



State of Wastewater Reuse in the
Meat and Poultry Industry

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Treatment Approaches for Water Reuse 2008

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Topics

- Wastewater Reuse Terminology and Options
- Regulations and Guidelines for Wastewater Reuse
- Physical/Chemical Approaches for Wastewater Reuse
- Advanced Wastewater Treatment Approaches for Wastewater Reuse
- Practical Limitations to Wastewater Reuse

Wastewater Reuse Terminology

Regeneration

Closed
-Loop

Redistribution

Single-Pass

Recycling

Reconditioned

TYPE A

Type B



Reclaimed

Reuse

Multi-Pass

ADVANCED
TREATMENT

Open-
loop

Type C

Wastewater Reuse

- is the capture and reutilization of wastewater within industrial processes with the intent of reducing total water use or increasing production without increasing total water use.

The 3 general types of Wastewater Reuse are:

- Water Reuse with No Treatment
- Water Reuse with Limited or Targeted Treatment
- Water Reuse with Advance or Full Treatment

A world map is visible in the background, rendered in a dark blue color against a lighter blue gradient. The map shows the outlines of continents and is overlaid with a grid of latitude and longitude lines. The text is centered over the map.

Regulations and Guidelines for Wastewater Reuse

9 CFR 416.2(g)

416.2(g)(1) A supply of running water that complies with the National Primary

Drinking Water regulations (40 CFR part 141), at a suitable temperature and under pressure as needed, must be provided in all areas where required (for processing product, for cleaning rooms and equipment, utensils, and packaging materials, for employee sanitary facilities, etc.). If an establishment uses a municipal water supply, it must make available to FSIS, upon request, a water report, issued under the authority of the State or local health agency, certifying or attesting to the potability of the water supply. If an establishment uses a private well for its water supply, it must make available to FSIS, upon request, documentation certifying the potability of the water supply that has been renewed at least semi-annually.

416.2(g)(2) Water, ice, and solutions (such as brine, liquid smoke, or propylene glycol) used to chill or cook ready-to-eat product may be reused for the same purpose, provided that they are maintained free of pathogenic organisms and fecal coliform organisms and that other physical, chemical, and microbiological contamination have been reduced to prevent adulteration of product.

416.2(g)(3) Water, ice, and solutions used to chill or wash raw product may be reused for the same purpose provided that measures are taken to reduce physical, chemical, and microbiological contamination so as to prevent contamination or adulteration of product. Reuse that which has come into contact with raw product may not be used on ready-to-eat product.

416.2(g)(4) Reconditioned water that has never contained human waste and that has been treated by an onsite **advanced wastewater treatment facility** may be used on raw product, except in product formulation, and throughout the facility in edible and inedible production areas, provided that measures are taken to ensure that this water **meets the criteria prescribed in paragraph (g)(1) of this section**. Product, facilities, equipment, and utensils coming in contact with this water must undergo a separate final rinse with non-reconditioned water that meets the criteria prescribed in paragraph (g)(1) of this section.

416.2(g)(5) Any water that has never contained human waste and that is free of pathogenic organisms may be used in edible and inedible product areas, provided it does not contact edible product. For example, such reuse water may be used to move heavy solids, to flush the bottom of open evisceration troughs, or to wash antemortem areas, livestock pens, trucks, poultry cages, picker aprons, picking room floors, and similar areas within the establishment.

416.2(g)(6) Water that does not meet the use conditions of paragraphs (g)(1) through (g)(5) of this section may not be used in areas where edible product is handled or prepared or in any manner that would allow it to adulterate edible product or create unsanitary conditions.

Where Reuse Water Can be used

- Stun, Scald, Bird Wash, Pickers, Outside Washes, Eviscerate, and initial Chiller baths (last touch must be fresh potable)
- Rough Clean of utensils, equipment, facilities, providing final rinse by fresh potable water

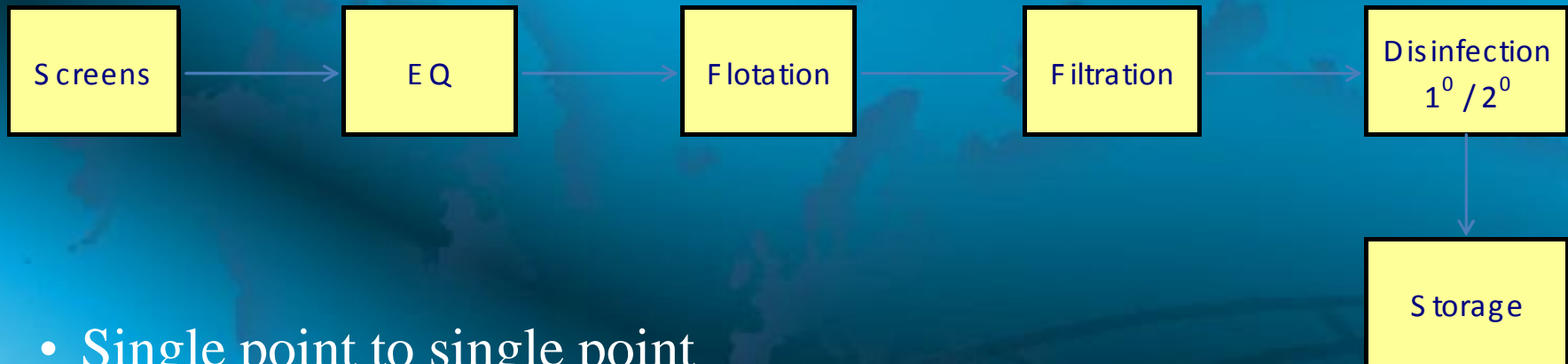
Where Reuse Water Cannot be used

- Final touch on bird
- Product / Ingredient Formulation
- Final Rinse of Product, Facilities, equipment, and utensils

Technology Options for Wastewater Reuse

- Point Source Reuse
 - Type A Reuse – Water reused for the same purpose
 - Inside/Outside Bird Wash Water
- Air Flotation Unit Effluent
 - Type B Reuse
 - Turbidity < 5 ntu ; Chlorine – 1 ppm ; Pathogen free
 - Non-contact applications
- Advanced Wastewater Reuse
 - Type C Reuse – End of Pipe
 - Turbidity < 1 ntu ; TOC < 100 ppm ; Pathogen free
 - Potable water quality (Primary Drinking Water Standards)
 - Biological Treatment Systems
 - All water up to the last touch point

Physical/Chemical Wastewater Reuse Options



- Single point to single point
 - chiller – recondition – chiller
 - water and BTU recovery
- Multiple point to multiple point
 - chiller and final bird washer – recondition – scalding, evisceration, IOBW
 - greater water volume

**USDA – FSIS
Terminology see
§ 416.2(g)**

Wastewater Reuse Screens w/ Disinfection

Luker
Engineering
Reuse Screen



DMP Liquid Reclamation Filtration System



The DMP Liquid Reclamation Filtration System is designed to remove particles (*solids*) from liquid that are greater in size than .008 (200 microns) to allow reuse of liquids. The DMP model LFS-112 is designed to handle up to 200 GPM (LFS-116 (300 GPM)).

In water reuse applications, test results have shown that with the correct additive of chlorine to the water before entering the system, no new or "make up" water or chlorine needs to be added after filtration to pass microbiological test for reuse water.

70 DMP Reuse Systems in operation in 40 different poultry processing facilities in 14 states.

Ozone Based Systems

American Water Purification, Inc. is the poultry industry leader in reprocessing waste water streams and returning USDA approved water to virtually all primary processing areas. Today, with five plants operating in three different states, AWPI saves the nation's leading poultry processors over 2.0 million gallons of water every day. In December of 2007, AWPI passed the 2.5 billion gallon milestone in reprocessed water returned to poultry processors since its first installation started up in November of 1997.



AWPI

The AWPI System Process



We start with raw water.



Screens filter out solid waste.



Waste water collects and ozone is injected and bubbles are accelerated.



Water is cycled through a tank system and the water gets progressively cleaner.



Water is run back through a series of screens to release ozone. No chemicals lost!

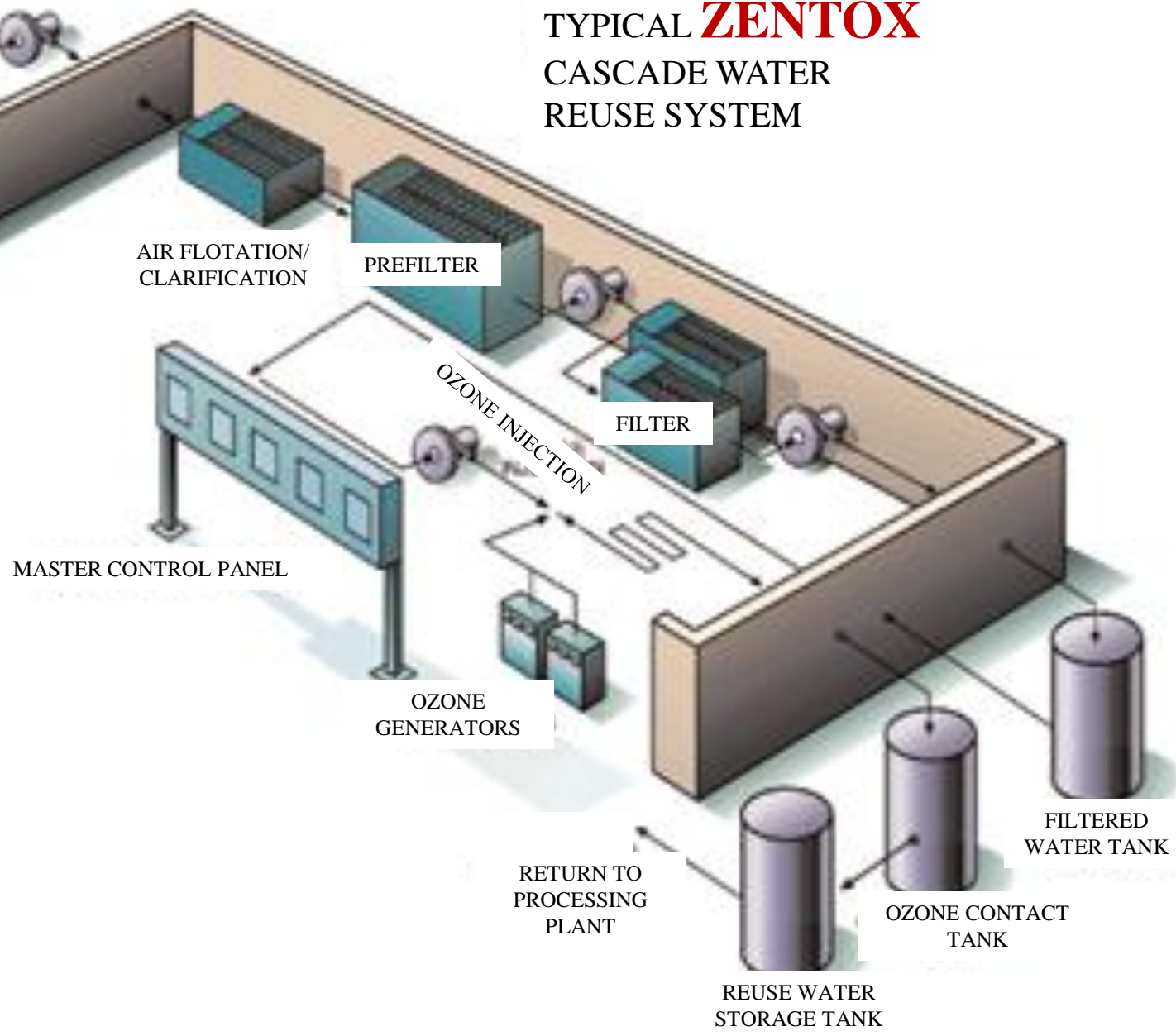


The previously raw water is now clean and ready for reuse.

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PROCESSING
PLANT

TYPICAL ZENTOX CASCADE WATER REUSE SYSTEM



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Advanced Wastewater Treatment Approaches for Wastewater Reuse

Secondary Effluent



How Effective?

Constituent	After secondary with BNR plus disinfection	After secondary with BNR plus depth filtration and disinfection	After secondary with BNR plus microfiltration, RO and disinfection
TSS	5-20	1-4	≤ 1
BOD	5-20	1-5	0-2
TN	2-12	2-12	≤ 1
NO ₃	1-10	1-10	≤ 1
Phosphorus	0.1-0.5	0.1-0.5	≤ 0.5
Turbidity	2-6	≤ 2	0.1 -1
Bacteria	2.2-240	≤ 2.2	≈ 0
Protozoan	5-10	≤ 1	≈ 0
Viruses	100-10000	$\leq .0001$	≈ 0

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Practical Limitations to Wastewater Reuse

Wastewater Reuse Concerns

- Pathogenic Organisms
- Corrosion
- Scaling
- Biological Fouling
- Accumulation of persistent wastewater constituents
- Public Perception

