



A Novel Hybrid Photocatalytic System for water purification: application to groundwater remediation and aquifer recharging

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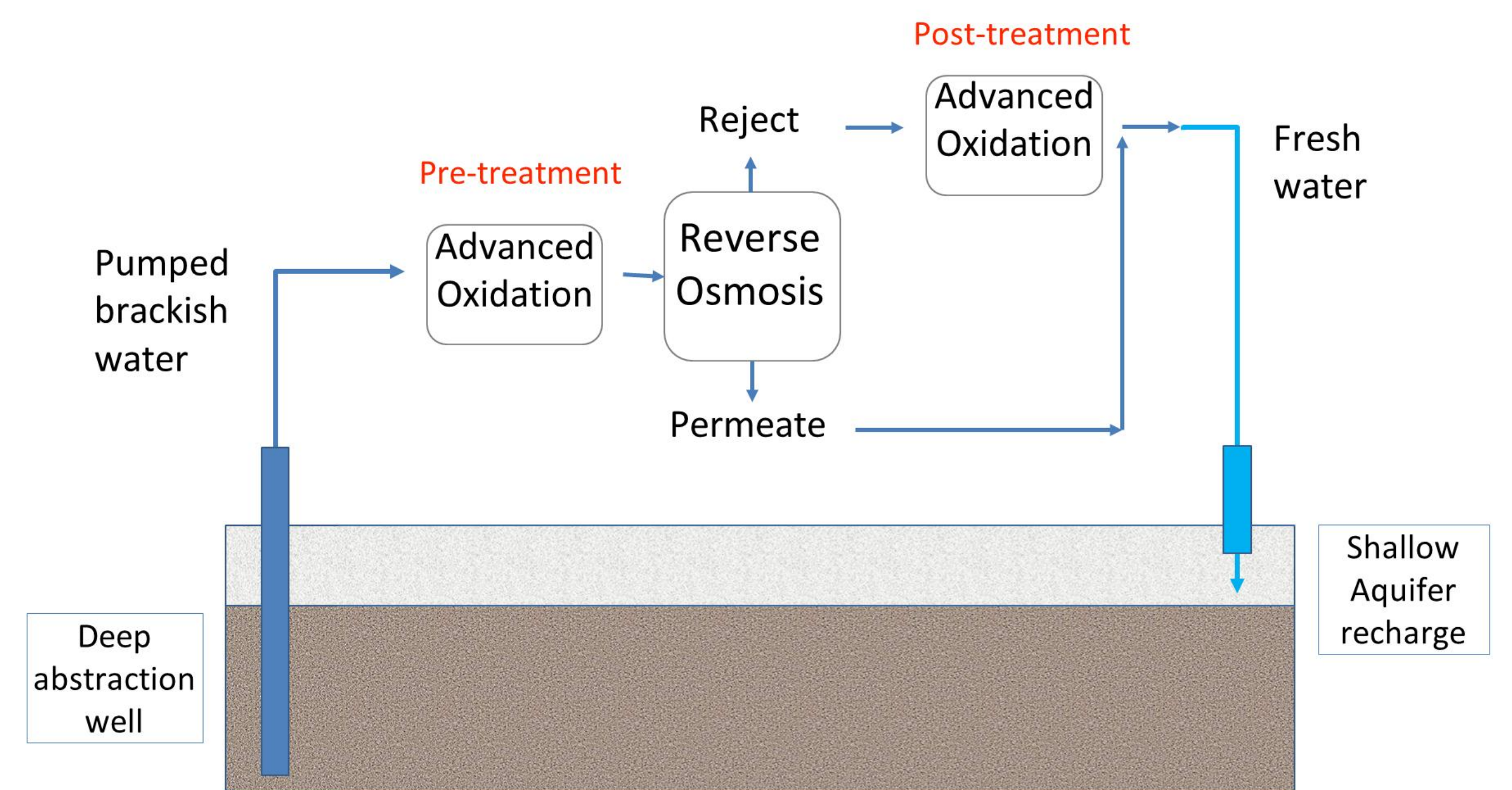
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Aims and Objectives

- ✓ Implementation of novel remediation techniques in the flow of the pumped groundwater, before it is reintroduced in the upper groundwater aquifer.
 - an RO system, which drastically reduces the ionic content of the water
 - an AOP system for the degradation and possible mineralization of organic pollutants in the presence of inorganic ions
- ✓ Techniques are remote monitored and operated, so as to be tested and applied in similar remote locations



Reverse Osmosis Unit

- **Inflow** water of 4500 $\mu\text{S}/\text{cm}$ (15 - 40°C)
- **outflow** of 200 $\mu\text{S}/\text{cm}$ at 60 m^3/day .

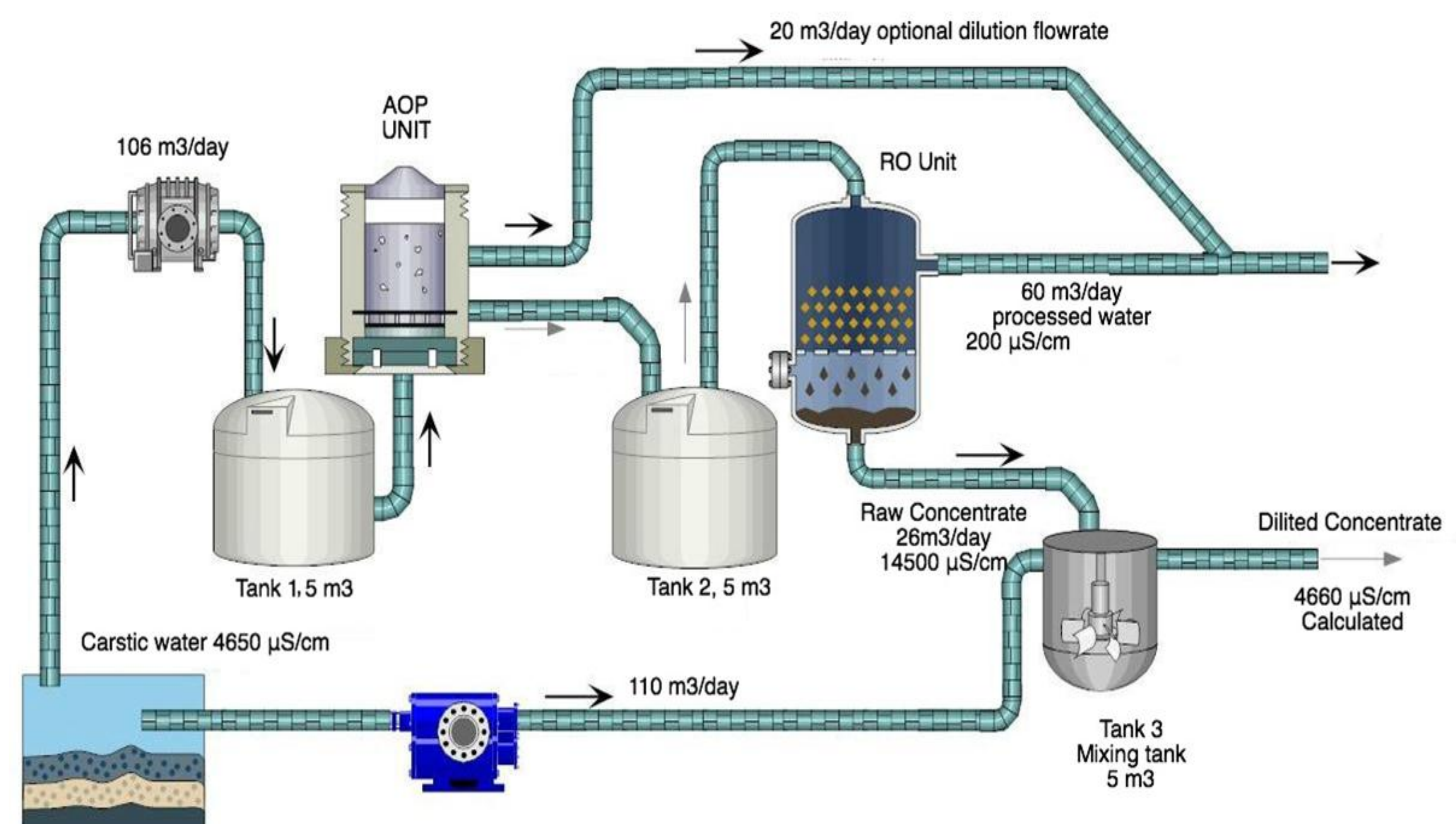


Includes:

- Sand filtration,
- antiscalant dosing,
- 5 μm cartridge filter
- Reverse Osmosis

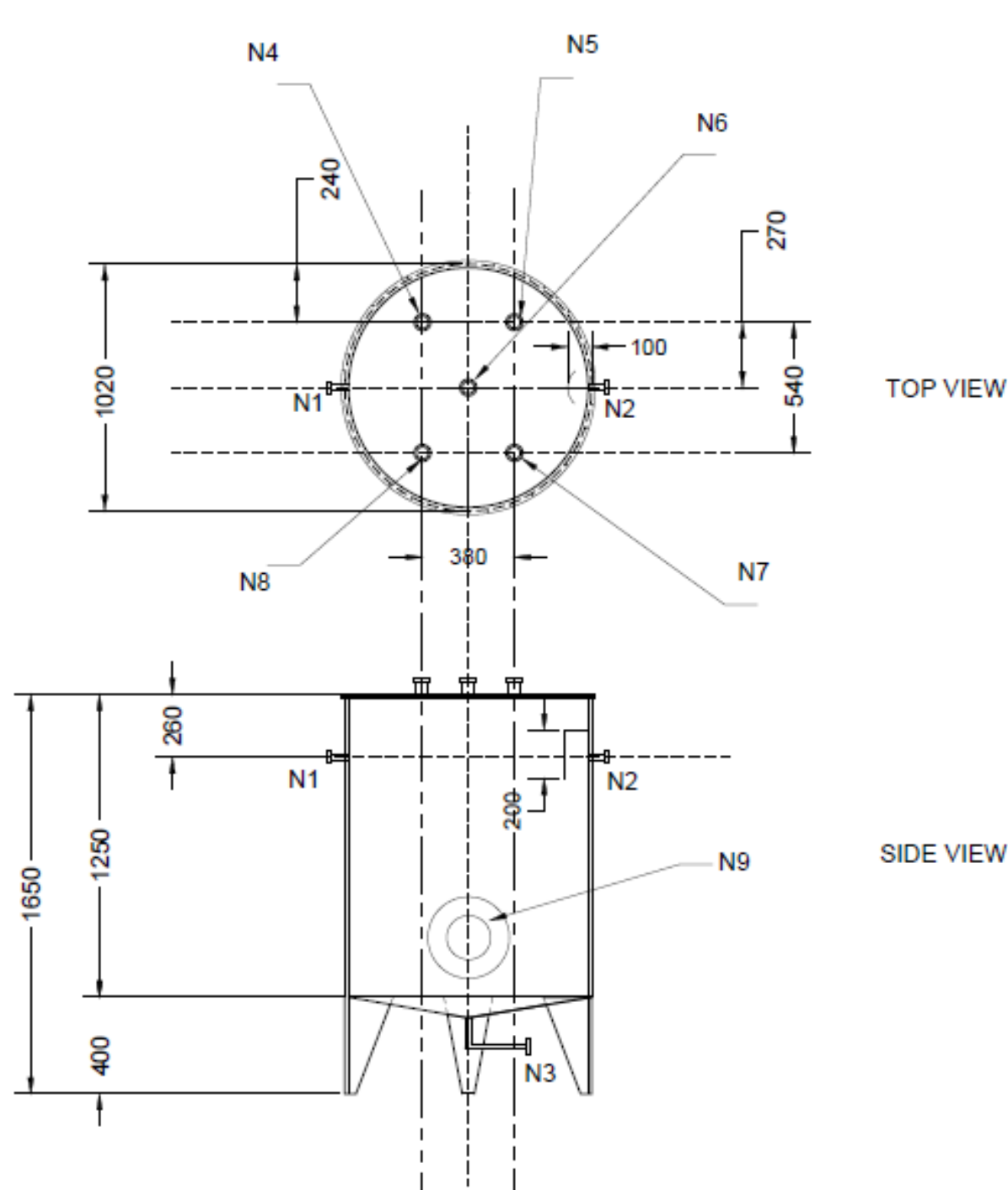


Operation

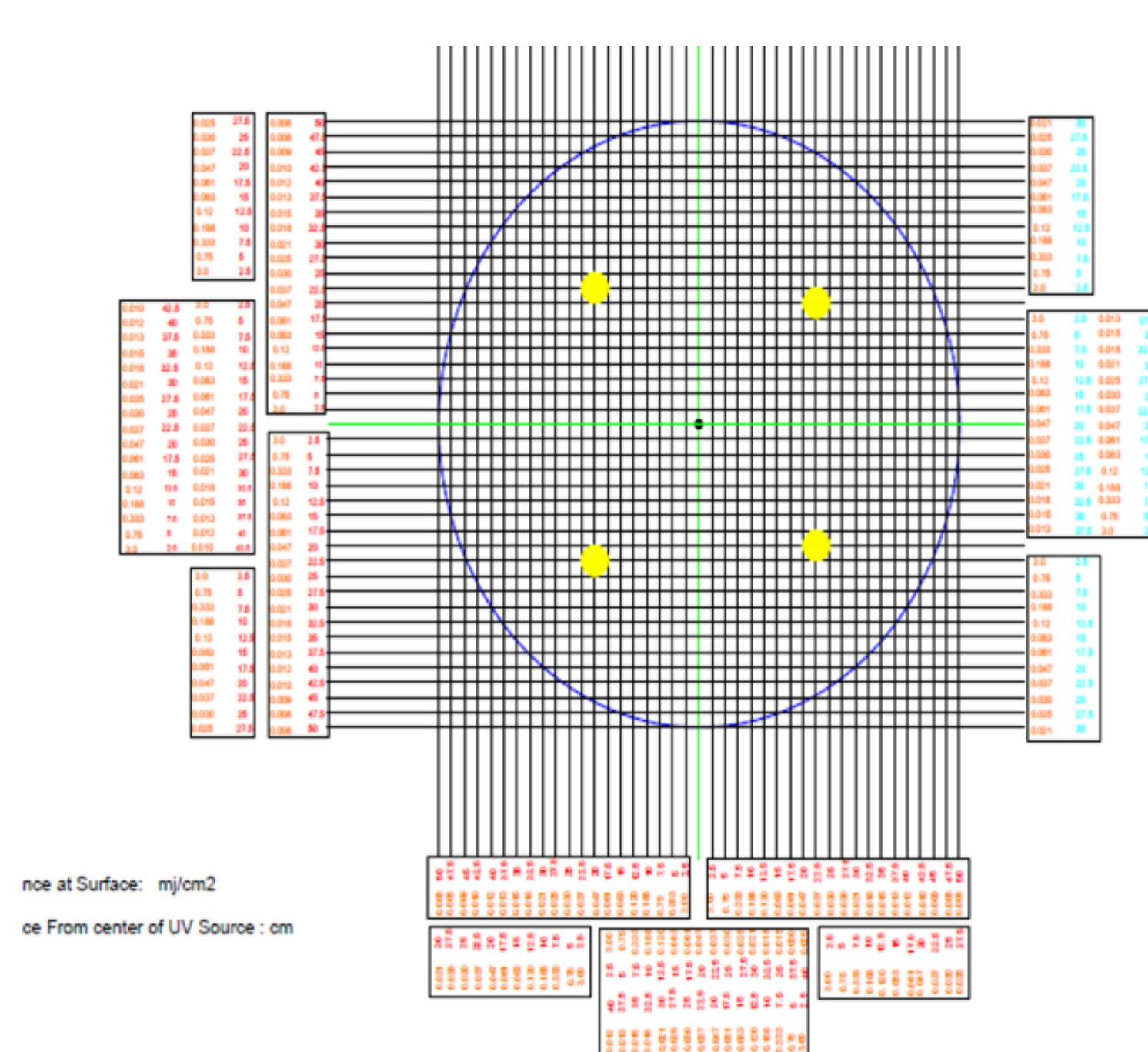


AOP Unit

AOP reactor design



Lamp Placement



- AOP grade 304 stainless steel tank of 1 m^3
- selected photocatalyst: photocatalytically active fumed titanium dioxide granules (>99,5%) with $\sim 20 \mu\text{m}$ particle size
- medium pressure UV lamps were used and their type and placement was designed and implemented
- catalyst loading: 300 mg/L (150-200 NTU)
- cross-flow microfiltration (MF) process has been used for solid / liquid separation leading to a complete recovery of TiO_2 particles
- Conductivity and TOC online monitoring
- remote monitoring and control

- TOC removal >95%
- Variable contact time, treatment cycles, UV illumination
- Aquifer recharge
- remote monitoring and control

Conclusions

An efficient integrated pilot scale AOP/RO system has been developed and constructed for the remediation and clean-up of a groundwater aquifer in Greece. The unit is continuously operated and monitored for maximum organic load remediation and salinity reduction, in order to recharge the nearby aquifer, without increasing the organic load of the RO reject flux. The project is under development and continuous data are gathered so as to maximize the efficiency of the unit.

Acknowledgements

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