Tamworth Water Recycling Pilot Plant

Advanced Water Recycling in Red Meat Processing

Presented by

Jacob Welch, Group Sustainability Manager

Jamie Hunt, Project Manager – Tamworth

SARDI R&D SOUTH AUSTRALIAN RESEARCH AND DEVELOPMENT INSTITUTE

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TEYS

Breaking the Barriers to Unlock Advanced Water Recycling in Red Meat Processing

- Opportunities
- Risks & Barriers
- Future Pathways

Why water efficiency and recycling is important?

- Water Scarcity
- Environnmental Responsibility
- Reducing operating costs

- 7.3 KL/t HSCW Red Meat – 22.5% down from 2010
  (AMPC 2025)
- 16% Recycled Water Use in Red Meat Processing
  (AMPC 2025)

Existing uses for Reuse and Recycled Water Stream

Approved Arrangements

- Cattle yards wash water and belly sprays
- Irrigation/watering gardens
- Wastewater belt press wash water
- Some rendering plant water
- Washing down external areas
- Steriliser & carcass hot wash water **reused** immediately for same use
- **Refrigeration condenser – This pilot trial**
- **Steam Systems – If not contacting meat**


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mla
MEAT & LIVESTOCK AUSTRALIA
HAZCHEM
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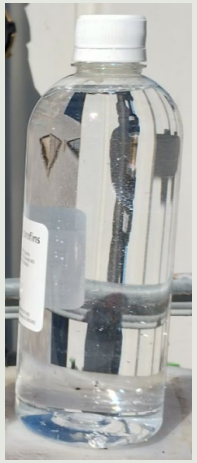
AMPC Pilot Recycled Water System – Process Flow

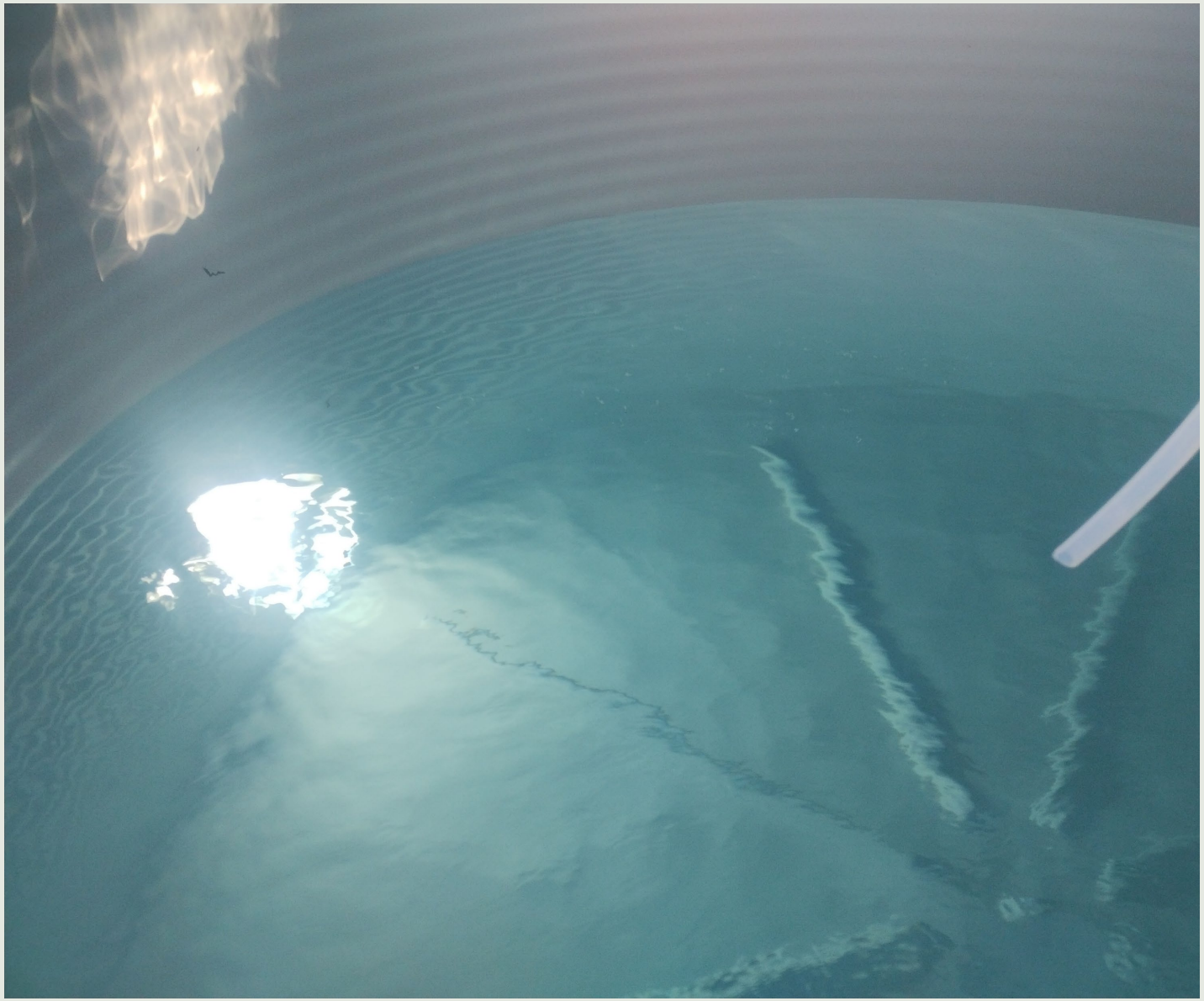
Multimedia Filter
- >90% TSS removal
- ~1mg/L TSS

Ultra-Filtration
- 0.04 micron
- <0.1 NTU
- <1 CFU/100mL

Reverse Osmosis
- Removal of TDS, virus, protozoa
- 50-70% recovery
- <100 us/cm



Recycled Water Plant Output

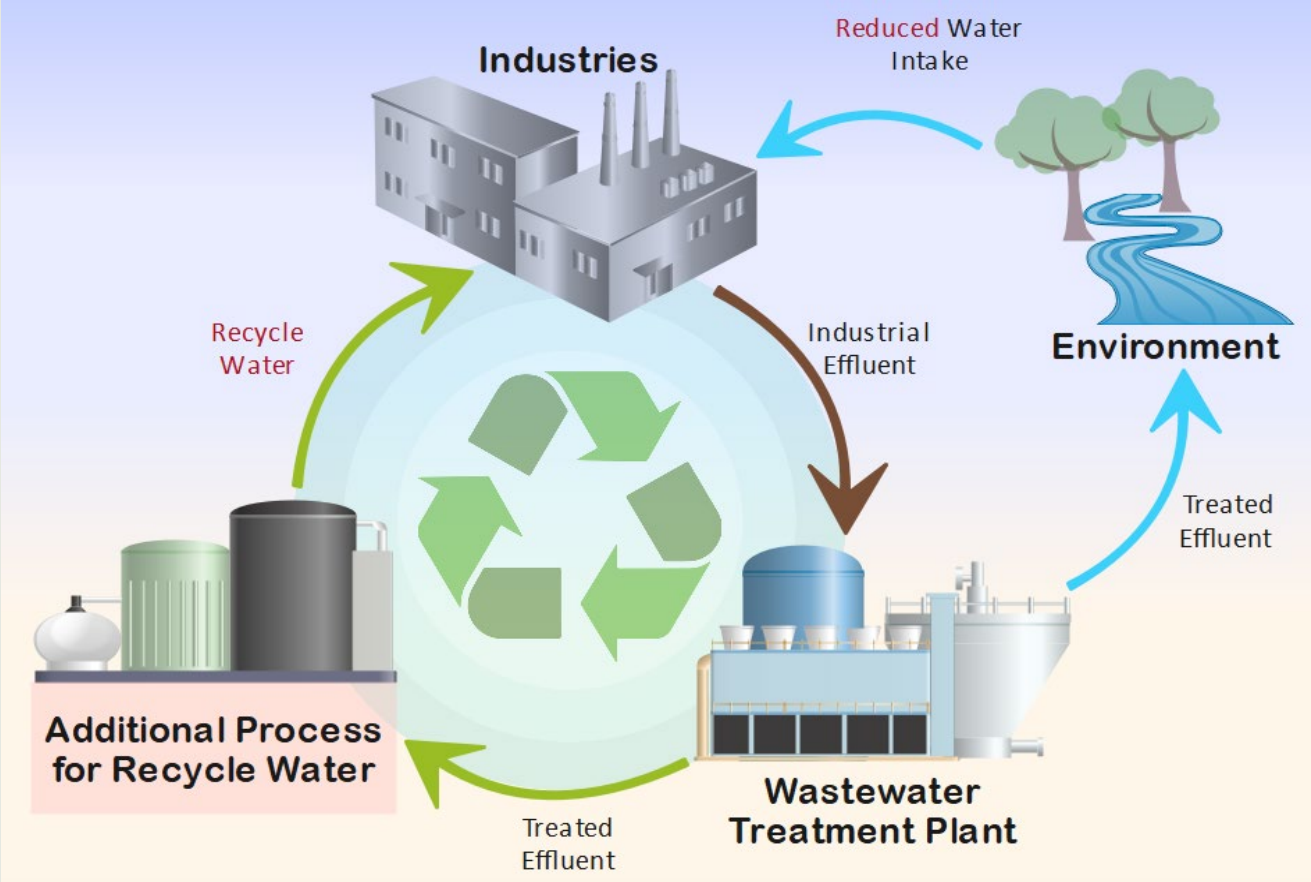


Date	Feed *E. coli*	UF *E. coli*	RO *E. coli*	UF Turbidity	RO Conductivity
	CFU/100mL			NTU	mS/cm
31/10/2023	1,000	<1	<1	<0.1	0.08
2/11/2023	910	<1	<1	<0.1	0.11
6/11/2023	3,800	<1	<1	<0.1	0.11
8/11/2023	3400	<1	<1	<0.1	0.16
13/11/2023	780	<1	<1	<0.1	0.12
15/11/2023	700	<1	<1	<0.1	0.12
20/11/2023	1,000	<1	<1	<0.1	0.11
22/11/2023	2,600	<1	<1	<0.1	0.161
27/11/2023	1,000	<1	<1	<0.1	0.07
30/11/2023	3,000	<1	<1	<0.1	0.08
4/12/2023	1,200	<1	<1	<0.1	0.08
19/02/2023	2000	<1	<1	<0.1	0.09

Pilot Trial – Phase I

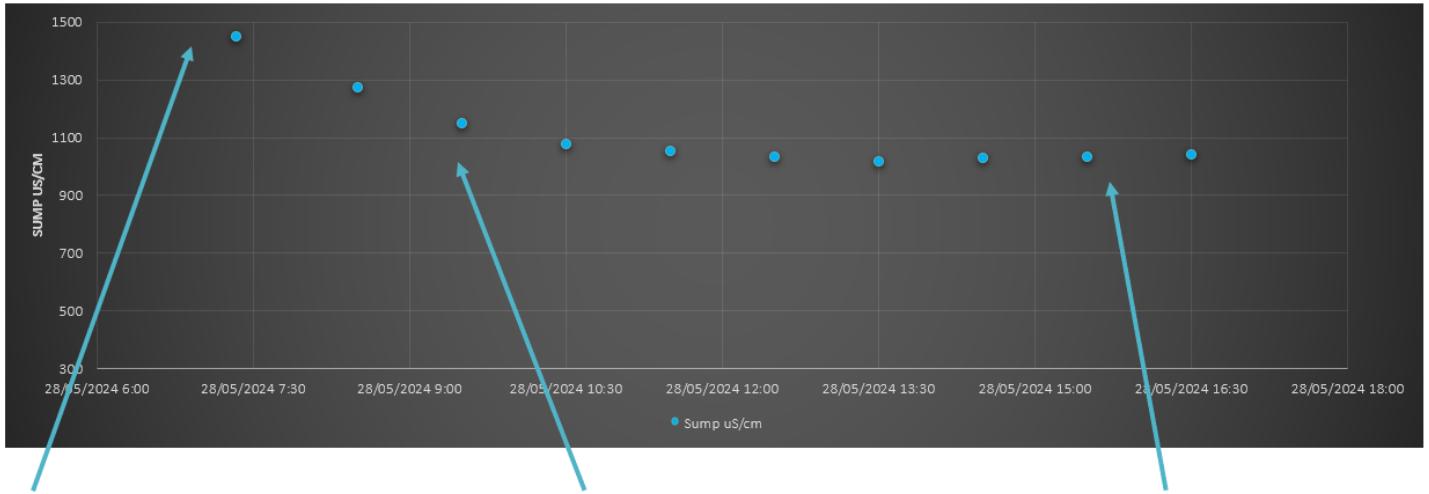
Refrigeration Condenser

- Water treatment verification
  - Raw water analysis
  - UF & RO efficacy
  - Microbial analysis
- HACCP developed
  - Hazards identified
  - CCP identified
  - Chlorination added as treatment step
- Approved arrangement with DAFF
  - SOP developed and approved



Refrigeration Condenser Trial

- Directed Recycled Water to Teys Tamworth Condenser 3 – supplying 100% of requirements for 9 hours
- Sufficient engineering controls to prevent backflow into intra-plant potable network
- Using E.coli as indicator, for pond counts ranging from 700 – 3,800 CFU/100mL, UF and RO filtrate always <1 CFU/100mL. Added chlorine dosing as a further CCP to reach target LRV



Up to this point, running on town water, normalised around bleed off setpoint of 1,500 us/cm

Within first few hours, differences in specific conductivity led to drop in blended sump conductivity

After new steady state ~1,100 us/cm started to trend back slowly to bleed set point

Pilot trial - Phase II

Fit for purpose? - The proof; Log Reduction Value (LRV)

Log reduction	% Removal
1	90
2	99
3	99.9
4	99.99
5	99.999
6	99.9999

Treatment Technology	*Indicative LRV*		
	Protozoa	***Virus***	***bacteria***
Primary Treatment	0-0.5	0-0.1	0.0.5
Secondary Treatment with aeration	0.5-2.0	0.5-2.0	1.0-3.0
Dual media filtration with coagulation	1.4-4.0	1.2-4.0	1.0-3.4
Lagoon Storage	1.0-3.5	1.0-4.0	1.0-5.0
Membrane Filtration (UF)	4.0	2.5-4.0	3.5-4.0
Reverse osmosis (RO)	1-4.0	1-4.0	1-4.0
Chlorination	0–0.5	1.0-4.0	2.0–4.0
Ozonation	n/a	3.0–4.0	2.0-4.0
UV Disinfection	3.0-4.0	1.0-4.0	2.0-4.0

Pilot trial - Phase II

Fit for purpose?

- Boiler feedwater – Quashed
- Upgrade pilot plant capacity to 150kL/day
- Increase pilot plant reliability, automation.
- New approach - Fit for purpose
  - Advanced treatment technologies can produce better quality water than potable
  - Using water inside the processing plant – processing water standard?
  - Processing floor cleaning water

Pond water, UF backwash, UF filtrate, RO retentate, and RO filtrate.

Pilot trial - Phase II

Fit for purpose? - The proof; DALY

Hierarchy of Water Management

Challenges

- Food safety & Public health
- Regulatory compliance
- Perception and market access
- Operational complexity & Scalability
- Infrastructure & Cost

Opportunities

- Sustainabiility
- Water security
- Cost savings*
- Fit for Purpose - Processing Water Standard?
- Capability Building

Jacob Welch
Group Sustainability Manager
e: jacobw@teysaust.com.au

Jamie Hunt
Project Manager - Tamworth
e: jamiehu@teysaust.com.au

Teys Australia Pty Ltd
ABN: 38 009 872 600

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