



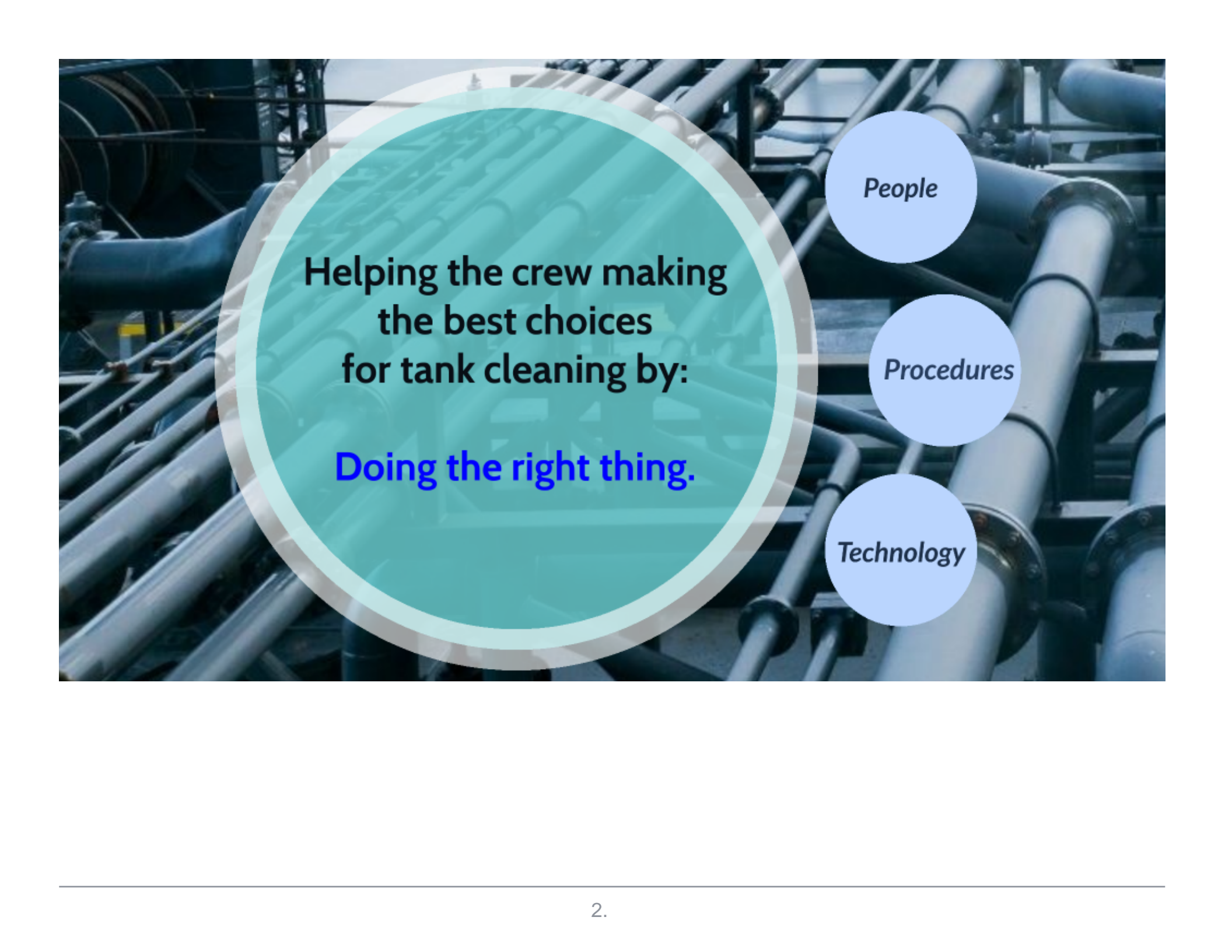
Challenge:
Tank
cleaning

The
solution

Try the
Original

Managing
the Risk

Tanker Operator
Conference
16th October 2018



Helping the crew making
the best choices
for tank cleaning by:

Doing the right thing.

People

Procedures

Technology

People involved in the process



Charterer



Operator



Crew

Burden of compliance:

And more
to come



Regulations



Industry Guidelines



Charterer Requirements



Company SMS & Requirements

Technologies available



Cleaning Know How




Highly efficient cleaners



Cleaning machines



Risk Assessment Technique



Tank cleaning challenges

Variety of cargoes

Hazards

Compatibility of cargoes

Conflicting goals

Tank Entry

Variety

Hazards

Cargo
compatibility

Conflicting
Goals

Tank Entry



Crude Oil

Some 400 Crude grades
COW Wash

Products: CPP and DPP

- Some 1000 different cargoes
- Wideley similar their properties and characteristics
- Also many special rules and issues
- * TC from Black Products to Clean Products
- * TC from Oxygeneated to Aviation fuel
- * TC From Sulphur containing to H.C Diesel/Gasoline

Cargo related hazards



Flammable



Toxic



Corrosive

Self reactive



Water Reactive

Reactive with O₂

Reactive with other

High Viscosity
Solidifying





Compatibility of cargoes

Adjacent cargo comparability

Previous (Last) Cargoes

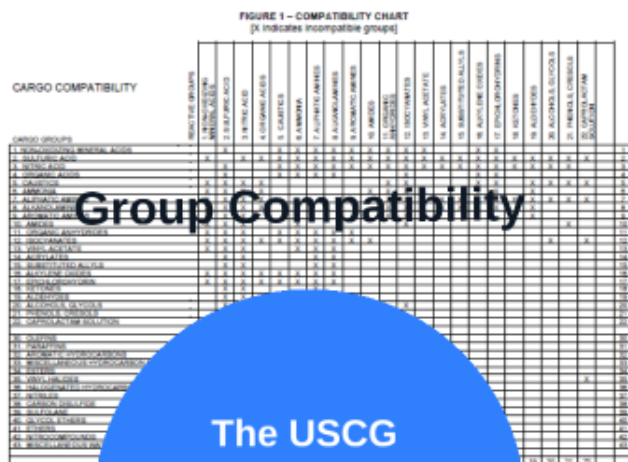
Reactivity

Adjacent
cargo
compatibility

FOSFA
NIOP
EU

Reactivity

Cargo Compatibility



Group Compatibility

The USCG compatibility chart is globally used and no IMO equivalent is available

cargo list with goup numbers

Negative Exceptions

Banned and acceptable cargoes

NIPO - NATIONAL INSTITUTE OF OILSEED PRODUCTS

- NIOP List 1
- NIOP List 2

FOSFA - The Federation of Oils, Seeds and Fats Associations Ltd

- FOSFA accepted
- FOSFA banned

COMMISSION DIRECTIVE 96/3/EC of 26 January 1996

granting a derogation from certain provisions of Council Directive 93/43/EEC on the hygiene of foodstuffs as regards the transport of bulk liquid oils and fats by sea

- EU Accepted

CIQ - China Inspection and Quarantine System

- CIQ accepted
- CIQ banned

**And what about
Charterer
Last Cargo
Requirements**

Reactivity (tank cleaning hazard)

Cargo reaction by using incompatible cleaning material

(example: water reactive cargoes and water)

Cargo reaction in the slop tank by mixing incompatible cargoes

Cargo reaction due to operational error

(example: mixing cargoes in a common stripping line)





Tank Entry


because of:

Inspection (WWT)

Manual Cleaning

Sweeping / Squeezing

Repair & Maintenance

The background of the slide is a photograph of industrial pipes and machinery, rendered in a blue-tinted, slightly blurred style. Overlaid on this is a large, light-blue circle with a white border. Inside this circle, the text 'Managing the Risk' is written in a bold, black font. Below it, three items are listed in a blue font: 'Risk Matrix (Risk Assessment)', 'Tank Cleaning Hazard Register', and 'Management of Change'. To the right of the large circle, there are three smaller, light-blue circles arranged vertically. Each of these smaller circles contains text in a bold, black font: 'Risk Matrix' at the top, 'TC Hazard Register' in the middle, and 'Management of Change' at the bottom.

Managing the Risk

Risk Matrix (Risk Assessment
Tank Cleaning Hazard Register
Management of Change

Risk Matrix

TC Hazard
Register

Management
of Change

Risk Matrix 5*5

		Likelihood									
						A	B	C	D	E	
		People	Asset	Environment	Reputation	Rare	Unlikely	Possible	Likely	Certain	
Consequence	Insignificant	No lost time injury	< \$10 K	Minor impact	Minor impact						1
	Minor	Lost time injury	\$10 - 100 K	Local impact	Impact						2
	Moderate	Lost work day case	\$ 100- 1000 K	Regional impact	High impact						3
	Major	Disability	\$ 1- 10 M	National impact	Major impact						4
	Severe	Fatality	> \$ 10 M	International impact	Severe impact						5

Without clear definitions the Matrix does not work.

					Likelihood					
					A	B	C	D	E	
					Never heard in the shipping industry	Has happened in the shipping industry	Happens in the shipping industry once per year or happened in the company in the past	Happens in the shipping industry more than once per year or in the company once per year	Happened in the company more than once per year	
Consequence	People	Asset	Environment	Reputation						1
	Insignificant	No lost time injury	< \$10 K	Minor impact	Minor impact					
	Minor	Lost time injury	\$10 - 100 K	Local impact	Impact					2
	Moderate	Lost work day case	\$ 100- 1000 K	Regional impact	High impact					3
	Major	Disability	\$ 1- 10 M	National impact	Major impact					4
	Severe	Fatality	> \$ 10 M	International impact	Severe impact					5

The Tank Cleaning Hazard Register

The Tank Cleaning Hazard Register is covering the potential risk of Standard (Routine) Tank Cleaning Operations on board oil and chemical tankers and is based on industry data evaluated by **ChemServe**.

NON-Standard (Routine) Operations cannot be covered and therefore might require an individual management of change process.

Risk Mitigation

Determine the ACTUAL risk of a Hazard

The Company to include all relevant Regulations, Guidelines, Company Procedures that will mitigate risk

The Company to include all technical controls which will mitigate the risk

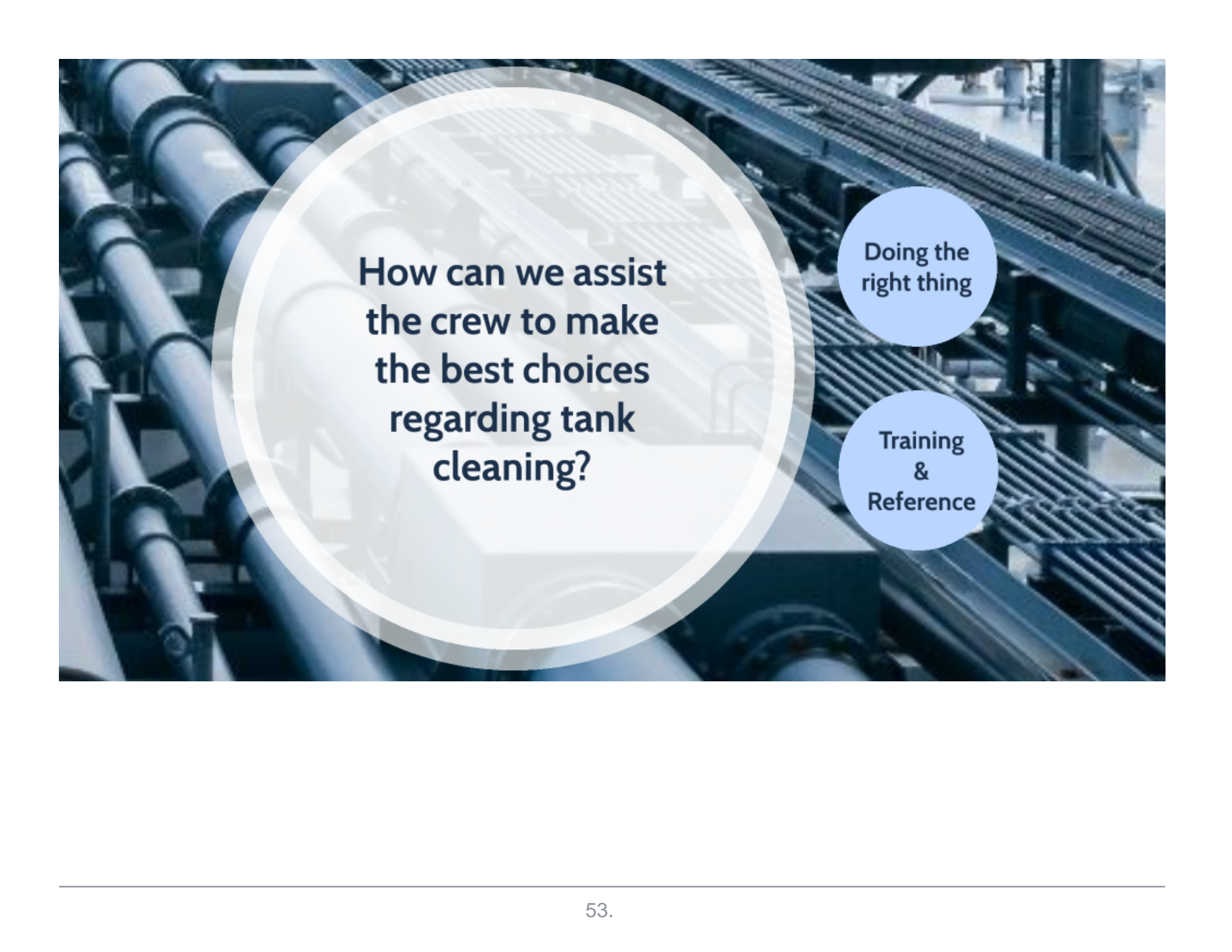
Hazard	Task	Location	Threat	Top Event	Potential consequences	Potential Risk				System Controls in place	Technical Controls in place	Actual Risk			
						P	A	E	R			P	A	E	R
Chemical flammable	Tank cleaning in inerted condition	at any time	Maintenance failure Equipment failure Human error Inadequate PPE Wrong equipment	Loss of primary containment Release of cargo Release of cargo vapour Release of Inert Gas	Injury Permanent Disability Fatality (multiple) Pollution Fire & Explosion Asset damage	B4	B2	B2	B2	TSG-C, IBC Code, MSDS, Miracle, Dr Verwey's Company Procedure XX - PPE & PPE Matrix.....	Inert Gas System Fixed TC Machines	B1	A2	A2	A1
Chemical flammable	Tank cleaning NOT inerted condition	at any time	Maintenance failure Equipment failure Human error Inadequate PPE Wrong equipment	Loss of primary containment Release of cargo Release of cargo vapour Release of Inert Gas	Injury Permanent Disability Fatality (multiple) Pollution Fire & Explosion Asset damage	B5	B5	B5	B4	TSG-C, IBC Code, MSDS, Miracle, Dr Verwey's Company Procedure XX - PPE & PPE Matrix.....	Fixed TC machines	C1	C2	A2	A2
Chemical flammable	Gas freeing operation	at any time	loss of primary containment	Loss of primary containment Release of cargo Release of cargo vapour Release of Inert Gas	Injury Permanent Disability Fatality (multiple) Pollution Fire & Explosion Asset damage	B5	B5	B5	B5	TSG-C, IBC Code, MSDS, Miracle, Dr Verwey's Company Procedure XX - PPE & PPE Matrix.....	Fixed Gas freeing system	C1	C1	C1	C1
Chemical Toxic	Tank cleaning	at any time	Maintenance failure Equipment failure Human error Inadequate PPE Wrong equipment	Loss of primary containment Release of cargo Release of cargo vapour Release of Inert Gas	Injury Chronic disease (cancer) Permanent Disability Fatality Pollution	B4	C1	C1	B4	TSG-C, IBC Code, MSDS, Miracle, Dr Verwey's Company Procedure XX - PPE & PPE Matrix.....	fix	Actual Risk with controls in place			B2
Can be Provided by ChemServe										To be completed by the SM					

Management of Change (TC)

Not all situations can be covered by a risk assessment in order to mitigate the risk.

Therefore a Management of Change might be required in such case
including active office support & assistance.

Consider External resources in case internal know how for a specific case is not
sufficient or available.



**How can we assist
the crew to make
the best choices
regarding tank
cleaning?**

**Doing the
right thing**

**Training
&
Reference**

Tank Cleaning Guidance!

Cleaning From - To is not a Miracle:

**The MIRACLE Tank Cleaning Database
contains guidance for nearly every
tank cleaning job -**

**including regulatory & safety requirements
as well as guidance & best practice.**

Tank Cleaning From - To

Menu

Start Seminar

Cleaning To Next Product

Cargo: STYRENE MONOMER

Second cargo: I-HEXENE

Latest product update on 23/01/2018

Washing Water Analysis

Private Notes

Download UV Spectrum Graph for 'styrene monomer in water' for Washing Water Test with UV Spectrometer

Chemical Trade

Required Cleanliness Standard: Ultra High Purity [read more...](#)

Cleanliness Remark: 'wall' wash with methanol. Tests with toughest limits must be passed: Colour, Hydrocarbon, Chloride, PTT and UV Spectrum. Plus lab test for NVM and analysis of last cargo traces by GC

Cleaning Advice

Cargo non water soluble. Persistent smell / odour. Liable to polymerization. Must be stabilized for transport and storage. Inhibitor is oxygen dependent FDSFA banned. At temperatures above 52 deg C polymerization can occur even with inhibitor.

Epoxy Coating: Cargo potentially aggressive

Check instructions from manufacturer of your coating. It could be required to ventilate the cargo until it has been restored before water is used for washing. The more solvency power a cargo has, the more cargo residues are retained in the coating. This could lead to either contamination of the next or after next cargo or breakdown of the coating film.

Method 3 Cleaning to Ultra High Purity or lower (Recipe is for 1000 m³ tank)

Step	Method	Time	Temp	Medium	Cleaner Description	Step Remark
1	Butterworth	15 hours	Ambient	Sea Water		Ambient temperature due to polymerization
2	Butterworth	1 hour	approx. 58 °C	Sea Water		
3	Recirculation	1 hour	60 °C to 70 °C	Sea Water or Fresh Water	0.2-0.4% CTC-Cleaner-VLC	
4	Recirculation	1 hour	60 °C to 70 °C	Sea Water or Fresh Water	0.2-0.4% CTC-Cleaner-VLC	Prepare a new cleaning solution
5	Rinse	20 minutes	Ambient	Fresh Water		
6	Vent/Strip/Dry					

ChemServe GmbH

Impressum Privacy Policy

Logout

Including Intertanko Cleanliness Standards



- Visually Clean
- Water White
- High Purity
- Ultra High Purity

These standards have now been implemented into the recipes of the MIRACLE tank cleaning guide

Cleaning to Intertanko Standards - Next cargo TBN

Cleaning from	STYRENE MONOMER	Cleaning to	
		Req. Standard	

Cleaning to Water White or lower Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polymerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater	no cleaner required	Temperature due to removal of smell
3	Rinse	20 mins	ambient	Fresh Water		
4	Vent/Map/Dry					

Cleaning to High Purity Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polymerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater		
3	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	
4	Rinse	20 mins	ambient	Fresh Water		
5	Vent/Map/Dry					

Cleaning to Ultra High Purity Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polymerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater		
3	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	
4	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	Prepare a new cleaning solution
4	Rinse	20 mins	ambient	Fresh Water		
5	Vent/Map/Dry					

Cleaning to Intertanko Standards - Next cargo TBN

All available cleaning standards for this cargo are displayed because next cargo not yet known

Cleaning from STYRENE MONOMER

Cleaning to

Req. Standard

Cleaning to Water White or lower Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polymerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater	no cleaner required	Temperature due to removal of smell
3	Rinse	20 mins	ambient	Fresh Water		
4	Vent/Map/Dry					

Cleaning to High Purity Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polymerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater		
3	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	
4	Rinse	20 mins	ambient	Fresh Water		
5	Vent/Map/Dry					

Cleaning to Ultra High Purity Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polymerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater		
3	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	
4	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	Prepare a new cleaning solution
4	Rinse	20 mins	ambient	Fresh Water		
5	Vent/Map/Dry					

Cleaning to Intertanko Standards - Next cargo - Visually Clean Standard

Cleaning from STYRENE MONOMER

Cleaning to Diesel Oil

Req. Standard Visually Clean

Cleaning to Water White or lower Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polimerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater	no cleaner required	Temperature due to removal of smell
3	Rinse	20 mins	ambient	Fresh Water		
4	Vent/Mop/Dry					

Cleaning to Intertanko Standards - Next cargo - Visually Clean Standard

Cleaning from STYRENE MONOMER

Cleaning to Diesel Oil
Req. Standard Visually Clean

Cleaning to Water White or lower Standard

Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polimerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater	no cleaner required	Temperature due to removal of smell
3	Rinse	20 mins	ambient	Fresh Water		
4	Vent/Mop/Dry					



Cleaning to Intertanko Standards - Next cargo - Ultra High Purity

Cleaning from	STYRENE MONOMER				Cleaning to	1-HEXENE
					Req. Standard	Ultra High Purity
Cleaning to Ultra High Purity Standard						
Step	Method	Time	Temp	Medium	Cleaner Descr.	Step Remark
1	Butterworth	1.5 hrs	ambient	Seawater		Ambient temperature due to polimerization
2	Butterworth	1.0- 1.5 hrs	50°C	Seawater		
3	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	
4	Recirculation	1.0 hrs	60-70 °C	Seawater or Freshwater	0,2-0,4% CTC-Cleaner-VLC	Prepare a new cleaning solution
4	Rinse	20 mins	ambient	Fresh Water		
5	Vent/Mop/Dry					

Tank Cleaning Plan

Best help is: providing the relevant information and data at the right time - Example of a tank cleaning plan:

Cargo to be cleaned: GASOLINE (unloaded) ☒

Cargo to be loaded: PALM OIL ☒

Physical Properties @ 20 Degree Celsius

Density: 0.75 (APPROX) Kg/l Flash Point:

Water-Solubility: INSOLUBLE %g/g LEL:

Melting Point: -20 (UPPERLIMIT) deg C UEL:

Boiling Point: 45 (LOWERLIMIT) deg C Odour Limit:

Vapour Pressure: UNKNOWN bar Static Accu:

Viscosity: 0.652 mPa*s

Evaluation of Cargo Data

Flammable cargo: Yes Inhibited: No

Static accumulator: Yes Water reactive cargo: No

Toxic cargo: No Evaporating Cargo: No

Corrosive cargo: No

Pollution Data

Annex: I Solidifying (06.2.9): NA

Category: NA High Viscosity (06.2.6): NA

Prewash Required: Unknown

Annex I

Oil/water slops of Annex I cargoes have to be disposed ashore.
Discharge to the sea is only allowed in designated areas via ODME.
Cleaning Chemicals could increase the disposal costs or could interfere in the
Tank Atmosphere Inert: ☐

For ships build from Jan 1 2016: Tanks must be inerted to oxygen content
of max 5% until all flammable vapours have been removed.

Bottom/line flush and ventilation acc ISGOTT Flush tank bottom and monitor
Moisture until LEL is < 50%. Then continue with tank cleaning.

Cargo to be cleaned: GASOLINE (unloaded) ☒

Cargo to be loaded: PALM OIL ☒

Chemical Trade

Required Cleanliness Standard: Water white [read more...](#)

Cleanliness Remark: Dry, odour-free, no visible residues. Wall-wash with methanol for

Cleaning Advice

Cargo non water soluble.

Method 1 Cleaning to Water White or lower (Recipe is for 1000 m³ tank)

Step	Method	Time	Temp	Medium	Cleaner Description
1	Butterworth	1 hour to 15 hours	Ambient	Sea Water	
2	Butterworth	1 hour to 15 hours	Hot	Sea Water	No cleaner required
3	Rinse	20 minutes	Ambient	Fresh Water	
4	Vent/Plug Dry				

User Cleaning Remarks

[Space for user remarks](#)

Static electricity precautions

Monitor LEL before injection of steam: NO

Monitor LEL before using cleaning additives: NO

Monitor LEL before recirculation cleaning: NO

Adjacent spaces monitoring

Monitor LEL in void spaces and cofferdams: YES

Monitor toxic vapour in void spaces/cofferdam: NO

Personal Protective Equipment

☒

☒

☒

☒

☒

☐

☐

☐

☐

☐

☐

☐

Helmet

Chem Goggles

Chem Gloves

Boiler Suit (Flame res.)

Safety Shoes

Chemical Splash Suit

EEBD Deck

Chemical Suit IBC Code

Safety Boots

BA SET

Personal Multimeter

Help for PPE selection


General User Remarks

MIRACLE easy Compatibility Chart


SODIUMHYDROXIDE SOLUTION 50%	
compatible to	incompatible to
Cargoes	Cargoes
Acrylonitrile/Styrene copolymer dispersion in Polyether polyol (20)	1, 4-Butylene glycol (20)
Alcohol (C12-C16) poly(1-5)ethoxylates (20)	Groups
Bio-fuel blends of Gasoline and Ethyl alcohol (>25% but <99% by volume) (20)	UNASSIGNED CARGOES (0)
Butyl alcohol (20)	NON-OXIDIZING MINERAL ACIDS (1)
Cetyl alcohol (20)	SULPHURIC ACID (2)
Decyl alcohol (20)	NITRIC ACID (3)
Diacetone alcohol (20)	ORGANIC ACIDS (4)
Diethylene glycol (40)	ORGANIC ANHYDRIDES (11)
Dodecyl alcohol (20)	ISOCYANATES (12)
Ethyl alcohol (20)	ALKYLENE OXIDES (16)
Ethyl hexanol (Octyl alcohol) (20)	EPICHLOROHYDRIN (17)
Ethylene glycol (20)	ALDEHYDES (19)
iso-Butyl alcohol (20)	ALCOHOLS AND GLYCOLS (20)
iso-Propyl alcohol (20)	PHENOLS AND CRESOLS (21)
iso-Tridecanol (20)	CAPROLACTAM SOLUTION (22)
Methyl alcohol (20)	

PROPYLENEOXIDE	
compatible to	incompatible to
Groups	Groups
AROMATIC AMINES (9)	UNASSIGNED CARGOES (0)
AMIDES (10)	NON-OXIDIZING MINERAL ACIDS (1)
ORGANIC ANHYDRIDES (11)	SULPHURIC ACID (2)
ISOCYANATES (12)	NITRIC ACID (3)
VINYL ACETATE (13)	ORGANIC ACIDS (4)
ACRYLATES (14)	CAUSTICS (5)
SUBSTITUTED ALLYLS (15)	AMMONIA (6)
ALKYLENE OXIDES (16)	ALIPHATIC AMINES (7)
EPICHLOROHYDRIN (17)	ALKANOLAMINES (8)
KETONES (18)	
ALDEHYDES (19)	
ALCOHOLS AND GLYCOLS (20)	
PHENOLS AND CRESOLS (21)	
CAPROLACTAM SOLUTION (22)	
OLEFINS (30)	
PARAFFINS (31)	


MIRACLE quick reference



Help to all relevant topic's




Direct link to the Miracle Seminar




Important downloads available

Density:	0.906	Kg/l	Flash Point:
Water-Solubility:	0.029 (INSOLUBLE)	%g/g	LEL:
Melting Point:	-31	deg C	UFL:
Boiling Point:	∠. water depth > ∠5 metres		
Vapour Pressure:	Washing Water Analysis		
Viscosity:	Download UV Spectrum Graph for 'styrene monomer in water' for Washing Water Test with UV Spectrometer		



Evaluation of Cargo



Chemical Trade

Required Cleanliness Standard: High Purity

For the Commercial Department, the Operation Department and the Crew



Pollution
Prevention

Handling

Cleaning

Incompatible
coatings

Incompatible
adjacent
cargoes

The Quick Check

Important
Physical
Hazards

Health
Hazards

Pollution
Prevention

Handling

Cleaning

Incompatible
coatings

Cargo: I-HEXENE (X)

Quick Check for I-HEXENE

Important Physical Hazards / Properties

- Highly flammable
- Static accumulator
- Cargo non water soluble

Health Hazards

Hazard Phrases
H225 Highly flammable liquid and vapour
H304 May be fatal if swallowed and enters airways
EUH066 Repeated exposure may cause skin dryness or cracking.
Other Hazard Vapours are heavier than air. Vapours may travel across the ground and reach remote ignition sources causing a flashback fire danger.

Pollution Prevention

Annex II, Y, Chapter 17, ST 3, TT 2G
No mandatory prewash

Handling

Required cleanliness standard of tank: Ultra High Purity
Wall Wash with methanol. Tests with toughest limits must be passed: Colour, Hydrocarbon, Chloride, PTT and UV Spectrum. Plus lab test for NVM and analysis of last cargo traces by GC
Inertization could be required depending on ship size, age and tank size according to SOLAS and IBC code.
Max adjacent temperature: Ambient
Carriage temperature: Ambient
Discharge temperature: Ambient
Heating Coils blanked off

Cleaning

Cargo non water soluble

Cleaning Recipe(s)

Method 1 to HP => CW FW 1h
Method 2 to UHP => CW FW 1.5h

Incompatible coatings

Incompatible with Tankguard CPC

Incompatible adjacent cargoes

Incompatible groups: SULPHURIC ACID (2)

References embedded in Miracle

Regulations



Industry Guidelines



Charterer Guidelines



Company Guidelines



The Miracle Seminar

A powerful system for all involved:

- A kind of Wikipedia about tank cleaning
- A comprehensive collection of themes, tables and videos
 - Explains technology
- **A great training tool for office members & the crew on board**
 - **A comprehensive reference tool for experienced people**



Cleaning Seminar

A tank cleaning wiki





Cleaning Seminar

A tank cleaning wiki

Physical Properties

Prod. Characteristics

Cleaning Machines

Single nozzle

Dual nozzle

Comparison

Time conversion


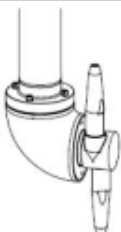

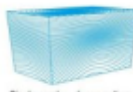

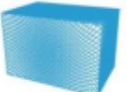
Pumps, Pipes & Hardware

Methods

Tank Cleaning Plan

Trade pattern

Cleaning
Process

	Single	Dual
Picture		
Number of nozzles (Hits)	1 (one hit always)	2 (two hits always)
Speed	Slower coverage of tank	Faster coverage of tank
Impact	High impact long throw length	Lower impact
Operation	Programmable	Variable cleaning time
Cleaning pattern	<p>Helical</p>  <p>Single nozzle - coarse pattern</p>  <p>Single nozzle - dense pattern</p>	<p>Criss-Cross</p>  <p>Dual nozzle - 1 cycle</p>  <p>Dual nozzle - 4 cycles</p>
Temperature	Only cleaned section hot	Keeps entire tank hot
Consumption (water and cleaner)	Higher	Lower



Cleaning Seminar

A tank cleaning v

**A great training tool for
office members,
the crew on board
and a great reference tool
for experienced people**

Tank
Material

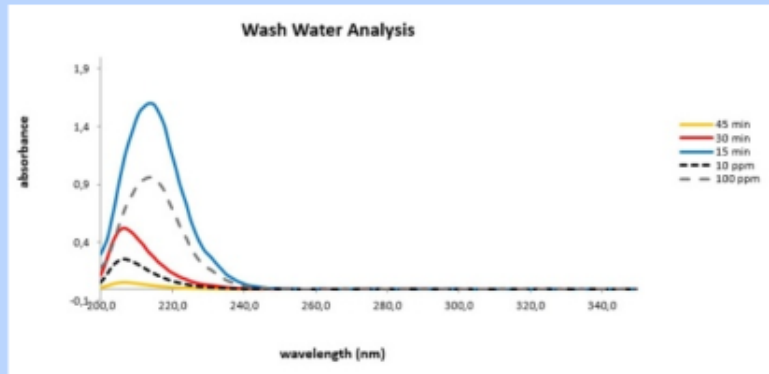
Manual

oting

C
Pr

Example: Washing Water Analysis

Analysis of samples from the washing water with UV Spectrometer in regular intervals



Cleaning step can be finished after 45 min. No cargo is removed anymore.

If this is a water soluble cargo it means the tank is clean.

If this a non water soluble cargo it means continuation will not improve anything. It could mean go to next step.

WWA advantages

- Substantial energy savings are possible because excessive hot washes can be avoided
- Less tank rejections and less contamination of cargoes
- Reduces hazards because less tank entries required

**UV Graphs
available for many
cargoes
in MIRACLE**

MIRACLE Tank Cleaning Database

Decades of Tank Cleaning Experience, Continuous Improvement, Latest Innovation included



Any Question?

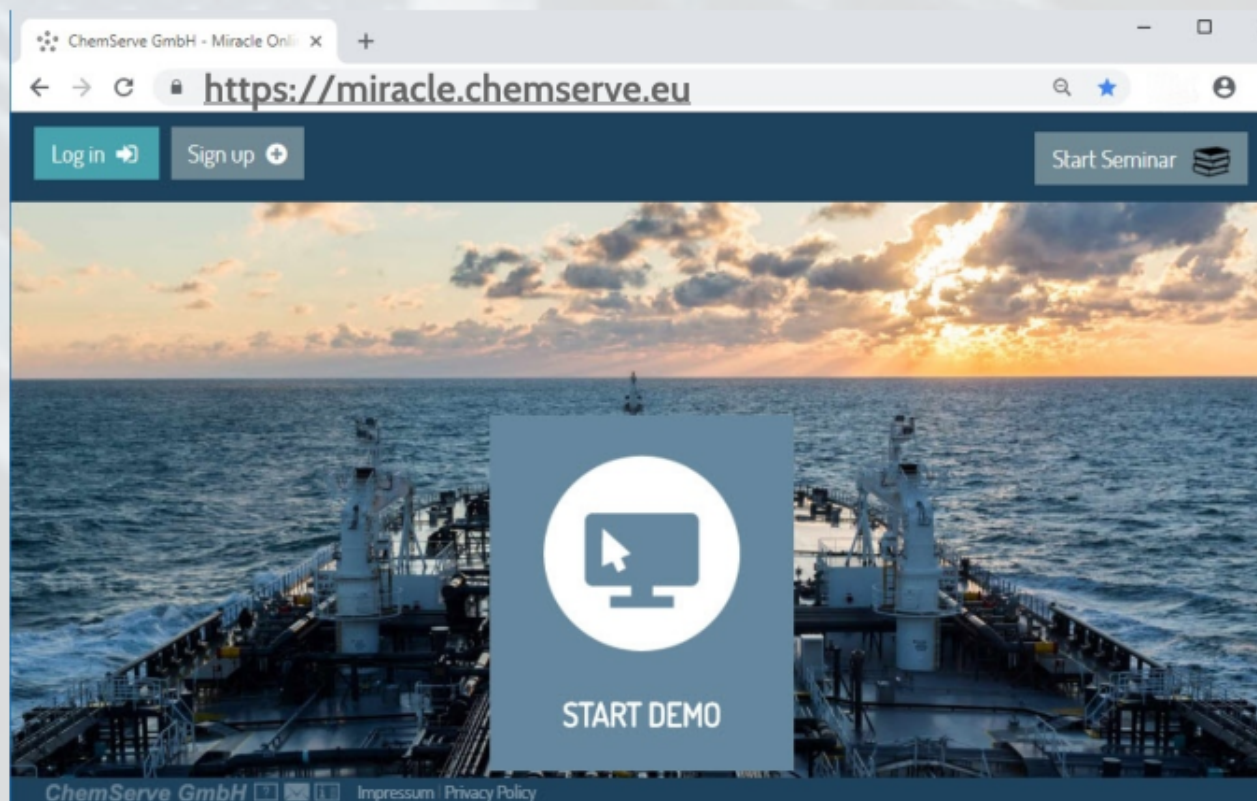
Please contact us!

ChemServe GmbH: Phone: +49 4135 808630 Fax: +49 4135 808631

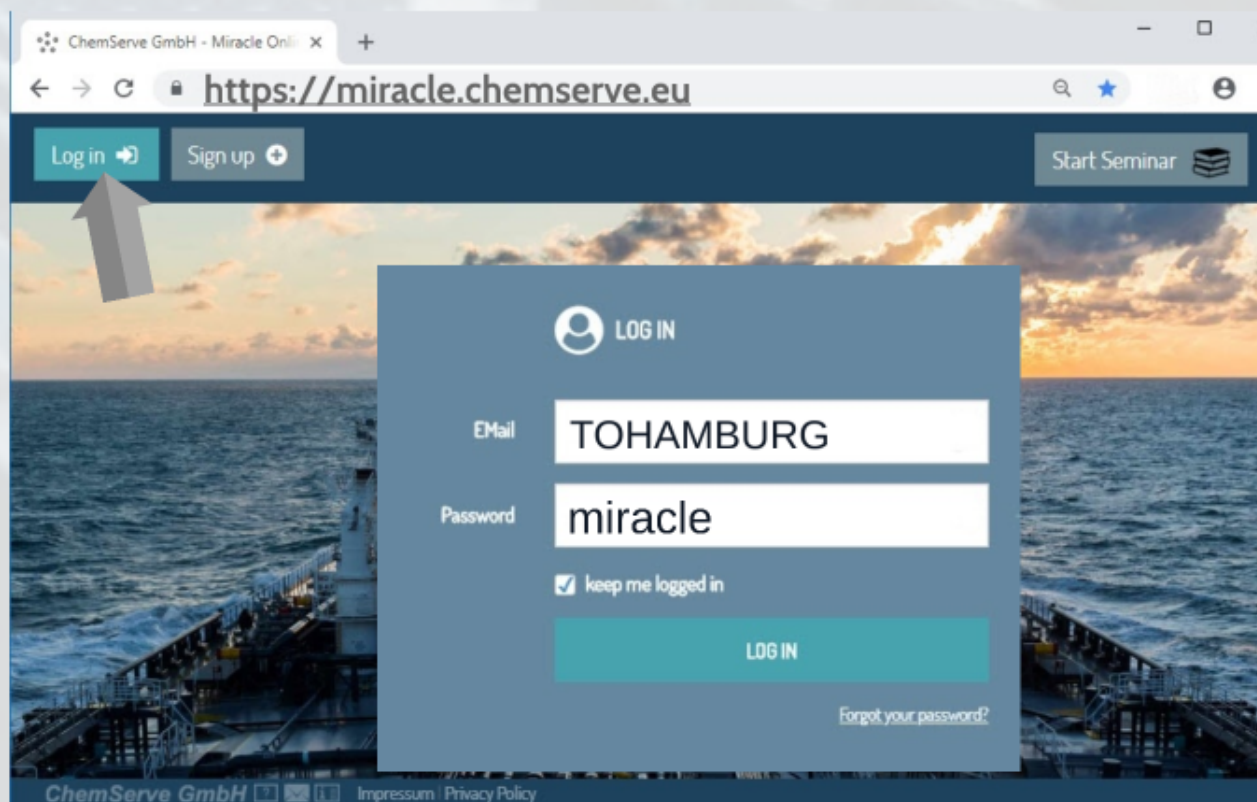
info@chemserve-marine.com OR axelkahl@chemserve-marine.com

<https://www.chemserve-marine.com>

Your free Trial valid until October 31



Your free Trial valid until October 31



The screenshot shows a web browser window with the address bar displaying <https://miracle.chemserve.eu>. The page features a dark blue header with a "Log in" button (highlighted by a grey arrow) and a "Sign up" button. A "Start Seminar" button is also visible in the top right corner. The main content area has a background image of an offshore oil rig at sea. A light blue login modal is centered on the screen, containing the following fields and options:

- LOG IN** (with a user icon)
- Email** field: TOHAMBURG
- Password** field: miracle
- ☒ keep me logged in
- LOG IN** button
- [Forgot your password?](#)

The footer of the page includes the text "ChemServe GmbH" and links to "Impressum" and "Privacy Policy".

Thank You

