



The Revolution of Integrated Purification

WOW introduces revolutionary multiple patented solutions that turns
any contaminated water into pure water
&
contaminated surfaces into clean surfaces

WOW TECHNOLOGY GROUP



WOW NUCLEAR SRL

focused on application of WOW™ technology in the nuclear field

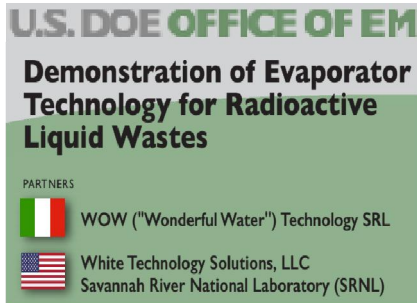


WOW KEMICAL SRL

focused on application of WOW™ technology in the chemical, oil & gas, ultra pure water and industrial fields

WOW™ IN BRIEF

AWARDS



The WOW water purification is a unique and very **high performance distillation process** that eliminates:

- demisters, bubble caps, membranes, additives
- distillation columns

DF performance is **order of magnitudes better** than existing evaporation technologies with only single evaporation stage.



This high performance allows the following **features and benefits**:

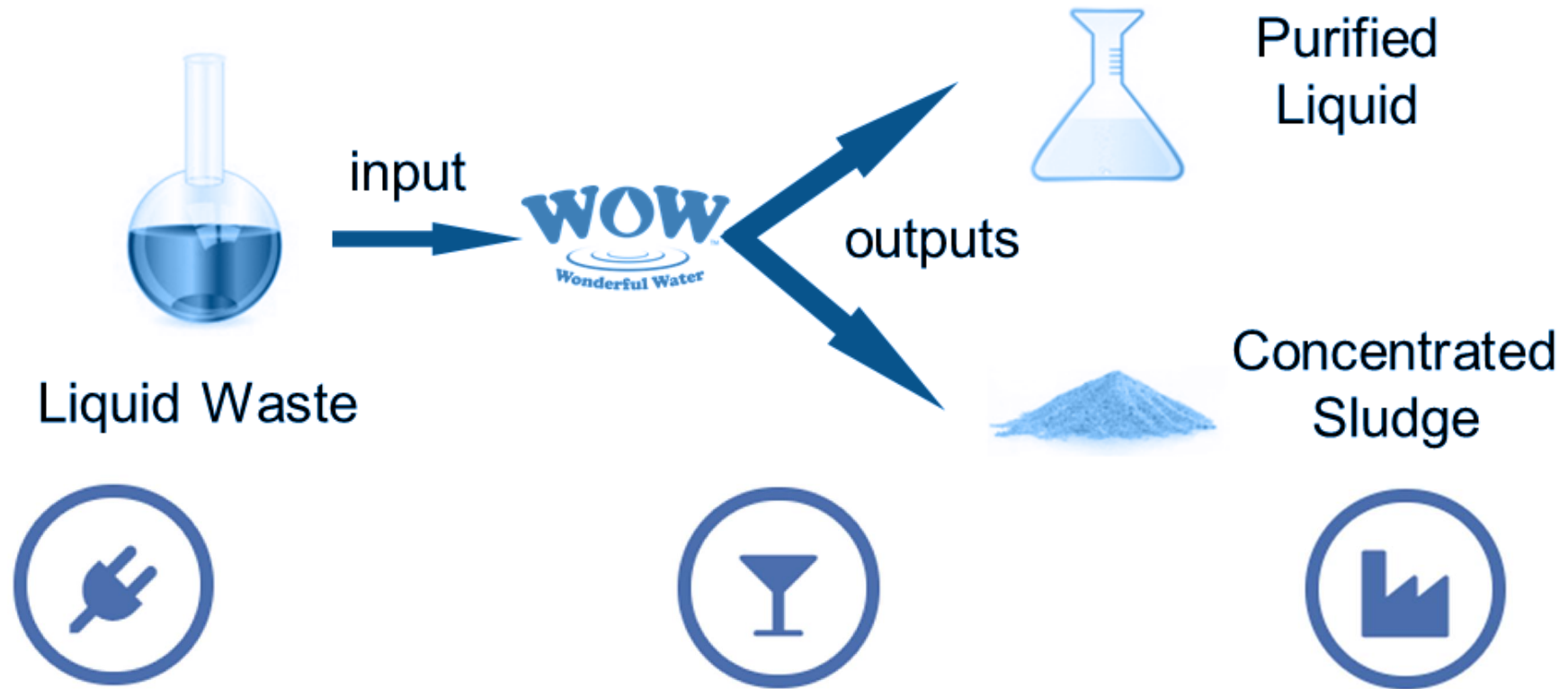
- **small operating foot print**
- **very efficient separation into**
 1. pure distillate stream;
 2. concentrate sludge stream with very high concentration factor;
- **very high concentration factors;**
- **easy cleaning of the equipment.**

The **small footprint and low cost** of the system makes this technology very attractive for deployment in both existing and new facilities. **Addresses CBR liquid waste treatment** throughout the **Nuclear and Chemical** industries.



TECHNOLOGY DESCRIPTION 1/2

WOW Solutions for Purification of Fluids



Readily available technology

- Revolutionary patented method
- Demonstrated at bench, pilot & commercial scales
- Up to 1000 times more effective than existing technologies such as conventional evaporators, reverse osmosis, electrodialysis

Portable and scalable

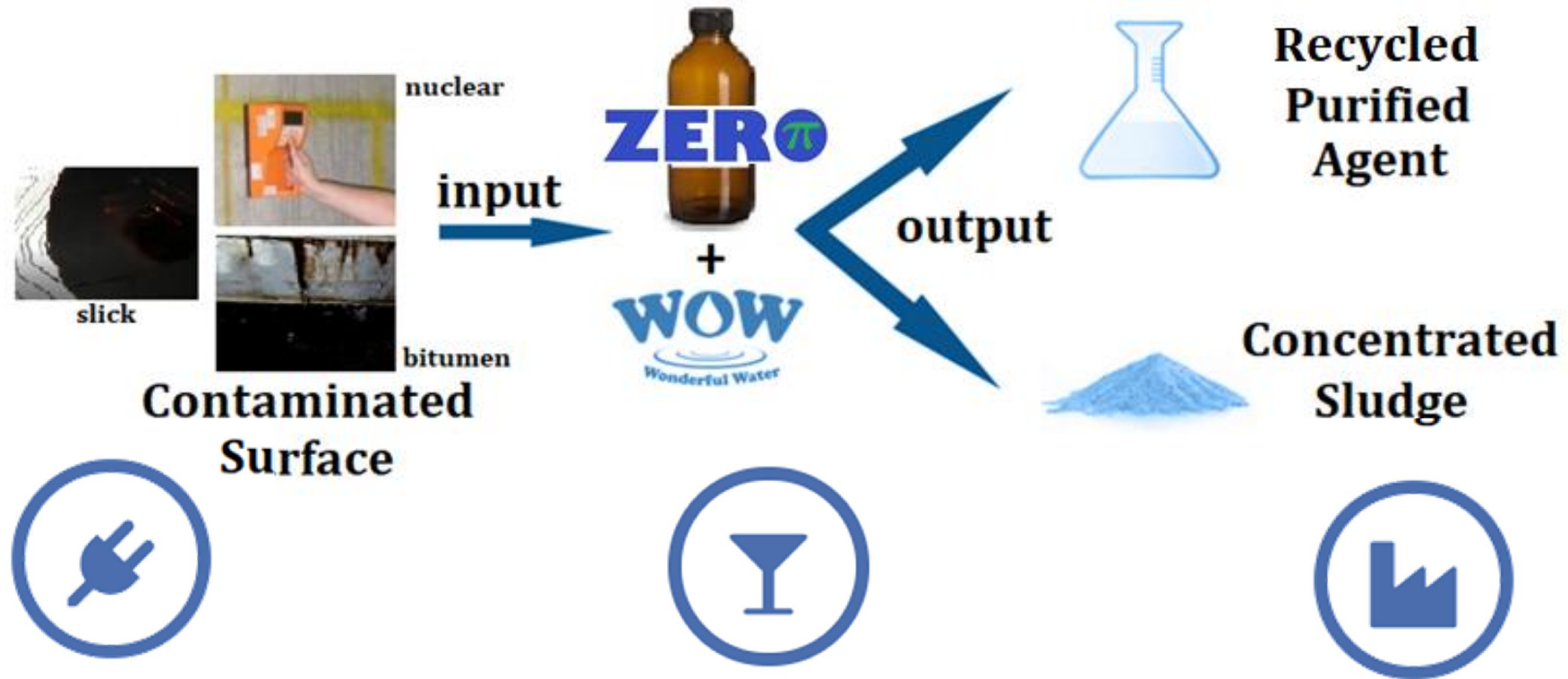
- Easily scaled for wide range of industrial applications [7 ÷ 800 gallons/hour and over]
- Compact footprint allows easy installation into existing facilities
- Simple process control

Pure water from any source

- Nuclear facilities
- Oil & Gas operations
- Industrial wastewaters
- Municipal wastewaters
- Environmental releases

TECHNOLOGY DESCRIPTION 2/2

WOW Solution for Decontamination of Surfaces



Readily available technology

- Demonstrated removal of radiochemical, organic and inorganic substances, and biological contamination
- Up to several times more efficient than existing methods

Decontamination agents (Zero π) are derived from natural and fully organic substances and are non-hazardous

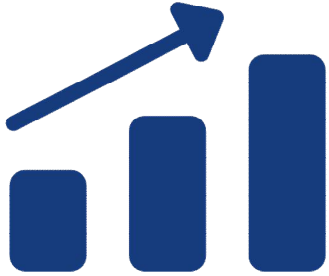
- Tested successfully for applications in nuclear, oil & gas, food, and chemical industries.

≈ ZLD (zero liquid discharge)

Fluids used for decontamination, that contains Decontaminant Agent, can be processed by WOW device and separated into sludge with recalcitrant deposits and fluid that can be refurbished and recycled for a new use. Agent act as passivant.



WOW™ BY NUMBERS (Update 2018-04; Rev. 10)



1000

Times more efficient than existing technologies (Fluid treatment).
Performance of decontaminant agent is greater than competitive substances



54980

Liters of pure water produced by 55.000 liters of radioactive water at Saluggia-IT nuclear repository.
Device fully decontaminated and released at the end of treatment 6

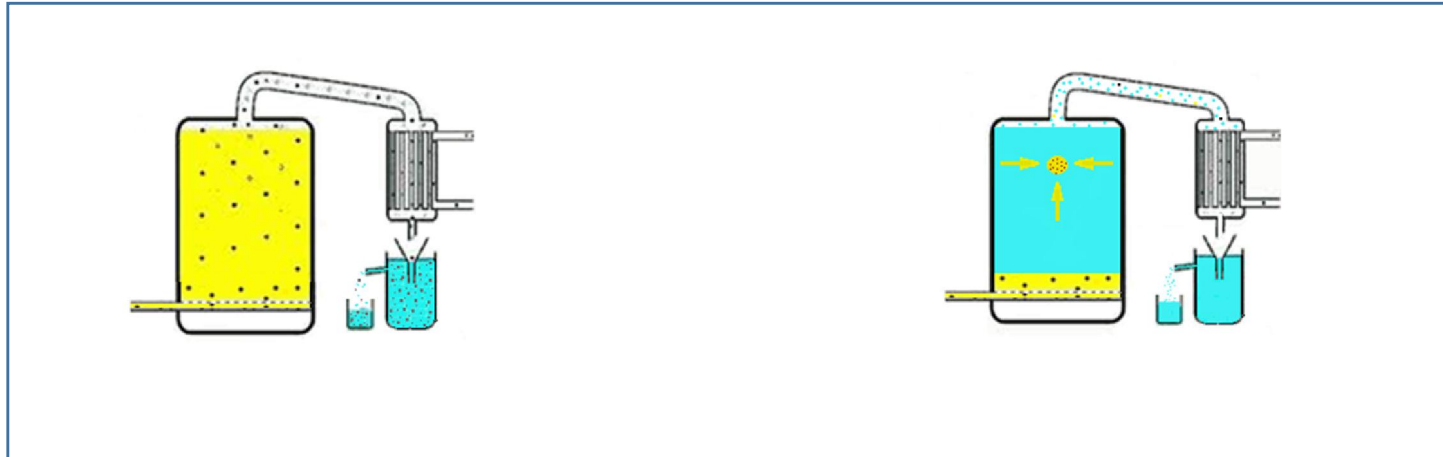


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Years of research and development in certified laboratories and nuclear facilities

INNOVATION 1/2

WOW Technology for Purification of Fluids



Standard process

vs

WOW process

The WOW process combines evaporation/distillation and fluid dynamics to separate liquid solvent from solute and suspended solids.

PATENTS & IP

WOW TECHNOLOGY SPA – (Purification of fluids: Granted worldwide)

WOW NUCLEAR SRL (Decontaminant Agent: Pending)

WOW KEMICAL SRL (Decontaminant Agent: Pending)

TREATMENT OF RADIOACTIVE WASTE WATER

Treatment of 55,000 L (14,500 gal) of Liquid Radwaste at SORIN Nuclear repository of Saluggia – IT. Input stream separated into:

*concentrated sludge stream = 20 litres,

***purified water stream = 54,980 L** that was **released to groundwater.**

Device Decontaminated with Decontaminant Agent (Zero π) and equipment released without restrictions

Radionuclides	Decontamination Factor After 120 Days
^{137}Cs	335,000 (**)
^{60}Co	> 890,000 (*)
^{241}Am	>> ND (*)
^{90}Sr	>91,470 (*)

(*) Output activity much lower than MDA | (**) Uncertainty 3% |



Scaled up unit @ Nuclear Repository
Advisors: UNIPV-LENA + NPL-UK

CBR ELEMENTS of INPUT STREAM				pH=4.6	biological elements	surfactants	sodium
potassium	calcium \approx	magnesium	nitrates	sulfates	fluorides	chloride	calcium
\approx 11mg/L	94mg/L	\approx 6mg/L	<5mg/L	\approx 303mg/L	<1mg/L	\approx 15mg/L	\approx 94mg/L

TREATMENT OF DOE RADIOACTIVE WASTE SOLUTIONS

Test 1: Radioactive surrogate representing the feed solution to the Savannah River Site Effluent Treatment Facility (ETF) evaporator



WOW's tailored equipment

Salts, pH=5÷6	NaNO ₃	Na ₂ SO ₄	UO ₂ (NO ₃) ₂	Al(NO ₃) ₃
	Ca(NO ₃) ₂	NaOH	Zn(NO ₃) ₂	
	HNO ₃	NaCl	NaF	Mg(NO ₃) ₂
	Na ₂ SiO ₃	NaNO ₂	Na ₃ PO ₄	
Radionuclide Feed Activity (Bq/L)	Cs-137 9E+03	Sr-90 25.5E+03	Pu-239/240 2.6E+02	Ru-106 4.41E+04
Distillate =>	0.16	0.33	<0.015	2.63
Sludge =>	80.7e+03	1.74E+05	80.4	1.63E+05

Treatment Performance

Boiler's punctual DF

- ¹³⁷Cs=320,000
- ¹⁴¹Ce>12,800
- ⁸⁵Sr=145,000
- ¹⁰⁶Ru=115,000

Total DF (*)

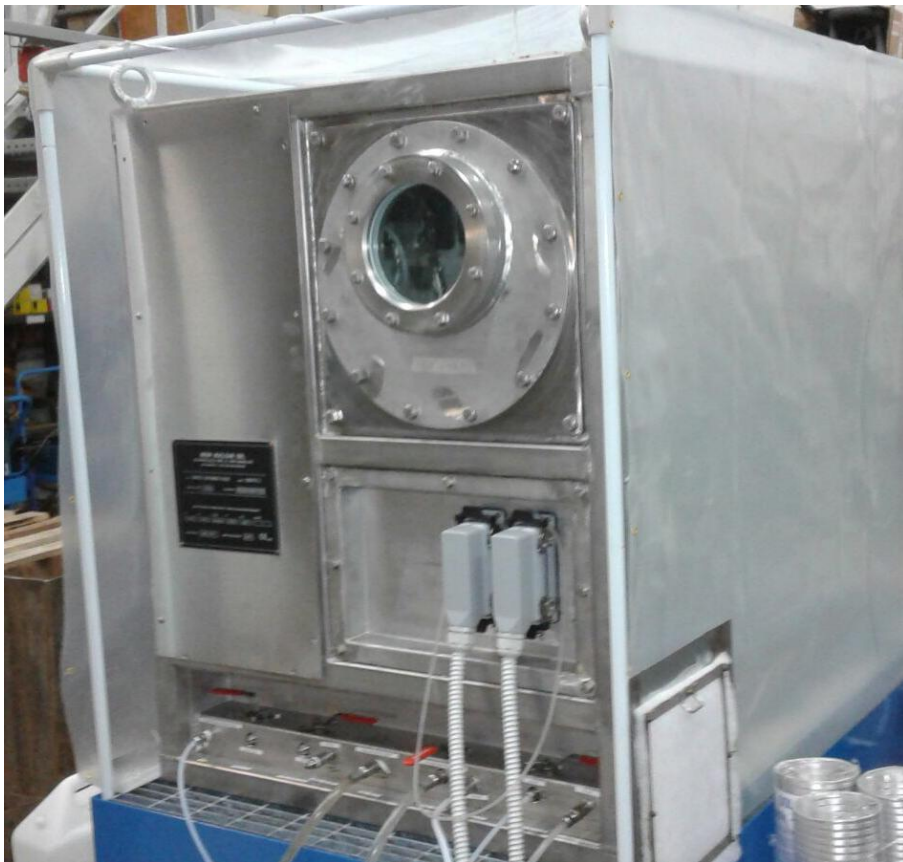
- ¹³⁷Cs=33,000
- ¹⁴¹Ce(^)>8,000
- ⁸⁵Sr=41,100
- ¹⁰⁶Ru=12,800

(*) @ a required concentration Factor of 15

(^) Output activity lower than MDA

TREATMENT OF DOE RADIOACTIVE WASTE SOLUTIONS

Test 2: Radioactive surrogate representing the eluent from the technetium ion-exchange process planned at the Hanford site



WOW's tailored equipment

Salts; pH ≈ 12.6	NaNO3	Na2SO4	Na3PO4
KCl	Ca(NO3)2	NaOH	Na2C2O4
Al(NO3)3	CsNO3	NaCl	NaNO2
H3BO3	Na2SiO3		
Radionuclide	Cs-137	Tc-99	
Feed Activity (Bq/L)	8.83E+03	1.6E+06	
Distillate =>	0,45	93	
Sludge =>	2,40E+07	80.5e+03	

Treatment Performance

Boiler's punctual DF

- $^{137}\text{Cs}=238,000$
- $^{99}\text{Tc}=235,000$

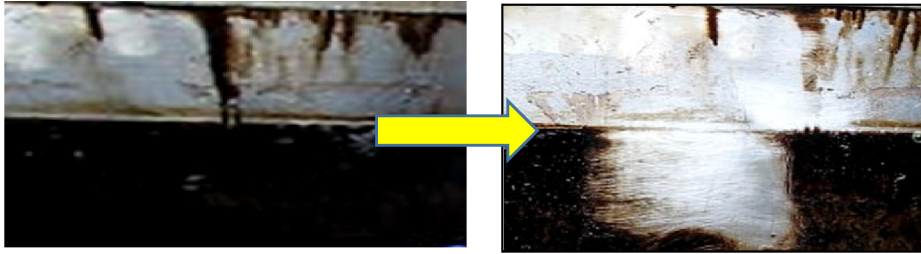
Total DF (*)

- $^{137}\text{Cs}=13,900$
- $^{99}\text{Tc}=21,300$

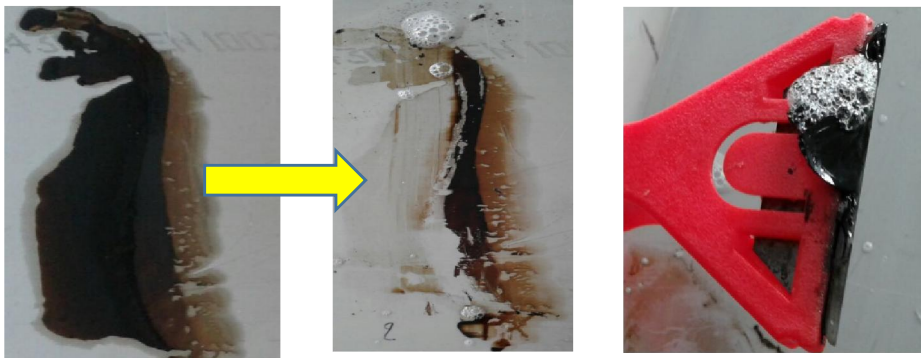
(*) @ a required concentration Factor of 12

INNOVATION 2/2

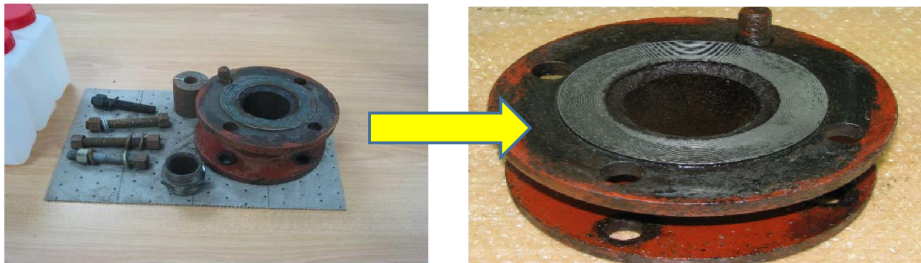
Purification of Surfaces



Example1: Bitumen+Oil bonded on steel; 100% removed in 20 min



Example2: Bitumen+Oil bonded on steel; 100% removed in 20 min



Example 3: 100% Oxide removed in a few minutes

OIL & GAS App: thick layer of crude oil and oxidation removed in a few minutes after the application of **ZERO- π**

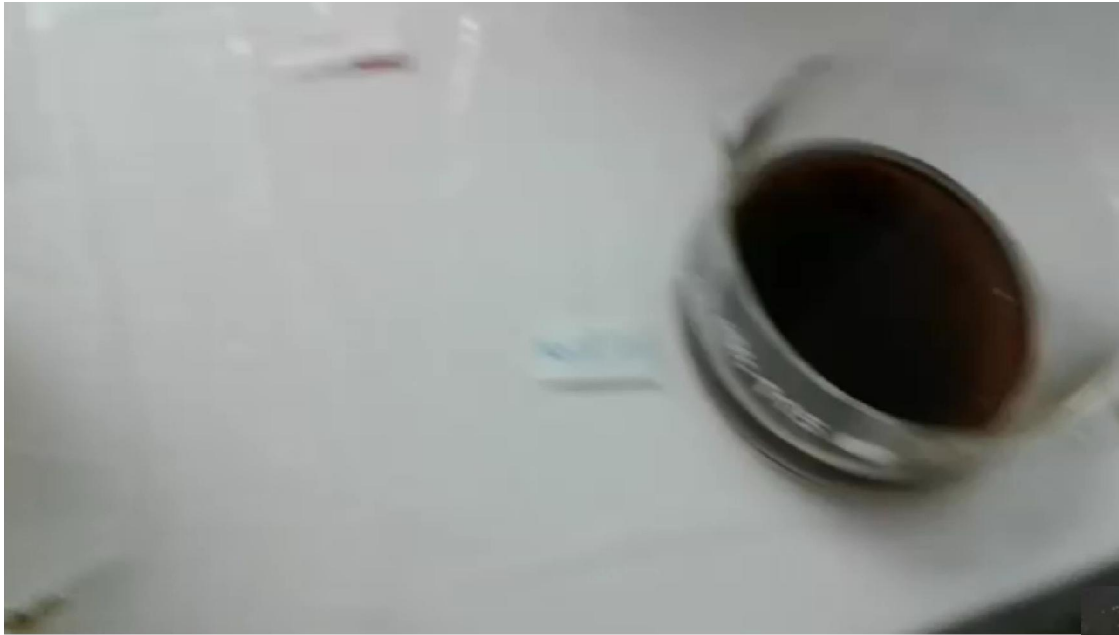
- **ZERO- π** is a collection of **decontaminant agents** developed by WOW Technology SpA group.
- Decontamination performance is much faster than commercial products for removing encrustation, carbonates, oxides, heavy metals, varnishes, oil and bitumen but not only. Decontamination agents are naturally occurring materials and non-hazardous. **Can be used without PPE.**
- Agents do not produce gaseous by-products
- Decontamination liquids can be evaporated



Example of application Removal Eff. with oxide A few residual Liquids

NUCLEAR App: DF @ single application of Agent+Electropolishing (**Rad. unit released after Decont.**)
 **^{137}Cs >>60, ^{60}Co >>400, ^{241}Am >>50,
 ^{90}Sr >15, ^{99}Tc > 20÷100**

EXAMPLES WITH OIL SLICKS VIDEOS



TREATMENT OF CRUDE OIL SLICK OVER SALT WATER

Crude oil is transformed by Decontamination Agent into an agglomerate & a hydro-repellent material (not a dispersant like other commercial products)

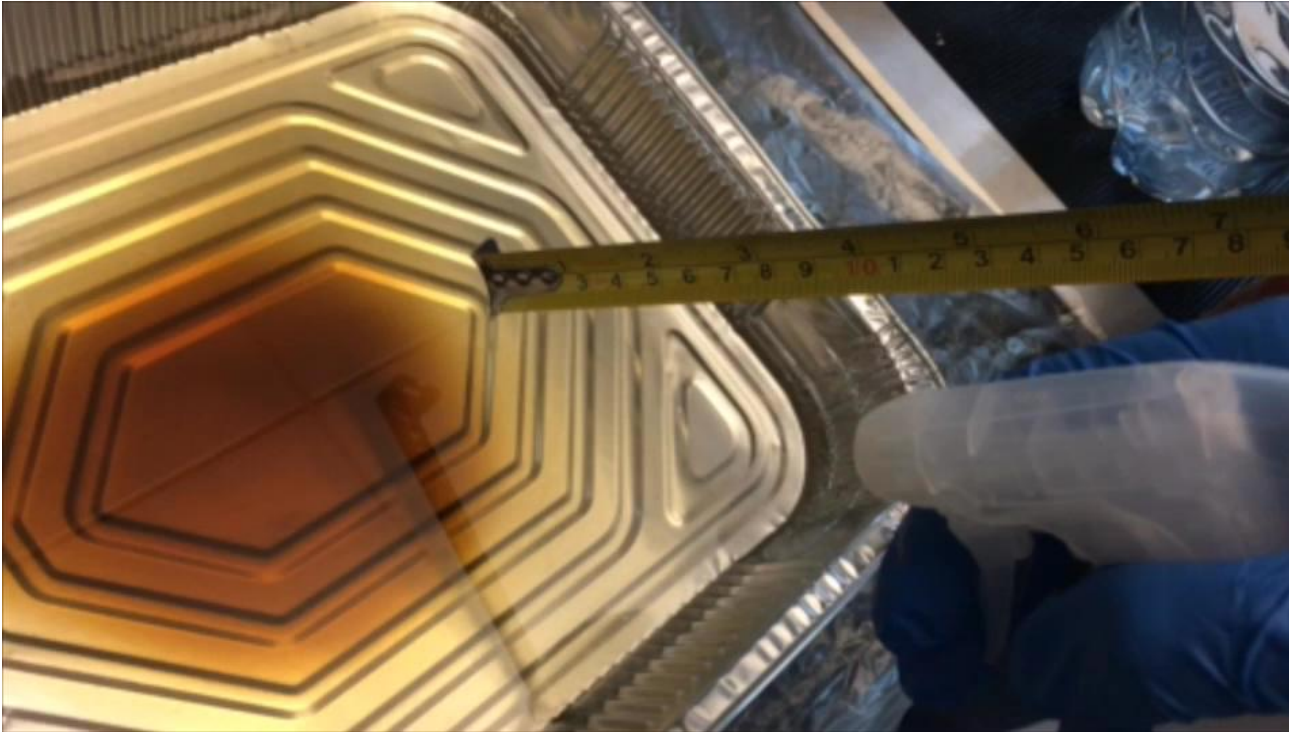
Videos are visible at LINK:

<http://www.wowwater.eu/en/elenco-news/2018-epa-international-decontamination-research-and-development-conference>

AGGLOMERATED CRUDE OIL SLICK CAN BE EASILY PICKED UP WITH OIL SCRAPER



EXAMPLES WITH OIL SLICKS VIDEOS



**TREATED MINERAL OIL AND DIESEL,
COLORED BLUE, SLICK OVER SALT WATER
OIL & DIESEL CAN BE PICKED UP EASILY**

Videos are visible at LINK:

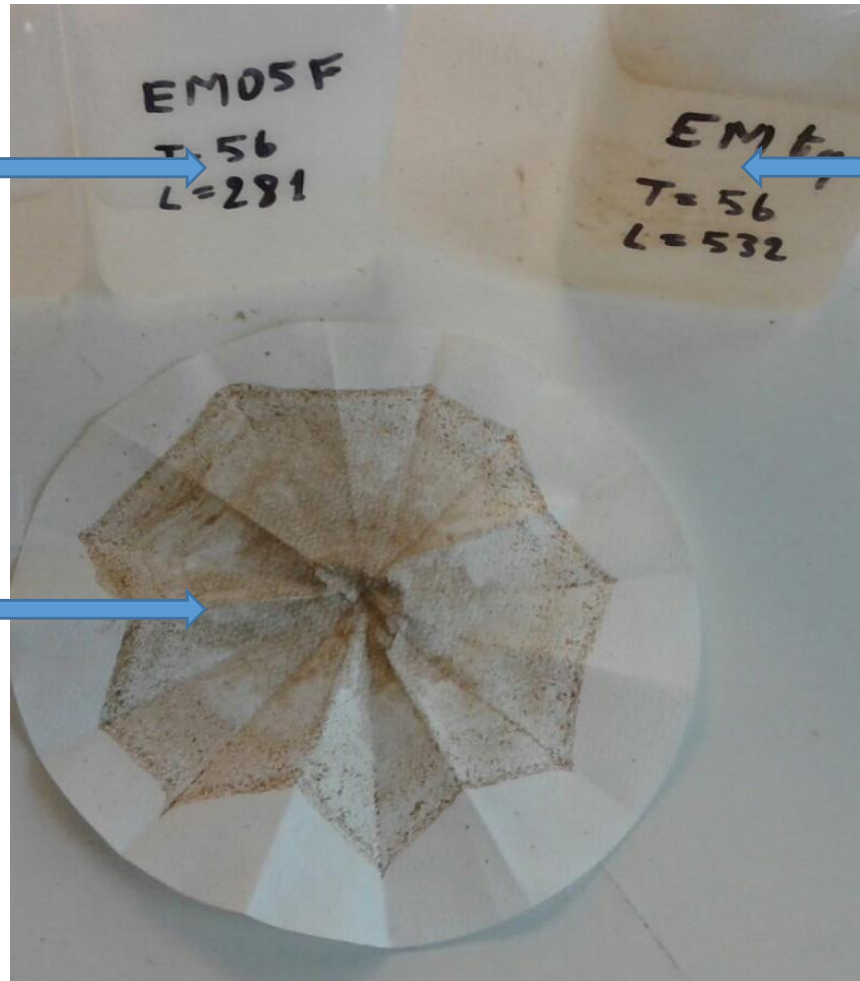
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OIL EMULSION EXAMPLE

TREATMENT OF OIL EMULSION BY MIXING WITH DECONTAMINATION AGENT FOR 80 MINUTES FOLLOWED BY FILTRATION

Water after treatment with Decontaminant Agent and filtering



Water and crude oil emulsion

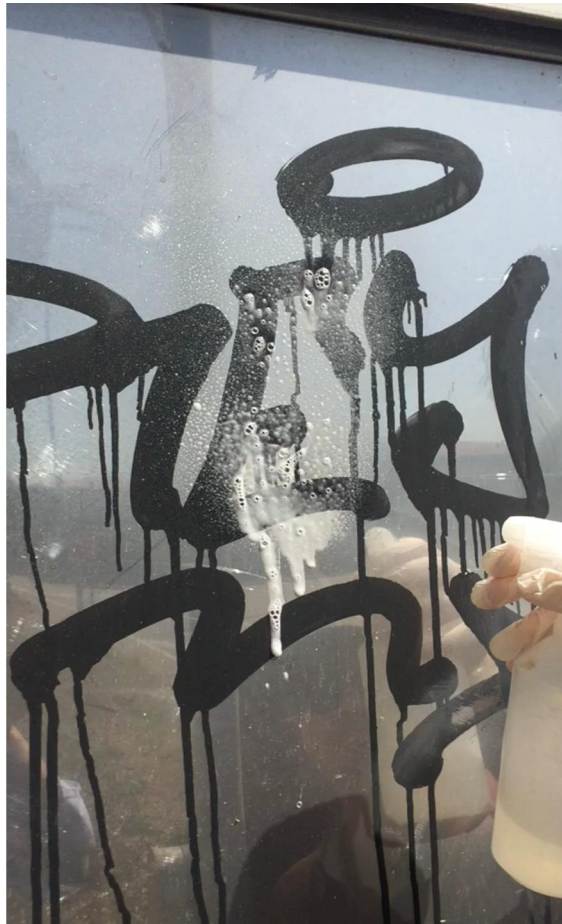
Crude oil captured on filter paper

EXAMPLES OF PAINTED GRAFFITI REMOVAL VIDEOS

**REMOVAL OF PAINTED GRAFFITI OVER STAINLESS STEEL SURFACE SPRAYING
DECONTAMINANT AGENT AND THEN REMOVED WITH SCRAPER OR WITH
PAPER IN A FEW SECONDS INSTEAD OF SEVERAL DOZEN MINUTES**

Videos are visible at LINK:

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WELCOME TO THE WORLD OF WOW™ TECHNOLOGY

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