



← AIRFLOW

hanningfield 
PRC-05-0267

Case Study

Uni-Dust Cyclone Enables Efficient Solids Recovery in Innovative Water Purification Process

Requirement

The Customer: Aquaplasma Technologies Group Pty Ltd, Adelaide, Australia

Aquaplasma Technologies Group, based in Adelaide, South Australia, has spent several years developing a proprietary water treatment process capable of treating seawater, wastewater, greywater, blackwater and other contaminated water sources.

The technology operates as a zero liquid discharge system, converting dissolved minerals, contaminants and impurities into a recoverable dry particulate stream while producing purified water. By generating dry solids that can be safely collected and managed, the process offers a sustainable approach to water treatment and resource recovery.

A critical requirement was the efficient separation and collection of the dry particulate stream generated during treatment.

The requirements of the separation process were:

- Clean collection of particulate product without a membrane or filter.
- High efficiency retention, ideally close to 100% for particulates greater than 50 microns in size.
- Suitable for a dry steam flow rate of 150 m³/hr (88 CFM) and operation with hot dry steam (circa 80°C).
- Internal surface finishes to cGMP standards.
- No power or services required.
- Easy to clean and empty, with potential future adaptation for a safe-change collection pot for hazardous products.
- Suitable for possible future scale-up.

Solution

Traditional zero liquid discharge systems can be costly, generate waste streams, require membrane replacement, and are difficult to maintain. Aquaplasma therefore sought a simple method to separate dry particulates from a dry steam stream and approached Hanningfield regarding the Uni-Dust range of high-efficiency cyclone separators. The Uni-Dust cyclones are sized according to gas flow rate, require no power, and contain no filter media, eliminating ongoing replacement and maintenance costs.

Although the application was novel and previously untested with this type of dry steam stream, modelling indicated a flow rate of approximately 100–150 m³/hr, making the Uni-Dust Type 5 suitable for pilot-scale evaluation. A demonstration unit was supplied, installed downstream of the treatment stage, and insulated to retain heat, with a sight glass and collection vessel added.

The cyclone now serves as the final solids recovery stage, separating particulates from the steam before downstream condensation into purified water, with recovered mineral powders and other by-products collected for removal, reclamation or further analysis.

Results & Conclusion

Following installation of the Uni-Dust cyclone, the Aquaplasma pilot plant was tested using seawater and hyper-salinated desalination effluent. Collection rates ranged from approximately 35 g to 200 g of powdered solids per litre of water processed, depending on feed composition. Particulate retention was estimated to be close to 100% for the 50–150 micron size range generated by the process.

The results validated reliable operation with hot dry steam streams, achieving efficient solids recovery without filters, membranes, or external power. Following the successful trials, Aquaplasma purchased the demonstration Type 5 cyclone, which now forms an integral part of its pilot plant and validation platform. The Uni-Dust range also provides a clear pathway for future scale-up into larger commercial systems.

Overall, the Hanningfield Uni-Dust Type 5 cyclone demonstrated effective and flexible particulate separation in a novel water treatment application, enabling consistent solids recovery and supporting scalable resource recovery processes.

“

We have been extremely pleased with the performance of the Hanningfield Uni-Dust cyclone throughout our pilot programme. The system has consistently demonstrated excellent separation efficiency, reliability and ease of operation, and has become an integral component of our technology platform.

”

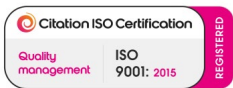
The Equipment



Uni-Dust Type 5



**Uni-Dust Type 5 -
Installed**



hanningfield



UK and Worldwide (Headquarters)

Hanningfield Process Systems Ltd
17 Millhead Way
Purdeys Industrial Estate
Rochford, Essex, SS4 1LB
United Kingdom

Tel: +44 (0) 1702 549 777

E-Mail: sales@hanningfield.com

USA, Canada, Mexico and North America

Hanningfield USA Inc



Scan for Contact Details

Australasia and the Asia-Pacific

Hanningfield (Asia-Pacific) Pty Ltd



Scan for Contact Details

India and the SAARC region

Hanningfield India PVT Ltd



Scan for Contact Details