

INSTRUCTIONS

*Read all instructions before sample collection*

**SECTION 1. SITE INFORMATION**

1. Before collecting samples, review the contents of this test kit (page 5). This kit allows testing of *fifteen* samples.
2. Use system diagrams and history to choose pipe inspection locations. These should include:
  - a. Riser area
  - b. Cross mains
  - c. Branch lines
  - d. “Hot spots” (areas with known problems)
3. Test one location at a time making sure to perform all tests in this kit. Record facility name and sampling location on attached Data Sheet, Sections A1 and A2.
4. Proceed to Section 2.

**SECTION 2. PHYSICAL CHARACTERISTICS OF PIPE DEPOSITS & PITS**

1. Note location (e.g., top, bottom) of pipe deposits on interior of pipe. Record data on attached Data Sheet, Section B1. Record location of largest or heaviest deposition.
2. Measure height and diameter of largest deposits using pit gauge or other ruler. Use the ruler printed at **top** of pit gauge (in thousandths of inches,  $\frac{1}{10}$  inch = 100 thousandths inch), as illustrated in *Figure 1*. Record data on attached Data Sheet, Sections B2 and B3.
3. Manually remove deposit materials with a wooden tongue depressor (do not use metal implements), as shown in *Figure 2*. Place approximately  $\frac{1}{2}$  teaspoon (as shown in *Figure 3*) of deposit materials into each of the three sampling tubes (one small 15 milliliter (ml) and two large 50 ml) for further analyses.



Figure 2



Figure 1



Figure 3

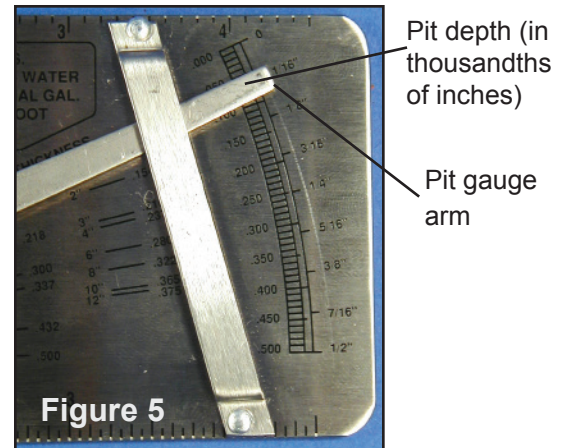
4. If pits are present, use pit gauge to measure deepest pits (in thousandths of inches). To measure pits, place pit gauge so it is flush with pipe surface and so that point of pit gauge arm is located over deepest pit. Push gauge arm down until point reaches bottom of pit, as shown in *Figure 4*. Read off value showing directly above top edge of pit gauge arm, printed on **rightmost side** of pit gauge, as shown in *Figure 5*. This is the pit depth (in thousandths of inches). Record depth of deepest pit on attached Data Sheet, Section B4.

5. Measure wall thickness at uncorroded area of pipe, as shown in *Figure 6*. Use ruler printed at **top** of pit gauge. Record wall thickness (in thousandths of inches) on attached Data Sheet, Section B5.

6. Calculate wall loss using measurements from steps #4 and #5.  
*Calculation:* To calculate percent (%) wall loss, divide pit depth (in thousandths of inches) by wall thickness (in thousandths of inches), then multiply by 100. Record percent wall loss on attached Data Sheet, Section B6.

7. Proceed to Section 3.

**Note:** If there is evidence of severe pitting in pipes with diameters too small to accommodate pit gauge, it will be necessary to cut out a piece of pipe, section it, and measure pits.



For technical assistance, to request MSDS, or to place an order:  
 Call Toll Free: 970.884.4629  
 Or E-mail: [products@bti-labs.com](mailto:products@bti-labs.com)

## SECTION 3. CHEMICAL CHARACTERISTICS OF PIPE DEPOSITS

1. Add deionized water (labeled "DI H<sub>2</sub>O") up to 10 milliliter (ml) mark of the small 15 ml sampling tube. Replace screw-cap. Shake vigorously to homogenize sample. You have just created what is known as a *slurry*.
2. Using marking pen, label the test tubes 1, 2, and 3. Place 15 ml tube and test tubes in plastic rack.
3. Use a plastic pipette to transfer 1 ml of slurry into each of the three test tubes, as shown in *Figure 7*.
4. Perform following chemical tests:

### a. pH

1. Place a strip of pH paper into slurry in test tube #1 so that paper touches liquid.
2. Compare pH strip color to color chart on pH vial.
3. Record pH value on attached Data Sheet, Section C1.

### b. Carbonate & Sulfide

**Caution:** 2 Normal hydrochloric acid (2N HCl) is a strong acid. Avoid contact with skin and eyes and avoid breathing vapors which may be generated! If contact is made with skin or eyes, flush with large amounts of fresh water.

1. Without touching slurry, fold a strip of lead acetate paper over mouth of test tube #2, as shown in *Figure 8*.
2. Add 1 ml (approximately 30 drops) of 2N HCl to tube #2. Make sure not to wet strip.
3. Place tube #2 cap on loosely over lead acetate strip. *Be careful* not to break strip.
4. A positive reaction for carbonate (CO<sub>3</sub><sup>=</sup>) is indicated by bubbles in the slurry.
5. Sulfide (S<sup>=</sup>) is present if lead acetate strip turns brown or black in color. Sulfide may also smell like rotten eggs due to hydrogen sulfide. **Avoid breathing these vapors!**
6. Record carbonate and sulfide results on attached Data Sheet, Sections C2 and C3.

### c. Total Iron

1. Pour 4 ml of the sample/slurry from 15 ml sampling tube into the 5 ml sampling tube. Add contents of iron reducer pack and mix. Reducer contents will not dissolve completely.
2. Perform total iron test on sample/slurry in 5 ml sampling tube. Follow instructions provided on wrapper (Method A), and use the same precautions for other test strips.
3. Record total iron level on attached Data Sheet, Section C4.
4. Discard sample/slurry in 5 ml sampling tube appropriately.

### d. Chloride

1. Dip lower end of chloride test strip into slurry

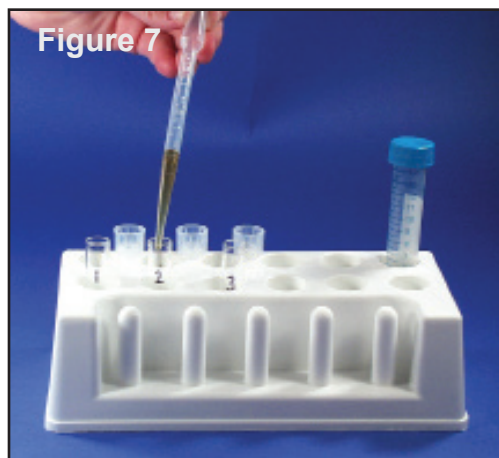
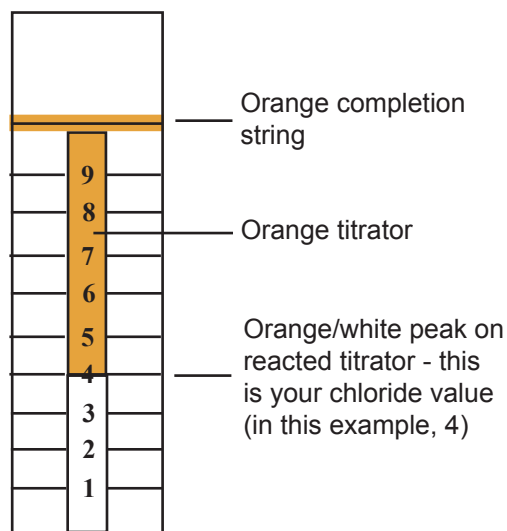


Figure 7



Figure 8

Figure 9





orange completion string dark.

- Note where the tip of orange/white peak on reacted titrator falls on numbered scale on test strip (see *Figure 9*).
- Determine chloride concentration using chart (*Figure 10*).
- Record chloride level on attached Data Sheet, Section C5.

- Proceed to Section 4.

**Figure 10. Chloride Conversion Chart**

Number on chloride test strip	ppm (mg/L) Chloride	Number on chloride test strip	ppm (mg/L) Chloride
1.0	26	4.4	190
1.2	32	4.6	205
1.4	39	4.8	221
1.6	45	5.0	239
1.8	53	5.2	257
2.0	60	5.4	277
2.2	68	5.6	297
2.4	76	5.8	320
2.6	85	6.0	344
2.8	94	6.2	370
3.0	104	6.4	397
3.2	114	6.6	428
3.4	125	6.8	461
3.6	137	7.0	497
3.8	149	7.2	537
4.0	162	7.4	581
4.2	176	7.6	631

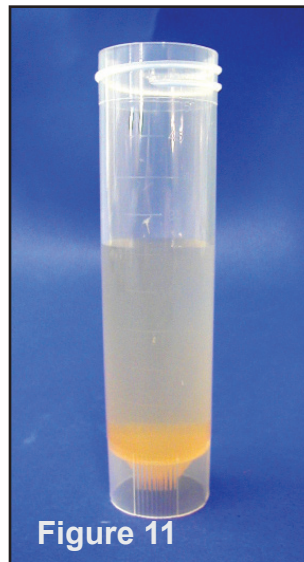
#### SECTION 4. MANUAL REMOVAL OF PIPE DEPOSITS

- Note appearance of deposits outside and inside. Are there colors within colors (e.g., rust-colored outside and black inside). Note observations in attached Data Sheet, Section D1.
- Using a wooden tongue depressor, scrape several patches of deposits. Note how easy or difficult it is to remove deposits. Record results on attached Data Sheet, Section D2.
- Proceed to Section 5.

#### SECTION 5. CHEMICAL REMOVAL OF PIPE DEPOSITS

**Caution:** 2 Normal hydrochloric acid (2N HCl) is a strong acid. Avoid contact with skin and eyes and avoid breathing vapors which may be generated! If contact is made with skin or eyes, flush with large amounts of fresh water.

- Add 2N HCl up to 25 ml mark of one of the large 50 ml sampling tubes containing deposit materials.
- Add Detergent-Chelant up to 25 ml mark of the other 50 ml sampling tube containing deposit materials.
- Replace caps.
- Shake vigorously.
- Observe 50 ml tubes to see if deposits become softened and fall apart in the solution (see *Figure 11*) or if deposits dissolve so that they are entirely suspended in the solution (see *Figure 12*) or if no significant change occurs. Record data on attached Data Sheet, Sections E1 through E4 under "0 Time" section.
- Repeat steps #3 through 5 after 1, 4, 8, and 24 hours. Record data on attached Data Sheet, Sections E1 through E4 at each time interval under corresponding sections.



**Figure 11**



**Figure 12**

## MICKit® Pipe Inspection Kit: List of Kit Contents

1. 1 Storage Box
2. 1 Plastic Tube Rack
3. 1 Metal Pit Gauge
4. 1 Bottle Deionized Water—Labeled “DI H<sub>2</sub>O” (250 ml)
5. 1 Bottle Dilute Acid—Labeled “2N HCl” (250 ml)
6. 1 Bottle Detergent-Chelant, 2% Solution (250 ml)
7. 2, 50 ml Sampling Tubes with Screw Caps
8. 1, 15 ml Sampling Tube with Screw Cap
9. 3, 6 ml Test Tubes with Snap Caps
10. 1 Vial pH Test Strips
11. 1 Vial Lead Acetate Test Strips
12. 15 Total Iron Test Strips
13. 15 Iron Reducer Packs
14. 15, 5 ml Centrifuge Tubes with Screw Caps
15. 15 Chloride Test Strips
16. 15 Wooden Tongue Depressors
17. 15 Plastic Transfer Pipettes

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## WARRANTY

**BTI Products, LLC's** products are warranted by **BTI Products, LLC** to perform as described in the technical literature supplied with each product, provided the products are used, stored, and maintained in accordance with the directions provided. They must also be used before the expiration date. Adequate quality control must be done by the user of the products.

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Should you have questions about this product or any of the products and services we provide, please call or write:

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Bayfield, CO 81122  
970.884.4629  
products@bti-labs.com

*We welcome all comments and inquiries.*

**Usage & Storage:** Use by expiration date printed on kit box label. Store test materials in a cool, dry place out of direct sunlight. Do not eat or drink any of the contents of the kit. Keep out of the reach of children. Material Safety Data Sheets available upon request.

**Disposal of Test Materials:** Properly dispose of all kit components. Needles must be destroyed before disposal by cutting or bending back the needle. Syringes must be destroyed by breaking or shattering the barrel. Federal and local laws apply.

Used media bottles must be properly disposed of according to local regulations. Alternatively, bottles/kits may be returned to **BTI Products, LLC** for proper disposal for a fee of \$26.00 per kit.

**Need Help?**

**Call 970.884.4629**

**DATA SHEET**  
MICKIT® Pipe Inspection Kit

A. Site Information	
<b>A1</b>	Facility name
<b>A2</b>	Location in FPS (e.g. System #2, Riser #1)
B. Physical Characteristics of Pipe Deposits & Pits	
<b>B1</b>	Location of deposits in pipe (e.g., top bottom)
<b>B2</b>	Height of largest deposit(s) (in thousandths of inches)
<b>B3</b>	Diameter of largest deposit(s) (in thousandths of inches)
<b>B4</b>	Depth of deepest pit(s) (in thousandths of inches)
<b>B5</b>	Wall thickness of pipe (in thousandths of inches)
<b>B6</b>	Wall loss (%) $\% \text{ Wall loss} = \frac{\text{Pit depth (inches)}}{\text{Wall thickness (inches)}} \times 100$
C. Chemical Characteristics of Pipe Deposits	
<b>C1</b>	pH
<b>C2</b>	Carbonates (yes/no)
<b>C3</b>	Sulfides (yes/no)
<b>C4</b>	Total iron (ppm)
<b>C5</b>	Chloride (ppm)
D. Manual Removal of Pipe Deposits	
<b>D1</b>	Appearance of deposits outside & inside
<b>D2</b>	Removal 1=easy 2=difficult 3=impossible

**DATA SHEET**  
MICKIT® Pipe Inspection Kit

E: Chemical Removal of Pipe Deposits				
<b>E1</b>	<b>0 Time:</b> Pipe deposits softened & broken apart by ZN HCl (yes/no)			
<b>E1</b>	<b>1 Hour:</b> Pipe deposits softened & broken apart by ZN HCl (yes/no)			
<b>E1</b>	<b>4 Hours:</b> Pipe deposits softened & broken apart by ZN HCl (yes/no)			
<b>E1</b>	<b>8 Hours:</b> Pipe deposits softened & broken apart by ZN HCl (yes/no)			
<b>E1</b>	<b>24 Hours:</b> Pipe deposits softened & broken apart by ZN HCl (yes/no)			
<b>E2</b>	<b>0 Time:</b> Pipe deposits dissolved by ZN HCl (yes/no)			
<b>E2</b>	<b>1 Hour:</b> Pipe deposits dissolved by ZN HCl (yes/no)			
<b>E2</b>	<b>4 Hours:</b> Pipe deposits dissolved by ZN HCl (yes/no)			
<b>E2</b>	<b>8 Hours:</b> Pipe deposits dissolved by ZN HCl (yes/no)			
<b>E2</b>	<b>24 Hours:</b> Pipe deposits dissolved by ZN HCl (yes/no)			
<b>E3</b>	<b>0 Time:</b> Pipe deposits softened & broken apart by detergent-chelant (yes/no)			
<b>E3</b>	<b>1 Hour:</b> Pipe deposits softened & broken apart by detergent-chelant (yes/no)			
<b>E3</b>	<b>4 Hours:</b> Pipe deposits softened & broken apart by detergent-chelant (yes/no)			
<b>E3</b>	<b>8 Hours:</b> Pipe deposits softened & broken apart by detergent-chelant (yes/no)			
<b>E3</b>	<b>24 Hours:</b> Pipe deposits softened & broken apart by detergent-chelant (yes/no)			
<b>E4</b>	<b>0 Time:</b> Pipe deposits dissolved by detergent-chelant (yes/no)			
<b>E4</b>	<b>1 Hour:</b> Pipe deposits dissolved by detergent-chelant (yes/no)			
<b>E4</b>	<b>4 Hours:</b> Pipe deposits dissolved by detergent-chelant (yes/no)			
<b>E4</b>	<b>8 Hours:</b> Pipe deposits dissolved by detergent-chelant (yes/no)			
<b>E4</b>	<b>24 Hours:</b> Pipe deposits dissolved by detergent-chelant (yes/no)			