



## PIPELINE INSPECTION CHEMICAL/BACTERIA KIT - SOLIDS

MIC Corrosion Areas, Mud, Soil, Solids, Pipeline Dust, Scale, Film, and Slime

### USER INSTRUCTIONS - CHEMICAL TESTING

**SPECIAL** Before using this Chemical Kit READ ALL INSTRUCTIONS. This kit only contains

**NOTE:** enough materials to test for EITHER SOLIDS OR FILM/SLIME - NOT BOTH.

#### CHEMICAL PARAMETERS

This kit will test for the following parameters:

pH	Iron	Sulfide	Nitrite	Chloride
Carbonate	Calcium	Nitrate	Manganese	Sulfate

#### CHEMICAL TESTING

The testing is performed by using the tubes, test strips, and droppers displayed in the foam block. Note that extra items (i.e., test strips, cotton swabs) are furnished - it is not necessary to use all of these, but they are provided if you should have a problem with a sample collection or testing procedure, or if you should desire to repeat the analysis for pH, carbonate, iron, chloride, calcium, sulfate, nitrate, nitrite and manganese. An additional lead-acetate paper strip is also provided. The following instructions provide the procedures for the testing of MIC corrosion areas, mud, soil, solids, pipeline dust, scale, film, and slime, and gunk, in conditions where the pH is between 4 and 8.

When testing mud, soil, solids, pipeline dust, and scale, use the white sample spoon found in the sealed plastic bag. When testing sludge, slime, surface films, gunk, or MIC areas, use the sterile cotton tipped swabs found in the sealed paper bag.

#### INSTRUCTIONS

##### SOLIDS AND SOILS - ONLY

(For use when sampling mud, soil, solids, pipeline dust, scale, etc.).

Step 1. If the solids/soils to be tested are wet, fill the white sampling spoon 1/2-full with the solids/soils. If the solids/soils to be tested are dry or dusty, fill the sampling spoon level.

Step 2. Empty the spoon into the tube with the blue cap (distilled, or DI water).

##### MIC, SLIME, SLUDGE, AND FILM - ONLY

(For use for surface sampling of MIC areas, slime, undercoating, film, etc.).

Step 1A. Use a sterile cotton tipped swab to collect a sample from the suspected MIC area, or from the slime, sludge, surface film or gunk. Cover (saturate) the cotton portion of the swab with the material. Do not touch the cotton with your hands.

Step 2A. Break the swab about an inch below the cotton end and place the cotton end in the tube with the blue cap distilled, or DI water). Do not handle swab.

With the sample collected and placed into the blue-capped (DI water) tube following Step 2/Step 2A, the remaining instructions are to be used for the chemical testing.

The remaining instructions are identical, regardless of material to be tested.

Step 3. Replace the blue cap and hand tighten. Make sure the cap is secure. With the cap securely on the tube, shake the tube vigorously to mix the sample and the liquid in the tube. The tube should be shaken for 30 to 45 seconds.

Step 4. Place tube back in foam holder and allow the tube to set for 1 to 2 minutes undisturbed.

Step 5. **pH Test.** Remove the cap from the blue tube and set the cap aside. Remove a pH strip from the plastic bag and fold the strip in half. Place the folded edge only of the pH strip into the liquid, making sure to wet only the tip of this folded area (will be the wide, non-numbered, yellow color bar of the pH strip). Remove the pH strip from the liquid and compare the color in the fold of the strip to the color chart on the pH strip. Record the pH reading that matches the wet area. If there is not an exact color match with this scale, then estimate an intermediate value.

pH \_\_\_\_\_ (Standard Units)

Step 6. **The next test is for the presence of carbonate.** To test for carbonate, take a test strip from the tube marked “Carbonate” and dip the yellow portion of the strip into the blue top tube. Stir for 5 seconds. Remove the strip, do not shake off the excess liquid. After 10 seconds compare the color change on the test strip to the color chart below. Record the result of the carbonate test below. If there is not an exact match with this color scale, then estimate an intermediate value. If the color indicated is darker than the highest value below, then record your result as “180 plus”.

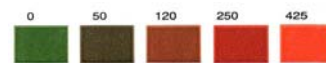


Carbonate \_\_\_\_\_ mg/l

Step 7. **The next test is for the presence of sulfide.** To test for sulfide, use one of the supplied 1 ml droppers to add 1 ml of test fluid (from the blue top tube) into the yellow cap tube. Do so by grabbing the large bulb end of the dropper between the thumb and forefinger and squeeze until the thumb and forefinger touch. Place the dropper into the test fluid (blue top tube) and allow liquid to flow into the dropper by opening the thumb and forefinger. The test fluid should fill the large bulb end ½ to ¾ full. Leave the yellow cap tube containing hydrochloric acid in the foam holder, but remove its cap and set it aside. Do not pour the acid out. Add the contents of the dropper directly into this tube by squeezing the dropper tightly between your thumb and forefinger. Dispose of the dropper - do not re-use. Take the test cap (gray cap) and a single strip of the (white) lead-acetate paper from the sealed plastic bag. Drape the paper strip over the opening of the yellow capped tube containing the acid and the test fluid, then loosely cover the paper and the tube with the gray test cap (see inset). Allow the tube, cap, and paper to remain undisturbed in the foam holder during Steps 8 and 9.



Step 8. **The next test is for the presence of calcium.** To test for calcium, take a test strip from the tube marked “Calcium” and dip the colored green portion of the strip into the blue top tube for 5 seconds. Remove, shake the excess fluid off, wait 15 seconds, then compare the color change to the color chart below and record the result below. If there is not an exact color match with this scale, then estimate an intermediate value. If the color indicated is lighter than the highest value below, then record your result as “425 plus”.



Calcium \_\_\_\_\_ mg/l

**Step 9. Complete test for presence of sulfide.**

Remove the test cap and lead acetate paper (from Step 7) from the top of the yellow cap tube. Turn the paper over. If the underside of the paper has turned black/brown, than sulfide is present at greater than or equal to 5 mg/l. If there is no color change, then sulfide is less than 5 mg/l. Securely fix the yellow cap back on the tube, then record the sulfide result below.

Sulfide \_\_\_\_\_ mg/l

**Step 10. The next test is for the presence of iron.**

To test for iron, use one of the supplied test strips from the tube marked “Iron” and dip the white portion of the strip in the blue top tube for 5 seconds. Remove, shake the excess liquid off, wait 20 seconds, then compare the indicator patch to the color chart below and record the result below. If there is not an exact color match with this scale, then estimate an intermediate value. If the color indicated is darker than the highest value below, then record your result as “100 plus”.



Iron \_\_\_\_\_ mg/l

**Step 11. The next test is for the presence of nitrate.**

Remove the test strip from the tube marked “Nitrate” and dip the white portion of the strip into the blue top tube for 30 seconds. Remove, shake the excess liquid off, let set for 30 seconds, then compare the color change to the color chart below and record the results below. If there is not an exact color match with this scale, then estimate an intermediate value. If the color indicated is darker than the highest value below, then record your result as “500 plus”.



Nitrate \_\_\_\_\_ mg/l

**Step 12. The next test is for the presence of nitrite.**

Remove the test strip from the tube marked “Nitrite” and dip the white portion of the strip into the blue top tube for 30 seconds. Remove, shake the excess liquid off, let set for 30 seconds, then compare the color change to the color chart below and record the results below. If there is not an exact color match with this scale, then estimate an intermediate value. If the color indicated is darker than the highest value below, then record your result as “80 plus”.



Nitrite \_\_\_\_\_ mg/l

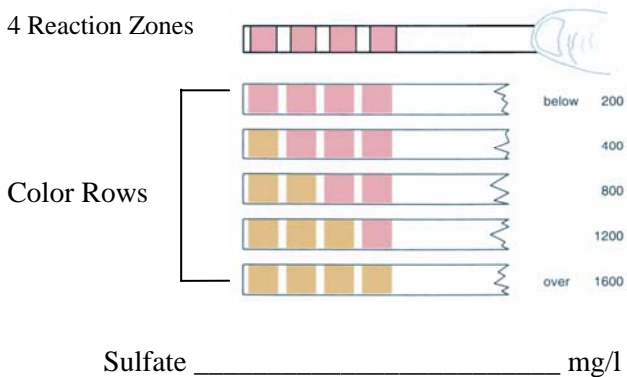
**Step 13. The next test is presence of manganese.**

Remove a test strip from the tube marked “Manganese”. Dip the yellow portion of the strip in the blue top tube. Remove, shake off the excess liquid, then dip the strip in the white top tube (“Reagent No. 1”). Remove, shake off the excess liquid, wait for 15 seconds, then dip into the red top tube (“Reagent No. 2”). Remove, shake off the excess liquid, wait for 60 seconds, then compare the color change to the color chart below and record the result below. If there is not an exact color match with this scale, then estimate an intermediate value. If the color indicated is darker than the highest value below, then record your result as “100 plus”.

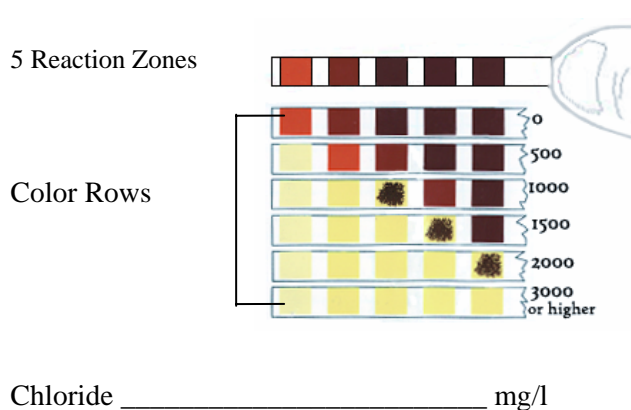


Manganese \_\_\_\_\_ mg/l

Step 14. **The next test is for the presence of Sulfate.** Remove the test strip from the tube marked “Sulfate”. Immerse the test strip with all four (4) reaction zones in the blue top tube. Make sure that all four (4) reaction zones are immersed in the fluid in the blue top tube for one (1) second. Remove the test strip and shake off any excess liquid from the test strip. Wait for two (2) minutes then compare the color pattern of the four (4) reaction zones with the color rows on the chart below. Determine which row the four (4) reaction zones color pattern matches most exactly and record the value for that row listed on the right side of the chart and record this value below. If an exact color match cannot be made with the rows in the chart, then estimate an intermediate value. If the four (4) reaction zones match the color pattern of the last row of the chart below, record the result as “1600 plus”.



Step 15. **The next test is for the presence of Chloride.** Remove the test strip from the tube marked “Chloride”. Immerse the test strip with all five (5) reaction zones in the blue top tube. Make sure that all five (5) reaction zones are immersed in the fluid in the blue top tube for one (1) second. Remove the test strip and shake off any excess liquid from the test strip. Wait for sixty (60) seconds, then compare the color pattern of the five (5) reaction zones with the color rows on the chart below. Determine which row the five (5) reaction zones color pattern matches most exactly and record the value for that row listed on the right side of the chart and record this value below. If an exact color match cannot be made with the rows in the chart, then estimate an intermediate value. If the five (5) reaction zones match the color pattern of the last row of the chart below, record the result as “3000 plus”.



Step 16. After completing all the tests, fill out the enclosed Chemical Testing Reporting Form by transferring the results recorded for each of the above steps onto the appropriate spaces of the Form. Also fill out all other appropriate information as indicated on the Reporting Form. Alternately, you may elect to transfer your results onto your own company’s reporting form.

Step 17. If additional solids testing are required, the 6 mil plastic sample bag is to be used to send the collected solid sample to MSES Corrosion Products Division for any additional testing.

Step 18. After the completion of the chemical testing, the testing materials can be discarded in the trash. No toxic or hazardous chemicals exist.

\_\_\_\_\_  
(Company)

\_\_\_\_\_  
(Location)

## CHEMICAL TESTING REPORTING FORM

Storage Field	Line Number	
Bell Hole Number	Well Number	Drip Name and Number
Township/District	County	State
Comments		
Sample Location		Sample Number
Sample Type <input type="checkbox"/> - Soil <input type="checkbox"/> - Scale <input type="checkbox"/> - Solids <input type="checkbox"/> - Sludge/Gunk <input type="checkbox"/> - Mud <input type="checkbox"/> - Slime <input type="checkbox"/> - MIC <input type="checkbox"/> - Pipeline Dust <input type="checkbox"/> - Other _____		
Comments		
Sample Collection Date	Sample Collection Time <input type="checkbox"/> - AM <input type="checkbox"/> - PM	Sampler
SAMPLE DESCRIPTION Color _____ Odor _____ Texture _____		
<b>CHEMICAL TESTING</b>		
pH _____  Air Temperature _____  Weather Conditions _____ _____	Test	mg/l
	Carbonate	
	Calcium	
	Sulfide	
	Chloride	
	Iron	
	Sulfate	
	Manganese	
	Nitrate	
Nitrite		
TESTED BY		DATE
COMMENTS		



**PIPELINE INSPECTION**  
**CHEMICAL/BACTERIA KIT - SOLIDS**  
Acid Producing Bacteria  
Sulfate Reducing Bacteria

**USER INSTRUCTIONS - MICROBIOLOGY SURVEY**

**SPECIAL NOTE:** Before using this Solids-Microbiology Survey kit **READ ALL INSTRUCTIONS.**  
This kit only contains enough materials for one (1) test.

**MICROBIOLOGY PARAMETERS**

This kit will test for the following parameters:

APBs - Acid Producing Bacteria  
(Red Cap Bottles)

SRBs - Sulfate Reducing Bacteria  
(Green Cap Bottles)

**MICROBIOLOGY TESTING – SOLIDS AND SOILS**

The testing is performed by the bottles and syringes contained in this kit. The following instructions provide the procedures for the testing of mud, soil, solids, pipeline dust and scale, use the white sample spoon found in the sealed plastic bag. When testing sludge, slime, surface films, gunk, or MIC areas, use the sterile cotton tipped swabs found in the sealed paper bag.

The testing of the pH will be preformed as part of the chemical testing portion of this total kit and does not need to be repeated for this microbiology testing.

**INSTRUCTIONS**

**SOLIDS AND SOILS - ONLY**

(For use when sampling mud, soil, solids, pipeline dust, scale, etc.).

Step 1. If the solids/soils to be tested are wet, fill the white sampling spoon 1/2-full with the solids/soils. If the solids/soils to be tested are dry or dusty, fill the sampling spoon level.

Step 2. Empty the spoon into the tube with the orange cap (ADS tube).

**MIC, SLIME, SLUDGE, AND FILM - ONLY**

(For use for surface sampling of MIC areas, slime, undercoating, film, etc.).

Step 1A. Use a sterile cotton tipped swab to collect a sample from the suspected MIC area, or from the slime, sludge, surface film or gunk. Cover (saturate) the cotton portion of the swab with the material. Do not touch the cotton with your hands.

Step 2A. Break the swab about an inch below the cotton end and place the cotton end in the tube with the orange cap (ADS tube). Do not handle swab.

With the sample collected and placed into the orange-capped (ADS tube) tube following Step 2/Step 2A, the remaining instructions are to be used for the bacteria testing.  
The remaining instructions are identical, regardless of material to be tested.

## INSTRUCTIONS

- Step 3. Replace the orange cap and hand tighten. Make sure the cap is secure. With the cap securely on the tube, shake the tube vigorously to mix the sample and the ADS liquid in the tube. The tube should be shaken for 30 to 45 seconds.
- Step 4. After mixing, set the “ADS” tube upright in the foam block provided with the bacteria bottles and allow the tube to set for 1 to 2 minutes. After this time has elapsed, you may proceed with the completion of the microbiology testing (Step 5).

### Microbiology Testing

#### Inoculation of APBs Bottles

- Step 5. Number the **red-cap** bottles 1 through 5.
- Step 6. Remove the metal tabs from the centers of all **red-cap** bottles. Do not remove the entire metal seal.
- Step 7. Using one of the enclosed alcohol swabs, wipe the exposed rubber part of the cap on each of the **red-cap** bottles.
- Step 8. Unwrap one of the four syringes. Draw one (1) mL of fluid from the orange top tube (ADS) into the first syringe.
- Step 9. Insert the syringe needle into the top of the first **red-cap** bottle and inject the sample into the bottle (**red-cap** bottle 1). Move the syringe plunger up and down a couple of times to mix the sample in the bottle.
- Step 10. Remove the empty syringe and set it aside.  
*You will not use it again.*
- Step 11. Unwrap the second of the four syringes. Insert it into the first **red-cap** bottle.
- Step 12. Now pull up on the syringe plunger to draw up one (1) mL of sample from the first **red-cap** bottle into the syringe.
- Step 13. Pull the syringe out of **red-cap** bottle 1, insert the needle into **red-cap** bottle 2, and inject the liquid into bottle 2. Once again, move the syringe plunger up and down to mix the sample, draw up one (1) mL of liquid, and inject it into **red-cap** bottle 3.

#### Inoculation of SRBs Bottles

- Step 16. Number the **green-cap** bottles 1 through 5.
- Step 17. Remove the metal tabs from the centers of all **green-cap** bottles. Do not remove the entire metal seal.
- Step 18. Using one of the enclosed alcohol swabs, wipe the exposed rubber part of the cap on each of the **green-cap** bottles.
- Step 19. Unwrap the third syringe. Draw one (1) mL of fluid from the orange top tube (ADS) into the syringe.
- Step 20. Insert the syringe needle into the top of the first **green-cap** bottle and inject the sample into the bottle (**green-cap** bottle 1). Move the syringe plunger up and down a couple of times to mix the sample in the bottle.
- Step 21. Remove the empty syringe and set it aside.  
*You will not use it again.*
- Step 22. Unwrap the fourth syringe. Insert it into the first **green-cap** bottle.
- Step 23. Now pull up on the syringe plunger to draw up one (1) mL of sample from the first **green-cap** bottle into the syringe.
- Step 24. Pull the syringe out of **green-cap** bottle 1, insert the needle into **green-cap** bottle 2, inject the liquid into bottle 2. Once again, move the syringe plunger up and down to mix the sample, draw up one (1) mL of liquid, and inject into **green-cap** bottle 3.

**Inoculation of APBs Bottles (continued)**

Step 14. Repeat the above step until all of the **red-cap** bottles have been injected. Note: you do not have to draw any liquid out of the last **red-cap** bottle (bottle 5).

Step 15. Remove the syringe from the last **red-cap** bottle and set the syringe aside. *You will not use it again.*

Step 27. Upon completion of Step 26, the ADS tube, syringes, etc. may be discarded. The syringes are to be discarded per the section entitled "Syringe Disposal". The ADS tube, alcohol swabs, etc. can be disposed of in the trash.

**Inoculation of SRBs Bottles (continued)**

Step 25. Repeat the above step until all of the **green-cap** bottles have been injected. Note: you do not have to draw any liquid out of the last **green-cap** bottle (bottle 5).

Step 26. Remove the syringe from the last **green-cap** bottle and set the syringe aside. *You will not use it again.*

**Recording the Microbiology Survey Results**

Step 28. The carton in which the Microbiology Survey APB and SRB bottles, syringes, etc. were originally shipped can be used as an incubator for the completion of the Microbiology Survey. After inoculating all the bacteria bottles, place the foam block containing the inoculated SRB and APB bottles back into the box, and close the lid. All other materials can then be discarded. The Microbiology Survey record found as a label on the lid of the box can be completed, for ease of reference.

Step 29. Keep the bottles out of direct sunlight and at room temperature for one month (30 days).

Step 30. Ten (10) days after inoculation, check the APB (**red-cap**) bottles for any color changes. If the liquid has changed from red to yellow, count that bottle as having changed (positive). Record the number of APB (**red-cap**) bottles, starting with Bottle 1, that have changed on the enclosed reporting form. After the ten (10) days, no further observations are needed for the APB (**red-cap**) bottles.

Step 31. Twenty-eight (28) to thirty (30) days after inoculation, check the SRB (**green-cap**) bottles for any color changes. If the liquid has changed from clear to black, count that bottle as having changed (positive). Record the number of SRB (**green-cap**) bottles, starting with Bottle 1, that have changed on the enclosed reporting form. After the thirty (30) days, no further observations are needed for the SRB (**green-cap**) bottles.

**Syringe Disposal**

**Needles and syringe barrels are to be destroyed and disposed in accordance with Federal and Local laws. At a minimum, the needles must be destroyed before throwing away by cutting the tips off the needle or by bending back the needle tips. Syringes must be destroyed by breaking or shattering the barrel.**

(Company)

(Location)

## MICROBIOLOGY SURVEY REPORTING FORM

Storage Field	Line Number	
Bell Hole Number	Well Number	Drip Name and Number
Township/District	County	State
Comments		
Sample Location		Sample Number
Sample Type <input type="checkbox"/> - Soil <input type="checkbox"/> - Scale <input type="checkbox"/> - Solids <input type="checkbox"/> - Sludge/Gunk <input type="checkbox"/> - Mud <input type="checkbox"/> - Slime <input type="checkbox"/> - MIC <input type="checkbox"/> - Pipeline Dust <input type="checkbox"/> - Other _____		
Comments		
Sample Collection Date	Sample Collection Time <input type="checkbox"/> - AM <input type="checkbox"/> - PM	Sampler
SAMPLE DESCRIPTION Color _____ Odor _____ Texture _____		
pH MEASUREMENT pH _____	WEATHER CONDITIONS Air Temperature _____ Conditions _____	
MICROBIOLOGY SURVEY RESULTS		
Positive Culture Bottles Bottle Number (Red Cap) Number of Days	APBs ○ (1)    ○ (2)    ○ (3)    ○ (4)    ○ (5) ____	Bacteria Colonies/ml _____
	<input checked="" type="checkbox"/> Record color change from red to yellow after 10 days	
Positive Culture Bottles Bottle Number (Green Cap) Number of Days	SRBs ○ (1)    ○ (2)    ○ (3)    ○ (4)    ○ (5) ____	Bacteria Colonies/ml _____
	<input checked="" type="checkbox"/> Record color change from clear to black after 28-30 days	
TESTED BY	DATE	
COMMENTS		

# MICROBIOLOGY SURVEY

## INTERPRETATION OF RESULTS

### 1. POSITIVE RESULTS ARE AS FOLLOWS:

<u>BACTERIA</u>	<u>MEDIA</u>	<u>POSITIVE</u>
APBs	Red	Media turns yellow
SRBs	Clear With Nail	Media turns dark gray to black

2. The number of bottles that show positive results in the interval time (10 days APBs and 28 to 30 days SRBs) can be used to calculate the bacteria level in the original sample by the following table:

<u>NUMBER OF POSITIVE BOTTLES</u>	<u>BACTERIA COLONIES/ML</u>	<u>REPORTING VALUE</u>
0	<1 - 10	<10
1	1 - 10	10
2	10 - 100	100
3	100 - 1,000	1,000
4	1,000 - 10,000	10,000
5	≥10,000 - 100,000	100,000

3. When a sample has elevated H<sub>2</sub>S levels, the sulfate reducer (SRBs) nutrient bottle no. 1 will often turn “positive” (black) within 15 - 60 seconds of inoculation. This occurrence should be considered “no growth”, if only this bottle is positive after 28 days. If SRB bottle no. 2 turns black immediately, a new sample should be obtained and the H<sub>2</sub>S purged from the sample before inoculation. If SRB bottle no. 2 turns black hours or days after inoculation, the bottle should be marked “positive” and the results recorded, per the table in Item 2.