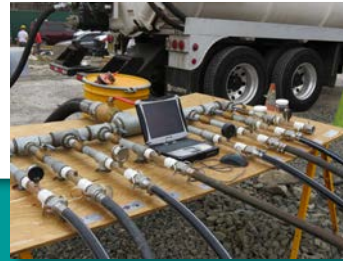
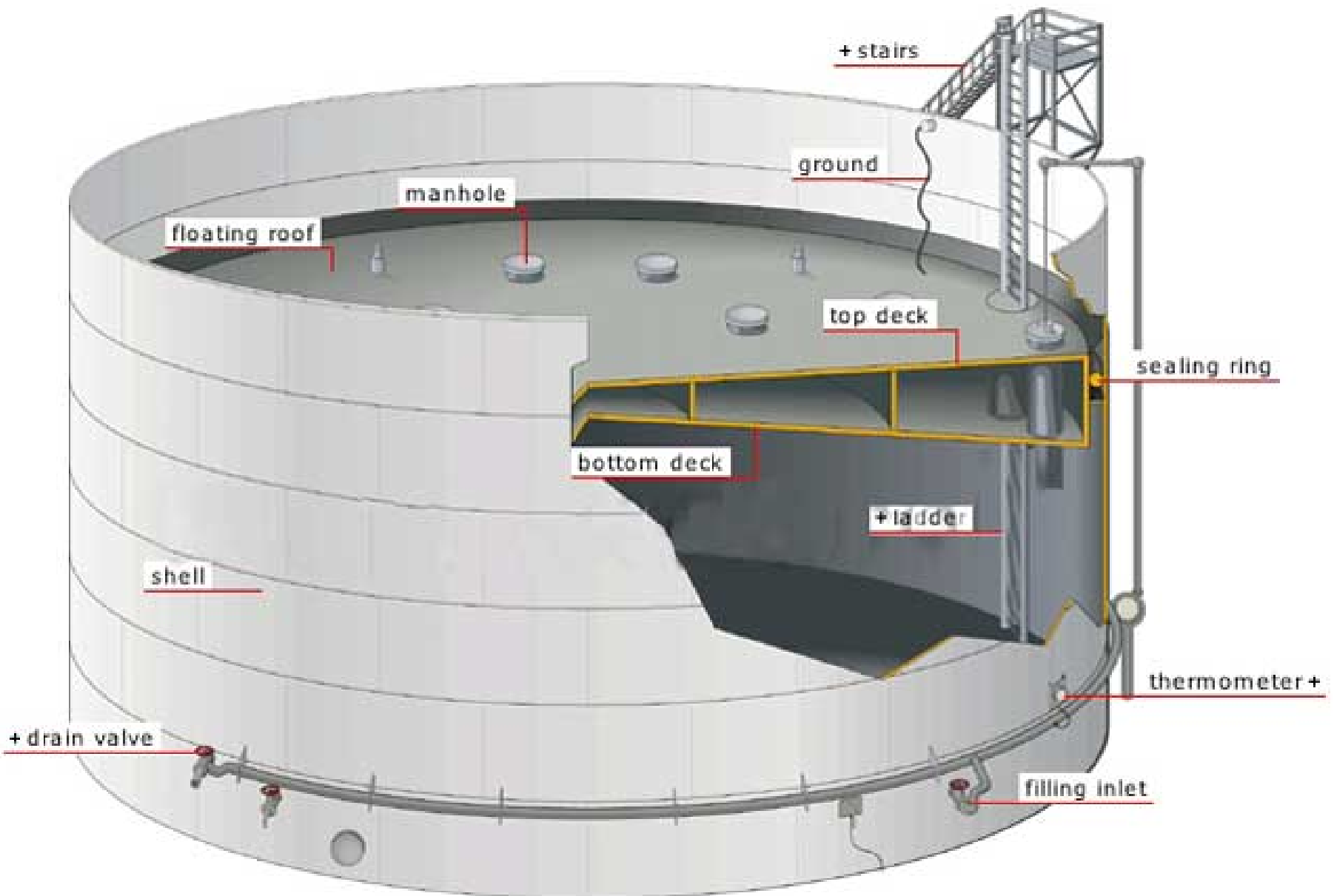




Using Surfactants to Decontaminate AST Subfloor Prior to Repair



CASE STUDY: AT MAJOR GULF COAST REFINERY



PROJECT DESCRIPTION

**120 FT DIAMETER AST
FLOATING ROOF
GASOLINE STORAGE TANK
CONE DOWN BOTTOM
CENTER SUMP**

SUBFLOOR

1 FOOT OF GRAVEL

1 FOOT OF SAND

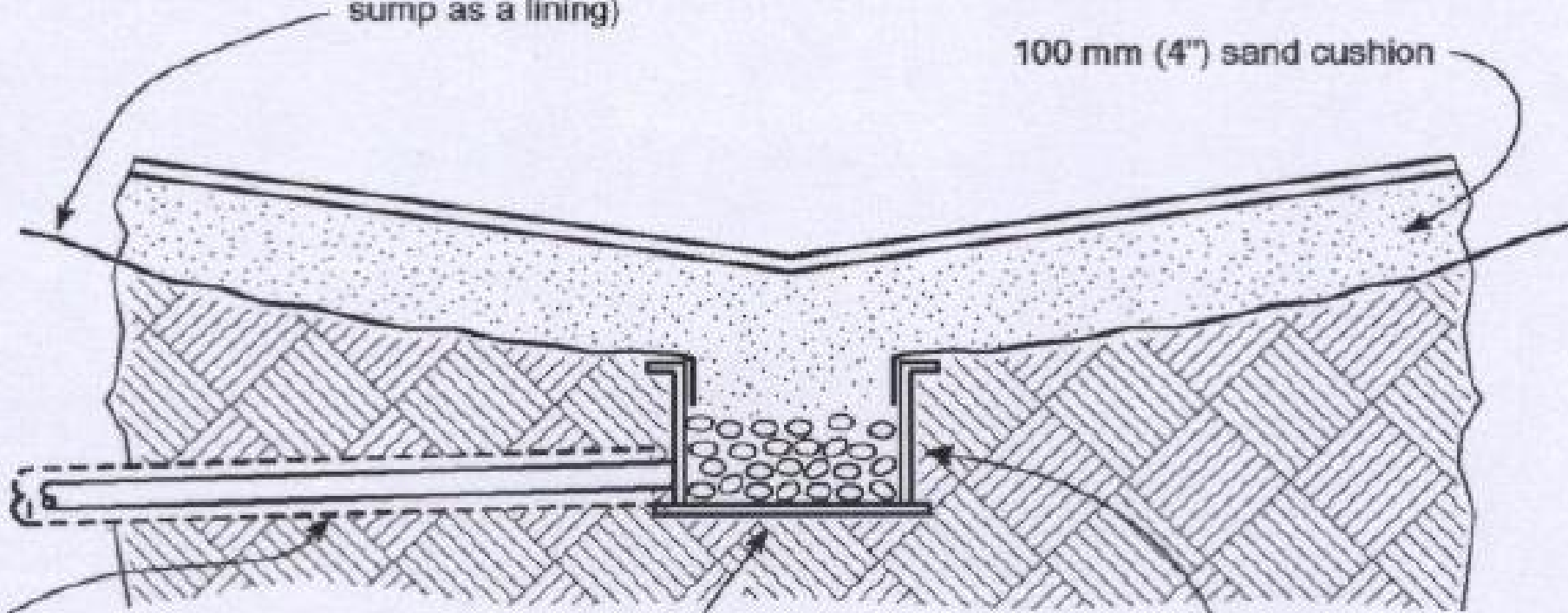
80 mm HDPE LINER

LEAK DETECTION



Flexible membrane liner bonded to sump (Alternative is to continue liner into the sump as a lining)

100 mm (4") sand cushion



Drain pipe with optional sleeve. Discharge to leak detection well or perimeter

Gravel at drain

300 mm (12") diameter (min) sump

CHALLENGE:

- **LEAK IN TANK FLOOR, CONTAMINATION BELOW**
- **VERY HIGH LEL READINGS, DRIPS AT LEAK DETECTION**
- **UNSAFE TO DO FLOOR REPAIR, EVEN USING COLD CUTTING**

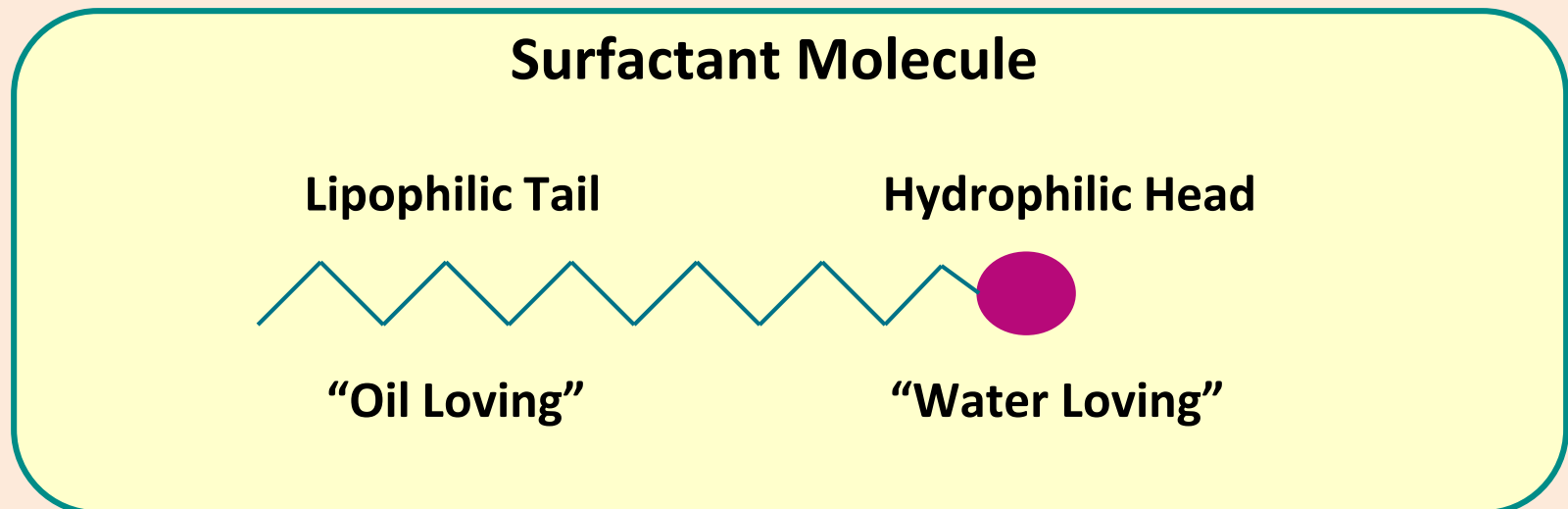
SOLUTION:

- **OLD - PUMP N₂ INTO VAPOR SPACE**
- **NEW - INJECT VAPOR SUPPRESSING SURFACTANT SOLUTION**

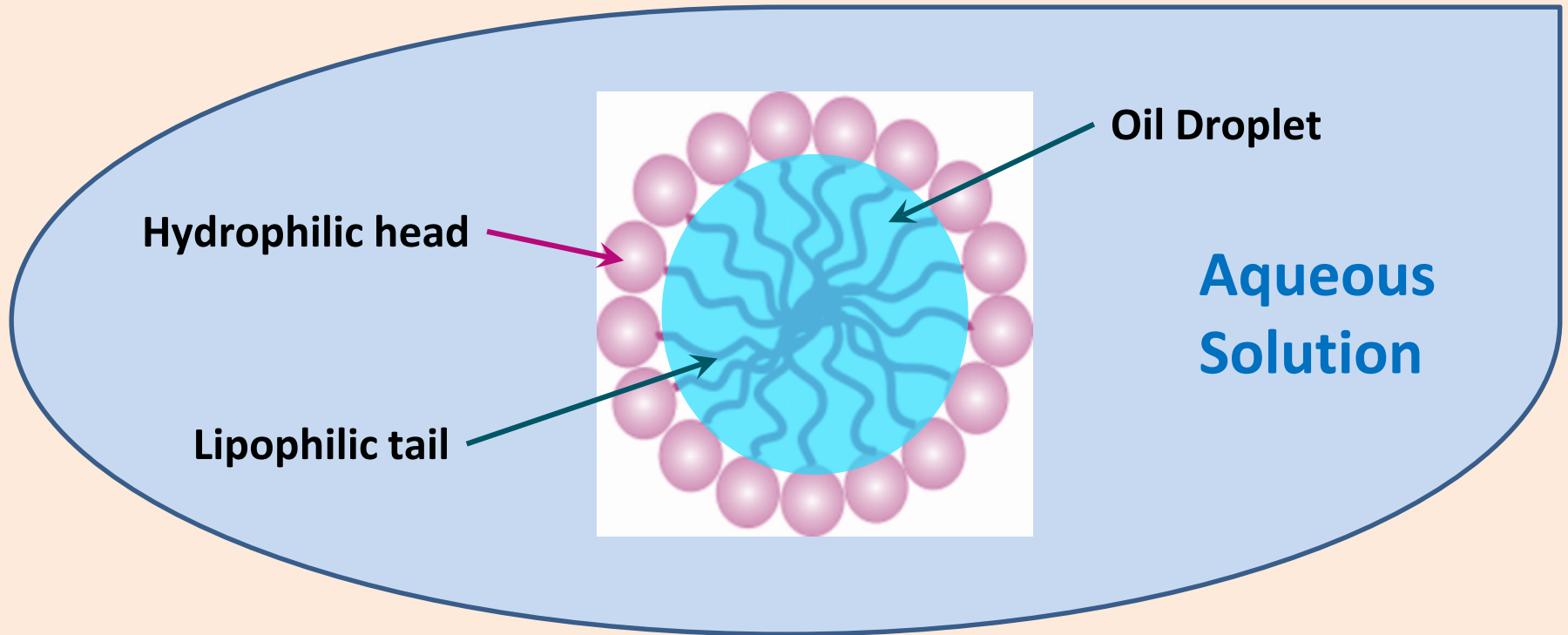
What are Surfactants?

SURFace ACTIVE AgeNT

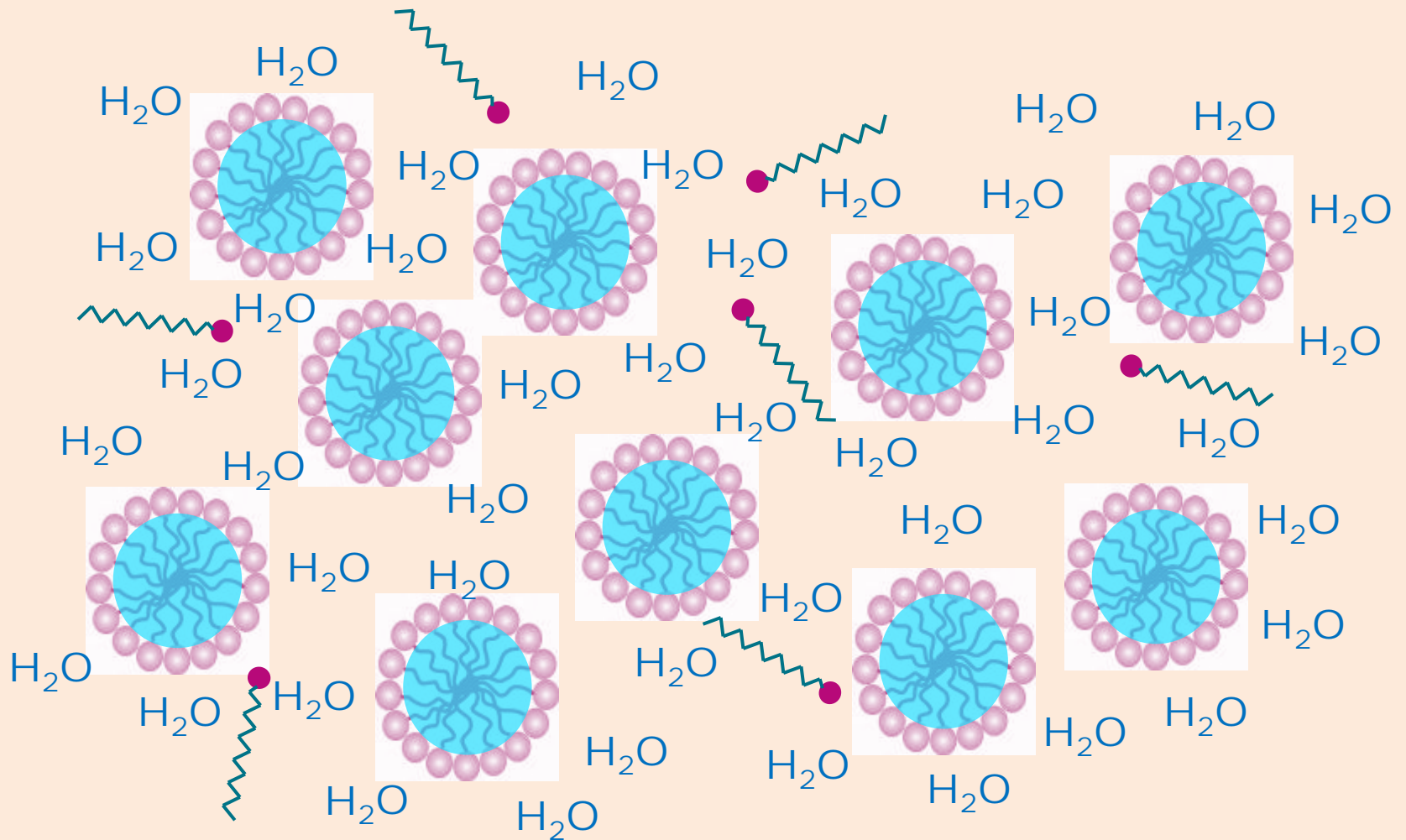
Surfactants change the behavior of liquids at the surface



**Attracted to both water and oil,
surfactants will encapsulate oil droplets**



“Micelle”



“Macro-Emulsion”

Massive Increase In Surface Area
Hydrocarbon Surfaces Not Exposed To Air
Droplet Surfaces Are Water Loving

Emulsion Characteristics

94% Diesel

4% Water

4% Pinkwater

100%

Density }
Toxicity } = DIESEL

Flow }
characteristics } = WATER
Volatility }



The emulsion contains *micro-encapsulated* hydrocarbons



Three Specific Benefits

- **Reduced volatility**
- **Increased solubility**
- **Improved bioavailability**



To create an emulsion ...



Contamination + Surfactant + Water + Agitation





Sold as a concentrate

PRODUCT LINE



bio solve
PINKWATER™
HYDROCARBON MITIGATION AGENT™

bio solve
CLEAR™
HYDROCARBON MITIGATION AGENT™

bio solve
FOGWASH®
REMOVES FATS, OILS & GREASE™

bio solve
ACTIVATOR™
SOIL REMEDIATION AGENT™

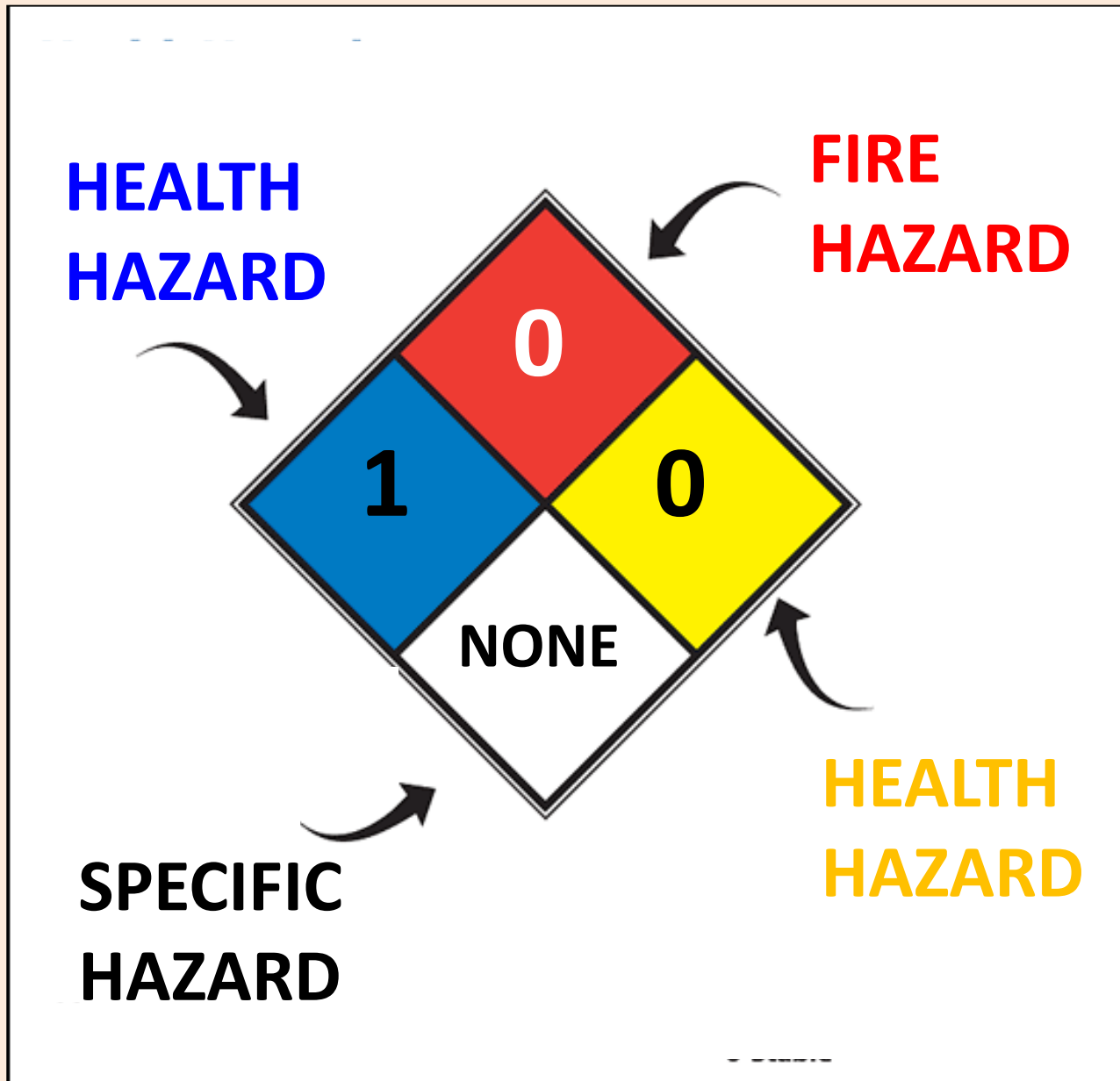
NEW!

NEW!

bio solve
HYDROVENT™
BIOREMEDIATION AGENT

*“Readily
Biodegradable”**

Pinkwater is “effective, simple & safe”



“Non – Hazardous”

BioSolve Pinkwater **does not contain any hazardous ingredients** as defined by:

- TSCA (Toxic Substances Control Act)
- CERCLA (Comprehensive Environmental Response, Compensation, and Liability Act)
- Massachusetts Right to Know Law
- California Proposition 65

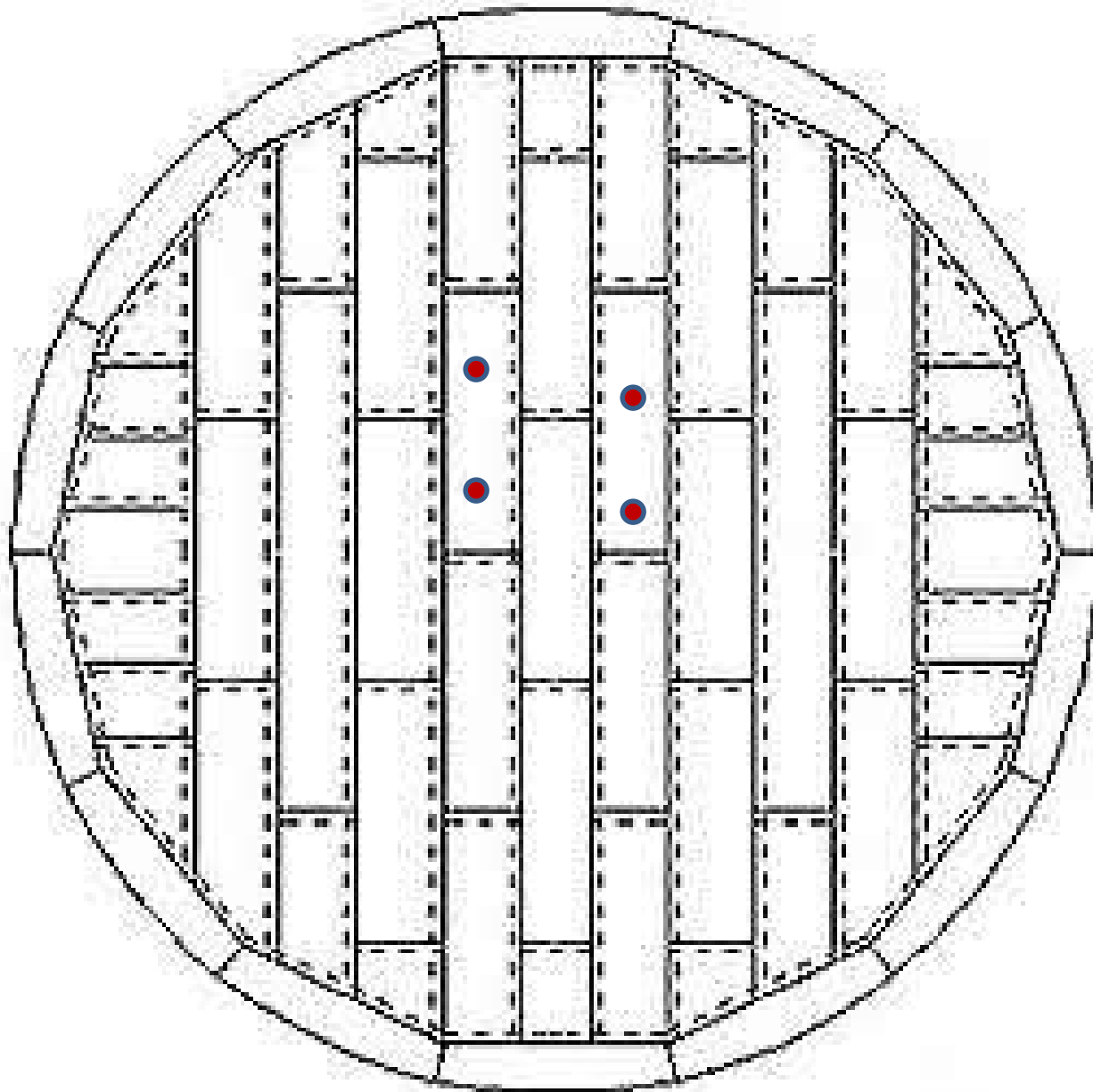
...“contains no listed ingredients”

PROCEDURE:

I – REDUCE LELS

- **COLD CUT FOUR HOLES INTO TANK BOTTOM**
- **PREPARE 20:1 OR 24:1 SOLUTION OF BIOSOLVE PINKWATER**
- **FLOOD SUBFLOOR UNTIL SOLUTION COMES THRU LEAK DETECTION AT SUMP**
- **MOVE TO NEW PLATES & REPEAT**

**OBJECTIVE IS TO GET LEL's DOWN
CAN REACH JUST 1% OR 2%**



PROCEDURE:

II – DECONTAMINATION

- **REMOVE FLOOR PLATES USING “RIVIT BUSTER”**
- **SET UP CRIBBING, REPLACING LEGS, TO SUPPORT FLOATING ROOF**
- **RECOVER & REPLACE CONTAMINATED SUBSTRATE**

REPEAT (I) AND (II) UNTIL ALL CONTAMINATION IS REMOVED

PROCEDURE:

III – REBUILD TANK FLOOR ABOVE DECONTAMINATED SUBFLOOR

Tank Cleaning





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