

ANCHORING/ELEVATING STATIONARY BULK TANKS WITHIN SECONDARY CONTAINMENT TO PREVENT FLOTATION

- **FEDERAL EPA REGULATIONS 40 CFR 165.85(d) & 165.87(d) REQUIRE NEW & EXISTING TANKS TO BE ANCHORED OR ELEVATED IN SECONDARY CONTAINMENT UNITS (DIKES) AS OF AUGUST 17, 2009**
- **STATE REQUIREMENTS FOR ANCHORING/ ELEVATING TANKS APPLY IF THAT STATE HAS RECEIVED EQUIVALENCY APPROVAL FROM THE FEDERAL EPA FOR THEIR CONTAINMENT PROGRAM**
- **CHECK WITH YOUR STATE REGULATORY AGENCY BEFORE STARTING ANY PROJECT REGARDING CHANGES TO EXISTING OR CONSTRUCTION OF NEW SECONDARY CONTAINMENT UNITS (DIKES)**
- **THE FEDERAL EPA REQUIREMENT IS A “PERFORMANCE” STANDARD FOR PREVENTING TANK FLOTATION IF THE SECONDARY CONTAINMENT UNIT (DIKE) FILLED WITH LIQUID**
- **COMPLIANCE CAN BE MET BY:**
 1. **ELEVATING AND SECURING THE TANKS**
 2. **ANCHORING THE TANKS WITH BOLTS OR CABLES**
 3. **ENSURING THAT THE TANKS ALWAYS HOLD ENOUGH PESTICIDE TO PREVENT FLOTATION – BUOYANT FORCE (The upward force on a partially or completely submerged tank that is equal to the weight of the fluid displaced by the tank).**
- **THE FEDERAL EPA CONSIDERS BUOYANT FORCE AS A FORM OF ANCHORING. IF A FACILITY CHOOSES TO ANCHOR TANKS IN THIS WAY:**
 1. **THE LEVEL OF PESTICIDE IN THE TANK MUST ALWAYS BE AT OR ABOVE THE REQUIRED VOLUME**
 2. **THE FACILITY SHOULD HAVE DOCUMENTATION OF THE BUOYANT FORCE CALCULATIONS**

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- **TO CALCULATE BUOYANT FORCE, THE FOLLOWING INFORMATION IS NEEDED:**
 - **MASS (WEIGHT) OF THE EMPTY TANK**
 - **DENSITY OF THE PESTICIDE (WEIGHT/GAL)**
 - **VOLUME OF PESTICIDE IN THE TANK (GALS)**
 - **DENSITY OF THE FLUID THAT FILLS THE SECONDARY CONTAINMENT UNIT (WEIGHT /GAL)**
 - **VOLUME OF THE TANK THAT IS SUBMERGED (GALS)**

- **THE FORMULA:**

Wt. of the empty tank + (wt/gal* of pesticide x vol. of pesticide in the tank) > wt /gal* of the fluid in the containment x vol. of the submerged part of the tank**

- * **Wt./gal = specific gravity x 8.34 or actual wt./gal of liquid**
- ** **Vol. of a cylinder (gals) = diameter sq. (ft.) x 5.874 x height (ft.)**
- ** **Vol. of a cone (gals) = diameter sq. (ft.) x 1.96 x height (ft.)**

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- **EXAMPLE:**

- An Empty 2500 Gal. Cone Bottom Pesticide Tank Is In A Secondary Containment Unit (Dike).
- The Empty Weight of the Tank is 1235 pounds (lbs)
- The Tank Is 6 Feet In Diameter
- The Wall of the Secondary Containment Unit Is 2 Feet High
- The Pesticide In the Tank Weighs 8.5 lbs/Gal
- The Cone of the Tank Is 1 Foot High
- The Entire Cone Is Below the Top Of The Wall of the Secondary Containment Unit

QUESTION: Will The Empty Tank Float If Product Leaks From The Tank And Fills The Secondary Containment Unit (Dike)?

- **CALCULATIONS:**

1. Buoyant Force = Weight/Gal of the Fluid Displaced By The Tank
= Weight/Gal of the Fluid in the Secondary
Containment Unit x Volume of the Submerged Part of
The Tank (Volume of the Cone)
= 8.5 lbs/gal x (diameter squared (ft) x 1.96 x height)
= 8.5 x (36 x 1.96 x 1)
= 599.8 lbs.
2. Downward Force = Weight of the Empty Tank + Weight of Any Product
In the Tank
= 1235 lbs + 0
= 1235 lbs

- **THE FORMULA:**

1. DOWNWARD FORCE > BUOYANT FORCE
2. 1235lbs > 599.8 lbs

ANSWER: The Empty Tank Will Not Float!