The General Labeling task appears on the task calendar today. The establishment's production sheet indicates that boneless ham water added using a processing procedure is being prepared today. You go to the production office and review the appropriate verification task. The processing procedure indicates that pickle solution is prepared in a 200-gallon batch. A gallon of pickle weighs 10 lb. The target pump is 14%.

The restricted ingredients used in the pickle formula :

Phosphate—72 lb; Nitrate—8 lb; Nitrite—2 lb 10 oz.; and Sodium Ascorbate—5 lb.

In the pickle preparing room, you find the procedure posted above the pickle tank. It is the same procedure you observed in the production office. You find the tank used for mixing this pickle has these dimensions:

40" length; 40" width; 30" height

The 200-gallon mark is located 3" from the top of the tank.

Is the mark on the tank, correct? No

If not, what concerns do you have?

Volume = lwh 1 gal = 231 cu in

40 x 40 x (30 - 3) = 1600 x 27 = 43,200 cu in

43,200 ÷ 231 = 187.01 gallons

Since the pickle is being prepared with 187 gallons of pickle rather than 200 gallons as stated in the formula, the ppm of ingoing RIs will be higher and may exceed the regulatory limit.

Calculate the ingoing parts per million (PPM) for each restricted ingredient based on 200 gallons of pickle.

$$ppm = \frac{\text{lb RI} \bullet \text{percent pump} \bullet 1{,}000{,}000}{\text{lb pickle}}$$

Phosphate

$$ppm = \frac{72 \bullet .14 \bullet 1{,}000{,}000}{2000}$$

ppm = 5040

Nitrate

$$ppm = \frac{8 \bullet .14 \bullet 1{,}000{,}000}{2000}$$

ppm = 560

Nitrite

$$ppm = \frac{2.625 \bullet .14 \bullet 1{,}000{,}000}{2000}$$

ppm = 183.75

Ascorbate

$$ppm = \frac{5 \bullet .14 \bullet 1{,}000{,}000}{2000}$$

ppm = 350

Calculate the ingoing PPM for nitrite based on the gallons of pickle from question 1.

Nitrite

$$ppm = \frac{2.625 \text{ X } .14 \text{ X } 1{,}000{,}000}{1870}$$

ppm = 196.52 ppm (higher than with the written pickle formula using 200 gallons)

Did these calculations support your concern(s) from question 1? Yes

The amount of ingoing nitrite was higher using the actual weight of the pickle (1,870 lb).

183.75 ppm vs 196.52 ppm

Based on the pickle formula (200 gallons), was the regulatory limit exceeded for any of the restricted ingredients? **Yes**

The phosphate regulatory limit was exceeded. Only 5000 ppm are permitted ingoing.

What is the maximum amount of curing compound permitted in this pickle formula?

62.21 lb **[Amount allowed ÷ percent in compound = lb restricted]**

Nitrite

$$200 = \frac{X \cdot 0.12 \cdot 1{,}000{,}000}{8586}$$

$$X = \frac{200 \cdot 8586}{.12 \cdot 1{,}000{,}000}$$

$$X = \frac{1{,}717{,}200}{120{,}000}$$

$X = 14.31$ lb

$X = 14.31 \div .23\ (23\%) =$ **62.21 lb**

Erythorbate

$$547 = \frac{X \cdot 0.12 \cdot 1{,}000{,}000}{8586}$$

$$X = \frac{547 \cdot 8586}{.12 \cdot 1{,}000{,}000}$$

$$X = \frac{4{,}696{,}542}{120{,}000}$$

$X = 39.13$ lb

$X = 39.13 \div .25\ (25\%) =$ **156.5 lb**

How many gallons are contained in a cylindrical drum filled to within two inches of the top with pickle if the drum dimensions are 24" (diameter) X 30" (height)?

Note: $V = \pi r^2 h$ $\pi = 3.14$ r = radius h = height V= volume

There are 231 cubic inches in a gallon

54.8 gallons

$V = \pi R^2 [H - 2]$

$$V = \frac{3.14 \cdot 12^2 \cdot [30 - 2]}{231}$$

$$V = \frac{3.14 \cdot 144 \cdot 28}{231}$$

$$V = \frac{12660.48}{231}$$

V = 54.8 gallons

How much nitrite, nitrate, and ascorbic acid could be used if the establishment wants to pump 15%? (A gallon of pickle weighs 9.68 pounds.)

Nitrite ___0.70___ lb

Nitrate ___2.47___ lb

Ascorbic Acid ___1.65___ lb

Nitrite

$$200 = \frac{X \cdot 0.15 \cdot 1{,}000{,}000}{54.8 \times 9.68 \text{ lb}}$$

$$X = \frac{200 \cdot 530.46}{.15 \cdot 1{,}000{,}000}$$

X = .70 lb

Nitrate

$$700 = \frac{X \cdot 0.15 \cdot 1{,}000{,}000}{530.46}$$

$$X = \frac{700 \cdot 530.46}{.15 \cdot 1{,}000{,}000}$$

X = 2.47 lb

Ascorbic Acid

$$469 = \frac{X \cdot 0.15 \cdot 1{,}000{,}000}{530.46}$$

$$X = \frac{469 \cdot 530.46}{.15 \cdot 1{,}000{,}000}$$

X = 1.65 lb