Recovered Water Management Solution Working Group

21 November 2025

Capital Delivery Team
Performance & Innovation

ROTORUA LAKES COUNCIL

Welcome

Welcome and Karakia

Agenda

- Presentation by Jason Ewert: Wastewater Treatment Plant Upgrade
- Presentation by Grant Northcott: Emerging Organic Contaminants
- Terms of Reference

Rotorua Wastewater Treatment Plant

Jason Ewert – Great Lake Consulting

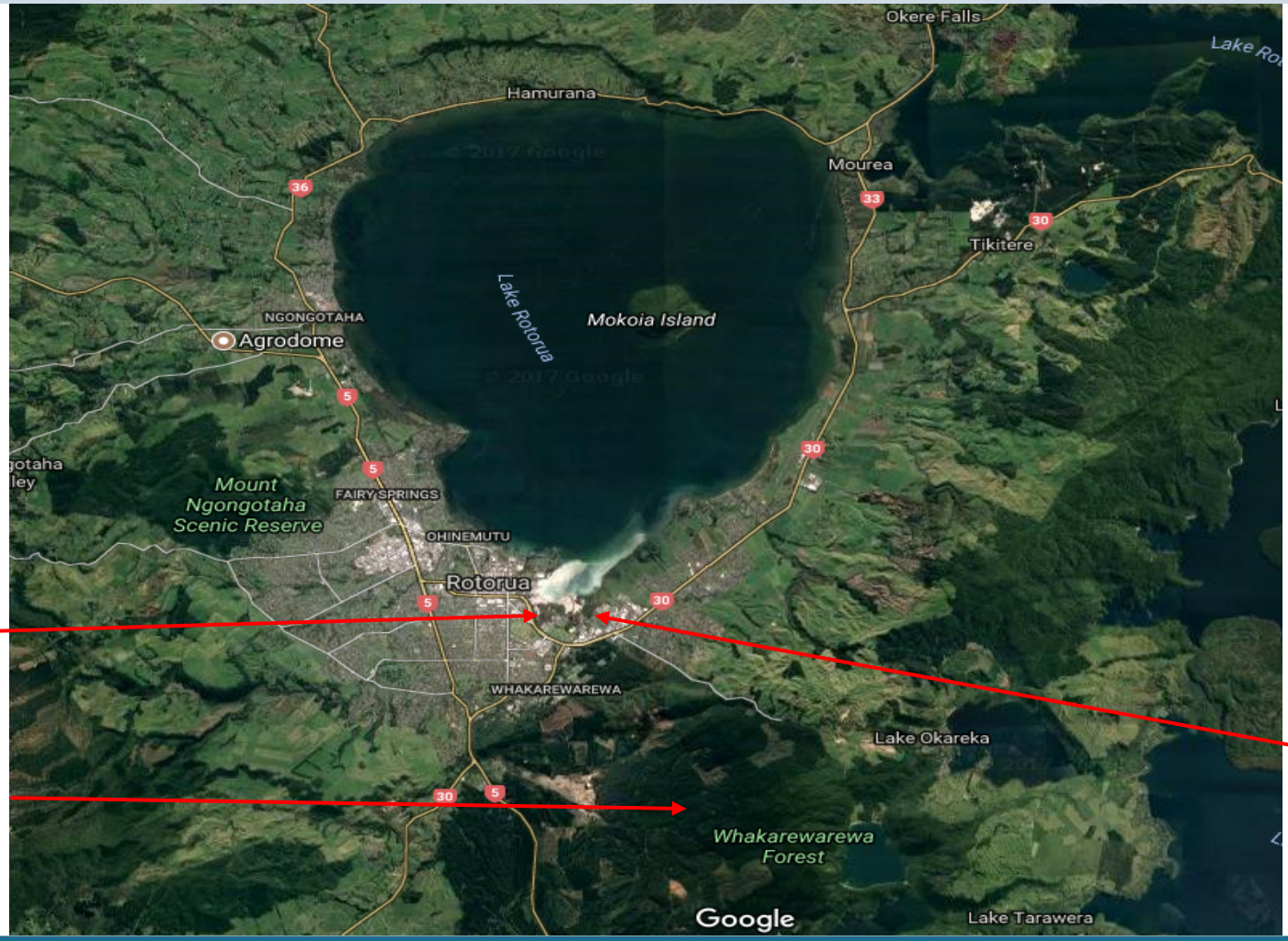
Agenda

- Background
- Existing WWTP Configuration
- WWTP Influent Characteristics
- WWTP Upgrade Design Objectives
- WWTP Upgrade Configuration
- Fate of Nutrients
- Further Potential Treatment/Upgrades
- Comparison to Limits of Technology
- Comparable Facilities in New Zealand
- Questions

Background

- Rotorua's Wastewater Treatment Plant (WWTP) treats most the districts wastewater
- Land Treatment System (LTS) at Whakarewarewa Forest currently takes all treated water
- The WWTP is currently being upgraded with state-of-the-art treatment designed to achieve close to the limits of technology for nutrient removal, plus double barrier disinfection and a significant capacity increase
- Design criteria for upgrade was for (direct) discharge to Lake Rotorua – design criteria has not changed
- RLC exploring options for beneficial re-use of recovered water

Background



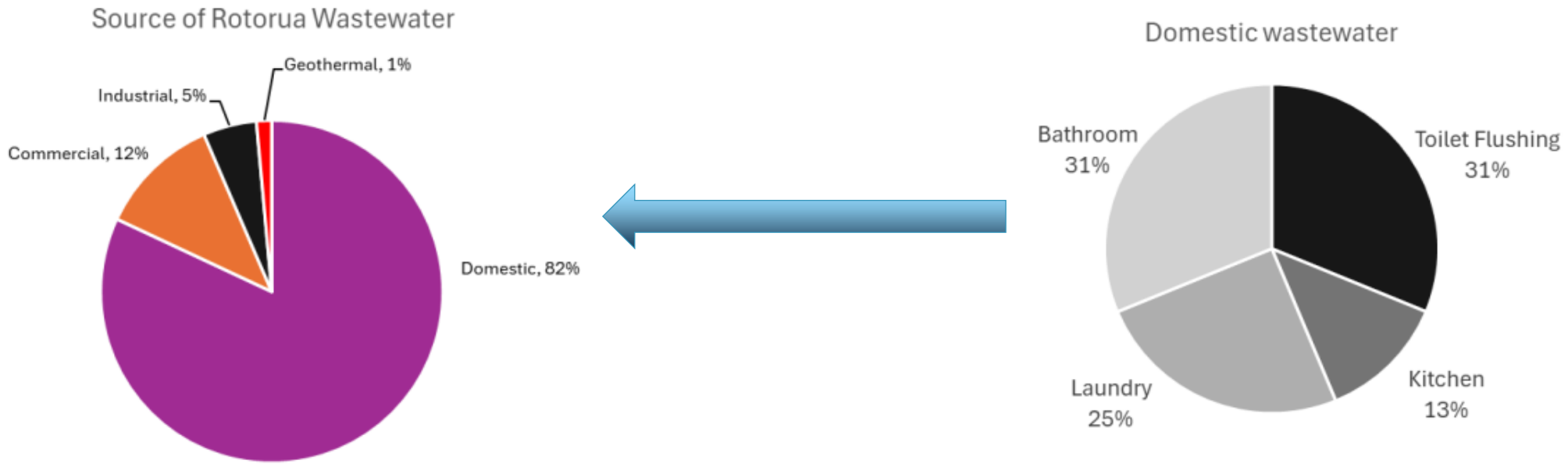
Rotorua WWTP

Land Treatment System

Lake Tarawera and Lake Okareka wastewater conveyed to Rotorua WWTP

What is in Rotorua Wastewater?

- Mostly water, with a small quantity of predominantly organic waste



Influent Characteristics

Measured by
VSS, BOD and COD

Influent Characteristics

Inorganic Solids
(e.g. sand/grit/plastic)
Not biodegradable

SUSPENDED SOLIDS

Organic Solids
Biodegradable

Measured by
TSS

Influent Characteristics

Inorganic Solids
(e.g. sand/grit/plastic)
Not biodegradable

INORGANICS

Salts and Metals

Influent Characteristics

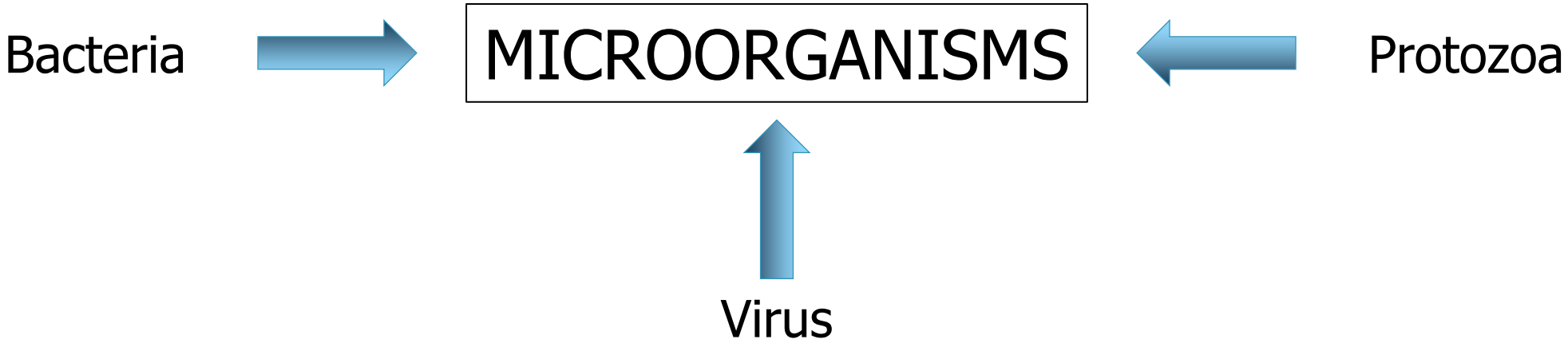
- Nutrients from human waste and food production

Organic Nitrogen and Ammonia - measured as TKN and NH_4-N

Measured as Total Phosphorus and DRP

Influent Characteristics

- Pathogens (from human waste)
- Many are harmless but others are disease causing
- Level of removal required depends on the fate of recovered water and potential infection pathways



Influent Characteristics

- Micropollutants

Influent Characteristics

- Industrial and Trade Waste
- Controlled by Trade waste Bylaw and Trade waste Consents
- Potential to impact biological treatment performance and biosolids (re-use options)

COD
Suspended Solids
Metals
Chemicals
Nutrients

Existing WWTP

WWTP Upgrade - Design Objectives

100% Containment and treatment of reasonably foreseeable influent flows	• Repurposing of existing tanks for peak flow storage • Can currently treat 44 MLD peak flow • After upgrade will treat 72 MLD peak flow
Recovered water to comprise of no more than:	• 30 Tonne per year of nitrogen (N) • 3 Tonne per year of phosphorus (P)
Double barrier to pathogens comprising of:	• Membrane ultrafiltration (physical barrier to pathogens) • Nominal pore size ≤0.04 µm; plus • UV Disinfection ≥ 35 mWs/cm² delivered for 99% of the time • Overall 7 log reduction in bacteria and 5 log reduction in virus

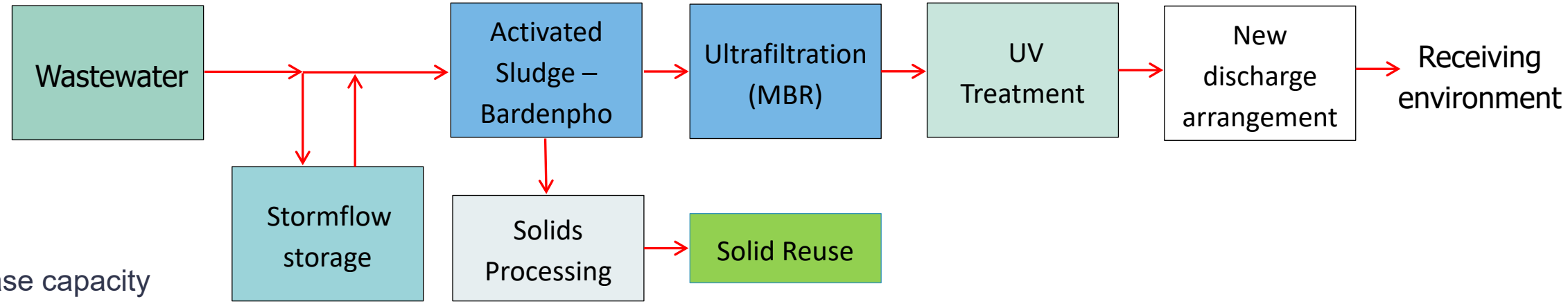
WWTP Upgrade

- Upgrade design based on:
  - New inlet works
  - Bypass of redundant primary tanks
  - Convert secondary clarifiers to storm flow storage tanks
  - Modifications to 5 stage Bardenpho reactor (increase capacity)
  - Decommission MBR1
  - New membrane (MBR) tanks – Ultrafiltration (UF)
  - Double barrier for disinfection – UV following UF

- Dewater biosolids and remove from site (as existing)

WWTP Upgrade - Summary

**First and foremost improve the mauri,
and make the water as clean as possible,
before it is returned to the environment**



- Increase capacity
- Stormflow storage/balancing
- Nitrogen and Phosphorous removal
- Full membrane filtration
- UV treatment

WWTP Upgrade

	Existing Treatment Plant	Upgraded Treatment Plant
Volume Treated	20 ML per day average	25.3 ML per day average
Stormflows	44 ML per day peak	72 ML per day peak
Treatment	Screening, grit removal, primary sedimentation, activated sludge, ethanol dosing, secondary clarification	Screening, grit removal, activated sludge, alum dosing, membrane filtration, UV disinfection
Water recovery	1/3 ultrafiltered (MBR) 2/3 secondary clarifiers	100% ultrafiltered (MBR)
Disinfection	1/3 membrane ultrafiltered 2/3 no disinfection	100% membrane ultrafiltered 100% UV disinfection
Return to receiving environment	Discharge to Whakarewarewa Forest Returns to Lake Rotorua via Puarenga Stream	Discharge TBC Returns to Lake Rotorua TBC

Upgraded WWTP

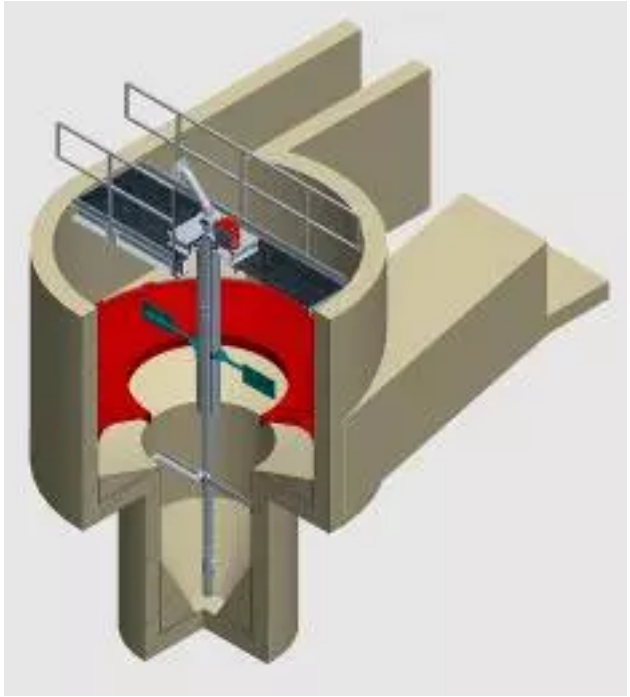
Treatment Process

Coarse Screening

Large material removed through a 6mm bar screens

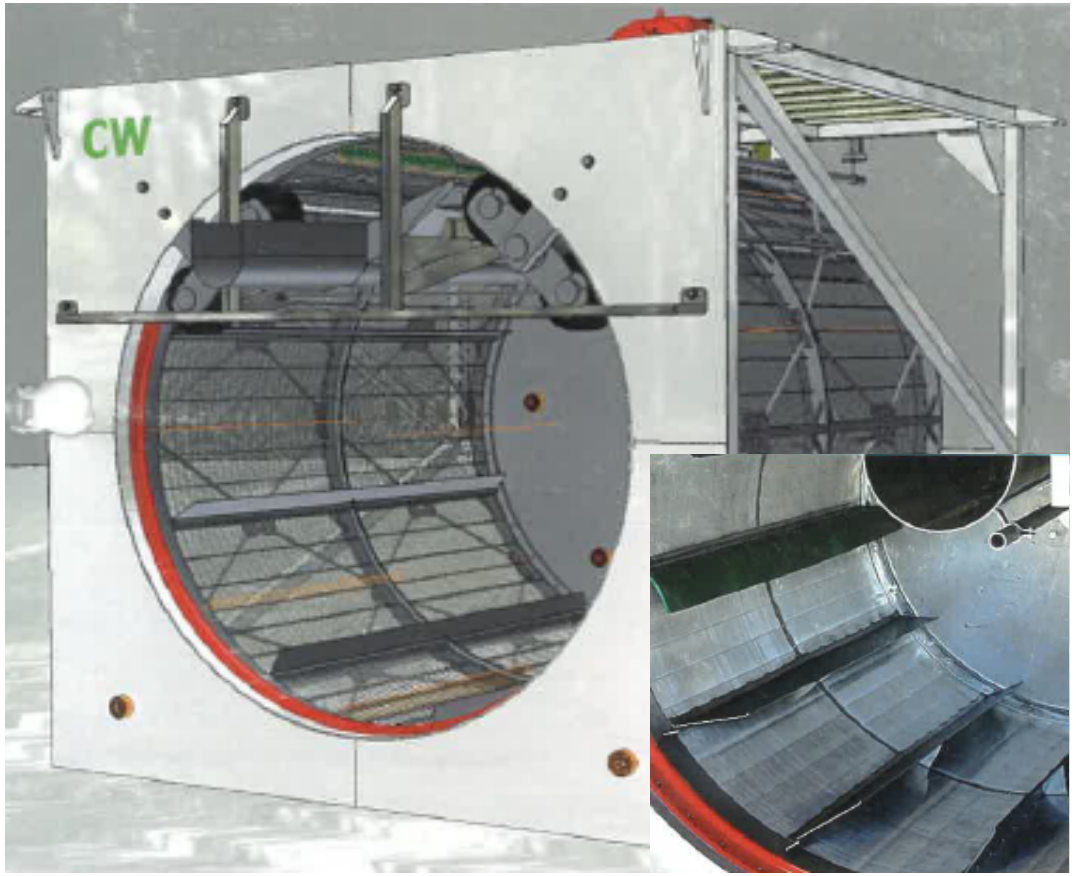
Followed by

grit removal



Followed by **Fine Screening**

Finer material removed through 2mm drum screens

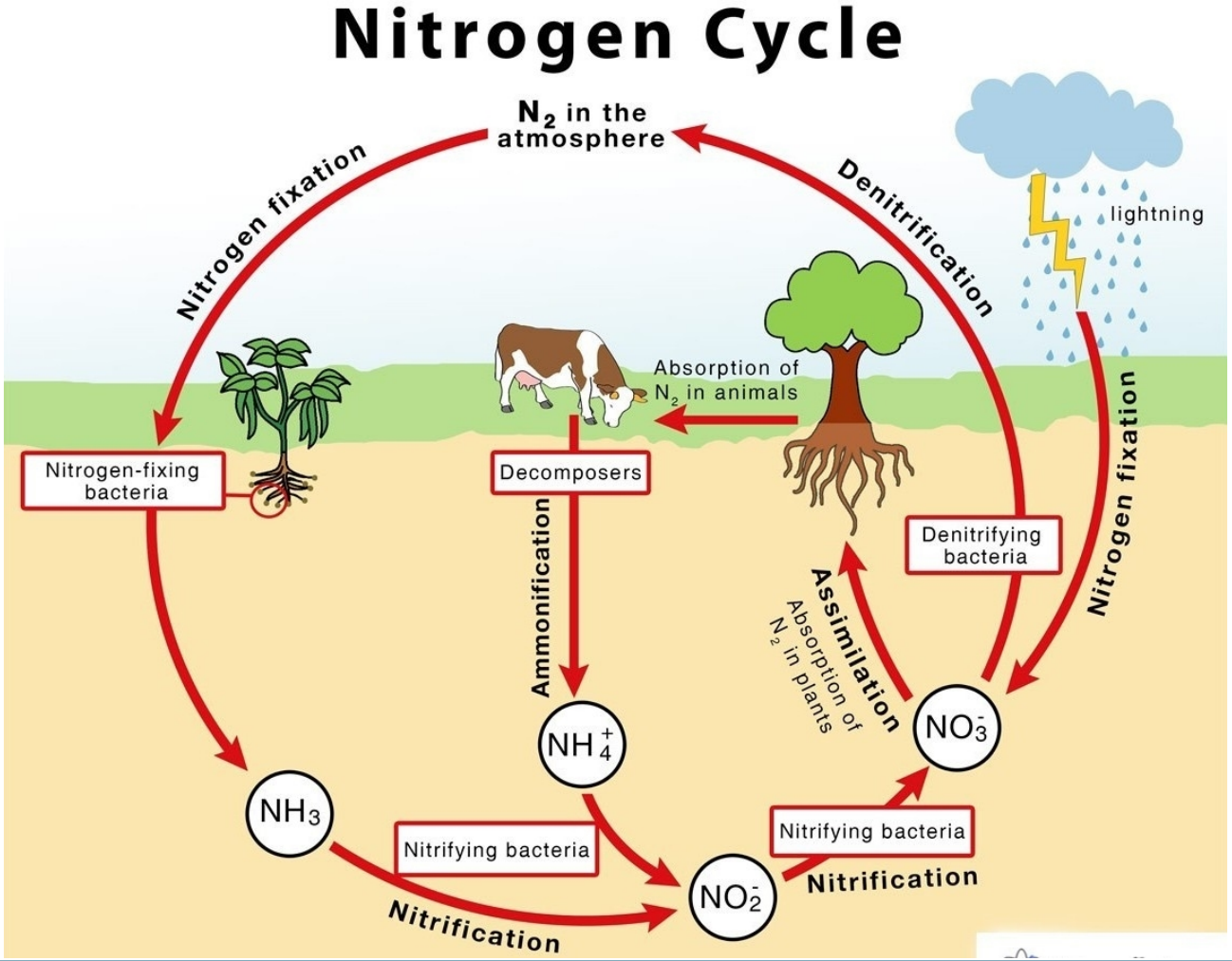


Treatment Process - Bardenpho

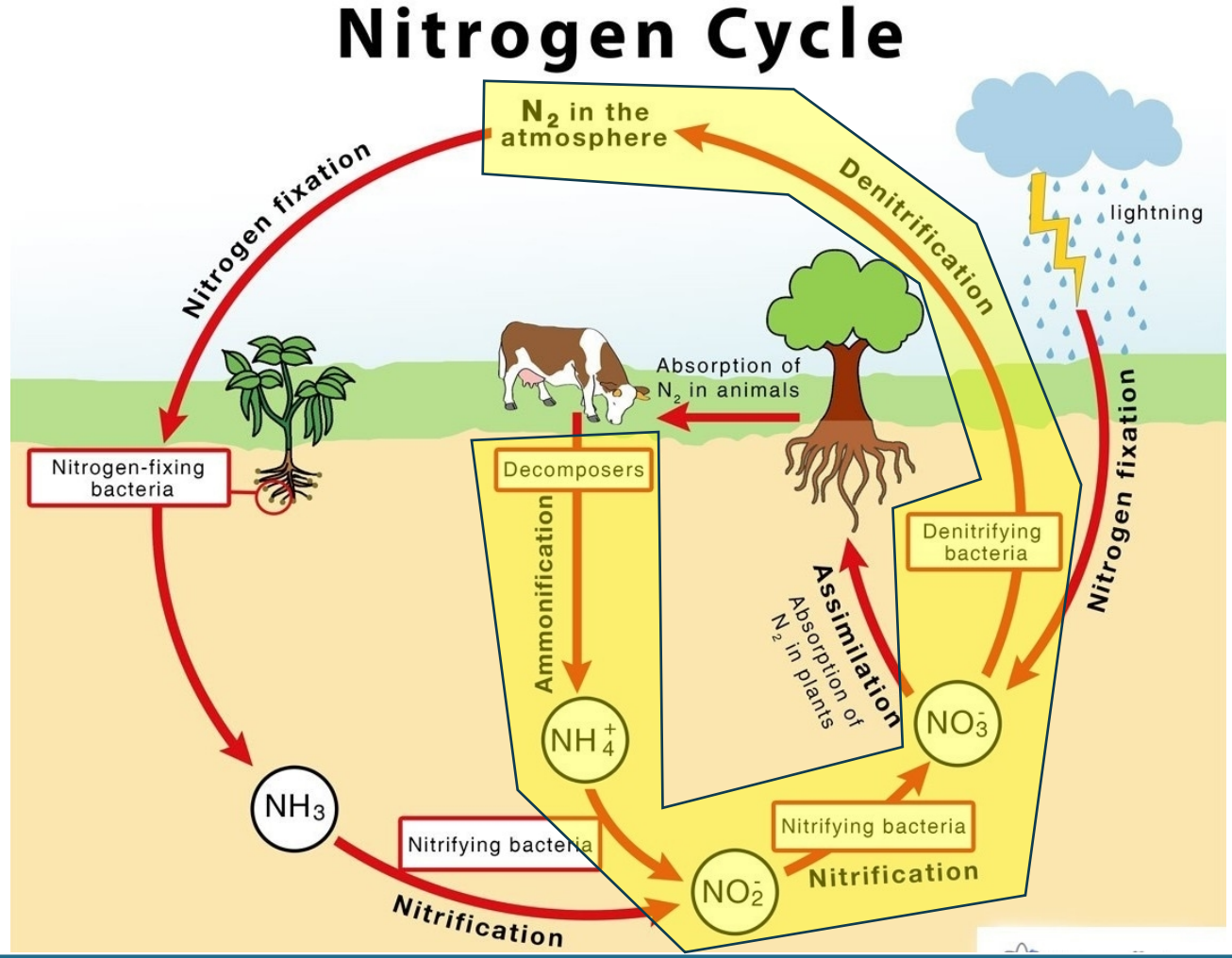
Activated Sludge Process

- Biological treatment using microorganisms
- Enhances and intensifies natural biological processes (that occur in the environment) to break down organic wastes in a contained and controlled tank
- Breaks down organic matter and nutrients and converts it into biomass, carbon dioxide, nitrogen gas and water.
- The biomass generated is removed as biosolids for processing (worm farm)
- Some alum is added to improve P removal

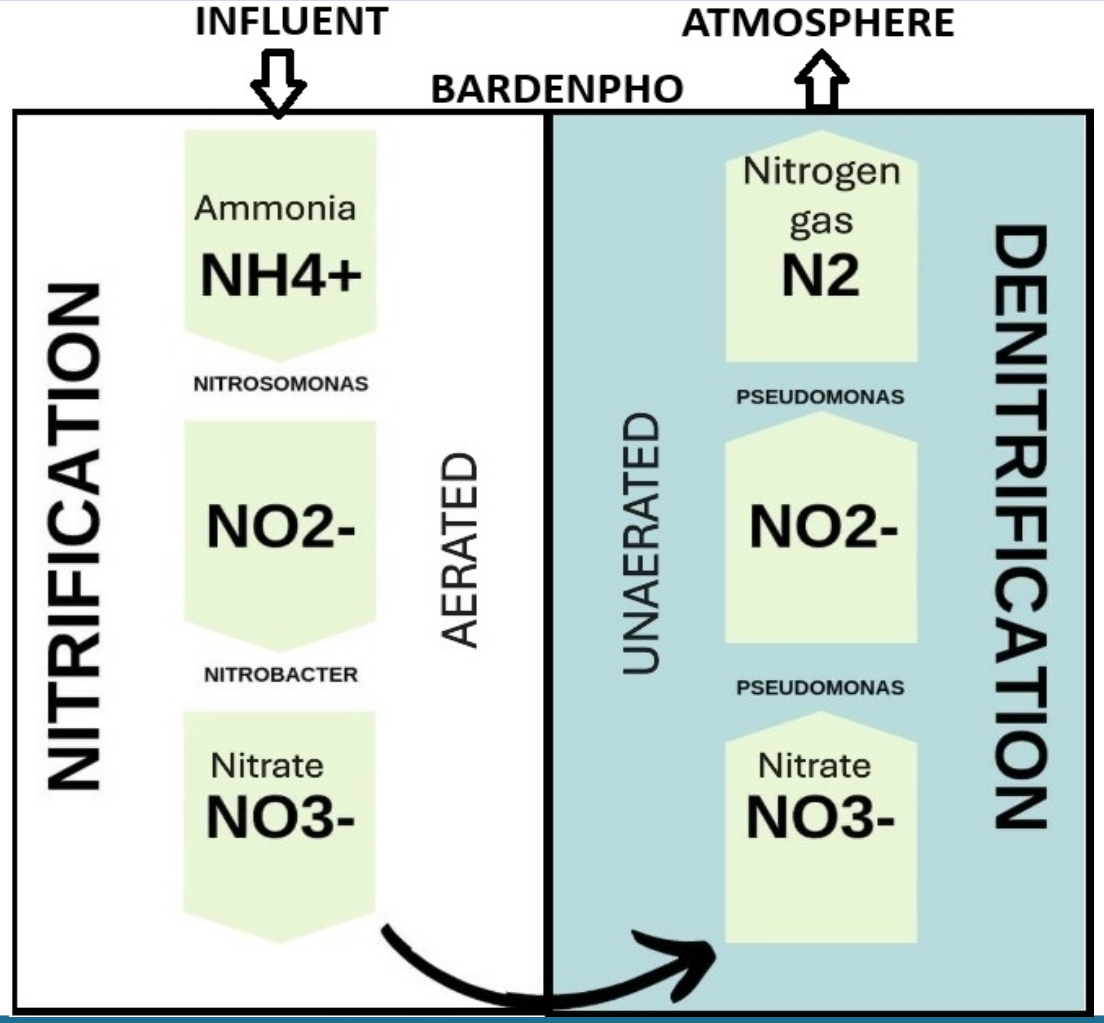
Treatment Process - Bardenpho



Treatment Process - Bardenpho



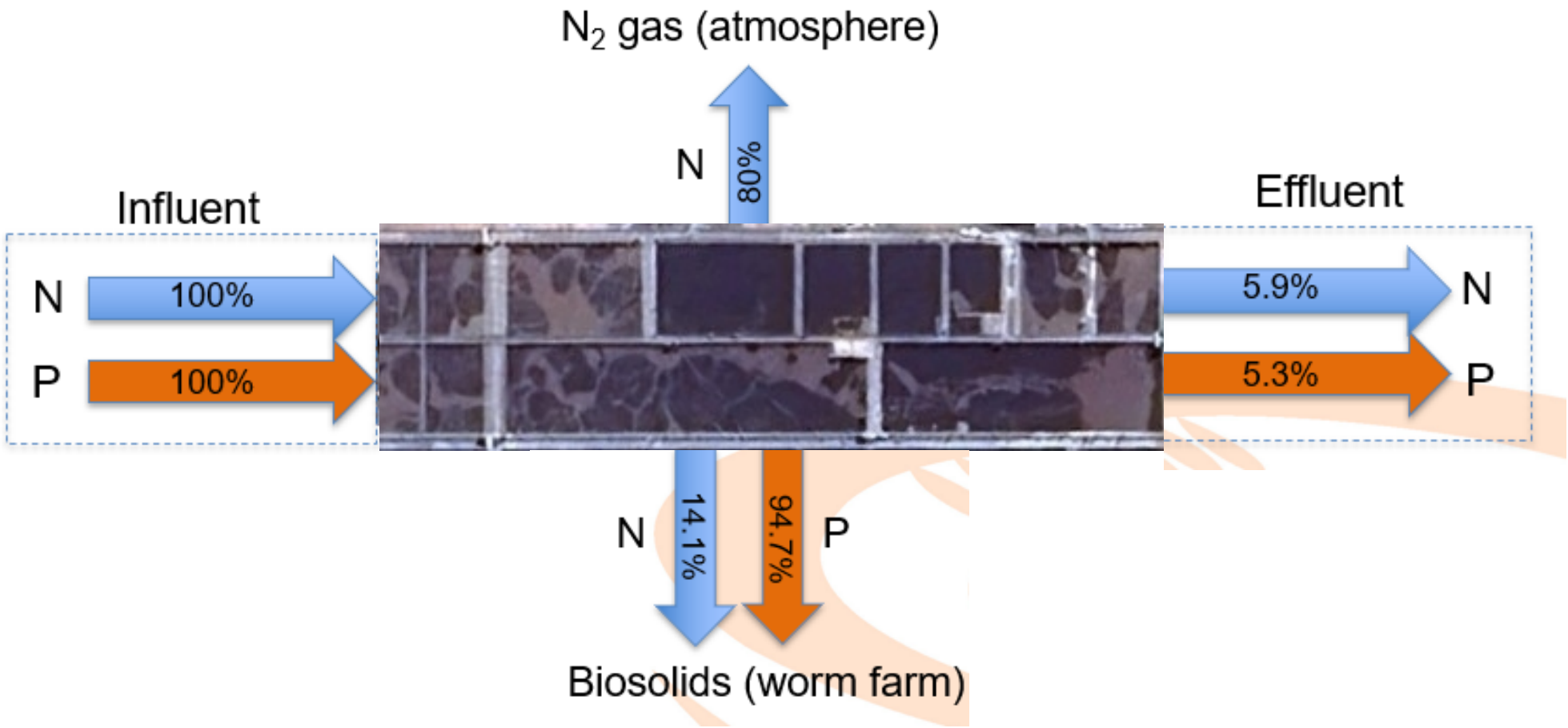
Treatment Process - Bardenpho



Treatment – Fate of Nutrients

- Two mechanisms of phosphorus removal:
  - Enhanced biological phosphorus removal
  - Chemical dosing (alum)
  - Phosphorus is removed in the biosolids
- Nitrification and denitrification is the main method of nitrogen removal
  - Most nitrogen converted to nitrogen gas (atmosphere)
  - Some nitrogen removed in biosolids
- Fine filtration (membranes) is essential to remove particulate N and P
- Rotorua WWTP will achieve close to limits of technology for N and P removal:
  - 94.1% N removal
  - 94.7% P removal
- 100% removal is not achievable

Treatment - Fate of Nutrients



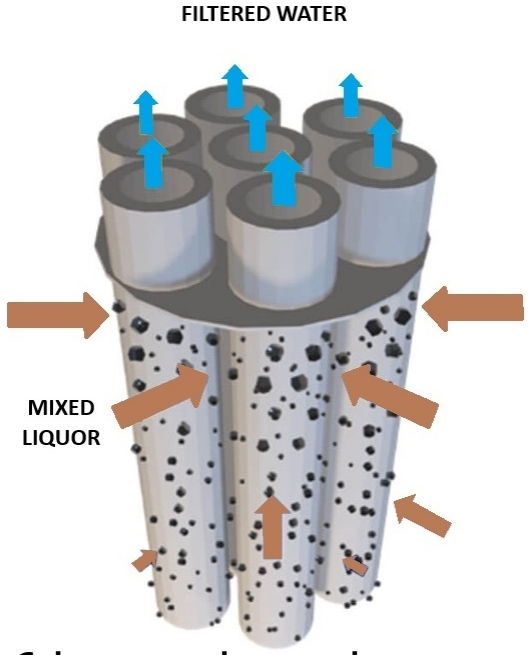
Fate of Nutrients - Current

Fate of Nutrients – Future (2050)

Treatment – Filtration and Disinfection

MBR

After biological treatment, the water passes through ultra-filtration membranes.



6 lumen shown here

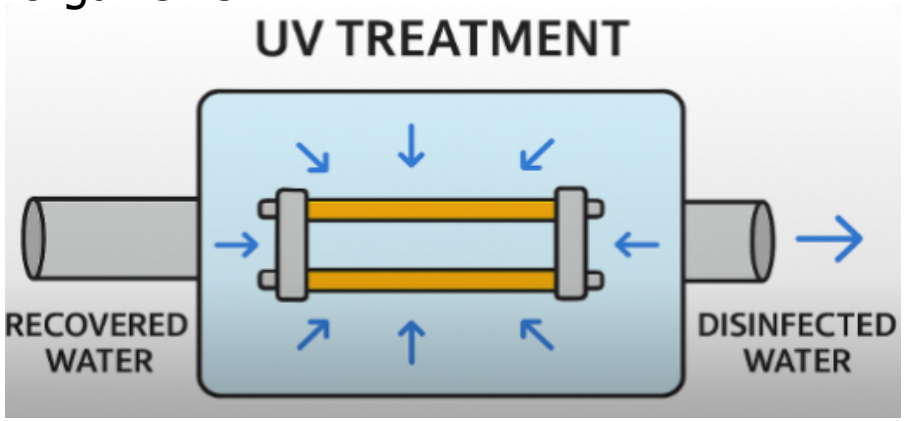
14.6 million lumen in the new plant

UV

Ultraviolet light damages the DNA of any microorganisms that get through the membranes so they can't reproduce.

It provides a second disinfection barrier without using chemicals

Effective against chlorine-resistant organisms.



Recovered Water

Comparison to 'Limit of Technology'

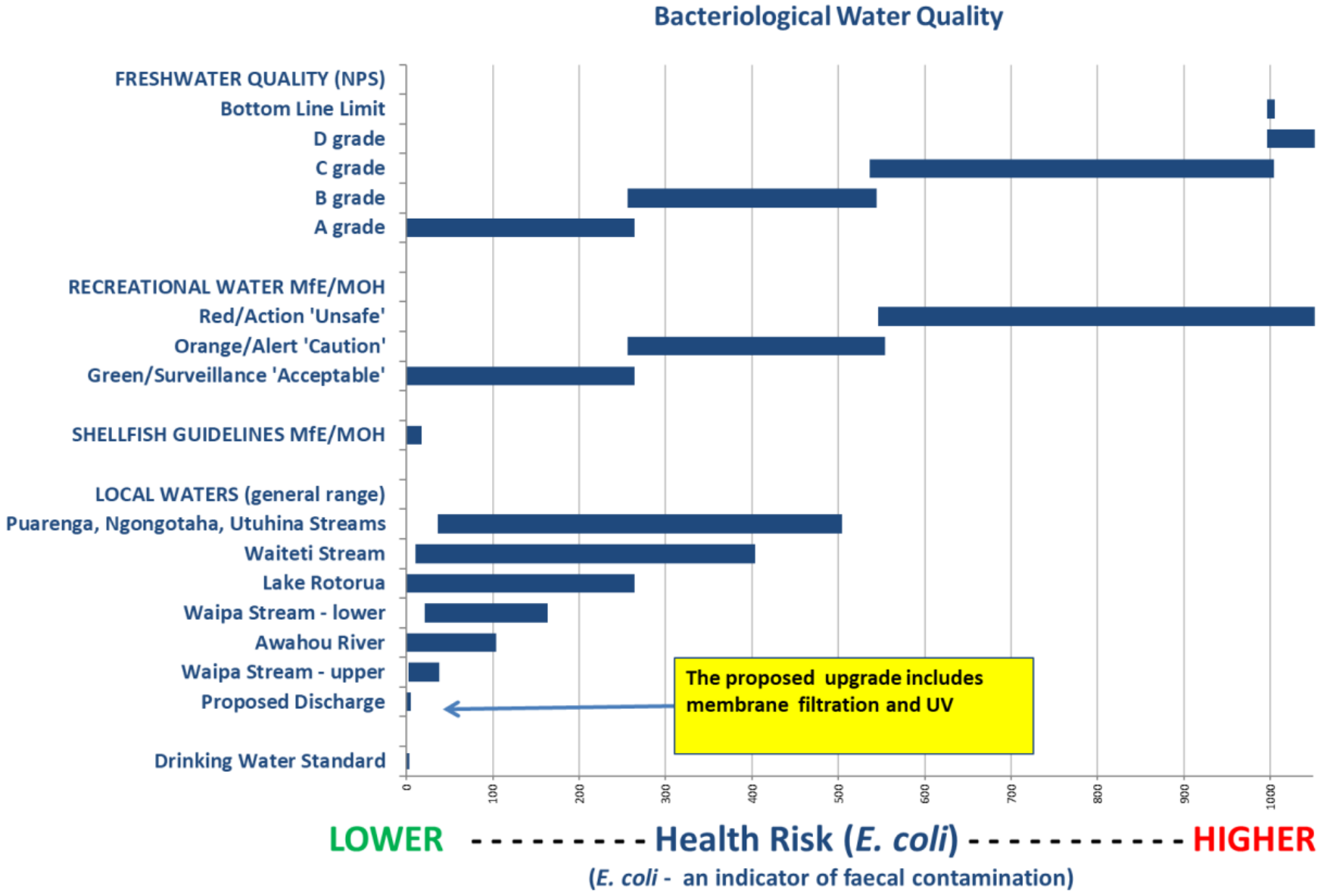
- 'Limit of Technology' (LOT) for nutrient removal is loosely defined as plants meeting:
  - 3mg/L TN and;
  - 0.1mg/ T TP
- The design objectives are for the annual mass of N and P in the recovered water to not exceed the WWTP allocation as part of the lakes protection programme
- To achieve the design objectives Rotorua WWTP must achieve:
  - ≤ 3.24 mg/L TN and;
  - ≤ 0.32 mg/L TP
- Hence, the Rotorua WWTP Upgrade will be approaching the 'Limit of Technology' for nutrient removal

What's in the Recovered Water?

Water Quality Concentrations (Averages)								Draft National Performance Standards	
Parameter	Measure	Raw sewage	Current discharge	Future discharge	Future discharge Reduction (%)			Lakes & Wetlands	Streams (low dilution)
TSS g/m^3	median	340	11	<1	99.7%			15	10
Total N g/m^3	median	55	6	3.24	94%			10	5
Total P g/m^3	median	6	3	0.32	95%			3	1
$cBOD_5$ mg/L O_2	median	220	5.5	2	99%			15	10
E.coli (cfu/100mL)	90%ile	15,000,000	10,000	<1	99.99999%			6,500	1,300
Ammoniacal-N g/m^3	90%ile	38	1	1	97%			3	1

Recovered Water

- Microorganisms



Recovered Water Quality

- Microorganisms

- RLC's aim is to produce a recovered water that could:
  1. Theoretically be used directly (i.e. without dilution) for contact recreational purposes such as swimming; and
  2. Meet the "unrestricted reuse" standard in relevant international guidelines*
- MBR alone provides sufficient bacteria and virus removal in the recovered water for primary contact recreation (aim 1)
- MBR plus UV provides sufficient bacteria and virus removal in the recovered water for unrestricted re-use (aim 2)

**Unrestricted reuse does not extend to use as a potable water supply. International guidelines were used as there was not a NZ guideline that specifies unrestricted reuse quality for virus*

Comparable Facilities

- Cambridge WWTP (under construction)
  - 4 Stage Bardenpho
  - Chem P removal
  - UF Membranes + UV
  - Direct Discharge to Waikato River
- Paeroa WWTP (under construction)
  - 5 Stage Bardenpho
  - BioP and Chem P removal
  - UF Membranes
  - Direct Discharge to Waihou River
- Kinloch WWTP
  - Bespoke design bioreactor, UF Membranes, “LOT” for N removal
  - Golf course subsurface drip irrigation close to Lake Taupō

Comparable Facilities

- TeKauwhata WWTP
  - Hybrid MABR
  - UF MBR
- Wellsford WWTP (under construction)
  - Hybrid MABR
  - UF MBR
  - UF Membranes
  - UV Disinfection
  - Direct Discharge to Hōteo River
- Snells Beach WWTP
  - 5 Stage Bardenpho
  - UF Membranes + UV
  - Discharge to Hauraki Gulf

Pātai?

Pātai?

THE EMERGING ORGANIC CONTAMINANTS CONUNDRUM- WHAT'S IN WASTEWATER AND WHAT'S THE RISK?

Dr Grant Northcott
Northcott Research Consultants Limited

Emerging Organic Chemicals (EOC)

Any synthetic or naturally occurring chemical that is not commonly monitored in the environment but has the potential to enter the environment and cause known or suspected adverse ecological and(or) human health effects

Emerging represents a move in focus from persistent organic pollutants (POPs) to bioactive anthropogenic chemicals

Contaminants of emerging concern (CECs) include microbial pathogens, microplastics, nanoparticles

The Chemical World

- >204M unique chemicals in the Chemical Abstract Service (identified by CAS number)
- >350,000 are commercially available
- All are considered potential contaminants
- Derived from industrial, urban, domestic and agricultural sources

The Chemical World

Environmental and health concerns

- Toxicity, mutagenicity, carcinogenicity
- Endocrine disruption, reproductive & developmental toxicity
- Antimicrobial/antibiotic resistance
- Unknown and unintended consequences- microplastics
- Unlike agrichemicals most EOCs have not been rigorously characterised for environmental impact or transformation to other chemicals

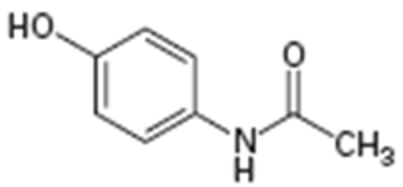
What Do We Know About EOCs In NZ?

- WWTPs and urbanised catchments are the largest source of PPCPs/per-halogenated EOCs into NZs environment
- Concentration of EOCs in WWTP influent and effluent is similar or greater than other western countries
- EOCs accumulate and persist in receiving environments
- EOCs have been detected in groundwater
- Dairy farming is the largest source of EDCs released into NZs environment, WWTPS are the next largest

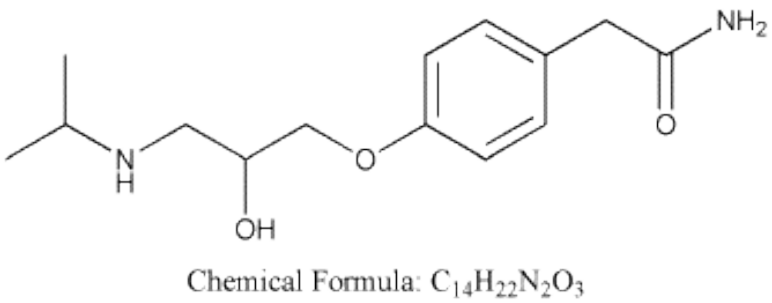
Target EOCs

- Phenolic antimicrobials
- Parabens
- Alkylphenols
- Insect repellents
- NSAIDs
- Plasticisers and phthalates
- UV filters
- Steroid hormones
- Alkylphosphate flame retardants
- Musk fragrances
- Benzotriazole and thiazole corrosion inhibitors
- Artificial sweeteners
- Antibiotics

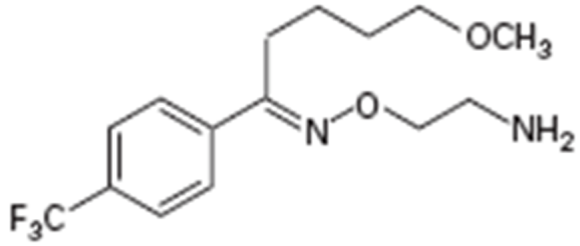
High-Volume Pharmaceuticals



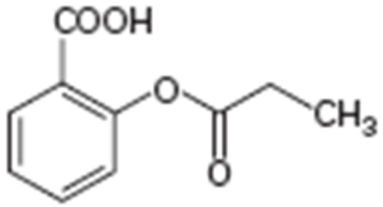
Acetaminophen
(paracetamol)



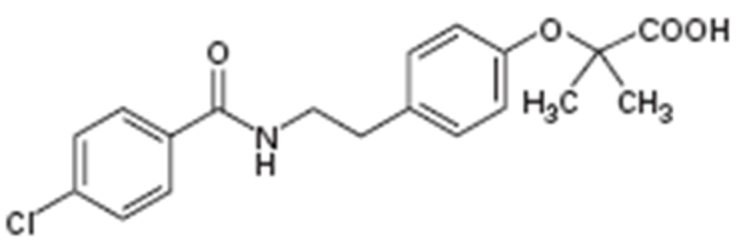
Atenolol



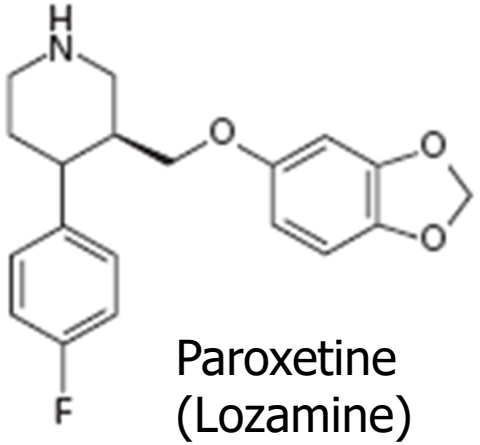
Fluoxetine
(Prozac)



Acetylsalicylic acid
(aspirin)

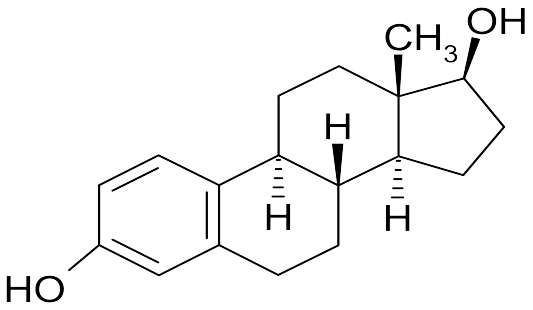


Bezafibrate

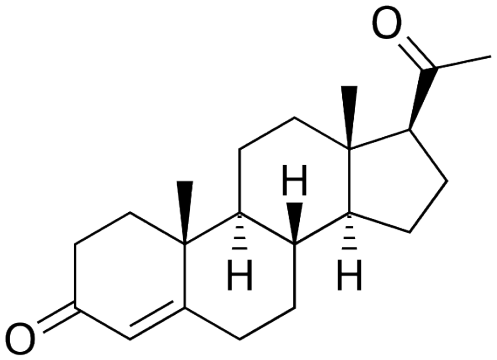


Paroxetine
(Lozamine)

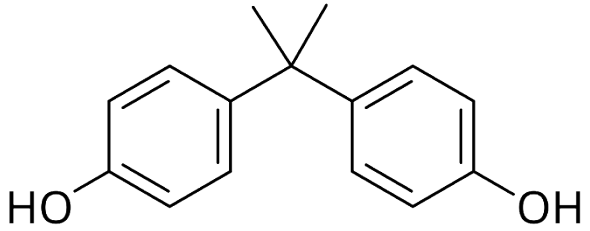
Endocrine Disrupting Chemicals



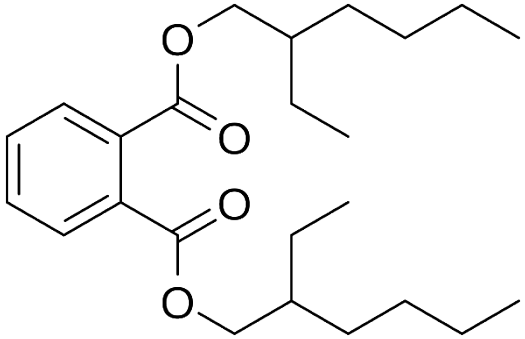
17β-estradiol



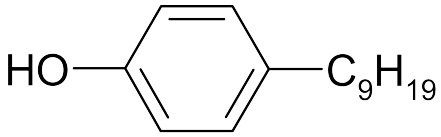
Progesterone



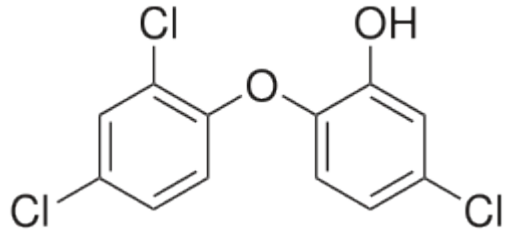
Bisphenol-A



Diethylhexyl phthalate

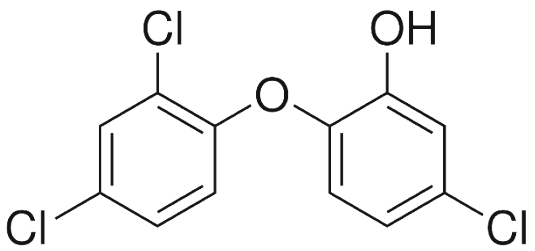


4n-nonylphenol

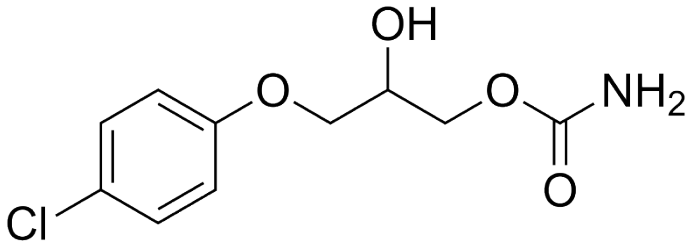


Triclosan

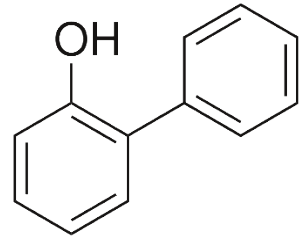
Antimicrobial and Fragrance Chemicals



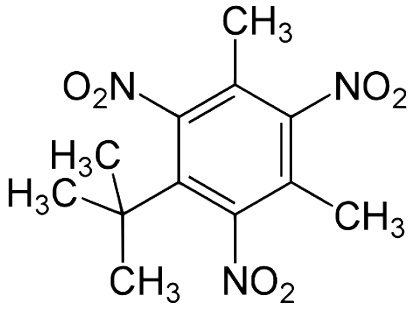
Triclosan



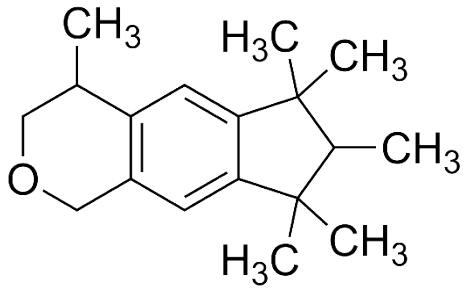
Chlorphenesin



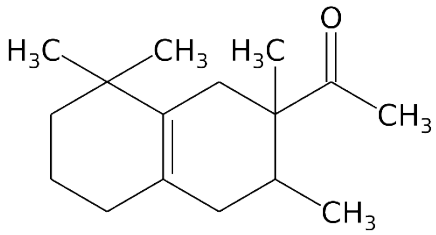
o-phenylphenol



Musk xylene



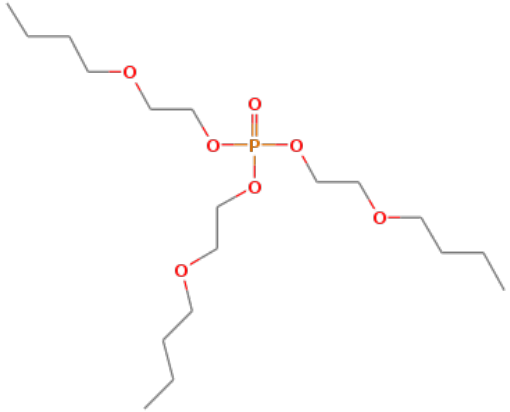
Galaxolide



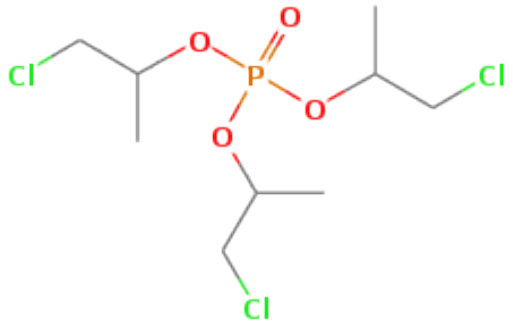
OTNE (Iso E Super)

Alkylphosphate Flame Retardants

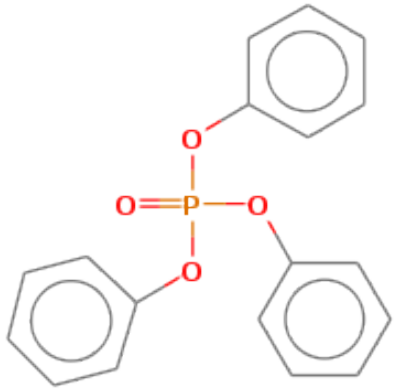
- Chemically similar to early organophsophate insecticides
- Eleven individual compounds- includes chlorinated analogues



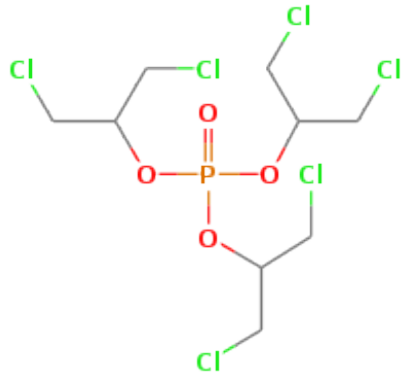
Tris-butoxyethyl phosphate (TBEP)



Tris(1-chloro-2-propyl) phosphate (TCPP)



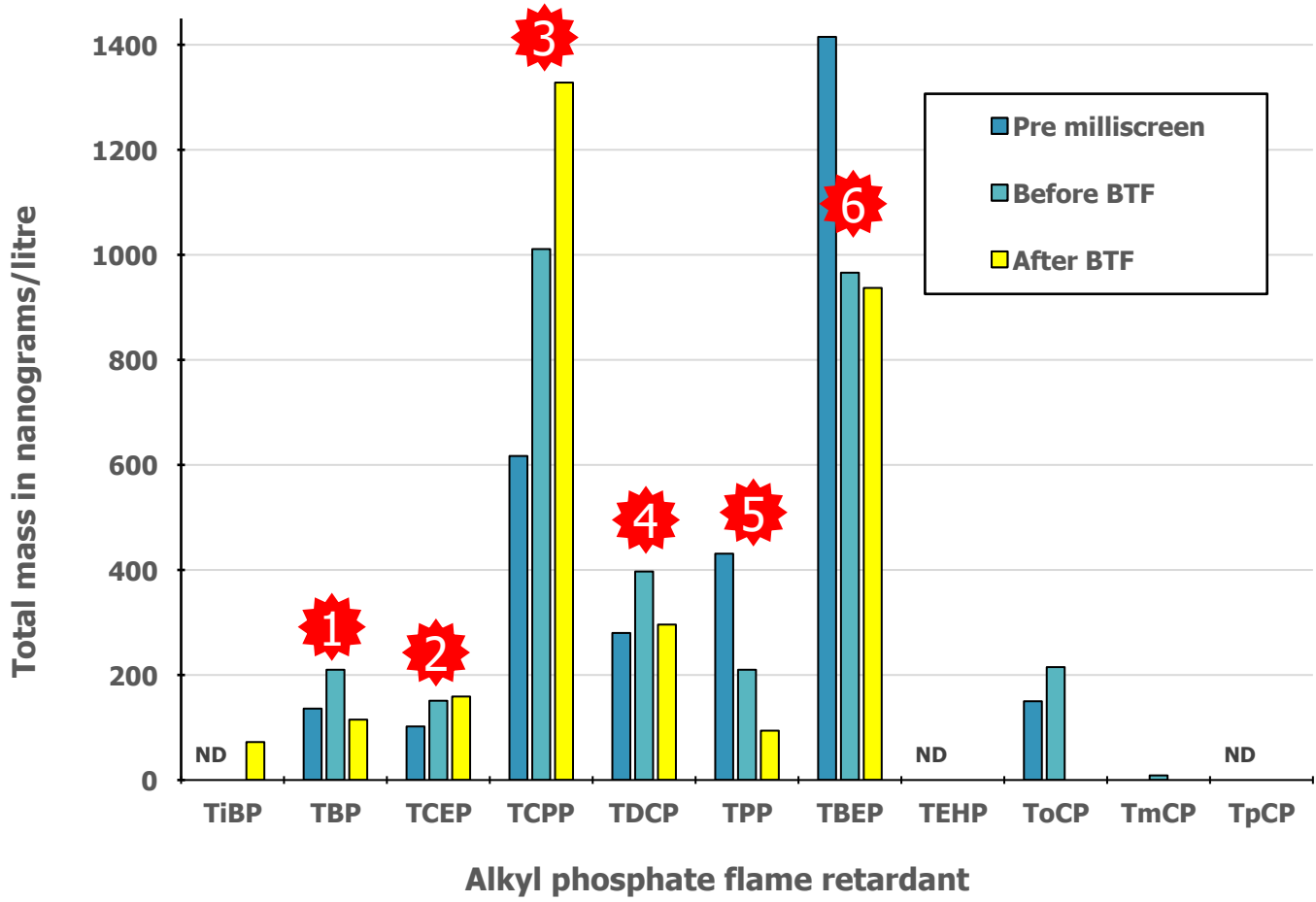
Triphenyl phosphate (TPP)



Tris(1,3-dichloro-2-propyl)phosphate

Concentration of Alkylphosphate Flame Retardants

Six of eleven APFRs are consistently detected

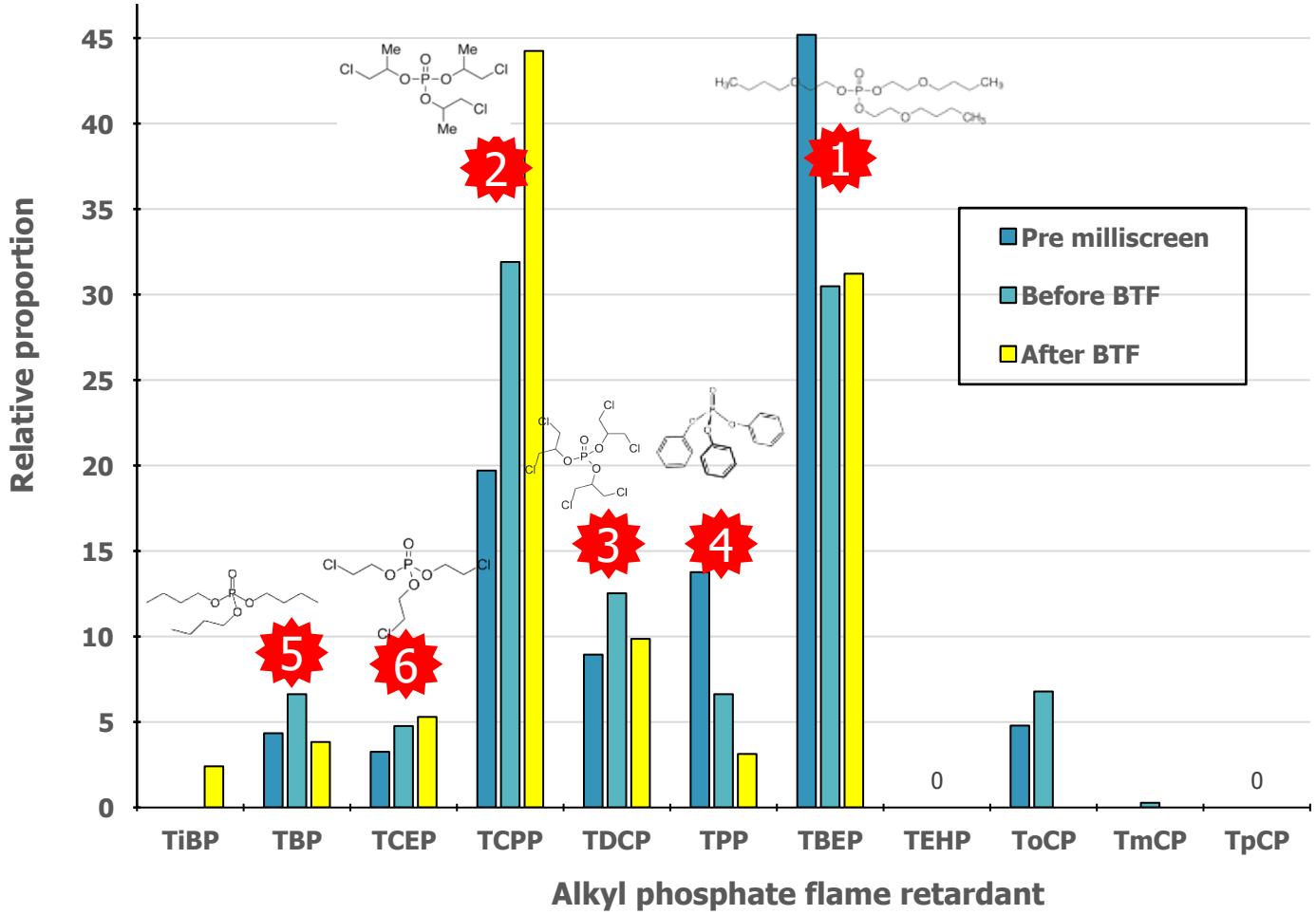


Profile of Alkylphosphate Flame Retardants

Dominated by

Tris(2-chloro-1-methylethyl) phosphate(TCPP) and

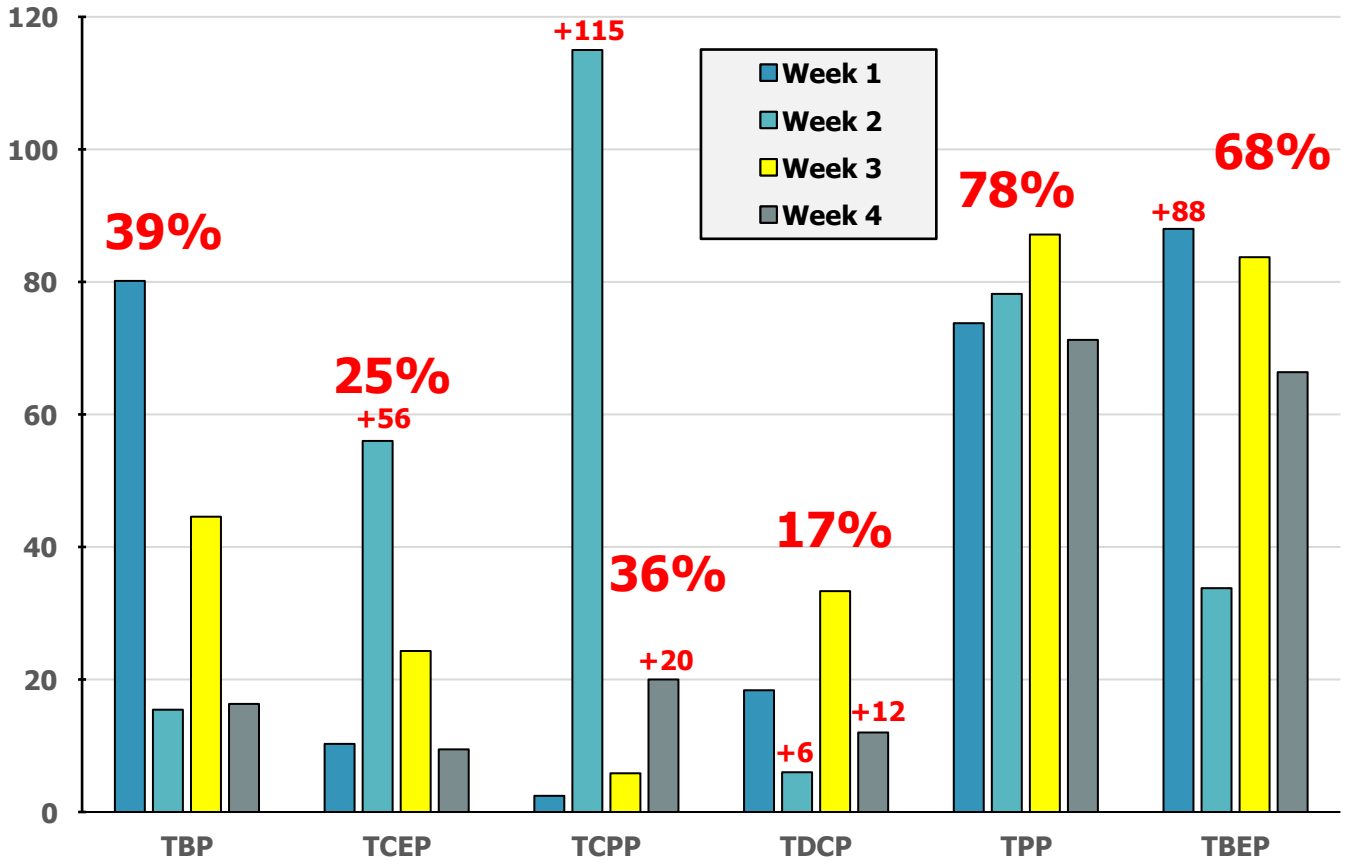
Tris(2-butoxyethyl) phosphate (TBEP)



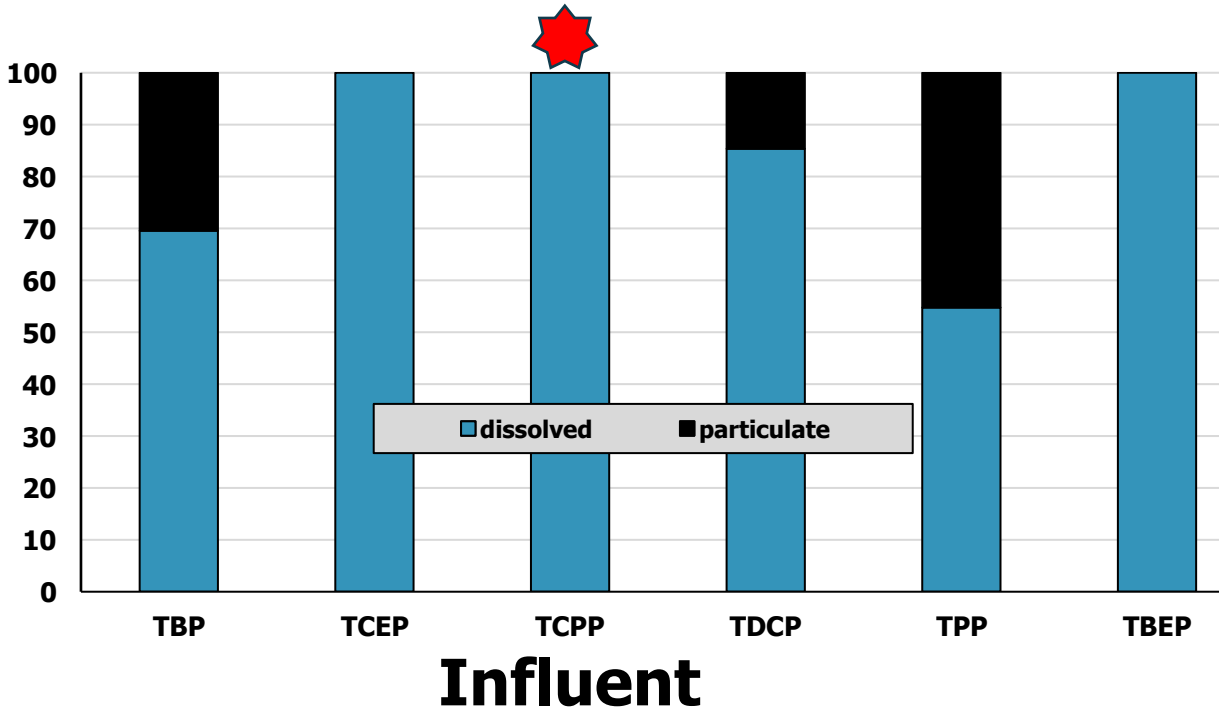
Reduction of Alkylphosphate Flame Retardants

Degree of reduction was variable

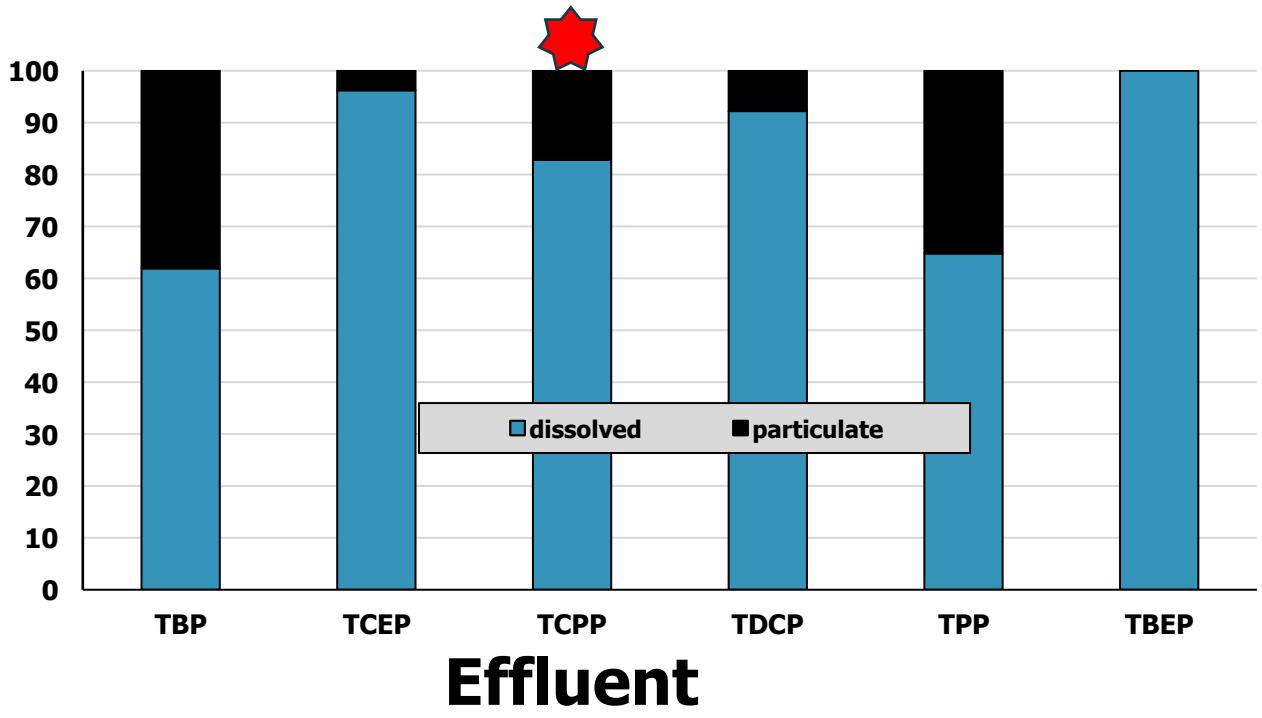
Some compounds actually increased



Phase Distribution of Alkylphosphate Flame Retardants



Influent



Effluent

The major APFRs are predominantly in the dissolved phase of influent and effluent but cannot be ignored in solids

Categorising EOCs in NZ WWTPs

	Concentration in ng/L (ppt)				
	Minimum	Mean	Maximum	Sample 1	Sample 2
Industrial alkylphenols					
4-tert-amylphenol	<0.1	1.13	10.9	11.7	4.26
4-tert-octylphenol	<0.1	3.96	26.5	26.4	39.6
Technical nonylphenols	9.1	208	655	3267	5498
Acidic Pharmaceuticals					
Acetaminophen	<0.10	13.5	164	78,008	86,184
Carbamazepine	120	479	1009	347	283
Diclofenac	16.0	447	913	397	235
Ibuprofen	4.08	1301	483	10,173	7,270
Ketoprofen	<0.10	16.9	54.5	63.7	38.1
Naproxen	2.69	229	770	2,831	1,544
Salicylic acid	2.00	29.1	118	9,231	5,489
Plasticisers					
Benzylbutylphthalate	<0.1	11.9	60.3	119	17.9
Di-n-butylphthalate	<5.0	74.2	318	222	87.7
Diethylphthalate	<5.0	131	817	12173	1470
Diethylhexylphthalate	<0.1	1045	11306	119	7.31
Dimethylhexylphthalate	0.48	30.6	226	123	71.7
Monobutylphthalate	<1.0	15.1	52.0	427	346
Monoethylhexylphthalate	2.6	269	1596	2695	1136
Monomethylphthalate	1.20	13.7	65.7	147	212
Bisphenol-A (BPA)	0.68	36.6	247	1475	1104
Steroid hormones					
Androstenedione	<0.10	0.12	0.28	33.9	ND
Estriol	<0.05	3.09	42	232	126
Estrone	<0.02	32.9	214	17.5	ND

< previous minimum

within previous range

> previous maximum

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< previous minimum

within previous range

> previous maximum

EOCs in RLC MBR Permeate

Concentration of EOCS in ng/L				
	DISCHARGED EFFLUENT			
Musk fragrance	**Min**	**Max**	**Mean**	**MBR Permeate**
Cashmeran	N.D.[A]	58.6	14.9	N.D.
Celestolide	N.D.	24.2	6.59	**28.7**[B]
Galaxolide	24.4	902	243	341[C]
Tonalide	9.83	168	60.9	137
Musk Ketone	N.D.	36.7	13.8	**59.5**
Alkyl phosphate flame retardant				
TiBP	N.D.	103	29.2	46.1
TnBP	26.9	499	128	N.D.
TCEP	16.3	303	108	N.D.
TCPP	70.5	1024	321	N.D.
TDCP	1.92	630	222	287
TBEP	N.D.	3441	783	1529
TPP	6.10	3277	301	29.1
Insect repellent				
DEET	15.2	1836	220	N.D
Benzylbenzoate	N.D	270	30.4	N.D
Antimicrobial				
Chloroxylenol	4.07	2633	322	3.53
o-Phenylphenol	N.D	6825	549	29.0
Chlorophene	N.D	N.D	N.D	**10.3**
methyl-Triclosan	N.D	5.45	1.38	**66.2**
Triclosan	4.43	158	38.3	98.6
Paraben preservatives				
Methyl-Paraben	N.D.	772	81.6	N.D
Ethyl-Paraben	N.D.	39	4.11	N.D.
Propyl-Paraben	N.D.	177	29.4	N.D
Butyl-Paraben	N.D.	13.0	2.70	N.D.
Plasticiser				
Bisphenol-A	N.D	66.9	17.0	33.7

< previous minimum

within previous range

> previous maximum

Categorisation In Treated Effluent

Concentration

Low: unlikely effect

Medium: possible effect

High: likely effect

Categorisation In Treated Effluent

Removal

> 95%: high

80% > < 95%: acceptable

< 80%: poor

Ranking of APFRs In Treated Effluent

TCPP and TBEP are clearly priority APFRs

Compound	dissolved	particulate	%Removal
TiBP	41.4	107	none
TBP	65.3	427	39.1
TCEP	172	16.2	14.7
TCPP	847	2386	4.1
TDCP	251	282	25.9
TPP	63.8	414	77.6
TBEP	820	583	61.3

Ranking of Steroid Hormones

Estrone, mestranol and EE2 are priority hormones

Compound	dissolved	particulate	% Reduction
Estrone	11.2	16.8	54.6
17α-estradiol	0.73	19	98.9
17β-estradiol	0.81	5.72	84.9
Estriol	19.1	N.D.	90.0
Mestranol	2.13	65.7	none
17α-ethynylestradiol	0.49	12.6	59.6
Dehydroisoandrosteron (DHEA)	0.76	N.D.	98.4
Androstenediol	0.07	N.D.	99.7
19-Nortestosterone	0.46	N.D.	95.2
Androstenedione	4.54	4.99	92.5
Testosterone	0.16	4.16	99.6
19-Norethindrone	N.D.	N.D.	NA
6β-hydroxy-testosterone	0.43	N.D.	97.3
11β-hydroxy-testosterone	0.38	N.D.	97.9
Norgestrel	N.D.	N.D.	100
16-ketotestosterone	0.43	N.D.	96.9

Risk to Aquatic Organisms

- Risk quotient (RQ)
- No-observable effect concentration (NOEC)
- Predicted no-effect concentration (PNEC)
- The test concentration below the lowest observable effect
- Predicted Environmental Concentration (PEC)
- RQ = Exposure & toxic impact

RQ = PEC/NOEC or PNEC

RQ<1
unlikely

1>RQ<1
possible

RQ>1
likely

Risk to Aquatic Organisms

- Concentration in receiving environments
- Life stage & species sensitivity
- Mode of toxicity
- Availability of toxicity data (NOEC/PNEC)
- No consideration of the toxicity of mixtures of EOCs, heavy metals or other contaminants
- For many aged WWTPs in NZ the current solution is dilution rather than treatment and removal

Risk Within The Receiving Environment

Emerging organic contaminant	PNEC or NOEC (µg/L)	PNCC concentration (µg/L) (dissolved/total)	Above/below PNEC/NOEC	Order of magnitude	Source
technical nonylphenol	0.20	10.5 (14.7) / 2.1 (5.5)	Above	1-2	Europe (WHO IPCS 2004)
	0.330		Above	1-2	EU 2002
	0.25		Above	1-2	Norman Network
Triclosan	0.11	0.083 (0.143)	Below/Equal		Norman Network
Galaxolide	39 (marine copepods)	2.6 (3.2) / 1.8 (2.8)	Below	1	HERA 2004
	6,800 (marine organisms)		Below	3	EU 2008c
	7		Equal		Norman Network
Diethylhexylphthalate	73	0.55 (26.3) / 065 (17.1)	Below/ Equal	2-3	Norman Network
Diclofenac	0.05	0.10 (0.11) / 0.12 (0.13)	Above	1	Norman Network
Ibuprofen	0.011	2.3 (2.4) / 0.17 (0.18)	Above	1-2	Norman Network
β-Estradiol	0.0004	0.0021 / ND	Above	1	Norman Network
Estrone	0.006	ND / 0.0074	Equal		Caldwell et al 2012
	0.0036		Equal		Norman Network
Estriol	0.06	0.061 / ND	Equal		Norman Network

[A] The format of the presentation of the measured concentrations is: winter effluent dissolved (total) / summer effluent dissolved (total)

- 100x dilution gives RQ<1, = no or minimal effect
- EDCs always feature, industrial and endogenous
- Current models don't account for mixture effects
- NOEC/PNEC values continue to decrease

EOCs in MBR Permeate- 2017

PNECs have reduced & others introduced since 2017

250x dilution eliminates the risk

Emerging Organic Chemical	MBR Permeate	50x dilution	100x dilution	PNEC or NOEC (ng/L)	Risk to aquatic organisms (GREEN=no risk; RED=risk)	UPDATED PNECs
Estrogenic steroid hormones						
17α-estradiol	0.60	0.012	0.006	NA[B] **4.06**	3 orders of magnitude below	PNEC now available
17β-estradiol	2.70	0.054	0.027	2.00/**0.40**	1 order of magnitude below	order of magnitude lower
Estrone	55.4	1.11	0.554	6.00/**0.36**	> PNEC at 50 & 100x dilution	order of magnitude lower
17α-ethinylestradiol	N.D	N.D	N.D	0.10	not detected in WWTP discharge	
Mestranol	1.90	[illegible]	[illegible]	NA/1.[illegible]	2 orders of magnitude below	PNEC now available
Androgenic steroid hormones						
Testosterone	1.50	0.030	0.015	NA/**4.37ug**	2 orders of magnitude below	PNEC now available
Progestogens						
Norethisterone	N.D	N.D	N.D	NA/**4.52ug**	not detected in WWTP discharge	PNEC now available
Norgestrel	0.50	0.010	0.005	NA/**5.86ug**	2-3 orders of magnitude below	PNEC now available
Industrial Alkylphenols						
4-n-nonylphenol	18.5	0.37	0.185	200/**43**	2 orders of magnitude below	order of magnitude lower
Tech-NP-equivalents	541	10.8	5.41	330/**43**	1 order of magnitude below	order of magnitude lower
Musk fragrances						
Celestolide (ADBI)	28.7	0.58	0.29	NA/43	2 orders of magnitude below	PNEC now available
Musk Ketone	59.5	1.19	0.595	NA/140	2-3 orders of magnitude below	PNEC now available
Tonalide(AHTN	137	2.74	1.37	3500/**23**	1 order of magnitude below	2-order of magnitude lower
Acidic pharmaceuticals						
Diclofenac	304	6.08	3.04	9800/**40**	1 order of magnitude below	2-order of magnitude lower
Ibuprofen	32.3	0.646	0.323	13,875/**11**	2 orders of magnitude below	3-order of magnitude lower
Naproxen	10.5	0.210	0.105	14,199/**1700**	4 orders of magnitude below	order of magnitude lower

Mitigating Factors

- Upgraded Bardenpho & Microfiltration stages could further reduce or remove EOCs
- Similarly, treatment by passage through soil
- What about UV treatment?
- Exposure to geothermal conditions in Lake Rotorua is expected to further degrade EOCs
- Some EOCs have been previously measured in waters of Lake Rotorua

THANK YOU

Questions Please

EU Developments: Annex VIII WFD

PBT core criteria 33 priority substances, SVC and pesticides DEHP relevant to NZ WWTPS

EU: Better and more cost-effective treatment of urban wastewater
New standards for micropollutants
New monitoring requirements for microplastics

SW protection
17b-estradiol, estrone, 17a-ethinylestradiol

Azithromycin, Clarithromycin, Erythromycin
Carbamazepine
Bisphenol-A
Diclofenac, Ibuprofen
triclosa

GW protection
Carbamazepine
Sulfamethoxazole
PFAS (24 compounds)

EU Solutions Project

Triphenylphosphate- fire retardant, plasticiser

Benzophenone-4- UV filter

Secobarbital- barbituate

2-(Methylthio)benzothiazole (MBT) - vulcaniser

Benzothiazole- vulcaniser, metabolite of MTB

European demonstration Project- SW contaminants

PFAS

Nonylphenol

Diclofenac, Ibuprofen

Triclosan

Azithromycin, Clarithromycin, Erythromycin

Caffeine

TPP

CBMZ

DEET

Verapamil

Working Group Terms of Reference

- What the Terms of Reference define as our scope and responsibilities
- Our approach to collaboration and decision-making
- Clarifications or feedback on the Terms of Reference

Wrap-Up and Karakia

Next Meeting: 18th December 2025, at 10:00am, Committee Room 2.