

DTS provides integrated membrane process systems for total recycle of liquid radwaste (LRW) at BWRs, and for water release at PWRs.

The Zero Environmental Release Option (ZERO™) System is an efficient, economical approach to LRW processing for both types of plant.

### The ZERO™ Approach

In the ZERO™ System, DTS combines several complimentary technologies to give you the greatest benefits of each.

Since each ZERO™ sub-system is a separate module, components can be added or removed to meet your operational and financial needs.

### System Components

**Process Stream Conditioning:** The Ozonator™ destroys organics before prefiltration to prevent fouling of membranes and media.

**Prefiltration:** This is the key to efficient operation of membrane systems. Depending on your plant's needs, prefiltration can be accomplished with a Tubular UltraFiltration (TUF™) unit, a Candle Filter System (CFS™), or a profiled deep-bed activated carbon filter.

**Dissolved Solids Removal:** Reverse Osmosis (RO) in a double-pass spiral wound configuration is ideal for removing dissolved solids.

**Permeate Polishing:** An ion exchange post-polisher helps to ensure consistent production of <0.1 µmho water.

**Reject Concentration:** A small, specialized RO unit super-concentrates reject volume before it is sent for drying.

**Drying:** A single- or double-headed Drum-Dryer™ dries concentrates to granular solids.



**ZERO™ System**

### Dry Solid Product

Solids removed from the water are concentrated and dried. The granular end product represents Volume Reduction (VR) as high as 100,000:1 for BWRs and 10,000:1 for PWRs.

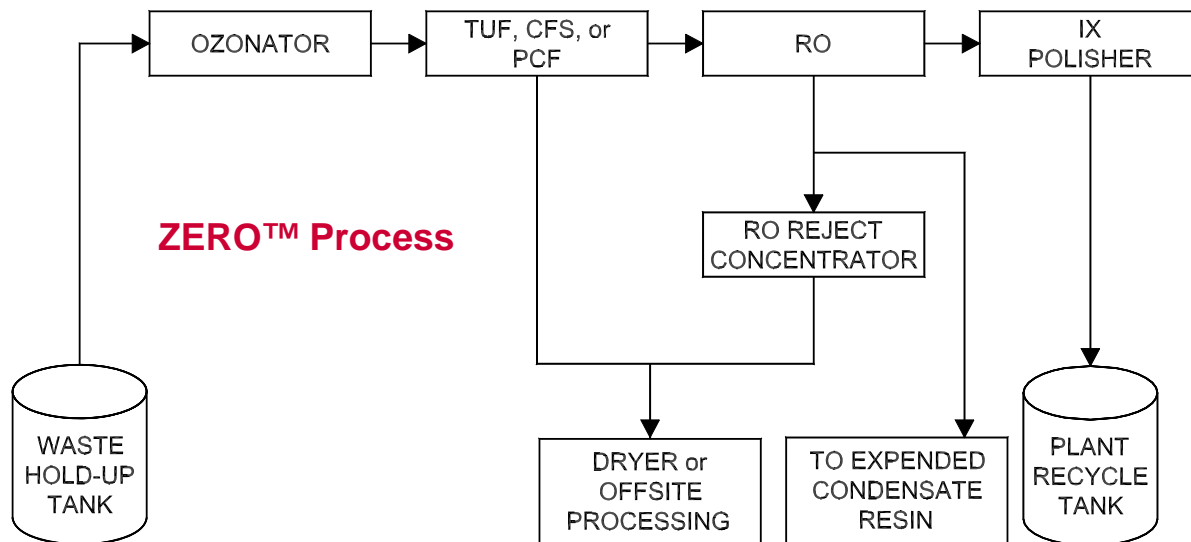
Drying sterilizes the waste, depriving microbes of the moisture they need, and eliminating microbial action (gas generation). The absence of moisture also eliminates the risk of chemical attack on storage containers.

Dry product is ideal for storage in High Integrity Containers (HICs), steel liners, or drums for future disposal. Dried waste can also be stabilized with DTS' polymer solidification process, which is approved by the NRC for Class B and C waste forms (no HIC required).

### Total Process Control

The ZERO™ System offers maximum operating flexibility. A Programmable Logic Controller (PLC) automatically adjusts operating parameters to optimize processing results under varying influent conditions.

A Man-Machine Interface (MMI) allows remote monitoring and operation, data logging, report generation, and data trending.



## ZERO™ Process

### Process Stream Conditioning

TOC in the process stream is a chronic problem for both BWRs and PWRs. The Ozonator™ destroys TOC and light oils before they reach the membrane systems. This improves system performance and reduces membrane fouling and the need for membrane cleaning.

### Prefiltration

Quality prefiltration is essential to assure long run times and low dose buildup for the RO membranes. The Tubular UltraFilter (TUF™) removes virtually all of the membrane-fouling TSS and TOC. With an effective filtration capacity of 0.05 micron, it provides protection 100 times better than the minimum recommended by membrane manufacturers.

The Candle Filter System (CFS™) provides a lower-cost yet effective filtration capacity of <5 micron, meeting the minimum recommended by membrane manufacturers. When used with a precoat, the CFS™ provides sub-micron filtration that enhances downstream RO performance.

A 50 cf PreConditioning Filter (PCF™), loaded with a profiled depth bed of activated carbon, can be used where space is restricted and

budgets limited. With downstream mechanical filtration, the PCF™ provides adequate protection for the RO membranes in most applications.

### Dissolved Solids Removal

The process stream is directed to a double-pass three-stage RO unit for further reduction of contaminants. This system produces high-quality effluent, even when system influent varies greatly.

### Permeate Polishing

Clean water (permeate) product from the double-pass RO can be directed to an optional ion exchange polisher that produces better than reactor grade water — typically 0.07 µmho.

### Reject Concentration

A small, high-pressure RO unit super-concentrates the reject volume before it is sent for drying.

### Concentrate and Sludge Drying

The DrumDryer™ can be used to dry the RO concentrates and collected solids to a dry solid waste form that is approved for disposal at Barnwell, South Carolina and Envirocare's Utah facility.