

# *Bottled Water QC Basics*

*New England Bottled Water Association  
September 16, 2011*

*Laura Current  
Beyond Organic, LLC*



# Types of Quality Standards & Frequencies

---

- In-House Quality Standards
- Federal or State Standards
- IBWA Standards
- Equipment Manufacturer's Standards
- HACCP
- Customer Standards – Contract Packing
- GFSI / BRC / SQF
- NSF Certification



# Frequency Determination

- Examples of frequencies determined by the standard
  - FDA, Annual Title 21s
  - FDA, Weekly source micros
  - NSF Certification, pH twice per shift
- Determine internal inspection frequencies by the criticality of the action (ozone vs. case seal)
- Is it a Critical Control Point (CCP) in your HACCP Plan?
- What is the cost of the product produced between line checks?



# Standards & Frequencies

## Example – Product & Source Analysis

TEST / PROCEDURE	STANDARD	FREQUENCY
Spring Source Annual Analysis	IBWA, FDA, & State	Once Per Year
Spring Source Bromide	In-House Standard	Monthly -1 <sup>st</sup> Year Quarterly Thereafter
Spring Source Microscopic Particulate Analysis (MPA)	In-House Standard	Twice Per Year First Year Only
Spring Product Annual Analysis	IBWA, FDA, & State	Once Per Year
Spring Product Bromide / Bromate	< 10 ppb	Monthly
Purified Water - Product Annual Analysis	IBWA, FDA, & State	Once Per Year
Purified Water - Product USP Analysis	USP	Once Per Year
Purified Water - Product Total Trihalomethanes	< 10 ppb	Monthly



# In-House Standards

## Source & Product Examples

SPRING SOURCE STANDARDS	TEST PARAMETER	RANGE
	pH	6.5 – 7.5
	Conductivity ( $\mu\text{S}/\text{cm}$ )	160 – 210
	TDS (ppm)	100 - 175
CITY SOURCE WATER STANDARDS	TEST PARAMETER	RANGE
	pH	7.0 – 8.0
	Conductivity ( $\mu\text{S}/\text{cm}$ )	170 - 250
	TDS (ppm)	100 - 150
DRINKING WATER PRODUCT STANDARDS	TEST PARAMETER	RANGE
	pH	6.5 – 7.5
	Conductivity ( $\mu\text{S}/\text{cm}$ )	5 - 50
	TDS (ppm)	0 - 30



# Types Of QC Tests/Inspections

---

## ■ Process

- Bottle Washer
- Silo
- Distiller
- Reverse Osmosis
- Mineral Injector

## ■ Product

- Ozone
- pH
- TDS

## ■ Package

- Cap Torque
- # of bottles per case
- Net Contents
- Case Code
- Case Seal
- Shrink Bull's Eye
- Pallet configuration
- Stretch Force to Load



# Line Checks

---

- When possible always have two methods or instruments to check everything
- Typically line checks (product & package) are done every 30 minutes to 1 hour
- Always do a full inspection - beginning of production run (or shift) and end of production run (or shift) - bracket the production run
- Perform a full inspection of line after breaks and downtime (first article inspection)
- Inspections can be split between operators and QC technicians
- Keep lab instruments calibrated and document calibrations



# Line Checks

---

- ❑ The production line should never start-up or run without an Operator and/or QC Technician present to perform product/package inspections
- ❑ Include the frequencies and standards on your line-check sheets when possible
- ❑ The Operator and/or QC Technician must understand the importance of their job and take the responsibility seriously



# Product - Line Check Frequencies

TEST / PROCEDURE	STANDARD	FREQUENCY
pH	Spring Drinking Distilled	Start Up Hourly End of Run
Ozone Concentration (Indigo Blue) <b>Critical Control Point</b>	FDA = 0.10 – 0.40 ppm 5 Gal = 0.2 – 0.25 ppm PET = 0.1 – 0.15 ppm 1 Gal = 0.1 – 0.15 ppm	Start Up End of Run
Ozone Concentration (DPD or ozone probe) <b>Critical Control Point</b>	FDA = 0.10 – 0.40 ppm 5 Gal = 0.2 – 0.25 ppm PET = 0.1 – 0.15 ppm 1 Gal = 0.1 – 0.15 ppm	Hourly
Conductivity (or TDS)	umhos/cm or (mg/L for TDS)	Start Up Hourly End of Run
Taste/Odor/Appearance (TOA) (use ultrasonic water bath or UV to remove ozone for taste test)	Satisfactory (compare to previous production run)	Start Up End of Run

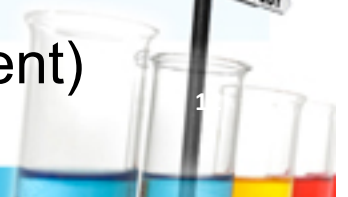






# Line Checks

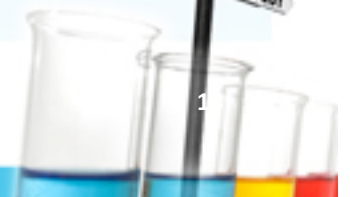
- Packaging inspections are some of the most commonly overlooked inspections
- Organize line checks like the process layout
- Inspect all the way to the end of the line
- Divide package inspections with operators
- Put counters on the line to document defect types
- Understand volumetric net contents vs. weight
- Bottle inspector is the most important position on the 5-Gallon line
- Install in-line vision systems when possible – net contents, caps, labels, etc.
- Install in-line probes to collect ozone and TDS readings continuously
- Don't forget to record the raw material lot numbers!
- Every bottle **MUST** have a date code - (FDA requirement)



# Line Checks

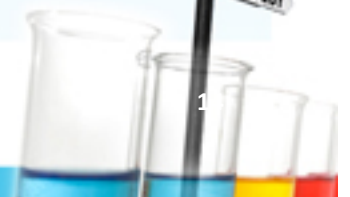
---

- Your line check sheet should be like a diary
- Write down all problems on the production line: power outages, low ozone, poor case seal, etc.
- Document all corrective actions taken, product destroyed, etc.
- Line checks made at the exact time each hour are suspicious



# Process Inspections

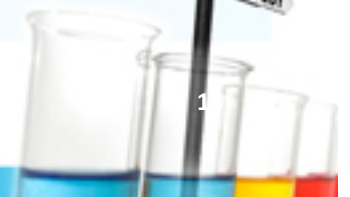
- Refer to the equipment manufacturer's recommendations for inspection items and standards: distiller, RO, mineral injector, etc.
- Automate when possible, collect data real-time
- Keep in-line probes and gauges calibrated
- Use outside services to calibrate scales, probes, gauges, etc. when possible
- Base frequencies on “how automated” the equipment is and accuracy of probes/gauges



# Production Standards

---

- Sometimes it is necessary to run equipment in order to get the finished product into standard
- Examples: cap torques, wrap around labeler, mineral injectors
- Determine the timeframe in which the equipment is allowed to produce questionable product
- Inspect product continuously during “questionable” timeframe



# Sampling Plan - Example

## □ PET Line - Start-Up

- pH
- Ozone - AccuVac Indigo Blue
- Taste/Odor/Appearance
- Conductivity or TDS
- Rinser Ozone Concentration (when not a blow/fill operation)
- Bottle Code
- Cap Application
- Removal Torque – All Capper Heads
- Label Application
- Net Contents – By Weight – 3 bottles
- Box Seal or Tray/Shrink
- Case/Tray Code
- 1 Bottle: TPC, Y&M, Coliform
- Retain Sample – 4 bottles from start-up



# Sampling Plan - Example

## □ PET Line - Hourly

- pH
- Ozone - DPD
- Taste/Odor/Appearance
- Conductivity or TDS
- Rinser Ozone Concentration – Every Two Hours
- Bottle Code
- Cap Application
- Removal Torque – All Capper Heads – Every Four Hours
- Label Application
- Net Contents – By Weight – 3 bottles
- Box Seal or Tray/Shrink
- Case/Tray Code
- Retain Sample – 4 bottles from middle of run



# Sampling Plan - Example

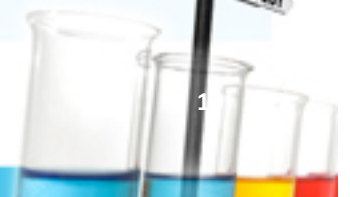
## □ PET – End of Run

- pH
- Ozone - DPD
- Taste/Odor/Appearance
- Conductivity or TDS
- Rinser Ozone Concentration
- Bottle Code
- Cap Application
- Removal Torque – All Capper Heads
- Label Application
- Net Contents – By Weight – 3 bottles
- Box Seal or Tray/Shrink
- Case/Tray Code
- 1 Bottle: TPC, Y&M, Coliform
- Retain Sample – 4 bottles from end of run



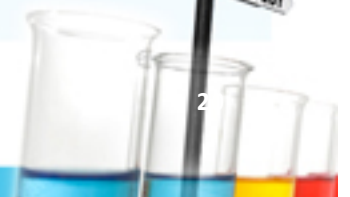
# HACCP and Quality Control

- ❑ Your facility's Standard Operating Procedures (SOPs) and QC procedures are a prerequisite to your HACCP Plan
- ❑ Your facility's HACCP Plan, SOPs, and QC procedures are an integral part of your Food Security & Quality Plan.
- ❑ None of these plans and/or procedures can stand alone without the other.



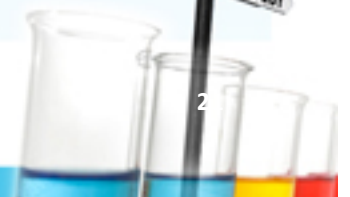
# Common HACCP Plan Issues

- ❑ Creating the HACCP Plan before the SOPs and/or QC Manual
- ❑ HACCP Plan is only taken off the shelf during an audit
- ❑ One person is responsible for the HACCP Plan updates and the day-to-day paperwork
- ❑ The HACCP Plan is too complicated and has too many CCPs creating an enormous paper trail
- ❑ Not keeping the HACCP Plan updated as processes, equipment, and personnel change



# Common HACCP Plan Issues

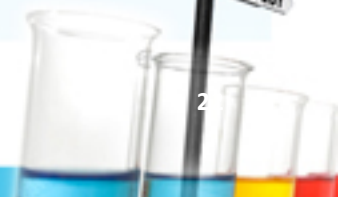
- ❑ The QC procedures and SOPs that should be referenced on the HACCP Plan have not been created
  - Basic day-to-day sampling plan
  - Corrective action forms & procedures
  - Product hold forms & procedures
- ❑ Typically these protocols have been followed for years, but were never formally documented
- ❑ CCPs not easily traced in paperwork flow



# CCP or CP

---

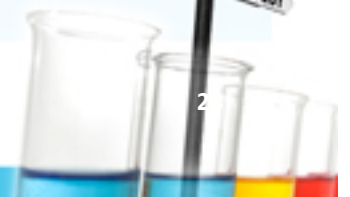
- ❑ Is it a Critical Control Point or a Control Point?
  - Each facility defines their CCPs and CPs
  - What are your CCPs?
    - Ozone
    - Bottle Washer Temperature
    - Bottle Washer Detergent Concentration
    - Taste/Odor/Appearance
    - Differential Pressure at Filter Housing
    - Fluoride Concentration
    - THMs
    - Bromate



# Production Scenario #1

---

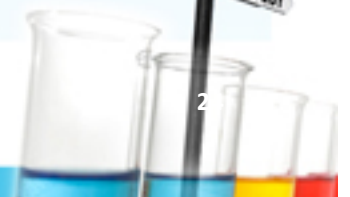
- ❑ The facility has defined Fluoride as one of their CCPs
- ❑ They inject sodium fluoride in-line during production
- ❑ At the end of production a representative sample is sent to an outside lab for fluoride analysis
- ❑ The product is shipped continuously during production and loaded on route trucks
- ❑ The fluoride results are received two weeks later



# Production Scenario #1

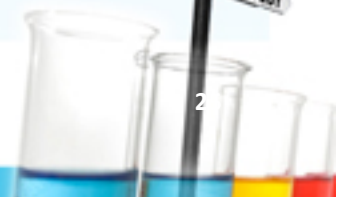
---

- ❑ Has this protocol eliminated or reduced the likely occurrence of this hazard (fluoride) to an acceptable level?
- ❑ How can the importance of this CCP be further reinforced?
  - The facility purchases a handheld colorimetric meter to run fluoride analysis in-house
  - Representative samples are taken during production to verify the fluoride concentration
  - Production is released in 3 hour segments
  - Another option would be to analyze the fluoride hourly, then run and ship



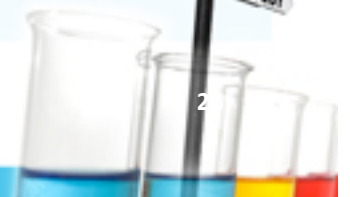
# Production Scenario #2

- ❑ The facility has defined Total Trihalomethanes (TTHMs) as one of their CCPs
- ❑ They are concerned about exceeding the TTHMs MCL in finished product – resulting in a product recall.
- ❑ This has been a problem in the past – especially in August & September
- ❑ Once per month samples are collected and sent to an outside lab for analysis
- ❑ The product is shipped continuously during production – day by day
- ❑ The TTHM results are received three weeks later



# Production Scenario #2

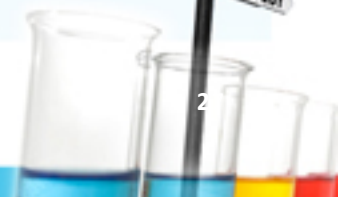
- ❑ Has this protocol eliminated or reduced the likely occurrence of this hazard (TTHMs) to an acceptable level?
- ❑ Will a subsequent step eliminate identified hazard(s) or reduce the likely occurrence to an acceptable level?
  - The facility doubles the size of their carbon tower
  - The facility installs a boiler and develops an SOP to steam the carbon monthly
  - Representative samples are taken monthly before and after steaming the carbon tower
  - The samples are sent to an outside lab for analysis.
  - The TTHM results are received three weeks later
- ❑ This CCP was later downgraded to a CP
- ❑ The cost of the finished product produced within the three week period justified the process improvement project



# HACCP & QC

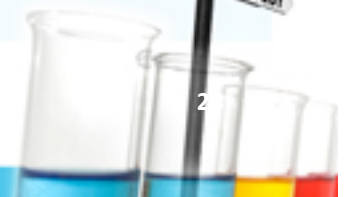
## A Shared Responsibility

- ❑ The HACCP Team should be a representative example of the production process
  - Production
  - Quality Control
  - Shipping
  - Maintenance
- ❑ Meet once per quarter
- ❑ Document process and personnel changes



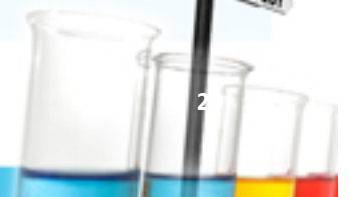
# Defective Product

- ❑ Always complete a Corrective Action Preventive Action (CAPA) form when there is a Critical Control Point deviation
- ❑ It is a good practice to complete a CAPA form for Control Points or make notes directly on line check sheet
- ❑ Have designated HOLD area in plant
- ❑ Determine disposition of finished goods quickly
- ❑ CLEARLY label defective product to prevent shipping errors
- ❑ When there is a Critical Control Point deviation it is best to destroy product in question within the same production day and document the destruction of this product.



# Determining The Effectiveness of Your Sanitation Program

- Determine sanitation frequency based on routine process micro results
- Monitor process using HPC and Y&M
- Try to keep process micros as low as possible
  - HPC  $\leq$  100 counts per 100 mls
  - Counts always higher after RO and filter housings
  - Should come down after UV
- Try to keep Yeast & Mold as low as possible
  - $\leq$  2 mold spores per 100 mls
- Take process samples at least once per week or twice per month to establish base line



# Sanitation - CIP & COP

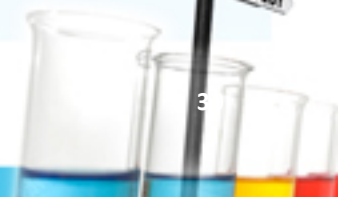
---

## ❑ Clean-In-Place

- May be an automated system
- Cleaner/sanitizer recirculated or flushed through system
- Limited disassembly required
- Most bottled water facilities perform manual CIP from storage tanks to filler

## ❑ Clean-Out-Of-Place

- Requires manual cleaning/soaking by hand
- May include a COP tank
- Requires manual disassembly and reassembly
- Manual sanitation of filter housing
- Manual sanitation of filler valves



# Sanitation & GMP Requirements

## PET - Example

EQUIPMENT	METHOD	FREQUENCY
Cap Hopper	Hand Clean / Sanitize Chlorine or Quaternary Ammonia	Daily / Prior To Start-Up
Cap Basket	Hand Clean / Sanitize Chlorine or Quaternary Ammonia	Daily / Prior To Start-Up
Cap Hopper and Elevator	Hand Clean / Sanitize	Weekly
Capper Assembly	Hand Clean / Sanitize Chlorine or Quaternary Ammonia	Daily / Prior To Start-Up
Filler Exterior	Chlorinated Foam Cleaner	Weekly / Prior To Start-Up
Rinser Exterior	Chlorinated Foam Cleaner	Weekly / Prior To Start-Up
Filler/Rinser Plexiglas Doors	Hand Clean and/or Foam	Weekly
Bottling Room Floor Drains and Floors	Foam	Weekly
Bottling Room Conveyors	Brush And/Or Foam	Weekly



# Sanitation & GMP Requirements

## PET - Example

EQUIPMENT	METHOD	FREQUENCY
<b>Filler Bowl / Valves</b>	Ozonated Water Flush	Daily / Prior To Start-Up
	Hot Water Flush (option)	Daily / Prior To Start-Up
	Valve Sanitation / COP	Weekly
	Sanitize Internally / CIP	Weekly
<b>Rinser - Internally</b>	Ozonated Water Flush	Daily / Prior To Start-Up
	Sanitize Internally / CIP	Weekly
<b>Ozone Contact Tank</b>	Acid Sanitation/CIP/COP	Annually
<b>Ozone Diffusion Stones</b>	Acid Sanitation/COP	As Needed
<b>UV Light</b>	CIP/COP	Annually
<b>New Stainless Piping</b>	Passify – Phosphoric Acid	Each New Installation



# Daily Sanitation - Bottling Room

## Bottling Room - Daily

Equipment	Frequency	Sanitizer Used	Concentration	Contact Time	Method	Initials
Capper Wheels	Daily		%	min.	Foam	
Capper Assembly	Daily		%	min.	Hand Clean	
Syntron Bowl	Daily		%	min.	Hand Clean	
Filler Exterior	Daily		%	min.	Foam	
Floors	Daily		%	min.	Foam	
Floor Drains	Daily		%	min.	Foam	
Floor Mats	Daily		%	min.	Hand Clean	
Walls	Daily		%	min.	Foam	
Doors	Daily		%	min.	Hand Clean	
Conveyors	Daily		%	min.	Foam	
Windows	Daily		%	min.	Hand Clean	
Platforms	Daily		%	min.	Foam	



# Sanitation & General Housekeeping

## Pre-Start Up

Cleaning Task	Monday	Tuesday	Wednesday	Thursday	Friday	Cleaning Solution
Filler - In / Out	x	x	x	x	x	CFC Foam/Agent
Capper - In / Out	x	x	x	x	x	CFC Foam/Agent

## Shut Down

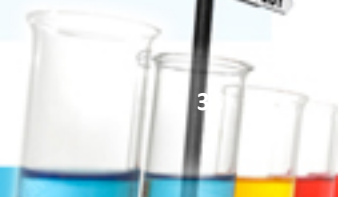
Cleaning Task	Monday	Tuesday	Wednesday	Thursday	Friday	Cleaning Solution
Bottle Refurbishment	x	x	X	x	x	200 ppm Chlorine
Prod. Floors	x	x	x	x	x	CFC Foam/Agent
Trash Receptacles	x	x	x	x	x	Discard all trash
Sink & Lube Barrel	x	x	x	x	x	CFC Foam/Agent
Washer Screens	x	x	x	x	x	Brush/Rinse
Consolidate Racks	x	x	x	x	x	N/A



# Sanitary Maintenance

---

- ❑ Filter changes
- ❑ Replace o-rings on filler valves
- ❑ Carbon towers – typically monthly
  - Steam
  - Hot water backwash
- ❑ Clean/sanitize reverse osmosis membranes
  - Typically once per quarter
  - Depends on level of pretreatment



# Process - Micro Sampling Frequencies

MICROS - PROCESS SAMPLE LOCATION	ANALYSIS DESCRIPTION	FREQUENCY
Spring Source Water - Spring House	1 x 100 mls / Coliform (Colilert – Idexx)	Daily In-House Lab
Spring Source Water - Spring House	1 x 100 mls / Coliform 1 x 100 mls / HPC 1 x 100 mls / Y&M	Weekly Outside Lab
Spring Water - Storage Silos	1 x 100 mls / Coliform (Colilert – Idexx)	Daily In-House Lab
Spring Water - Storage Silos	1 x 100 mls / Coliform 1 x 100 mls / HPC 1 x 100 mls / Y&M	Weekly In-House Lab
Spring Water - Before Contact Tank	1 x 100 mls / Coliform 1 x 100 mls / HPC 1 x 100 mls / Y&M	Weekly In-House Lab



# Micro Sampling Frequencies Containers & Rinse Water

MICROS – RAW MATERIALS	DESCRIPTION	FREQUENCY
4 Washed/Rinsed Bottles (prior to filler)	4 x 100 mls / Coliform 4 x 100 mls / HPC 4 x 100 mls / Y&M	Monthly In-House Lab
4 Washed/Rinsed Bottles (can be run as unit with cap)	4 x 100 mls / Coliform 4 x 100 mls / HPC 4 x 100 mls / Y&M	Quarterly Outside Lab FDA Requirement
4 Caps From Cap Chute	4 x 100 mls / Coliform 4 x 100 mls / HPC 4 x 100 mls / Y&M	Monthly In-House Lab
4 Caps From Cap Chute (can be run as unit with bottle)	4 x 100 mls / Coliform 4 x 100 mls / HPC 4 x 100 mls / Y&M	Quarterly Outside Lab FDA Requirement
Final Rinse Water (5-Gallon & PET)	1 x 100 mls / Coliform 1 x 100 mls / HPC 1 x 100 mls / Y&M	Monthly In-House Lab



# Example of Micro Sampling Frequencies Product & Process

MICROS - FINISHED PRODUCT	DESCRIPTION	FREQUENCY
Each Water Type – By Line 1 Bottle End Of Run - Daily	1 x 100 mls / Coliform (Colilert – Idexx)	Every Production Run In-House Lab
Spring Water 1 Bottle End Of Run	1 x 100 mls / Coliform 1 x 100 mls / HPC 1 x 100 mls / Y&M	Weekly Outside Lab FDA Requirement
Distilled Water 1 Bottle End Of Run	1 x 100 mls / Coliform 1 x 100 mls / HPC 1 x 100 mls / Y&M	Weekly Outside Lab FDA Requirement
Drinking Water 1 Bottle End Of Run	1 x 100 mls / Coliform 1 x 100 mls / HPC 1 x 100 mls / Y&M	Weekly Outside Lab FDA Requirement
MICROS - SANITATION EVALUATION	DESCRIPTION	FREQUENCY
Filler Valve Swabs (3 Valves)	3 x HPC 3 x Y&M	Monthly In-House Lab
Capper Swabs	3 x HPC 3 x Y&M	Monthly In-House Lab



# Retained Samples

- Collect extra retained samples when there was a CCP deviation during production
- Take the time to analyze your retained samples at the end of shelf life
- Catch product/packaging problems before they become issue in market
- What is your product's shelf-life?
- What does the packaging look like at the end of the product's shelf-life?
- Higher speed retail lines should set aside more retain samples - typically 1 case per water type per shift – 4 start-up, 4 middle, 4 end)



# Retain Samples - Example

PRODUCT	RETAIN SAMPLE SIZE	FREQUENCY	# OF RETAIN SAMPLES	TEST PARAMETERS	DISCARD
Returnable 3 & 5 Gallon	Container or 500 ml sample	Daily	2	T/O/A HPC Y&M Coliform	6 Months
Retail 1 Gallon	Container	Daily	2	T/O/A HPC Y&M Coliform	6 Months
Retail 0.5 Liter	Container	Daily	2	T/O/A HPC Y&M Coliform	1 Year
Retail 1 Liter	Container	Daily	2	T/O/A HPC Y&M Coliform	1 Year



# Food Grade Materials?

---

- Are all product contact surfaces in your plant “food grade”?
- Do you have documentation that shows your bottles, caps, minerals, salt for softener, etc. are food grade?
- Do you receive and file the Certificates of Analysis (COA) of each lot received?
- Only use food grade detergents and sanitizers in your facility



# Raw Material Receipt & Inspection

- ❑ In order to control finished product quality, the quality of incoming raw materials must also be monitored.
- ❑ FDA now requires raw material lot code documentation.
- ❑ All raw materials should be inspected on a routine basis to ensure that the materials are received in good condition (without damage) and that the amount ordered is the same as the amount received.
- ❑ Poor quality of raw materials can result in customer complaints.



# Raw Materials Receipt & Inspection

Date Received	Amount Received	Raw Material Type	Raw Material Lot #	Describe Condition Of Raw Materials Received



# 5 Gallon Raw Materials - Inspection

PACKAGE TEST / PROCEDURE	STANDARD	FREQUENCY
Cap Lot #s	FDA	Each Lot As Received Each Lot As Used In Production
Bottle Lot #s (5 gallon – new bottles only)	FDA	Each Lot As Received Each Lot As Used In Production
Bottle Weight	As per Manufacturer Standards	Quarterly 12 Bottles per Lot Received
Bottle Neck Dimensions	As per Manufacturer Standards	Quarterly 12 Bottles per Lot Received
Bottle Height	As per Manufacturer Standards	Quarterly 12 Bottles per Lot Received
Closure Weight	As per Manufacturer Standards	Quarterly 12 Caps per Lot Received
Closure Diameter	As per Manufacturer Standards	Quarterly 12 Caps per Lot Received



# Raw Material - Storage & Usage

- ❑ Raw materials (caps, bottles, boxes, labels, etc.) must be stored in a clean and orderly manner.
- ❑ Care should be taken to ensure proper rotation (First-In-First-Out)
- ❑ Only bring the amount of raw materials needed for one day's production to the bottling area.
- ❑ Always document the raw material's lot number when received and when used in production.
- ❑ Only new 5 gallon bottle lot codes must be documented (when received and when used)
- ❑ Do not store partial pallets of raw materials in the bottling area.
- ❑ Return all unused raw material to their proper storage areas at the end of the production day.
- ❑ Mark and/or label the partial pallet/box to ensure that it is pulled "first" the next time.



# Old Stock

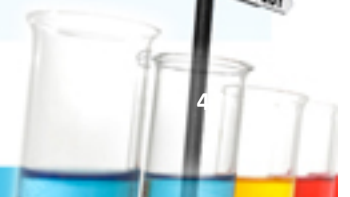
---

- How long is your product in your warehouse?
- How long is your product in your sales centers?
- What is the cost of your warehouse inventory?
- Is your product being damaged in your own warehouse?



# What is your scrap telling you?

- Scrap is an important tool for QC personnel
- Keep track of the type of defect
- This data may be used to justify a new piece of equipment or a process change
- Analyze using statistical process control when possible
- Analyze using a Cause & Effect Diagram



# Ozone Controls

---

- ❑ In-line ozone probes highly recommended
- ❑ Systems with control loops tend to give the most consistent results
- ❑ Manual systems are extremely tedious and prone to operator error



# Importance of Ozone Controls

- ❑ Decreasing the ozone levels in the finished product can have a negative impact on the microbial integrity of the product.
- ❑ The micro counts must be maintained in the plant's process to a level that does not overwhelm your final disinfection process prior to bottling.
- ❑ The residual counts in the process, package, and equipment must be maintained to a controllable level when running lower ozone levels.



# Record Retention & Organizing Your Records

- You may prefer to organize your records by production line
  - 5 gallon
  - 1 gallon
- Many facilities organize their sanitation records by frequency
  - Daily
  - Weekly
  - Monthly
- Keep records in a dry/clean area for 5 years!
- Have a record retention program that documents the destruction of records at the end of 5 years!



# Computerize Your Records

- Hand-held devices are easily adapted to the line check process
- Bar codes denoting line position can be placed at each inspection point
- Only collect useful data
- Fast access to historical data is a great benefit
- You can use Microsoft Outlook to keep you organized
- There are multiple quality software packages available that can automate data collection



# What is SPC?

---

- ❑ Statistical process control (SPC) is the application of statistical methods to the monitoring and control of a process to ensure that it operates at its full potential to produce conforming product.
- ❑ Under SPC, a process behaves predictably to produce as much conforming product as possible with the least possible waste.
- ❑ Key tools in SPC are control charts, a focus on continuous improvement and designed experiments.
- ❑ Statistical Process Control may be broadly broken down into three sets of activities: understanding the process, understanding the causes of variation, and elimination of the sources of special cause variation.



# Contact Information

---

**LAURA CURRENT**

DIRECTOR OF QUALITY | **BEYOND ORGANIC, LLC**

1250 Southern Road, Kansas City, MO 64120

Mobile 770.596.8088

Email [lcurent@livebeyondorganic.com](mailto:lcurent@livebeyondorganic.com)

