



INFECTION CONTROL

Life Blood of the CSSD The Importance of Water Quality in Healthcare

Enviro-Check Enterprises Pty Ltd
Presentation by Dr. Julian Catmull
For
Australian College for Infection Prevention and Control
(ACIPC – WA, August 2017)

ENVIRO-CHECK ENTERPRISES



A WATER QUALITY SPECIALIST

LABORATORY ANALYSIS (NATA #14542)

WATER INDUSTRY TRAINING (RTO #31366)

WATER QUALITY RISK MANAGEMENT PLANS (WQRMPS)

TRIGGER ACTION RESPONSE PLANS (TARPs)

Joins SYMBIO LABORATORIES

A TRUE CONSOLIDATION OF EXPERTISE



**NATA Accredited
laboratory**
Accred. to ISO 17025



NATIONALLY RECOGNISED
TRAINING

**Nationally Accredited
Water Industry
Training**

ENVIRO-CHECK ENTERPRISES



A specialist consulting laboratory in environmental and water quality;
compliance, operations and system management



Water Quality Risk Management Plans (WQRMPs)



Sewage Treatment Plants, Effluent Compliance

Analyses & Compliance for bacteria
and bacteriophage (<24hrs),
& water chemistry
(3-7 days) apply.



Field Services

ECE provides field service technicians for
sample collection and in-situ, field,
measurements



Registered Plant Water Quality Compliance

Assistance with design system
performance monitoring & implementation
of suitable control strategies



Environmental Water Quality Compliance



Quarantine Approved Site

ECE is a quarantine approved
premises (#Q1149) accredited to
receive for analysis water from any
location in the world

Symbio LABORATORIES



Symbio
LABORATORIES
Proudly AUSTRALIAN



Independently Australian Owned & Operated

>35,000 tests/week
~7,000 customers



Major Sector Clients

- Food, Agricultural & Environmental Sectors
- Producers, processors
- Retailers, consultants, Federal, State & Local Governments



Australia Wide

Rockhampton, Townsville, Wagga Wagga & Moranbah



Extensive Range of Tests

- Microbiology
- Organic Chemistry
- Residue Chemistry
- Inorganic Chemistry



Expert Team

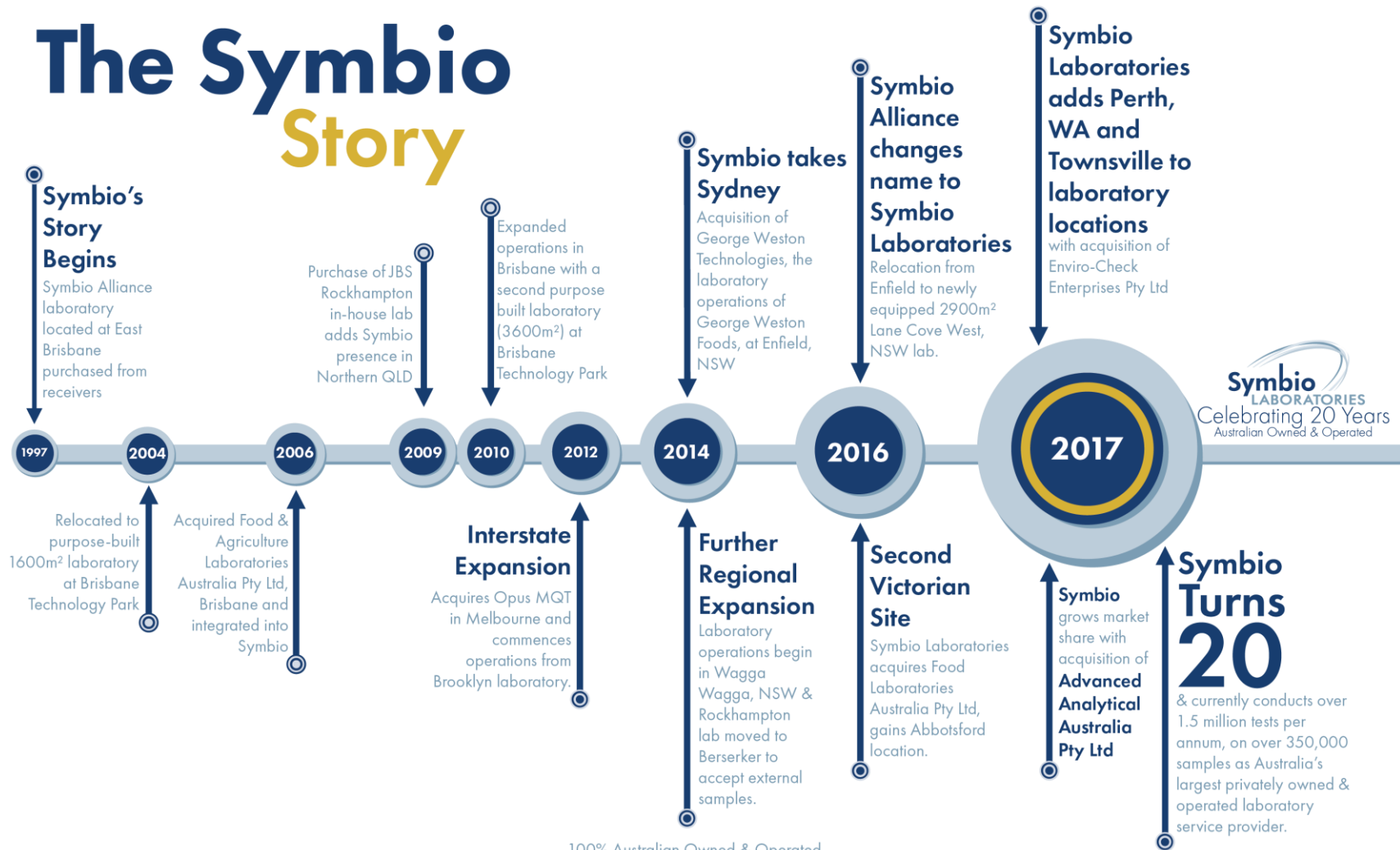
- Highly qualified personnel
- Customer Service team with industry expertise & credentials
- Dedicated IT support



Largest independent laboratory

Servicing the analytical testing needs of food, agricultural and environmental industries across Australia

The Symbio Story



100% Australian Owned & Operated

Central Sterile Supply Dept. (CSSD)



Introduction – Background/ Message

CSSDs

Are often referred to as the heart of Healthcare

Therefore

WATER

is the Life Blood

while

Authorities, Standards and Governance

bring a rhythm (**AEDs** ?) for consistency and control to the CSSD through defined QCs / e.g. ASNZS
4187 for water

to

Manage Risk

Water Quality Risk Management

CSSD Infection Control: Legislation, Policies, Regulation

Australia has 9 depts. of Health = some **confusion?**

My Understanding

- NSW has Legislated for the requirements of water quality in Healthcare
- Other states have health policy Directives

i.e. all must strive for compliance in water quality
(remember we are not perfect – even the regulators)

Table 7.2: ASNZS 4187
Water quality for reprocessing RMDs

Chemical Analysis Parameters	Cleaning Process	Final Rinse (final water rinse conducted on the RMD)
Appearance	clear colourless	clear colourless
pH at 25°C		5.5-8.0
Conductivity at 25°C		30 uS/cm
Total Dissolved Solids (TDS) @180 degrees		40mg/L
Total Hardness (CaCO ₃)	60 mg/L	50 mg/L
Chloride	120 mg/L	10 mg/L
Lead		10 mg/L
Iron		2 mg/L
Phosphate (P ₂ O ₅)		0.2 mg/L
Silicate (SiO ₂)	2 mg/L	0.2 mg/L
Total viable count		100 cfu/100ml
Endotoxin (EU/mL)		0.25 EU/mL

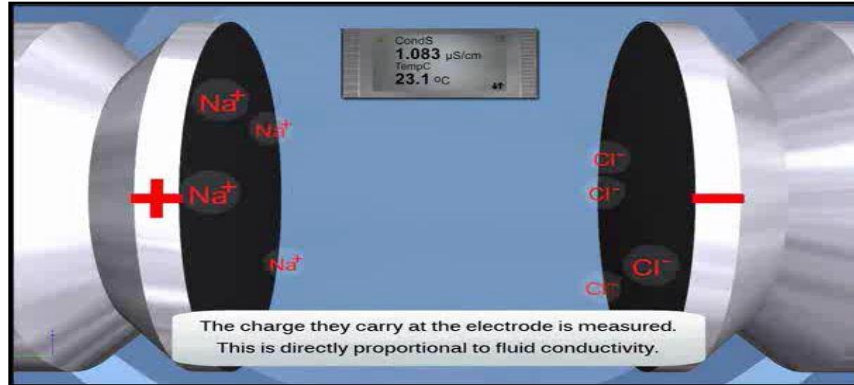
Rinse Water Key Characteristics

1. **Conductivity:** (Max of 30 μ S/cm)
 - Dissolved salts – metals and chlorides
2. **pH** 5.5 to 8.0 units
3. **Biologicals**
 - Bacterial counts as total viable counts
 - Endotoxins

Conductivity

Water's ability to conduct electrical current

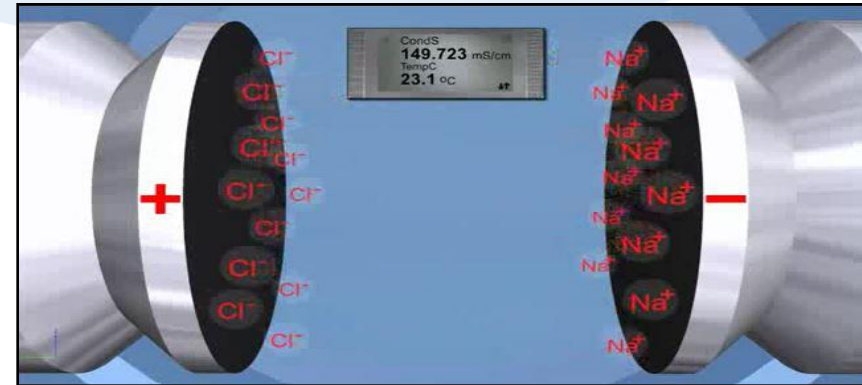
Low Conductivity



Low Conductivity (low salt) – RO
Reverse osmosis water has low salts

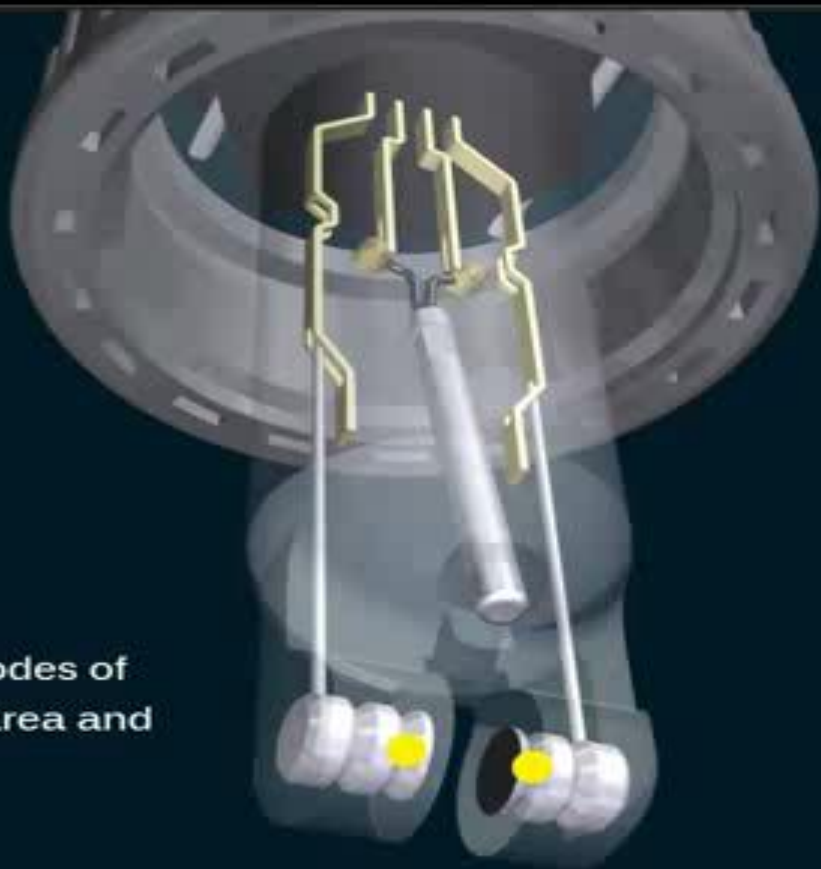
High Conductivity (high salt) – sea water
Reverse Osmosis removes salts

High Conductivity

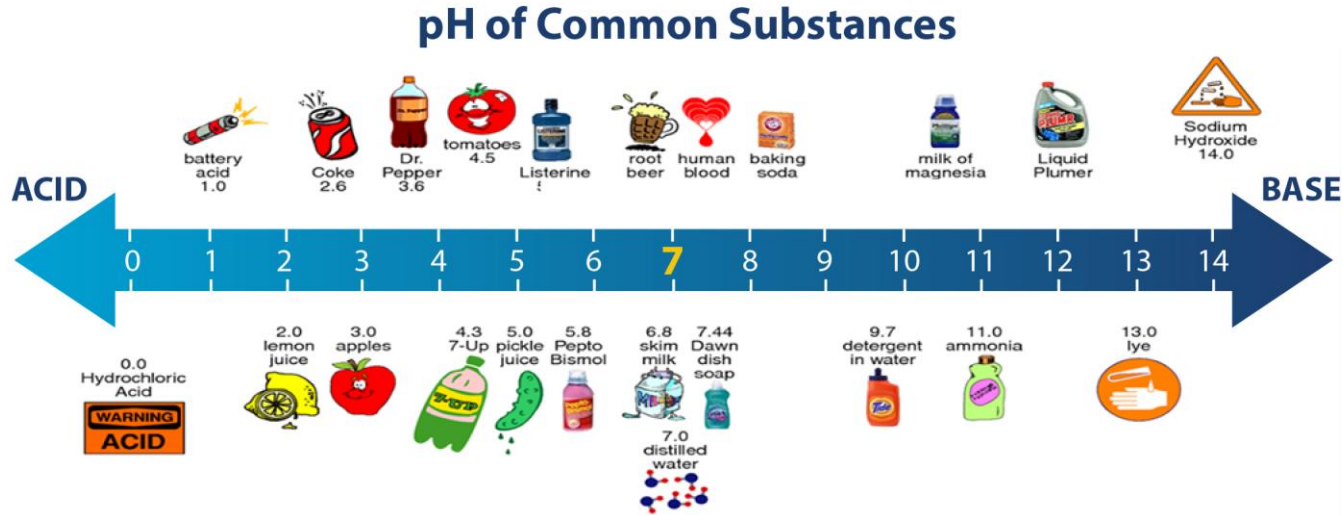


Conductivity meters ..

Have two electrodes of known surface area and distance apart.



pH of Common Substances



If there are more (H⁺) than (OH⁻) then the water is acidic

If there are more (OH⁻) than (H⁺) then the water is alkaline

pH - Potential of Hydrogen

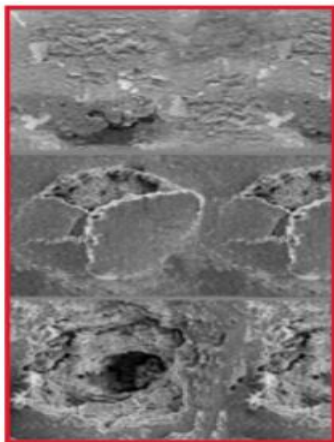


pH (potential of hydrogen) is a scale of acidity from 0 to 14. It tells how acidic or alkaline a substance is. More acidic solutions have lower **pH** and more alkaline solutions have higher.

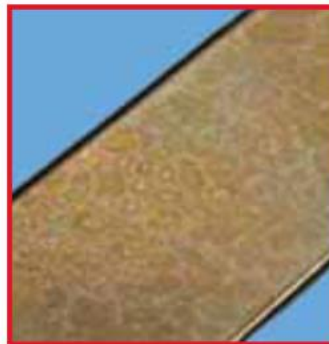
Low pH is corrosive – Acidic



Instrument Corrosion



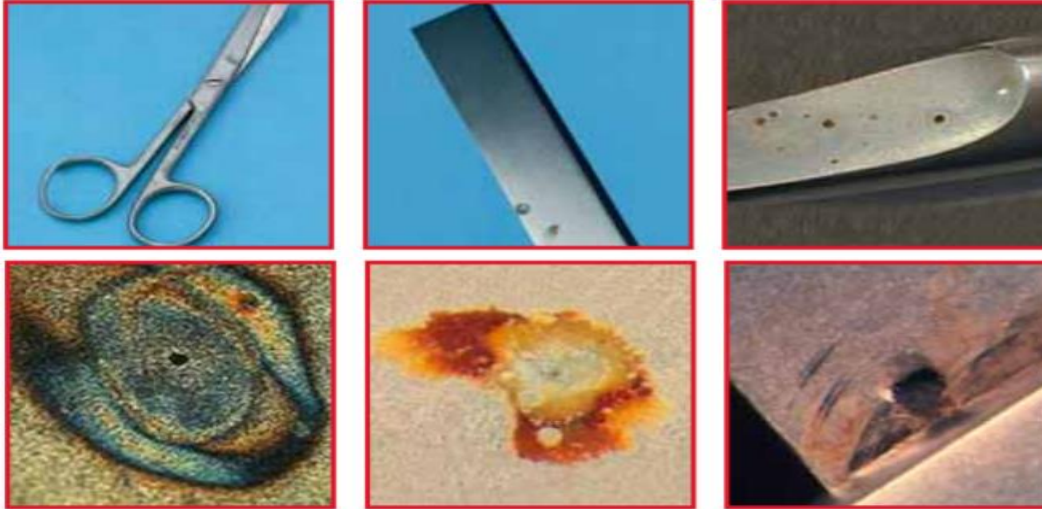
Scanning electron microscope image of chloride-induced pitting



Typical silicate discolouration on the surface of the instrument after steam sterilization caused by excessive silicon dioxide levels in the demineralised water

pH + Salts in Collaboration

- Instrument Corrosion



Pitting induced by exposure to halide ions (chlorides, bromides and iodides), but especially chlorides, on stainless steel instruments

Costly both in terms of adverse health outcomes and medical devices

Biologicals - Biofilm



(Courtesy Rodney Donlan and Donald Gibbon, by permission from ASM MicrobeLibrary.)

Natural biofilm on a metal surface. Scanning electron micrograph of a native biofilm that developed on a mild steel surface in an 8-week period in an industrial water system.

Gram Negative Bacteria - Endotoxins

1. **Bacterial membrane debris;** proteins, sugars and LPS (lipopolysaccharides)
 - Non living
2. **Not readily removed by sterilisation procedures**
 - Persistent
 - Heat Resistant
3. **Anaphylactic substances**
 - pyrogenic / fever without infection
4. **Patients - Cumulative Effects**
 - via long term repetitive exposures - catheters, surgery and dialysis
 - Allergic reactions via eliciting hormone pathway/cascades

Is 0.25EU/ml for Endotoxins low enough?

Purifying Water for CSSDs

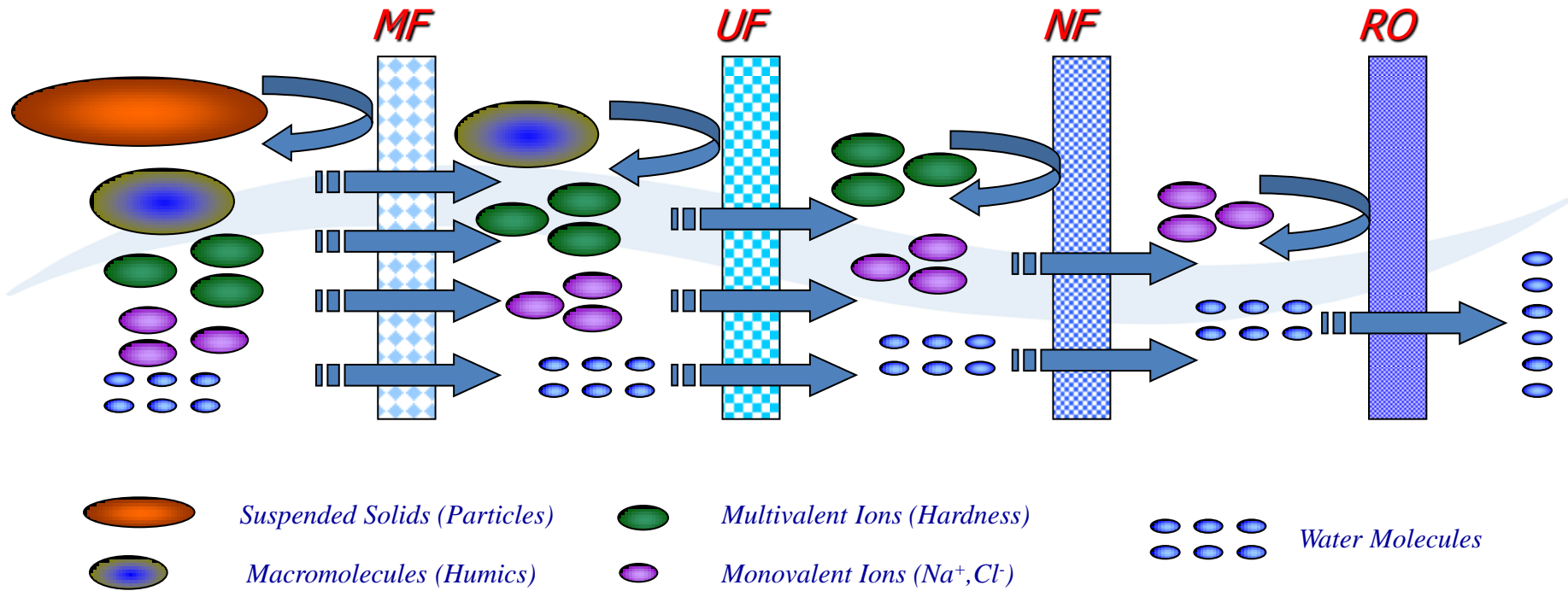
What is Reverse Osmosis (RO) ?

Are there downstream problems?

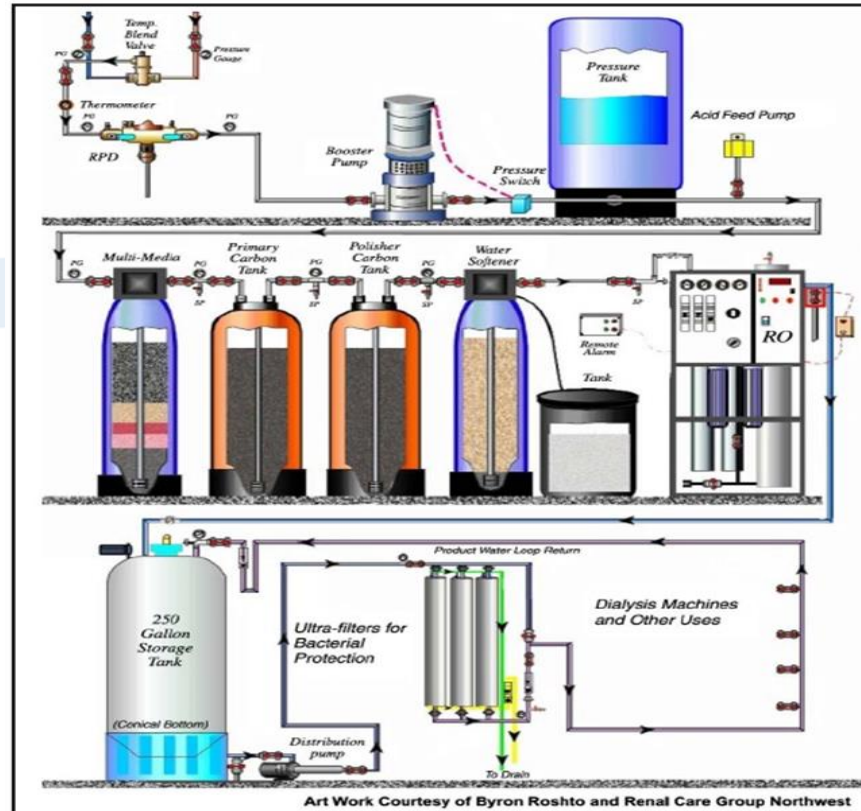
- Disinfection
- pH control
- Corrosion

How do we control these effects?

CSSD – Purified Water: A Size Exclusion Process



Water Treatment Plants Come in Many Configurations



RO plants also come in many configurations



RO plants also come in many configurations



Main components of a Getinge WPT:

1. Compact size
2. Softener
3. Salt reservoir
4. Prepack-particle & carbon filter
5. RO-filter
6. EDI (Option)
7. UV-light
8. Water Tank 300L
9. Pump RO
10. Control and power unit
11. Distribution pump

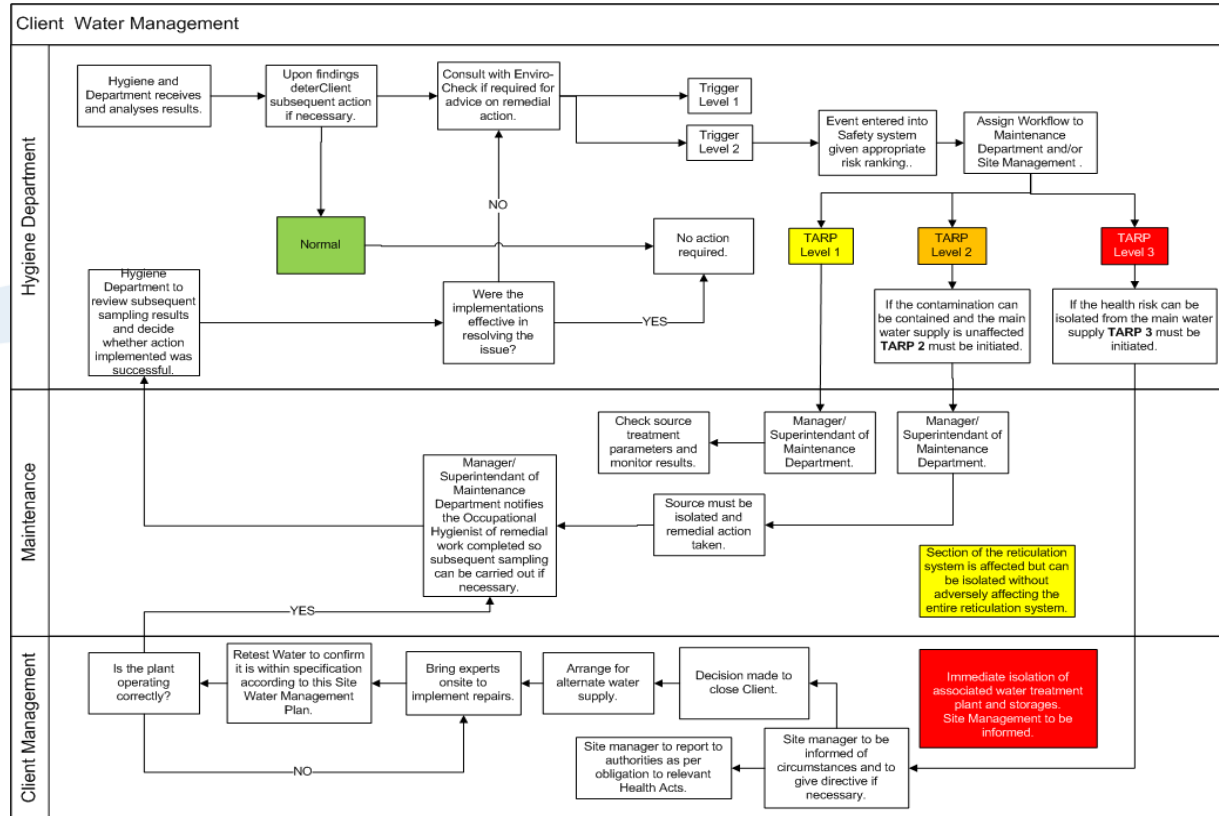
Water Quality Risk Management Plans (WQRMPs)

1. **Water Source**
2. **Manufacture, Supply and Storage**
3. **Use – fit for purpose / Standards**
4. **Maintenance**
5. **Quality controls – confidence and compliance**
6. **Water Quality Risk Management WQRMP – Plans**
7. **Communications, understanding, training**
8. **Monitoring – on site and externally**
9. **Reporting and a Chain of Command**
10. **Compliance**
11. **Controlled Responses – Trigger Action Response Plans**
12. **Collaboration of all stakeholders – (a water team – no silos)**

WQRMP: example, Legionella TARP

	Normal	Level 1 Low Probability of Health Impacts	Level 2 Moderate Probability of Health Impacts	Level 3 High Risk of Adverse Health Impacts
Trigger	Legionella not detected.	Legionella not detected.	Legionella detected but less than 1000cfu/ml.	Legionella detected and counts greater than 1000cfu/ml.
Criteria for downgrading alert	N/A	N/A	If two klklafgpoka gpo;lk ;l akr treatment.	If sd;fgls f;glkporep;fkl S;fk disinfection.
Monitoring	Monthly	Monthly	Monitor sdkljasj;la fojanna; noigokl mkl fgklmla vl;vaa;vln;ln ;lna;adfnl zc m;klm fo ; c;nkm c mzmlz jnfbosjsj l;lz xcklnz l lzz'l 'l l ko lz; z zmk z;mmlz 'lmz k'lm'dvsdkospioepwipweomamzkl'pzcj'lvmp]v ZZz	Monitor Monitor sdkljasj;la fojanna; noigokl mkl fgklmla vl;vaa;vln;ln ;lna;adfnl zc m;klm fo ; c;nkm c mzmlz jnfbosjsj l;lz xcklnz l lzz'l 'l l ko lz; z zmk z;mmlz 'lmz k'lm'dvsdkospioepwipweomamzkl'p
Actions	N/A	N/A	Investigate possibilities of Monitor sdkljasj;la fojanna; noigokl mkl fgklmla vl;vaa;vln;ln ;lna;adfnl zc m;klm fo ; c;nkm c mzmlz jnfbosjsj l;lz xcklnz l l (Appendix H & I). <ul style="list-style-type: none"> Consult with water treatment specialists. Conduct system drain and clean if heavily fouled with solids and scale. 	Prevent all Monitor sdkljasj;la fojanna; noigokl mkl fgklmla vl;vaa;vln;ln ;lna;adfnl zc m;klm fo ; c;nkm c mzmlz jnfbosjsj l;lz xcklnz l lzz'l 'l l ko lz; z zmk z;mmlz 'lmz k'lm'dvsdkospioepwipweomamzkl'pzcj'lvmp]v ZZzk Zk ;lMandatory
Notification	N/A	N/A	Infrastructure and Clsdka fjk afajmklavk'asd vsd;l'asd d';lkav';l kad;asdf lsd';lak; Notify all affected personnel.	General Manager. Infrastructure asdakld ;klfasd po;l;lkasd f Notify all affected personnel.

WQRMP: Chain of Command



Coming Together – No “I” Team

Many specialist areas must interact together:

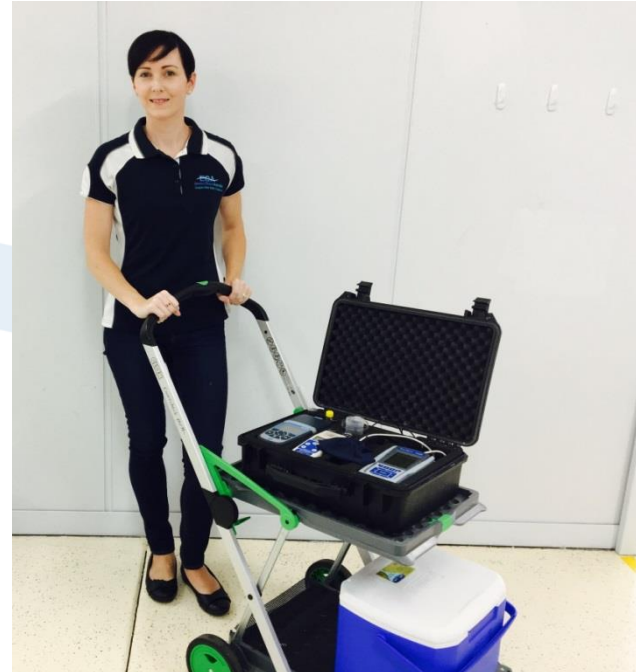
1. Water plant operations – Reticulated supply materials and storage
2. Disinfection control through the reticulated network?
3. Supply and demand – long retention times?
4. Detergents and cleaning aids to suite wash waters and enable rinsing without residue

Management of Water: coming together

Many specialist areas must interact together:

- 5. pH control of RO Waters?**
- 6. Monitoring schedules, reporting, defined responses**
- 7. Establishing CSSD procedures – routines**
- 8. Communications and Understanding**
- 9. Chain of Command, WQRMP and TARPs**
- 10. Criticality of a sample – artificial verses actual..**

Ensuring CSSD Water Quality Manufacture and Monitoring for QA



Monitoring and Sample Criticality

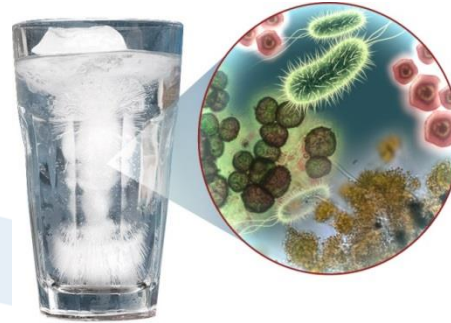
- sample points?



Understand Why, How and Where to sample?

Sample points - Endoscopes, RO, Final Rinse?

- **microbiological organisms**
or
- **physical/chemical parameters**



Ensuring the Connection, Goals and Understanding

BEYOND SIMPLY REPORTING OUR RESULTS

- **Water Quality Risk Management Plans (WQRMPs)**
- **Trigger Action Response Plans (TARPs)**
- **TRAINING – ECE empowers your staff through our Nationally accredited training (RTO#31366)**
- **NATA accredited laboratory and field analysis (#14542)**
- **AUDITS risk assessments for healthcare services, commercial, industrial, domestic cooling towers and evaporative air-coolers**

THE WINDOW IN TIME IS NOW

1. **Plan and budget** to achieve the **transition** to the requirements of ASNZS 4187
2. Understand water source type
3. Water Plant Operations
 - Skill, competency, monitoring
4. Reticulation System /Storages
5. NATA accredited analysis
 - Fit For Purpose



THE WINDOW IN TIME IS NOW

6. Interpretation/Understanding
7. System Development - WQRMP
8. Implementation/evolve/adapt
9. Sample, report, respond
10. Measured and Controlled responses
(TARPs) as per your WQRMPs
11. Communications, meetings
12. Training for staff
13. Establishment of your water team
14. **Enviro Check Enterprises brings this
consolidation of expertise to your team**



SIMPLICITY IS THE KEY BEHIND AN EFFECTIVE WQRMP



1. The Laboratory (NATA)

- **Fit for purpose / Targeted Analyses**
- **Sample collection and field analysis**

2. Ongoing Support Services

(a) Active Participants – A WATER TEAM

- **Workshops / Meetings / Training**

(b) Defined WQRMP and TARPs

(c) Accredited sample collection

(d) Broad Expertise in RO and WTP Ops

These provide the required confidence to CSSDs

THE POWER OF WATER - CONQUEST



ECE Facilitates Water Quality in Healthcare via Consolidation of Expertise



Thank you
**You are welcome to contact me directly or one of our laboratories
anytime**

Enviro-Check Enterprises locations

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Symbio Laboratories locations

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Contact Symbio Laboratories

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