Glosten

SHIPBOARD TESTING ON ATB *JOHN J. CARRICK*

PRESENTED BY: KEN FITZGERALD

13 APRIL 2017

BALLAST WATER: CONTINGENCY TREATMENT UPDATE

OVERVIEW

Contingency System

inTank

inResponse™

System Overview

Great Lakes Field Deployment

What did we do?

Verification Test

How did we do?

PARTICIPANTS

McAsphalt Marine Transportation

National Park Service

Grand Portage Tribe

Moss Landing Marine Laboratories

BACKGROUND

THE EQUIPMENT AND THE SHIP

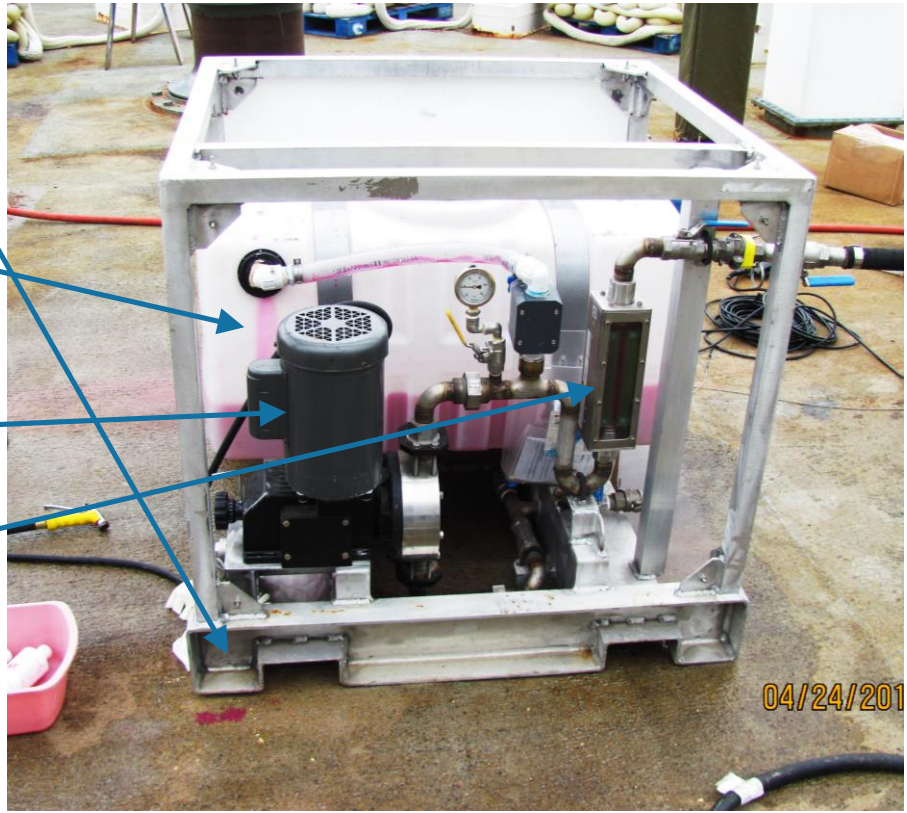
METERING SKID

Portable design

Chemical prep tank

Metering pump

Flow meter



MIXING PUMP

Submersible

300 GPM flow rate

Treatment injection

3-way nozzle outlet

Tripod mount

TEST VESSEL ARRANGEMENT

THE EQUIPMENT AND THE SHIP

TANK BARGE *JOHN J. CARRICK*
TUG *VICTORIOUS*

GREAT LAKES ASPHALT TRADE

ATB TANK BARGE

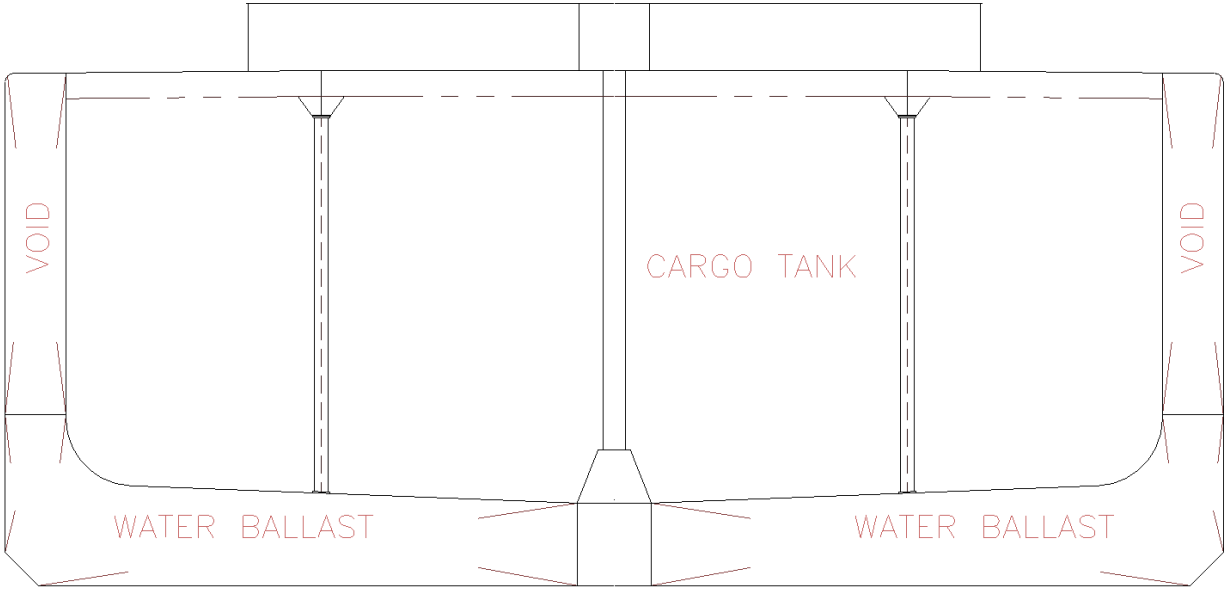
inTank

- **Midbody Ballast Tanks (#4 P&S)**
- **Mixing pump and piping installed in tanks**

inResponse™

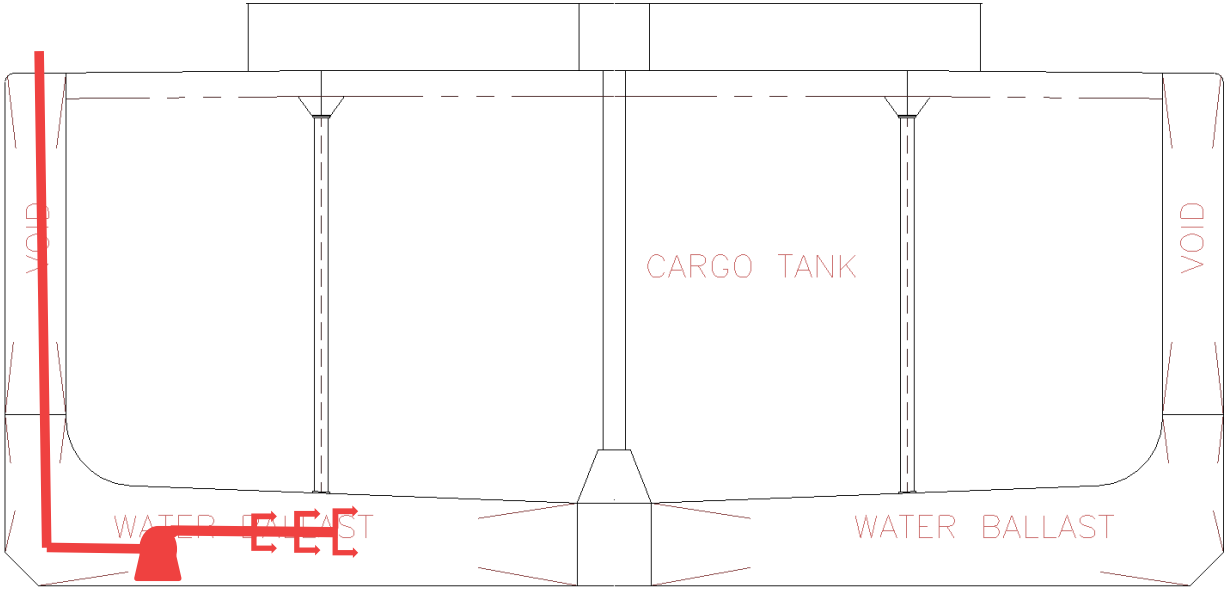
- **Aft Peak Tanks (P&S)**
- **Portable pump**

TANK ARRANGEMENT: MIDBODY 4P & 4S



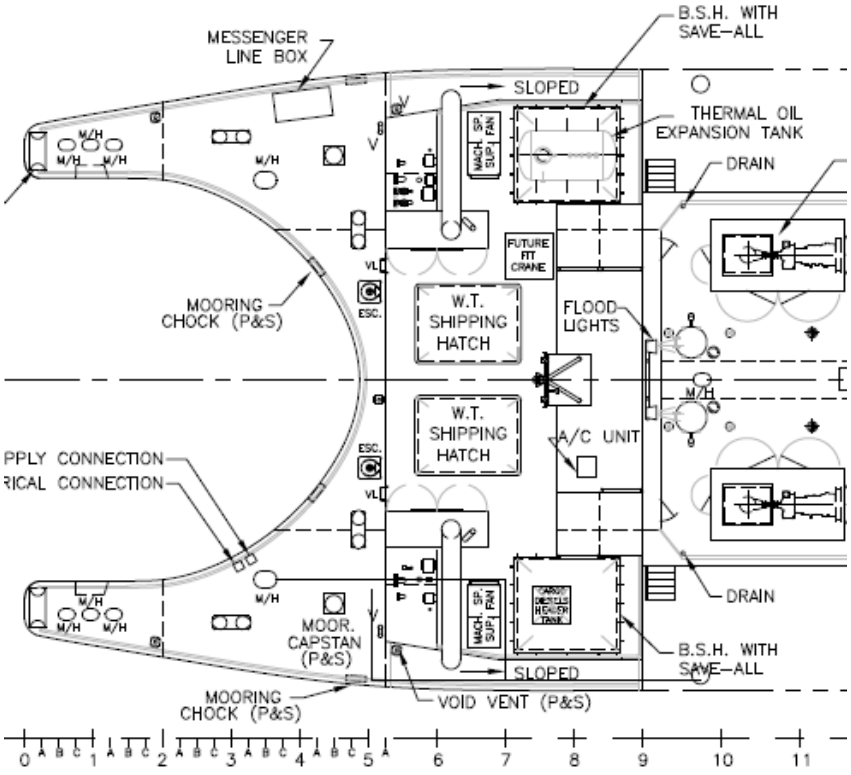
MIDSHIP SECTION

INTANK MIXING: MIDBODY 4P & 4S

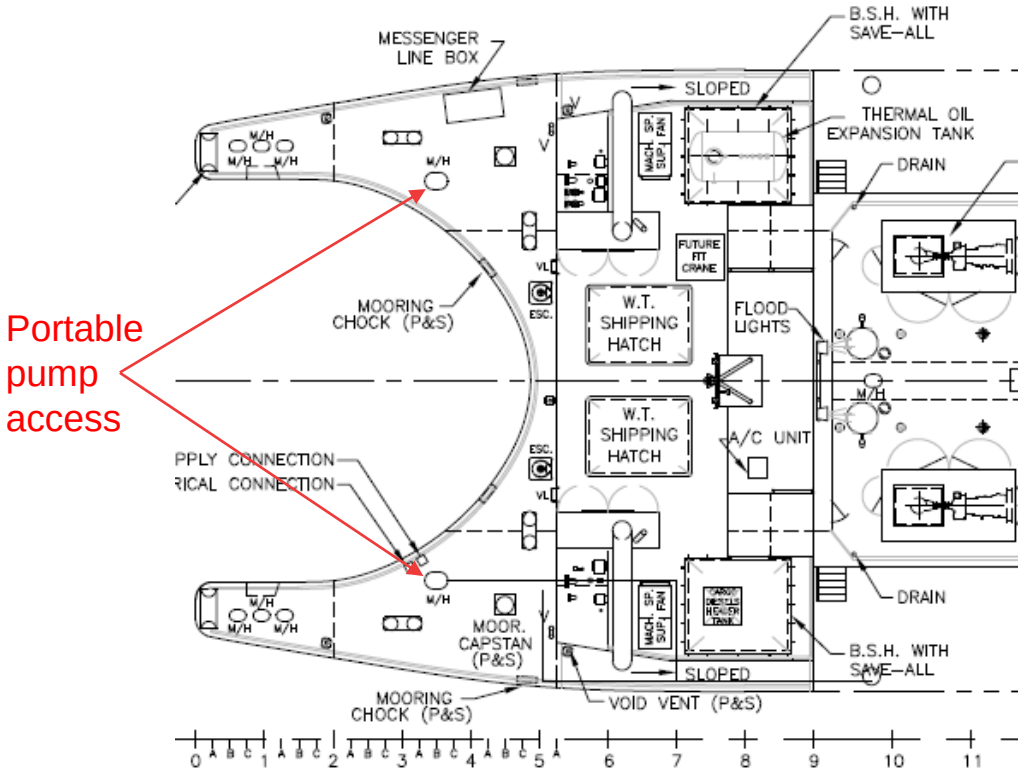


MIDSHIP SECTION

TANK ARRANGEMENT PLAN: AFT PEAK



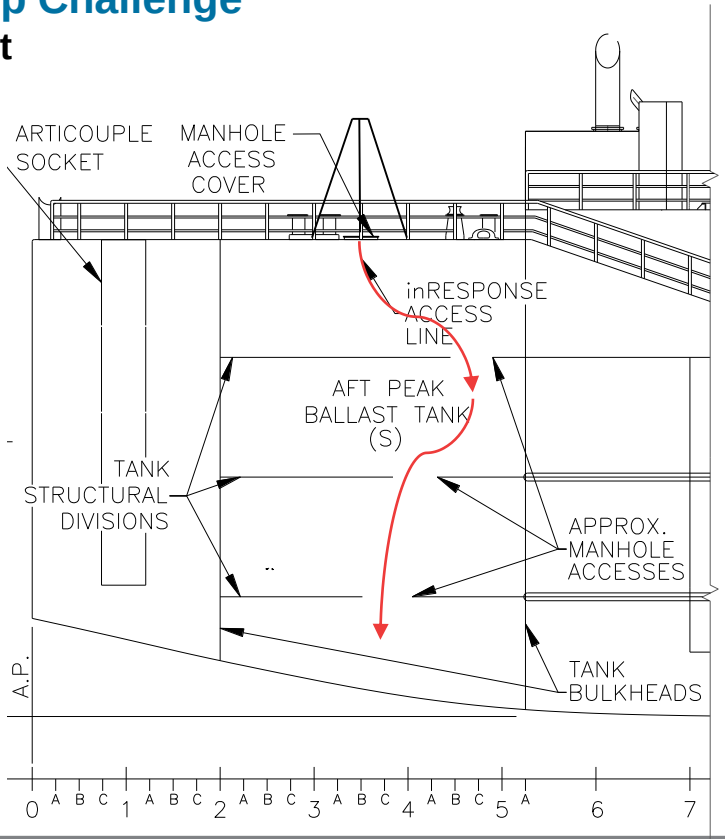
INRESPONSE MIXING: AFT PEAK



TANK ARRANGEMENT ELEVATION: AFT PEAK

inResponse Portable Pump Challenge

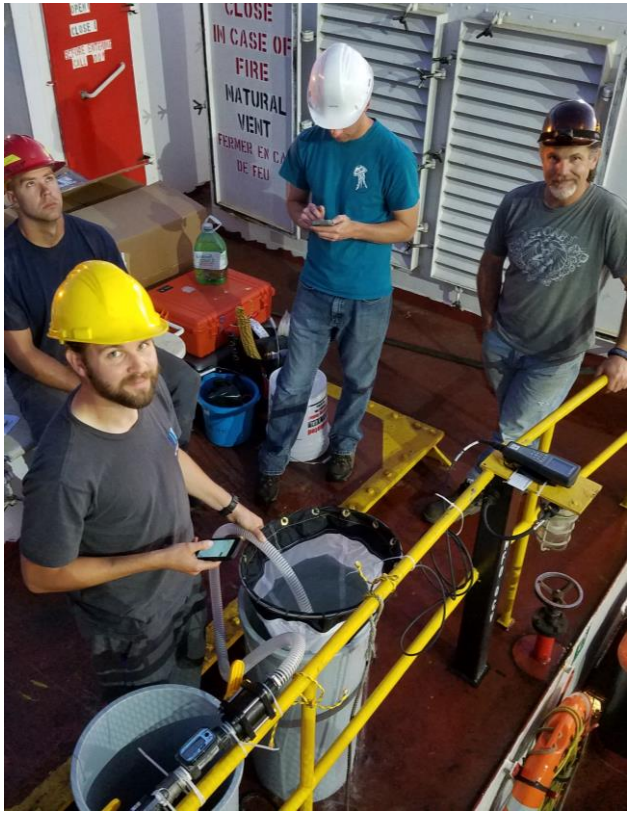
- **Vertical manhole alignment**
- **Mixing divided tanks**



FIELD TESTING

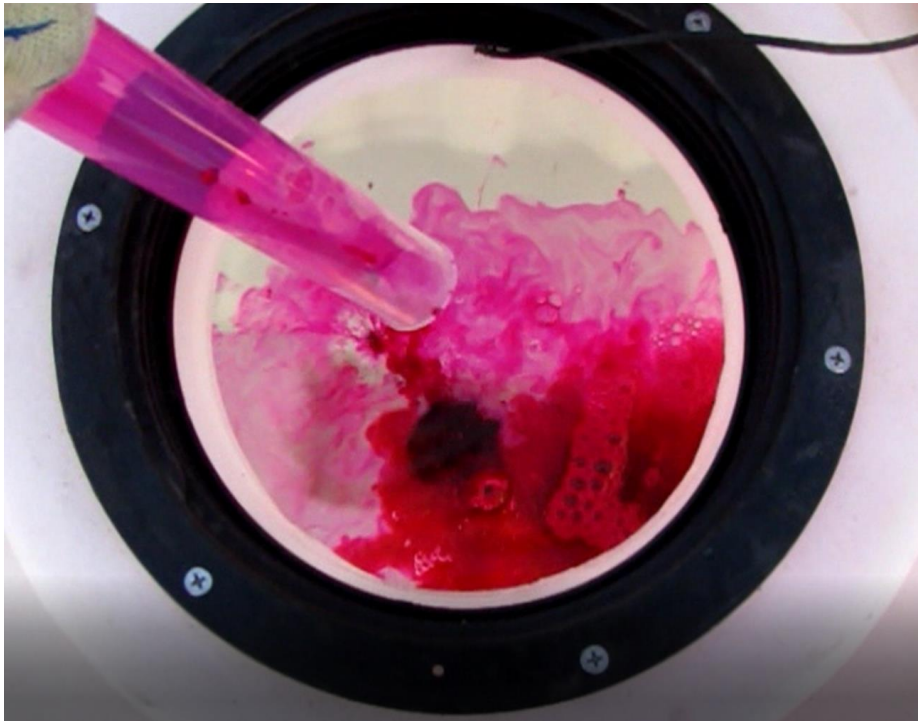
WHAT DID WE LEARN?

BALLAST UPTAKE SAMPLING



- Sub-isokinetic flow through in-line pitot tube
- Staggered tank sequence: Mixed samples from each tank
- Plankton net filtering for >50um zooplankton
- Offsite lab for other analysis

TANK MIXING DYE STUDY



Aft Peak tanks mixing poorly

Midbody tanks mixing well

DOSING: TREATMENT PARAMETERS

Target Sustained Dose (SD)

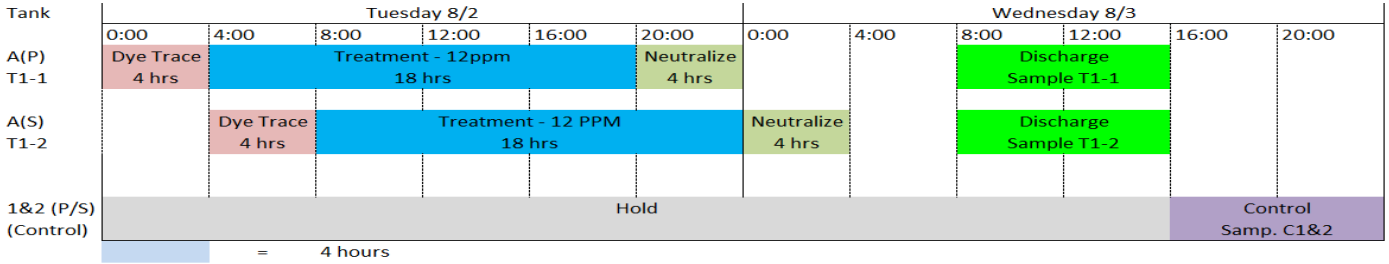
Mixing Coordination

Applied Dose Margin

Residence Time (RT)

Monitoring and Re-dose Interval

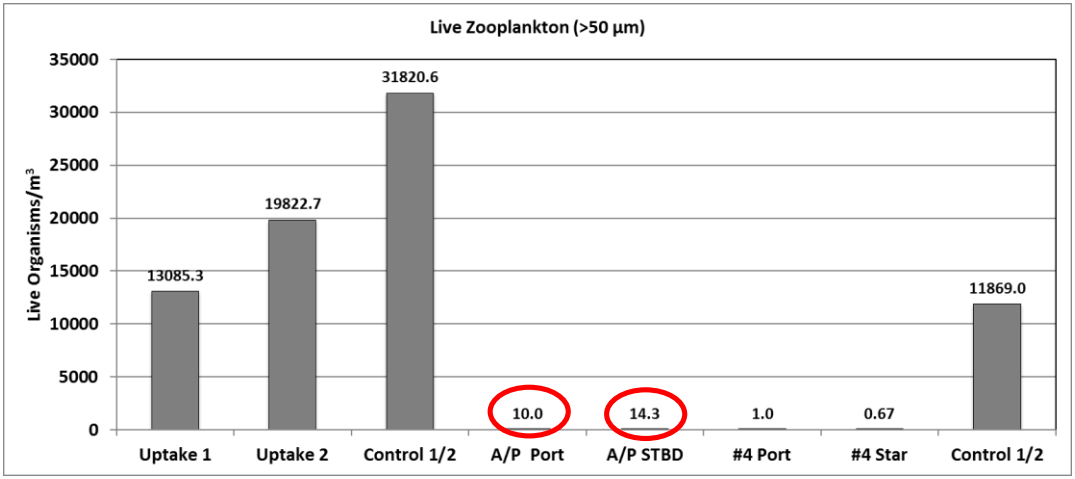
TREATMENT DOSING: AFT PEAK



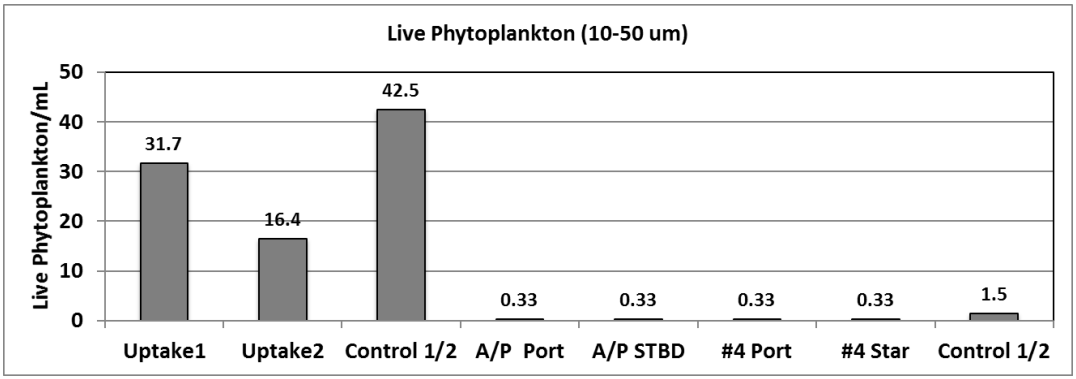
- **Aft Peak dosed for full tank volume concentration target**
- **Mostly mixing in the upper volume**
- **High concentrations during treatment monitoring**

Event	Time
Mixing pump start	12:44
Initial dose	13:02
Dosing shutoff	13:21
Sample T-0	14:25
Mixing pump shutoff	14:27
Mixing pump start	16:28
Sample T-1	17:31
Mixing pump shutoff	17:32
Mixing pump start	20:10
Sample T-2	22:06
Mixing pump shutoff	22:07
Re-check T-0	23:30
Mixing pump start	0:45
Sample T-3	2:43
Mixing pump shutoff	2:45
Mixing pump start	5:10
Sample T-4	7:02
Mixing pump shutoff	7:08
Mixing pump start	10:05
Sample T-5	12:13
Mixing pump shutoff	12:17
Mixing pump start	17:56
Nuetralization Sample N-0	N/A
Dosing Pump Start	17:54
Nuetralizer Fully Delivered	18:10
Mixing pump shutoff	18:45
Nuetralization Sample N-1	18:40

BIOLOGY RESULTS



Target: <10



Target: <10

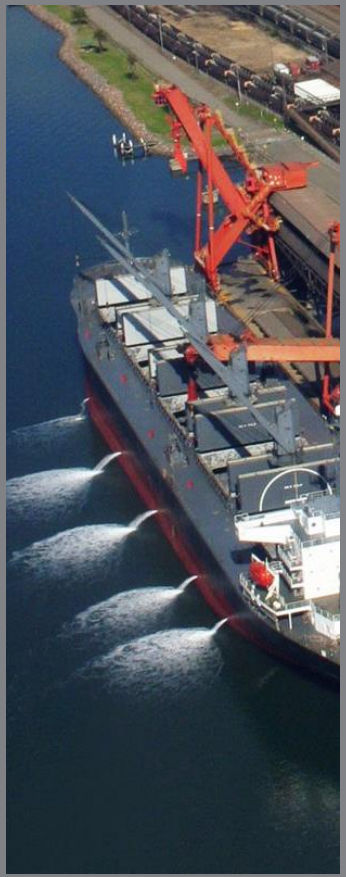
WHAT DID WE LEARN?

Incomplete mixing still provides effective treatment

Mixing and residence times subject to vessel operations

Vessel owner commitment to testing

- *Install discharge pipe pitot system*
- *Provide vessel interfaces: power, temporary flowlines, sampling space*
- *Test crew accommodation*



PROGRAM FUTURE

WHAT'S NEXT?

WHAT'S NEXT?

Emergency Response Package

- *System maintenance*
- *Salvage scenario systems optimization*
- *Global Diving & Salvage, West Coast response network*
- *Vessel Operator Awareness: contingency solution*

West Coast Testing

- *New biology*
- *New routes and transit durations*
- *Vessel types*

GLOBAL
Diving & Salvage, Inc.