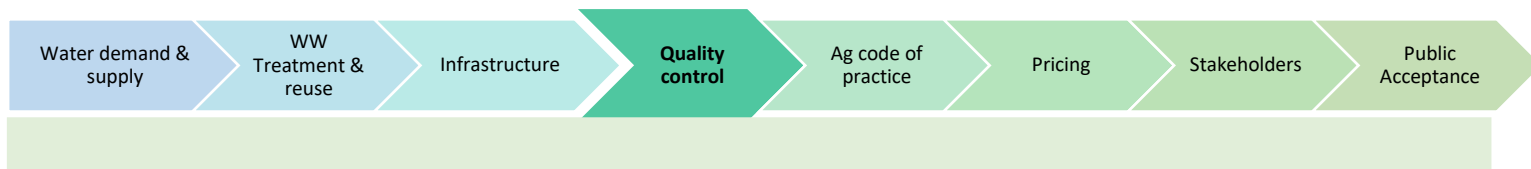




The Success Story of Cyprus

Fact Sheet 4 - Quality control of treated effluent



KEYS FOR SUCCESS – Lessons learned from the success stories of Cyprus and Israel

SUWANU EUROPE is a H2020 project aiming to promote the effective exchange of knowledge, experience and skills among practitioners and relevant actors on the use of reclaimed water in agriculture. This factsheet is part of a total of 17 factsheets that describe the successful reclamation practices of Israel and Cyprus in order to learn and boost implementation of solutions adapted to the European context. Our ultimate goal is to enhance acceptance and awareness to an alternative source of an increasingly scarce resource, water.

Quality Control of the reclaimed water in Cyprus is dictated clearly in legally binding instruments.

- "Water Pollution Control Law (106(I)/2002 to 2009)"
- and the "Ministerial Decree of small-scale UWTPs (KDP 269/2005)".

According to the Article 12 of the Directive 91/271/EEC referring to Urban Wastewater Treatment, "treated wastewater shall be reused whenever appropriate". Based on the Code of Good Agricultural Practice issued with a decree within the framework of Cyprus Water Pollution Control Laws, the use of recycled wastewater of appropriate quality is required and is an environmentally accepted solution, given the dry climate and reduced rainfall in Cyprus.

A. Quality Control for Urban and Rural Agglomerations above 2.000 person equivalents (P.E.):

Sampling and analysis are being executed by:

- Urban Sewerage Boards (USBs): Assure the quality of treated effluent according to the requirements of their Discharge Permits (Law 106(I)/102);
- Water Development Department (WDD): is responsible of the disposal of the treated effluent produced by the Urban Sewerage Boards (government policy);
- Department of Environment (DoE): is responsible for issuing the Discharge Permits. Moreover, the DoE follows up whether every UWTP meets the requirements of their Discharge Permits.

The quality characteristics of recycled water are included in the terms of discharge and disposal permits (Table 1).

Table 1 – Effluent quality characteristics included in disposal permits of UWTs above 2000 P.E. and frequency of controls by WDD and USB (*WDD: Water Development Department, USB: Urban Sewerage Board)
(Source: Cyprus Water Development Department, 2019).

A/A	PARAMETERS	MAXIMUM PERMITTED VALUE	FREQUENCY OF ANALYSIS - BY WDD	FREQUENCY OF ANALYSIS - BY USB
1	BOD ₅	10 mg/l	4/year	1/15 days
2	COD	70 mg/l	4/year	1/15 days
3	Suspended Solids (SS)	10 mg l	4/year	1/15 days
4	Conductivity	2500 pS/c m	4/year	1/15 days
5	Total Nitrogen (TN)	15 mg l	4/year	1/15 days
6	Total Phosphorous (TP)	10 mg l	4/year	1/15 days
7	Chlorides (Cl)	300 mg/l	4/year	1/month
8	Fat and Oil	5 mg/l	4/year	1/month
9	Zinc (Zn)	1mg/l	2/year	2/year
10	Copper (Cu)	0,1mg/l	2/year	2/year
11	Lead (Pb)	0,15 mg/l	2/year	2/year
12	Cadmium (Cd)	0,01 mg/l	2/year	2/year
13	Mercury (Hg)	0,005 mg/l	2/year	2/year
14	Chromium (Cr)	0,1mg/l	2/year	2/year
15	Nickel (Ni)	0,2 mg/l	2/year	2/year
16	Boron (B)	1mg/l	2/year	2/year
17	E.Coli	5 E.Coli / 100ml	4/year	1/15 days
18	Eggs of Intestinal Worms	Nothing	4/year	4/year
19	Residual Chlorine	1mg/l	4/year	1/15 days
20	pH	6.5-8,5	4/year	1/15 days
21	Toxicity		1/year	1/year

Information on the frequency of analyses by the Water Development Department (WDD) and the Urban Sewage Boards (USBs) is also included in the disposal permits.

B. Quality Control for Rural Agglomerations less than 2.000 P.E.:

Sampling and analysis are being executed by the Water Development Department.

In addition, specific terms for reclaimed water disposal apply for all WWTs serving a capacity of P.E. of 2000 residents (P.E.) or below. Based on these, treated wastewater could be reused for irrigation or stored in reservoirs for further use. The exact areas to be irrigated need to be identified and disposal and use of reclaimed water should be in accordance to the Cyprus Code of Good Agricultural Practice (Table 2).

Table 2 – Dramatic changes in B concentration in secondary effluent of the Shafdan WWTP over time in response to drastic changes in regulation

A/A	Species allowed to be irrigated	BOD ₅ (mg/L)	Suspended Solids (mg/L)	E. coli / 100 mL	Intestinal worms ***
1	All crops and green areas with restricted use (a)	10*	10*	5*	N/L
				15**	
2	Green areas and cooked vegetables (b)	10*	10*	50*	N/L
				15**	
3	Green areas with restricted use by the public	20*	30*	200*	N/L
				30**	
4	Fodder crops	20*	30*	1000*	N/L
				30**	
5	Industrial crops	50*	-	3000*	-
				70**	

* 80% of the samples, 24 samples/year
 ** Max acceptable value
 *** sampling frequency once a year/summer months
 (a) No vegetables with leaves, bulbs and condyles eaten raw
 (b) Potatoes, Beetroots

Reclaimed water that will be used for irrigation must not contain toxic elements or compounds which on their own or in combination are accumulated on the edible parts of the plant irrigated with reclaimed water and have been proven to be toxic for humans.

During the winter period, reclaimed water should be stored in a tank of a capacity equal to the water quantity for at least 10 days. Storage of reclaimed water in dams is allowed only in cases when the water is used for irrigation purposes. Also, in cases where the stored water in dams is used for drinking purposes, the reclaimed water percentage should not exceed 5% total stored water content. Toxicity inspections must take place four times per year or less frequently, when the conditions allow it, while genotoxicity tests must be conducted at least once per year (Kalavrouziotis et al., 2015).

CLOSING REMARKS

The strict quality control scheme of water reclamation and reuse which is aided by the regulatory enforcement of high quality standards, encourages a very high degree of compliance of the stakeholders who make use of reclaimed water. Moreover, a high degree of coordination and communication among the governmental authorities and organizations that are in control of the water reuse schemes in Cyprus, makes the monitoring of quality and compliance, a success story.

REFERENCES:

Water Development Department (WDD), Information and Data on Water Resources, Water Use and Wastewater Treatment Plants Provided by the Water Development Department, Cyprus, 2019.

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