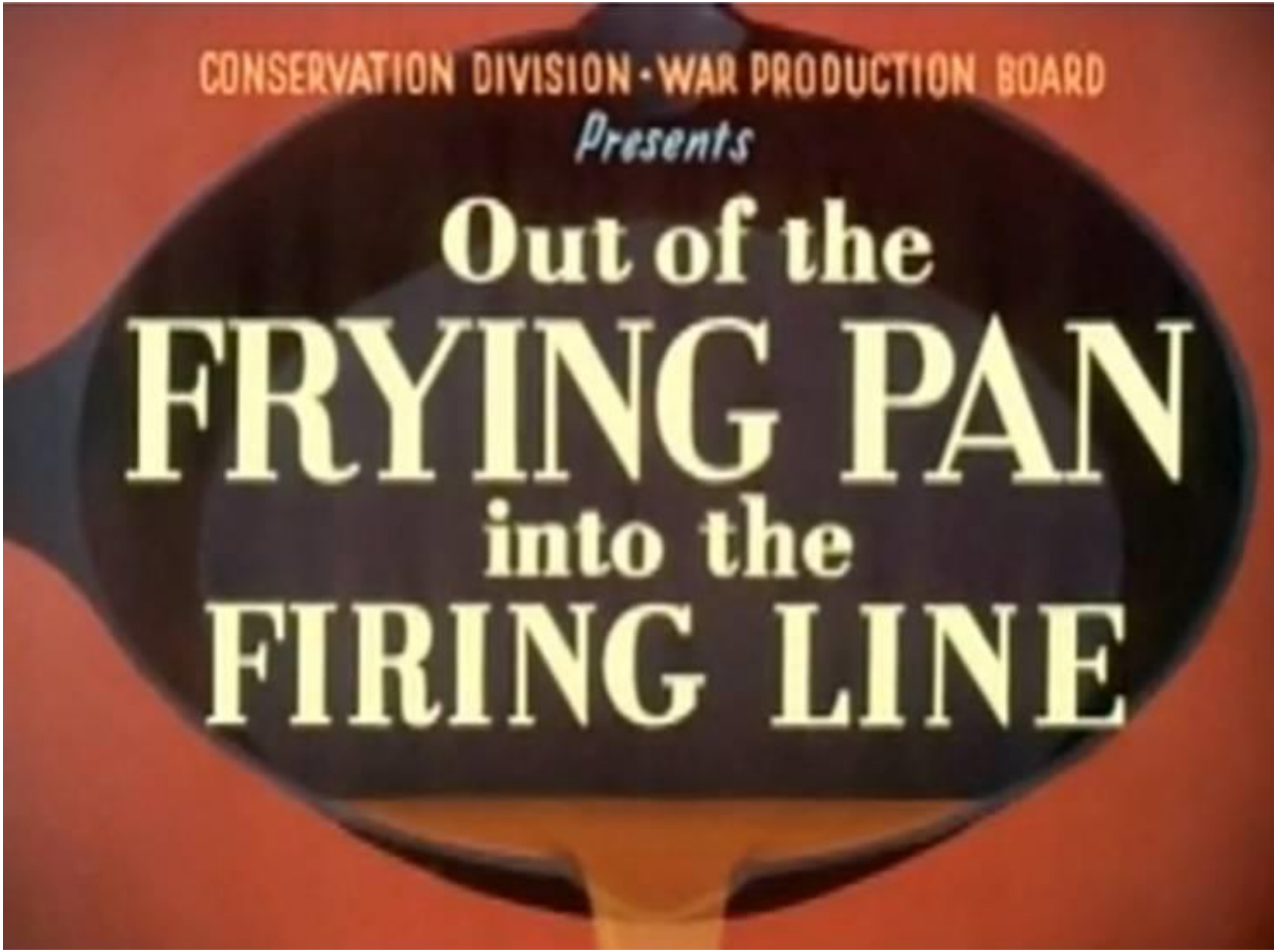
The History and Evolution of Grease Interceptors

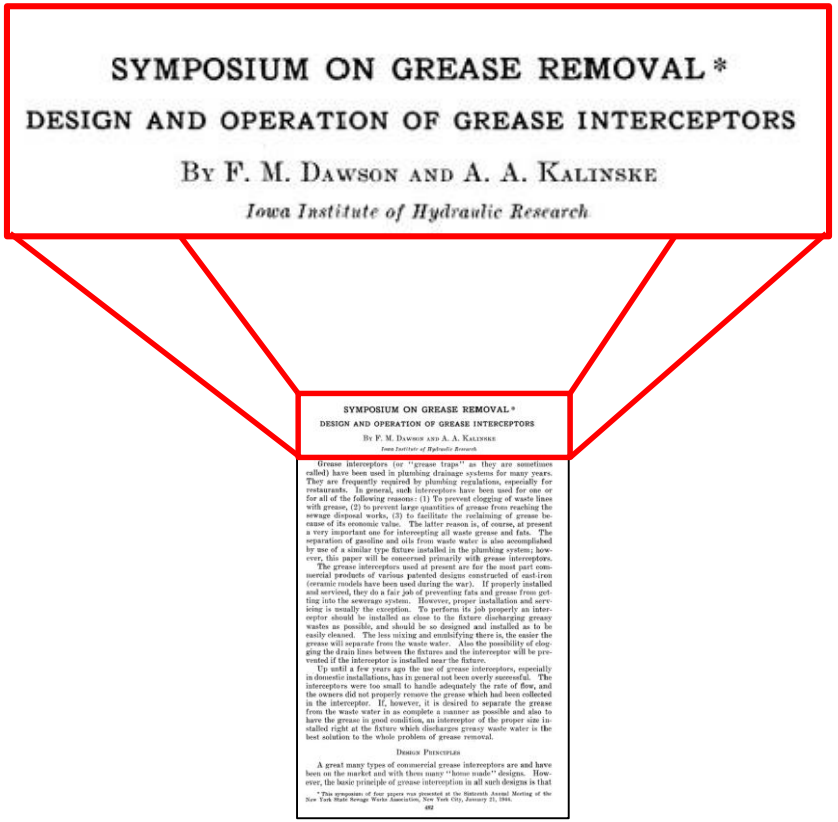
Presented by:

Ken Loucks

IW Consulting Service, LLC
www.interceptorwhisperer.com
888-615-5615

WW II


CONSERVATION DIVISION · WAR PRODUCTION BOARD
Presents
Out of the
FRYING PAN
into the
FIRING LINE



SYMPOSIUM ON GREASE REMOVAL *

DESIGN AND OPERATION OF GREASE INTERCEPTORS

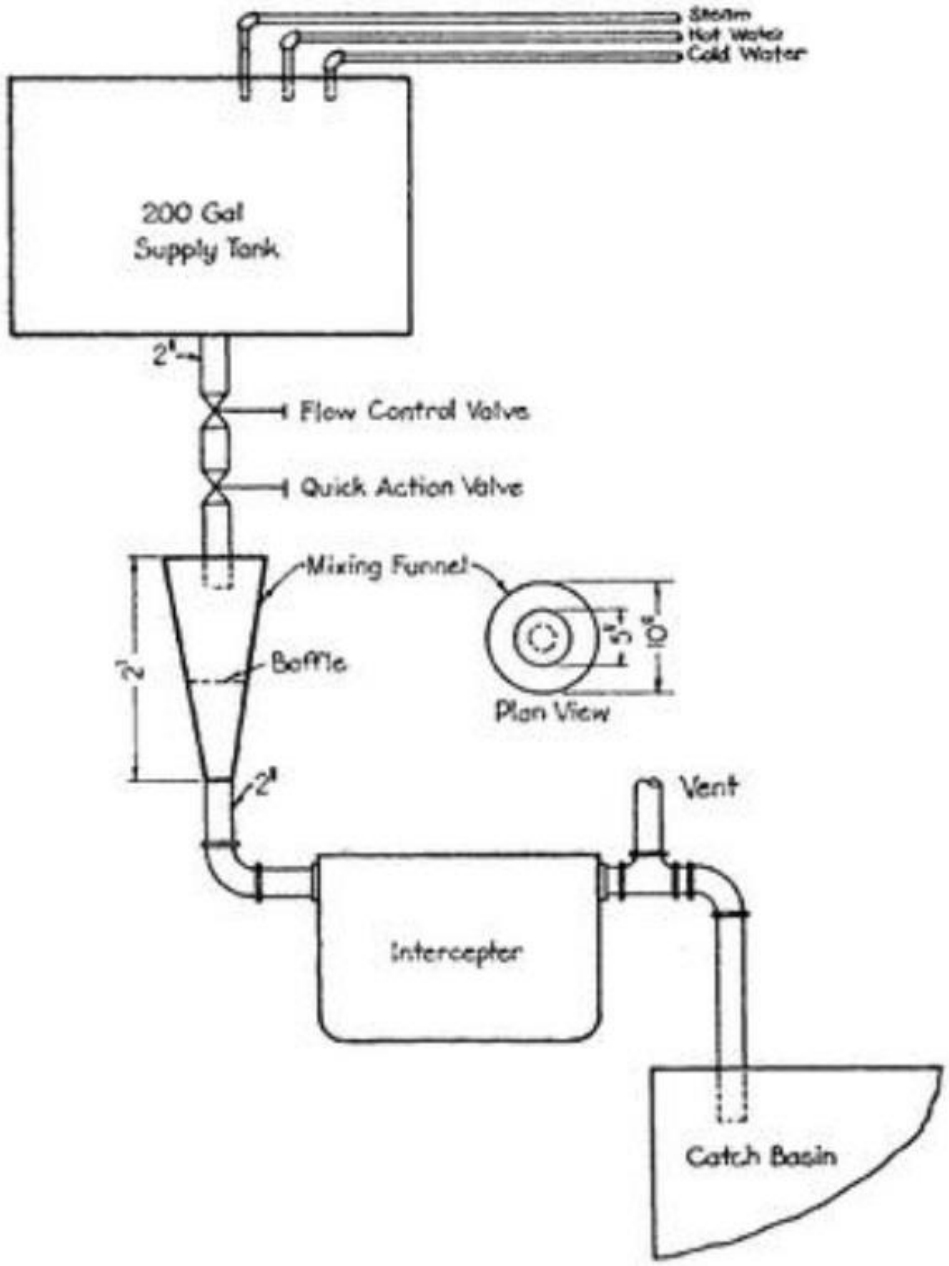
By F. M. Dawson and A. A. Kalinske

Iowa Institute of Hydraulic Research

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

Gravity-Differential Separation of *free floating* fats, oils and grease

1942 Test Apparatus at IIHR Lab



Grease Interceptor Performance Requirements:

- Average efficiency, 90% minimum
- Capacity, 2 lbs grease for each 1 gpm

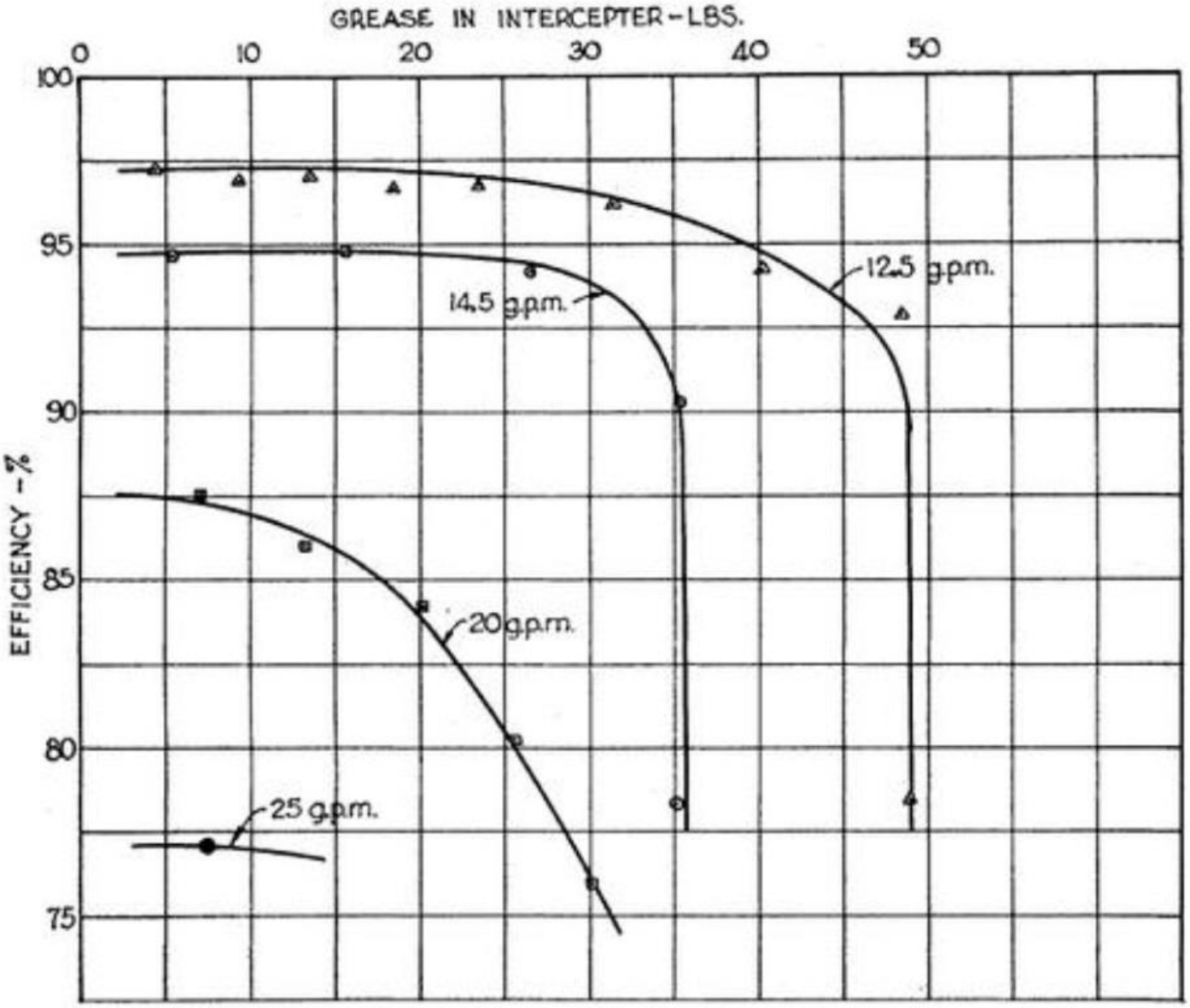


FIG. 2.—Typical laboratory test data for a commercial grease intercepter.

1969

1970

Federal Water Pollution Control Act (1948) Amended

Clean Water Act

Established the basic structure for regulating pollutants discharged into the waters of the United States

1972

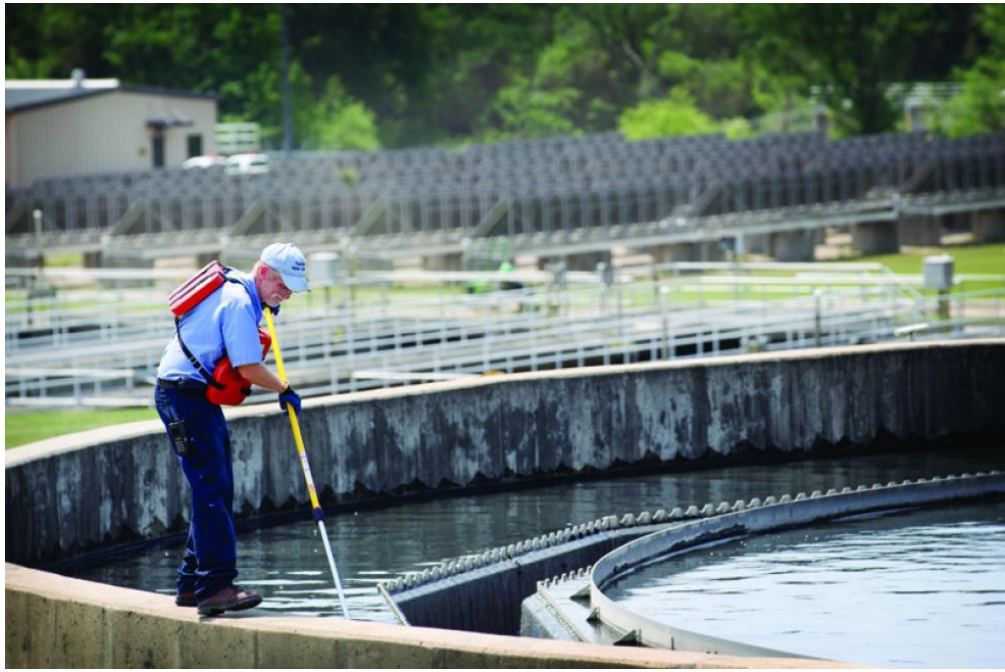
Key revisions:

Made it unlawful for any person to discharge any pollutant from a point source into navigable waters, unless a permit was obtained under its provisions;

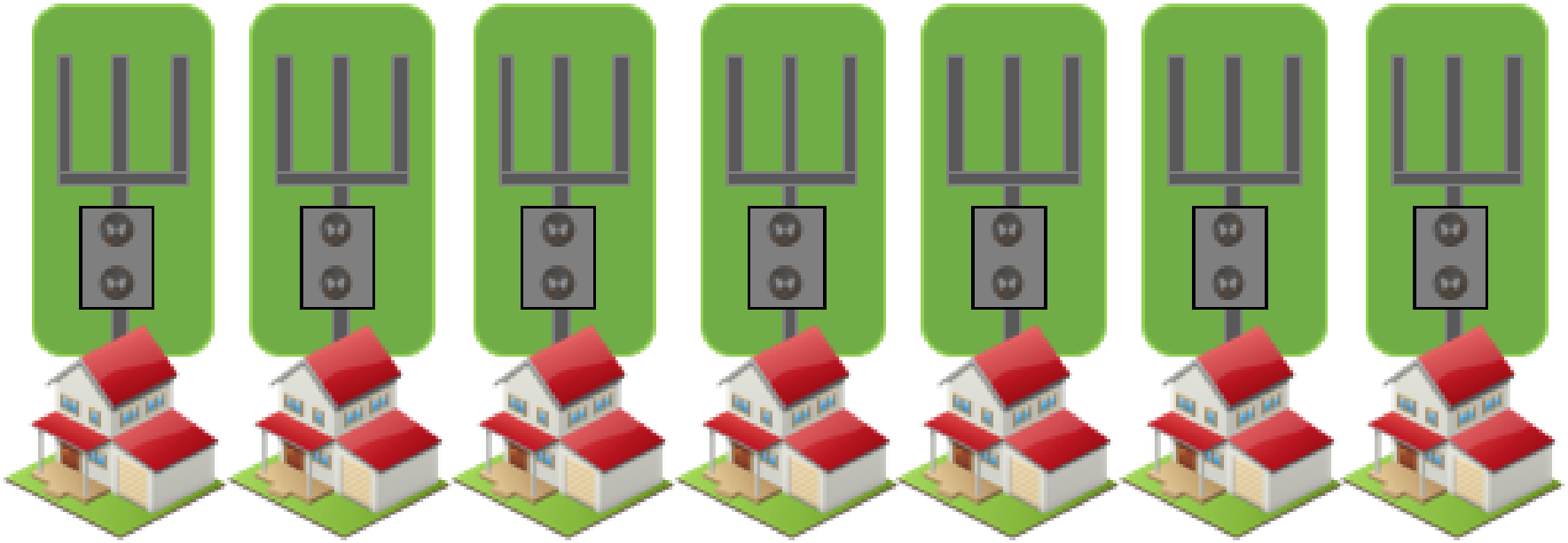
Key revisions:

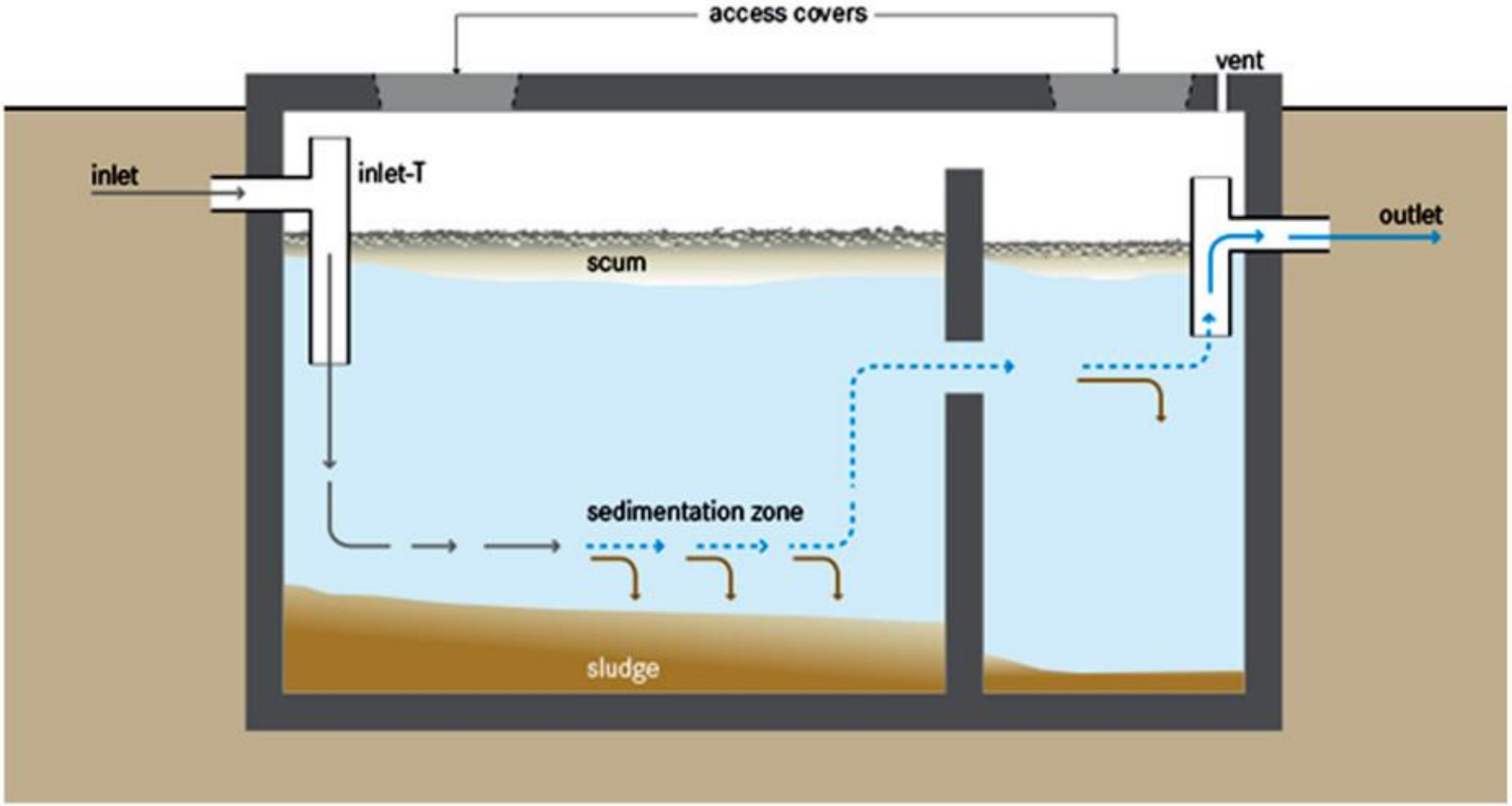
Gave EPA the authority to implement pollution control programs such as setting wastewater standards for industry;

Key revisions:

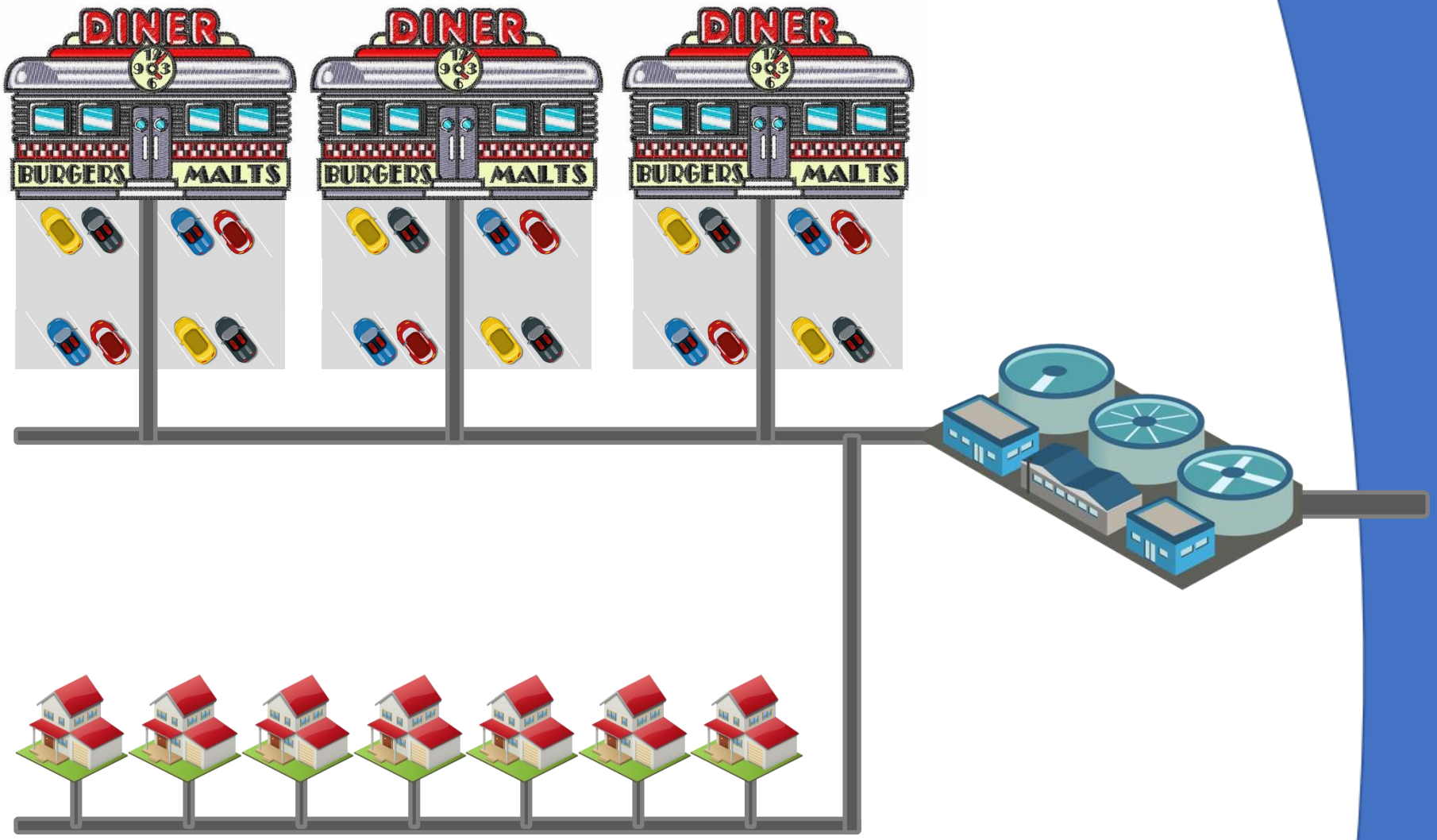


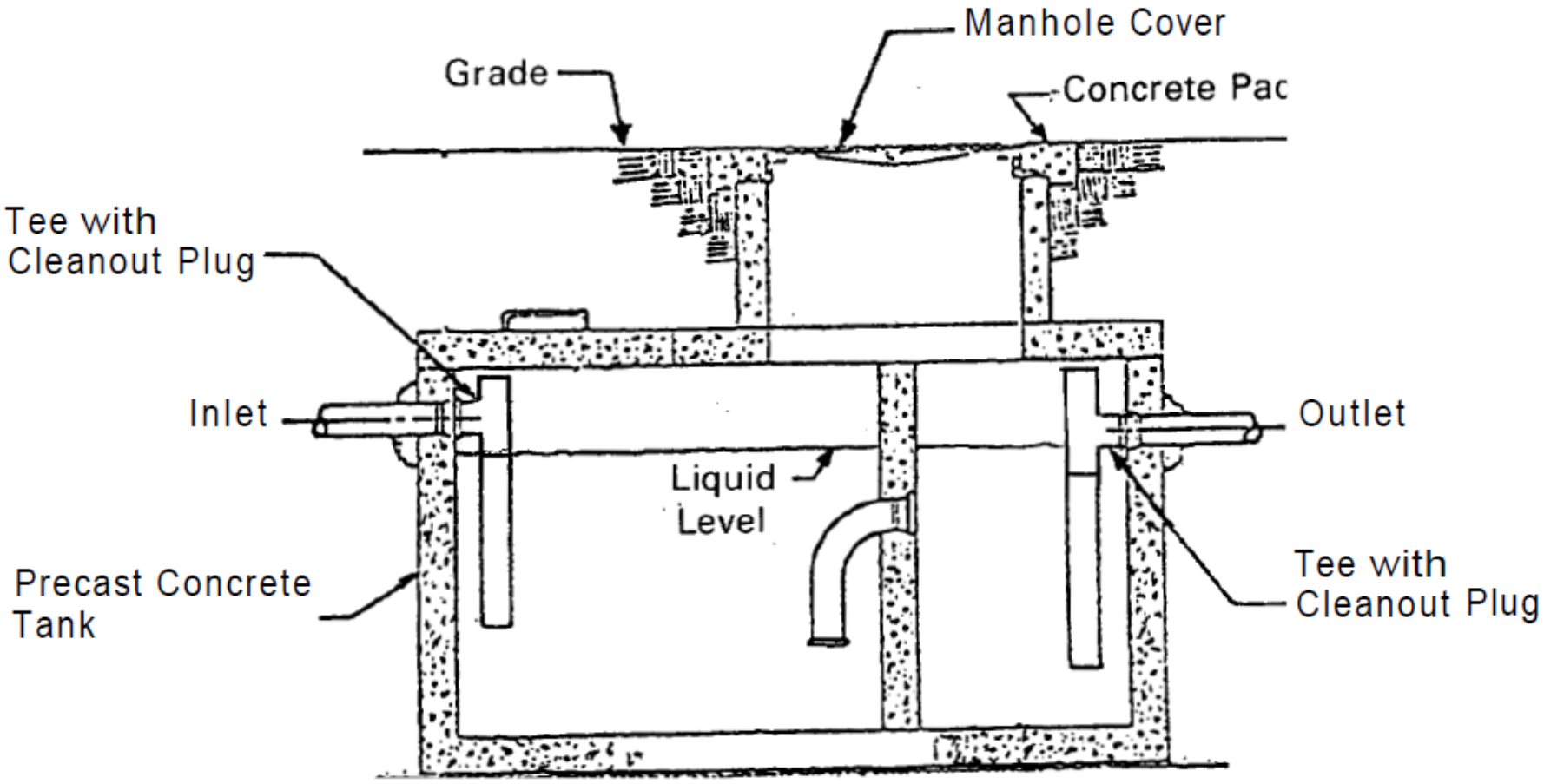
Funded the construction of sewage treatment plants under the construction grants program





What does the future look like for prefabricators of septic tanks?


DINER
BURGERS
MALTS
DINER
BURGERS
MALTS
DINER
BURGERS
MALTS


Manhole Cover
Grade
Concrete Pad
Tee with
Cleanout Plug
Inlet
Outlet
Liquid
Level
Precast Concrete
Tank
Tee with
Cleanout Plug

1. RESTAURANTS:

$$(D) \times (GL) \times (ST) \times \left(\frac{HR}{2}\right) \times (LF) = \text{Size of Grease Interceptor, gallons}^{a}$$

D = number of seats in Dining Area

GL = Gallons of wastewater per meal, normally 5 gal
ST = Storage capacity factor -- minimum of 1.7
onsite disposal - 2.5
HR = Number of hours open
LF = Loading factor -- 1.25 interstate freeways
1.0 other freeways
1.0 recreational areas
0.8 main highways
0.5 other highways

United States
Environmental Protection
Agency

Office of Water Program
Operations
Washington DC 20460

Office of Research and
Development
Municipal Environmental Research
Laboratory
Cincinnati OH 45268

Technology Transfer

EPA

Design Manual

Onsite Wastewater Treatment and Disposal Systems

1980

HYGI Design Manual, 1979
M.C. Nottingham
Pasadena, CA

Works cited by EPA Design Manual, Onsite Wastewater Treatment and Disposal Systems, 1980

International Association of
Plumbing and Mechanical Officials

UNIFORM PLUMBING CODE

1982

EDITION

Adopted at the Fifty-Second Annual Conference

OCTOBER, 1981

INTERNATIONAL ASSOCIATION OF PLUMBING
AND MECHANICAL OFFICIALS

(A Non-Profit Organization)

APPENDIX H

Recommended Procedures for Sizing Commercial Kitchen Grease Interceptors

H1 Waste Discharge Requirements

(a) Waste discharge from fixtures and equipment in establishments which may contain grease, including but not limited to, scullery sinks, pot and pan sinks, dishwashing machines, soup kettles and floor drains located in areas where grease-containing materials may exist, may be drained into the sanitary waste through the interceptor when approved by the Administrative Authority.

(b) Toilets, urinals and other similar fixtures shall not waste through the interceptor.

(c) All waste shall enter the interceptor through the inlet pipe only.

H2 Design

(a) Interceptors shall be constructed in accordance with the design approved by the Administrative Authority and shall have a minimum of two compartments with fittings designed for grease retention.

(b) There shall be an adequate number of manholes to provide access for cleaning all areas of an interceptor; a minimum of one (1) per ten (10) feet of interceptor length. Manhole covers shall be gas tight in construction having a minimum opening dimension of twenty (20) inches.

(c) In areas where traffic may exist the interceptor shall be designed to have adequate reinforcement and cover.

H3 Location

(a) Each grease interceptor shall be so installed and connected that it shall be at all times easily accessible for inspection, cleaning and removal of the intercepted grease. A grease interceptor may not be installed in any part of a building where food is handled. Location of the grease interceptor shall meet the approval of the Administrative Authority.

(b) Interceptors shall be placed as close as practical to the fixtures it serves.

(c) Each business establishment for which a grease interceptor is required shall have an interceptor which shall serve only that establishment.

H4 Sizing Criteria

(a) Parameters—The parameters for sizing a grease interceptor are hydraulic loading and grease storage capacity, for one or more fixtures.

(b) Sizing Formula—The size of the interceptor shall be determined by the following formula:

$$\text{Number of meals per peak hour}^{1} \times \text{waste flow rate}^{2} \times \text{retention time}^{3} \times \text{storage factor}^{4} = \text{Interceptor size (liquid capacity)}$$

[1]Meals Served at Peak Hour

[2]Waste Flow Rate

a. With dishwashing machine	6 gallon flow
b. Without dishwashing machine	5 gallon flow
c. Single service kitchen	2 gallon flow
d. Food waste disposer	1 gallon flow

[3]Retention Times

Commercial kitchen waste	
Dishwasher	2.4 hours
Single service kitchen	
Single serving	1.5 hours

[4]Storage Factors

Fully equipped commercial kitchen	8 hour operation: 1
	16 hour operation: 2
	24 hour operation: 3
Single Service Kitchen	1.5

H5 Effluent Sampling

An effluent sampling box on grease interceptors may be required by the Administrative Authority.

H6 Abandoned Grease Interceptors

Abandoned grease interceptors shall be pumped and filled as required for abandoned sewers and sewage disposal facilities in Section 1119 of the Uniform Plumbing Code.

UPC Grease Task Group Meeting
January 25 & 26, 2005
IAPMO Headquarters
Ontario, CA

January 25, 2005 attendees included: Rand Ackroyd, Tim Allinson, Sherrill Bond, Sid Cavanaugh, Joe Cunningham, Kook Dean, Linda Deunay, Mike Gitter, Stephen Hamilton, Wayne Harrison, Mark Kawamoto, Don Kirkland, Terresa Moritz, Rick Oliver, Phil Ribbs, Bill Rice, Linda Shadler, John Shaffer, Billy Smith, Bill Sobanski, Stan Steinbach, Max Weiss, John Halliwill, Maribel Campos, Anne Sonner, Ken Browne, Jay Peters, Michael Kobel.

January 26, 2005 attendees included: Rand Ackroyd, Tim Allinson, Sherrill Bond, Sid Cavanaugh, Joe Cunningham, Linda Deunay, Stephen Hamilton, Wayne Harrison, Mark Kawamoto, Don Kirkland, Terresa Moritz, Rick Oliver, Phil Ribbs, Bill Rice, Linda Shadler, Billy Smith, Stan Steinbach, Max Weiss, Maribel Campos, Anne Sonner, Ken Browne, Jay Peters, Michael Kobel.

Following are the cumulative, consensus recommendations of the Task Group following these two days of final meetings. While not presented in the order discussed at the meetings, these are all the recommendations of the Task Group.

Delete term: ~~Grease Trap~~

Add term: Hydromechanical Grease Interceptor (HGI)

Add sizing method for HGI:

Table 10-2 – 1015.1

Table 10-2
Hydromechanical Grease Interceptor (HGI)
Sizing Chart*

DFU	HGI FLow (gpm)
8	20
10	25
13	35
20	50
35	75
172	100
216	150
342	200
428	250
576	350
720	500

*Based on intermittent potentially full flow in drainage lines.

Delete ~~Appendix H~~

Add new sizing method for Gravity Grease Interceptors (GGI):

Table 10-3
Gravity Grease Interceptor Sizing

DFUs (1)	Interceptor Volume (2)
8	500 gallons
21 (3)	750 gallons
35	1,000 gallons
90 (3)	1,250 gallons
172	1,500 gallons
216	2,000 gallons
307 (3)	2,500 gallons
342	3,000 gallons
428	4,000 gallons
576	5,000 gallons
720	7,500 gallons
2112	10,000 gallons
2640	15,000 gallons

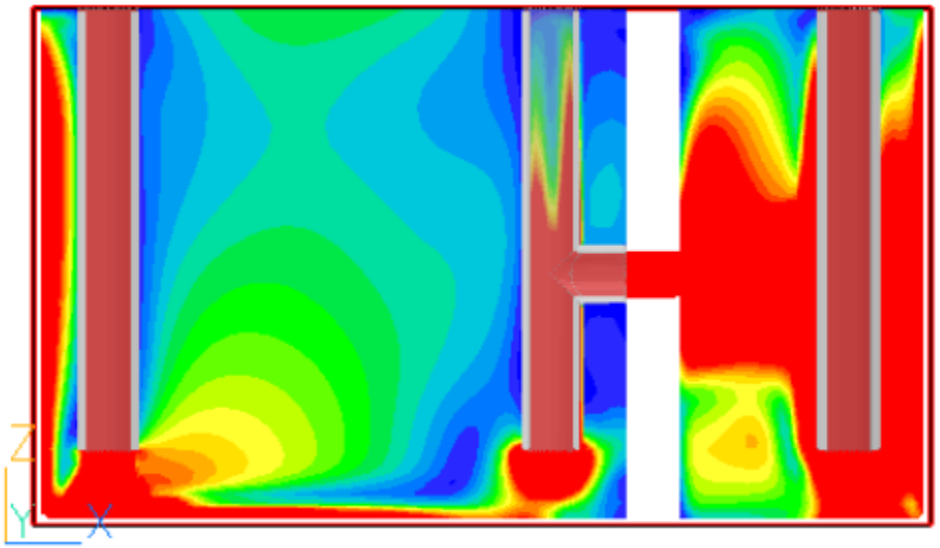
Notes

(1) The maximum allowable DFUs plumbed to the kitchen drain lines that will be connected to the grease interceptor.

(2) This size is based on: the DFUs, the pipe size from this code; Table 7-5; Useful Tables for flow in half-full pipes (ref: *Mohinder Nayyar Piping Handbook*, 3rd Edition, 1992).

(3) Based on 30-minute retention time (ref.: Metcalf & Eddy, Inc. *Small and Decentralized Wastewater Management Systems*, 3rd Ed. 1998). Rounded up to nominal interceptor volume.

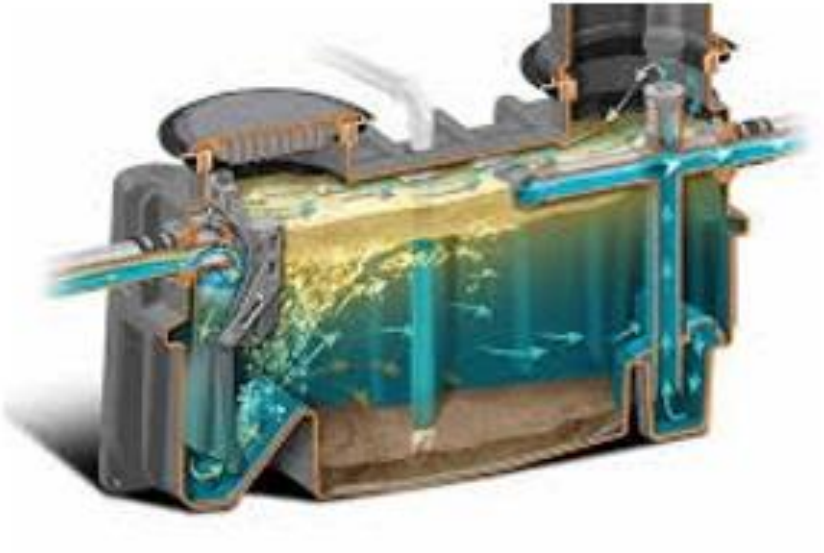
2008 WERF Report: *Assessment of Grease Interceptor Performance*



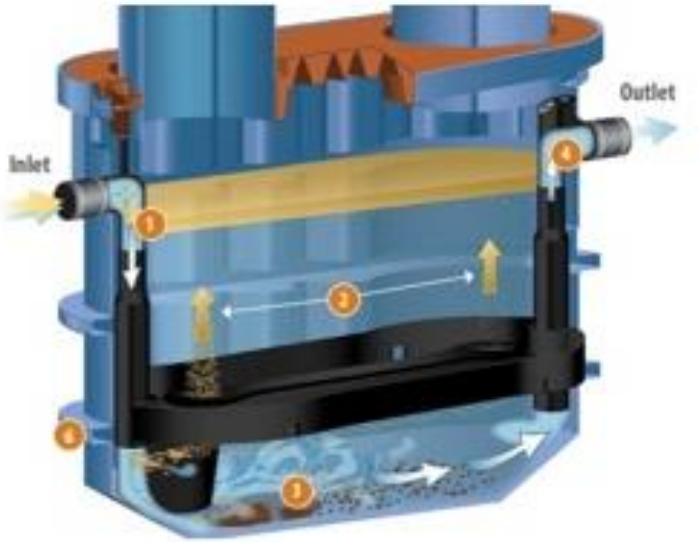
Short-circuiting from uncontrolled turbulence and velocity at 20 min RT

High-capacity Hydromechanical
2006 - 2018

High-capacity Hydromechanical Grease Interceptors Emerge…



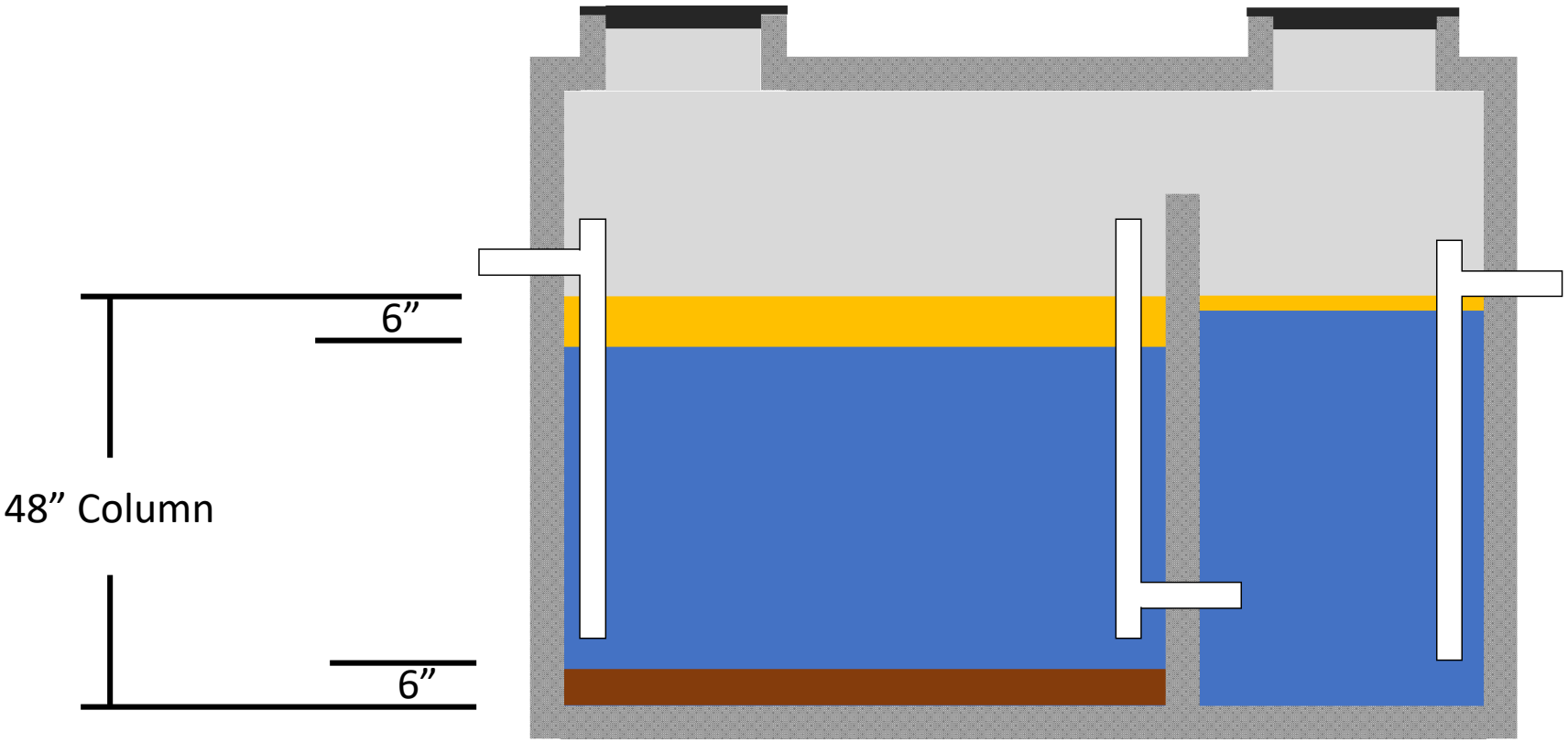
Endura
XL 100



Trapzilla
TZ-1826

100 GPM

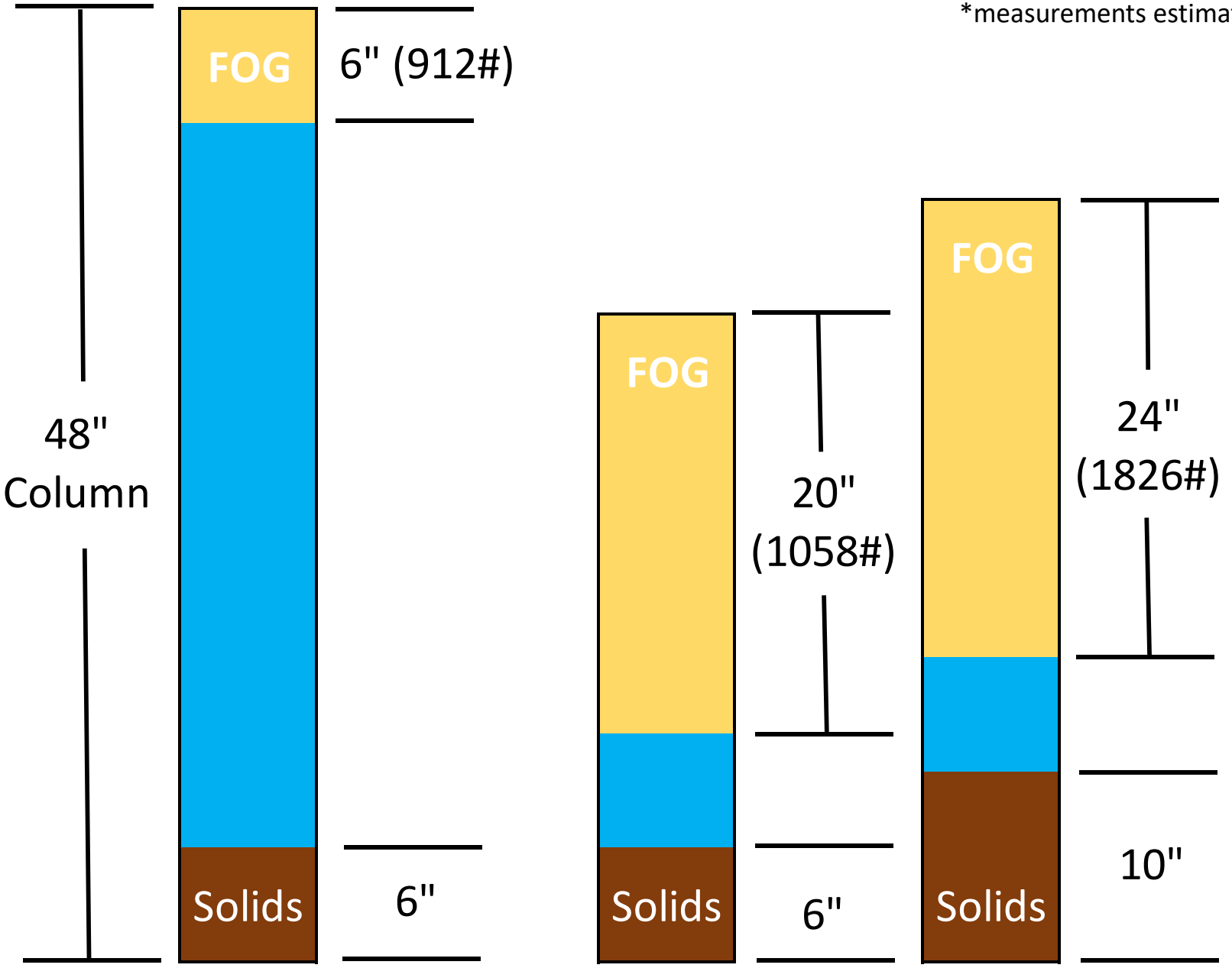
How much FOG and Solids in a 1000 gal. GGI?



(FOG depth) / (total water column) x (total gallons) = gallons of FOG

(125 Gallons of FOG) x (7.3 lbs per gal.) = **912 lbs**

*measurements estimated

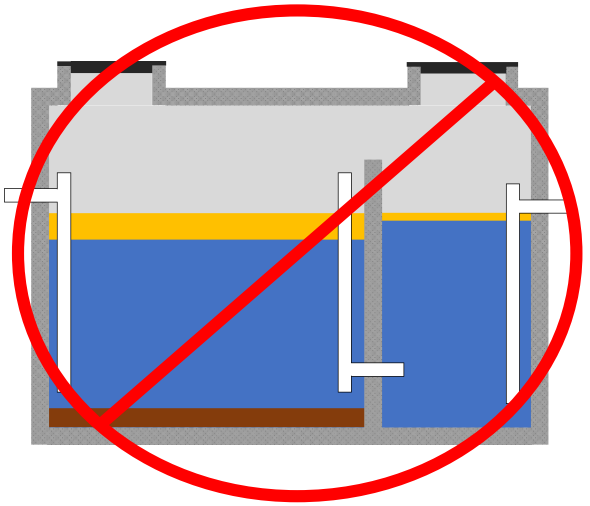


Concrete
1000 GGI

Endura
XL-100

Trapzilla
TZ-1826

PROVEN
performance



ASSUMED
performance

Questions?

Presented by:

Ken Loucks

IW Consulting Service, LLC
www.interceptorwhisperer.com
888-615-5615

INTERCEPTOR WHISPERER
FOG TRAINING INSTITUTE