

# Precast Concrete Tank Inspection & Installation Tips

**NOWRA 2021**

**Onsite Wastewater Mega-Conference**

**Kayla Hanson, P.E.**

**Director of Technical Services**

**National Precast Concrete Association**



# **Disclaimer**

**Please Note:**

**The materials being presented represent the speaker's opinions and do not reflect the opinions of NOWRA.**

# National Precast Concrete Association (NPCA)

- **What:**

- Not-for-profit trade association dedicated to expanding the use of quality precast concrete products

- **Who:**

- Producers, Associates, Professional Members, Students

- **How:**

- Technical services and resources, extensive member and industry education, networking, advocacy

# Learning Objectives

- Outline TCEQ requirements for tank design and construction.
- Describe 3 things to look for before the structure is installed.
- Identify crucial steps in installation that can affect watertightness, durability, and safety.
- List 3 key items to look for during septic system service and inspection that could diagnose potential issues.

# Mouras Automatic Scavenger

“A mysterious contrivance consisting of a vault hermetically closed by a hydraulic seal. By a mysterious operation, and one which reveals an entirely novel principle, it rapidly transforms all the excrementitious matters it receives into a homogeneous fluid, only slightly turbid, and holding all the solid matter in suspension in the form of scarcely visible filaments. The vault is self emptying and continuous in its workings.”



# The Tank is the Heart of the System



# What Ensures a Durable Tank?

- Design
- Manufacturing
- Installation
- Inspection and Maintenance



# TCEQ Requirements

- **Texas Commission on Environmental Quality**
  - Title 30
    - Part 1
      - Chapter 85
        - » Subchapter D
          - » Rule §285.32 Criteria for Sewage Treatment Systems



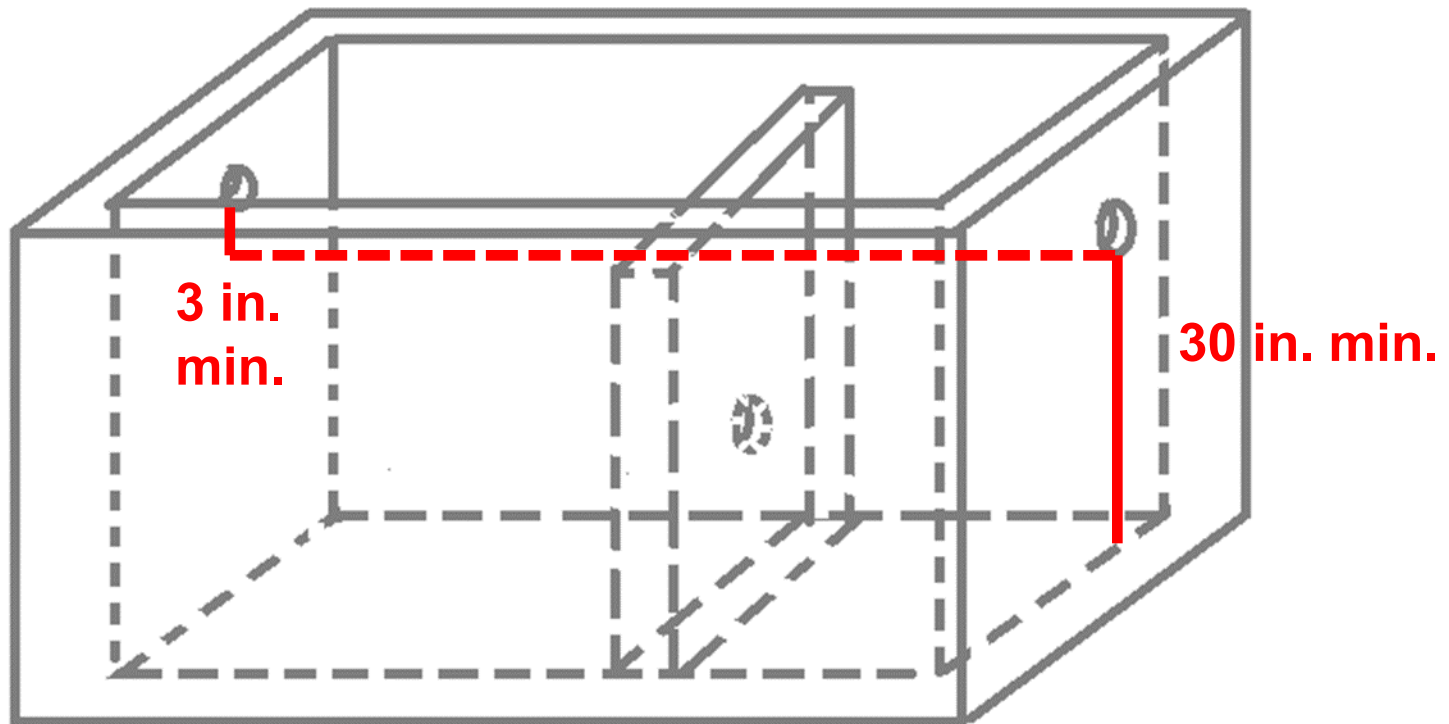


# TCEQ Requirements

- **Tank volume.**

- The liquid volume of a septic tank, measured from the bottom of the outlet, shall not be less than established in §285.91(2). Additionally, the liquid depth of the tank *shall not be less than 30 inches*.
- The flowline of the tank's inlet device in the first compartment of a two-compartment tank, or in the first tank in a series of tanks, shall be *at least three inches higher* than the flowline of the outlet device.

# Liquid Depth & Flow Line



- The liquid depth of the tank shall not be less than 30 inches.
- The flowline of the tank's inlet device in the first compartment shall be at least three inches higher than the flowline of the outlet device.

# TCEQ Requirements

- **Inlet and outlet devices.**
  - The inlet devices shall be "T" branch fittings, constructed baffles or other structures or fittings approved by the executive director.
  - The outlet devices shall use a "T" unless an executive director approved fitting is installed on the outlet.



# TCEQ Requirements

- **Inlet and outlet devices.**
  - All inlet and outlet devices shall be installed watertight to the septic tank walls and shall be a minimum of three inches in diameter.

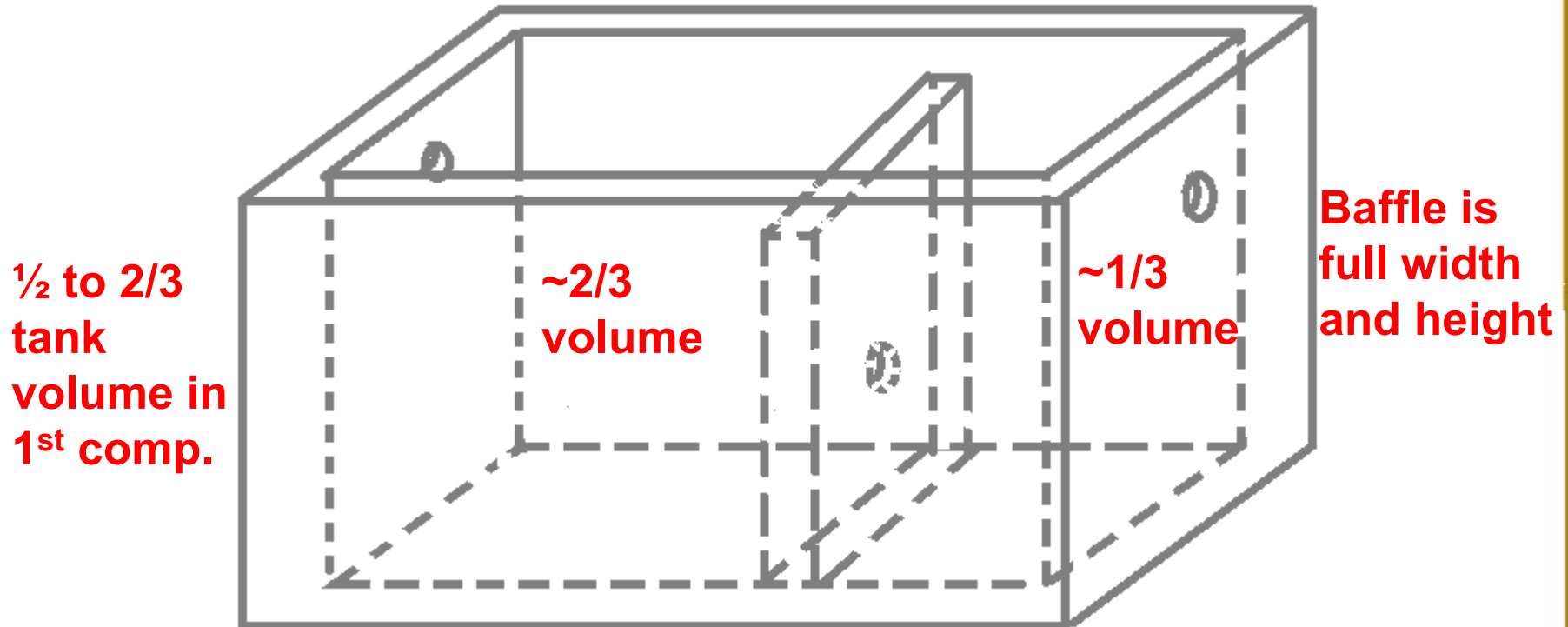


# TCEQ Requirements

- **Baffles and series tanks.**
  - All septic tanks shall be divided into *two or three compartments* by the use of baffles or by connecting two or more tanks in a series.
  - In a baffled tank, the baffle shall be located so that *one half to two thirds* of the total tank volume is located in the first compartment.
  - Baffles shall be constructed the *full width and height* of the tank with a gap between the top of the baffle and the tank top.

# Compartments & Baffle Details

At least 2 compartments

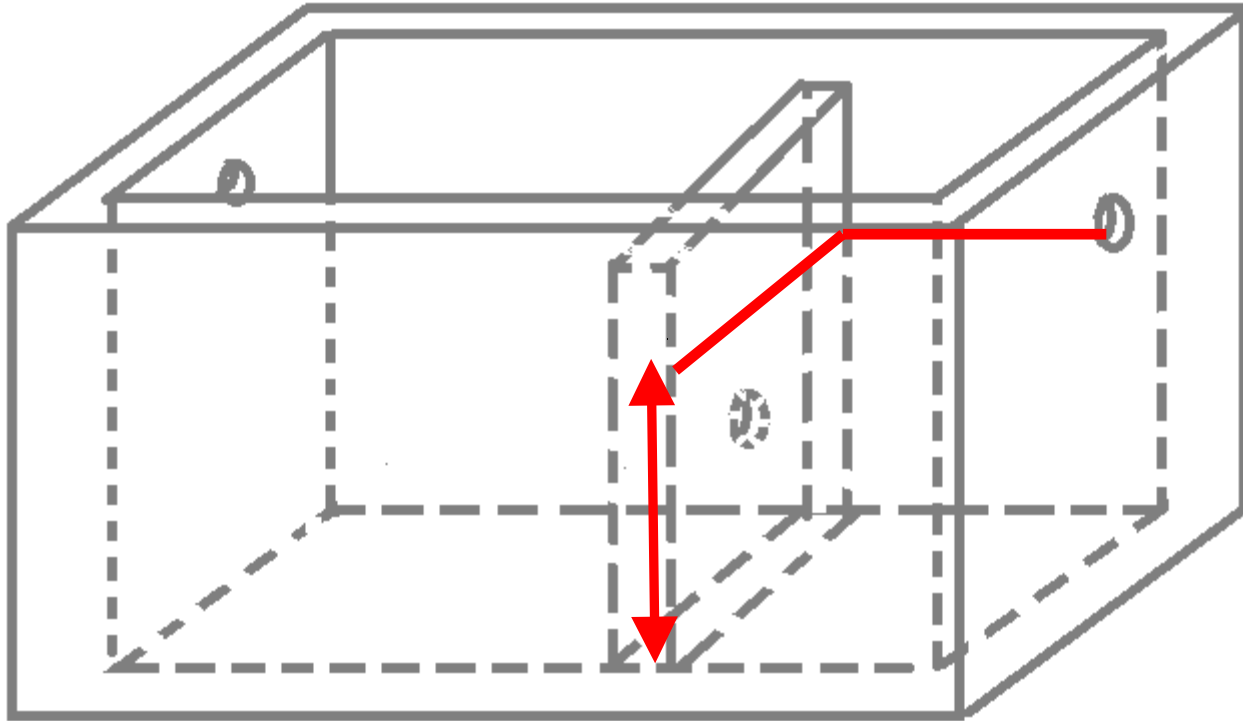


- Not less than  $1/2$ , and not more than  $2/3$  of the total volume shall be in the first compartment.
- Baffle is full-width and height of the tank with a small gap between the top of the baffle and the tank top.

# TCEQ Requirements

- **Baffles and series tanks.**
  - The baffle shall have an opening located below the liquid level of the tank at a depth *between 25% and 50%* of the liquid level. The opening may be a slot or hole.

# Baffle Opening



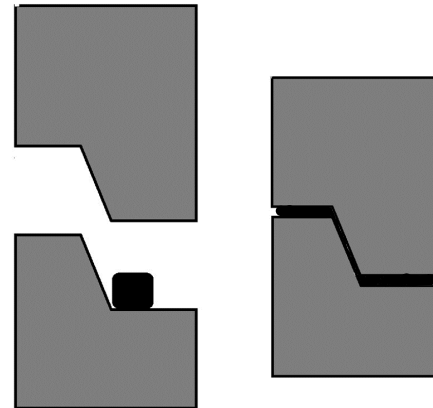
- The opening is located below the liquid level of the tank at a depth between 25% and 50% of the liquid level.



# TCEQ Requirements

- **Septic tank design and construction materials.**
  - The septic tank shall be of *sturdy, water-tight construction*.
  - The tank shall be designed and constructed so that all *joints, seams, component parts*, and fittings prevent groundwater from entering the tank, and prevent wastewater from exiting the tank, except through designed inlet and outlet openings.

# Watertight Joints, Seams, & Openings



# TCEQ Requirements

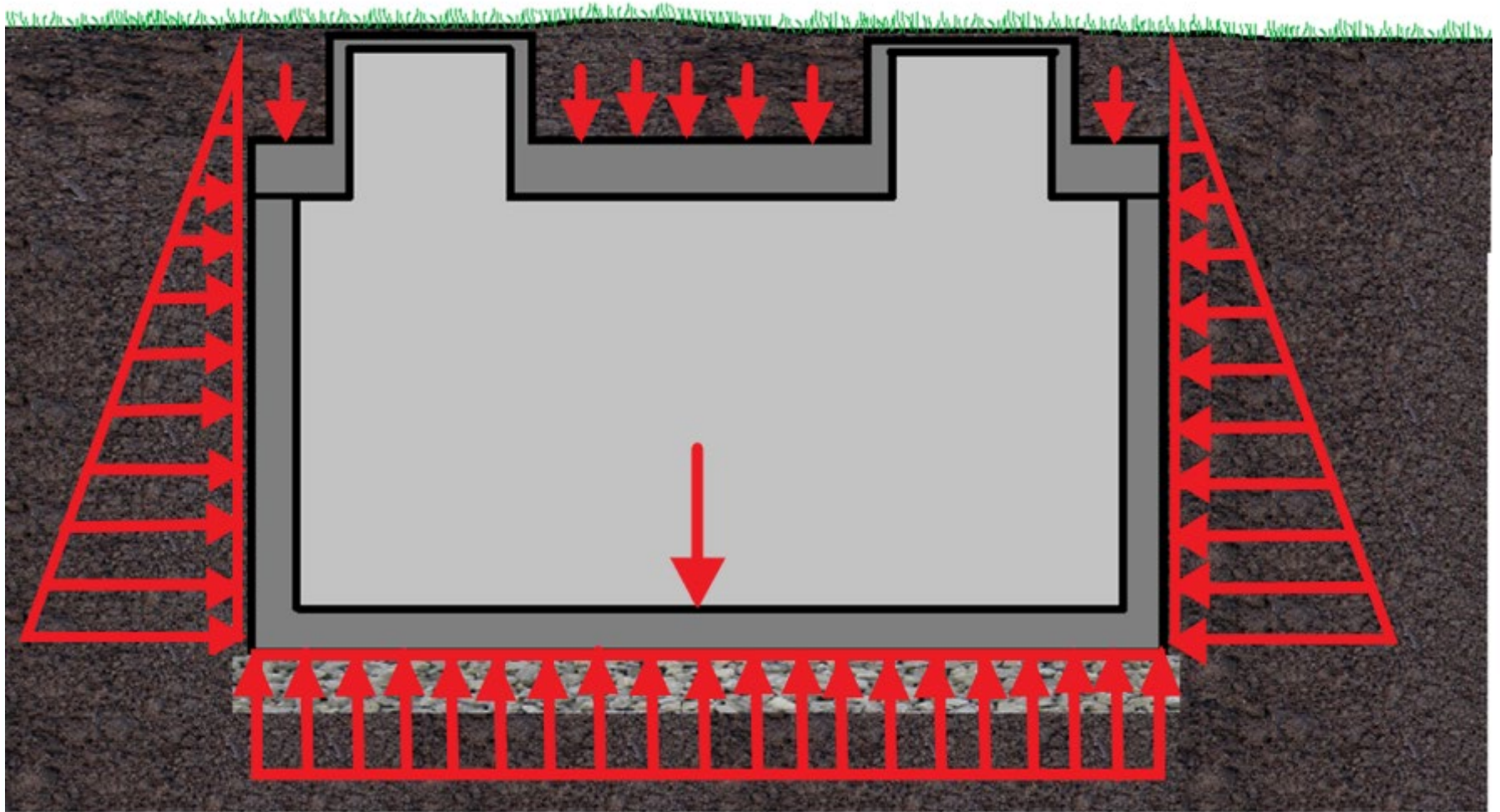
- **Septic tank design and construction materials.**
  - Materials used shall be steel-reinforced poured-in-place concrete, steel-reinforced precast concrete, fiberglass, reinforced plastic polyethylene, or other materials approved by the executive director.
  - ***Metal septic tanks are prohibited.***



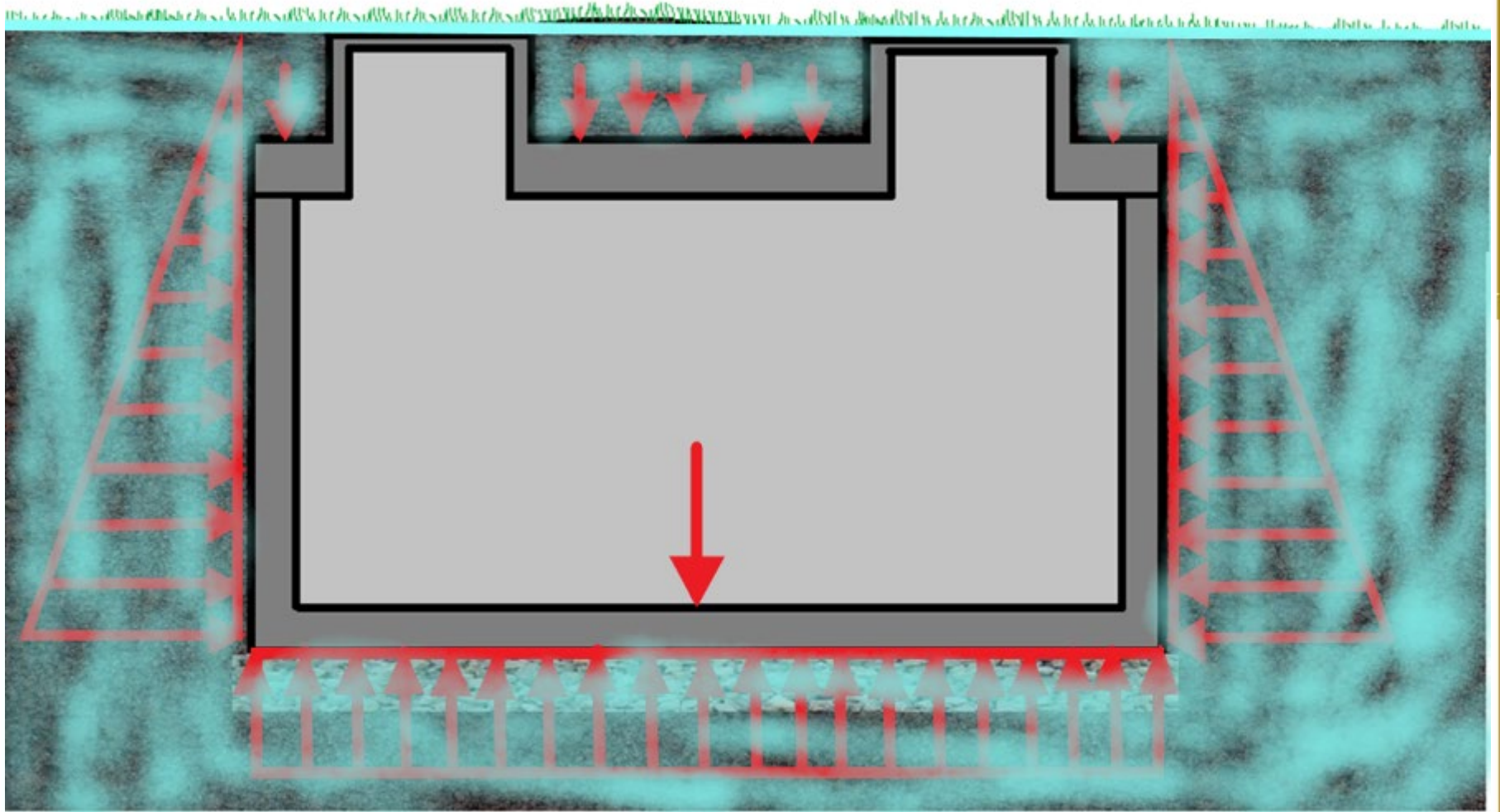
# TCEQ Requirements

- **Septic tank design and construction materials.**
  - The septic tank shall be structurally designed to *resist buckling from internal hydraulic loading and exterior loading* caused by earth fill and additional surface loads.

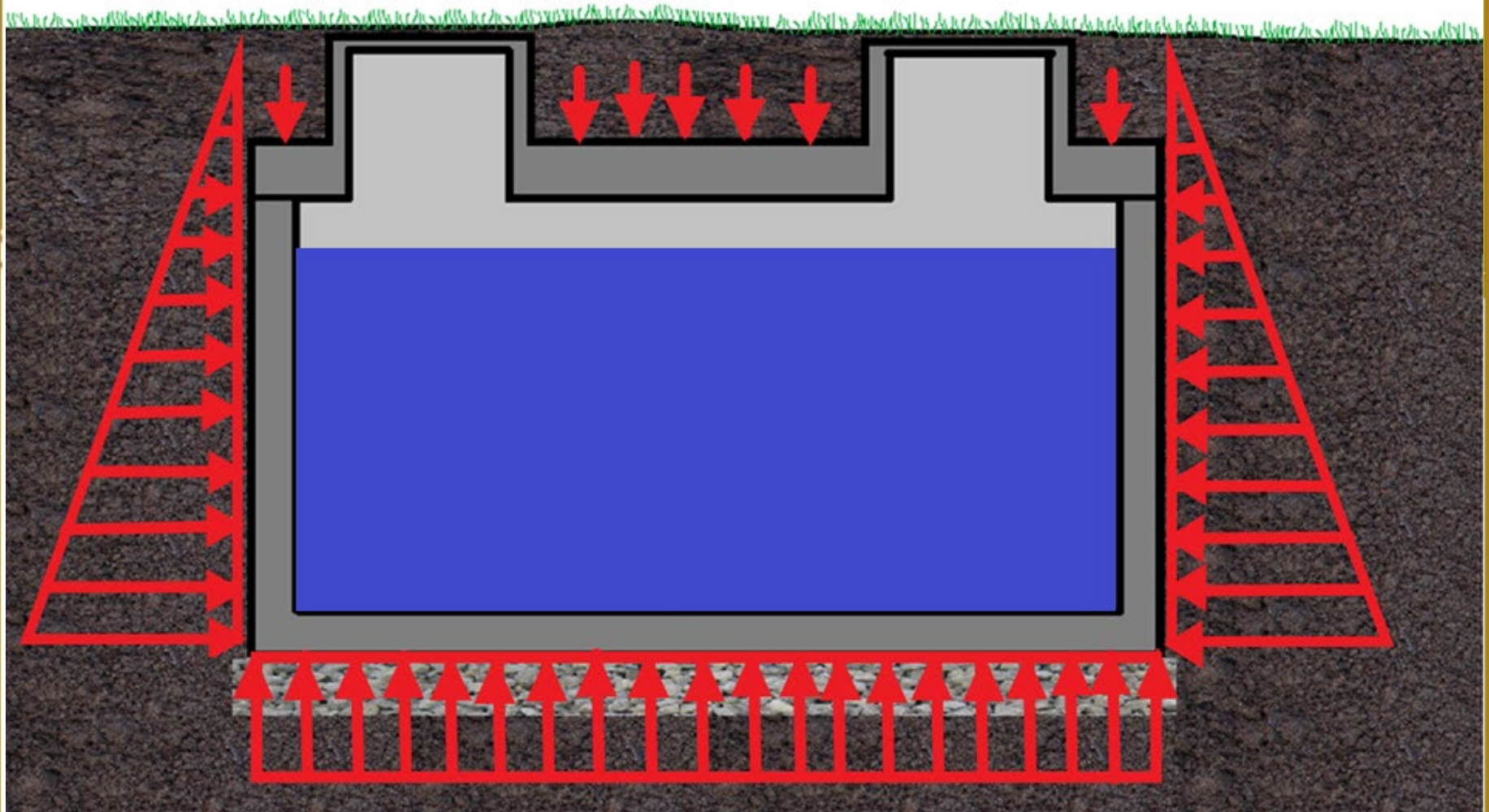
# Watertight & Structurally Sound



# Watertight & Structurally Sound



# Watertight & Structurally Sound



# TCEQ Requirements

- **Precast concrete tanks.**
  - In addition to the general requirements in this subparagraph, precast concrete tanks shall conform to requirements in the Materials and Manufacture Section and the Structural Design Requirements Section of ASTM Designation: *C1227, “Standard Specification for Precast Concrete Septic Tanks”* or under any other standards approved by the executive director.



# TCEQ Requirements



Designation: C1227

## Standard Specification for Precast Concrete Septic Tanks<sup>1</sup>

This standard is issued under the fixed designation C1227; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This specification covers design requirements, manufacturing practices, and performance requirements for monolithic or sectional precast concrete septic tanks.

1.2 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

C94/C94M Specification for Ready-Mixed Concrete

C125 Terminology Relating to Concrete and Concrete Aggregates

C150 Specification for Portland Cement

C231 Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

C260 Specification for Air-Entraining Admixtures for Concrete

C330 Specification for Lightweight Aggregates for Structural Concrete

C494/C494M Specification for Chemical Admixtures for Concrete

C595 Specification for Blended Hydraulic Cements

C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

# Inspecting New Tanks



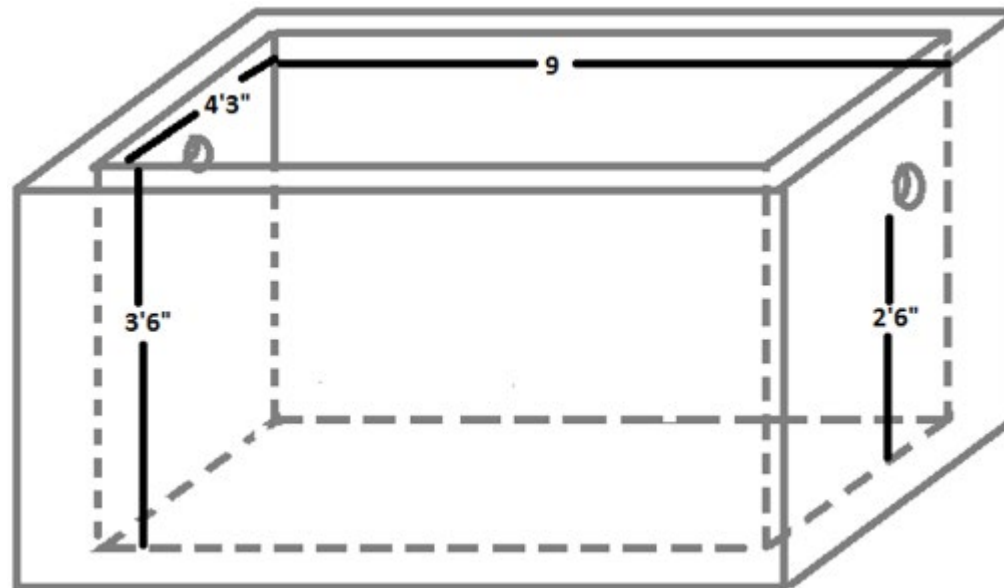
# New Tank Inspection Prior To Backfill

- **Verify the proper tank markings:**
  - ASTM C1227
  - Date of manufacture
  - Inlet and outlet
  - Depth of bury
  - Tank capacity



# New Tank Inspection Prior To Backfill

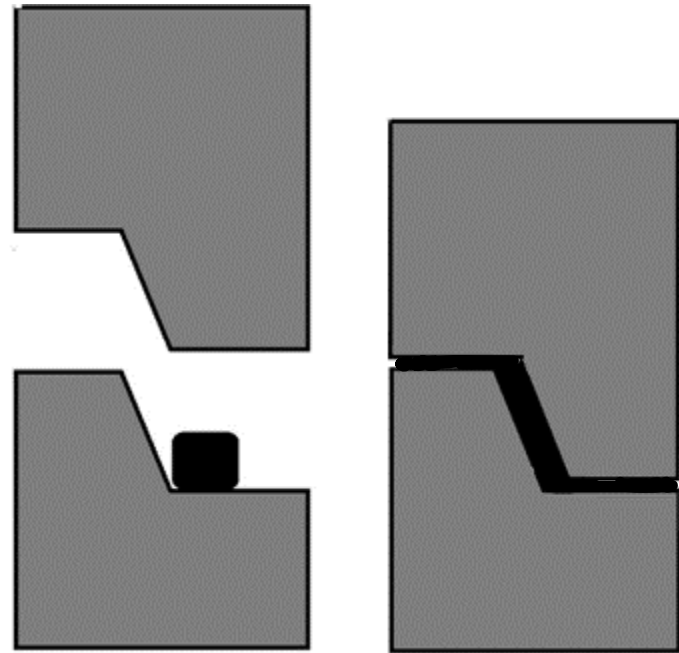
- Verify the tank volume/capacity and the number of compartments



- What is the volume of this tank?
- $9 \text{ ft} \times 4.25 \text{ ft} \times 3.5 \text{ ft} = 133.88 \text{ cf} \times 7.48 \text{ gal/cu ft} = 1001.39 \text{ gal}$
- $9 \text{ ft} \times 4.25 \text{ ft} \times 2.5 \text{ ft} = 96.63 \text{ cf} \times 7.48 \text{ gal/cu ft} = 715 \text{ gal}$

# New Tank Inspection Prior To Backfill

- Confirm the sealant is properly applied



# New Tank Inspection Prior To Backfill

- Conduct on-site watertightness testing, if required
  - Vacuum test
  - Hydrostatic test



# New Tank Inspection Prior To Backfill

- **Confirm existence, location, and proper installation of auxiliary components:**
  - Risers
  - Resilient connectors
  - Inlet and outlet baffles
  - Effluent filter
  - Secondary safety apparatus
  - Lids and all the required screws tightened properly



# Tank Installation Considerations

1. Jobsite excavation
2. Transportation to the jobsite
3. Lifting and handling the tank on-site
4. Proper bedding, level bedding
5. Setting the tank
6. Assembling and sealing the tank and piping
7. Proper backfill





# Tank Installation

- **Proper installation of onsite wastewater structures is key to ensuring their function, watertightness, durability, and safety.**



# Proper Bedding

- The #1 rule to setting an installation up for success is providing proper bedding

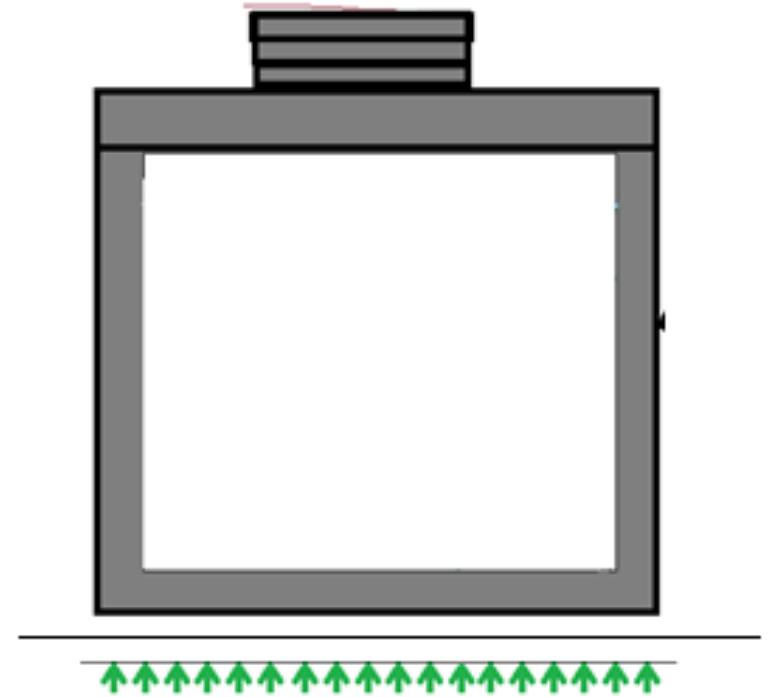
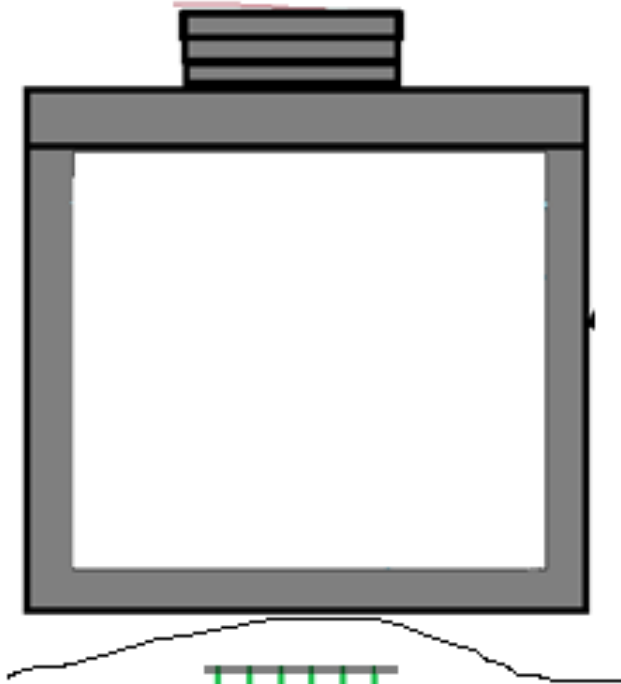


# Proper Bedding

- **Firm, level, well-compacted granular material**
- **Bedding depth requirements vary**



# Uneven Bedding vs. Level Bedding



# Verify Depth of Bury & Backfill in Consistent Lifts

- 12" to 24" lifts are typical



# Tank Safety

- **Lid safety:**
  - Locks
  - ALL screws in place
  - Missing screws replaced
  - Heavy concrete lids



# Secondary Safety Apparatus

- Typically rated to carry 250 lbs
- Designed to be redundant device to protect against accidental entry into the tank by kids and pets



# **Inspecting Tanks in Service (Existing Tanks)**





# Surrounding Soil Conditions

- **What does it mean if you see:**
  - Soggy, wet grass
  - Settlement
  - Odors



# Condition of the Cover

- **Is the cover:**
  - There
  - Loose
  - Cracked
  - Broken or damaged
  - Missing screws



# Riser Condition

- **Are the risers:**

- Cracked
- Deteriorating
- Misaligned
- Made of acceptable material



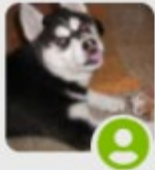
- **Is there:**

- Root invasion
- Ground water infiltration
- Water in the risers



# Appropriate Riser Materials

- **Question:** How can I make my own riser? A “to code” riser costs too much.



**Buckgnarly**

Well-known member

May 16, 2011

I made one out of a plastic 55 gallon drum with metal lid. I did not like finding it the first time, no interest in looking a second.



# Appropriate Riser Materials

- **Question:** How can I make my own riser? A “to code” riser costs too much.

john B. ne ind.

04-19-2012  
01:37:13

[Report to Moderator](#)

Re: OT- Cheap Septic tank risers in reply to dwel,  
04-17-2012 15:24:06

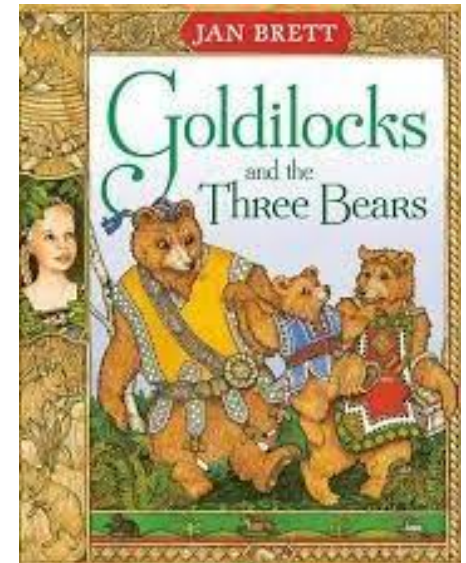
I used 3, 5 gal buckets stacked together. The lid from the tank was just the right size to cover the buckets. That was 40 years ago and it still works fine. The dirt around the lid will make a good enough seal that no other sealer is needed. I worked part time in HS and then 4 years after in the sh\*t buss. and can say for sure, just about anything will work and I've seen a bunch of different ones.

[\[Log in to Reply\]](#) [\[No Email\]](#)



# Condition and Level of Wastewater

- Liquid level
- Scum layer
- Sludge depth
- Troubleshoot



# Inlet & Outlet Baffle/Tee Condition

- **Are they:**
  - There
  - Missing pieces or components
  - Positioned correctly
  - Properly sized
  - Clogged



# Effluent Filter

- **Is it:**
  - Missing
  - Clogged
  - In need of cleaning or in need of replacement
  - Getting clogged constantly





# Streamline Inspections

- **Clear, easy-to-follow standardized forms**
- **Measurements for common tank configurations**
- **Training**
- **Troubleshooting assistance**



# **Quality Control Program**

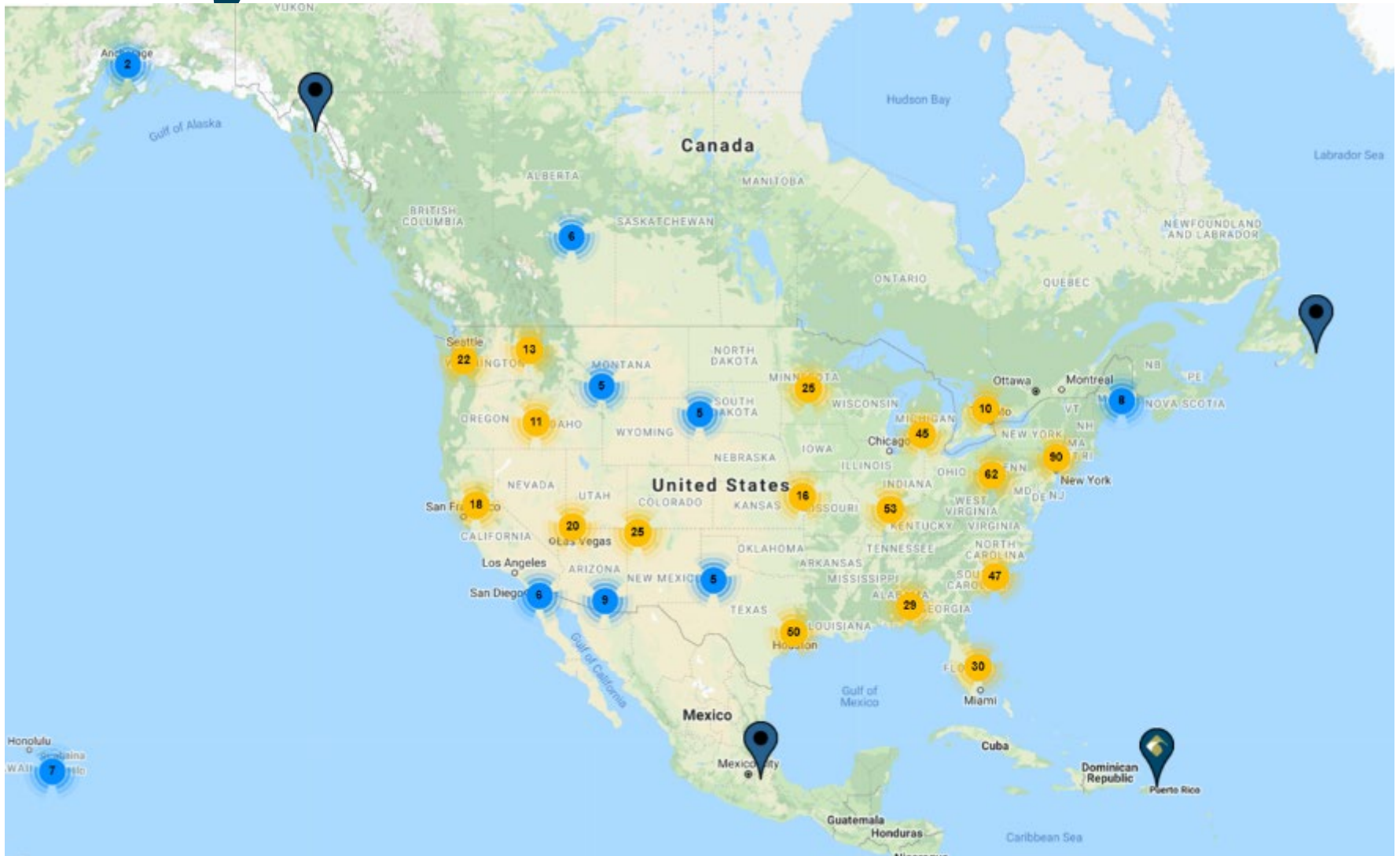
**All onsite wastewater structures should be manufactured using a detailed, documented quality control program**



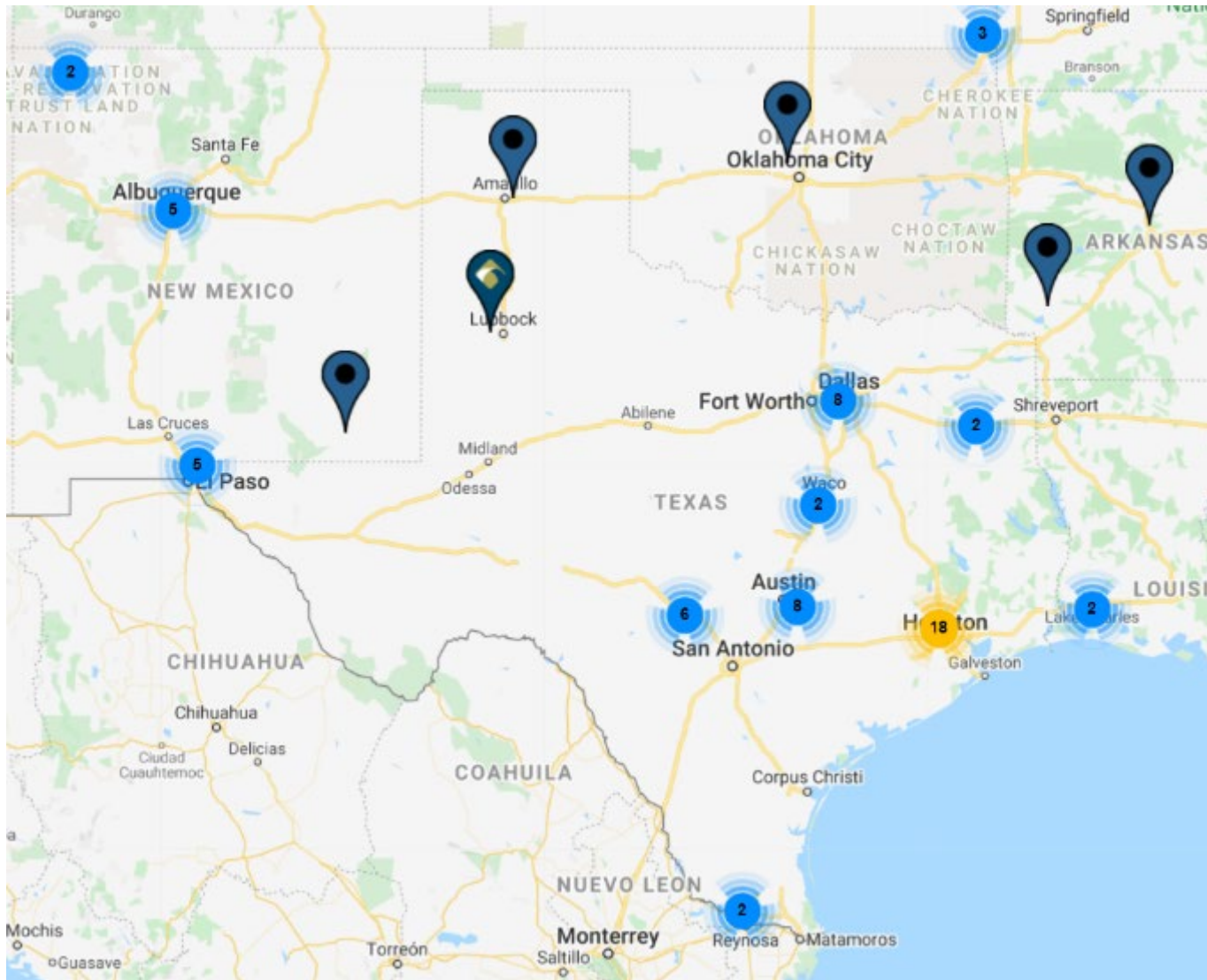
# Stakeholders – Always Advancing



# Rely on Your Local Producers!



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# Rely on Your Local Producers!



**FIND PRECAST**  
PRODUCTS & SUPPLIES

- [www.precast.org](http://www.precast.org)
- [www.precast.org/find](http://www.precast.org/find)

# Additional Free Resources

- **NPCA website:** [www.precast.org](http://www.precast.org)
  - NPCA Quality Control Manual
  - Onsite Wastewater Homeowner Manual
  - Onsite Wastewater Best Practices Manual
  - Gravity Grease Interceptor Design Guide
  - Gravity Grease Interceptor Design White Paper
  - Grease Interceptor O&M Manual
  - Buoyancy White Paper
  - Webinars
- **Kayla Hanson, P.E.**
  - (800) 366-7731
  - [khanson@precast.org](mailto:khanson@precast.org)

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