envirocleanse

MARSHIP engineering

ENVIROCLEANSE inTank™ BWTS

A solution for high ballast dependent vessels

AGENDA

- ❑ ENVIROCLEANSE LLc – Mr. Bobby Waid
- ❑ COMMON ASPECTS OF FULL TA BWT SYSTEMS
- ❑ THE inTANK BALLAST WATER SOLUTION
- ❑ inTANK VERSUS INLINE TREATMENT
- ❑ Q&A

INTRO BY MR. BOBBY WAID

I. ENVIROCLEANSE BACKGROUND

1) ***Charter Brokerage***
2) ***The Berkshire Hathaway Connection***
3) ***Mission Statement***: The mission of Envirocleanse is to provide a superior ballast water treatment system that assists companies around the world to perform at the highest safety, compliance and reliability standards **without impacting cargo operations.**

II. WHY WILL WE BE AROUND IN 20 YEARS?

KEY MILESTONES

- 2007: Envirocleanse LLc founded: disinfection of industrial process water via EC-activation technology:
  - Applications : oil & gas fracking, medical and food industries
  - Large installed base of Hypochlorite generators Offshore & landbased

- 2016: Developed design in principle for ballast water treatment
  - Engineering design partner Glosten Marine engineering
  - Patented inTank nozzle & metric C/T value

- 2017: Testing, Product detail marine design,Testing & Pilot ship
  - DNV_GL selected as our IL under Norwegian Flag
  - Selected Golden Bear (USA) accredited Test Facility for LB/SB
  - Successfully installed inTank pilot system on Capesize : incl. treatment of 22.000 m^3 cargo hold

KEY MILESTONES – 2018/2019

- January : LB/SB testing completed for both USCG and IMO
- July : Application submitted to USCG for type approval
- October : IMO grants final approval for EC Variation MEPC 73
- November : GESAMP no objections for BC Variation -> MEPC 74
- January 2019 : USCG application review fully completed

- April 2019 : Planned final approval for Liquid Bulk Variation

SHIPOWNERS QUOTES

“… NONE OF THE SYSTEMS SOLVE THE CRITTER PROBLEM WITHOUT A COMPROMISE TO MY OPERATIONS”

“ …I’M WAITING, THE PROBLEM IS … I’M STUCK WITH FILTERS”

“…IN MISSISSIPPI IT IS NOT POSSIBLE TO FILTER WITHOUT DELAYING THE CARGO OPERATIONS.

“…ALL SYSTEMS SO FAR ARE OPTIMISED TO TREAT FLOW AT THE WORST POSSIBLE MOMENT AND PLACE …”

KEY DRIVERS FOR CARGO SHIPS

- TIME & TIMING IS CRITICAL [LT CHARTERS - SPOT] (US$)
- CONTINGENCY PLANNING (… PLAN B,C)
- FLEXIBILITY (OR LIBERTY TO ACT, NO RESTICTIONS)
- REDUNDANCY (SHOW MUST GO ON)
- RISK AVERSION (TIME / SAFETY / SHIP STABILITY)

ABILITY TO BALLAST AND DEBALLAST AS REQUIRED

TA : 10 YEARS BWT INDUSTRY TECHNOLOGY …

Maker	Model	Principle	Capacity	Vessel status	Design Metric	Hold T	PSU, Temp or UV-i	Other limit:
Optimarin	OBS/OBS Ex	Filt. + UV	167 – 3,000 m3/h	Alongside	Pump flow rate	72	UV-i > 600W/m²	
Alfa Laval	PureBallast 3	Filt.+ UV	150 – 3,000 m3/h	Alongside	Pump flow rate	72	UV-i > 820 W/m²	
TeamTec	OceanSaver	Filt.+ EC (dia)	200 – 7,200 m3/h	Alongside	Pump flow rate	0	PSU>20, T>17	TRO: 1.7 mg/L
Sunrui	BalClor	Filt.+ EC	50 – 8,500 m3/h	Alongside	Pump flow rate	0	PSU>15, T>5	TRO: 7.5 mg/L
Ecochlor, Inc.	Ecochlor	Filt. + Chem. Inj	500 – 16,200 m3/h	Alongside	Pump flow rate	24		Act.dose: 4.25 mg/L
Erma First	Erma First FIT	Filt.+ EC	100 – 3,740 m3/h	Alongside	Pump flow rate	0	PSU>0.9, T>-2	TRO: 6 mg/L
Techcross, Inc.	Electro-Cleen	EC	150 – 12,000 m3/h	Alongside	Pump flow rate	120	PSU > 1.5	TRO: 9 mg/L
SHI	Purimar	Filt.+ EC	250 – 10,000 m3/h	Alongside	Pump flow rate	24	PSU>10, 4<T<40	TRO: 2.5 – 3.0 mg/L
Bio-UV Group	Bio-Sea	Filt. + UV	55 – 1,400 m3/h	Alongside	Pump flow rate	0, 24, 72	UV-i> 690 W/m²	
Wärtsilä	Aquarius EC	Filt.+ EC	250 – 4,000 m3/h	Alongside	Pump flow rate	24	PSU>15, T>15	TRO: 10 mg/L
HHI	HiBallast	Filt.+ EC	75 – 10,000 m3/h	Alongside	Pump flow rate	48,72	PSU>15, T>4	TRO: 8 mg/L
Headway	OceanGuard	Filt.+ EC	65 – 5,200 m3/h	Alongside	Pump flow rate	24,120	PSU>0.85	TRO: 2.0 mg/L
JFE Corp.	BallastAce	Filt. + Chem. Inj	500 – 3,500 m3/h	Alongside	Pump flow rate	24		Max. dose: 20 mg/L
Panasia	GloEn-Patrol	Filt.+ UV	50 – 6,000 m3/h	Alongside	Pump flow rate	48	UV-i > 600W/m²	
De Nora	Balpure	Filt.+ EC	400 – 8,570 m3/h	Alongside	Pump flow rate	24	18<PSU<36, 15<T<50	TRO range: 7-15 mg/L
						Contact Time		
Envirocleanse	**inTank**	**EC variant**	**Up to 200,000 m3**	**On Voyage**	**Tank Volume**	**24**	**Not a limit, 0<T<35**	**C/T Value = 120**
Envirocleanse	**inTank**	**BC variant**	**Up to 200,000 m3**	**On Voyage**	**Tank Volume**	**24**	**None**	**C/T Value = 120**

INLINE SYSTEM COMMON ASPECT IS THAT THEY…

- ALL TREAT ALONGSIDE
- INTERRUPT or RESTRICT BALLAST FLOW
- REDUCE FLEXIBILITY
- INTRODUCE LIMITATIONS
- INTRODUCE COMMERICAL RISKS […DELAY]
- LACK A MEANS TO CONTROL BIOLOGICAL REGROWTH

IMPLICATIONS OF INLINE DESIGN…

- **MUST TREAT** AT BALLAST UPTAKE (& DISCHARGE FOR UVT) or NEUTRALIZE AT DISCHARGE
- MUST **FILTER** (EXCEPT ONE MAKER)
- CONSUME ADDITIONAL **POWER IN PARRALEL WITH CARGO OPERATION**
- DIRECTLY RELATED TO BALLAST PUMP **FLOW RATE**
- “ONE SHOT TO KILL” (TWO SHOTS FOR UV-T)
- MAY RESTRICT COMMON PRACTICE OF GRAVITY DISCHARGE
- “ODD” TANKS ARE A TREATMENT CHALLENGE (TOPSIDES, AFT, CARGO-HOLDS)
- IMPACTFULL TO MEET eX HAZARDOUS STANDARDS (SUBMERGED PUMPS)

A DIFFERENT APPROACH

Link to 3D movie via streaming :

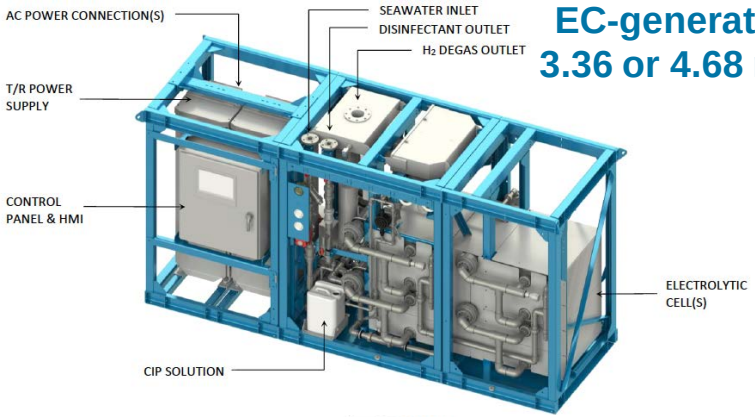
Youtube or Vimeo
or we insert the movie
or we play it from USB

SUMMARY	inTank™	In-Line
Where:	At Sea	At Port | Terminal
What:	Tank Volume	Flow
How:	Recirculation	Full Flow / Side Stream
Timing:	Delayed / Variable	Direct & Fixed
Limiting Factors:	Voyage Time	Salinity ,T , UV-T, Power
Filters:	None	Required (Almost all)
Port water quality:	Targeted dose	Under or overdose
Regrowth management:	Yes	None (long voyages?)

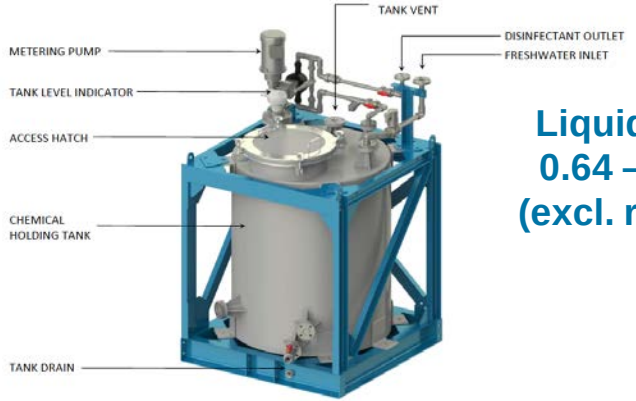
THE BENEFITS OF TREATMENT IN THE TANKS AT SEA:

- ✓ NO IMPACT ON CARGO OPERATIONS
- ✓ NO FILTER
- ✓ FLEXIBILTY TO START TREATMENT EVENT
- ✓ COMPLETED FULL TREATMENT BEFORE NEXT PORT CALL
- ✓ TARGET TIMING AVOIDS RISK OF BIOLOGICAL REGROWTH
- ✓ ABILITY TO SCALE /SIZE SYSTEM TO OPERATIONAL PROFILE
- ✓ HIGH LEVEL OF REDUNDANCY:
  - EC GENERATED and LIQUID BULK DOSING
  - 2 PARALLEL SYSTEMS

INTANK COMPONENTS FOOTPRINT = MAX. 8.97 M²

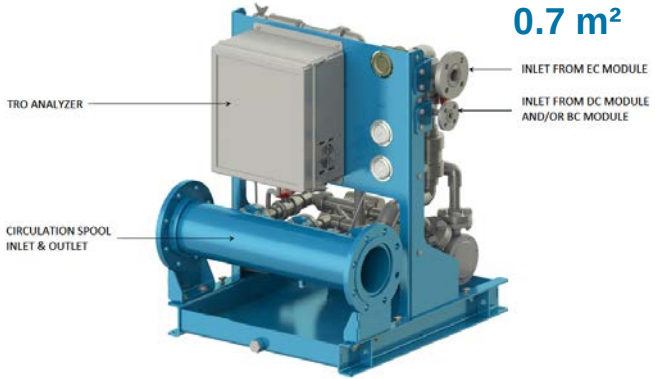


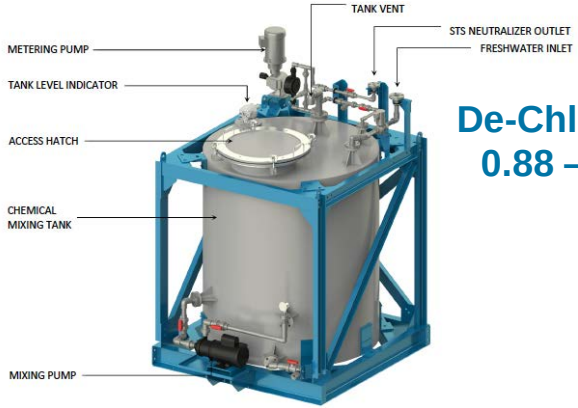
EC-generator
3.36 or 4.68 m²



Liquid Dosing
0.64 – 1.21 m²
(excl. refill tank)

Dosing Module
0.7 m²





De-Chlor Module
0.88 – 2.38 m²

WORLD WIDE SALES, SERVICE & PARTS NETWORK

All partners have a track record in following marine services technical support, service-technicians and spare parts

0 = Factory, Laramie

1 = Envirocleanse HQ
Katy, Houston
Americas U.S.A

2-3 = Marship Engineering
Rotterdam | Athens
Europe

4 = Coffin Turbo Pumps
Singapore | Malaysia

5 = Sam-Gong
Busan - Korea

6 = Marine Equip
Hong-Kong Guangzhou
Shanghai - China

7 = KAML
Mumbai – India

8 = Pangea Marine AS
Instanbul, Turkey

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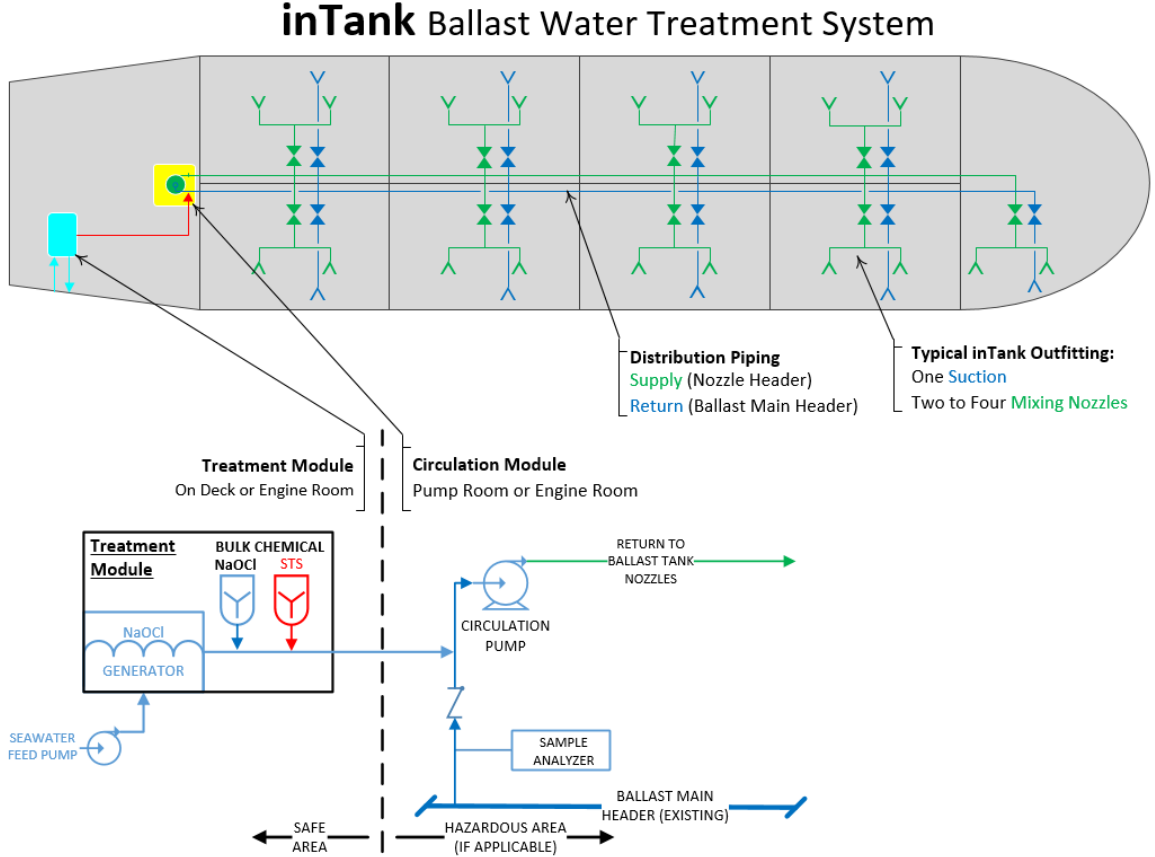
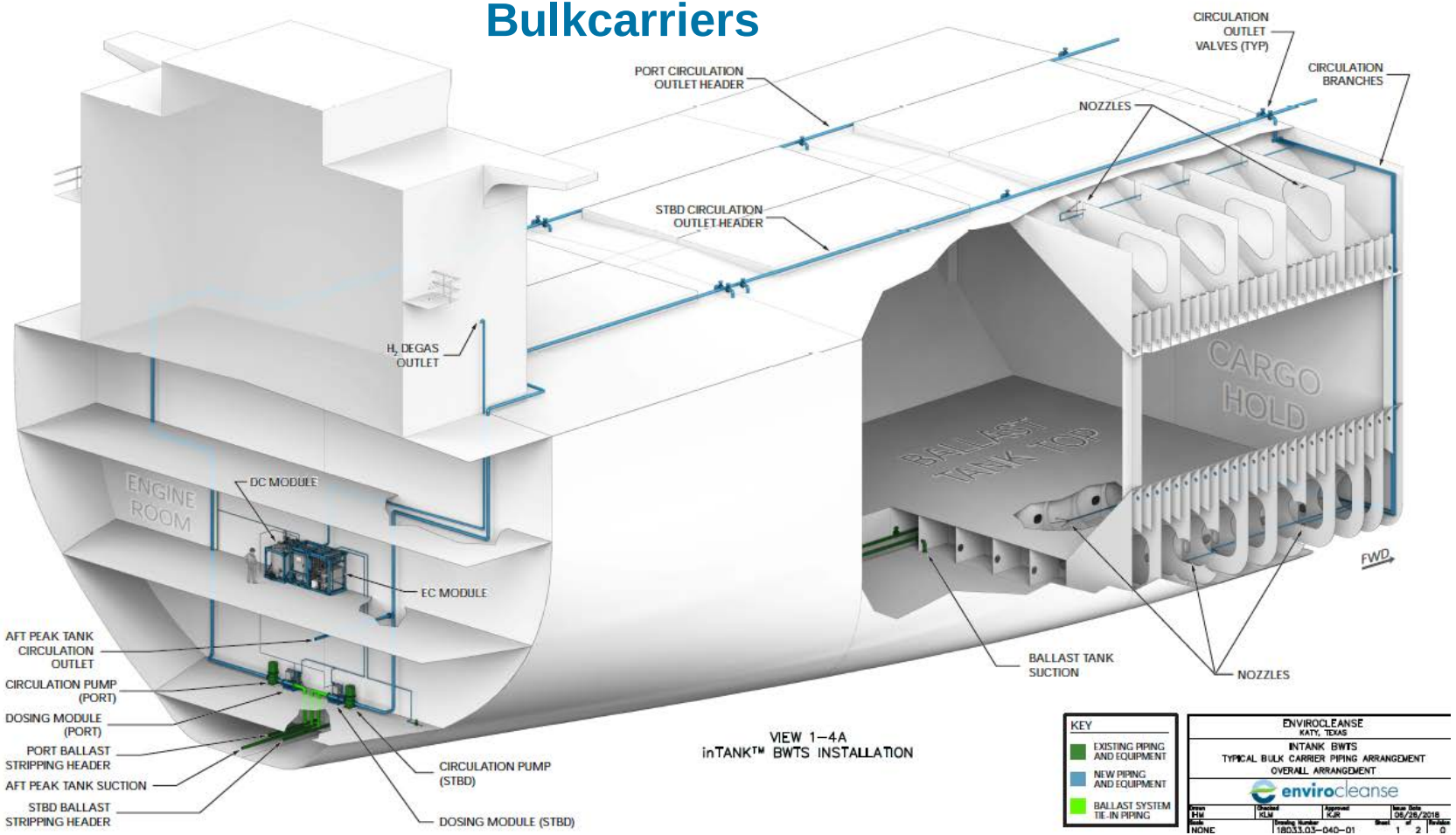
THANK YOU FOR YOUR ATTENTION

BACK UP SHEETS

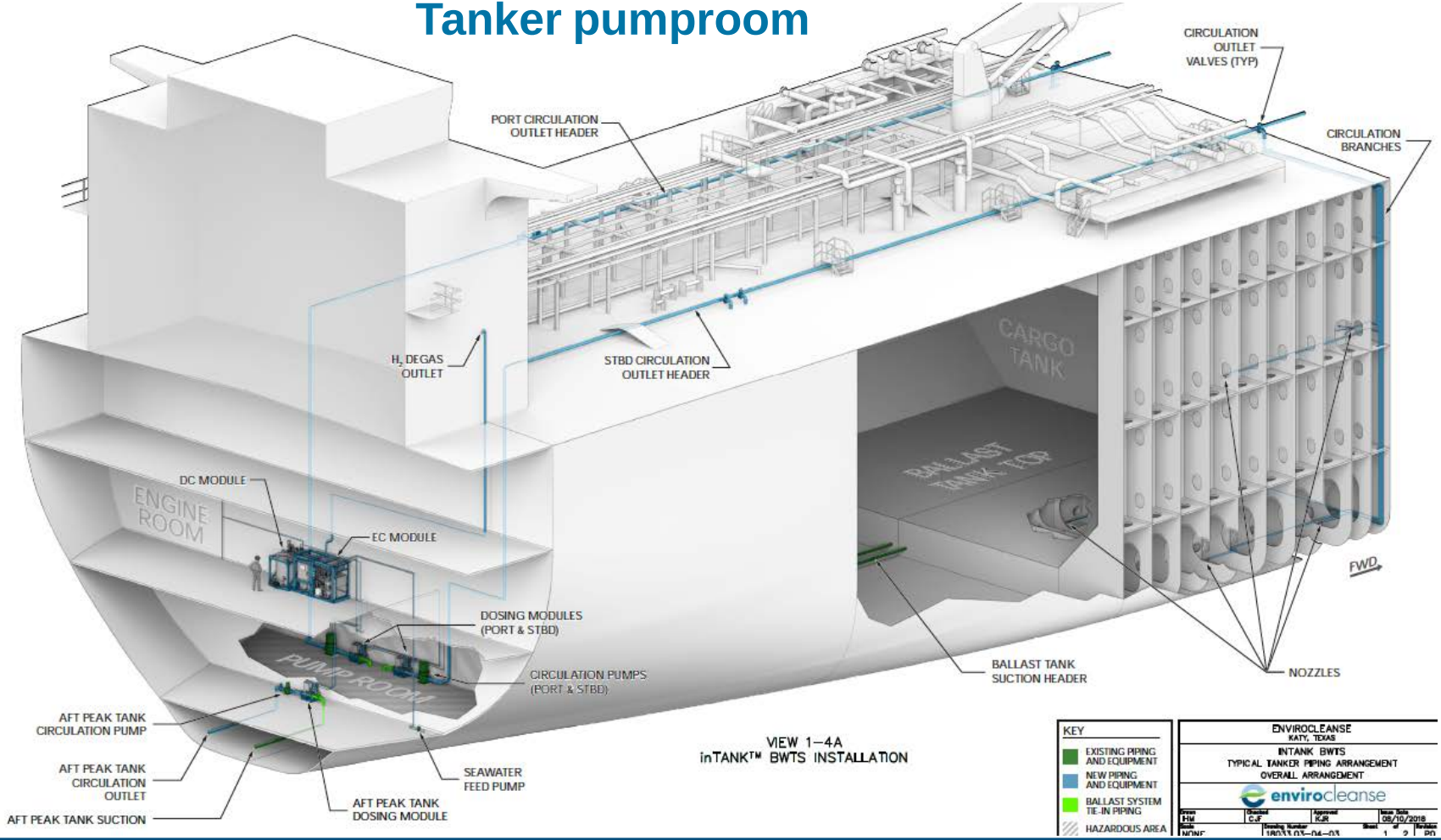
SYSTEM SIMPLIFIED SCHEMATIC OVERVIEW



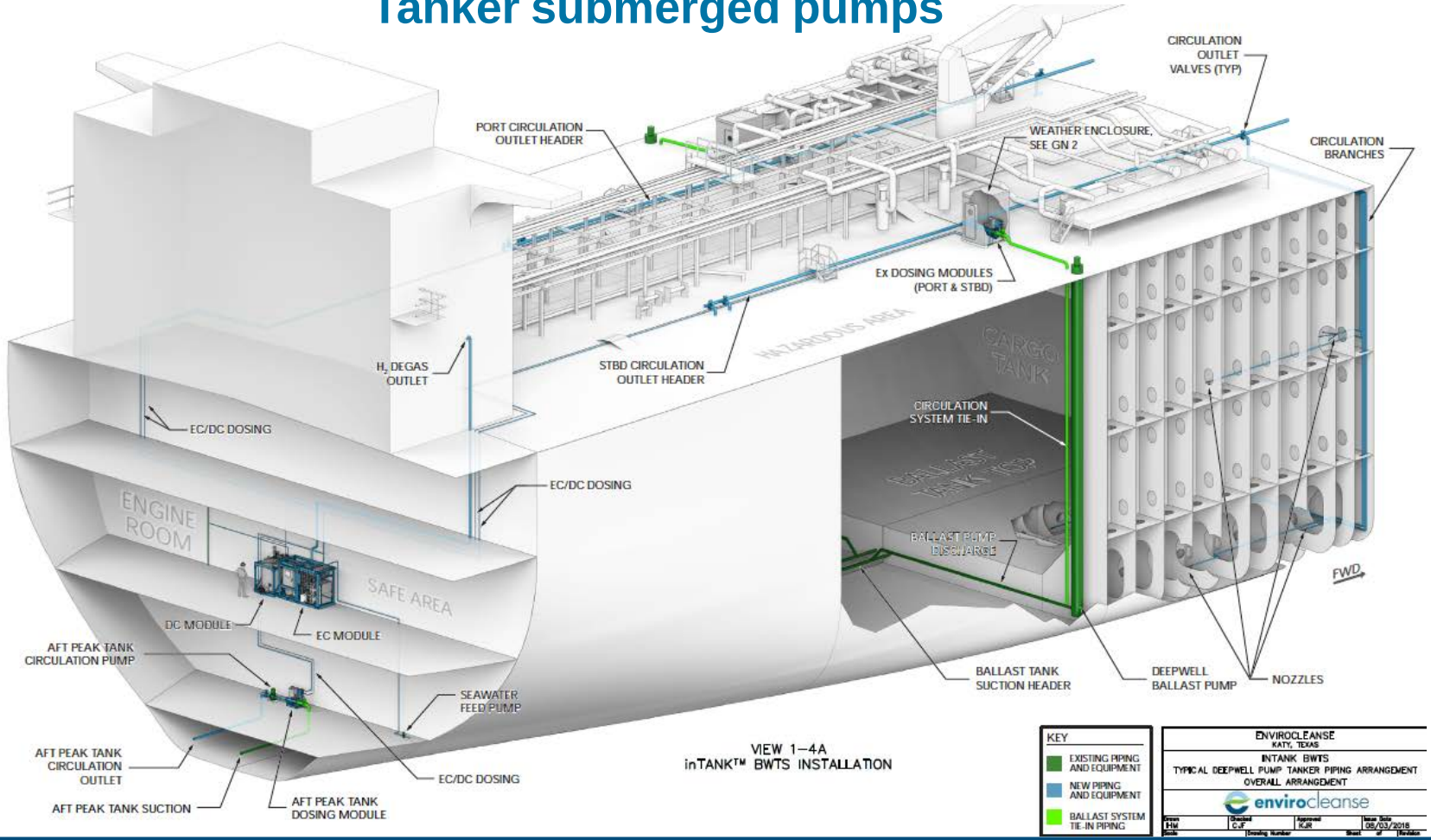
Bulkcarriers



Tanker pumproom

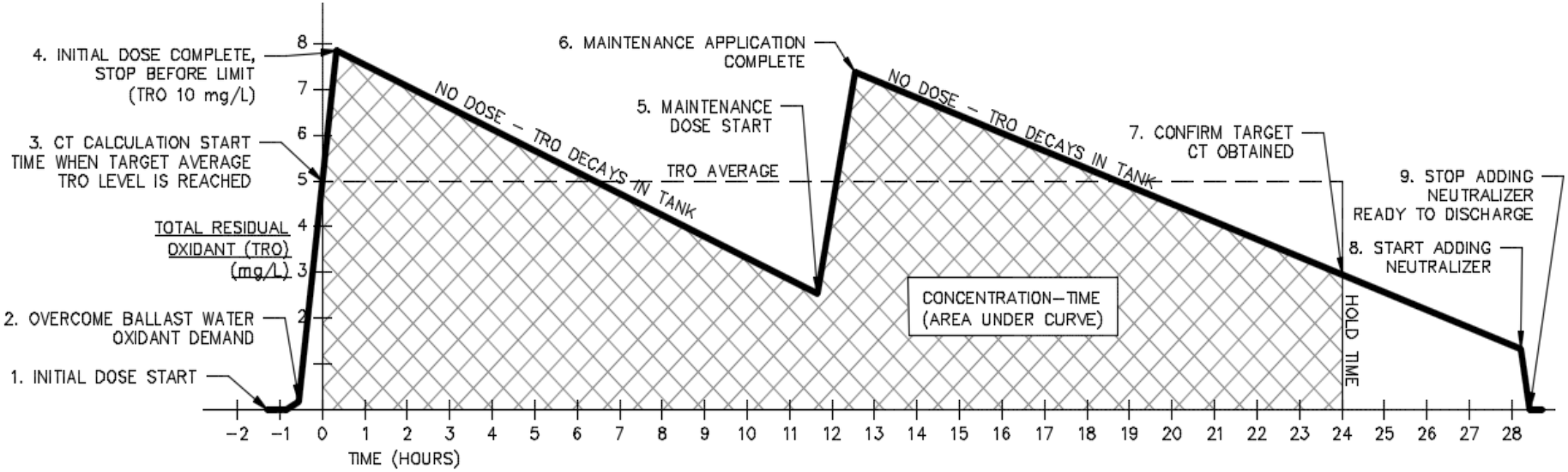


Tanker submerged pumps



CONCENTRATION TIME (CT) – VALUE TARGET = 120

CT is “area under the curve”



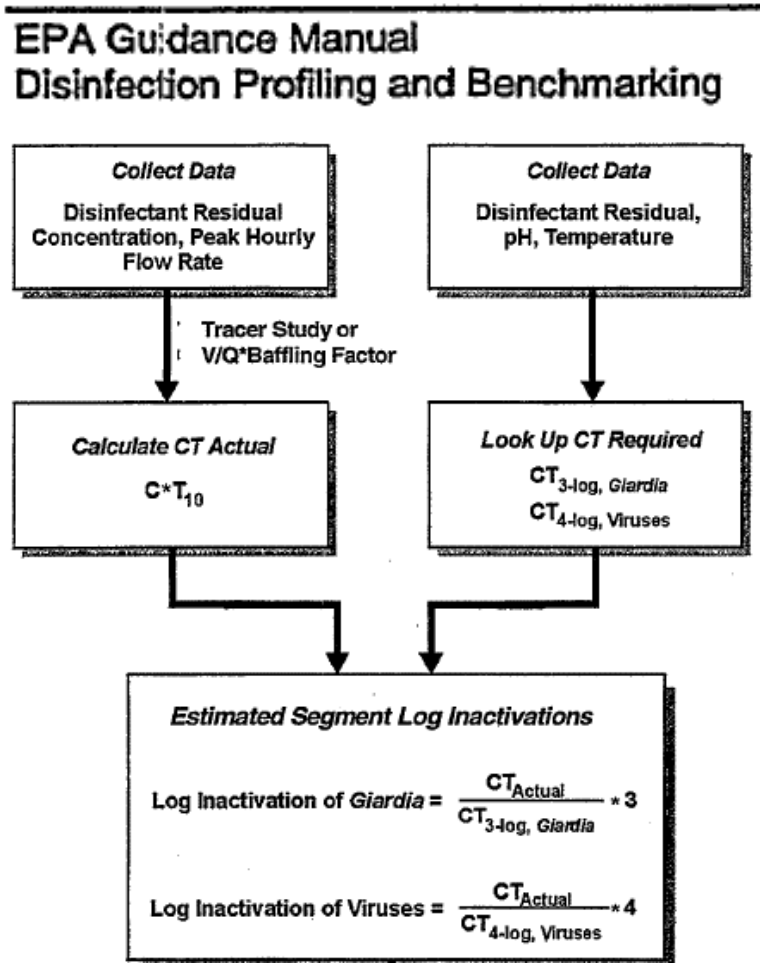
CT Value = Concentration of oxidant (in mg/ltr) x Contact time (in Hrs)

Example 1 Avg. 5 ppm x 24 Hrs.

Example 2 Avg. 3 ppm x 40 Hrs.

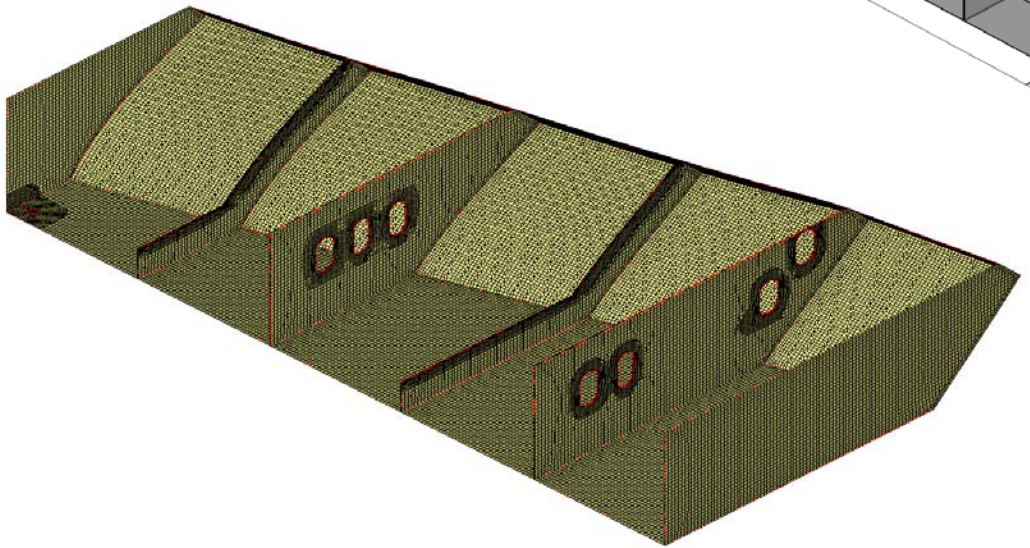
CONCENTRATION TIME (CT)

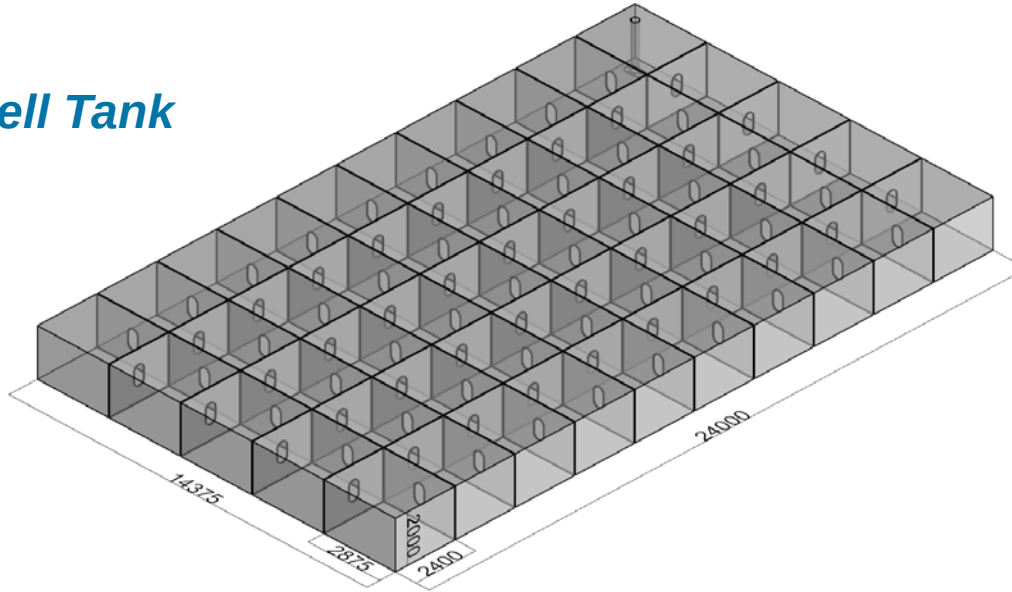
1. *Collected Data on pH, Temperature, DBPs, Flow Rates.*
   a) *Mixing efficiency*
   b) *CT-required*
2. *Calculate CT-actual*
   a) *Using EPA "poor" mixing factor of 0.3 for ballast tanks.*
   b) *Use CFD guidance for nozzle placement.*
   c) *Use Tracer Study during commissioning to confirm (if needed).*
3. *Application*
   a) *Used method on pilot biological efficacy trials with success.*
   b) *Using method for TA testing.*



INTANK MIXING AND SCALING

CFD Analysis with Open and Closed Cell Tank Configurations





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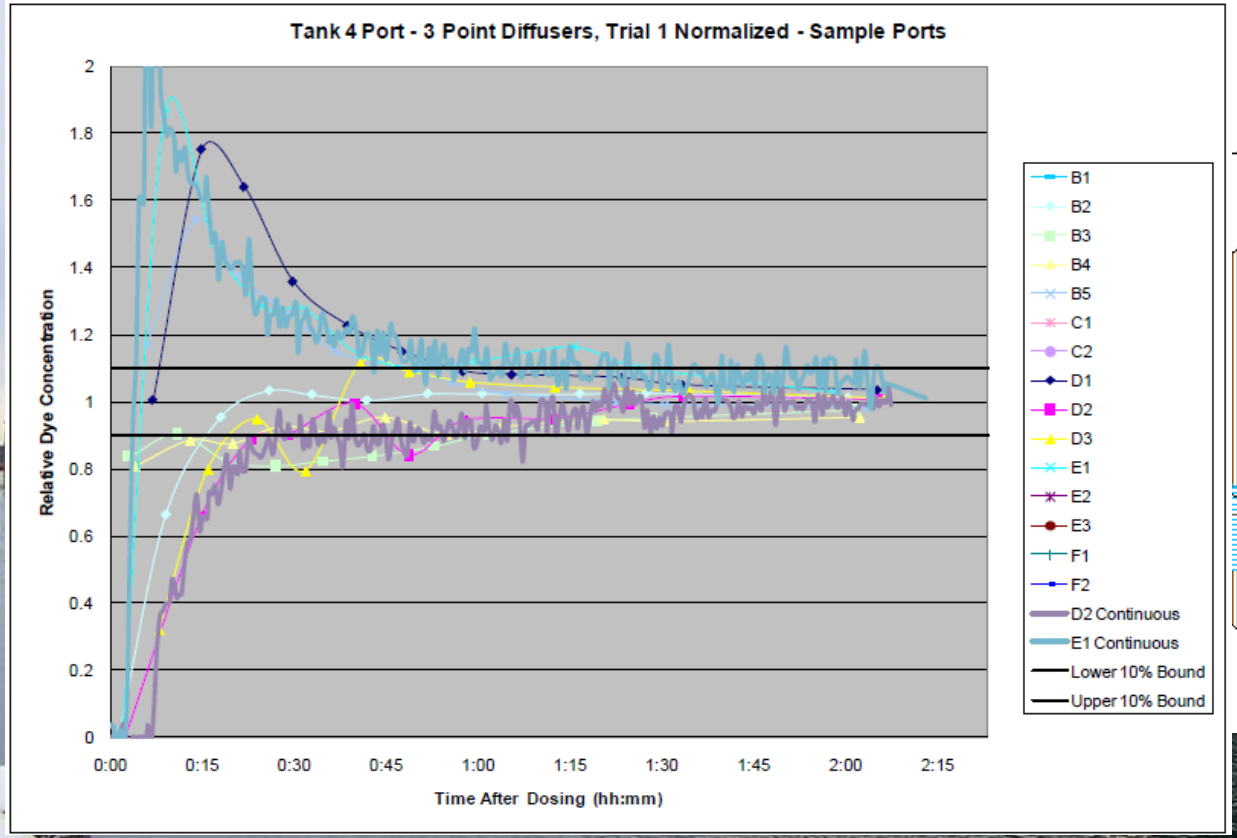

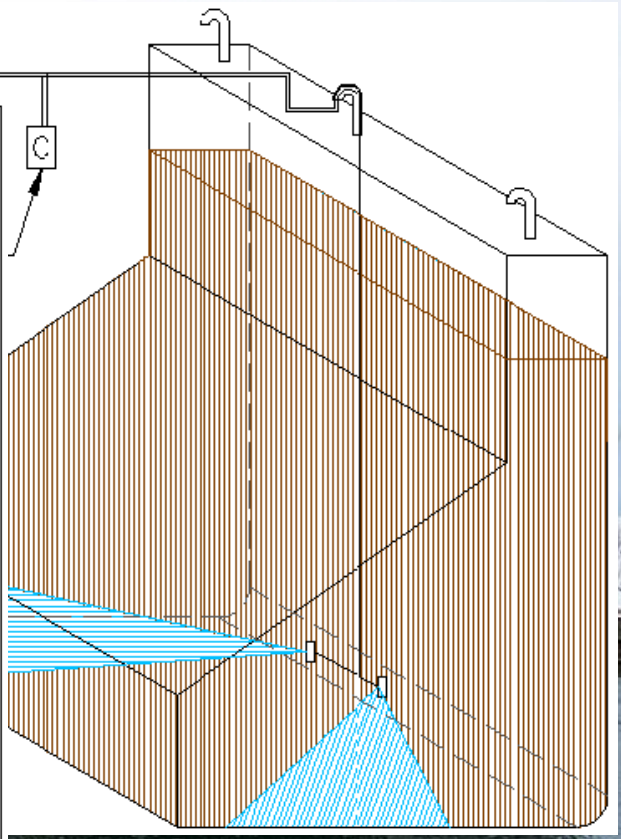

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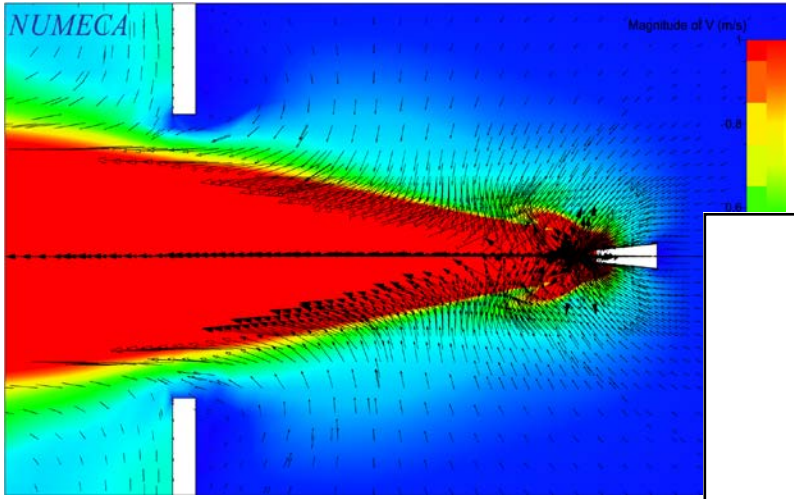

US Patented Nozzle design.
15:1 Ratio Motive/Ballast Water