The Importance of and Methods for Secondary Containment

Single-Wall and Single-Bottom Tanks Have Historical Acceptance as the Standard for AST's

This Applies to Field-Erected AST's

And Shop-Fabricated Tanks

From the early days in the oil fields, up until the end of World War II…

The best way to join two plates of steel together was by riveting

Welding replaced riveting with improvements in technology in the late 1940's and early 1950's

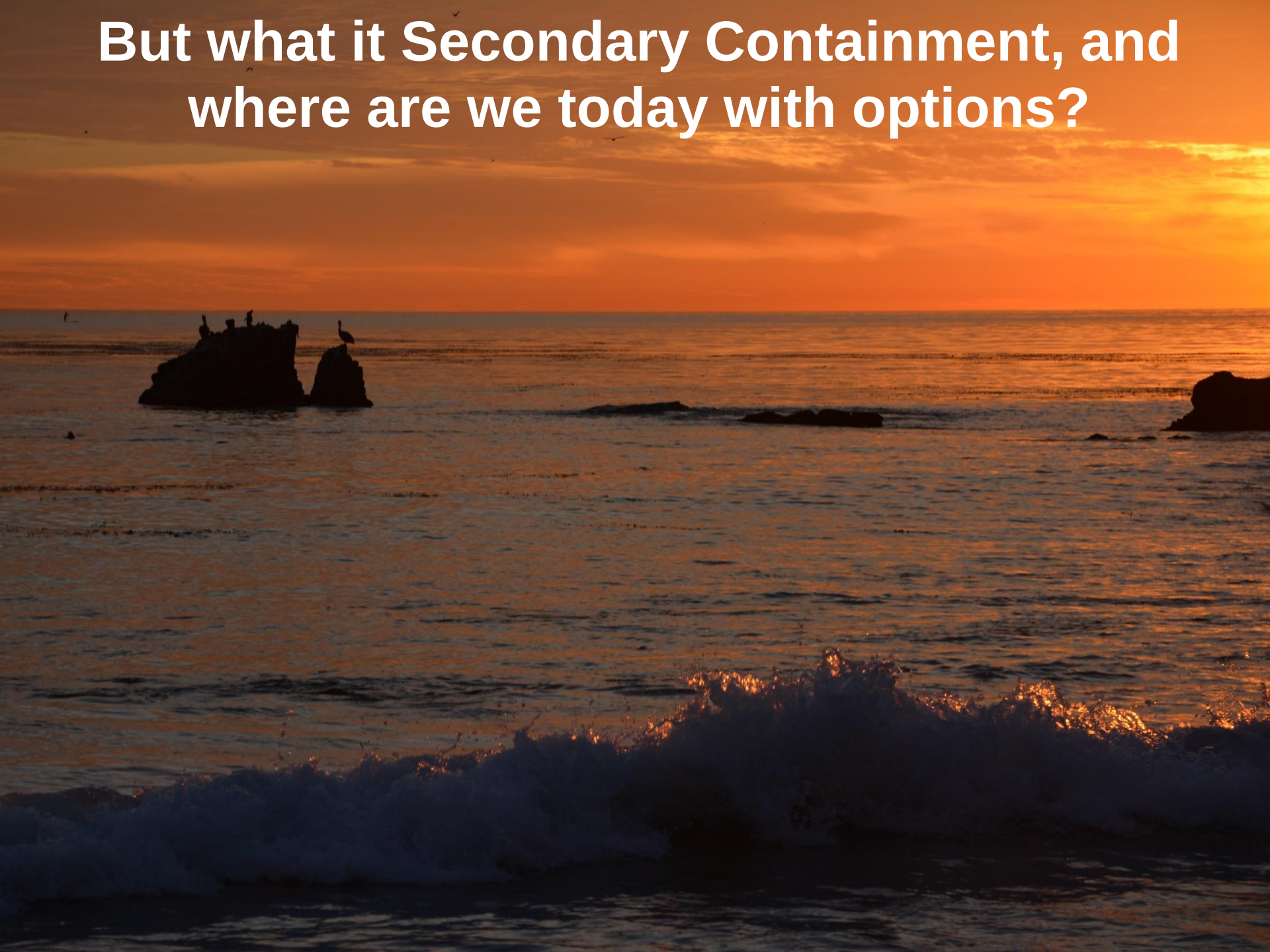
Fire code authorities developed the dike-field containment requirements around ASTs as a safety precaution for controlling tank fires

However, growing public and political interest in environmental protection in the late 1960's and early 1970's , along with several noteworthy AST discharge events gave rise to the birth of Storage Tank Regulatory Programs in the early 1980's

It was the regulatory response to prevent AST releases to the environment that led to the requirements for double-walls and other types of AST (and UST) secondary containment

Germany pioneered some early AST double-bottom designs

But what it Secondary Containment, and where are we today with options?



The Original Secondary Containment

What is Secondary Containment? (not a stupid question…)

Secondary Containment Connotations:

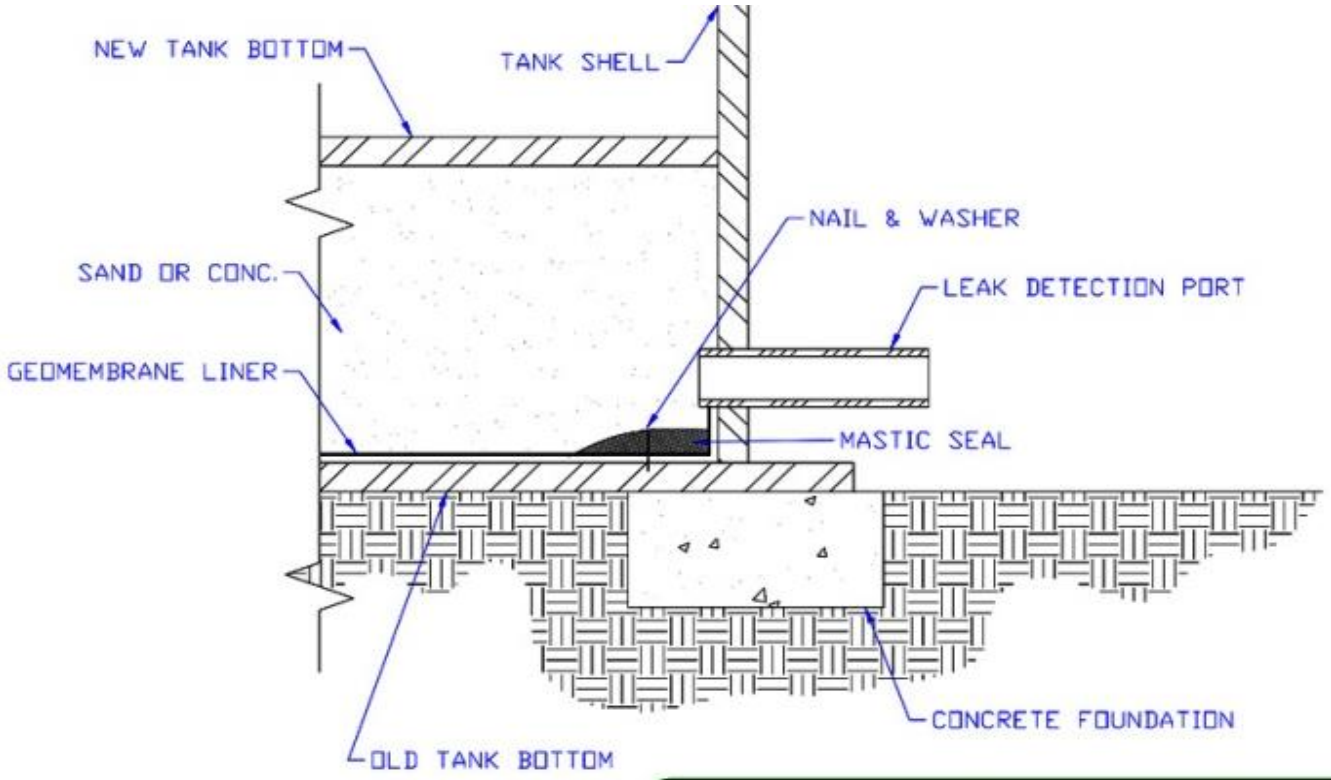
Some consider secondary containment to be an all inclusive definition for impervious containment beneath ASTs, around ASTs in a dike-field, and any double-wall systems. Others consider it to be an RPB (Release Prevention Barrier), and others just the NFPA 30-required containment (not necessarily impervious) around an AST as a dike-field, bund, or attached containment on a shop-fabricated tank. Other definitions lie between these categories. (Suggestion – use the definition provided in the standards and your state, federal, and local government rule)

Secondary Containment is good for the Environment

Tanks

Typical components (starting from below)

– Lower tank bottom
– HDPE liner
– Sand or concrete with drainage system
– Upper tank bottom



API 650 Appendix - Optional/Traditional Double-Bottom Designs

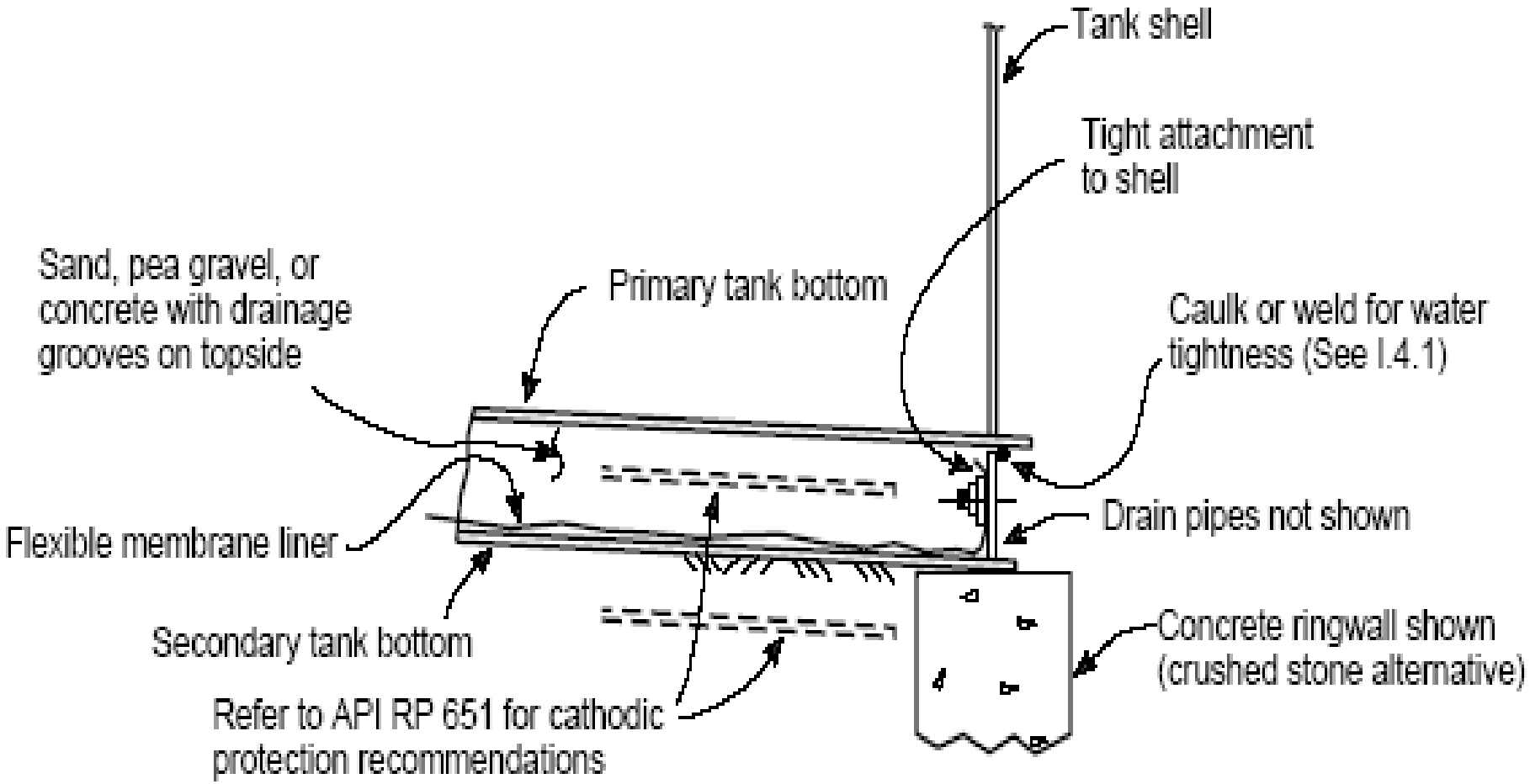


Figure I-4—Double Steel Bottom with Leak Detection at the Tank Perimeter (Typical Arrangement)


German
Double-
Bottom
Design

El Segundo Bottoms

Cone-Down

El-Segundo Designs

- Cone-up
- Cone-down
- Shovel-bottom

Double-Wall Tanks


Port of
Palm Beach


Germany


Port Canaveral

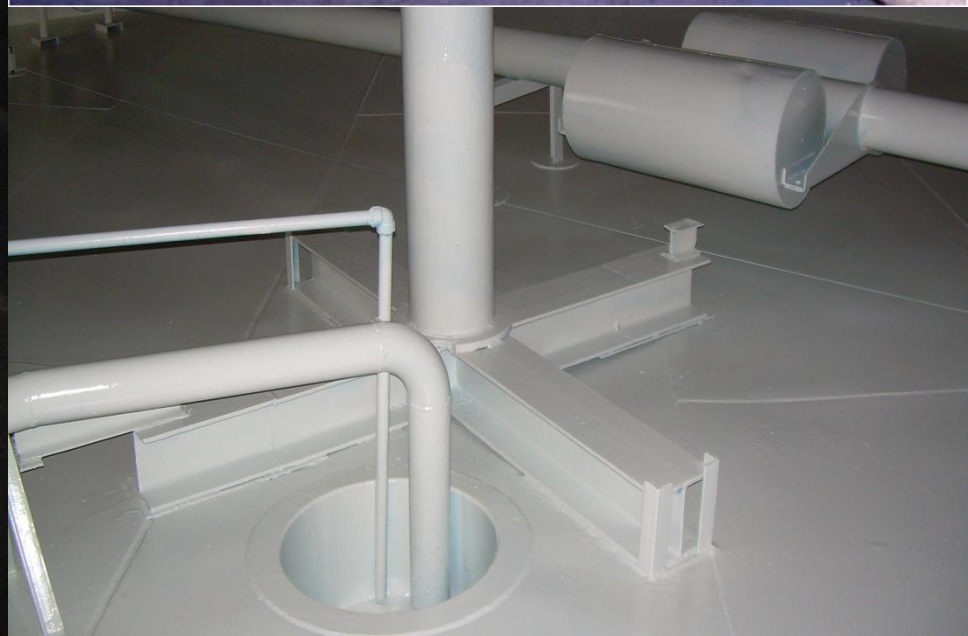
Impervious Synthetic Liners Beneath the Tank

Upgrading Existing Single-Bottom ASTs with Secondary Containment

Internal Secondary Containment Using Parabeam

Tankbau (Germany) Internal Secondary Containment System

Steel Internal Secondary Containment



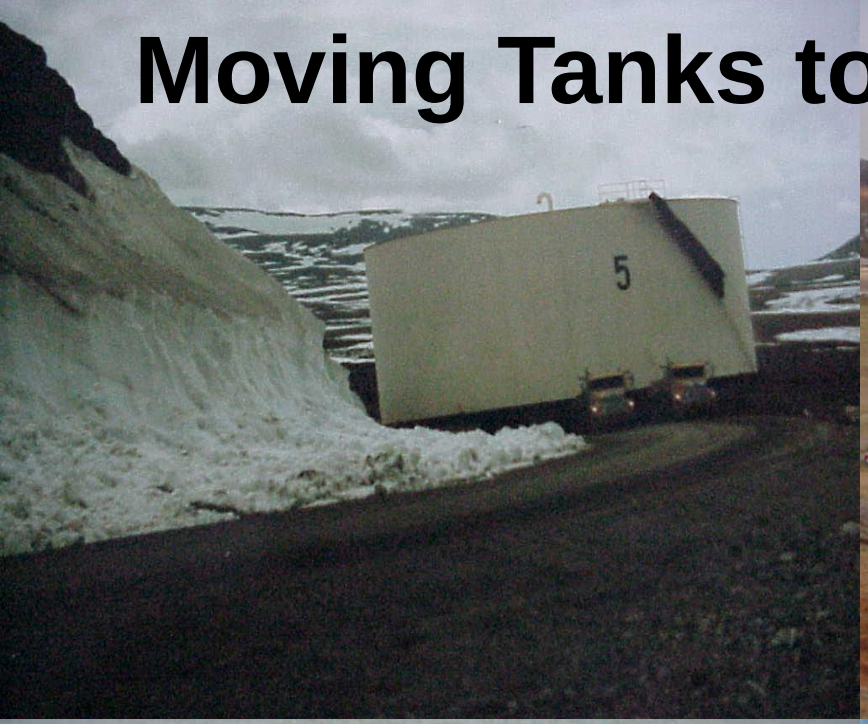
Tank-Jacking to Install Secondary Containment

Air Bag-Lift Technology for Secondary Containment Installation Beneath Tanks

Things You Can Only See After a Tank Lift

Lowering the Tank

Moving Tanks to Different Locations

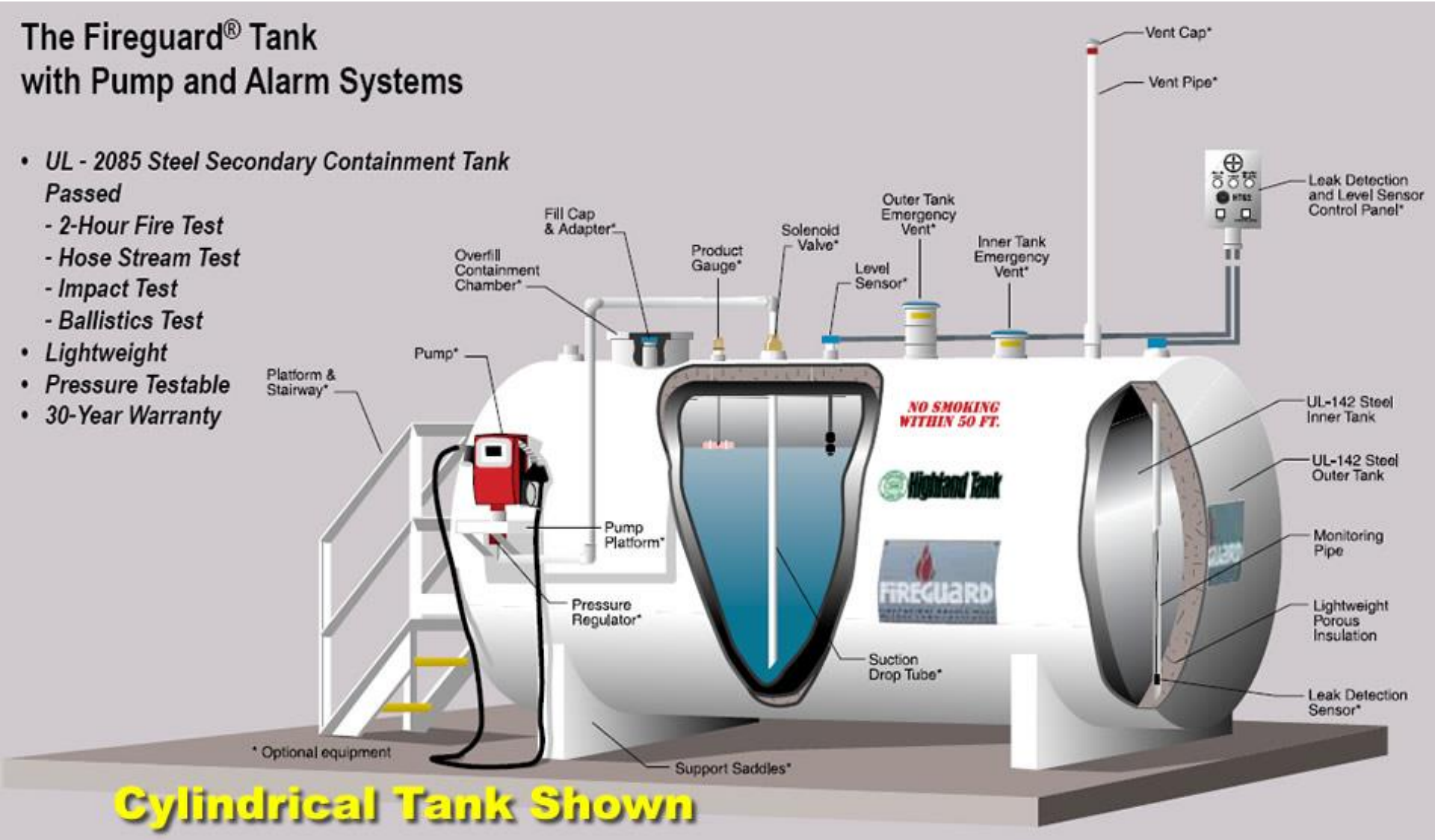


Shop-Fabricated Tanks

Double-wall Tanks

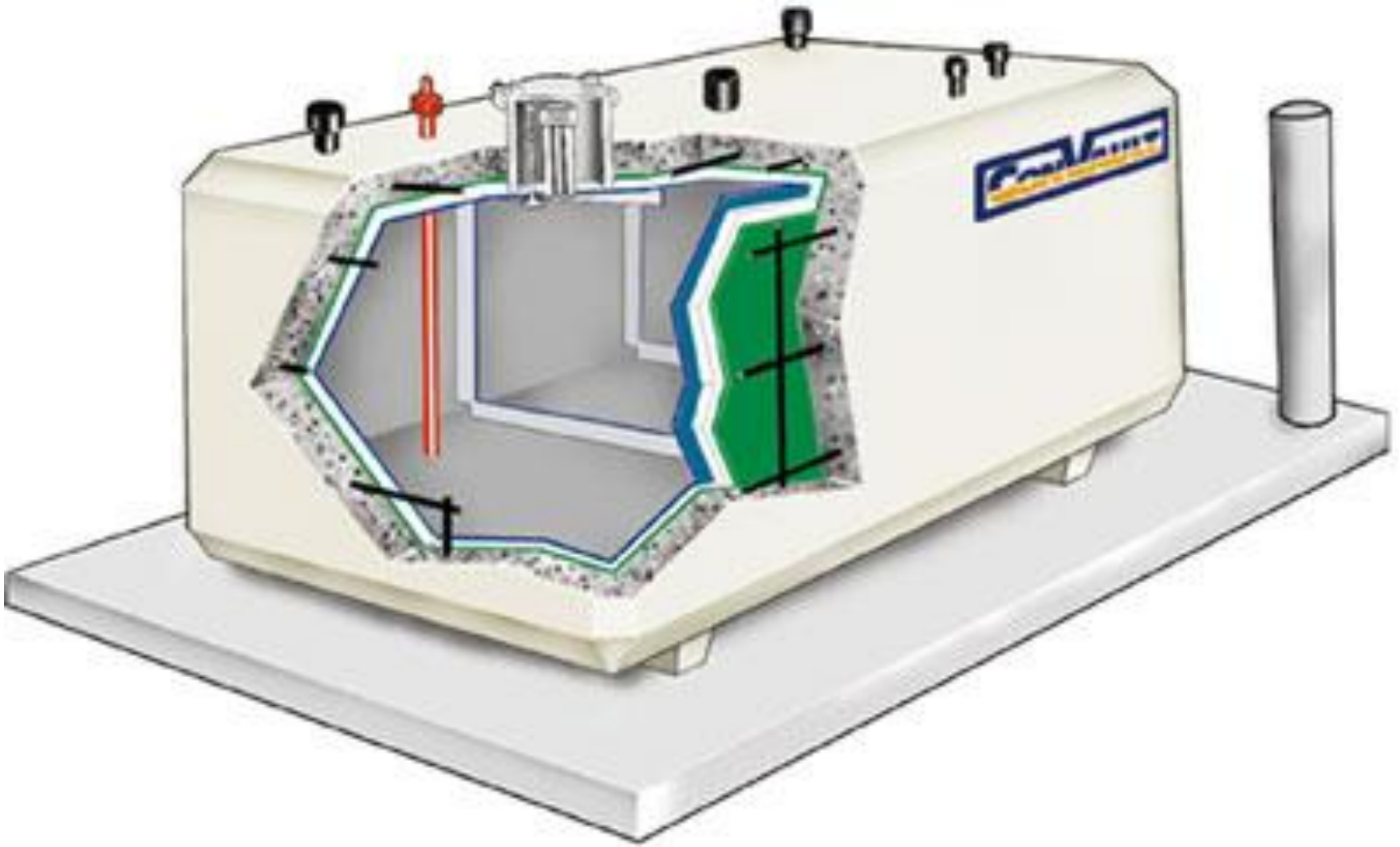

007
NO SMOKING
PHILIPSBURG-OSCEOLA AREA SCHOOL DISTRICT
DIESEL
OSCEOLA
SCHOOL

Fire-Protected Tanks



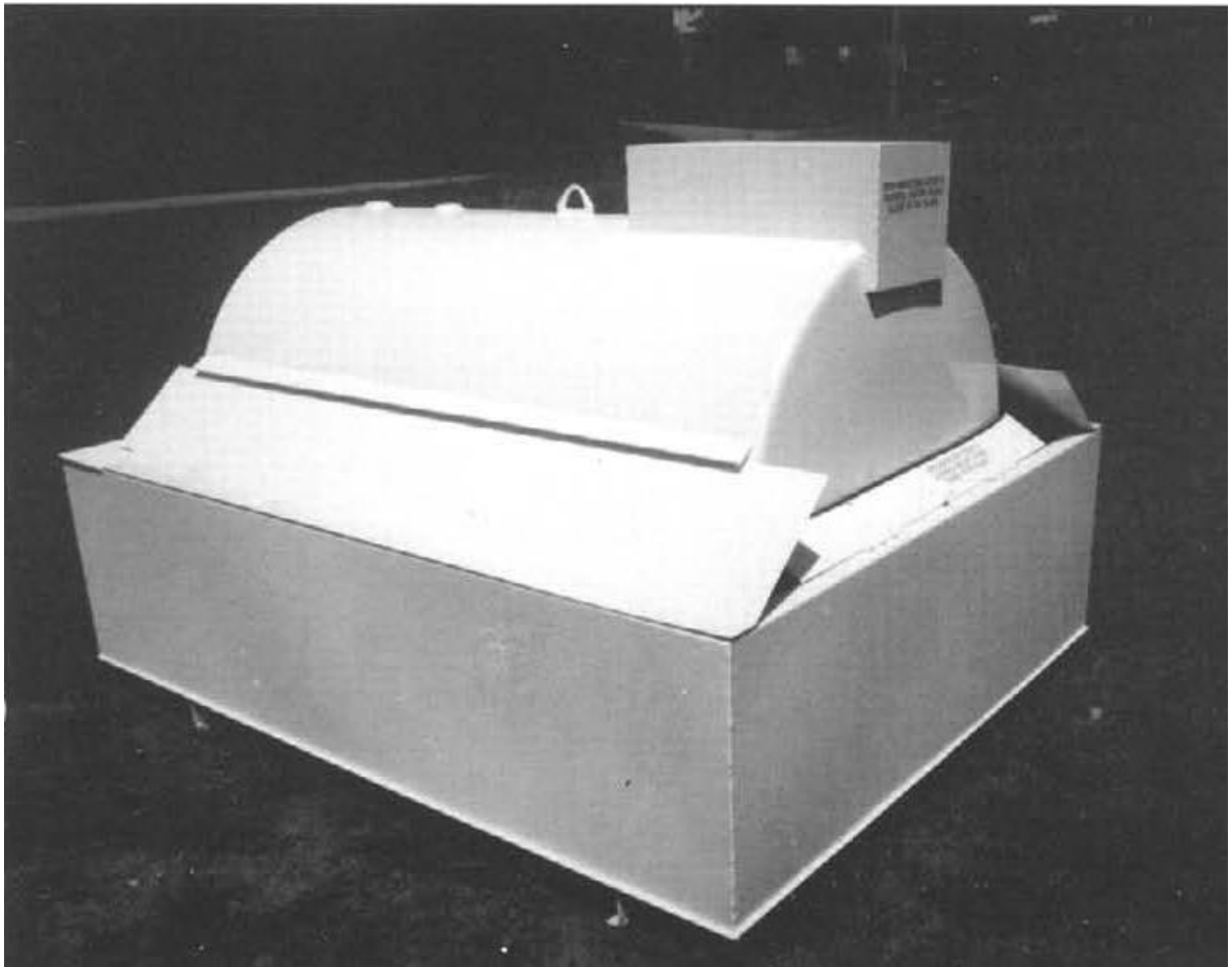
Fire-Protected Tanks

Fire-Protected Vaulted Tanks



Internal Overfill Containment Tanks

Single-wall Tanks in Steel Dikes with Rain Shields



Single-wall Tanks in Concrete Dikes

Dike-Field (or Bund) Containment

What is Dike-Field Containment?

Dike-Field Containment

- Holds 110 % of the capacity of the largest tank within the dike-field, providing for:
- The displacement of the other tanks in the dike-field
- The volume of stormwater from a 25 year storm on top of the capacity of the largest tank within the dike-field
- Prevent catastrophic discharges from leaving the dike-field and getting to the environment outside the dike-field
- If impervious, it provides secondary containment around the storage tank

Not Impervious

Note the Seven Meter High Dike-wall…

AST Dike-field Secondary Containment - Field-Erected Tanks

HDPE Liner Installation

HDPE Installation

HDPE Installation – Weld Seams

Pre-Hydrated Bentonite Clay Liners – “Rawmat” by Rawell

“Rawmat” by Rawell

Poly-Urea Liners

Poly-Urea

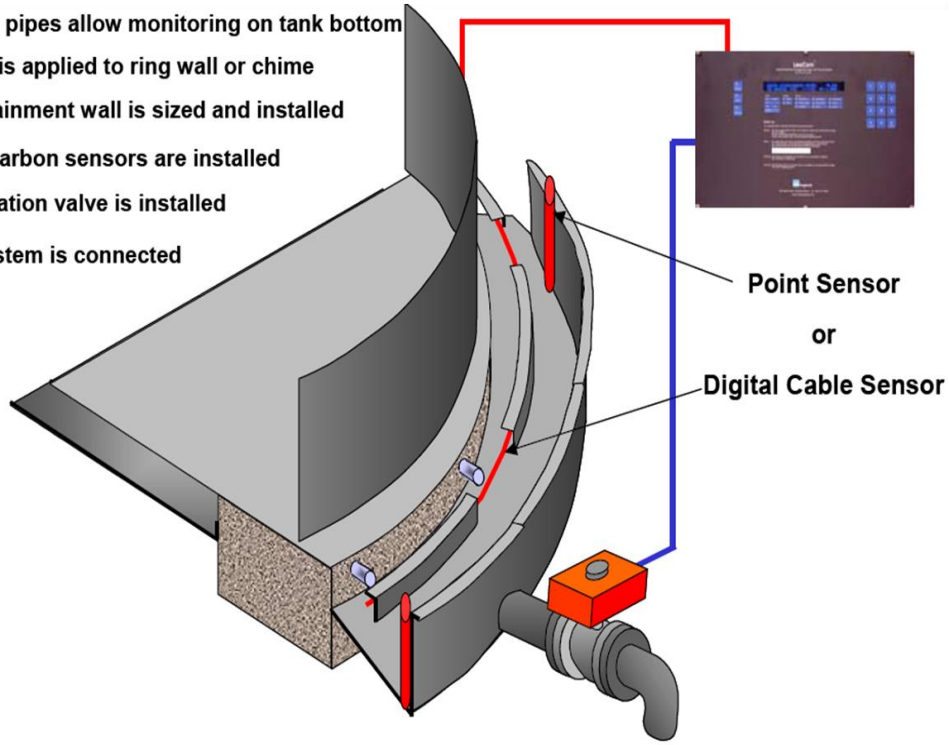
Poly-Urea good around dike-floor penetrations and piping supports

Poly-Urea Spray Application

Concrete

Concrete

- ✓ Telltale pipes allow monitoring on tank bottom
- ✓ A skirt is applied to ring wall or chime
- ✓ A containment wall is sized and installed
- ✓ Hydrocarbon sensors are installed
- ✓ An isolation valve is installed
- ✓ The system is connected



Alternative Dike Field Secondary Containment

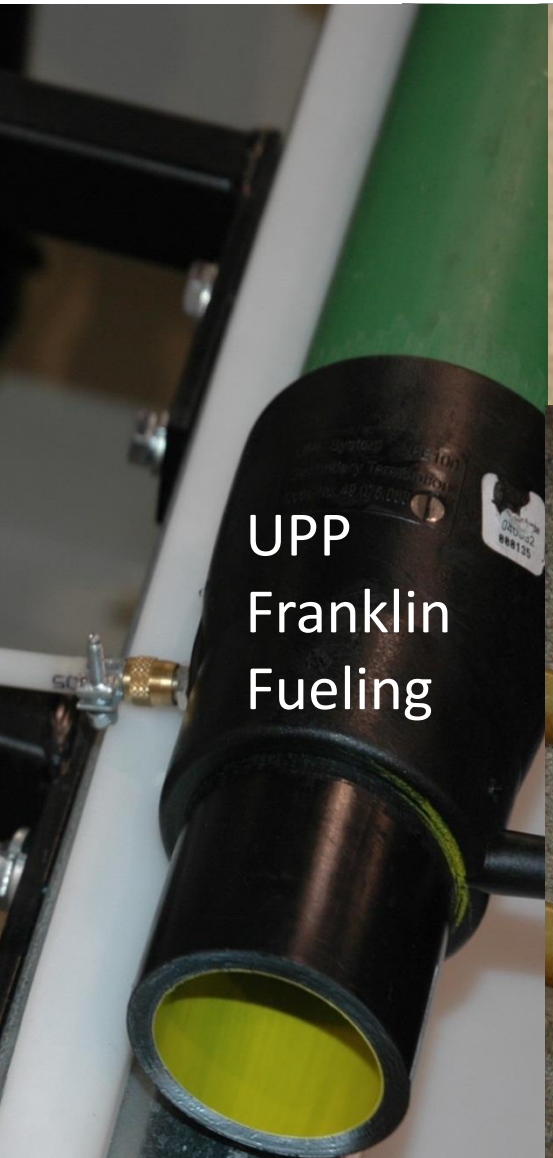

Piping
4 11:25AM

Steel Bulk Product Piping with Secondary Containment for Piping in Contact with the Soil

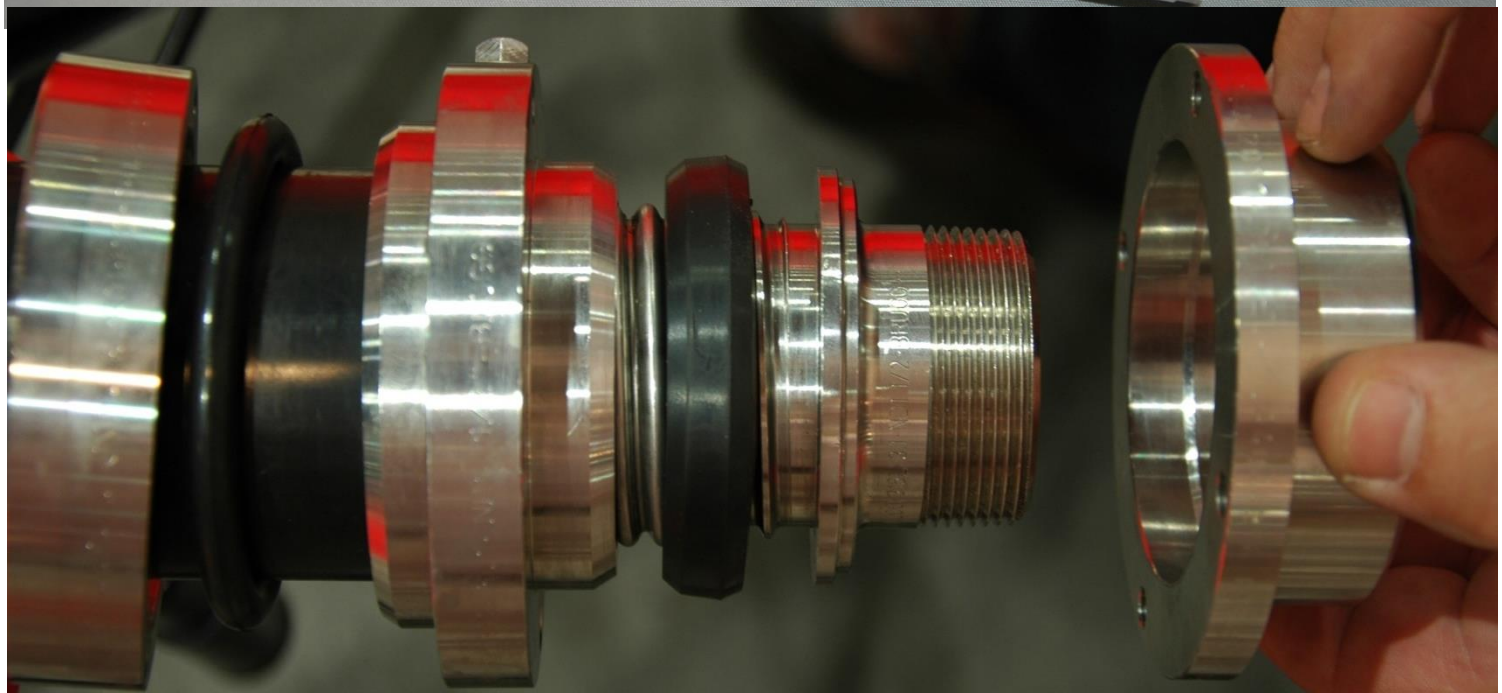

HDPE Pipe
Semi-Rigid Pipe
UPP
Rheomax

IPP HDPE Semi-Rigid Petrol Pipe

Double-wall Piping with a Good Performance Record in the Florida Leak Autopsy Study*



Brugg – Stainless Steel Primary & HDPE Secondary



The End