

What is Gravity-Differential Separation?

Separation?

How All Grease Interceptors Work!

Presented by:

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Terms and Definitions:

Gravity

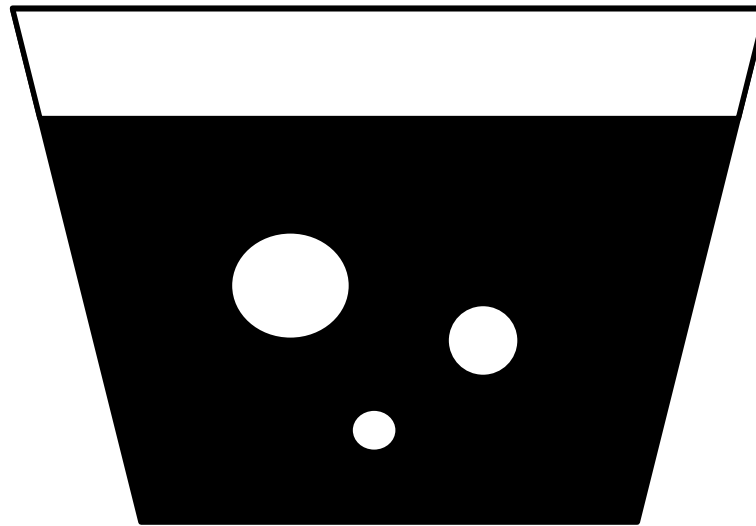
a fundamental physical force that is responsible for interactions which occur because of mass between particles. We are MOST familiar with the MASS of EARTH and its effect on independent particles...



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

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Grease interceptors (or "grease traps" as they are sometimes called) have been used in plumbing drainage systems for many years. They are frequently required by plumbing regulations, especially for restaurants. In general, such interceptors have been used for one or for all of the following reasons: (1) To prevent clogging of waste lines with grease, (2) to prevent large quantities of grease from reaching the sewage disposal works, (3) to facilitate the reclaiming of grease because of its economic value. The latter reason is, of course, of present a very important one for intercepting all waste grease and fats. The separation of gasoline and oils from waste water is also accomplished by use of a similar type fixture installed in the plumbing system; however, this paper will be concerned primarily with grease interceptors.

The grease interceptors used at present are for the most part commercial products of various patented designs constructed of cast-iron (ceramic insides have been used during the war). If properly installed and serviced, they do a fair job of preventing fats and grease from getting into the sewerage system. However, proper installation and servicing is usually the exception. To perform its job properly an interceptor should be installed as close to the fixture discharging greasy wastes as possible, and should be so designed and installed as to be easily cleaned. The less mixing and emulsifying there is, the easier the grease will separate from the waste water. Also the possibility of clogging the drain lines between the fixture and the interceptor will be prevented if the interceptor is installed near the fixture.

Up until a few years ago the use of grease interceptors, especially in domestic installations, has in general not been overly successful. The interceptors were too small to handle adequately the rate of flow, and the owners did not properly remove the grease which had been collected in the interceptor. If, however, it is desired to separate the grease from the waste water in as complete a manner as possible and also to have the grease in good condition, an interceptor of the proper size installed right at the fixture which discharges greasy waste water is the best solution to the whole problem of grease removal.

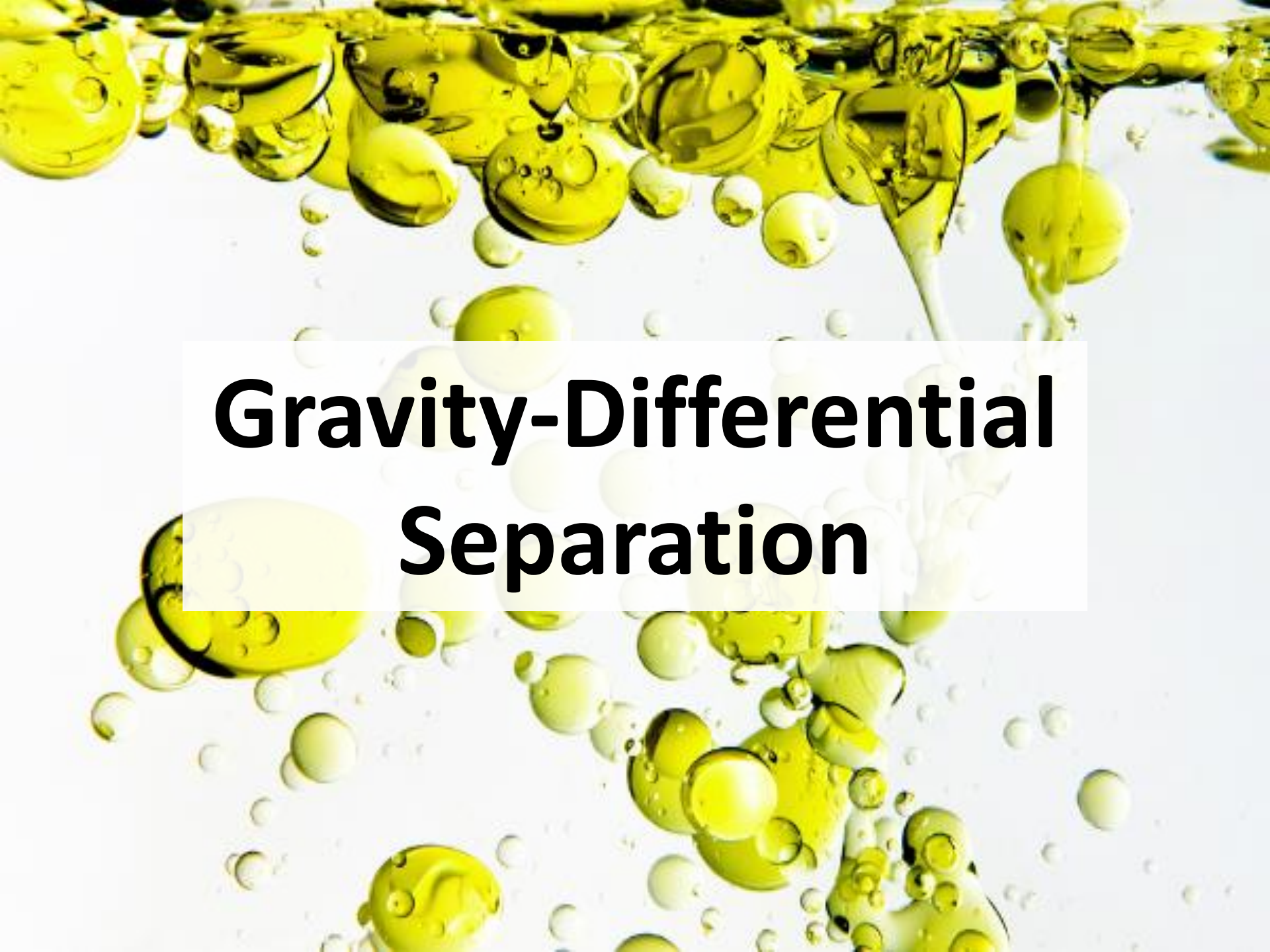
DANIEL FROSTMAN

A great many types of commercial grease interceptors are and have been on the market and with these many "home made" designs. However, the basic principle of grease interception in all such designs is that

*This symposium of four papers was presented at the Sixteenth Annual Meeting of the Iowa State Hygiene Society, Des Moines, Iowa, March 21, 1936.

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



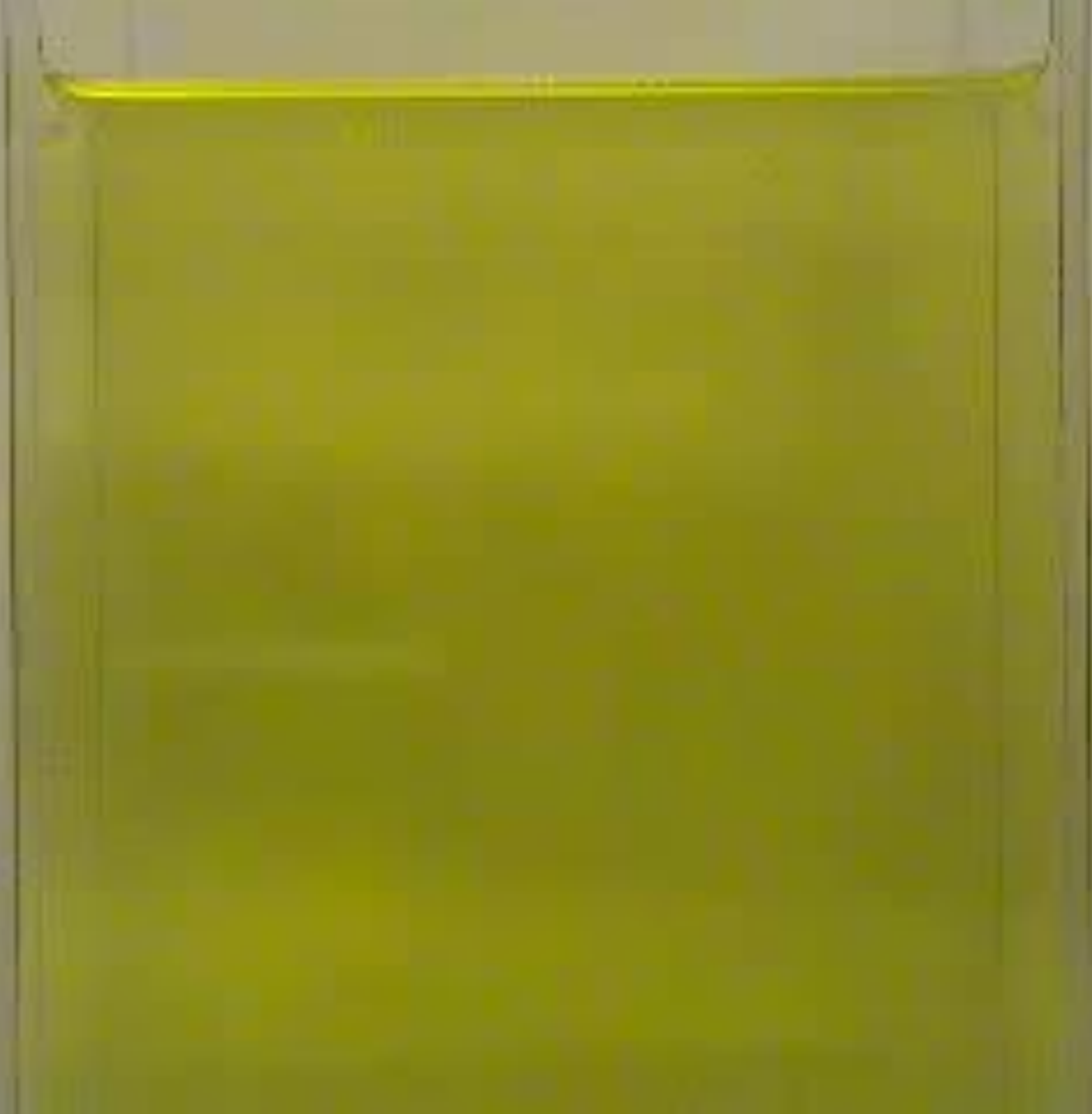
Gravity-Differential Separation

Factors that effect gravity-differential separation:

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



SIZE

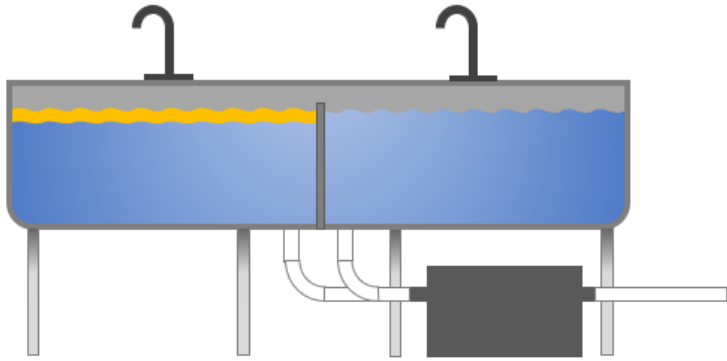


**Travel Time for 3" Distance at
68° F (hr:min:sec)**

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

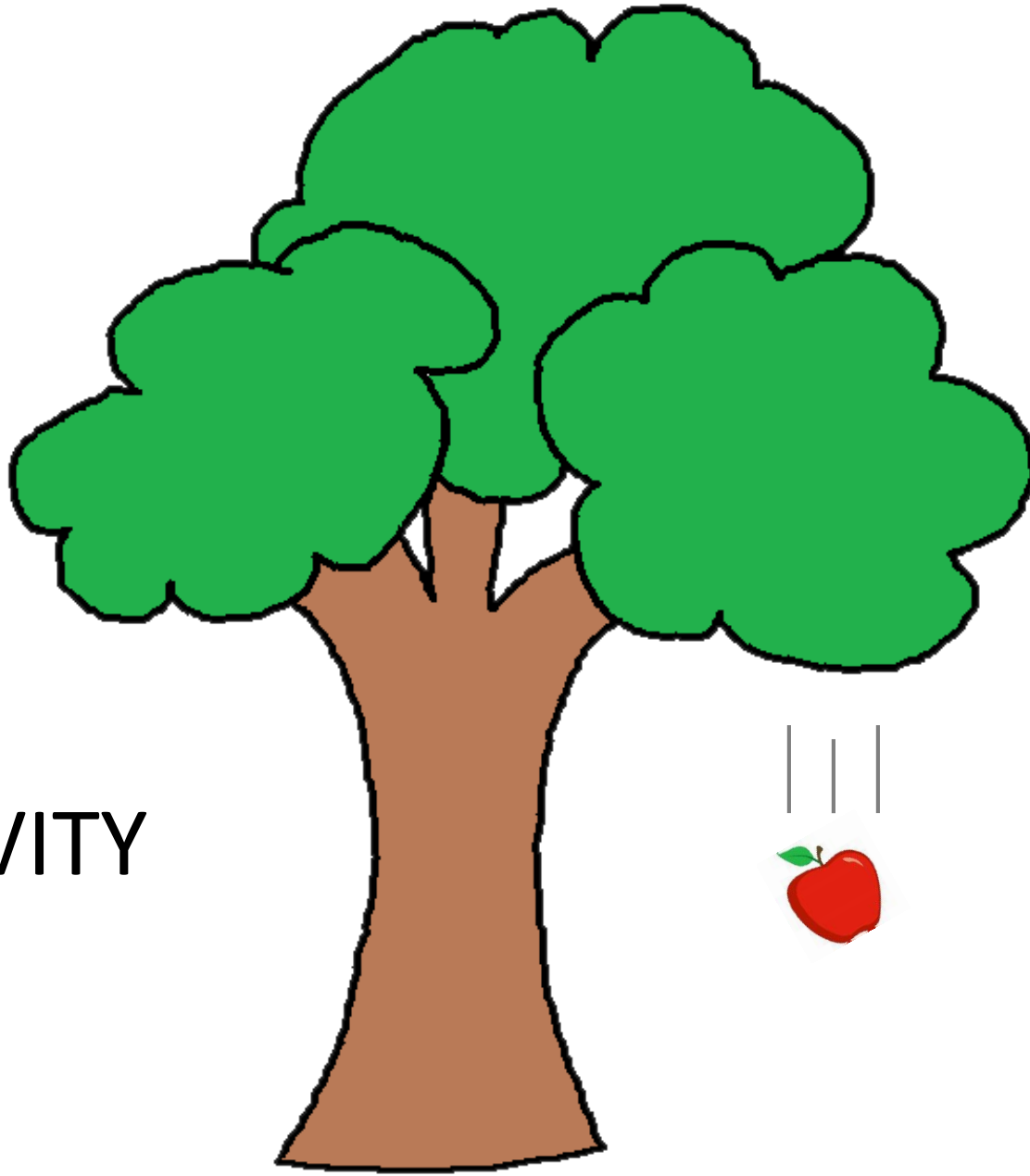


= 150 microns or >



= 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

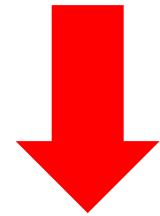


TEMPERATURE

Temperature



Viscosity



**As viscosity decreases
rise rate increases**

VISCOSITY

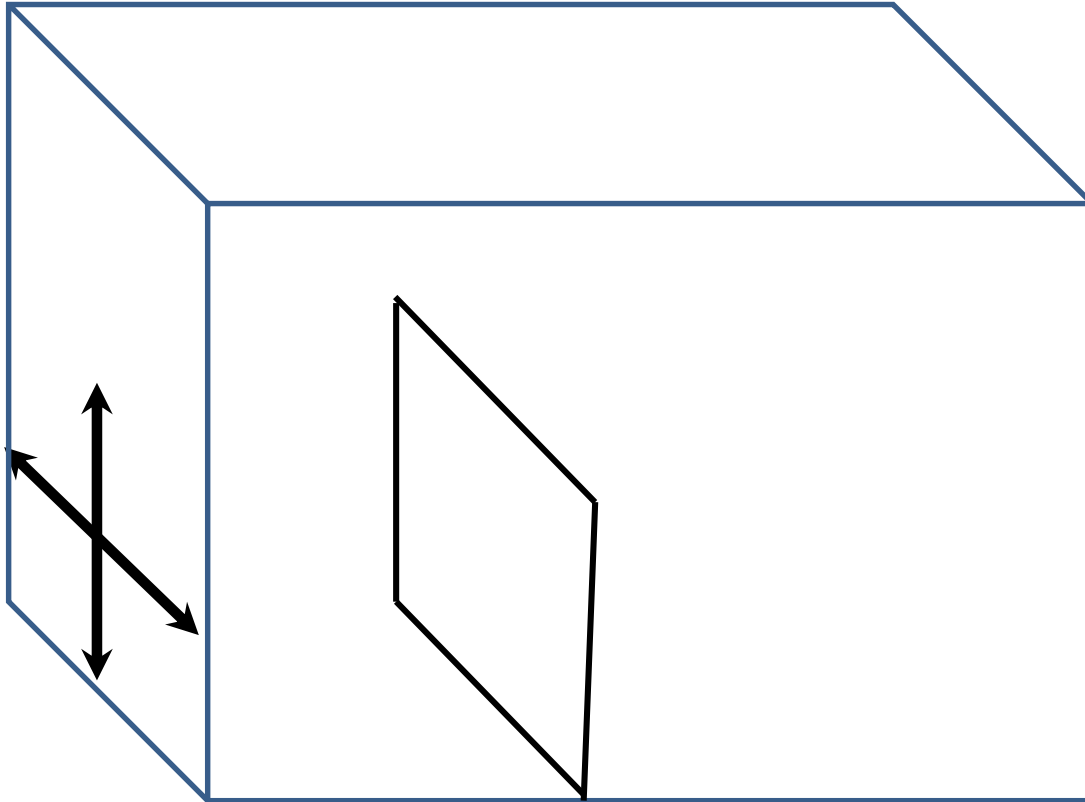




VELOCITY

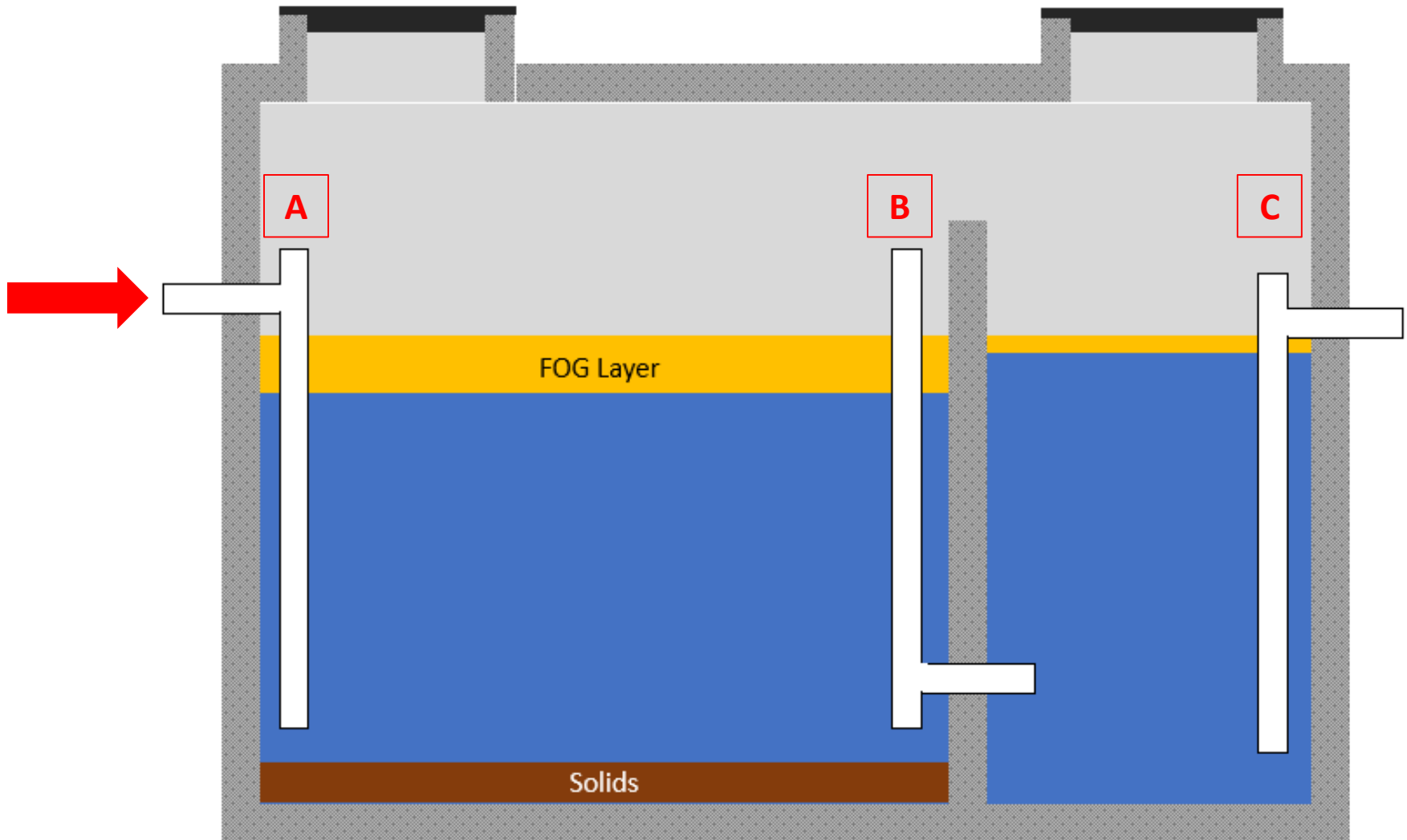


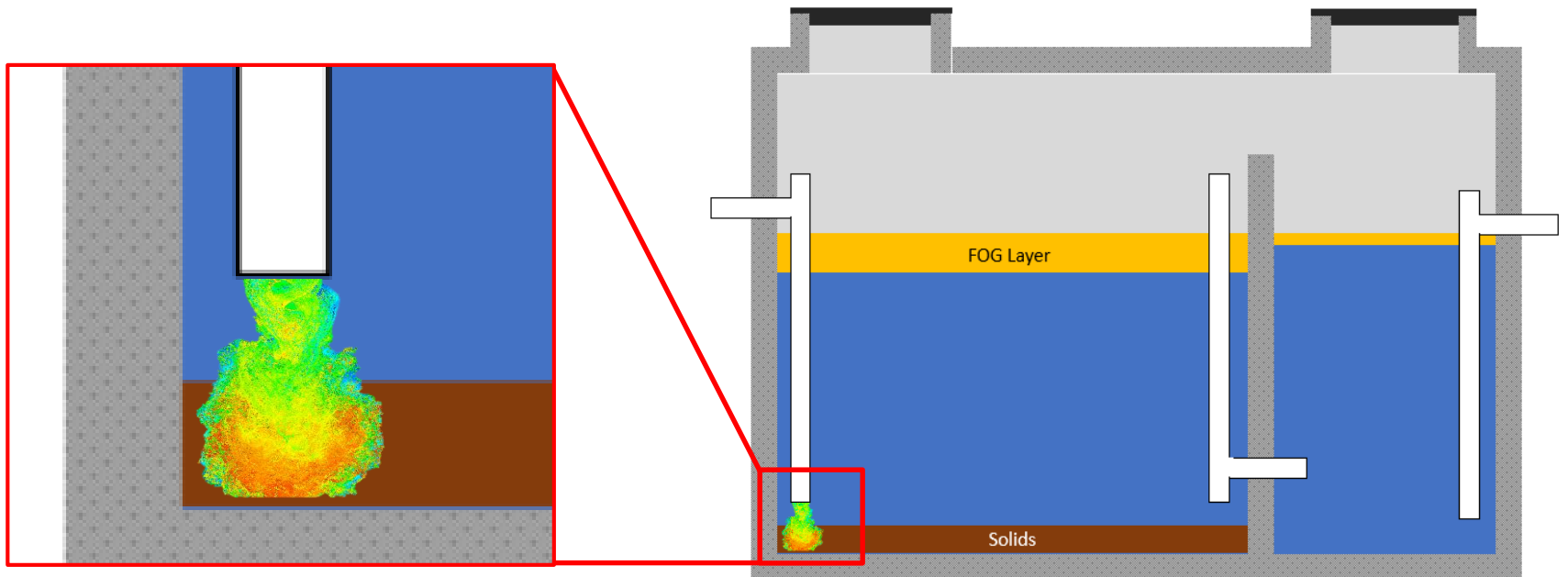
Velocity; vertical $>$ horizontal



**Distribute flow throughout
cross-sectional area**

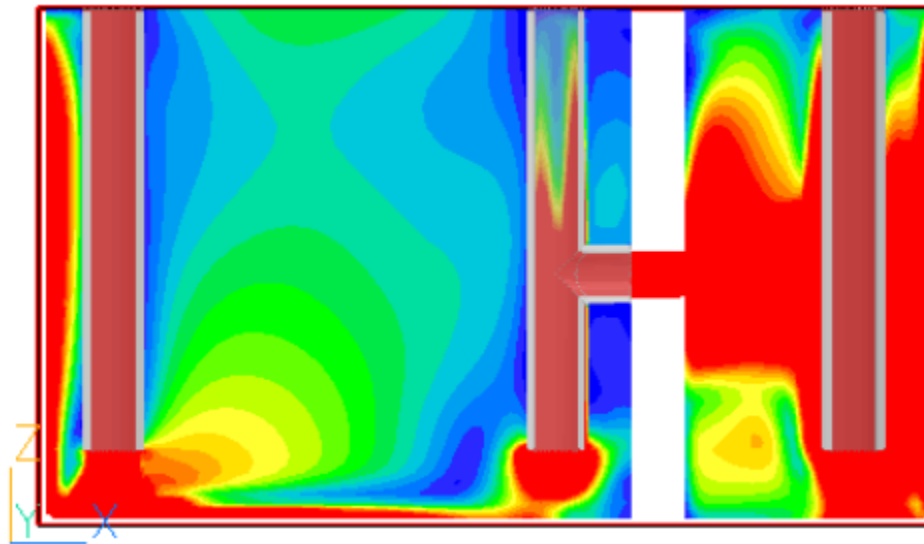
Flow through time vs. Residence time





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**



How about a demonstration?

Gravity-differential Separation...

It's how ALL grease interceptors work!

Questions?

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