County of San Diego

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REGULATED SUBSTANCES/EXTREMELY HAZARDOUS SUBSTANCES

HOW TO DETERMINE THRESHOLD QUANTITIES & THRESHOLD PLANNING QUANTITIES

A *regulated substance* is a substance listed in Section 2770.5 of Title 19 of the California Code of Regulations (CCR). An *extremely hazardous substance* is a substance listed in Appendix A of Part 355 of Subchapter J of Title 40 of the Code of Federal Regulations. A *regulated substance* has a Threshold Quantity (TQ). An *extremely hazardous substance* has a Threshold Planning Quantity (TPQ). **Note:** Some *regulated substances* and *extremely hazardous substances* have TQs and TPQs with two values. The larger value is used when the substance is a solid greater than or equal to 100 microns.

The list of *regulated substances* in Section 2770.5 of Title 19 CCR is used to determine the need to comply with the California Accidental Release Program (CalARP). The list of *regulated substances* comprises three tables. Table 1 and 2 are used to determine compliance with the federal and state requirements of CalARP. Table 3 is used to determine compliance with the state only requirements of CalARP. **Note:** Some *regulated substances* appear on both Table 1 and Table 3. This is because the state requirements designated lower thresholds for some toxic *regulated substances* than the thresholds established in federal regulations.

The list of *extremely hazardous substances* in Appendix A of Part 355 of Subchapter J of Title 40 CFR is used to determine the need to comply with the federal Emergency Planning Community Right-to-Know Act (EPCRA).

STEPS TO DETERMINE TQ/TPQ

Step One:
To determine the TQ for compliance with CalARP **go to** ..... (**Step Two**)
To determine the TPQ for compliance with EPCRA **go to** ..... (**Step Four**)

Step Two:
The chemical is listed as a *regulated substance* on either Table 1, 2, or 3 of Section 2770.5 of Title 19 CCR **go to** ..... (**Step Three**)
The chemical is not listed as a *regulated substance* on either Table 1, 2, or 3 of Section 2770.5 of Title 19 CCR..... (**Stop**)

Step Three:
If the *regulated substance* is a toxic chemical **go to**..... (**Step Five**)
If the *regulated substance* is flammable chemical **go to** ..... (**E**)

Step Four:

The chemical is listed as an *extremely hazardous substance* in Appendix A of Part 355 of Subchapter J of Title 40 of the Code of Federal Regulations **go to**.....(**Step Five**)
The chemical is not listed as an *extremely hazardous substance* in Appendix A of Part 355 of Subchapter J of Title 40 of the Code of Federal Regulations.....(**Stop**)

Step Five:

I. The *regulated substance* or *extremely hazardous substance* is a gas **go to**.....(**A**)
The *regulated substance* or *extremely hazardous substance* is not a gas **go to**...(**II**)

II. The *regulated substance* or *extremely hazardous substance* is a liquid or solid pesticides **go to** .....(**D**)
The *regulated substance* or *extremely hazardous substance* is not a liquid or solid pesticides **go to** .....(**III**)

III. The *regulated substance* or *extremely hazardous substance* is a liquid (pure or mixture) **go to** .....(**B**)
The *regulated substance* or *extremely hazardous substance* is a solid **go to** .....(**C**)

(A) GASES

A gas is a substance that generally* exists in the gaseous phase at standard temperature and pressure (0°C and 760mmHg). When under pressure a gas may be in a liquid phase, however, it would still be considered a gas for the purposes of determining the TQ or TPQ. Gases may be measured in pounds, gallons, or cubic feet. **TQs and TPQs must be calculated in pounds.** Only the percent of gas, which is a *regulated substance* or *extremely hazardous substance*, is used in determining the TQ or TPQ. ***Note:** Some substances technically do not meet the definition of a gas at STP because they have boiling points above 0°C. However, because they have boiling points much lower than room temperature (20°C) they are only formulated and handled as gas, although they may be liquefied under pressure (e.g., methyl bromide → boiling point 3.6°C). Additionally, some substances that do not meet the technical definition of a gas will sometimes be formulated as a gas or a liquid (e.g., hydrogen fluoride gas and hydrofluoric acid → boiling point 19.4°C).

Examples:

1) Determining the TQ of a *regulated substance* that is a gas.

   a) A facility has three 1-ton cylinders of chlorine. The TQ for chlorine is listed as 2500 pounds on Table 1 and 100 pounds on Table 3 in Section 2770.5 of Title 19 CCR.

      Multiply 2000 pounds (1-ton) x 3 = 6000 pounds. This is above the TQ for chlorine in both Table 1 and Table 3.

   b) A facility has four 150-pound cylinders of anhydrous ammonia. The TQ for anhydrous ammonia is listed as 10,000 pounds on Table 1 and 500 pounds on Table 3 in Section 2770.5 of Title 19 CCR.

      Multiply 150 x 4 = 600 pounds. This is below the TQ listed on Table 1 but above the TQ listed on Table 3 in Section 2770.5 of Title 19 CCR.

2) Determining the TPQ of an *extremely hazardous substance* that is a gas.

a) A lab has 100 cubic feet of hydrogen selenide gas. The TPQ for hydrogen selenide listed in Appendix A of Part 355 of Subchapter J of Title 40 CFR is 10 pounds. How many pounds of hydrogen selenide gas does the lab have and is it above the TPQ?

The conversion factor for hydrogen selenide from cubic feet to pounds is 4.43. Dividing 100 cubic feet by 4.43 cubic feet per pound = 22.57 pounds. This is above the TPQ for hydrogen selenide.

b) A lab has 100 cubic feet of a mixture of hydrogen selenide and hydrogen gas. Five percent of the mixture is hydrogen selenide. How many pounds of hydrogen selenide gas does the lab have and is it above the TPQ?

From the above example, it was determined that 100 cubic feet of hydrogen selenide was equal to 22.57 pounds, therefore multiplying by 0.05 (5%) will provide the answer of 1.13 pounds which is below the TPQ for hydrogen selenide.

(B) LIQUIDS

Liquids are substances that exist in the liquid phase at standard temperature and pressure. Liquids are normally found in gallons and must be converted to pounds. A liquid may be pure or a percentage of a solution or a mixture. If the concentration of the *regulated substance* or *extremely hazardous substance* in the mixture is greater than 1% then the mixture must be considered in determining if the liquid is at or above the TQ or TPQ. **Note:** A toxic regulated substance in a mixture need not be considered for determining the TQ if it can be demonstrated to have a partial pressure less than 10 millimeters of mercury (mm Hg). The exemption regarding portions of a process where Toluene-2,4-Diisocyanate and Toluene –2,6-Diisocyanate are handled at partial pressures below 10 mm Hg does not apply to these substances.

To approximate the weight of a liquid in solution you may use the following formula:

(Gallons on hand) x (weight of water, 8.33 lbs/gal) x [(specific gravity of water) + the amount of the chemical's specific gravity that exceeds the specific gravity of water x the percent of the chemical)]

Note: Specific gravity varies with temperature and concentration. In most cases the correct temperature to use is ambient temperature (20°C.). The specific gravity of the concentration can be calculated from of a standard found in a chemical handbook such a Chemical Engineers' Handbook, Perry & Chilton or found on a Material Safety Data Sheet (MSDS).

When calculating the partial pressure of a mixture it is suggested to use either:

EPA's RMP *"Offsite Consequence Analysis Guidance"* document or a chemical handbook such as Chemical Engineer's Handbook, Perry & Chilton.

Examples:

1) Determining the TQ of a *regulated substance* that is a liquid.

A facility stores 70% hydrofluoric acid (HF) in 55-gallon drums. The maximum number of drums on site in storage at any one time is five. The specific gravity of 70% HF is 1.26 at 25°C. The partial pressure of a 70% solution of HF is approximately 124 mm Hg. The TQ for HF is listed as 1000 pounds at a concentration of 50% or greater in Table 1 and 100 pounds in Table 3 in Section 2770.5 of Title 19 CCR.

Multiply 55 gallons x 5 containers = 275 gallons. Then multiply 275 gallons x 8.33 lbs/gallon x [1+(.26 x .70)] = 2708 pounds. This is above the TQ of 1000 pounds for HF listed on Table 1 and the TQ of 100 pounds for HF listed in Table 3 in Section 2770.5 of Title 19 CCR. **Note:** 1= the specific gravity of water; .26 is the specific gravity value of HF that exceeds the specific gravity of water; .70 is the percent of HF.

2) Determining the TQ of a *regulated substance* that is a liquid.

A facility has a 1000-gallon tank with 10% solution of nitric acid (HNO_3). The specific gravity of 10% HNO_3 at 20°C is 1.0543. The partial pressure of 10% solution of HNO_3 is well below 10 mmHg. The TQ for HNO_3 is listed as 15,000 pounds in Table 1 and 1000 pounds in Table 3 in Section 2770.5 of Title 19 CCR.

Because the partial pressure for a 10% solution of HNO_3 is below 10 mmHg, the HNO_3 would not need to be considered for determination of the TQ.

3) Determining the TPQ of an *extremely hazardous substance* that is a liquid.

A facility stores 70% nitric acid (HNO_3) in 55 gallons. The maximum number of drums they have on site at any one time is ten. The specific gravity for 70% HNO_3 at 20°C is 1.41. The TPQ for HNO_3 listed in Appendix A of Part 355 of Subchapter J of Title 40 CFR is 1000 pounds.

Multiply 55 gallons x 10 drums = 550 gallons. Then multiply 550 gallons x 8.33 lbs/gallon x [1 + (.41 x .70)] = 5896 pounds. This is above the TPQ of 1000 pounds for HNO_3.

(C) SOLIDS

Solids that are *regulated substances* in Table 3 in Section 2770.5 of Title 19 CCR *and extremely hazardous substances* listed in Appendix A of Part 355 of Subchapter J of Title 40 CFR are subject to either of two threshold levels, a lower threshold and an upper threshold. The lower threshold level applies only if the solid exists in powdered form and has a particle size less than 100 microns; or if handled in solution or in molten form; or the substance has an NFPA rating for reactivity of 2, 3, or 4. Otherwise, a 10,000 pound threshold applies. The exemption for *regulated substances* handled at partial pressures below 10 mm Hg does not apply to solids in solution.

The *regulated substance* or *extremely hazardous substance* is a solid in solution then **go to** ..... (a)
The *regulated substance* or *extremely hazardous substance* is a molten solid then **go to** ..... (b)
The *regulated substance* or *extremely hazardous substance* is a solid powder (or other particle size) then **go to** ..... (c)

(a) Solids in Solution

If the concentration of the solid in solution is greater than 1% then the solution must be considered in determining if the solid is at or above the TQ or TPQ. **Note:** You must use the lower TQ or TPQ value for solids in solution.

To determine the amount of solid in a solution in packaged containers refer to the MSDS. To determine the amount of solid not in a packaged container you can use the following formula:

Weight % = [(pounds of solute) ÷ (pounds of solute + pounds of solvent)] x 100%

Examples:

1) Determining the TQ of a *regulated substance* that is a solid in solution.

A 1000-gallon tank of water contains a 5% concentration of sodium cyanide (NaCN). The TQ for sodium cyanide is listed as 100 pounds in Table 3 in Section 2770.5 of Title 19 CCR. **Note:** Sodium cyanide is a solid with only one TQ value.

1000 gallons of water is equal to 8330 pounds (1000 x 8.33, the weight of water per pound).

5% = [(X lbs of NaCN)/(X lbs of NaCN + 8330)] · 100%

.05X + 416.5 lbs = X

X = 438 pounds, which is above the TQ of 100 pounds.

2) Determining the TPQ of an *extremely hazardous substance* that is a solid in solution.

A 500-gallon tank of water contains a 5% concentration of potassium cyanide (KCN). The TPQ for potassium cyanide is listed in Appendix A of Part 355 of Subchapter J of Title 40 CFR as 100 pounds. **Note:** Potassium cyanide is a solid with only one TPQ value).

500 gallons of water is equal to 4165 pounds.

5% = [(X lbs of KCN)/(X lbs of KCN + 4165)] · 100%

.05X + 208.3 lbs = X

X = 219 pounds, which is above the TPQ of 100 pounds.

(b) Solids in Molten Form

Some solids are found in a molten form, that is they melt at a certain temperature and take on a liquid phase. The amount of solid in molten form must be

multiplied by (0.3) to determine if either the TQ or TPQ is met. **Note:** You must use the lower TQ or TPQ value for solids in molten form.

(c) Solids in Powder (or other Particle Size)

Solids can be found in powder form, which includes various particle sizes from fine powders, granules, etc. A fine powder is a solid with a particle size less than 100 microns. The lower TQ or TPQ value must be used for finely powdered solids. The upper TQ or TPQ value is used for solids with particle sizes 100 microns or larger, unless the solid has an NFPA Reactivity Rating of 2, 3, or 4 then the lower TQ or TPQ value must be used. **Note:** The National Fire Protection Association has established a standard system for the identification of the fire hazards of materials. This system identifies the hazards of a material in terms of three principal categories, health, flammability, and reactivity using a diamond. The health category is indicated by the color blue and is positioned to the left; the flammability category is indicated by the color red and is positioned at the top; and the reactivity category is indicated by the color yellow and is positioned to the right. The order of severity is divided into five divisions ranging from (4), which indicates a severe hazard, to (0), which indicates no special hazard. The NFPA rating may be found on the MSDS for the particular chemical in question. Not all chemicals are assigned an NFPA rating.

First determine if the solid has an NFPA Reactivity Rating of 2, 3, or 4. If it does, use the lower TQ or TPQ value. If the solid has an NFPA Reactivity Rating below 2, you will need to calculate the percent particle size. If the particle size is below 100 microns you must use the lower TQ or TPQ value. The information on particle size may be obtained from the Materials Safety Data Sheet (MSDS) or the chemical distributor. If you cannot determine the particle size you must consider the *regulated substance* or *extremely hazardous substance* as a fine powder.

Examples:

1) Determining the TQ of a regulated substance that is a solid in powder (or other particle size).

   A facility has 6,000 pounds of acrylamide stored in a large bin. The MSDS indicates there is no NFPA rating. The manufacturer indicates that 20% of the material is of a particle size less than 100 microns. The lower TQ value for acrylamide is listed in Table 3 in Section 2770.5 of Title 19 CCR as 1000 pounds.

   (6000 pounds) x (.20) = 1200 pounds of acrylamide is less than 100 microns of particle size. This is above the TQ for acrylamide.

2) Determine the TPQ of an extremely hazardous substance that is a solid powder (or other particle size).

   A facility has 750 pounds of phenylmercuric acetate in storage. The MSDS indicates that the NFPA Reactivity Rating is 0. The manufacturer indicates that 10 % of the material is of a particle size less than 100 microns. The lower TPQ value listed in Appendix A of Part 355 of Subchapter J of Title 40 CFR for phenylmercuric acetate is 500 pounds.

(750 pounds) x (.10) = 75 pounds of phenylmercuric acetate is less than 100 microns of particle size. This is below the TPQ for phenylmercuric acetate.

(D) PESTICIDES

The TQ or TPQ for liquid pesticides and solid pesticides in solution is determined by using the active ingredient listed on the pesticide label and multiplying the amount of material on hand. TQs and TPQs for pesticide solids in powder form (or other particle size) are calculated as in the previous section (C).

Examples:

1) Determine the TQ of a *regulated substance* that is a pesticide.

A pesticide dealer has thirty (5) gallon cans of Disyston 8 Emulsifiable Insecticide. The pesticide label indicates that the active ingredient is 8 pounds of disyston (disulfoton) per gallon. The TQ for disyston (disulfoton) is listed in Table 3 in Section 2770.5 of Title 19 CCR as 500 pounds.

(30 x 5 gallons) x (8 pounds per gallon) = 1200 pounds, which is above the TQ of 500 pounds.

2) Determine the TPQ of an *extremely hazardous substance* that is a pesticide.

A farmer has ten (5) gallon cans of Guthion 2L Emulsifiable Insecticide. The pesticide label indicates that the active ingredient is two pounds of guthion (azinphos-methyl) per gallon. The TPQ value listed in Appendix A of Part 355 of Subchapter J of Title 40 CFR for guthion (azinphos-methyl) is 10/1000.

(10 x 5 gallons) x (2 pounds per gallon) = 100 pounds, which is above the lower TPQ value of 10 pounds.

(E) FLAMMABLE SUBSTANCES

If a flammable *regulated substance* is present in a mixture and the concentration of the substance is below 1% by weight of the mixture, the mixture need not be considered when determining the TQ. If the concentration of the regulated substance is 1% or greater by weight of the mixture, then the entire weight of the mixture must be treated as the *regulated substance* unless it can be demonstrated that the mixture itself does not have a NFPA flammability rating of 4. The demonstration shall be in accordance with the definition of flammability hazard rating 4 in the NFPA 704, Standard System for Identification of the Hazards of Materials for Emergency Response, National Fire Protection Association, Quincy, MA, 1996. Available from the National Fire Protection Association, 1 Batterymarch Park, Quincy, MA 02269-9101.