FOOD SERVICE CHEMICAL SANITIZATION

DAN DAHLMAN – REGULATORY AFFAIRS MANAGER

NICHOLAS POPP— RD&E PROGRAM LEADER

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ECOLAB®

Everywhere It Matters.™

Our Shared Purpose

THE WORK WE DO MATTERS

Every day Ecolab makes the world
cleaner, safer and healthier

Protecting people and vital resources

Industry leading expertise

Our food safety experts **monitor and educate customers** of food safety trends and regulations **across the food supply chain**.

20+ **GOVERNMENT AND PROFESSIONAL APPOINTMENTS**

Contributing industry expertise in development of policy and regulations

30+ **FOOD SAFETY SPEAKING ENGAGEMENTS PER YEAR**

Including NRA, IFMA, Hotel Experience, FMI

(AVERAGE) **15** **NUMBER OF ARTICLES PUBLISHED ANNUALLY**

Across trade publications, scientific journals and peer associations

OVER **25** **INDUSTRY PARTNERSHIPS ACROSS THE FOOD SUPPLY CHAIN**

Covering food manufacturing, food chain supply vendors, food retail, full service and quick service restaurants

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Foodborne Illness Annual Estimates

Global foodborne illness estimate: 600 million cases and 420,000 deaths

The importance of food safety

78% of all foodborne illnesses originate in commercial foodservice facilities[1]

25% of all citations are due to food contact surfaces not properly cleaned and sanitized.[1]

$75K average cost of an outbreak.[2]

Proper cleaning and food preparation procedures can help reduce food safety risks.

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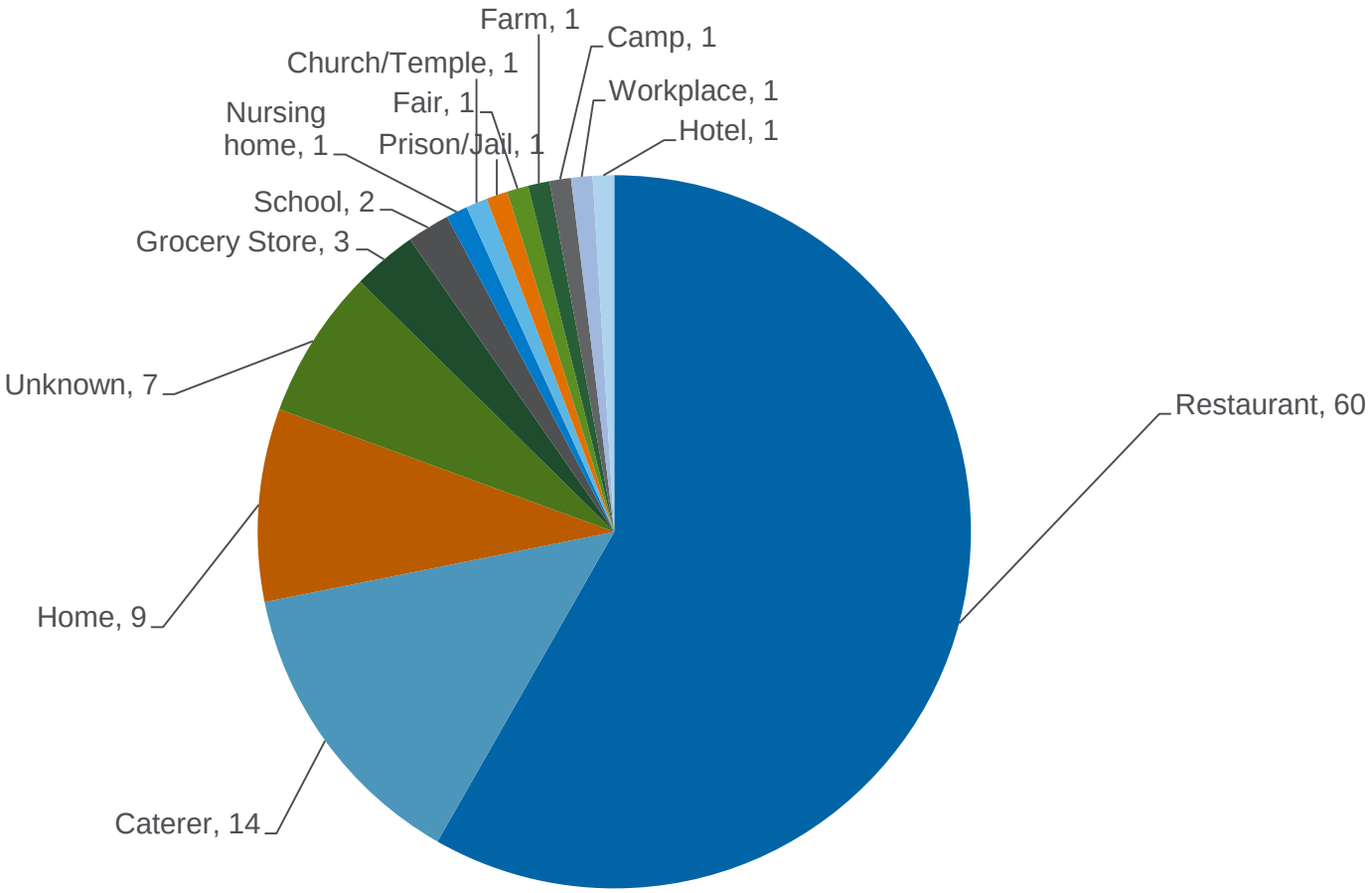
1. Centers for Disease Control and Prevention, New CDC Data on Foodborne Disease Outbreaks, June 2014
2. National Restaurant Association

Where Was Contaminated Food Consumed?

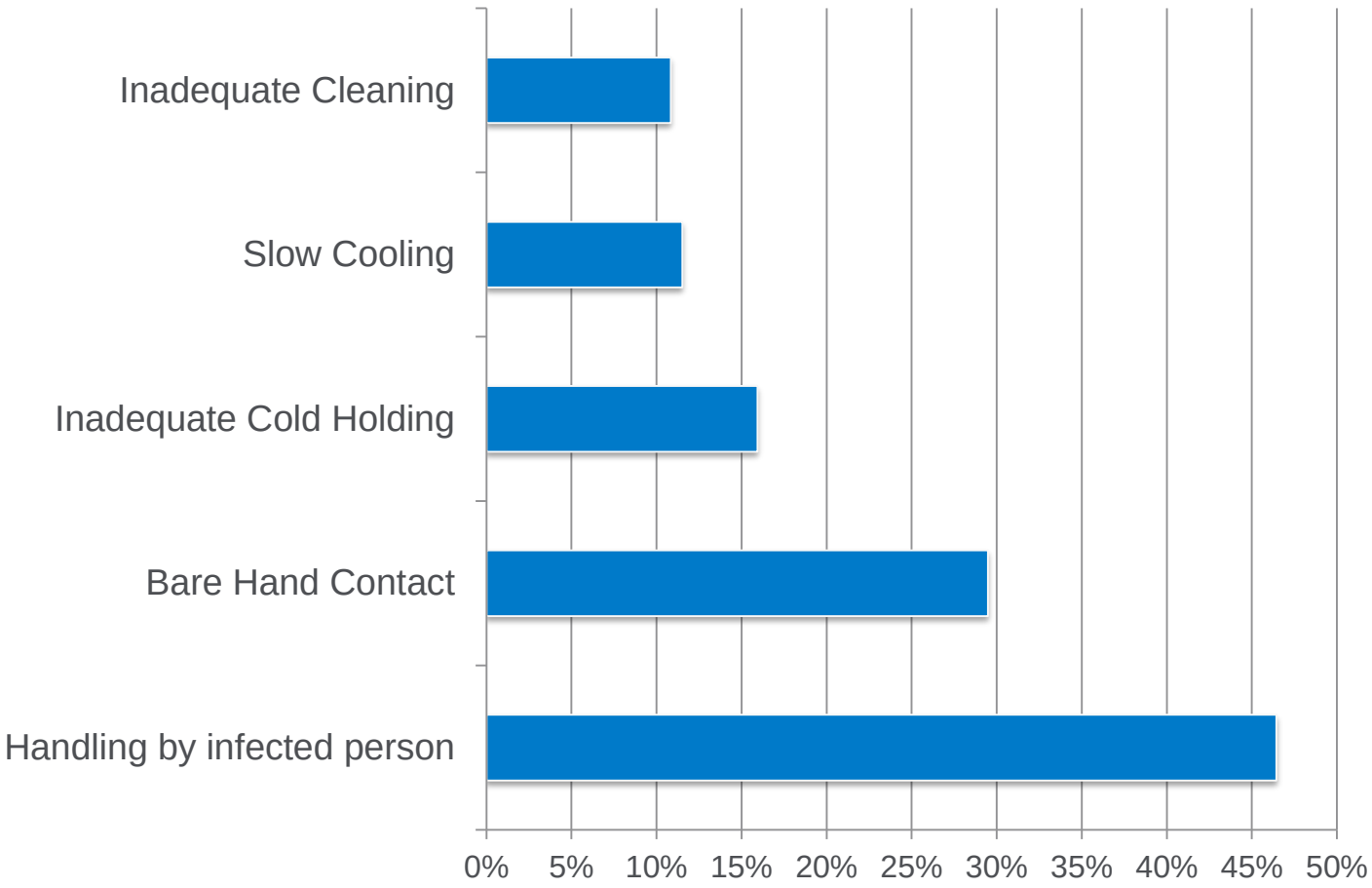
When Location Is Known, Reported Data

USA, 2015. Percent of total outbreaks



Source: https://wwwn.cdc.gov/foodborneoutbreaks/

Contributing Factors to Restaurant Outbreaks

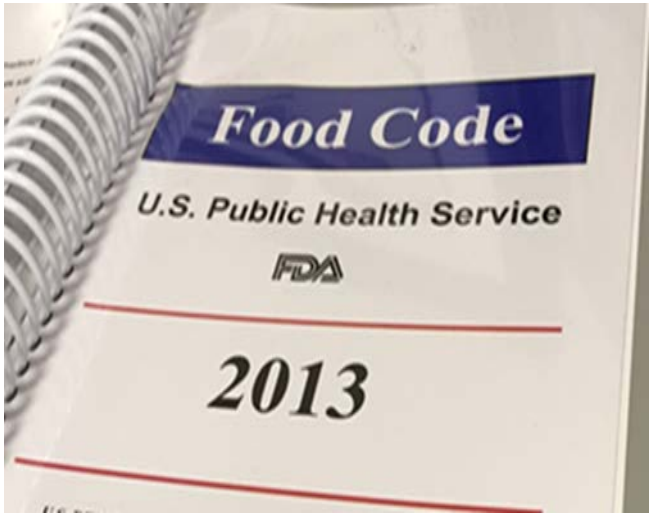


Source: Gould, et al. 2013 JFP 76(11):1824.

US FDA MODEL FOOD CODE

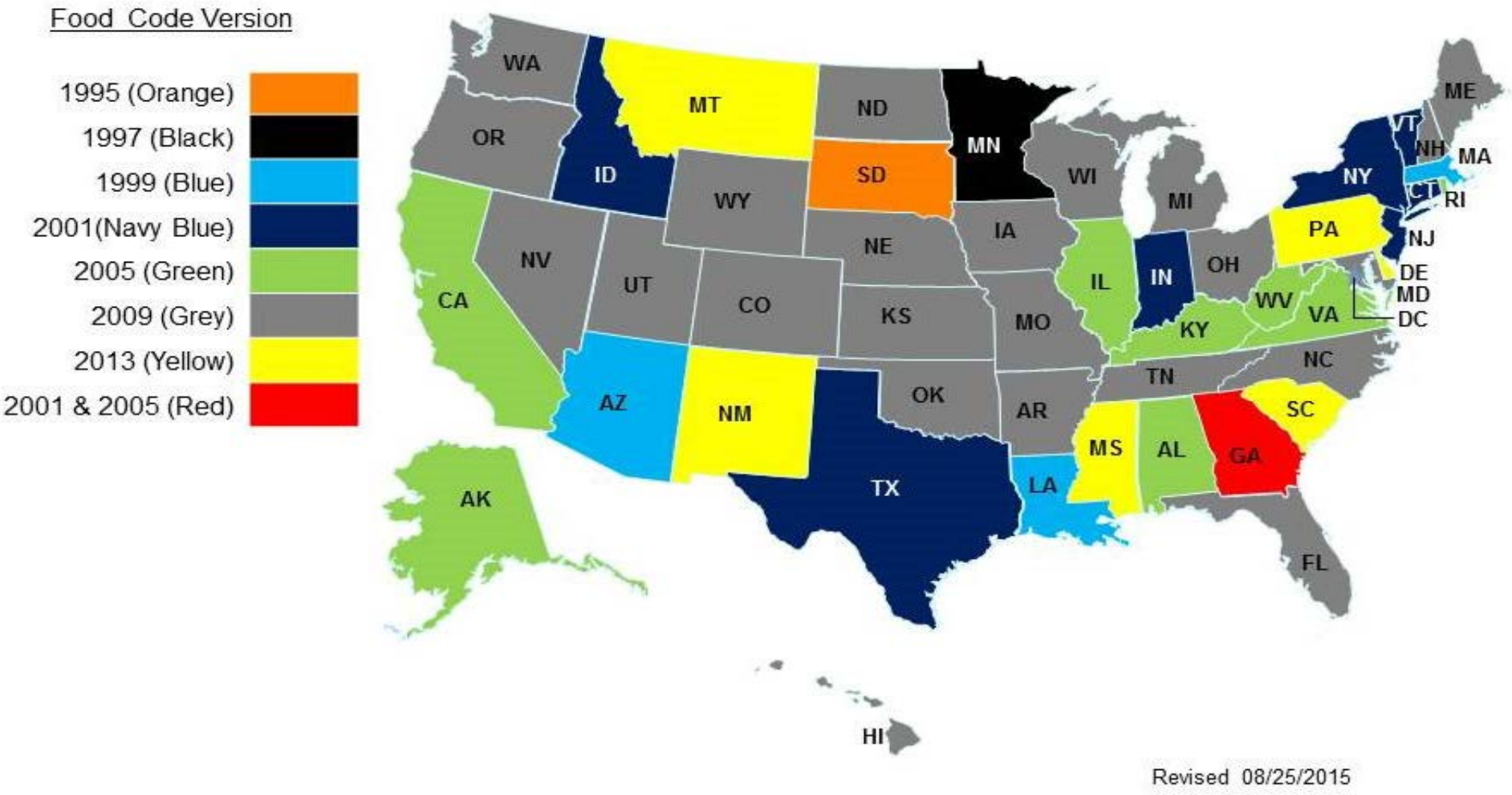
US Model Food Code

- A reference document for state, city, county and tribal agencies
- Guidance for food safety practices based on science
- To mitigate risk factors that are known to cause or contribute to food borne illness outbreaks associated with retail and foodservice establishments



US Model Food Code

ADOPTION BY STATE



Outdated Food Code causes confusion

- 2013 FDA Food Code
  - **7-204.11 Sanitizers, Criteria.**
    - Chemical SANITIZERS, including chemical sanitizing solutions generated on-site, and other chemical antimicrobials applied to FOOD-CONTACT SURFACEs shall:
      - (A) Meet the requirements specified in **40 CFR 180.940** Tolerance exemptions for active and inert ingredients for use in antimicrobial formulations (Food-contact surface sanitizing solutions)P, or…

- 4626.1620 7-204.11 SANITIZERS; CRITERIA.*
  - Chemical sanitizers and other chemical antimicrobials applied to food-contact surfaces shall meet the requirements specified in **Code of Federal Regulations, title 21, section 178.1010**.

*Source: 2013 US Food Code

Food Contact Surface

- Food contact surfaces*
  - A surface of equipment or a utensil with which food normally comes into contact
  - A surface of equipment or a utensil from which may drain, drip or splash into a **food** or onto a surface **normally in contact with food**
- Non-food contact surfaces
  - Any other surfaces

*Source: 2013 US Food Code

Wash, Rinse, Sanitize- Food Contact Surfaces

- Washing step
  - Removes soil and organic matter
- Rinsing step
  - Removes the detergent and any excess debris
  - If this step is not done properly, the excess detergent is mixed with the sanitizer and can neutralize the solution, thus making the sanitizing step ineffective
- Sanitizing step
  - Reduces bacterial load by 99.999%
  - Sanitizers are designed to be applied to clean surfaces

Washing

FDA FOOD CODE 2013

4-601.11 Equipment, Food Contact Surfaces, Non-Food Contact Surfaces, and Utensils

Equipment, food contact surfaces and utensils shall be clean to sight and touch

4-602.11 Equipment, Food Contact Surfaces and Utensils

(C) Except as specified in (D), if used with potentially hazard foods, equipment food contact surfaces and utensils shall be cleaned through the day at least every four hours

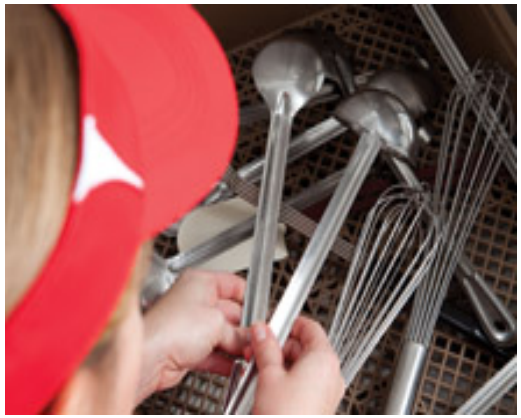
(D) Surface and utensils and equipment contacting potentially hazard foods may be cleaned less frequently than every four hours if…..

Rinsing

FDA FOOD CODE 2013

4-603.16 Utensils and Equipment

Washed utensils and equipment shall be rinsed so that abrasives are removed or diluted through the use of water or a detergent-sanitizer solution



Sanitizing

FDA FOOD CODE 2013

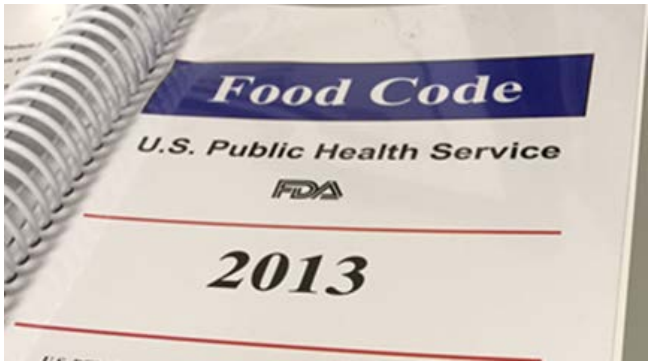
Sanitization: the application of cumulative heat or chemical on cleaned food contact surfaces that, when evaluated for efficacy, is sufficient to yield a reduction of 5-log, which is equal to a 99.999% reduction, of representative disease microorganisms of public health importance

4-701.10 Food Contact Surfaces and Utensils

Equipment, food contact surfaces and utensils shall be sanitized before use after cleaning

Detergent-Sanitizer

FDA FOOD CODE 2013



4-501.115 Detergent-Sanitizer

If a Detergent-Sanitizer is used to sanitize in a cleaning and sanitizing procedure where there is no distinct water rinse step between the washing and sanitizing steps, the agent applied in the sanitizing step shall be the same Detergent-Sanitizer that is used in the washing step

Food Contact Surface Sanitizers

1. Must use EPA registered product
2. Entire surface must be clean
3. Time and temperature
4. Use only for purposes listed on label
5. Don’t mix products
6. Use per manufacturer’s instructions
7. Rinse, if required
8. Test concentration

SANITIZER JURISDICTION...FDA or EPA?

Jurisdiction Of Food Use Antimicrobial Treatments Is Determined By:

- Product Application/Use
- What is the intended technical effect?
- Product claims (implied or expressed)
- EPA's definition of a "pest" (40 CFR 152.5)
- FDA's definition of a "processed food"

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Post FQPA/ARTCA(1998): Here And Now

- Sole FDA Jurisdiction
  - Antimicrobials applied to reduce microbial count on the surfaces of processed foods
  - Example- Antimicrobial applied directly to a sliced carrot in a processing facility

- Sole EPA Jurisdiction
  - **Hard surface food contact sanitizers.**
  - Antimicrobials applied to raw agricultural commodities (RAC's) in the field, post harvest and in transportation
  - Example- Antimicrobial applied to a whole apple in the field/non-processing facility

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Post FQPA/ARTCA(1998): Here And Now

- Joint EPA/FDA Jurisdiction
  - **Antimicrobials applied to RAC's in a food processing facility**
  - **Antimicrobials to reduce microbial count in process water coming in contact with further processed fruit and vegetables**
  - Antimicrobials applied to food packaging
  - Example- antimicrobial applied in the w
    apples

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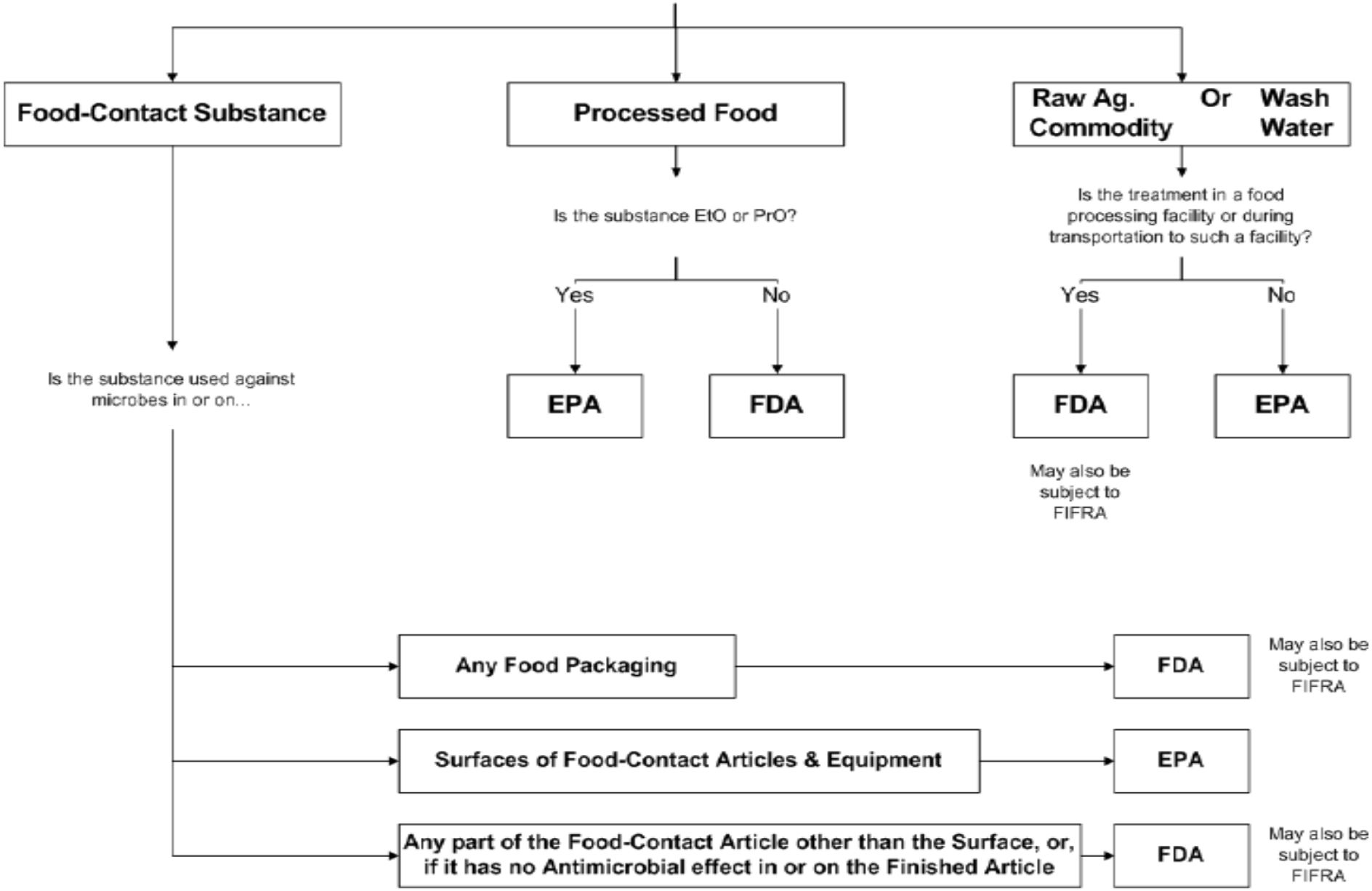
Hard Surface Food Contact Sanitizer Regulations

- **EPA's 40 CFR 180.940 replaces the former FDA 21 CFR 178.1010 "sanitizing solutions"**

- Tolerances or exemptions from food tolerance are not required for antimicrobials used on household food contact surfaces.
  - EPA conducts a dietary risk assessment

- ***EPA holds sole jurisdiction over hard surface food contact sanitizers due to the passage of FQPA and ARTCA***

The Microbes to be Controlled are in or on a...



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WHAT DOES ALL OF THIS MEAN FOR YOU?

REGULATORY JURISDICTION OF FOOD ANTIMICROBIALS CAN BE COMPLICATED.

MARKET TRENDS
QUEST FOR OPTIMAL SANITIZER
FUTURE INNOVATION

Market Trends

Macro trends changing the foodservice industry and operations

Market Decline

- Declining foot traffic in FSR

Escalating Costs

- Labor and food costs increasing

Water Scarcity

- Future regulations

Food Safety

- Push towards transparency for food sources

Ownership Structure

- Franchised structure and brand standards

Operator challenges

MANAGING COSTS

23 out of 50

U.S. states increased minimum wage in 2015[1]

INCREASING REGULATIONS

New food codes come out every

4 years

MEETING GUEST EXPECTATIONS

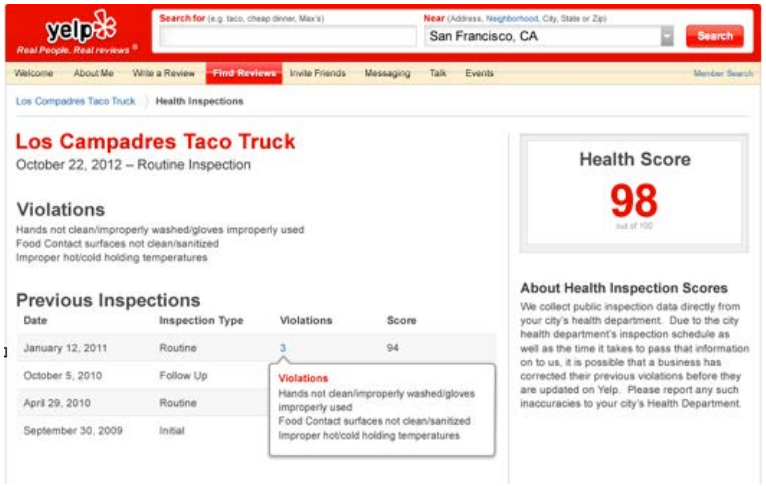
4 out of the top 10

"very important" attributes customers look for when choosing a restaurant relate to cleanliness[2]

Complex and risky regulatory environment

Health Inspections

- Customers can be inspected several times a year based on 54 different items
- Problem item: Food contact surfaces not properly cleaned and sanitized
  - **#2 most cited violation = 25% of all citations***



Consumer Awareness

- Government is becoming more transparent with results
- Yelp and others are now **displaying results of health inspections**
- Several states now post **"Letter Grade" on restaurant fronts**

We need to provide simple food safety solutions that keep our customers compliant with health code and allow them to focus on guest satisfaction

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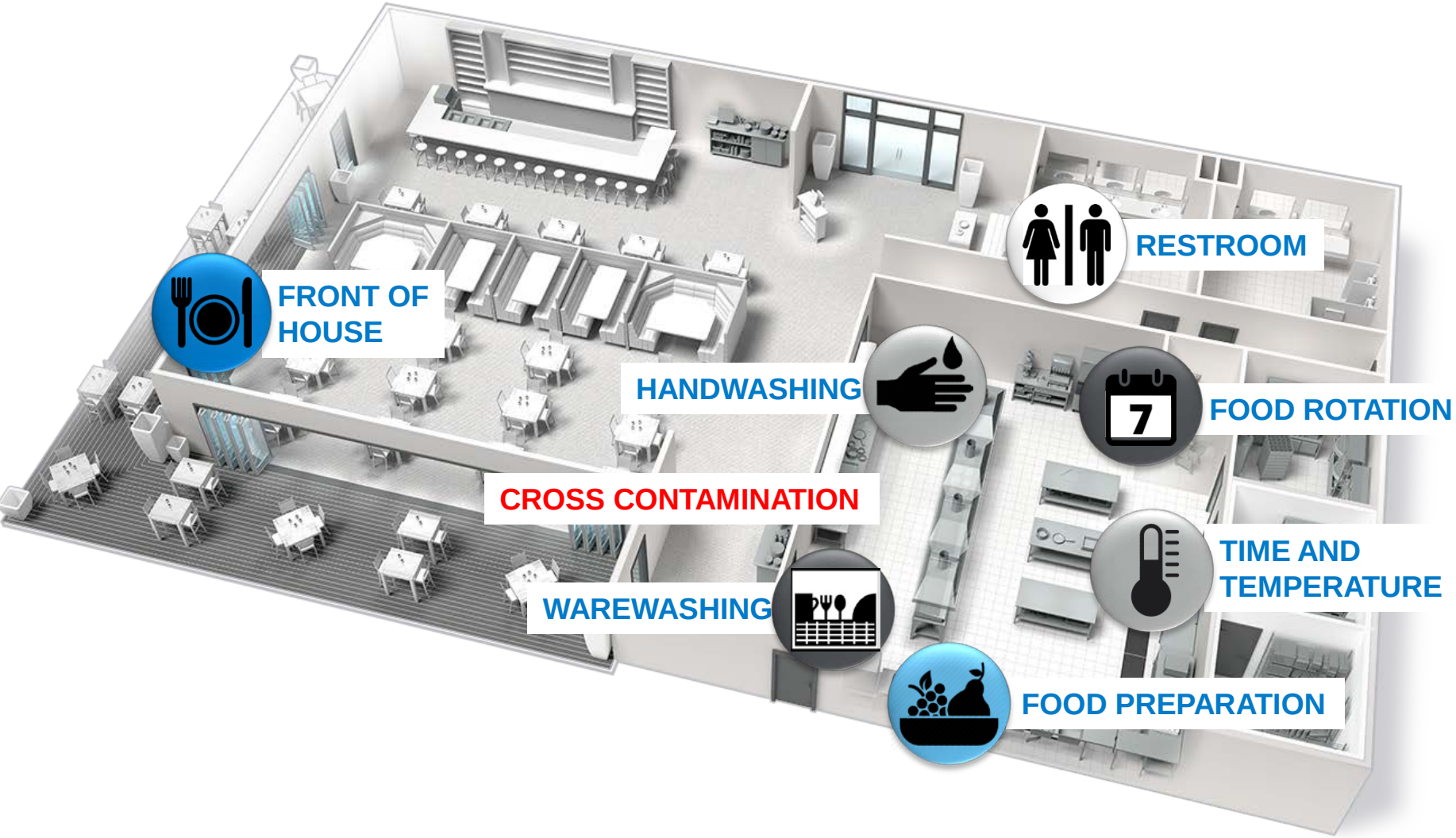
*2014 HDI Study

Goal: Optimal Sanitation Control

Comprehensive Approach Needed



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The Ideal Sanitizer

- Broad Antimicrobial Activity
- Rapid
- Easily prepared and soluble in water
- Stable
- Tolerant of soil, hard water etc.
- Environmentally compatible and non-toxic
- Noncorrosive
- Economical
- Safe to use

Factors that Affect Sanitizer Efficacy

- Cleanliness of the surface
- Equipment sanitary design
- Chemistry dosage accuracy
- Method of application
  - Coverage
- Type of microorganisms
- Temperature
  - environment, equipment
- Water
  - Chemistry (alkalinity/pH)
  - Composition (hardness)
- Equipment composition (Materials of construction)
- Residual activity
- Usage in accordance with label
- Shelf life

Common Chemical Sanitizer Types

Chlorines	Hypochlorites, Various Powdered Chlorine Sources
Quats	Benzalkonium chlorides, Blended Quats (dual or twin chain)
Peroxyacids	Acetic, Citric, Octanoic, Mixed Peroxyacids
Fatty Acids	Fatty Acid + Organic Acid + Mineral Acid
Iodophors	Compounds that complex I_2 + surfactant + acid
Acid Anionics	Anionic Surfactants + Acid

Microbiological Efficacy

	Chlorine	Quats	Peroxy Acids	Fatty Acids	Iodophors	Acid Anionics
Vegetative Bacterial Efficacy	Best	Good	Best	Good	Best	Good
Yeast/Mold Efficacy	Better	Good	Better/Good	Good/Limited	Best	Good
Phage	Better	Limited	Better	Limited	Good	Better

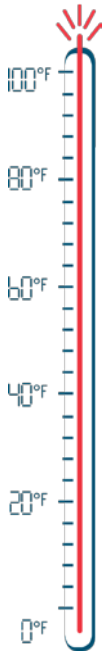
Could be additionally be broken down by:

- Bacterial type (Gram +/-)
- Bacterial spores
- Viruses
- Bacteriophages etc.

Temperature Sensitivity

Quats, Fatty Acids and Acid Anionics less effective for refrigerated applications

	Chlorine	Quats	Peroxy Acids	Fatty Acids	Iodophors	Acid Anionics
70° F	+	+	+	+	+	+
55° F	+	+/-	+	+/-	+/-	+
40° F	+	-	+/-	-	-	+



+ Good Activity +/- Moderate Activity - Substantial Loss of Activity

Water Hardness and pH Sensitivity

While not a factor for cleaners, water pH is important to sanitizer efficacy

	Chlorine	Quats	Peroxy Acids	Fatty Acids	Iodophors	Acid Anionics
Water Hardness	**Low**	**Moderate**	**Low**	**Low**	**Low**	**Moderate**
pH Sensitivity	**Moderate**	**Low**	**Low**	**High**	**Low**	**High**
Optimum Use Solution pH	More effective as pH is reduced. As pH approaches 4, increasing amounts of toxic chlorine gas is formed.	Neutral pH	pH 3-4.5 Effective up to pH of 7.5	<3.5	More effective at pH 2-5 Acceptable efficacy toward neutral pH	<3.0

Soil Load Sensitivity

The presence of any residual soil can chemically and physically impair the efficacy of sanitizers

- Soil may chemically inactivate the sanitizer
- Soil may physically shield microorganisms from the necessary direct contact with the sanitizers

	Chlorine	Quats	Peroxy Acids	Fatty Acids	Iodophors	Acid Anionics
Soil Load Sensitivity	High*	Low	Low	Moderate	Moderate	Moderate

*Except for ClO_2

Additional Factors Affecting Sanitizer Efficacy

- Equipment Material: Chlorine (sodium hypochlorite) can be highly corrosive to Stainless Steel
- Quats, Acid Anionics offer highest potential for foaming
- Quats offer highest residual activity

	Chlorine	Quats	Peroxy Acids	Fatty Acids	Iodophors	Acid Anionics
Corrosive (Stainless Steel)	High		Low	Low	Moderate	Low
Foam Level		High		Low	Moderate	High
Residual Activity		High		Low		Low

Additional Factors Affecting Sanitizer Choices

Competing challenges for new chemistry development increases complexity

Digital is Changing our Markets

- Digital is changing the way business is done…

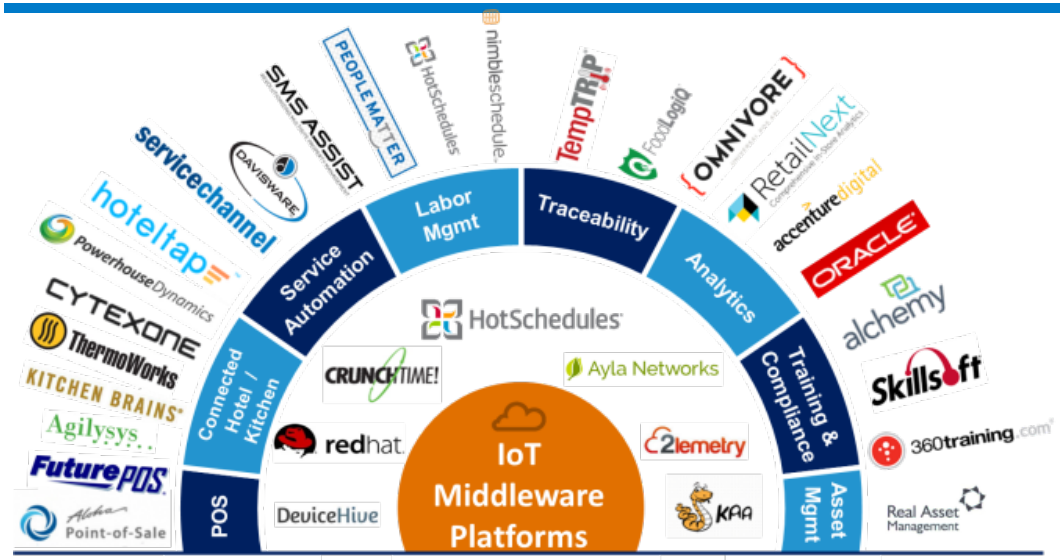
Digital is a **force** sweeping through consumer and customer behavior, underpinned by a technology disruption

Digital is a **game changer** of fundamental competitive dynamics, driving new sources of advantage and new business models

Digital provides a **set of tools** in the existing business system to improve insights, reduce costs and drive revenue, including advanced analytical techniques leveraging massive amounts of data

Digital technology disruption provides both Opportunity & Risk

Data Driven Insights



We don't want a data dump. Tell us what needs to get done and help us take care of it.

Lot of activity on data side

Fragmented solutions –
not comprehensive for customer needs

True disruptive solution needs all three

Products

Data & Insights

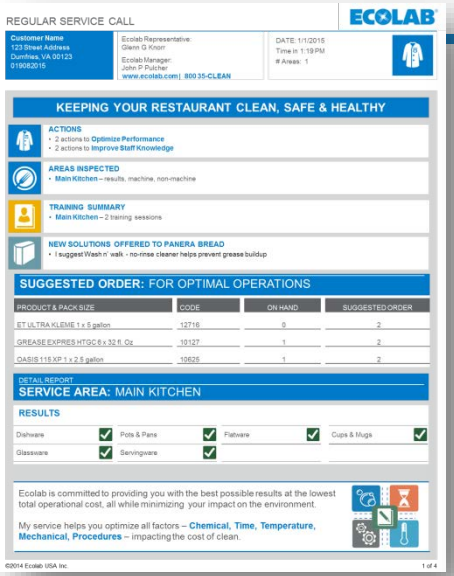
Service

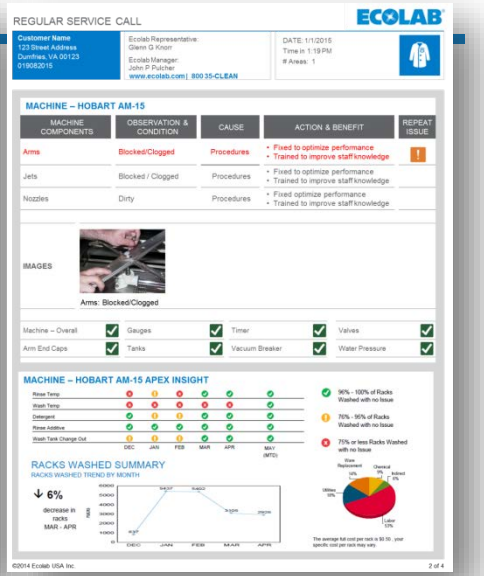
Technology innovation is creating compliance opportunities

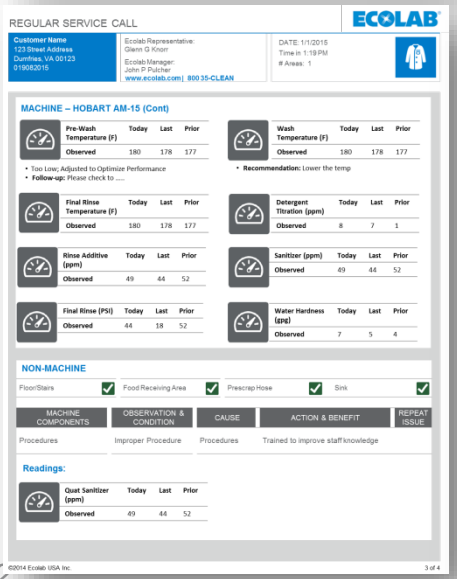
Ecolab Approach

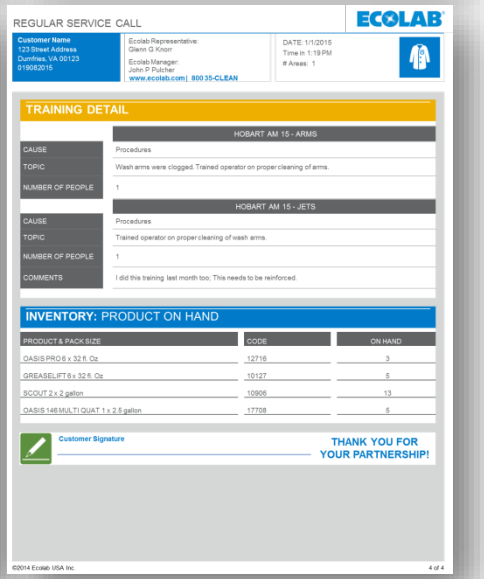
Consistent. Protected. On Site.

- **Enhance the interaction** between Ecolab's team & customer
- **Maintain consistency** in that same interaction
- Bring **actionable insight into the results** delivered at every unit
- **Innovate** multi-use, simplified sanitizing solutions









Example: Warewash Sanitization

New Chemistry Introduction Example in Machine Warewashing

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Concentrated Sanitizing Rinse

- **Launched mid-2015**
- **Combined Sani-Rinse = Multipurpose**
- **Improved performance**
  - Improved filming
  - Reduced Corrosion
- **Differentiated from legacy systems**
  - Peroxyoctanoic Acid based
  - Closed Loop dispensing

Before

After

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Concentrated Sanitizing Rinse

- Significant effort to bring new EPA registered foodservice sanitizer to market

4-501.114 Manual and Mechanical Warewashing Equipment, Chemical Sanitization Temperature, pH, Concentration, and Hardness.

A chemical SANITIZER used in a SANITIZING solution for a manual or mechanical operation at contact times specified under 4-703.11(C) shall meet the criteria specified under 7-204.11 Sanitizers, Criteria, shall be used in accordance with the EPA registered label use instructions, and shall be used as follows:

A) A **chlorine** solution shall have a minimum temperature based on the concentration and PH of the solution as listed in the following chart;

Concentration Range (MG/L)	Minimum Temperature PH 10 or less °C (°F)	Minimum Temperature PH 8 or less °C (°F)
25 – 49	49 (120)	49 (120)
50 – 99	38 (100)	24 (75)
100	13 (55)	13 (55)

(B) An **iodine** solution shall have a:

(1) Minimum temperature of 20°C (68°F),

(2) PH of 5.0 or less or a PH no higher than the level for which the manufacturer specifies the solution is effective, and

(3) Concentration between 12.5 MG/L and 25 MG/L;

(C) A **quaternary** ammonium compound solution shall:

(1) Have a minimum temperature of 24o C (75o F),

(2) Have a concentration as specified under § 7-204.11 and as indicated by the manufacturer's use directions included in the labeling, and

(3) Be used only in water with 500 MG/L hardness or less or in water having a hardness no greater than specified by the EPA-registered label use instructions;

(D) If another solution of a chemical specified under (A) (C) of this section is used, the PERMIT HOLDER shall demonstrate to the REGULATORY AUTHORITY that the solution achieves SANITIZATION and the use of the solution shall be APPROVED; P 136 Utensils and Temperature and Pressure Measuring Devices

(E) **If a chemical SANITIZER other than chlorine, iodine, or a quaternary ammonium compound is used, it shall be applied in accordance with the EPA-registered label use instructions; and**

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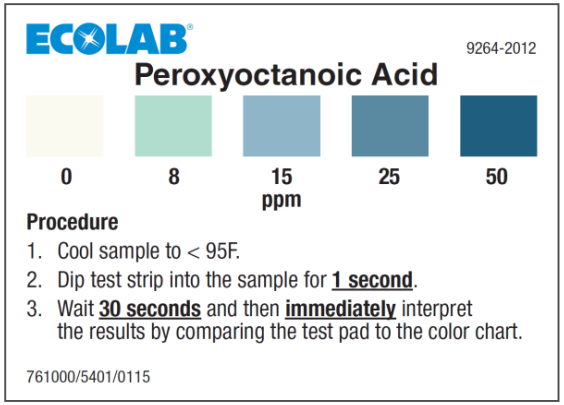
New Sanitizer Implications

- EPA Registration

EPA Reg. No. 1677-244

- NSF Testing
- New Machine Sanitizing Faceplate

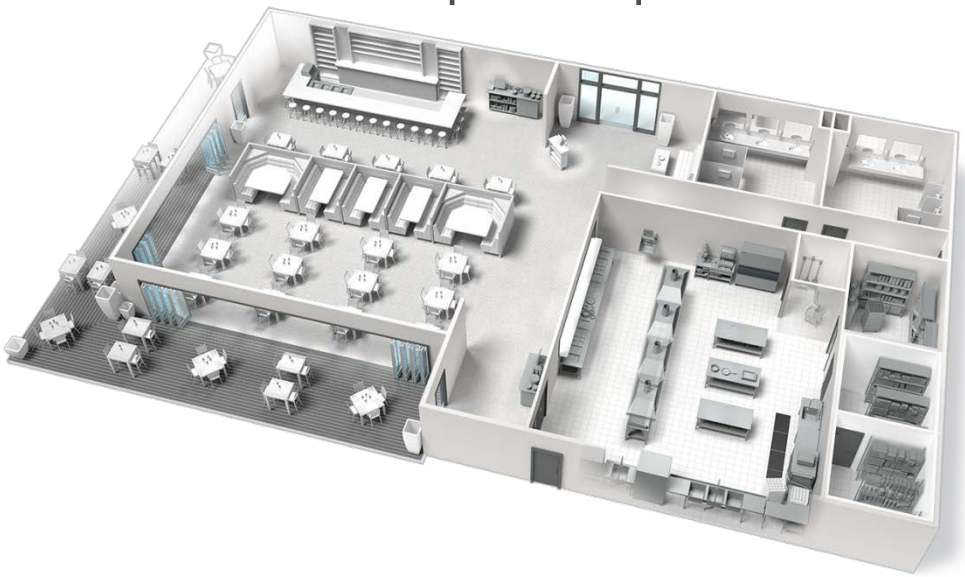
- New Sanitization Test Strips
  - Different test conditions and procedures than traditional systems



New Sanitizers require EPA and NSF approval and may use new field test tools.

Summary

- Regulatory jurisdiction of food antimicrobials can be **complicated**
- **Comprehensive** solution needed
- New tools and simplified solutions can drive Food Service **compliance**
- New sanitizing solutions will **change** the traditional inspection process



Thank You!