

# Fouling Release Coatings Combat Fouling

in

**Power Generation &  
Water**

**Treatment Facilities**

**4 Case Histories**

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# WHY FOULING RELEASE?

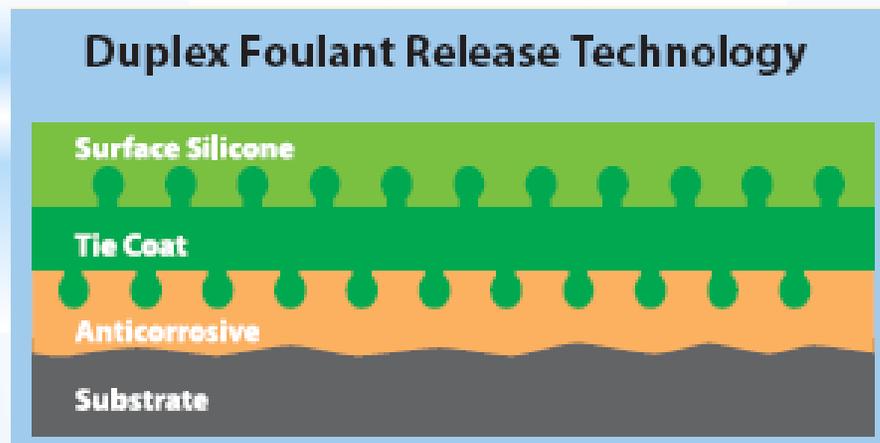
- Continued ***spread of animal and plant fouling*** organisms negatively impacted operations.
- Silicone fouling release (SFR) coatings offer **barrier technology & facilitate ongoing maintenance challenges** created by both indigenous and invasive species.

## We will review four case histories:

- 2 Water Treatment: invasive ***quagga and zebra mussels*** in a water delivery pipe from a lake in central Colorado to a ***municipal potable water process facility & combating algae growth*** in the weirs of a waste treatment clarifier in coastal Virginia.
- 2 Power Generation: invasive ***didymo algae*** in New Zealand & indigenous ***barnacles*** on an intake structure along the southeast coast of Florida.

# The Silicone Fouling Release coating system:

- **Surface preparation** to “near white” industry standards (National Association of Corrosion Engineers NACE #2, Society of Protective Coatings **SSPC-SP 10**, Swedish Standards SA 2 ½) or equal
- **Two coat of immersion grade epoxy** applied at 6 mils (150 microns) dry film thickness
- **One coat of silicone fouling release Tie Coat** applied at 6 mils (150 microns) dry film thickness
- **One coat of silicone fouling release Surface Coat** applied at 6 mils (150 microns) dry film thickness



## Case history - Didymo Algae in New Zealand:

- Owner - Meridian Energy Ltd of New Zealand
- Location - Ahuriri, Lower Waitaiki, Mararoa, Upper Ohau and Waiau Rivers on the country's South Island
- Market – power generation
- ***Fouling species - didymo algae (didymosphenia geminate)***

## Issue:

The company was concerned with the ***algae posing risks to continued operations of the company's hydroelectric power plants*** due to didymo *attach to water intake and other generating structures.*



Didymo “***explosion***” across entire river bed, ***displacing all existing aquatic life***, a worst case scenario



Full grown didymo attached to a rock

## The structures to be coated:

It was decided to test the fouling release coating system in two scenarios:

1. Initial testing would be on coated test panels placed in the infested rivers by the power company.



Panel without FR Coating



Panel with FR coating

2. Successful results, a second phase of testing application of the coating system by a New Zealand industrial painting contractor ***to naturally occurring indigenous river boulders.***



At time of immersion



Minimal fouling after 10 months

## **Outcome of the applications:**

The ***owner considered the results successful.*** A concluding summarization by the owner stated:

***“ The coating trial has been successful: the release coating system works! And I've got an important insurance policy in my back pocket in case situations change in the future and didymo growth & biomass production increases to higher levels. “***

## Case history - Barnacles along Florida's southeast coast

- Owner – Vero Beach Municipal Power Company
- Location – Inter-Coastal Waterway, Vero Beach, FL
- Market – power generation
- Fouling species – ***indigenous barnacles and potentially the green mussel (perna viridis)***

## Issue:

Solution to **barnacle attachment on the power plant's intake grates** constructed of high density polyethylene plastic (HDPE). ***Not only was water flow restriction from the fouling & increased maintenance cost for cleaning during outages.***



Fouling on intake trash gates **prior to installation** of FR coating system

## The Structures top be coated:

- 2 intake trash grates coated with the FR system for trial purposes. Successful performance resulted in the owner's decision to have 6 additional grates coated by a professional industrial painting contractor.

## Outcome of the applications :

- 18 months of performance removed, inspected and easily cleaned. Inspection revealed a few barnacles had attempted to attach and a yellowish slime had settled on the surfaces.
- Cleaning of the grates was successfully accomplished with little effort using water at normal garden hose pressure.



Cleaning of coated trash grate with a garden hose

## Outcome of the applications :

The ***owner considered the results successful***. The representative stated:

*“I’m very happy with the results in that there were only a few barnacles attached” and **“I was able to rinse with the garden hose”**.*

Additionally, the owner stated **“The results have far exceeded our expectations considering the harsh salt / brackish water environment & greatly reduce our maintenance cost of man power needed to remove, clean, and reinstall the trash grates to service”**.

# Case history - defense against Quagga mussels in a Municipal Water delivery pipe in Colorado

- Owner 1 – U.S. Department of Interior, Bureau of Reclamation (owner of reservoir and dam)
- Owner 2 – City of Colorado Springs, CO, Colorado Springs Utilities (owner of water delivery pipe)
- Location - Pueblo Reservoir, CO
- Market – Water treatment
- Fouling species – ***quagga mussels (dreissena bugensis)***

**Issue:**

Potential for fouling by ***Quagga mussels that were reported found in Pueblo Reservoir*** by the U.S. Geological Survey (USGS).

***Construction design for Colorado Springs Utilities' delivery pipe to take water from the downstream side of the Bureau of Reclamation's Pueblo Reservoir dam, so FR coatings were specified to prevent quagga mussel fouling in the pipe section exiting the dam face where chlorine injection would not take place.***

***Additionally required that the FR coating be certified for contact with potable water as Colorado Springs Utilities would be utilizing the water for drinking purposes.***

## The Structure to be coated:

Approximately 110 feet X 96 inch diameter steel pipe a professional industrial coatings applicator installed the fouling release coating system.



Delivery pipe exiting dam face



Inspection of finish coated pipe interior

## Outcome of the application:

At this time, construction of the water delivery pipe continues and the section coated with SFR remained out of service. Phase II of the project calls for construction of an additional 585 feet of pipe interior to be coated. Oct-November 2013 application will begin.

# Case history - fouling release coatings to combat algae growth in wastewater treatment clarifier weirs

- Owner – Hampton Roads Sanitation District
- Location – Nansemond Waste Treatment Facility, Suffolk, VA
- Market – Wastewater treatment
- Fouling species – *algae*

## **Issue:**

*Water from clarifiers destined for return to natural water bodies are required to meet regulated maximum allowable solids content levels. Excessive algae growth in the clarifier weirs contributes to the water's solids content causing the maximum allowance to be exceeded.*

*Regular washing of the weirs is performed as a method to prevent algae accumulation and excess solids in the water.*

*With continuous washing to remove algae from the concrete surfaces of clarifier weirs, the concrete eroded becoming rougher and rougher. The result was very rough concrete from which it was extremely difficult to remove the offending algae.*

*Cleaning became labor intensive and costly. Objectives were to provide a solution to combating algae fouling, protect the underlying concrete and dramatically reduce cleaning efforts and costs.*

## The structure to be coated:

Eroded & aggregate exposed concrete was repaired with a cement patching material. The FR system was applied (while not normally recommended, the coating system was applied with appropriate precautions at ambient air temperatures above 100 degrees F).



Algae conditions prior to coatings

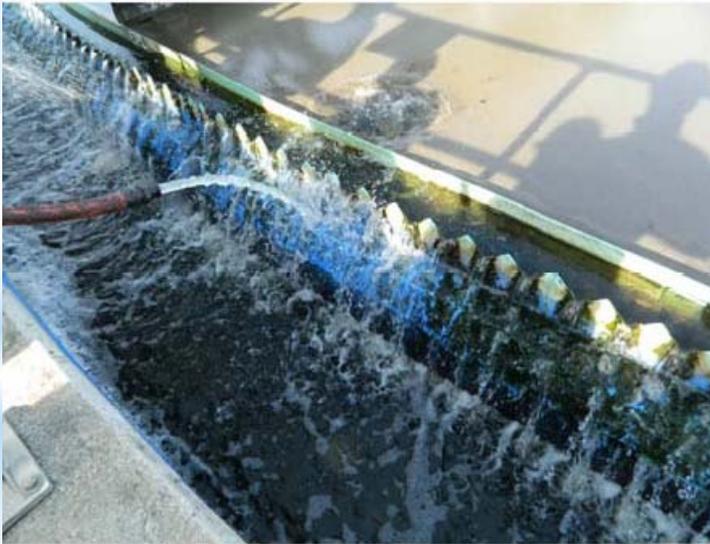


Completed fouling release coating system

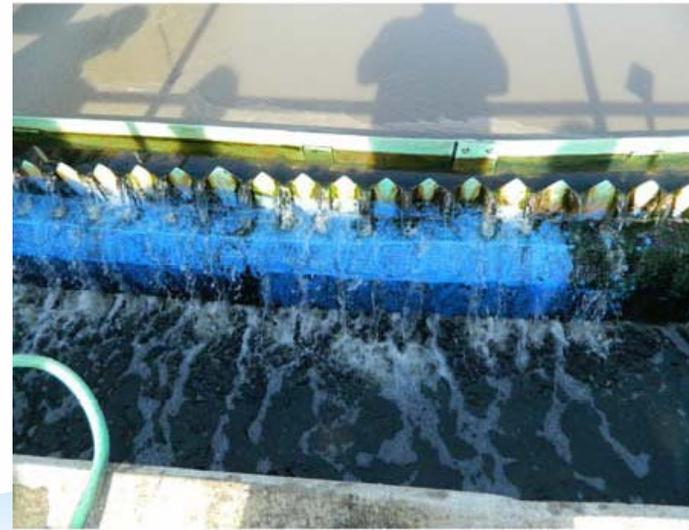
## Outcome of the application:

As expected, algae continued to grow in the weirs. However, cleaning was accomplished in short order with lower pressure water through a garden hose without harm to the coating system or underlying concrete substrate.

The owner reported that the coating system met objectives and expectations and plans to coat additional clarifiers in 2013.



Low water pressure garden hose cleaning



Results after one minute of cleaning

## Conclusion:

In both test and commercial application case histories, Fouling Release coating systems have been successfully demonstrated to ***combat fouling and reduce maintenance and cleaning costs.***