



Policy and Regulation for Water Reuse in Cyprus

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Legislative Framework

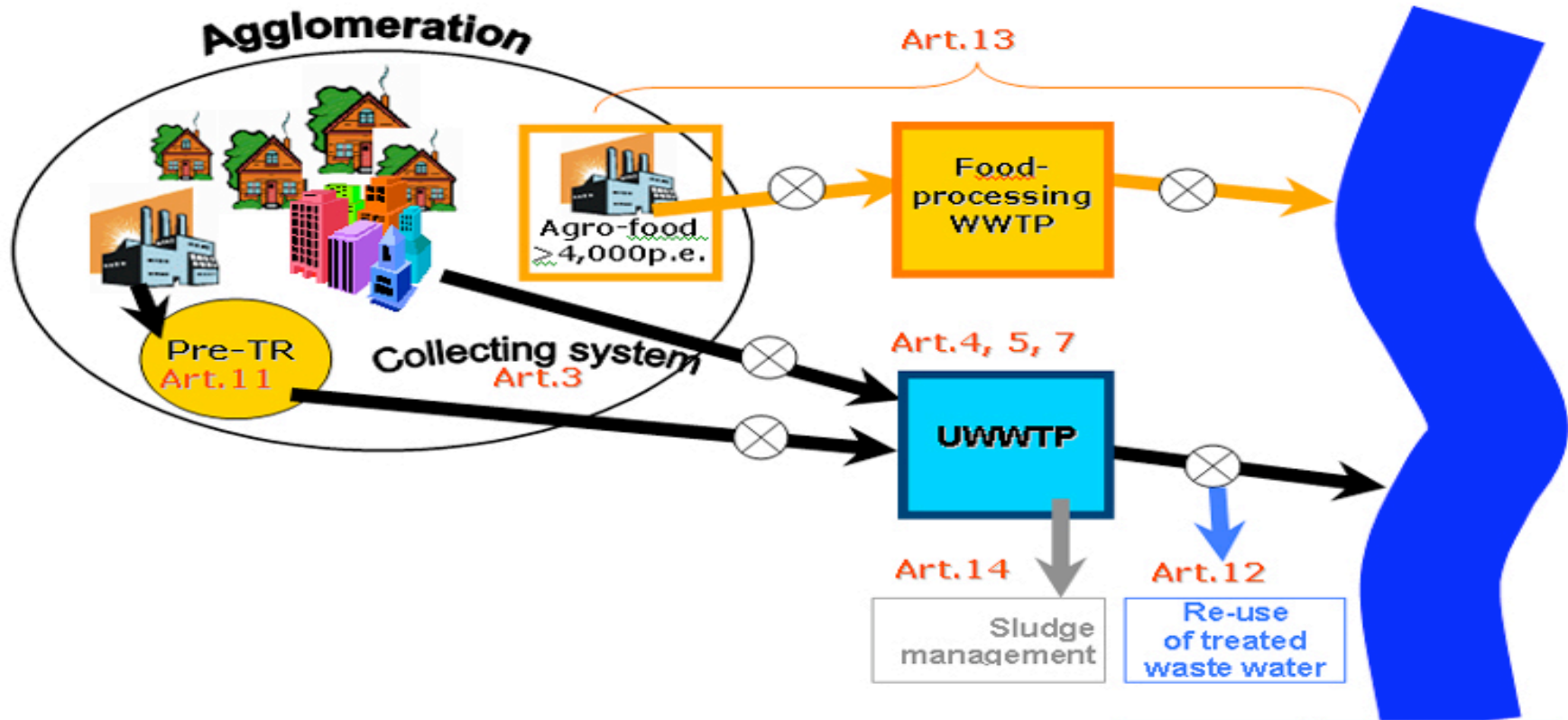


In Cyprus, the use or the discharge of effluent from urban wastewater treatment plants was regulated by:

- ❑ The Environmental Impact Assessment Law (No. 140 (I)/2005)
- ❑ The Water Pollution Control Laws 2002–2009
- ❑ The Water Pollution Control (Discharge of Urban Waste Water) Regulations of 2003 (No. 772/2003)
- ❑ The Water Pollution Control (Sensitive Areas for Disposal of Urban Waste Water) Ministerial Decree of 2004 (No. 111/2004)
- ❑ The Code of Good Agriculture Practice Decree (No. 263/2007)
- ❑ The Ministerial Decree of small – scale wastewater treatment plants ≤ 2000 p.e (No. 269/2005)



Flowchart of UWWTD (271/91/EEEC) including industrial waste water from the sector of food processing plants



Legend:

- Pre-TR = pre-treatment
- Agro-food = food-processing industries
- UWWTP = urban waste water treatment plant
- Agro-food >4000 p.e. = food-processing industry
- Art. 3, 4, 5, 7, 11, 12, 13, 14 = articles of the Directive 91/271/EEC



Policy/Competent Authorities



☒ Implementation of UWWTD in Cyprus:

- ∅ Department of Environment
- ∅ Water Development Department Councils
- ∅ Sewerage Boards Councils, while the Ministerial Council is responsible for the implementation of the relevant projects

☒ Water Development Department (WDD):

- National Implementation Program and Report under Article 17 to European Commission
- Design, tenders and contracts for the construction and the maintenance of all rural, sewerage collection systems and WWTPs on behalf of the Rural Sewerage Boards
- Tertiary treatment
- Technical services and advice to the Rural Sewerage Boards Councils

☒ Municipal Sewerage Boards Councils:

- Installation of sewerage networks and treatment plants in urban centers



Department of Environment /Responsibilities



- ❑ **Implementation of UWWTD** in cooperation with **WDD** and **Sewerage Boards Councils** and **participation** to the **European Committee** for the implementation of UWWTD
- ❑ Identification of **Sensitive Areas** in cooperation with WDD and DFMR
- ❑ **Reporting** to European Commission according to Article 15 and 16 of the UWWTD
- ❑ **Waste Discharge Permits** for the operation of Urban Waste Water Treatment Plants and the **UWWTPs effluent discharges** in order to protect the water resources
- ❑ **Monitoring Programme** for effluent quality



Identification of Sensitive Areas



Definition of Sensitive Areas: Surface water bodies or coastal waters which are found to be or may become **eutrophic** or which are intended for the abstraction of **drinking water** or **further treatment is necessary under the provisions of other Directives** (such as the Nitrates Directive, the Bathing Water Directive)

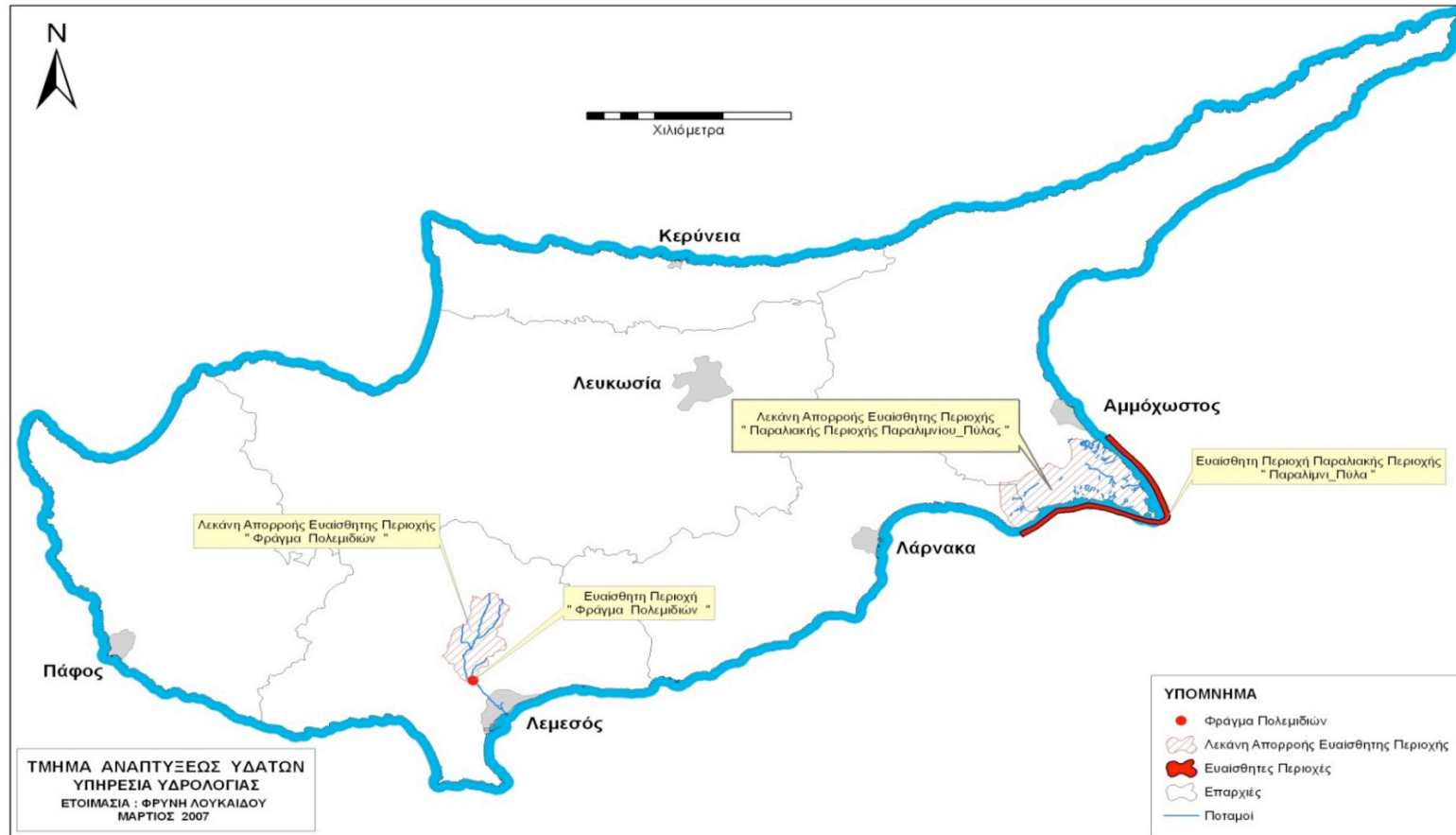
According to the Ministerial Decree of 2004, two Sensitive Areas have been identified in Cyprus:

- ➡ ***Polemida Dam***
- ➡ ***Kokkinochoria Coastal Waters***

The identification of Sensitive Areas was reviewed in 2008. The sensitive areas mentioned above remain in the list of Sensitive Areas for the next 4 years. The next revision will be conducted soon



Sensitive Areas





Reporting to European Commission



- ☒ **Article 15** > Monitoring data of UWWTP effluent discharges and water quality of receiving areas (available to the Commission within 6 months of receipt of a request)

The last Cyprus Report was submitted in 31.12.2012 and the reference year was 2009.

The next report is anticipated for the 2014 for the year 2011 or 2012.

- ☒ **Article 16** > Situation Report on the disposal of Urban Waste Water and Sludge (every 2 years)

Cyprus is preparing the 3rd Situation Report regarding the period 2009 – 2010.



Protection of Environment, Water Resources and Human Health from UWWTPs effluent discharges



☒ Implementation of **Environmental Impact Assessment Law**

The environmental impacts from the construction and operation of Sewerage Systems and Urban Waste Water Treatment Plants as well as the **Management of the Recycled Water** are subject to the above mentioned Law. An EIA is prepared by the applicant and evaluated by a Technical Committee. An Environmental Approval is issued by the Department of Environment setting specific terms for the protection of Environment.

☒ According to the Water Pollution Control Law, **Waste Discharge Permits** are issued by the Minister of Agriculture, Natural Resources and Environment for:

- The operation of Urban Waste Water Treatment Plants and the disposal of sludge
- The management of **UWWTP effluent discharges**
- Industrial wastewater from the sector of food processing plants with organic load >4000 p.e.



Permitting

☒ Each permit includes specific operating conditions, measures that must be taken by the operator and for the management of treated water. The terms and conditions usually refer to the following:

- General Operational Conditions
- Effluent quality requirements
- Discharge method, quantity, areas, crops irrigated etc
- Storage and emergency tanks
- Self monitoring of effluent quality and quantity and record keeping
- Submission of annual report



Inspection

- ❑ The Department of Environment, through **Inspections** and **Annual Reports** as well as through the Monitoring Program ensures that the permit conditions are met, in order to achieve protection of water and soil
- ❑ In the case of not complying all the relevant legal measures are taken. These measures include:
 - Letters of compliance (comments and guidance on compliance where appropriate)
 - Fines.
 - Letter and situation report to the Legal Service for initiating a court procedure.





Monitoring Program



- ❑ According to the Waste Discharge Permit, the UWWTPs are obliged to self monitor the effluent quality
- ❑ Furthermore, in the context of the implementation of UWWTD, the Department of Environment has a **Monitoring Program** which it includes sampling and chemical analysis of effluent quality conducted by an independent laboratory (once per month for UWWTPs related to agglomerations <2000 and twice per month for UWWTPs related to agglomerations >2000 for all the parameters that are defined in the Directive). A Database has been developed and is used since 2007
- ❑ The Monitoring Program is applied to all UWWTPs as well as food industries



Water Reuse






According to Article 12 of UWWTD, treated waste water shall be reused whenever appropriate.

It is the policy of Cyprus and is implemented through the obligation for tertiary treatment set out in the permit.

The UWWTPs effluent is mainly reused in agriculture. According to 2010 data, 77% of the tertiary effluent was reused for irrigation, 14% was recharged in aquifer and 9% was discharged to surface waters (dam or sea).

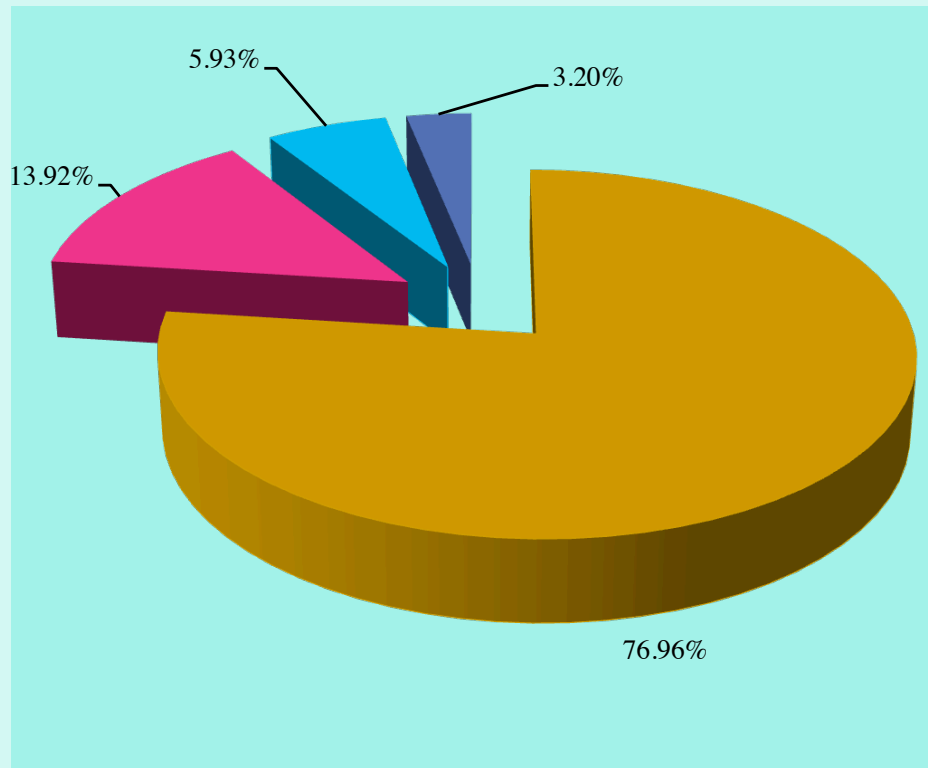
In Cyprus the UWWTP effluent used:

- ∅ Irrigation  77%
- ∅ Recharge to Aquifer  13,9%
- ∅ * Discharge to dams for irrigation purposes  3,2%
- ∅ * Discharge to coastal waters 5,9%

* during the winter period when the demand for irrigation is limited.



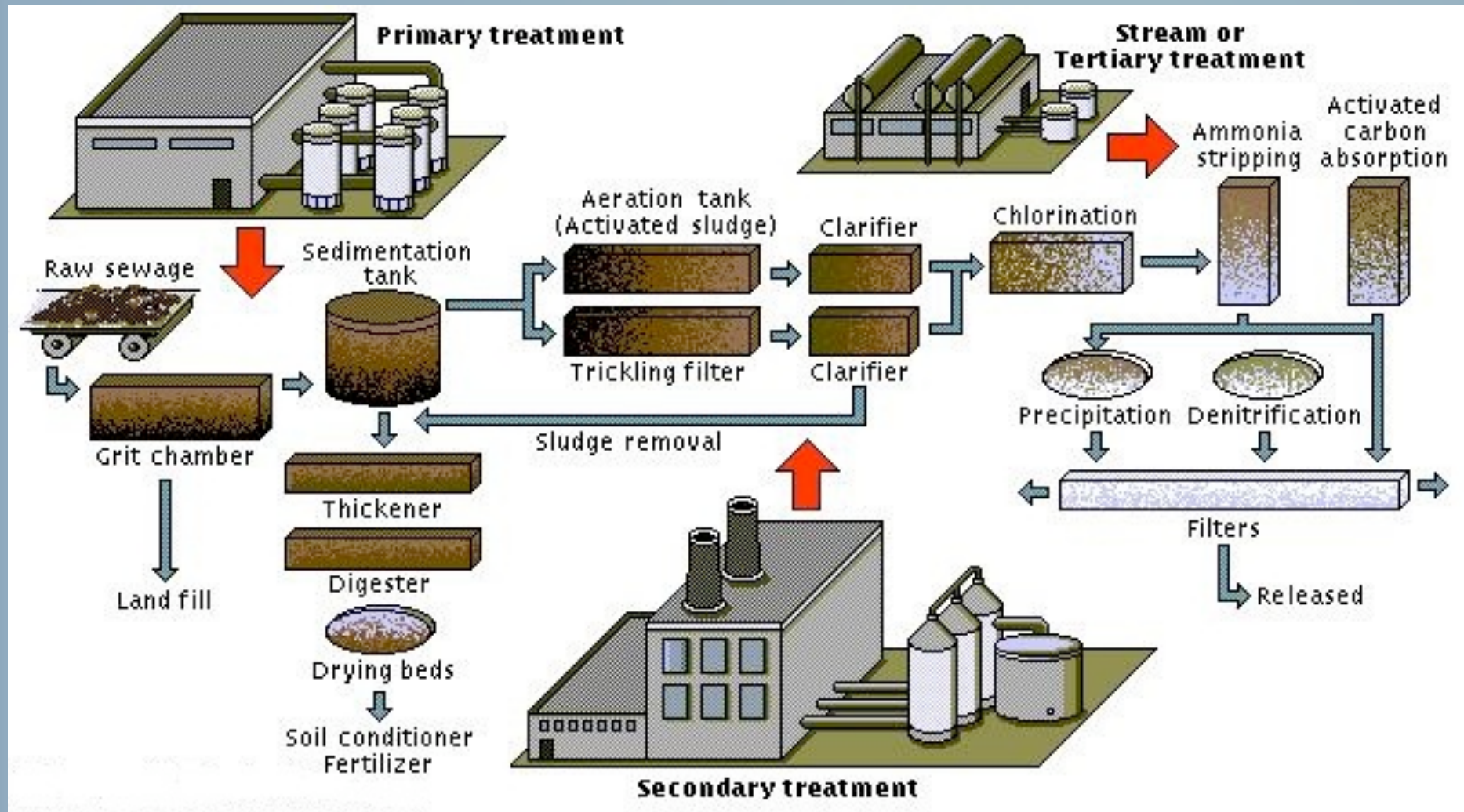
Water Reuse 2010



- Percentage of tertiary effluent reused for irrigation
- Percentage of tertiary effluent recharged in aquifer
- Percentage of tertiary effluent discharged to surface waters (sea)
- Percentage of tertiary effluent discharged to surface waters (Polemida Dam)



Flowchart Tertiary Treatment





Effluent Quality Standards for WWTPs of Municipal Sewerage Boards



| A/A | Parameters | Max Limits | Frequency of analysis |
|-----|------------------------------|--------------------------|--|
| 1 | pH | 6.5-8,5 | every 15 days |
| 2 | Conductivity: | 2500 μ S/cm | every 15 days |
| 3 | **Residual chlorine: | 1mg/l | every 15 days |
| 4 | BOD ₅ : | 10 mg/l | every 15 days |
| 5 | COD: | 70 mg/l | every 15 days |
| 6 | SS: | 10 mg/l | every 15 days |
| 7 | TN: | 10mg/l (discharge to SA) | every 15 days (during the winter period) |
| 8 | TP: | 1mg/l (discharge to SA) | every 15 days (during the winter period) |
| 9 | Cl: | 300 mg/l | 2 x year |
| 10 | B: | 1mg/l | 2 x year |
| 11 | FOG: | 5 mg/l | 2 x year |
| 12 | E-Coli: | 5 E.Coli / 100ml | 15 days** |
| 13 | Eggs of Intestinal Worms: | 0 | 1 x year (during the summer period) |
| 14 | **Zn: | 1mg/l | 2 x year |
| 15 | Cu: | 0,1 mg/l | 2 x year |
| 16 | Pb: | 0,15 mg/l | 2 x year |
| 17 | Cd: | 0,01 mg/l | 2 x year |
| 18 | Hg: | 0,005 mg/l | 2 x year |
| 19 | Cr: | 0,1 mg/l | 2 x year |
| 20 | Ni: | 0,2 mg/l | 2 x year |
| 21 | Toxicity | * | 1 x year |

- 75% of samples must conform to the following levels of acute toxicity: Microtox TU50 <1 TU20 <1.5, or Daphnia TU <1, Algae TU50 <1.

- The sample must not be positive in S9 test Mutatox. Discharge to coastal waters:

- Zn \leq 0,1mg/l
 Moreover, the WDB is obliged to monitor the quality of the effluent as well as the quality of ground waters. Relevant requirements are defined in the Permit according to the Directive on the protection of groundwater.



Effluent Quality Standards for WWTPs <2000



| A/A | Irrigation | BOD ₅ mg/L (every 15 days) | (SS mg/ L) (every 15 days) | (E. Coli/100 ml) (every 15 days) | (Eggs of Intestinal Worms/ L ^{***}) (every year during the summer period) |
|-----|--|---|-------------------------------------|--|---|
| 1. | All crops and green areas (a) | 10 [*] | 10 [*] | 5 [*] 15 ^{**} | None |
| 2. | Vegetables eaten cooked | 10 [*] 15 ^{**} | 10 [*] 15 ^{**} | 50 [*] 100 ^{**} | None |
| 3. | Products for human consumption and green areas with limited access to the public | 20 [*] 30 ^{**} | 30 [*] 45 ^{**} | 200 [*] 1000 ^{**} | None |
| 4. | Crops for animal feed | 20 [*] 30 ^{**} | 30 [*] 45 ^{**} | 1000 [*] 5000 ^{**} | None |
| 5. | Industrial plants | 50 [*] 70 ^{**} | - | 3000 [*] 10000 ^{**} | - |

•The 80% of the samples to be analyzed must not exceed *these values*.

*Number of samples:
24 samples /year.*

*** Maximum
accepted value.*

**** Sampling every
year during the
summer period.*

*(a) Not for leafy
vegetables,
bulbs eaten raw.*



Other Requirements for Irrigation



- ☒ The quality requirements as well as the crops irrigated are defined in the permit in cooperation with the Department of Agriculture having considered the provisions of the Code of Good Agriculture Practice Decree (No. 263/2007)

- ☒ In Cyprus the UWWTPs effluent is mainly reused for irrigation of the following crops:
 - Ø Crops for animal feed
 - Ø Olive trees and citrus trees
 - Ø Green areas.



Suggestions



- ❏ Improve the management of tertiary effluent during the winter period when due to low irrigation needs there is no interest by the farmers (more effective and less costly solutions)
- ❏ Provide effective information to the farmers, motives for the use of tertiary effluent for irrigation. Coordination of the Water Development Department and the Department of Agriculture for the implementation of the Code of Good Agriculture Practice and Permit Conditions
- ❏ Appropriate crops development close to the location of the UWWTP
- ❏ Promote the use of renewable energy projects for the disposal of the effluent
- ❏ Incorporation of rural Sewerage Boards under the Urban/District Sewerage Boards for financial and technical support



Conclusions



- ❏ The Department of Environment in setting terms and conditions in the permit, includes provisions of all relevant legislation for protection of waters and soil based on EU Directives
- ❏ The Waste Legislation has been revised to cover the gap and control the illegal discharges from sewerage tankers
- ❏ For effective implementation of Legislation and for protection of waters the cooperation of local authorities, the public and the competent authorities is necessary





Thank you
Have a Nice Summer

