

We Stand Behind Our Results

***A three prong approach to ensuring
confidence in sanitation and food quality***

Quality Assurance Association Meeting

November 15th, 2006



Agenda

- **Neogen – a leader in environmental monitoring**
- **A tripartite technique for complete environmental analysis**
 - Sanitation verification
 - Allergens and their impact on the supply chain
 - Specific rapid microbiological analysis
- **Questions**

Single Source Solution Provider

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Who is Neogen?

The mission of Neogen Corporation is to be the dominant company in the development, manufacturing and marketing of solutions for food and animal safety.



Who is Neogen?

Founded: 1982

Ownership: Nasdaq — 16.1 million shares

Stock Price: \$15.35 — \$25.22 (\$20.35)

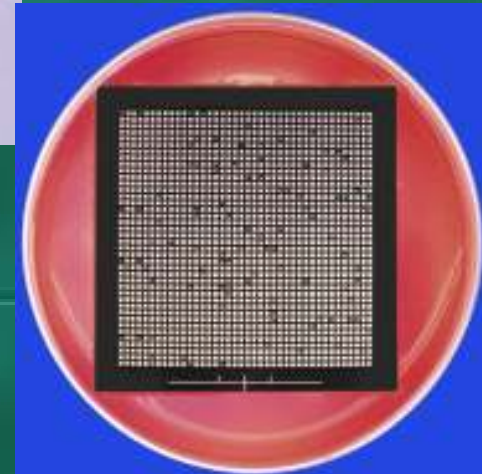
<i>(in millions except EPS)</i>	<i>FY04</i> <i>(ended 5/31)</i>	<i>FY05</i> <i>(ended 5/31)</i>	<i>FY06</i> <i>(ended 5/31)</i>
<i>Revenues</i>	\$ 55.5	\$ 62.8	\$ 72.4
<i>Net Income</i>	\$ 5.1	\$ 5.9	\$ 7.9
<i>EPS</i>	\$ 0.61	\$ 0.70	\$ 0.92

Strengths: Biotechnology Applications
Sales and Marketing Organization

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- Toxins
- Bacteria
- Indicator/Spoilage Organisms
- Unique Proteins
- Genetically Modified Organisms
- Milk Antibiotics
- Allergens
- Sanitation
- Culture Media

Diagnostic test kits



The most AOAC approved methods

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Food safety customers

- Milling and Grain
- Grocery Products
- Meat & Poultry
- Seafood
- Dairy & Beverage
- Fruit & Vegetable
- Food Service and Retail
- Commercial & Regulatory Labs



Novel Technologies with Key Benefits

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**...the world's
most complete line
of food safety diagnostics**

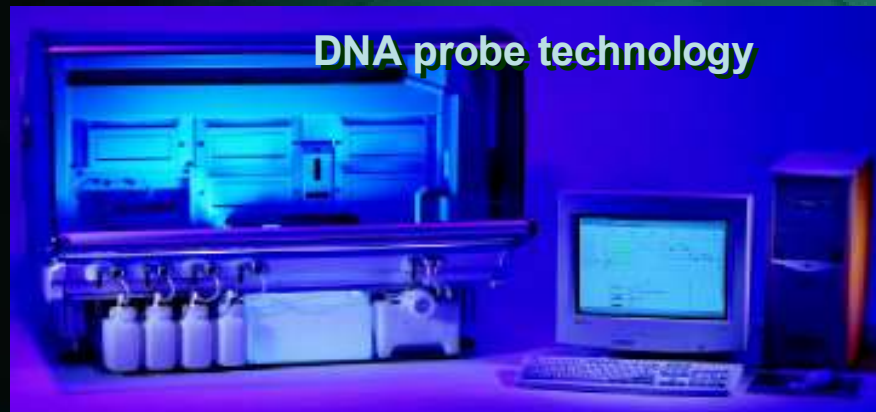
**Optical
microbial
detection**



**Membrane
filtration
technology**



DNA probe technology



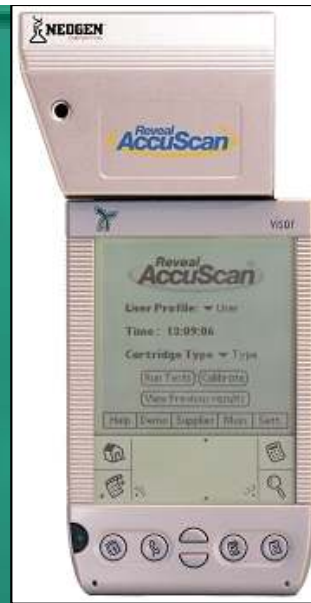
**Lateral flow
technology**



**Dehydrated
culture
media**



**Lateral flow
test reader**



**ATP
Detection**

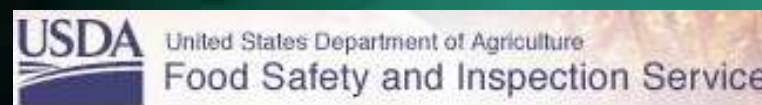


Microwell technology



Trust is earned

A world-class
portfolio of
customers

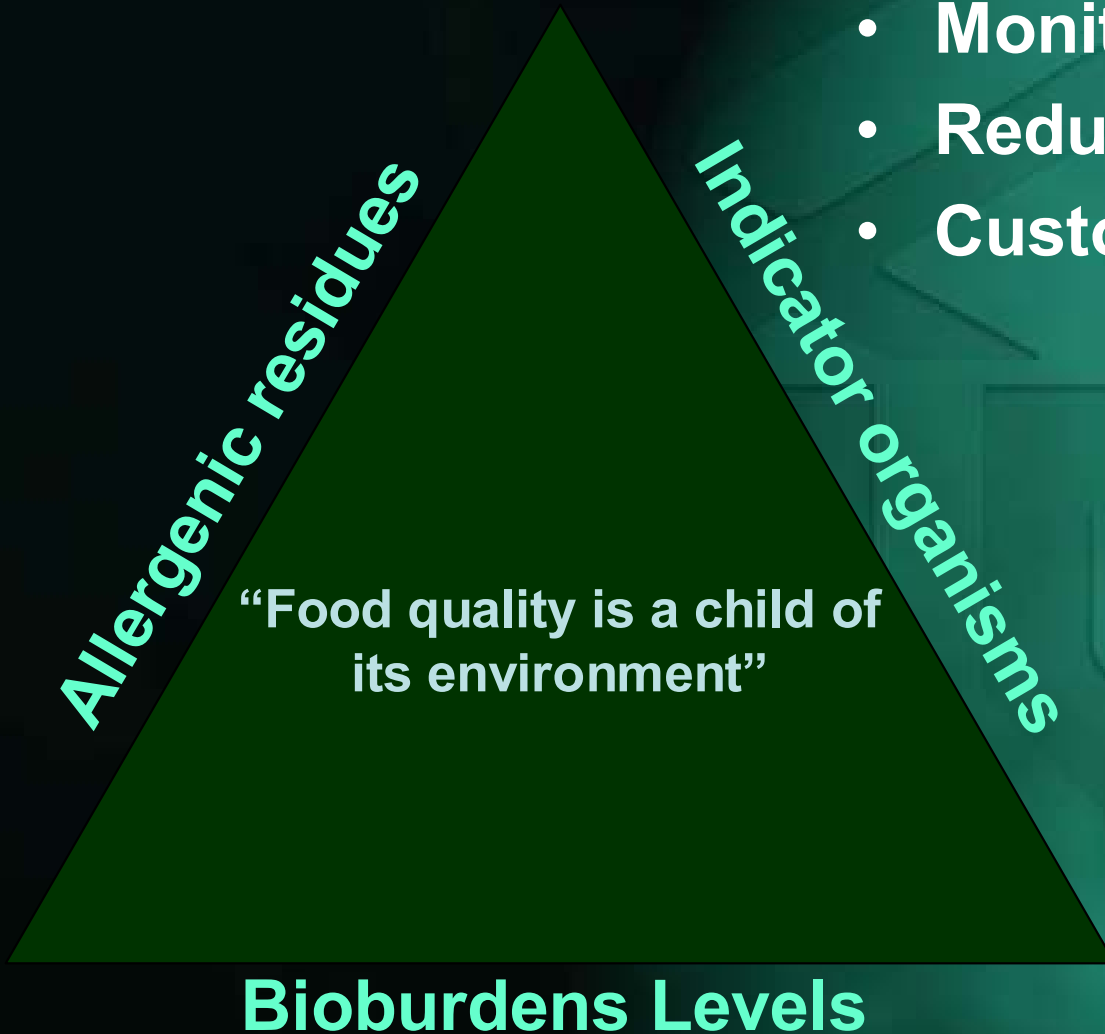


Training and support

- **Neogen's key differentiator is product support**
 - 12 Ph.D's on staff
 - 12+ dedicated technical service/field application specialists
 - Utilize a combination of virtual & on-site training
 - Webinars for product introductions & pre-training
 - Easy for multiple sites to logon
 - Excellent for software demos
 - On-site training
 - Initial setup/training – can train 1, 2 or 3 shifts
- **Trainees are tested and must pass 'exam' to be given training certificate**
- **Continual support and follow-up training**

The environmental triangle

- Monitor and trend data
- Reduce final product testing
- Customize for your facility



Food safety throughout the supply chain

**Incoming product
Raw materials**

In process

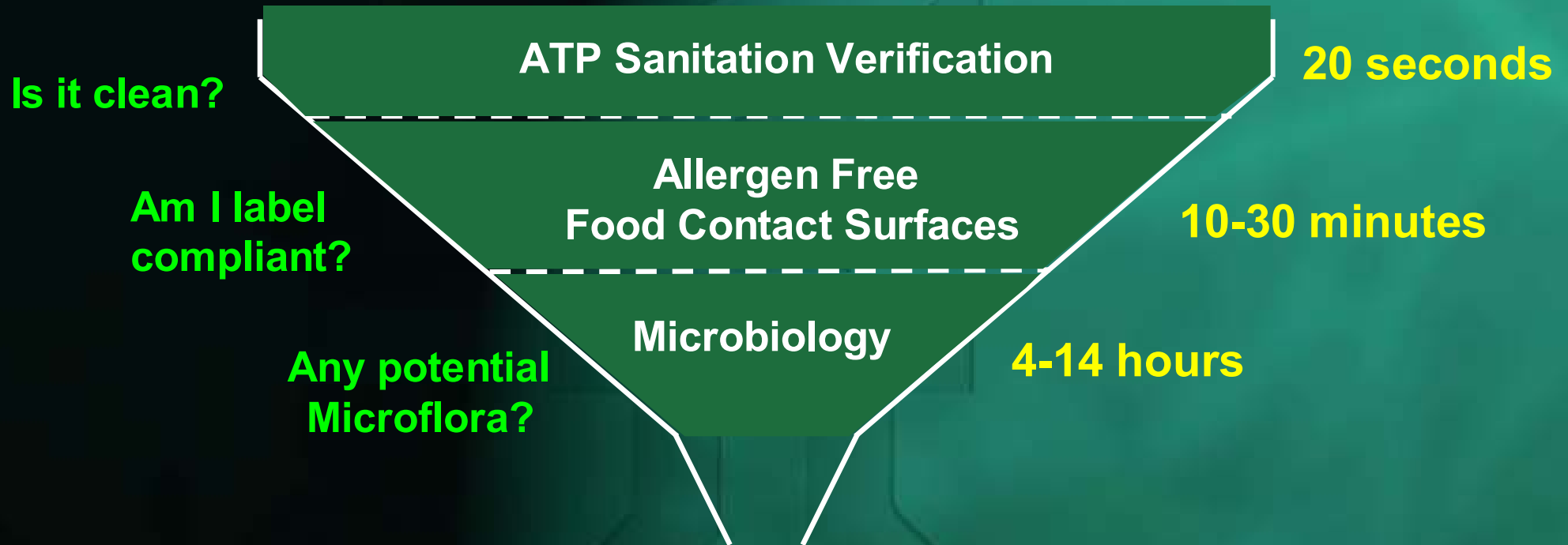
**Critical Control
Process deviations**

Finished Product

- **Increase screening/scrutiny of raw materials**
- **In-process measure and control is critical**
- **Shift/product change monitoring slows production**
- **Final product testing can impede logistics**

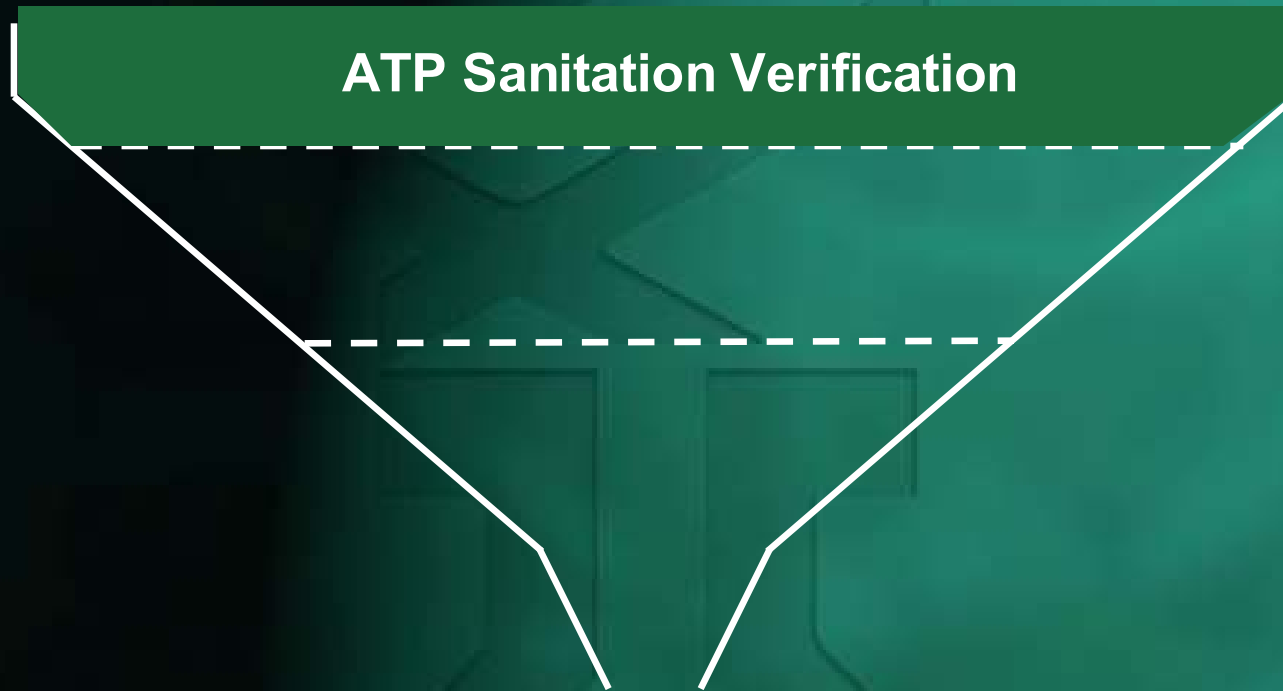
Holding at any state = \$\$\$

Different tests for different needs



- All organic matter can be measured with ATP
- Allergen tests must be specific and sensitive
- Traditional micro is the 'gold standard'
 - Process dependent

Presence of ATP = Dirty surface



- **Organic matter provides a ‘food source’ for microorganisms**
- **Promotes better sanitation practices**
 - What gets measured – gets done!

ATP hygiene monitoring

- **As food or other organic material comes into contact with surfaces, it leaves ATP**
- **After we clean, the amount of ATP that remains is a direct indication of how much food, bacteria and other organic matter that is still left on the surface**



Critical Elements of a sanitation monitoring system

- **It must be easy to use**
- **It must provide consistent results**
- **Allows easy data analysis**

- **The AccuPoint system is one of the most technologically advanced yet easiest to use ATP monitoring system**

- **It's designed to deliver a more consistent result**

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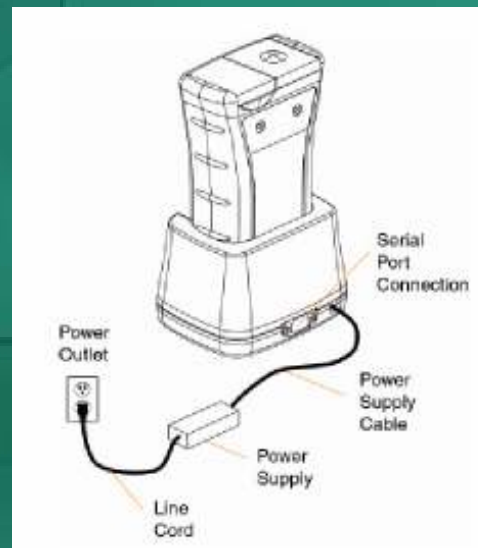


Components

Monitor - Luminometer

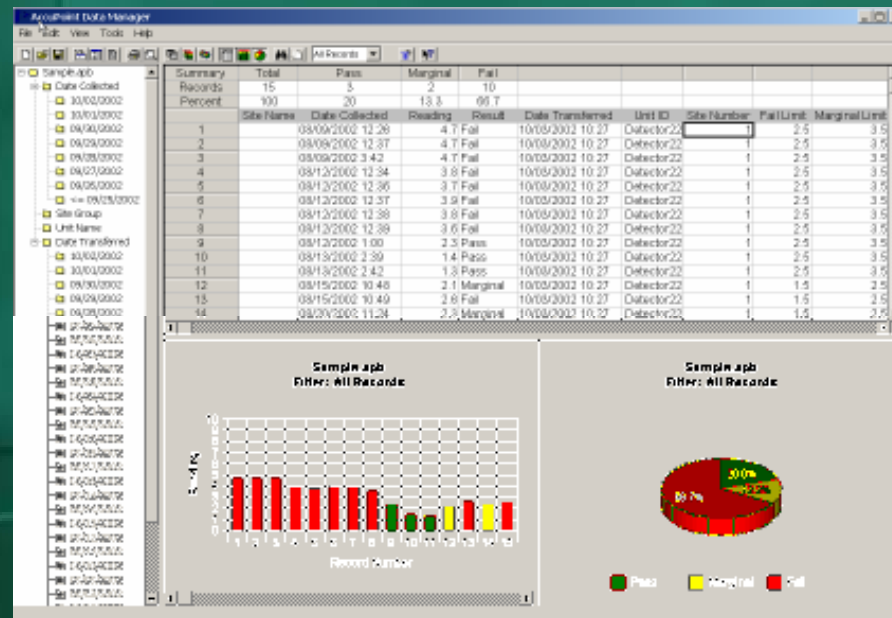


Consumable Samplers



Docking Station

PC Software



AccuPoint advantages

- **AccuPoint is simple and easy to use**
- **Photodiode / Solid-State Technology = dependable maintenance free system**
- **Smallest, lightest instrument on the market means you can take it with you to the point of sampling**
- **Rugged, durable design that will stand-up to the harshest environment**
- **Easy re-tests. The system is programmed to accept a re-test automatically when the need arises**
- **The docking station provides the ultimate in convenient recharging and data transferal**

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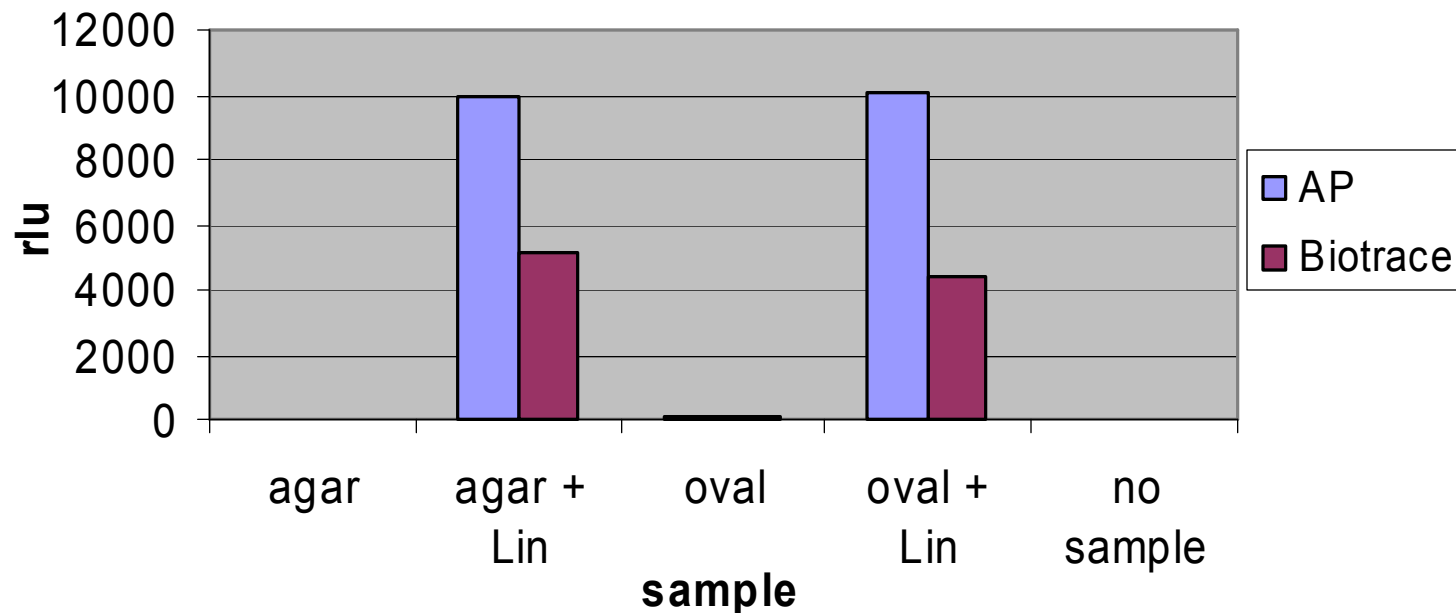
Key product advantage

The AccuPoint samplers are better for breaking through biofilms to determine the true sanitation level of a surface



Biofilms have been implicated in many large product recalls

**AccuPoint vs. Biotrace recovery of ATP from a Biofilm
($1e7$ cfu *Listeria innocua* per 100 cm^2)**



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AccuPoint ATP samplers



Each engineered for specific application



AccuPoint Data Manager
File Edit View Tools Help

Sample -2.apb

- Date Collected
 - 10/28/2003
 - 10/29/2003
 - 10/30/2003
 - 10/31/2003
 - 11/01/2003
 - 11/02/2003
 - 11/03/2003
 - <= 10/27/2003
- Site Group
 - Plant 1
 - Plant 2
 - PLant 1
 - Plant 3
 - Plant 4
- Unit Name
 - AP-0316-1-
- Date Transferred
 - 11/03/2003
 - <= 11/02/2003

Summary	Total	Pass	Marginal	Fail					
Records	22	10	4	8					
Percent	100	45.5	18.2	36.4					
	Site Name	Site Group	Date Collected	Reading	Result	Comments	Marginal Limit	Fail Limit	Da
1			10/09/2003 8:16	19996	Pass		19990	20010	11/
2	De-boning equipment	Plant 1	11/04/2003 10:42	1	Pass		150	300	11/
3	Slicer	Plant 1	11/04/2003 10:43	0	Pass		150	300	11/
4	Chopper	Plant 1	11/04/2003 10:44	0	Pass		150	300	11/
5	Grinder	Plant 1	11/04/2003 10:45	0	Pass		200	400	11/
6	Breeding equipment	Plant 2	11/04/2003 10:46	0	Pass		200	400	11/
7	Oven	Plant 2	11/04/2003 11:18	1	Pass		250	500	11/
8	De-boning equipment	Plant 1	11/04/2003 11:31	1153	Fail		150	300	11/
9	De-boning equipment	Plant 1	11/04/2003 11:31	499	Fail	Retest	150	300	11/
10	Slicer	Plant 1	11/04/2003 11:32	8069	Fail		150	300	11/
11	Chopper	Plant 1	11/04/2003 11:32	8953	Fail		150	300	11/
12	Grinder	Plant 1	11/04/2003 11:33	6082	Fail		200	400	11/
13	Breeding equipment	Plant 2	11/04/2003 11:33	265	Marginal		200	400	11/
14	Cooker	Plant 2	11/04/2003 11:34	389	Marginal		250	500	11/
15	Oven	Plant 2	11/04/2003 11:34	445	Marginal		250	500	11/
16	Conveyor Belt 1	Plant 1	11/04/2003 11:35	475	Fail		150	300	11/
17	Conveyor Belt 2	PLant 1	11/04/2003 11:35	0	Pass		150	300	11/

Sample -2.apb
Filter: All Records

Reading

Record Number

Sample -2.apb
Filter: All Records

36.4% 45.5% 18.2%

Pass Marginal Fail

Allergens on Environmental Surfaces



- **Important to document specific allergen sanitation for labeling**
- **Low ATP is NOT indicative of allergen free**
- **A protein/ATP test will not differentiate allergenic vs. non allergenic proteins**

Food Allergens

- **Food allergens are proteins in food that can create an immune response in sensitive individuals**
- **Neogen kits allow food manufacturers to properly label food products which may contain such allergens**

Why Monitor for Food Allergens?

Four Types of Risks:

- **Clinical**
 - Trace amounts of the allergen can trigger reactions
- **Regulatory**
 - Increase in recalls – new focus on allergens
- **Consumers**
 - Dissatisfaction and loss of confidence
- **Business**
 - Increased cost due to down-time; loss of competitive edge in market

Regulatory input

- **FALCPA provided comprehensive report to Congress in July 2006.**
 - the report provided an assessment of allergen control practices within targeted food industries.
- **Allergen testing has become the Standard of Care for food manufacturers**

How allergen monitoring fits into a food safety program?

- **As a sanitation validation component of a company's food safety program.**
- **As part of a sanitation standard operating procedure (SSOP) when changing over from an allergen-containing product.**
- **Since allergens are classified as a chemical hazard by the FDA, with the unlabeled allergen the hazard, it is imperative to have an allergen control plan in place.**

Uses for allergen test kits

- **Sanitation validation**
- **Supplier verification**
- **Allergenic ingredient determination**
- **Manufacturing issue diagnosis**
- **Occasional finished product analysis for label Verification**
- **Consumer complaint samples**

Uses for allergen test kits

Test kits are primarily used for:

- **Sourcing food allergen cross contact**
 - inadequate cleaning
 - ingredient
 - rework and push through product
- **Verification of allergen control plan**
- **Sanitation validation**

Supply chain – process control

- **Ingredient sourcing**
 - Does your supplier have an allergen control plan
 - Your attempts to be ‘allergen free’ are supply chain dependent

- **Sanitation sourcing**
 - concentrate on hard to clean areas
 - e.g. welds, angles, scarred areas

- **Will need to disassemble parts to access with swab**

Verification

- **Product development**
- **Receiving/raw materials**
- **Equipment/sanitation**
- **Processing**
- **Labeling accuracy**

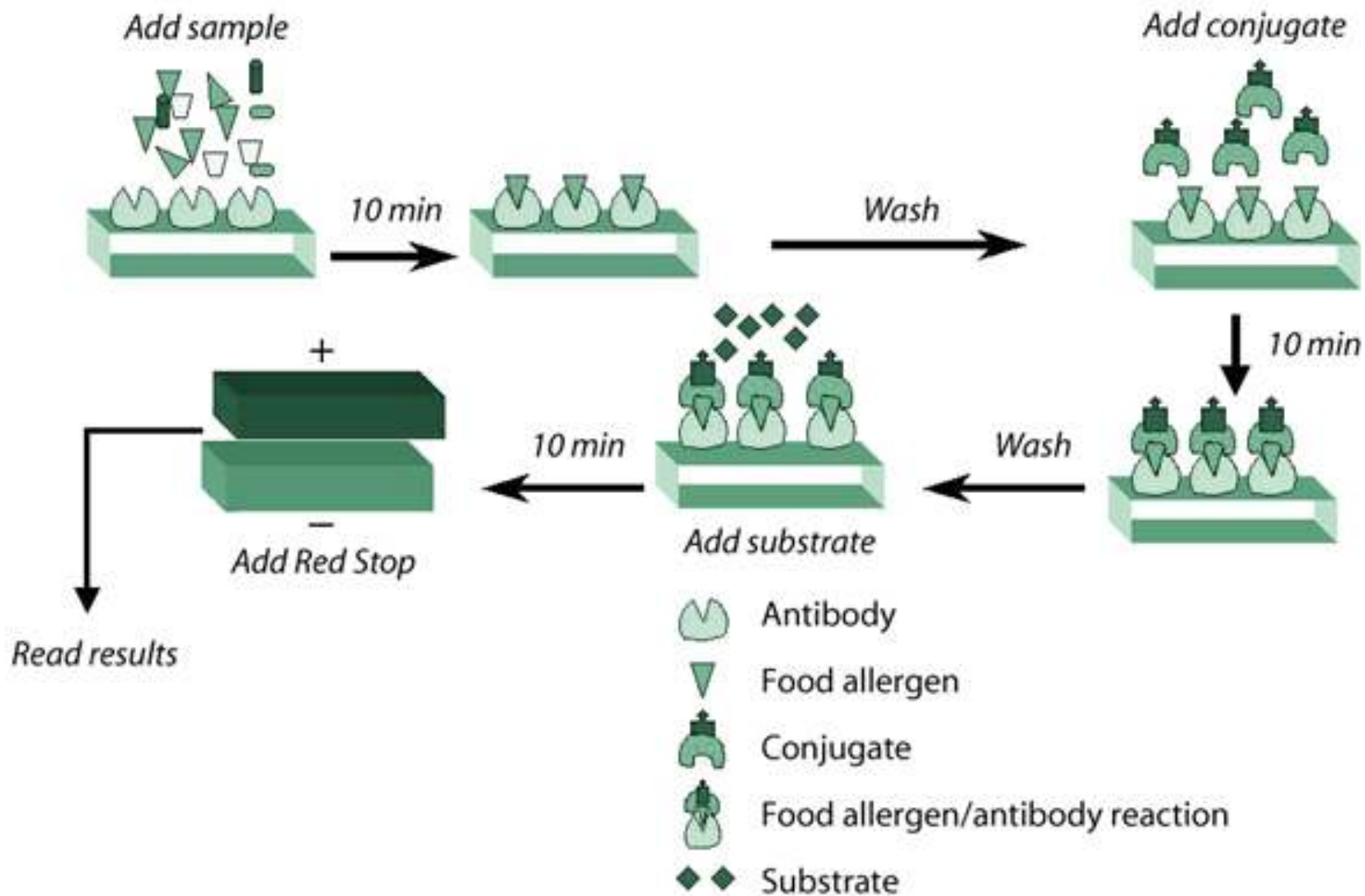
Allergen Cleanup Validation

- **Verify allergen in previous food**
 - take swab for positive control –swab prior to cleaning
- **Clean the equipment**
- **Complete ATP testing**
 - take swab for allergen testing
- **Require multiple successful validation to establish a “validated process”**
- **Risk assessment is a critical step**
 - Initial increase in testing
 - Then reduction and steady state levels

Neogen/FARRP Collaboration

- **FARRP scientists are world renowned experts in the allergen field**
 - Food Allergy Research & Resource Program
- **Neogen partnered with FARRP in 1997**
- **Neogen and FARRP collaborated on development of rapid test kits for peanut, milk, egg, almond, gliadin, soy flour and hazelnut**

Food Allergen Sandwich ELISA Test



Veratox® Food Allergens

- **Quantitative microwell format assays:**
 - **Peanut (AOAC-RI)**
 - 2.5 - 25 ppm
 - **Total Milk**
 - 2.5 - 25 ppm
 - **Egg**
 - 2.5 - 25 ppm
 - **Almond**
 - 2.5 - 25 ppm
 - **Soy Flour**
 - 2.5 - 25 ppm
 - **Hazelnut**
 - 2.5 – 25 ppm
 - **Gliadin**
 - 5 – 50 ppm

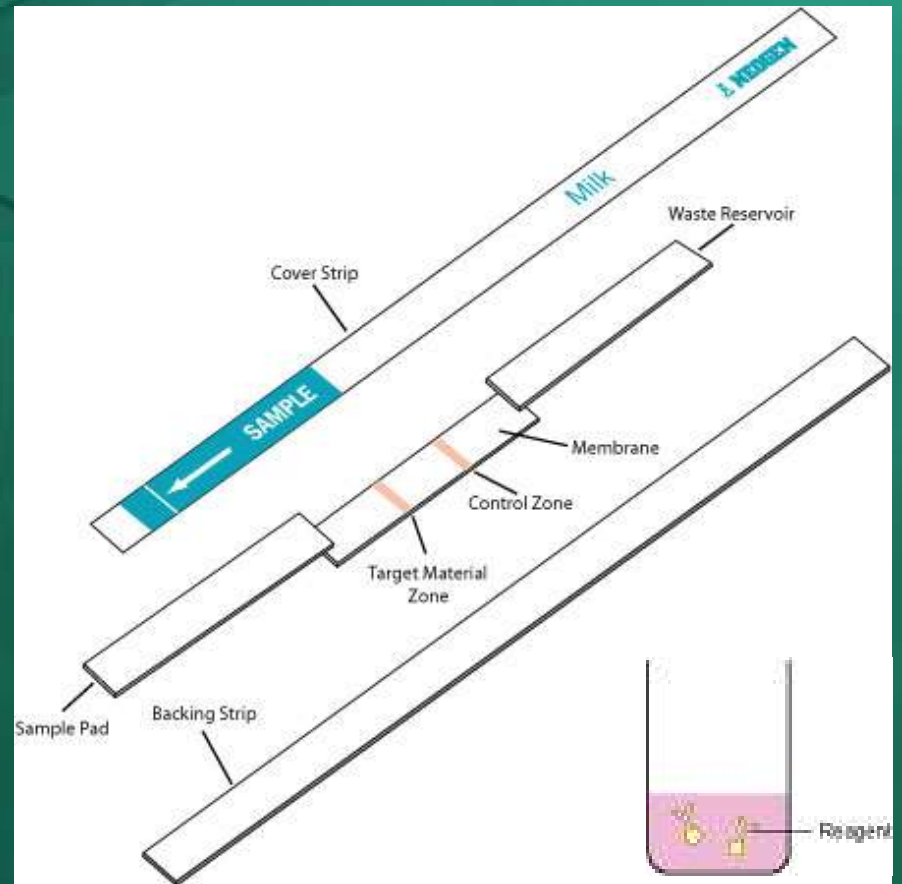
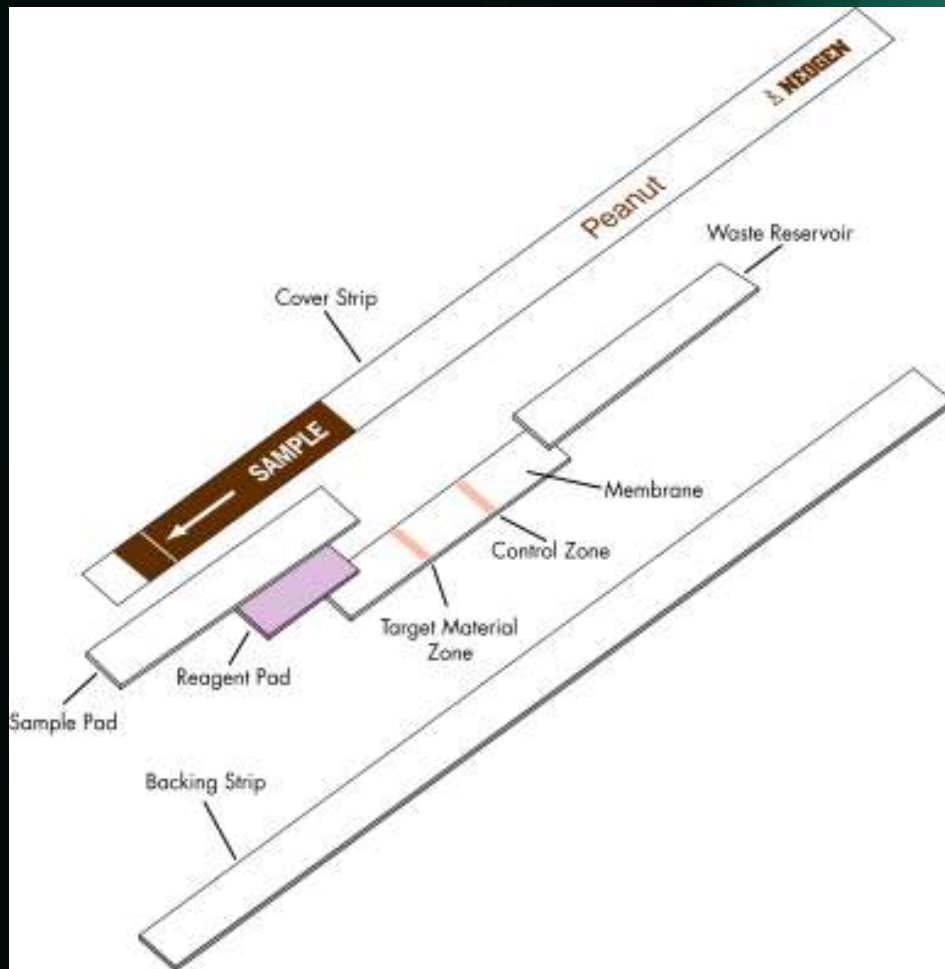


Alert® Food Allergens

- **Qualitative microwell format assays:**
 - Peanut Allergen
 - Egg Allergen
 - Total Milk Allergen
 - Almond Allergen
 - Soy Flour
 - Gliadin (10 ppm)



Reveal for Allergens



Reveal for food allergens

- **Qualitative lateral flow format assay:**
 - Less than 10 min. test time
 - Two lines = positive
 - One line = negative
 - Limit of detection: 5 ppm



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Reveal for Total Milk Allergen



Positive (more than 5 ppm) sample can be interpreted as soon as 2 lines are visible (2-3 min).

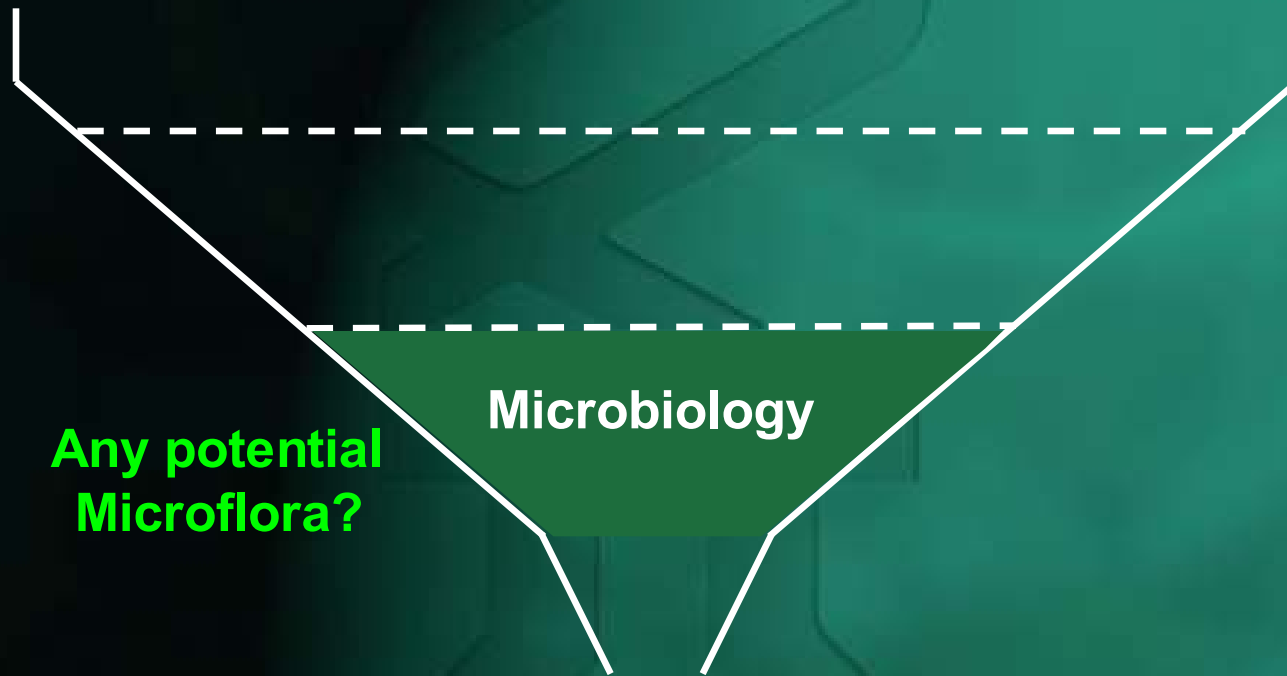
Negative (less than 5 ppm) sample should be interpreted at 5 min. No sample line and one control line.

**AND
OR**



Interpret using the Reveal AccuScan System.

Different tests for different needs



- **Classic method for environmental surveys**
- **Long time to results**
- **Industry need for ‘same shift’ micro results**

Need for Speed



Einstein discovers that time is actually money.

Microbiology at the Speed of Light

Hours not Days	Testing Times		
	Typical Sample Bioburden Level	Conventional Method	Soleris Method
Total Viable Count	100,000	48 hours	6-8 hours
Coliform	100	24 hours	9-10 hours
<i>E coli</i>	10	24 hours	7-10 hours
Yeast and Mold (Mold Assembly Vial)	10	5 days	60-72 hours
Lactics	100	3-5 days	30-35 hours

Increase productivity

- **Hardware** = Temperature control incubator units
- **Consumables** = Ready to use vials, no preparation required
- **Scalable** = Start 1, 2 or 32 samples at any time no batching required
- **Easy-to-use** and sensitive test systems for Indicator and Spoilage micro-organisms



128 Capacity



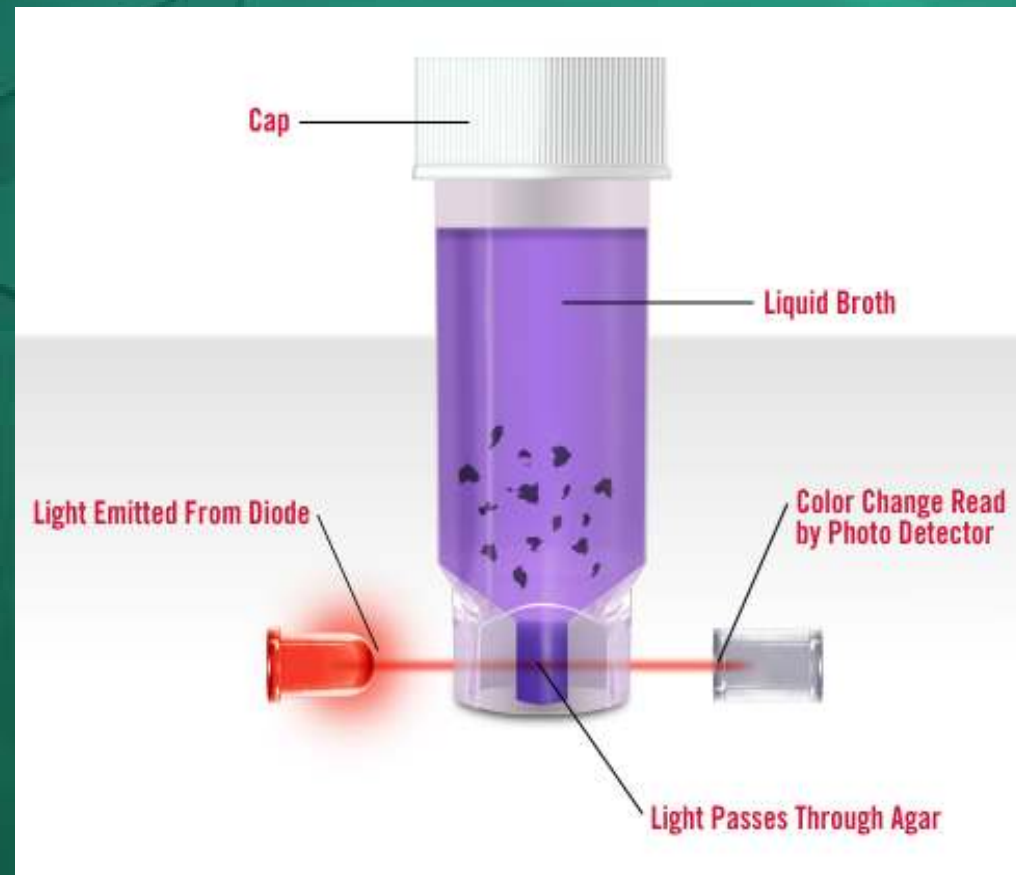
32 Capacity



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The Technology

- Vials contain enrichment media and a pH indicator
- Microbial growth in vial causes pH shift, changing the indicator color
- Monitor growth by monitoring changes in color and detecting at “barrier layer” (agar plug) every 6 minutes
- No interference from food products or particles due to separation between product and monitoring zone



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Soleris is simple



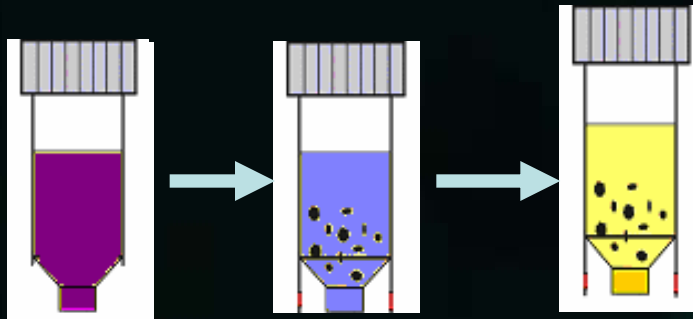
Highly versatile system

- **TVC (APC)**
- **Coliform**
- ***E. coli***
- **Lactic acid bacteria**
- **Yeast**
- ***Enterobacteriaceae***
- ***Listeria***
- **Mold**
- ***Staphylococcus***
- ***Pseudomonas***
- ***Alicyclobacillus***
- **Osmophilic Yeast**
- **Sterility**
- **Environmental**
 - **Swabs**
 - **Sponges**
 - **Sanitation monitoring**
- **Spoilage flora**
 - **Gram negatives**
 - **Sterility testing**
 - **Challenge test**
 - **Shelf-life**

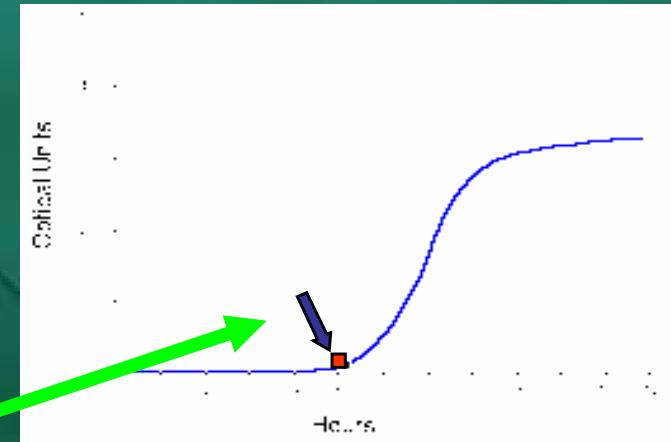
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Turn-key Automation

Add sample to vial



1A1					
A	03AprMD1 Milk Milk TVC	5.7 9.1E+4	<input checked="" type="checkbox"/>	03AprMD2 Milk Milk TVC	6.9 2.1E+4
B	03AprMD1 Milk Milk Coliform	5.9 1.7E+5	<input checked="" type="checkbox"/>	03AprMD2 Milk Milk Coliform	10.7 1.6E+2
C	03AprYD1 Yogurt		<input type="checkbox"/>	03AprYD2 Yogurt	



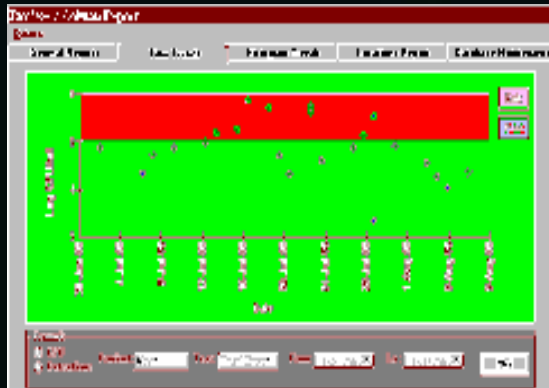
Versatility of Soleris Vials

- **Ability to place Millipore or other filters directly into vials**
 - Analyze 100 ml+ volumes
- **Ability to utilize Sponges, Swabs or Kimwipes**
 - Environmental monitoring



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Trend reports and Statistical Analysis



Time Trends



Trend Analysis

Line No.	Location Code	Description	Description
1	101	101-101-101-101	101-101-101-101
2	102	102-102-102-102	102-102-102-102
3	103	103-103-103-103	103-103-103-103
4	104	104-104-104-104	104-104-104-104
5	105	105-105-105-105	105-105-105-105
6	106	106-106-106-106	106-106-106-106
7	107	107-107-107-107	107-107-107-107
8	108	108-108-108-108	108-108-108-108
9	109	109-109-109-109	109-109-109-109
10	110	110-110-110-110	110-110-110-110
11	111	111-111-111-111	111-111-111-111
12	112	112-112-112-112	112-112-112-112
13	113	113-113-113-113	113-113-113-113
14	114	114-114-114-114	114-114-114-114
15	115	115-115-115-115	115-115-115-115
16	116	116-116-116-116	116-116-116-116
17	117	117-117-117-117	117-117-117-117
18	118	118-118-118-118	118-118-118-118
19	119	119-119-119-119	119-119-119-119
20	120	120-120-120-120	120-120-120-120

HACCP Verification



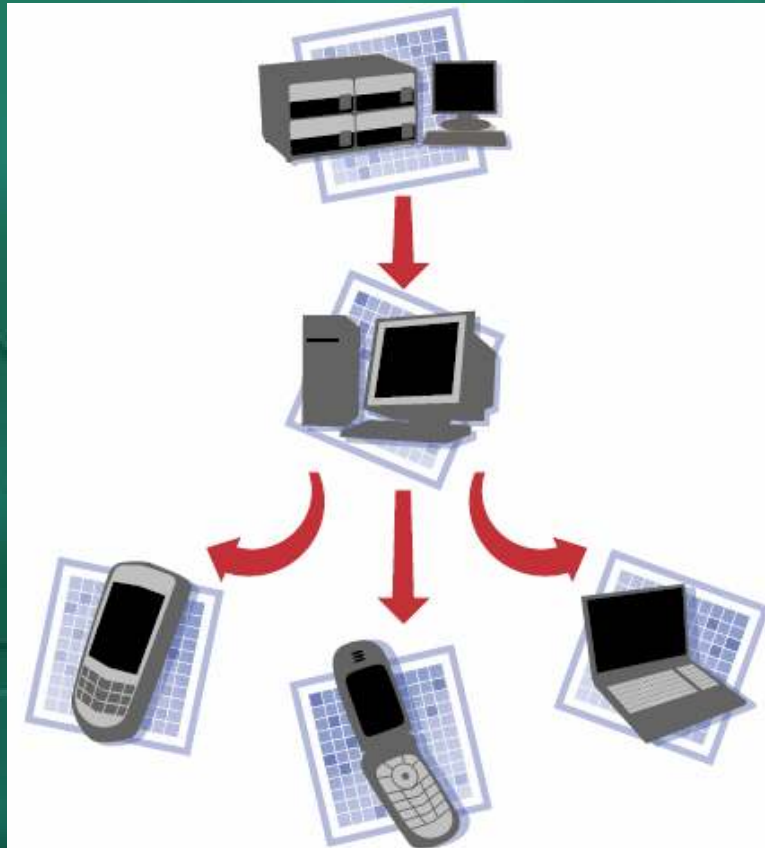
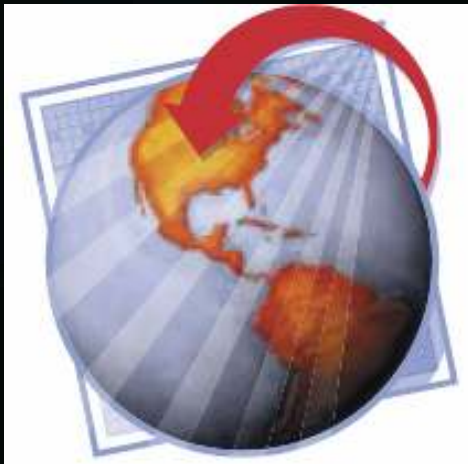
Detection Time

Product Name	Total Count	CFU/g	CFU/g	CFU/g	CFU/g
101	101	101	101	101	101
102	102	102	102	102	102
103	103	103	103	103	103
104	104	104	104	104	104
105	105	105	105	105	105
106	106	106	106	106	106
107	107	107	107	107	107
108	108	108	108	108	108
109	109	109	109	109	109
110	110	110	110	110	110
111	111	111	111	111	111
112	112	112	112	112	112
113	113	113	113	113	113
114	114	114	114	114	114
115	115	115	115	115	115
116	116	116	116	116	116
117	117	117	117	117	117
118	118	118	118	118	118
119	119	119	119	119	119
120	120	120	120	120	120

Sample Reports

Connectivity

- **See results instantly - Take action immediately.**
- **The optional connectivity package of the Soleris software allows the system to instantly transmit test results or alarms to remote locations and workstations.**



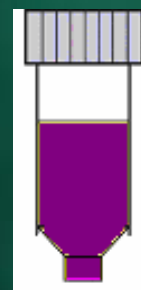
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One vial replaces many functions!



Save Time = \$\$\$
Less Direct Labor
Less Overhead

Reduce complexity
Less equipment
Less clutter
Less chance for error



Same Shift Results

Summary

- Final product quality assurance starts with careful supply chain and process analysis
- Tripartite environmental analysis model
 - Sanitation – Good data management is critical
 - Allergens – work with the market leader
 - Rapid micro – same shift results are now available
- Assorted of methodology depends on your process
- Only the '**Neogen Operating System**' can fulfill all of your reagent and service needs

Improve efficiency – streamline testing

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Questions?

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