What is Gravity-Differential Separation?

How All Grease Interceptors Work!

Presented by:

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INTERCEPTOR WHISPERER

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Terms and Definitions:

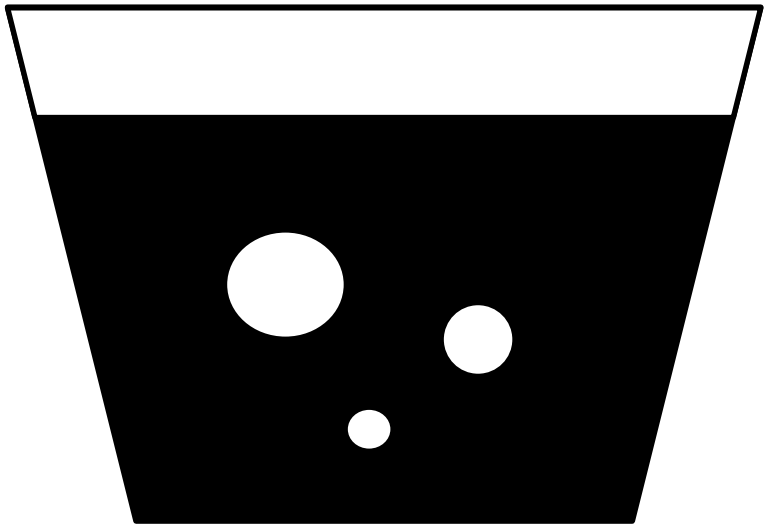
Gravity

a fundamental physical force that is responsible for interactions which occur because of mass between particles. We are MOST familiar with the MASS of EARTH and its effect on independent particles…

Terms and Definitions:

Stokes Law

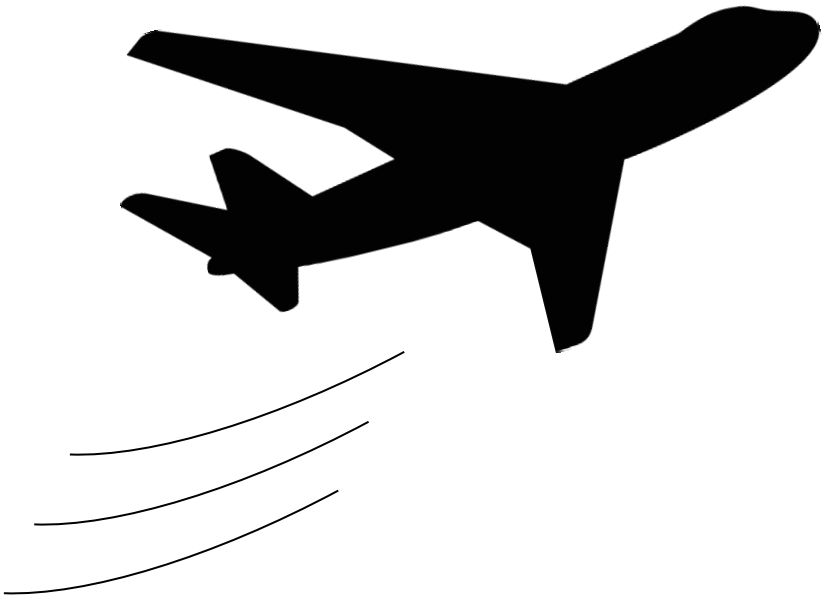
the force required to move a sphere through a given viscous fluid at a low uniform velocity is directly proportional to the velocity and radius of the sphere. Stokes LAW applies to a STATIC oil water mixture, where ONLY the **vertical** velocity is calculated.

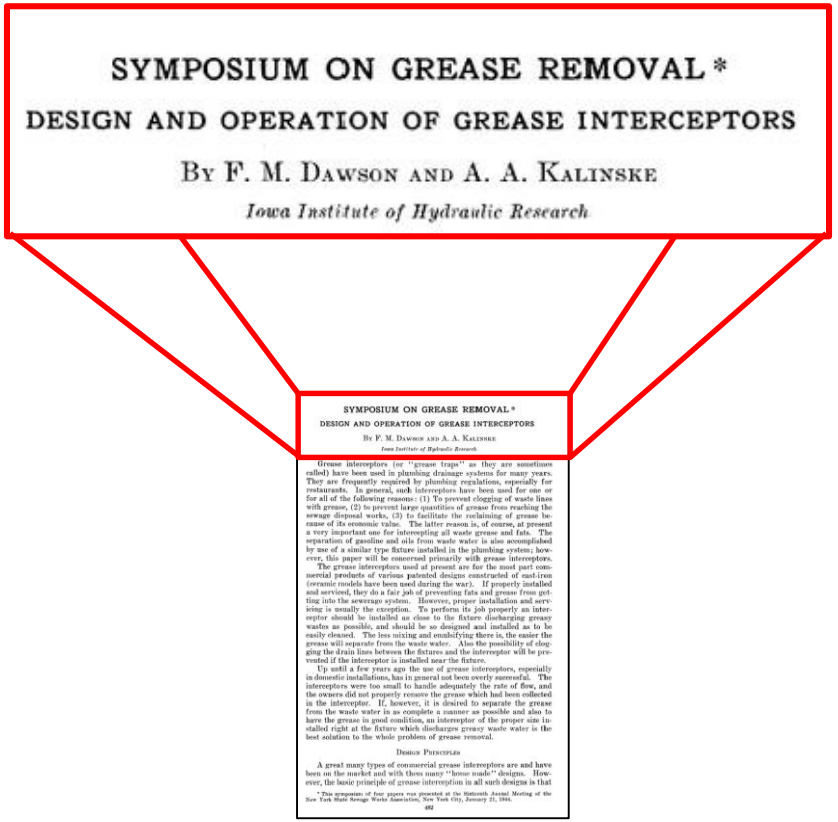


Terms and Definitions:

Bernoulli's Principle

the statement that an increase in the speed of a fluid produces a decrease in pressure and a decrease in the speed produces an increase in pressure





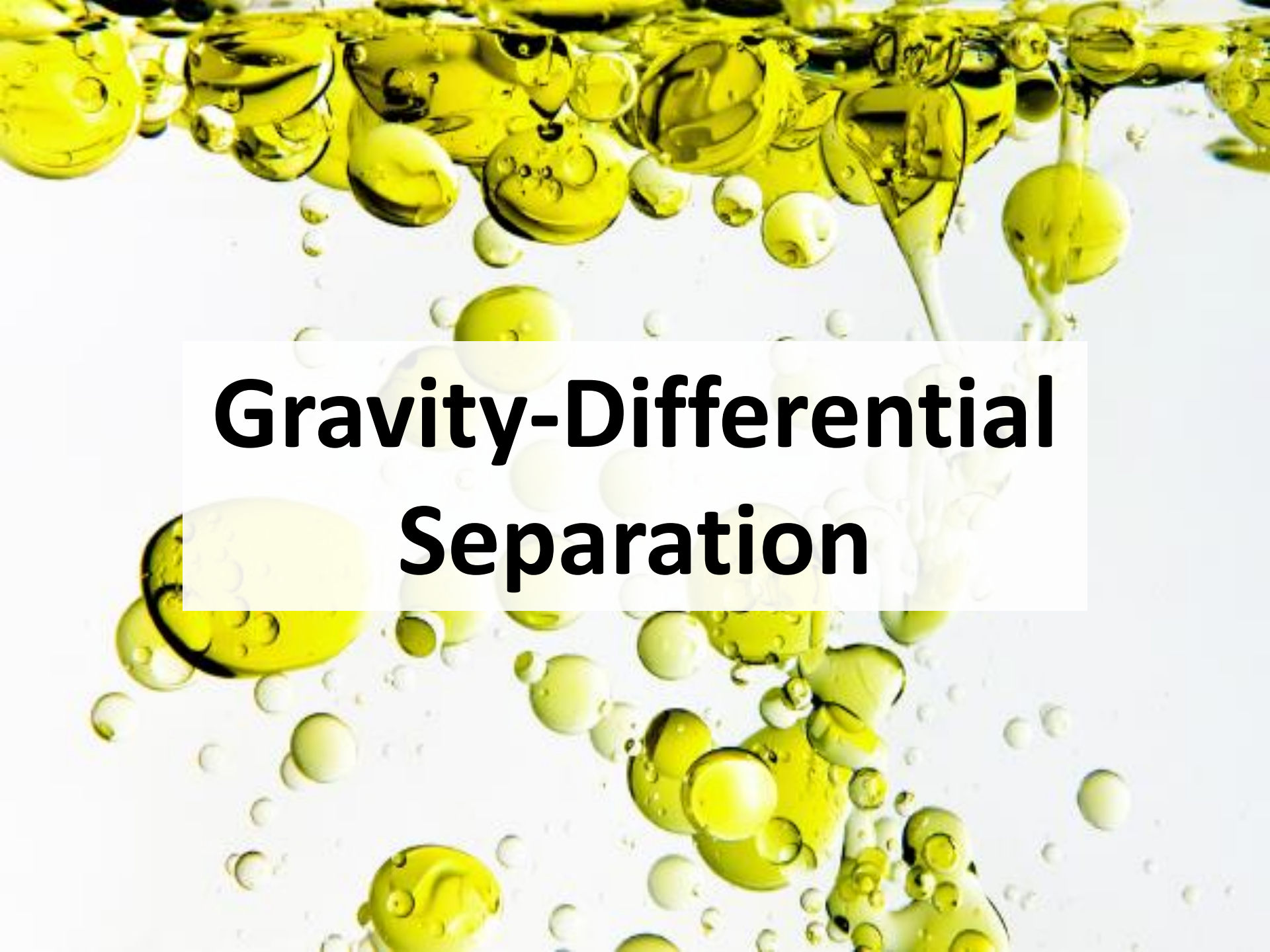
SYMPOSIUM ON GREASE REMOVAL *

DESIGN AND OPERATION OF GREASE INTERCEPTORS

By F. M. Dawson and A. A. Kalinske

Iowa Institute of Hydraulic Research

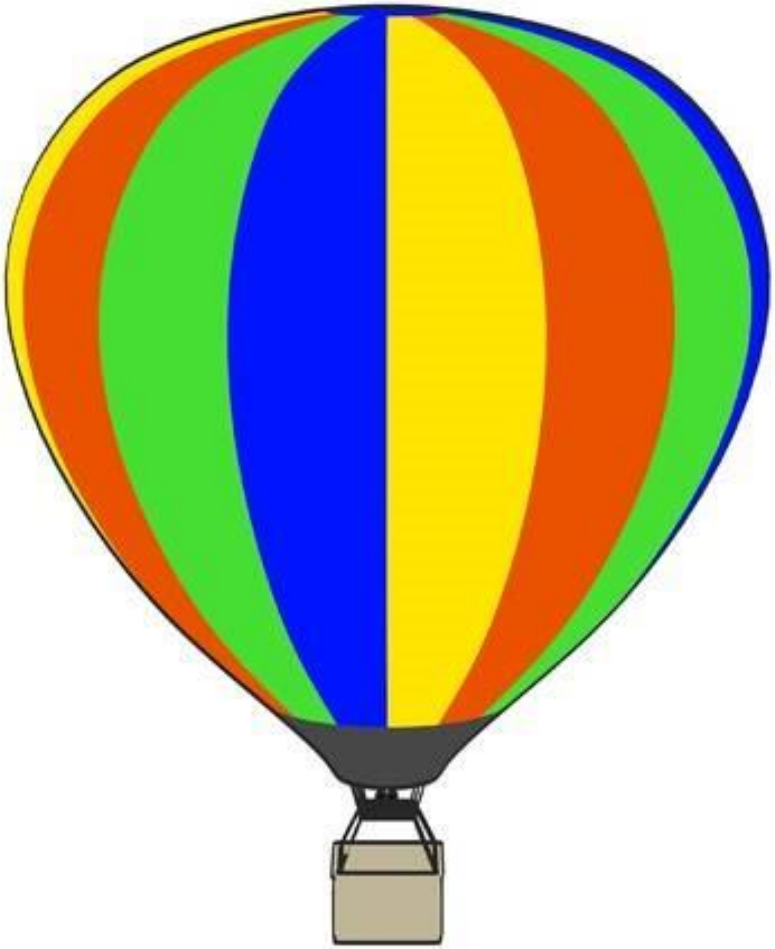
Francis Murray Dawson, Dean of Engineering, Iowa Institute of Hydraulic Research, 1936-1944

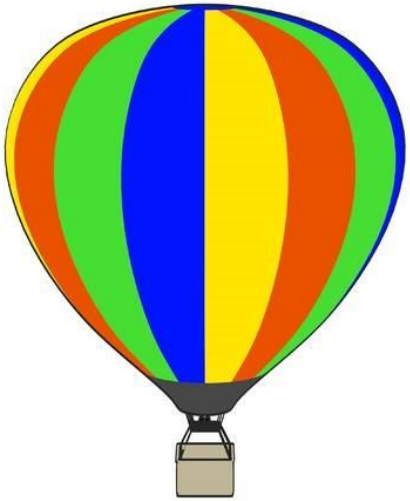


Gravity-Differential Separation

Factors that effect gravity-differential separation:

- Size of grease bubble
- Specific gravity
- Temperature
- Velocity
- Emulsification



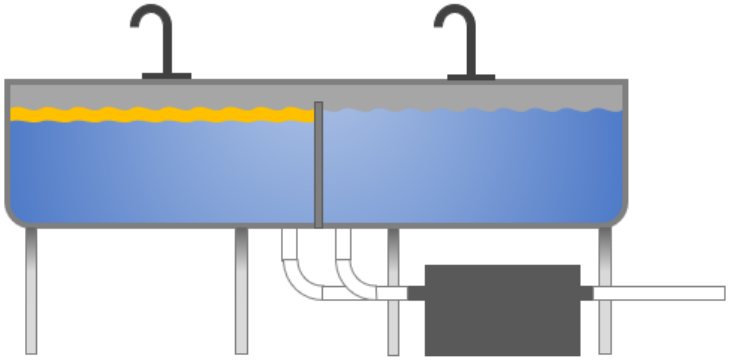


SIZE

Travel Time for 3" Distance at 68° F (hr:min:sec)	
Droplet Diameter (microns)	**Oil (rise time) SG 0.90**
300	0:00:15
150	0:01:03
50	0:09:18
15	1:43:22

150 microns = .15 mm

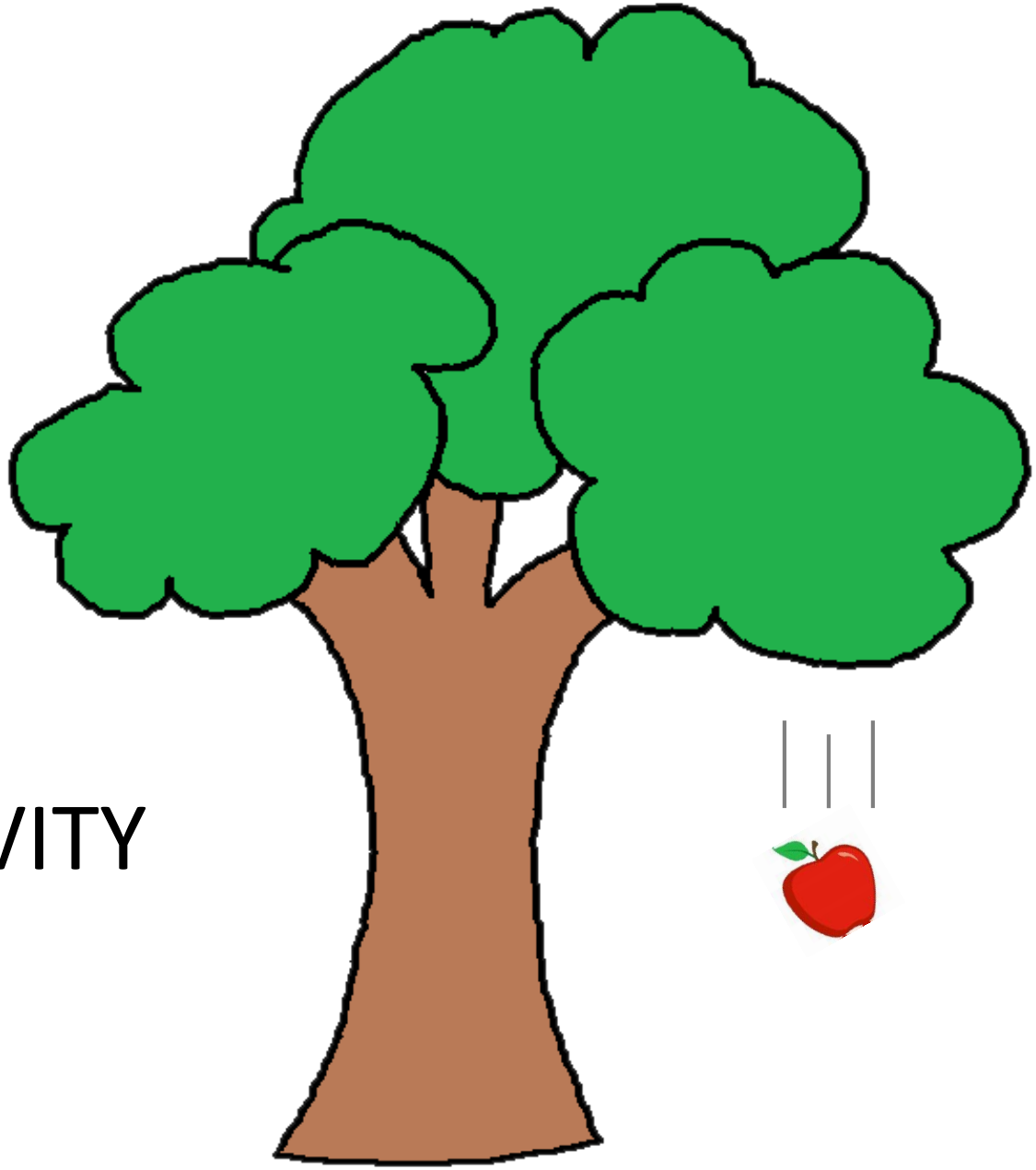
50 microns = .05 mm



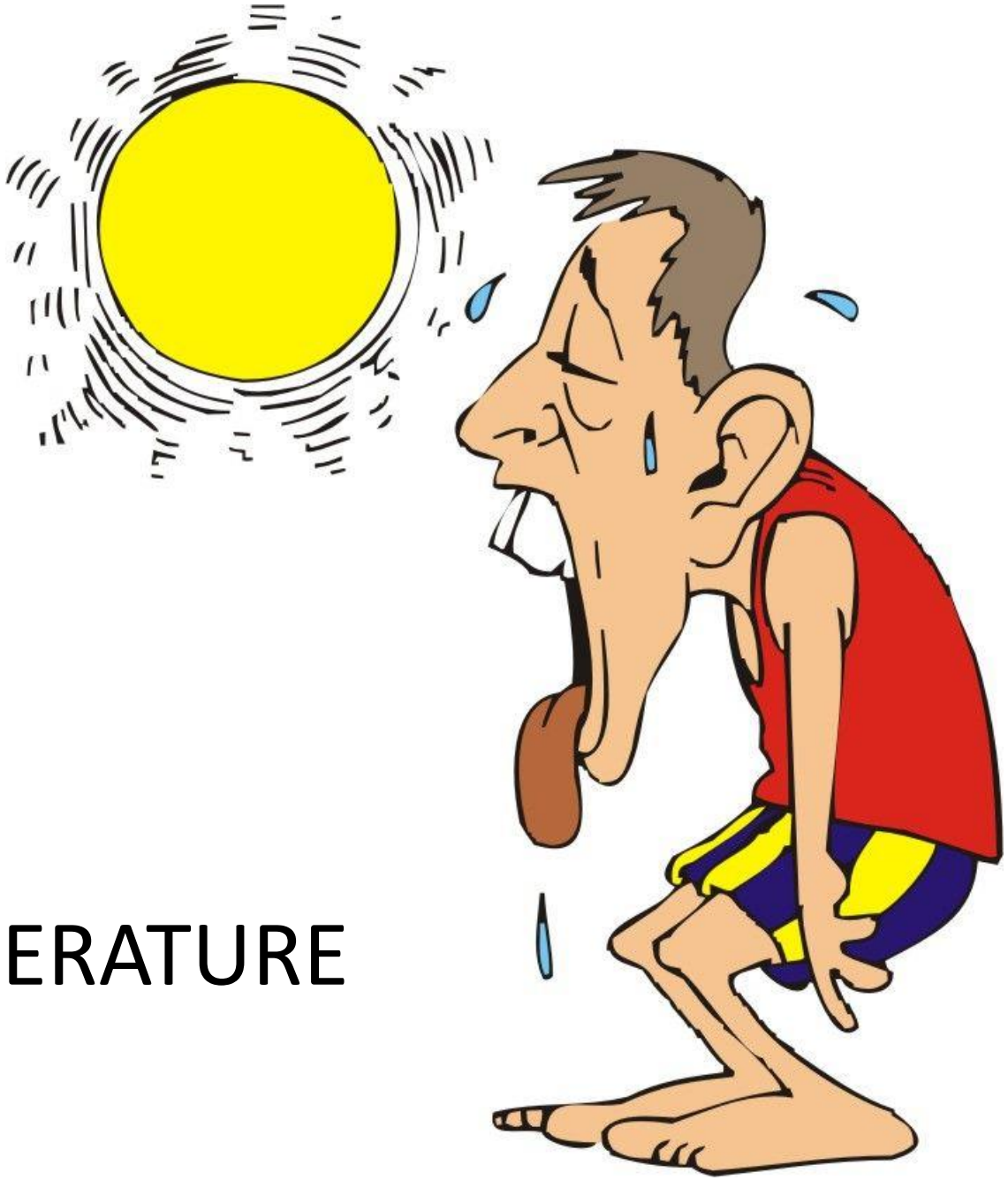
= 150 microns or >

= 50 microns or >

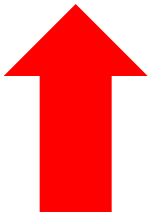
GRAVITY



Density (S.G.) at Different Temperatures		
Type of Media	**Temperature**	
	60 deg. F	160 deg. F
Corn Oil	0.924	0.88
Coconut Oil	0.924	0.879
Soybean Oil	0.919	0.879
Rapeseed Oil	0.92	0.869
Lard	0.915	0.875



TEMPERATURE

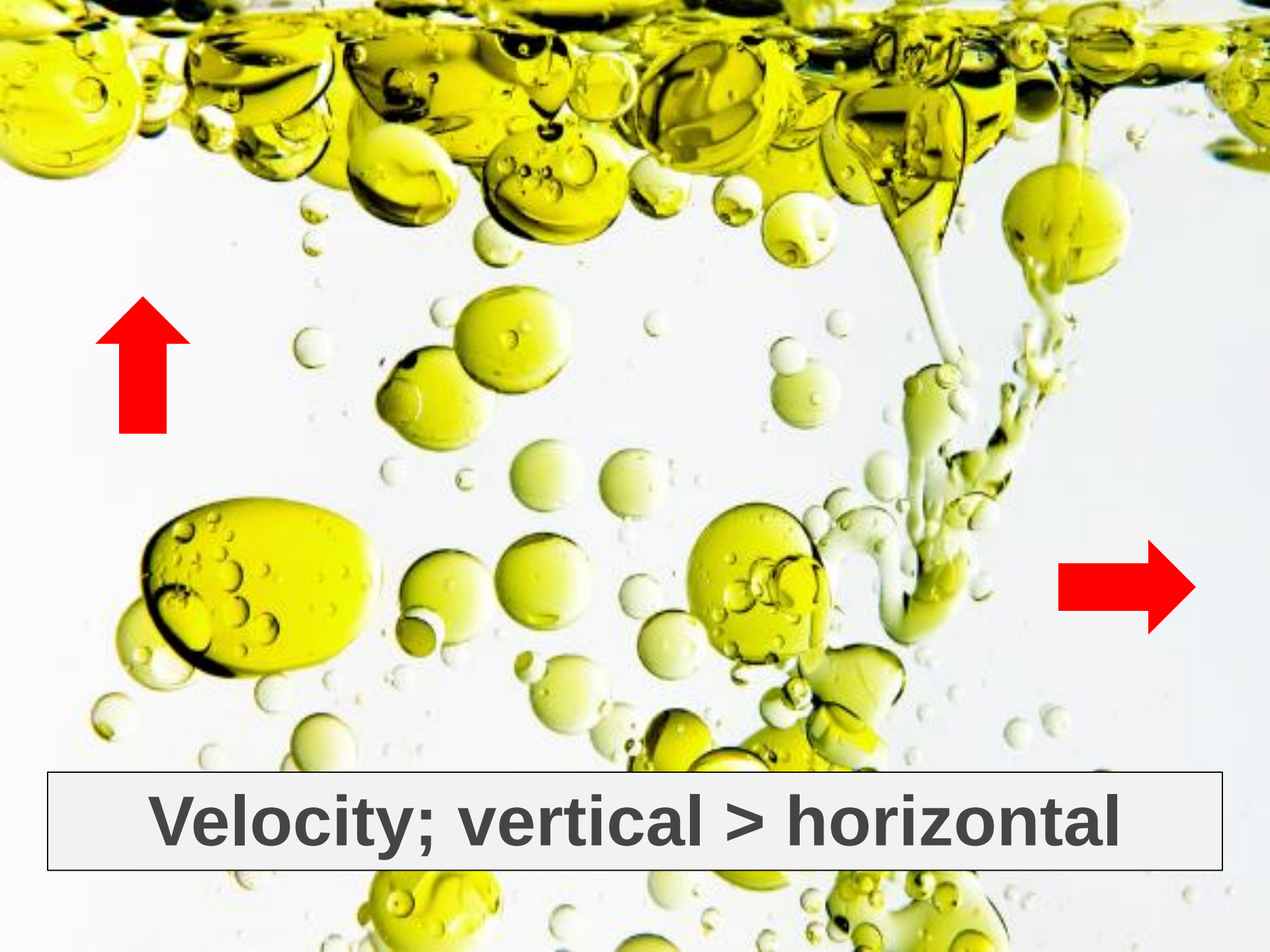
Temperature 

Viscosity 

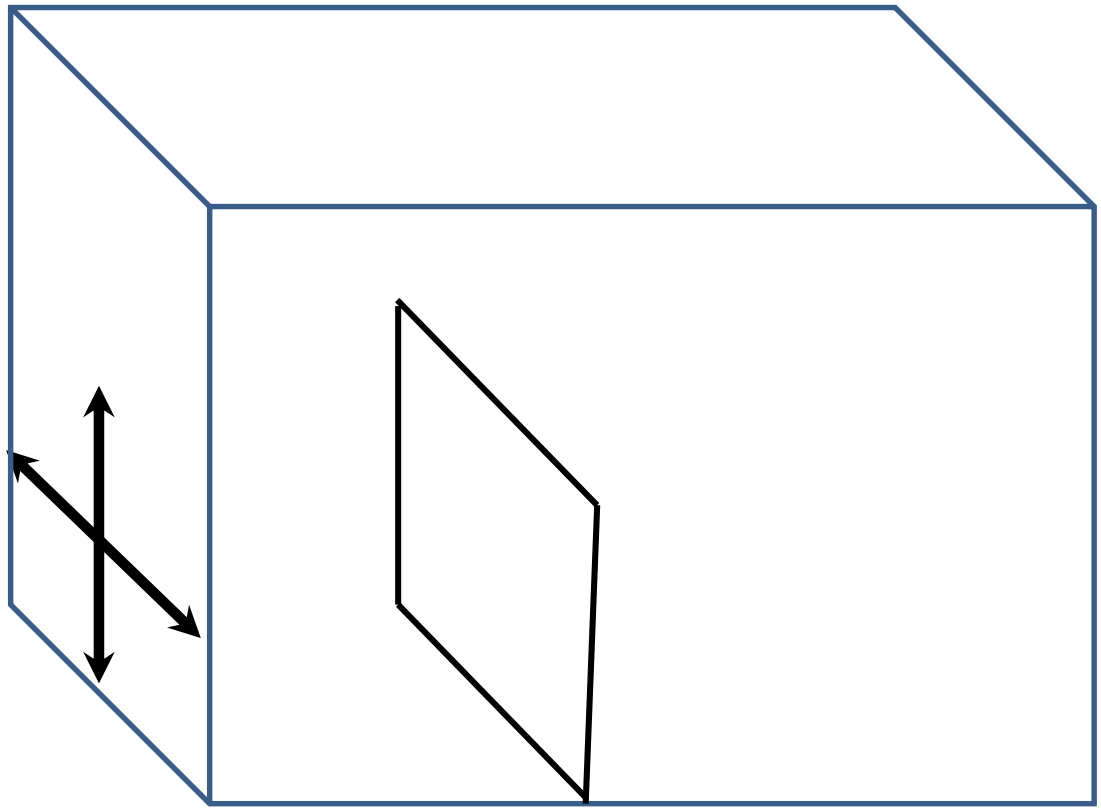
As viscosity decreases rise rate increases

VISCOSITY

VELOCITY

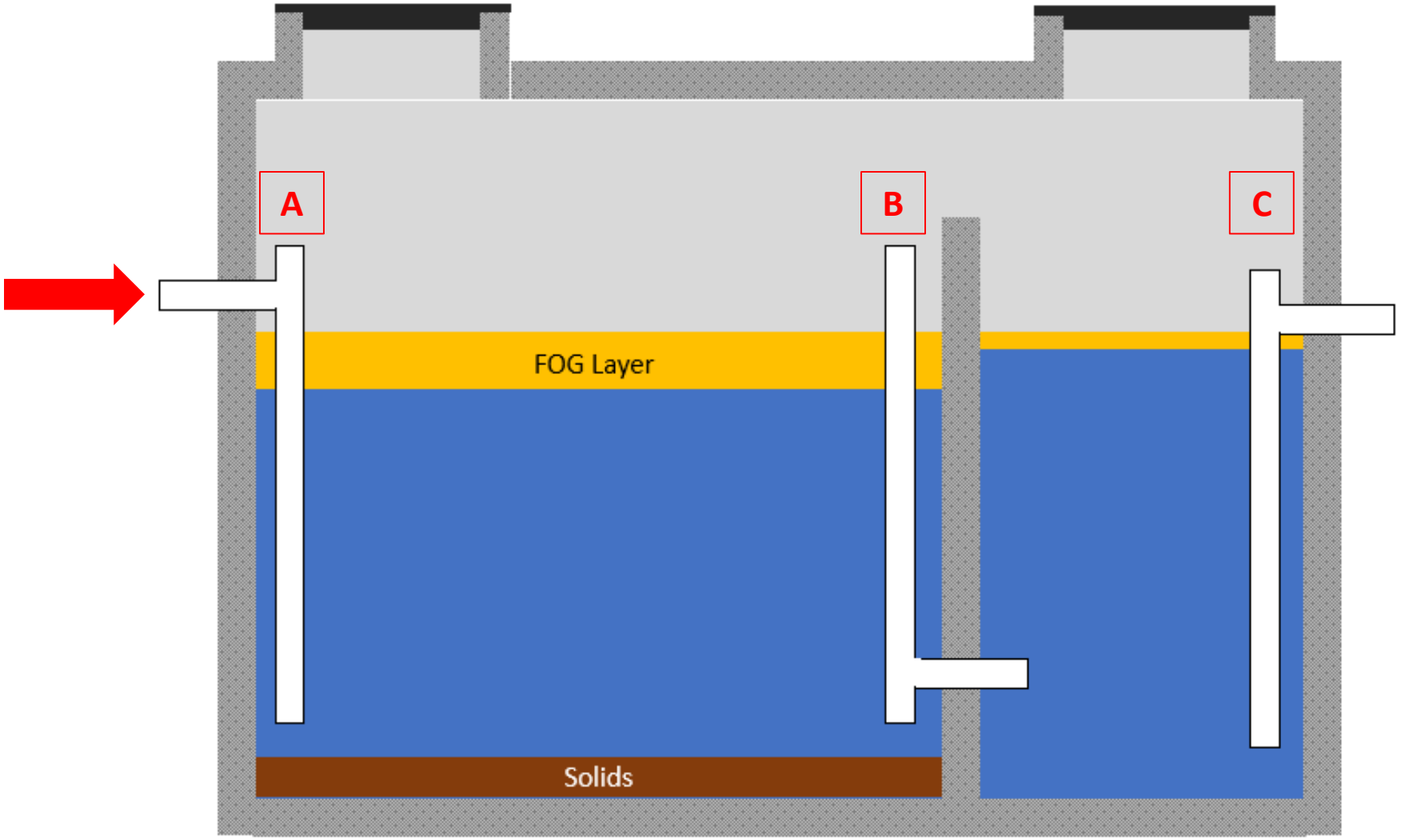


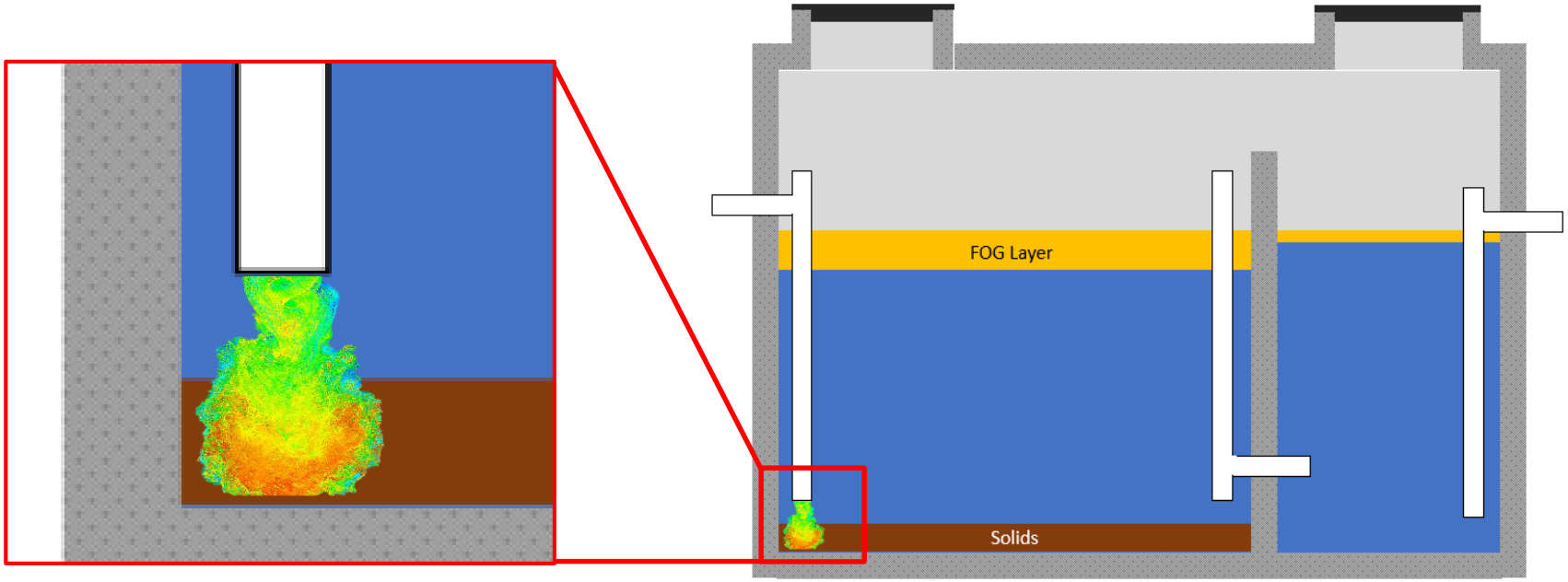
Velocity; vertical > horizontal



Distribute flow throughout cross-sectional area

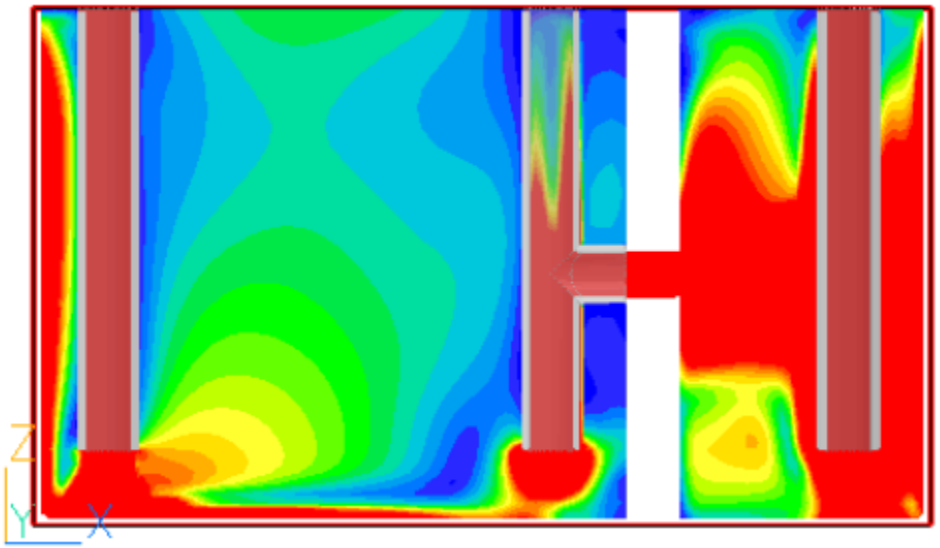
Flow through time vs. Residence time





How does this design distribute the velocity?

2008 WERF Report: *Assessment of Grease Interceptor Performance*



Short-circuiting from uncontrolled turbulence and velocity at 20 min RT


FREE floating vs.
Emulsified FOG


Kroger
IMPORTED • COLD PRESSED
Extra Virgin
Olive Oil
ABOUT 33 SERVINGS
17 FL OZ (1 PT 1 FL OZ) 500mL
Corn Oil
Vegetable Oil
96 SERVINGS
48 FL OZ (1 QT 1 PT) 1.41L
How about a demonstration?

Gravity-differential Separation…

It’s how ALL grease interceptors work!

Questions?

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