

An aerial photograph of a dense forest of evergreen trees covered in a thick layer of snow. The trees are scattered across a light-colored, snow-covered ground. The text "In factory cip post Chlorine" is overlaid in the center of the image in a blue, sans-serif font.

In factory cip post Chlorine

Content

- Introduction
- “The drop for the cat”
- The 4 T’s and successful Cip
- Control- the cornerstone of cip
- Maintenance- from milking machine to the pack
- The alternatives, chemicals and chemical company support
- Water- the universal solvent!

Introduction

“There are increased food safety concerns regarding the use of chlorine for cleaning milking equipment, due to residues of TCM and Chlorate. The removal of chlorine from cleaning routines would significantly reduce the risk of these residues in milk and consequently, in final products, such as lactic butter and milk powder” – [David Gleeson ,Teagasc Moorepark](#)

Introduction



- (3) Apart from its former use in plant protection products, chlorate is also a substance that is formed as by-product resulting from the use of chlorine disinfectants in food and drinking water processing. These uses lead to the current situation of detectable residues of chlorate in food.
- (4) The European Food Safety Authority ('the Authority') collected between 2014 and 2018 monitoring data to investigate the presence of residues of chlorate in food and drinking water. Those data indicated that chlorate residues are present at levels that frequently exceed the default MRL of 0,01 mg/kg and that the levels vary depending on the source and the product. It follows from those findings that even if good practices are used, it is currently not possible to achieve levels of chlorate residues compliant with the current MRL of 0,01 mg/kg.
- 7) This Regulation addresses the setting of temporary maximum levels in food. For this purpose a large number of occurrence data was collected between 2014 and 2018, both by Member States and by food business operators. The data shows a general trend towards decreasing levels, suggesting that manufacturing practices have already improved to a certain extent. In the specific case of chlorate, for which residues do not stem from pesticide use but result from use of chlorine-based solutions in food processing and drinking water treatment, maximum levels should be set at levels which are 'as low as reasonably achievable' (ALARA principle) by following good manufacturing practices while ensuring at the same time that good hygiene practices remain possible. This approach ensures that food business operators apply measures to prevent and reduce the chlorate levels in food as far as possible in order to protect public health, but also take into account the need for microbiological safety of food.

"The drop for the cat"

- Milking machine wash chemicals
- Cip over runs and poor rinsing
- Water treatment and spikes
- Control and monitoring



The 4 T,s and successful Cip

Cleaning in Place (CIP)

CIP is a method for cleaning production lines without dismantling the installation by circulating cleaning solutions according to defined protocols, combining physical, mechanical and chemical energies.

EVERY WASH
EVERY TIME
EVERYWHERE



The 4 T,s and successful Cip

Factors impacting plant cleaning:

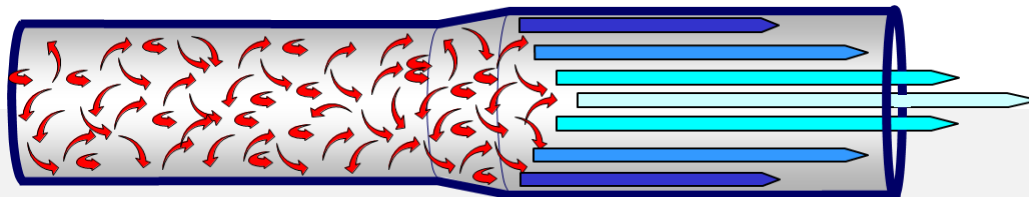
- Design and layout.
- Scheduled cleaning regime.
- Correct cleaning equipment/ chemicals available to carryout tasks.
- Checking procedures and regular cleaning audits.
- Training



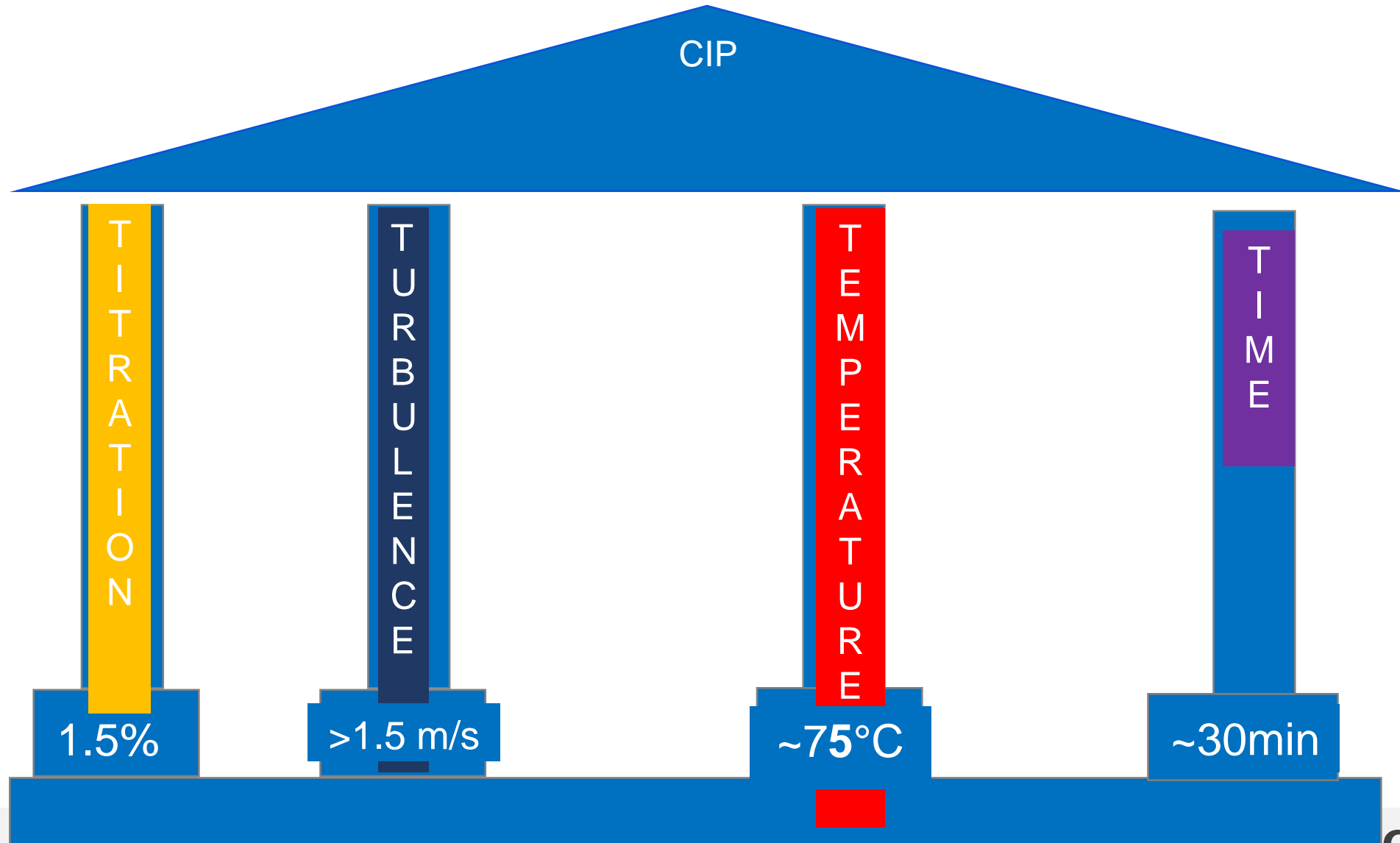
The 4 T,s and successful Cip

How to clean a plant that has been processing food depends on;

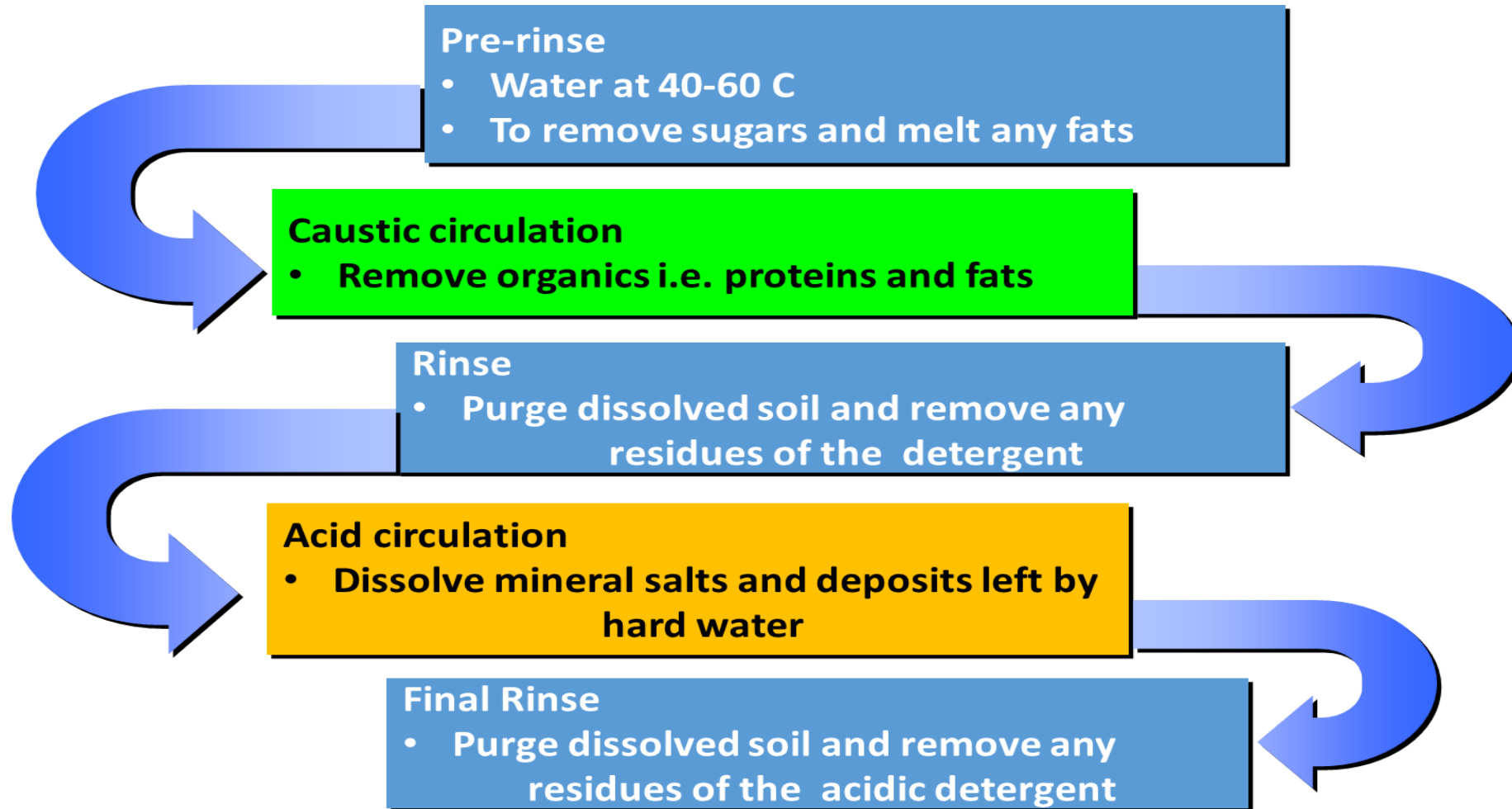
- the type of food that has been produced, and under which conditions.
 - ***Processing temperature and running time affect how the equipment will be soiled.***
- Efficient CIP will depend on how mechanical, thermal and chemical processes work on different types of soiling.
- It will also depend on how acids and detergents affect different types of soiling and how their interaction can be optimized.



The 4 T,s and successful Cip



The 4 T,s and successful Cip



The 4 T,s and successful Cip

- Technology: discipline that requires detailed engineering
- Turbulence: 1.5 to 2m/s
- Titration : not too high/ not too low
- Temperature: adapted to process
- Time: depends on the circuit
- Training: everybody needs the same understanding

CONFIDENCE

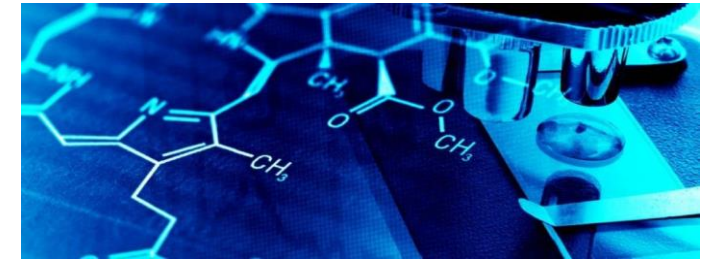
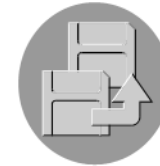


RELIABILITY



The 4 T,s and successful Cip

- Quality Improvement
- Reproducible Results
- Documentation
- Economical
- Time
- Safe



Why is CIP
important?

Control – The cornerstone of Cip



POWER IS NOTHING WITHOUT CONTROL™

Control – The cornerstone of Cip



- **CIP validation** is a procedure to ensure that the cleaning cycles are effectively removing residues to predetermined levels of acceptability. These acceptance criteria are directly related to the specifications of the products.
- All cleaning plans need to be controlled for their efficiency by **Verification/ monitoring**. Monitoring of all elements of CIP is essential, not just of cleaning cycles, but also of status of cleaning fluids, rinse water, etc.
- Any **change** to the CIP system or procedure must be handled through a Management of Change process, the outcome of which shall be used to decide the scope of re-validation or verification.

Control – The cornerstone of Cip

Cleaning validation

It's one thing to **verify** the cleaning effectiveness of a particular cleaning cycle, but how can you know if you are **systematically** following good cleaning regimens that **consistently** produce an **acceptable** result that minimizes the risk of spoiled products?

- ▶ It **verifies the effectiveness** of the cleaning procedure for removal of product residues.
- ▶ It **documents evidence** that the cleaning process removes residues to predetermined acceptable levels – repeatedly and reliably.

- Validation “**Brilliant at the basics**”



Control – The cornerstone of Cip

What do we measure/monitor - How do we control

Monitoring The 4T's

Turbulence:

Flow meter (supply – critical)

Temperature:

At the tank or in the CIP return line (return – critical)

Titration:

Conductivity meter which monitors the solution concentration (return – critical)

Time:

Timer setting **based on correct turbulence, temperature, and titration**



- The cornerstone of Cip



AN INNOVATIVE PROGRAM

3D TRASAR™ CIP is a diagnostic tool that uses sensors to **verify every clean-in-place (CIP) wash** and alert you when any wash step deviates specification. Additionally, it helps **identify opportunities to improve** your CIP efficiency and provides peace of mind that someone is monitoring your food safety risk 24/7.



DRIVING CONSISTENCY WITH BUSINESS-FOCUSED RESULTS

- FOOD SAFETY & PRODUCT QUALITY** - 3D TRASAR CIP helps provide the most optimal quality of clean and sanitization, helping assure food safety, quality and consistency across your operation.
- OPERATIONAL EFFICIENCY** - CIP experts provide optimized CIP programs - providing consistent results with improved efficiency and lower total cost.
- SAVES WATER** - Provides lowest total impact of CIP consumables, including water.
- ENHANCED PRODUCTIVITY** - Gain production capacity by reducing total cleaning time and reducing labor.



CUSTOMIZED CONTINUOUS CIP OPTIMIZATION PROGRAM



- Monitors CIP systems 24/7/365
- Provides a CIP analysis team to analyze and make recommendations
- Establishes the "optimal CIP" for each object/circuit
- Tracks each CIP against its "optimal CIP profile"
- Automatically flags deviations that impact product quality and efficiencies
- Identifies opportunities for quality improvement and cost optimization
- Provides benchmark performance between systems

COMMON CIP DISCOVERY:

VISIBILITY TO COMMON CIP ISSUES:	DIRECTLY IMPACTS		
	FOOD SAFETY & PRODUCT QUALITY	PRODUCTIVITY	WATER
Incomplete a washes	X	X	X
Not achieving temperature parameters	X	X	X
Similar objects washing differently	X	X	X
Low or no chemical concentration	X	X	X
On-site contamination of water into sanit bar stop	X	X	X
Equipment malfunctions	X	X	X
Deviations from SOPs	X	X	X
Ineffective, inefficient system out of water	X	X	X
Not at cleaning time due to inconsistent rinse, wash & sanit bar stops	X	X	X

To make 3D TRASAR CIP your indispensable advantage, contact your Ecolab Representative.



© 2017 Ecolab USA, Inc. All rights reserved. 47124/01/20170819



CIPTEC

See the unseen

Are you over or under-cleaning your CIP system?

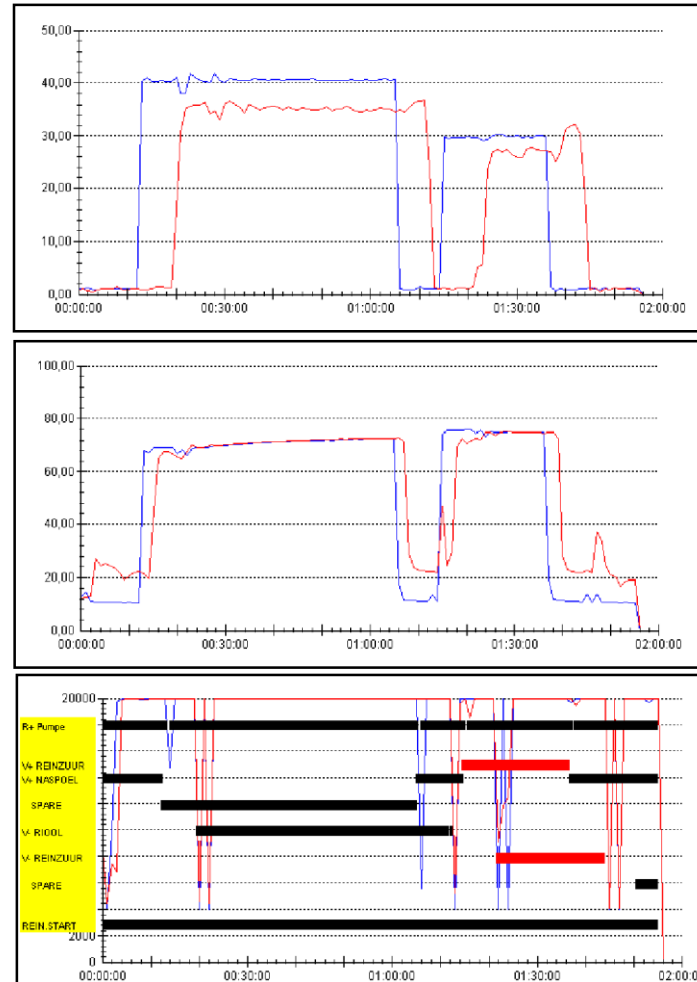


Control – The cornerstone of Cip

Evaluation of parameters

- **Conductivity**
- **Temperature**

**Flow /
Start/Stop of
pumps and
Opening /
Closing of
valves**



Complimentary methods to support automatic performance monitoring

- **Visual inspection**
- **Chemical tests**
- **Rapid microbiological testing (ATP-method)**
- **Full microbiological evaluation**

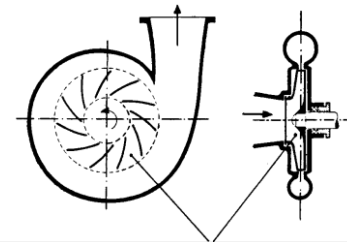
Maintenance– Milking machine to the Pack



- **Seals** – schedule, right type and duty
- **Pumps** – Centi for supply/ Rtn in closed system ,liquid ring return in open system, seals, speed, impeller condition
- **Calibrations** – Flowmeters, tank probes return Probes, Flow switches and timers
- **Spray devices** – Static sprayballs, turbines Etc, seals, debris and fittings
- **Program checks**- Versus the UPS and the validation docs
- **Heat Ex** – Seals, plates etc
- **Valves** – Seals, plugs, travel etc

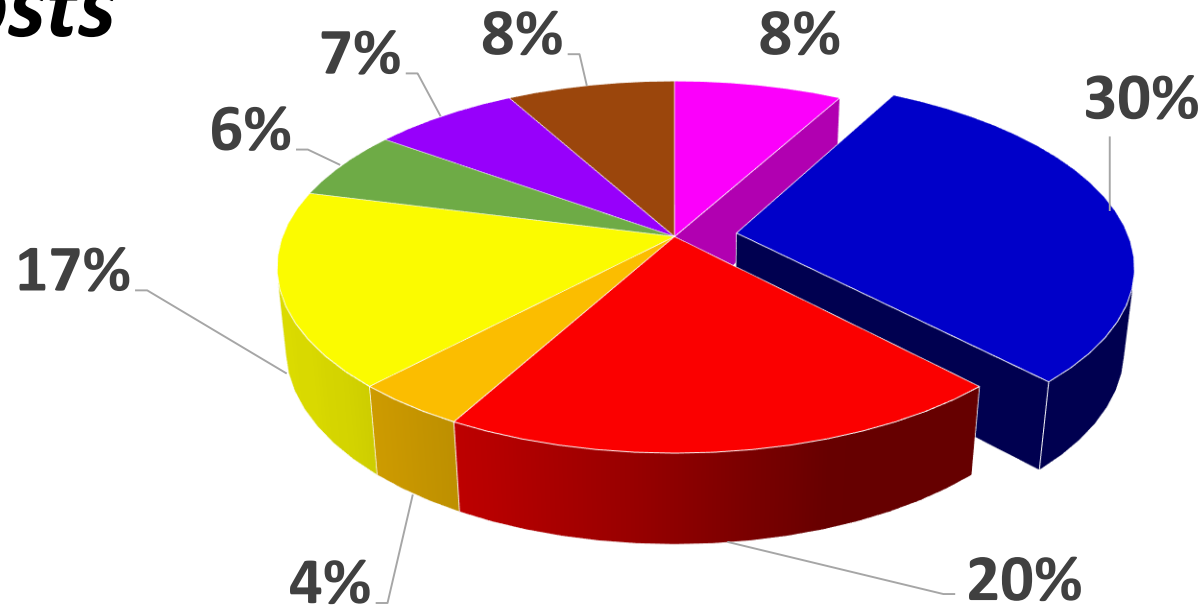


— Ferrule
— Clamp
— Gasket
— Ferrule



Chemicals, alternatives and supplier support

Cleaning Costs



- Cleaning agents/disinf
- Water (in/out)
- Heating
- Electricity
- Man hours
- Depreciation
- Maintenance
- Quality Costs

Chemicals, alternatives and supplier support

Cleaning chemicals should:

- Be able to remove soil from the walls of equipment
- Be able to dissolve hard water deposits
- Be non tainting
- Be able to be completely rinsed clean
- Be free from abrasive particles
- Be environmentally friendly
- Be stable upon storage
- Be cost effective

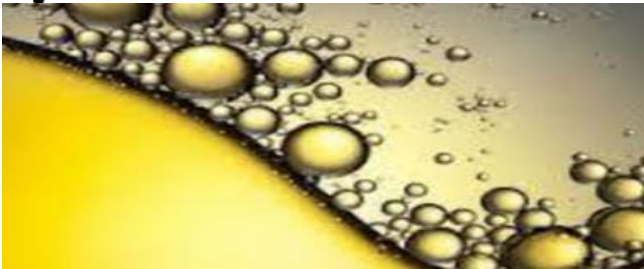


Chemicals, alternatives and supplier support

- It is important to understand how detergents are used in cleaning procedures in order to achieve optimal cleaning results – and without wasting money on unnecessary chemicals that further burden the environment.
- Detergents/Acids can range from pure chemicals such as sodium hydroxide (lye), nitric acid or phosphoric acid to more complex formulated detergents supplied by detergent companies.
- A third alternative is adding additives to a pure chemical, such as sodium hydroxide, at the food manufacturer. This is a very flexible alternative where you might use only pure chemical for some cleaning objects and create a formulated detergent for others.



Chemicals,alternatives and supplier support



- Important to have a Cip champion

Phases	Main Steps	Sub steps	Templates
Phase A At the Factory level	CIP Management organization	Create CIP Management Team	Paper work suite,_CIP Management_ Northstar no 3

Step	Deliverables
1	CIP Champion identified CIP Management team identified, with roles & responsibilities
2	CIP Management Team trained
3	Information Gathering started
4	CIP Validation Plan agreed using the prioritization concept

The Cip champion can be a full time role or can be someone who fills the role on top of their own

- Needs to be passionate, a cip evengilist, know the processes, understand the requirements and a resource to assist Q.A/Regulatory on audit prep and when dealing with outside regulatory visits.

Chemicals, alternatives and supplier support



- “As your partner, we can provide laboratory testing and determine the correct cleaning chemistry for the application. We perform TOC testing during product recommendation testing and develop new validated documents to help support your operations.”
- “Diversey Consulting is the food safety & risk management services group of Diversey. By creating reliable and solid guidelines for food safety and health & hygiene, we assist you in developing a practical yet credible and risk-based system. A robust food safety & infection prevention system which is the corner stone for you to ensure the safety of your guests and employees. We provide you with global food safety and risk management services from the design of your management system to implementation and training up to monitoring and auditing.”

Chemicals, alternatives and supplier support



NODSAN EAS makes it possible to combine cleaning and disinfection in CIP applications into one step. This helps to save time, water and energy in industrial cleaning. The new Ecolab development is an effective, non-oxidizing CIP disinfectant that can be used alone or in combination with alkaline or acid detergents.



Goulding Chemicals Division



F Divosan OSA-N VS37 Phosphate free acidic detergent disinfectant/ terminal disinfectant for CIP applications
Description Divosan OSA-N is a concentrated low foaming phosphate free acidic detergent disinfectant/terminal disinfectant for CIP applications in the brewing, beverage, dairy and processed food industries

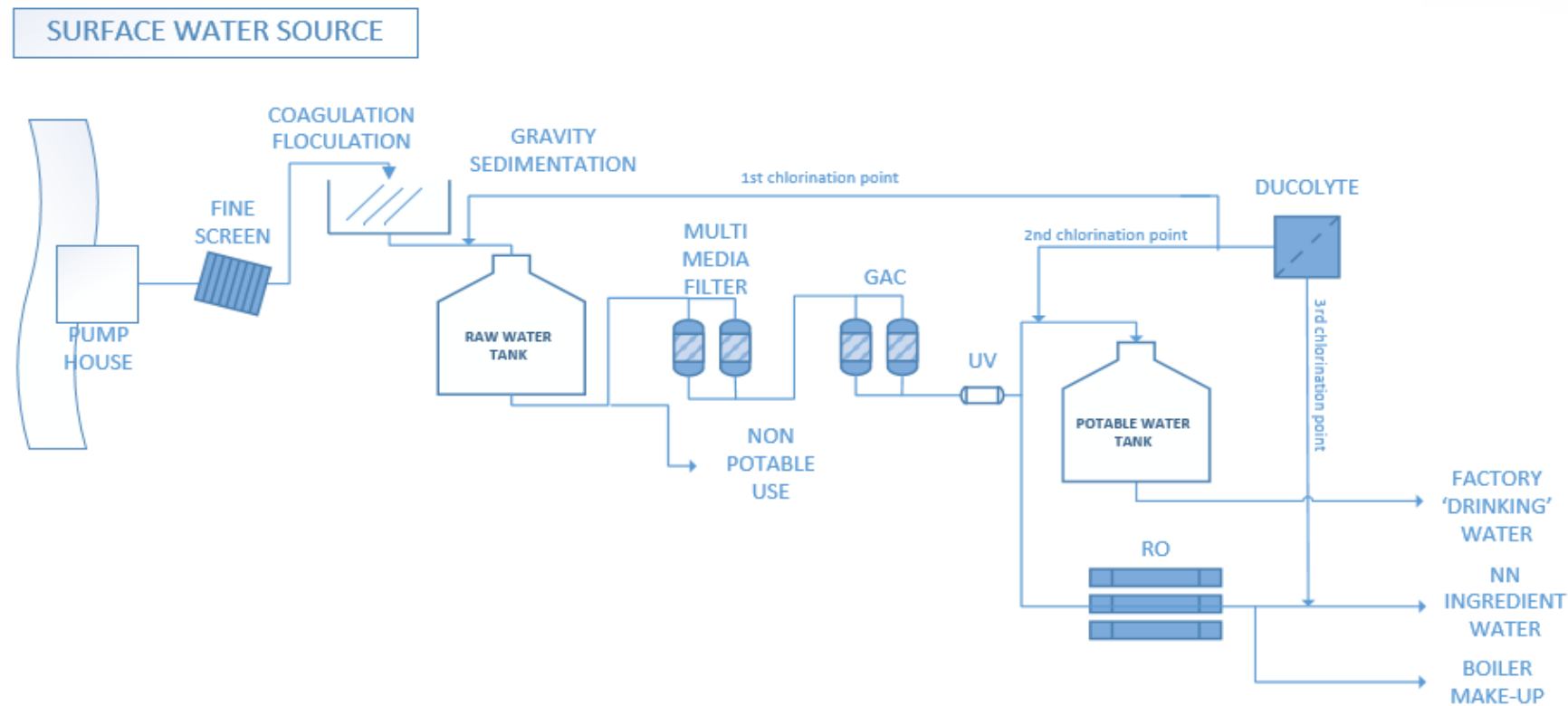
water – The Universal solvent

- Water makes up > 95% of the cleaning solution, (**“Universal Solvent”**).
- Carries chemicals to & contamination **away**.
- Water **impurities** effect performance.
- **Hardness** (Ca & Mg), Scaling & heat transfer
- Chemical contamination - iron
- Physical -Colour, odour, taste, temp. & turbidity
- Micro –Coli,crypto,etc
- Final treatment can have knock on effects i.e chlorination



Water – The Universal solvent

- Source, treatment and main uses in Processing



Water – The Universal solvent



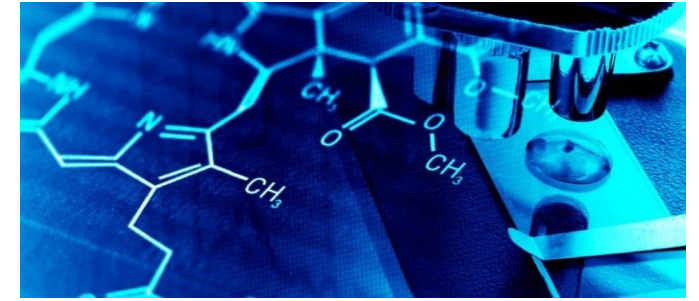
- The type of treatment prior to primary disinfection, and the way that treatment is managed and operated, can have a very significant influence on the performance of disinfection

In the case of chlorination, upstream treatment may be used to reduce:

- Chlorine demand, particularly from total organic carbon (TOC), allowing higher chlorine concentration to be achieved with less potential for by-product formation,
- The variability of water quality thereby allowing more reliable control over chlorine residual,
- The turbidity of the water and thereby provide less shielding of the micro-organisms from the effects of disinfection chemicals and UV,
- The microbiological challenge to disinfection because of more effective removal of micro-organisms by upstream treatment. Similar considerations apply to other disinfectants e.g. upstream treatment reduces ozone demand and UV absorbance

The pH value at which disinfection occurs also affects disinfection efficiency and associated by-product formation. In the case of the most common disinfection method, (i.e. chlorination) there is a strong pH dependence because the form of the disinfectant in the water changes with pH.

Water – The Universal solvent



- Hypochlorite solutions used in water disinfection contain many regulated and unregulated chemical contaminants, including bromate, chlorite, chlorate, and perchlorate. These chemicals have the potential to contaminate drinking water at unacceptable levels if adequate control measures are not taken to minimize their formation during manufacture, shipment, and storage of hypochlorite solutions.
- Due to the decomposition of hypochlorite solutions into by-products, the free available chlorine in the solution decreases over time. Consequently, the dosing of hypochlorite solution may be increased by operators to achieve the target of free chlorine, however thereby also increasing the chlorate dose over time.
- Other solutions are now required.

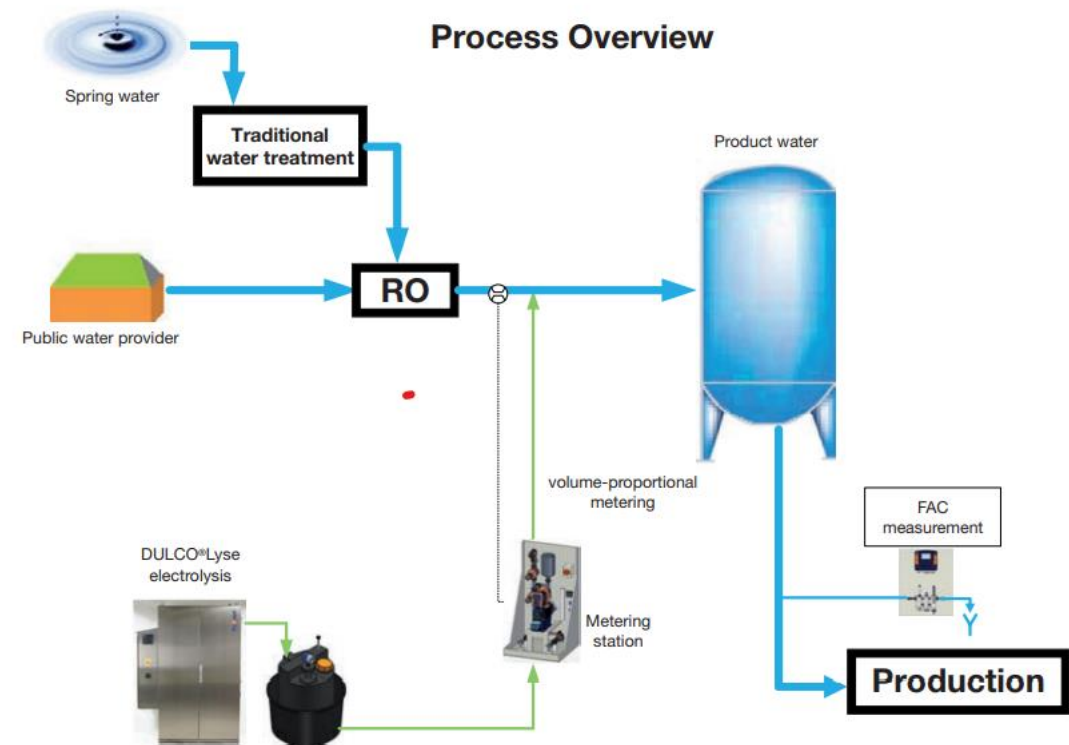
Water – The Universal solvent



The different forms of chlorine commonly used in drinking water to disinfect and maintain a residual level of disinfectant throughout the distribution System are:

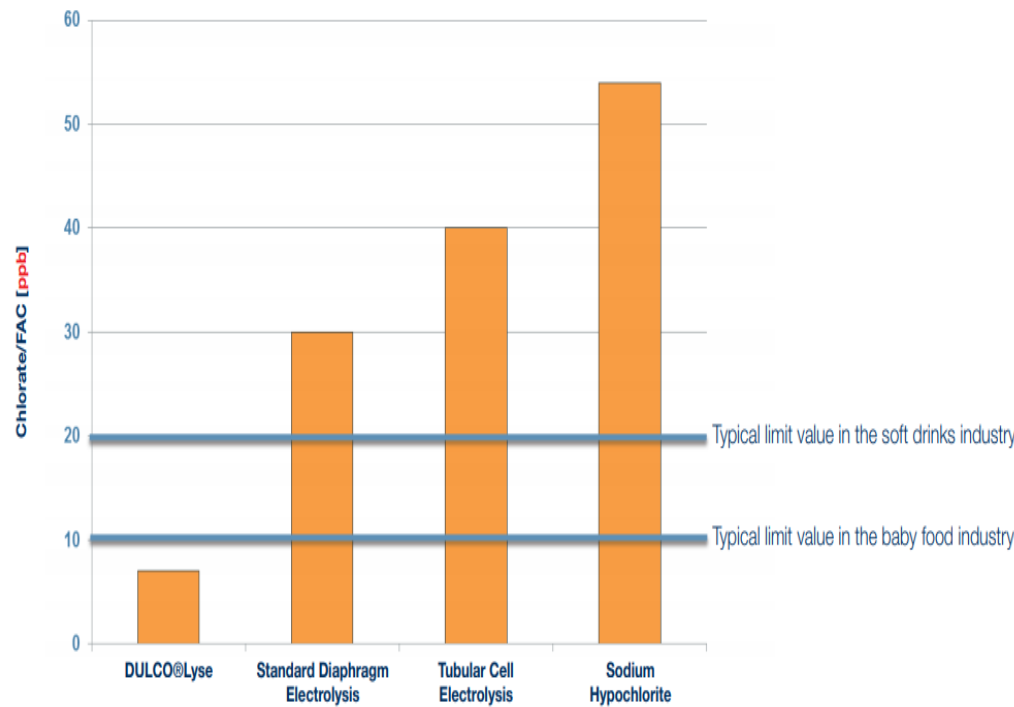
- **Bulk hypochlorite** – should only be used for non product/product contact applications.
- **Onsite hypochlorite generators (OSG)** –best solution but capital investment high. $(\text{NaCl} + \text{H}_2\text{O} + \text{ENERGY} \rightarrow \text{NaOCl} + \text{H}_2)$
- **Chlorine dioxide** -Chlorine dioxide is produced by the controlled mixing of the precursor or 'binary' chemicals, hydrochloric acid and sodium chlorite.

Water – The Universal solvent



Integration of DULCO®Lyse into the entire process

Low-chlorate disinfection – effective and safe



less than 0.01 ppm (10 ppb) of chlorate is produced when metering 1 ppm of FAC.