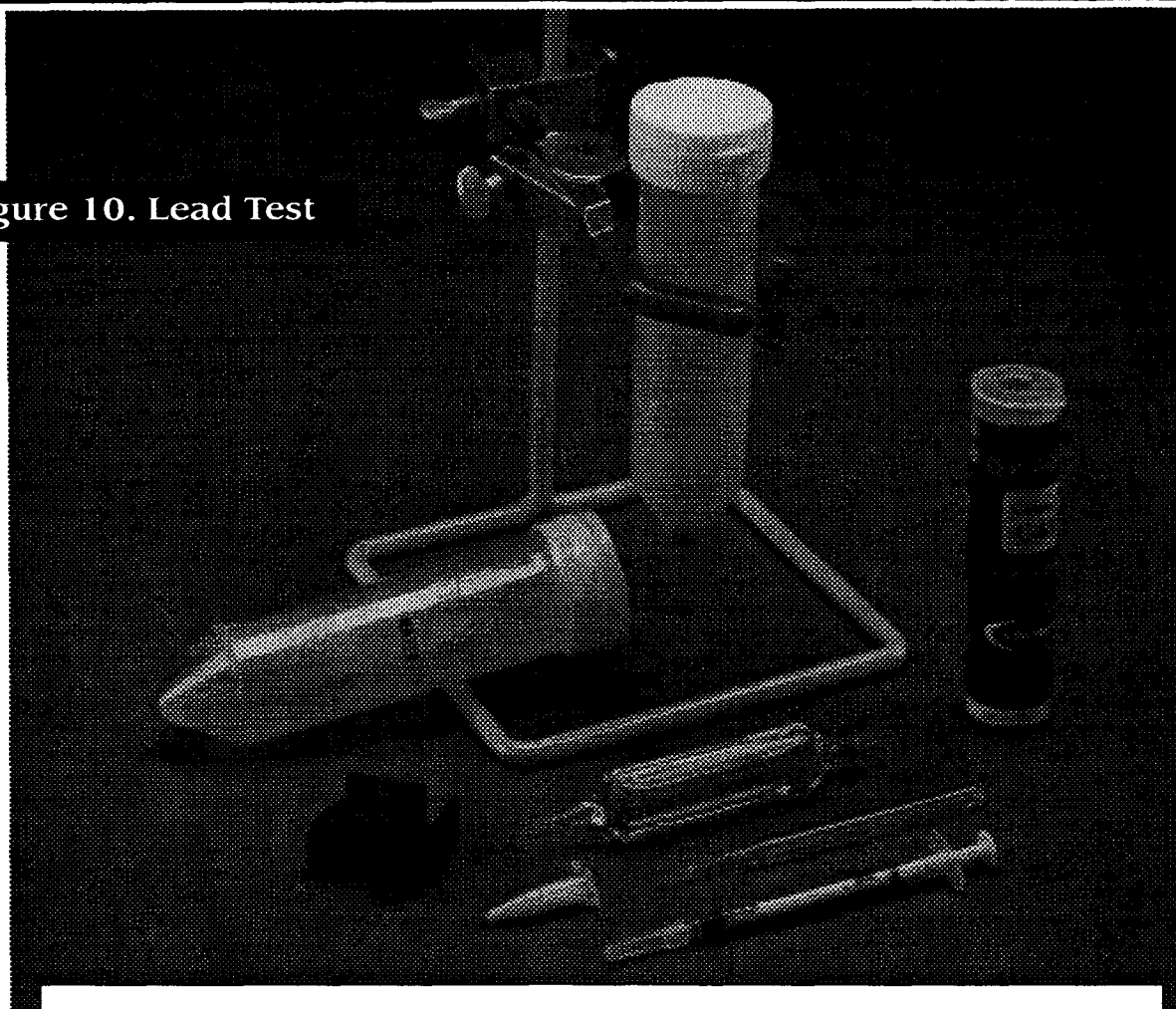
Copper Testing:

All items used for the Copper Test are color coded orange.

- a) **Fill sample cup** to 25ml mark from the 600 ml of manhole water initially drawn.
- b) **Remove vacuole** from the box marked Copper Test.
- c) **Insert vacuole tip** into 25ml cup and **carefully snap tip off**.
(NOTE: water will be drawn up into the vacuole.)
- d) **Remove vacuole and mix contents** of the vacuole with a back and forth motion.
- e) Immediately **place the vacuole into the comparator**, flat end downward. **Direct the comparator toward** a source of **bright light, while** viewing from the bottom. Hold the comparator in a nearly horizontal position and **rotate it until the color standard below the vacuole shows the closest match or a marked color change**.
- f) This does not need to be the exact same color as in the comparator. Any color change indicates foreign matter. If there is no color change, the test is negative. **Refer to the laminated field instruction card to determine if the test result is acceptable.**
- g) **Log results** in the logbook. **Remove** vacuole from the comparator and place in ringstand for disposal at the conclusion of the lead test. If the Copper test shows that the vault/manhole should be pumped and no more tests are required, deposit the used vacuole flat end down in the copper test cardboard box in the reagent box.

3.06 LEAD TEST PROCEDURES

Figure 10. Lead Test



BEFORE STARTING:
Set up work area per company practice.

3.06 TO TEST FOR LEAD

- 1) **Take out a reaction tube** (blue cap). **Remove all** components from the tube and place them inside the base of the ring stand.
- 2) Using the syringe, **withdraw a sample (to 1.0 cc on the syringe)** from the 600 ml initial sample drawn, and **inject the sample** into the tube through the small hole in the cap.

3.06 LEAD TEST PROCEDURES

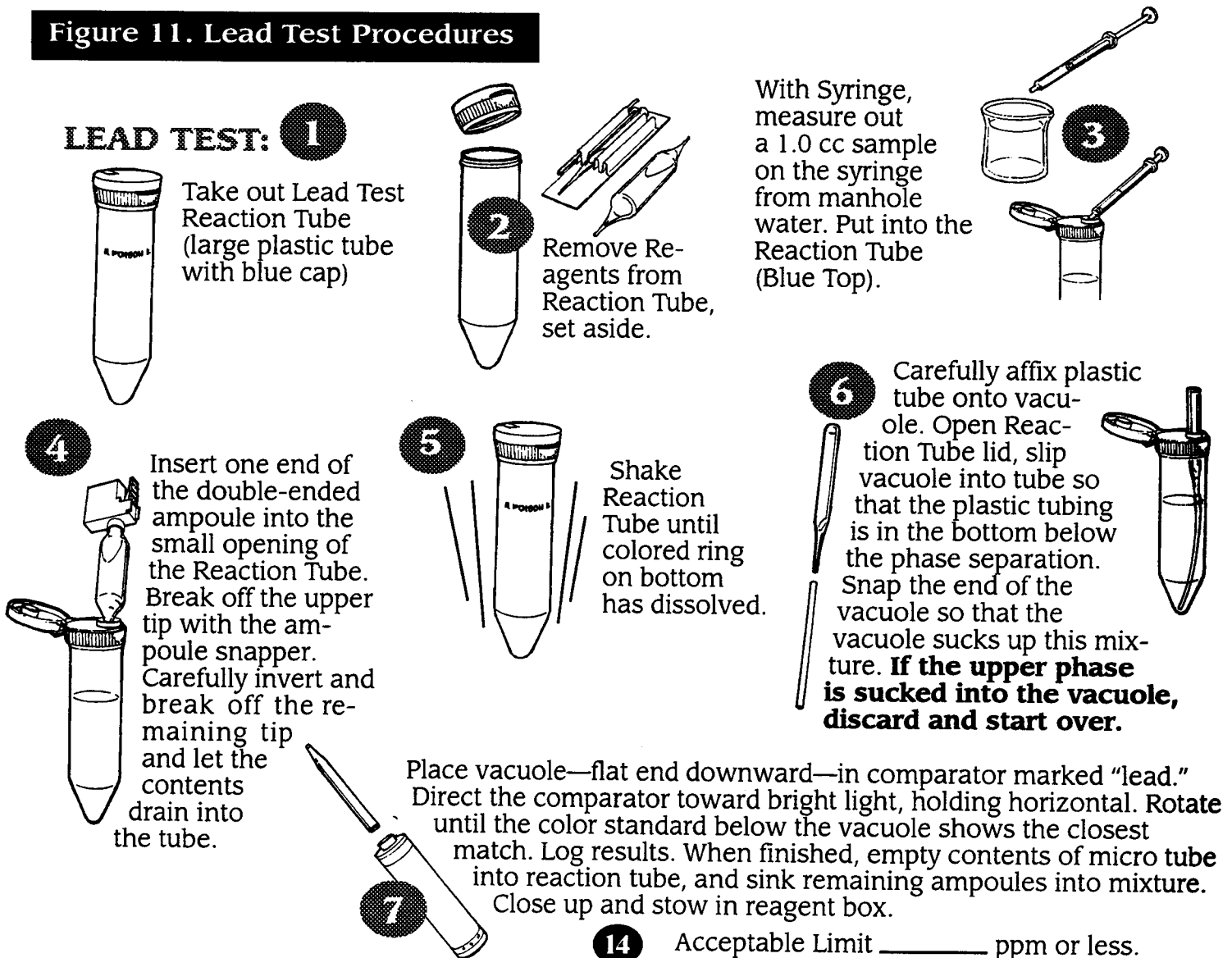
- 3) **Pick up** the large **double ended ampoule**. **Insert one end** into the **small opening** in the cap. With the ampoule snapper, **break off the tip** on the top of the ampoule that is exposed. Carefully **invert and break off** the remaining tip. Let the contents **drain into the reaction tube**.
- 4) **Close the cap** and **shake the reaction tube** until the color ring at the bottom of the tube is fully dissolved.
- 5) Put the **reaction tube** in the ring stand and let **sit for one minute**. The organic phase will collect below the orange colored aqueous phase.
- 6) **Assemble** the sampling **vacuole** by carefully sliding the piece of flexible tubing onto the tapered end of the vacuole. **Do not snap the tip off the vacuole**.
- 7) **Insert** the **vacuole** into the reaction tube **through the flip-top-cap**, making sure that the end of the flexible tubing is at the bottom of the reaction tube. **Snap off the tip** of the vacuole by gently pressing it against the near side of the reaction tube as illustrated in the chart in the Kit lid. Wait until the vacuole stops filling.
- 8) **Shake** the vacuole **to mix** the contents.
- 9) Immediately **place the vacuole into the comparator**, flat end downward. **Direct the comparator toward** a source of **bright light**, while viewing from the bottom. **Hold** the comparator in a nearly **horizontal** position and **rotate it until the color standard below the vacuole shows the closest match**. The colors do not need to match exactly.
- 10) **Match color intensity** with the number on the outside of the comparator and **log results**. **Refer to the laminated field instruction card to determine if the test result is acceptable**.

3.06 LEAD TEST PROCEDURES

DISPOSAL: TO SAFELY DISPOSE OF THE REAGENTS AFTER PERFORMING THE TESTS

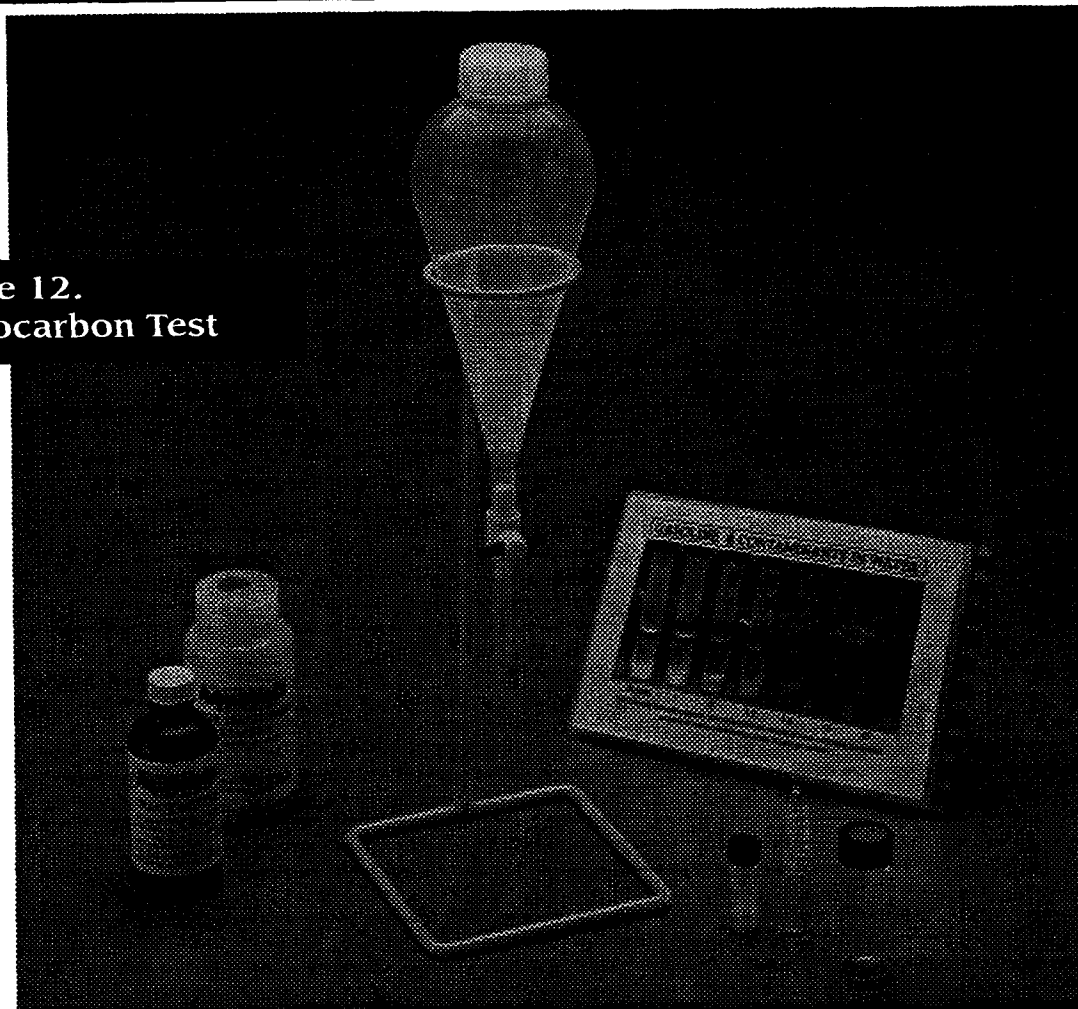
- a) With the **reaction tube** in the ring stand, **remove** the entire **cap**.
- b) **Add the dry chemical** contained in the micro-test tube to the contents of the **reaction tube**. This will neutralize unreacted chemicals in about 1 hour.
- c) **Place the empty double-tipped ampoule into the liquid**. It will sink by itself as it fills. **Drop the used vacuole, the flexible tubing and the copper test ampoule into the liquid**. **Replace the Cap** on the reaction tube.
- d) **Place** the reaction tube back **in the reagent box** to be sent back to GDS **for recycling**.

Figure 11. Lead Test Procedures



3.07 HYDROCARBON TEST PROCEDURE

Figure 12.
Hydrocarbon Test



BEFORE STARTING:
Set up work area per company practice.

3.07 TO TEST FOR HYDROCARBONS

- 1) **Remove** the 500ml **separatory funnel** and **stand**.
- 2) **Insert the funnel** into the **stand**.
- 3) **Remove the 600ml dipper** from case and **obtain a sample** to be tested from vault or manhole.

3.07 HYDROCARBON TEST PROCEDURE

- 4) **Fill separatory funnel** to 500ml (the center of the oval on the funnel).
- 5) **Remove** 5ml extractant **reagent ampoule**. (With red dot on top).
- 6) **Carefully break top off the ampoule top** (using the ampoule snapper) and **empty the contents** into the separatory funnel.
- 7) **Replace** the **cap** on the funnel.
- 8) Take the separatory funnel out of the stand and **shake vigorously** for 2 minutes.
- 9) Carefully open the cap to **relieve** the **pressure** that may have built up. Put the funnel back into the stand. Wait for the solvent to separate and settle to the bottom. At this time, the solvent and the water will have separated. You can readily see a line at the point that the water and solvent meet—*The solvent is heavier than water and will pull any hydrocarbons to the bottom.*
- 10) **Take** out a screw top **test tube**—Red dot on cap. Remove the top. Place the glass tube under the separatory funnel and carefully **drain** off the solvent, moving the phase separation line down to the top of the petcock. **DO NOT COMPLETELY DRAIN THE SOLVENT.** **(IMPORTANT: If you drain water into the tube, discard and start over).**
- 11) Take out **Colorizing Agent** vial and dump contents **into test tube**. (Colorizing agent vials are contained in the larger plastic jar—with the red dot—in the reagent box).
- 12) **Replace top** on test tube and **shake**.
- 13) **Compare color** with chart. **Refer to the laminated field instruction card to determine if the test result is acceptable. Log your results.**
- 14) Always drain remaining solvent into waste jar. Then put the used test tube, vial, and waste jar back into reagent box. These will be sent back to GDS & Associates for recycling when all tests are completed.

3.07 HYDROCARBON TEST PROCEDURE

Figure 13. Hydrocarbon Test Procedures

HYDROCARBON TEST:

1 Take out ampoule marked with a red dot and snap off the top. Pour the contents into the separatory funnel.

2 Replace the top, take the funnel out of the stand, and shake vigorously for 2 minutes. Turn rightside up, slowly remove cap to "burp" or vent pressure.

3 Replace into stand and let sit until phase separation occurs. Take out a vial with a red dot on the lid, place under the funnel and carefully drain until 1/8" phase separation is visible. **Do not drain upper phase (water) into vial, if so, discard and start over.**

4 Empty the contents of a small vial in the white jar with the red dot marked "colorizing reagent" into the larger vial. Compare color with photos in book. Log results. Place small vial back into plastic jar, and carefully pour liquid contents of the vial into waste jar. Wash out funnel with two or three drops of the decontamination solution mixed with water. Put all equipment back into case.

Blank	0.5	5.0	20.0

Blank	0.01	.05	0.2

Acceptable Limit _____ ppm or less.

GDS & ASSOCIATES, INC.
AquaVats Water Test Program
Storm Water Pollution Prevention Plan (SWP3)

3.08 GDS & Associates AquaVats™ USER LOG SHEET

WIRE CENTER: 610 DWO/EST No. 12 DATE: 1/12/96

TECHNICIAN'S NAME: Winkler PHONE No. Ext. 6172

Time 8:50 a.m.

Manhole No. 211

STEP 1

Outside Manhole

Climate* 40°F Intermittant rain

Neighborhood* Industrial

Unusual Observations* Adjacent to storage yard for heavy equipment

STEP 1

Inside Manhole

Floatables* None

Odor* Fuel

Discoloration* Sheen

Fluorescence (Y or N) Yes

Gas Indicator Test (Standard Co. Test) Marginal

STEP 2

pH Reading 7.6

TDS Reading 1390

STEP 3

Copper 8 ppm

Lead 6 ppm

Hydrocarbons 4 ppm

OPTIONAL

Opt Test #1 _____

Opt Test #2 _____

Opt Test #3 _____

* Describe observations

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GDS & ASSOCIATES, INC.
AquaVats Water Test Program
Storm Water Pollution Prevention Plan (SWP3)

3.08 GDS & Associates AquaVats™ USER LOG SHEET

WIRE CENTER: 610 DWO/EST No. 12 DATE: 1/12/96

TECHNICIAN'S NAME: Winkler PHONE No. Ext. 6172

Time 4:30 p.m.

Manhole No. 121

STEP 1

Outside Manhole

Climate* 35°F Intermittant rain

Neighborhood* New residential

Unusual Observations* None

STEP 1

Inside Manhole

Floatables* None

Odor* None

Discoloration* None

Fluorescence (Y or N) No

Gas Indicator Test (Standard Co. Test) OK

STEP 2

pH Reading 7.4

TDS Reading 940

STEP 3

Copper .5 ppm

Lead 2 ppm

Hydrocarbons None

OPTIONAL

Opt Test #1 _____

Opt Test #2 _____

Opt Test #3 _____

* Describe observations

GDS & ASSOCIATES, INC.
AquaVats Water Test Program
Storm Water Pollution Prevention Plan (SWP3)

3.08 GDS & Associates AquaVats™ USER LOG SHEET

WIRE CENTER: _____ DWO/EST No. _____ DATE: _____

TECHNICIAN'S NAME: _____ PHONE No. _____

Time _____

Manhole No. _____

STEP 1

Outside Manhole

Climate* _____

Neighborhood* _____

Unusual Observations* _____

STEP 1

Inside Manhole

Floatables* _____

Odor* _____

Discoloration* _____

Fluorescence (Y or N) _____

Gas Indicator Test (*Standard Co. Test*) _____

STEP 2

pH Reading _____

TDS Reading _____

STEP 3

Copper _____

Lead _____

Hydrocarbons _____

OPTIONAL

Opt Test #1 _____

Opt Test #2 _____

Opt Test #3 _____

* Describe observations

4.0 GDS & Associates AquaVats™ PRACTICES

4.0 What If I Find a Problem with any of the Tests?

4.01 If the GDS & Associates' pH/TDS Meter Test Kit is being used and a high or low reading is found you should contact your Foreman or Supervisor at once. The Foreman or Supervisor should make the decision to either (1); use the Chemical Kit to see if you can find out what is causing the problem, or (2); call for a VAC truck, or an On-site Remediation Unit if this is a Company option. UNTIL THESE OPTIONS HAVE BEEN CONSIDERED AND RESOLVED, THE MANHOLE OR VAULT SHOULD NOT BE DISCHARGED INTO THE SANITARY SEWER OR STORM DRAIN.

4.02 If the GDS & Associates' AquaVats™ Chemical Kit is being used and any of the tests are out of the numeric range, either high or low, or on the upper limits of the color range, you should call your Foreman or Supervisor at once.

4.03 If for any reason you feel you need additional training, please make arrangements through the proper channels, or call GDS & Associates or one of their representatives for additional training.